LENNOX DOAS

**LNX74-525.2**
5H0837230002

August, 2021

# CONTROLS SYSTEM MANUAL
## Packaged Ventilation/Dedicated Outside Air System (DOAS) model DLV

**Carel pCO5+ Microprocessor Controller**


## ⚠ WARNING

1. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.
2. Disconnect power supply before making wiring connections or working on this equipment. Follow all applicable safety procedures to prevent accidental power up. Failure to do so can result in injury or death from electrical shock or moving parts and may cause equipment damage.
3. For units equipped for dual power supply sources, both sources of power must be disconnected to prevent electrical shock and equipment damage.
4. Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

## ⚠ CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

## IMPORTANT

1. The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of this unit must be performed by a qualified installation and service agency.
2. These instructions must also be used in conjunction with the Installation and Service Manual originally shipped with the unit, in addition to any other accompanying component supplier literature.
3. This manual applies to the control system program version series 7.xxx. For any other version, please contact the Service Department. The program version that resides in the unit controller can be found in the Information section of the Installer Sub Menu. Refer to the manual for instructions on accessing this screen.

THIS MANUAL IS THE PROPERTY OF THE OWNER.
PLEASE BE SURE TO LEAVE IT WITH THE OWNER WHEN YOU LEAVE THE JOB.

# CONTROLS SYSTEM MANUAL

## Table of Contents



## Special Design Requests

Units are sometimes built units with special features as requested by the customer. This manual only covers standard features and does not include any changes made for special feature requests by the customer. Units built with special features are noted with a 5-digit SPO (Special Product Order) Number on the Serial Plate.

## Model Nomenclature Note

While the entire model nomenclature should be reviewed, there are several key digits that will help identify the primary characteristics of the unit referred to in this manual:

- Digits 4-5 = Unit Nominal Cooling Tons
- Digit 6 = Unit Cabinet Size
- Digit 7 = Unit Air Control Configuration

  Some key characteristics of Digit 7 that are helpful to know:

  **Dampers**
  - A, B, C, R have OA and RA dampers
  - D, E, F are 100% OA only

  **Exhaust**
  - A, D have no exhaust
  - B, E have energy recovery exhaust (referred to in this manual as ERV units)
  - C, F have non-energy recovery exhaust (referred to in this manual as PEM units)
- Digit 17 = Heat Type
- Digit 18 = Heat Rating

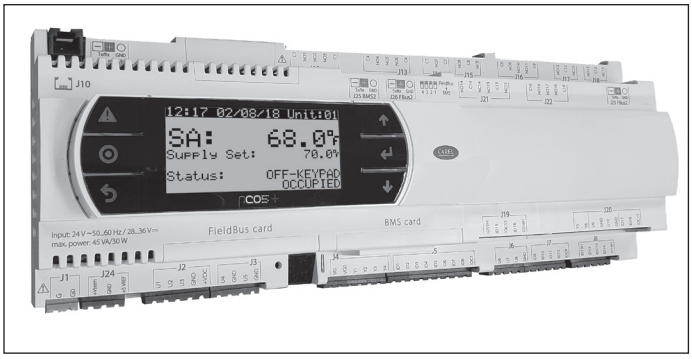
For the most current model nomenclature descriptions, please refer to the Model Nomenclature section in the Installation and Service Manual that shipped with the equipment.

## Acronyms Used

| Acronym | Meaning |
|---|---|
| BMS | Building Management System |
| BPS | Bits Per Second |
| CCS | Capacity Control Solenoid |
| CF | Condenser Fan |
| CFM | Cubic Feet per Minute |
| Comp or CP | Compressor |
| CT | Current Transformer |
| CV | Constant Volume |
| Dehum | Dehumidification |
| Diff | Difference |
| DOAS | Dedicated Outside Air System |
| EA | Exhaust Air |
| EEV | Electronic Expansion Valve |
| ERV | Energy Recovery Ventilator |
| EVD | Electronic Valve Driver |
| Ex | Exhaust |
| HGRH | Hot Gas Re-Heat |
| HOAS | High Outside Air system |
| LL | Liquid Line |
| m | "Minutes" or "Minimum" |
| Mod | Modulation |
| OA | Outside Air |
| psig | Pounds per Square Inch gauge |
| RA | Return Air |
| RH | Relative Humidity |
| SA | Supply Air |
| SetPt or SP | Setpoint |
| Std-by | Standby |
| Temp | Temperature |
| Vlv | Valve |
| VT | Voltage Transformer |

## Controller Overview

Controls are one of the most important components of specialized HVAC equipment. The control system is designed and engineered specifically for the model DLV Packaged Ventilation/Dedicated Outside Air System (DOAS) unit to ensure the unit operates safely, reliably, with optimized performance, and maintaining maximum energy efficiency.




The control system utilizes a Carel pCO5+ Large programmable microprocessor controller. Highly advanced with a powerful microprocessor and fast processing speed, the controller features a number of I/O's for complex HVAC/R applications.

The main controller board is housed in a plastic case that ensures a high index of protection and reduces the risk of electrostatic discharges due to incorrect handling. The controller offers greater safety due to the optical isolation of the serial pLAN, protection of the analog inputs in the event of incorrect connections, and an extended range of operating temperatures. Given the increasing demand for integration, pCO5+ can interface with BMS systems via many of the most commonly-used serial communication standards, using optional boards.

### pCO5+ Large Main Features:

- 10 Analog Inputs
  - Uses 10K NTC temperature sensors
  - 4-20ma Humidity and CO2 sensors for reliability
- 6 Analog Outputs
  - 0-10vdc for easy fault finding
- 18 Digital inputs
  - Used to monitor all aspects of the unit
- 18 Digital Outputs
  - True relayed outputs for reliability
- Real Time Clock
  - With battery backup and day light savings adjustment
- pLAN Communication
  - To allow connectivity to space sensors and other controllers
- Built In Display
  - Backlit easy to use and easy to read
- Alarm Logging
  - With a snapshot of the unit sensors
- Run Hours logging
  - With maintenance setpoints
- Password Protection
  - Three levels of password protection
- Manual Control
  - For easy startup and service
- Simple Interface
  - Easy to understand menus and settings
- Built in Scheduler
  - Up to 7 periods per day – Either On/Off control or Occupied/Unoccupied
  - Holiday Scheduler with up to 20 holiday periods
- Remote Display option
  - Can be 100ft from unit using standard RJ12 cable
- All reset points fully adjustable

## Digital Scroll Compressor Operation

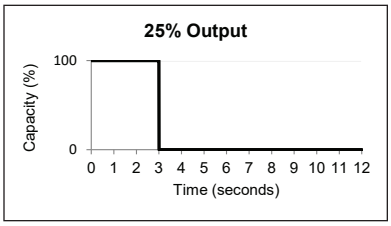
Copeland Digital Scroll™ compressor technology is used to provide seamless modulating capacity over a wide operating range. The Digital Scroll compressor is capable of modulating capacity from 25 to 100%, however when combined with additional compressors, the system modulation range can be significantly greater. The following compressor combinations with modulation range are shown:

| Casing Size | Nominal Tons | Compressor Description | | System Modulation Range |
|---|---|---|---|---|
| | | Circuit 1 | Circuit 2 | |
| B | 7 | Single Modulating Digital Scroll | n/a | 25.0-100% |
| B and C | 10 to 30 | Tandem Modulating Digital Scroll/On-Off | n/a | 12.5-100% |
| D | 30 to 60 | Tandem Modulating Digital Scroll/On-Off | Tandem On-Off/On-Off | 6.3-100% |

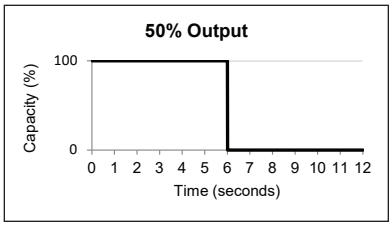
The capacity modulation is achieved by timed loading of the compressor on a repeating 12 second cycle. The compressor is supplied with an external solenoid valve. This “normally closed” (de-energized) solenoid valve is a key component for achieving modulation. When the solenoid valve is in its normally closed position, the compressor operates at full capacity or in the “loaded state”. When the solenoid valve is energized, the two scroll elements move apart axially, or into the “unloaded state”. During the unloaded state, the compressor motor continues running, but since the scrolls are separated, there is no compression. During the “loaded state”, the compressor delivers 100% capacity and during the “unloaded state”, the compressor delivers 0% capacity. A cycle consists of “loaded state” and “unloaded state”. By varying the time of “loaded state” and “unloaded state”, an average capacity is obtained to precisely match the load demand of the system.

**Digital Scroll Capacity Modulation Examples:**

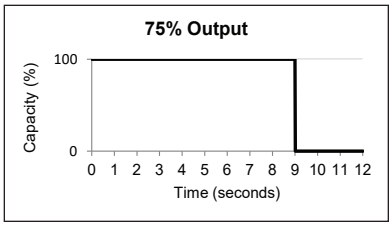
**Example 1:**
On Time = 3 seconds
Off Time = 9 seconds
Average Capacity = 25%




**Example 2**
On Time = 6 seconds
Off Time = 6 seconds
Average Capacity = 50%




**Example 3**
On Time = 9 seconds
Off Time = 3 seconds
Average Capacity = 75%




**Starting Frequency and Minimum Compressor Running Time**

The following default values are used for compressor protection:

- **Compressor Minimum Run-Time:** This is the time required to ensure adequate oil return and sufficient motor cooling from the suction gas upon start-up of the compressor. The time is set for 60 seconds.
- **Compressor Minimum Off-Time:** This is the time used to provide a measure of hysteresis to the system to stop the compressor from starting immediately after it has stopped. The time is set for 30 seconds.
- **Inter-Stage Delay:** This is the time required between successive compressors. For example, when compressor 1 starts, compressor 2 cannot start until the inter-stage delay has timed out. The time is set for 120 seconds.

**Compressor Example (D-Cabinet Shown)**

## Electronic Expansion Valve Operation

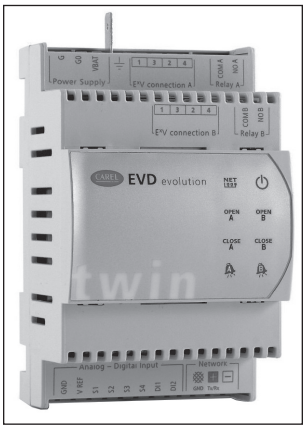
The unit uses electronic expansion valves to enable the correct metering of refrigerant. The valve uses both a pressure transducer and temperature probe to ensure that the superheat of the refrigeration system remains correct.

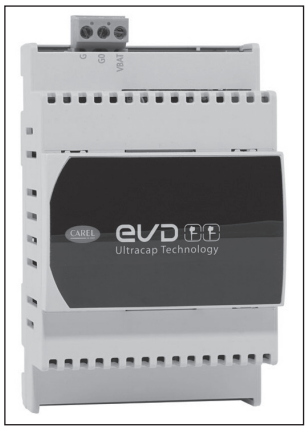
Electronic expansion valves differ from thermostatic expansion valves in their ability to maintain control of the suction superheat at reduced head pressures. This can lead to significant energy savings, particularly at reduced loading and low ambient temperatures.

EEV step position, superheat setpoint, head pressure set point, and other features can be viewed and adjusted via the microprocessor display - far easier than having to manually adjust thermostatic expansion valves.

The electronic expansion valve(s) are driven by the Carel EVD Evolution Twin controller, comprised of two stepper motor drivers that can independently manage two electronic expansion valves. Each driver controls refrigerant superheat and optimises refrigerant circuit performance. Each circuit has one expansion valve for the evaporator coil. For units that include optional modulating hot gas reheat, another expansion valve is included for hot gas reheat capacity control.

Also included for each EVD Evolution Twin controller is a Carel EVD Ultracap which provides emergency power supply to ensure complete closing of the valves even when there is a sudden loss of main unit power supply.

## Sequence of Operation

The model DLV Packaged Ventilation unit is designed for both Dedicated Outdoor Air Systems (DOAS) and High Outdoor Air Systems (HOAS) applications, allowing space ventilation or make-up air with accurate control of temperature and humidity via mechanical cooling, heating and dehumidification during year round outdoor ambient conditions.

The unit is also available with an Energy Recovery Ventilation option with standard economizer bypass (for all energy recovery wheel sizes except 81") to provide for reduced operating costs and increased energy savings.

The unit is intelligently managed by the factory installed programmable microprocessor controller with control operating sequences detailed below. The controls are pre-configured at the factory for the customer selected control strategy so the unit is ready when it reaches the jobsite.

### 1. Unit On/Off

In order for the unit to run, power must be applied and the controller display/keypad used to enable the unit via the "ON/OFF UNIT" sub menu.

- If the unit is "ON", control will be determined by the current occupancy mode of the unit and control configuration/setpoints.
- If the unit is "OFF", no setpoint control will take place and the unit will remain in stand-by with all control devices disabled.

In addition, the following control sources are also available as secondary means to turn the unit on and off:

a) **On/Off by Digital Input:** Available when Remote On/Off Switch wired to unit controller

b) **On/Off by BMS:** Available when BMS Interface Card installed in unit controller

c) **On/Off by pAD Thermostat:** Available when a pAD Thermostat wired to unit controller

d) **On/Off by Clock/Schedule:** Always available from schedule within the unit controller

### 2. Occupancy Mode

When the unit is "ON", there are two modes of occupancy – occupied and unoccupied. Occupancy can be determined by any of the following:

a) **Occupancy by Digital Input:** Set via the replacement of jumper wire on controller input ID7 where:

- 0V = Unoccupied
- 24V = Occupied

a) **BMS Call:** Available when BMS Interface Card installed in unit controller

b) **Time Schedule:** Configured via the "CLOCK/SCHEDULER" menu.

c) **Space Occupancy Override:** Set via the override button found on the pAD thermostat. Note: To utilize space occupancy control, a space pAD device **must** be installed. If there is no space pAD installed there will be no option to use occupied and unoccupied control setpoints.

### 3. Damper Sequences

**DOAS Damper Configuration**

Utilizes outside air dampers only with a 2-position on/off actuator. The available damper controls are as follows:

A. **Two Position Control:** Outside air dampers are open to 100% outside air position when in the occupied mode. Outside air dampers are closed in the unoccupied mode.

**HOAS Damper Configuration**

Utilizes outside and return dampers with a modulating 2-10V damper actuator controlled by a modulated signal from an analog output on the controller to drive both the outdoor air damper and return air damper simultaneous in opposing directions. The outside air damper and return air damper positions always total 100%. For example, if the outside air damper is at 70%, the return air damper will be at 30%.

The available damper controls are described below for the occupied mode of operation with minimum 20% outside air (80% return air) for base rate ventilation. In all cases, outside air dampers are closed and return air dampers open in the unoccupied mode.

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## Sequence of Operation (continued)

A. **Two Position Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air.

B. **Digital Input (Multi-Position) Control:** The unit controller sends the damper actuator to one of up to four position setpoints determined by the combinational logic at one or two of the digital inputs on the controller(s), as shown in the following table. Each of the four setpoint values can be modified between limits of 20% and 100% outside air.

| Control Type | Digital Input 15 | pCOe Digital Input 1 | Position (Default) |
|---|---|---|---|
| Two Position via Digital Input | Open (0V) | Not Used | 1 (50.0%) |
| | Closed (24V) | Not Used | 2 (100.0%) |
| Three Position via Digit Input | Open (0V) | Open (0V) | 1 (50.0%) |
| | Open (0V) | Closed (24V) | 2 (75.0%) |
| | Closed (24V) | OP or CL | 3 (100.0%) |

*Note: For all cases, the combinational logic does not activate the unit. The logic determines which position the dampers are in if in the OCCUPIED mode. Occupied can be via schedule or occupancy digital input.*

C. **Building Pressure Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:

a) If the building pressure is below the setpoint, the dampers will modulate to increase the volume of outside air, increasing the building pressure. The dampers will modulate to the maximum outside air setpoint, up to 100%.

b) If the building pressure is above the setpoint, the dampers will modulate to reduce the volume of outside air, decreasing the building pressure. The dampers will modulate to the minimum outside air setpoint, down to 20%.

D. **Differential Enthalpy Economizer with Dew Point Offset Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. Outdoor and return air enthalpy sensors are monitored by the controller and will control as follows:

a) If the outdoor enthalpy and dew point is higher than the return air enthalpy and dew point, the dampers will modulate to the minimum position setpoint to decrease the volume of outside air to avoid placing additional load on the mechanical cooling/dehumidification system.

b) If the outdoor enthalpy or dew point is lower than the return air enthalpy or dew point, the dampers will modulate to increase the volume of outside air to maintain a dry bulb temperature based on the intersection of the mixed air process line and target dew point temperature setpoint. The target dew point is control setup selected and can be mixed air, space (requires a space pAD), or mixed air and space (requires a space pAD). The mechanical heating/cooling/dehumidification will then modulate as needed to maintain the active supply air temperature setpoint.

E. **Demand Controlled Ventilation ($CO_2$) Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. A space mounted $CO_2$ sensor monitors the space $CO_2$ level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that $CO_2$ reading against the $CO_2$ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:

a) If the $CO_2$ level is below the setpoint, the dampers will modulate to the minimum outside air position.

b) If the $CO_2$ level is above the setpoint, the dampers will modulate to increase the volume of outside air to dilute the $CO_2$ levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

F. **Differential Enthalpy Economizer with Dew Point Offset Control and $CO_2$ Override:** Dampers open to a customer defined minimum position between 20% and 100% outside air. Outdoor and return air enthalpy sensors and a space mounted $CO_2$ sensor are monitored by the controller. The dampers are controlled as follows:

a) If the outdoor enthalpy and dew point is higher than the return air enthalpy and dew point, the dampers will modulate to the minimum position setpoint to decrease the volume of outside air to avoid placing additional load on the mechanical cooling/dehumidification system.

b) If the outdoor enthalpy or dew point is lower than the return air enthalpy or dew point, the dampers will modulate to increase the volume of outside air to maintain a dry bulb temperature based on the intersection of the mixed air process line and target dew point temperature setpoint. The target dew point is control setup selected and can be mixed air, space (requires a space pAD), or mixed air and space (requires a

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## Sequence of Operation (continued)

space pAD). The mechanical heating/cooling/dehumidification will then modulate as needed to maintain the active supply air temperature setpoint.

c) Concurrently with conditions (a) and (b) above, the space mounted $CO_2$ sensor monitors the space $CO_2$ level and sends a corresponding proportional 4-20mA signal back to the main unit controller The controller will then compare that $CO_2$ reading against the $CO_2$ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:

i. If the $CO_2$ level is below the setpoint, the dampers will control to steps (a) and (b) above.

ii. If the $CO_2$ level is above the setpoint, the controller will override the enthalpy economizer dew point control steps (a) and (b) and the dampers will modulate to increase the volume of outside air to dilute the $CO_2$ levels below the setpoint. The dampers will modulate to the maximum outside air setpoint, up to 100%.

G. **Building Management System (BMS) Control:** Dampers will open or close based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

### 4. Supply Fan Sequences

The unit features direct drive fans with motor controlled by variable frequency drive(s). Supply fan controls are coordinated with damper controls to avoid control conflicts. For example, you cannot have building pressure control on both dampers and supply fan.

The available supply fan controls are described below for the occupied mode of operation. In all cases, the fan is either off during unoccupied or intermittent on a call for space heating, cooling, or dehumidification if equipped with a space pAD and configured for unoccupied setback operation. The fan speed will be based on the occupied control point.

For variable air volume applications described below, there are operating range limitations to protect the equipment. Minimum speed is based on the greater of 50% of design airflow or minimum design airflow. Consider the following scenarios for the B-cabinet size unit which has an allowable airflow range of 1,100 to 6,000CFM:

- If the design airflow is 3,000CFM, 50% airflow is 1,500CFM, which is greater than the 1,100CFM minimum, therefore 1,500CFM (50%) is the minimum airflow.
- If the design airflow is 1,800CFM, 50% airflow is 900CFM. In this case, the minimum 1,100CFM of the allowable airflow range is greater, so the minimum airflow is 1,100CFM (≈61%).

The available supply fan control options are as follows:

A. **Constant Speed:** The supply fan operates at a constant speed that does not dynamically change. The default setpoint is 100% but can be adjusted within the allowable range described above.

B. **Digital Input (Multi-Speed) Control:** The unit controller sends the supply fan VFD to one of up to four speed setpoints determined by the combinational logic at one or two of the digital inputs on the controller(s), as shown in the following table. Each of the four setpoint values can be modified between the range described above.

| Control Type | Digital Input 15 | pCOe Digital Input 1 | Speed (Default) |
|---|---|---|---|
| Two Speed via Digital Input | Open (0V) | Not Used | 1 (50.0%) |
| | Closed (24V) | Not Used | 2 (100.0%) |
| Three Speed via Digit Input | Open (0V) | Open (0V) | 1 (50.0%) |
| | Open (0V) | Closed (24V) | 2 (75.0%) |
| | Closed (24V) | OP or CL | 3 (100.0%) |

*Note: For all cases, the combinational logic does not activate the unit. The logic determines which speed the fan is in if in the OCCUPIED mode. Occupied can be via schedule or occupancy digital input.*

C. **Building Pressure Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100” W.C., adjustable between limits of 0.000” and 5.000” W.C.) and control as follows:

a) If the building pressure is below the setpoint, the VFD will modulate to increase the volume of outside air, increasing the building pressure. The VFD will modulate up within the allowable range described above.

b) If the building pressure is above the setpoint, the VFD will modulate to reduce the volume of outside air, decreasing the building pressure. The VFD will modulate down with the allowable range described above.

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## Sequence of Operation (continued)

D. **Duct Pressure Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A duct pressure sensor installed downstream in the supply duct monitors the pressure in the duct and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the duct pressure setpoint (default value is 1.500" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:

a) If the duct pressure is below the setpoint, the VFD will modulate to increase the volume of supply air, increasing the duct pressure. The VFD will modulate up within the allowable range described above.

b) If the duct pressure is above the setpoint, the VFD will modulate to reduce the volume of supply air, decreasing the duct pressure. The VFD will modulate down with the allowable range described above.

In order to prevent over pressurization of the duct work, if the duct pressure sensor detects a pressure above 5.000" W.C. then the unit is immediately shutdown via the high static pressure alarm. The unit will remain shut down in alarm until the alarm condition is cleared via the handheld display or BMS reset call.

E. **Demand Controlled Ventilation ($CO_2$) Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A $CO_2$ sensor installed in the space monitors the $CO_2$ level and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that $CO_2$ reading against the $CO_2$ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:

a) If the $CO_2$ level is below the setpoint, the VFD will modulate to reduce the volume of outside air. The VFD will modulate down with the allowable range described above.

b) If the $CO_2$ level is above the setpoint, the VFD will modulate to increase the volume of outside air to dilute the $CO_2$ levels below the setpoint. The VFD will modulate up with the allowable range described above.

F. **Building Management System (BMS) Control:** The supply fan VFD will modulate within the range described above based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

**Note for Units with Energy Recovery:** Energy Recovery equipped units include an economizer bypass (units with 74" wheels or smaller), whose function is described in the Energy Recovery section. When the economizer bypass damper opens, the total static pressure that the supply fan must overcome is reduced, which will cause the airflow to increase, increasing energy consumption. For all control types above, there is a setting called "Bypass Offset" (default is 10%, adjustable from 0% to 20%) that reduces the fan speed in an attempt to maintain approximately the same airflow as when the bypass is closed. With the default 10% setting, the supply fan speed will be reduced by 10% when the bypass is opened.

### 5. Exhaust Fan Sequences

When equipped with an exhaust fan option, the unit features motors controlled by either a motor starter or a variable frequency drive. Exhaust fan controls are coordinated with supply fan controls to avoid control conflicts. For example, you cannot have building pressure control on both supply and exhaust fans.

There are three different exhaust fan configurations that can be enabled. Depending on which exhaust fan configuration is selected determines which control sequences are available. The exhaust fan configurations are:

a) ON/OFF – Relay: The exhaust fan is enabled by a relay output on the PRTU controller. The enable signal is sent to the exhaust fan when the unit is in occupied mode and supply fan is active. This is used with either PEM (non-energy recovery Power Exhaust Module) equipped units that are single speed motor starter controlled or for activating remote exhaust fans by others.

b) ERV (Energy Recovery Ventilation): This option is for units configured with Energy Recovery Exhaust and is only available with an exhaust fan variable frequency drive for motor control as described below.

c) PEM (Power Exhaust Module): This option is for units configured with Non-Energy Recovery Exhaust with variable frequency drive motor control as described below.

For variable air volume exhaust applications described below, there are operating range limitations to provide proper equipment function. For units with an ERV, the allowable range is up to 50% to 100% of design airflow. For units with a PEM, the allowable range is 20% to 100% of design airflow.

The available exhaust fan controls are described below for the occupied mode of operation. In all cases, the fan is off during the unoccupied mode of operation.

A. **Constant Speed:** The supply fan operates at a constant speed that does not dynamically change. There are two options available for Constant Speed:

1. **Variable Frequency Drive (ERV or PEM Units):** The unit includes a variable frequency drive. The default setpoint is 100% but can be adjusted within the allowable range described above.

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## Sequence of Operation (continued)

2. **Single Speed Motor Starter (PEM Units Only):** The unit includes a single speed motor starter. The unit exhaust fan operates at 100% speed and is non-adjustable through the motor starter control.

B. **Digital Input (Multi-Speed) Control (PEM Units Only):** The unit controller sends the exhaust fan VFD to one of up to four speed setpoints determined by the combinational logic at one or two of the digital inputs on the controller(s), as shown in the following table. Each of the four setpoint values can be modified between the range described above.

| Control Type | Digital Input 15 | pCOe Digital Input 1 | Speed (Default) |
|---|---|---|---|
| Two Speed via Digital Input | Open (0V) | Not Used | 1 (50.0%) |
| | Closed (24V) | Not Used | 2 (100.0%) |
| Three Speed via Digit Input | Open (0V) | Open (0V) | 1 (50.0%) |
| | Open (0V) | Closed (24V) | 2 (75.0%) |
| | Closed (24V) | OP or CL | 3 (100.0%) |

*Note: For all cases, the combinational logic does not activate the unit. The logic determines which speed the fan is in if in the OCCUPIED mode. Occupied can be via schedule or occupancy digital input.*

C. **Supply Fan Offset (ERV or PEM Units):** The exhaust fan will run at a constant speed determined by the supply fan speed and a configurable offset value (default -10%, adjustable from -20% to 20%). For example, if the supply fan is operating at 70% and the offset is -10%, then the exhaust fan operate at 60% (70% - 10% = 60%).

D. **Building Pressure Control (ERV or PEM Units):** The exhaust fan VFD will ramp up to the minimum speed setpoint. A building pressure sensor installed in the space monitors the pressure relative to atmospheric pressure outside the space and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that pressure reading against the building pressure setpoint (default value is 0.100" W.C., adjustable between limits of 0.000" and 5.000" W.C.) and control as follows:

a) If the building pressure is below the setpoint, the VFD will modulate to decrease the volume of exhaust air, increasing the building pressure. The VFD will modulate down within the allowable range described above.

b) If the building pressure is above the setpoint, the VFD will modulate to increase the volume of exhaust air, increasing the building pressure. The VFD will modulate up with the allowable range described above.

E. **Building Management System (BMS) Control (ERV or PEM Units):** The exhaust fan VFD will modulate within the range described above based on a command from the customer BMS. There are no internal control setpoints or sensors for this mode of operation.

**Note for Units with Energy Recovery:** Energy Recovery equipped units include an economizer bypass (units with 74" wheels or smaller), whose function is described in the Energy Recovery section. When the economizer bypass damper opens, the total static pressure that the exhaust fan must overcome is reduced, which will cause the airflow to increase, increasing energy consumption. For all control types above, there is a setting called "Bypass Offset" (default is 10%, adjustable from 0% to 20%) that reduces the fan speed in an attempt to maintain approximately the same airflow as when the bypass is closed. With the default 10% setting, the exhaust fan speed will be reduced by 10% when the bypass is opened.

### 6. Temperature Control Sequences

**Supply Air Temperature Control**

The temperature control sequences maintain the required supply air temperature with heating, cooling, and economizer modes of operation. The supply air temperature is monitored by a factory supplied, field installed supply air sensor that is mounted downstream of the unit discharge in the supply duct. Temperature is maintained by modulation of cooling and heating systems to meet the supply air temperature setpoint.

The active supply air temperature control will be one of three possible setpoints:

A. **Cooling:** The setpoint will be 55.0°F (adjustable from 45°F to 90°F). Cooling operation requires a supply air reset be used to create a call for cooling, as discussed in the "Supply Air Reset Controls" section.

B. **Heating:** The setpoint will be 85.0°F (adjustable from 60°F to either 100°F [condensing gas heat or electric] or 130°F [non-condensing gas heat]). Heating operation requires a supply air reset be used to create a call for heating, as discussed in the "Supply Air Reset Controls" section.

C. **Neutral Air:** The setpoint will be 70°F (adjustable from 50°F to 90°F). The neutral air setpoint is active if there is no call for heating or cooling from a supply air reset.

Dehumidification is not covered in this section. It will be detailed in a separate section called "Dehumidification Control Sequences".

(continued next page)

## Sequence of Operation (continued)

### Economizer Operation

There are two modes of operation that are economizer based control, and will be indicated as such on the controller status screen. The two possible modes indicated on the controller screen are as follows:

A. **Econ:** Econ will be displayed when the Enthalpy Economizer damper control (if equipped) is active without any mechanical cooling active. For more information on the Enthalpy Economizer damper control, refer to the "Damper Sequences" section.

B. **Fan Only:** Fan-Only will be displayed whenever mechanical cooling/dehumidification or heating is not required and the supply air temperature is within +/- 5°F (adjustable) of the active setpoint.

### Supply Air Temperature Resets

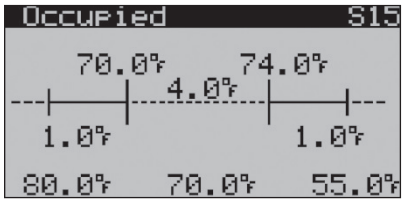
While the basic control for supply air temperature control is neutral air, reset of the supply air temperature for heating or cooling can be configured using either a space temperature sensor (pAD), the outdoor air temperature sensor, or a combination of both. Each is described as follows:

A. **Space Temperature Reset:** The space reset call comes from the pAD mounted in the conditioned space. This call is generated based on the space temperature and space cooling and heating setpoints. The default space temperature setpoint values are as follows:

1. Occupied Mode

- Cooling: 74.0°F (adjustable from 50.0°F to 90.0°F)
- Heating: 70.0°F (determined by the Heat Offset, see next item)
- Heating Offset: 4.0°F (adjustable from 2.0°F to 20.0°F)
- Heating Differential: 1.0°F (adjustable from 1.0°F to 10°F)
- Cooling Differential: 1.0°F (adjustable from 1.0°F to 10°F)

The Heating Offset determines how far below the cooling setpoint the temperature must fall before the unit enters the heating mode. The Heating and Cooling differentials prevent short cycling. Graphically, the occupied mode setpoints above are as follows:



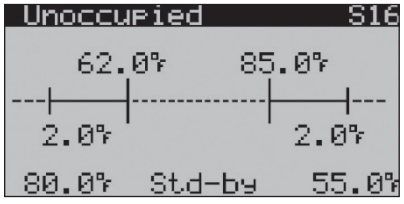

Note the bottom row displays the Heating, Neutral Air, and Cooling supply air reset temperature setpoints.

For example, with a cooling setpoint of 74.0°F the space must exceed 75.0°F (74.0°F + 1.0°F) before a cooling reset call is sent to the unit. The space must fall below 74°F before the cooling reset condition is cleared. On a call for space cooling, the supply air temperature setpoint will be reset to 55°F. Once the call for cooling is satisfied, the unit will return to the neutral air active setpoint which is 70°F.

2. Unoccupied Mode

- Cooling: 85.0°F (adjustable from 70.0°F to 90.0°F)
- Heating: 62.0°F (adjustable from 50.0°F to 70.0°F)
- Heating Differential: 2.0°F (adjustable from 1.0°F to 10°F)
- Cooling Differential: 2.0°F (adjustable from 1.0°F to 10°F)

Graphically, the unoccupied mode setpoints above are as follows:




(continued next page)

## Sequence of Operation (continued)

Note the bottom row displays the Heating and Cooling supply air reset temperature setpoints. For space temperatures between the Heating and Cooling setpoints, the unit is in Stand-By mode.

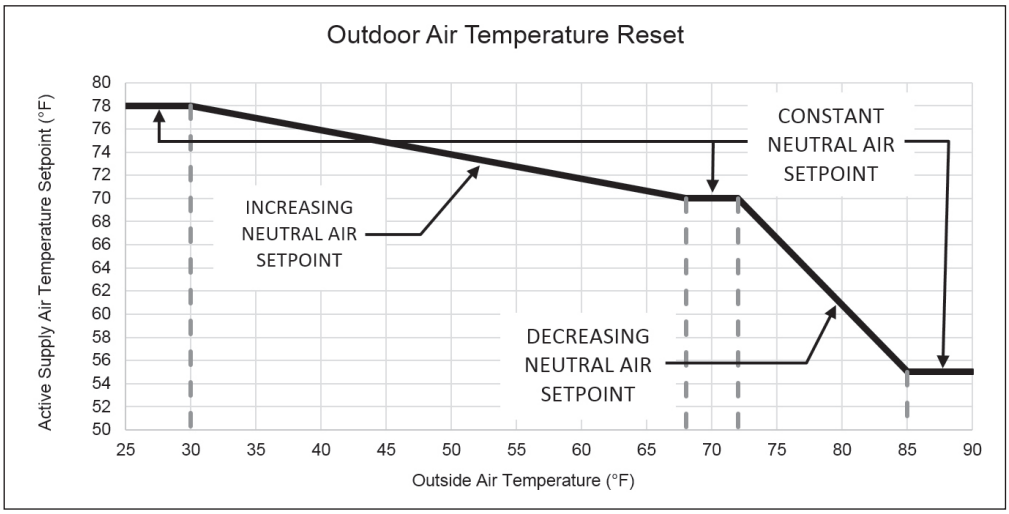
For example, with a heating setpoint of 62.0°F the space must fall below 60.0°F (62.0°F - 2.0°F) before a heating reset call is sent to the unit. The space must rise above 62°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset to 80°F (was adjusted from the default reset setting of 85°F in this example). Once the call for heating is satisfied, the unit will return to the Stand-By mode of operation.

B. **Outdoor Air Temperature Reset:** The outdoor reset calls comes from the outdoor air temperature sensor. This call is generated based on the outdoor temperature and outdoor cooling and heating setpoints. The resulting supply air temperature setpoint is proportionally increased in the heating reset mode or decreased in the cooling reset mode. This is only active in the occupied mode. This method of temperature control is best suited to preventing the space temperature rising too high during high ambient conditions or falling too low during low ambient conditions. The default temperature setpoint values are as follows:

1. **Heating Neutral Air Reset** (values below on Setpoints S1 screen)
   - OA (top left value): 30.0°F (adjustable from 0.0°F to 50.0°F)
   - HTG (top right value): 78.0°F (adjustable from 60.0°F to 100.0°F)
   - OA (bottom left value): 68.0°F (adjustable from 50.0°F to 75.0°F)
   - NA (bottom right value): 70.0°F (adjustable from 60.0°F to 80.0°F)
2. **Cooling Neutral Air Reset** (values shown below on Setpoints S2 screen)
   - OA (top left value): 72.0°F (adjustable from 65.0°F to 75.0°F)
   - NA (top right value): 70.0°F (adjustable from 60.0°F to 80.0°F)
   - OA (bottom left value): 85.0°F (adjustable from 75.0°F - 100.0°F)
   - CLG (bottom right value): 55.0°F (adjustable from 50.0°F - 80.0°F)

The Outdoor Air Temperature Reset sequence is much easier to understand if viewed graphically. Reviewing the setpoints and the graphic below, the following is the sequence:

- **Outside Air between 68°F and 72°F:** The neutral air setpoint will be 70.0°F.
- **Outside Air below 68°F:** The neutral air setpoint is adjusted as follows:
  - **From 68°F down to 30°F:** The setpoint will be proportionally increased from 70.1°F to 77.9°F.
  - **Below 30°F:** The setpoint will be 78.0°F.
- **Outside Air above 72**°F: The neutral air setpoint is adjusted as follows:
  - **From 72**°F **up to 85**°F: The setpoint will be proportionally decreased from 69.9°F to 54.9°F.
  - **Above 85**°F: The setpoint will be 55.0°F.

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## Sequence of Operation (continued)

**Mechanical Cooling/Heating System Response to Cooling/Heating Resets**

With supply air heating and cooling resets detailed above, the following describes the control of mechanical cooling and heating to maintain the active supply air setpoint.

A. **Cooling:** On receiving a call for cooling the unit controller compares the supply air temperature from the duct sensor with the active supply air temperature setpoint in order to generate a cooling demand, ranging from 0-100%, using a proprietary PI control loop. Up to four scroll compressors (CP1 through CP4) are used on up to two refrigeration circuits. All cabinet sizes have CP1 and CP 2 located on circuit 1. The D-Cabinet unit adds an additional circuit with CP3 and CP4. In all cases, CP1 is always a modulated digital scroll compressor while the remaining compressors are fixed speed scroll compressors. The combination of a digitally modulated and fixed speed scroll compressors allows precise capacity modulation at lower loads.

Compressor enabling logic includes the required minimum on/off compressor anti-cycle times in order to ensure mechanical protection of the compressors. Compressor lockout alarms, and temperature lockouts, and compressor envelope control are also managed by the unit controller, inhibiting compressor usage if required, in order to protect the compressor. Compressor envelope control monitors operation to ensure minimum and maximum evaporating and condensing temperatures to ensure the operating limits based of the compressor are not exceeded. The following alarms will inhibit a compressor from being used in the compressor rotation and activation calculation.

Common Compressor Lockouts – Applicable to all units.

1. Supply Air Temperature Sensor Fault or Disconnected.
2. Low Outdoor Air Temperature DX Cool Lockout (45.0°F)
3. Unit Door Open
4. Condensate Float Switch

Circuit 1 Compressor Lockouts – Applicable to all cabinet unit sizes.

1. HP Switch
2. LP Switch
3. Digital Scroll Compressor Discharge Temperature High
4. Low Superheat CCT1
5. Low Suction Temperature CCT1
6. Condenser Fan VFD Alarm
7. EVD1 Motor “A” Alarm
8. EVD1 Not Ready
9. CP1/CP2 Operating Outside Envelope

Circuit 2 Compressor Lockouts – Applicable to D cabinet unit sizes.

1. HP Switch
2. LP Switch
3. Low Superheat CCT2
4. Low Suction Temperature CCT2
5. Condenser Fan VFD Alarm
6. EVD2 Motor “A” Alarm
7. EVD2 Not Ready
8. pCOe Expansion Board Offline
9. CP3/CP4 Operating Outside Envelope

(continued next page)

## Sequence of Operation (continued)

B. **Heating:** On receiving a call for heating the unit controller compares the supply air temperature from the duct sensor with the active supply air temperature in order to generate a heating demand, ranging from 0-100%, using a proprietary PI control loop. The unit is available with Gas, Electric, or Hot Water heating options. Each of these options are available individually, however the Gas is available with Auxiliary Electric Heat that can be used separately or simultaneously. The sequence of each is as follows:

a) **Gas Heating:** Gas burner operation is regulated by a separate microprocessor control board. The unit controller sends a 0-10VDC modulating signal to that controller to indicate heating demand. The control board interprets this demand signal and uses its own internal control scheme to manage the required capacity modulation to maintain the required active supply air temperature setpoint.

b) **Electric Heating:** Electric heating element operation is regulated by separate contactor(s) and SCR controller. The unit controller uses relay output(s) to close the contactor(s) and sends a 0-10VDC modulating signal to the SCR controller to manage the required capacity modulation to maintain the active supply air temperature setpoint.

c) **Gas with Auxiliary Electric Heating:** The gas heating control previously detailed is paired with 20kW or 40kW (nominal) of fully modulated SCR controlled electric heat as detailed for electric heating. The gas and electric heating are staged based on demand as follows:

i. Aux electric heating is activated when heating demand begins to build and is above 1% but less than the heating demand required to enable a furnace. When the unit heating demand exceeds the minimum percentage to turn on the gas furnace system, then the furnace heat is turned on and the aux electric heat is turned off. The aux electric heat is then locked out until the total heating demand reaches 0% once again.

ii. Aux electric heating is also activated when heating demand exceeds the capacity of the gas heating system. This is referred to as “Aux. Elec. Heat Boost” mode. This function is enabled by default and allows the aux electric heating to assist the gas furnace heating if the furnace heating is active at 100.0% (configurable) for a time period of 20 minutes (configurable). The boost mode will then be exited once the heating demand falls below 90.0% (configurable).

d) **Hot Water Heating:** A fully modulated 2-10VDC analog signal from the unit controller is sent directly to a modulating hot water valve by others.

### 7. Dehumidification Control Sequences

The dehumidification (dehum) control is sequenced to maintain supply air that has a dew point below the setpoint to reduce or avoid adding to the space relative humidity. Dehum can be initiated based on space relative humidity (RH), mixed air dew point (MADP), outdoor air dew point (OADP), or a combination of space RH / OADP. If the dehum mode is set to none, there is no dehum sequence initiated.

Temperature control is not covered in this section. It is detailed in a separate section called “Temperature Control Sequences”.

**Dehum Initiation Options**

A. **Space RH Control:** This option requires a space pAD with humidity sensing be installed in the space. The call for dehum comes from the pAD and is generated based on the space RH and the space RH setpoints. The default space humidity setpoints are as follows:

- Occupied Mode: 60% RH (adjustable from 0% to 100% RH)
- Unoccupied Mode: 70% RH (adjustable from 0% to 100% RH)

A 5% RH offset is applied to the space dehum setpoints to prevent short cycling of a dehum call from the space pAD. For example, with an occupied humidity setpoint of 60% RH, the space must be dehumidified to 55% RH before the dehum call is ended.

B. **Outdoor Air DP Control:** This option requires an outdoor temperature/humidity sensor be installed, which is factory installed on all DOAS and HOAS units. The call for dehum comes from the outdoor sensor and is generated based on the calculated outdoor air dew point and comparing against the outdoor air dew point setpoint. This cannot call for dehum in unoccupied. See Combination Outdoor DP/Space RH control option. The default dew point setpoint is

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

(continued next page)

## Sequence of Operation (continued)

C. **Combination Outdoor Air DP and Space RH Control:** This option is a combination of both Outdoor Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as outdoor air DP control alone does not permit unoccupied operation. The default dew point setpoints are:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

D. **Mixed Air DP Control:** This option requires a return air temperature/humidity sensor, an outdoor air temperature/humidity sensor, and mixed air dry bulb temperature sensor be installed. These sensors are standard with all HOAS units. The call for dehum comes from the calculated mixed air DP value and compared against the mixed air DP setpoint. This cannot call for dehum in unoccupied. See Combination Mixed Air DP/Space RH control option. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: Not Applicable

E. **Combination Mixed Air DP and Space RH Control:** This option is a combination of both Mixed Air DP and Space RH controls described above with all the same hardware requirements. In addition to adding occupied space RH dehum initiation, it also adds unoccupied space RH dehum initiation, as mixed air DP control alone does not permit unoccupied operation. The default mixed air DP setpoints are as follows:

- Occupied Mode: 55°F (adjustable from 45.0°F to 65.0°F).
- Unoccupied Mode: 60.0°F (adjustable from 45.0°F to 65.0°F)

**Dehum/Cooling Control Priority**

Dehumidification is given priority over cooling as follows:

- **No Cooling Demand:** When a call for dehum is received, the unit will transition into dehum mode immediately.
- **Cooling Demand:** When a call for dehum is received while the unit is in cooling mode, the unit will transition from cooling to dehum mode, via a demand transfer process. The demand transfer process allows both cooling and dehum demand to build simultaneously so that compressors already operational from cooling can remain active and modulation changes based on dehum demand in place of cooling demand, without the need to restart the compressor or compressor rotation calculation. This results in more precise supply air temperature control and less cycling of the units compressors as it transitions from one mode to the other.

**Mechanical Cooling/Heating System Response to Dehum Initiation**

With dehum initiation controls and dehum/cooling control priority detailed above, the following describes the control of the mechanical cooling system, including hot gas reheat and condenser fans, to maintain the active supply air setpoint required to achieve dehumidification.

A. **Compressor Control:** Compressor(s) are controlled to decreased and hold the evaporator coil temperature below the dew point of the air passing through the evaporator coil to enable dehumidification of the air. The compressor control is handled in one of two ways:

1. **Single Circuit Configurations (B & C-Cabinet):** Compressors are controlled to maintain a suction line pressure. The suction line pressure default setpoint is 130.0 PSI (adjustable from 110.0 to 155.0 PSI). This suction pressure equates to an evaporating temperature of 45.0°F. The average air off coil temperature is slightly higher than the evaporating temperature.
2. **Dual Circuit Configurations (D-Cabinet):** Compressors are controlled to maintain an evaporator coil leaving air temperature. The evaporator coil leaving air temperature default setpoint is 50.0°F (adjustable from 45.0°F to 70.0°F).

B. **Hot Gas Reheat (HGRH) Control:** The supply air temperature sensor mounted in the supply duct is monitored by the unit controller. The HGRH modulating valves are controlled to maintain the active supply air setpoint, as described in Section “6. Temperature Control Sequences” (see Note). For example, if there is a call for cooling reset, it will control to that supply air setpoint, typically 55°F. If there is a call for heating, it will control to that supply air setpoint, typically 85°F. If there is neither a call for heating or cooling, it will control to the neutral air setpoint, typically 70°F.

(continued next page)

## Sequence of Operation (continued)

**Notes:**

1. The HGRH control can be configured to control to a single supply air setpoint that is different than the Neutral Air, Cooling Reset, or Heating Reset setpoints. It is called the HGRH setpoint and can be set in the Service Settings CS16 screen. The range of adjustability on that setpoint is 50.0°F to 90.0°F and would be maintained in dehum mode, even if there is a call for cooling or heating reset. This control is not normally used.
2. In some cases, especially low load conditions, HGRH capacity may be reduced and the supply air temperature may fall short of the active setpoint. This is usually a transient issue that is resolved once the load increases. In select cases, if equipped with a natural gas heating option, space pAD enabled gas heating can be used as an auxiliary reheat source to prevent overcooling of the space. The use of this setting must be reviewed by the Service Department.

C. **Condenser Fan (Head Pressure) Control:** The liquid line pressure transducer for each circuit is monitored by the unit controller. All condenser fans are modulated together to control the air volume passing through the condenser coil to maintain head pressure, or liquid line pressure for each circuit. The default liquid line setpoint is 310.0 PSI.

### 8. Energy Recovery Sequences

If the unit is equipped with optional Energy Recovery (ERV), the ERV is active in the occupied mode. The unit controller manages sequencing of the exhaust fan, energy recovery wheel, economizer wheel bypass damper (if applicable), and entering air pre-heater, if equipped. The control sequence for the ERV is as follows:

**Exhaust Fan:** The exhaust fan control sequence is described above in the “Exhaust Fan Sequences” section.

**Energy Recover Wheel:** The energy recovery wheel is active when required based on the current operating mode:

A. **Cooling Mode:** Return air (RA) and outdoor air (OA) enthalpy sensors are actively monitored and will control as follows:

1. If the OA enthalpy is 3.0 BTU/lb. (adjustable from 2.0 to 10.0 BTU/lb.) or more higher than the RA enthalpy, the wheel operates to pre-condition the outside air before it reaches the DX coil.
2. If the OA enthalpy is less than 2.0 BTU/lb. (adjustable from 0.0 to 2.0 BTU/lb.) higher than the RA enthalpy, the wheel is stopped, as energy recovery is minimal or may actually add load to the mechanical cooling system. The economizer bypass damper is opened as described below.

B. **Dehumidification Mode:** Return air (RA) and outdoor air (OA) enthalpy sensors are actively monitored and will control as follows:

1. If the OA humidity ratio is 10Gr/lb. or more higher than the RA humidity ratio, the wheel operates to pre-condition the outside air before it reaches the DX coil.
2. If the OA humidity ratio is less than 10Gr/lb. higher than the RA humidity ratio, the wheel is stopped, as energy recovery is minimal or may actually add load to the mechanical cooling system. The economizer bypass damper is opened as described below.

C. **Heating Mode:** Return air (RA) and outdoor air (OA) dry bulb temperature sensors are actively monitored and will control as follows:

1. If the RA temperature is higher than the OA temperature, the wheel operates to pre-condition the air before it reaches the heating system.
2. If the RA temperature is below the OA temperature, the wheel is stopped, as energy recovery is minimal or may actually add load to the heating system. The economizer bypass damper is opened as described below.

**Energy Wheel Economizer Bypass Damper (units with 74” wheels and smaller):** The energy recovery module includes an economizer bypass damper that opens when the energy recovery wheel is not being used. Opening the bypass reduces airside pressure drop and resulting fan power. The controller monitors outside air, return air, and energy recovery wheel supply air conditions. If the use of the wheel is adding load to the mechanical cooling or heating system (mode dependent), the wheel is stopped and the bypass damper is opened. The supply fan VFD speed is reduced by 10% (adjustable) to prevent the supply air volume from increasing due to the drop in static pressure when the air is bypassed around the wheel.

**Economizer Bypass Jog Mode:** The module shall include energy recovery wheel start-stop-jog control to periodically rotate the wheel position during economizer mode to avoid wheel contamination from the airstream. When the wheel is stopped in this mode, the wheel is run for 5 seconds every 20 minutes to prevent a buildup of dirt or dust on the face of the wheel.

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## Sequence of Operation (continued)

**Wheel Defrost:** If the temperature of the wheel falls below the dew point of the exhaust air stream, condensation can form on the wheel and form frost that significantly degrades performance. There are two methods used for frost control:

A. **Wheel Start/Stop:** The standard sequence on all energy recovery wheel equipped units that do not have the optional electric preheat option is a wheel start/stop sequence. If the outside ambient temperature is above 20°F, the wheel defrost sequence is not active. If the outside ambient temperature is below 20°F, the following is the defrost sequence:

1. Run energy wheel for 30 minutes.
2. Stop energy wheel for 60 seconds to allow the exhaust air to defrost one half of the wheel.
3. Run energy wheel for 6 seconds to rotate the wheel ½ turn.
4. Stop energy wheel for 60 seconds to all the exhaust air to defrost the other half of the wheel.
5. Check the outside air temperature. If the temperature is still below the 20°F, the control will repeat sequence until the outside temperature rises above 22°F.

B. **Entering Air Preheater:** The energy recovery wheel entering air preheater is used to avoid frost build up on the energy recovery wheel during low ambient temperatures. The preheater is a single stage, on-off control based on a dynamically calculated frost threshold temperature. The controller monitors outside ambient temperature, return air temperature, and return air humidity and dynamically calculates the frost threshold temperature, which is the line tangent to the psychrometric saturation curve that passes through the actual indoor temperature/humidity condition. The preheater is then turned on to maintain an incoming airflow temperature that is above the frost threshold temperature. A 5.0°F band is used for enabling and disabling of the output.

**Exhaust Air Damper:** The exhaust air damper is not motorized and therefore is not managed by the unit controller. This damper opens when there is sufficient differential pressure across it from the exhaust fan operation.

### 9. Dual Power Sequence

All units as standard have a single set of 3-phase power terminals to which the power feed conductors are landed from a single power source. The Dual Power option is for applications where the unit may be required to run in a low power mode from a stand-by power source, such as a backup generator. With this option, the unit has two sets of 3-phase power terminals to which the power feed conductors are landed. The unit electrical systems are separated into two separate circuits as follows:

**Circuit 1:** Compressors, Condenser Fan Motors, *Primary or Aux Electric Heat*

**Circuit 2:** Unit Controls, Supply Fan Motor(s), Dampers, *Gas Heating*, *Exhaust Fan Motor*, *Energy Recovery Wheel Motor*

**NOTE:** Items in *italics* apply only if selected.

The mode of operation is dependent on the state of digital inputs as shown in the following table.

| Dual Power Mode ① | Digital Input 12 (Dual Power) | Digital Input 16 (Phase Fail Relay 1) ② |
|---|---|---|
| Normal (Main Utility Feed) | Open | Closed |
| Low Power (Stand-By Power Feed) | Closed | Open or Closed |
| | Open or Closed | Closed |

① The changeover of power source control, switching, and circuit protection is by others and external to the HVAC unit. The changeover must be communicated to the Carel controller on the unit by the customer via closure at Digital Input DI12 and/or by the unit Phase Failure Relay 1 opening at DI16.

② If DI12 is open (normal operation) but DI16 is open (power failure on Circuit 1), the unit will go into the Stand-By Power mode. If a stand-by power source is not active, the unit will be shutdown from lack of power on Circuit 2.

The sequence of operation is as follows:

A. **Normal Power Mode:** Both Circuits 1 and 2 are fed from the utility feed and all systems operate normally.

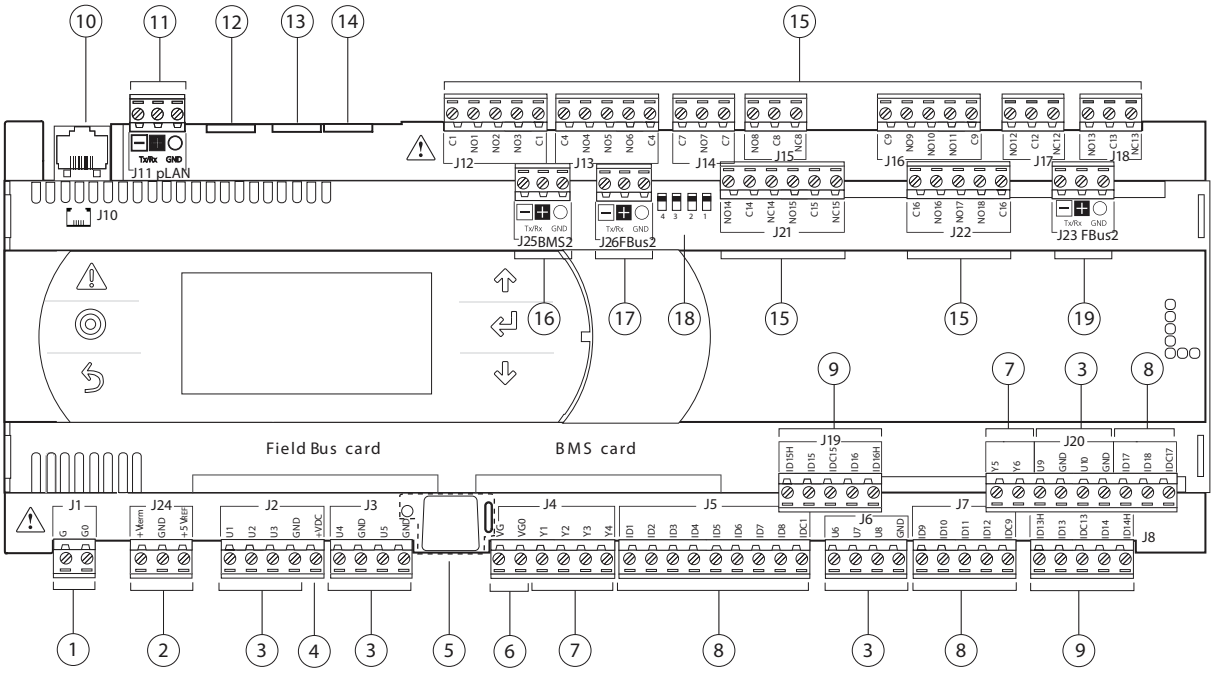
B. **Stand-By Power Mode:** The utility feed is removed from Circuits 1 and 2 and the stand-by power feed is applied to Circuit 2 only. In this low power mode of operation, the unit can be configured to run in one of the following modes (configurable in the Service Settings):

1. **Minimum Output:** Any on/off components are on, any modulating components (ex: dampers) are at minimum.
2. **Maximum Output:** Any on/off components are on, any modulating components (ex: dampers) are at maximum.
3. **Auto Output:** Any on/off components are on, any modulating components (ex: dampers) are based on one of the following settings (configurable in the Service Settings):

i. **Lock:** The modulated component is locked at the output based on the demand when the unit went into the Stand-By Power mode.

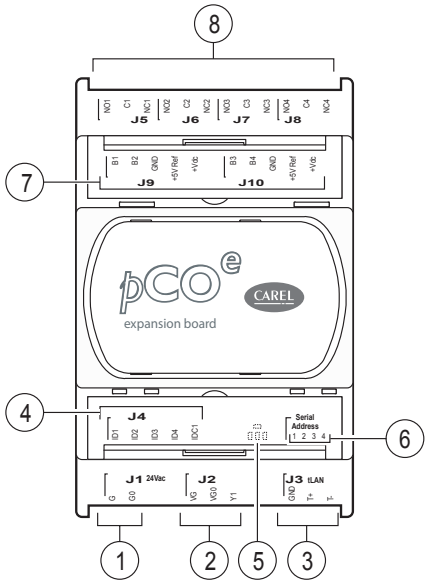
ii. **Auto:** The modulated component modulates based on ongoing demand.

## pCO5+ Large Controller Layout




1. Power supply connector [G (+), G0 (-)]
2. +Vterm: Power to additional terminal
   +5 Vref: Power to ratiometric probes
3. Universal inputs/outputs
4. +VDC: Power to active probes
5. Button for setting pLAN address, secondary display, LEDs
6. VG: Voltage to optically-isolated analog output
   VG0: Power to optically-isolated analog output, 0 Vac/Vdc
7. Analog outputs
8. Digital inputs
9. Digital inputs
10. pLAN telephone connector for terminal/downloading application program
11. pLAN plug-in connector
12. Reserved
13. Reserved
14. Reserved
15. Relay digital outputs
16. BMS2 connector
17. Fieldbus2 connector
18. Fieldbus/BMS selector microswitch
19. Fieldbus2 connector

## pCOe Expansion Board Layout




1. Power supply connector [G (+), G0 (-)]
2. Analog outputs
3. Network connector for expansions in RS485 (GND, T+, T-)
4. 24Vac/Vdc digital inputs
5. Yellow power on LED and 3 signalling LEDs
6. Serial address
7. Analog inputs and probe supply
8. Relay digital outputs

## pCO5+ Large Controller Input/Output (I/O) List

| I/O Type | pCO5+ Large | | Description | Notes | Standard or Optional |
|---|---|---|---|---|---|
| | I/O # | Type/Voltage | | | |
| Universal | U1 | 4-20mA | Return Air Humidity | OA/RA units, units with ERV | O |
| | U2 | PT1000 | Evaporator Air Off Temp (D-Cabinet only) | D-Cabinet only with dehum | S |
| | U3 | 4-20mA | Building Pressure | Only if control selected | O |
| | U4 | PT1000 | Outdoor Air Temp OR ERV Off Wheel Temp | Includes humidity probe | S |
| | U5 | PT1000 | Return Air Temp | OA/RA units, units with ERV | O |
| | U6 | NTC HT | Discharge Line Temp (CCT1 on D-Cabinet) | All units | S |
| | U7 | 4-20mA | Outdoor Air Humidity OR ERV Off Wheel Humidity | Includes humidity probe | S |
| | U8 | 0-10vDC | BPP Gas Furnace Stage 1 Status | Gas Heat Units Only | O |
| | U9 | PT1000 | Mixed Air Temp | OA/RA Units Only | O |
| | U10 | PT1000 | Supply Air Temp | All units | S |
| Digital Input | DI1 | 24vAC | HP Switch (CCT1 on D-Cabinet) | Open = High Pressure | S |
| | DI2 | 24vAC | LP Switch (CCT1 on D-Cabinet) | Open = Low Pressure | S |
| | DI3 | 24vAC | Supply Air Flow Switch | Open = Improper Airflow | S |
| | DI4 | 24vAC | Smoke Detector | Open = Smoke Alarm | O |
| | DI5 | 24vAC | Dirty Filter Switch | Closed = High Pressure | O |
| | DI6 | 24vAC | Damper End Switch | Closed = Running | S |
| | DI7 | 24vAC | Occupied | Closed = Occupied | O |
| | DI8 | 24vAC | Supply Fan VFD Status | Open = VFD Fault | O |
| | DI9 | 24vAC | Condensate Float Switch | Open = High Condensate | S |
| | DI10 | 24vAC | UT Gas Valve 1 Status | Closed = Gas Valve On | O |
| | DI11 | 24vAC | UT Gas Valve 2 Status | Closed = Gas Valve On | O |
| | DI12 | 24vAC | Dual Power | Open = Normal Power, Closed = Auxillary Power | O |
| | DI13 | 24vAC | Door Switch | Open = Open Door | S |
| | DI14 | 24vAC | Remote Unit Initiation | Open = OFF, Closed = ON | S |
| | DI15 | 24vAC | Damper Position DI1 OR Supply Fan Speed DI1 | Only if control selected | O |
| | DI16 | 24vAC | Phase Fail Relay 1 | Only if control selected | O |
| | DI17 | 24vAC | Exhaust Air Flow Switch (Not used on D-Cabinet) | Closed = Running | O |
| | DI18 | 24vAC | Condenser Fan VFD Status (CCT1 on D-Cabinet) | Open = VFD Fault | S |
| Analog Input | AO1 | 0 - 10vDC | Dampers | OA/RA Units Only | O |
| | AO2 | 0 - 10vDC | Condenser Fans (CCT on D-Cabinet) | | S |
| | AO3 | 0 - 10vDC | Aux. Electric Heat | | O |
| | AO4 | 0 - 10vDC | Furnace 1 Signal OR Main Electric Heat OR Hot Water Heat | Units with heat option | O |
| | AO5 | 0 - 10vDC | Supply Fan | | S |
| | AO6 | 0 - 10vDC | Exhaust Fan | Only on units with exhaust | O |
| Digital Output | DO1 | NO Relay | Gas Boost Heat | Unit 24vac | O |
| | DO2 | - | Furnace 2 Stage 2 OR Furnace 3 Enable | Units with heat option | O |
| | DO3 | NO Relay | Compressor 1 | Unit 24vac | S |
| | DO4 | NO Relay | Compressor 2 | Unit 24vac | S |
| | DO5 | NO Relay | Outdoor Air Damper | Unit 24vac (100% OA Only) | S |
| | DO6 | NO Relay | HGRH Close Off Valve (CCT1 on D-Cabinet) | Unit 24vac | O |
| | DO7 | NO Relay | Condenser Fan VFD Enable (CCT1 on D-Cabinet) | VFD isolated 24vac | S |
| | DO8 | NO Relay | Supply Fan VFD Enable | VFD isolated 24vac | S |
| | DO9 | NO Relay | Heat 1 OR Furnace 1 Ignit. Initiation OR Main Electric Heat Enable | Units with heat option | O |
| | DO10 | NO Relay | Heat 2 OR Furnace 2 Stage 1 OR Furnace 2 Enable | Units with heat option | O |
| | DO11 | NO Relay | HGRH Stage 2 Valve (Not used on D-Cabinet) | Unit 24vac | O |
| | DO12 | - | Not Used | - | - |
| | DO13 | NO Relay | Exhaust Fan Enable | Units with exhaust | O |
| | DO14 | NO Relay | CP1 Unloader Valve | | S |
| | DO15 | NO Relay | General Alarm | | S |
| | DO16 | NO Relay | Aux. Electric Heat Enable | Units with aux heat option | O |
| | DO17 | NO Relay | Furnace 4 Enable (D-Cabinet only) | Units with heat option | O |
| | DO18 | - | Not Used | - | - |

For the pCOe Expansion Board I/O List, please see next page.

## pCOe Expansion Board Input/Output (I/O) List

(used with certain control options and all D-Cabinet units)

| I/O Type | pCOe | | Description | Notes | Standard or Optional |
|---|---|---|---|---|---|
| | I/O # | Type/Voltage | | | |
| Universal Input | B1 | 4-20mA | CO2 Content | Only if control selected | O |
| | B2 | 4-20mA | Duct Pressure | Only if control selected | O |
| | B3 | - | Not Used | - | - |
| | B4 | - | Not Used | - | - |
| Digital Input | DI1 | 24vAC | Damper Position DI2 OR Supply Fan Speed DI2 OR HW Coil Freeze Stat | Only if control selected | O |
| | DI2 | 24vAC | Condenser Fan VFD Status CCT2 (D-Cabinet only) | Open = VFD Fault | S |
| | DI3 | 24vAC | HP Switch CCT2 (D-Cabinet only) | Open = High Pressure | S |
| | DI4 | 24vAC | LP Switch CCT2 (D-Cabinet only) | Open = Low Pressure | S |
| Analog Output | AO1 | | Condenser Fans CCT2 (D-Cabinet only) | | S |
| Digital Output | DO1 | NO | Condenser Fan VFD Enable CCT2 (D-Cabinet only) | D-Cabinet only | S |
| | DO2 | NO | Compressor 3 (D-Cabinet only) | D-Cabinet only | S |
| | DO3 | NO | Compressor 4 (D-Cabinet only) | D-Cabinet only | S |
| | DO4 | NO | HGRH Close Off Valve CCT2 (D-Cabinet only) | D-Cabinet only | O |

## pCOxs Controller Input/Output (I/O) List

(used on units with Energy Recovery option)

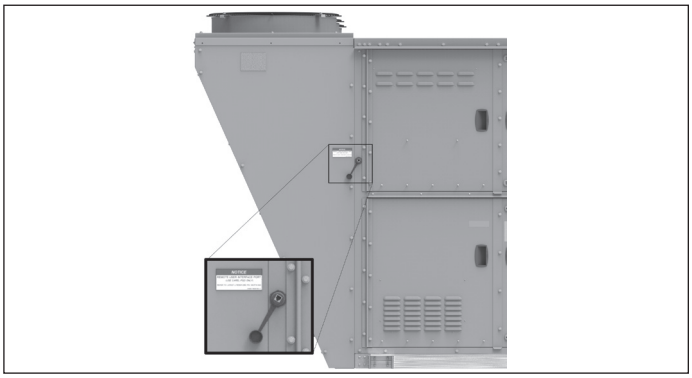
| I/O Type | pCOxs | | Description | Notes | Standard or Optional |
|---|---|---|---|---|---|
| | I/O # | Type/Voltage | | | |
| Heartbeat | SYNC | - | Wheel Proximity | Only if option selected | O |
| Universal | B1 | 4-20mA | Outdoor Air Humidity | All units | S |
| | B2 | 4-20mA | Outdoor Air Temperature | All units | S |
| | B3 | - | Not Used | - | - |
| | B4 | - | Not Used | - | - |
| Digital Input | DI1 | 24vAC | Exhaust Air Filter Switch | Only if option selected | O |
| | DI2 | 24vAC | Wheel Pressure Switch | Only if option selected | O |
| | DI3 | 24vAC | Outdoor Air Filter Switch | Only if option selected | O |
| | DI4 | 24vAC | Exhaust Air Flow Switch (or VFD status on D-Cabinet) | All units | S |
| | DI5 | 24vAC | ERV Door Switch | All units | S |
| | DI6 | 24vAC | Wheel VFD Status (D-Cabinet only) | Only if option selected | O |
| Analog Output | AO1 | 0 - 10vDC | Wheel Speed (D-Cabinet only) | Only if option selected | O |
| | AO2 | 0 - 10vDC | Exhaust Fan | All units | S |
| | AO3 | - | Not Used | - | - |
| Digital Output | DO1 | NO Relay | Outdoor Air Bypass Damper | All units except with 81" wheel | S |
| | DO2 | NO Relay | Wheel Enable (or Wheel VFD Enable for D-Cabinet) | All units | S |
| | DO3 | NO Relay | Electric Preheat Enable (or Preheat Stage 1 on D-Cabinet) | Only if option selected | O |
| | DO4 | NO Relay | Exhaust Fan Enable | All units | S |
| | DO5 | NO Relay | Electric Preheat Stage 2 (D-Cabinet only) | Only if option selected | O |

## Display/Keypad Functions

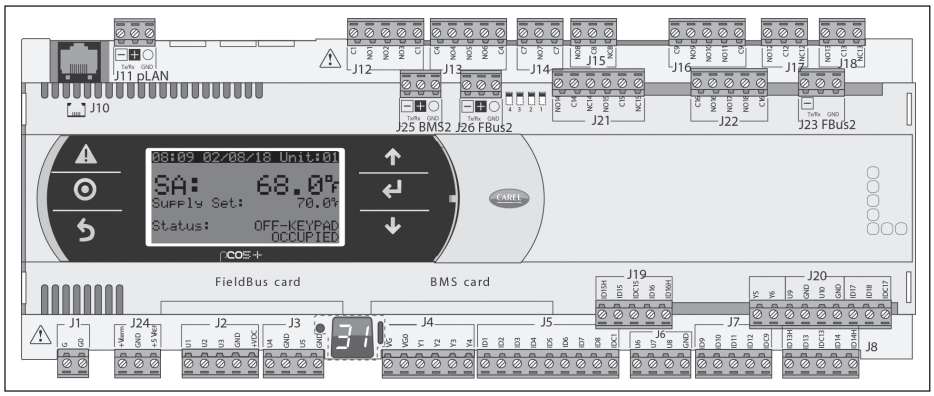
The controller features a built-in user interface with LCD display and keypad. Additionally, all functions of the display/keypad can be replicated using the remote user interface module, pGD1 or pGDE.

B- and C-Cabinet units are available with an optional unit mounted remote user interface data port to allow access without opening the control cabinet or disconnecting unit supply power. D-Cabinet sized units feature a dedicated low voltage control compartment that allows access while the unit is powered.

### Optional Remote User Interface Data Port



### Carel pCO5+ Large Display and Keypad



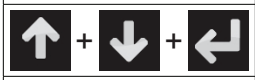
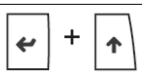

### Remote User Interface Module ①


① Refer to the literature included with the pGD1 for installation instructions. Refer to the Board Settings section for instructions on programming the remote display keypad to the controller.

### Standard Keypad Button Functions

| pCO5+ Built-In Keypad | pGD1 Remote User Interface Module ② | Function | Button Function |
|---|---|---|---|
|  |  | ALARM | Illuminated when there is an active alarm, pressing once will allow viewing of active alarms, pressing twice will reset active manual-reset alarms. |
|  |  | PRG | Selects the main navigation menu screen. |
|  |  | ESC | Returns to the main unit status display screen. |
|  |  | UP | Scroll through display screens, settings, or increase the setpoint value. |
|  |  | ENTER | Confirm point adjustments or move the cursor to the next available set point. |
|  |  | DOWN | Scroll through display screens, settings, or decrease the setpoint value. |

### Extra Function Keypad Button Sequences

| pCO5+ Built-In Keypad | pGD1 Remote User Interface Module ② | Function | Button Function |
|---|---|---|---|
|  |  | UP + DOWN+ ENTER | Accesses controller address. |
|  |  | ENTER + UP | Change unit displayed on remote keypad. (ERV Only) |

② If using the pGDE remote user interface module, the keypad keys match the pCO5+ built-in keypad.

## Menu Navigation

The Main Status Screen is displayed when the unit is first turned on or after one minute of keypad inactivity. From this Main Status Screen, eight sub menus can be accessed. Details on the Main Status Screen and each sub menu shown below will be detailed in the following sections of this manual.

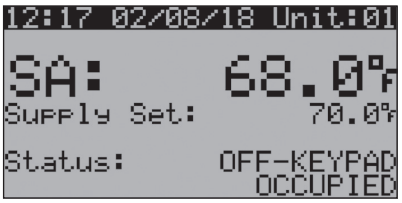
### Sub Menu Selections

| Sub Menu | Description |
|---|---|
| A. On/Off Unit | Switch unit on or off. |
| B. Setpoints | View the user setpoints. |
| C. Clock/Scheduler | View the current time and date and occupancy schedule. |
| D. Input/Output | View the status of the controller inputs and outputs. |
| E. Alarm Logger | View the alarm log. |
| F. Board Switch | Change the controller pLAN board address. |
| G. Service | View maintenance related parameters, such as hours run, sensor calibration and manual overrides. |
| H. Manufacturer | Manufacturer menu and adjustment of various manufacturer related parameters, such as unit configuration and timing settings. |

### Example Sub Menu Navigation

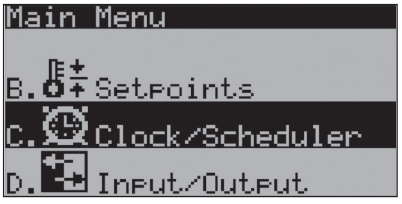
The following example shows how to navigate to and enter the Clock/Scheduler sub menu, however the process is similar for all sub menu selections.

1. Starting from the Main Status Screen:

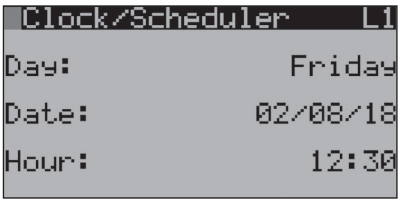



2. Press the PRG key to access the sub menu. Note that the sub menu starts with On/Off Unit highlighted.


3. Press the UP or DOWN key repeatedly until the Clock/Scheduler sub menu is selected.

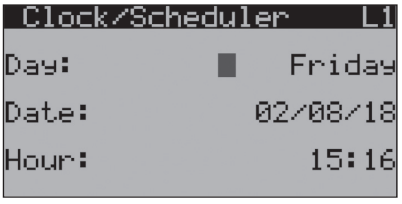



4. Press the ENTER key to enter the sub menu.




5. Once within the sub menu, if the blinking cursor is located in top line of the screen, pressing the UP or DOWN keys will scroll through available Clock/Scheduler sub menus.

6. If the user wants to change a parameter on the displayed sub menu, pressing the ENTER key will move the cursor to the parameter settings and successive presses of ENTER will move the cursor to the next item. To change any item, the UP or DOWN arrow keys can be used to make the changes. Note that some selections are read only and cannot be changed.



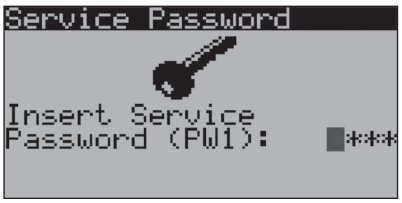

7. To revert back to the previous sub menu level, press the ESC key.

## Password Protection

**⚠WARNING**

Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

To prevent unauthorized adjustments, a password is required to gain access to certain menus. When a password is required, the following screen will be displayed:




The password can be entered by using the UP or DOWN key to scroll through the values for each digit, then pressing ENTER to move the cursor to the next digit. Repeat this process until all four digits of the password are entered.

The password for appropriate Service sub menu selections is 1500. The password for the Manufacturer sub menu is a custom, one-time password that is only available by contacting the Service Department.

## Menu Tree

Regardless of the current screen displayed, pressing the PRG key main sub menu listing, indicated on page 8 and as shown below. The sub menu screens shown are condensed on this page and are detailed further in this manual. Depending on the configuration of the unit, not all sub menu screens are available.

| MAIN SCREEN | MAIN SUB MENU | SUB MENU SCREENS ① | SCREEN # |
|---|---|---|---|
| Unit Status | A. On/Off Unit | On/Off Unit | - |
| | B. Setpoints | Outdoor Air Reset | S1-4 |
| | | Space Supply Air Resets | S5-6 |
| | | Neutral Air | S7 |
| | | Occupied Setpoints | S8-11 |
| | | Unoccupied Setpoints | S12-14 |
| | | Occupied | S15 |
| | | Unoccupied | S16 |
| | | DeHum Dewpt Setpoints | S17-18 |
| | C. Clock/ Scheduler | Clock | L1-2 |
| | | Scheduler | L3-4 |
| | | Holidays | L5-9 |
| | D. Input/Output | Analog Inputs | R1-13 |
| | | Digital Inputs | T1-20 |
| | | Relay Outputs | V1-15 |
| | | Analog Output | W1-6 |
| | | Relay Output (pCOe) | B1-4 |
| | | Analog Output (pCOe) | B5 |
| | | Digital Input (pCOe) | B6-9 |
| | | Analog Input (pCOe) | B10 |
| | E. Alarm Logger | Alarm Log | - |
| | F. Board Switch | | - |
| | G. Service | a. Information | A1-7 |
| | | b. Running Hours | X1-19 |
| | | c. Power Meter | PM1-8 |
| | | d. BMS Config. | U1-8 |
| | | e. Fieldbus Config. | FB1-11 |
| | | f. Service Settings / a. Maintenance Hours | M1-18 |
| | | f. Service Settings / b. Probe Adjustment | P1-18 |
| | | f. Service Settings / c. Control Settings | CS1-20 |
| | | f. Service Settings / d. P/PI/PID Loops | D1-20 |
| | | f. Service Settings / e. Alarm Management | AM1-24 |
| | | g. Manual Management / a. Manual Control | MN1-6 |
| | | g. Manual Management / b. Analog Inputs | C1-13 |
| | | g. Manual Management / c. Digital Inputs | D1-20 |
| | | g. Manual Management / d. Relay Outputs | G1-17 |
| | | g. Manual Management / e. Analog Outputs | H1-6 |
| | | g. Manual Management / f. Exp. Board (pCOe) | F1-9 |
| | | i. pAD Config. | PC1-4 |
| | | j. ERV Config. | E1-10 |
| | H. Manufacturer | Contact Service Department for Guidance | |

Shaded Area Requires Password for Access

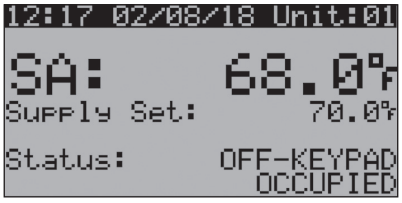
① Menu tree listing is condensed and may show selections that are not available on all units.

## Main Status Screen

The Main Status Screen is displayed when the unit is first turned on or after one minute of keypad inactivity.

The following information is displayed on the Main Status Screen:

- Time/date
- Unit number
- Supply Air Temperature
- Current Supply Air Setpoint
- Unit Status
- Unit Mode




Once this screen is displayed, the user can navigate up and down through the list of Main Status Screen Parameters by using the UP or DOWN buttons. These screens are described in further detail in the next section.

Note that the main unit controller will always show as Unit: 01. If the unit is also equipped with an ERV module, it has its own controller, which is Unit: 02. The keypad at the main controller or the remote key pad can be used to change the Main Status Screen to display either Unit 01 or 02.

To change the controller being displayed, press the ENTER + UP buttons. If you are viewing the main controller display, pressing those buttons will switch to displaying the ERV controller. Pressing those buttons again will revert back to displaying the main controller.

## Main Status Screen Parameters

The following table describes the menu parameters:

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Main Screen** | **-** | **Time/Date:** | Actual Value | Hr:Min<br>MM/DD/YY | - |
| | | **SA:** | Actual Value | - | °F |
| | | **Supply Set:** | Actual Value | - | °F |
| | | **Status:** (Off/On) | Actual Value | WAITING<br>UNIT ON<br>OFF by ALARM<br>OFF by pLAN<br>OFF by BMS<br>OFF by CLOCK<br>OFF by DIG-IN<br>OFF-KEYPAD<br>OFF-OPEN DOOR<br>WAIT SUP FAN<br>WAIT-DAMPER | - |
| | | (Mode) | Actual Value | Fan-Only<br>Econ<br>Heating<br>Cooling<br>Dehumid | - |
| | | (Occupancy) | Actual Value | UNOCCUPIED<br>OCCUPIED-BMS<br>OCCUPIED-CLK<br>OCCUPIED-DIG<br>OCCUPIED-PAD<br>OCCUPIED | - |
| **pAD Thermostat**<br>*(Visible only if pAD is Enabled)* | **M1** | **pAD Thermostat:** (Address) | Actual Value | - | - |
| | | **Temperature:** | Actual Value | - | °F |
| | | **pAD Humidity:** (If Available on pAD) | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |

(continued next page)

## Main Status Screen Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Serial Probe** *(Probes 1 - 4 if enabled)* | **M2 - M5** | **Location:** | Actual Value | - | - |
| | | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Serial Probe Number:** | Actual Value | - | - |
| **Conrol Temp/Hum** *(Visible only if Serial Probes are enabled)* | **M6** | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |
| **Status of Outside Air** | **M7 & M8** | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |
| **Status of Return Air** *(Visible only with HOAS Units)* | **M9** | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |
| **Status of ERV leaving Air** *(Visible only with ERV Units)* | **M10** | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |
| **Mixed Air** *(Visible only with HOAS Units)* | **M11** | **Temperature:** | Actual Value | - | °F |
| | | **Humidity:** | Actual Value | - | %rH |
| | | **Dew Point:** | Actual Value | - | °F |
| | | **Enthalpy:** | Actual Value | - | BTU/Lb. |
| **Evaporator Off Temp** | **M12** | **Temperature:** | Actual Value | - | °F |
| **Status of Space CO2** *(Visible only with CO2 Sensor)* | **M13** | **CO2 level:** | Actual Value | - | ppm |
| | | **CO2 setpoint:** | Actual Value | - | ppm |
| **Status of Building Pressure** *(Visible only with building pressure sensor)* | **M16** | **Pressure:** | Actual Value | - | iwc |
| | | **Setpoint:** | Actual Value | - | iwc |
| **Status of Duct Pressure** *(Visible only with duct pressure sensor)* | **M17** | **Pressure:** | Actual Value | - | iwc |
| | | **Setpoint** | Actual Value | - | iwc |
| **Main Dampers** | **M18** | **OA Damper Pos:** | Actual Value | OPEN or CLOSED<br>0 - 100 | - |
| | | **RA Damper Pos:** (if enabled) | Actual Value | 0 - 100 | % |
| **Fan Status** | **M19** | **Supply:** (On/Off) | Actual Value | 0 - 100 | % |
| | | **Exhaust:** (On/Off) | Actual Value | 0 - 100 | % |
| | | **Cond Fan Circuit 1:** (On/Off) | Actual Value | 0 - 100 | % |
| | | **Cond Fan Circuit 2:** (On/Off) | Actual Value | 0 - 100 | % |
| **Status of ERV** *(Visible only with ERV Units)* | **M20** | **ERV Wheel:** | Actual Value | OFF or ON | - |
| | | **Wheel Status:** | Actual Value | STOPPED<br>RUNNING | - |
| | | **Bypass Damper:** | Actual Value | CLOSED or OPEN | - |
| | | **Preheater On/Off:** (if enabled) | Actual Value | OFF or ON | - |

(continued next page)

## Main Status Screen Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Demand Status** | **M21** | **Cooling Demand:** | Actual Value | 0 - 100 | % |
| | | **Heating Demand:** | Actual Value | 0 - 100 | % |
| | | **Dehum Demand:** (if enabled) | Actual Value | 0 - 100 | % |
| | | **Hot Gas Reheat:** (if enabled) | Actual Value | 0 - 100 | % |
| **Aux. Electric Heat Status** | **M22** | **Modulation:** | Actual Value | 0 - 100 | % |
| **Primary Electric Heat Status** | **M23** | **Modulation:** | Actual Value | 0 - 100 | % |
| **Gas Heat Status** | **M24** | **Gas Stages On:** *(United Tech. Board)* | Actual Value | 0 - 2 | - |
| | | **Gas Stage 1 Status:** *(Beckett Control Board)* | Actual Value | Primary Limit Failure<br>Loss of inducer Motor<br>No Firing Rate Input<br>Gas Sensor Failure<br>Air Sensor Failure<br>Low Combustion Air<br>Mod Valve Failure<br>Weak Flame Signal<br>Limiting Low Fire<br>Failed Ignition<br>Improper Flame<br>Lost Flame<br>COM Error<br>Running<br>Retry<br>OFF | - |
| | | **Gas Stage 2 Status:** *(Beckett Control Board)* | Actual Value | | - |
| **Digital Scroll Status** | **M25** | **Status** | Actual Value | Off<br>On<br>Start Up<br>Forced Off<br>Alarm<br>Off by time<br>On by time | - |
| | | **Countdown** | Actual Value | - | (s)econds |
| | | **Maxpower Admit** | Actual Value | 0 - 100 | % |
| | | **Requested Cap.:** | Actual Value | 0.0 - 100.0 | % |
| | | **Current Capac.:** | Actual Value | 0.0 - 100.0 | % |
| **DX Circuit 1** *(Graphical Display)* | **M26/27** | **SH:** (Super Heat) | Actual Value | - | °F |
| | | **Suction Temperature** | Actual Value | - | °F |
| | | **EEV Position percent** | Actual Value | 0 - 100 | % |
| | | **EVD:** (EVD Status) | Actual Value | ‾‾<br>On<br>Close<br>Std-by<br>Pos<br>Wait<br>Init | - |
| | | **Digital Compressor Status (On/Off)** | (Graphic) | - | - |
| | | **Unloader Valve status** | (Graphic) | - | - |
| | | **Compressor 2 Status (On/Off)** | (Graphic) | | |
| | | **Protection Status** | Actual Value | LoSH<br>LOP<br>MOP | - |
| | | **SP:** (Suction Pressure) | Actual Value | - | psig |

(continued next page)

## Main Status Screen Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **DX Circuit 2** *(Graphical Display)* | **M28** | **SH:** (Super Heat) | Actual Value | - | °F |
| | | **Suction Temperature** | Actual Value | - | °F |
| | | **EEV Position percent** | Actual Value | 0 - 100 | % |
| | | **EVD:** (EVD Status) | Actual Value | On<br>Close<br>Std-by<br>Pos<br>Wait<br>Init | - |
| | | **Compressor 3 Status (On/Off)** | (Graphic) | - | - |
| | | **Compressor 4 Status (On/Off)** | (Graphic) | - | - |
| | | **Protection Status** | Actual Value | LoSH<br>LOP<br>MOP | - |
| | | **SP:** (Suction Pressure) | Actual Value | - | psig |
| **DX Circuit 1** | **M29** | **Discharge Pressure:** | Actual Value | - | psig |
| | | **Discharge Temperature:** | Actual Value | - | °F |
| | | **Suction Pressure:** | Actual Value | - | psig |
| **DX Circuit 2** | **M30** | **Discharge Pressure:** | Actual Value | | psig |
| | | **Suction Pressure:** | Actual Value | | psig |
| **DX Circuit 1** | **M31** | **LL Temp.:** | Actual Value | - | °F |
| | | **LL Cond Temp.:** | Actual Value | - | °F |
| | | **Subcool:** | Actual Value | - | °F |
| **DX Circuit 2** | **M32** | **LL Temp.:** | Actual Value | - | °F |
| | | **LL Cond Temp.:** | Actual Value | - | °F |
| | | **Subcool:** | Actual Value | - | °F |
| **Lockouts** | **M33** | **DX System Lockout:** | Actual Value | OFF or ON | - |
| | | **Circuit 1:** | Actual Value | OFF or ON | - |
| | | **Circuit 2:** | Actual Value | OFF or ON | - |
| | | **Heating Lockout:** | Actual Value | OFF or ON | - |
| | | **Temperature Lockouts:** | Actual Value | None<br>DX Cooling<br>Heating | - |
| **Scheduler** | **M34** | **Clock Override:** | Actual Value | OFF or ON | - |
| | | **Override Time:** | Actual Value | 1 - 3 | (hr)hours |
| **Manual I/O Status** | **M35** | **Unit Operating Mode:** | Actual Value | Auto or Manual | - |
| | | **Reset unit to auto mode:** | NO | NO or YES | - |

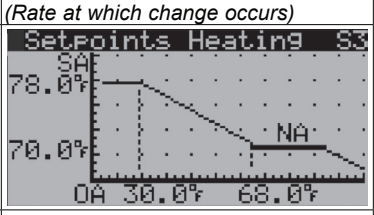
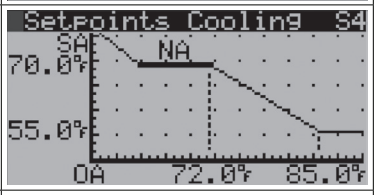
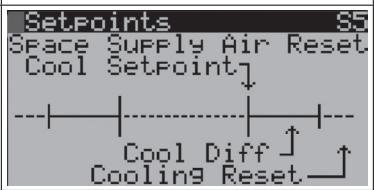
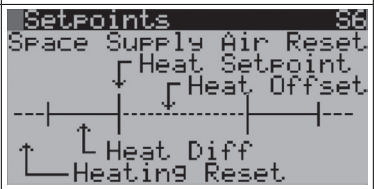
## A. On/Off Unit Sub Menu Parameters

The On/Off Unit menu allows the user to view the detailed On/Off status of the controller.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **On/Off Unit** | | **Unit Address:** | Actual Value | 1 - 32 | - |
| | | **Power by Display:** | OFF | OFF<br>ON | - |
| | | **Status:** | OFF by KEYPAD | WAITING<br>UNIT ON<br>OFF by ALARM<br>OFF by pLAN<br>OFF by BMS<br>OFF by CLOCK<br>OFF by DIG-IN<br>OFF-KEYPAD<br>OFF-OPEN DOOR<br>WAIT SUP FAN<br>WAIT-DAMPER | - |
| **On/Off Unit**<br>*(Visible only if pAD enabled)* | | **pAD n°** | 1 | 1 - 32 | - |
| | | **On/Off** | ALWAYS ON | ALWAYS ON<br>pLAN ON/OFF | - |

## B. Setpoints Sub Menu Parameters

The Setpoint menu allows the user to view and adjust temperature related parameters.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Outdoor Air Reset Heating** | **S1** | **OA** *(Top Left Value)* | 30.0 | 0.0 - 50.0 | °F |
| | | **NA High** *(Top Right Value)* | 78.0 | 60.0 - 100.0 | °F |
| | | **OA** *(Bottom Left Value)* | 68.0 | 50.0 - 75.0 | °F |
| | | **NA Low** *(Bottom Right Value)* *(Same as Cooling NA High)* | 70.0 | 60.0 - 80.0 | °F |
| | | **NA Granularity:** *(Rate at which change occurs)* | 0.5 | 0.5 or 1.0 | °F |
| **Outdoor Air Reset Cooling** | **S2** | **OA** *(Top Left Value)* | 72.0 | 65.0 - 75.0 | °F |
| | | **NA High** *(Top Right Value)* *(Same as Heating NA Low)* | 70.0 | 60.0 - 80.0 | °F |
| | | **OA** *(Bottom Left Value)* | 85.0 | 75.0 - 100.0 | °F |
| | | **NA Low** *(Bottom Right Value)* | 55.0 | 50.0 - 80.0 | °F |
| | | **SA/NA Granularity:** *(Rate at which change occurs)* | 0.5 | 0.5 or 1.0 | °F |
| **Outdoor Air Reset Heating Setpoints** *(Graphical Display of S1 Outdoor Air Reset Setpoints, if configured)* | **S3** |  | Actual Value | - | °F |
| **Outdoor Air Reset Cooling Setpoints** *(Graphical Display of S2 Outdoor Air Reset Setpoints, if configured)* | **S4** |  | Actual Value | - | °F |
| **Space Supply Air Reset Cooling** *(Graphical Display of Space Reset Setpoints, if configured)* | **S5** |  | Reference Only *(These correlate to the settings in S8 through S11 with actual values seen in screens S15 and S16)* | - | - |
| **Space Supply Air Reset Heating** *(Graphical Display of Space Reset Setpoints, if configured)* | **S6** |  | Reference Only *(These correlate to the settings in S8 through S11 with actual values seen in screens S15 and S16)* | - | - |
| **Neutral Air** *(Reset type NONE)* | **S7** | **Neutral Air:** | 70.0 | 50.0 - 90.0 | °F |
| **pAD Thermostat Occupied Setpoints** *(Screen Visble with pAD)* | **S8** | **pAD Thermostat** *(Address)* | Actual Value | 1 - 32 | - |
| | | **Cool Setpoint:** | 74.0 | 60 - 90 | °F |
| | | **Heat Offset:** | 4.0 | 2 - 20 | °F |
| | | **Heat Setpoint:** | Actual Value | Actual Value | °F |
| **Differentials Occupied** | **S9** | **Cool Diff::** | 1.0 | 1.0 - 10.0 | °F |
| | | **Heat Diff:** | 1.0 | 1.0 - 10.0 | °F |
| **Supply Air Reset Occupied** | **S10** | **Cooling Reset:** | 55.0 | 45.0 - 100.0 | °F |
| | | **Neutral Air:** *(Space Reset Only)* | 70.0 | 50.0 - 90.0 | °F |
| | | **Heating Reset:** *(81% eff. Furnace)* *(90+%/hybrid eff. Furnace)* *(Electric Heat)* | 80.0 | 60.0 - 130.0<br>60.0 - 100.0<br>60.0 - 100.0 | °F |

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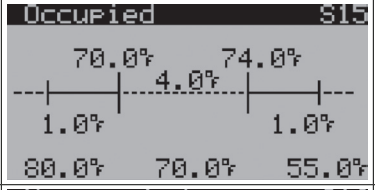
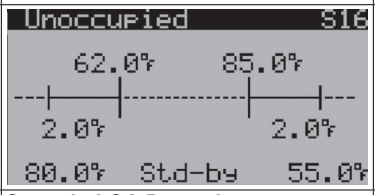
## B. Setpoints Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **pAD Thermostat Occupied Setpoints** *(Screen Visble with pAD)* | **S11** | **pAD Thermostat** *(Address)* | Actual Value | 1 - 32 | - |
| | | **Space Humidity** | 60 | 0 - 100 | %rh |
| | | **Humidity Offset** | 5 | 0 - 99 | %rh |
| **pAD Thermostat Unoccupied Setpoints** | **S12** | **pAD Thermostat** *(Address)* | Actual Value | 1 - 32 | - |
| | | **Cool Setpoint:** | 85.0 | 70.0 - 90.0 | °F |
| | | **Heat Setpoint:** | 62.0 | 50.0 - 70.0 | °F |
| | | **Space Humidity:** | 70 | 0 - 100 | %rh |
| | | **Humidity Diff:** | 5 | 0 - 99 | %rh |
| **Supply Air Reset Unoccupied** | **S13** | **Cooling Reset:** | 55.0 | 45.0 - 100.0 | °F |
| | | **Heating Reset:**<br>*(81% eff. Furnace)*<br>*(90+%/hybrid eff. Furnace)*<br>*(Electric Heat)* | 80.0 | 60.0 - 130.0<br>60.0 - 100.0<br>60.0 - 100.0 | °F |
| **Differentials Unoccupied** | **S14** | **Cool Diff::** | 2.0 | 1.0 - 10.0 | °F |
| | | **Heat Diff:** | 2.0 | 1.0 - 10.0 | °F |
| **Occupied** *(Graphical Display of S8-S11 Outdoor Air Reset Setpoints, if configured)* | **S15** |  | Actual Value | - | °F |
| **Unoccupied** *(Graphical Display of Setpoints)* | **S16** |  | Actual Value | - | °F |
| **DeHum Dewpt Setpoints** *(Screen Visible with Dewpoint Dehumidification and DOAS configuration)* | **S17** | **Occupied OA Dewpoint:**<br>*(OA & Space Selected)* | 55.0<br>Adjusted from pAD | 45.0 - 65.0<br>- | °F |
| | | **Occupied Diff Off:** | 5.0 | 0.0 - 10.0 | °F |
| | | **Unoccupied Space Dewpoint:**<br>*(Visible only with pAD)* | 60.0 | 45.0 - 65.0 | °F |
| | | **Unoccupied Diff Off:**<br>*(Visible only with pAD)* | 5.0 | 0.0 - 10.0 | °F |
| **DeHum Dewpt Setpoints** *(Screen Visible with Dewpoint Dehumidification)* | **S18** | **Occupied MA Dewpoint:**<br>*(MA & Space Selected)* | 55.0<br>Adjusted from pAD | 45.0 - 65.0<br>- | °F |
| | | **Occupied Diff Off:** | 5.0 | 0.0 - 10.0 | °F |
| | | **Unoccupied Space Dewpoint:**<br>*(Visible only with pAD)* | 60.0 | 45.0 - 65.0 | °F |
| | | **Unoccupied Diff Off:**<br>*(Visible only with pAD)* | 5.0 | 0.0 - 10.0 | °F |

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## C. Clock/Scheduler Sub Menu Parameters

The Clock/Scheduler menu allows the user to view and alter the time and date. The user can also add up to seven schedules for occupancy requirements as well as up to sixteen holidays.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Clock** | **L1** | **Day:** | Actual Day | SUNDAY - SATURDAY | - |
| | | **Date:** | Actual Date | MM/DD/YY | - |
| | | **Hour: (Military Time)** | Actual Time | HH:MM | - |
| **Clock** | **L2** | **DST: (daylight Savings Time)** | ENABLE | ENABLE or DISABLE | - |
| | | **Transition Time:** | 60 | 0-60 | (min)utes |
| | | **Start: (Date placement in month)** | SECOND | LAST<br>FIRST<br>SECOND<br>THIRD<br>FOURTH | - |
| | | **Start: (Day)** | SUNDAY | SUNDAY - SATURDAY | Day |
| | | **Start: (Month)** | March | JANUARY - DECEMBER | Month |
| | | **Start: (Time)** | 2 | 0 - 23 | Hour |
| | | **End: (Date placement in month)** | FIRST | LAST<br>FIRST<br>SECOND<br>THIRD<br>FOURTH | - |
| | | **End: (Day)** | SUNDAY | SUNDAY - SATURDAY | Day |
| | | **End: (Month)** | NOVEMBER | JANUARY - DECEMBER | Month |
| | | **End: (Time)** | 2 | 0 - 23 | Hour |
| **Scheduler** | **L3** | **Number of Schedules** | 0 | 0 - 7 | - |
| **Scheduler** | **L4** | **Schedule #:** | 0 | 1-7 | - |
| | | **Time On:** | 00:00 | 00:00 - 23:59 | Hrs:Min |
| | | **Time Off:** | 00:00 | 00:00 - 23:59 | Hrs:Min |
| | | **Days Enabled:** | *<br>*<br>*<br>*<br>*<br>*<br>* | M<br>T<br>W<br>T<br>F<br>S<br>S | - |
| **Holidays** | **L5** | **Number:** | 0 | 0, 4, 8, 12, 16 | - |
| **Holidays (Screen will show only if Holidays = 4 or more)** | **L6** | **Holiday 1 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 2 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 3 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 4 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| **Holidays (Screen will show only if Holidays = 8 or more)** | **L7** | **Holiday 5 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 6 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 7 Start - Stop** | 00/00-00/01 | 1/1-12/31 | Days |
| | | **Holiday 7 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 8 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| **Holidays (Screen will show only if Holidays = 12 or more)** | **L8** | **Holiday 9 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 10 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 11 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 12 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| **Holidays (Screen will show only if Holidays = 16)** | **L9** | **Holiday 13 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 14 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 15 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |
| | | **Holiday 16 Start - Stop** | 00/00-00/00 | 1/1-12/31 | Days |

## D. Input/Output Sub Menu Parameters

The Input/Output menu allows the user to quickly view the status of the controller inputs and outputs.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | CHANNEL | RANGE | UNITS |
|---|---|---|---|---|---|
| **a. Analog Inputs** *(Screens are visible based on unit configuration)* | **R1** | **Return Air Humidity** | U01 | - | %rH |
| | **R2** | **CO2 Sensor** | U02 | - | ppm |
| | **R3** | **Furnace Stage 2 Status** | U02 | - | vdc |
| | **R4** | **Evaporator Off Temp** | U02 | - | °F |
| | **R5** | **Building Pressure** | U03 | - | iwc |
| | **R6** | **Static Pressure** | U03 | - | iwc |
| | **R7** | **Outside Air Temp** | U04 | - | °F |
| | **R8** | **Return Air Temp** | U05 | - | °F |
| | **R9** | **Discharge Line Temp** | U06 | - | °F |
| | **R10** | **Outside Air Humidity** | U07 | - | %rH |
| | **R11** | **Furnace Stage 1 Status** | U08 | - | vdc |
| | **R12** | **Mixed Air Temp** | U09 | - | °F |
| | **R13** | **Supply Air Temp** | U10 | - | °F |
| **b. Digital Inputs** *(Screens are visible based on unit configuration)* | **T1** | **High Pressure SW CCT1** | DI1 | CLOSED or OPEN | - |
| | **T2** | **Low Pressure SW CCT1** | DI2 | CLOSED or OPEN | - |
| | **T3** | **S.F. Airflow Switch** | DI3 | CLOSED or OPEN | - |
| | **T4** | **Smoke Dectector** | DI4 | CLOSED or OPEN | - |
| | **T5** | **Dirty Filter Switch** | DI5 | CLOSED or OPEN | - |
| | **T6** | **Damper End Switch** | DI6 | CLOSED or OPEN | - |
| | **T7** | **Occupied** | DI7 | CLOSED or OPEN | - |
| | **T8** | **Supply Fan CFD Status** | DI8 | CLOSED or OPEN | - |
| | **T9** | **Condensate Pan Float** | DI9 | CLOSED or OPEN | - |
| | **T10** | **Gas Valve 1** | DI10 | CLOSED or OPEN | - |
| | **T11** | **Gas Valve 2** | DI11 | CLOSED or OPEN | - |
| | **T12** | **Dual Point Power** | DI12 | CLOSED or OPEN | - |
| | **T13** | **Door Switch** | DI13 | CLOSED or OPEN | - |
| | **T14** | **Remote On/Off** | DI14 | CLOSED or OPEN | - |
| | **T15** | **Damper Position 2** | DI15 | CLOSED or OPEN | - |
| | **T16** | **Supply Fan Speed 2** | DI15 | CLOSED or OPEN | - |
| | **T17** | **Damper Position 3** | DI16 | CLOSED or OPEN | - |
| | **T18** | **Supply Fan Speed 3** | DI16 | CLOSED or OPEN | - |
| | **T19** | **E.F. Airflow Switch** | DI17 | CLOSED or OPEN | - |
| | **T20** | **C.F. VFD Status CCT1** | DI18 | CLOSED or OPEN | - |

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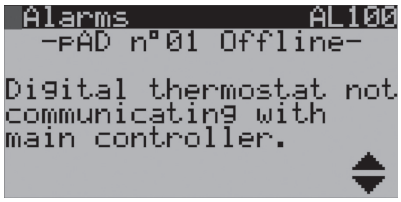
## D. Input/Output Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | CHANNEL | RANGE | UNITS |
|---|---|---|---|---|---|
| c. Relay Outputs *(Screens are visible based on unit configuration)* | V1 | Heat 3 | 1 | OFF or ON | - |
| | V2 | Gas Boost Heat | 1 | OFF or ON | - |
| | V3 | Heat 4 | 2 | OFF or ON | - |
| | V4 | Compressor 1 | 3 | OFF or ON | - |
| | V5 | Compressor 2 | 4 | OFF or ON | - |
| | V6 | OA Damper Open | 5 | OFF or ON | - |
| | V7 | HGRH Solenoid CCT1 | 6 | OFF or ON | - |
| | V8 | Condenser Fans CCT1 | 7 | OFF or ON | - |
| | V9 | Supply Fan | 8 | OFF or ON | - |
| | V10 | Heat 1 | 9 | OFF or ON | - |
| | V11 | Heat 2 | 10 | OFF or ON | - |
| | V12 | HGRH Stage 2 CCT1 | 11 | OFF or ON | - |
| | V13 | Exhaust Fan | 13 | OFF or ON | - |
| | V14 | General Alarm | 15 | OFF or ON | - |
| | V15 | Aux. Electric Heat | 16 | OFF or ON | - |
| d. Analog Output *(Screens are visible based on unit configuration)* | W1 | Damper Modulation | Y1 | 0.0 - 10.0 | vdc |
| | W2 | Condenser Fans CCT1 | Y2 | 0.0 - 10.0 | vdc |
| | W3 | Aux. Electric Heat | Y3 | 0.0 - 10.0 | vdc |
| | W4 | Modulated Heat | Y4 | 0.0 - 10.0 | vdc |
| | W5 | Supply Fan | Y5 | 0.0 - 10.0 | vdc |
| | W6 | Exhaust Fan | Y6 | 0.0 - 10.0 | vdc |
| e. Exp Board Relay Output | B1 | Condenser Fans CCT2 | 1 | OFF or ON | - |
| | B2 | Compressor 3 | 2 | OFF or ON | - |
| | B3 | Compressor 4 | 3 | OFF or ON | - |
| | B4 | HGRH Solenoid CCT2 | 4 | OFF or ON | - |
| e. Exp Board Analog Output | B5 | Condenser Fans CCT2 | Y1 | 0.0 - 10.0 | vdc |
| e. Exp Board Digital Input | B6 | Freeze Stat | ID1 | OPEN or CLOSED | |
| | B7 | C.F. VFD Status CCT2 | ID2 | OPEN or CLOSED | |
| | B8 | High Pressure SW CCT2 | ID3 | OPEN or CLOSED | |
| | B9 | Low Pressure SW CCT2 | ID4 | OPEN or CLOSED | |
| e. Exp Board Analog Input | B10 | CO2 Sensor | B1 | - | ppm |

## E. Alarm Logger Sub Menu Parameters

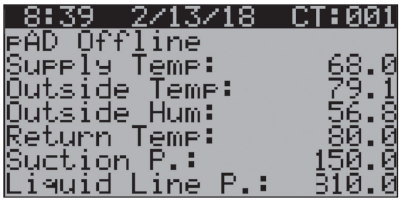
The Alarm Logger menu allows the user to view up to 100 past alarms.

To access the contents of the Alarm Logger, start by pressing the ALARM button, followed by the DOWN button. Displayed will be the most recent alarm, as shown in the following example:




To get to the log, press the DOWN arrow key until the following screen is shown, then press the ENTER key:


The most recent alarms will be displayed, as shown in the following example:




| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Alarm Log | - | **Time**<br>**Date**<br>**CT:** *(Alarm Count)* | Actual Value | HH:MM<br>MM/DD/YY<br>0 - 100 | - |
| | | *(Alarm Description)*<br>*(If no alarm is stored in the log "NO ALARMS" will be displayed)* | Actual Value | See Below | - |
| | | **Supply Temp:** | Actual Value | - | - |
| | | **Outside Temp:** | Actual Value | - | - |
| | | **Outside Hum:** | Actual Value | - | - |
| | | **Return Temp:** | Actual Value | - | - |
| | | **Suction P.:** | Actual Value | - | - |
| | | **Liquid Line P.:** | Actual Value | - | - |

## E. Alarm Logger Sub Menu - Alarm Listing

| ALARM/LOGGED EVENTS | AR ① | UD ① | CD ① | CAUSE | ACTION |
|---|---|---|---|---|---|
| Clock Alarm | • | | • | Indicates an error with the real time clock on-board the controller. During alarm any schedules may not work properly. | Once the clock returns to functioning correctly the alarm will be automatically reset. The clock time may need to be reset. |
| BMS Offline | • | | | BMS/BAS has lost communication with controller. | Unit will operate as is until communication can be reestablished. |
| Beckett Control Board 1 Fail | • | | • | Health Status Signal is less than 1.0 vdc. | If shutdown unit on furnace alarm is selected, unit will shutdown if only 1 furnace is available. Otherwise unit will continue to run without heat. |
| Beckett Control Board 2 Fail | • | | • | Health Status Signal is less than 1.0 vdc. | If shutdown unit on furnace alarm is selected, unit will shutdown if neither furnaces is available. Otherwise unit will continue to run without heat. |
| Building Pressure Sensor Failure | • | | • | Building Pressure Sensor faulty or not connected. | Alarm is generated – Building Pressure control is locked out. |
| CO2 Sensor | • | | • | CO2 Sensor faulty or not connected. | Alarm is generated – Demand ventilation is locked out. |
| Condensate Float Al (Al=Alarm) | | | • | Unable to drain condensation after trap priming/ purge sequence. | This input has two strikes, if two trips occur within an hour an alarm will be generated and the compressor is locked out. |
| Condenser Fan Al CCT1 | | • | • | Circuit 1 VFD fault perserved. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. Cooling circuit 1 permanently disabled. Does not apply to units with EC condenser fans. |
| Condenser Fan Al CCT2 | | | • | Circuit 2 VFD fault perserved. | If shutdown unit on cooling alarm is selected, unit will continue to run unless Circuit 1 critical alarm is also present. Cooling circuit 2 permanently disabled. Does not apply to units with EC condenser fans. |
| Condenser Fan CCT1 | • | | • | Circuit 1 VFD fault detected. | Cooling circuit 1 temporarily locked out. |
| Condenser Fan CCT2 | • | | • | Circuit 2 VFD fault detected. | Cooling circuit 2 temporarily locked out. |
| Cooling Diff Alarm (if enabled) | • | | | If there is a call for cooling and the supply air does not drop below the outside temperature. | Alarm is generated – No other action taken. |
| Daily PW Active | | | | Not an alarm, notification only that the Daily Password (obtained from Factory Service Department) is active. | None. |
| Disch. Temp Probe CCT1 | • | • | • | Discharge Temperature Sensor for Circuit 1 disconnected or faulty. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. If not shutdown unit on cooling alarm Circuit 1 critical alarm is set and unit will run with cooling/dehumidification permanently disabled. |
| Door Switch LO (LO=Lockout) | • | • | • | Evaporator fan door open. | Unit is disabled. |
| Duct Static Pressure | • | • | | Pressure sensor disconnected or broken. | If DSP Fail action is set to Min Speed fan will continue to operate at minimum. If DSP Fail is set to Unit Shutdown, unit will shutdown. |
| Envelope Code1 Al CCT1 | | • | | During normal working mode compressor running outside safe operating conditions multiple times within the hour. | Circuit permanently locked out. |
| Envelope Code1 Al CCT2 | | • | | During normal working mode compressor running outside safe operating conditions multiple times within the hour. | Circuit permanently locked out. |
| Envelope Code1 LO CCT1 | • | | | During normal working mode compressor running outside safe operating conditions. | Circuit temporarily locked out. |
| Envelope Code1 LO CCT2 | • | | | During normal working mode compressor running outside safe operating conditions. | Circuit temporarily locked out. |

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

(continued next page)

## E. Alarm Logger Sub Menu - Alarm Listing (continued)

| ALARM/LOGGED EVENTS | AR ① | UD ① | CD ① | CAUSE | ACTION |
|---|---|---|---|---|---|
| Envelope Code2 Al CCT1 | | • | | Working in a conditional zone where the maximum admitted power is 0% multiple times within the hour. | Circuit permanently locked out. |
| Envelope Code2 Al CCT2 | | • | | Working in a conditional zone where the maximum admitted power is 0% multiple times within the hour. | Circuit permanently locked out. |
| Envelope Code2 LO CCT1 | • | | | Working in a conditional zone where the maximum admitted power is 0%. | Circuit temporarily locked out. |
| Envelope Code2 LO CCT2 | • | | | Working in a conditional zone where the maximum admitted power is 0%. | Circuit temporarily locked out. |
| Envelope Code3 Al CCT1 | | • | | During startup procedure exceeded maximum startup zone limit within the hour. | Circuit permanently locked out. |
| Envelope Code3 Al CCT2 | | • | | During startup procedure exceeded maximum startup zone limit within the hour. | Circuit permanently locked out. |
| Envelope Code3 LO CCT1 | • | | | During startup procedure exceeded maximum startup zone limit. | Circuit temporarily locked out. |
| Envelope Code3 LO CCT2 | • | | | During startup procedure exceeded maximum startup zone limit. | Circuit temporarily locked out. |
| ERV Comms Alarm | • | • | • | Communication between main controller and ERV controller disconnected or broken. | ERV shutdown. |
| ERV Door Open | • | • | • | ERV exhaust fan door open. | ERV/Exhaust fan shutdown. |
| ERV OA Filters Dirty | • | | | ERV outside air filters are dirty . | Alarm generated – No further action taken. |
| Evap Off Temp | • | | | Evap off temp sensor disconnected or broken. | Alarm generated. |
| EVD1 Config Error | • | | • | EVD parameter transmission error. | Circuit permanently locked out. |
| EVD1 EPROM Alarm | • | | • | EVD memory fault. | Circuit permanently locked out. |
| EVD1 Exv Motor "A" | • | | • | Electronic expansion valve disconnected or faulty. | Circuit temporarily locked out. |
| EVD1 Exv Motor "A" Al | | | • | Electronic expansion valve disconnected or faulty condition persists. | Circuit permanently locked out. |
| EVD1 Exv Motor "B" | • | | • | HGRH valve(s) disconnected or faulty. | Circuit permanently locked out. |
| EVD1 Firmware Error | • | | • | EVD firmware not compatible with main controller. | Circuit permanently locked out. |
| EVD1 Offline Al | | | • | EVD expansion valve drive not communicating with main controller. Exceeded hourly limit. | Circuit permanently locked out. |
| EVD1 Offline LO | • | | • | EVD expansion valve drive not communicating with main controller. | Circuit temporarily locked out. |
| EVD2 Config Error | • | | • | EVD parameter transmission error. | Circuit permanently locked out. |
| EVD2 EPROM Alarm | • | | • | EVD memory fault. | Circuit permanently locked out. |
| EVD2 Exv Motor "A" | • | | • | Electronic expansion valve disconnected or faulty. | Circuit temporarily locked out. |
| EVD2 Exv Motor "A" Al | | | • | Electronic expansion valve disconnected or faulty condition persists. | Circuit permanently locked out. |
| EVD2 Exv Motor "B" Al | | | • | HGRH valve(s) disconnected or faulty. | Circuit permanently locked out. |
| EVD2 Firmware Error | • | | • | EVD firmware not compatible with main controller. | Circuit permanently locked out. |
| EVD2 Offline Al | | | • | EVD expansion valve drive not communicating with main controller. Exceeded hourly limit. | Circuit permanently locked out. |
| EVD2 Offline LO | • | | • | EVD expansion valve drive not communicating with main controller. | Circuit temporarily locked out. |
| Exhaust Fan Al | • | | | Airflow proving switch not indicating healthy status. | Alarm is generated. |
| Exhaust Fan SD | | | • | Airflow proving switch not indicating healthy status after extended period of time. | Exhaust Fan call ended to prevent any further damage. |
| Extended memory fault | • | | • | Controller memory fault. | Alarm is generated. |

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

(continued next page)

## E. Alarm Logger Sub Menu - Alarm Listing (continued)

| ALARM/LOGGED EVENTS | AR ① | UD ① | CD ① | CAUSE | ACTION |
|---|---|---|---|---|---|
| Furnace Stage1 Signal (Beckett Control Board units only) | | | • | Health Status Signal not being received by the controller input or furnace board broken. | If shutdown unit on furnace alarm is selected, unit will shutdown if only 1 furnace is available. Otherwise unit will continue to run without heat. |
| Furnace Stage2 Signal (Beckett Control Board units only) | | | • | Health Status Signal not being received by the controller input or furnace board broken. | If shutdown unit on furnace alarm is selected, unit will shutdown if neither furnaces is available. Otherwise unit will continue to run without heat. |
| Gas Valve 1 (United Technologies Control Board units only) | • | | | The unit is calling for Gas heat but the main gas valve has not been energized. | Alarm is generated – No other action taken. |
| Gas Valve 2 (United Technologies Control Board units only) | • | | | The unit is calling for Gas heat but the main gas valve has not been energized. | Alarm is generated – No other action taken. |
| H.W. Freeze Stat | • | • | • | Freeze condition indicated on HW coil. | Alarm will be generated – Unit will be Off by Alarm. |
| Heating Diff Alarm (if enabled) | • | | | If there is a call for heat and the supply air does not rise above the outside air temperature. | Alarm is generated – No other action taken. |
| High Disch. Temp Al | | | • | Discharge temperature has exceeded upper limit through the capacity reduction for 60s and exceeded the allowable number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. If not shutdown unit on cooling alarm Circuit 1 critical alarm is set and unit will run with cooling/dehumidification permanently disabled. |
| High Disch. Temp CCT1 | • | | • | Discharge temperature has exceeded upper limit through the capacity reduction for 60s. | Incident logged. Temporary lockout of the circuit. |
| High Duct Pressure Al | | • | | Duct pressure has exceeded upper limit setpoint. | Alarm generated – Unit will be Off by Alarm. |
| High Pressure Al CCT1 | • | | • | Compressor tripped on high pressure limit switch . | This input has two strikes, if two trips occur within an hour an alarm will be generated and Circuit 1 is locked out. |
| High Pressure Al CCT2 | • | | • | Compressor tripped on high pressure limit switch . | This input has two strikes, if two trips occur within an hour an alarm will be generated and Circuit 2 is locked out. |
| High Pressure LO CCT1 | • | | • | Compressor tripped on high pressure limit switch . | This is temporary lockout, a logged event, no alarm generated and is part of High Pressure Al CCT1. |
| High Pressure LO CCT2 | • | | • | Compressor tripped on high pressure limit switch . | This is temporary lockout, a logged event, no alarm generated and is part of High Pressure Al CCT2. |
| Liquid Line Press CCT1 | • | | • | Liquid Line Pressure Sensor faulty or not connected. | If two trips occur within an hour an alarm will be generated and Circuit 1 is locked out. |
| Liquid Line Press CCT2 | • | | • | Liquid Line Pressure Sensor faulty or not connected. | If two trips occur within an hour an alarm will be generated and Circuit 2 is locked out. |
| Liquid Line Temp CCT1 | • | | • | Liquid Line Temperature sensor disconnected or faulty. | Alarm is generated - Circuit 1 locked out. |
| Liquid Line Temp CCT2 | • | | • | Liquid Line Temperature sensor disconnected or faulty. | Alarm is generated - Circuit 2 locked out. |
| Low Pressure Al CCT1 | | | • | Low pressure status received by Carel controller and exceeded allowable number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. If not shutdown unit on cooling alarm Circuit 1 critical alarm is set and unit will run with cooling/dehumidification permanently disabled. Alarm generated. |
| Low Pressure Al CCT2 | | | • | Low pressure status received by Carel controller and exceeded allowable number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will continue to run unless Circuit 1 critical alarm is also present. Cooling circuit 2 permanently disabled. Alarm generated. |

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

(continued next page)

## E. Alarm Logger Sub Menu - Alarm Listing (continued)

| ALARM/LOGGED EVENTS | AR ① | UD ① | CD ① | CAUSE | ACTION |
|---|---|---|---|---|---|
| Low Pressure LO CCT1 | • | | | Low pressure status received by Carel controller. | This is temporary lockout, a logged event, no alarm generated and is part of Low Pressure Al CCT1. |
| Low Pressure LO CCT2 | • | | | Low pressure status received by Carel controller. | This is temporary lockout, a logged event, no alarm generated and is part of Low Pressure Al CCT2. |
| Low Pressure Sensor Failure | • | | • | Suction Line Pressure Sensor faulty or not connected. | Alarm is generated – Dehum is locked out. |
| Low Suct. Temp AL CCT1 | | | • | Suction temperature has fallen below low limit threshold and exceeded number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. If not shutdown unit on cooling alarm Circuit 1 critical alarm is set and unit will run with cooling/dehumidification permanently disabled. Alarm generated. |
| Low Suct. Temp LO CCT1 | • | | • | Suction temperature has fallen below low limit threshold. | Incident logged. Temporary lockout of the circuit. |
| Low Superheat Al CCT1 | | | • | Superheat value below threshold longer than allowabe time and exceeded allowed number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will shutdown on single circuit units otherwise circuit 2 could continue to run. If not shutdown unit on cooling alarm Circuit 1 critical alarm is set and unit will run with cooling/dehumidification permanently disabled. Alarm generated. |
| Low Superheat Al CCT2 | | | • | Superheat value below threshold longer than allowabe time and exceeded allowed number of trips per hour. | If shutdown unit on cooling alarm is selected, unit will continue to run unless Circuit 1 critical alarm is also present. Cooling circuit 2 permanently disabled. Alarm generated. |
| Low Superheat LO CCT1 | • | | • | Superheat value below threshold longer than allowable time. | Incident logged. Temporary lockout of the circuit. |
| Low Superheat LO CCT2 | • | | • | Superheat value below threshold longer than allowable time. | Incident logged. Temporary lockout of the circuit. |
| Main Filters Dirty | • | | | Main filters are dirty. | Alarm is generated – No action taken. |
| Mixed Air Temp | • | | • | Mixed Air Sensor is either faulty or not connected. | Alarm is generated - No action taken. |
| Outside Air Hum | • | | • | Outside Air Sensor is either faulty or not connected. | Alarm is generated - Dehum is locked out. |
| Outside Air Temp | • | | • | Outside Air Sensor is either faulty or not connected. | Alarm is generated – Heating and Cooling are locked out. |
| P-Type Mem Fault | | • | | Permanent memory fault in controller. | Alarm is generated – replace controller. |
| Return/Exh Air Hum | • | | • | Return Air Sensor faulty or not connected. | Alarm is generated - Wheel shutdown. |
| Return/Exh Air Temp | • | | • | Return Air Sensor faulty or not connected. | Alarm is generated - Wheel shutdown. |
| Smoke Alarm - Auto Res | • | • | | The smoke detector input has been triggered. | Alarm is generated - Unit is Off by Alarm. |
| Smoke Alarm - Man. Res | • | | • | The smoke detector input has been triggered. | Alarm is generated – Unit is shut down. |
| Static Pressure Sensor Failure | • | | • | Static Pressure Sensor faulty or not connected. | Alarm is generated – Static Pressure control is locked out. |
| Suction Pressure CCT1 | | | • | Suction pressure sensor disconnected or faulty. | Alarm is generated – Circuit is locked out. |
| Suction Pressure CCT2 | | | • | Suction pressure sensor disconnected or faulty. | Alarm is generated – Circuit is locked out. |
| Suction Temp CCT1 | | | • | Suction temperature sensor disconnected or faulty. | Alarm is generated – Circuit is locked out. |
| Suction Temp CCT2 | | | • | Suction temperature sensor disconnected or faulty. | Alarm is generated – Circuit is locked out. |

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

(continued next page)

## E. Alarm Logger Sub Menu - Alarm Listing (continued)

| ALARM/LOGGED EVENTS | AR ① | UD ① | CD ① | CAUSE | ACTION |
|---|---|---|---|---|---|
| Supply Air Temp | • | • | | Supply Air temperature sensor disconnected or faulty. | Alarm is generated – Unit is Off by Alarm. |
| Supply Fan Airflow | | • | | Supply fan is running but the air flow proving switch has not made. | Logged condition. |
| Supply Fan Airflow AI | • | | • | Supply fan is running but the air flow proving switch has not made. | Alarm is generated (after 15 sec) – All heating and cooling is stopped. After 180 seconds the supply fan will be turned off. |
| Supply Fan VFD(s) | | • | | Health signal from the Supply Fan VFD has indicated a fault. | Alarm generated - Unit will be Off by Alarm. |
| Supply High Limit | • | | • | The supply air temperature has exceeded its maximum setting. | Alarm will be generated – Unit Shutdown. |
| Supply Low Limit | • | • | • | If the supply air does not get above 40F within 5 min the unit will shut down. | Alarm will be generated – Unit Shutdown. |
| The Supply Fan has exceeded the set number of run hours | • | | | The Supply Fan has gone over the hour's setpoint. | Maintenance alarm generated – No other action taken. |
| **Note: The following applies only to optional gas and 20kw electric heat option is enabled and the unit is fitted with a pCOe expansion module** | | | | | |
| pCOe Offline | • | | • | The pCOe is not connected or incorrectly setup and is not communicating to the pCO5. | Alarm generated – Circuit 2 Locked out. |
| **Note: The following applies only to units with an Energy Recovery Section with a pCOxs controller** | | | | | |
| ERV Hum Probe | • | | • | ERV humidity sensor is either faulty or not connected. | Alarm generated – Wheel Shutdown. |
| ERV Temp Probe | • | | • | ERV Temperature sensor is either faulty or not connected. | Alarm generated – Wheel Shutdown. |
| ERV Exhaust Fan Airflow Failure | • | | • | ERV Fan running but the air proving switch has not made. | Alarm generated – Fan will shut down after 180 sec. |
| ERV Exhaust Fan Shutdown | • | | • | ERV Exhaust Fan has shut down to lack of air flow. | Alarm generated – Fan shuts down. |
| ERV Wheel AI (only applicable if the unit includes the optional rotation detector) | • | | • | Wheel is on but no rotation being detected . | Alarm generated – Wheel will shut down after 120 sec. |
| ERV Wheel SD (SD=Shut Down) | • | | • | Wheel has shut down due to lack of rotation. | Alarm generated. |
| ERV Exh Filters Dirty | • | | | ERV exhaust filters are dirty . | Alarm generated – No further action taken. |
| ERV Wheel Press Drop | • | | | ERV Wheel is either dirty, frozen or air flow too high. | Alarm generated – No further action taken. |
| pLAN Communication Down with ERV unit | • | • | • | ERV's controller is not communicating with the main controller. | Alarm generated – ERV section will not run. |
| **Note: The following only applies if the unit has a pAD Wall thermostat** | | | | | |
| pAD Offline | • | | • | pAD is either faulty or not connected. | Alarm generated - pAD functions will be disabled. |
| pAD Hum Probe | • | | • | pAD Humidity Sensor is faulty. | Alarm generated – Space Dehum functions disabled. |
| pAD Temp Probe | • | | • | pAD Temperature Sensor is faulty. | Alarm generated – Space heating and cooling will be disabled. |

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

① AR = Auto Reset, UD = Unit Disabled, CD = Component Disabled

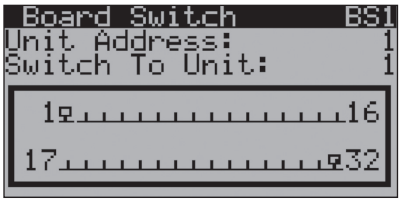
## F. Board Switch Sub Menu Parameters

The Board Switch menu allows the user to jump between different controllers with a remote display. This requires a remote display, along with additional controllers, setup in a pLAN network. A pLAN can consist of up to 32 devices, in different combinations, but a maximum of 31 controllers.

The menu displays the following selections:

- Unit Address: The pLAN address of the controller the display is currently accessing.
- Switch to unit: The pLAN address of the controller the display would like to access.

The Board Switch screen will indicate the current devices connected to the pLAN network (Keypad, pAD Wall Stat, and/or ERV unit). In the screen below, the main controller is on address 1.



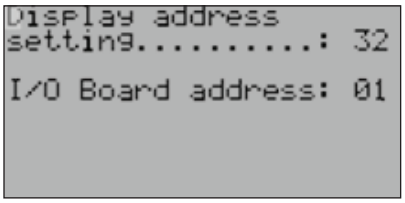

The pCO5+ main unit controller is factory defaulted to the following addresses for modules communicated with on the pLAN:

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | ADDRESS |
|---|---|---|---|---|---|
| **Board Switch** | **BS1** | **Unit Address:** | Actual Value | pCO5+ Controller<br>ERV<br>Remote Wall Stat (pAD)<br>Superheat Control (EVD1)<br>Superheat Control (EVD2)<br>Remote Display (pGD1) | 1<br>2<br>4<br>30<br>31<br>32 |
| | | **Switch to Unit:** | Actual Value | See Above | See Above |

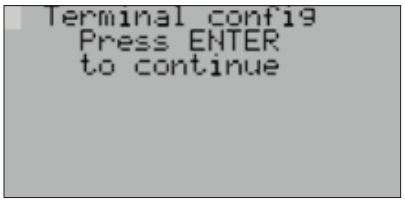
## Programming the Remote Display Keypad to the Carel Controller

Once the pGD1 is connected to the Carel controller, the address must be set as follows:

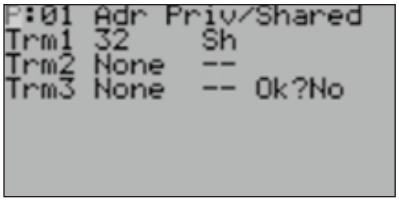
1. Press and hold down the UP+DOWN+ENTER buttons simultaneously until “Display Address” screen is shown. The address settings should be:
   - Display: 32
   - I/O Board: 1 (for PCO5) or 2 (for PCOxs)




2. If the settings are not as shown, press the ENTER button to go to the “Terminal Config” screen as follows:




3. Press the ENTER button again. The display will show the following terminal configuration screen:




4. Press the ENTER button until the cursor is underneath the Trm1 setting. Press the UP or DOWN buttons to change the value to 32.
5. Press the ENTER button until the cursor is underneath Pr or Sh. Press the UP or DOWN buttons to change the value to Pr for units without an ERV (Energy Recovery) or Sh for units with an ERV.
6. Press the ENTER button until the cursor is underneath No. Press the UP or DOWN buttons to change the value to Yes and press the ENTER button to complete the programming.

## G. Service Sub Menu Parameters

The Service menu allows the user to access several sub-menus regarding controller information, controller overrides, operating hours, BMS configuration, I/O manual management and BMS protocol settings (BACnet® or LonWorks®).

Certain screens within the Service Sub Menus require a password for access. Refer to the section titled “Password Protection” for additional guidance.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **a. Information** | | | | | |
| **INFORMATION** | **A1** | **Project Name** | Actual Value | - | - |
| | | **Ver. (Software Version)** | Actual Value | - | #.#.### |
| | | **Date (Software Release Date)** | Actual Value | - | MM/DD/YY |
| | | **Bios Version & Date** | Actual Value | - | MM/DD/YY |
| | | **Boot Version & Date** | Actual Value | - | MM/DD/YY |
| **SPO INFORMATION (if unit has special program)** | **A2** | **SPO Number** | Actual Value | Actual Value | - |
| | | **Date:** | Actual Value | - | MM/DD/YY |
| | | **Software Changes** | - | - | - |
| **INFORMATION** | **A3** | **pCO Type** | - | - | - |
| | | **Total flash** | Actual Value | - | Kb |
| | | **RAM** | Actual Value | - | Kb |
| | | **Built-In Type (Display)** | Actual Value | - | - |
| | | **T Memory Writes** | Actual Value | - | - |
| | | **Main Cycle:** | Actual Value | - | Cycles/sec |
| | | **Cycle Time** | Actual Value | - | ms |
| **INFORMATION** | **A4** | **Board Temp:** | - | - | °F |
| | | **Board Voltage:** | Actual Value | - | Vac |
| | | **Board Current:** | Actual Value | - | mA |
| | | **Frequency:** | Actual Value | 50<br>60 | Hz |
| **INFORMATION** | **A5** | **T-Memory Writes:** | Actual Value | - | - |
| | | **pLAN Online:** | Actual Value | ON<br>OFF | - |
| **Control Power Status** | **A6** | **Last Off Time:** | Actual Value | - | MM/DD/YY<br>HH/MM/SS |
| | | **Last On Time:** | Actual Value | - | MM/DD/YY<br>HH/MM/SS |
| **Restore Dates** | **A7** | **Factory Save:** | Actual Value | - | MM/DD/YY<br>HH/MM/SS |
| | | **Last Customer Save:** | Actual Value | - | MM/DD/YY<br>HH/MM/SS |
| **b. Running Hours** | | | | | |
| **Supply Fan** | **X1** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Condenser Fan CCT 1** | **X2** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Condenser Fan CCT 2** | **X3** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |

(continued next page)

## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Compressor 1** | **X4** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Compressor 2** | **X5** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Compressor 3** | **X6** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Compressor 4** | **X7** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Gas Heater 1** | **X8** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Gas Heater 2** | **X9** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Exhaust Fan** | **X10** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Electric Heat 1** | **X11** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Electric Heat 2** | **X12** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Electric Heat 3** | **X13** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **Electric Heat 4** | **X14** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **ERV Exhaust Fan** | **X15** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |
| **ERV Wheel** | **X16** | **Run Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Number of Starts:** | Actual Value | 0 - 350,000 | - |
| | | **Reset:** | OFF | OFF<br>ON | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| ERV Preheater | X17 | Run Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Number of Starts: | Actual Value | 0 - 350,000 | - |
| | | Reset: | OFF | OFF<br>ON | - |
| Aux-Electric Heat | X18 | Run Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Number of Starts: | Actual Value | 0 - 350,000 | - |
| | | Reset: | OFF | OFF<br>ON | - |
| Running Hours | X19 | Hours Save: | OFF | OFF<br>ON | - |
| | | Hours Restore: | OFF | OFF<br>ON | - |
| c. Power Meter | | | | | |
| Power Meter | PM1 | PM Address: | 001 | 0 - 254 | - |
| | | VT Wiring Type: | 3LL | 3Ln<br>2Ln<br>2LL<br>3LL | - |
| | | CT Wiring Type: | 3CT | 3CT<br>1CT<br>2CT | - |
| | | Primary VT: | 400.0 | 0.0 - 999.9 | - |
| | | Secondary VT: | 400.0 | 0.0 -999.9 | - |
| | | Primary CT: | 150 | 0 - 9999 | - |
| | | Secondary CT: | 5 | - | - |
| Power Meter | PM2 | Primary CT: | Actual Value | - | (A)mps |
| | | Secondary CT: | Actual Value | - | (A)mps |
| | | Primary VT: | Actual Value | - | (V)olts |
| | | Secondary VT: | Actual Value | - | (V)olts |
| | | Reset Counters: | No | No<br>Yes | - |
| Voltages (V) | PM3 | L1 - L2: | Actual Value | - | Volts |
| | | L2 - L3: | Actual Value | - | Volts |
| | | L3 - L1: | Actual Value | - | Volts |
| Current (A) | PM4 | Line 1: | Actual Value | - | Amps |
| | | Line 2: | Actual Value | - | Amps |
| | | Line 3: | Actual Value | - | Amps |
| | | Power Factor: | Actual Value | - | - |
| | | Frequency (Hz) | Actual Value | - | Hz |
| Total System Energy | PM5 | Active (kW) | Actual Value | - | kW |
| | | Reactive (kVAR) | Actual Value | - | kVAR |
| | | Apparent(kVA) | Actual Value | - | kVA |
| | | Load Type: | - | Capacitive<br>Inductive<br>Resistive | - |
| Import Energy | PM6 | Active (kWh) | Actual Value | - | kWh |
| | | Reactive (kVArh) | Actual Value | - | kVArh |
| Export Energy | PM7 | Active (kWh) | Actual Value | - | kWh |
| | | Reactive (kVArh) | Actual Value | - | kVArh |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| THD (%) | PM8 | L1 - L2: | Actual Value | - | % |
| | | L2 - L3: | Actual Value | - | % |
| | | L3 - L1: | Actual Value | - | % |
| | | Line 1: | Actual Value | - | % |
| | | Line 2: | Actual Value | - | % |
| | | Line 3: | Actual Value | - | % |
| d. BMS Config. | | | | | |
| BMS Configuration (Control System Supports the Following Protocols: Lon BACnet IP/Eth BACnet MSTP) | U1 | BMS-1 Protocol: | BACnet MSTP | N/A<br>CAREL<br>MODEM<br>MODBUS<br>PCOLOAD<br>BACnet MSTP<br>BACnet IP/Eth<br>LON | - |
| | | BACnet PlugIn? | NO | NO<br>YES | - |
| | | BMS-2 Protocol: | PCOLOAD | N/A<br>PCOLOAD<br>CAREL<br>MODBUS | - |
| BMS Configuration | U2 | Address | 1 | 0 - 999 | - |
| | | Baud rate | 2400 | 1200<br>2400<br>4800<br>9600<br>19200 | - |
| BMS Configuration | U3 | Enable Heartbeat: | OFF | OFF<br>ON | - |
| | | Thresholds: | 5 | 0 - 999 | - |
| | | Timeout: | 300s | 0 - 9999 | (s)econds |
| | | Period: | Actual Value | 0.0 -999.9 | (s)econds |
| BMS Configuration | U4 | If BMS Offline Turn Unit: | OFF | OFF<br>ON | - |
| MSTP SETUP (Screen only Visible When BACnet MSTP is Selected and BACnet PlugIn is Enabled.) | U5 | Instance | 0 | 0 - 4194999 | - |
| | | Baud rate | N/A | N/A<br>9600<br>19200<br>38400<br>76800 | bps |
| | | MAC Address: | 0 | 0 - 127 | - |
| | | MaxMasters: | 0 | 0 - 127 | - |
| | | MaxInfoFrames: | 0 | 0 - 99 | - |
| TCP/IP Setup (Screen Only Visible when BACnet IP/Eth is Selected and BACnet Plugin is Enabled.) | U6 | Instance: | Actual Value | 0 to 99,000 | - |
| | | IP: | Actual Value | 0.0.0.0 to 255.255.255.255 | - |
| | | SubNet: | Actual Value | 255.0.0.0 to 255.255.255.0 | - |
| | | Gateway: | Actual Value | 0.0.0.0 to 255.255.255.255 | - |
| TCP/IP Setup (Page 2) (Screen Only Visible when BACnet IP/Eth is Selected and BACnet Plugin is Enabled.) | U7 | DNS 1 | Actual Value | 0.0.0.0 to 255.255.255.255 | - |
| | | DNS 2 | Actual Value | 0.0.0.0 to 255.255.255.255 | - |
| | | Type | Actual Value | IP<br>Ethernet | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **BACnet Read/Write (Screen Only Visible when BACnet IP/Eth or BACnet MSTP is Selected and BACnet Plugin is Enabled.)** | **U8** | **Function:** | Read | Read<br>Write | - |
| | | **Update?** | NO | NO<br>YES | - |
| **e. Fieldbus Config.** | | | | | |
| **Fieldbus 1 Config.** | **FB1** | **Fieldbus 1 Config. Protpcol:** | WinLoad | - | - |
| | | **Fieldbus 2 Config. Protpcol:** | MODBUS | MODBUS<br>WinLoad | - |
| **Modbus Status** | **FB2** | **Modbus CMD Result:** | - | Modbus General Error<br>Invalid Com Config<br>Com Config Done<br>No Error | - |
| **Configuration of Modbus Settings 1st Master** | **FB3** | **Baudrate:** | 19200 | 1200<br>2400<br>4800<br>9600<br>19200 | Bits/s |
| | | **Stop Bit:** | 1 | 1,2 | - |
| | | **Parity Mode:** | None | None<br>Even<br>Odd | - |
| | | **Timeout** | 180ms | 100 - 5000 | ms |
| | | **Error Status:** | None | “Nothing”<br>Generic Error<br>Bios Error | - |
| **Configuration of Modbus Settings 2nd Master** | **FB4** | **Baudrate:** | 19200 | 1200<br>2400<br>4800<br>9600<br>19200 | Bits/s |
| | | **Stop Bit:** | 1 | 1,2 | - |
| | | **Parity Mode:** | None | None<br>Even<br>Odd | - |
| | | **Timeout** | 180ms | 100 - 5000 | ms |
| | | **Error Status:** | None | “Nothing”<br>Generic Error<br>Bios Error | - |
| **Power Meter Settings** | **FB3** | **Enable Power Meter:** | Off | ON/OFF | - |
| | | **Modbus Address:** | 001 | 001 - 255 | - |
| | | **BaudRate:** | 19200 | 1200<br>2400<br>4800<br>9600<br>19200 | Bits/s |
| **Serial Probe n°01 - 04** | **FB6 - FB9** | **Serial Probe n°01 - 04** | OFF | ON<br>OFF | - |
| | | **Location: (Alphanumeric description used for front screen)** | - | - | - |
| | | **Address:** | 128 - 131 | 128 - 159 | - |
| | | **Type:** | TEMPERATURE | TEMPERATURE<br>TEMP.+HUMID. | - |
| | | **Default Inst.** | NO | NO<br>YES | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Temperature and Humidity control | FB10 | Temperature process control for all space readings: | AVERAGE | AVERAGE<br>MAXIMUM<br>pAD ONLY | - |
| | | Humidity process control for all space readings: | AVERAGE | AVERAGE<br>MAXIMUM<br>pAD ONLY | - |
| pAD Control | FB11 | INCLUDE/EXCLUDE pAD in temperature and humidity averaging or maximum reading. | INCLUDE | INCLUDE<br>EXCLUDE | - |
| f. Service Settings / a. Maintenance Hours | | | | | |
| Supply Fan | M1 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Condenser Fan CCT 1 | M2 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Condenser Fan CCT 2 | M3 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Compressor 1 | M4 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Compressor 2 | M5 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Compressor 3 | M6 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Compressor 4 | M7 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Gas Heater 1 | M8 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Gas Heater 2 | M9 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Exhaust Fan | M10 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |
| Electric Heat 1 | M11 | Maint Hours: | Actual Value | 0 - 350,000 | (h)ours |
| | | Setpoint: | 0 | 0 - 350,000 | (h)ours |
| | | Reset to Zero? | NO | NO<br>YES | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Electric Heat 2** | **M12** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **Electric Heat 3** | **M13** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **Electric Heat 4** | **M14** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **ERV Exhaust Fan** | **M15** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **ERV Wheel** | **M16** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **ERV Preheater** | **M17** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **Aux-Electric Heat** | **M18** | **Maint Hours:** | Actual Value | 0 - 350,000 | (h)ours |
| | | **Setpoint:** | 0 | 0 - 350,000 | (h)ours |
| | | **Reset to Zero?** | NO | NO<br>YES | - |
| **f. Service Settings / b. Probe Adjustment** | | | | | |
| **Return Air Humidity** | **P1** | **Input:** | U01 | - | - |
| | | **Offset:**<br>**Calibration Offset** | 0 | -99.9 - 99.9 | %rH |
| | | **Value:**<br>**(including Offset)** | Actual Value | - | %rH |
| **CO2** | **P2** | **Input:** | U02 | - | - |
| | | **Offset:**<br>**Calibration Offset** | 0 | -99.9 - 99.9 | ppm |
| | | **Value:**<br>**(including Offset)** | Actual Value | - | ppm |
| **Furnace Stage 2** | **P3** | **Input:** | U02 | - | - |
| | | **Offset:**<br>**Calibration Offset** | 0 | -99.9 - 99.9 | vdc |
| | | **Value:**<br>**(including Offset)** | Actual Value | - | vdc |
| **Evaporator Off Temp** | **P4** | **Input:** | U02 | - | - |
| | | **Offset:**<br>**Calibration Offset** | 0 | -99.9 - 99.9 | °F |
| | | **Value:**<br>**(including Offset)** | Actual Value | - | °F |
| **Duct Static Pressure** | **P5** | **Input:** | U03 | - | - |
| | | **Offset:**<br>**Calibration Offset** | 0 | -99.9 - 99.9 | iwc |
| | | **Value:**<br>**(including Offset)** | Actual Value | - | iwc |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Building Pressure | P6 | Input: | U03 | | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | iwc |
| | | Value: (including Offset) | Actual Value | - | iwc |
| Outside Air Temperature | P7 | Input: | U04 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | °F |
| | | Value: (including Offset) | Actual Value | - | °F |
| Return Air Temperature | P8 | Input: | U05 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | °F |
| | | Value: (including Offset) | Actual Value | - | °F |
| Discharge Line Temperature | P9 | Input: | U06 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | °F |
| | | Value: (including Offset) | Actual Value | - | °F |
| Outside Air Humidity | P10 | Input: | U07 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | %rH |
| | | Value: (including Offset) | Actual Value | - | %rH |
| Furnace Stage 1 | P11 | Input: | U08 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | vdc |
| | | Value: (including Offset) | Actual Value | - | vdc |
| Mixed Air Temperature | P12 | Input: | U09 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | °F |
| | | Value: (including Offset) | Actual Value | - | °F |
| Supply Air Temperature | P13 | Input: | U10 | - | - |
| | | Offset: Calibration Offset | 0 | -99.9 - 99.9 | °F |
| | | Value: (including Offset) | Actual Value | - | °F |
| pCOe | P14 | pCOe number: | Actual Value | - | - |
| | | Offset Ch 1: | 0 | -999.9 - 999.9 | - |
| | | Offset Ch 2: | 0 | -999.9 - 999.9 | - |
| | | Offset Ch 3: | 0 | -999.9 - 999.9 | - |
| | | Offset Ch 4: | 0 | -999.9 - 999.9 | - |
| EVD 1 | P15 | EVD n° | 01.a | - | - |
| | | S1 Offset: | 0 | -870 - 870 | psig |
| | | S1 Probe: | Actual Value | - | psig |
| | | S2 Offset: | 0 | -36.0 - 36.0 | °F |
| | | S2 Probe: | Actual Value | - | °F |
| EVD 1 | P16 | EVD n° | 01.b | - | - |
| | | S3 Offset: | 0 | -870 - 870 | psig |
| | | S3 Probe: | Actual Value | - | psig |
| | | S4 Offset: | 0 | -36.0 - 36.0 | °F |
| | | S4 Probe: | Actual Value | - | °F |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| EVD 2 | P17 | **EVD n°** | 02.a | - | - |
| | | **S1 Offset:** | 0 | -870 - 870 | psig |
| | | **S1 Probe:** | Actual Value | - | psig |
| | | **S2 Offset:** | 0 | -36.0 - 36.0 | °F |
| | | **S2 Probe:** | Actual Value | - | °F |
| EVD 2 | P18 | **EVD n°** | 02.b | - | - |
| | | **S3 Offset:** | 0 | -870 - 870 | psig |
| | | **S3 Probe:** | Actual Value | - | psig |
| | | **S4 Offset:** | 0 | -36.0 - 36.0 | °F |
| | | **S4 Probe:** | Actual Value | - | °F |
| **f. Service Settings / c. Control Settings** | | | | | |
| pGD1 Settings | CS1 | **Disable Buzzer:** | YES | NO<br>YES | - |
| | | **Backlight Delay:** | 5 | 5 - 100 | (m)inutes |
| Control Settings | CS2 | **Temperature Units:** | °F | °F | - |
| | | **Barometric Pressure:** | 29.92 | 28.00 - 30.99 | inHg |
| Enable Unit On/Off | CS3 | **By Digital Input:** | OFF | OFF<br>ON | - |
| | | **By Supervisor:** | OFF | OFF<br>ON | - |
| | | **By pLAN network:** | OFF | OFF<br>ON | - |
| | | **By Schedule:** | OFF | OFF<br>ON | - |
| Control Settings | CS4 | **pAD Thermostat:** | OFF | OFF<br>ON | - |
| | | **Reset Type:** | NONE | NONE<br>SPACE<br>OUTSIDE AIR<br>SPACE & OA | - |
| | | **Dehum Mode:** | NONE | NONE<br>OA DEWPOINT<br>OA & SPACE<br>SPACE<br>MA & SPACE<br>MA DEWPOINT | - |
| Control Settings | CS5 | **Allow pAD Setpoint to be Neutral Air Setpoint:**<br>**(Screen shown if pAD is ON and Reset Type is set to NONE)** | NO | NO<br>YES | - |
| Control Settings | CS6 | **Supply Air Reset Filtering Time:** | 10 | 0 - 999 | (s)econds |
| Supply Fan Control (Parameters depend on Supply Fan configuration type) | CS7 | **Air Balance Adj.** | 0 | -20 - 20 | - |
| | | **Constant Speed:**<br>**Speed 1:**<br>**Press Setpt:**<br>**(Building or Duct Static Pressure)**<br>**CO2 Setpoint**<br>**BMS Modulation:** | 100.0<br>50.0<br>0.100<br>1.500<br>800<br>(Min Output) | Min - Max Output<br>0 - 100.0<br>0.000 - 0.500<br>0.000 - 5.000<br>0 - 2000<br>Min - Max Output | %<br>%<br>iwc<br>iwc<br>ppm<br>% |
| | | **Speed 2:** | 70.0 | 0 - 100.0 | % |
| | | **Speed 3:**<br>**Minimum Output:** | 85.0<br>50 | 0 - 100.0<br>Design Min Limits | %<br>% |
| | | **Speed 4:**<br>**Maximum Output:** | 100.0<br>100 | 0 - 100.0<br>Design Max Limits | %<br>% |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Exhaust Fan Control (Parameters depend on Exhaust Fan configuration type) | CS8 | Constant Speed:<br>Speed 1:<br>Press Setpt:<br>(Building Pressure)<br>Sup Fan Offset:<br>BMS Modulation: | 50.0<br>20.0<br>0.100<br><br>-10.0<br>(Min Output) | 20.0 - 100.0<br>0 - 100<br>0.000 - 0.500<br><br>-20.0 - 20.0<br>Min - Max Output | %<br>%<br>iwc<br><br>%<br>% |
| | | Speed 2: | 40.0 | 0 - 100 | % |
| | | Speed 3:<br>Minimum Output: | 70.0<br>20.0 | 0 - 100<br>40 - 100 | %<br>% |
| | | Speed 4:<br>Maximum Output: | 100.0<br>100.0 | 0 - 100<br>40 - 100 | %<br>% |
| OA Damper Control (Parameters depend on Damper configuration type. Screen not shown on DOAS units) | CS9 | OA Position:<br>OA Damp Pos 1:<br>CO2 Setpoint:<br>Building Pressure Setpoint:<br>BMS OA Damper Pos: | 50<br>50<br>800<br>0.100<br>(Min Open) | Min - Max Output<br>0 - 100<br>0 - 2000<br>0.000 - 0.500<br>0 - 100 | %<br>%<br>ppm<br>iwc<br>% |
| | | OA Damp Pos 2: | 50 | 0 - 100 | % |
| | | OA Damp Pos 3:<br>OA Damp Min Opent: | 50<br>0 | 0 - 100<br>Design Min Limits | %<br>% |
| | | OA Damp Pos 4:<br>OA Damp Max Open: | 50<br>100 | 0 - 100<br>Design Max Limits | %<br>% |
| Gas and Electric Staging Setup | CS10 | Gas OR Electric C/O: | ON | OFF<br>ON | - |
| | | OA Setpoint: | 50.0 | 0 - 100.0 | °F |
| | | OA On Differential: | 5.0 | 1.0 - 10.0 | °F |
| Gas and Electric Staging Setup | CS11 | Gas AND Electric: | OFF | OFF<br>ON | - |
| | | OA Setpoint: | 10.0 | -50.0 - 100.0 | °F |
| | | OA On Differential: | 5.0 | 1.0 - 10.0 | °F |
| Boost Heater (for control of external heater) | CS12 | Boost Heat En: | OFF | OFF<br>ON | - |
| | | OA Setpoint: | 10.0 | -50.0 - 100.0 | °F |
| | | OA On Differential: | 5.0 | 1.0 - 10.0 | °F |
| Temperature Lockouts | CS13 | Compressor and Furnace Lockouts Reference: | OUTSIDE AIR | OUTSIDE AIR<br>RETURN AIR | - |
| Mechanical Lockouts | CS14 | Cooling Below: | 45.0 | 0.0 - 99.9 | °F |
| | | Heating Above: | 65.0 | 1.0 - 99.9 | °F |
| Fan-Only Mode Diff. | CS15 | Above Setpoint: | 5.0 | 0.0 - 99.9 | °F |
| | | Current Setpoint: | Actual Value | - | °F |
| | | Below Setpoint: | -5.0 | -10.0 - 0.0 | °F |
| | | Temp/Time Delay: | 30 | 10 - 180 | (s)econds |
| | | Heat/Cool Change over Delay: | 5.0 | 5 - 60 | (m)inutes |
| HGRH Settings | CS16 | Control HGRH to: | SUPPLY AIR SETPOINT | SUPPLY AIR SETPOINT<br>HGRH SETPOINT | - |
| | | HGRH Setpoint: | 50.0 | 50.0 - 90.0 | °F |
| Hot Water Settings | CS17 | Un-occupied Bleed OA Setpoint: | 40.0 | 0.0 - 99.9 | °F |
| | | Un-occupied Bleed HW Valve Position: | 20 | 0 - 100 | % |
| Hot Water Settings | CS18 | Occupied Bleed OA Setpoint: | 50.0 | 0.0 - 99.0 | °F |
| | | Occupied Bleed HW Valve Position: | 10 | 0 - 100 | % |
| Dual Point Power | CS19 | Enable: | OFF | OFF<br>ON | - |
| | | Enable Furnace in Standby: | OFF | OFF<br>ON | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Standby Power Mode Operation** | **CS20** | **Exhaust Fan Speed:** | CURRENT SPEED | CURRENT SPEED<br>OFF | - |
| | | **Damper Position:** | CURRENT POS | CURRENT POS<br>100% OA | - |
| **Customer Parameters** | **-** | **Customer Save:** | NO | NO<br>YES | - |
| | | **Customer Restore:** | NO | NO<br>YES | - |
| **f. Service Settings / d. P/PI/PID Loops** | | | | | |
| **Cooling Control** | **D1** | **Proportional Gain:** | 3.0 | 0 - 99.9 | - |
| | | **Integration Time:** | 100 | 0 - 999.9 | (s)econds |
| | | **Derivative Time:** | 0 | 0 - 999 | (s)econds |
| | | **Anti-Bump Xfer:** | ON | OFF<br>ON | - |
| | | **Output Period:** | 500 | - | ms |
| **Dehum Control** | **D2** | **Proportional Gain:**<br>**- (B & C Cabinet Sizes)**<br>**- (D Cabinet Size)** | <br>1.0<br>3.0 | 0 - 99.9 | - |
| | | **Integration Time:**<br>**- (B & C Cabinet Sizes)**<br>**- (D Cabinet Size)** | <br>225<br>125 | 0 - 999.9 | (s)econds |
| | | **Derivative Time:** | 0 | 0 - 999 | (s)econds |
| | | **Anti-Bump Xfer:** | ON | OFF<br>ON | - |
| | | **Output Period:** | 500 | - | ms |
| **Heating Control** | **D3** | **Proportional Gain:** | 3.5 | 0 - 99.9 | - |
| | | **Integration Time:** | 160 | 0 - 999.9 | (s)econds |
| | | **Derivative Time:** | 0 | 0 - 999 | (s)econds |
| | | **Anti-Bump Xfer:** | ON | OFF<br>ON | - |
| | | **Output Period:** | 500 | - | ms |
| **Hot Gas Reheat (Screen visible on HGRH units)** | **D4** | **Control Type:** | REV | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | **Bd:** | FULL | FULL<br>HALF | - |
| | | **Band:** | 100.0 | 0 - 999.9 | - |
| | | **Integration Time: (if control type is P+I)** | 80 | 0 - 999 | (s)econds |
| | | **Derivative Time: (if control type is PID)** | 0 | 0 - 999 | (s)econds |
| | | **Output Period:** | 500 | 0 - 9999 | ms |
| **Hot Gas Reheat (Screen visible on HGRH units)** | **D5** | **Dead Band:** | OFF | OFF<br>ON | - |
| | | **Above Set Point:** | 0.0 | 0 - 99.9 | - |
| | | **Below Set Point:** | 0.0 | 0 - 99.9 | - |
| **Condenser Fan CCT 1** | **D6** | **Proportional Gain:** | 1.0 | 0 - 99.9 | - |
| | | **Integration Time:** | 100 | 0 - 999.9 | (s)econds |
| | | **Derivative Time:** | 0 | 0 - 999 | (s)econds |
| | | **Anti-Bump Xfer:** | ON | OFF<br>ON | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Condenser Fan CCT 2 (D-Cabinet only) | D7 | Proportional Gain: | 1.0 | 0 - 99.9 | - |
| | | Integration Time: | 100 | 0 - 999.9 | (s)econds |
| | | Derivative Time: | 0 | 0 - 999 | (s)econds |
| | | Anti-Bump Xfer: | ON | OFF<br>ON | - |
| Economizer Control (Enthalpy Economizer Selected) | D8 | Proportional Gain: | 1.0 | 0 - 99.9 | - |
| | | Integration Time: | 100 | 0 - 999.9 | (s)econds |
| | | Derivative Time: | 0 | 0 - 999 | (s)econds |
| | | Anti-Bump Xfer: | ON | OFF<br>ON | - |
| CO2 Damper Control | D9 | Control Type: | DIR | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Band: | 20.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 100 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| CO2 Damper Control | D10 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |
| ERV Preheater Control (Screen Visible with ERV) | D11 | Control Type: | REV | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Bd: | FULL | FULL<br>HALF | - |
| | | Band: | 20.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 100 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| ERV Preheater Control (Screen Visible with ERV) | D12 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| ERV Exhaust Fan Control (Screen Visible with ERV) | D13 | Control Type: | DIR | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Bd: | FULL | FULL<br>HALF | - |
| | | Band: | 50.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 100 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| ERV Exhaust Fan (Screen Visible with ERV) | D14 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |
| Supply Fan Building Pressure Control (Screen Visible with Building Pressure Sensor) | D15 | Control Type: | REV | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Band: | 10.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 120 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| Supply Fan Building Pressure Control (Screen Visible with Building Pressure Sensor) | D16 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |
| Supply Fan Static Pressure Control (Screen Visible with Static Pressure Sensor) | D17 | Control Type: | REV | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Band: | 30.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 120 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| Supply Fan Static Pressure Control (Screen Visible with Static Pressure Sensor) | D18 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Exhaust Fan Building Pressure Control (Screen Visible on HOAS units with Building Pressure Sensors) | D19 | Control Type: | DIR | DIR<br>REV<br>BOTH | - |
| | | | P+I | P<br>P+I<br>PID | - |
| | | Band: | 5.0 | 0 - 999.9 | - |
| | | Integration Time: (if control type is P+I) | 100 | 0 - 999 | (s)econds |
| | | Derivative Time: (if control type is PID) | 0 | 0 - 999 | (s)econds |
| | | Min: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Max: (if control type is PID) | 0 | -1000 - 1000 | - |
| | | Output Period: | 500 | 0 - 9999 | ms |
| Exhaust Fan Building Pressure Control (Screen Visible on HOAS units with Building Pressure Sensors) | D20 | Dead Band: | OFF | OFF<br>ON | - |
| | | Above Set Point: | 0 | 0 - 99.9 | - |
| | | Below Set Point: | 0 | 0 - 99.9 | - |
| f. Service Settings / e. Alarm Management | | | | | |
| Temperature Differential Alarms | AM1 | Differential Alarm Enable: | NO | NO<br>YES | - |
| | | Cooling Differential: | 1.0 | 0 - 10.0 | °F |
| | | Cooling Alarm Delay: | 10 | 0 - 30 | (m)inutes |
| | | Heating Differential: | 5.0 | 0 - 10.0 | °F |
| | | Heating Alarm Delay | 3 | 0 - 30 | (m)inutes |
| Supply Fan Alarm | AM2 | Startup Delay: | 15 | 0 - 999 | (s)econds |
| | | Shut Down Delay: | 180 | 0 - 999 | (s)econds |
| Exhaust Fan Alarm | AM3 | Alarm Delay: | 30 | 0 - 999 | (s)econds |
| | | Shut Down Delay: | 180 | 0 - 999 | (s)econds |
| | | Enable Airflow Proving Switch | NO | NO<br>YES | - |
| Duct Static Pressure (Screen Visible with Static Pressure Sensor) | AM4 | Sensor Failure Action: | Sup-Fan Min Speed | Sup-Fan Min Speed<br>Unit Shutdown | - |
| Duct Static Pressure (Screen Visible with Static Pressure Sensor) | AM5 | High Static Alarm Shutdown Pressure: | 5.000 | 0 - 9.999 | iwc |
| Supply Fan Alarm | AM6 | Shutdown Unit on a Compressor Alarm | NO | NO<br>YES | - |
| | | High Limit Alarm | 610.0 | 500.0 - 700.0 | psig |
| Force Off Comps | AM7 | Comp 1 (Dig): | OFF | OFF<br>ON | - |
| | | Comp 2: | OFF | OFF<br>ON | - |
| | | Comp 3:<br>(Dual circuit system) | OFF | OFF<br>ON | - |
| | | Comp 4:<br>(Dual circuit system) | OFF | OFF<br>ON | - |
| Furnace Alarms | AM8 | Shut Down Unit on a Beckett Board Failure:<br>(Stage 1 or Stage 1 and Stage 2)<br>(Beckett furnace control board) | NO | NO<br>YES | - |
| Furnace Alarms | AM9 | Gas Alarm Delay:<br>(United Tech. furnace control board) | 240 | 0 - 500 | (m)inutes |
| Smoke Detector Alarm | AM10 | Reset Type: | AUTO | AUTO<br>MANUAL | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Retry Status | AM11 | Condensate Float Status: | 0/ 0 | - | trips/ (m)inute |
| | | Supply Fan Shutdown Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM12 | Supply Air Temperature Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM13 | EVD1 Offline Status: | 0/ 0 | - | trips/ (m)inute |
| | | EVD1 Valve A Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM14 | Low Pressure CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| | | High Pressure CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM15 | Low Superheat CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| | | Low Suction Temp CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM16 | Discharge Line Temp Status: | 0/ 0 | - | trips/ (m)inute |
| | | Condenser Fans CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM17 | Comp Env. CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| | | Comp Avoid Zone CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM18 | Max Restarts CCT1 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM19 | EVD2 Offline Status: | 0/ 0 | - | trips/ (m)inute |
| | | EVD2 Valve A Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM20 | Low Pressure CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| | | High Pressure CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM21 | Low Superheat CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| | | Low Suction Temp CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM22 | Condenser Fan CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM23 | Comp Env. CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| | | Comp Avoid Zone CCT2 Status: | 0/ 0 | - | trips/ (m)inute |
| Retry Status | AM24 | Max Restarts CCT2 Status: | 0/ 0 | - | trips/ (m)inute |

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## G. Service Sub Menu Parameters (continued)

**⚠ WARNING**

Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **g. Manual Management / a. Manual Control** | | | | | |
| **Manual Override** | **MN1** | **Time:** | 30 | 0 - 480 | (m)inutes |
| **Demand Control** | **MN2** | **Enable Demand Control:** | OFF | OFF<br>ON | - |
| | | **Select Mode:**<br>**(Unit Specific)** | FAN-ONLY | FAN-ONLY<br>ECON<br>HEATING<br>COOLI NG<br>DEHUM | - |
| | | **Cool:** | 0 | 0 - 100 | % |
| | | **Dehum:** | 0 | 0 - 100 | % |
| | | **Heat:** | 0 | 0 - 100 | % |
| | | **Aux Heat:** | 0 | 0 - 100 | % |
| | | **Econ:** | 0 | 0 - 100 | % |
| **EVD n°01.a Carel EEV** | **MN3** | **Enable Manual Valve Position:** | OFF | OFF<br>ON | - |
| | | **Manual Position:** | 0 | 0 - 480 | steps |
| | | **Current Position:** | Actual Value<br>Actual Value | Actual Value<br>Actual Value | steps<br>% |
| **EVD n°02.a Carel EEV**<br>**(Dual Circuit Unit)** | **MN4** | **Enable Manual Valve Position:** | OFF | OFF<br>ON | - |
| | | **Manual Position:** | 0 | 0 - 480 | steps |
| | | **Current Position:** | Actual Value<br>Actual Value | Actual Value<br>Actual Value | steps<br>% |
| **EVD n°01.b HGRH Valve** | **MN5** | **Enable Manual Valve Position:** | OFF | OFF<br>ON | - |
| | | **Manual Position:** | 0 | 0 - 100 | % |
| | | **Current Position:** | Actual Value | Actual Value | % |
| **EVD n°02.b HGRH Valve**<br>**(Dual Circuit Unit)** | **MN6** | **Enable Manual Valve Position:** | OFF | OFF<br>ON | - |
| | | **Manual Position:** | 0 | 0 - 100 | % |
| | | **Current Position:** | Actual Value | Actual Value | % |
| **g. Manual Management / b. Analog Inputs** | | | | | |
| **Return Air Humidity**<br>**(As the analog inputs have been listed under "Inputs/Outputs" section, only the Return Air Humidity sensor has been detailed.)** | **C1 to C13** | **Manual Control U "XX":**<br>**Puts the input into manual mode** | OFF | OFF<br>ON | - |
| | | **Manual Position:**<br>**Sets the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).** | 0 | - | °F |
| | | **U "XX" Value:**<br>**If Manual Control is OFF it is the actual value of the Sensor.**<br>**If Manual Control is ON it is the value of the Manual Position.** | Actual Value | - | °F |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **g. Manual Management / c. Digital Inputs** | | | | | |
| **Digital Input High Pressure (As the digital inputs have been listed under "Inputs/Outputs" section, only the High Pressure switch has been detailed.)** | **D1 to D20** | **Manual Control DI "XX": Puts the input into manual mode** | OFF | OFF<br>ON | - |
| | | **Manual Position: Sets the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).** | Actual Value | CLOSED<br>OPEN | - |
| | | **DI "XX" Status: If Manual Control is OFF it is the actual status of the input. If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **g. Manual Management / d. Relay Outputs** | | | | | |
| **Relay Output Heat 1 (As the digital outputs have been listed under "Inputs/Outputs" section, Only Heat 1 has been detailed.)** | **G1 To G17** | **Manual Relay "XX": Puts the output into manual mode** | OFF | OFF<br>ON | - |
| | | **Manual Position: Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).** | Actual Value | OFF<br>ON | - |
| | | **Relay "XX" Status: If Manual Control is OFF it is the actual status of the output. If Manual Control is ON it is the status of the Manual Position.** | Actual Value | OFF<br>ON | - |
| **g. Manual Management / e. Analog Outputs** | | | | | |
| **Damper Modulation (As the analog outputs have been listed under "Inputs/Outputs" section, Only the Damper Modulation value has been detailed.)** | **H1 to H6** | **Manual Y "X": Puts the output into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Value Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).** | Actual Value | 0.00 - 10.00 | vdc |
| | | **Y "X" Output: If Manual Control is AUTO it is the actual value of the output. If Manual Control is HAND it is the value of Manual Value.** | Actual Value | 0.00 - 10.00 | vdc |
| **g. Manual Management / f. Exp. Board (pCOe)** | | | | | |
| **Condenser Fans CCT2 (As the expansion board digital outputs have been listed under "Inputs/ Outputs" section, Only Condenser Fans CCT2 has been detailed for the expansion board.)** | **F1 to F4** | **pCOe Number:** | Actual Value | 0 - 256 | - |
| | | **Manual Relay "X": Puts the output into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Position: Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).** | Actual Value |  | - |
| | | **Relay "X" Status: If Manual Control is AUTO it is the actual value of the output. If Manual Control is HAND it is the value of Manual Value.** | Actual Value |  | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Condenser Fan Modulation CCT2 (As the expansion board analog outputs have been listed under "Inputs/ Outputs" section, Only the Cond Fan Mod CCT2 value has been detailed for the expansion board.)** | **F5** | **pCOe Number:** | Actual Value | 0 - 256 | - |
| | | **Mode:**<br>**Puts the output into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Value:**<br>**Sets the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).** | Actual Value | 0.00 - 100.0 | % |
| | | **Output:**<br>**If Manual Control is AUTO it is the actual value of the output.**<br>**If Manual Control is HAND it is the value of Manual Value.** | Actual Value | 0.00 - 100.0 | % |
| **Freeze Stat (As the expansion board digital inputs have been listed under "Inputs/ Outputs" section, only the Freeze Stat has been detailed for the expansion board.)** | **F6 to F9** | **pCOe Number:** | Actual Value | 0 - 256 | - |
| | | **Manual Control DI "X":**<br>**Puts the input into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Position:**<br>**Sets the Manual Value for this input (only has an affect when the input is in manual control, item above is HAND).** | Actual Value | CLOSED<br>OPEN | - |
| | | **Input Status:**<br>**If Manual Control is AUTO it is the actual status of the input.**<br>**If Manual Control is HAND it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **i. pAD Config.** | | | | | |
| **pAD Configuration** | **PC1** | **pAD n°01** | Actual Value | - | - |
| | | **Plan Address** | 4 | 0 - 256 | - |
| | | **Firmware Version** | Actual Value | - | - |
| | | **HW Options** | Actual Value | None (Temp Only)<br>Humid (Humidity probe installed) | - |
| **pAD Configuration** | **PC2** | **pAD n°01** | Actual Value | - | - |
| | | **Large Display**<br>**(Change what appears on the thermostat)** | Temp | NA<br>T.Set<br>Temp<br>H.Set<br>Hum | - |
| | | **Small Display**<br>**(Change what appears on the thermostat)** | Hum | Time<br>T.Set<br>Temp<br>H.Set<br>Hum | - |
| **pAD Configuration Set Point Limits** | **PC3** | **Temperature Min:** | 60.0°F | 45 - 100°F | °F |
| | | **Temperature Max:** | 90.0°F | 60 - 100°F | °F |
| | | **Humidity Min:** | 0% | 0 - 100% | % |
| | | **Humidity Max:** | 100% | 0 - 100% | % |
| **pAD Configuration Key Functions** | **PC4** | **Key 1:** | 1 = ON/OFF | 0 = DISABLE<br>1 = ON/OFF<br>2 = MODE<br>3 = HUM<br>4 = NIGHT/SLEEP<br>5=CLOCK<br>6 = TMEP<br>7 = PROG<br>8 = FAN<br>9 = ALARM | - |
| | | **Key 2:** | 9 = ALARM | | - |
| | | **Key 3:** | 3 = HUM | | - |
| | | **Key 4:** | 4 = NIGHT/SLEEP | | - |
| | | **Key 5:** | 0 = DISABLE | | - |
| | | **Key 6:** | 6 = TEMP | | - |

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## G. Service Sub Menu Parameters (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| j. ERV Config. | | | | | |
| ERV Configuration | E1 | En. Bypass Damper: | YES | NO<br>YES | - |
| | | Bypass Offset: | -10.0 | -30.0 - 30.0 | % |
| | | Bypass Lockout OA Temp <: | 30.0 | 0.0 - 150.0 | °F |
| | | Bypass Lockout Differential: | 5.0 | 2.0 - 10.0 | °F |
| ERV Wheel Configuration | E2 | Rotation Detection: | OFF | OFF<br>ON | - |
| | | Cleaning Rotation Delay: | 20 | 0 - 999 | (m)inutes |
| | | Duration: | 5 | 0 - 999 | (s)econds |
| ERV Preheater | E3 | Preheater Enable: | NO | NO<br>YES | - |
| | | Set Point: | MANUAL | CALCULATED<br>MANUAL | - |
| | | Mode: | ON/OFF | ON/OFF<br>PWM | - |
| | | Calculated Setpoint: | Actual Value | - | °F |
| | | Calculation Differential: | 0.5 | 0 - 10.0 | °F |
| ERV Wheel Defrost (Screen Visible when Preheater is set to NO) | E4 | OA Setpoint: | 20.0 | 0.0 - 40 | °F |
| | | OA Setpoint Differential: | 2.0 | 0.0 - 40 | °F |
| | | Defrost Cyc Time: | 30 | 0 - 99 | (m)inutes |
| | | Defrost Off Time: | 60 | 0 - 99 | (s)econds |
| | | Defrost Bmp Time: | 6 | 0 - 99 | (s)econds |
| ERV Wheel Temperature Check | E5 | Delay: | 60 | 0 - 180 | (m)inutes |
| | | Duration: | 4 | 0 - 9 | (m)inutes |
| ERV Wheel Cooling Control | E6 | RA Enthalpy: | Actual Value | - | btu |
| | | OA Enthalpy: | Actual Value | - | btu |
| | | Wheel ON Offset: | 3.0 | 0.0 - 10.0 | btu |
| | | OA BTU Turns Wheel On | Actual Value | - | btu |
| ERV Wheel Cooling Control | E7 | RA Enthalpy: | Actual Value | - | btu |
| | | OA Enthalpy: | Actual Value | - | btu |
| | | Wheel OFF Offset: | 2.0 | 0.0 - 10.0 | btu |
| | | OA BTU Turns Wheel OFF | Actual Value | - | btu |
| ERV Wheel Dehum Control | E8 | RA Humidity Ratio: | Actual Value | - | Gr/lb |
| | | OA Humidity Ratio: | Actual Value | - | Gr/lb |
| | | Wheel ON Offset: | 10 | 0 - 20 | Gr/lb |
| | | OA Humidity Ratio Turn Wheen ON: | Actual Value | - | Gr/lb |
| ERV Wheel Dehum Control | E9 | RA Humidity Ratio: | Actual Value | - | Gr/lb |
| | | OA Humidity Ratio: | Actual Value | - | Gr/lb |
| | | Wheel OFF Offset: | 0 | 0 to 20 | Gr/lb |
| | | OA Humidity Ratio Turn Wheen OFF: | Actual Value | - | Gr/lb |
| ERV Wheel Alarm Times | E10 | Exh Fan Warning: | 30 | 0 - 999 | (s)econds |
| | | Exh Fan Shutdown: | 180 | 0 - 999 | (s)econds |
| | | Wheel Warning: | 100 | 0 - 999 | (s)econds |
| | | Wheel Shutdown: | 180 | 0 - 999 | (s)econds |
| | | Wheel Pressure: | 120 | 0 - 999 | (s)econds |
| | | OA / Exh Filters | 120 | 0 - 999 | (s)econds |

## H. Manufacturer Sub Menu Parameters

The Manufacturer sub menu is for factory setup of the unit and is not accessible without contacting the factory for guidance.

**THE FOLLOWING SECTIONS APPLY ONLY TO UNITS EQUIPPED WITH ENERGY RECOVERY (MODEL DIGIT 7= B OR E). FOR ALL OTHER UNITS, PROCEED TO PAGE 68.**

## Main Status Screen (ERV UNITS)

The Main Status Screen for ERV equipped units is displayed when the display is changed to address 2 as described in the “F. Board Switch Sub Menu Parameters” section.

Once this screen is displayed, the user can navigate up and down through the list of Main Status Screen Parameters by using the UP or DOWN buttons. These screens are described in further detail in the next section.

Note that the main unit controller will always show as Unit: 01. If the unit is also equipped with an ERV module, it has its own controller, which is Unit: 02. The keypad at the main controller or the remote key pad can be used to change the Main Status Screen to display either Unit 01 or 02.

To change the controller being displayed, press the ENTER + UP buttons. If you are viewing the main controller display, pressing those buttons will switch to displaying the ERV controller. Pressing those buttons again will revert back to displaying the main controller.

## Main Status Screen Parameters (ERV UNITS)

The following table describes the menu parameters:

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| ERV | - | **Unit:** | 2 | - | - |
| | | **Entering Temperature:** | Actual Value | - | °F |
| | | **Entering Humidity** | Actual Value | - | %rh |
| | | **Status:** (Off/On) | Actual Value | UNIT ON<br>ERV DOOR OPEN<br>OFF by pLAN | - |

(continued next page)

## Service Sub Menu Parameters (ERV UNITS)

The Service menu for units equipped with energy recovery allows the user to access several sub-menus regarding controller information, controller overrides, and I/O manual management.

Certain screens within the Service Sub Menus require a password for access. Refer to the section titled “Password Protection” for additional guidance.

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **A. Input/Output** | | | | | |
| **Digital Inputs** | **ID1** | **Exhaust Air filter** | DI1 | Open<br>Closed | - |
| | **ID2** | **Wheel Pressure Drop** | DI2 | Open<br>Closed | - |
| | **ID3** | **Outdoor Air Filter** | DI3 | Open<br>Closed | - |
| | **ID4** | **Exhaust fan Status** | DI4 | Open<br>Closed | - |
| | **ID5** | **ERV Door Switch** | DI5 | Open<br>Closed | - |
| **Analog Inputs** | **B1** | **Entering Humidity** | B1 | Actual Value | %rh |
| | **B2** | **Entering Temperature** | B2 | Actual Value | °F |
| **Relay Outputs** | **NO1** | **OA Bypass Damper** | 1 | OFF<br>ON | - |
| | **NO2** | **Wheel Enable** | 2 | OFF<br>ON | - |
| | **NO3** | **Preheater Enable** | 3 | OFF<br>ON | - |
| | **NO4** | **Exhaust Fan Enable** | 4 | OFF<br>ON | - |
| **Analog Outputs** | **Y1** | **Wheel Speed** | Y1 | 0.0 - 10.0 | RPM |
| | **Y2** | **Exhaust Fan Speed** | Y2 | 0.0 - 10.0 | RPM |
| **B. Service / a. Information** | | | | | |
| **ERV** | **A1** | **Code (Name of Program)** | Actual Value | - | - |
| | | **Ver. (Software Version) & Date (Release Date)** | Actual Value | - | MM/DD/YY |
| | | **Bios Version & Date** | Actual Value | - | MM/DD/YY |
| | | **Boot Version & Date** | Actual Value | - | MM/DD/YY |
| **Information** | **A2** | **pCO Type** | pCOXS | - | - |
| | | **Total FLASH** | Actual Value | - | Kb |
| | | **RAM** | Actual Value | - | Kb |
| | | **Built to In Type** | Actual Value | - | - |
| | | **T Memory Writes** | Actual Value | - | - |
| | | **Main Cycle:** | Actual Value | - | Cycles/s |
| | | **Cycle Time** | Actual Value | - | ms |
| **B. Service / b. Working Hours** | | | | | |
| **System** *(ERV)* | **X1** | Run Hours | Actual Value | 0 to 350,000 | (h)ours |
| | | Number of starts | Actual Value | 0 to 350,000 | - |

(continued next page)

## Service Sub Menu Parameters (ERV UNITS) (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| B. Service / c. Manual Management | | | | | |
| **Manual Override** | **MN1** | **Time:** | 30 | 30 - 500 | (m)inutes |
| **Exhaust Air Filter** | MN2 | **Manual DI 1**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Sets the Manual Value for this input (only has an affect when the input is in Manual Control, item above is ON).** | - | CLOSED<br>OPEN | - |
| | | **DI 1 Status**<br>**If Manual Control is OFF it is the actual status of the input.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **Wheel Pressure Drop** | MN3 | **Manual DI 2**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Sets the Manual Value for this input (only has an affect when the input is in Manual Control, item above is ON).** | - | CLOSED<br>OPEN | - |
| | | **DI 2 Status**<br>**If Manual Control is OFF it is the actual status of the input.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **Outdoor Air Filter** | MN4 | **Manual DI 3**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Sets the Manual Value for this input (only has an affect when the input is in Manual Control, item above is ON).** | - | CLOSED<br>OPEN | - |
| | | **DI 3 Status**<br>**If Manual Control is OFF it is the actual status of the input.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **Exhaust Fan Status** | MN5 | **Manual DI 4**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Sets the Manual Value for this input (only has an affect when the input is in Manual Control, item above is ON).** | - | CLOSED<br>OPEN | - |
| | | **DI 4 Status**<br>**If Manual Control is OFF it is the actual status of the input.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |
| **ERV Door Switch** | MN6 | **Manual DI 5**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Sets the Manual Value for this input (only has an affect when the input is in Manual Control, item above is ON).** | - | CLOSED<br>OPEN | - |
| | | **DI 5 Status**<br>**If Manual Control is OFF it is the actual status of the input.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | CLOSED<br>OPEN | - |

(continued next page)

## Service Sub Menu Parameters (ERV UNITS) (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| Entering Humidity | MN7 | **Manual Control B01**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).** | - | 0 - 100 | %rh |
| | | **Value**<br>**If Manual Control is OFF it is the actual value of the Sensor.**<br>**If Manual Control is ON it is the value of the Manual Position.** | Actual Value | 0 - 100 | %rh |
| Entering Temperature | MN8 | **Manual Control B02**<br>**(Puts the input into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this input (only has an affect when the input is in manual control, item above is ON).** | - | -40.0 - 140.0 | °F |
| | | **Value**<br>**If Manual Control is OFF it is the actual value of the Sensor.**<br>**If Manual Control is ON it is the value of the Manual Position.** | Actual Value | 0 - 100 | °F |
| OA Bypass Damper | MN9 | **Manual Relay 1**<br>**(Puts the output into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).** | - | OFF<br>ON | - |
| | | **Relay 1 Status**<br>**If Manual Control is OFF it is the actual status of the output.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | OFF<br>ON | - |
| Wheel Enable | MN10 | **Manual Relay 2**<br>**(Puts the output into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).** | - | OFF<br>ON | - |
| | | **Relay 2 Status**<br>**If Manual Control is OFF it is the actual status of the output.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | OFF<br>ON | - |
| Preheater Enable | MN11 | **Manual Relay 3**<br>**(Puts the output into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).** | - | OFF<br>ON | - |
| | | **Relay 3 Status**<br>**If Manual Control is OFF it is the actual status of the output.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | OFF<br>ON | - |

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## Service Sub Menu Parameters (ERV UNITS) (continued)

| SCREEN NAME | SCREEN # | PARAMETER DESCRIPTION | FACTORY VALUE | RANGE | UNITS |
|---|---|---|---|---|---|
| **Exhaust Fan Enable** | MN12 | **Manual Relay 4**<br>**(Puts the output into manual mode)** | OFF | OFF<br>ON | - |
| | | **Manual Position**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is ON).** | - | OFF<br>ON | - |
| | | **Relay 4 Status**<br>**If Manual Control is OFF it is the actual status of the output.**<br>**If Manual Control is ON it is the status of the Manual Position.** | Actual Value | OFF<br>ON | - |
| **Wheel Speed** | MN13 | **Mode**<br>**Puts the output into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Value**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).** | - | 0.00 - 10.00 | vdc |
| | | **Output**<br>**If Manual Control is AUTO it is the actual value of the output.**<br>**If Manual Control is HAND it is the value of the Manual Position.** | Actual Value | 0.00 - 10.00 | vdc |
| **Exhaust Fan Speed** | MN14 | **Mode**<br>**Puts the output into manual mode** | AUTO | AUTO<br>HAND | - |
| | | **Manual Value**<br>**Set the Manual Value for this output (only has an affect when the output is in manual control, item above is HAND).** | - | 0.00 - 10.00 | vdc |
| | | **Output**<br>**If Manual Control is AUTO it is the actual value of the output.**<br>**If Manual Control is HAND it is the value of the Manual Position.** | Actual Value | 0.00 - 10.00 | vdc |

## Typical BMS System Variables - Analog

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| Supply Air Temperature | Supply_Temp_BMS | R | A | AV1 | Supply_Temp | 105 | out |
| Space Temperature | pAD_Temp1_BMS | R | A | AV2 | pAD_Temp | 105 | out |
| Outside Air Temperature | OA_Temp_BMS | R | A | AV3 | OA_Temp | 105 | out |
| Outside Air Humidity | OA_Hum_BMS | R | A | AV4 | OA_Hum | 81 | out |
| Off Wheel Temperature | Off_Wheel_Temp_BMS | R | A | AV5 | Off_Wheel_Tem | 105 | out |
| Off Wheel Humidity | Off_Wheel_Hum_BMS | R | A | AV6 | Off_Wheel_Hum | 81 | out |
| Return Air Temperature | RA_Temp_BMS | R | A | AV7 | - | - | - |
| Return Air Humidity | RA_Hum_BMS | R | A | AV8 | - | - | - |
| OA & RA Mixed Temperature | Mixed_Temp_BMS | R | A | AV9 | Mixed_Temp | 105 | out |
| Mixed Air Humidity | MA_Hum_BMS | R | A | AV10 | - | - | - |
| Temperature Off the Evaporator Coil | Evap_Off_Temp_BMS | R | A | AV11 | Evap_Off_Temp | 105 | out |
| Building Pressure | Build_Press_BMS | R | A | AV12 | Buildin_Press | 8 | out |
| Duct Static Pressure | Static_Pressure_BMS | R | A | AV13 | Duct_Press | 8 | out |
| Temperature reading by serial probe 1 | Serial_Probe_Temp_1_BMS | R | A | AV14 | - | - | - |
| Temperature reading by serial probe 2 | Serial_Probe_Temp_2_BMS | R | A | AV15 | - | - | - |
| Temperature reading by serial probe 3 | Serial_Probe_Temp_3_BMS | R | A | AV16 | - | - | - |
| Temperature reading by serial probe 4 | Serial_Probe_Temp_4_BMS | R | A | AV17 | - | - | - |
| Humidity reading by serial probe 1 | Serial_Probe_Hum_1_BMS | R | A | AV18 | - | - | - |
| Humidity reading by serial probe 2 | Serial_Probe_Hum_2_BMS | R | A | AV19 | - | - | - |
| Humidity reading by serial probe 3 | Serial_Probe_Hum_3_BMS | R | A | AV20 | - | - | - |
| Humidity reading by serial probe 4 | Serial_Probe_Hum_4_BMS | R | A | AV21 | - | - | - |
| blank | nu_bms_A_22 | R | A | AV22 | - | - | - |
| Actual Supply Air Temp. Setpoint | SA_Setp_BMS | R | A | AV23 | SA_Setpoint | 105 | out |
| Space Cooling Occupied Temperature Setpoint | pAD_Setp_Temp_occ_BMS | R/W | A | AV24 | pAD_Setp_Temp | 105 | in/out |
| Space Heating Setpoint Offset | Space_Heat_Offset_BMS | R/W | A | AV25 | - | - | - |
| Actual Occupied Space Heating Setpoint | space_ht_sp_occ_BMS | R | A | AV26 | - | - | - |
| space cooling differential | space_cl_diff_occ_BMS | R/W | A | AV27 | - | - | - |
| Space Heating Differential | space_ht_diff_occ_BMS | R/W | A | AV28 | - | - | - |
| Occupied - Supply Air Cooling Setpoint | space_cl_sa_sp_occ_BMS | R/W | A | AV29 | - | - | - |
| Neutral Air Temperature Setpoint | NA_Setp_BMS | R/W | A | AV30 | NA_Setpoint | 105 | in/out |
| Occupied - Supply Air Heating Setpoint | space_ht_sa_sp_occ_BMS | R/W | A | AV31 | - | - | - |
| Unoccupied - Space Cooling Setpoint | space_cl_sp_unocc_BMS | R/W | A | AV32 | - | - | - |
| Unoccupied - Spcae Heating Setpoint | space_ht_sp_unocc_BMS | R/W | A | AV33 | - | - | - |
| space cooling differential | space_cl_diff_unocc_BMS | R/W | A | AV34 | - | - | - |
| Space Heating Differential | space_ht_diff_unocc_BMS | R/W | A | AV35 | - | - | - |
| Supply Air Cooling Setpoint Unoccupied | space_cl_sa_sp_unocc_BMS | R/W | A | AV36 | - | - | - |
| Supply Air Heating Setpoint Unoccupied | space_ht_sa_sp_unocc_BMS | R/W | A | AV37 | - | - | - |
| blank | nu_bms_A_38 | R | A | AV38 | - | - | - |
| pAD Wall Stat Minimum allowed Temp setpoint adjustment | pAD_SetMin_Temp_BMS | R/W | A | AV39 | - | - | - |
| pAD Wall Stat Maximum allowed Temp setpoint adjustment | pAD_SetMax_Temp_BMS | R/W | A | AV40 | - | - | - |
| blank | nu_bms_A_41 | R | A | AV41 | - | - | - |
| 55F (0-100) | SA_Reset_Heat_High_BMS | R/W | A | AV42 | - | - | - |
| 70F (50-100) | SA_Reset_Heat_Low_Cool_High_ BMS | R/W | A | AV43 | - | - | - |
| 78F (50-100) | SA_Reset_Cool_Low_BMS | R/W | A | AV44 | - | - | - |

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## Typical BMS System Variables - Analog (continued)

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| 70F (50-100) | OA_Reset_Heat_Low_BMS | R/W | A | AV45 | - | - | - |
| 85F (50-100) | OA_Reset_Heat_High_BMS | R/W | A | AV46 | - | - | - |
| 30F (0-100) | OA_Reset_Cool_Low_BMS | R/W | A | AV47 | - | - | - |
| 60F (50-100) | OA_Reset_Cool_High_BMS | R/W | A | AV48 | - | - | - |
| blank | nu_bms_A_49 | R | A | AV49 | - | - | - |
| Outdoor Dewpoint Setpoint | OA_Dp_Sp_BMS | R/W | A | AV50 | OA_Dewpt_Setp | 105 | in/out |
| Mixed Air Dewpoint Setpoint | MA_Dp_Sp_BMS | R/W | A | AV51 | MA_Dewpt_Setp | 105 | in/out |
| Unoccupied Dehum. Dewpoint Setpoint | Un_Dehum_DP_SP_BMS | R/W | A | AV52 | - | - | - |
| Dewpoint differential | Dewpoint_Diff_BMS | R/W | A | AV53 | Dewpoint_Diff | 147 | in/out |
| Unoccupied Dehum Dew Point | Un_Dehum_DP_Diff_BMS | R/W | A | AV54 | - | - | - |
| blank | nu_bms_A_55 | R | A | AV55 | - | - | - |
| Offset to which unit will exit Fan Only and enter Heating based on SA Temp | SA_Vent_Mode_Heating_Offset_ BMS | R/W | A | AV56 | - | - | - |
| Offset to which unit will exit Econ and enter Cooling based on SA Temp | SA_Vent_Mode_Cooling_Offset_ BMS | R/W | A | AV57 | - | - | - |
| SA Heating Changeover Temperature | SA_Vent_Mode_Heating_CO_Temp_ BMS | R | A | AV58 | - | - | - |
| SA Cooling Changeover Temperature | SA_Vent_Mode_Cooling_CO_Temp_ BMS | R/W | A | AV59 | - | - | - |
| blank | nu_bms_A_60 | R | A | AV60 | - | - | - |
| Current capacity of C1 (Digital Scroll Compressor) | Digital_Capacity_Cur | R | A | AV61 | - | - | - |
| Liquid Line Pressure Circuit 1 | LL_Press_CCT1_BMS | R | A | AV62 | - | - | - |
| Suction Pressure Circuit 1 | Evap_Press_CCT1_BMS | R | A | AV63 | - | - | - |
| Liquid Line Pressure Circuit 2 | LL_Press_CCT2_BMS | R | A | AV64 | - | - | - |
| Suction Pressure Circuit 2 | Evap_Press_CCT2_BMS | R | A | AV65 | - | - | - |
| Discharge Line Temperature | Discharge_Temp_BMS | R | A | AV66 | - | - | - |
| Refrigeration Circuit 1 - Superheat | Superheat_CCT1_BMS | R | A | AV67 | - | - | - |
| Refrigeration Circuit 1 - Subcool | Subcool_CCT1_BMS | R | A | AV68 | - | - | - |
| Refrigeration Circuit 2 - Superheat | Superheat_CCT2_BMS | R | A | AV69 | - | - | - |
| Refrigeration Circuit 2 - Subcool | Subcool_CCT2_BMS | R | A | AV70 | - | - | - |
| Suction Line Temperature - From Driver Probe S2 | Suction_Temp_CCT1_BMS | R | A | AV71 | - | - | - |
| Suction Line Temperature - From Driver Probe S2 | Suction_Temp_CCT2_BMS | R | A | AV72 | - | - | - |
| Supply Fan Speed Adjust | Supply_Fan_BMS | R/W | A | AV73 | Sup_Fan_Mod | 81 | in |
| Exhaust Fan Speed Adjust | Exhaust_Fan_BMS | R/W | A | AV74 | Exh_Fan_Mod | 81 | in |
| blank | nu_bms_A_75 | R | A | AV75 | - | - | - |
| Power Monitor. Voltage L1 - L2 | Voltage_L1_L2_MSK | R | A | AV76 | - | - | - |
| Power Monitor. Voltage L2 - L3 | Voltage_L2_L3_MSK | R | A | AV77 | - | - | - |
| Power Monitor. Voltage L3 - L1 | Voltage_L3_L1_MSK | R | A | AV78 | - | - | - |
| Power Monitor. Line 1 Current | Current_1_BMS | R | A | AV79 | - | - | - |
| Power Monitor. Line 2 Current | Current_2_BMS | R | A | AV80 | - | - | - |
| Power Monitor. Line 3 Current | Current_3_BMS | R | A | AV81 | - | - | - |
| Power Monitor. Mains Frequency | Frequency_W | R | A | AV82 | - | - | - |

(continued next page)

## Typical BMS System Variables - Integer

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| Unit Status | Unit_Status | R | I | AV1001 | Unit_Status | 8 | out |
| Occupied Mode | Occupied_disp | R | I | AV1002 | - | - | - |
| Current Mode of Operation | Unit_Mode | R | I | AV1003 | Unit_Mode | 8 | out |
| Temperature Lockouts | Mechanical_Temp_Lockouts | R | I | AV1004 | - | - | - |
| Number of compressors ON | Comp_Status_BMS | R | I | AV1005 | Comp_Status | 8 | out |
| Supply Fan Modulation | Supply_Fan_mod_disp | R | I | AV1006 | Sup_Fan_mod_d | 8 | out |
| Exhaust Fan Modulation | Ex_Fan_mod_disp | R | I | AV1007 | Exh_Fan_mod_d | 8 | out |
| ERV Exhaust Fan Modulation | ERV_Ex_Fan_mod_disp | R | I | AV1008 | - | - | - |
| Condenser Fan Modulation CCT1 | Cond_Fan_mod_disp_CCT1 | R | I | AV1009 | CF_CCT1_mod_d | 8 | out |
| Condenser Fan Modulation CCT2 | Cond_Fan_mod_disp_CCT2 | R | I | AV1010 | CF_CCT2_mod_d | 8 | out |
| ERV Wheel Modulation | Wheel_mod_disp | R | I | AV1011 | - | - | - |
| blank | nu_bms_I_12 | R | I | AV1012 | - | - | - |
| Outside Air Damper Position BMS | OA_Damp_pos_BMS | R/W | I | AV1013 | OA_Damper_Pos | 8 | in |
| Outside Air Damper Position | OA_Damper | R | I | AV1014 | OA_Damper_d | 8 | out |
| Return Air Damper Position | RA_Damper | R | I | AV1015 | - | - | - |
| Outside Air Minimum Open Position | OA_Damp_min_pos_BMS | R/W | I | AV1016 | - | - | - |
| Outside Air Maximum Open Position | OA_Damp_max_pos_BMS | R/W | I | AV1017 | - | - | - |
| blank | nu_bms_I_18 | R | I | AV1018 | - | - | - |
| Cooling Demand | Cooling_Demand_disp | R | I | AV1019 | Coolin_Demand | 8 | out |
| Heat Demand | Heating_Demand_disp | R | I | AV1020 | Heatin_Demand | 8 | out |
| Dehumidification Demand | Dehum_Demand_disp | R | I | AV1021 | Dehum_Demand | 8 | out |
| Hot Gas Reheat Modulation | HGRH_mod_disp | R | I | AV1022 | HGRH_mod_d | 8 | out |
| Gas or Electric Heat Modulation | Heat_mod_disp | R | I | AV1023 | - | - | - |
| 20kw Supplementary Electric Heat Modulation | Aux_Heat_mod_disp | R | I | AV1024 | - | - | - |
| blank | nu_bms_I_25 | R | I | AV1025 | - | - | - |
| Space Humidity | pAD_Hum | R | I | AV1026 | pAD_Hum | 8 | out |
| Minimum allowable Humidity setpoint on the wall stat | pAD_SetMin_Hum | R/W | I | AV1027 | - | - | - |
| Maximum allowable Humidity setpoint on the wall stat | pAD_SetMax_Hum | R/W | I | AV1028 | - | - | - |
| Space Humidity Setpoint | pAD_Setp_Humid | R/W | I | AV1029 | pAD_Setp_Hum | 8 | in/out |
| Space Unoccupied Dehum Humidity Setpoint | Un_Dehum_Space_Hum_SP | R/W | I | AV1030 | - | - | - |
| Space CO2 Level | CO2 | R | I | AV1031 | CO2 | 8 | out |
| Space CO2 Setpoint | CO2_Setp_BMS | R/W | I | AV1032 | - | - | - |
| Expansion Valve CCT1 percent open | EEV_Percent_CCT1 | R | I | AV1033 | - | - | - |
| Expansion Valve CCT2 percent open | EEV_Percent_CCT2 | R | I | AV1034 | - | - | - |
| blank | nu_bms_I_35 | R | I | AV1035 | - | - | - |
| Power Factor (divide by 1000) | Power_Factor_Int | R | I | AV1036 | - | - | - |
| System Power | Power_BMS | R | I | AV1037 | - | - | - |
| System Apparent Power | Apparent_Power_BMS | R | I | AV1038 | - | - | - |
| System Reactive Power | Reactive_Power_BMS | R | I | AV1039 | - | - | - |
| blank | nu_bms_I_40 | R | I | AV1040 | - | - | - |
| Alarm Code Number Variable 1 | Alarm_Code_1 | R | I | AV1041 | Alarm_Code_1 | 8 | out |
| Alarm Code Number Variable 2 | Alarm_Code_2 | R | I | AV1042 | Alarm_Code_2 | 8 | out |
| Alarm Code Number Variable 3 | Alarm_Code_3 | R | I | AV1043 | Alarm_Code_3 | 8 | out |
| Alarm Code Number Variable 4 | Alarm_Code_4 | R | I | AV1044 | Alarm_Code_4 | 8 | out |
| Alarm Code Number Variable 5 | Alarm_Code_5 | R | I | AV1045 | Alarm_Code_5 | 8 | out |
| Alarm Code Number Variable 6 (Maintenance) | Alarm_Code_6 | R | I | AV1046 | Alarm_Code_6 | 8 | out |
| Software Version High | BMS_Sw_Ver_H | R | I | AV1047 | - | - | - |
| Software Version Low | BMS_Sw_Ver_L | R | I | AV1048 | - | - | - |
| SPO Number | SPO_Number | R | I | AV1049 | - | - | - |

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## Typical BMS System Variables - Integer (continued)

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| Current day | CURRENT_DAY | R | I | AV1080 | - | - | - |
| Current month | CURRENT_MONTH | R | I | AV1081 | - | - | - |
| Current year | CURRENT_YEAR | R | I | AV1082 | - | - | - |
| Current hour | CURRENT_HOUR | R | I | AV1083 | - | - | - |
| Current minute | CURRENT_MINUTE | R | I | AV1084 | - | - | - |

## Typical BMS System Variables - Digital

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| Occupied Mode 0= Unoccupied 1= Occupied | Occupied | R | D | BV1 | Occ_Status | 95 | out |
| BMS Occupied Command | Occupied_BMS | R/W | D | BV2 | Occ_Command | 95 | in/out |
| Standby Power Active | Standby_Power | R | D | BV3 | Standby_Power | 95 | out |
| General Alarm Output | General_Alarm | R | D | BV4 | General_Al | 95 | out |
| Manual reset alarm | Critical_Alarm | R | D | BV5 | - | - | - |
| Auto reset alarm | Non_Critical_Alarm | R | D | BV6 | - | - | - |
| Maintenance Alarm | Maint_Alarm | R | D | BV7 | - | - | - |
| Alarm Reset by BMS Command | BMS_Reset | R/W | D | BV8 | AL_Reset_Cmd | 95 | in/out |
| BMS On-Off Command | BMS_OnOff | R/W | D | BV9 | OnOff_Command | 95 | in/out |
| Unit Is In Manual Mode | Manual_OnOff | R | D | BV10 | - | - | - |
| Heartbeat signal From BMS | heartbeat | R/W | D | BV11 | - | - | - |
| Standby Power BMS switch | Standby_Power_sw_BMS | R/W | D | BV12 | Stdby_Pwr_sw | 95 | in/out |
| blank | nu_bms_D_13 | R | D | BV13 | - | - | - |
| shutdown unit based on alarm inputs | unit_shutdown | R | D | BV14 | - | - | - |
| Faulty Supply Sensor Shutdown Alarm | Supply_Sensor_Alarm | R | D | BV15 | - | - | - |
| Low Supply Air Temperature Shutdown Alarm | Low_SA_SD_Alarm | R | D | BV16 | - | - | - |
| Supply Fan Alarm | Supply_Fan_SD | R | D | BV17 | - | - | - |
| Smoke Detector Alarm Unit Shutdown | Smoke_Detector_Shutdown | R | D | BV18 | - | - | - |
| Supply Fan Duct Static Pressure Alarm | Sup_Fan_DSP_al | R | D | BV19 | - | - | - |
| Duct Static Pressure - Sensor Failure | DSP_fail_unit_SD | R | D | BV20 | - | - | - |
| Compressor Alarm Shuts Down Unit | DX_Cooling_Alarm_Unit_Shutdown | R | D | BV21 | - | - | - |
| Supply Air High Temp Alarm | SA_Hi_Temp_AL | R | D | BV22 | - | - | - |
| Supply Fan Status Switch | Supply_Fan_VFD_AL | R | D | BV23 | - | - | - |
| Gas Board Fail - Stage 1 | BPP_board_failure_1 | R | D | BV24 | - | - | - |
| Gas Board Fail - Stage 2 | BPP_board_failure_2 | R | D | BV25 | - | - | - |
| Hot Water Coil Freeze Protection Switch | Freeze_Stat_sw | R | D | BV26 | - | - | - |
| OA Temperature Probe Fault | OA_Temp_Fail | R | D | BV27 | - | - | - |
| ERV temp probe failure | ERV_OA_Temp_Fail | R | D | BV28 | - | - | - |
| blank | nu_bms_D_29 | R | D | BV29 | - | - | - |
| Alarm condition present on DX circuit 1 | Circuit_1_Alarm | R | D | BV30 | - | - | - |
| Alarm condition present on DX circuit 2 | Circuit_2_Alarm | R | D | BV31 | - | - | - |
| General Alarm present on Valve Driver 1 | EVD1_General_Alarm | R | D | BV32 | - | - | - |
| Critical Alarm on Valve Driver 1 | EVD1_Critical_Alarm | R | D | BV33 | - | - | - |
| Compressor High Pressure Alarm on Circuit 1 | HP_Alarm_CCT1 | R | D | BV34 | - | - | - |
| Compressor Low Pressure Alarm Circuit 1 | LP_Alarm_CCT1 | R | D | BV35 | - | - | - |

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## Typical BMS System Variables - Digital (continued)

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| Condenser Fan Alarm on Circuit 1 | CF_Alarm_CCT1 | R | D | BV36 | - | - | - |
| General Alarm present on Valve Driver 2 | EVD2_General_Alarm | R | D | BV37 | - | - | - |
| Critical Alarm on Valve Driver 2 | EVD2_Critical_Alarm | R | D | BV38 | - | - | - |
| Compressor High Pressure Alarm circuit 2 | HP_Alarm_CCT2 | R | D | BV39 | - | - | - |
| Compressor Low Pressure Alarm Circuit 2 | LP_Alarm_CCT2 | R | D | BV40 | - | - | - |
| Condenser Fan Alarm on Circuit 2 | CF_Alarm_CCT2 | R | D | BV41 | - | - | - |
| Condensate Float Switch Alarm | CFS_Alarm | R | D | BV42 | - | - | - |
| blank | nu_bms_D_43 | R | D | BV43 | - | - | - |
| System DX Cooling Alarm | DX_Cooling_Alarm | R | D | BV44 | - | - | - |
| DX locked out due to outside temperature | DX_temperature_LO | R | D | BV45 | - | - | - |
| Heating Locked Out | Heating_Lockout | R | D | BV46 | - | - | - |
| Heating locked out due to outside temperature | Heating_temperature_LO | R | D | BV47 | - | - | - |
| Main Filter Dirty Alarm | Main_Filter_AL | R | D | BV48 | - | - | - |
| Supply Fan Door Switch | Door_sw | R | D | BV49 | - | - | - |
| Damper End Switch | Damper_End_sw | R | D | BV50 | - | - | - |
| Supply Fan Airflow Switch | Airflow_sw | R | D | BV51 | - | - | - |
| Gas Valve 1 Alarm | Gas_Valve1_al | R | D | BV52 | - | - | - |
| Gas Valve 2 Alarm | Gas_Valve2_al | R | D | BV53 | - | - | - |
| Exhaust Fan VFD Alarm | Exhaust_Fan_VFD_AL | R | D | BV54 | - | - | - |
| Exhaust Fan Shutdown Alarm | Exh_Fan_SD | R | D | BV55 | - | - | - |
| Economizer Fault Detection Alarm | Econ_FDD_AL | R | D | BV56 | - | - | - |
| Unit On - Off Control Status | Dig_In_OnOff | R | D | BV57 | - | - | - |
| Supply Fan Speed 2 Status | DI_Sup_Fan_Speed2 | R | D | BV58 | - | - | - |
| Supply Fan Speed 3 Status | DI_Sup_Fan_Speed3 | R | D | BV59 | - | - | - |
| blank | nu_bms_D_60 | R | D | BV60 | - | - | - |
| pAD Thermostat not communicating with controller | pAD1_Offline | R | D | BV61 | - | - | - |
| Serial Probe 1 Offline - Modbus | Serial_Probe_1_Offline | R | D | BV62 | - | - | - |
| Serial Probe 2 Offline - Modbus | Serial_Probe_2_Offline | R | D | BV63 | - | - | - |
| Serial Probe 3 Offline - Modbus | Serial_Probe_3_Offline | R | D | BV64 | - | - | - |
| Serial Probe 4 Offline - Modbus | Serial_Probe_4_Offline | R | D | BV65 | - | - | - |
| Expansion Valve Driver 1 Offline | EVD1_Offline | R | D | BV66 | - | - | - |
| Expansion Valve Driver 2 Offline | EVD2_Offline | R | D | BV67 | - | - | - |
| pCOe expansion board not communicating with main controller | pCOe_Offline | R | D | BV68 | - | - | - |
| ERV not communicating with main controller | ERV_Offline | R | D | BV69 | - | - | - |
| Power Meter Offline | EM_Offline | R | D | BV70 | - | - | - |
| blank | nu_bms_D_71 | R | D | BV71 | - | - | - |
| ERV running | ERV_on | R | D | BV72 | - | - | - |
| ERV Exhaust Fan Output On | ERV_Ex_Fan_out | R | D | BV73 | - | - | - |
| ERV Exhaust Fan Status Switch | ERV_Ex_Fan_Status | R | D | BV74 | - | - | - |
| ERV Wheel Output On | ERV_Wheel_on | R | D | BV75 | ERV_Wheel_on | 95 | out |
| ERV Wheel Rotation Alarm | ERV_Wheel_AL | R | D | BV76 | - | - | - |
| ERV Wheel Pressure Drop Alarm | ERV_Wheel_Press_AL | R | D | BV77 | - | - | - |
| ERV Wheel Rotation Status | ERV_Wheel_Status | R | D | BV78 | - | - | - |
| ERV Wheel Shut Down Alarm | ERV_Wheel_SD | R | D | BV79 | - | - | - |
| ERV Outdoor Air Filter Alarm | ERV_OA_Filter_AL | R | D | BV80 | - | - | - |
| ERV Ehaust Air Filter Alarm | ERV_EX_Filter_AL | R | D | BV81 | - | - | - |
| ERV Door Switch | ERV_Door_sw | R | D | BV82 | - | - | - |

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## Typical BMS System Variables - Digital (continued)

| Variable Description | Variable Name | Read/ Write | Data Type | BACNet | Lon Name | SNVT # | Direction |
|---|---|---|---|---|---|---|---|
| ERV By-Pass Damper Output On | ERV_Bypass_Damp | R | D | BV83 | - | - | - |
| ERV Preheater Output On | ERV_Preheater_On | R | D | BV84 | - | - | - |
| blank | nu_bms_D_85 | R | D | BV85 | - | - | - |
| Evaporator Off Temperature Probe Fault | Evap_Off_Temp_Fail | R | D | BV86 | - | - | - |
| Mixed Air Temperature Probe Fault | Mixed_Temp_Fail | R | D | BV87 | - | - | - |
| Discharge Line Temperature Probe Fault | Disc_Temp_Fail | R | D | BV88 | - | - | - |
| Return Air Temperature Probe Fault | RA_Temp_Fail | R | D | BV89 | - | - | - |
| Return Air Humidity Probe Fault | RA_Hum_Fail | R | D | BV90 | - | - | - |
| Outside Air Humidity Probe Fault | OA_Hum_Fail | R | D | BV91 | - | - | - |
| ERV Entering Humidity Probe Fault | ERV_OA_Hum_Fail | R | D | BV92 | - | - | - |
| pAD Thermostat Temperature Probe Fault | pAD1_Temperature_Fail | R | D | BV93 | - | - | - |
| pAD Thermostat Humidity Probe Fault | pAD1_Humidity_Fail | R | D | BV94 | - | - | - |
| CO2 Probe Fault | CO2_Fail | R | D | BV95 | - | - | - |
| Building Pressure Probe Fault | Building_Pressure_Fail | R | D | BV96 | - | - | - |
| Duct Pressure Probe Fault | Static_Pressure_Fail | R | D | BV97 | - | - | - |
| Status signal from BPP furnace board fault | BPP_Status_Signal_Fail | R | D | BV98 | - | - | - |
| blank | nu_bms_D_99 | R | D | BV99 | - | - | - |
| Supply fan on and airflow switch made | Supply_Fan_On | R | D | BV100 | - | - | - |
| Compressor 1 Output | C1_On | R | D | BV101 | - | - | - |
| Compressor 2 Output | C2_On | R | D | BV102 | - | - | - |
| Compressor 3 Output | C3_On | R | D | BV103 | - | - | - |
| Compressor 4 Output | C4_On | R | D | BV104 | - | - | - |
| Exhaust Fan Running | Exh_Fan_On | R | D | BV105 | - | - | - |
| Condenser Fan Circuit 1 Output | Cond_Fan_CCT1_On | R | D | BV106 | - | - | - |
| Condenser Fan Circuit 2 Output | Cond_Fan_CCT2_On | R | D | BV107 | - | - | - |
| Outside Air Damper Opening | OA_Damper_open | R | D | BV108 | - | - | - |
| Return Air Damper Opening | RA_Damper_open | R | D | BV109 | - | - | - |
| Hot Gas Reheat Close Off Valve Output for circuit 1 | HGRH_CV_CCT1 | R | D | BV110 | - | - | - |
| Hot Gas Reheat Stage 2 Output | HGRH_S2 | R | D | BV111 | - | - | - |
| Hot Gas Reheat Close Off Valve Output for circuit 2 | HGRH_CV_CCT2 | R | D | BV112 | - | - | - |
| Gas Heat or Electric Heat Stage 1 Output | GH_EH1_On | R | D | BV113 | GASorELE_H_on | 95 | out |
| Gas Heat or Electric Heat Stage 2 Output | GH_EH2_On | R | D | BV114 | - | - | - |
| Electric Stage 3 or Boost Heat Output | EH3_BoostHT_On | R | D | BV115 | - | - | - |
| Electric Heat Stage 4 Output | EH4_On | R | D | BV116 | - | - | - |
| Auxiliary Electric Heat Output | Aux_Heat_On | R | D | BV117 | - | - | - |
| ERV Wheel VFD Status Alarm | ERM_Wh_VFD_AL | R | D | BV118 | - | - | - |
| ERV Exhaust Fan VFD Status Alarm | ERM_Exh_Fan_VFD_AL | R | D | BV119 | - | - | - |
| Furnace Lockout Alarm - See Lockout Alarm Code | General_Furnace_Alarm | R | D | BV120 | - | - | - |

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**Lennox Industries, Inc.** • P.O. Box 799900 • Dallas, TX 75379-9900 • Phone: 1.800.4LENNOX (1.800.453.6669)
www.lennoxcommercial.com