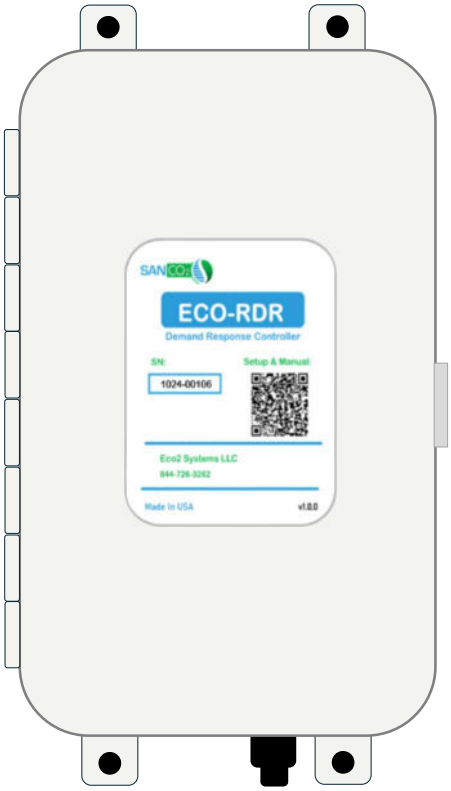
SANCO2
Hot water, naturally.

INSTALLATION GUIDE



ECO-RDR

RESIDENTIAL DEMAND RESPONSE CONTROLLER

For more information, please call **1-844-SANDCO2** or email **info@eco2systemsllc.com**

ECO2 SYSTEMS

Eco2 Systems LLC
P.O. Box 1358, Walled Lake, MI 48390
Phone : 1-844-726-3262 or 1-844-SANDCO2
E-mail : info@eco2systemsllc.com
Website : www.eco2waterheater.com

Eco2 Dealer

REV: 7/25

Important Information

REQUIRED SOFTWARE UPDATES

Always check if a software update is required for the RDR at:

https://eco2waterheater.com/residential/residential-controller/

If so, the file must be downloaded onto a USB thumb drive and plugged into the controller. An adapter is included inside the RDR enclosure for a standard thumb drive to connect to the controller's Upgrade Port.

COMMUNICATION WIRE REQUIRED

Communication wire is required to connect the controller to the heat pump. This must be 20-24g, shielded, twisted wire with 3 conductors. Eco2 offers wire in 100 ft lengths for purchase, as well as custom lengths available.

SKYBOX FOR GRID RADIO

Some utilities may require the RDR to be connected to a radio module to receive grid commands to be eligible for rebates. This requires the purchase of the SkyCentrics Skybox adapter.

ECO2 CLOUD MODULE

The Eco2 Cloud Module can be added to the RDR for remote access and control through the Arduino App.

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SAFETY WARNINGS!

Qualified Personnel Only:

This controller must be installed by qualified personnel in accordance with state and local building codes.

Electrical Shock Hazard:

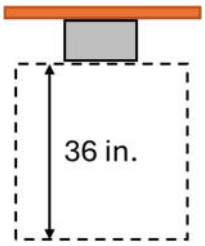
- Do not attempt to open the controller while the AC adapter is connected and plugged into an outlet.

For Domestic Water Heating Control Only:

This controller is programmed for potable domestic hot water heating control only. It is not designed for controlling other heating applications, such as combined DHW and space heating.

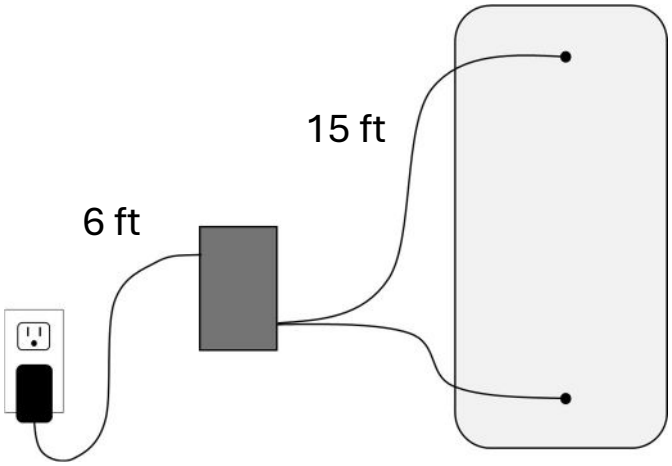
This document covers the RDR Controller Installation only. Consult the SanCO2 heat pump installation instructions to first install the heat pump.

INSTALLATION LOCATION

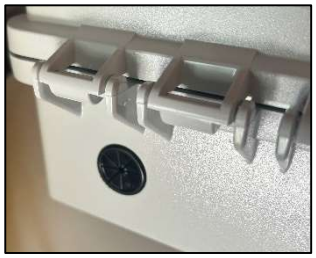


Service Clearance: The controller must be placed in a location with **36 in**. of open space in front for adequate service clearance.

Location: The controller can be installed indoors or outdoors. The ideal location will be within 6 ft of a 110v wall outlet for power and less than 15 ft from the storage tank for the temperature probe leads. If the controller must be placed further from the tank, additional wire can be spliced to the sensor wires to add length.



Outdoor Installation: If the controller is installed outdoors, it can be powered by a weatherproof 110v outlet or from the heat trace terminals on the heat pump, see "Connect Power" section. If conduit is not installed on ethernet pass-through, it must be plugged or coated with silicone to prevent water ingress.

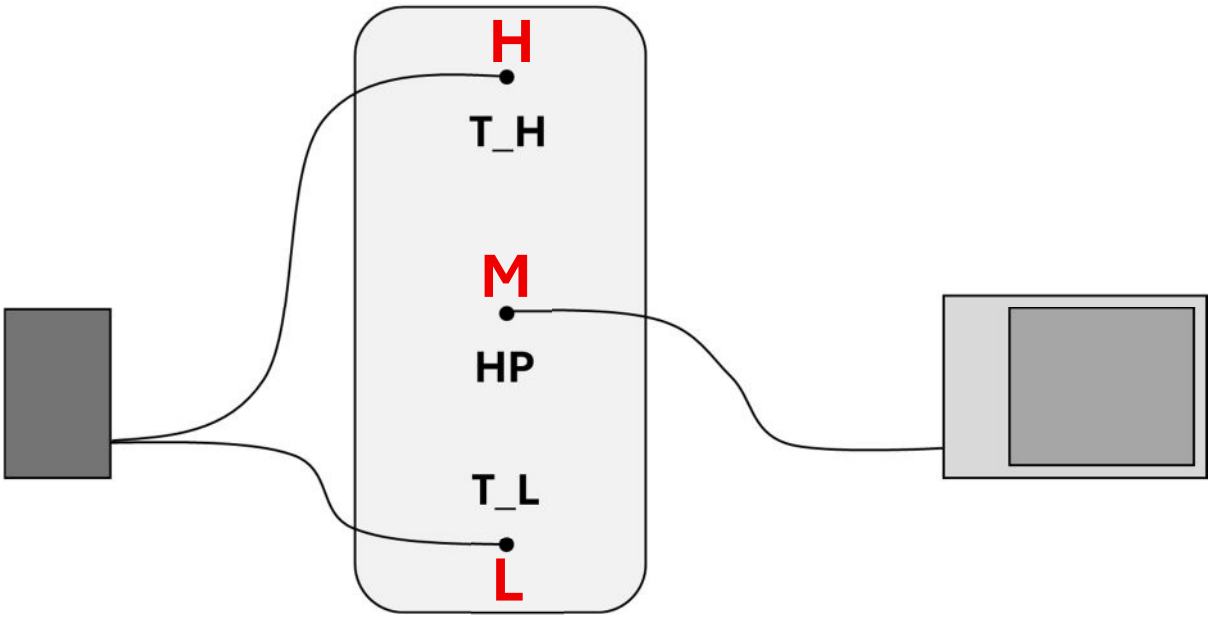


Wall Mounting Procedure:

1. Attached the (4) mounting brackets to the back of the controller using the included screws. Hand tighten only, using a Philips screwdriver.
2. If wall anchors are required, hold the controller in its desired location and mark mounting hole locations.
3. Attach the controller to the wall using the appropriate fasteners (not included) for the wall material.

INSTALL TANK TEMPERATURE SENSORS

The RDR controller comes with (2) temperature sensors, labeled "T_H" and "T_L". These do not replace the tank thermistor supplied with the heat pump. Insert the "T_H" sensor in the tank well near the top of the tank and "T_L" in the well near the bottom of the tank. The heat pump's sensor is installed in the well in the middle of the tank.



These sensors have 15 ft leads which can be extended using 20-24 AWG copper wire if necessary. If extending, ensure that splice joints are well connected; failure of these two temperature signals is a critical error that will prevent HP operation.

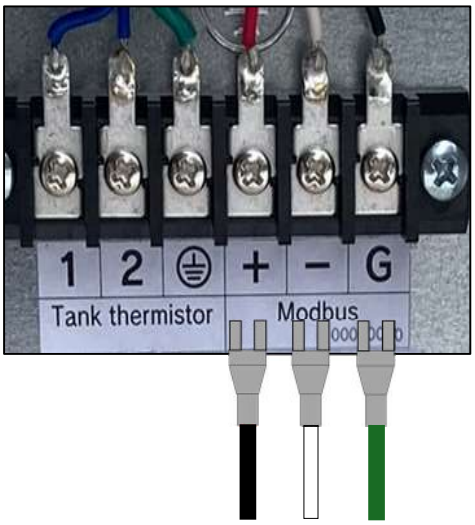
Notes for successful installation:

-Coat sensor tips in thermal paste before inserting into tank thermowells.

-Secure sensors in place using clips or a small amount of silicone in well opening.

CONNECT COM WIRE TO HEAT PUMP

The controller must be connected to the heat pump with communication wire. Wire is available from Eco2 where your controller was purchased in 100 ft length with heat pump spade connectors installed. Pull this wire from the controller to the heat pump's connection panel's "Modbus" terminals.



Connect the heat pump end to the terminals labeled +, - , G above "Modbus". If using wire other than Eco2 supplied, adding spade connectors to the heat pump ends for secure connections.

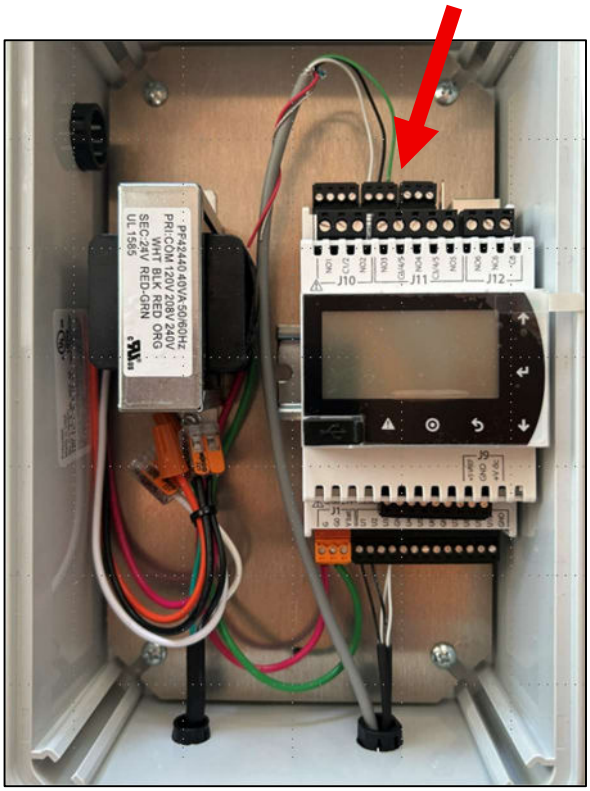
CONNECT COM WIRE TO CONTROLLER

To connect the com wire to the controller:

1. Loosen the enclosure's waterproof pass-through fitting and thread the wire through into the controller.

2. Pull sufficient wire through to reach the top of the PLC and tighten the fitting to hold the wire.

3. Strip back the cable sheath and individual wire insulation about ¼".



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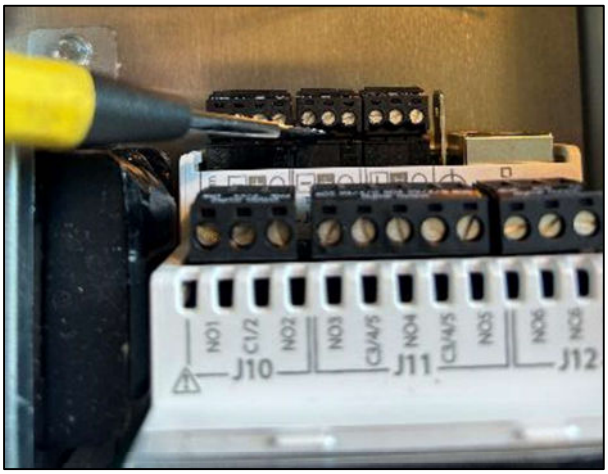
4. Connect the wires to the “J4” terminal on the top of the PLC.
   Matching the wires to +, - , o as they are connected to the heat pump +, - , G.



CONNECT SUPPLY POWER

Powered from 110V Outlet

For standard wall connection, plug the controller’s cord into a 110v wall outlet.

Powered from Heat Pump

If there is no 110v power available, the controller can be powered from the heat pump’s heat trace power terminals.

1. Ensure that the power to the heat pump is disconnected or electrical shock may occur.

2. Mount the controller in its desired location.

3. Open the lever nuts that connect the 110v power cord and pull the cord from the enclosure. Leave the lever nut on the White wire.

4. Take the lever nut off the Black wire and move it to either the Red (208V) or Orange (240V) wire for the appropriate voltage that the heat pump is powered by.

5. Place the wire nut removed from the Red/Orange wire onto the Black wire.

6. Pull (3) 14g wires from the heat pump's supply power box to the controller. Follow State and local codes for conduit requirements.

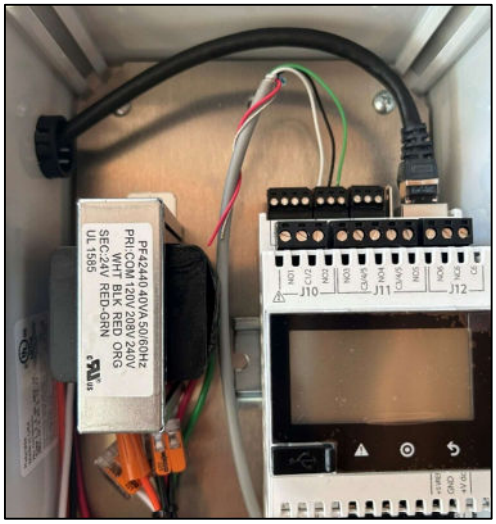
7. Connect the wires to the L, N, G terminals on the "Heat Tape" side of the heat pump's power connections.

8. On the Controller end, connect L to the Red or Orange wire used and N to the White Wire.

9. Connect the Ground wire to the metal back plate in the controller using a screw.

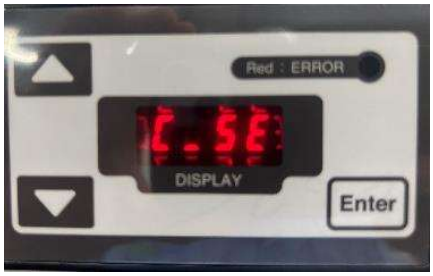
CONNECT SKYBOX (FOR GRID RESPONSE)

If a Skybox/EcoPort will be used for Grid Response, install the Skybox per the manufacturer's recommendations. Connect the Skybox to the controller using an ethernet cable (not included) connected directly between each device's RJ-45 ports or using a router or switch.



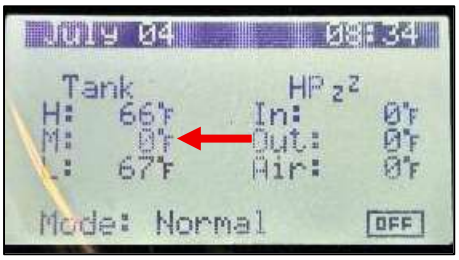
HEAT PUMP COMM SETUP

Once the heat pump has been powered up and completed it Air Purge cycle, it can be configured.

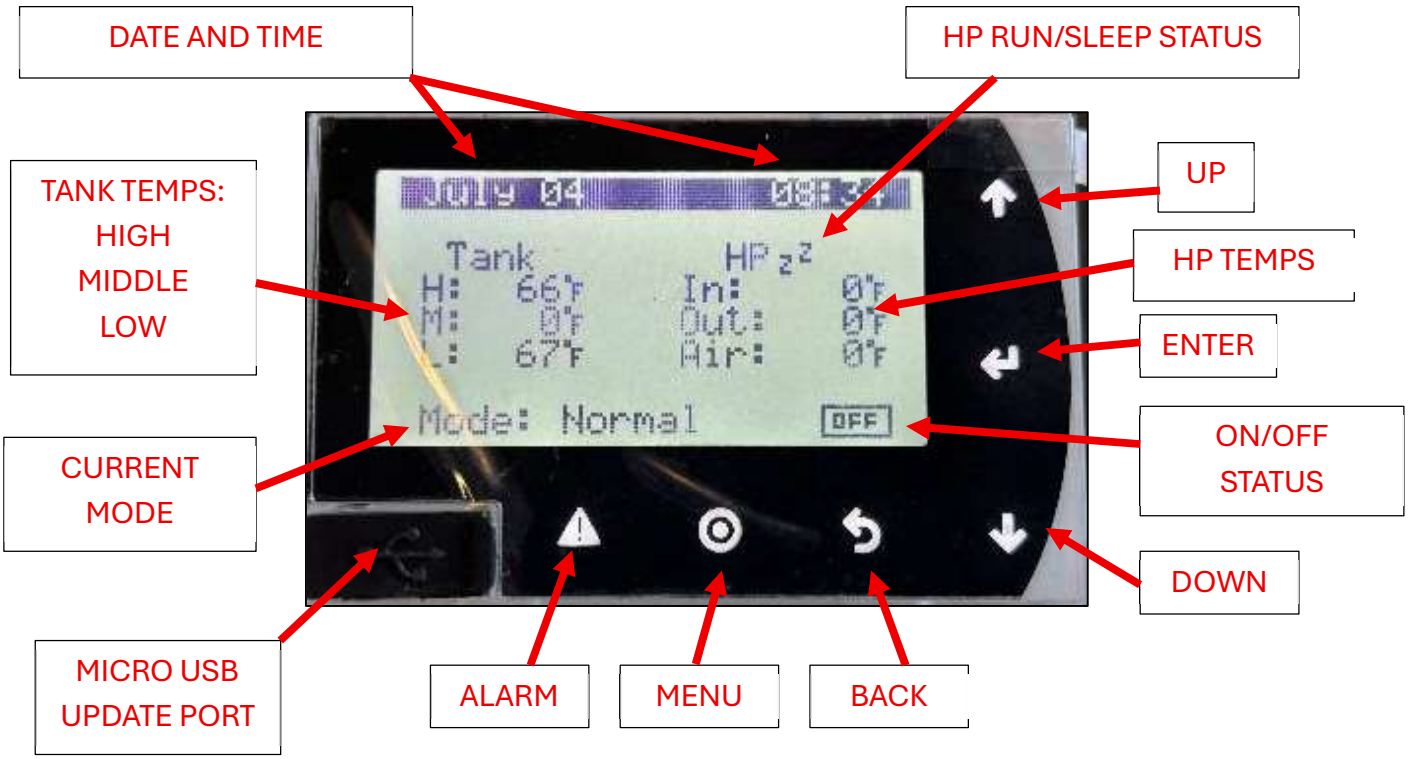


Using the heat pump's onboard User Interface, set the heat pump's C_SE variable to "ON". Consult the heat pump's manual for more information.

If the Middle temperature is reading 0 on the Controller it means that the data is not being received from the heat pump. Check that the heat pump C_SE has been changed and that the communication wire between the heat pump and controller are wired correctly.



CONTROLLER INTERFACE



CONTROLLER INITIAL SETTINGS

User Settings

Press the Enter button to go to the User Settings menu. These settings are meant to be able to be accessed by the homeowner as well.

Use the Up and Down arrows to move between screens. Press Enter to step through the settings on each screen. Up and Down arrows change the values of each setting.

Screen 1: On/Off and Overrides

System On/Off: Sets if the controller is allowed to turn the heat pump on. On = The heat pump can be run if needed. Off = Do not turn on the heat pump.

Mode Override: Used in cases where the user would like to override the schedule or grid command and keep the settings in Normal mode. If turned to On, the controller will go into Normal mode for 8 hours, then revert to the regular schedule or command.

Countdown: This is the countdown timer for the override mode.

Adv. Loadup: The user can allow or not allow the system to go into Advanced Loadup and Deep Shed modes. These modes are much more aggressive in using or not using energy.

Alarm Sound: Turn on or off the audible beep that the controller makes when there is an alarm.

Screen 2 & 3: Time, Date and Time Zone

Set the current time, date, and time zone.

Once these settings have been made, press the Back button to return to the Main Screen.

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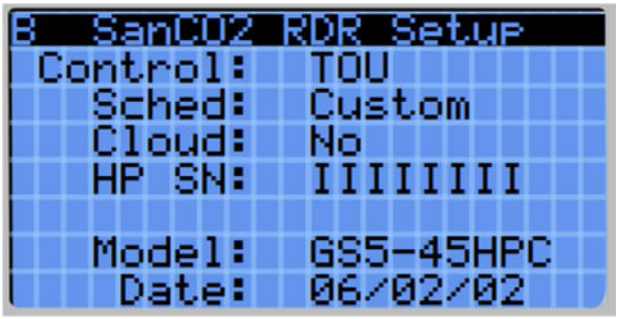
Contractor Settings

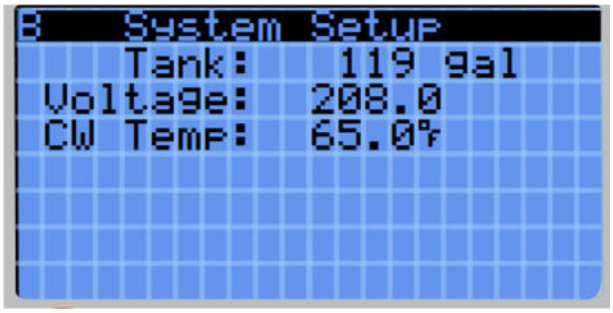
Press the Menu button on the controller to enter the Contractor Setup mode. These are not meant to be readily accessed by the homeowner, so a password screen will appear. Enter 0101 using the Up, Down and Enter buttons.

*****Take Pictures of Screens 1 – 6 For Utility Rebate Submissions*****

Screen 1: General Setup



Screen 2: System Info



Control: Set to "TOU" for the controller to operate only on an internal schedule.

Set to "Skybox" if a Skybox and radio will be connected for grid response control. Schedule operation takes over if Skybox disconnects).

Schedule: Select from 4 pre-programmed default schedules for Californias utilities or a custom schedule that will be entered later.

Standard schedules are PGE E-ELEC, SCE D-4-9, SDGE DR1, and SMUD 5-8.

*****If the Custom Schedule is not selected, pictures of Screens 3-6 are not required.*****

Cloud: Select Yes if an Eco2 Cloud module is attached. If not, leave as No.

HP SN: Enter the serial number of the heat pump, found on the sticker on the side of the unit near the water connections.

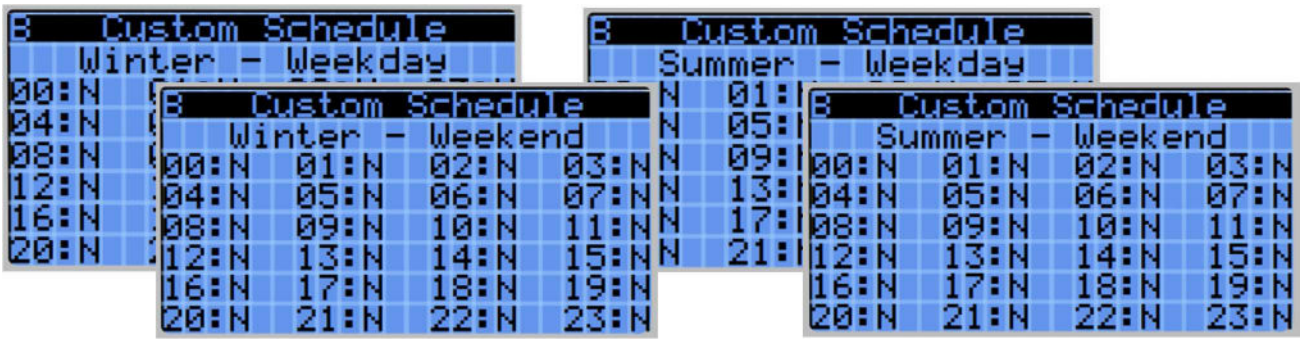
Model and Date: These are for reference and not editable here.

Tank: Set to match the nominal size of the tank paired with the SanCO2 heat pump.

Voltage: Input the actual measured voltage supplied to the heat pump (measurement should be performed by qualified individuals only.) Incorrect voltage will skew energy usage values.

CW Temp: Measure the temperature of the cold water coming into the building and enter it here. Incorrect temperature will skew energy values.

Screen 3 – 6: Custom Schedule



If the Custom Schedule is selected, four additional screens appear. They are similar but cover different periods, Winter (May-Sept) and Summer (Oct-April), and weekends and weekdays within those months. Each one has 24 hour blocks, 00 = 12am–1 am, 01 = 1am–2am, … 23 = 11 pm–12 am.

Using the Enter, Up and Down buttons the desired Operation Mode for every hour of the day can be set.

O = Off	Controller will not turn on heat pump.
N = Normal Operation	Heat pump controlled using standard setpoints.
S = Shed	Setpoints adjusted so heat pump to runs less.
L = Load Up	Setpoints adjusted so heat pump to runs more.
D = Deep Shed	Heat pump runs as little as possible. Will turn on heat pump if hot water is fully depleted.
A = Advanced Loadup	Heat pump runs as much as possible.

Screen 7: Skybox Address

If Skybox mode is selected, a screen appears next allowing the IP address of the Skybox to be set. Please refer to the Skybox setup instructions for obtaining this. Use the Enter, Up, and Down arrows to set each portion of the address.

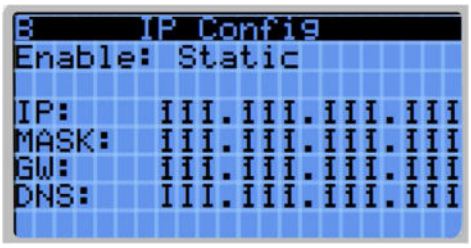
Screen 8: RDR IP Address

Another screen to view/modify the controller's IP address also appears when in Skybox mode. Press Enter on this screen to enter IP management.

IP Configuration Screen

A power cycle of the controller is required for new IP settings to take effect.

Enable: Select between Off, Static, and DHCP (Default) IP assignments.



If DHCP is selected IP, MASK,GW and DNS values will automatically populate once assigned by router. It may take several minutes for this process.

If set values are desired, place in Static mode and input the desired values to match the Skybox or router.

Service Screen

The last screen shows additional heat pump operational data that is used for troubleshooting the heat pump.

For servicing, the heat pump can also be forced into the On, Off modes. Ensure that it is always placed back into Auto mode.

If a program upgrade will be performed on the controller, the existing Total kWs used can be recorded and then re-entered after update in the **kW Restore** field.

Once all the initial settings are complete, press the Back button to return to the Home Screen.

This completes the initial setup of the controller and heat pump. Refer to the RDR controller User's Manual for further information.

Additional Resources Are Available at:

https://eco2waterheater.com/residential/residential-controller/

Need Assistance?

Contact Eco2 Systems Technical Support

844-726-3262

techsupport@eco2systemsllc.com