

Reference Guide for Microprocessor Controller

Please read and save these instructions for future reference. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with these instructions will result in voiding of the product warranty and may result in personal injury and/or property damage.

ERV v3.10/3.11

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ERV Technical Support
 Call 1-800-240-0870



Introduction

Program Features

The microprocessor controller offers control through easy monitoring and adjustment of unit parameters by way of a lighted graphical display and an integral push-button keypad.

Pre-Programmed Operating Sequences

The controller has been pre-programmed to offer multiple control sequences to provide preconditioned air. Factory default settings allow for easy setup and commissioning. The sequence parameters are fully adjustable. Refer to the Sequence of Operation for details.

BMS Communication

The user can remotely adjust setpoints, view unit status points and alarms. The microprocessor controller is capable of communicating over several protocols:

- BACnet® MSTP
- Modbus RTU
- BACnet® IP
- Modbus IP

Reference Points List for a complete list of BMS points.

Internal Time Clock (Schedule)

The controller has an internal programmable time clock, allowing the user to set occupancy schedules for each day of the week.

Alarm Management

The microprocessor controller will monitor the unit's status for alarm conditions. Upon detecting an alarm, the controller will record the alarm description, time, date, and input/output status points for user review. A digital output is reserved for remote alarm indication. Alarms are also communicated via BMS (if equipped).

Occupancy Modes

The microprocessor controller offers three modes of determining occupancy: a digital input, the internal time clock or the BMS.

Remote Display (if equipped)

A touch pad display allows for remote monitoring and adjustment of parameters, allowing ease of control access without going outdoors.

WARNING

Electrical shock hazard. Can cause personal injury or equipment damage. Service must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

WARNING

Mechanical high static protection cutoffs must be installed by others to protect the system and equipment from over-pressurization when using factory provided control sensors. The manufacturer does not assume responsibility for this.

Table of Contents

Sequence of Operation

| | |
|------------------------------------|---|
| General Operation | 3 |
| Supply Fan VFD Sequence | 3 |
| Exhaust Fan VFD Sequence | 3 |
| Economizer | 4 |
| Frost Control | 4 |
| Alarms | 4 |
| Setpoint Control | 5 |
| Heating | 5 |
| Cooling | 5 |

Controller Overview

| | |
|----------------------------------|---|
| Controller | 6 |
| c.pCOe Expansion Board | 6 |

Display Use 7

Example of Parameter Adjustment 7

Web User Interface 8

Main Menu Navigation 9

Unit Status Overview 10

Menus

| | |
|--------------------------------|----|
| Unit Enable | 12 |
| Control Variables | |
| Temperature Control | 12 |
| Energy Recovery | 14 |
| Fan Control | |
| Supply Fans Control | 15 |
| Exhaust Fans Control | 16 |
| Advanced | |
| Manual Overrides | 17 |
| Advanced Setpoints | 18 |
| Network Settings | 20 |
| Backup/Restore | 21 |
| I/O Configuration | 23 |
| Unit Configuration | 23 |
| Alarms | 24 |

Appendix

| | |
|---|----|
| Remote Display | 25 |
| Carel® NTC Temp Sensor Chart | 25 |
| I/O Expansion Board Quick Start | 26 |
| Points List | 27 |

Our Commitment Backcover

General Operation

UNIT START COMMAND: The microprocessor controller requires a digital input to enable operation. The unit can then be commanded on or off by this digital input, keypad, the BMS or internal time clock. When a start command becomes active the following steps occur:

Energy Wheel

- Factory mounted and wired outdoor air damper actuator is powered.
- Exhaust fan starts after a (adj.) delay.
- Supply fan and energy wheel start after a (adj.) delay.

Energy Core

- Factory mounted and wired outdoor air damper actuator is powered.
- Exhaust fan starts after a (adj.) delay.
- Supply fan starts after a (adj.) delay.

UNIT STOP COMMAND:

The unit becomes disabled due to the following:

- The unit was disabled from the controller's Unit Enable screen.
- The unit was disabled from the BMS.
- The shutdown input is in the shutdown position.
- A shutdown alarm was activated.

When disabled the following actions occur:

Energy Wheel

- Supply fan, exhaust fan, and energy wheel de-energized.
- Outdoor air damper actuator is spring return closed.

Energy Core

- Supply fan and exhaust fan de-energized.
- Outdoor air damper actuator is spring return closed.

Supply Fan VFD Sequence

The factory installed VFD is wired to the controller. Supply fan speed needs to be set during test and balance of the unit.

- **Constant Volume:** The supply blower is provided with a factory mounted and wired VFD and is intended to operate at a constant speed (adjustable set point in controller) during operation. This speed needs to be set during the test and balance of the unit.
- **Space/Duct CO2 Sensor:** The controller will modulate the supply fan based upon a comparison of the CO2 setpoint to the actual CO2 levels reported from the sensor.
- **Duct Static Pressure Sensor:** The controller will modulate the supply fan based upon a comparison of the duct static pressure setpoint to the actual duct static pressure level reported from the sensor.

- **Building Static Pressure Sensor:** The controller will modulate the supply fan based upon a comparison of the building static pressure setpoint to the actual building static pressure level reported from the sensor.
- **Network Control:** The controller will modulate the supply fan based upon a command from the Building Management System (BMS). This sequence must be field configured.
- **Volatile Organic Compound (VOC) Sensor:** The controller will modulate the supply fan based upon a signal from the VOC sensor. The controller will modulate the supply fan based upon a comparison of the VOC set point (adj.) to the actual VOC levels reported from the sensor.
- **0-10 VDC Signal by Others:** The supply blower is modulated based upon a 0-10 VDC signal (field provided) wire directly into the microprocessor.

Exhaust Fan VFD Sequence

The factory installed VFD is wired to the controller. Exhaust fan speed needs to be set during test and balance of the unit.

- **Constant Volume:** The exhaust blower is provided with a factory mounted and wired VFD and is intended to operate at a constant speed (adjustable set point in controller) during operation. This speed needs to be set during the test and balance of the unit.
- **Building Pressure Sensor:** The controller will modulate the exhaust fan based upon a comparison of the building static pressure setpoint to the actual building static pressure level reported from the sensor.
- **Supply Fan Tracking:** The controller will proportionally modulate the exhaust fan based upon the supply fan speed.
- **Network Control:** The controller will modulate the exhaust fan based upon a command from the Building Management System (BMS). This sequence must be field configured.
- **0-10 VDC Signal by Others:** The exhaust blower is modulated based upon a 0-10 VDC signal (field provided) wire directly into the microprocessor.

Economizer (optional):

Energy Wheel

If the unit is equipped with an energy recovery wheel, the economizer will modulate/stop the energy wheel to achieve free cooling.

- **Stop Wheel:** When economizer mode is enabled and there is a signal for cooling, the wheel will stop rotating to allow free cooling. The sequence allows the wheel to rotate for a short period of time exposing a new section to the air stream.
- **Modulate Wheel:** When economizer mode is enabled and there is a signal for cooling, the controller modulates wheel speed to maintain the supply temperature setpoint.
- **VFD Signal by Others:** When the application requires cooling and the outdoor air conditions are suitable for free cooling, a 0-10 VDC signal is provided by others to the energy wheel VFD to control the speed of rotation.
- **BMS Control:** When the application requires cooling and the outdoor air conditions are suitable for free cooling, the energy wheel is modulated based upon a command from the Building Management System (BMS). This sequence must be field configured.

OA Temp Setpoint: The economizer will be locked out when the outdoor air is <50°F (adj.) or >65°F (adj.).

OA/EA Temp. Differential: The economizer will be locked out when the outdoor air temperature is greater than the return air temperature.

OA Enthalpy Setpoint: The economizer will be locked out when the outdoor air is <50° F (adj.) or >75° F. (adj.) or has an enthalpy >23.0 btu/lb. (adj.)

Energy Core

If the unit is equipped with an energy recovery core and bypass damper, the economizer will cycle into a bypass condition, allowing cool air to flow past the energy recovery core rather than passing through it.

OA Temp Setpoint: The economizer will be locked out when the outdoor air is <50°F (adj.) or >65°F (adj.).

OA Enthalpy Setpoint: The economizer will be locked out when the outdoor air is <50° F (adj.) or >75° F. (adj.) or has an enthalpy >23.0 btu/lb. (adj.)

Frost Control (optional):

Energy Wheel

The microprocessor controller will activate the frost control method when the outdoor air temperature is less than the defrost setpoint (5°F) and the wheel pressure switch is closed due to a high wheel pressure drop. Once the pressure drop decreases below the pressure switch point or the outdoor air temperature increases, the unit will resume normal operation.

- **Electric Preheater:** When frosting is occurring, the preheater is energized to defrost the wheel.

- **Modulate Wheel:** When frosting is occurring, the wheel slows to allow defrosting to occur.
- **Timed Exhaust:** When frosting is occurring, the supply fan is cycled off along with the tempering for a defrost cycle time (5 minutes). The exhaust fan will continue to run allowing the warm exhaust air to defrost the wheel. After the defrost cycle time, the supply fan and tempering are re-energized to continue normal operation. The controller will not allow another defrost cycle for a minimum normal operating cycle time (30 minutes).

Energy Core

The microprocessor controller will activate the frost control method when the exhaust air temperature is less than 36°F. Once the exhaust air temperature increases above 36°F, the unit will resume normal operation.

- **Electric Preheater:** When frosting is occurring, the preheater is energized to prevent/control frost on the core. The preheater is enabled for a minimum of 10 minutes. After 10 minutes, the unit will resume normal operation once the exhaust air temperature increases above 36°F.
- **Timed Exhaust:** When frosting is occurring, the supply fan is cycled for a defrost cycle time (5 minutes). The exhaust fan will continue to run allowing the warm exhaust air to defrost the core. After the defrost cycle time, the supply fan is re-energized to continue normal operation. The controller will not allow another defrost cycle for a minimum normal operating cycle time (30 minutes).

Alarms

The microprocessor controller includes a digital output for remote indication of an alarm condition, which connects via the **J12** port. Possible alarms include:

- **Dirty Filter Alarm:** If the outside air or return air filter differential pressure rises above the differential pressure switch setpoint, the microprocessor controller will activate an alarm.
- **Supply and Exhaust Air Proving Alarm:** Microprocessor controller monitors proving switch on each blower and displays an alarm in case of blower failure.
- **Sensor Alarm:** Microprocessor controller will send an alarm if a failed sensor is detected (temperature, pressure, relative humidity).
- **Other Alarms:** High Wheel Pressure

Sequence of Operation

Set Point Control (Occupied)

Supply air temperature setpoint can be configured as OA reset or be set as a constant static setpoint. If equipped with BMS communications, the user can also directly command the supply temperature setpoint.

- **Outside Air Temperature Reset Function:** The controller will default to supply temperature reset based on outdoor air temperature. The controller will monitor the OA temperature and reset the supply temperature setpoint based upon the outdoor air reset function.

Set Point Control (Unoccupied)

When equipped with an unoccupied recirculation damper and optional space temperature and/or humidity sensors, the unit will cycle on to maintain the unoccupied space set points.

- **Unoccupied Heating:** If equipped with heating, the unit is enabled when the space temperature is less than the unoccupied heating set point minus differential (60°F). The supply air temperature set point will be set to the supply max reset limit (90°F). The unit cycles off when the space temperature reaches the unoccupied heating set point.
- **Unoccupied Cooling:** If equipped with cooling, the unit is enabled when the space temperature is greater than the unoccupied cooling set point plus differential (80°F+5°F). The supply air temperature set point will be set to the supply min reset limit (55°F). The unit cycles off when the space temperature reaches the unoccupied cooling set point.
- **Unoccupied Dehumidification:** If equipped with cooling, the unit is enabled when the space relative humidity exceeds the unoccupied space relative humidity set point plus differential (50%+5%). The supply air temperature set point will be set to the equivalent occupied supply set point.
- **Morning Warm-Up/Cool Down:** At the request to occupy the space, the unit will run using the warm-up or cool down sequence until the occupied set point is achieved. The heating or cooling mode must not be locked out and the space temperature is below or above set point by the unoccupied hysteresis (5°F, adj). This optional sequence requires a space temperature sensor and is field-enabled.

The following steps occur during a morning warm-up/cool down:

- The dampers would be in full recirc if the damper if the damper actuators are not powered (adj) during occupied mode. Otherwise the following is true:
 - Outside air damper is open to minimum OAD position.
 - Recirculation air damper is open at 100% minus OAD position.
- Supply Fan is ON at 100%.
- Exhaust fan is OFF.

- In heating, controls to maintain the maximum supply set point (90°F).
- In cooling, controls to the minimum supply set point (50°F).
- Reheat off.
- Energy recovery wheel off.

Heating

The heating is controlled to maintain a supply temperature setpoint. The heating will be locked out when the outside air temperature is above the heating lockout (80 deg F adj.).

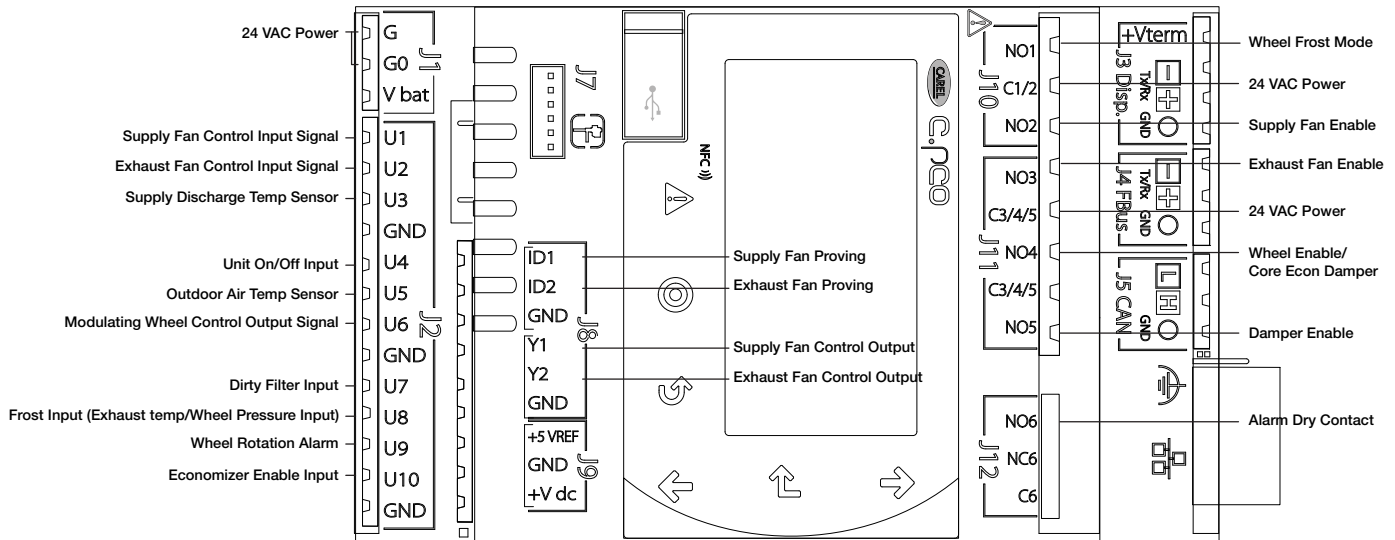
- **Hot Water Coil:** Microprocessor controller will modulate a hot water valve (provided by others) to maintain the supply temperature setpoint. Coil freeze protection must be provided by others in the field!
- **SCR Electric Heater:** Microprocessor controller will modulate an SCR electric heater (provided by others) to maintain the supply temperature setpoint.

Cooling

The cooling is controlled to maintain the supply temperature setpoint. The mechanical cooling will be locked out when the outside air temperature is below the cooling lockout (55 deg F).

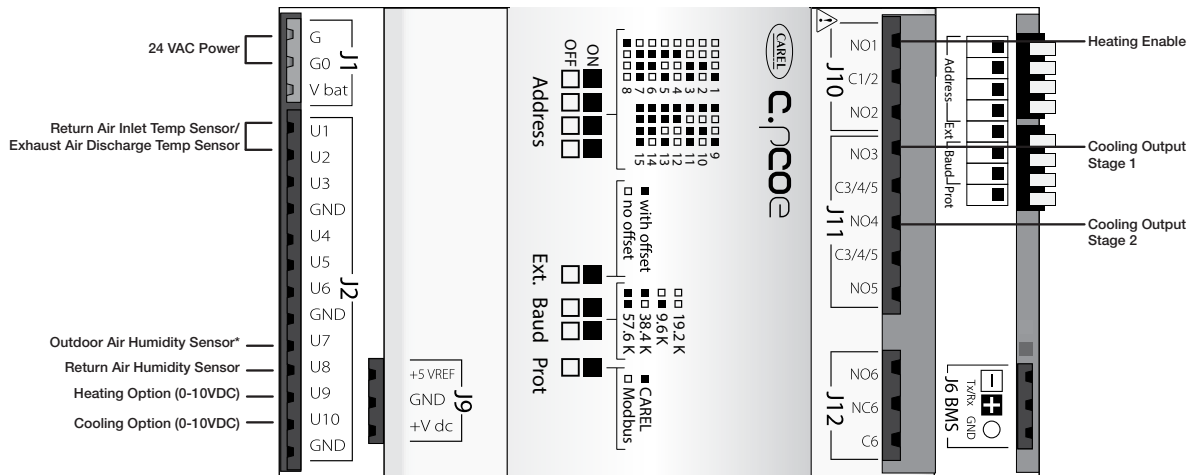
- **Chilled Water:** Microprocessor controller will modulate a chilled water valve (provided by others) to maintain a supply temperature setpoint. Coil freeze protection must be provided by others in the field!
- **Split DX:** Microprocessor controller will enable/stage a split DX coil (provided by others) to maintain a supply temperature setpoint.

Controller Overview



c.pCOe - Expansion Board Overview, Medium Controller Arrangement

The expansion board is an I/O module that can be used to monitor additional statuses or provide commands from medium board controller.



*Outdoor Air Humidity Sensor can float to open inputs on the main controller U1, U2, U6 or U10. If main board inputs are full OAH will land on U7 on the expansion board.

Display Use

The microprocessor controller is located in the unit control center. The face of the controller has six buttons, allowing the user to view unit conditions and alter parameters. The microprocessor controller is pre-programmed with easy to use menus. A remote display is also available, which connects via the **J3 Disp** port. A six wire patch cable is needed.

| Keypad Description | | |
|--------------------|----------------|---|
| Button | Description | Functions |
| | Main Menu | Press to go directly to the Main Menu from any screen. From the Main Menu, navigate to the following screens: <ul style="list-style-type: none"> • Unit Enable • Unit Status • Ctrl Variables • Alarm Menu |
| | Alarm | The Alarm button flashes when there is an active alarm. Press to view active alarms. Press twice to go to the alarms reset screen. |
| | Escape | Press from the Main Menu to view the Unit Status screen. Press to go back one menu level. Press when editing a variable to cancel editing. |
| | Up | Press to navigate through the menus/screens. Press after entering a variable to increase a current value. |
| | Enter | Press to enter a highlighted menu or screen item. Press to enter a writable variable and press again to confirm the new variable value. |
| | Down | Press to navigate menus/screens. Press after entering a variable to decrease the current value. |
| | 2 Button Click | Virtual keypad/display on web interface only. These two buttons on the virtual keypad/display are used to simulate two-button actions on the handheld keypad/display. To simulate pressing two buttons simultaneously: 1. Click on 2-Button Click. 2. Then, sequentially click on two keypad buttons (Main, Alarm, Escape, Up, Enter, Down). To simulate pressing and holding two buttons simultaneously: 1. Click on 2-Button Hold. 2. Then, sequentially click on two keypad buttons (Main, Alarm, Escape, Up, Enter, Down). |
| | 2 Button Hold | |

Example of Parameter Adjustment

Supply air low limit

Alarm when supply is below: 35.0° F

Alarm delay: 300s

The cursor always begins in the upper left corner of the display and will be blinking. Press the button to move the cursor down for parameter adjustment.

Supply air low limit

Alarm when supply is below: 32.0° F

Alarm delay: 300s

Once the cursor has reached the desired parameter, press the buttons to adjust the value.

Supply air low limit

Alarm when supply is below: 32.0° F

Alarm delay: 300s

When satisfied with the adjustment, press the button to save the parameter. When finished, make certain the cursor is in the upper left corner. If the cursor is not in the upper left corner, the changes will not be saved. The cursor must be in the upper left corner to enable screen advancement.

Web User Interface

The Web User Interface allows access to the unit controller through the building network. Reference Ctrl Variables/Advanced/Network Settings to set the IP network protocol. Once proper communication is established, the user can click on the follow tabs:

Overview – Includes a functioning unit graphic, monitoring points, and active setpoint adjustment.

Alarm – Shows current and cleared alarms.

Unit Display – Mimics the unit controller display. Allows the user full access to the controller without physically being at the unit.

Trending – User can view past and present controller points.

Information – Provides manufacturer support information as well as IOM resources.

Service – User must be logged with service access criteria (1000). Once proper login is established, the user can view configured input/output points associated with the unit controller



Main Menu Navigation

Unit Enable

Main Status

↳ Unit Status

↳ Input Output Status

Note:
Additional status screens are displayed depending on unit configuration. Screens may include, but are not limited to: Occupancy, Fans, Economizer, Frost, CO₂, Energy Recovery, Space Static, Duct Static and Expansion IO.

Ctrl Variables

↳ Temp Control

↳ Energy Recovery

↳ Fan Control

↳ Supply Fan Control

↳ Exhaust Fan Control

↳ Damper Control

↳ Occupancy

↳ Advanced

↳ Login

↳ Manual Overrides

↳ Adv. Setpoints*

↳ Network Settings

↳ Backup/Restore

↳ IO Status/Offset*

↳ IO Config

↳ Unit Config

↳ Unit Settings*

↳ Service Info*

↳ Alarm Management

↳ Shutdown Alarms

↳ General Alarms

Note:
The Advanced menu is read-only. The service password is required to change these settings. Reference the Advanced menu section for more information.

*Consult factory for more information.

Alarm Menu

↳ Active Alarms



↳ Reset Alarms


↳ Alarm History

↳ Clear History

↳ Export History

Unit Status Overview

The microprocessor controller will revert to a default main menu loop. This loop includes several screens to view the operating conditions of the unit. Scroll through the menu screens by using the   buttons.




| | |
|-------------|---|
| SUPPLY | OUTSIDE |
| 64°F | 40°F |
| EXHAUST FAN | Delay: 0 |
| 100% |  |
| System On | |

THE INITIAL MENU SCREEN DISPLAYS THE JOB NAME, UNIT TAG, UNIT STATUS, OUTSIDE AIR CONDITIONS, SPACE CONDITIONS AND SETPOINTS.

Possible modes include:

- Off/Standby
- Unoccupied Start
- Dampers Open
- Fan Start Delay
- Fans Starting
- Startup Delay
- System On
- System Disabled
- Remote Off
- Shutdown Alarm
- Economizing
- Defrost Active
- Overrides Active
- Expansion Offline

Unit Status Screen Symbols

| Symbol | Indicates |
|---|--|
|  | Supply air fan status. Rotation indicates airflow; static blades indicate no airflow. |
|  | Economizing |
|  | Defrost |

| Input Output Status | |
|---------------------|--------|
| IO Type: All | |
| Chrt+: Main U5 | |
| Outside Air Temp | |
| Value: | 95.0°F |

INPUT OUTPUT STATUS

Displays real time conditions from sensors located in the unit and building space if equipped with space mounted sensors. Controller output conditions can also be viewed from this screen. To view the desired input/output point, the user must select the desired channel. Reference the Controller Overview section in this IOM for individual point locations.

| Occupancy Status | |
|------------------|---------------|
| Status: | Occupied |
| Method: | Digital Input |
| Timezone | 5:52 PM |
| 11 CHICAGO | |

OCCUPANCY STATUS

Displays current status of occupancy and the configured occupancy control method and time zone.

| Supply Fan Status | | |
|-------------------|--------|--------|
| COMMAND | SIGNAL | STATUS |
| 1:On | 100% | On |

SUPPLY FAN STATUS

This screen displays the fan enable command, fan proving status, and the supply fan ramp being sent from the controller to the VFD. The minimum and maximum speeds are set in the VFD (Reference unit Installation and Operation Manual for VFD programming). The controller can modulate the fan between the min and max speeds via an analog output.

| Exhaust Fan Status | | |
|--------------------|--------|--------|
| COMMAND | SIGNAL | STATUS |
| 1:On | 100% | On |

EXHAUST FAN STATUS

This screen displays the fan enable command, fan proving status, and the exhaust fan ramp being sent from the controller to the VFD. The minimum and maximum speeds are set in the VFD (Reference unit Installation and Operation Manual for VFD programming). The controller can modulate the fan between the min and max speeds via an analog output.

| Heating Ramp | |
|----------------|--------|
| Setpoint: | 70.0°F |
| Temp: | 96.3°F |
| RAMP: Disabled | 0% |

HEATING RAMP

This screen displays the active set point, supply air temperature, status of the heating control ramp, and heating ramp being sent from the controller.

Unit Status Overview

Economizer Ramp

Setpoint: 72.0°F
Temp: 71.5°F
Ramp: Disabled 0%
Mode:
Outside Dry Bulb

ECONOMIZER RAMP

The economizer ramp screen will be active if the unit is configured for an economizer control method. This screen displays the economizer setpoint, economizer ramp status, and economizer control mode of control. Economizer control mode options include outside dry bulb, or outside enthalpy.

CO₂ Ramp Output

Setpoint: 1000PPM
CO₂ Level: 0PPM
Ramp: Disabled 0%

CO₂ RAMP OUTPUT

The CO₂ Ramp Output screen will be active if the unit is configured for CO₂ control. This screen displays the CO₂ setpoint, CO₂ level from the space, and the status of the control ramp.

Energy Recovery

Status: Enabled
Ramp: 100%
100% = Full Speed

ENERGY RECOVERY WHEEL STATUS

This screen only appears if the unit is equipped with an energy recovery wheel. This screen provides overall status of the energy recovery wheel.

Defrost Ramp Output

Setpoint: 5.0°F
Outside Temp: 1.2°F
Press Switch: Normal
RAMP: 0%

DEFROST RAMP OUTPUT

This screen only appears if the unit has an energy recovery wheel and a frost control method was provided on the unit.

Upon sensing a high differential pressure across the energy wheel, the unit will go into defrost if the outside air temperature is below the defrost temperature setpoint.

SUPPLY SPACE STATIC

Output: 0.0%
Static: 0.000"WC
Setpoint: 0.050"WC

SUPPLY SPACE STATIC

This screen displays status points if the unit is configured for space static pressure control. Status points include controller output ramp, static pressure in the space, and the space static pressure setpoint. Similar status screen will appear for the exhaust fan if the unit is configured for exhaust fan space static control.

SUPPLY DUCT STATIC

Output: 0.0%
Static: 0.000"WC
Setpoint: 1.000"WC

SUPPLY/RETURN DUCT STATIC

This screen displays status points if the unit is configured for duct static pressure control. Status points include controller output ramp, static pressure in the duct, and the duct static pressure setpoint. Similar status screen will appear for the exhaust fan if the unit is configured for exhaust fan duct static control.



VOC Ramp Output

Setpoint: 0PPM
VOC Level: 0PPM
Ramp: Disabled 0%

VOC RAMP OUTPUT

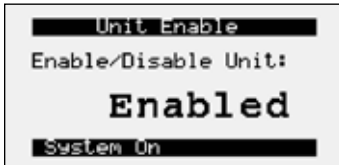
The VOC Ramp Output screen will be active if the unit is configured for VOC control. The screen displays the VOC setpoint, VOC level from the space and the status of the control ramp.

Menu

The controller is equipped with several menus to help guide users with altering program parameters. The following menus can be accessed by pressing the  button. To enter the desired menu, press the  button.

Unit Enable

The **Unit Enable** menu allows the user to enable and disable the unit through the controller. Reference sequence of operation for additional unit starts/stop details.



The unit ships from the factory in a disabled state. To allow the unit to operate, the controller must receive a run command from digital input U4. **Jumper unit terminals R - G to allow the unit to operate.**

Change to (Enabled/Disabled): Enables user to manually turn unit on/off via display. Unit terminal **G** must be connected to ground to enable the unit.

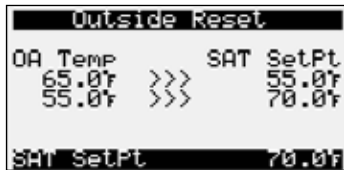
Control Variables

The **Controls Variables** menu allows the user to view and adjust unit control parameters.

Control Variables

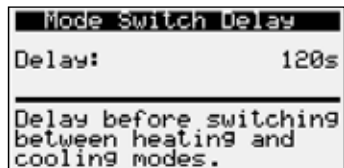
 Temperature Control

The **Temperature Control** menu allows the user to



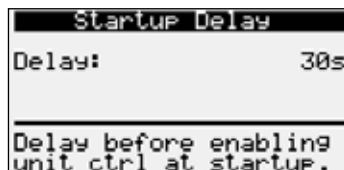
OUTSIDE RESET

This screen will be active if the controller is configured for outside air reset. The heating and cooling devices modulate to maintain the supply air temperature setpoint as determined by the outside reset circulation.



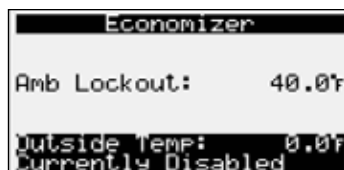
MODE SWITCH DISPLAY

This screen displays the time required before switching between heating and cooling mode.



STARTUP DISPLAY

This screen displays the delay time after the fans have started and tempering begins.



ECONOMIZER

This screen displays the economizer lockout temperature. Economizer will be locked out below the economizer lockout temperature (40°F).

Unit Status Overview

Cooling

Amb Lockout: 55.0°F
Outside Temp: 95.0°F
Currently Allowed

COOLING LOCKOUT

This screen displays the cooling lockout temperature. Cooling will be disabled when outside air is below the cooling lockout temperature (55°F).

Heating

Amb Lockout: 80.0°F
Outside Temp: 95.0°F
Currently Disabled

HEATING LOCKOUT

This screen displays the heating lockout temperature. Heating will be disabled when outside air is above the lockout temperature (80°F).

Economizer Mode

Selected Mode:
Outside Dry Bulb

Active Mode:
Outside Dry Bulb

ECONOMIZER CONTROL VARIABLES.

The economizer screen appears when economizer function is enabled.

The outside air damper will modulate between the min and max position to maintain the supply temperature set point.

The user can select the economizer control method from the following options:

Outside Dry Bulb – Economizing is allowed when the outside dry bulb is less than the economizer temperature enable set point.

Economizer Settings Outside Dry Bulb

Setpoint: 65.0°F
Sensor Status: Valid
Mode Status: Not Ready
Econ Status: Disabled

Outside Enthalpy - Economizing is allowed when outside enthalpy is less than the economizer enthalpy set point

Economizer Settings Outside Enthalpy

Setpoint: 23.0btu/lb
Sensor Status: Invalid
Mode Status: Not Ready
Econ Status: Disabled

Economizer Settings Hysteresis

Temperature: 2.0°F
Enthalpy: 2.0btu/lb

ECONOMIZER SETTINGS

There is a built-in hysteresis that disables economizer above the economizer set point.

(Example: If economizer outside dry bulb = 65°F, economizer operation is disabled above 67°F).

Control Variables

Energy Recovery

The **Energy Recovery** menu allows the user to adjust energy recovery wheel sequence setpoints.



THIS SCREEN DISPLAYS THE TEMPERATURE AT WHICH THE UNIT WILL ENABLE FROST CONTROL MODE IF NECESSARY (FACTORY DEFAULT=5°F)

This screen only appears if the unit has an energy recovery wheel and a frost control method was provided with the unit.

Upon sensing a high differential pressure across the energy wheel, the unit will enter defrost mode if the outside air temperature is below this temperature setting. Max Active Time and Min Off Time will be available if the frost control method was provided as timed exhaust or cycle wheel.

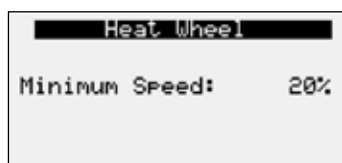


THIS SCREEN DISPLAYS THE HEAT WHEEL JOG FUNCTION

This screen display the energy recovery wheel jog function.

This screen only appears if the unit has an energy recovery wheel and stop wheel economizer method for control.

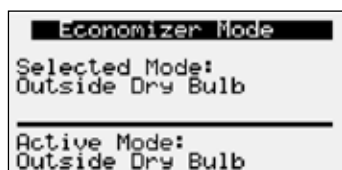
Momentarily enables the wheel in order to expose a new section to the airstream.



THIS SCREEN DISPLAYS THE HEAT WHEEL MINIMUM SPEED

This screen displays the minimum energy wheel speed.

This screen only appears if the unit has an energy recovery wheel with a VFD.

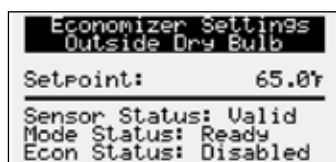


THIS SCREEN DISPLAYS THE ECONOMIZER MODE

This screen only appears if economizer functionality was provided.

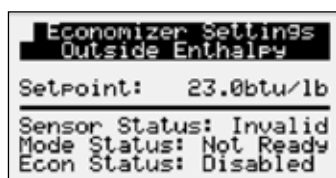
The user can select the economizer control method from the following options:

- Outside Dry Bulb
- Outside Enthalpy



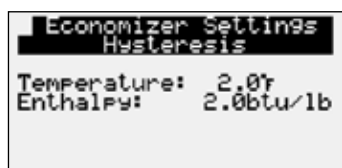
THIS SCREEN DISPLAYS THE ECONOMIZER SETTINGS

Outside Dry Bulb - Economizing is allowed when the outdoor dry bulb is less than the economizer temperature enable setpoint.



THIS SCREEN DISPLAYS THE ECONOMIZER SETTINGS OUTSIDE ENTHALPY

Outside Enthalpy - Economizing is allowed when the outside enthalpy is less than the economizer enthalpy setpoint.



THIS SCREEN DISPLAYS THE ECONOMIZER SETTINGS HYSTERESIS

There is a built-in hysteresis that disables economizer above the economizer setpoint.

(Example: If Economizer Outside Dry Bulb = 65°F, economizer operation is disabled above 67°F).

Control Variables

- ☐ Fan Control
- ☐ Supply Fan Control

The **Supply Fan Control** menu allows the user to adjust exhaust control setpoints

THIS SCREEN DISPLAYS THE SUPPLY FAN DELAY.

The supply fan delay will begin once the damper sequence is complete. This delay can be used to offset starting times between the supply fan and exhaust fan.

THIS SCREEN DISPLAYS MINIMUM AND MAXIMUM SUPPLY FAN SPEED PERCENTAGES.

The speed set point is the proportional percentage of the analog output from the controller to the VFD.

50% Speed = Min speed

100% Speed = Max speed

Possible Setpoint Sources:

Local – The fan speed will be constant; set from screen (e.g. 100%).

BMS – The BMS can directly control the fan speed (requires BMS communication option).

Duct Pressure – Fan speed is determined by duct pressure control loop.

Space Pressure – Fan speed is determined by building pressure control loop.

CO₂ – Fan speed is determined by CO₂ control loop.

VOC Monitor - Fan speed is determined by VOC control loop.

0-10 VDC Signal by Others - Fan speed is determined by others through a 0-10 VDC signal.

SUPPLY Fan

Enable Delay: 5s

Adjust delay time to offset starting fans.

SUPPLY Fan

Minimum Speed: 50%

Maximum Speed: 100%

SUPPLY Fan

Constant Volume Setpt

Occupied: 100%

SUPPLY Fan

Duct Static

Setpoint: 1.000"wc

Current: 0.000"wc

SUPPLY Fan

Space Static

Setpoint: 0.050"wc

Current: 0.000"wc

CO₂ Setpoint

Setpoint: 1000PPM

CO₂ Level: 0PPM

Control Variables

- ↳ Fan Control
- ↳ Exhaust Fan Control

The **Exhaust Fan Control** menu allows the user to adjust supply control setpoints.

```

Exhaust Fan
Enable Delay:      0s

Adjust delay time to
offset starting fans.
    
```

THIS SCREEN DISPLAYS THE EXHAUST FAN DELAY

The exhaust fan will begin once the damper sequence is complete. This delay can be used to offset starting times between the supply and exhaust fan.

```

Exhaust Fan
Minimum Speed:     50%
Maximum Speed:     100%
    
```

THIS SCREEN DISPLAYS MINIMUM AND MAXIMUM EXHAUST FAN SPEED PERCENTAGES.

The speed set point is the proportional percentage of the analog output from the controller to the VFD.

50% Speed = Min speed

100% Speed = Max speed

```

Exhaust Fan
Constant Volume Setpt
Occupied:          100%
    
```

Possible Setpoint Sources:

Local – The fan speed will be constant; set from screen (e.g. 100%).

BMS – The BMS can directly control the fan speed (requires BMS communication option).

Space Pressure – Fan speed is determined by building pressure control loop.

Supply Fan Tracking with Offset – The exhaust fan will track the supply fan, between a minimum and maximum position. An offset can be added to achieve the proper balance.

Duct Pressure – Fan speed is determined by duct pressure control loop.

0-10 VDC Signal by Others - Fan speed is determined by others through a 0-10 VDC signal.

```

Exhaust Fan
Space Static
Setpoint:          0.050"wc
Current:           0.00"wc
    
```

```

Exhaust Fan
Supply Tracking
Offset:            -10%
    
```

```

Exhaust Fan
Return Duct Static
Setpoint:          -2.000"wc
Current:           0.000"wc
    
```

Menu

Control Variables

➤ Advanced

User Login

Enter Password: 1000

Current Access:
Read Only

The **Advanced** menu allows the user to access several submenus regarding controller information, controller overrides, network settings, I/O configuration, and unit configuration. Submenu options are read only and will require the user to input proper login criteria. The **service password (1000)** is required to change service access menus. Consult factory for factory level access.

Control Variables

➤ Advanced

➤ Manual Overrides

The **Manual Overrides** menus are for start-up, commissioning, and troubleshooting.

Manual Override Mode

Enable: ☐ 720m

Time Remaining: 0:00
Status: Disabled

MANUAL OVERRIDE MODE

The Manual Overrides menu is for start-up, commissioning, and troubleshooting. This menu allows the user to override the control loops and specific inputs and outputs.

To access the Manual Overrides submenus, enter the **service password (1000)**. Manual overrides must be enabled at this screen to allow the user to override control loops. Override options must be changed from Auto to Manual for manual control.

Unit On Off

Override: Auto

Value: On

Enable Main Override

THIS SCREEN ALLOWS THE USER TO OVERRIDE THE UNIT ON OR OFF.

When manual override is set to enable, use the arrow buttons to turn the unit on or off.

Occupancy

Override: Auto

Value: Occupied

Enable Main Override

THIS SCREEN ALLOWS THE USER TO OVERRIDE OCCUPANCY CONTROL.

When manual override is set to enable, use the arrow buttons to change occupancy control.

Supply Fan

Override: Auto

Command: On

Speed: 100%

Enable Main Override

THIS SCREEN ALLOWS THE USER TO OVERRIDE THE SUPPLY FAN VFD SPEED (IF EQUIPPED).

The speed is the proportional percentage of the analog output from the controller to the VFD.

0% Speed = Min speed (determined by VFD)

100% Speed = Max speed (determined by VFD)

(Reference unit Installation and Operation Manual for VFD programming).

Exhaust Fan

Override: Auto

Command: On

Speed: 100%

Enable Main Override

THIS SCREEN ALLOWS THE USER TO OVERRIDE EXHAUST FAN VFD SPEED (IF EQUIPPED).

This screen only appears if the unit is equipped with a exhaust fan VFD controlled by the microprocessor.

The speed is the proportional percentage of the analog output from the controller to the VFD.

0% Speed = Min speed (determined by VFD)

100% Speed = Max speed (determined by VFD)

(Reference unit Installation and Operation Manual for VFD programming).

Menu

| | |
|-----------------------------|------|
| Economizer Ramp | |
| Override: | Auto |
| Value: | 0% |
| Enable Main Override | |

THIS SCREEN ALLOWS THE USER TO OVERRIDE THE ECONOMIZER CONTROL OPERATION.

This screen allows the user to override the economizer control, if equipped.

| | |
|-----------------------------|------|
| Defrost Ramp | |
| Override: | Auto |
| Value: | 0% |
| Reduces Energy Recovery | |
| 100%=Full Bypass/MinSpeed | |
| ER Ramp: 100% | |
| Enable Main Override | |

THIS SCREEN ALLOWS THE USER TO OVERRIDE THE ENERGY RECOVERY DEFROST OPERATION.

This screen only appears if modulating wheel frost control is equipped. When the defrost control ramp is in manual mode, use the arrow buttons to vary the defrost output.

0% = Maximum Wheel Speed

100% = Minimum Wheel Speed

| | |
|-----------------------------|------|
| Energy Recovery Ramp | |
| Override: | Auto |
| Value: | 100% |
| Actual output after | |
| defrost: 100% | |
| 100%=Full Speed | |
| Enable Main Override | |

ENERGY RECOVERY RAMP

This screen only appears with an energy wheel VFD. When energy recovery ramp is in manual mode, use the arrow buttons to vary the energy recovery ramp.

Control Variables

- ↳ Advanced
- ↳ Adv. Setpoints

The **Advanced Setpoints** Menus allows the user to make modifications to lockouts and PID loops. Contact factory before adjusting.

| | |
|-------------------|--------|
| Economizer | |
| P Gain: | 2.000 |
| I Time: | 300s |
| Output: | |
| Temp: | 0.0% |
| Setpoint: | 52.5°F |
| | 70.0°F |

ECONOMIZER

This screen only appears if an economizer option was provided with the unit. The controller utilizes a PI loop control for economizer. This allows for less sporadic changes in supply temperature, resulting in a smooth reaction to changing conditions.

| | |
|--|--|
| Economizer | |
| Disable Fallback: <input type="checkbox"/> | |
| Prevents active mode | |
| from falling back to | |
| next available mode if | |
| sensors are invalid. | |

ECONOMIZER FALLBACK

This screen only appears if an economizer was selected. The controller will fall back to the next available mode if sensors become invalid. This screen allows this functionality to be disabled.

| | |
|------------------------|------|
| Defrost | |
| Defrost Delay: | 30 s |
| Delay before the unit | |
| enters defrost after | |
| the exhaust temp drops | |
| below frost threshold | |

DEFROST

This screen only appears if a defrost strategy based on exhaust air temperature was selected. The controller will wait 30 seconds after the exhaust air temperature drops below the frost threshold to enable defrost. This delay reduces cycling in and out of defrost.

| | |
|------------------------|-------|
| Defrost | |
| Min EF Defrost Speed: | 50.0% |
| Minimum EF Speed when | |
| the units enters timed | |
| exhaust defrost. | |

TIMED EXHAUST DEFROST

The screen only appears if a timed exhaust defrost strategy is selected. This screen allows the minimum exhaust fan speed to be increased during defrost to ensure proper airflow to defrost the energy recovery device.

Menu

```
SUPPLY DUCT STATIC PID
P Gain:      4.000
I Time:      30s
-----
Output:      0.0%
Static:      0.006"wc
Setpoint:    1.000"wc
```

SUPPLY DUCT STATIC

This screen only appears if the unit is controlling to supply duct static. The controller utilizes a PI loop control for the supply duct static control. This allows for less sporadic changes in the supply fan speed, resulting in a smooth reaction to changing conditions.

```
Login Duration
Login Duration: 30m
-----
Time before being
automatically logged
out of Service and
Factory menus.
```

LOGIN DURATION

This screen allows the user to change the login duration which controls how long the user is logged into the service and factory menus.

```
Password Management
Service Password: 9998
-----
Save Password: ☐
```

PASSWORD MANAGEMENT

This screen allows the user to change the service password required to change service access menus.

```
Unit Off Protection
Enable When OA < 40°F
Hot Water Valve: ☐
Open HW Valve: 30%
-----
Enables HW Valve When
OFF to set % when
OA temp is below set.
```

UNIT OFF PROTECTION

This screen only appears if hot water heating and/or cold water cooling is supplied with the unit. Unit off protection allows the unit to open the hot water and cold water valves to a preset position when the unit is off and the outdoor air is below the specified set point. This will keep water moving in the coils, to reduce the chance of freezing the coils

```
Call For Cooling
Call for Cooling
Locks Out Heating: ☐
-----
Enables Call for Cool
input to lock out heat
regardless of supply
temperature.
```

CALL FOR COOLING

This screen only appears if the unit has heating and cooling. This check box allows for the call for cooling digital input to allow cooling and lockout out heating.

Control Variables

- ↳ Advanced
- ↳ Network Settings

The **Network Settings** Menu allows the user to view and modify network settings. The **service password (1000)** is required to make changes.

```

BMS Communications
Type:      None
Location:  Ethernet
    
```

BMS COMMUNICATION MENU

This screen shows the current BMS protocol and the location where the BMS system should be connected.

```

pCO Board Address
Enable DHCP: ☐
IP: 192.168.1.101
Mask: 255.255.255.0
GW: 192.168.1.1
DNS: 0.0.0.0
Save Changes: ☐
    
```

THIS SCREEN ALLOWS THE USER TO VIEW AND ADJUST CONTROLLER TCP/IP SETTINGS.

This screen will appear with or without a network protocol provided with the unit.

This screen allows the user to configure the IP setting for BMS and/or when the Web User Interface will be utilized. The controller may have a DHCP server-assigned address or a manually-assigned static IP address. Factory settings are shown in the screen to the left.

To change pCO Board Address parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to Network Settings menu and view pCO Board Address screen.
3. Move cursor to desired parameter by pressing the enter button. Press up and down arrows to adjust the parameter. Press enter to accept adjusted value.
4. Once desired parameters have been entered, enable the 'Save Settings' option and press the enter button.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View pCO Board Address Config. If changed values did not save, contact the factory.

```

BACnet IP Config
Device: 0077077
Port: 0047808
    
```

THIS SCREEN ALLOWS THE USER TO VIEW AND ADJUST CONTROLLER BACNET IP CONFIG SETTINGS.

This screen will appear if the unit is set for BACnet IP and allows the user to set the device and port settings.

```

Modbus TCP Slave
Device ID: 1
    
```

THIS SCREEN ALLOWS THE USER TO VIEW AND ADJUST CONTROLLER MODBUS TCP SLAVE.

This screen will appear if the unit is set for Modbus TCP and allows the user to set device ID number.

```

BACnet MSTP Config
Device: 0077077
Info Frames: 20
Max Masters: 127
MSTP Address: 57
Baud Rate: 9600
Save Settings: ☐
    
```

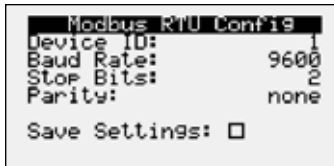
THIS SCREEN ALLOWS THE USER TO ADJUST BACNET AND MSTP PARAMETERS.

This screen only appears if the selected BMS protocol is set to BACnet MSTP. Factory settings are shown in the screen to the left.

To change BACnet MSTP parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to Network Settings menu and view BACnet MSTP Config screen.
3. Move cursor to desired parameter by pressing the enter button. Press up and down arrows to adjust the parameter. Press enter to accept adjusted value.
4. Once desired parameters have been entered, enable the 'Save Settings' option and press the enter button.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View BACnet MSTP Config. If changed values did not save, contact the factory.

Menu

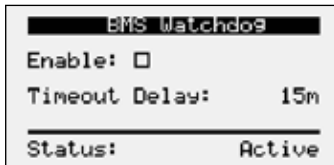


THIS SCREEN ALLOWS THE USER TO ADJUST MODBUS PARAMETERS.

This screen only appears if the selected BMS protocol is set to Modbus. Factory settings are shown in the screen to the left.

To change Modbus RTU parameters:

1. Power on the controller and allow several minutes to initialize.
2. Go to Network Settings menu and view Modbus RTU Config screen.
3. Move cursor to desired parameter by pressing the enter button. Press up and down arrows to adjust the parameter. Press enter to accept adjusted value.
4. Once desired parameters have been entered, enable the 'Save Settings' option and press the enter button.
5. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.
6. View Modbus RTU Config. If changed values did not save, contact the factory.



THIS SCREEN ALLOWS THE USER TO ENABLE THE BMS WATCHDOG FUNCTION.

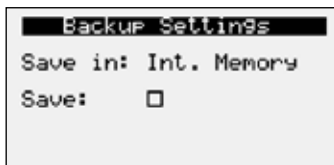
The BMS watchdog function verifies BMS connectivity. The watchdog is required for the BMS to take the place of a hardwired sensor. The BMS toggles the watchdog variable from true to false within the timeout delay. If the timer expires, the controller falls back to hardwired sensors until the BMS connection can be established. At this time, a BMS watchdog alarm activates.

The following variables may be used by the BMS in place of hardwired sensors:

- Outside_RH_from_BMS
- Outside_Temp_from_BMS
- Return_RH_from_BMS
- Return_Temp_from_BMS
- Space_1_CO2_from_BMS
- Return_CO2_from_BMS
- Space_Static_from_BMS
- Space_1_VOC_from_BMS

Control Variables

- ☒ Advanced
- ☒ Backup/Restore



The Backup/Restore Menus allows the user to create a backup file of setpoints and configuration variables on a USB drive or in the controller's internal memory.

Connecting to USB Drives

The controller has a built-in Micro USB port for connecting to USB drives. The USB drives can be used for backing up all settings and reported conditions such as alarm history and current values. This creates a file named User_Backup.txt.

CREATING A BACKUP FILE

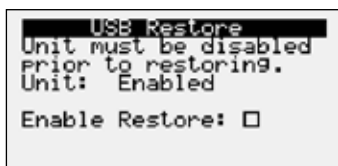
Important:

- At first startup or commissioning, or prior to communicating with Technical Support about performance issues, we recommend creating a backup file for each controller.
- Name each file with the unit sales order–line number found on the silver nameplate attached to the electrical access door.
- Also consider creating a backup file whenever significant program changes are made.

To create a system backup file using the handheld or virtual keypad/display buttons:

1. Go to the Main Menu/Ctrl Variables/Advanced/Login screen. Press the Enter and Up or Down arrow buttons to enter the service password, which is 9998.
2. Go to the Main Menu/Ctrl Variables/Advanced/Backup/Restore screen.
3. Press the Up or Down arrow buttons to navigate to the Backup Settings screen.

4. Press the Enter and Up or Down arrow buttons to select the backup location (internal memory or USB). If creating a backup to a USB drive, insert a USB drive into the main controller.
5. Press Enter to highlight and then the Up or Down arrow buttons to fill the Save checkbox. This action creates the backup file.



RESTORING FROM A BACKUP FILE

From USB

1. Place the restore file in the root directory of a USB drive. (Do not place the file within a folder on the USB drive.) The file must be named: User_Backup.txt
2. Insert the USB drive into the controller's USB port.
3. Go to the Main Menu/Unit Enable screen. Press the Enter and Up or Down arrow buttons to disable the unit.
4. Go to the Main Menu/Ctrl Variables/Advanced/Login screen. Press the Enter and Up or Down arrow buttons to enter the service password (9998).
5. Go to the Main Menu/Ctrl Variables/Advanced/Backup/Restore screen.
6. Press the Up or Down arrow buttons to navigate to the USB Restore screen.
7. Press Enter to highlight and then the Up or Down arrow buttons to fill the Restore checkbox. This action restores the backup file. If there is an error during the process, the specific error is displayed on this screen.
8. Cycle power to the controller.

From internal memory

1. Go to the Main Menu/Unit Enable screen. Press the Enter and Up or Down arrow buttons to disable the unit.
2. Go to the Main Menu/Ctrl Variables/Advanced/Login screen. Press the Enter and Up or Down arrow buttons to enter the service password, which is 9998.
3. Go to the Main Menu/Ctrl Variables/Advanced/Backup/Restore screen.
4. Press the Up or Down arrow buttons to navigate to the Internal Restore screen. This screen is only available when a backup file exists in internal memory.
5. Press Enter to highlight and then the Up or Down arrow buttons to fill the Restore checkbox. This action restores the backup file. If there is an error during the process, the specific error is displayed on this screen.
6. Cycle power to the controller.



FACTORY DEFAULT

This screen allows access to restore the unit back to the factory defaults.

Restoring to the factory defaults will result in all values returning to the factory defaults. The user should not restore to these settings unless instructed by the factory.

Menu

Control Variables

- ↳ Advanced
- ↳ I/O Configuration

```
I/O Configuration
IO Type: Analog Input
Supply Air Temp
Ch: M U4   Type: NTC

Value:      71.6°F
```

The **IO Configuration** Menu allows the user to view and modify controller input and output points.

THIS SCREEN ALLOWS THE USER TO VIEW AND EDIT I/O POINTS.

Screen to the left is an example of an analog input configuration screen. Similar screens appear for remaining I/O when selected.

To monitor individual I/O points:

1. Press the enter button to highlight the I/O type.
2. Press the up and down arrows to change the IO type.
3. Press the enter button to highlight the controller channel.
4. Press the up and down arrows to change the channel.

```
IO Conf Options
Editable:  ☐
Scroll by
All Configured: ☒
```

THIS SCREEN ALLOWS THE USER TO ENABLE I/O CONFIGURATION EDITS.

Changes to the IO configuration requires the service login password. Consult factory for IO configuration changes.

ADJUSTMENT OF I/O CONFIGURATION MUST ONLY BE DONE UNDER FACTORY GUIDANCE! IMPROPER ADJUSTMENT MAY RESULT IN SYSTEM DAMAGE!

Control Variables

- ↳ Advanced
- ↳ Unit Configuration

```
Unit Configuration
Supply Fan Control

Type: Constant Volume
SAVE CONFIG: No
```

The **Unit Configuration** menus allows the user to view unit configuration provided from factory. Configuration menus listed below can be altered with the service password. Consult factory for unit configuration changes!

THIS SCREEN ALLOWS THE USER TO VIEW AND CHANGE THE SUPPLY FAN CONTROL TYPE.

Reference control variables for possible supply fan control methods.

```
Unit Configuration
Exhaust Fan Control

Type: Constant Volume
SAVE CONFIG: No
```

THIS SCREEN ALLOWS THE USER TO VIEW AND CHANGE THE EXHAUST FAN CONTROL

Reference control variables for possible exhaust fan control methods.

```
Unit Configuration
Configuration Code

1111011110000000
SAVE CONFIG: No
```

UNIT CONFIGURATION CODE

The code is set from the factory to operate the components selected with the unit. When troubleshooting, refer to the wiring diagram sent with the unit (located on the control center door) to verify the unit code is correct. If changes to the setup code are required, save the configuration by changing save config to yes.

Alarms

The **Alarms** menu allows the user to view active alarms, reset active alarm (if possible), and alarm history.

```
Active Alarms 0/0  
  
No Active Alarms  
_____
```

ACTIVE ALARMS

If an alarm occurs, alarm the button will glow red on the controller and the remote display (if installed).

To view alarm, press the Alarm button once. This will display the most recent alarm. If the alarm cannot be cleared, the cause of the alarm has not been fixed. Press the up and down buttons to view any additional occurring alarms.

```
Reset Active Alarms  
  
Press ENTER to reset  
active alarms.  
  
Alarm Count: 00
```

RESET ACTIVE ALARMS

This screen allows the user to clear active alarms.

```
Alarm Event History  
Record: 001+ ID:044  
  
Exp Board 4 Status  
Board is Offline  
Alarmed: 09:45am 01/24  
_____
```

ALARM EVENT HISTORY

This screen allows the user view recent alarms. To view all saved alarms, press the “down” button to enter the data logger.

```
Clear Alarm Log  
  
Clear Alarm Log? No
```

CLEAR ALARM LOG

This screen allows the user to clear all alarms in alarm log history.

Appendix: Remote Display (pGD1)

The pGD1 is an optional remote display for use with manufacturer's microprocessor controllers. The remote display allows for remote monitoring and adjustment of parameters of the unit mounted controller. The remote display allows identical access to menus and screens as the unit mounted controller display. The remote display is not available when the unit has BACnet MSTP or Modbus RTU.



Specifications

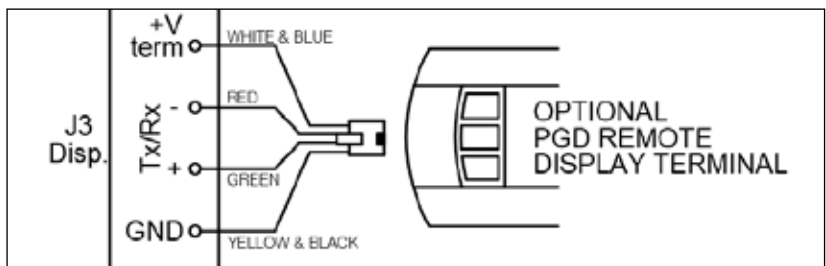
| | |
|-----------------------------------|--|
| Carel Model | PGD1000W00 |
| Power Supply | Power supplied from unit controller through RJ25 cable |
| Max distance from unit controller | 150 feet |
| Required Cable | 6P6C RJ25/RJ12 Cable (straight) |
| Operating Conditions | -4°F to 140°F, 90%RH (non-condensing) |
| Display Type | Backlit LED with lighted buttons |

Installation

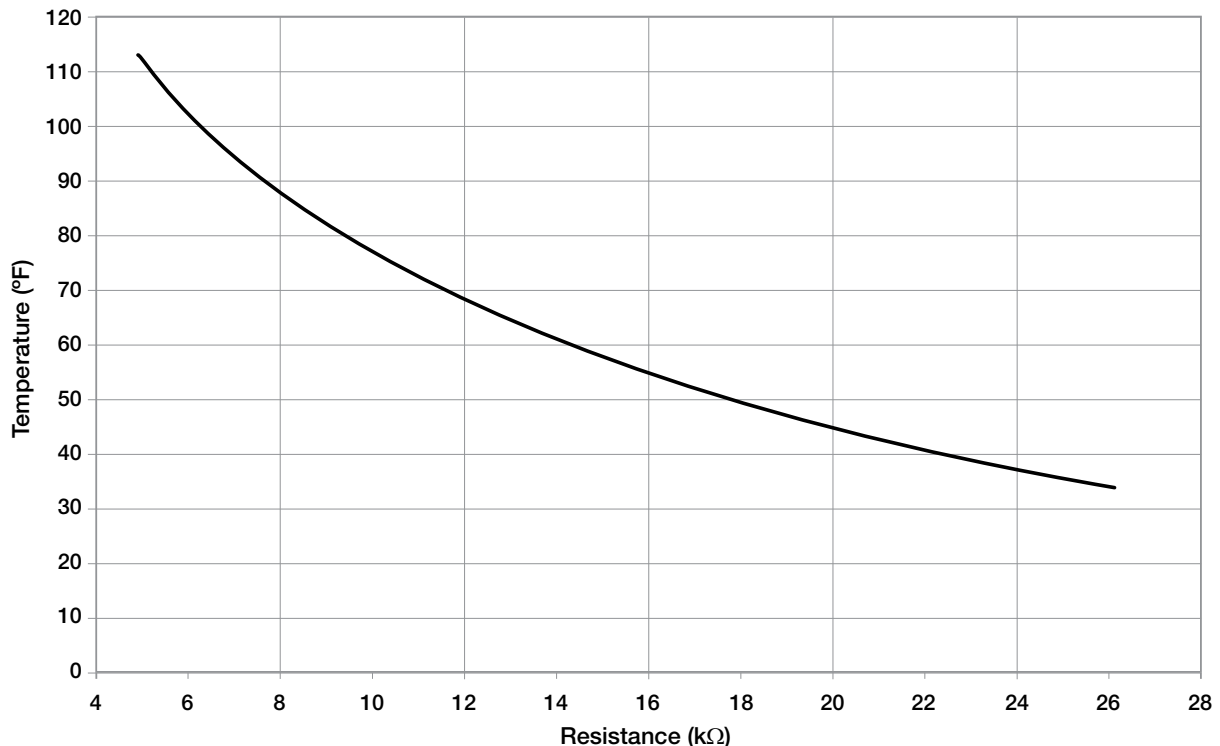
The remote display connects to the unit mounted controller through a six-wire RJ25 or RJ12 telephone cable (straight). When ordered from the factory, a cable is provided with the remote display. The display and cable can be used to assist with start-up and maintenance.

Connecting Cable

If mounted remotely, the factory cable can either be extended or replaced with a longer cable to obtain the necessary distance.



NTC Temperature Sensor Chart

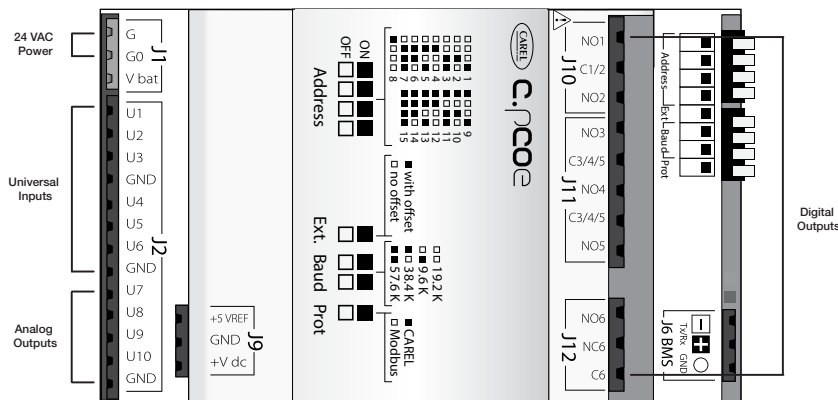


Appendix: I/O Expansion Board (c.pCOe) Quick Start

The expansion board is an I/O module than can be used to monitor additional statuses or provide commands from large board controller. It allows the user to view and control:

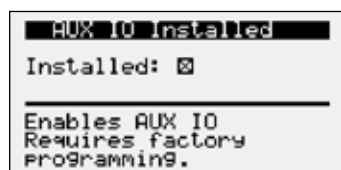
- 8 Universal Inputs (Digital Input*, NTC, 0/1VDC, 0/10VDC, 0/20mA, 4/20mA, 0/5VDC)
*Only dry to ground contacts can be utilized for digital inputs. Applying voltage will result in damage to the I/O expansion board.
- 2 Analog Outputs (VDC)
- 6 Digital Outputs

The inputs and outputs can be monitored and controlled by the Building Management System. Reference Points List for detailed point information.

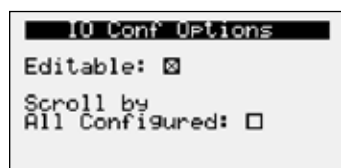


Setup

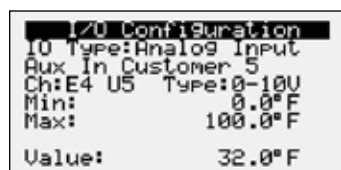
In order for the controller to communicate with the c.pCOe, several parameters must be adjusted. If you have a c.pCOe installed from the factory, the controller is already set up for communication with the main controller. The factory password is required for expansion board and I/O configuration updates. Consult factory for I/O configuration changes.



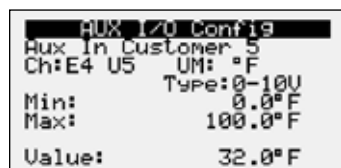
Enabling the c.pCOe in the Main Controller. - To enable the c.pCOe expansion I/O module, go to Ctrl Variables/Advanced/Unit Config. User will have to enter the Service Password to make any edits at this point. Consult factory for configuring the expansion board. The expansion board must be enabled to configure spare I/O points. Once enabled, the user must reboot the controller. See screens to the left for expansion board enable points.



Configuring the I/O Type - In order to edit and configure the I/O configuration of the unit, go to Ctrl Variables/Advanced/I/O Configuration. The user must enable the Editable option for configuring I/O points. If configuring a new I/O point, 'Scroll by All Configured' must be deselected to view all I/O options.



Change or Update the I/O Point - Once the editable option is selected, the user must scroll to the I/O Configuration Menu. At this menu the desired I/O type can be selected. Once selected the user can configure the desired channel at the expansion board. The channel will have an 'E' designation for expansion board. Aux In Customer 1-10, Aux Analog Out 1-4, and Aux Digital Out 1-6 will be allocated for the I/O expansion board. See example to the left.



Viewing c.pCOe Auxiliary Values - Once the expansion board I/O is configured, the user can view and/or change the I/O type by navigating to Ctrl Variables/Aux I/O Config.

Appendix: Points List

| VARIABLE | DESCRIPTION | ACTIVE TEXT | INACTIVE TEXT | OBJECT INSTANCE | HYST | INDEX |
|--|--|-------------|---------------|--|------|--|
| Analog Inputs - Read Only | | | | BACNET (Object Type-AI, Access-ReadCOV_NoWrite) | | MODBUS (Register Type - Input, Size -2) |
| Supply_Temp_Analog_Input | Supply Temperature | | | 1 | 0.1 | 30031 |
| Outside_Air_Temp_Analog_Input | Outside Air Temperature | | | 2 | 0.1 | 30033 |
| Exhaust_Temp_Analog_Input | Exhaust Temperature | | | 3 | 0.1 | 30035 |
| Outside_RH_Analog_Input | Outside Relative Humidity % | | | 4 | 0.1 | 30037 |
| Space_Static_Pressure_Analog_Input | Space Static Pressure | | | 5 | 0.01 | 30039 |
| Supply_Duct_Static_Pressure_Analog_Input | Supply Duct Static Pressure | | | 6 | 0.01 | 30041 |
| Space_CO2_1_Analog_Input | Space 1 CO2 ppm | | | 7 | 10 | 30043 |
| Exhaust_Fan_Speed_Analog_Input | Exhaust Fan Speed Remote Command Input value (0-10 by others) | | | 8 | 1 | 30045 |
| Supply_Fan_Speed_Analog_Input | Supply Fan Speed Remote Command Input value (0-10 by others) | | | 9 | 0.1 | 30047 |
| Space_VOC_1_Analog_Input | Space 1 VOC ppm | | | 10 | 10 | 30049 |
| Aux_In_Customer_1 | Customer defined auxiliary input | | | 31 | 0.1 | 30051 |
| Aux_In_Customer_2 | Customer defined auxiliary input | | | 32 | 0.1 | 30053 |
| Aux_In_Customer_3 | Customer defined auxiliary input | | | 33 | 0.1 | 30055 |
| Aux_In_Customer_4 | Customer defined auxiliary input | | | 34 | 0.1 | 30057 |
| Aux_In_Customer_5 | Customer defined auxiliary input | | | 35 | 0.1 | 30059 |
| Aux_In_Customer_6 | Customer defined auxiliary input | | | 36 | 0.1 | 30061 |
| Analog Values - Read/Write | | | | BACNET (Object Type-AV, Access-ReadCOV_Commandable) | | MODBUS (Register Type - Holding, Size -2) |
| Temperature_Setpoint | Temperature Set point | | | 1 | 0 | 40001 |
| Economizer_Temp_Enable_Setpoint | Economizer Ambient Temp Enable Setpoint. Allow Econ when OAT<Spt | | | 2 | 0 | 40003 |
| Economizer_Enthalpy_Enable_Setpoint | Economizer Enthalpy Enable Setpoint. Allow Econ when OA Enthalpy<Spt | | | 3 | 0 | 40005 |
| Space_Static_Pressure_Setpoint | Space Static Pressure Setpoint | | | 4 | 0.1 | 40007 |
| Supply_Duct_Static_Pressure_Setpoint | Supply Duct Static Pressure Setpoint | | | 5 | 0.1 | 40009 |
| Space_CO2_Setpoint | Space CO2 Setpoint | | | 6 | 0.1 | 40011 |
| Space_VOC_Setpoint | Space VOC Setpoint | | | 7 | 0.1 | 40013 |
| SF_Control_Signal_BMS | BMS to control signal for supply fan speed | | | 8 | 0.1 | 40015 |
| EF_Control_Signal_BMS | BMS to control signal for exhaust fan speed | | | 9 | 0.1 | 40017 |
| Outside_RH_from_BMS | Outside RH from BMS. Used when source selection is set to BMS. | | | 10 | 0.1 | 40019 |
| Outside_Temp_from_BMS | Outside Temp from BMS. Used when source selection is set to BMS. | | | 11 | 0.1 | 40021 |
| Space_1_CO2_from_BMS | Space 1 CO2 from BMS. Used when source selection is set to BMS. | | | 12 | 0.1 | 40023 |
| Space_Static_from_BMS | Space Static from BMS. Used when source selection is set to BMS. | | | 13 | 0.1 | 40025 |
| Space_VOC_from_BMS | SpaceVOC from BMS. Used when source selection is set to BMS. | | | 14 | 0.1 | 40027 |
| Aux_BMS_Analog_Output_1 | BMS Commanded auxiliary analog output | | | 101 | 0.1 | 40101 |
| Aux_BMS_Analog_Output_2 | BMS Commanded auxiliary analog output | | | 102 | 0.1 | 40103 |
| Aux_BMS_Analog_Output_3 | BMS Commanded auxiliary analog output | | | 103 | 0.1 | 40105 |
| Aux_BMS_Analog_Output_4 | BMS Commanded auxiliary analog output | | | 104 | 0.1 | 40107 |

Appendix: Points List

| VARIABLE | DESCRIPTION | ACTIVE TEXT | INACTIVE TEXT | OBJECT INSTANCE | HYST | INDEX |
|--|--|-------------|---------------|---|------|--|
| Analog Values - Read Only | | | | BACNET (Object Type-AV, Access-ReadCOV_NoWrite) | | MODBUS (Register Type - Input, Size -2) |
| Unit_Status_Mode | 0: Off/Standby 1: Occupied Start 2: Opening Dampers3: Dampers Open 4: Fan Start Delay 5: Exhaust Fan Starting 6: Supply Fan Starting 7: System On 8: System Disabled 9: Remote Off 10: Shutdown Alarm 19: Fans and Energy Recovery 20: Economizing 21: Defrost Active 22: Overrides Active 23: Expansion Offline | | | 45 | 0 | 30001 |
| Supply_Temperature_Calculated_Setpoint | Active Supply Temperature Setpoint | | | 46 | 0.1 | 30003 |
| Defrost_Ramp | Defrost Ramp | | | 47 | 1 | 30005 |
| Economizer_Ramp | Economizer Ramp | | | 48 | 1 | 30007 |
| Exhaust_Fan_Space_Static_Pressure_Ramp | Exhaust Fan Space Static Pressure Ramp | | | 49 | 1 | 30009 |
| Exhaust_Fan_Supply_Tracking_Ramp | Exhaust Fan Supply Tracking Ramp | | | 50 | 1 | 30011 |
| Space_CO2_Control_Ramp | Space CO2 Control Ramp | | | 51 | 1 | 30013 |
| Supply_Duct_Static_Pressure_Ramp | Supply Duct Static Pressure Ramp | | | 52 | 1 | 30015 |
| Supply_Fan_Space_Static_Pressure_Ramp | Supply Fan Space Static Pressure Ramp | | | 53 | 1 | 30017 |
| Outside_Dewpoint | Outside Dewpoint | | | 54 | 0.1 | 30019 |
| Outside_Enthalpy | Outside Enthalpy | | | 55 | 0.1 | 30021 |
| Energy_Recovery_Analog_Output | Energy Recovery Analog Output | | | 56 | 0.1 | 30023 |
| Exhaust_Fan_Speed_Analog_Output | Exhaust Fan Speed Analog Output | | | 57 | 0.1 | 30025 |
| Supply_Fan_Speed_Analog_Output | Supply Fan Speed Analog Output | | | 58 | 0.1 | 30027 |
| Integer Values - Read Only | | | | BACNET (Object Type-IV, Access-ReadCOV_NoWrite) | | MODBUS (Register Type - Input, Size -2) |
| LatestAlm | Most recent alarm. See alarm table. | | | 1 | 1 | 30101 |
| Binary Inputs - Read Only | | | | BACNET (Object Type-BI, Access-ReadCOV_NoWrite) | | MODBUS (Register Type - Discrete) |
| Supply_Fan_1_Status_Digital_Input | Supply Fan 1 Status | Active | Inactive | 10 | 0 | 10100 |
| Exhaust_Fan_1_Status_Digital_Input | Exhaust Fan 1 Status | Active | Inactive | 11 | 0 | 10101 |
| Unit_Enable_Digital_Input | Remote Unit Enable Digital Input Status | Active | Inactive | 12 | 0 | 10102 |
| Binary Inputs - Read/Write | | | | BACNET (Object Type-BV, Access-Read_Commandable) | | MODBUS (Register Type - Coil) |
| BMS_Watchdog | BMS Watchdog command. Used to determine comm status. Must heartbeat within the watchdog timeout delay to detect comm status. | Active | Inactive | 1 | 0 | 2 |
| System_Enable | Master system enable/disable point. | Enable | Disable | 2 | 0 | 3 |
| Reset_All_Alarms | Alarm Reset Command. | Reset | Normal | 3 | 0 | 4 |
| Outside_RH_Source_BMS | Outside RH Source Selection. True = BMS. False = Local. | BMS | Local | 4 | 0 | 5 |
| Outside_Temp_Source_BMS | Outside Temp Source Selection. True = BMS. False = Local. | BMS | Local | 5 | 0 | 6 |
| Space_1_CO2_Source_BMS | Space 1 CO2 Source Selection. True = BMS. False = Local. | BMS | Local | 6 | 0 | 7 |
| Space_Static_Source_BMS | Space Static Source Selection. True = BMS. False = Local. | BMS | Local | 7 | 0 | 8 |
| SF_Control_Source_BMS | Allows the BMS to control supply fan speed. True = BMS. False = Local. | BMS | Local | 8 | 0 | 9 |
| EF_Control_Source_BMS | Allows the BMS to control exhaust fan speed. True = BMS. False = Local. | BMS | Local | 9 | 0 | 10 |
| Space_VOC_Source_BMS | Space VOC Source Selection. True = BMS. False = Local. | BMS | Local | 10 | 0 | 11 |
| Econ_Enable_Source_BMS | Economizer Enable Source Selection. True = BMS. False = Local. | BMS | Local | 11 | 0 | 12 |
| Econ_Enable_from_BMS | Economizer Enable from BMS. Used when source selection is set to BMS. | Enable | Disable | 12 | 0 | 13 |

Appendix: Points List

| VARIABLE | DESCRIPTION | ACTIVE TEXT | INACTIVE TEXT | OBJECT INSTANCE | HYST | INDEX |
|---|---|-------------|---------------|--|------|---|
| Binary Values - Read Only | | | | BACNET (Object Type-BV, Access- ReadCOV_NoWrite) | | MODBUS (Register Type - Discrete) |
| Global_Alarm | General alarm point. Optionally set to indicate any alarm is active, or a shutdown alarm is active. | Alarm | Normal | 30 | 0 | 10002 |
| System_Shutdown_Alarm | Shutdown alarm status. When true, System Enable will be set to false and the unit will remain off. | Shutdown | Normal | 31 | 0 | 10003 |
| Manual_Override_Active | Indicates that manual overrides are active. | Override | Normal | 32 | 0 | 10004 |
| Heat_Wheel_Enable_Digital_Output | Heat Wheel Enable Digital Output | Active | Inactive | 33 | 0 | 10005 |
| BMS_Offline_Alarm.Active | BMS Offline Alarm (0=Normal 1=Alarm) | Alarm | Normal | 34 | 0 | 10006 |
| Exhaust_Fan_1_Alarm.Active | Exhaust Fan 1 Alarm (0=Normal 1=Alarm) | Alarm | Normal | 35 | 0 | 10007 |
| Outside_Air_Temperature_Sensor_Alarm.Active | Outside Air Temperature Sensor Alarm (0=Normal 1=Alarm) | Alarm | Normal | 36 | 0 | 10008 |
| Filter_Alarm.Active | Outside Filter Alarm (0=Normal 1=Alarm) | Alarm | Normal | 37 | 0 | 10009 |
| Outside_RH_Sensor_Alarm.Active | Outside RH Sensor Alarm (0=Normal 1=Alarm) | Alarm | Normal | 38 | 0 | 10010 |
| Space_CO2_1_Analog_Input_Alarm.Active | Space CO2 1 Analog Input Alarm (0=Normal 1=Alarm) | Alarm | Normal | 39 | 0 | 10011 |
| Space_High_Static_Alarm.Active | Space High Static Alarm (0=Normal 1=Alarm) | Alarm | Normal | 40 | 0 | 10012 |
| Space_Static_Pressure_Analog_Input_Alarm.Active | Space Static Pressure Analog Input Alarm (0=Normal 1=Alarm) | Alarm | Normal | 41 | 0 | 10013 |
| Supply_Air_Temp_Low_Limit.Active | Supply Air Temp Low Limit Alarm (0=Normal 1=Alarm) | Alarm | Normal | 42 | 0 | 10014 |
| Supply_Air_Temperature_Sensor_Alarm.Active | Supply Air Temperature Sensor Alarm (0=Normal 1=Alarm) | Alarm | Normal | 43 | 0 | 10015 |
| Supply_Duct_Static_Pressure_Analog_Input_Alarm.Active | Supply Duct Static Pressure Analog Input Alarm (0=Normal 1=Alarm) | Alarm | Normal | 44 | 0 | 10016 |
| Supply_Fan_1_Alarm.Active | Supply Fan 1 Alarm (0=Normal 1=Alarm) | Alarm | Normal | 45 | 0 | 10017 |
| Supply_High_Duct_Static_Alarm.Active | Supply High Duct Static Alarm (0=Normal 1=Alarm) | Alarm | Normal | 46 | 0 | 10018 |
| Wheel_Rotation_Alarm.Active | Wheel Rotation Alarm (0=Normal 1=Alarm) | Alarm | Normal | 47 | 0 | 10019 |
| ER_Wheel_High_DP.Active | Energy Recovery Wheel high differential pressure (0=Normal 1=Alarm) | Alarm | Normal | 48 | 0 | 10020 |
| Greentrol_1_Alarm.Active | Greentrol Device Alarm | Alarm | Normal | 49 | 0 | 10021 |
| Greentrol_2_Alarm.Active | Greentrol Device Alarm | Alarm | Normal | 50 | 0 | 10022 |
| Binary Values - Commandable | | | | BACNET (Object Type-BV, Access- ReadCOV_Commandable) | | MODBUS (Register Type - Coil) |
| Aux_BMS_Digital_Output_1 | BMS Commanded auxiliary digital output | Active | Inactive | 101 | 0 | 21 |
| Aux_BMS_Digital_Output_2 | BMS Commanded auxiliary digital output | Active | Inactive | 102 | 0 | 22 |
| Aux_BMS_Digital_Output_3 | BMS Commanded auxiliary digital output | Active | Inactive | 103 | 0 | 23 |
| Aux_BMS_Digital_Output_4 | BMS Commanded auxiliary digital output | Active | Inactive | 104 | 0 | 24 |
| Aux_BMS_Digital_Output_5 | BMS Commanded auxiliary digital output | Active | Inactive | 105 | 0 | 25 |
| Aux_BMS_Digital_Output_6 | BMS Commanded auxiliary digital output | Active | Inactive | 106 | 0 | 26 |

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.

