PROGRAM GUIDE

ECO-CMB-BAC
COMMERCIAL MODBUS CONTROLLER WITH BACNET

<mark>WARNING!</mark>

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.

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

INSTALLATION GUIDE

TABLE OF CONTENTS

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.
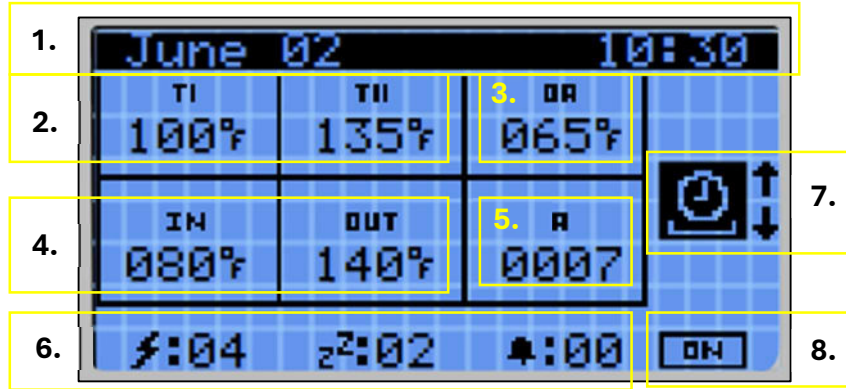
CONTROLLER STARTUP

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.

INSTALLATION GUIDE

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. T1 and T2:   Tank temperature probe readings.
3. Outside Air: Average of all heat pumps' Outside Air temperature readings.
4. In and Out: Average of all RUNNING heat pumps' Inlet and Outlet readings.
5. Amps: The total amp draw of all heat pumps.
6. HP Counts: Shows the number of heat pumps called to energize, in standby, and
                             in alarm.
7. 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.
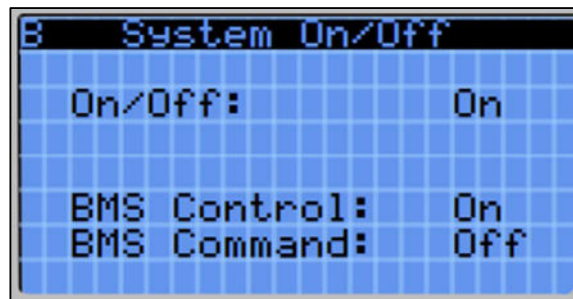8. ON/OFF: Displays the controller's On/Off status.

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.

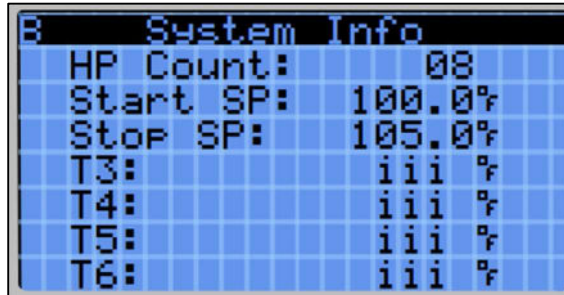Press the BACK button to return to the Home Screen.

This screen also allows for the user to set whether the BMS can control the on/off setting. To allow, set BMS Control to ON. To prevent, set to OFF.

The BMS Command line displays the current input command from the BMS for on/off.

INFO: A series of screens showing additional system and heat pump information. Scroll though the screens using the UP and DOWN arrows.

Screen 1, System Info: This screen shows general system information.

```
B      System Info
 HP Count:        08
 Start SP:    100.0°F
 Stop SP:     105.0°F
 T3:             iii °F
 T4:             iii °F
 T5:             iii °F
 T6:             iii °F
```

- The number of heat pumps in the system (changed in the Setup menu.)

- The Start Setpoint, at which the controller will begin to turn HPs on.
- The Stop Setpoint, at which all HPs will be off.
- T3 to T6: If installed, will display the temperatures measure by these optional probes. If not installed, these will show, "- " or "0".
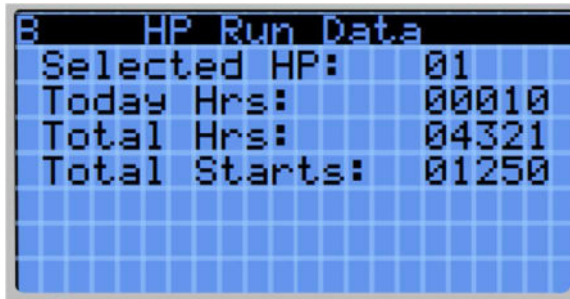
Screen 2, HP Info: This screen shows individual data reported from a heat pump.

```
B         HP Info
 Selected HP:     01
 State: Standby
 Error: E1
 Descr: High Out Amps

 In: 080°F      Amb: 065°F
 Out:140°F      Amps:005°F
```

- Selected HP: Change to show the data from any HP in the network.
- State: The current operating state of the HP: Standby, Air Purge, Freeze Protection, or Heating.
- Error: Shows the code for the current error, if the HP is in error. See SanCO2 heat pump Owner's Manual for more information.
- Descr: Description of the current error.
- In, Out, Amb, Amps: Shows the temperatures and current draw of that HP.
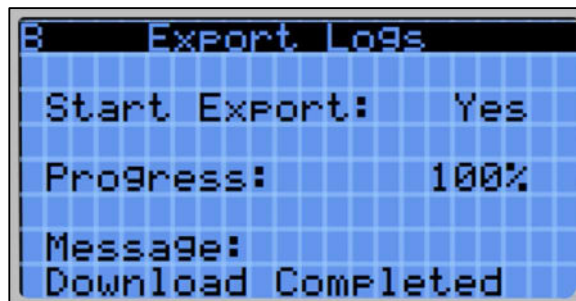
INSTALLATION GUIDE

Screen 3, HP Run Data: This screen shows the cumulative run data for the selected HP.
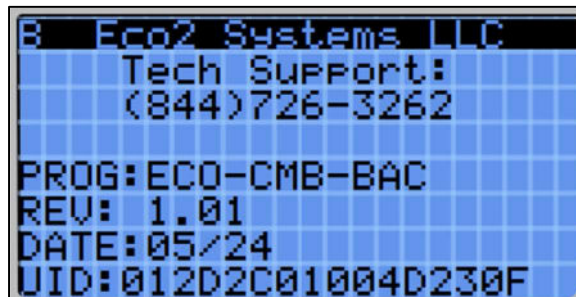

- Selected HP: Change to show the data from any HP in the network.
- Today Hrs: Hours the HP has run in a 24-hour period. Resets every day at 1 am.
- Total Hrs: The lifetime total hours the HP has run.
- Total Starts: The lifetime total number of starts for the HP.

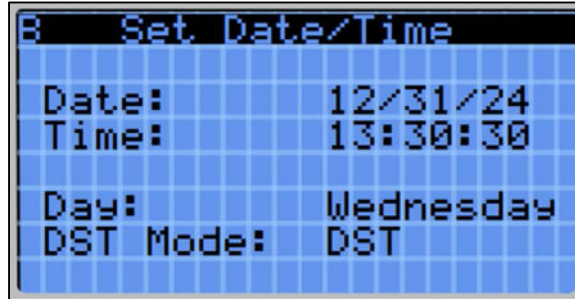**Screen 4, Export Logs:** This screen allows for the controller's internal logs to be saved to a storage device (USB thumb drive). Connect a storage device to the micro-USB port. Set "Start Export" to Yes and the screen will show the download progress.

Screen 5, Controller Info: Shows Eco2 Systems technical support contact number, controller software info, and the serial number of the controller's PLC.
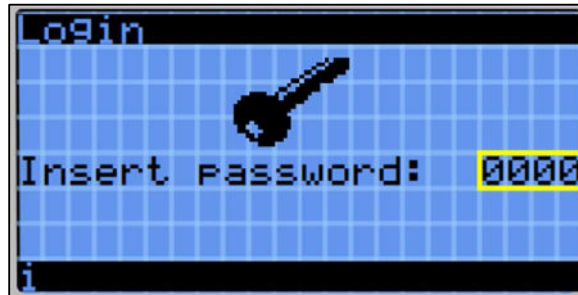
Set Date/Time: Allows the user to set the date and time. Date is MM/DD/YY and time is 24 hour format. The screen shows the calculated weekday and if it is Daylight Savings or Standard Time. Daylight savings changes happen automatically in Nov and March.

```
B     Set Date/Time

Date:          12/31/24
Time:          13:30:30

Day:           Wednesday
DST Mode:      DST
```
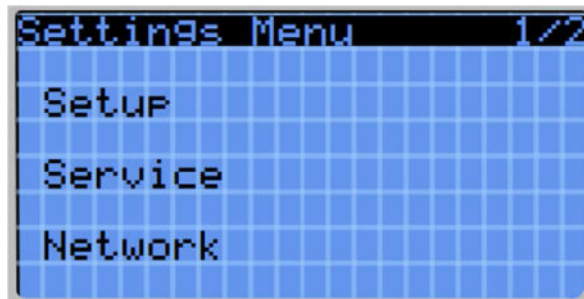
SETTINGS MENU

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.

```
Login



Insert password:    0000


i
```

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

```
Settings Menu        1/2

  Setup

  Service

  Network
```

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

SETUP

Screen 1, 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. **A reboot is required for heat pump network communication to update after changing HP Count.**
- HPs/Stage: Set the desired number of heat pumps to start at each temperature trigger step.
- Steps: Calculated based on HP Count and HPs/Stage, rounds up if uneven number.
- HP Run # Limit: If it is desired to limit the total number of heat pumps that run at and one time, set this number to the desired limit. Defaults to HP Count.
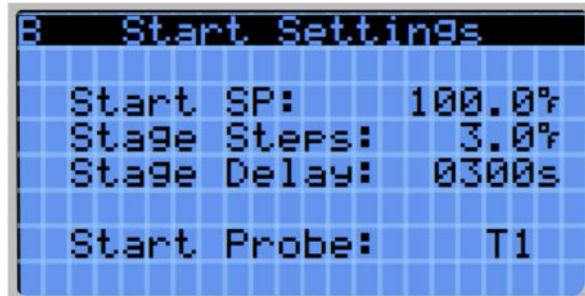
Screen 2, Aux Alarm Setup: The controller can accept a dry contact alarm signal from a 3rd party device (leak detector, etc.) and pass this along to a BMS device. This screen configures that alarm input.

- Aux Alarm: Set to Yes if Aux alarm will be used.
- Polarity: Set if Auxiliary signal is Normally Open or Normally Closed type.

Screen 3, Start Settings: Configure the settings for the controller to start the heat pumps. **Incorrect settings can impact system performance and should only be done by qualified personnel.**

```
B     Start Settings

   Start SP:       100.0°F
   Stage Steps:      3.0°F
   Stage Delay:     0300s

   Start Probe:        T1
```

- Start SP: Set the temperature below which the controller will turn on heat pumps.
- Stage Steps: The temperature differential between additional stages being brought on.
- Stage Delay: Delay between stages being brough on if multiple points triggered at once.
- Stop Probe: Set which probe is used for start triggering. Default is T1. This must be set to the same sensor or below used as the Start sensor.

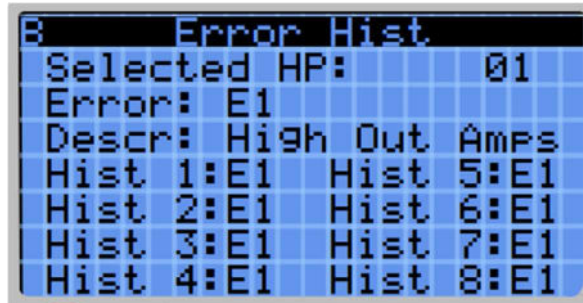**Screen 4, Stop Settings:** Configure the settings for the controller to stop the heat pumps. **Incorrect settings can impact system performance and should only be done by qualified personnel.**

```
B     Stop Settings

   Stop SP:        105.0°F
   Stage Steps:      2.0°F
   Stage Delay:     0030s

   Stop Probe:         T1
```

- Stop SP: Set the temperature above which all the heat pumps will be off.
- Stage Steps: The temperature differential between additional stages being brought on.
- Stage Delay: Delay between stages being brough on if multiple points triggered at once.
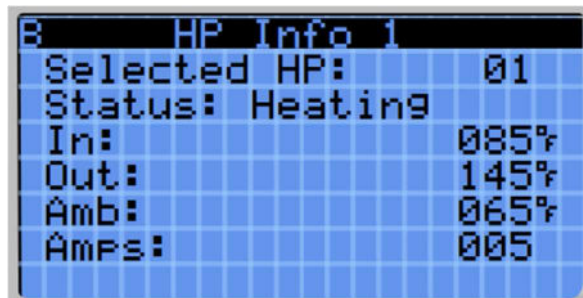- Start Probe: Set which probe is used for start triggering. Default is T1.

SERVICE

Screen 1, Error Hist: Displays the Error history of the selected heat pump.

- Selected HP: Select which number HP to show Error History.
- Error: Code for current HP error.
- Hist 1-8:   Previous 8 error codes.

Screen 2, HP Info 1: Displays additional HP info for diagnosis.
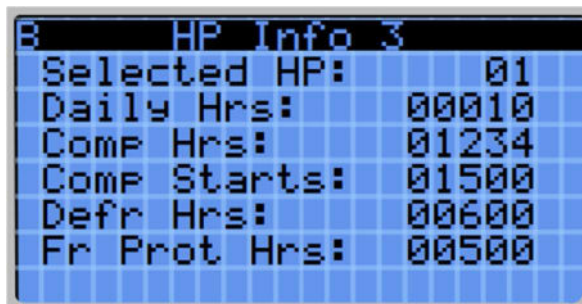

- Selected HP: Select which number HP to show info.
- Status: Current mode of HP.
- In, Out, Amb, Amps: Temperatures and amperage of HP.

Screen 3, HP Info 2: Additional information on selected HP.
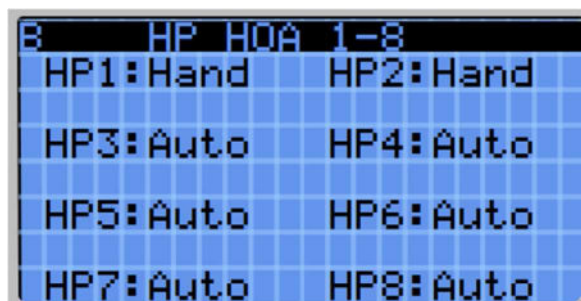

- Selected HP: Select which number HP to show info.
- Evap, Suct, Disc: Refrigerant circuit temperatures.
- Comp, Pump, Fan: Component speeds.

Screen 4, HP Info 3: Additional information on selected HP.

- Selected HP: Change to show the data from any HP in the network.
- Daily Hrs: Hours the HP has run in a 24-hour period. Resets evert day at 1 am.
- Comp Hrs: The lifetime total hours the compressor has run.
- Comp Starts: The lifetime total number of compressor starts.
- Defr Hrs: The lifetime total hours the unit has been in defrost.
- Fr Prot Hrs: The lifetime total hours the unit has been in Freeze Protection.

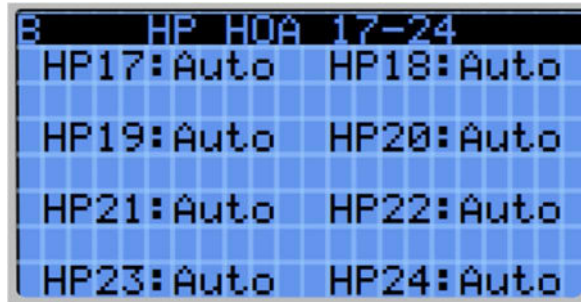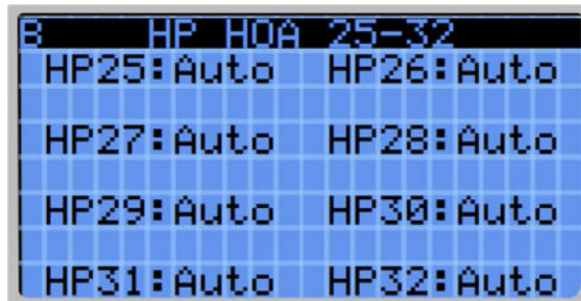**Screen 5, HP HOA 1-8:** Auto/Hand/Off control of heat pumps 1-8.

Screen 6, HP HOA 9-16: Auto/Hand/Off control of heat pumps 9-16.

Screen 7, HP HOA 17-24: Auto/Hand/Off control of heat pumps 17-24.

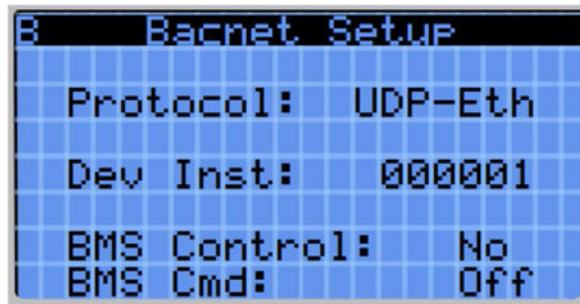**Screen 8, HP HOA 25-32:** Auto/Hand/Off control of heat pumps 25-32.

Screen 9, Aux Signal HOA: The controller has the ability to control auxiliary equipment, such as booster pump or fan. This screen allows Auto/Hand/Off control of that signal.
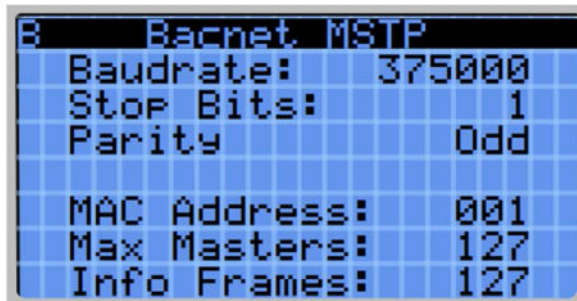
NETWORK

This group configures the controller network settings to connect to a BACnet MS/TP or UDP BMS system. **Controller reboot is required for Network settings to take effect.**
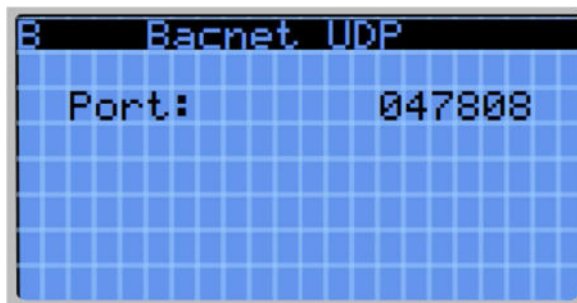
Screen 1, Bacnet Setup:

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

Screen 2, Bacnet MSTP: Configure MSTP settings.

Screen 3, Bacnet UDP: Set the BACnet UDP port.

Screen 4A, IP Address: Press ENTER to configure IP address settings of controller. The default is DHCP automatic IP assignment.
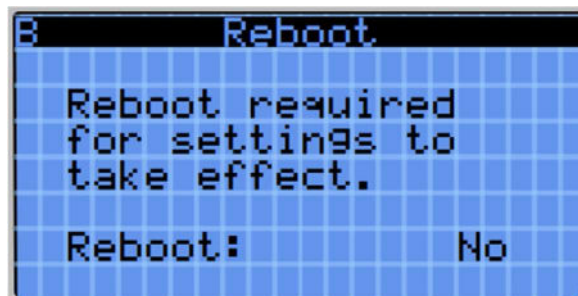

Screen 4B, IP Config: Once ENTER is pressed on screen 4, the IP configuration can be set.

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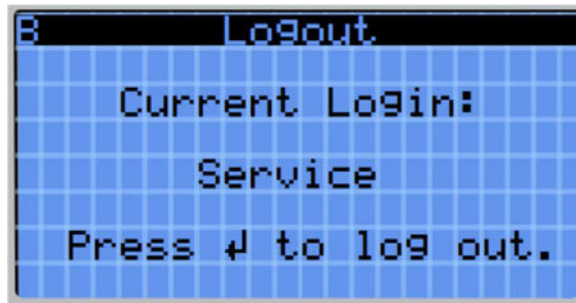- IP, Mask, GW, DNS: Allows view and setting of controller network.

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

FACTORY

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

Screen 1, Logout: If password has been entered, allows logout. Controller will also automatically
logout after 5 minutes of inactivity.

```
B          Logout
        Current Login:

            Service

    Press ↵ to log out.
```

Screen 2, Safety Limits: Safety limits to prevent HP damage.

```
B       Safety Limits

   Min On:          0300s
   Min Off:         0060s
   Time/Starts:     0600s
   Max Inlet:        115%
   Max Daily Hrs:      12
```

Screen 3, Factory Reset: Clears retained memory to reset controller to factory defaults.

```
B       Factory Reset

    Wipe Retain:     No

    Wipe NVRAM:      No

    Wipe Both:       Yes
```