PROGRAM GUIDE

ECO-CMB-BAC

COMMERCIAL MODBUS CONTROLLER WITH BACNET

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

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Eco2 Dealer

REV: 7/26

WARNING!

Please review the important information below before proceeding with controller installation.

Qualified Personnel Only:

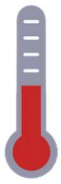
This controller must be installed by licensed professionals in accordance with local building codes.

Electrical Shock Hazard:

- Do not perform work on energized components.
- Prevent unauthorized access to controller by placing a lock on enclosure.

For Domestic Water Heating Control Only:

This controller is programmed for potable domestic hot water heating control only. Any other heating application, such as combined DHW and space heating, requires a different control program.



Setpoint Modifications:

The controller comes set at standard temperature setpoints and sensor configuration to ensure reliable operation of the SanCO2 heat pump water heaters. Changing these setpoints is not recommended unless authorized by SanCO2. Incorrect settings will result in loss of HPWH warranty coverage.

TABLE OF CONTENTS

User Interface	01
Controller Startup	01
Home Screen	02
User Menu	03
On/Off, Date/Time	03
Info	03
Heat Pump Data	07
Setup	10
Service	15
Network	17
Factory	20

Need Assistance?

Contact Eco2 Systems Technical Support

844-726-3262

techsupport@eco2systemsllc.com

Additional documentation and resources also available online:

www.eco2waterheater.com/commercial-controller

USER INTERFACE

The CMB controller has a backlit LCD display and six buttons to navigate the menus. Important menus are password protected to prevent unauthorized modification of critical settings. Contact Eco2 Systems for more information. The screen backlight will turn on at startup or when any button is pushed and turns off after 5 minutes or inactivity.

Button Functions

1. Alarm: Navigates to the Alarm management page and silences the alarm ring.
2. Program: Opens the Settings Menu (if correct password entered.)
3. Back: Returns to the previous screen or the Home screen.
4. Up: Cycles through screens and adjusts values.
5. Enter: Selects menu items and steps through items on individual screens.
6. Down: Cycles through screens and adjusts values.
7. USB Port: Under the cover is a micro-USB port used to update programming and save log files.

CONTROLLER STARTUP

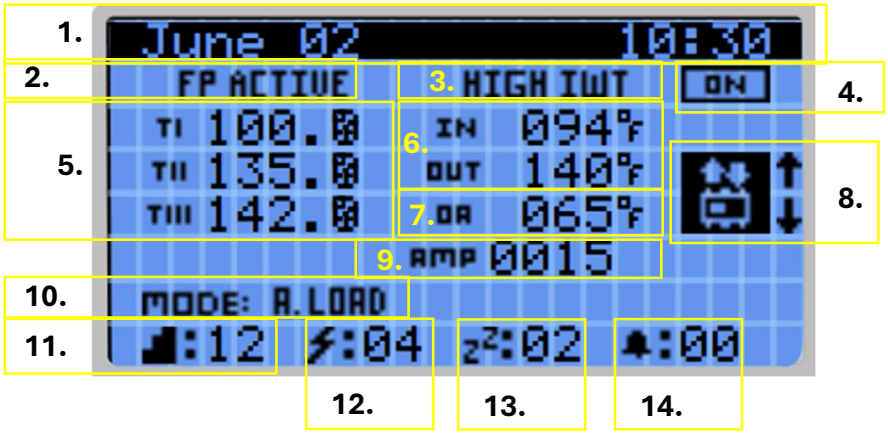
The controller will automatically startup once power is supplied to it. The screen backlight will turn on and the SanCO2 logo will appear.

Language Selection: On the first startup or if controller memory has been reset, the select language screen will appear. If so, press enter to continue to Settings Menu.

Power Disruption: In the event of a power loss, the controller will automatically restart when power returns and will remember if it was set to ON or OFF.

HOME SCREEN

The Home screen shows the operating status and data for the system. On the right side is the icon for the User menu item selected (open access to all).



1. Date and Time: Shows current date and time setting.
2. FP Active: Appears when heat pump(s) are in Freeze protection mode.
3. High IWT: Appears when a high inlet water temperature is detected.
4. ON/OFF: Displays the controller's On/Off status.
5. T1, T2 and T3: Tank temperature probe readings.
6. In and Out: Average of all RUNNING heat pumps' Inlet and Outlet readings.
7. Outside Air: Average of all heat pumps' Outside Air temperature readings.
8. User Menu: Shows the current option for the User Menu that will be accessed by pressing the ENTER button. Use the UP/DOWN arrows to change between options.
9. Amps: Total amp draw of all heat pumps.
10. Current Mode: Displays the current run mode that the system is in.
11. Demand: The number of heat pumps the controller is calling to turn on.
12. HPs Running: Total number of HPs reporting they are in heating mode.
13. HPs Standby: Total number of HPs reporting they are in Standby.
    This number will be less than HP count if heat pumps are not communicating with the controller.
14. HPs Alarm: The number of heat pumps reporting an alarm.

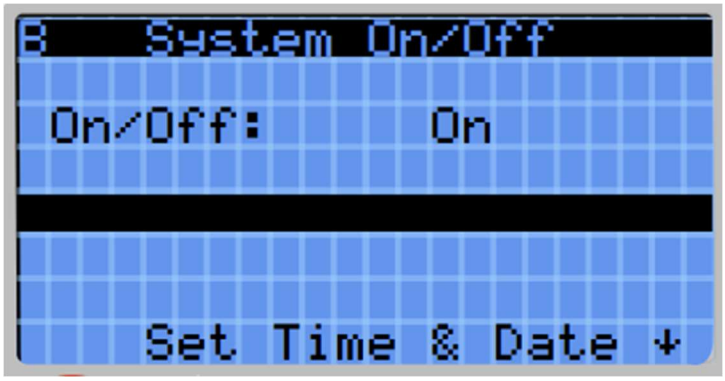
USER MENU

There are several screens that can be accessed via the User Menu by selecting the icon on the Home Screen and pressing ENTER.

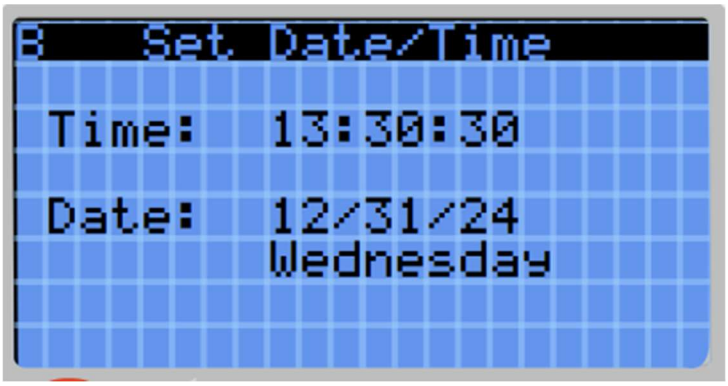
ON/OFF: Access to turn the controller on and off. In the Off position, the controller will not signal for any heat pumps to run. The controller will remember this setting in the event of a power failure and come back in the same mode.

Press ENTER to step down through the values on the screen that can be changed. Change the values using the UP and DOWN arrows.

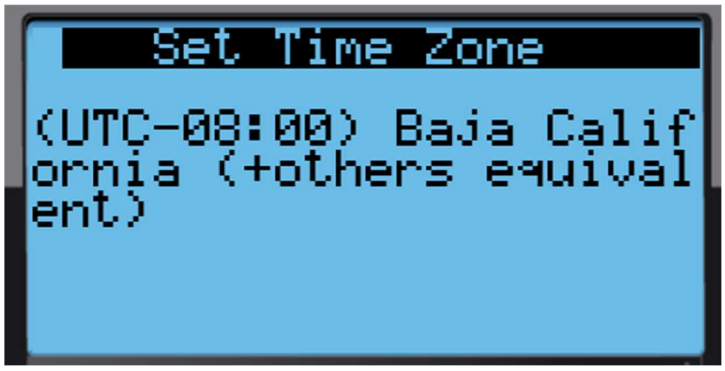
Press the BACK button to return to the Home Screen. Press the DOWN arrow to advance to the next screen to set the Date and Time.



Set Date/Time: Allows the user to set the date and time. Date is MM/DD/YY and time is 24 hour format.

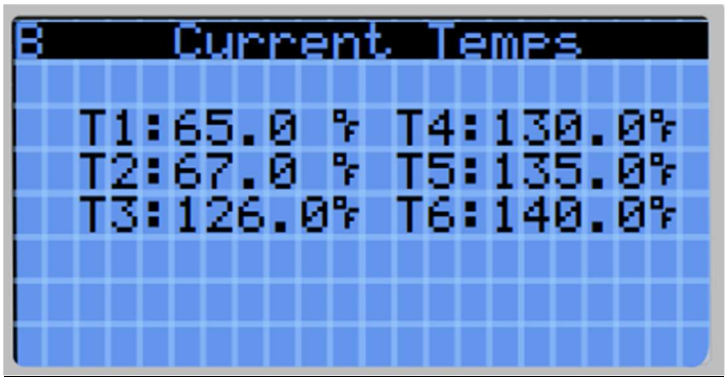


Set Time Zone: Allows the user to set the time zone that the controller is located in. This is used for automatic daylight savings adjustments.



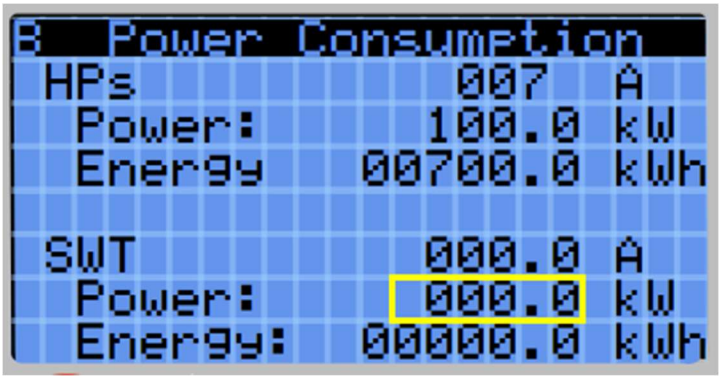
INFO: A series of screens showing current temps of all temp. probes, power consumption, stored energy and software version info . Scroll though the screens using the UP and DOWN arrows.

Screen 1, Current Temps: This screen shows current temperature readings of temperature probes T1-T6. Disconnected probes will display "#####".

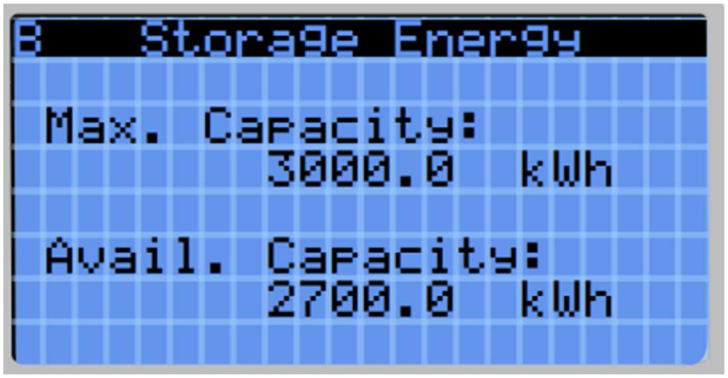


Screen 2, Power Consumption: This screen shows current energy usage data of the system. On the top is the total instantaneous amps and power being consumed by the heat pumps, along with total historic heat pump energy used. The lower section displays the same values for the swing tank or supplemental heater if being monitored. (Requires an additional current transducer.)

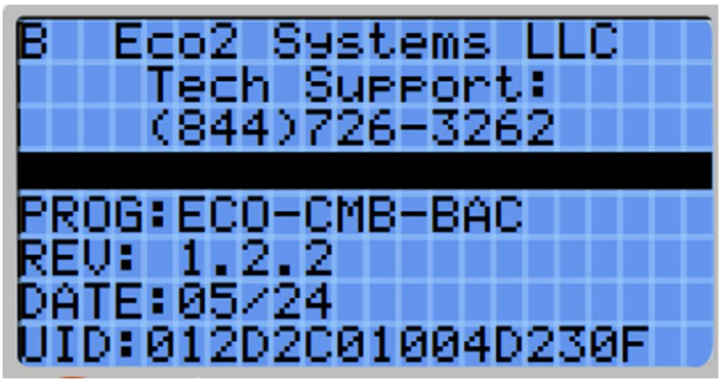
* Please note, that some program updates will reset the Energy totals, so those should be recorded prior to updates*



Screen 3, Storage Energy: Displays the calculated Maximum amount of energy the storage tanks can hold, along with the current amount of energy that could be added by the heat pumps.



Screen 4, Controller Info: Shows Eco2 Systems technical support contact number, controller software info, and the serial number of the controller's PLC.

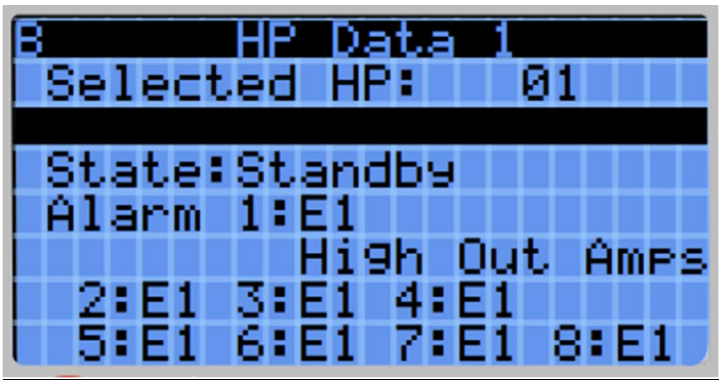


Screen 5, Export Logs: This screen allows for the controller's internal logs to be saved to a storage device (USB thumb drive). Connect a storage device to the micro-USB port. Set "Start Export" to Yes and the screen will show the download progress.

Heat Pump Data: A series of screens that show the status and data of the heat pumps. Use the Down arrow to scroll through the data screens.

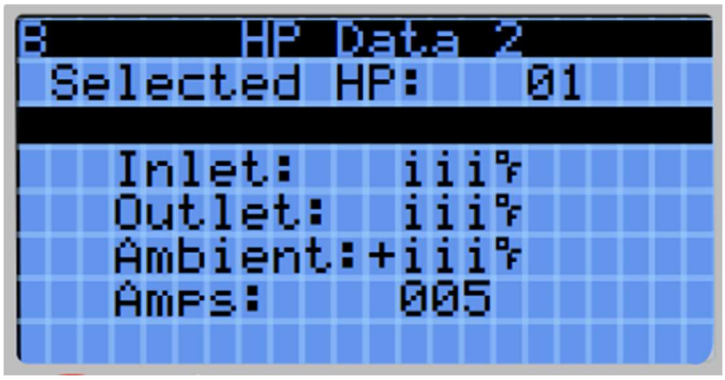
Screen 1,Selected HP Data: Displays the current State of the selected heat pump and alarm history.

Press Enter and use the arrow keys to select the desired heat pump by number. Displays heat pump state, current alarm (if any), and 8 previously logged alarms.

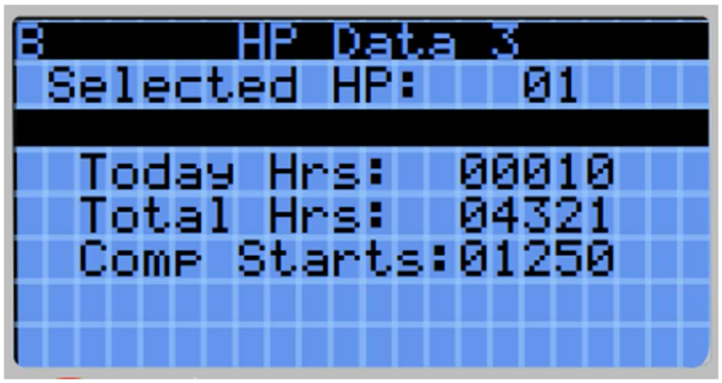


Screen 2,Selected HP Data: This screen displays the individual Inlet, Outlet and ambient air temps as well as the instantaneous current draw of the selected heat pump.

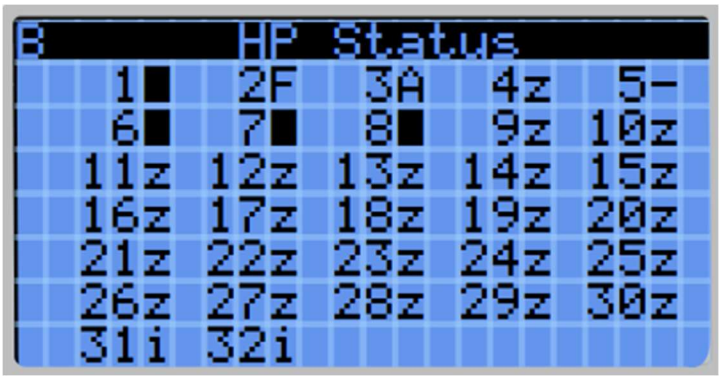
The selected heat pump number can be changed via this screen as well.



Screen 3 ,Run Time Data: This screen displays the run history of the selected heat pump . Daily and total run hours and total compressor starts.



Screen 4, HP Status: Displays the current operating status of all heat pumps in the system.



= ■ Heat Pump running.

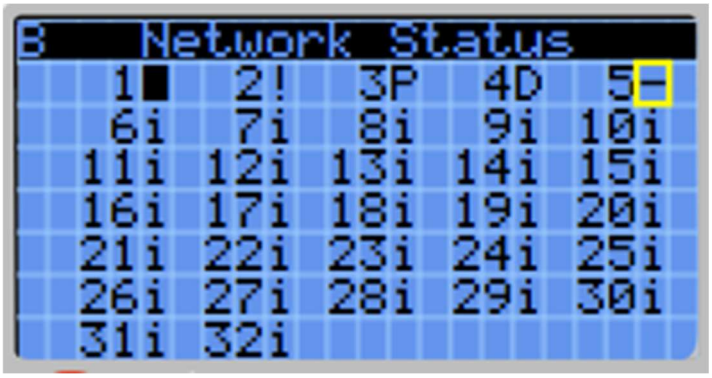
= F Heat Pump in Freeze protection mode.

= A Heat Pump in Air Purge mode.

= z Heat Pump in Standby.

= - Heat Pump Offline.

Screen 5, Heat Pump Network Status: Displays the current network status of all the heat pumps in the system.



= Heat Pump Online.

= Heat Pump Offline. If the HP remains constantly in this state it is not communicating with the controller.

= Packet Error. Occurs occasionally in systems but not critical alert.

= Device Error.

= Waiting for first poll.

SETTINGS MENU

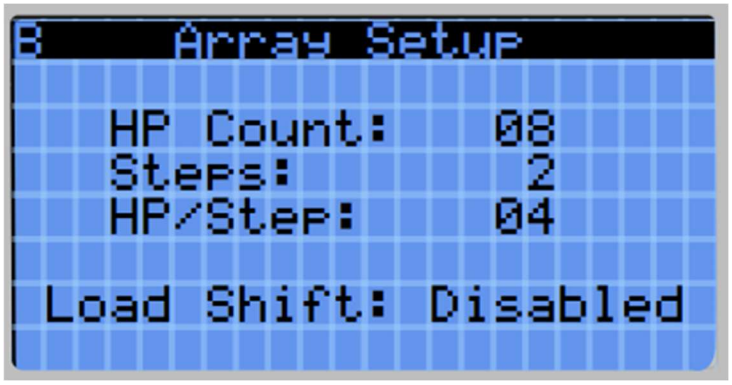
The Settings Menu is reached by pressing the MENU button from any screen. A password must be input to gain access. Use the UP/DOWN arrows to set each number in the code and press ENTER to advance.

Once the correct password has been input, the user can select from the Settings Menu categories: Setup, Service, Network and Factory.

Setup: Configure the controller and setpoints to match the heat pump water heater system.
Service: Information and overrides for system troubleshooting.
Network: Setup the communications protocols.
Factory: Restricted functions reserved for Factory personnel.

SETUP

Screen 1, Array Setup: This screen sets the number of heat pumps and how they are staged.



HP Count: Set to match the number of heat pumps in the system.

Steps: Can select for the heat pumps to be brought on in groups of 1-4. This controls the quantity only. Which HPs are in each group will change.

HPs/Stage: Controller calculated number of heat pumps per step. If there is an uneven number of heat pumps the controller rounds up the earlier stages and saves the reminder for the last stage.

Example:

HP Count: 8

Steps: 3

Calculated HPs / Step: 3

Step 1 = 3 HPs

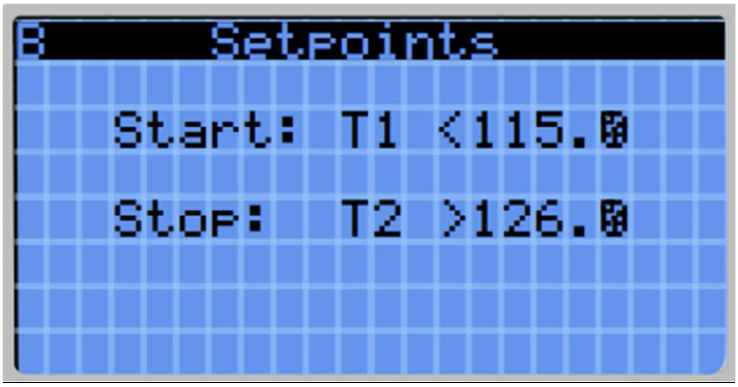
Step 2 = 3 HPs

Step 3 = 2 HPs

Load Shift: Enables/Disables Load Shift Control Mode. **This mode causes the controller to pause or delay starting the heat pumps during certain time periods. Improper settings may lead to loss of hot water.**

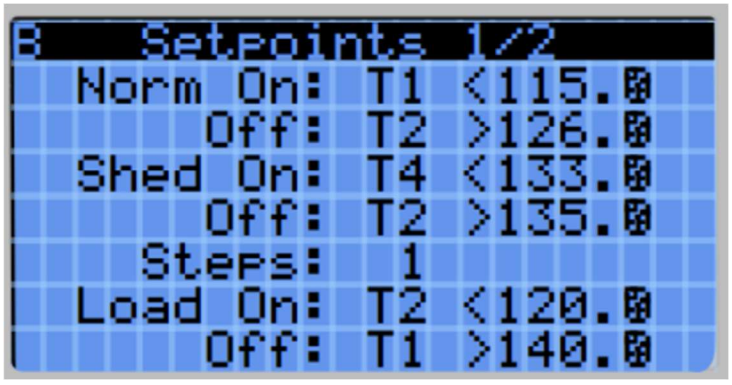
Screen 2, Setpoints: ***This screen only appears when Load Shift mode is disabled.***

Allows the user to define the probes and temperatures to Start and Stop heating operation.

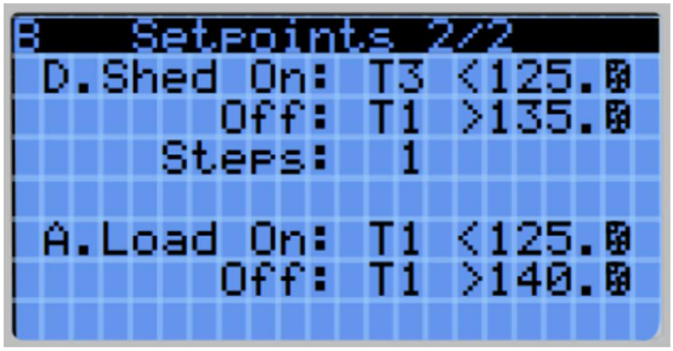


***The next 5 screens only appear when Load Shift mode is enabled.**

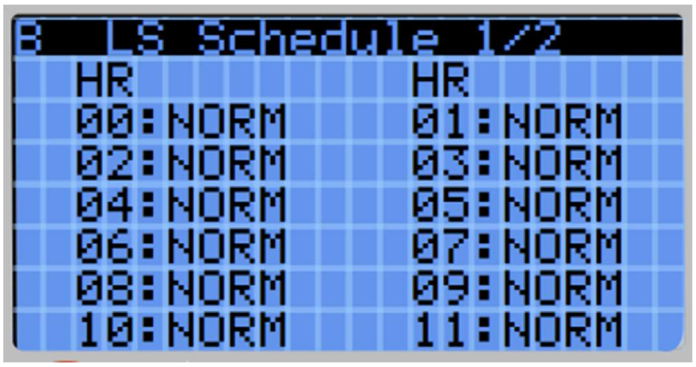
Screen 2, Setpoints 1/2: This screen allows the user to set the desired Start and Stop temperature probes and set points for Normal, Shed, Load modes. Also allows the user to set the maximum number of steps to be called in Shed mode.



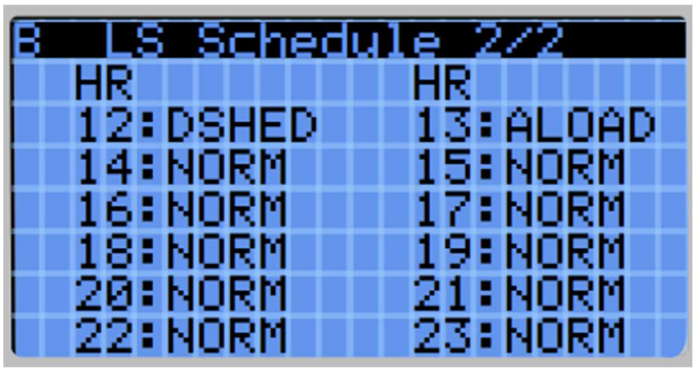
Screen 3, Setpoints 2/2: A continuation from the previous screen to set the desired Start and Stop temperature probes and set points for Advanced Load and Deep Shed modes. Also allows the user to set the maximum number of steps called in Deep Shed mode.



Screen 4, Load Shed Schedule 1/2: Set the desired mode by hour. Controller will change to the set mode at the beginning of each hour. Starts at "00' for Midnight and goes through 11am.



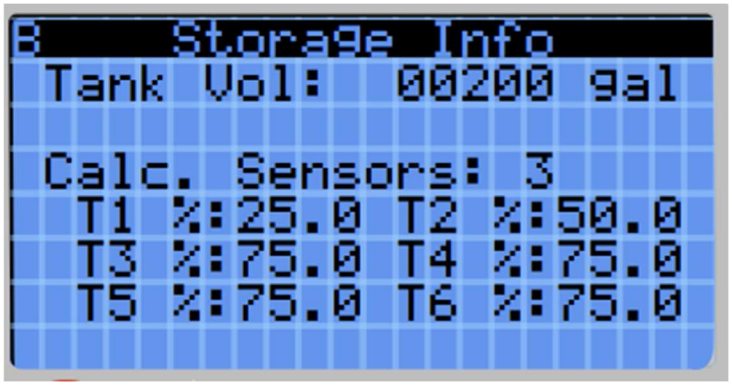
Screen 5, Load Shed Schedule 2/2: Continues the schedule settings for 12 (Noon) through 23 (11pm).



Typical Mode Operations:

Normal: The standard operating mode. Starts heating when water is used.
Shed: Waits longer before heating and limits number of HPs to consume less energy during high-cost periods.
Load: More aggressive heating to build up hot water during lower cost periods.
Deep Shed: Consumes even less energy than Shed.
Advanced Loadup: Runs more aggressively than Load.

Screen 6, Storage Info: Set the characteristics of the system to be used in the Energy Calculations. Tank Vol. is the total storage volume heated by the heat pumps. Calc. sensors is the number of sensors used on the controller (1-6). These must be installed with T1 closest to the HP supply and progress toward the HP Return. Set the approximate volume % location of each sensor used. (Ignore those not used).

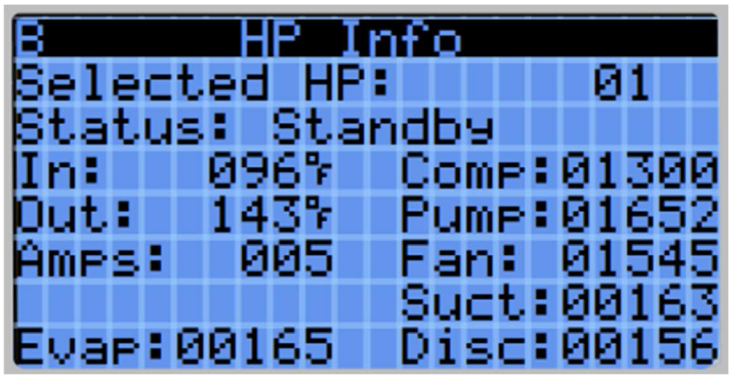


Screen 7, Swing Tank Info: Sets the system info if the Swing tank or supplemental heater is used. Indicate whether swing tank monitoring hardware is installed. Measure and Enter the actual site supply voltage and select number of phases.

- Value: Current value being read by swing tank CT
- Adjust: Some CT's will register small amounts of current when the swing tank is off, use this adjustment to ensure the current Value reads 0.0 when the heater is off.

SERVICE

Screen 1, HP Info 1: Displays heat pump diagnostic info. The selected HP number can be changed.



Screen 2, HP Overide 1: Allows user to manually set heat pump operation for service or emergencies.

Run All HP's: Auto: All HPs operate according to heating setpoints.
Run: Commands all HPs to heat, regardless of tank temps.
Stop: Commands all HPs to Standby, regardless of tank temps.

HP1, HP2...: Auto, Run and Stop are same as above.

Off: Takes that heat pump out of the array and the controller ignores it for staging.

Screens 3 - 5, HP Overrides 2-4: These screen appear when HP Count is set higher to cover HPs 9-32.

Screen 6, Output Overide: Manually set the auxiliary outputs to desired values.

- Mode: Set the mode of the Aux Relay. Auto, Run, Stop.
- Hand SP: Set the voltage output of the Aux 0-10V output.
-
- Mode: Set the Mode of the Aux 0-10V output.
- Output: Displays the output voltage of the 0-10V output.

Screen 7, Aux 0-10V setup: The controller has the ability to control auxiliary equipment via a 0-10v signal. This screen allows the voltage to be set for each stage of HPs called.

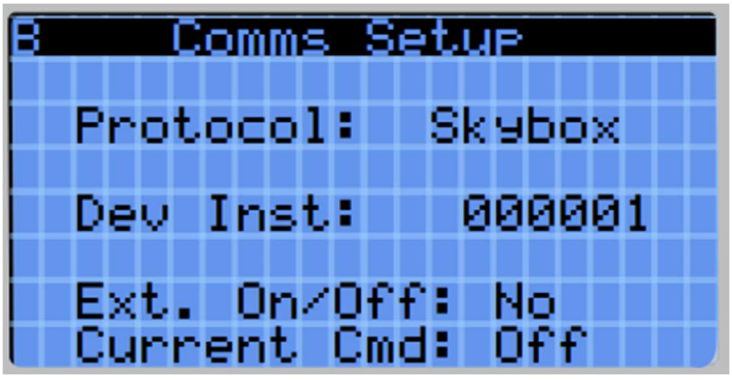
Screen 8, Aux Input Setup: The contoller can accept an Auxilary dry contact signal to be passed along to the BMS.

NETWORK

This group configures the controller network settings to connect to a Cloud Module, Skybox, or BACnet device via UDP or MS/TP.

****A BACnet license is required to establish communication, record the UID code found in the Info menu and contact Eco2 Systems to receive this license****

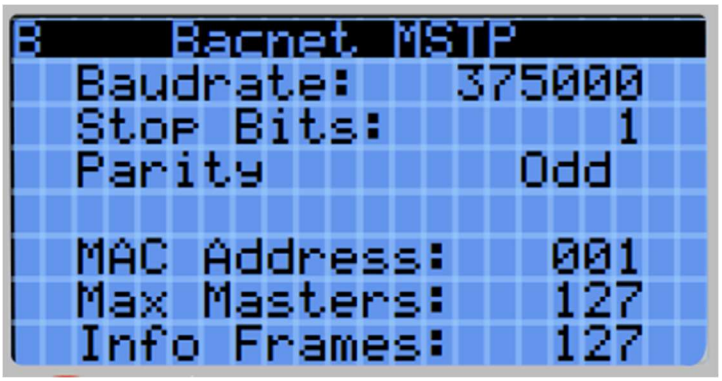
Screen 1, Bacnet Setup:



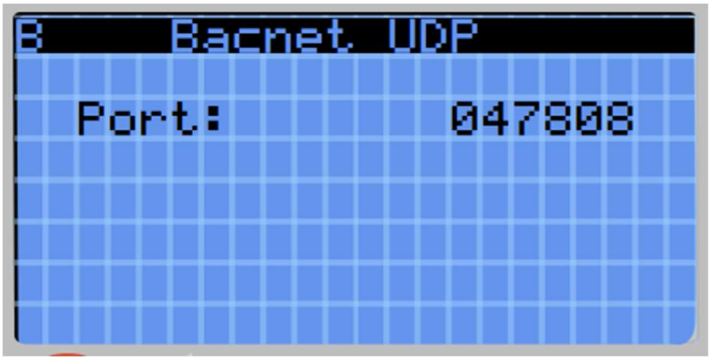
- Protocol: Select between Cloud, Skybox, BACnet MSTP and UDP.
- Dev Inst: Set the controller's device instance on the network.
- Ext. ON/Off: Another location to set whether the remote system has on/off control.
- BMS Cmd: The current on/off command coming from the remote system.

Screen 2, Skybox Config(Only appears if Skybox is enabled): Allows Deep Shed and Advanced Loadup to be enabled or disabled.

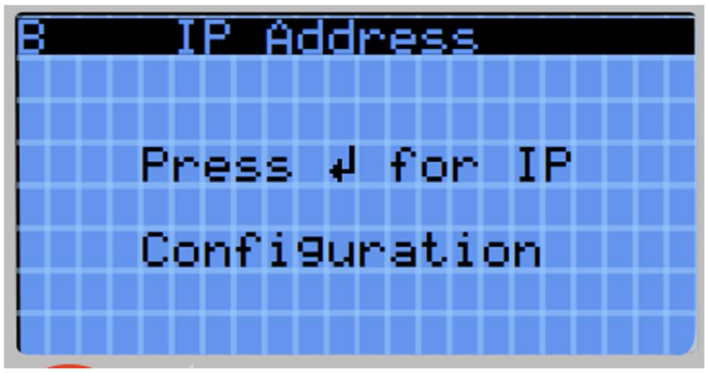
Screen 3, Bacnet MSTP: Configure MSTP settings.



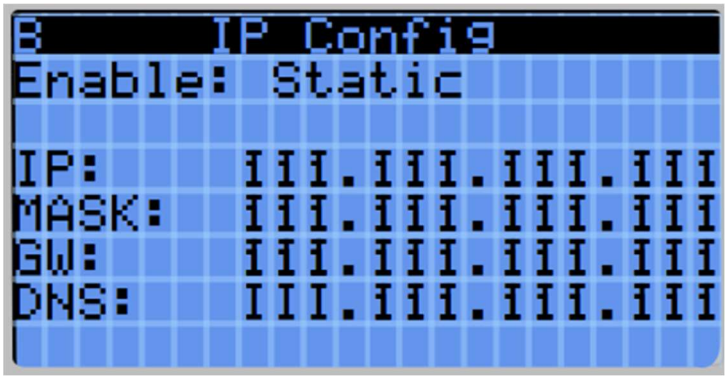
Screen 4, Bacnet UDP: Set the BACnet UDP port.



Screen 4A, IP Address: Press ENTER to configure IP address settings of controller.

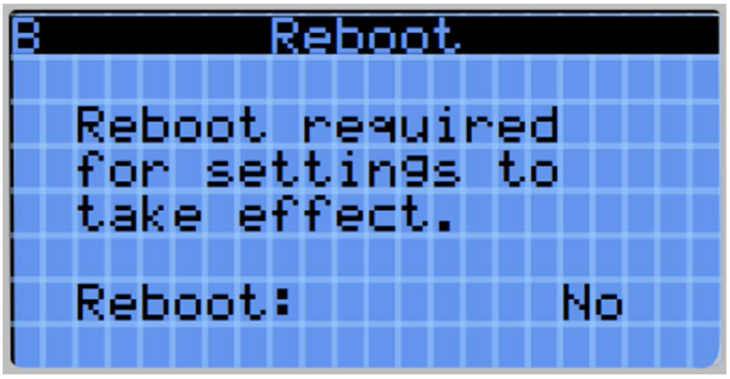


Screen 4B, IP Config: Once ENTER is pressed on screen 4, the IP configuration can be set.

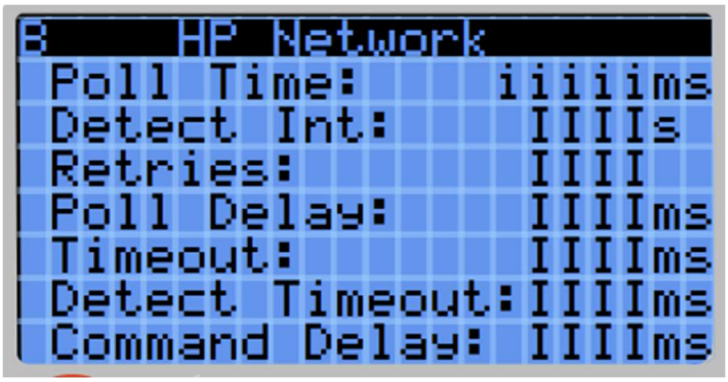


- Enable: Set to Off, Static, or DHCP.
- IP, Mask, GW, DNS: Allows view and setting of controller network.

Screen 5, Reboot: Network setting changes require a reboot to take effect. This screen allows for this without cycling power on the controller.



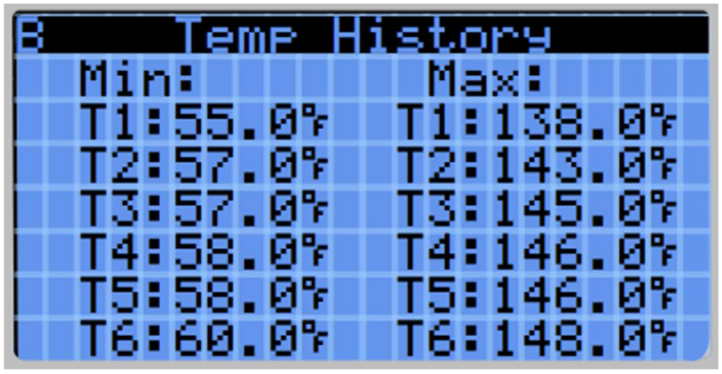
Screen , HP Network: This screen allows adjustment of the HP network polling. This should not be changed unless instructed to by Eco2 personnel.



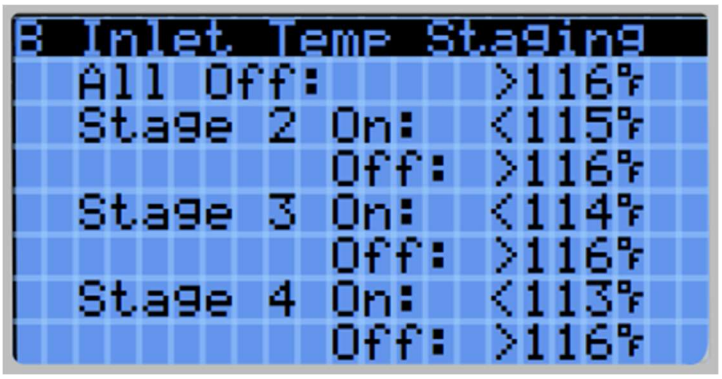
FACTORY

Functions typically used only by Factory technicians. Access is limited by additional passcode. Contact Eco2 Systems if changes are necessary.

Screen 1, Temp History: Displays the Minimum and Maximum temperatures recorded by each temperature sensor.

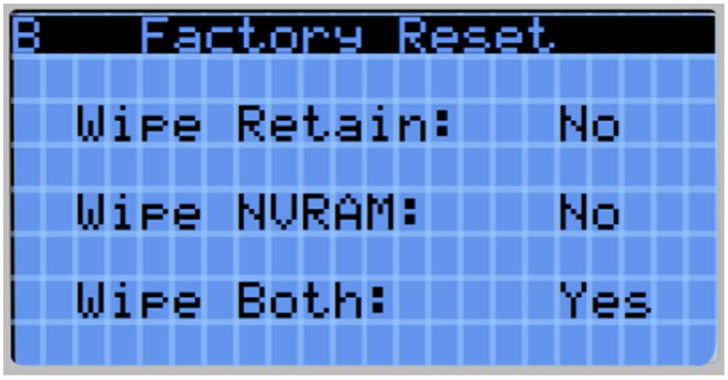


Screen 2, Inlet Temp. Staging: Adjust the staging setpoints.



Screen 3, Limits: Factory limits and safeties.

Screen 4, Factory Reset: Clears memory to reset controller to factory defaults.



Screen 5, Alarm Memory: Delete logs, Clear Auto reset and enable/disable alarm sound.