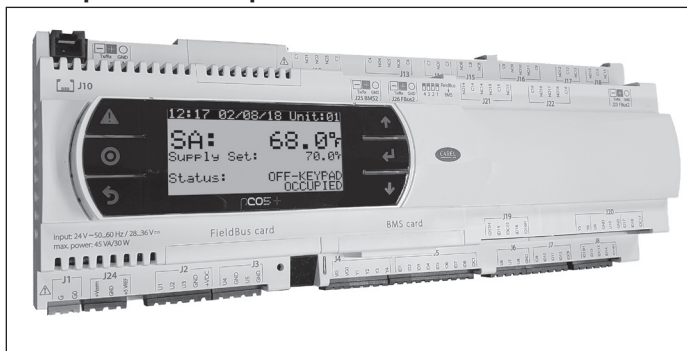


CONTROLS SYSTEM MANUAL

Packaged Ventilation/Dedicated Outside Air System (DOAS) model MPR

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.

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.

! CAUTION

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

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

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Special Design Requests

Units are sometimes built 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.

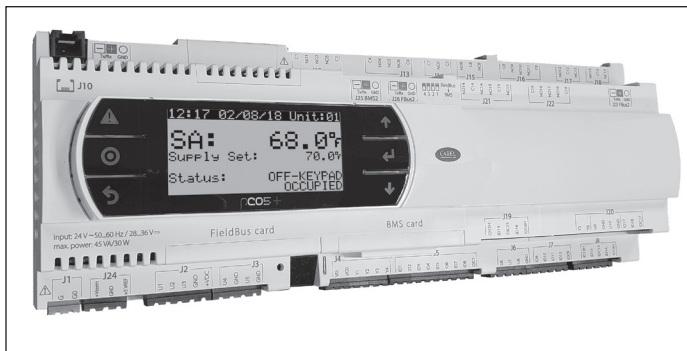
Acronyms Used

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

CONTROLS SYSTEM MANUAL

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 MPR 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

CONTROLS SYSTEM MANUAL

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.

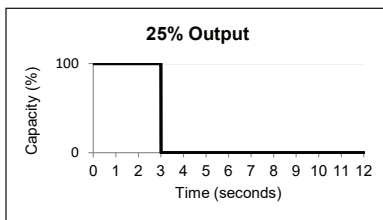
Digital Scroll Capacity Modulation Examples:

Example 1:

On Time = 3 seconds

Off Time = 9 seconds

Average Capacity = 25%

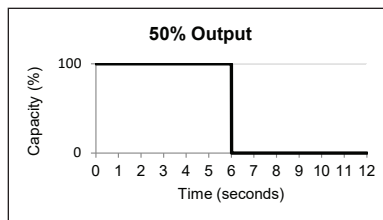


Example 2

On Time = 6 seconds

Off Time = 6 seconds

Average Capacity = 50%

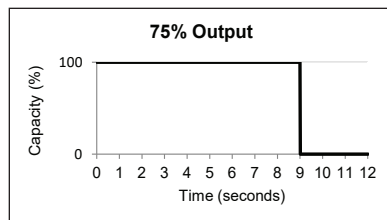


Example 3

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)



CONTROLS SYSTEM MANUAL

Electronic Expansion Valve Operation

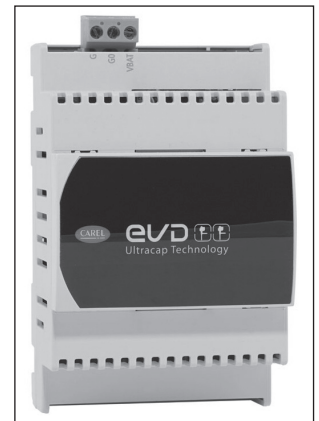
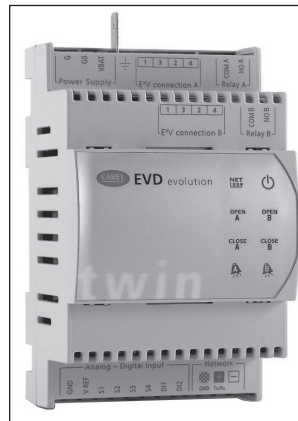
The unit uses electronic expansion valves to enable the correct metering of refrigerant. The valve uses both a pressure transducer and temperature probe to ensure that the superheat of the refrigeration system remains correct.

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.



CONTROLS SYSTEM MANUAL

Sequence of Operation

The model MPR 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.

(continued next page)

CONTROLS SYSTEM MANUAL

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	pCO ₂ 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:
- 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%.
 - 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:
- 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.
 - 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 (CO₂) Control:** Dampers open to a customer defined minimum position between 20% and 100% outside air. A space mounted CO₂ sensor monitors the space CO₂ level and sends a corresponding proportional 4-20mA signal back to the main unit controller. The controller will then compare that CO₂ reading against the CO₂ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and the dampers are controlled as follows:
- If the CO₂ level is below the setpoint, the dampers will modulate to the minimum outside air position.
 - If the CO₂ level is above the setpoint, the dampers will modulate to increase the volume of outside air to dilute the CO₂ 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 CO₂ 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 CO₂ sensor are monitored by the controller. The dampers are controlled as follows:
- 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.
 - 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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CONTROLS SYSTEM MANUAL

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 CO₂ sensor monitors the space CO₂ level and sends a corresponding proportional 4-20mA signal back to the main unit controller. The controller will then compare that CO₂ reading against the CO₂ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:
 - i. If the CO₂ level is below the setpoint, the dampers will control to steps (a) and (b) above.
 - ii. If the CO₂ 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 CO₂ 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.

(continued next page)

CONTROLS SYSTEM MANUAL

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:
- 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.
 - 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 (CO₂) Control:** The supply fan VFD will ramp up to the minimum speed setpoint. A CO₂ sensor installed in the space monitors the CO₂ level and sends a proportional 4-20mA signal back to the main unit controller. The controller will then compare that CO₂ reading against the CO₂ setpoint (default value is 800PPM, adjustable between limits of 0 and 2000PPM) and control as follows:
- If the CO₂ 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.
 - If the CO₂ level is above the setpoint, the VFD will modulate to increase the volume of outside air to dilute the CO₂ 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:

- 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.
- 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.
- 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:
- 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.

(continued next page)

CONTROLS SYSTEM MANUAL

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:
- 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.
 - 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:

- 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.
- 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.
- 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)

CONTROLS SYSTEM MANUAL

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

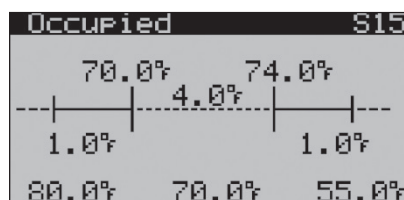
While the basic control for supply air temperature control is neutral air, reset of the supply air temperature for heating or cooling can be configured using either a space temperature sensor (pAD), the outdoor air temperature sensor, or a combination of both. Each is described as follows:

- 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:



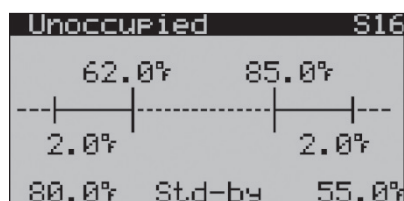
Note the bottom row displays the Heating, Neutral Air, and Cooling supply air reset temperature setpoints.

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)

CONTROLS SYSTEM MANUAL

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.

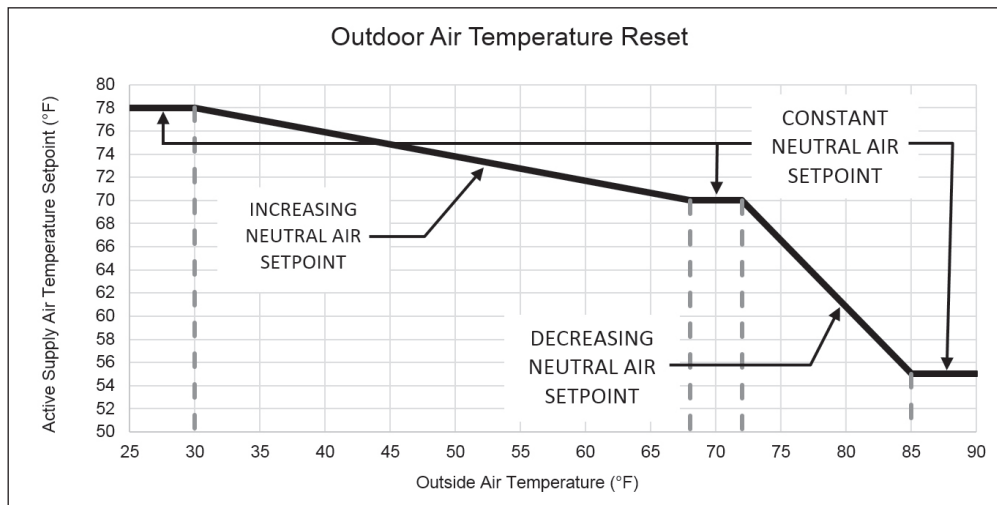
For example, with a heating setpoint of 62.0°F the space must fall below 60.0°F (62.0°F - 2.0°F) before a heating reset call is sent to the unit. The space must rise above 62°F before the heating reset condition is cleared. On a call for space heating, the supply air temperature setpoint will be reset 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.



(continued next page)

CONTROLS SYSTEM MANUAL

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)

CONTROLS SYSTEM MANUAL

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)

CONTROLS SYSTEM MANUAL

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 dehumidification, it also adds unoccupied space RH dehumidification, 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 dehumidification comes from the calculated mixed air DP value and compared against the mixed air DP setpoint. This cannot call for dehumidification 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 dehumidification, it also adds unoccupied space RH dehumidification, 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)

Dehumidification Control Priority

Dehumidification is given priority over cooling as follows:

- **No Cooling Demand:** When a call for dehumidification is received, the unit will transition into dehumidification mode immediately.
- **Cooling Demand:** When a call for dehumidification is received while the unit is in cooling mode, the unit will transition from cooling to dehumidification mode, via a demand transfer process. The demand transfer process allows both cooling and dehumidification demand to build simultaneously so that compressors already operational from cooling can remain active and modulation changes based on dehumidification 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 Dehumidification Initiation

With dehumidification initiation controls and dehumidification/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 decrease 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.

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CONTROLS SYSTEM MANUAL

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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CONTROLS SYSTEM MANUAL

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 allow 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.

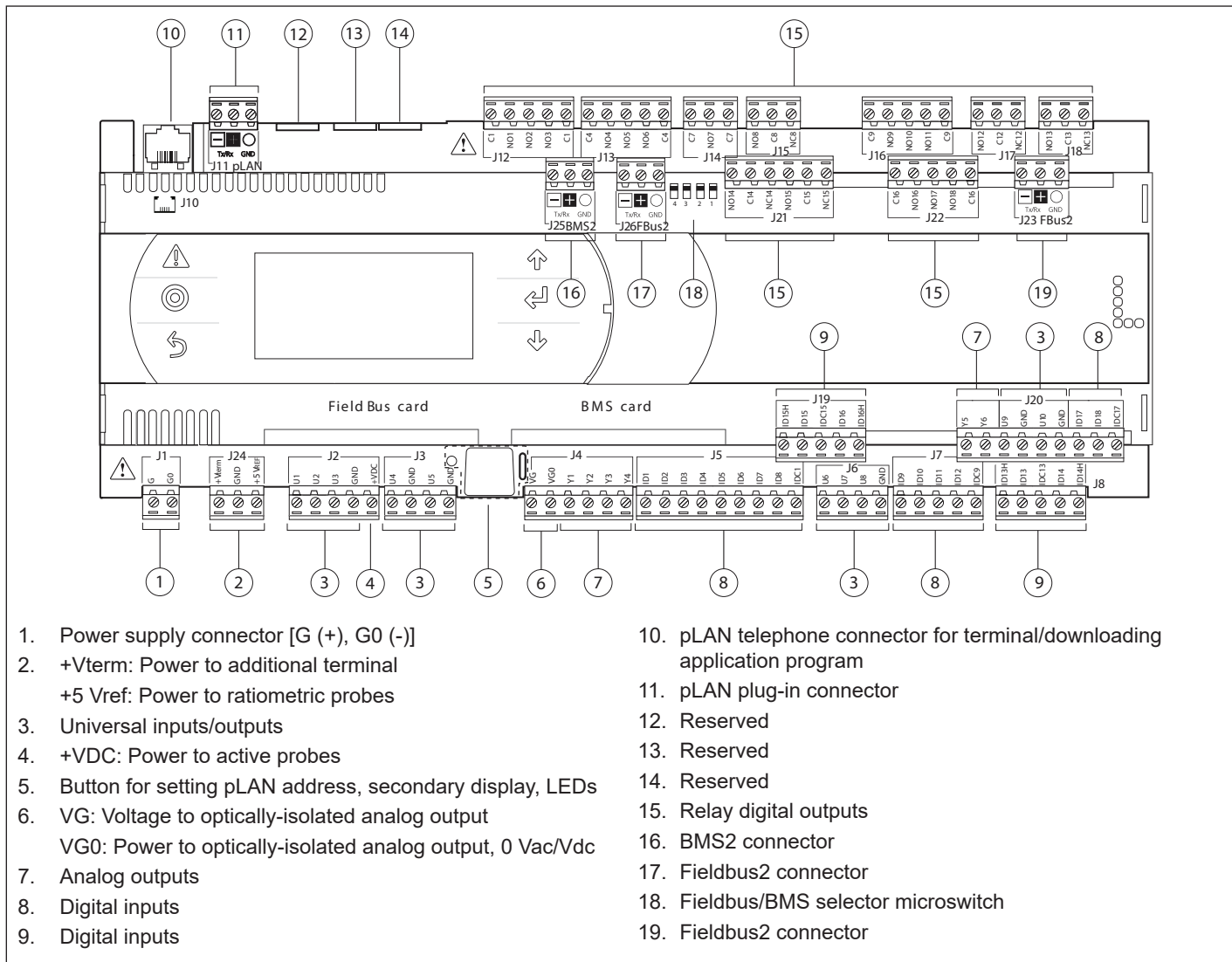
② If DI12 is open (normal operation) but DI16 is open (power failure on Circuit 1), the unit will go into the Stand-By Power mode. If a stand-by power source is not active, the unit will be shutdown from lack of power on Circuit 2.

The sequence of operation is as follows:

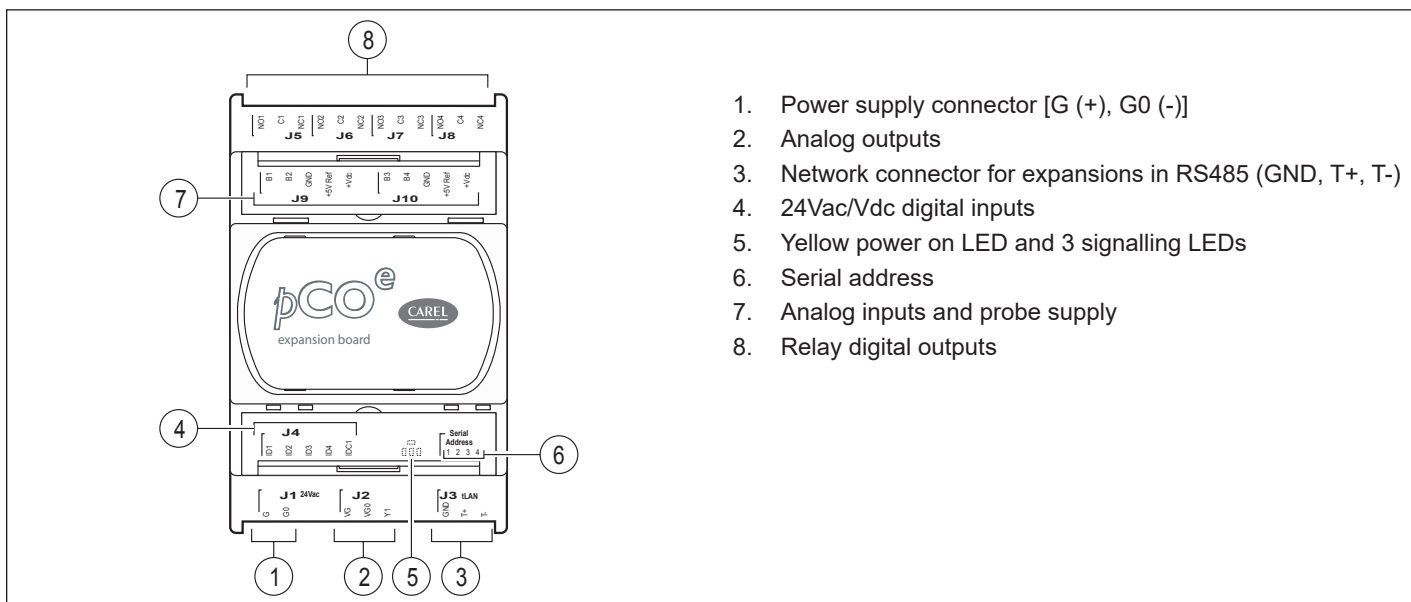
- A. **Normal Power Mode:** Both Circuits 1 and 2 are fed from the utility feed and all systems operate normally.
- B. **Stand-By Power Mode:** The utility feed is removed from Circuits 1 and 2 and the stand-by power feed is applied to Circuit 2 only. In this low power mode of operation, the unit can 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.

CONTROLS SYSTEM MANUAL

pCO5+ Large Controller Layout



pCOe Expansion Board Layout



CONTROLS SYSTEM MANUAL

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.

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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

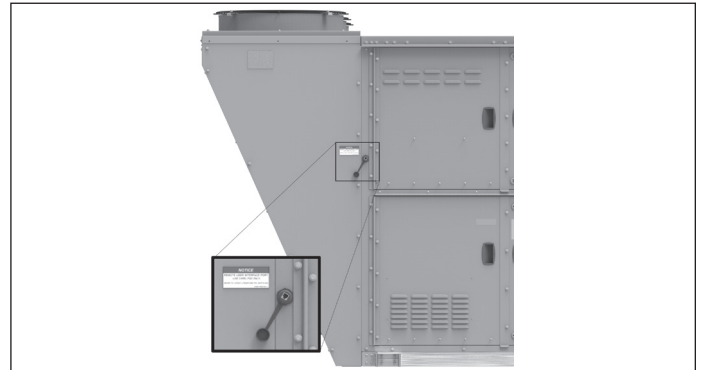
CONTROLS SYSTEM MANUAL

Display/Keypad Functions

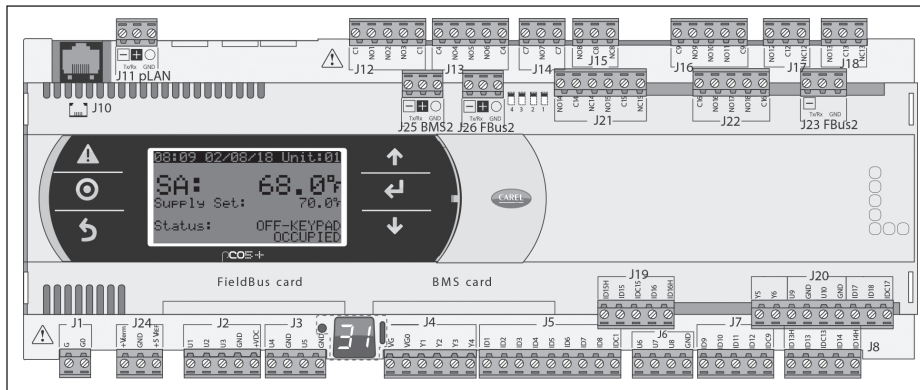
The controller features a built-in user interface with LCD display and keypad. Additionally, all functions of the display/keypad can be replicated using the remote user interface module, pGD1 or pGDE.

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.

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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:

```
12:17 02/08/18 Unit:01
SA: 68.0%
Supply Set: 70.0%
Status: OFF-KEYPAD
        OCCUPIED
```

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

```
Main Menu
H. [Icon] Manufacturer
A. [Icon] On/Off Unit
B. [Icon] Setpoints
```

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

```
Main Menu
B. [Icon] Setpoints
C. [Icon] Clock/Scheduler
D. [Icon] Input/Output
```

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

```
Clock/Scheduler L1
Day: Friday
Date: 02/08/18
Hour: 12:30
```

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.

```
Clock/Scheduler L1
Day: [Cursor] Friday
Date: 02/08/18
Hour: 15:16
```

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

CONTROLS SYSTEM MANUAL

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.

CONTROLS SYSTEM MANUAL

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	

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

CONTROLS SYSTEM MANUAL

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

```
12:17 02/08/18 Unit:01
SA: 68.0°F
Supply Set: 70.0°F
Status: OFF-KEYPAD
          OCCUPIED
```

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 MM/DD/YY	-
		SA:	Actual Value	-	°F
		Supply Set:	Actual Value	-	°F
		Status: (Off/On)	Actual Value	WAITING UNIT ON OFF by ALARM OFF by pLAN OFF by BMS OFF by CLOCK OFF by DIG-IN OFF-KEYPAD OFF-OPEN DOOR WAIT SUP FAN WAIT-DAMPER	-
		(Mode)	Actual Value	Fan-Only Econ Heating Cooling Dehumid	-
		(Occupancy)	Actual Value	UNOCCUPIED OCCUPIED-BMS OCCUPIED-CLK OCCUPIED-DIG OCCUPIED-PAD OCCUPIED	-
pAD Thermostat (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)

CONTROLS SYSTEM MANUAL

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	-	-
Control 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 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 RUNNING	-
		Bypass Damper:	Actual Value	CLOSED or OPEN	-
		Preheater On/Off: (if enabled)	Actual Value	OFF or ON	-

(continued next page)

CONTROLS SYSTEM MANUAL

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 Loss of inducer Motor No Firing Rate Input Gas Sensor Failure Air Sensor Failure Low Combustion Air Mod Valve Failure Weak Flame Signal	-
		Gas Stage 2 Status: (Beckett Control Board)	Actual Value	Limiting Low Fire Failed Ignition Improper Flame Lost Flame COM Error Running Retry OFF	-
Digital Scroll Status	M25	Status	Actual Value	Off On Start Up Forced Off Alarm Off by time 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	On Close Std-by Pos Wait Init	-
		Digital Compressor Status (On/Off)	(Graphic)	-	-
		Unloader Valve status	(Graphic)	-	-
		Compressor 2 Status (On/Off)	(Graphic)		
		Protection Status	Actual Value	LoSH LOP MOP	-
		SP: (Suction Pressure)	Actual Value	-	psig

(continued next page)

CONTROLS SYSTEM MANUAL

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 Close Std-by Pos Wait Init	-
		Compressor 3 Status (On/Off)	(Graphic)	-	-
		Compressor 4 Status (On/Off)	(Graphic)	-	-
		Protection Status	Actual Value	LoSH LOP 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 DX Cooling 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	-

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A. On/Off Unit Sub Menu Parameters

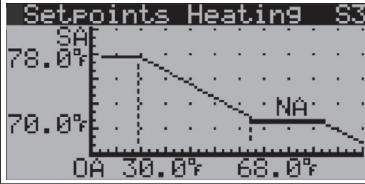
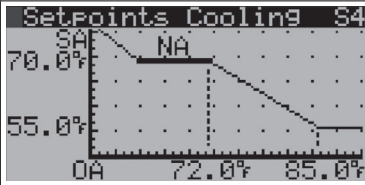
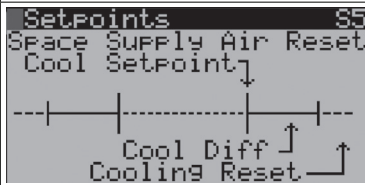
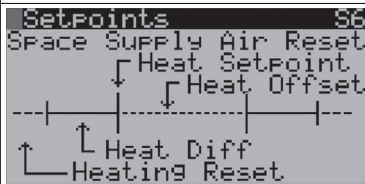
The On/Off Unit menu allows the user to view the detailed On/Off status of the controller.

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

CONTROLS SYSTEM MANUAL

B. Setpoints Sub Menu Parameters

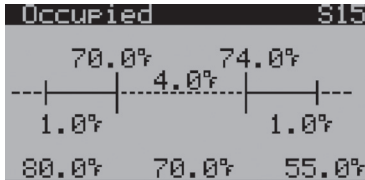
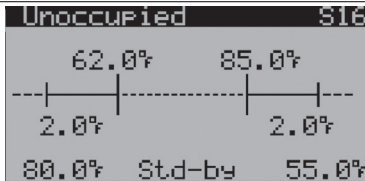
The Setpoint menu allows the user to view and adjust temperature related parameters.

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 Visible 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 60.0 - 100.0 60.0 - 100.0	°F

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CONTROLS SYSTEM MANUAL

B. Setpoints Sub Menu Parameters (continued)

SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	FACTORY VALUE	RANGE	UNITS
pAD Thermostat Occupied Setpoints (Screen Visible 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: (81% eff. Furnace) (90+%/hybrid eff. Furnace) (Electric Heat)	80.0	60.0 - 130.0 60.0 - 100.0 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: (OA & Space Selected)	55.0 Adjusted from pAD	45.0 - 65.0 -	°F
		Occupied Diff Off:	5.0	0.0 - 10.0	°F
		Unoccupied Space Dewpoint: (Visible only with pAD)	60.0	45.0 - 65.0	°F
		Unoccupied Diff Off: (Visible only with pAD)	5.0	0.0 - 10.0	°F
DeHum Dewpt Setpoints (Screen Visible with Dewpoint Dehumidification)	S18	Occupied MA Dewpoint: (MA & Space Selected)	55.0 Adjusted from pAD	45.0 - 65.0 -	°F
		Occupied Diff Off:	5.0	0.0 - 10.0	°F
		Unoccupied Space Dewpoint: (Visible only with pAD)	60.0	45.0 - 65.0	°F
		Unoccupied Diff Off: (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 FIRST SECOND THIRD 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 FIRST SECOND THIRD 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:	*	M	-
			*	T	
			*	W	
			*	T	
			*	F	
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

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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 <i>(Screens are visible based on unit configuration)</i>	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 <i>(Screens are visible based on unit configuration)</i>	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)

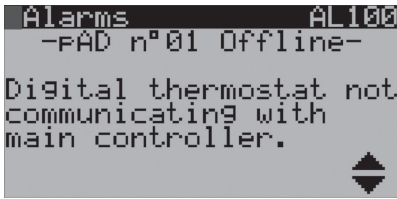
SCREEN NAME	SCREEN #	PARAMETER DESCRIPTION	CHANNEL	RANGE	UNITS
c. Relay Outputs <i>(Screens are visible based on unit configuration)</i>	V1	Heat 3	1	OFF or ON	-
	V2	Gas Boost Heat	1	OFF or ON	-
	V3	Heat 4	2	OFF or ON	-
	V4	Compressor 1	3	OFF or ON	-
	V5	Compressor 2	4	OFF or ON	-
	V6	OA Damper Open	5	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 <i>(Screens are visible based on unit configuration)</i>	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

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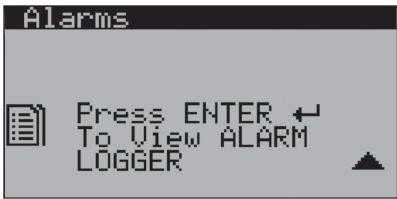
E. Alarm Logger Sub Menu Parameters

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

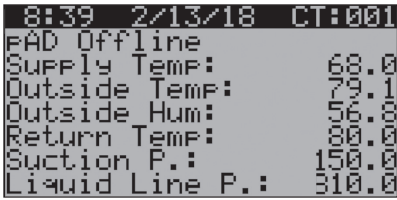
To access the contents of the Alarm Logger, start by pressing the ALARM button, followed by the DOWN button. Displayed will be the most recent alarm, as shown in the following example:



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	Actual Value	HH:MM	-
		Date		MM/DD/YY	
		CT: (Alarm Count)		0 - 100	
		(Alarm Description) <i>(If no alarm is stored in the log "NO ALARMS" will be displayed)</i>	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	-	-

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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 AI (AI=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 AI 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 AI 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 AI CCT1		•		During normal working mode compressor running outside safe operating conditions multiple times within the hour.	Circuit permanently locked out.
Envelope Code1 AI 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

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CONTROLS SYSTEM MANUAL

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

ALARM/LOGGED EVENTS	AR ①	UD ①	CD ①	CAUSE	ACTION
Envelope Code2 AI CCT1		•		Working in a conditional zone where the maximum admitted power is 0% multiple times within the hour.	Circuit permanently locked out.
Envelope Code2 AI 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 AI CCT1		•		During startup procedure exceeded maximum startup zone limit within the hour.	Circuit permanently locked out.
Envelope Code3 AI 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" AI			•	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 AI			•	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" AI			•	Electronic expansion valve disconnected or faulty condition persists.	Circuit permanently locked out.
EVD2 Exv Motor "B" AI			•	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 AI			•	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 AI	•			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

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CONTROLS SYSTEM MANUAL

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 AI			•	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 AI		•		Duct pressure has exceeded upper limit setpoint.	Alarm generated – Unit will be Off by Alarm.
High Pressure AI 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 AI 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 AI 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 AI 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 AI 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 AI 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

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CONTROLS SYSTEM MANUAL

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 AI 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 AI 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 AI CCT1			•	Superheat value below threshold longer than allowable 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 AI CCT2			•	Superheat value below threshold longer than allowable 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)

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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

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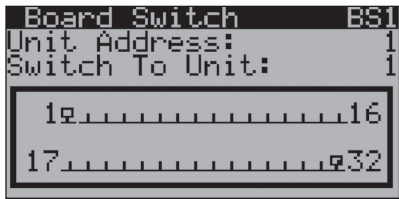
F. Board Switch Sub Menu Parameters

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	1
				ERV	2
				Remote Wall Stat (pAD)	4
				Superheat Control (EVD1)	30
				Superheat Control (EVD2)	31
				Remote Display (pGD1)	32
		Switch to Unit:	Actual Value	See Above	See Above

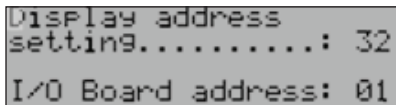
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Programming the Remote Display Keypad to the Carel Controller

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

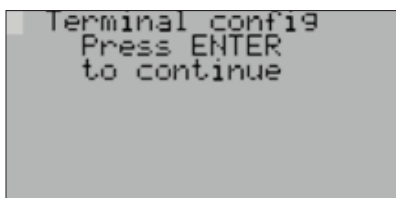
1. Press and hold down the UP+DOWN+ENTER buttons simultaneously until "Display Address" screen is shown. The address settings should be:

- Display: 32
- I/O Board: 1 (for PCO5) or 2 (for PCOxs)



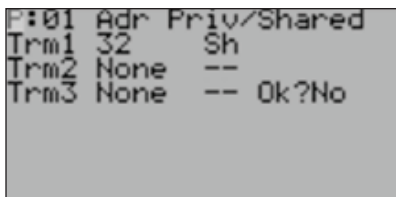
```
Display address
setting9.....: 32
I/O Board address: 01
```

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



```
Terminal conf
Press ENTER
to continue
```

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



```
P:01 Adr Priv/Shared
Trm1 32 Sh
Trm2 None --
Trm3 None -- Ok?No
```

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.

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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 60	Hz
INFORMATION	A5	T-Memory Writes:	Actual Value	-	-
		pLAN Online:	Actual Value	ON OFF	-
Control Power Status	A6	Last Off Time:	Actual Value	-	MM/DD/YY HH/MM/SS
		Last On Time:	Actual Value	-	MM/DD/YY HH/MM/SS
Restore Dates	A7	Factory Save:	Actual Value	-	MM/DD/YY HH/MM/SS
		Last Customer Save:	Actual Value	-	MM/DD/YY 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 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 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 ON	-

(continued next page)

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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 ON	-
Compressor 2	X5	Run Hours:	Actual Value	0 - 350,000	(h)ours
		Number of Starts:	Actual Value	0 - 350,000	-
		Reset:	OFF	OFF ON	-
Compressor 3	X6	Run Hours:	Actual Value	0 - 350,000	(h)ours
		Number of Starts:	Actual Value	0 - 350,000	-
		Reset:	OFF	OFF ON	-
Compressor 4	X7	Run Hours:	Actual Value	0 - 350,000	(h)ours
		Number of Starts:	Actual Value	0 - 350,000	-
		Reset:	OFF	OFF 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 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 ON	-
Exhaust Fan	X10	Run Hours:	Actual Value	0 - 350,000	(h)ours
		Number of Starts:	Actual Value	0 - 350,000	-
		Reset:	OFF	OFF 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 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 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 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 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 ON	-
ERV Wheel	X16	Run Hours:	Actual Value	0 - 350,000	(h)ours
		Number of Starts:	Actual Value	0 - 350,000	-
		Reset:	OFF	OFF ON	-

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CONTROLS SYSTEM MANUAL

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 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 ON	-
Running Hours	X19	Hours Save:	OFF	OFF ON	-
		Hours Restore:	OFF	OFF ON	-
c. Power Meter					
Power Meter	PM1	PM Address:	001	0 - 254	-
		VT Wiring Type:	3LL	3Ln 2Ln 2LL 3LL	-
		CT Wiring Type:	3CT	3CT 1CT 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 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 Inductive 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 CAREL MODEM MODBUS PCOLOAD BACnet MSTP BACnet IP/Eth LON	-
		BACnet PlugIn?	NO	NO YES	-
		BMS-2 Protocol:	PCOLOAD	N/A PCOLOAD CAREL MODBUS	-
BMS Configuration	U2	Address	1	0 - 999	-
		Baud rate	2400	1200 2400 4800 9600 19200	-
BMS Configuration	U3	Enable Heartbeat:	OFF	OFF 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 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 9600 19200 38400 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 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 Write	-
		Update?	NO	NO YES	-
e. Fieldbus Config.					
Fieldbus 1 Config.	FB1	Fieldbus 1 Config. Protpcol:	WinLoad	-	-
		Fieldbus 2 Config. Protpcol:	MODBUS	MODBUS WinLoad	-
Modbus Status	FB2	Modbus CMD Result:	-	Modbus General Error Invalid Com Config Com Config Done No Error	-
Configuration of Modbus Settings 1st Master	FB3	Baudrate:	19200	1200 2400 4800 9600 19200	Bits/s
		Stop Bit:	1	1,2	-
		Parity Mode:	None	None Even Odd	-
		Timeout	180ms	100 - 5000	ms
		Error Status:	None	"Nothing" Generic Error Bios Error	-
Configuration of Modbus Settings 2nd Master	FB4	Baudrate:	19200	1200 2400 4800 9600 19200	Bits/s
		Stop Bit:	1	1,2	-
		Parity Mode:	None	None Even Odd	-
		Timeout	180ms	100 - 5000	ms
		Error Status:	None	"Nothing" Generic Error Bios Error	-
Power Meter Settings	FB3	Enable Power Meter:	Off	ON/OFF	-
		Modbus Address:	001	001 - 255	-
		BaudRate:	19200	1200 2400 4800 9600 19200	Bits/s
Serial Probe n°01 - 04	FB6 - FB9	Serial Probe n°01 - 04	OFF	ON OFF	-
		Location: (Alphanumeric description used for front screen)	-	-	-
		Address:	128 - 131	128 - 159	-
		Type:	TEMPERATURE	TEMPERATURE TEMP.+HUMID.	-
		Default Inst.	NO	NO 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 MAXIMUM pAD ONLY	-
		Humidity process control for all space readings:	AVERAGE	AVERAGE MAXIMUM pAD ONLY	-
pAD Control	FB11	INCLUDE/EXCLUDE pAD in temperature and humidity averaging or maximum reading.	INCLUDE	INCLUDE 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 YES	-
f. Service Settings / b. Probe Adjustment					
Return Air Humidity	P1	Input:	U01	-	-
		Offset: Calibration Offset	0	-99.9 - 99.9	%rH
		Value: (including Offset)	Actual Value	-	%rH
CO2	P2	Input:	U02	-	-
		Offset: Calibration Offset	0	-99.9 - 99.9	ppm
		Value: (including Offset)	Actual Value	-	ppm
Furnace Stage 2	P3	Input:	U02	-	-
		Offset: Calibration Offset	0	-99.9 - 99.9	vdc
		Value: (including Offset)	Actual Value	-	vdc
Evaporator Off Temp	P4	Input:	U02	-	-
		Offset: Calibration Offset	0	-99.9 - 99.9	°F
		Value: (including Offset)	Actual Value	-	°F
Duct Static Pressure	P5	Input:	U03	-	-
		Offset: Calibration Offset	0	-99.9 - 99.9	iwc
		Value: (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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CONTROLS SYSTEM MANUAL

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 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 ON	-
		By Supervisor:	OFF	OFF ON	-
		By pLAN network:	OFF	OFF ON	-
		By Schedule:	OFF	OFF ON	-
Control Settings	CS4	pAD Thermostat:	OFF	OFF ON	-
		Reset Type:	NONE	NONE SPACE OUTSIDE AIR SPACE & OA	-
		Dehum Mode:	NONE	NONE OA DEWPOINT OA & SPACE SPACE MA & SPACE MA DEWPOINT	-
Control Settings	CS5	Allow pAD Setpoint to be Neutral Air Setpoint: (Screen shown if pAD is ON and Reset Type is set to NONE)	NO	NO 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:	100.0	Min - Max Output	%
		Speed 1:	50.0	0 - 100.0	%
		Press Setpt:	0.100	0.000 - 0.500	iwc
		(Building or Duct Static Pressure)	1.500	0.000 - 5.000	iwc
		CO2 Setpoint	800	0 - 2000	ppm
		BMS Modulation:	(Min Output)	Min - Max Output	%
		Speed 2:	70.0	0 - 100.0	%
		Speed 3:	85.0	0 - 100.0	%
		Minimum Output:	50	Design Min Limits	%
Speed 4:	100.0	0 - 100.0	%		
Maximum Output:	100	Design Max Limits	%		

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CONTROLS SYSTEM MANUAL

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:	50.0	20.0 - 100.0	%
		Speed 1:	20.0	0 - 100	%
		Press Setpt: (Building Pressure)	0.100	0.000 - 0.500	iwc
		Sup Fan Offset:	-10.0	-20.0 - 20.0	%
		BMS Modulation:	(Min Output)	Min - Max Output	%
		Speed 2:	40.0	0 - 100	%
		Speed 3:	70.0	0 - 100	%
		Minimum Output:	20.0	40 - 100	%
OA Damper Control (Parameters depend on Damper configuration type. Screen not shown on DOAS units)	CS9	Speed 4:	100.0	0 - 100	%
		Maximum Output:	100.0	40 - 100	%
		OA Position:	50	Min - Max Output	%
		OA Damp Pos 1:	50	0 - 100	%
		CO2 Setpoint:	800	0 - 2000	ppm
		Building Pressure Setpoint:	0.100	0.000 - 0.500	iwc
		BMS OA Damper Pos:	(Min Open)	0 - 100	%
		OA Damp Pos 2:	50	0 - 100	%
Gas and Electric Staging Setup	CS10	OA Damp Pos 3:	50	0 - 100	%
		OA Damp Min Opent:	0	Design Min Limits	%
		OA Damp Pos 4:	50	0 - 100	%
Gas and Electric Staging Setup	CS11	OA Damp Max Open:	100	Design Max Limits	%
		Gas OR Electric C/O:	ON	OFF ON	-
		OA Setpoint:	50.0	0 - 100.0	°F
Gas and Electric Staging Setup	CS12	OA On Differential:	5.0	1.0 - 10.0	°F
		Gas AND Electric:	OFF	OFF ON	-
		OA Setpoint:	10.0	-50.0 - 100.0	°F
Boost Heater (for control of external heater)	CS13	OA On Differential:	5.0	1.0 - 10.0	°F
		Boost Heat En:	OFF	OFF ON	-
		OA Setpoint:	10.0	-50.0 - 100.0	°F
Temperature Lockouts	CS14	OA On Differential:	5.0	1.0 - 10.0	°F
Mechanical Lockouts	CS15	Compressor and Furnace Lockouts Reference:	OUTSIDE AIR	OUTSIDE AIR RETURN AIR	-
Fan-Only Mode Diff.	CS16	Cooling Below:	45.0	0.0 - 99.9	°F
		Heating Above:	65.0	1.0 - 99.9	°F
		Above Setpoint:	5.0	0.0 - 99.9	°F
		Current Setpoint:	Actual Value	-	°F
		Below Setpoint:	-5.0	-10.0 - 0.0	°F
HGRH Settings	CS17	Temp/Time Delay:	30	10 - 180	(s)econds
		Heat/Cool Change over Delay:	5.0	5 - 60	(m)inutes
Hot Water Settings	CS18	Control HGRH to:	SUPPLY AIR SETPOINT	SUPPLY AIR SETPOINT HGRH SETPOINT	-
		HGRH Setpoint:	50.0	50.0 - 90.0	°F
Hot Water Settings	CS19	Un-occupied Bleed OA Setpoint:	40.0	0.0 - 99.9	°F
		Un-occupied Bleed HW Valve Position:	20	0 - 100	%
Dual Point Power	CS20	Occupied Bleed OA Setpoint:	50.0	0.0 - 99.0	°F
		Occupied Bleed HW Valve Position:	10	0 - 100	%
Dual Point Power	CS21	Enable:	OFF	OFF ON	-
		Enable Furnace in Standby:	OFF	OFF ON	-

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CONTROLS SYSTEM MANUAL

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 OFF	-
		Damper Position:	CURRENT POS	CURRENT POS 100% OA	-
Customer Parameters	-	Customer Save:	NO	NO YES	-
		Customer Restore:	NO	NO 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 ON	-
		Output Period:	500	-	ms
Dehum Control	D2	Proportional Gain: - (B & C Cabinet Sizes) - (D Cabinet Size)	1.0 3.0	0 - 99.9	-
		Integration Time: - (B & C Cabinet Sizes) - (D Cabinet Size)	225 125	0 - 999.9	(s)econds
		Derivative Time:	0	0 - 999	(s)econds
		Anti-Bump Xfer:	ON	OFF 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 ON	-
		Output Period:	500	-	ms
Hot Gas Reheat (Screen visible on HGRH units)	D4	Control Type:	REV	DIR REV BOTH	-
			P+I	P P+I PID	-
		Bd:	FULL	FULL 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 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 ON	-

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CONTROLS SYSTEM MANUAL

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 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 ON	-
CO2 Damper Control	D9	Control Type:	DIR	DIR REV BOTH	-
			P+I	P P+I 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 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 REV BOTH	-
			P+I	P P+I PID	-
		Bd:	FULL	FULL 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 ON	-
		Above Set Point:	0	0 - 99.9	-
		Below Set Point:	0	0 - 99.9	-

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CONTROLS SYSTEM MANUAL

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 REV BOTH	-
			P+I	P P+I PID	-
		Bd:	FULL	FULL 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 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 REV BOTH	-
			P+I	P P+I 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 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 REV BOTH	-
			P+I	P P+I 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 ON	-
		Above Set Point:	0	0 - 99.9	-
		Below Set Point:	0	0 - 99.9	-

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CONTROLS SYSTEM MANUAL

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 REV BOTH	-
			P+I	P P+I 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 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 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 YES	-
Duct Static Pressure (Screen Visible with Static Pressure Sensor)	AM4	Sensor Failure Action:	Sup-Fan Min Speed	Sup-Fan Min Speed 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 YES	-
		High Limit Alarm	610.0	500.0 - 700.0	psig
Force Off Comps	AM7	Comp 1 (Dig):	OFF	OFF ON	-
		Comp 2:	OFF	OFF ON	-
		Comp 3: (Dual circuit system)	OFF	OFF ON	-
		Comp 4: (Dual circuit system)	OFF	OFF ON	-
Furnace Alarms	AM8	Shut Down Unit on a Beckett Board Failure: (Stage 1 or Stage 1 and Stage 2) (Beckett furnace control board)	NO	NO YES	-
Furnace Alarms	AM9	Gas Alarm Delay: (United Tech. furnace control board)	240	0 - 500	(m)inutes
Smoke Detector Alarm	AM10	Reset Type:	AUTO	AUTO MANUAL	-

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CONTROLS SYSTEM MANUAL

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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CONTROLS SYSTEM MANUAL

G. Service Sub Menu Parameters (continued)

WARNING

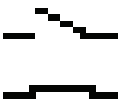
Improper control adjustments and manual mode control can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before making adjustments.

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 ON	-
		Select Mode: (Unit Specific)	FAN-ONLY	FAN-ONLY ECON HEATING COOLI NG 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 ON	-
		Manual Position:	0	0 - 480	steps
		Current Position:	Actual Value Actual Value	Actual Value Actual Value	steps %
EVD n°02.a Carel EEV (Dual Circuit Unit)	MN4	Enable Manual Valve Position:	OFF	OFF ON	-
		Manual Position:	0	0 - 480	steps
		Current Position:	Actual Value Actual Value	Actual Value Actual Value	steps %
EVD n°01.b HGRH Valve	MN5	Enable Manual Valve Position:	OFF	OFF ON	-
		Manual Position:	0	0 - 100	%
		Current Position:	Actual Value	Actual Value	%
EVD n°02.b HGRH Valve (Dual Circuit Unit)	MN6	Enable Manual Valve Position:	OFF	OFF ON	-
		Manual Position:	0	0 - 100	%
		Current Position:	Actual Value	Actual Value	%
g. Manual Management / b. Analog Inputs					
Return Air Humidity (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”: Puts the input into manual mode	OFF	OFF 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).	0	-	°F
		U “XX” Value: If Manual Control is OFF it is the actual value of the Sensor. 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 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 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 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 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 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 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 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 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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CONTROLS SYSTEM MANUAL

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: Puts the output into manual mode	AUTO	AUTO 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 - 100.0	%
		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 - 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”: Puts the input into manual mode	AUTO	AUTO HAND	-
		Manual Position: 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 OPEN	-
		Input Status: If Manual Control is AUTO it is the actual status of the input. If Manual Control is HAND it is the status of the Manual Position.	Actual Value	CLOSED 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) Humid (Humidity probe installed)	-
pAD Configuration	PC2	pAD n°01	Actual Value	-	-
		Large Display (Change what appears on the thermostat)	Temp	NA T.Set Temp H.Set Hum	-
		Small Display (Change what appears on the thermostat)	Hum	Time T.Set Temp H.Set 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 1 = ON/OFF 2 = MODE 3 = HUM 4 = NIGHT/SLEEP 5=CLOCK 6 = TMEP 7 = PROG 8 = FAN 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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CONTROLS SYSTEM MANUAL

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 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 ON	-
		Cleaning Rotation Delay:	20	0 - 999	(m)inutes
		Duration:	5	0 - 999	(s)econds
ERV Preheater	E3	Preheater Enable:	NO	NO YES	-
		Set Point:	MANUAL	CALCULATED MANUAL	-
		Mode:	ON/OFF	ON/OFF 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

CONTROLS SYSTEM MANUAL

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 ERV DOOR OPEN OFF by pLAN	-

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CONTROLS SYSTEM MANUAL

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 Closed	-
	ID2	Wheel Pressure Drop	DI2	Open Closed	-
	ID3	Outdoor Air Filter	DI3	Open Closed	-
	ID4	Exhaust fan Status	DI4	Open Closed	-
	ID5	ERV Door Switch	DI5	Open 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 ON	-
	NO2	Wheel Enable	2	OFF ON	-
	NO3	Preheater Enable	3	OFF ON	-
	NO4	Exhaust Fan Enable	4	OFF 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)

CONTROLS SYSTEM MANUAL

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 (Puts the input into manual mode)	OFF	OFF 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).	-	CLOSED OPEN	-
		DI 1 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 OPEN	-
Wheel Pressure Drop	MN3	Manual DI 2 (Puts the input into manual mode)	OFF	OFF 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).	-	CLOSED OPEN	-
		DI 2 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 OPEN	-
Outdoor Air Filter	MN4	Manual DI 3 (Puts the input into manual mode)	OFF	OFF 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).	-	CLOSED OPEN	-
		DI 3 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 OPEN	-
Exhaust Fan Status	MN5	Manual DI 4 (Puts the input into manual mode)	OFF	OFF 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).	-	CLOSED OPEN	-
		DI 4 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 OPEN	-
ERV Door Switch	MN6	Manual DI 5 (Puts the input into manual mode)	OFF	OFF 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).	-	CLOSED OPEN	-
		DI 5 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 OPEN	-

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CONTROLS SYSTEM MANUAL

Service Sub Menu Parameters (ERV UNITS) (continued)

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

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CONTROLS SYSTEM MANUAL

Service Sub Menu Parameters (ERV UNITS) (continued)

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

CONTROLS SYSTEM MANUAL

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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CONTROLS SYSTEM MANUAL

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	-	-	-

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CONTROLS SYSTEM MANUAL

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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CONTROLS SYSTEM MANUAL

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_AI	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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CONTROLS SYSTEM MANUAL

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 Exhaust 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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As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.

