

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.

DOAS v6.2
Version date 7/21

Technical Support
Call 1-866-478-2574



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 tempered 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 set points, view unit status points and alarms. The microprocessor controller is capable of communicating over several protocols:

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

Reference Points List for a complete list of BMS points.

Built-In Occupancy Schedule

The controller has an internal programmable time clock, allowing the user to set occupancy schedules for each day of the week. The controller option also has morning warm-up and cool down capability for improved comfort at the time of occupancy.

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. Alarms are also communicated via BMS (if equipped).

Occupancy Modes

The microprocessor controller offers three modes of determining occupancy: a digital input, occupancy schedule or the BMS. If in the unoccupied mode, the unit will either be shut down, continue normal operation utilizing adjustable unoccupied set points, recirculate with unoccupied set points or will cycle on to maintain adjustable unoccupied space temperature and humidity set points (space temperature and humidity sensor is optional).

Remote Unit Access (if equipped)

The WebUI and Remote Display are two ways to gain access to the unit controller allowing monitoring of the unit and parameter adjustment without being at the unit.

The WebUI can be accessed via a building network and is included with every unit controller. The Remote Display is an LCD to be panel mounted in a remote location and is an option available for purchase.

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.

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Our Commitment	Backcover

The microprocessor controller can be configured for air handler, energy recovery, and dedicated outdoor air systems. Each application utilizes similar technologies for heating and cooling: chilled water, hot water, indirect gas, electric heat, and packaged or split DX cooling. All set points, lockouts and delays are user adjustable via the integral keypad display, remote display, or web user interface.

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 schedule. When a start command becomes active the following steps occur:

- Energy recovery wheel starts, if equipped
- Factory mounted and wired dampers are powered (Outside air, exhaust air, and recirculation air dampers, if equipped)
- Exhaust fan, if equipped, starts after adjustable delay
- Supply fan starts after adjustable delay
- Tempering operation starts after adjustable delay

UNIT STOP COMMAND: A shutdown occurs when there is not an occupied or unoccupied start command. The following shutdown methods can occur.

Hard shutdown occurs under the following conditions:

- A user or the BMS disables the system, and the supply temperature is less than the soft shutdown enable set point.
- Occupancy is commanded to unoccupied while there is no unoccupied start command, and the supply temperature is less than the soft shutdown enable set point.

When a hard shutdown occurs:

- The unit shuts down immediately.
- Dampers spring-return to their off position. Damper power is cut 30 sec. after the fans. This allows the fans to slow down prior to spring closing the dampers.

Soft shutdown occurs under the following conditions:

- A user or the BMS disables the system, and the supply temperature is greater than or equal to the soft shutdown enable set point.
- There is no unoccupied or occupied start command and the supply temperature is greater than or equal to the soft shutdown enable set point.

The following occurs during a soft shutdown:

- Tempering outputs immediately revert back to their off value; while
- Dampers remain open and fans continue to run; until
 - The supply air temperature falls below the soft shutdown enable set point minus 5.0°F; or
 - The soft shutdown delay timer has expired.

UNIT/SYSTEM DISABLED COMMAND:

The unit becomes disabled due to the following:

- The unit was disabled from the controller's Unit Enable screen.
- The unit enable digital input changes to the disabled state.
- The unit was disabled from the BMS.
- The remote start input is in the off position.
- The shutdown input is in the shutdown position.
- A system shutdown alarm was activated.

When disabled the following actions occur:

- The unit shuts down immediately; and
- Dampers spring-return to their off position.

OCCUPANCY: The microprocessor controller offers five modes of determining occupancy: digital input, occupancy schedule, BMS, always occupied, or always unoccupied. When in the unoccupied mode, the unit can be configured to shut down, or cycle on to maintain the unoccupied space set points. The unit can be temporarily overridden to the occupied mode via a digital input, keypad display, or space thermostat, if equipped.

• Occupied Mode:

- Exhaust fan on, if equipped
- Supply fan on
- Energy Recovery Wheel Control (refer to Energy Recovery Wheel section), if equipped
- Damper Control (refer to Outside Air and Recirculated Air section), if equipped
- Heating (refer to Heating section)
- Cooling (refer to Cooling section)

• Unoccupied Mode:

- **Unit Off:** Unit remains off when in unoccupied mode.
- **Normal operation with unoccupied set points:** Unoccupied mode will operate as if in occupied mode but will utilize adjustable unoccupied set points.
 - Exhaust fan on, if equipped
 - Supply fan on
 - Energy Recovery Wheel Control (refer to Energy Recovery Wheel section), if equipped
 - Damper Control (refer to Outside Air and Recirculated Air section), if equipped
 - Heating (refer to Heating section)
 - Cooling (refer to Cooling section)
- **Recirculation with unoccupied set points:** Optional unoccupied mode when there is an unoccupied recirculation damper. The unit will continue to run, but in full recirculation.
 - Supply fan on
 - Recirculation air damper open
 - OA damper closed
 - Tempering operations begin

Sequence of Operation

- **Night Setback:** Unoccupied mode when there is space temperature and/or humidity sensor(s) connected to the controller. The unit will cycle on to maintain unoccupied space set points if there is a call for unoccupied heating, cooling or dehumidification.
 - Exhaust fan off, if equipped
 - Supply fan on
 - Recirculation air damper open
 - OA damper closed
 - Tempering operations begin

Set Point Control (Occupied)

Supply air temperature set point can be configured as constant, or can be reset by either outside air temperature, or space temperature set point. If equipped with BMS communications, the user can also directly command the temperature set point, if equipped.

- **Outside Air Temperature Reset Function:** The controller will default to supply temperature reset based on OA temperature. The controller will monitor the OA temperature and reset the supply temperature set point based upon the OA reset function.
- **Space temperature Reset:** With a space temperature sensor, the controller will adjust the supply air temperature set point between the min (55°F) and max (90°F), to satisfy the desired space temperature. The temperature set point can be adjusted locally at the microprocessor, the BMS or a space thermostat.

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 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 the supply temperature set point. The heating will be locked out when the outside air temperature is above the heating lockout (80°F adj).

- **Indirect Gas Furnace:** Microprocessor controller will modulate the indirect gas furnace to maintain the supply temperature set point.
- **Hot Water Coil:** Microprocessor controller will modulate a hot water valve (provided by others) to maintain the supply temperature set point. **Coil freeze protection must be provided by others in the field!**
- **Electric Heater:** Microprocessor controller will modulate an electric heater to maintain the supply temperature set point.

Cooling

The cooling is controlled to maintain the supply temperature set point. The cooling will be locked out when the outside air temperature is below the cooling lockout (55°F).

- **Chilled Water:** Microprocessor controller will modulate a chilled water valve (provided by others) to maintain supply air set point. Coil freeze protection must be provided by others in the field!
- **Mechanical Cooling:** Microprocessor controller enables stages of cooling to maintain the supply air

setpoint. When a modulating compressor is installed (Digital or Inverter Scroll), the compressor modulates to maintain the supply air setpoint. Mechanical cooling is available in the following configurations:

- **Packaged DX:** Unit with compressors and condensing section located within the same unit. This unit may have lead standard, lead digital scroll, or lead inverter scroll compressors.
- **Split DX:** Unit with compressors located in the unit and utilizes a remote condenser section. This type of unit may have lead standard, or lead digital scroll compressors.

Active Head Pressure Control

Packaged DX mechanical systems will maintain head pressure control by utilizing transducers on each refrigerant circuit. The pressure reading from the transducer is converted to a saturated discharge temperature for each circuit. The temperature, or maximum temperature when two circuits are present, is compared to a setpoint.

The following sequences are based on the type of condenser fan modulation installed in the unit.

- **No Modulating Fans (All AC):** Condenser fans are staged using digital outputs and the saturated discharge temperature. The first fan stages on with the start of the first compressor. Each additional stage turns on based on the saturated temperature reaching setpoint plus an offset and turns off when the temperature falls below setpoint. Built-in delays between stages assist in staging fans off or on too quickly.
- **Lead Modulating Fan:** A unit with this option has one modulating condenser fan per fan bank. The modulating condenser fan utilizes an analog output to vary the speed of the fan. The modulating fan turns on with the start of the first compressor. When the saturated temperature is above setpoint, the modulating fan speed will increase to maintain head pressure. When below setpoint, the fan speed will decrease.

Additionally, non-modulating fans are staged using digital outputs and an offset. Each additional stage turns on based on the saturated temperature reaching setpoint plus an offset and turns off when the temperature falls below setpoint. Built-in delays between stages assist in staging fans off or on too quickly.

- **All Modulating Fans:** A unit with this option has all modulating condenser fans. One analog signal modulates all fans in a bank. The first fan stages on with the start of the first compressor. The fans modulate to maintain the saturated discharge temperature setpoint. When the saturated temperature is above setpoint, the fan speed will

increase to maintain head pressure. When below setpoint, the fan speed will decrease.

Sliding Head Pressure Control

The head pressure control setpoint changes based on the outside air temperature and an offset. As the outside temperature increases so does the control setpoint for the condenser fans. This feature is active in cooling and dehumidification modes unless disabled in the controller. Sliding head pressure control is enabled by default.

Air Source Heat Pump

When a unit is configured as an ASHP, compressors are used for cooling and heat pump heating. A reversing valve is energized when the unit is in heating mode to reverse the flow of the refrigerant. The ASHP is only available as a packaged unit with an inverter scroll as the lead compressor.

- **Cooling:** Mechanical cooling operates the same as any other unit with compressors by controlling the compressors to maintain the supply air temperature set point in cooling mode and to maintain the cooling coil temperature in dehumidification mode.
- **Heat Pump Heating:** When heat is required, the reversing valve is switched, and the compressors are staged to maintain the supply air temperature set point.
- **Heat Pump Heating Lockout:** Heat pump heating may be locked out for any of the following reasons:
 - Defrost is initiated 3 times in one hour.
 - Supply Air temperature is 5°F below set point for more than 10 minutes and secondary heat is available as backup only.
 - Outside ambient temperature is below the HP ambient lockout set point(10°F).
- **Resetting HP Heating Lockout:** One of the following conditions must occur to return to HP heating:
 - The outside temperature increases by 5°F.
 - The outside humidity decreases by 20%RH, if humidity sensor is installed.
 - The unit has been locked out for more than 2 hours when a humidity sensor is not installed and not locked out on low ambient condition.
- **Defrost:** Periodically, the ASHP need to initiate a defrost cycle to remove accumulated frost from the outside coil when operating in heating mode. The saturated suction temperature, the outside ambient temperature and/or the outside humidity determine when a defrost initiates and terminates.

Sequence of Operation

Initiation: One of the following must be true for a defrost cycle to initiate:

- The saturated suction temperature is less than -15°F; or
- The saturated suction temperature is less than ambient conditions (temp/dewpoint) minus an offset (35°F/25°F).

Termination: The defrost cycle is terminated when one of the following occur:

- The saturated discharge temperatures of all refrigerant circuits are greater than the cancel defrost set point (80°F); or
 - The max defrost time (5 min) has been exceeded.
- **Outside Coil Fan Control:** Head pressure control of the outside fans will maintain head pressure control by utilizing transducers on each refrigerant circuit. The outside fan options available on the ASHP are lead modulating or all modulating fans and utilize refrigerant transducers to stage fans on and off in cooling/dehumidification and heating modes
- **Cooling/Dehumidification:** Reference the Active Head Pressure Control section of the IOM for operation in cooling and dehumidification modes of operation.
 - **Heating:** In heating mode, the pressure reading from the transducer is converted to a saturated suction temperature for each circuit. The temperature, or minimum temperature when two circuits are present, is compared to a setpoint. When the saturated temperature is below setpoint, the modulating fan speed will increase to maintain head pressure. When above setpoint, the modulating fan speed will decrease. Non-modulating fans, if installed, will stage on and off based on setpoint minus/plus setpoint. This function is similar to the cooling/dehumidification active head pressure control for lead modulating fans.
 - **Defrost:** When defrost is initiated, the outside fans turn off allowing the heat to build and defrost the outside coil. When defrost is terminated, the outside fans turn on to bring the pressure down before switching back to heating mode
- **Secondary Heat:** A secondary heating device may be installed in the unit. This device may be electric heat, gas furnace, or a hot water coil. The following sequences are available for secondary heat:
- **Backup:** Secondary heat only operates when heat pump heating is not available.
 - **Supplemental:** Secondary heat will operate simultaneously with heat pump heating when the compressors are not producing enough heat to stay within 2°F of set point.

Economizer

If the application requires cooling, and the OA conditions are suitable for free cooling, the controller will enter economizer mode. If the unit is economizing and the discharge temperature set point is not being met, the controller will bring on mechanical cooling. If equipped with a modulating OA and recirculated air damper, the dampers will modulate between the min OA and max positions to maintain the supply temperature set point. If equipped with an energy wheel, Reference Energy Recovery Wheel Sequence.

- **Temperature:** The economizer will be locked out when:
 - The outside air is greater than the economizer high lockout (65°F).
 - The unit is operating in dehumidification mode.
 - There is a call for heating.
- **Temperature/Enthalpy:** The economizer will be locked out when:
 - The outside air is greater than the economizer high lockout (65°F dry-bulb).
 - The outside air is greater than the economizer high enthalpy lockout (23 btu/lb).
 - The unit is operating in dehumidification mode.
 - There is a call for heating.

Dehumidification

The cooling is controlled to maintain the cold coil set point. Dehumidification is enabled when the OA temperature is greater than the cold coil set point plus an offset (adj. 10°F). Dehumidification is disabled when the OA temperature falls below the enable point by a hysteresis (2°F). If equipped with BMS communications, the user can also directly set the cold coil leaving air set point.

- **Optional Room Relative Humidity Sensor or Thermostat:** The controller will adjust the cold coil leaving air temperature set point between the min (50°F) and max (55°F) set point to satisfy the desired space relative humidity set point.

Reheat

While the unit is dehumidifying, the supply air temperature is maintained by controlling the reheat device to the supply air set point.

- **Hot Gas Reheat (valve):** The microprocessor controller modulates to maintain set point.
- **Reheat Plus:** The microprocessor controller can be configured to use the primary heat source as secondary reheat.

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. If equipped with BMS

Sequence of Operation

communications, the user can also directly command the supply fan speed. The following sequences are selectable for supply fan control. The fan speed is constrained by its min and max speed set points.

- **Constant Volume:** Supply fan operates at a constant speed based on a constant volume set point based on occupancy.
- **0-10 VDC:** The supply fan is enabled by the unit controller. An external field-supplied 0-10 VDC signal is responsible for modulating the supply fan's speed.
- **CO₂ Control:** The supply fan modulates to maintain CO₂ set point based on a sensor located in the space or return duct. A CO₂ sensor or BMS communicated value is required for this sequence.
- **Duct Static Pressure Sensor:** The supply fan modulates to maintain an adjustable duct static set point based on a sensor located in the supply duct. A static pressure sensor or BMS communicated value is required for this sequence.
- **Space Static Pressure:** The supply fan modulates to maintain a space static pressure set point based on a sensor located in the space. A space static pressure sensor or BMS communicated value is required for this sequence.
- **Single Zone VAV :** The controller will control the supply air temperature and supply fan speed in order to maintain the space temperature.

Heating Mode- The supply temperature set point will be increased before increasing the supply fan speed in order to maintain the space temperature set point. If the calculated supply temperature set point is greater than the current space temperature, the supply fan speed will be increased while the supply temperature set point is increased.

Cooling Mode - The supply temperature set point will be decreased before increasing the supply fan speed in order to maintain the space temperature set point.

- **Two Speed:** The supply fan is enabled by the unit controller. An external field-supplied digital contact is responsible for enabling high speed operation.

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. If equipped with BMS communications, the user can also directly command the exhaust fan speed. The following sequences are selectable for exhaust fan control. The fan speed is constrained by its min and max speed set points.

- **Constant Volume:** Exhaust fan operates at a constant speed based on a constant volume set point based on occupancy.
- **0-10 VDC by Others:** The exhaust fan is enabled by the unit controller. An external field-supplied 0-10

VDC signal is responsible for modulating the supply fan's speed.

- **Space Static Pressure:** The exhaust fan modulates to maintain a space static pressure set point based on a sensor located in the space. A space static pressure sensor or BMS communicated value is required for this sequence.
- **Supply Fan Tracking:** The exhaust fan proportionally modulates based on the supply fan speed plus an adjustable offset.
- **Outside Air Damper Tracking:** The exhaust fan proportionally modulates based on the outdoor air damper modulation. (This sequence requires a modulating outdoor air damper.)

Outside Air and Recirculated (Recirc) Air Damper Control

If equipped with a modulating OA and recirculated air damper, the recirculated air damper will operate inverse of the OA damper. The OA damper opens to its min position. If the controller is configured to modulate the supply fan speed, the min and max OA positions can be reset based on supply fan speed. If equipped with BMS communications, the BMS can directly control the outside damper position. The damper position is constrained by its min and max set point positions.

- **CO₂ Control:** The controller will proportionally modulate the OA/RA dampers based upon a comparison of the CO₂ set point to the actual CO₂ level reported from the sensor. As the CO₂ level rises, the controller will proportionally modulate the OA damper open, between the min OA damper position and max CO₂ position.
 - **Space Static Pressure:** The OA/RA dampers will modulate based upon the signal from a building static pressure sensor. The controller will modulate the dampers, between the min and max OA positions, based upon a comparison of the building static pressure set point to the actual building static pressure level reported from the sensor.
 - **0-10 by Others:** An external field supplied 0-10 VDC signal is responsible for setting the damper position.
 - **Two Position:** An external field supplied digital contact is responsible for setting the damper to max position.
-

Energy Wheel Control

Economizer: 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 call for cooling, the wheel will stop rotating to allow free cooling. Jog wheel control is available during stop wheel economizer operation. This 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 call for cooling, the controller modulates wheel speed to maintain the supply temperature set point.
- **Energy Wheel Bypass Dampers, if equipped:** During normal operation, the dampers shall remain closed to allow full operation of the energy wheel. During economizer sequences, the dampers will be open to bypass the energy wheel.

Frost Control (Polymer): The microprocessor controller will activate the frost control method when the OA temperature is less than the defrost set point (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 OA 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.
- **Cycle Wheel:** When frosting is occurring, the energy wheel is cycled off for a defrost cycle time (5 minutes). After the defrost cycle time, the wheel is re-energized to continue normal operation. The controller will not allow another defrost cycle for a min normal operating cycle time (30 minutes).
- **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 min normal operating cycle time (30 minutes).

Frost Control (Aluminum): The microprocessor controller will activate the frost control based on the following methods.

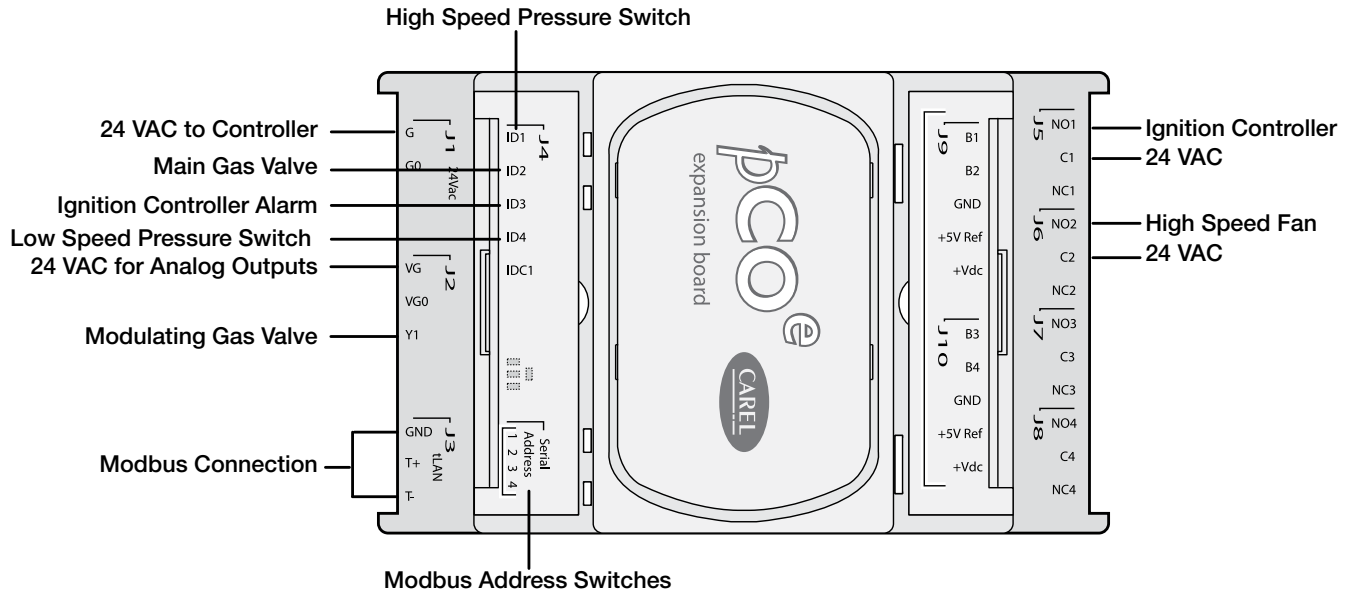
- **Electric Preheater:** When the outdoor air temperature is less than 10°F (adj.), the preheater is energized to defrost the wheel.
- **Modulate Wheel:** When the exhaust air temperature is less than 36°F (adj.), the wheel is modulated to maintain a 36°F exhaust air temperature.

Alarms

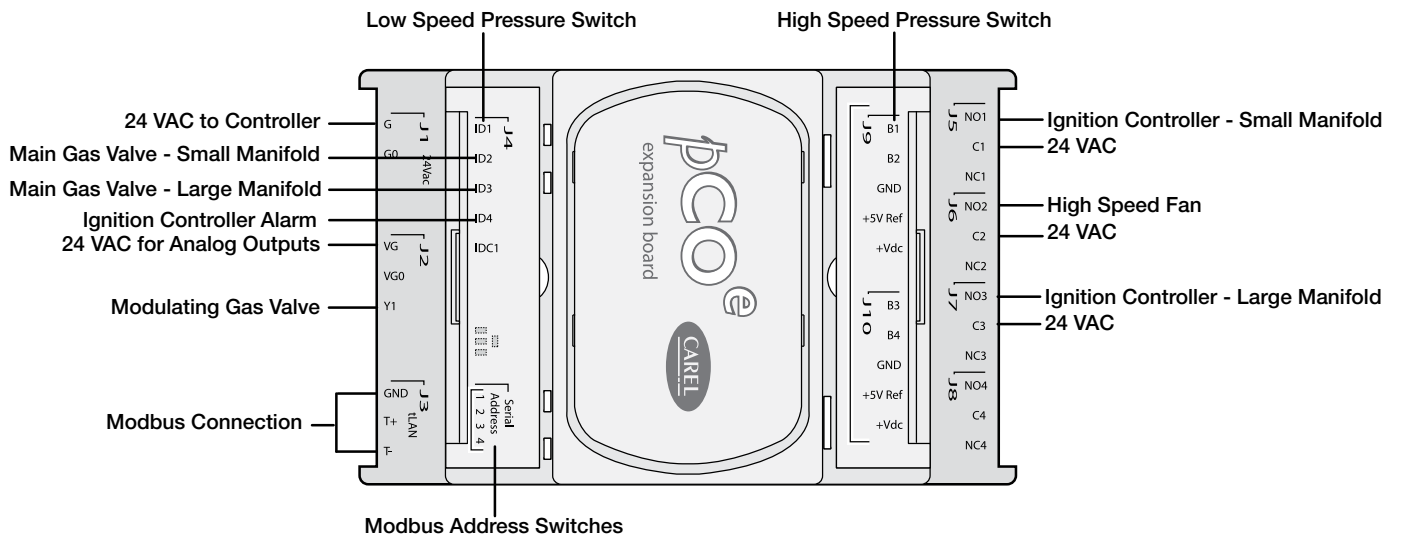
The microprocessor controller monitors alarms and will alarm on the following conditions:

- **Dirty Filter Alarm:** If the outside air or return air filter differential pressure rises above the differential pressure switch set point, the microprocessor controller will activate an alarm.
 - **Supply and Exhaust Air Proving Alarm:** Microprocessor controller monitors fan proving 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).
 - **Supply Air Low Limit:** If the supply air temperature drops below the supply air low limit (35°F), the controller disables the unit and activate the alarm output after a preset time delay (300 sec.).
 - **Other Alarms:** Wheel Rotation, High Wheel Pressure, High/Low Refrigerant Pressure.
 - **Condensate Overflow:** Microprocessor controller monitors the float switch installed in the drain pan and will disable the unit and activate an alarm on high condensate.
-

pCOe - 4:1 Furnace Overview



pCOe - High Turndown Furnace



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 **J10** port with six wire patch.


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 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.
	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.
 		Unit 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: <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> 1. Click on 2-Button Hold. 2. Then, sequentially click on two keypad buttons (Main, Alarm, Escape, Up, Enter, Down).

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 set point adjustment.

Alarms – Shows current and cleared alarms.

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 (9998). Once proper login is established, the user can view configured input/output points associated with the unit controller

Pop-Up Tools

Live Trend - User can see current values from the controller. The list of variables available is preselected based on the configuration of the unit.

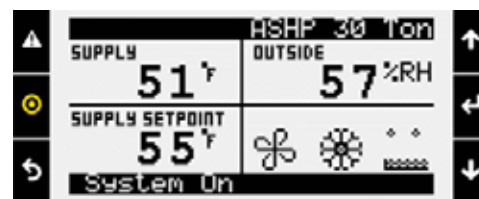
Unit Display - Mimics the unit controller display. Allows the user full access to the controller without having to physically be at the unit.

Dewpoint Calculator - A calculator with three sliders to determine the dew point, temperature, or humidity. Two of the three values are necessary to get the third.

Upgrade Application - A new application program can be loaded to the controller via the WebUI.



Web User Interface



Unit Display





Web User Interface

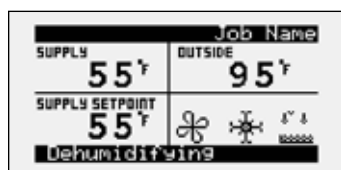
Logged in with Service, red boxes will appear after logging in.

Main Menu Navigation

<div>Unit Enable</div>	<div><div>Main Status</div><div><div><div><div>Unit Status</div></div></div><div><div><div>Input Output Status</div></div></div><div><div><div><div><div>Note:</div><div>Additional status screens are displayed depending on unit configuration. Screens may include, but are not limited to:</div><div><div>Occupancy</div><div>Damper positions</div><div>Fan status</div><div>Airflow</div><div>Set Points</div><div>Economizer</div><div>Energy recovery</div><div>Cooling</div><div>Circuit pressure</div><div>Heating</div><div>Dehumidification</div><div>Static pressure</div></div></div></div></div></div></div></div>	<div><div>Ctrl Variables</div><div><div><div><div>Temp Control</div></div></div><div><div><div>Dehumidification</div></div></div><div><div><div><div>Refrigeration</div><div><div><div>Compressor Control</div><div>Pressure Control</div><div>Heat Pump Control</div></div></div></div></div><div><div><div>Damper Control</div></div></div><div><div><div>Energy Recovery</div></div></div><div><div><div><div>Fan Control</div><div><div>Supply Fan Control</div><div>Exhaust Fan Control</div></div></div></div><div><div><div>Occupancy</div></div></div><div><div><div><div>Advanced</div><div><div><div>Note:</div><div>The Advanced menu is read-only. The service password is required to change these settings. Reference the Advanced menu section for more information.</div><div><div>*Consult factory for more information.</div></div></div></div><div><div><div><div>Login</div><div>Manual Overrides</div><div>Adv. Set Points*</div><div>PID Tuning*</div><div>Network Settings</div><div>Backup/Restore</div><div>IO Status/Offset*</div><div>IO Config</div><div><div><div>Unit Config*</div><div><div>Service Config</div><div>Factory Config</div></div></div><div><div>Unit Settings*</div></div><div><div>Service Info*</div></div><div><div><div>Alarm Management</div><div><div>Shutdown Alarms</div><div>General Alarms</div></div></div></div></div></div></div></div></div></div></div></div></div></div></div>	<div><div>Alarm Menu</div><div><div><div>Alarm History</div></div><div><div><div>Active Alarms</div></div></div><div><div><div>Reset History</div></div></div><div><div><div>Clear History</div></div></div><div><div><div>Export History</div></div></div></div></div>
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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.









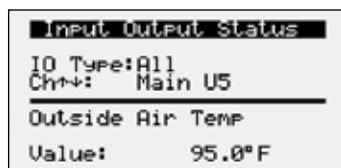
THE INITIAL MENU SCREEN DISPLAYS THE JOB NAME, UNIT TAG, UNIT STATUS, OUTSIDE AIR CONDITIONS, SPACE CONDITIONS AND SET POINTS.

Possible modes include:

- Off/Standby
- Unoccupied Start
- Dampers Open
- Fan Start Delay
- Fans Starting
- Startup Delay
- System On
- Soft Shutdown
- System Disabled
- Remote Off
- Shutdown Alarm
- Fans Only
- Economizing
- Cooling
- Dehumidifying
- Heating
- HGRH Purging
- Defrost Active
- Overrides Active
- Expansion Offline

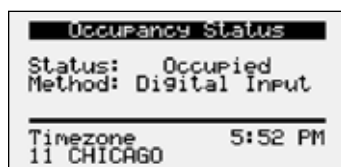
Unit Status Screen Symbols

Symbol	Indicates
	Supply air fan status. Rotation indicates airflow; static blades indicate no airflow.
	Cooling
	Heating
	Dehumidifying
	Economizing
	Defrost



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 manual for individual point locations.



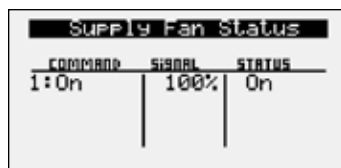
OCCUPANCY STATUS

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



DAMPER COMMANDED POS

This screen appears if equipped with modulating OA and recirculated air dampers. Displays current position of the OA damper.



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 min and max 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.

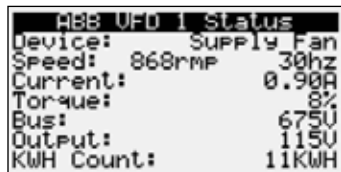


ABB FAN 1 STATUS

This screen appears if equipped with a Modbus controlled VFD. This screen displays the fan speed, current, torque, bus voltage, output voltage and power consumption being sent from the VFD to the controller.

Unit Status Overview

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 min and max 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.

Airflow Status	
Exh Fan:	0
OAD:	0

AIRFLOW STATUS

This screen displays the current status of airflow volumes if the unit is provided with airflow monitoring.

Ambient Lockout Status	
Heating:	Disabled
Cooling:	Allowed
Outside Temp:	95.0°F

AMBIENT LOCKOUT STATUS

Displays heating and cooling lockout status based on the outside air ambient temperature. Ambient lockouts for heating and cooling can be altered by entering Main Menu/Ctrl Variables/Temp Control/Cooling or Heating.

Outside Reset	
Outside Temp:	95.0°F
Supply Spt:	55.0°F
Active Spt:	55.0°F

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 set point as determined by the outside reset calculation.

Active Reset	
Supply Temp:	70.0°F
Supply Spt:	72.0°F
Cooling Spt:	74.0°F
Heating Spt:	70.0°F
Active Spt:	72.0°F

ACTIVE RESET

This screen will be active if temperature control mode is set for space or return air reset. The supply temperature set point is calculated based on the active set point and the current space or return temperature. The calculated set point is scaled between the supply temperature min and max set points determined by the current mode of operation.

Supply Setpoint	
Supply Temp:	71.5°F
Setpoint:	72.0°F

SUPPLY SET POINT

This screen is active when supply temp control is selected or the active mode of control. Displays current supply temperature and supply temperature set point to be achieved.

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

ECONOMIZER RAMP

The economizer ramp screen will be active if the unit is configured for economizer control. This screen displays the economizer set point, supply air discharge temperature, economizer ramp status, and economizer control mode. Economizer control mode options include, outside dry bulb, outside enthalpy, comparative dry bulb, and comparative enthalpy.

CO ₂ Ramp Output	
Setpoint:	1000PPM
CO ₂ 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 set point, 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 provides overall status of the energy recovery wheel.

Unit Status Overview

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 set point.

Cooling Ramp 1

Setpoint: 72.0°F
 Supply: 71.5°F
 Ramp: Enabled 27%
 Capacity: 27%

Press ENTER for detail

COOLING RAMP 1

This screen displays the active set point, supply discharge temperature, cooling enable/disable, cooling ramp being sent from the controller, and the overall capacity being demanded.

HP Heating Ramp

Setpoint: 72.0°F
 Supply: 54.1°F
 Ramp: Disabled 0%
 Capacity: 0%

Press ENTER for detail

HEAT PUMP HEATING RAMP

The Heat Pump Heating Ramp status screen is active when the unit is configured as a heat pump. The screen displays the active set point, supply temperature, status of the heat pump heating control ramp, the current ramp percentage, and the current capacity of the operating compressors.

Compressor Request

COMPRESSOR	RAMP	CIRCUIT
1: On 26%	1	A

COMPRESSOR REQUEST

The compressor request screen will be active if the unit is equipped with DX cooling. This screen displays overall status of individual compressor operation being sent from the unit controller. Example: Circuit A compressor enable (On) with modulating value of 26%.

ExV-A Status

SH: 39.4°F
 0stp
 EVD: 152.9psi
 Std-by: 53.6°F

EXV STATUS

The ExV Status screen is active when the unit is equipped with an inverter scroll compressor and electronic expansion valve (ExV). The screen displays information from the EVD (electronic valve driver) including the number of steps (stp) of the valve, the open percentage of the valve, the EVD control status, the suction superheat, the suction temperature, the suction pressure, and the saturated suction temperature. The second status screen also displays the capacity of the circuit the valve is installed on and the discharge refrigerant temperature for that circuit.

ExV-A Status

Valve Status: Std-by
 Valve Opening: 0.0%
 Valve Position: 0stp
 Cooling Capacity: 0%
 Superheat: 39.4°F
 Discharge Temp: 203.0°F

Inverter Compressor 1

Req: 0.0% OFF → 0.0%
 163.5psi → 203.0°F T
 STATUS: OFF BY ALARM
 152.9psi → 53.6°F T

INVERTER COMPRESSOR STATUS

The inverter compressor screen is active when an inverter scroll compressor is installed in the unit. This screen displays information about the operation of the inverter scroll starting with the requested capacity of the compressor compared to its actual operating capacity. The requested capacity and the actual could be different at startup and depending on where it is in the operating envelope. The status of the compressor, current envelope zone and current refrigerant temperatures and pressures are also displayed.

Pressure Ramp 1
Condenser Fan Ctrl

RAMP: Disabled Circ: A/B
 Fan 1: 0% Fan 2: Off
 Fan 3: Off
 Setpoint: 80.0°F
 Offset: 5.0°F
 Sat Disch Temp: 69.4°F

CONDENSER FAN STATUS

The pressure control status screen is active when a unit is equipped with active head pressure control, this is currently available only with inverter scroll compressors. This screen provides information regarding the outside fan ramp status, circuits affected by the ramp, the status of the fans, and the set point, offset and current saturated temperature.

Circuit A			
	SATURATED	PRESSURE	LINE
S	54°F	152Psi	93°F
D	58°F	163Psi	203°F
L			
Superheat:			39°F

Heating Ramp	
SetPoint:	72.0°F
SUPPLY:	71.5°F
RAMP: Disabled	0%

Dehumidification	
Status:	Enabled
Based On:	
OAT > Coil Set+Offset	
Overcooled:	No
Enable Delay:	0s

HGRH Ramp Output	
SetPoint:	55.0°F
SUPPLY Temp:	55.0°F
RAMP: Enabled	9%
Act. HGRH Circuits:	A,

Supply Space Static	
Output:	0.0%
Static:	0.000"WC
SetPoint:	0.050"WC

Supply Duct Static	
Output:	0.0%
Static:	0.000"WC
SetPoint:	1.000"WC

Outside Air Conditions	
Temp:	51.8°F
Humidity:	61%
Enthalpy:	17.9btu/lb
Dewpoint:	38.6°F

Space Conditions	
Temp:	71.6°F
Humidity:	80%
Enthalpy:	31.9btu/lb
Dewpoint:	65.2°F

REFRIGERANT CIRCUIT STATUS

The refrigerant circuit status screen is active when the unit is equipped with active head pressure control. This screen provides temperatures and pressures for suction, discharge, and liquid line sensors when installed. Superheat is also displayed when suction temperature and pressure sensors are installed.

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.

DEHUMIDIFICATION

This screen will display the overall dehumidification status and selected dehumidification control mode.

The following dehumidification modes are available when the space is in occupied mode:

- Cold coil set point plus offset (10°F)
- Inside RH*
- Inside dew point*
- Outside dew point
- Inside RH or inside dew point*
- Inside RH or inside dew point or outside dew point
- Inside RH and inside dew point*
- Inside RH and inside dew point or outside dew point

*Available during unoccupied mode.

HGRH RAMP

This screen will display the status of the hot gas reheat ramp. The screen includes the active set point, supply air discharge temperature, the ramp status, and hot gas reheat valve request being sent from the controller.

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 set point. Similar status screen will appear for the exhaust fan if the unit is configured for exhaust fan space static control.



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 set point. Similar status screen will appear for the exhaust fan if the unit is configured for exhaust fan duct static control.

CONDITIONS

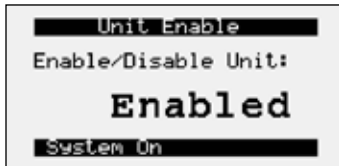
The condition screens are active when both temperature and humidity sensors for the location are installed in the unit. The enthalpy and dew point are calculated based on the temperature and humidity readings. The unit altitude is used for the enthalpy calculation.

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 ID4. **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 have 24 VAC power to enable the unit.

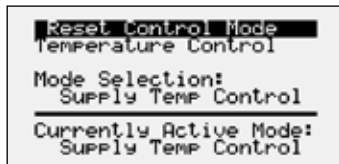
Control Variables

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

Control Variables

 Temp Control

The **Temperature Control** menu allows the user to view and adjust temperature control conditions of the unit.



METHOD FOR TEMPERATURE CONTROL

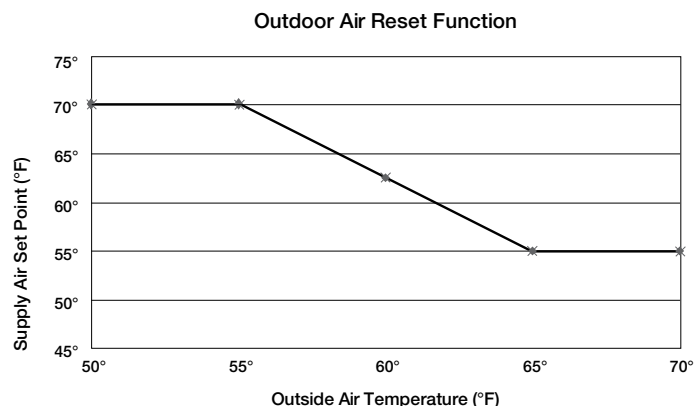
Set Point Selections:

Supply Temp Control – The supply discharge set point is a constant value (e.g. 72°F). Reference Temperature Set point screen for set point adjustment.

Space Reset – The controller will reset the supply air temperature set point to maintain the space temperature set point (requires space temp sensor). Reference the Temperature Set point screen for space set point adjustment.

Return Reset – The controller will reset the supply air temperature set point to maintain the return air temperature set point (requires duct mounted return air temp sensor). Reference the Temperature Set point screen for return air set point adjustment.

OA Reset – The controller monitors the OA temperature and adjusts the desired supply temperature set point accordingly. For example, when the OA is below 55°F, the controller will change the supply set point to 70°F. If the OA is above 65°F, the controller will change the supply set point to 55°F. If the OA temperature is between 55°F and 65°F, the supply set point changes according to the OA reset function. A visual representation of the OA reset function is shown below. Reference Outside Set points for min and max outside air limits.



Temperature Setpoint

Temp SPT: 72.0°F

Supply Temperature or
Reset Target Temp
based on current mode.

TEMPERATURE SET POINT

This screen only appears if supply temp control, space reset, or return reset is selected as the reset control mode.

Set Point Selections:

Local – The space set point will be constant; set from screen (e.g. 72°F).

BMS – The BMS can directly control the space temperature set point (requires BMS communication option).

T-Stat – The space set point will be adjustable from the space thermostat.

Reference Appendix: Room Thermostat Quick Start for additional information.

Heat Cool Deadband

Deadband: 4.0°F

Setpoint: 72.0°F
Cooling Spt: 74.0°F
Heating Spt: 70.0°F

HEAT COOL DEADBAND

This screen only appears if space reset or return air reset is selected as the reset control mode. The heat cool deadband allows for separate cooling and heating set points when the reset control mode is set for space reset or return air reset.

Supply Setpoints Cooling Mode

Maximum: 90.0°F
Minimum: 55.0°F

Minimum and Maximum
reset values.

Supply Setpoints Heating Mode

Maximum: 90.0°F
Minimum: 55.0°F

Minimum and Maximum
reset values.

SUPPLY SET POINTS

Cooling and heating supply set points screens only appear if outdoor reset, space reset, or return air reset is selected. These screens allow the user to set the min and max set point limits for cooling or heating operation. The controller will adjust the supply temperature set point between the set limits depending on mode of operation.

Outside Reset

OA Temp SAT SetPt
55.0°F >>> 70.0°F
65.0°F >>> 55.0°F

SAT SetPt 55.0°F

OUTSIDE SET POINTS

This screen only appears if outside reset is selected as the reset control mode.

Mode Switch Delay

Delay: 120s

Delay before switching
between heating and
cooling modes.

MODE SWITCH DISPLAY

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

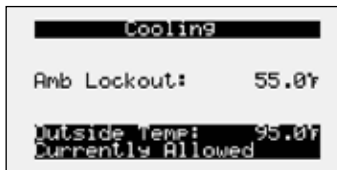
Startup Delay

Delay: 30s

Delay before enabling
unit ctrl at startup.

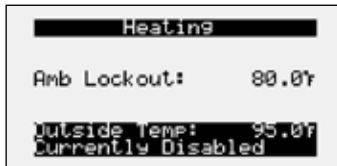
STARTUP DISPLAY

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



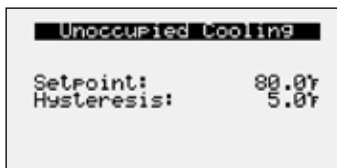
COOLING LOCKOUT

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



HEATING LOCKOUT

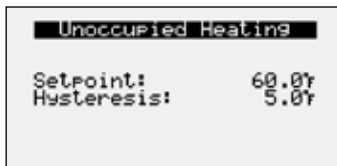
This screen displays the heating lockout temperature. Heating will be disabled when outside air is above the lockout temperature (80°F).



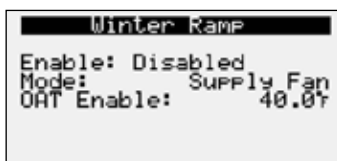
SPACE SET POINTS DURING UNOCCUPIED MODE

The controller will have separate screens for unoccupied cooling and heating set points.

Unoccupied Cooling Example: If set point = 80°F, unoccupied cooling is enabled when space equals 80°F and above. Unoccupied cooling is disabled when space temperature is below 75°F.



Unoccupied Heating Example: If set point = 60°F, unoccupied heating is enabled when space temperature equals 60°F and below. Unoccupied heating is disabled when space temperature is above 65°F.



WINTER RAMP

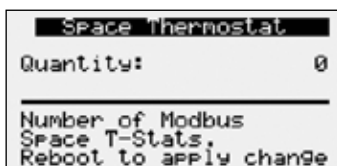
The winter ramp function prevents the supply temperature from dropping below set point under the following conditions:

- Outside air temperature is below the winter ramp enable set point; and
- Heating capacity is at 100%

One of the following is used to perform the winter ramp function:

- Supply fan speed; or
- Outside air damper position

Note: If the unit is a heat pump, the supply fan is always used.



MODBUS SPACE T-STAT

The quantity of thermostats installed in the space that communicate the temperature, humidity, and set point to the controller. The controller averages the temperature and humidity readings when there is more than one installed. See Appendix C for more information.

Control Variables
 Dehumidification

```

Dehumidification Mode
Dehumidify when:
OAT > Coil Spt + 10.0°F
Space RH Spt: 55%RH

```

The **Dehumidification** menu allows the user to view and adjust dehumidification control parameters.

DEHUMIDIFICATION MODE - OCCUPIED.**Possible Modes:**

- Outside Air Temp is greater than cold coil set point plus offset (10°F)
- Inside RH*
- Inside dew point*
- Outside dew point
- Inside RH or inside dew point*
- Inside RH or inside dew point or outside dew point
- Inside RH and inside dew point*
- Inside RH and inside dew point or outside dew point

*Available during unoccupied mode.

There must be a constant call for dehumidification for the duration of the enable delay for dehumidification mode to become enabled. The call remains active until conditions are satisfied and dehumidification mode has been active for the min active time. Reference Ctrl Variables/Advanced/Unit Config/Unit Configuration Occupied Dehum Call for dehumidification method options.

```

Dehumidification Mode
Unoccupied Mode
Dehumidify when:
Indoor RH > 60%RH

```

DEHUMIDIFICATION MODE - UNOCCUPIED.

If the unit is unoccupied while there is a dehumidification call, the unit will start and dehumidify until the unoccupied dehumidification set points are satisfied. The above dehumidification modes marked with an * indicate availability during unoccupied mode. The unoccupied dehumidification mode can be set differently than the occupied dehumidification mode. Reference Ctrl Variables/Advanced/Unit Config/Unit Configuration Unoccupied Dehum Call for dehumidification method options.

DEHUMIDIFICATION HYSTERESIS

This screen displays hysteresis for enabling dehumidification during occupied and unoccupied conditions. %RH for indoor RH control and °F for indoor dew point control. Example: If indoor RH set point = 50%, dehumidification is enabled when indoor RH equals 50% and above. Dehumidification is disabled when indoor RH is below 44%.

```

Dehumidification Mode
On Delay: 2m
Minimum On time: 15m

```

DEHUMIDIFICATION TIMERS

This screen allows adjustment for delay and min on time for dehumidification mode. Times are in place to prevent short cycling between dehumidification and other control modes.

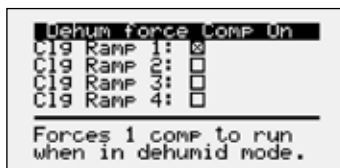
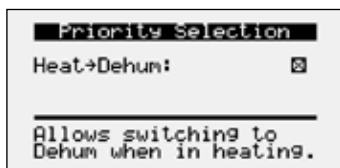
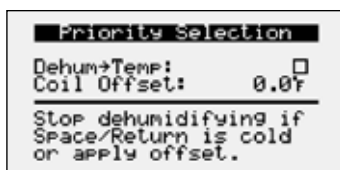
```

Cold Coil Setpoint
Coil Spt Min: 55.0°F
Coil Spt Max: 55.0°F
Cooling Coil leaving
temp spt. Value reset
based on demand.

```

COLD COIL SET POINT

This screen displays the temperature set points for the cooling coil. This screen only appears if the unit is equipped with cooling. When in dehumidification mode, the cooling ramp maintains the cold coil set point by increasing or decreasing the amount of cooling provided from the cooling device installed. The calculated coil set point has a min and max set point that is based on the demand from the dehumidification ramp. When the demand is high, the temperature is low. If a constant temperature off the coil is desired during dehumidification, the min and max can be set to the same value. If a BMS is available, the set points can be adjusted over the BMS.



DEHUMIDIFICATION PRIORITY

The following priorities are used to determine what is more important in the unit: temperature over dehumidification or heating over dehumidification. Both priority selections determine when the unit is allowed to dehumidify.

1. Temperature over Dehumidification

Determines when the unit is allowed to dehumidify based on the space/return air temperatures.

a. Temperature - If temperature is set as the priority, box not checked, and the space or return air is over cooled, dehumidification is locked out until the space or return temperature is no longer overcooled.

b. Dehumidification - If the priority is dehumidification, box checked, and the space or return air is overcooled, the coil offset will be added to the coil leaving set point. (Default 0°F offset).

c. Overcooled - If space or return reset is enabled, the target is considered over cooled when it is 4°F below set point for 5 minutes. It remains overcooled until the target is at set point and the over-cool logic has been active for a min of 5 minutes.

2. Heating over Dehumidification

Determines when the unit is allowed to dehumidify when heating is active.

a. Heating - If priority is set to heating, box in checked, the unit locks out dehumidification while heating is active.

b. Dehumidification - If priority is set to dehumidification, box is not checked, the unit is allowed to switch to dehumidification when heating is active.

COMPRESSOR DEHUMIDIFICATION FORCE.

In dehumidification mode, the lead compressor will continue to run as long as the dehumidification mode sequence has been enabled in order to prevent compressor cycling and potential reevaporation of moisture. To disable this operation and allow the compressor to cycle in dehumidification mode, uncheck the applicable cooling ramps.

Menu

Control Variables

↳ Refrigeration

The **Refrigeration** menu allows the user to view and adjust compressor and condenser settings, if equipped.

Control Variables

↳ Refrigeration
↳ Compressor Control

COMPRESSOR CONTROL

Consult factory prior to adjusting parameters in the compressor control menu.

Control Variables

↳ Refrigeration
↳ Pressure Control

PRESSURE CONTROL

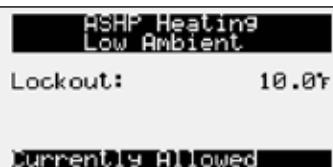
Consult factory prior to adjusting parameters in the pressure control menu.

Control Variables

↳ Refrigeration
↳ Heat Pump Control

COMPRESSOR CONTROL

Allows the user to adjust heat pump heating control set points.



AIR-SOURCE HEAT PUMP AMBIENT LOCKOUT

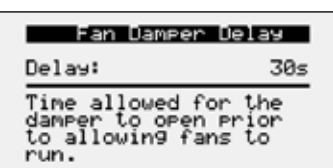
The screen allows the user to adjust the minimum ambient temperature the compressors can be utilized for heating. When the outside air temperature drops below this temperature, heating with the compressors will not be allowed.

Control Variables

↳ Damper Control

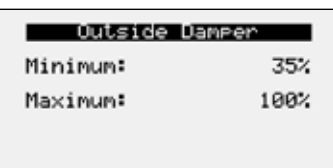
HEAT PUMP DEFROST

Consult factory prior to adjusting set points related to heat pump defrost operation.



FAN DAMPER DELAY

This screen allows adjustment for delay time between damper opening and fan operation. This timer allows the damper to open before the fan start sequence begins. This prevents the fans from having to overcome higher static pressure when the damper(s) are opening.



OUTSIDE DAMPER POSITION

This screen only appears if equipped with a modulating OA and recirculating damper. The screen displays the min and max positions for the outside air damper. These set points reflect the percentage of the outside air damper being opened.

0% = Full recirculation air
100% = Full OA



Minimum Position – When in the occupied mode, the active set point will be equal to a local min OA set point, which may be constant or reset by fan speed if equipped with a modulating supply fan.

The OA damper set point can then be further adjusted between the min and max OA settings with sequences such as DCV CO₂, Building Pressure and Economizer.

Menu

```

OAD SF Reset
OAD Supply Fan Reset
Installed: ☐
-----
Allows damper to be
limited based on
supply fan speed.
  
```

```

Outside Damper
SUPPLY Fan Reset
SF Speed 50%--> 100%
-----
Minimum: 35%--> 20%
CO2 Maximum: 50%
Maximum: 100%--> 100%
  
```

```

CO2 Setpoint
Setpoint: 1000PPM
-----
CO2 Level: 0PPM
  
```

```

Economizer Mode
Selected Mode:
Outside Dry Bulb
-----
Active Mode:
Outside Dry Bulb
  
```

```

Economizer Settings
Outside Dry Bulb
Setpoint: 65.0°F
-----
Sensor Status: Valid
Mode Status: Not Ready
Econ Status: Disabled
  
```

```

Economizer Settings
Outside Enthalpy
Setpoint: 23.0btu/lb
-----
Sensor Status: Invalid
Mode Status: Not Ready
Econ Status: Disabled
  
```

```

Economizer Settings
Comparative Dry Bulb
Sensor Status: Invalid
Mode Status: Not Ready
Econ Status: Disabled
  
```

```

Economizer Settings
Comparative Enthalpy
Sensor Status: Invalid
Mode Status: Not Ready
Econ Status: Disabled
  
```

Maximum Position – Each sequence that can adjust the OA damper set point contains a max position to prevent excess OA. The active set point will be determined based on the greatest demand of the configured sequences. For example, if a unit is equipped with a DCV CO₂ and an economizer sequence, the OA damper set point will react to an economizer demand even if the CO₂ set point is satisfied. Likewise, if economizer is not available but CO₂ is above set point, the OA damper will open to satisfy the CO₂ set point.

Economizer – The active set point will be reset based on Economizer demand, between the min and max positions.

Set Point Selections:

Constant Position – The min OA percentage is constant; set by the controller.

SF Reset – The min and max positions are reset by the supply fan speed.

BMS – The BMS can directly control the OA damper position between the min and max percentages.

Building Pressure – Damper position is reset by a building pressure control loop.

DCV CO₂ – Damper position is reset by a demand-controlled ventilation control loop based on space CO₂ levels. The CO₂ max is the highest percentage that the OA damper can modulate when solely based on CO₂.

2 Position – Damper position is reset to “2-Pos/Max Vent:” set point when a contact closure is made. The 2-position damper operation can be configured to temporarily force the unit into occupied mode until the contact is open (Max Ventilation Mode - enabled in Advanced menu).

0-10V By Others – The 0-10V signal directly correlates to the damper position of 0-100%. When the signal is below the minimum damper position setpoint, the damper will modulate to minimum position. When the signal is above the maximum damper position setpoint, the damper will modulate to max position.

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.

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

Comparative Dry Bulb - Economizing is allowed when outside temperature is less than the space or return temperature.

Comparative Enthalpy - Economizing is allowed when outside enthalpy is less than the space or return enthalpy.

Menu

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).

Economizer Settings

Energy Recovery
Reduction Only: ☐

When true, economizer
will not open the OAD.

ENERGY REDUCTION ONLY CONTROL.

If enabled, the OA damper and recirculation damper will not modulate during economizer. Instead, only the energy recovery wheel will be stopped to ensure no energy is transferred from the supply airstream and exhaust airstream.

Control Variables

↳ Energy Recovery

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

Defrost Ramp

Defrost Setpt: 5.0°F
Max Active Time: 5m
Min Off Time: 30m
Ramp: 0%

DEFROST RAMP

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.

Heat Wheel

Enable Jog: ☒
Jog Enable Delay: 60m
Jog Duration: 2m

ENERGY RECOVERY 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.

Menu

Control Variables

- ☞ Fan Control
- ☞ Supply Fan Control

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

SUPPLY Fan

Enable Delay: 5s

Adjust delay time to offset starting fans.

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.

SUPPLY Fan

Minimum Speed: 50%

Maximum Speed: 100%

SUPPLY FAN SPEED

This screen displays min and max 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

SUPPLY Fan
Constant Volume Setpt

Occupied: 100%

Unoccupied: 60%

Set Point Selections:

Constant Volume – 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.

Single Zone VAV - The supply fan is modulated in addition to the supply air temperature to satisfy the space temperature set point.

2-Speed (High Speed Set Point) - Supply fan speed is reset to max speed when a contact closure is made. (Max Ventilation Mode).

0-10 By Others – The 0-10V signal directly correlates to the fan speed of 0-100%. When the signal is below the minimum fan speed setpoint, the fan will operate at minimum. When the signal is above the maximum fan speed setpoint, the fan will operate at maximum.

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

Soft Shutdown
Enable

Setpoint: 85.00°F

Delay: 120s

SUPPLY TEMP >= Setpt

SOFT SHUTDOWN ENABLE CONDITIONS

During a soft shutdown the following will occur:

- Tempering outputs immediately revert back to their off value; while
- Dampers remain open and fans continue to run; until
 - The supply air temperature falls below the soft shutdown enable set point minus 5°F; or
 - The soft shutdown delay timer has expired.

Control Variables

- ↳ Fan Control
- ↳ Exhaust Fan Control

The **Exhaust Fan Control** menu allows the user to adjust exhaust control set points.

EXHAUST FAN DELAY AND ENABLE

This screen displays min and max exhaust fan speed percentages. This screen displays the exhaust fan delay and enable based on OA damper position. The exhaust 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 also provides the ability to enable the exhaust fan on a set OA damper position if the unit is equipped with a modulating OA damper.

EXHAUST FAN SPEED PERCENTAGES

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

25% Speed = Min speed

100% Speed = Max speed

Set Point Selections:

Constant Volume – 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).

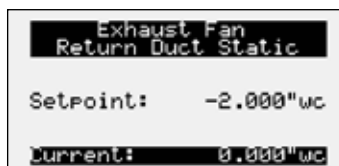
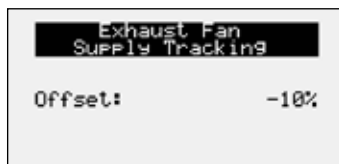
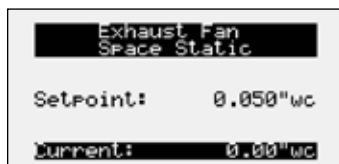
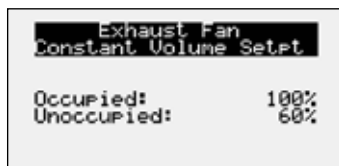
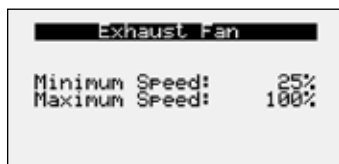
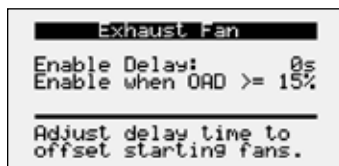
Space Pressure – Fan speed is determined by building pressure control loop.

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

Outside Air Damper Tracking – The exhaust fan will proportionally track the OA damper, between a min and max position.

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

0-10V By Others - The 0-10V signal directly correlates to the fan speed of 0-100%. When the signal is below the minimum fan speed setpoint, the fan will operate at minimum. When the signal is above the maximum fan speed setpoint, the fan will operate at maximum.



Menu

Control Variables

Occupancy

```
Occupancy Control
Mode: Digital Input
BMS: Occupied
Digital In: Occupied
Schedule: Occupied
Timed Ovr: Unoccupied
```

```
Occupancy Schedule
Day: Friday
Schedule
Start Time: 06:00 AM
Stop Time: 06:00 PM
Currently: Occupied
```

```
Unoccupied Start
Enable Modes
Cooling: [X]
Heating: [X]
Dehumidification: [X]
```

```
Occ Timed Override
Enable: [ ]
Duration: 60m
Status: Unoccupied
Time Remaining: 0m
```

The **Occupancy** menu allows the user to adjust occupancy control parameters which includes occupancy control mode and schedule.

OCCUPANCY CONTROL

This screen displays the current mode of operation for occupancy control. Status of the other mode option can also be found on this screen. This screen allows the user to select the source of determining occupancy. The factory default is BMS control.

BMS: BMS control (Reference Points List). BMS can be overridden with ID6.

Digital Input: Typically used with a remote time clock, motion sensor or switch.

Always Occ: Controller will always remain in occupancy mode.

Always Unocc: Controller will always remain in unoccupancy mode.

Schedule: Allows the user to set an occupancy schedule for each individual day of the week.

OCCUPANCY SCHEDULE

This screen allows the user to adjust the schedule. Requires the user to enter a start time, stop time and the applicable days of the schedule.

UNOCCUPIED START ENABLE MODES.

This screen only appears if unit is provided with unoccupied recirculation.

This screen allows the user to enable/disable modes of operation when in unoccupied recirculation control.

OCCUPANCY TIMED OVERRIDE

Screen allows the user to override occupancy for a set duration.

Menu

Control Variables

↳ Advanced

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 (9998)** is required to change service access menus. Consult factory for factory level access.

User Login

Enter Password: 9998

Current Access:
Service Level

Control Variables

↳ Advanced

↳ Manual Overrides

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

IG Furnace Setup

Press ENTER to access
IG Furnace Commission

Unit must be running

IG FURNACE COMMISSIONING MENU

This screen only appears if an indirect gas furnace was provided with the unit. Entering the furnace commissioning menu will step the user through the furnace start-up.

Manual Override Mode

Enable: ☐

Duration: 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 (9998)**. 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

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

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

OVERRIDE THE SUPPLY FAN VFD SPEED

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
    
```

OVERRIDE EXHAUST FAN VFD SPEED

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).

```

Outside Damper
Override: Auto
Position: 35%
Enable Main Override
    
```

OVERRIDE THE POSITION OF THE OUTSIDE AIR DAMPER

This screen only appears if the unit is equipped with a modulating OA and recirculation damper. The recirculation damper position will be the inverse of the OA damper position shown.

0% = Outside air damper closed

100% = Outside air damper fully open

```

Compressor Request
Override: Auto
1: Off 2: Off
Enable Main Override
    
```

OVERRIDE THE COMPRESSOR

This screen only appears if the unit is equipped with DX cooling. When manual override is set to enable, use the arrow buttons to turn individual compressor requests on or off.

```

Compressor Signal
Override: Auto
1: 0%
Enable Main Override
    
```

OVERRIDE THE MODULATING COMPRESSOR CONTROL LOOP

When manual override is set to enable, use the arrow buttons to change the compressor modulation value.

```

Cooling Ramp 1
Override: Auto
Demand: 0%
Enable Main Override
    
```

OVERRIDE COOLING

When the cooling control is in the manual mode, use the arrow buttons to vary the cooling output.

Chilled Water: The cooling percent is directly proportional to the 0 - 10 VDC output signal.

0% Cooling = 0 VDC

100% Cooling = 10 VDC

Packaged Cooling: The cooling percent displays compressor engagement as a percent. The compressors are subject to the min on/off times and heating/cooling lockouts.

```

Electric Heat
Override: Auto
Elec Heater 1: 100%
Enable Main Override
    
```

OVERRIDE THE ELECTRIC HEATER

This screen only appears if the unit is equipped with electric post heat. Electric heater percentage is directly proportional to the 0 – 10 VDC output signal.

```

Heating Ramp
Override: Auto
Demand: 100%
Enable Main Override
    
```

```

Heat Pump Heating Ramp
Override: Auto
Demand: 0%
Enable Main Override
    
```

```

Economizer Ramp
Override: Auto
Value: 0%
Enable Main Override
    
```

```

Hot Gas Reheat Ramp
Override: Auto
Value: 100%
Enable Main Override
    
```

```

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

```

Pressure Control
Compressor must be off
Override: Auto
Ramp 1 Speed: 0.0%
Fixed Stages
Stg 2: Off
Enable Main Override
    
```

Control Variables

- ☒ Advanced
- ☒ Advanced Setpoints

```

Advanced Setpoints
Occupied Dehum Call
Enabled when:
OAT > Coil Set+Offset
    
```

```

Advanced Setpoints
Unoccupied Dehum Call
Enabled when:
Indoor RH
    
```

OVERRIDE HEATING

When the heating control is in the manual mode, use the arrow buttons to vary the heating output.

OVERRIDE HEAT PUMP HEATING

This screen will be available when the unit is configured as a heat pump. When in manual mode, change the demand to control the position of the reversing valve and the amount of compressor request. The compressors are subject to the min on/off times and heating lockouts.

OVERRIDE THE ECONOMIZER CONTROL

When the heating control is in the manual mode, use the arrow buttons to vary the heating output.

OVERRIDE THE HOT GAS REHEAT

This screen only appears if modulating hot gas reheat option was provided with the unit. When the hot gas reheat loop control is in the manual mode, use the arrow buttons to vary the reheat output.

OVERRIDE THE ENERGY RECOVERY DEFROST

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

OVERRIDE PRESSURE CONTROL FANS

This screen will be available when active head pressure control is installed in the unit. When in manual mode, with the compressors off, the modulating fan speed can be altered by using the arrows to change the output. The fixed stage fan can be enabled by changing the output to On.

The Advanced Setpoints Menus allows the user to view and modify network settings. The **service password (9998)** is required to make changes.

OCCUPIED DEHUMIDIFICATION CALL.

Reference control variables for possible Occupied dehumidification call methods.

UNOCCUPIED DEHUMIDIFICATION CALL.

Reference control variables for possible unoccupied dehumidification call methods.

Menu

```

Advanced Setpoints
Unocc Unit Operation
Mode:
Night Setback Cycle
    
```

```

Advanced Setpoints
Morning Sequences
Warm UP Enable: ☐
Cool Down Enable: ☐
Max duration: 30m
    
```

Control Variables

- ☐ Advanced
- ☐ Network Settings

```

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: ☐
    
```

```

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

```

Modbus TCP Slave
Device ID: 1
    
```

```

BACnet MSTP Config
Device: 0077077
Info Frames: 20
Max Masters: 127
Mstp Address: 77
Baud Rate: 9600
Save Settings: ☐
    
```

VIEW AND CHANGE THE UNOCCUPIED UNIT OPERATION.

Possible unoccupied unit operation methods include:

- Unit Off
- Night Setback Cycle
- Recirculation with Unoccupied Set Points
- Normal Operation with Unoccupied Set Points

ENABLE MORNING WARM UP AND COOL DOWN.

The user can enable morning warm up, morning cool down, and set the duration for the sequence.

The Network Settings Menus allows the user to view and modify network settings. The **service password (9998)** is required to make changes.

C.PCO BOARD ADDRESS

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.

CONTROLLER BACNET IP CONFIG

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

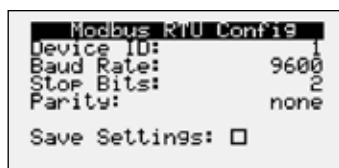
MODBUS TCP SLAVE. This screen will appear if the unit is set for Modbus TCP and allows the user to set device ID number.

BACNET 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. Go to Network Settings menu and view BACnet MSTP Config screen.
2. 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.
3. Once desired parameters have been entered, enable the 'Save Settings' option and press the enter button.
4. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.

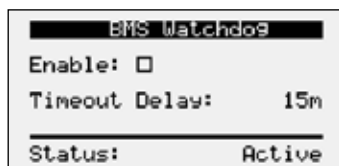


MODBUS RTU PARAMETERS

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. Go to Network Settings menu and view Modbus RTU Config screen.
2. 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.
3. Once desired parameters have been entered, enable the 'Save Settings' option and press the enter button.
4. Reboot the controller by cycling power to the unit. Allow several minutes for the controller to initialize.

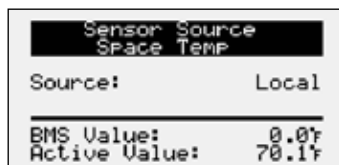


BMS WATCHDOG

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_RH_from_BMS
- Space_Static_from_BMS
- Space_Temp_from_BMS



SENSOR SOURCE

The sensor source can be changed to source by BMS through the controller or by a dedicated BMS point. Reference Points List above and in the Appendix for more detailed point information. Screen to the left is an example of the sensor source type. Source can be set for local or BMS at this screen.

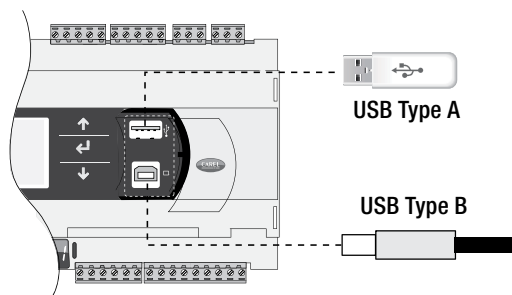
Control Variables

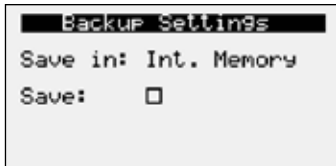
- ☒ Advanced
- ☒ Backup/Restore

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

Connecting to USB Drives

The controller has built-in USB ports 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. The controller will either have a USB Type A, USB Type B or Micro USB dependent on model.





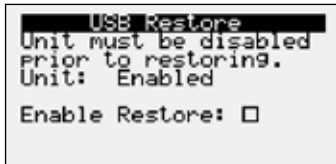
CREATING A BACKUP FILE

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.

Menu

Control Variables

- ↳ Advanced
- ↳ I/O Configuration

```
I/O Configuration
IO Type: Analog Input
Supply Air Temp
Ch: M 04 Type: NTC
```

Value: 71.6°F

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

I/O CONFIGURATION

This screen is read only and will require the factory password to make changes. 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.

I/O Conf Options

```
Editable: ☐
Scroll by
All Configured: ☒
```

I/O CONFIGURATION OPTIONS

Changes to the IO configuration requires the factory 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 Config
- ↳ Service Config

```
Service Unit Config
Supply Fan Control
Type: Constant Volume
K Factor: 0.0
```

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!

SUPPLY FAN CONTROL TYPE

Reference control variables for possible supply fan control methods.

```
Service Unit Config
Exhaust Fan Control
Type: Space Static
K Factor: 0.0
```

EXHAUST FAN CONTROL TYPE

Reference control variables for possible exhaust fan control methods.

Menu

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
ENTER → Alarm History
ALARM → Alarm Reset
```

ACTIVE ALARMS

If an alarm occurs, 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.

IG Furnace Alarm (AL) Descriptions

IG no flame 3 try AL	Indicates a furnace failure to light or properly sense flame after 3 trials.	Alarm only
IG combustion fan high pressure switch failure	Indicates a call for high speed combustion fan but high pressure switch did not close.	Alarm only
IG furnace ignition control	Indicates an alarm from the ignition controller.	Alarm only
Pressure switch closed with combustion fan off	Indicates low pressure switch was closed with no call for combustion fan.	Alarm only
Combustion fan not proved	Indicates a call for low speed combustion fan but low pressure switch did not close.	Alarm only
IG furnace max retry	Indicates that the max number of retries was reached.	Alarm and Furnace lockout
IG High Temp AL	Indicates that power was lost from the High Temp Limit Sensor. Check for high limit trip.	Alarm only
IG offline	Indicates communication with furnace control has failed.	Alarm only
IG Lg Man No Flame AL	No flame after 3 trials for ignition on the large manifold.	Alarm only

Appendix A: 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.



Specifications

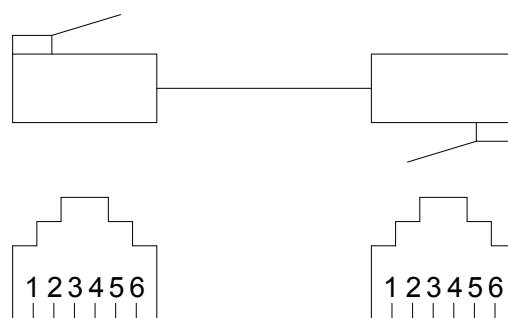
Carel Model	PGD1000W00
Power Supply	Power supplied from unit controller through RJ25 cable
Max distance from unit controller	150 feet
Required Cable	6P6C RJ25/RJ12 Cable (straight)
Operating Conditions	-4°F to 140°F, 90%RH (non-condensing)
Display Type	Backlit LED with lighted buttons

Installation

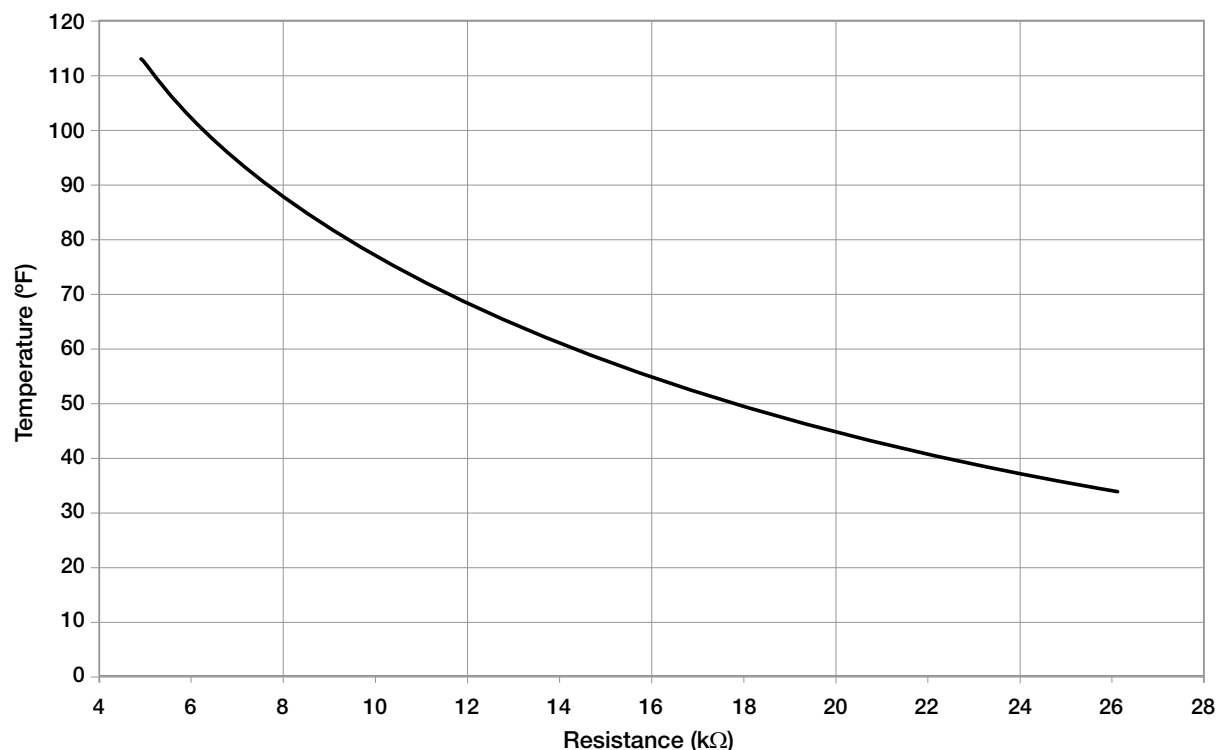
The remote display connects to the unit mounted controller through a six-wire RJ25 or RJ12 telephone cable (straight). When ordered from the factory, a 10 ft. cable is provided with the remote display. The display and cable can be used to assist with start-up and maintenance.

Connecting Cable

If mounted remotely, the factory cable can either be extended or replaced with a longer cable to obtain the necessary distance. The resulting cable connections should be a "straight through cable," where pins on one end correspond identically to the pins on the opposite end. If making your own cable, use the same pin-out for each end.



NTC Temperature Sensor Chart

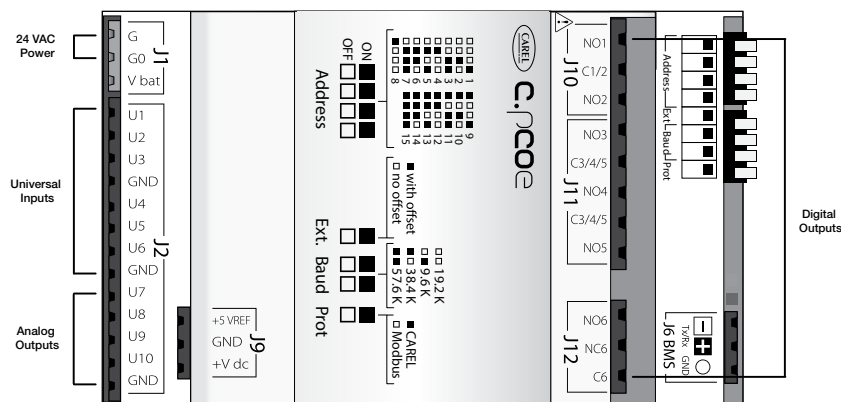


Appendix B: I/O Expansion Board (c.pCOe) Quick Start

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

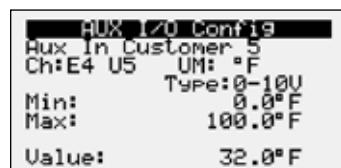
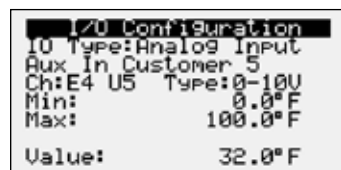
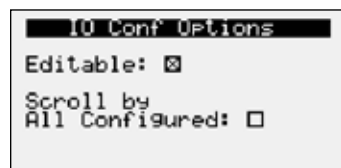
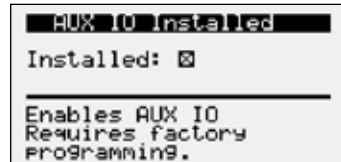
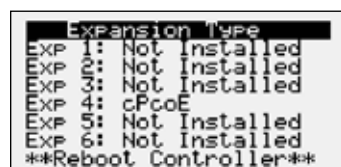
- 6 Universal Inputs (Digital Input*, NTC, 0/1VDC, 0/10VDC, 0/20mA, 4/20mA, 0/5VDC)
*Only dry to ground contacts can be utilized for digital inputs. Applying voltage will result in damage to the I/O expansion board.
- 4 Analog Outputs (VDC)
- 6 Digital Outputs

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 Factory Password to make any edits at this point. Consult factory for factory password and 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 1-6, 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 C: Space Thermostat Quick Start



The space thermostat gives users the ability to view the space temperature and relative humidity (optional) and control the active space set points from the adjustable display. The space thermostat also has the ability to send the unit into temporary occupied mode. It is also providing the functionality to average up to 4 temperature readings through the microprocessor. The space thermostat is shipped loose with installation by others and is a Modbus connected device.

Room thermostat functions:

- Temporary occupancy override control
- Temperature and relative humidity monitoring
- Temperature and relative humidity set point adjustability
- Status icon on LCD display with push buttons
- Optional temperature monitoring up to 4 sensors

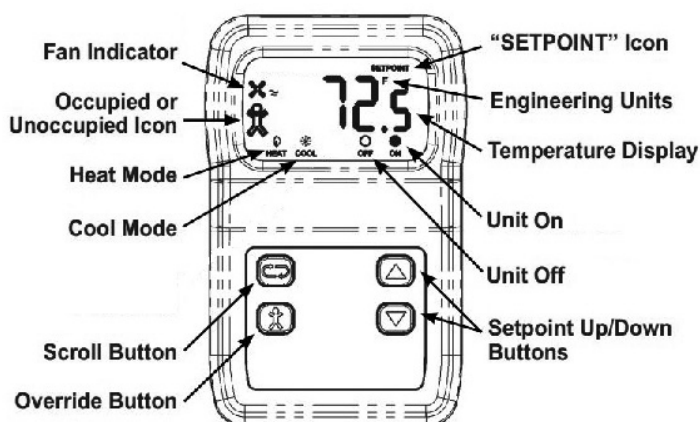
Display

If more than one space thermostat is provided for averaging, only one space thermostat will be provided with a display and push buttons for adjustment.

Adjusting SET POINT - The default display will show the current temperature value for the room. Use the scroll button to index through additional sensor parameters. Parameters with the "SET POINT" icon displayed above the temperature display are adjustable. Use the Up/Down buttons to adjust the set point, and use the scroll button to view the next parameter or return to the normal display mode.

Up/Down Button Function - The Up/Down buttons are used to adjust editable parameters including the temperature and humidity set point.

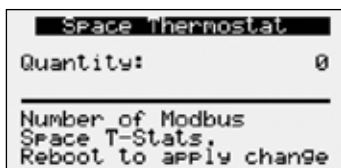
Override Button Function - The display shows a person in the lower left corner of the display at all times. If the person is solid, the unit is operating in occupied mode. If it is an outline of the person, the unit is in unoccupied mode. Pushing the Override button when the unit is in unoccupied mode will allow a temporary override sequence to Occupied mode for a period of 1 to 3 hours (adjustable at the unit microprocessor).



Initial Setup and Communication Configuration

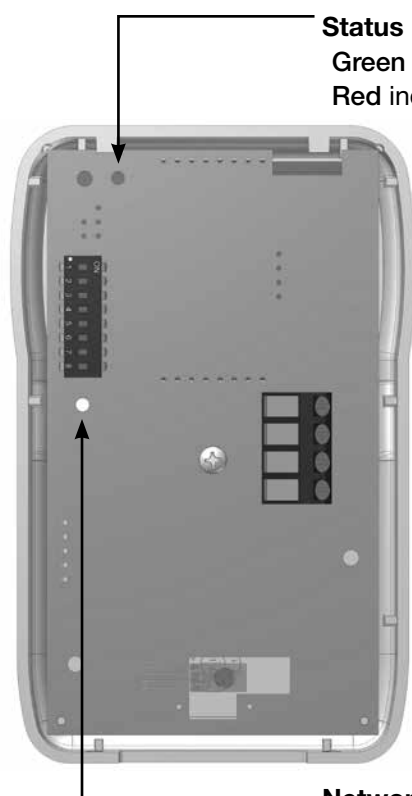
The space thermostat is a Modbus connected device. There can be up to three additional Modbus temperature sensors added for space temperature averaging. The sensors must all be connected in a daisy chain configuration.

The microprocessor controller will be pre-configured for one space thermostat. If space temperature averaging is desired, additional field setup will be required both in the controller and on the Modbus space sensors:



- Each space sensor must have the DIP switches adjusted on the back of the sensor to the corresponding switches. Reference Room Thermostat Modbus Address chart on the following page for DIP switches settings.
- Once the address is set and the wires are connected the "Status" LED should be a steady green and the "Network" LED should be a quick blinking amber/green color.
- In the Controller, enter the Ctrl Variables Menu/Temperature and scroll down in the Temperature Menu to select Space Thermostat. Choose the number of space sensor being used (1-4).

Appendix C: Space Thermostat Quick Start

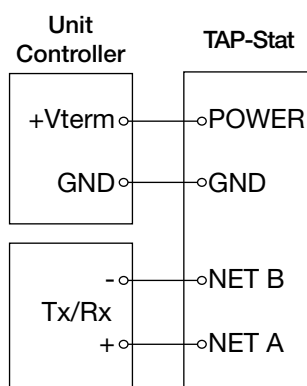


Status LED

Green indicates that the unit is operating properly.

Red indicates that there is a problem with the unit.

Terminal	Description
GND	Power Supply Ground (common to the controller)
Net B	RS485 network connection (Data -)
Net A	RS485 network connection (Data +)
Power	Power supply hot



Network LED

Flashing Red Slowly indicates that there has been no communications for 60 seconds.

Flashing Green Slowly indicates that there have been normal communications within the last 60 seconds.

Flashing Green Slowly with Quick Red Flashes; the quick red flashes indicate active communications.

Space Thermostat Modbus Address				
	T-Stat 1 (Display)	T-Stat 2	T-Stat 3	T-Stat 4
Address in Microprocessor	10	11	12	13
Dip Switch Set on Stat	Sw 2 + Sw 8	Sw 1 + Sw 2 + Sw 8	Sw 4 + Sw 8	Sw 1 + Sw 4

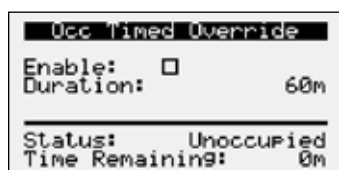
Baud Rate Setting

In order for the space thermostat to communicate with the microprocessor, the correct baud rate must be set in the space thermostat. To set the baud rate:

- The “PROG” DIP switch on the back of the space thermostat must be flipped to the right side.
- Use the Set Point Down button to display P11 on the space thermostat.
- Push the Scroll button and use the Set Point Up/Down buttons to adjust the baud rate to 192.
- Once 192 is displayed, push the Scroll button again to save the setting. Once the setting is saved, P11 should appear on the display.
- Flip the “PROG” DIP switch on the back of the space thermostat back to the left. The space thermostat should communicate and be set back to normal mode.

Occupancy Override Time Adjustment

If the occupancy override time needs to be adjusted:



- If the occupancy override is enabled from the space thermostat or the unit microprocessor, it will override for the period of time set on this menu screen.
- To adjust the temperature override time, enter the following menu options at the controller, Ctrl Variables/Occupancy. Scroll down at the Occupancy Menu and select Occ Timed Override. This menu will allow the user to enable occupancy override from the controller and set override duration.

Appendix D: GreenTrol® Airflow Monitoring Quick Start

Airflow Status	
Exh Fan:	0
OAD:	0

The GreenTrol® airflow monitoring station measures airflow using advanced thermal dispersion technology. An integral LCD display provides a local indication of airflow measurement and device configuration. The airflow monitor also features Modbus communication allowing the main unit microprocessor to monitor the airflow as well. The GreenTrol also accepts up to two airflow probes for averaging.

GreenTrol Airflow Monitor functions:

- LCD readout of measured airflow
- Dual airflow probe averaging
- Modbus connectivity



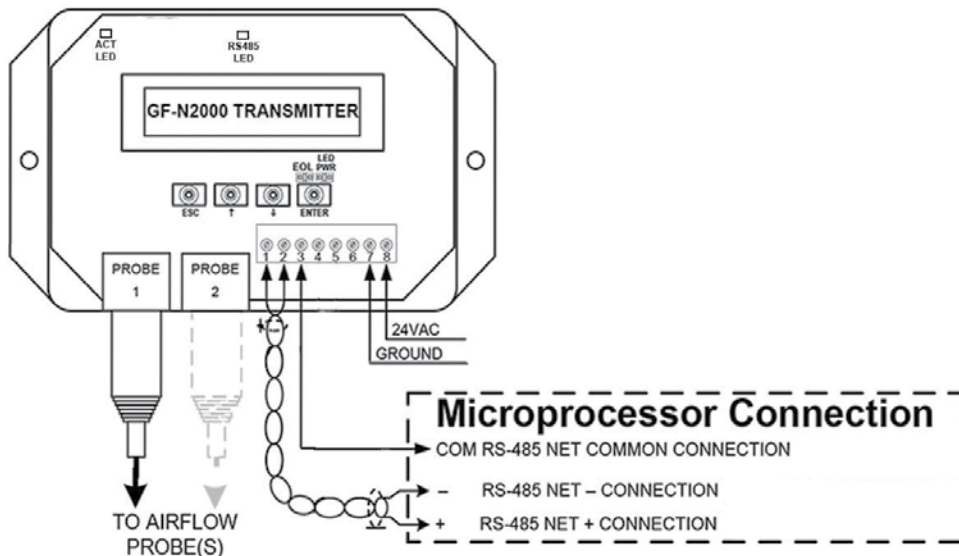
Display and Navigation

The LCD screen will by default show the current airflow that is being measured. To enter the menu to set up the monitoring station the user must remove the front cover of the GreenTrol to uncover the navigation buttons. Press and hold the UP and DOWN buttons at the same time for 3 seconds to enter the menu.

Enter Button Function - The ENTER button allows the user to go into the selected menu or function, as well as save the selected value.

Up/Down Button Function - The Up/Down buttons are used to navigate the menu and to change values in the menu.

Esc Button Function - The ESC button allows the user to exit the current menu or function.



Appendix E: Points List

BACnet Object	Modbus Register	Description
Analog Inputs - Read COV/No Write - Modbus Input Registers (Size)		
AI-3	30199(2)	Circuit A Suction Temperature
AI-4	30201(2)	Circuit B Discharge Temperature
AI-6	30205(2)	Circuit B Suction Temperature
AI-25	30243(2)	Cold Coil 1 Temperature
AI-30	30253(2)	Exhaust Temperature
AI-35	30263(2)	Mixed Temperature
AI-37	30267(2)	Outside Air Temperature
AI-41	30275(2)	Return Temperature
AI-44	30281(2)	Space Temperature
AI-45	30283(2)	Supply Temperature
AI-86	30349(2)	Outside % Relative Humidity
AI-88	30353(2)	Return % Relative Humidity
AI-89	30355(2)	Space % Relative Humidity
AI-93	30363(2)	Return Duct Static Pressure
AI-94	30365(2)	Space Static Pressure
AI-95	30367(2)	Supply Duct Static Pressure
AI-116	30401(2)	Space 1 CO2 ppm
AI-118	30405(2)	Return CO2 ppm
AI-119	30407(2)	Circuit A Discharge Pressure
AI-120	30409(2)	Circuit A Suction Pressure
AI-121	30411(2)	Circuit B Discharge Pressure
AI-122	30413(2)	Circuit B Suction Pressure
AI-143	30455(2)	Exhaust Fan Speed Remote Command
AI-155	30461(2)	Supply Fan Speed Remote Command
AI-640	30639(2)	Customer defined auxiliary input
AI-642	30641(2)	Customer defined auxiliary input
AI-644	30643(2)	Customer defined auxiliary input
AI-646	30645(2)	Customer defined auxiliary input
AI-648	30647(2)	Customer defined auxiliary input
AI-650	30649(2)	Customer defined auxiliary input
Analog Values - Read COV/ Write-Commandable - Modbus Holding Registers (Size)		
AV-1	40001(2)	Main Temperature Setpoint - Supply, Space, or Return
AV-2	40003(2)	Heat/Cool Spt Deadband Space or Return reset control is active Clg Spt = Temp Spt + Deadband/2 Htg Spt = Temp Spt - Deadband/2
AV-3	40005(2)	Cooling Coil Leaving Air Setpoint Minimum
AV-5	40009(2)	Dehumidification Setpoint %RH for Space or Return reset control
AV-6	40011(2)	Outside Dewpoint Dehumidification Trigger Setpoint

Appendix E: Points List

AV-7	40013(2)	Indoor Dewpoint Dehumidification Trigger Setpoint
AV-9	40017(2)	Unoccupied Indoor Dewpoint Dehumidification Trigger Setpoint
AV-10	40019(2)	Unoccupied Cooling Setpoint
AV-11	40021(2)	Unoccupied Dehumidification %RH Setpoint
AV-12	40023(2)	Unoccupied Heating Setpoint
AV-16	40031(2)	Economizer Ambient Temp Enable Setpoint Allow Econ when OAT<Spt
AV-17	40033(2)	Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy<Spt
AV-21	40041(2)	Outside RH from BMS (BV-5 set to 1 for BMS Control)
AV-22	40043(2)	Outside Temp from BMS (BV-6 set to 1 for BMS Control)
AV-23	40045(2)	Return RH from BMS (BV-7 set to 1 for BMS Control)
AV-24	40047(2)	Return Temp from BMS (BV-8 set to 1 for BMS Control)
AV-25	40049(2)	Space 1 CO2 from BMS (BV-9 set to 1 for BMS Control)
AV-27	40053(2)	Return CO2 from BMS (BV-11 set to 1 for BMS Control)
AV-28	40055(2)	Space RH from BMS (BV-12 set to 1 for BMS Control)
AV-29	40057(2)	Space Static from BMS (BV-13 set to 1 for BMS Control)
AV-30	40059(2)	Space Temp from BMS (BV-14 set to 1 for BMS Control)
AV-31	40061(2)	Cooling Ambient Lockout Setpoint
AV-32	40063(2)	Heating Ambient Lockout Setpoint
AV-33	40065(2)	Preheat Ambient Lockout Setpoint
AV-36	40071(2)	Return Duct Static Pressure Setpoint
AV-37	40073(2)	Space Static Pressure Setpoint
AV-38	40075(2)	Supply Duct Static Pressure Setpoint
AV-39	40077(2)	Space CO2 Setpoint
AV-133	40083(2)	Supply Fan Speed Control Signal from BMS (BV-56 set to 1 for BMS Control)
AV-134	40085(2)	Exhaust Fan Speed Control Signal from BMS (BV-57 set to 1 for BMS Control)
AV-136	40089(2)	OA Damper Position Control Signal from BMS (BV-59 set to 1 for BMS Control)
AV-137	40091(2)	Outside Air Damper Minimum Setpoint
AV-138	40093(2)	BMS Commanded auxiliary analog output
AV-139	40095(2)	BMS Commanded auxiliary analog output
AV-140	40097(2)	BMS Commanded auxiliary analog output
AV-141	40103(2)	BMS Commanded auxiliary analog output
AV-313	40101(2)	Cooling Coil Leaving Air Setpoint Maximum

Appendix E: Points List

Analog Values - Read COV/No Write - Modbus Input Registers (Size)

AV-40	30001(2)	Unit Status 0: Off/Standby 1: Unoccupied Start 2: Occupied Start 3: Opening Dampers 4: End Switch 5: Dampers Open 6: Fan Start Delay 7: Fans Starting 8: Fans Starting 9: Heat/Cool Delay 10: System On 11: Soft Shutdown 12: System Disabled	13: Remote Off 14: Shutdown Alarm 19: Fans Only 20: Economizing 21: Cooling 22: Heating 23: Dehumidifying 25: HGRH Purging 26: Defrost Active 28: Cooling & Heating 29: Dehum w/Heat 30: Overrides Active 31: Expansion Offline
AV-41	30003(2)	Active Supply Temperature Setpoint	
AV-43	30007(2)	Cooling Ramp 1 Capacity	
AV-47	30015(2)	Defrost Ramp	
AV-48	30017(2)	Economizer Ramp	
AV-49	30019(2)	Exhaust Fan Space Static Pressure Ramp	
AV-50	30021(2)	Exhaust Fan Supply Tracking Ramp	
AV-51	30023(2)	Head Pressure Control Ramp 1	
AV-52	30025(2)	Head Pressure Control Ramp 2	
AV-59	30039(2)	Heat Pump Heating Ramp	
AV-60	30041(2)	Heating Ramp	
AV-61	30043(2)	Hot Gas Reheat Ramp	
AV-64	30049(2)	OAD CFM Ramp	
AV-71	30063(2)	Space CO2 Control Ramp	
AV-72	30065(2)	Supply Duct Static Pressure Ramp	
AV-73	30067(2)	Supply Fan CFM Control Ramp	
AV-74	30069(2)	Supply Fan Space Static Pressure Ramp	
AV-75	30071(2)	Winter Ramp Output	
AV-82	30085(2)	Outside Dewpoint	
AV-83	30087(2)	Outside Enthalpy	
AV-86	30093(2)	Return Dewpoint	
AV-87	30095(2)	Return Enthalpy	
AV-88	30097(2)	Space Dewpoint	
AV-89	30099(2)	Space Enthalpy	
AV-93	30107(2)	Circuit A Superheat	
AV-95	30111(2)	Circuit B Superheat	
AV-107	30135(2)	Total Exhaust Fan CFM	
AV-110	30139(2)	Total Supply Fan CFM	
AV-129	30173(2)	OAD CFM	
AV-131	30177(2)	OAD Static Pressure Ramp %	

Appendix E: Points List

AV-132	30179(2)	Active Temperature Setpoint
AV-201	30473(2)	Chilled Water 1 Valve Position %
AV-205	30481(2)	Condenser Ramp 1 %
AV-206	30483(2)	Condenser Ramp 2 %
AV-221	30513(2)	Electric Heater Output %
AV-229	30517(2)	Energy Recovery Output %
AV-231	30521(2)	Exhaust Fan Speed %
AV-235	30523(2)	Hot Gas Reheat Valve Position %
AV-236	30525(2)	Hot Water Valve Position %
AV-242	30537(2)	Mod Gas Furnace Output %
AV-250	30541(2)	Outside Air Damper Position
AV-264	30557(2)	Supply Fan Speed %
AV-285	30585(2)	Modulating Compressor Speed %
AV-286	30587(2)	Circuit A Saturated Discharge Temperature
AV-287	30589(2)	Circuit B Saturated Discharge Temperature
AV-294	30603(2)	Circuit A Saturated Suction Temperature
AV-295	30605(2)	Circuit B Saturated Suction Temperature
AV-312	30653(2)	Calculated Coil Leaving Setpoint

Binary Inputs - Read COV/No Write - Modbus Discrete Inputs

BI-3	10052	Circuit A High Pressure Switch (1=Active; 0=Inactive)
BI-4	10053	Circuit A Low Pressure Switch (1=Active; 0=Inactive)
BI-5	10054	Circuit B High Pressure Switch (1=Active; 0=Inactive)
BI-6	10055	Circuit B Low Pressure Switch (1=Active; 0=Inactive)
BI-21	10070	Drain Pan Alarm Status (1=Active; 0=Inactive)
BI-23	10072	Exhaust Fan 1 Status (1=Active; 0=Inactive)
BI-28	10077	Freeze Stat Alarm Status (1=Active; 0=Inactive)
BI-52	10101	OAD End Switch Status (1=Active; 0=Inactive)
BI-53	10102	Occupancy Status (1=Active; 0=Inactive)
BI-54	10103	Filter Alarm Status (1=Active; 0=Inactive)
BI-75	10124	Shutdown Alarm Status (1=Active; 0=Inactive)
BI-78	10127	Supply Fan 1 Status (1=Active; 0=Inactive)
BI-82	10131	Remote Unit Enable Status (1=Active; 0=Inactive)
BI-83	10132	Heat Wheel Status (1=Active; 0=Inactive)

Binary Values - Read/Commandable - Modbus Coil

BV-1	2	BMS Watchdog Command Write a 1 to the watchdog within the timeout delay to establish communication from BMS to the controller. (1=Active; 0=Inactive)
BV-2	3	Master System Enable (1=Enable; 0=Disable)
BV-3	4	Occupancy Command (1=Unoccupied; 0=Occupied)
BV-4	5	Alarm Reset Command (1=Reset; 0=Normal)
BV-5	6	Outside RH Source Selection (1=BMS; 0=Local) (AV-21 Analog Value)
BV-6	7	Outside Temp Source Selection (1=BMS; 0=Local) (AV-22 Analog Value)
BV-7	8	Return RH Source Selection (1=BMS; 0=Local) (AV-23 Analog Value)

Appendix E: Points List

BV-8	9	Return Temp Source Selection (1=BMS; 0=Local) (AV-24 Analog Value)
BV-9	10	Space 1 CO2 Source Selection (1=BMS; 0=Local) (AV-25 Analog Value)
BV-11	12	Return CO2 Source Selection (1=BMS; 0=Local) (AV-27 Analog Value)
BV-12	13	Space RH Source Selection (1=BMS; 0=Local) (AV-28 Analog Value)
BV-13	14	Space Static Source Selection (1=BMS; 0=Local) (AV-29 Analog Value)
BV-14	15	Space Temp Source Selection (1=BMS; 0=Local) (AV-30 Analog Value)
BV-56	19	SF Control Source Selection (1=BMS; 0=Local) (AV-133 Analog Value)
BV-57	20	EF Control Source Selection (1=BMS; 0=Local) (AV-134 Analog Value)
BV-59	22	OAD Control Source Selection (1=BMS; 0=Local) (AV-136 Analog Value)
BV-207	24	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
BV-208	25	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
BV-209	26	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
BV-210	27	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
BV-211	28	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
BV-212	29	BMS Commanded auxiliary digital output (1=Active; 0=Inactive)
Binary Values - Read COV/No Write - Modbus Discrete Inputs		
BV-16	10002	Occupied Status (1=Occupied; 0=Unoccupied)
BV-18	10004	Unoccupied Cooling Call Status (1=Active; 0=Inactive)
BV-19	10005	Unoccupied Dehumidification Call Status (1=Active; 0=Inactive)
BV-20	10006	Unoccupied Heating Call Status (1=Active; 0=Inactive)
BV-24	10010	General Alarm Status Optionally set to indicate any alarm is active, or a shutdown alarm is active. (1=Alarm; 0=Normal)
BV-25	10011	Shutdown Alarm Status When in alarm, the System Enable is set to false and the unit will remain off. (1=Shutdown; 0=Normal)
BV-27	10013	Unit Cooling (1=Active; 0=Inactive)
BV-28	10014	Unit Economizing (1=Active; 0=Inactive)
BV-29	10015	Unit Heating (1=Active; 0=Inactive)
BV-31	10017	Unit Dehumidifying (1=Active; 0=Inactive)
BV-32	10018	Manual Overrides Active (1=Override; 0=Normal)
BV-33	10019	Cooling Allowed (1=Allowed; 0=Locked_Out)
BV-34	10020	Heating Allowed (1=Allowed; 0=Locked_Out)
BV-36	10022	PreHeat Allowed (1=Allowed; 0=Locked_Out)
BV-37	10023	Hot Gas Reheat Purge Cycle (1=Active; 0=Inactive)
BV-43	10029	Dampers Opening Startup Sequence (1=Yes; 0=No)
BV-44	10030	Exhaust Fan Startup Sequence (1=Yes; 0=No)
BV-48	10034	Supply Fan Startup Sequence (1=Yes; 0=No)
BV-49	10035	BMS Watchdog Ping Active (1=Active; 0=Inactive)
BV-50	10036	BMS Occupancy Command (1=Occupied; 0=Unoccupied)
BV-60	10042	Condenser Water Pump Required (1=Yes; 0=No)
BV-100	10153	Damper Actuator Power (1=Active; 0=Inactive)
BV-111	10164	Compressor 1 Enable (1=Active; 0=Inactive)

Appendix E: Points List

BV-112	10165	Compressor 2 Enable (1=Active; 0=Inactive)
BV-113	10166	Compressor 3 Enable (1=Active; 0=Inactive)
BV-114	10167	Compressor 4 Enable (1=Active; 0=Inactive)
BV-119	10172	Condenser Ramp 1 Stage 1 Start (1=Active; 0=Inactive)
BV-120	10173	Condenser Ramp 1 Stage 2 Start (1=Active; 0=Inactive)
BV-121	10174	Condenser Ramp 1 Stage 3 Start (1=Active; 0=Inactive)
BV-123	10176	Condenser Ramp 2 Stage 1 Start (1=Active; 0=Inactive)
BV-124	10177	Condenser Ramp 2 Stage 2 Start (1=Active; 0=Inactive)
BV-125	10178	Condenser Ramp 2 Stage 3 Start (1=Active; 0=Inactive)
BV-127	10180	Exhaust Fan 1 (1=Active; 0=Inactive)
BV-131	10184	Furnace 1 Stage 1 (1=Active; 0=Inactive)
BV-133	10186	Furnace 2 Stage 1 (1=Active; 0=Inactive)
BV-163	10208	Heat Wheel Enable (1=Active; 0=Inactive)
BV-166	10211	PreHeat Enable (1=Active; 0=Inactive)
BV-175	10220	Reversing Valve Position (1=Heat; 0=Cool)
BV-186	10231	Supply Fan 1 (1=Active; 0=Inactive)
BV-313	10264	BMS Offline Alarm (1=Alarm; 0=Normal)
BV-315	10266	Circuit A Discharge Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-316	10267	Circuit A Discharge Temp Sensor Alarm (1=Alarm; 0=Normal)
BV-319	10270	Circuit A Suction Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-320	10271	Circuit A Suction Temp Sensor Alarm (1=Alarm; 0=Normal)
BV-324	10275	Circuit B Discharge Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-325	10276	Circuit B Discharge Temp Sensor Alarm (1=Alarm; 0=Normal)
BV-328	10279	Circuit B Suction Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-329	10280	Circuit B Suction Temp Sensor Alarm (1=Alarm; 0=Normal)
BV-387	10338	Cold Coil 1 Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-395	10346	Comp Circ A High Pressure Alarm (1=Alarm; 0=Normal)
BV-396	10347	Comp Circ A Low Pressure Alarm (1=Alarm; 0=Normal)
BV-397	10348	Comp Circ B High Pressure Alarm (1=Alarm; 0=Normal)
BV-398	10349	Comp Circ B Low Pressure Alarm (1=Alarm; 0=Normal)
BV-420	10371	Damper End Switch Alarm (1=Alarm; 0=Normal)
BV-422	10372	Drain Pan Alarm (1=Alarm; 0=Normal)
BV-423	10373	Exhaust Fan 1 Alarm (1=Alarm; 0=Normal)
BV-424	10374	Exhaust Fan 1 CFM Transducer Alarm (1=Alarm; 0=Normal)
BV-433	10383	Exhaust Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-434	10384	Expansion Board 1 Alarm (1=Alarm; 0=Normal)
BV-435	10385	Expansion Board 2 Alarm (1=Alarm; 0=Normal)
BV-436	10386	Expansion Board 3 Alarm (1=Alarm; 0=Normal)
BV-441	10391	Freeze Stat Alarm (1=Alarm; 0=Normal)
BV-448	10398	HP Circuit A High Sat Discharge Temp Alarm (1=Alarm; 0=Normal)
BV-454	10404	HP Circuit B High Sat Discharge Temp Alarm (1=Alarm; 0=Normal)
BV-498	10448	Internal Board Temp Alarm - Full Platform Only (1=Alarm; 0=Normal)
BV-502	10452	Mixed Temperature Sensor Alarm (1=Alarm; 0=Normal)

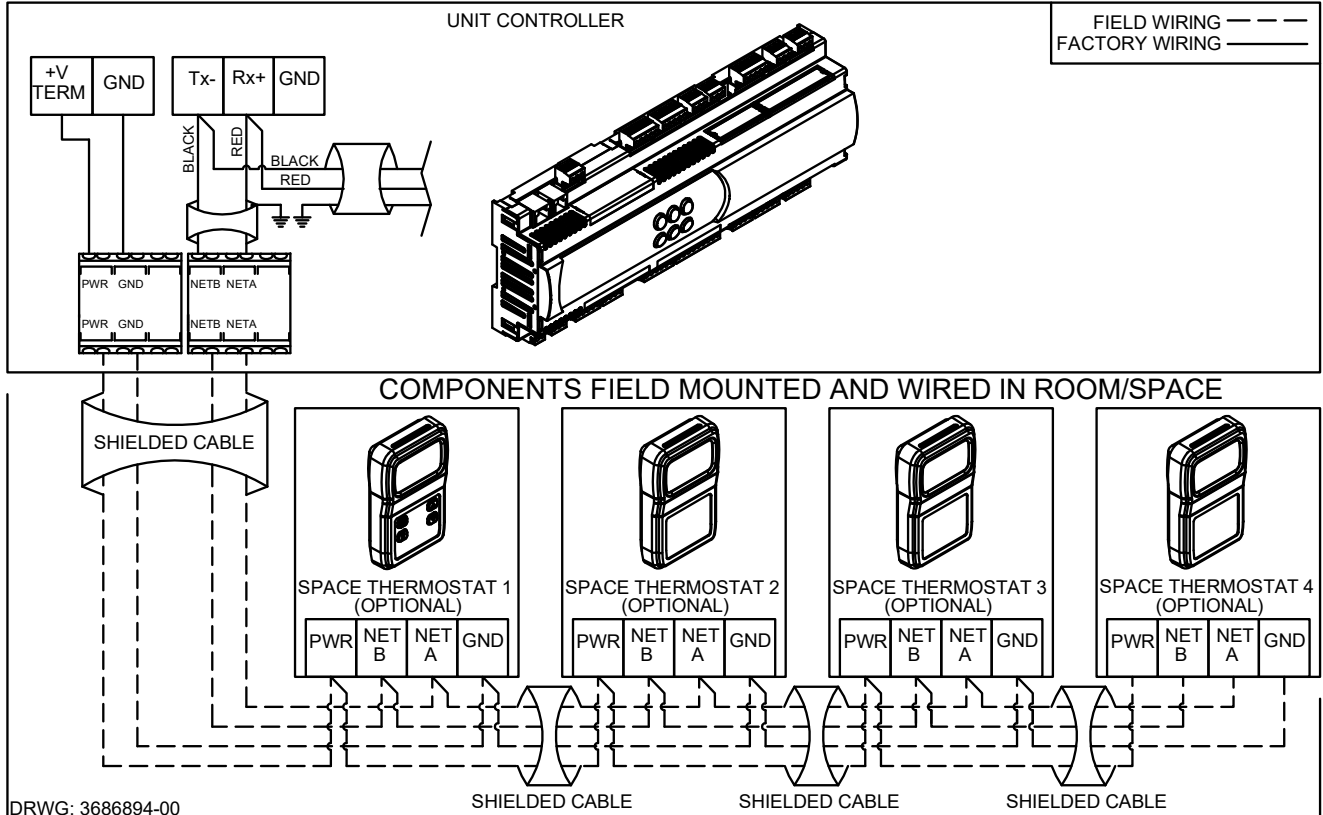
Appendix E: Points List

BV-506	10456	OAD CFM Transducer Alarm (1=Alarm; 0=Normal)
BV-507	10457	Outside Air Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-508	10458	Filter Alarm (1=Alarm; 0=Normal)
BV-509	10459	Outside RH Sensor Alarm (1=Alarm; 0=Normal)
BV-520	10470	Return CO2 Sensor Alarm (1=Alarm; 0=Normal)
BV-521	10471	Return Duct Static Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-531	10481	Return Low Static Alarm (1=Alarm; 0=Normal)
BV-532	10482	Return RH Sensor Alarm (1=Alarm; 0=Normal)
BV-533	10483	Return Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-535	10485	Space CO2 1 Sensor Alarm (1=Alarm; 0=Normal)
BV-537	10487	Space High Static Alarm (1=Alarm; 0=Normal)
BV-538	10488	Space RH Sensor Alarm (1=Alarm; 0=Normal)
BV-540	10490	Space Static Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-541	10491	Space Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-551	10501	Supply Air Temp Low Limit Alarm (1=Alarm; 0=Normal)
BV-552	10502	Supply Air Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-553	10503	Supply Duct Static Pressure Transducer Alarm (1=Alarm; 0=Normal)
BV-554	10504	Supply Fan 1 Alarm (1=Alarm; 0=Normal)
BV-558	10508	Supply Fan 1 CFM Transducer Alarm (1=Alarm; 0=Normal)
BV-563	10513	Supply High Duct Static Alarm (1=Alarm; 0=Normal)
BV-565	10515	Supply Temp High Limit Alarm (1=Alarm; 0=Normal)
BV-567	10517	TMem Error Alarm (1=Alarm; 0=Normal)
BV-576	10526	Wheel Rotation Alarm (1=Alarm; 0=Normal)
BV-589	10539	EVD Battery Alarm (1=Alarm; 0=Normal)
BV-590	10540	EVD Configuration Alarm (1=Alarm; 0=Normal)
BV-591	10541	Compressor Envelope - High Discharge Pressure Alarm (1=Alarm; 0=Normal)
BV-592	10542	Compressor Envelope - High Discharge Temperature Alarm (1=Alarm; 0=Normal)
BV-593	10543	EVD Low Discharge Pressure Alarm (1=Alarm; 0=Normal)
BV-594	10544	EVD EEPROM Alarm (1=Alarm; 0=Normal)
BV-595	10545	ExV Motor Alarm - Valve 1 (1=Alarm; 0=Normal)
BV-597	10547	EVD Emergency Closing Alarm (1=Alarm; 0=Normal)
BV-598	10548	EVD Offline Communication Alarm (1=Alarm; 0=Normal)
BV-599	10549	EVD Firmware Compatibility Alarm (1=Alarm; 0=Normal)
BV-600	10550	Compressor Envelope - High Current Alarm (1=Alarm; 0=Normal)
BV-601	10551	Compressor Envelope - High Pressure Ratio Alarm (1=Alarm; 0=Normal)
BV-602	10552	EVD High Condenser Temp Alarm (1=Alarm; 0=Normal)
BV-603	10553	EVD Incomplete Closing Alarm (1=Alarm; 0=Normal)
BV-604	10554	EVD Low Operating Pressure Alarm (1=Alarm; 0=Normal)
BV-606	10556	EVD Low SuperHeat Alarm (1=Alarm; 0=Normal)
BV-608	10558	Compressor Envelope - Low Pressure Delta Alarm (1=Alarm; 0=Normal)
BV-609	10559	Compressor Envelope - Low Pressure Ratio Alarm (1=Alarm; 0=Normal)

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BV-610	10560	Low Suction Refrigerant Temperature (1=Alarm; 0=Normal)
BV-612	10562	EVD Max Operating Pressure Alarm (1=Alarm; 0=Normal)
BV-614	10564	EVD-S1 Suction Pressure Sensor Alarm (1=Alarm; 0=Normal)
BV-615	10565	EVD-S2 Suction Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-617	10567	EVD-S4 Discharge Temperature Sensor Alarm (1=Alarm; 0=Normal)
BV-618	10568	Compressor Envelope - High Suction Pressure (1=Alarm; 0=Normal)
BV-619	10569	Compressor Envelope - Low Suction Pressure (1=Alarm; 0=Normal)
BV-631	10579	Heat Pump Defrost Alarm (1=Alarm; 0=Normal)
BV-633	10581	Heat Pump Heating Locked Out (1=Alarm; 0=Normal)
BV-634	10582	Unexpected EEV Position - Preposition Failed (1=Alarm; 0=Normal)
BV-731	10679	Energy Recovery Wheel High Differential Pressure (1=Alarm; 0=Normal)
BV-733	10682	High Low Pressure Switch Alarm Circuit A (1=Alarm; 0=Normal) - Legacy
BV-734	10683	High Low Pressure Switch Alarm Circuit B (1=Alarm; 0=Normal) - Legacy
BV-735	10684	High Low Pressure Switch Alarm Circuit C (1=Alarm; 0=Normal) - Legacy
BV-736	10685	High Low Pressure Switch Alarm Circuit D (1=Alarm; 0=Normal) - Legacy
BV-737	10686	EF Greentrol Alarm (1=Alarm; 0=Normal) - Legacy
BV-738	10687	OAD Greentrol Alarm (1=Alarm; 0=Normal)
BV-739	10688	Greentrol Device 3 Alarm (1=Alarm; 0=Normal) - Legacy
BV-741	10690	OAD Feedback Error - Not Opening When Economizing (1=Alarm; 0=Normal)
BV-742	10692	OAD Feedback Error - OAD is Open (1=Alarm; 0=Normal)
BV-743	10694	OAD Feedback Error - OAD is Not Modulating (1=Alarm; 0=Normal)
BV-744	10696	OAD Feedback Error - OAD is Not Closing (1=Alarm; 0=Normal)
BV-745	10700	Space Thermostat 1 Offline (1=Alarm; 0=Normal)
BV-746	10702	Space Thermostat 2 Offline (1=Alarm; 0=Normal)
BV-747	10704	Space Thermostat 3 Offline (1=Alarm; 0=Normal)
BV-748	10706	Space Thermostat 4 Offline (1=Alarm; 0=Normal)
BV-749	10708	Inverter Scroll 1 Alarm (1=Alarm; 0=Normal)
BV-753	10716	IG Furnace Alarm (1=Alarm; 0=Normal)
BV-754	10718	SF VFD Alarm - Mini Platform (1=Alarm; 0=Normal)
BV-758	10726	Embedded EVD Alarm - Mini Platform (1=Alarm; 0=Normal)
BV-759	10728	Supply Fan VFD Offline - Mini Platform (1=Alarm; 0=Normal)
Integer Values - Read COV/No Write - Modbus Input Registers		
IV-1	30181	Fan and Damper Startup Sequence Delay Timer
IV-2	30183	Supply Fan Startup Sequence Delay Timer
IV-3	30185	Exhaust Fan startup sequence time before starting the exhaust fan.
IV-7	30193(2)	Most Recent Alarm - Call Technical Support for current table
IV-9	30655	Active Temperature Reset Sequence 1. No Reset, Supply Control 2. Space 3. Return 4. Outside
Integer Values - Read COV/Commandable - Modbus Holding Register		
IV-8	40105	Selected Temperature Reset Sequence 1. No Reset, Supply Control 2. Space 3. Return 4. Outside

MODBUS CONNECTIONS

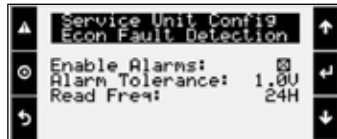


Appendix G: Fault Detection and Diagnostics

The Fault Detection and Diagnostics (FDD) will send a feedback signal from the outdoor air (OA) damper to the controller on the OA damper user interface. This allows the controller to determine if the economizer is operating correctly. Various faults and statuses will display on the controller and through the Building Management System as per the Title 24 Economizer Fault Detection and Diagnostic requirements.

Enable Fault Detection and Diagnostics

When ordered, the FDD will come enabled from the factory. The FDD alarms can be disabled through the service config menu in the controller. To access the service config menu, navigate the following way: 'Ctrl variables' → 'Advanced' → 'Unit Config' → 'Service Config'. Alarm tolerance and read frequency will also be able to be adjusted through this menu.



There will be an 'Actuator Feedback' screen in the 'Service Info' menu that will show the commanded damper position, the actual feedback position, and when the damper positions were last read. This screen is also where the field could force the FDD to read the damper position via a check box option. The service info menu can be accessed via the following: 'Ctrl → variables' → 'Advanced' → 'Service Info'.



Faults/Alarms - Additional faults can generate when the Economizer FDD is enabled, below is a list of the alarms and a description of each. These alarms can also be generated through a BACnet® protocol only.

- **Not Economizing when it should** will generate when FDD is enabled, the outdoor damper status is active on economizer, and the feedback signal from the OA damper is below the damper commanded position by more than 1VDC. Because of the speed of the actuator there is a 3-minute alarm delay to allow the actuator a chance to "catch up" if a sudden change in damper position happens.



- **Economizing when it should not** will generate when FDD is enabled, the outdoor damper status is NOT active on economizer, and the feedback signal from the OA damper is above the damper commanded position by more than 1VDC. Because of the speed of the actuator there is a 3-minute alarm delay to allow the actuator a chance to "catch up" if a sudden change in damper position happens.



- **Damper not modulating** will show up when FDD is enabled, Damper status is NOT Active on Economizer, and feedback signal is not within 1VDC above or below the damper commanded position within 180 seconds.



- **Excess outdoor air** will generate when FDD is enabled, the outdoor damper status is active on economizer, and the feedback signal from the OA damper is above the damper commanded position by more than 1VDC. Because of the speed of the actuator there is a 3-minute alarm delay to allow the actuator a chance to "catch up" if a sudden change in damper position happens.



Appendix G: Fault Detection and Diagnostics

Below is the BACnet Point if the Fault Detection and Diagnostic Alarms are to be read through BACnet:

Points List • BACnet®			
Type	Instance	Name	Read Write
Binary	741	OAD_Feedback_Error_Not_Economizing.Active	ReadCOV_NoWrite
Binary	742	OAD_Feedback_Error_Economizing.Active	ReadCOV_NoWrite
Binary	743	OAD_Feedback_Error_OAD_Not_Modulating.Active	ReadCOV_NoWrite
Binary	744	OAD_Feedback_Error_Excess_OA.Active	ReadCOV_NoWrite

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.

