Revision: CP-P125-R7DA-D19-D21-D22-D23 (03-19) PN1024315R0

Supersedes: D300535B (10-18) CP-P125-D19-D21-D22

CONTROL SYSTEM GUIDE FOR Y, J, AND R7 SERIES

DIGITAL CONTROL OPTIONS D19, D21, D22, AND D23

Important safety information for Y and J series packaged rooftop equipment:

⚠ DANGER ⚠

This unit contains R-410A high pressure refrigerant. Hazards exist that could result in personal injury or death. Installation, maintenance, and service should only be performed by an HVAC technician qualified in R-410A refrigerant and using proper tools and equipment. Due to much higher pressure of R-410A refrigerant, DO NOT USE service equipment or tools designed for R22 refrigerant.

Important safety information for R7 series packaged rooftop equipment:

⚠ WARNING ⚠

FIRE OR EXPLOSION HAZARD

- **Failure to follow safety warnings exactly could result in serious injury or property damage.**
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**
- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Leave the building immediately.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

DO NOT DESTROY. PLEASE READ CAREFULLY. KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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GENERAL INFORMATION

This equipment has been tested for capacity and efficiency so as to provide many years of safe and dependable comfort providing it is properly installed and maintained. With regular maintenance, this equipment will operate satisfactorily year after year. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

To achieve optimum performance and minimize equipment failure, it is recommended that periodic maintenance be performed on this equipment. The ability to properly perform maintenance on this equipment requires certain tools and mechanical skills.

REFERENCES

Table 1. Related Technical Manuals Available from Factory Distributor

Type	Form	PN
Y Series		
Installation/operation	I-Y	D300530
Replacement parts	P-Y	273651
J Series		
Installation	I-J	D300537
R7 Series		
Installation	I-R7DA	1024294
Operation	O-R7DA	1024295
Replacement parts	P-R7DA	D303299

CONTROL SYSTEM

The control system utilizes a factory-installed system programmable controller, an optional field-installed remote display (wall-mounted or handheld), and an optional field-installed space-mounted thermostat display that allows for complete access to unit test features, schedules, discharge air setpoints, fan control, alarms, and other unit operational setpoints. The control system's features include:

- Local and remote alarming
- Integrated time clock
- Compressor anti-cycle protection and minimum ON/OFF cycle rates
- Protocol support for BACnet®
- Alarm shutdown feature
- Commissioning and test mode functions
- Energy-conscious applications
- TAB menu for creating backup of setpoints

System Programmable Controller

The system programmable controller (see **Figure 1**) has an integral display that shows unit features and parameters that can be modified. Refer to **Table 2** for a list of control system hardware input points and their descriptions. Refer to **Table 3** for a list of control system hardware output points and their descriptions.

Figure 1. System Programmable Controller with Integral Display

Table 2. Control System Inputs

Input Terminal	Input Point Name	Input Description	Signal Type	Signal Range	Always Active?
Controller Inputs					
J23 FB2	**Spc_Temp**	Space temperature, up to total of 6 inputs	RS-485 communication	—	No
	Spc_Humidity	Space humidity, up to total of 6 inputs			
U1	**OA_Hum_Raw**	Outside air humidity	0–10 VDC	0 to 100% RH	
U2	**OA_Temp_Raw**	OAT	Thermistor 10K-2	–35°F to 240°F (–37°C to 115°C)	Yes
U3	**EE_Temp_A**	Entering evaporator temperature circuit A			No
U4	**DA_Temp**	DAT			Yes
U5	**CC_Temp**	Cooling coil DAT			No
U6	**MA_Temp**	Mixed air temperature			
U7	**Bldg_Pressure**	Building static pressure	0–10 VDC	–0.5 IN WC through +0.5 IN WC	
U8	**Duct_Pressure**	Duct static pressure		0–2.5 IN WC	
U9	**Spc_CO2**	Space CO_2		0–2000 ppm	
U10	**ERV_DA_Temp**	Energy recovery wheel DAT	Thermistor	–35°F to 240°F (–37°C to 115°C)	
J26 FB2	**RA_Temp**	Return air temperature	RS-485 communication	—	
	RA_Humidity	Return air humidity			
J26 FB2	**EA_Temp**	Exhaust air temperature			
	EA_Humidity	Exhaust air humidity			
ID1	**SF_Sts**	Supply fan status	Dry contact	Open = OFF/close = ON	Yes
ID2	**Filter_Sts**	Main or ERV dirty filter status			No
ID3	**Safety_Sts**	Safety input status		Open = ALARM/close = NORMAL	Yes
ID4	**Ext_OCC**	Occupied mode input		Open = OFF/close = ON	No
ID5	**Ext_Call_Fan**	External fan call input (G)			

Table 2. Control System Inputs—Continued

Input Terminal	Input Point Name	Input Description	Signal Type	Signal Range	Always Active?
ID6	**Ext_Call_Heat**	External heat call input (W1)	Dry contact	Open = OFF/close = ON	No
ID7	**Ext_Call_Cool**	External cool call input (Y1)			
ID8	**Ext_Call_Dh**	External dehumidification call input			
ID9	**Ext_ Switch_1**	External position switch 1			
ID10	**Ext_ Switch_2**	External position switch 2			
ID11	**EF_Sts**	Exhaust fan status			
ID12	**Comp_A_Alarm**	Modulating compressor A alarm			
ID13	**RH_A_Alarm**	Modulating reheat compressor A alarm			
ID14	**Phase_Alarm**	Phase protection alarm			
ID15	**Htr_1_Sts**	Gas heater 1 status	Relay N.O. contact		
ID16	**Htr_2_Sts**	Gas heater 2 status			
Expansion Board Inputs					
U1	**SF_DP**	Supply fan differential pressure	0–5 VDC	0–10 IN WC	No
U2	**EF_DP**	Exhaust fan differential pressure			
U3	**OA_Flow**	Outside airflow		0–15,000 scfm	
U4	**EE_Temp_B**	Entering evaporator temperature circuit B	Carel NTC	–58°F to 221°F (–50°C to 105°C)	
U5	**EA_Temp**	Exhaust air temperature			
U6	**SF_Temp**	Supply fan temperature			
J25 BMS2	**EF_Cmd**	Exhaust fan command	RS-485 communication	—	
	EF_Spd_Cmd	Exhaust fan speed command			

Table 3. Control Sysyem Outputs

Output Terminal	Output Point Name	Output Description	Signal Type	Signal Range	Always Active?
Y1	**Damper_Cmd**	Damper output command	0–10 VDC	0–100% open	No
Y2	**SF_Spd_Cmd**	Supply fan speed command		0–100% speed	
Y3	**Comp_A_Cmd**	Compressor A modulation command	1–5 VDC	0–100% capacity	
Y4	**HX_Mod_Cmd**	Gas heating modulation command	2–10 VDC		
		Electric heating modulation command	0–10 VDC		
Y5	**RH_A_Cmd**	Reheat A modulation command (pump)	1–5 VDC		
		Reheat A modulation command (valve)	0–10 VDC		
Y6	**CF_Spd_Cmd (Y and J series)**	Condenser fan speed command		Fixed at 90% speed	
	Vent_Spd_Cmd (R7 series)	Venter fan speed command		0–100% speed	
NO1	**SF_Cmd**	Supply fan command	24Vac contact	Open = OFF/close = ON	Yes
NO2	**Comp_B_Cmd**	Compressor B command			No
NO3	**Comp_C_Cmd**	Compressor C command			
NO4	**Comp_D_Cmd**	Compressor D command			
NO5	**Cond_A_Cmd**	Condenser section A command			
NO6	**Cond_B_Cmd**	Condenser section B command			
NO7	**Alm_Rly_Cmd**	Unit general alarm relay command			Yes
NO8	**HX_Stg1_Cmd**	Heating stage 1 command			No
NO9	**HX_Stg2_Cmd**	Heating stage 2 command			
NO10	**HX_Stg3_Cmd**	Heating stage 3 command			
NO11	**HX_Stg4_Cmd**	Heating stage 4 command			
NO12	**HX_Stg5_Cmd**	Heating stage 5 command			
NO13	**HX_Stg6_Cmd**	Heating stage 6 command			
NO15	**ERV_Cmd**	Energy recovery wheel command			
NO16	**Preheat_Cmd**	Electric preheat command			
J25 BMS2	**EF_Cmd**	Exhaust fan command	RS-485 communication	—	
	EF_Spd_Cmd	Exhaust fan speed command			
Expansion Board Outputs					
U7	**RH_B_Cmd**	Reheat B modulation command (valve)	0–10 VDC	0–100% capacity	No

Display Screen Navigation

Navigation through the controller's display screens is accomplished by using the function keys (see **Figure 2**) located on each side of the controller's display or the function keys on the remote display.

Function Key Identification	Alarm	Prg	Esc	Up	Enter	Down
Function Key Display on the System Controller	⚠	◎	↩	↑	↵	↓
Function Key Display on the Remote Controller	🔔	Prg	Esc	↑	↵	↓

Figure 2. Function Keys

The position of the cursor on the screen dictates which of the function keys need to be pressed and when. The home position for the cursor on any screen is located in the upper left-hand corner as shown in **Figure 3**. Display screen navigation when the cursor is in the home position is as follows:

- Press up key to go back to previous screen
- Press down key to advance to next screen in alpha-numeric order
- Press enter key to advance cursor to next available modifiable field (see **Figure 3**)

Display screen navigation when the cursor is positioned on a modifiable field is as follows:

- Press up or down keys to scroll through or toggle
- Press enter key to advance cursor through remaining modifiable fields
- Press enter key again to advance cursor to home position

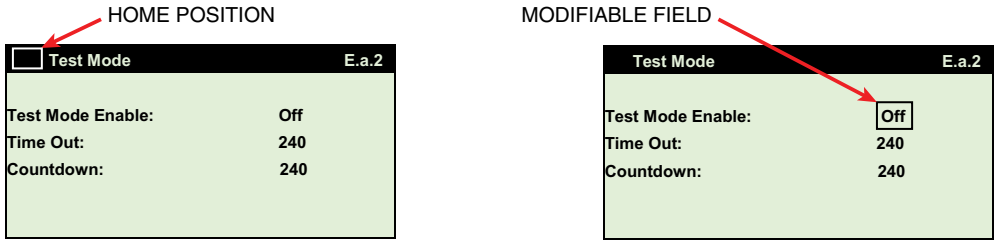


Figure 3. Cursor Home Position and Modifiable Field Position

Thermostat Display

In its normal state, the thermostat's user display shows space temperature and humidity, unit status, and time.

User space-mounted thermostat (option CL78)

NOTE: Option CL78 is optional with digital controls D19 and D21, standard with D23, and not available with D22.

Controls for thermostat option CL78 are listed and described in **Table 4** and shown in **Figure 4**.

Table 4. Thermostat Controls

Button/Dial*	Current State	Action
Mode	—	Selects Heat, Cool, or Auto state when pressed
Fan		Initiates temporary occupied period when pressed
ON/OFF	Heat, Cool, or Auto	Sets unit state to OFF when pressed
	Off	Sets unit state to previous Heat, Cool, or Auto state when pressed
Setpoint adjustment	—	Selects temperature setpoint: press inward on dial once and turn dial clockwise (increase) or counterclockwise (decrease)
		Selects humidity setpoint: press inward on dial twice and turn dial clockwise (increase) or counterclockwise (decrease)

*See **Figure 4**.

Figure 4. Thermostat (Option CL78)

Optional space temperature and humidity averaging feature

NOTE: Refer to the installation manual and/or unit wiring drawings for specific wiring information.

Up to five space sensors may be added to the control system in addition to the CL78 for a total of six space inputs. These devices are combination temperature and humidity sensors that operate on a RS-485 communication trunk. The space averaging sensor addressable DIP switches inside the sensor are shown in **Figure 5**. The user must set these addresses accordingly in the field.

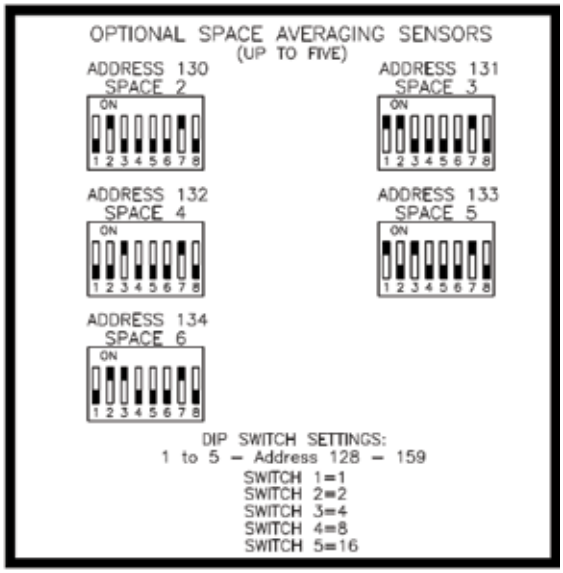


Figure 5. Space Averaging Sensor Addressable DIP Switch Settings

STATES AND MODES OF OPERATION

The states and modes of operation for control options D19, D21, D22, and D23 are described in the following paragraphs. D19, D21, and D22 control Discharge Air Temperature (DAT) as follows: 1) unit supplies ***neutral*** air temperature that does not affect space conditions, 2) unit supplies ***cold*** air temperature to provide space cooling, or 3) unit supplies ***hot*** air temperature to provide space heating. D23 controls space temperature.

NOTE: Heating applies only when a unit is ordered with a gas or electric heat section. Heating is included in all control instructions.

D19 (Discharge Air Temperature) Control via Conventional Thermostat or BMS Input

The D19 control option can operate the supply fan, exhaust fan, dampers, DX cooling, and gas/electric heat to maintain a set of DAT control setpoints via the conventional thermostat or a Building Maintenance System (BMS) input.

D19 conventional input states of operation

D19 controls the unit in the following conventional states of operation:

- **Enable ON:** The unit is permitted to operate based on the automatic control system. The unit switches to the Enable ON state only when the state is manually-selected through the user interface device, unit display, or building automation network communication point.
- **Enable OFF:** The unit supply fan and all associated mechanical equipment is OFF in this state. There are no associated sequences of operation in this state. The unit switches to the OFF state only when the state is manually-selected through the user interface device, unit display, or building automation network communication point. Mechanical system selections are permitted only in the Enable OFF state.
- **Enable OFF/Alarm:** The Enable OFF/Alarm state can occur only from a sequence failure. The unit stops all mechanical operation until resolution of the failure condition(s). Upon resolving the failure, the unit returns to its externally-commanded condition. Alarms may also be cleared by resetting power to the unit.

D19 conventional input modes of operation

When the unit is called to operate in the auto, heating, or cooling state(s), D19 controls the unit in one of two conventional input modes: occupied or unoccupied. The unit will run in occupied or unoccupied mode based on one of the following three user-selected commands:

- Internal time clock schedule selects occupied or unoccupied mode
- Physical input point (ID4) (contact closed = occupied)
- Building automation (BACnet®) command (option BHB8 required)

Descriptions for the D19 conventional inputs are as follows:

NOTE: The desired input type must be selected. The default is conventional thermostat inputs.

1. **Occupied Call (Occupied Contacts (ID4), Optional BMS, or Local Schedule):** when occupied, the dampers follow the occupied mode sequences. When unoccupied, the dampers follow the unoccupied mode sequences (refer to the **Damper Control** section for specific details).
2. **Fan Call (Fan Contacts (ID5) or BMS Input):** when the supply fan call is on. the unit supply fan starts. The fan also automatically starts when the heating, cooling, or dehumidification calls are on. Otherwise, the fan is OFF. The auto sequence is activated from the fan control when the mechanical cooling and heating contacts are open. For continuous supply fan operation, the fan call needs to remain on.
3. **Heating Call (Heating Contacts (ID6) or BMS Input):** when the heating call is on, the supply fan starts and the heating sequence is enabled. Mechanical heat operates to maintain the heating DAT setpoint listed in **Table 5** (Heating Contacts state).
4. **Cooling Call (Cooling Contacts (ID7) or BMS Input):** when the cooling call is on, the supply fan starts. Mechanical cooling operates to maintain the cooling unit DAT setpoint listed in **Table 5** (Cooling Contacts state).
5. **Dehumidification Call (Dehumidification Contacts (ID8) or BMS Input):** when the dehumidification call is on and the cooling and heating contacts are open, the supply fan starts and the unit reheat system is active.
6. **Auto Sequence:** when the fan call is on and the mechanical cooling, heating, and dehumidification calls are off, the unit operates in the auto sequence. The unit operates to maintain one of the DAT setpoints listed in **Table 5** (Auto Sequence Heat state) based on the Outside Air Temperature (OAT). If both heating and cooling calls are on, the unit will not turn on any mechanical system until the condition is removed.

Table 5. D19 Conventional Input Setpoints					
State	**OAT Allowed**	**Discharge Air Control**	**Variable**	**Default Setpoint**	**Range**
Heating Contacts	—	Space heating air temperature	**DA_SpcHtg_SP**	90°F (32°C)	50–140°F (10–60°C)
Cooling Contacts		Space cooling air temperature	**DA_SpcClg_SP**	55°F (12°C)	50–100°F (10–37°C)
Auto Sequence Cool	OAT > 65°F	Neutral air temperature	**DA_NAClg_SP**	70°F (21°C)	50–100°F (10–37°C)
Auto Sequence Heat	OAT < 65°F	Neutral air temperature	**DA_NAHtg_SP**	70°F (21°C)	50–140°F (20–60°C)

D19 (Discharge Air Temperature) Control via CL78 Space Sensor

The D19 control option can also operate the supply fan, exhaust fan, dampers, DX cooling, and gas or electric heat to maintain a set of DAT control setpoints via the CL78 space sensor. If the space temperature sensor option CL78 fails, the logic ignores space requirements and operates to maintain neutral air temperature and neutral air dehumidification control.

NOTE: Heating applies only when a unit is ordered with a gas or electric heat section.

D19 CL78 space sensor states of operation

D19 control via the CL78 space sensor can switch between states based on the following:

- Controller display (user-selected)
- th-tune space control device (option CL78)
- Building automation (BACnet®) command (option BHB8 required)
- Automatically based on sequence of operation

The unit state of operation is the primary determination of individual component function. The five primary states are as follows:

1. **OFF:** the unit supply fan and all associated mechanical equipment is OFF in this state. There are no associated sequences of operation in this state. The unit switches to the OFF state only when the state is manually-selected through the th-tune device (option CL78), unit display, or building automation network communication point. Upon initial power, the OFF state is the default.
2. **OFF/Alarm:** the OFF/Alarm state can occur only from a sequence failure. The unit switches to this state from the heating, cooling, or auto state. The unit stops all mechanical operation (unit state OFF) until resolution of the failure condition(s). Upon resolving the failure, the unit returns to the heating, cooling, or auto state. Alarms may also be cleared by resetting power to the unit.
3. **Heat:** the Heat state can be selected from the th-tune device (option CL78), controller display, or BMS. In this state, the supply fan runs and the mechanical heating and dampers are operated to maintain the heating sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.
4. **Auto:** the Auto state can be selected from the th-tune device (option CL78), controller display, or BMS. In this state, the CL78 space sensor is the primary controlling device for the unit. The unit switches between space heating and space cooling based on the zone temperature and setpoint. When the space conditions are satisfied, the unit will maintain neutral DAT. When the unit is providing neutral air temperature, it will switch between two adjustable neutral setpoints. The switch between the setpoints is based on OAT. When the outdoor air temperature is below 65°F (18°C), the unit uses the neutral air heating setpoint. When the outdoor air temperature is above 65°F (18°C), the unit uses the neutral air cooling setpoint.
5. **Cool:** the Cool state can be selected from the th-tune device (option CL78), controller display, or BMS. In this state, the unit supply fan runs and the mechanical cooling and the dampers are operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.

D19 CL78 space sensor modes of operation

When the unit is called to operate in the auto, heating, or cooling state(s), the D19 CL78 space sensor controls the unit in one of two modes: occupied or unoccupied. The unit will run in occupied or unoccupied mode based on one of the following three user-selected commands:

- Internal time clock schedule selects occupied or unoccupied mode
- Physical input point (ID4) (contact closed = occupied)
- Building automation (BACnet®) command (option BHB8 required)

D21 (Discharge Air Temperature) Control with Optional CL78 Space Sensor

The D21 control option can operate the supply fan, exhaust fan, dampers, DX cooling, and gas or electric heat to maintain a set of DAT control setpoints via the CL78 space sensor. If the space temperature sensor option CL78 is not enabled or fails, the logic ignores space requirements and operates to maintain neutral air temperature and neutral air dehumidification control.

NOTE: Heating applies only when a unit is ordered with a gas or electric heat section.

D21 states of operation

D21 control via the CL78 space sensor can switch between states based on the following:

- Controller display (user-selected)
- th-tune space control device (option CL78)
- Building automation (BACnet®) command (option BHB8 required)
- Automatically based on sequence of operation

The unit state of operation is the primary determination of individual component function. The five primary states are as follows:

1. **OFF:** the unit supply fan and all associated mechanical equipment is OFF in this state. There are no associated sequences of operation in this state. The unit switches to the OFF state only when the state is manually-selected through the th-tune device (option CL78), unit display, or building automation network communication point. Upon initial power, the OFF state is the default.
2. **OFF/Alarm:** the OFF/Alarm state can occur only from a sequence failure. The unit switches to this state from the heating, cooling, or auto state. The unit will stop all mechanical operation (unit state OFF) until resolution of the failure condition(s). Upon resolving the failure, the unit returns to the heating, cooling, or auto state. Alarms may also be cleared by resetting power to the unit.
3. **Heat:** the Heat state can be selected from the th-tune device (Option CL78), controller display, or BMS. The supply fan runs and the mechanical heating and dampers are operated to maintain the heating sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.
4. **Auto:** the Auto state can be selected from the th-tune device (Option CL78), controller display, or BMS. Upon initial selection of the auto state, the unit will be in the auto-heating state (if equipped) whenever outdoor air temperature is below 65°F (18°C). Otherwise, the unit will be in the auto-cooling state. The unit changes to auto-cooling/auto-heating state when the temperature crosses the changeover setpoint for more than 15 minutes or is more than 5°F (2.8°C) beyond the changeover setpoint.

NOTE: The unit switches between heating and cooling based upon OAT. Space temperature does not dictate heating or cooling mode.

5. **Cool:** the Cool state can be selected from the th-tune device (Option CL78), controller display, or BMS. In this state, the unit supply fan runs and the mechanical cooling and dampers are operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.

D21 modes of operation

When the unit is called to operate in the auto, heating, or cooling state(s), the D21 CL78 space sensor controls the unit in one of two modes: occupied or unoccupied. The unit will run in occupied or unoccupied mode based on one of the following three user-selected commands:

- Internal time clock schedule selects occupied or unoccupied mode
- Physical input point (ID4) (contact closed = occupied)
- Building automation (BACnet®) command (option BHB8 required)

D22 (Discharge Air Temperature) Control via Single Setpoint

The D22 control option allows the end user to set the desired DAT for the unit via a single setpoint. The control operates the supply fan, dampers, exhaust fan, DX cooling, and gas or electric heat to maintain the DAT control setpoint. The setpoint variable, when selected, becomes the single discharge air setpoint for the unit. **Table 6** lists and describes the two variables that can be selected.

Table 6. D22 Discharge Air Setpoint Variables

Variable Name	Variable Description	Default Setpoint	Range
DA_Loc_SP	**DAT local setpoint:** accessible from unit display and allows unit to operate stand-alone without need for third-party BMS system	70°F (21°C)	50–140°F (10–60°C)
DA_BMS_SP	**DAT BMS setpoint:** intended for use by third-party BMS system for external temperature setpoint adjustment	—	50–140°F (10–60°C)

D22 states of operation

D22 controls the unit in the following states of operation:

- **Enable ON:** The unit is permitted to operate based on the automatic control system. The unit switches to the Enable ON state only when the state is manually-selected through the user interface device, unit display, or building automation network communication point.
- **Enable OFF:** The unit supply fan and all associated mechanical equipment is OFF in this state. There are no associated sequences of operation in this state. The unit switches to the OFF state only when the state is manually-selected through the user interface device, unit display, or building automation network communication point. Mechanical system selections are permitted only in the Enable OFF state.
- **Enable OFF/Alarm:** The Enable OFF/Alarm state can occur only from a sequence failure. The unit stops all mechanical operation until resolution of the failure condition(s). Upon resolving the failure, the unit returns to its externally-commanded condition. Alarms may also be cleared by resetting power to the unit.

D22 modes of operation

When the unit is called to operate in the auto, heating, or cooling state(s), D22 controls the unit in one of two modes: occupied or unoccupied. The unit will run in occupied or unoccupied mode based on one of the following three user-selected commands:

- Internal time clock schedule selects occupied or unoccupied mode
- Physical input point (ID4) (contact closed = occupied)
- Building automation (BACnet®) command (option BHB8 required)

D23 (Space Temperature) Control via Single Setpoint

The D23 control option allows the end user to set the desired space temperature for the unit via a single setpoint. The control operates the supply fan, dampers, exhaust fan, DX cooling, and gas or electric heat to maintain space temperature. If the space temperature sensor option CL78 fails, the logic ignores space temperature requirements, shuts down the heating and cooling functions, and operate only with blowers.

D23 states of operation

D23 control can switch between states based on the following:

- Controller display (user-selected)
- th-tune space control device (option CL78)
- Building automation (BACnet®) command (option BHB8 required)
- Automatically based on sequence of operation

The unit state of operation is the primary determination of individual component function. The five primary states are as follows:

1. **OFF:** the unit supply fan and all associated mechanical equipment is OFF in this state. There are no associated sequences of operation in this state. The unit switches to the OFF state only when the state is manually-selected through the th-tune device (option CL78), unit display, or building automation network communication point. Upon initial power, the OFF state is the default.

STATES AND MODES OF OPERATION—CONTINUED

2. **OFF/Alarm:** the OFF/Alarm state can occur only from a sequence failure. The unit switches to this state from the heating, cooling, or auto state. The unit will stop all mechanical operation (unit state OFF) until resolution of the failure condition(s). Upon resolving the failure, the unit returns to the heating, cooling, or auto state. Alarms may also be cleared by resetting power to the unit.
3. **Heat:** the Heat state can be selected from the th-tune device (Option CL78), controller display, or BMS. The supply fan runs and the mechanical heating and dampers are operated to maintain the heating sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.
4. **Auto:** the Auto state can be selected from the th-tune device (Option CL78), controller display, or BMS. In this state, the supply fan runs and the mechanical heating/cooling and dampers are operated to maintain the automatic sequence of operation. In the auto sequence the unit switches between heating and cooling to maintain the space temperature setpoint.
5. **Cool:** the Cool state can be selected from the th-tune device (Option CL78), controller display, or BMS. In this state, the unit supply fan runs and the mechanical cooling and dampers are operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except for the OFF/Alarm state.

D23 modes of operation

When the unit is called to operate in the auto, heating, or cooling state(s), D23 controls the unit in one of two modes: occupied or unoccupied. The unit will run in occupied or unoccupied mode based on one of the following three user-selected commands:

- Internal time clock schedule selects occupied or unoccupied mode
- Physical input point (ID4) (contact closed = occupied)
- Building automation (BACnet®) command (option BHB8 required)

UNIT OPERATING CONTROLS

The operating controls for the supply fan, dampers, heating systems, cooling systems, temperature and humidity control are described in the following paragraphs.

Temperature and Humidity Control

Selected temperature and humidity setpoints are user-adjustable from the unit display, optional wall-mounted user interface, or optional BMS card. Depending on the state, mode, and control option, temperature and humidity are controlled based on the setpoints listed in **Table 7**.

Table 7. Temperature and Humidity Control Setpoints

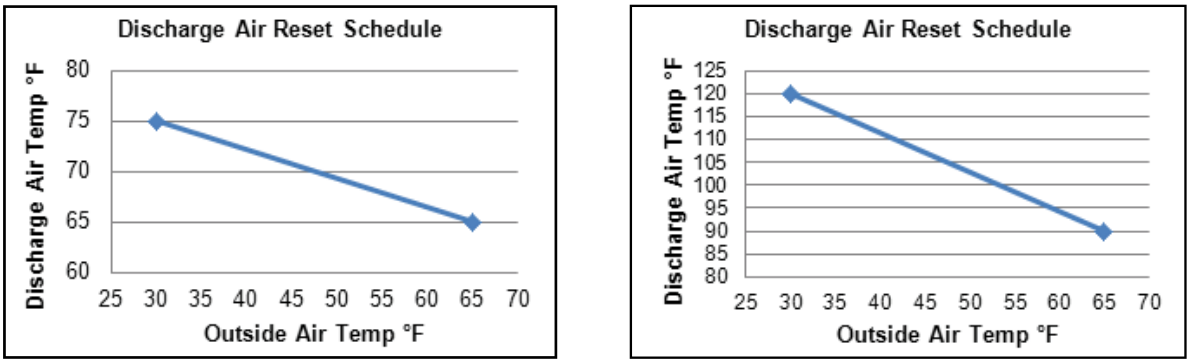
Applicable Control Option Code	Variable Name	Variable Description	Default Setpoint	Range
D19, D21	**DA_SpcHtg_SP**	DAT space heating setpoint	90°F (32°C)	50–140°F (10–60°C)
	DA_SpcClg_SP	DAT space cooling setpoint	55°F (12°C)	50–100°F (10–37°C)
	DA_NAHtg_SP	DAT neutral heating setpoint	70°F (21°C)	50–140°F (20–60°C)
	DA_NAClg_SP	DAT neutral cooling setpoint	70°F (21°C)	50–100°F (10–37°C)
D21	**DA_SpcHtCl_SP**	DAT space heat mode cooling setpoint	55°F (12°C)	50–100°F (10–37°C)
D22	**DA_Loc_SP**	DAT local setpoint	70°F (21°C)	50–140°F (10–60°C)
	DA_BMS_SP	DAT BMS setpoint	—	50–140°F (10–60°C)
RPLE, RPHE, AUR2	**DA_Dh_SP**	DAT dehumidification setpoint	70°F (21°C)	50–100°F (10–37°C)
	CC_DA_SP	Cooling coil dehumidification DAT setpoint	52°F (11°C)	45–80°F (7–26°C)
D19, D21, D23	**SpcTempSP**	Space temperature setpoint	72°F (22°C)	65–85°F (18–29°C)
	SpcHumSP	Space humidity setpoint	52%	35–75%

Optional neutral air heating sliding scale temperature reset schedule setpoint (D19 and D21 only)

For control options D19 and D21, the user can select a reset schedule for the discharge setpoint used when in neutral air heating mode. **Table 8** lists reset schedule tempeature setpoints (see **Figure 6**).

Table 8. Reset Schedule Temperature Setpoints

Neutral Air Heating Mode		Space Heating Mode	
OAT	**DAT**	**OAT**	**DAT**
30°F (–1.1°C)	75°F (23.8°C)	30°F (–1.1°C)	120°F (48.9°C)
65°F (18.3°C)	65°F (18.3°C)	65°F (18.3°C)	90°F (32.2°C)



Neutral Air Heating Mode **Space Heating Mode**

Figure 6. Reset Schedule Air Temperatures

Optional space heating sliding scale temperature reset schedule setpoint (D19 and D21 only)

For control options D19 and D21, the user can also select a reset schedule for the discharge setpoint used when in space heating mode. **Table 8** lists reset schedule tempeature setpoints (see **Figure 6**).

Space Temperature and Humidity Setpoint Definitions

The base space temperature setpoint (**SpcTempSP**) is 72°F (22°C), and the base space humidity setpoint is 52% (refer to **Table 7**). The following calculations are used to establish base setpoints that are then used to calculate setpoints for the heating/cooling/dehumidification modes that follow.

SpcTempSP – SpcHtgDB = SpcHtgSP

- base space heating dead band (**SpcHtgDB**) = 1°F (0.4°C)
- base space heating setpoint (**SpcHtgSP**) = 71°F (22°C)

SpcTempSP + SpcClgDB = SpcClgSP

- base space cooling dead band (**SpcClgDB**) = 1°F (0.4°C)
- base space cooling setpoint (**SpcClgSP**) = 73°F (23°C)

Occupied heating

When the unit is in the occupied mode, the space heating setpoint (**SpcHtgSP**) is the space effective heating setpoint (**SpcEffHtgSp**).

- space effective heating setpoint (**SpcEffHtgSp**) = 71°F (22°C)

SpcEffHtgSp – SpcHtgOnDiff = actual space heating on value

- space heating ON differential (**SpcHtgOnDiff**) = 1°F (0.4°C)
- actual space heating on value = 70°F (21°C)

When the space temperature is ≤70°F (21°C), the Space Heating Mode is ON.

SpcEffHtgSp + SpcHtgOffDiff = actual space heating off value

- space heating OFF differential (**SpcHtgOffDiff**) = 1°F (0.4°C)
- actual space heating off value = 72°F (22°C)

When the space temperature is ≥72°F (22°C), the Space Heating Mode is OFF.

Space Temperature and Humidity Setpoint Definitions—Continued

Occupied cooling

When the unit is in the occupied mode, the space cooling setpoint (**SpcClgSP**) is the space effective cooling setpoint (**SpcEffClgSp**).

- space effective cooling setpoint (**SpcEffClgSp**) = 73°F (23°C)

SpcEffClgSp + SpcClgOnDiff = actual space cooling on value

- space cooling ON differential (**SpcHtgOnDiff**) = 1°F (0.4°C)
- actual space cooling on value = 74°F (23°C)

When the space temperature is ≥74°F (23°C), the Space Cooling Mode is ON.

SpcEffClgSp – SpcClgOffDiff = actual space cooling off value

- space cooling OFF differential (**SpcClgOffDiff**) = 1°F (0.4°C)
- actual space cooling off value = 72°F (22°C)

When the space temperature is ≤72°F (22°C), the Space Cooling Mode is OFF.

Occupied heating cooling (control option D21 only)

When the unit is in the occupied heating cooling mode, the space cooling setpoint (**SpcClgSP**) is the space effective cooling setpoint (**SpcEffClgSp**).

- space effective cooling setpoint (**SpcEffClgSp**) = 73°F (23°C)

When the unit is set to auto heating, option D21 controls space cooling as follows:

SpcEffClgSp + SpcHCOnDiff = actual space cooling on value

- space heating cooling ON differential (**SpcHCOnDiff**) = 1°F (0.4°C)
- actual space cooling on value = 74°F (23°C)

When the space temperature is ≥74°F (23°C), the Space Heating Cooling Mode is ON.

SpcEffClgSp – SpcHCOffDiff = actual space cooling off value

- space heating cooling OFF differential (**SpcHCOffDiff**) = 1°F (0.4°C)
- actual space cooling off value = 72°F (22°C)

When the space temperature is ≤72°F (22°C), the Space Heating Cooling Mode is OFF.

Unoccupied heating

NOTE: By default, unoccupied heating and cooling are enabled when the system is equipped with a CL78 space sensor. If unoccupied heating or cooling is not desired, set the Ena_Unocc_Spc variable to OFF.

When the unit is in the unoccupied mode, heating is determined by the space effective heating setpoint (**SpcEffHtgSp**).

SpcHtgSP – SpcHtgUnoOs = SpcEffHtgSp

- space heating unoccupied offset setpoint (**SpcHtgUnoOs**) = 8°F (4°C)
- space effective heating setpoint (**SpcEffHtgSp**) = 63°F (17°C)

SpcEffHtgSp – SpcHtgOnDiff = actual space heating on value

- space heating ON differential (**SpcHtgOnDiff**) = 1°F (0.4°C)
- actual space heating on value = 62°F (17°C)

When the actual space temperature is ≤62°F (17°C), the Space Heating Mode is ON.

SpcEffHtgSp + UnoHtgOffDiff = actual space heating off value

- unoccupied space heating OFF differential (**UnoHtgOffDiff**) = 4°F (2.2°C)
- actual space heating off value = 67°F (19°C)

When the space temperature is ≥67°F (19°C), the Space Heating Mode is OFF.

Unoccupied cooling

When the unit is in the unoccupied mode, cooling is determined by the space effective cooling setpoint (**SpcEffClgSp**).

SpcClgSP + SpcClgUnoOs = SpcEffClgSp

- space cooling unoccupied offset setpoint (**SpcClgUnoOs**) = 8°F (4°C)
- space effective cooling setpoint (**SpcEffClgSp**) = 81°F (27°C)

SpcEffClgSp + SpcClgOnDiff = actual space cooling on value

- space cooling ON differential (**SpcClgOnDiff**) = 1°F (0.4°C)
- actual space cooling on value = 82°F (28°C)

When the space temperature is ≥82°F (28°C), the Space Cooling Mode is ON.

SpcEffClgSp – UnoClgOffDiff = actual space cooling off value

- unoccupied space cooling OFF differential (**UnoClgOffDiff**) = 4°F (2.2°C)
- actual space cooling off value = 77°F (25°C)

When the space temperature is ≤77°F (25°C), the Space Cooling Mode is OFF.

Unoccupied heating cooling (control option D21 only)

When the unit is in the unoccupied mode and it is set to auto heating, cooling is determined by the space effective cooling setpoint (**SpcEffClgSp**).

SpcClgSP + SpcClgUnoOs = SpcEffClgSp

- space cooling unoccupied offset setpoint (**SpcClgUnoOs**) = 8°F (4°C)
- space effective cooling setpoint (**SpcEffClgSp**) = 81°F (27°C)

SpcEffClgSp + SpcHCOnDiff = actual space cooling on value

- space heating cooling ON differential (**SpcHCOnDiff**) = 1°F (0.4°C)
- actual space cooling on value = 82°F (28°C)

When the space temperature is ≥82°F (28°C), the Space Heating Cooling Mode is ON.

SpcEffClgSp – UnoHCOffDiff = actual space cooling off value

- unoccupied space heating cooling OFF differential (**UnoHCOffDiff**) = 4°F (2.2°C)
- actual space cooling off value = 77°F (25°C)

When the space temperature is ≤77°F (25°C), the Space Cooling Mode is OFF.

Space dehumidification control

- space humidity setpoint (**SpcHumSp**) = 52%

SpcHumSp + SpcDhOnDiff = actual space dehumidification on value

- space dehumidification ON differential (**SpcDhOnDiff**) = 3%
- actual space dehumidification on value = 55%

When the space humidity is ≥55°F, the Space Dehumidification Mode is ON.

SpcHumSp – SpcDhOffDiff = actual space dehumidification off value

- space dehumidification OFF differential (**SpcDhOffDiff**) = 2%
- actual space dehumidification off value = 50%

When the space humidity is ≤50°F, the Space Dehumidification Mode is OFF.

Electric Heat Staging

Electric heat staging—discharge air temperature control (options D19, D21, and D22)

Electric heat staging will start when the DAT is 5°F (2.8°C) below the active setpoint and the OAT is below the heating lockout setpoint. The Proportional Integral Derivative (PID) loop will activate and the unit will stage (refer to **Table 9**) to maintain the active discharge air setpoint. The unit may be equipped with up to six stages of electric heat. The number of stages and the modulated capacity control are determined by unit size and/or option.

Table 9. Electric Heat Staging—Discharge Air Temperature Control (Options D19, D21, and D22)

Stage*	Output	Increase Interstage Timing	Activate**	Decrease Interstage Timing	Deactivate**
1	NO6 = ON	—	DAT 5°F (2.8°C) below setpoint (Y4 modulates SCR via heating demand)	15 minutes	Heating demand < 2.5% and DAT 5°F (2.8°C) above setpoint
2	NO7 = ON	5 minutes	Heating demand > 70% and DAT 5°F (2.8°C) below setpoint		Heating demand < 5% and DAT 5°F (2.8°C) above setpoint
3	NO8 = ON		Heating demand > 75% and DAT 5°F (2.8°C) below setpoint		Heating demand < 10% and DAT 5°F (2.8°C) above setpoint
4	NO9 = ON		Heating demand > 80% and DAT 5°F (2.8°C) below setpoint		Heating demand < 20% and DAT 5°F (2.8°C) above setpoint
5	NO10 = ON		Heating demand > 85% and DAT 5°F (2.8°C) below setpoint		Heating demand < 30% and DAT 5°F (2.8°C) above setpoint
6	NO11 = ON		Heating demand > 90% and DAT 5°F (2.8°C) below setpoint		Heating demand < 40% and DAT 5°F (2.8°C) above setpoint

*All stages have adjustable minimum ON and OFF times.

**PID loop control: all statements must be true to activate or deactivate.

Electric heat staging—space temperature control (option D23)

Electric heat staging will start when the unit enters the Space Heating mode and the OAT is below the heating lockout setpoint. The PID loop will activate and the unit will stage (refer to **Table 10**) to maintain the space temperature setpoint. The unit may be equipped with up to six stages of electric heat. The number of stages and the modulated capacity control are determined by unit size and/or option.

Table 10. Electric Heat Staging—Space Temperature Control (Option D23)

Stage*	Output	Increase Interstage Timing	Activate**	Deactivate**
1	NO6 = ON	—	Space Heating mode ON (Y4 modulates SCR via heating demand)	Space Heating mode OFF
2	NO7 = ON	5 minutes	Space Heating mode ON ***and*** heating demand > 70%	Space Heating mode OFF ***or*** heating demand < 5%
3	NO8 = ON		Space Heating mode ON ***and*** heating demand > 75%	Space Heating mode OFF ***or*** heating demand < 10%
4	NO9 = ON		Space Heating mode ON ***and*** heating demand > 80%	Space Heating mode OFF ***or*** heating demand < 20%
5	NO10 = ON		Space Heating mode ON ***and*** heating demand > 85%	Space Heating mode OFF ***or*** heating demand < 30%
6	NO11 = ON		Space Heating mode ON ***and*** heating demand > 90%	Space Heating mode OFF ***or*** heating demand < 40%

*All stages have adjustable minimum ON and OFF times.

**PID loop control: all statements must be true to activate or deactivate.

Gas Heat Staging

Gas heat staging—discharge air temperature control (options D19, D21, and D22)

Gas heat staging will start when the DAT is 5°F (2.8°C) below the active setpoint and the OAT is below the heating lockout setpoint. The PID loop will activate and the unit will stage (refer to **Table 11**) to maintain the active discharge air setpoint. The unit may be equipped with up to four stages of gas heat. The number of stages and the modulated capacity control are are determined by unit size and/or option.

Table 11. Gas Heat Staging—Discharge Air Temperature Control (Options D19, D21, and D22)					
Stage*	**Output**	**Increase Interstage Timing**	**Activate****	**Decrease Interstage Timing**	**Deactivate****
1	NO6 = ON (refer to NOTEs 1–3)	—	DAT 5°F (2.8°C) below setpoint (Y4 modulates heat exchanger 1 via heating demand)	5 or 15 minutes (refer to NOTE 4)	Heating demand < 2.5% and DAT 5°F (2.8°C) above setpoint
2	NO7 = ON	5 minutes	Heating demand > 70% and DAT 5°F (2.8°C) below setpoint		Heating demand < 5% and DAT 5°F (2.8°C) above setpoint
3	NO8 = ON		Heating demand > 75% and DAT 5°F (2.8°C) below setpoint		Heating demand < 10% and DAT 5°F (2.8°C) above setpoint
4	NO9 = ON		Heating demand > 80% and DAT 5°F (2.8°C) below setpoint		Heating demand < 20% and DAT 5°F (2.8°C) above setpoint
*All stages have adjustable minimum ON and OFF times.					
**PID loop control: all statements must be true to activate or deactivate.					
NOTE 1: Y series light OFF (Y4 gas valve modulation value for natural gas and propane = 30% duration 30 seconds).					
NOTE 2: R7 series light OFF (Y4 gas valve modulation value for natural gas and propane = 65% duration 60 seconds).					
NOTE 3: Y4 modulation applies only to units equipped with modulating gas valves.					
NOTE 4: 5-minute timer for non-modulated systems. 15-minute timer used on modulated systems to allow capacity control to achieve low fire rate.					

Gas heat staging—space temperature control (option D23)

Gas heat staging will start when the unit enters the Space Heating mode and the OAT is below the heating lockout setpoint. The PID loop will activate and the unit will stage (refer to **Table 12**) to maintain the space temperature setpoint. The unit may be equipped with up to four stages of gas heat. The number of stages and the modulated capacity control are determined by unit size and/or option.

Table 12. Gas Heat Staging—Space Temperature Control (Option D23)				
Stage*	**Output**	**Increase Interstage Timing**	**Activate****	**Deactivate****
1	NO6 = ON (refer to NOTEs 1–3)	—	Space Heating mode ON (Y4 Modulates heat exchanger 1 via heating demand)	Space Heating mode OFF
2	NO7 = ON	5 minutes	Space Heating mode ON ***and*** heating demand > 70%	Space Heating mode OFF ***or*** heating demand < 5%
3	NO8 = ON		Space Heating mode ON ***and*** heating demand > 75%	Space Heating mode OFF ***or*** heating demand < 10%
4	NO9 = ON		Space Heating mode ON ***and*** heating demand > 80%	Space Heating mode OFF ***or*** heating demand < 20%
*All stages have adjustable minimum ON and OFF times.				
**PID loop control: all statements must be true to activate or deactivate.				
NOTE 1: Y series light OFF (Y4 gas valve modulation value for natural gas and propane = 30% duration 30 seconds).				
NOTE 2: R7 series light OFF (Y4 gas valve modulation value for natural gas and propane = 65% duration 60 seconds).				
NOTE 3: Y4 modulation applies only to units equipped with modulating gas valves.				

Mechanical Cooling Staging

Mechanical cooling staging—discharge air temperature control (options D19, D21, and D22)

Mechanical cooling staging will start when the DAT is 5°F (2.8°C) above the active setpoint and the OAT is above the cooling lockout setpoint. The PID loop will activate and the unit will stage (refer to **Table 13**) to maintain the active discharge air setpoint. The unit may be equipped with up to two stages of cooling. The number of stages is determined by unit size and/or option.

Mechanical Cooling Staging—Continued

Table 13. Mechanical Cooling Staging—Discharge Air Temperature Control (Options D19, D21, and D22)

Stage*	Output	Compressor/ Condenser	Interstage Timing	Activate**	Deactivate**
1	Y3	A	5 minutes	DAT 5°F (2.8°C) above setpoint (circuit A modulates with cooling demand)	<10% modulation ***and*** DAT 5°F (2.8°C) below setpoint
2	NO2	A and B		>70% modulation ***and*** DAT 5°F (2.8°C) above setpoint	<50% modulation ***and*** DAT 5°F (2.8°C) below setpoint
Condenser A (refer to NOTE 1)	NO5	Cond_Sec_A	—	When Y3 > 0%	When Y3 = 0%, OFF
Condenser B	NO6	Cond_Sec_B		When NO2 = ON	When NO2 = OFF
*All stages have adjustable minimum ON and OFF times.					
**PID loop control: all statements must be true to activate or deactivate.					
NOTE 1: R7 series units use condensor section A only and NO5 activates with either compressor.					

Mechanical cooling staging—space temperature control (option D23)

Mechanical cooling staging will start when the unit enters the Space Cooling mode and the OAT is above the cooling lockout setpoint. The PID loop will activate and the unit will stage (refer to **Table 14**) to maintain the space temperature setpoint. The unit may be equipped with up to two stages of cooling. The number of stages is determined by unit size and/or option.

Table 14. Mechanical Cooling Staging—Space Temperature Control (Option D23)

Stage*	Output	Compressor/ Condenser	Interstage Timing	Activate**	Deactivate**
1	Y3	A	5 minutes	Space Cooling mode ON (circuit A modulates with cooling demand)	Space Cooling mode OFF
2	NO2	A and B		Space Cooling mode ON ***and*** >70% modulation	Space Cooling mode OFF ***or*** <50% modulation
Condenser A (refer to NOTE 1)	NO5	Cond_Sec_A	—	When Y3 > 0%	When Y3 = 0%, OFF
Condenser B	NO6	Cond_Sec_B		When NO2 = ON	When NO2 = OFF
*All stages have adjustable minimum ON and OFF times.					
**PID loop control: all statements must be true to activate or deactivate.					
NOTE 1: R7 series units use condensor section A only and NO5 activates with either compressor.					

Dehumidification Control

Space dehumidification

All of the following conditions must be true for the unit to enter the Space Dehumidification mode:

1. Outdoor air temperature is above reheat low lockout setpoint (58°F (14°C) reheat lockout, range 50–100°F (10–37°C) drybulb)
2. Outdoor air temperature is below reheat high lockout setpoint (100°F (37°C) reheat high lockout, range 50–120°F (10–48°C) drybulb)
3. Space Cooling mode is ***not*** active
4. Unit cooling coil sensor is ***not*** in failed condition
5. Space dehumidification call is active
6. Reheat pump controller must ***not*** be in alarm condition (RPLE and RPHE units only)

Neutral air dehumidification

All of the following conditions must be true for the unit to enter the Neutral Air Dehumidification mode:

1. Outdoor air temperature is above reheat low lockout setpoint (58°F (14°C) reheat lockout, range 50–100°F (10–37°C) drybulb)
2. Outdoor air temperature is below reheat high lockout setpoint (100°F (37°C) reheat high lockout, range 50–120°F (10–48°C) drybulb)
3. Unit outside air humidity sensor is ***not*** in failed condition
4. Unit cooling coil sensor is ***not*** in failed condition
5. Outside air dewpoint > 58°F (14°C) (options D19, D21, and D22 only)
6. Space dehumidification call is ***not*** active
7. Space Cooling mode is ***not*** active
8. For units selected with D22, active discharge air setpoint must be 15°F (8.3°C) greater than cooling coil discharge setpoint
9. Reheat pump controller must ***not*** be in alarm condition (RPLE and RPHE units only)

Dehumidification control (options AUR2, RPLE, and RPHE)

When either the Space Dehumidification or Neutral Air Dehumidification mode is active, the main evaporator compressor(s) will be enabled to maintain a 52°F (11°C) cooling coil discharge setpoint and will use the U5 CC_Temp sensor.

- For units selected with option AUR2, the reheat valve is enabled and modulated by output Y5 to maintain the reheat setpoint at 70°F (21°C) via the U4 DAT Temp sensor (Y5 = 0–10V, 0–100% capacity)
- For units selected with reheat pump option RPLE or RPHE, the reheat pump is enabled and modulated by output Y5 to maintain the reheat setpoint at 70°F (21°C) via the U4 DAT Temp sensor (Y5 = 1–5V, 0–100% capacity, Y5 = 1V is an OFF condition)

Energy Recovery Control

Energy recovery economizer operation (default control setting)

The Energy Recovery Wheel (ERV) operates whenever the exhaust fan is ON in any mode and when either of the following two conditions are true:

- Outdoor air temperature is more than 2.5°F (1.4°C) below active DAT setpoint
- Outdoor air temperature is more than 2.5°F (1.4°C F) above active DAT setpoint and outside air dew point > 58°F (1.4°C)

When the ERV is disabled due to economizer conditions, the wheel starts and runs for a period of 5 minutes every 3 hours for cleaning purposes.

In the event of an exhaust fan failure, the ERV is not permitted to operate.

The optional energy recovery preheat NO16 operates whenever the ERV supply air temperature is < 33°F (1°C) (with a 2° differential) and the outdoor air temperature is < 32°F (0°C) (with a 2° differential). Otherwise, the electric preheat is OFF.

In the event that the ERV supply air temperature sensor fails, energy recovery preheat is not be permitted to operate.

Energy recovery continuous operation (optional)

The ERV recovery wheel operates whenever the exhaust fan is ON in any mode.

In the event of an exhaust fan failure, the ERV is not permitted to operate.

The optional energy recovery preheat NO16 operates whenever the ERV supply air temperature is < 33°F (1°C) (with a 2° differential) and the outdoor air temperature is < 32°F (0°C) (with a 2° differential). Otherwise, the electric preheat is OFF.

In the event that the ERV supply air temperature sensor fails, energy recovery preheat is not be permitted to operate.

Supply Fan Control

Supply fan control—occupied mode

The supply fan provides to the space the total volume of conditioned air at a given rate. Once enabled, fan operation is dictated by the selection of one of the following control options:

- **Option VFC1 (high/low fan speed control):** There are two individual supply fan speed % setpoints, one for space heating, cooling, and dehumidification modes (high) and one for neutral air modes (low). When the system is in either the space heating, cooling, or dehumidification mode, the fan operates on the high speed % setpoint. When the system is in any neutral air mode, the fan operates on the low speed % setpoint.
- **Option VFC3 (duct static pressure control, 0.0–2.5 IN WC):** The fan modulates between the user-adjustable minimum and maximum fan speed % setpoints using a Proportional Integral (PI) loop to maintain the duct static pressure setpoint (+0.5 IN WC default).
- **Option VFC4 (building static pressure control, –0.5–0.5 IN WC):** The fan operates between the user-adjustable minimum and maximum fan speed % setpoints and modulates using a PI loop to maintain the building static pressure setpoint (+0.1 IN WC default).
- **Option VFC9 (summer/winter constant volume):** There are two individual supply fan speed % setpoints, one for heating and one for cooling. When the unit is in space or neutral air heating mode, the fan operates on the heating speed % setpoint. When the unit is in any other mode, the fan operates on the cooling speed % setpoint.
- **Option VFC2 (external source 0–10 VDC):** The speed control signal is sourced by others. A direct connection of a 0–10 VDC input to the unit terminal strip must be provided.
- **Option VFCC (BMS source):** The fan modulates between the user-adjustable minimum and maximum fan speed % setpoints. The speed control signal is sourced by others and is communicated via a BMS network. A connection to a BHB8 BMS card is required.
- **Option VFCD (two-speed CO_2 control):** There are two individual supply fan speed % setpoints, low and high. When the CO_2 is below the space CO_2 setpoint, the fan operates on the low speed % setpoint. When the CO_2 is above the CO_2 space setpoint, the fan operates on the high speed % setpoint.
- **Option VFCE (supply fan cfm control):** The fan operates between the user-adjustable minimum and maximum fan speed % setpoints and modulates using a PI loop to maintain the supply fan cfm setpoint.
- **Option VFCF (occupied/unoccupied speed control):** There are two individual supply fan speed % setpoints, one for occupied mode and one for unoccupied mode. In occupied mode, the fan operates on the occupied speed % setpoint. In unoccupied mode, the fan operates on the unoccupied speed % setpoint.

Supply fan control—unoccupied mode

When configured for space control, the supply fan operates intermittently, based on zone temperature (refer to **Temperature and Humidity Control** section for space control and setpoint definitions).

Exhaust Fan Control

The exhaust fan provides a volume of air expelled to outdoors. The exhaust fan is normally ON in the occupied mode and is normally OFF in the unoccupied mode. The fan is permitted to operate in the unoccupied mode if the unit is configured for 100% outside air. Exhaust fan operation is also permitted on mixed air arrangements when the unoccupied ventilation enable variable for the unit damper(s) is set to ON. Once enabled, fan operation is dictated by the selection of one of the following control options:

- **Option EFC1 (high/low fan speed control):** There are two individual exhaust fan speed % setpoints, one for space heating, cooling, and dehumidification modes (high) and one for neutral air modes (low). When the system is in either the space heating, cooling, or dehumidification mode, the fan operates on the high speed % setpoint. When the system is in any neutral air mode, the fan operates on the low speed % setpoint.
- **Option EFC4 (building static pressure control, –0.5–0.5 IN WC):** The fan operates between the user-adjustable minimum and maximum fan speed % setpoints and modulates using a PI loop to maintain the building static pressure setpoint (+0.1 IN WC default).
- **Option EFC7 (supply fan tracking, not available with option VFC2):** This option uses an offset to determine the speed setpoint for the exhaust fan. The active speed % setpoint for the exhaust fan is the supply fan speed % command minus the value of the speed offset %.

- **Option EFC9 (constant volume):** There are two individual exhaust fan speed % setpoints, one for heating and one for cooling. When the unit is in the space or neutral air heating mode, the fan operates on the heating speed % setpoint. When the unit is in any other mode, the fan operates on the cooling speed % setpoint.
- **Option EFCC (BMS source):** The fan modulates between the user-adjustable minimum and maximum fan speed % setpoints. The speed control signal is sourced by others and is communicated via a BMS network. A connection to a BHB8 BMS card is required.
- **Option EFCD (two-speed CO_2 control):** There are two individual exhaust fan speed % setpoints, low and high. When the CO_2 is below the space CO_2 setpoint, the fan operates on the low speed % setpoint. When the $CO_2$is above the CO_2 space setpoint, the fan operates on the high speed % setpoint.
- **Option EFCE (exhaust fan cfm control):** The fan operates between the user-adjustable minimum and maximum fan speed % setpoints and modulates using a PI loop to maintain the exhaust fan cfm setpoint.
- **Option EFCF (occupied/unoccupied speed control):** There are two individual exhaust fan speed % setpoints, one for occupied mode and one for unoccupied mode. In occupied mode, the fan operates on the occupied speed % setpoint. In unoccupied mode, the fan operates on the unoccupied speed % setpoint.
- **Option EFCG (supply fan cfm tracking):** This option uses a cfm offset to determine the exhaust fan cfm setpoint. The active cfm setpoint for the exhaust fan is the value of the cfm offset minus the actual supply fan cfm. The fan modulates between the user-adjustable minimum and maximum fan speed % setpoints to maintain the exhaust fan cfm setpoint.

Damper Control

When the unit is not enabled, the dampers are commanded to the closed or recirculated air position. Once the unit is enabled, damper operation is dictated by the selection of one of the following control options:

- **Option GF1 (External Input 0–10 VDC):** The damper control signal is sourced by others. A direct connection of a 0–10 VDC input to the unit terminal strip must be provided.
- **Option GF2 (two-position damper):**
  Occupied mode: The dampers open to the user-adjustable occupied damper position setpoint.
  Unoccupied mode: The dampers open to the user-adjustable unoccupied damper position setpoint.
- **Option GF2A (100% outside air):** When the unit is indexed to start, the outside air damper is commanded to open. When the actuator end switch proves the damper is approximately 80% open, unit operation is permitted.
- **Option GF4 (four positions based on two digital inputs):**
  Occupied mode: The dampers open to one of four user-adjustable setpoints based on hardware input switches ID9 and ID10, as listed in **Table 15**.
  Unoccupied mode: With the unoccupied ventilation variable set to ON, the dampers operate according to the occupied sequence. With the unoccupied ventilation variable set to OFF, the dampers are commanded to the recirculated air position.

Table 15. Hardware Input Switches ID9 and ID10

Variable Name	Input Switch		Default Damper Position	Display Range	Y1 Output Range
	ID9	ID10			
Aux_1_SP	Open	Open	20%	0–100%	0–10V
Aux_2_SP	Close	Open	40%	0–100%	0–10V
Aux_3_SP	Open	Close	60%	0–100%	0–10V
Aux_4_SP	Close	Close	80%	0–100%	0–10V

- **Option GF1A (BMS source):** The damper control signal is sourced by others and is communicated via a BMS network. A connection to a BHB8 BMS card is required.
- **Option GF5 (building static pressure control, –0.5–0.5 IN WC):**
  Occupied mode: The dampers operate using a PI loop to maintain the building static pressure setpoint (+0.1 IN WC default).
  Unoccupied mode: With the unoccupied ventilation variable set to ON, the dampers operate according to the occupied sequence. With the unoccupied ventilation variable set to OFF, the dampers are commanded to the recirculated air position.

Damper Control—Continued

- **Option GF8 (economizer package mechanical minimum damper position):**
  Occupied mode:
  Without option BE15 (space CO_2 sensor): When space cooling mode is OFF, the dampers are positioned to the value of the adjustable minimum damper position setpoint (Default = 10%) for fresh air.
  With space CO_2 sensor option BE15: When space cooling mode is OFF, the dampers are positioned to minimum fresh air. The minimum damper position is determined using adjustable setpoints as follows:
  Space CO_2 setpoint (default = 1000 ppm)
  Space CO_2 setpoint differential (default = 200 ppm)
  Minimum damper position setpoint (default = 10%)
  CO_2 damper offset setpoint (default = 10%)

  When the space CO_2 is greater than 1000 ppm, the value of the CO_2 damper offset setpoint 10% is added to the value of the minimum damper position setpoint 10%

  CO_2 > 1000 ppm = active minimum damper position 20%
  CO_2 < 800 ppm = active minimum damper position 10%

  When space cooling is required, and the outdoor air temperature is less than the economizer dry bulb temperature lockout and economizer dewpoint lockout, the dampers modulate using a PI loop from the minimum position to the maximum position to maintain the mixed air temperature at the **MAEff_Temp_SP** (effective mixed air setpoint). The effective mixed air setpoint is determined by subtracting the **MA_Diff** (mixed air setpoint differential) from the **DA_SpcClg_SP** (discharge air space cooling setpoint).

  Example: **DA_SpcClg_SP (default 55°) – MA_Diff (default 3°) = MAEff_Temp_SP (52°)**

  When cooling is not required, the dampers revert to the minimum position.

  Unoccupied mode: With the Unoccupied Enable Economizer mode variable (**Unocc_Eco_Ena**) set to ON, the dampers operate according to the occupied sequence. With the Unoccupied Enable Economizer mode variable (**Unocc_Eco_Ena**) set to OFF, the dampers are commanded to the recirculated air position.
- **Option GF10 (outside air cfm):**
  Occupied mode: The dampers operate using a PI loop to maintain the outside air cfm setpoint.
  Unoccupied mode: With the unoccupied ventilation variable set to ON, the dampers operate according to the occupied sequence. With the unoccupied ventilation variable set to OFF, the dampers are commanded to the recirculated air position
- **Option GF11 (economizer package minimum outside air cfm):**
  Occupied mode:
  Without CO_2 sensor option BE15: When space cooling mode is OFF, the dampers are positioned to the value of the adjustable minimum cfm setpoint (default = 500 cfm) for fresh air.
  With CO_2 sensor option BE15: When space cooling mode is OFF, the dampers are positioned to minimum fresh air. The minimum the fresh air setpoint is determined as follows:
  Space CO_2 setpoint (default = 1000 ppm)
  Space CO_2 setpoint differential (default = 200 ppm)
  Minimum cfm setpoint (default 500 cfm)
  CO_2 cfm offset setpoint (default 500 cfm)

  When the space CO_2 is greater than 1000 ppm, the value of the CO_2 cfm offset setpoint (default 500 cfm) is added to the value of the minimum cfm setpoint (default 500 cfm)

  CO_2 > 1000 ppm = active minimum cfm setpoint = 1000 cfm
  CO_2 < 800 ppm = active minimum cfm setpoint = 500 cfm

  When space cooling is required and the outdoor air temperature is less than the economizer dry bulb temperature lockout and economizer dewpoint lockout, the dampers modulate using a PI loop from the minimum position to the maximum position to maintain the mixed air temperature at the effective mixed

air setpoint (**MAEff_Temp_SP**). The effective mixed air setpoint is determined by subtracting the mixed air setpoint differential (**MA_Diff**) from the discharge air space cooling setpoint (**DA_SpcClg_SP**).

Example: **DA_SpcClg_SP (default 55°) – MA_Diff (default 3°) = MAEff_Temp_SP (52°)**

When cooling is not required, the dampers revert to the minimum cfm.

Unoccupied mode: With the unoccupied enable economizer (**Unocc_Eco_Ena**) mode variable set to ON, the dampers operate according to the occupied sequence. With the unoccupied enable economizer (**Unocc_Eco_Ena**) mode variable set to OFF, the dampers are commanded to the recirculated air position.

Airflow Monitoring Options

The following air monitoring options are available (refer to the **Supply Fan Control**, **Exhaust Fan Control**, and **Damper Control** sections for cfm-based control options).

- Option AFS1 (supply fan cfm monitor only—temperature and elevation compensated)
  cfm monitoring via supply fan inlet ring delta P
  cfm value displayed on system DDC interface and available through BACnet® interface card
  functions as outside air monitoring on 100% outside air arrangements
- Option AFS2 (exhaust fan cfm monitor only—temperature and elevation compensated)
  cfm monitoring via exhaust fan inlet ring delta P
  cfm value displayed on system DDC interface and available through BACnet® interface card
- Option AFS3 (outside air cfm monitor only—mixed air arrangements only)
  cfm monitoring via thermal dispersion probes located at inlet air side of unit's outside air opening
  cfm value displayed on system DDC interface and available through BACnet® interface card

SAFETIES AND ALARMS

Selected safeties have an adjustable delay to prevent nuisance alarms. All alarms are time-stamp logged. If a critical shutdown alarm occurs, the unit will not restart until the alarm is cleared via the display or power cycling.

NOTE: The unit can be configured to automatically-reset when the ID3 contact closes by setting the Auto Reset Safety Alarm variable to ON. The unit can also be configured to automatically-reset when the ID14 contact closes by setting the Auto Reset Phase Loss Alarm variable to ON.

Alarm Conditions

Table 16 lists the alarm conditions, their accompanying display messages, and their reset conditions.

Table 16. Alarms

No.	Alarm ID	Alarm Condition/Control Action	Unit Alarm Display Message	Reset Condition
1	**Unit Safety Alarm (Critical Shutdown Alarm)**	Any time status of safety relay (ID3 = alarm contact closure opens) Unit immediately shuts down and all mechanical equipment is turned OFF	**Unit Safety Alarm Unit OFF**	Unit will not restart until condition has cleared and alarm is acknowledged via unit controller or remote display
		NOTE: The unit is equipped with a safety status relay that is energized in the normal state. The coil of the safety relay is piloted by an optional firestat, duct smoke detector, or field-supplied safety device.		
2	**Supply Fan Failure (Critical Shutdown Alarm)**	Fan operation does not prove via airflow switch (ID1 = OFF) after adjustable 120-second time delay from supply fan start command (NO1 = ON) Controller shuts down system	**Supply Fan Failure Unit OFF**	Unit will not restart until alarm is acknowledged via unit controller or remote display
3	**Exhaust Fan Failure**	Fan operation does not prove via airflow switch ID11 = OFF after adjustable 60-second time delay from exhaust fan start command via Modbus	**Exhaust Fan Failure**	—
4	**Low Discharge Temperature Alarm (Critical Shutdown Alarm)**	DAT (U4) falls below low limit alarm setpoint (33°F (1°C)) for more than 10 minutes Controller shuts down system	**Low Discharge Air Temperature Alarm Unit OFF**	Unit will not restart until alarm is acknowledged via unit controller or remote display
		NOTE: When the heat is called to be ON and the first stage is enabled, the low discharge temperature limit alarm will be allowed.		
6	**Filter Status**	Main unit filter pressure switch activates ID2 = ON No other action is taken by control system	**Dirty Filter Status Check Filters**	—

SAFETIES AND ALARMS—CONTINUED

Alarm Conditions—Continued

Table 16. Alarms—Continued

No.	Alarm ID	Alarm Condition/Control Action	Unit Alarm Display Message	Reset Condition
7	**Modulating Compressor Failure**	Compressor alarm input ID12 shows ON for more than 5 minutes DX mechanical equipment is turned OFF	**Modulating Compressor Failure**	DX mechanical equipment automatically restarts when alarm point is opened
8	**Modulating Reheat Compressor Failure**	Reheat compressor alarm input ID13 shows ON for more than 5 minutes Reheat compressor is turned OFF	**Modulating Reheat Compressor Failure**	Reheat compressor automatically restarts when alarm point is opened
9	**Phase Loss (Critical Shutdown Alarm)**	Phase loss input ID14 shows ON Unit shuts down and all equipment is turned OFF	**Phase Loss Unit OFF**	Unit will not restart until condition has cleared and alarm is acknowledged via the unit controller or remote display
10	**Outside Air Humidity Sensor Failure**	Outdoor air humidity sensor reading (U1) is invalid Unit turns OFF outside air dewpoint enabled dehumidification mode	**Outdoor Air Humidity Sensor Failure**	Unit will automatically return to normal operation when humidity sensor value returns
11	**Outside Air Temperature Sensor Failure**	Outdoor air temperature sensor reading (U2) is invalid Unit turns OFF heating and cooling functions	**Outside Air Temperature Sensor Failure Blower Only**	Unit will automatically return to normal operation when temperature sensor value returns
12	**Discharge Air Temperature Sensor Failure (Critical Shutdown Alarm)**	DAT sensor reading (U4) is invalid Unit shuts down and all equipment is turned OFF	**Discharge Air Temperature Sensor Failure Unit OFF**	Unit will not restart until condition has cleared and alarm is acknowledged via unit controller or remote display
13	**Cooling Coil Temp Sensor Failure**	Cooling coil temperature sensor reading (U5) is invalid Unit turns OFF all dehumidification functions	**Cooling Coil Temp Sensor Failure**	Unit will automatically return to normal operation when temperature sensor value returns
14	**Mixed Air Temp Sensor Failure**	Mixed air temperature sensor reading (U6) is invalid	**Mixed Air Temp Sensor Failure**	—
15	**Building Pressure Sensor Failure**	Pressure sensor reading (U7) is invalid	**Building Pressure Sensor Failure**	
16	**Duct Pressure Sensor Failure**	Pressure sensor reading (U7) is invalid	**Duct Pressure Sensor Failure**	
17	**CO2 Sensor Failure**	CO_2 sensor reading (U9) is invalid	**CO2 Sensor Failure**	
18	**ERV Discharge Temp Sensor Failure**	Outdoor air temperature sensor reading (U10) is invalid , the unit turns OFF the electric preheat functions.	**ERV Discharge Air Temp Sensor Failure**	Unit will automatically return to normal operation when temperature sensor value returns
19	**Gas Heater 1 Status Alarm**	First stage of heating associated with gas heater 1 is enabled and proof of flame is not proven via heater ignition control board within 5 minutes	**Possible Failure Gas Heater 1 Check Ignition Control Board.**	—
20	**Gas Heater 2 Status Alarm**	First stage of heating associated with gas heater 2 is enabled and proof of flame is not proven via heater ignition control board within 5 minutes	**Possible Failure Gas Heater 2 Check Ignition Control Board.**	
21	**Exhaust Fan Alarm Diagnostic**	Exhaust fan is enabled and is in diagnostic alarm state	**Exhaust Fan Alarm Diagnostic**	
		NOTE: One or more additional message will be displayed: Device Offline, Phase fault, Motor blocked, Mains undervoltage, Mains overvoltage, DC-link overvoltage, DC-link undevoltage, Motor superheating, Intern. circ.superheat., Output stage superheat., and/or Hall sensor error		
22	**Exhaust Fan Warning Diagnostic**	Exhaust fan is enabled and is in diagnostic warning state	**Exhaust Fan Warning Diagnostic**	—
		NOTE: One or more additional message will be displayed: Out stage high temp, Intern.circ.high temp, Motor high temperature, DC-link voltage low, Limited mains power, Limited mains current, and/or Brake mode		
23	**Return Air Probe Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 128 Return Air Probe Offline**	—
24	**Return Air Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 128 Return Air Temperature Probe Broken**	
25	**Return Air Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 128 Return Air Humidity Probe Broken**	

Table 16. Alarms—Continued				
No.	**Alarm ID**	**Alarm Condition/Control Action**	**Unit Alarm Display Message**	**Reset Condition**
26	**Exhaust Air Probe Offline**	Optional exhaust air probe is enabled and serial communication fails	**Serial Sensor Add 129 Exhaust Air Probe Offline**	—
27	**Exhaust Air Temp Probe Broken**	Optional exhaust air probe is enabled and temperature sensor fails	**Serial Sensor Add 129 Exhaust Air Temperature Probe Broken**	
28	**Exhaust Air Humidity Probe Broken**	Optional exhaust air probe is enabled and humidity sensor fails	**Serial Sensor Add 129 Exhaust Air Humidity Probe Broken**	
29	**Space Sensor thTune (Option CL78) Offline**	Optional CL78 space sensor is enabled and serial communication fails	**CL78 thTune Serial Sensor Add 1 Space 1 Offline**	Unit will continue to operate and reverts to neutral DAT control
30	**Space Sensor thTune (Option CL78) Temperature Sensor Broken**	Optional CL78 space sensor is enabled and space temperature sensor fails	**CL78 thTune Serial Sensor Add 1 Space 1 Temperature Probe Broken**	Unit will continue to operate and reverts to neutral DAT control
31	**Space Sensor thTune (Option CL78) Humidity Sensor Broken**	Optional CL78 space sensor is enabled and space humidity sensor fails	**CL78 thTune Serial Sensor Add 1 Space 1 Humidity Probe Broken**	Unit will continue to operate and reverts to neutral DAT control
32	**Space 2 Sensor Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 130 Space 2 Probe Offline**	—
33	**Space 2 Sensor Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 130 Space 2 Temperature Probe Broken**	
34	**Space 2 Sensor Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 130 Space 2 Humidity Probe Broken**	
35	**Space 3 Sensor Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 131 Space 3 Probe Offline**	
36	**Space 3 Sensor Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 131 Space 3 Temperature Probe Broken**	
37	**Space 3 Sensor Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 131 Space 3 Humidity Probe Broken**	
38	**Space 4 Sensor Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 132 Space 4 Probe Offline**	
39	**Space 4 Sensor Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 132 Space 4 Temperature Probe Broken**	
40	**Space 4 Sensor Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 132 Space 4 Humidity Probe Broken**	
41	**Space 5 Sensor Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 133 Space 5 Probe Offline**	
42	**Space 5 Sensor Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 133 Space 5 Temperature Probe Broken**	
43	**Space 5 Sensor Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 133 Space 5 Humidity Probe Broken**	
44	**Space 6 Sensor Offline**	Optional return air probe is enabled and serial communication fails	**Serial Sensor Add 134 Space 6 Probe Offline**	
45	**Space 6 Sensor Temperature Probe Broken**	Optional return air probe is enabled and temperature sensor fails	**Serial Sensor Add 134 Space 6 Temperature Probe Broken**	
46	**Space 6 Sensor Humidity Probe Broken**	Optional return air probe is enabled and humidity sensor fails	**Serial Sensor Add 134 Space 6 Humidity Probe Broken**	
47	**Entering Evaporator Temp Sensor Failure Circuit A**	Entering evaporator temperature sensor reading is invalid Dehumidification mode is turned OFF	**Entering Evaporator Temp Sensor Failure Circuit A**	
48	**Concurrent Calls for Heating (W1) and Cooling (Y1) (Critical Shutdown Alarm)**	Either external or BMS conventional call for heating and cooling is active at same time	**Concurrent calls for Heating (W1) and Cooling (Y1) Unit Off**	
49	**Supply Fan CFM Sensor Failure**	Supply fan cfm sensor reading expansion board (U1) is invalid	**Supply Fan CFM Sensor Failure**	

Alarm Conditions—Continued

Table 16. Alarms—Continued

No.	Alarm ID	Alarm Condition/Control Action	Unit Alarm Display Message	Reset Condition
50	**Supply Fan Temp Sensor Failure**	Supply fan temperature sensor reading expansion board (U6) is invalid	**Supply Fan Temp Sensor Failure**	—
51	**Exhaust Fan CFM Sensor Failure**	Exhaust fan cfm sensor reading expansion board (U2) is invalid	**Exhaust Fan CFM Sensor Failure**	
52	**Exhaust Fan Temp Sensor Failure**	Exhaust fan temp sensor reading expansion board (U5) is invalid	**Exhaust Fan Temp Sensor Failure**	
53	**Outside Air CFM Sensor Failure**	Outside air cfm sensor reading expansion board (U3) is invalid	**Outside Air CFM Sensor Failure**	
54	**Entering Evaporator Temp Sensor Failure Circuit B**	Entering evaporator temperature sensor reading is invalid Dehumidification mode is turned OFF	**Entering Evaporator Temp Sensor Failure Circuit B**	

Alarm Management

When the unit controller has an active or unacknowledged alarm, the alarm status is reflected by a flashing alarm key on the unit display and by a flashing alarm bell symbol on the face of the optional CL78 space sensor. The unit controller is also equipped with an output (NO7) configured to energize a factory-mounted unit general alarm relay. The alarm relay has a set of normally-open and normally-closed contacts available for customer use. The status of output NO7 is also reported to the optional BAS communication card. When an active and or unacknowledged alarm occurs, the user needs to manage the condition locally from the unit display or from an optional remote display. **Table 17** lists the procedure for acknowledging unit alarms and for viewing the alarm logger (see **Figure 2** for keypad descriptions).

Table 17. Acknowledging Unit Alarms and Viewing Alarm Logger

Step	Description	Display Screen
1	Press flashing alarm key	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
	Most recently-queued active and/or unacknowledged alarm and message is displayed	***Alarm***
2	Press down key to scroll through current list of active and/or unacknowledged alarms	Unit Safety Alarm Unit Off
	Prompt appears at end of queued alarm list to either press alarm key to clear alarms or to press enter key to display alarm logger	
	If alarm key is pressed:	***Alarm***
	Controller is prompted to attempt to reset any critical shutdown alarms that have occurred	Alarm(s) active Press ALARM to clear Press ENTER for the logger
	If critical shutdown condition is no longer active, controller re-enables unit	
	Controller clears any of non-critical alarms that are no longer active	
	If enter key is pressed, first page of alarm logger is displayed that shows most recently-logged alarm along with date, time, and Alarm ID	
	Snapshot is displayed of OAT, outside air humidity, DAT, cooling coil temperature (optional), and mixed air temperature (optional) sensors at time alarm was logged	06:34am 12/26/18 001:Alarm ID:1 OA_Temp 78.9°F OA_Humidity 21.0% DA_Temp 70.0°F CC_Temp 49.0°F MA_Temp 59.2°F
3	Press up key in succession to display any remaining logged alarms from most recent to least recent entry	

SETUP OF UNIT USING SYSTEM PROGRAMMABLE CONTROLLER

Set Date and Time

Table 18 lists the procedure for setting the date and time (see **Figure 2** for keypad descriptions).

Table 18. Setting Date and Time

Step	Description	Display Screen
1	From home screen, press program key to access **Main Menu**	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
2	From **Main Menu**, select **B. Schedule**	Main Menu A. Quick Setpoints B. Schedule C. Points List
3	From screen **B.1**, press enter key to access modifiable date and time fields Set date and time fields to current date and time	Clock B.1 06:34am 12/27/18 Date: 12/27/18 Hour: 06:34am Day: Thursday
4	Advance to screen **B.2** and set modifiable **DST** fields	Clock B.2 DST: Enable Transition Time: 60min Start: Last Sunday In March at 2.00 End: Last Sunday In October at 3.00
5	Press escape key three times to return to home screen Setting date and time is now complete	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F

Select Unit Occupancy Type and Enable System

Table 19 lists the procedure for setting the unit occupancy type and for enabling the system (see Figure 2 for keypad descriptions).

Table 19. Selecting Unit Occupancy Type and Enabling System Sequence

Step	Description	Display Screen
1	From home screen press program key to access **Main Menu**	06:34am 12/26/18 M.1 R7 Series D21 Mode:Occ State_Sel: Off Outside Air Conditions Temperature: 78.9°F Humidity: 47.3% Dewpoint: 52.7°F
2	From **Main Menu** select **E. Service**	Main Menu A. Quick Setpoints B. Schedule C. Points List
3	From screen **A.1**, select **Occupied Mode Select:** field and set to one of following: **Digital Input:** This is default value (unit ships with jumper wired on occupied digital input); unit remains in occupied status until occupied jumper is removed and replaced with external field-supplied contact **Schedule:** Unit operates based on local time of day schedule (configurable for up to 10 weekly schedules and 16 holidays) **BMS:** Unit operates based on command from third-party BACnet system (requires BHB8 BACnet card option)	Quick setpoints A.1 Occupied Mode Select: Digital Input State Select: Off
4	When occupied mode has been selected, press escape key to return to **Main Menu** If **Schedule** mode has been selected, proceed to step 5 If **Digital Input** or **BMS** mode has been selected, proceed to step 8	Main Menu A. Quick Setpoints B. Schedule C. Points List
5	From **Main Menu**, select **B. Schedule**	
6	Advance to screen **B.3** and press enter key to access **Schedule** fields Set **Time On:**, **Time Off:**, and **Days Enabled:** fields to desired values Press escape key to return to **Main Menu**	Scheduler B.3 Schedule # 1 Time On: 7:00am Time Off: 5:00pm Days Enabled: MTWTF**
7	From **Main Menu**, select **A. Quick Setpoints**	Main Menu F. Factory Settings A. Quick Setpoints B. Schedule
8	For units equipped with control option D19 or D22, set **System Enable:** field to **On** from screen **A.1** For units equipped with control option D19, D21, or D23, set **State Select:** field to **Heat**, **Cool**, or **Auto** from screen **A.1** Selecting unit occupancy type and enabling system procedure is now complete	Quick setpoints A.1 Occupied Mode Select: Digital Input System Enable: On Quick setpoints A.1 Occupied Mode Select: Digital Input State Select: Auto

Controller Display Menus

Table 20 lists the controller display menus and their fields.

Table 20. Controller Display Menu Structure

Screen	Field	Description	Default	UOM*	Min	Max
Main Menu M.1 through M.5 Screens						
M.1 (monitor only)	**Control Option Code**	Current Control Option Code (D19 with TStat, D19 with CL78, D21, D21 with CL78, D22 or D23)	—	—	—	—
	Mode:	Current Unit Mode (Occ or Unocc)	—	—	—	—
	State:	Current Unit State (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF)	Off	—	2	5
	System Enable:	Current System Enable (On or Off)	Off		—	
	Temperature:	Current Outside Air Temp	—	°F	—	—
	Humidity:	Current Outside Air Humidity	—	%rH	—	—
	Dew Point:	Current Outside Air Dew Point	—	°F	—	—
M.2 (displayed when unit is selected with space sensor option CL78, monitor only)	**Spc_Temp:**	Space Temp (current space temperature)	—	°F	—	—
	SpcTempSP:	Space Temp SP (base space temperature setpoint value from space thermostat or from controller display adjustment)	72	°F	65	85
	Spc_Humidity:	Space Humidity (current space humidity)	—	%rH	—	—
	SpcHumSP:	Space Humidity SP (current space humidity setpoint)	55	%rH	35	75
Main Screen M.3 (monitor only)	**Fan:**	Current Supply Fan Commanded Speed	—	%	—	—
	DA_Temp:	Discharge Air Temp (current DAT)	—	°F	—	—
	DA_SP:	Discharge Air Temp Active SP (active DAT setpoint)	—	°F	—	—
M.4 (displayed when unit is selected with control option D19 with Tstat, monitor only)	**Input Type:**	Input Type (current status of selected input type for D19 conventional inputs (external or BMS)	External	—	—	—
	OccMode_Sel:	Occupied Mode Select (currently-selected occupancy type (Schedule, Digital Input, or BMS)	Digital input	—	—	—
	Mode:	Current Unit status of the unit mode (Occ or Unocc)	—	—	—	—
	Ext Occ:	External Occupancy Call (current status of External Occupied Input)	—	—	Off	On
	Fan:	External Fan Call Input (G) (current status of External Fan Input)	—	—	Off	On
	Htg:	External Heat Call Input (W1) (current status of External Heat Input)	—	—	Off	On
	Clg:	External Cool Call Input (Y1) (current status of External Cool Input)	—	—	Off	On
	Dehum:	External Dehum Call Input (current status of External Dehum Input)	—	—	Off	On
M.5 (modes displayed based on unit configuration, monitor only)	**Spc_Clg_Md:**	Space Cooling Mode (unit controls applicable cooling stages to maintain DA_SpcClg_SP or space temperature)	—	—	Off	On
	Spc_Dehum_Md:	Space Dehum Mode (unit controls reheat compressor to maintain DA_Dh_SP and controls applicable cooling stages to maintain CC_DA_SP)	—	—	Off	On
	Spc_Htg_Md:	Space Heating Mode (unit controls applicable heating stages to maintain DA_SpcHtg_SP or space temperature)	—	—	Off	On
	Spc_HtgClg_Md:	Space Heating Cooling Mode (unit controls applicable heating stages to maintain DA_SpcHtCl_SP (D21 auto heating only)	—	—	Off	On
	NA_Clg_Md:	Neutral Air Cooling Mode (unit controls applicable cooling stages to maintain DA_NAClg_SP)	—	—	Off	On
	NA_Dehum_Md:	Neutral Air Dehum Mode (unit controls reheat compressor to maintain DA_Dh_SP and controls applicable cooling stages to maintain CC_DA_SP)	—	—	Off	On
	NA_Htg_Md:	Neutral Air Heating Mode (unit controls applicable heating stages to maintain DA_NAHtg_SP)	—	—	Off	On
Main Menu: A. Quick Setpoints Screens						
A.1	**OccMode_Sel:**	Occupied Mode Select (Schedule, Digital Input, or BMS) (sets desired unit occupancy type)	Digital Input	—	—	—
	System Enable:	System Enable (sets system to enabled and available for operation) Displayed with D19 Tstat and D22	Off	—	—	—
	State_Sel:	State Select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF, sets unit state) Displayed with D19 CL78, D21 and D23	5	—	2	5

*Unit of measurement.

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: A. Quick Setpoints Screens						
A.2 (displayed when unit is selected with control option D19 and Thermostat)	**System Enable:**	System Enable (sets system to enabled and available for operation) Displayed with D19 Tstat and D22	Off	—	—	—
	State_Sel:	State Select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF, sets unit state) Displayed with D19 CL78, D21, and D23	5	—	2	5
	OAChgOv_SP:	OA Change Over SP (OA temperature setpoint used to enable heating and cooling when unit is in auto state)	65	°F	45	80
	OAChgOvDiff:	OA Change Over SP Differential (sets differential for OAChgOv_SP)	5	°F	0.5	10
	OAChgOvDel:	OA Change Over Delay Time (delay period required to switch between heating and cooling when unit is in auto state)	15	Minute	5	30
A.3 (displayed when unit is selected with control option D19 with CL78 Space Sensor)	**State_Sel:**	State Select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF, sets unit state)	5	—	2	5
	OAChgOv_SP:	OA Change Over SP (OA temperature setpoint used to enable heating and cooling when unit is in auto state)	65	°F	45	80
	OAChgOvDiff:	OA Change Over SP Differential (sets differential for OAChgOv_SP)	5	°F	0.5	10
	OAChgOvDel:	OA Change Over Delay Time (delay period required to switch between heating and cooling when unit is in auto state)	15	Minute	5	30
	TempOcc:	Temporary Occupied Status from Space Thermostat (indexed on when thermostat fan button is pressed)	Off	—	Off	On
	TempOcc_Time:	Temporary Occupied Time Duration (sets time duration for temporary occupancy)	240	Minute	0	480
A.4 (displayed when unit is selected with control option D21	**State_Sel:**	State Select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF, sets unit state)	5	—	2	5
	OAChgOv_SP:	OA Change Over SP (OA temperature setpoint used to enable heating and cooling when unit is in auto state)	65	°F	45	80
	OAChgOvDiff:	OA Change Over SP Differential (sets differential for OAChgOv_SP)	5	°F	0.5	10
	OAChgOvDel:	OA Change Over Delay Time (delay period required to switch between heating and cooling when unit is in auto state)	15	Minute	5	30
	TempOcc:	Temporary Occupied Status from Space Thermostat (indexed on when thermostat fan button is pressed)	Off	—	Off	On
	TempOcc_Time:	Temporary Occupied Time Duration (sets time duration for temporary occupancy)	240	Minute	0	480
A.5 (displayed when unit is selected with control option D22)	**System Enable:**	System Enable (sets system to enabled and available for operation)	Off	—	—	—
	Setpoint Type:	Setpoint Type (sets DAT setpoint type between BMS or Local)	Local	—	—	—
	DA_BMS_SP:	Discharge Air Temp BMS SP (sets DAT setpoint via BMS system)	—	—	50	140
	DA_Loc_SP:	Discharge Air Temp Local SP (sets DAT setpoint via local display)	—	—	50	140
	DA_SP:	Discharge Air Temp Active SP (active DAT setpoint)	—	—	—	—
A.6 (displayed when unit is selected with control option D23)	**State_Sel:**	State Select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF, sets unit state)	5	—	2	5
	TempOcc:	Temporary Occupied Status from Space Thermostat (indexed on when thermostat fan button is pressed)	Off	—	Off	On
	TempOcc_Time:	Temporary Occupied Time Duration (sets time duration for temporary occupancy)	240	Minute	0	480
A.7 (displayed when unit is selected with space sensor option CL78 or D23)	**Spc_Temp:**	Space Temp (current space temperature)	—	°F	—	—
	SpcTempSP:	Space Temp SP (base space temperature setpoint value from space thermostat or controller display adjustment)	72	°F	65	85
	SpcHtgSp:	Space Heating SP (value is equal to SpcTempSP minus SpcHtgDB)	70	°F	—	—
	SpcClgSp:	Space Cooling SP (value is equal to SpcTempSP plus SpcClgDB)	74	°F	—	—
	SpcHtgDB:	Space Heating Dead Band (sets value subtracted from SpcTempSP for SpcEffHtgSP definition)	1	°F	0	5
	SpcClgDB:	Space Cooling Dead Band (sets value added to SpcTempSP for SpcEffClgSP definition)	1	°F	0	5

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued						
Screen	**Field**	**Description**	**Default**	**UOM***	**Min**	**Max**
Continued—Main Menu: A. Quick Setpoints Screens						
A.8 (displayed when unit is selected with space sensor option CL78 or D23)	**SpcEffClgSP:**	Space Effective Cooling SP (defined by SpcClgDB and SpcClgUnoOs setpoints)	—	°F	—	—
	SpcClgOnDiff:	Space Cooling On Differential (sets differential required above SpcEffClgSP for space cooling call to turn on)	1	°F	0.5	10
	SpcClgOffDiff:	Space Cooling Off Differential (sets differential required below SpcEffClgSP for space cooling call to turn off)	1	°F	0.5	10
	SpcClgUnoOs:	Space Cooling Unoccupied Offset (sets value added to SpcTempSP when in unoccupied mode for SpcEffClgSP definition)	8	°F	0	15
	UnoClgOffDiff	Unoccupied Space Cooling Off Differential (sets differential required below SpcEffClgSP for space cooling call to turn off when in unoccupied mode)	4	°F	0	10
	DA_SpcClg_SP:	Discharge Air Temp Space Cooling SP (sets discharge setpoint used when in Space Cooling Mode)	55	°F	50	100
A.9 (displayed when unit is selected with space sensor option CL78 or D23)	**SpcEffHtgSP:**	Space Effective Heating SP (defined by SpcHtgDB and SpcHtgUnoOs setpoints)	—	°F	—	—
	SpcHtgOnDiff:	Space Heating On Differential (sets differential required below SpcEffHtgSP for space heating call to turn on)	1	°F	0.5	10
	SpcHtgOffDiff:	Space Heating Off Differential (sets differential required above SpcEffHtgSP for space heating call to turn off)	1	°F	0.5	10
	SpcHtgUnoOs:	Space Heating Unoccupied Offset (sets value subtracted from SpcTempSP when in unoccupied mode for SpcEffHtgSP definition)	8	°F	0	15
	UnoHtgOffDiff	Unoccupied Space Heating Off Differential (sets differential required above SpcEffHtgSP for space heating call to turn off when in unoccupied mode)	4	°F	0	10
	DA_SpcHtg_SP:	Discharge Air Temp Space Heating SP (sets discharge setpoint used when in Space Heating Mode)	90	°F	50	140
A.10 (displayed when unit is selected with space sensor option CL78 and option D21)	**SpcEffClgSP:**	Space Effective Cooling SP (defined by SpcClgDB and SpcClgUnoOs setpoints)	—	°F	—	—
	SpcHCOnDiff:	Space Heating Cooling On Differential (sets differential required above SpcTempSP for space cooling call to turn on (auto heating only))	1	°F	0.5	10
	SpcHCOffDiff:	Space Heating Cooling Off Differential (sets differential required below SpcTempSP for space cooling call to turn off (auto heating only))	1	°F	0.5	10
	UnoHCOffDiff	Unoccupied Space Heating Cooling off Differential (sets differential required above SpcEffHtgSP for space heating call to turn off when in unoccupied mode)	4	°F	0	10
	DA_SpcHtCl_SP:	Discharge Air Temp Space Heat Mode Cooling SP (sets discharge air setpoint used when in Space Heat Cooling Mode (auto heating only))	55	°F	50	100
A.11 (displayed when unit is configured for space control and dehumidification)	**Spc_Humidity:**	Space Humidity (current space humidity)	—	%rH	—	—
	SpcHumSP:	Space Humidity SP (sets space humidity setpoint)	52	%rH	35	75
	SpcDhOnDiff:	Space Dehum On Differential (sets differential required above SpcHumSP for space dehumidification call to turn on)	3	%rH	1	10
	SpcDhOffDiff:	Space Dehum Off Differential (sets differential required below SpcHumSP for space dehumidification call to turn off)	2	%rH	1	10
A.12 (displayed with control options D19 and D21)	**DA_NAClg_SP:**	Discharge Air Temp Neutral Cooling SP (sets discharge setpoint used when in Neutral Air Cooling Mode)	70	°F	50	100
	DA_NAHSPSel:	Neutral DA Heating SP Select (used to select desired discharge setpoint for Neutral Air Heating Mode Single Setpoint or Reset Setpoint)	SP	—	SP	Reset
	DA_NAHtg_SP:	Discharge Air Temp Neutral Heating SP (sets discharge setpoint used when in Neutral Air Heating Mode)	70	°F	50	140
	DA_NAHRst_SP:	Discharge Air Temp Neutral Heat Reset SP (display of optional calculated reset schedule setpoint used when in Neutral Air Heating Mode)	—	°F	50	140
***Unit of measurement.						

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: A. Quick Setpoints Screens						
A.13 (displayed with control options D19 and D21)	**OA_Temp:**	Current Outside Air Temp	—	°F	—	—
	DA_NAHRst_SP:	Discharge Air Temp Neutral Heat Reset SP (display of optional calculated reset schedule setpoint used when in Neutral Air Heating Mode)	—	°F	50	140
	NAHRDAMax:	Neutral Air Heat DA SP Reset DA Max (sets maximum neutral air heating DAT reset setpoint)	75	°F	50	140
	NAHRDAMin:	Neutral Air Heat DA SP Reset DA Min (sets minimum neutral air heating DAT reset setpoint)	65	°F	50	140
	NAHROAMax:	Neutral Air Heat DA SP Reset OA Max (sets maximum neutral air heating OAT reset setpoint)	65	°F	0	100
	NAHROAMin:	Neutral Air Heat DA SP Reset OA Min (sets minimum neutral air heating OAT reset setpoint)	30	°F	0	100
A.14 (displayed with control options D19 and D21 and space control)	**System Enable:**	Unit Enable (sets unit to enabled and available for operation)	5	—	2	5
	DA_SpcClg_SP:	Discharge Air Temp Space Cooling SP (sets discharge setpoint used when in Space Cooling Mode)	55	°F	50	100
	DA_SpcHSPSel:	Space DA Heating SP Select (used to select desired discharge setpoint for Space Heating Mode (Single Setpoint or Reset Setpoint)	SP	—	SP	Reset
	DA_SpcHtg_SP:	Discharge Air Temp Space Heating SP (sets discharge setpoint used when in Space Heating Mode)	90	°F	50	140
	DA_SpcHRst_SP:	Discharge Air Temp Space Heating Reset SP (display of optional calculated reset schedule setpoint used when in Space Heating Mode)	—	°F	50	140
A.15 (displayed with control options D19 and D21 and space control)	**OA_Temp:**	Current Outside Air Temp	—	°F	—	—
	DA_SpcHRst_SP:	Discharge Air Temp Space Heating Reset SP (display of optional calculated reset schedule setpoint used when in Space Heating Mode)	—	°F	50	140
	SpcHRDaMax:	Space Heat DA SP Reset OA Max (sets maximum space heating DAT reset setpoint)	120	°F	50	140
	SpcHRDaMin:	Space Heat DA SP Reset DA Min (sets minimum space heating DAT reset setpoint)	90	°F	50	140
	SpcHROaMax:	Space Heat DA SP Reset OA Max (sets maximum space heating OAT reset setpoint)	65	°F	0	100
	SpcHROaMin:	Space Heat DA SP Reset OA Min (sets minimum space heating OAT reset setpoint)	30	°F	0	100
A.16 (displayed when unit is configured for dehumidification)	**DhOADP_SP:**	Sets the Dehum OA Dew Point SP (used to allow Neutral Air Dehumidification Mode when OA dew point is greater than SP)	58	°F	50	100
	DhOADP_Diff:	Dehum OA Dew Point SP Differential (sets differential for DhOADP_SP)	2	°F	0.5	10
A.17 (displayed when unit is selected with Building Pressure Control)	**Pressure Control**	Factory Selection: Building	—	—	—	—
	Controlled Device	Factory Selection: Supply Fan, Dampers, or Exhaust Fan	—	—	—	—
	Bldg_Pressure	Building Static Pressure	—	—	—	—
	Setpoint:	Building Static Pressure SP	0.1	iwc	–0.5	0.5
A.18 (displayed when unit is selected with Duct Pressure Control)	**Pressure Control**	Factory Selection: Duct	—	—	—	—
	Controlled Device	Factory Selection: Supply Fan	—	—	—	—
	Duct_Pressure	Duct Static Pressure	—	—	—	—
	Setpoint:	Duct Static Pressure SP	0.5	iwc	0	2.5
A.19 (displayed when unit is selected with option VFCD, EFCD, or BE15)	**SpcCO2SP:**	Space CO2 SP (current space CO2 setpoint)	1000	ppm	0	2000
	SpcCO2Diff:	Space CO2 SP Differential (differential for SpcCO2SP)	200	ppm	10	500
Main Menu: B. Schedule Screens						
B.1	**Date:**	Sets current month day and year (default value: Factory Date)				
	Hour:	Sets current time (default value: Factory Time)				

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: B. Schedule Screens						
B.2	**DST:**	Set to enable DST (default value: enable)				
	Transition Time:	Sets Transition Time (default value: 60 minutes)				
	Start:	Sets Start day, month, and time (default value: last Sunday in March at 2:00)				
	End:	Sets End day, month, and time (default value: last Sunday in October at 3:00)				
B.3 (displayed when unit **OccMode_Sel** is set to Schedule)	**Schedule #:**	Modifiable field used to advance through 10 available Weekly Schedules				
	Time On:	Sets desired On time for selected Schedule #				
	Time Off:	Sets desired Off time for selected Schedule #				
	Days Enabled:	Sets desired days of week for selected Schedule #				
B.4 (displayed when unit **OccMode_Sel** is set to Schedule)	**1:**	Sets desired Holiday Range 1: for Extended Unoccupied Mode 0/0 - 0/0				
	2:	Sets desired Holiday Range 2: for Extended Unoccupied Mode 0/0 - 0/0				
	3:	Sets desired Holiday Range 3: for Extended Unoccupied Mode 0/0 - 0/0				
	4:	Sets desired Holiday Range 4: for Extended Unoccupied Mode 0/0 - 0/0				
B.5 (displayed when unit **OccMode_Sel** is set to Schedule)	**5:**	Sets desired Holiday Range 5: for Extended Unoccupied Mode 0/0 - 0/0				
	6:	Sets desired Holiday Range 6: for Extended Unoccupied Mode 0/0 - 0/0				
	7:	Sets desired Holiday Range 7: for Extended Unoccupied Mode 0/0 - 0/0				
	8:	Sets desired Holiday Range 8: for Extended Unoccupied Mode 0/0 - 0/0				
B.6 (displayed when unit **OccMode_Sel** is set to Schedule)	**9:**	Sets desired Holiday Range 9: for Extended Unoccupied Mode 0/0 - 0/0				
	10:	Sets desired Holiday Range 10: for Extended Unoccupied Mode 0/0 - 0/0				
	11:	Sets desired Holiday Range 11: for Extended Unoccupied Mode 0/0 - 0/0				
	12:	Sets desired Holiday Range 12: for Extended Unoccupied Mode 0/0 - 0/0				
B.7 (displayed when unit **OccMode_Sel** is set to Schedule)	**13:**	Sets desired Holiday Range 13: for Extended Unoccupied Mode 0/0 - 0/0				
	14:	Sets desired Holiday Range 14: for Extended Unoccupied Mode 0/0 - 0/0				
	15:	Sets desired Holiday Range 15: for Extended Unoccupied Mode 0/0 - 0/0				
	16:	Sets desired Holiday Range 16: for Extended Unoccupied Mode 0/0 - 0/0				
Main Menu: C. Points List Screens						
C.1 thru C.3	**Screens and content displayed based on unit configuration****	Applicable analog outputs for unit configuration				
C.4 thru C.6		Applicable relay outputs for unit configuration				
C.7 thru C.14		Applicable analog inputs for unit configuration				
C.15 thru C.22		Temperature and humidity values for optional space sensors 1 through 6				
C.23		Current status information for EBM exhaust fan				
C.24 thru C.26		Applicable digital inputs for unit configuration				
Main Menu: D. Alarms Screens						
Active Alarms are displayed with option of entering Alarm Logger (refer to Alarm Management section for detailed information on Active and Logged alarms)						
Main Menu: E. Service Screens						
a. Test Mode Screens (screens and content displayed based on unit configuration)						
E.a.1	**Enable:**	Modifiable field used to enable Test Mode	—	—	—	—
	Time Out:	Modifiable field used to adjust Test Mode time duration	240	Minute	0	240
E.a.2	**Supply Fan Cmd:**	Automatically-commanded supply fan start output	—	—	—	—
	Exhaust Fan Cmd:	Automatically-commanded supply fan start output	—	—	—	—
	Damper:	Automatically-commanded percentage output to unit damper(s)	100	—	—	—
E.a.3	**Test Supply Fan Speed:**	Supply fan speed output modifiable field used to test unit supply fan VFD or ECM Motor and set air balance fan speed adjustment	100	%	30	100
	Y02 SF_Spd_Cmd	Output in VDC to supply fan VFD or ECM Motor	10	VDC	0	10
	DI01 SF_Sts	Status of supply fan air proving switch	—	—	Off	On
E.a.4	**Test Exhaust Fan Speed:**	Exhaust fan speed output modifiable field used to test unit Exhaust fan ECM Motor and set air balance fan speed adjustment	100	%	30	100
	EF_Spd_Cmd	Output in VDC to supply fan VFD or ECM Motor	10	VDC	0	10
	RPM	Current exhaust fan rpm	—	rpm	—	—
	DI11 EF_Sts	Status of exhaust fan air proving switch	—	—	Off	On
E.a.5	**Test Comp A:**	Modifiable field used to adjust output to A compressor Emerson controller	0	%	0	100
	Y03 Comp_A_Cmd:	Output in VDC to A compressor Emerson controller	1	VDC	1	5
	Cond_A_Cmd:	Automatically-commanded condenser section A fan contactor(s) output	Off	—	Off	On

*Unit of measurement.

Refer to **Table 2 and **Table 3** for a complete list of IO points and serial communication connections.

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens a. Test Mode Screens (screens and content displayed based on unit configuration)—Continued						
E.a.6	**Test Reheat A:**	Modifiable field used to adjust output to A compressor Emerson controller	0	%	0	100
	Y05 RH_A_Cmd :	Output in VDC to A compressor Emerson controller	1	VDC	1	5
E.a.7	**Test NO02 Comp_B:**	Modifiable field used to turn on Compressor Stage 2	Off	—	Off	On
	Cond_B_Cmd:	Automatically-commanded condenser section B fan contactor(s) output (Y series only)	Off	—	Off	On
E.a.8	**Test Reheat B:**	Modifiable field used to adjust output to modulation valve(s)	0	%	0	100
	U7 RH_B_Mod_Cmd:	Output in VDC to modulation valve(s)	0	VDC	0	10
E.a.9	**Test NO08 HX_Stg1:**	Modifiable field used to turn on Heating Stage 1	Off	—	Off	On
	DI15 Htr_1_Sts	Status of heat section 1 proof of flame	—	—	Off	On
E.a.10 (displayed when unit is selected with gas option AG73 or AG74)	**Test NO08 HX_Stg1:**	Modifiable field used to turn on Heating Stage 1	Off	—	Off	On
	DI15 Htr_1_Sts	Status of heat section 1 proof of flame	—	—	Off	On
	Test HX Mod:	Modifiable field used to adjust output to gas heating modulation valve	0	%	0	100
	Y04 HX_Mod_Cmd:	Output in VDC to gas heating modulation valve	0	VDC	2	10
	Y06 Vent_Spd_Cmd	Output in VDC to combustion venter motor PWM Converter (R7 series only)	0	VDC	0	10
E.a.11 (displayed when unit is selected with gas option AG73)	**Test NO09 HX_Stg2:**	Modifiable field used to turn on Heating Stage 2	Off	—	Off	On
	Test NO10 HX_Stg3:	Modifiable field used to turn on Heating Stage 3	Off	—	Off	On
	DI16 Htr_2_Sts	Status of heat section 2 proof of flame	—	—	Off	On
E.a.12 (displayed when unit is selected with gas option AG71 or AG72)	**Test NO08 HX_Stg1:**	Modifiable field used to turn on Heating Stage 1	Off	—	Off	On
	Test NO09 HX_Stg2:	Modifiable field used to turn on Heating Stage 2	Off	—	Off	On
	DI15 Htr_1_Sts	Status of heat section 1 proof of flame	—	—	Off	On
E.a.13 (displayed when unit is selected with gas option AG72)	**Test NO10 HX_Stg3:**	Modifiable field used to turn on Heating Stage 3	Off	—	Off	On
	Test NO11 HX_Stg4:	Modifiable field used to turn on Heating Stage 4	Off	—	Off	On
	DI16 Htr_2_Sts	Status of heat section 2 proof of flame	—	—	Off	On
E.a.14 (displayed when unit is selected with electric Heating)	**Test HX Mod:**	Modifiable field used to adjust output to Electric SCR Controller	0	%	0	100
	Y04 HX_Mod_Cmd:	Output in VDC to Electric SCR Controller	0	VDC	0	10
	Test NO08 HX_Stg1:	Modifiable field used to turn on Heating Stage 1	Off	—	Off	On
E.a.15 (displayed when unit is selected with electric heating)	**Test NO09 HX_Stg2:**	Modifiable field used to turn on Heating Stage 2	Off	—	Off	On
	Test NO10 HX_Stg3:	Modifiable field used to turn on Heating Stage 3	Off	—	Off	On
	Test NO11 HX_Stg4:	Modifiable field used to turn on Heating Stage 4	Off	—	Off	On
	Test NO12 HX_Stg5:	Modifiable field used to turn on Heating Stage 5	Off	—	Off	On
	Test NO13 HX_Stg6:	Modifiable field used to turn on Heating Stage 6	Off	—	Off	On
E.a.16 (displayed when unit is selected with an ERV)	**Test NO15 ERV_Cmd:**	Modifiable field used to turn on Energy Recovery Wheel	Off	—	Off	On
E.a.17 (displayed when unit is selected with electric preheat)	**Test NO16 Preheat_Cmd:**	Modifiable field used to turn on Electric Preheat	Off	—	Off	On
E.a.18 through E.a.37		Contains all applicable analog and binary hardware sensor inputs, including any serial communicated sensors depending upon unit configuration				

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens						
b. TAB Screen (used to perform Service Save of controller setpoints and Service Restore of previously-saved setpoints)						
E.b.1	**Set Max SF Spd?**	Modifiable field used to set maximum allowable supply fan speed for saving	No	—	No	Yes
	Set Max EF Spd?	Modifiable field used to set maximum allowable exhaust fan speed for saving	No	—	No	Yes
	Save?	Modifiable field used to perform Service Save of current setpoints	No	—	No	Yes
	Restore?	Modifiable field used to perform Service Restore of current setpoints	No	—	No	Yes
c. Supply Fan Menu Screens (applicable screens and content displayed based on unit configuration)						
E.c.1	**Control:**	Selected Fan Control Strategy (VFC9 Constant Vol, VFC4 Bldg Pressure, VFC3 Duct Pressure, VFC2 0–10 VDC input, VFCD 2 Speed CO2, VFC1 High Low Speed, VFCC BMS source, VFCF Occ Unocc Speed or VFCE CFM)	—	—	—	—
	SFSpdClgSP:	Supply Fan Speed Cooling SP (sets commanded speed for supply fan when in cooling mode (applies to VFC9))	100	%	30	100
	SFSpdHtgSP:	Supply Fan Speed Heating SP (sets commanded speed for supply fan when in heating mode (applies to VFC9))	100	%	30	100
	SFSpdLoSP:	Supply Fan Speed Low SP (sets commanded speed for supply fan when unit is in either in htg or clg mode (applies to VFC1))	100	%	30	100
	SFSpdHiSP:	Supply Fan Speed High SP (sets commanded speed for supply fan when unit is in either htg or clg mode (applies to VFC1))	100	%	30	100
	SFSpdLoCO2SP:	Supply Fan Speed Low Co2 SP (sets commanded speed for supply fan when unit is below CO2 setpoint (applies to VFCD))	100	%	30	100
	SFSpdHiCO2SP:	Supply Fan Speed High Co2 SP (sets commanded speed for supply fan when unit is above CO2 setpoint (applies to VFCD))	100	%	30	100
	SF_BMS:	Supply Fan Speed BMS (value of current commanded fan speed from BMS (applies to VFCC)	—	%	30	100
	SFSpdOcc:	Supply Fan Speed Low SP (sets commanded speed for supply fan when unit is occupied (applies to VFCF))	100	%	30	100
	SFSpdUnocc:	Supply Fan Speed High SP (sets commanded speed for supply fan when unit is unoccupied (applies to VFCF))	100	%	30	100
	SupFan_CycleMode:	Supply Fan Cycle Mode (Set on to cycle fans based space temp set off for continuous fan (Applies to option D23))	Off	-	Off	On
E.c.2 (displayed when Supply Fan is selected for VFC4 Building Pressure Control	**Bldg Pressure**	Current building static pressure	—	iwc	–0.5	0.5
	Setpoint:	Current building static pressure SP	0.1	iwc	–0.5	0.5
	PI Output:	Current output of control loop	—	%	0	100
	SF Signal:	Scaled Percentage output signal	—	%	0	100
	SF_VFD_Cmd	Current supply fan VFD command in VDC	—	VDC	0	10
E.c.3 (displayed when Supply Fan is selected for VFC3 Duct Pressure Control	**Duct Pressure**	Current duct static pressure	—	iwc	0	2.5
	Setpoint:	Current duct static pressure SP	0.5	iwc	0	2.5
	PI Output:	Current output of control loop	—	%	0	100
	SF Signal:	Scaled Percentage output signal	—	%	0	100
	SF_VFD_Cmd	Current supply fan VFD command in VDC	—	VDC	0	10
E.c.4 (displayed when Supply Fan is selected for VFCE CFM Control or AFS1)	**Elevation Value for Unit Location:**	Sets elevation value for unit location	0	feet	0	25000
E.c.5 (displayed when Supply Fan is selected for VFCE Supply Fan CFM Control)	**Supply Fan CFM**	Current Supply Fan CFM	—	CFM	0	32000
	Setpoint:	Current CFM SP	3000	CFM	0	32000
	PI Output:	Current output of control loop	—	%	0	100
	SF Signal:	Scaled Percentage output signal	—	%	0	100
	SF_VFD_Cmd	Current supply fan VFD command in VDC	—	VDC	0	10
E.c.6 (displayed when Supply Fan is selected for VFCE Supply Fan CFM Control)	**U1 SF_DP:**	VCD input from supply Fan differential pressure sensor	—	VDC	0	5
	SF_Temp:	Temperature at inlet of supply fan	—	°F	—	—
	SF_Press:	Scaled pressure reading from supply fan differential pressure sensor	—	iwc	0	10
	SF_VFD_Cmd	Current supply fan VFD command in VDC	—	VDC	0	10
	Supply Fan CFM	Current Supply Fan CFM	—	CFM	0	32000
E.c.7	**SFSpdMax_SP:**	Supply Fan Maximum Speed Setpoint	100	%	30	100
	SFSpdMin_SP:	Supply Fan Minimum Speed Setpoint	30	%	30	100

*Unit of measurement.

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens d. Capacity Menu Screens (screens and content displayed based on unit configuration)						
E.d.1 (monitor only)	**Fuel Type:**	AA1 Natural Gas, AA2 Propane, AA4 Hydronic, AA6 Electric, AA0 None				
	Cooling Size:	060, 062, 090, 092, 120, 150, 180, 210, 240, 300, or 360				
	Reheat Option:	None, RPLE, RPHE, or AUR2				
	Electric Preheat	Yes or No				
E.d.2	**th- Space Sens:**	th- space sensor (enables/disables option CL78 space sensor 1)	Off	—	—	—
	Spc_Avg_Ena:	Spc_Avg_Ena (enables averaging of multiple space sensors from 2 up to 6)	Off	—	—	—
	Num_Avg_Sens:	Num_Avg_Sens (sets number of sensors to average including th-Tune)	2	—	2	6
	Ena_Unocc_Spc:	Enabled unoccupied space control (enables night setback and night setup operation)	On	—	Off	On
E.d.3 (displayed when unit is selected with control option D21)	**OAHtgLo_SP**	OA Heating Lockout SP (sets OA setpoint used to disable heating)	65	°F	0	150
	OAHtgLoDiff	OA Heating Lockout SP Differential (sets differential used for OAHtgLo_SP)	2	°F	0.5	10
	OAClgLo_SP	OA Cooling Lockout SP (sets OA setpoint used to disable mechanical cooling)	65	°F	–10	150
	OAClgLoDiff	OA Cooling Lockout SP Differential (sets differential used for OAClgLo_SP)	2	°F	0.5	10
E.d.4 (displayed when unit is selected with control option D19, D22, or D23)	**OAHtgLo_SP_2**	OA Heating Lockout SP (sets OA setpoint used to disable heating)	60	°F	0	150
	OAHtgLoDiff_2	OA Heating Lockout SP Differential sets differential used for OAHtgLo_SP)	2	°F	0.5	10
	OAClgLo_SP_2	OA Cooling Lockout SP (sets OA setpoint used to disable mechanical cooling)	60	°F	–10	150
	OAClgLoDiff_2	OA Cooling Lockout SP Differential (sets differential used for OAClgLo_SP)	2	°F	0.5	10
E.d.5 (displayed when unit is configured with Heating and Discharge Air Control)	**DA_Temp**	Current DAT	—	°F	—	—
	Setpoint:	Current DAT setpoint	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	HX_Mod_Cmd	Heating modulation command in VDC	—	VDC	0–2	10
E.d.6 (displayed when unit is configured with Heating and Space Temp Control)	**Spc_Temp**	Current space temperature	—	°F	—	—
	Setpoint:	Current discharge air SP	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	HX_Mod_Cmd	Heating modulation command in VDC	—	VDC	0–2	10
E.d.7 (displayed when unit is configured with Heating)	**HX_Stg1_Cmd**	Current Heating Stage 1 command	—	— —	Off	On
	HX_Stg2_Cmd	Current Heating Stage 2 command	—		Off	On
	HX_Stg3_Cmd	Current Heating Stage 3 command	—	—	Off	On
	HX_Stg4_Cmd	Current Heating Stage 4 command	—	—	Off	On
	HX_Stg5_Cmd	Current Heating Stage 5 command	—	—	Off	On
	HX_Stg6_Cmd	Current Heating Stage 6 command	—	—	Off	On
E.d.8 (displayed when unit is configured with Cooling and Discharge temp control)	**Active Input:**	Current controlling input for cooling (DA_Temp or CC_Temp used in Dehumidification Mode)	—	°F	—	—
	Setpoint:	Current discharge SP or (cooling coil SP used in Dehumidification Mode)	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	Clg_Mod_Cmd	Cooling modulation command in VDC	—	VDC	1	5
E.d.9 (displayed when unit is configured with Cooling and Space temp control)	**Active Input:**	Current controlling input for cooling (Spc_Temp or CC_Temp used in Dehumidification Mode)	—	°F	—	—
	Setpoint:	Current Space Temp SP or (cooling coil SP used in Dehumidification Mode)	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	Clg_Mod_Cmd	Cooling modulation command in VDC	—	VDC	1	5

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens d. Capacity Menu Screens (screens and content displayed based on unit configuration)—Continued						
E.d.10	**Comp_Stg2_Cmd**	Current Compressor Stage 2 command	—	—	Off	On
	Cond_A_Cmd	Current Condenser Section A command	—	—	Off	On
	Cond_B_Cmd	Current Condenser Section B command (Y Series Units Only)	—	—	Off	On
E.d.11 (displayed when unit is configured with Reheat Pump, Reheat Pump Demand Control Loop Monitoring)	**DA_Temp**	Current DAT	—	°F	—	—
	Setpoint:	Current reheat DAT SP	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	RH_Mod_Cmd	Current reheat modulation command in VDC	—	VDC	1	5
E.d.12 (displayed when unit is configured with Reheat Valve(s), Reheat Valve Demand Control Loop Monitoring)	**DA_Temp**	Current DAT	—	°F	—	—
	Setpoint:	Current reheat DAT SP	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	RH_A_Cmd	Current reheat modulation command in VDC circuit A	—	VDC	0	10
	RH_B_Cmd	Current reheat modulation command in VDC circuit B (Cooling Sizes 120 or larger)	—	VDC	0	10
E.d.13 (displayed when unit is configured with Reheat option)	**OADhHLo_SP**	OA Dehum High Lockout SP (sets OA setpoint used to disable dehumidification)	110	°F	0	110
	OADhHLoDiff	OA Dehum High Lockout SP Differential (sets differential used for OADhHLo_SP)	2	°F	0.5	10
	OADhLLo_SP	OA Dehum Low Lockout SP (sets OA setpoint used to disable dehumidification)	58	°F	50	100
	OADhLLoDiff	OA Dehum Low Lockout SP Differential (sets differential used for OADhLLo_SP)	2	°F	0.5	10
E.d.14 (displayed when unit is configured with Reheat option)	**DA_Dh_SP**	Discharge Air Temp Dehum SP (sets discharge air setpoint used to control reheat compressor during Dehumidification Mode)	70	°F	50	100
	CC_DA_SP	Cooling Coil Dehum DA SP (sets discharge air setpoint used to control unit primary cooling when in Dehumidification Mode)	52	°F	45	80
E.d.15 (Digital Scroll Compressor A)	**Run Hours:**	Accumulated total run hours	—	Hour	—	—
	Num Starts:	Accumulated total number of starts	—	—	—	—
	Reset to Zero?	Used to reset accumulators to zero	—	—	—	—
E.d.16 (displayed when unit is configured with Compressor B)	**Run Hours:**	Accumulated total run hours	—	Hour	—	—
	Num Starts:	Accumulated total number of starts	—	—	—	—
	Reset to Zero?	Used to reset accumulators to zero	—	—	—	—
E.d.17 (displayed when unit is configured digital scroll with Reheat Compressor	**Run Hours:**	Accumulated total run hours	—	Hour	—	—
	Num Starts:	Accumulated total number of starts	—	—	—	—
	Reset to Zero?	Used to reset accumulators to zero	—	—	—	—
E.d.18 (Alarm Config)	**Auto Reset Safety Alarm:**	Sets unit to automatically reset from safety alarm when condition is cleared	On	—	—	—
	Auto Reset Phase Alarm:	Sets unit to automatically reset from phase alarm when condition is cleared	On	—	—	—
	AutoRst_AlDel:	Auto Reset Delay Time (sets time delay period required for auto reset)	30	Second	—	—
E.d.19 (displayed when unit is selected with control option D19 and Tstat)	**Input Type:**	Input Type (sets selected input type for D19 conventional inputs (External or BMS)	External	—	—	—
	Ext Occ:	External Occupancy Call (current status of External Occupied Input)	—	—	Off	On
	Fan:	External Fan Call Input (G) (current status of External Fan Input)	—	—	Off	On
	Htg:	External Heat Call Input (W1) (current status of External Heat Input)	—	—	Off	On
	Clg:	External Cool Call Input (Y1) (current status of External Cool Input)	—	—	Off	On
	Dehum:	External Dehum Call Input (current status of External Dehum Input)	—	—	Off	On

*Unit of measurement.

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens						
d. Capacity Menu Screens (screens and content displayed based on unit configuration)—Continued						
E.d.20 (displayed when unit is selected with control option D22)	**Setpoint Type::**	Setpoint Type (sets DAT setpoint type between BMS or Local)	Local	—	—	—
	DA_BMS_SP:	Discharge Air Temp BMS SP (sets DAT setpoint via BMS system)	—	—	50	140
	DA_Loc_SP:	Discharge Air Temp Local SP (sets DAT setpoint via Local Display)	—	—	50	140
	DA_SP:	Discharge Air Temp Active SP (active DAT setpoint)	—	—	—	—
e. Damper Menu Screens (screens and content displayed based on unit configuration)						
E.e.1	**Control:**	Selected Damper Control Strategy (GF2A 100% OA, GF1 0–10 VDC Input, GF2 Two Position, GF4 Four Position, GF5 Bldg Pressure, GF8 Economizer % Min, GF1A BMS Source, GF10 OA CFM or GF11 Economizer CFM Min)	—	—	—	—
	UnoccVnt_Ena:	Unoccupied Ventilation Enable (allows OA during unoccupied mode)	Off	—	—	—
	Dmpr_SP_Occ:	Two Position Dmpr Occ SP (sets value that unit dampers will be commanded to when unit is occupied (applies to GF2))	100	%	0	100
	Dmpr_SP_Unocc:	Two Position Dmpr Unocc SP (sets value that unit dampers will be commanded to when unit is unoccupied (applies to GF2))	0	%	0	100
	Aux_1_SP:	Aux 1 Damper Position SP (damper position setpoint 1 (applies to GF4))	20	%	0	100
	Aux_2_SP:	Aux 2 Damper Position SP (damper position setpoint 2 (applies to GF4))	40	%	0	100
	Aux_3_SP:	Aux 3 Damper Position SP (damper position setpoint 3 (applies to GF4))	60	%	0	100
	Aux_4_SP:	Aux 4 Damper Position SP (damper position setpoint 4 (applies to GF4))	80	%	0	100
	Damper_BMS	Damper BMS (current value commanded to unit damper(s) from BMS system (applies to GF1A))	—	—	—	—
E.e.2 (displayed when Dampers are selected for GF5 Building Pressure Control)	**Bldg Pressure**	Current building static pressure	—	iwc	–0.5	0.5
	Setpoint:	Current building static pressure SP	0.1	iwc	–0.5	0.5
	PI Output:	Current output of control loop	—	%	0	100
	Dmpr Signal:	Scaled Percentage output signal	—	%	0	100
	Damper_Cmd	Current damper output command in VDC	—	VDC	0	10
E.e.3 (displayed when unit is selected for option GF8 economizer control)	**Unocc_Econ_Ena:**	Unoccupied Enable Economizer Mode (allows economizer during unoccupied mode)	Off	—	Off	On
	Ec_OALO_SP:	Economizer OA Temp Lockout SP (OA temperature setpoint value that economizer is enabled)	60	°F	0	120
	Ec_OALODiff:	Economizer OA Temp Lockout Diff (differential for Ec_OALO_SP)	2	°F	0.5	10
	Ec_OADPLO_SP:	Economizer OA Dew Point Lockout SP (OA dew point setpoint value that economizer is enabled)	58	°F	0	120
	Ec_OADPLODiff:	Economizer OA Dew Point Lockout Diff (differential for Ec_ OADPLO_SP)	2	°F	0.5	10
	MA_Diff:	Mixed Air Setpoint Differential (sets differential between unit discharge air setpoint and mixed air temperature setpoint)	3	°F	0	5
	En_DX_Econ:	Enable DX Economizer (when set to on it allows mechanical cooling to operate when unit economizer is active)	Off	—	—	—
E.e.4 (displayed when unit is selected for option GF8 economizer control and space CO_2 sensor)	**SpcCO2SP:**	Space CO2 SP (current space CO2 setpoint)	1000	ppm	0	2000
	SpcCO2Diff:	Space CO2 SP Differential (differential for SpcCO2SP)	200	ppm	10	500
	MinDmprSP:	Minimum Damper SP (sets unit minimum damper position)	10	%	0	100
	CO2DmprOsSP	CO2 Minimum Damper Offset SP (value added to MinDmprSP when space CO2 is above setpoint)	10	%	0	100

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued						
Screen	**Field**	**Description**	**Default**	**UOM***	**Min**	**Max**
Continued—Main Menu: E. Service Screens						
e. Damper Menu Screens (screens and content displayed based on unit configuration)—Continued						
E.e.5 (displayed when unit is selected for option GF11 economizer control and space CO_2 sensor)	**SpcCO2SP:**	Space CO2 SP (current space CO2 setpoint)	1000	ppm	0	2000
	SpcCO2Diff:	Space CO2 SP Differential (differential for SpcCO2SP)	200	ppm	10	500
	Min_CFM_Sp:	Minimum CFM Damper SP (sets unit minimum CFM)	500	CFM	0	32000
	Min_CFMOsSP:	CO2 Minimum CFM Damper Offset SP (value added to Min_CFM_Sp when space CO2 is above setpoint)	500	CFM	0	32000
E.e.6 (displayed when unit is selected for option GF8 Economizer)	**MinDmprSP:**	Minimum Damper SP (sets unit minimum damper position)	10	%	0	100
E.e.7 (displayed when unit is selected for option GF11 Economizer)	**Min_CFM_Sp:**	Minimum CFM Damper SP (sets unit minimum CFM)	500	CFM	0	32000
E.e.8 (displayed when unit is selected for option GF8 or GF11 Economizer Control	**MA_Temp**	Current Mixed Air Temp	—	°F	—	—
	Setpoint:	Current Mixed Air Temp SP (DA_SpcClg_SP = 55°F minus value of MA_Diff setpoint)	—	°F	—	—
	PI Output:	Current output of control loop	—	%	0	100
	Dmpr Signal:	Scaled Percentage output signal	—	%	0	100
	Damper_Cmd	Current damper output command in VDC	—	VDC	0	10
E.e.9 (displayed when unit is selected for option GF10 OA CFM Control	**CFM**	Current OA Inlet CFM	—	CFM	0	32000
	Setpoint:	Current CFM SP	3000	CFM	0	32000
	PI Output:	Current output of control loop	—	%	0	100
	Dmpr Signal:	Scaled Percentage output signal	—	%	0	100
	Damper_Cmd	Current damper output command in VDC	—	VDC	0	10
E.e.10 (displayed when unit is selected for option GF11 Economizer Control	**CFM**	Current OA Inlet CFM	—	CFM	0	32000
	Setpoint:	Current CFM SP	500	CFM	0	32000
	PI Output:	Current output of control loop	—	%	0	100
	Dmpr Signal:	Scaled Percentage output signal	—	%	0	100
	Damper_Cmd	Current damper output command in VDC	—	VDC	0	10
f. Exhaust Fan and ERV Screens						
E.f.1	**Control:**	Selected Exhaust Fan Control Strategy (None, EFC1 High Low Speed, EFC9 Constant Vol, EFC7 SA Fan Track, EFC4 Bldg Pressure, EFCC BMS Source, EFCD 2 Spd Co2, EFCE CFM, EFCF Occ Unocc Spd, EFCG SA CFM Track)	—	—	—	—
	EFSpdClgSP	Exhaust Fan Speed Cooling SP (sets commanded speed for exhaust fan when in cooling mode (applies to EFC9))	100	%	15	100
	EFSpdHtgSP	Exhaust Fan Speed Heating SP (sets commanded speed for exhaust fan when in heating mode (applies to EFC9))	100	%	15	100
	EFSpdLoSP	Exhaust Fan Speed Low SP (sets commanded speed for exhaust fan when in either htg or clg mode (applies to EFC1))	100	%	15	100
	EFSpdHiSP	Exhaust Fan Speed High SP (sets commanded speed for exhaust fan when in either htg or clg mode (applies to EFC1))	100	%	15	100
	EFSpdLoCO2SP:	Exhaust Fan Speed Low CO2 SP (sets commanded speed for supply fan when unit is below CO2 setpoint (applies to EFCD))	100	%	15	100
	EFSpdHiCO2SP:	Exhaust Fan Speed High CO2 SP (sets commanded speed for supply fan when unit is above CO2 setpoint (applies to EFCD))	100	%	15	100
	EFSpdOcc:	Exhaust Fan Speed Low SP (sets commanded speed for Exhaust fan when unit is Occupied (applies to EFCF))	100	%	15	100
	EFSpdUnocc:	Exhaust Fan Speed High SP (sets commanded speed for supply fan when unit is Unoccupied (applies to EFCF))	100	%	15	100
	EF_Os_SP	Exhaust Fan Tracking Offset SP (sets offset SP used to subtract from commanded supply fan speed for exhaust fan speed command (applies to EFC7))	0	%	0	100
	EF_Spd_Cmd	Current exhaust fan speed command	—	%	—	—
	Actual:	Current rpm of exhaust fan	—	rpm	—	—
	SF_VFD_Cmd:	Current supply fan VFD command (applies to EFC7)	—	%	—	—

*Unit of measurement.

SETUP OF UNIT USING SYSTEM PROGRAMMABLE CONTROLLER—CONTINUED

Controller Display Menus—Continued

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens f. Exhaust Fan and ERV Screens—Continued						
E.f.2 (displayed when Exhaust Fan is selected for EFC4 Building Pressure Control)	**Bldg Pressure**	Current building static pressure	—	iwc	–0.5	0.5
	Setpoint:	Current building static pressure SP	1	iwc	–0.5	0.5
	PI Output:	Current output of control loop	—	%	0	100
	EF_Spd_Cmd:	Exhaust fan speed command	—	%	15	100
	Actual:	Current rpm of exhaust fan	—	rpm	—	—
E.f.3 (displayed when unit is selected with electric preheat)	**ERVDAPH_SP:**	Energy Recovery Wheel DA Preheat SP (sets ERV discharge temperature setpoint)	33	°F	25	45
	ERVDAPHDiff:	Energy Recovery Wheel DA Preheat Differential SP (sets differential for ERVDAPH_SP)	2	°F	5	10
	ERVOAPH_SP:	Energy Recovery Wheel OA Preheat SP (sets OA ERV preheat enable setpoint)	32	°F	25	45
	ERVOAPHDiff:	Energy Recovery Wheel OA Preheat Differential SP (sets differential for ERVOAPH_SP)	2	°F	5	10
E.f.4 (displayed when unit is selected with an ERV)	**ERV Econ Enable:**	ERV Economizer Enable (sets ERV economizer enable on or off)	On	—	Off	On
	ERVLoOA_SP:	Energy Recovery Low Outside Air Enable SP (sets top half of default 5° range for Energy Recovery Wheel Economizer Mode)	2.5	°F	0	20
	ERVLoOADiff:	Energy Recovery Low Outside Air Enable Differential SP (sets differential for ERVLoOA_SP)	0.5	°F	0.5	10
	ERVHiOA_SP:	Energy Recovery High Outside Air Enable SP (sets bottom half of default 5° range for Energy Recovery Wheel Economizer Mode)	2.5	°F	0	20
	ERVHiOADiff:	Energy Recovery High Outside Air Enable Differential SP (sets differential for ERVHiOA_SP)	0.5	°F	0.5	10
	ERV_P_Md:	Energy Recovery Wheel Purge Mode (shows current status of Energy Recovery Wheel Purge Mode)	—	—	Off	On
E.f.5 (displayed when unit is selected with an ERV)	**ERVOADP_SP:**	ERV OA Dew Point SP (sets OA dew point setpoint for Energy Recovery Wheel Economizer Mode)	58	°F	50	100
	ERVOADP_DIFF:	Energy Recovery Low Outside Air Enable SP (sets OA dew point setpoint differential)	2	°F	0.5	10
E.f.6	**DmprEF_St_Ena:**	Damper Exhaust Fan Start Enable (enables damper position exhaust fan interlock)	Off	—	Off	On
	DmprEF_St_Sp:	Damper Exhaust Fan Start Setpoint (sets setpoint for damper position to start exhaust fan)	75	%	0	100
	DmprEF_St_Diff:	Damper Exhaust Fan Start Setpoint Differential (sets differential for setpoint for Damper Exhaust Fan Start Enable SP)	5	%	0	100
E.f.7 (displayed when Exhaust Fan is selected for EFCE CFM Control)	**Elevation Value for Unit Location:**	Sets elevation value for unit location	0	feet	0	25000
E.f.8 (displayed when Exhaust Fan is selected for EFCE Exhaust Fan CFM Control)	**Exhaust Fan CFM**	Current Exhaust Fan CFM	—	CFM	0	32000
	Setpoint:	Current CFM SP	3000	CFM	0	32000
	PI Output:	Current output of control loop	—	%	0	100
	EF_Spd_Cmd	Current exhaust fan command	—	%	15	100
	Actual:	Current rpm of exhaust fan	—	rpm	—	—
E.f.9 (displayed when Supply Fan is selected for EFCE Exhasut Fan CFM Control)	**U2 EF_DP:**	VCD input from exhaust fan differential pressure sensor	—	VDC	0	5
	EF_Temp:	Temperature at inlet of exhaust fan	—	°F	—	—
	EF_Press:	Scaled pressure reading from exhaust fan differential pressure sensor	—	iwc	0	10
	Exhaust Fan CFM:	Current Exhaust Fan CFM	—	CFM	0	32000

*Unit of measurement.

Table 20. Controller Display Menu Structure—Continued

Screen	Field	Description	Default	UOM*	Min	Max
Continued—Main Menu: E. Service Screens						
f. Exhaust Fan and ERV Screens—Continued						
E.f.10 (displayed when Exhaust Fan is selected for EFCG Supply Fan CFM Tracking Control)	**Exhaust Fan CFM**	Current Exhaust Fan CFM	—	CFM	0	32000
	Supply Fan CFM	Current Supply Fan CFM	—	CFM	0	32000
	Setpoint:	Current CFM SP	—	CFM	0	32000
	PI Output:	Current output of control loop	—	%	0	100
	EF_Spd_Cmd	Current exhaust fan command	—	%	15	100
	Actual:	Current rpm of exhaust fan	—	rpm	—	—
	EF_CFMOs_SP:	Exhaust Fan CFM Offset Setpoint	0	CFM	0	32000
E.f.11	**EFSpdMax_SP:**	Exhaust Fan Maximum Speed Setpoint	100	%	30	100
	EFSpdMin_SP:	Exhaust Fan Minimum Speed Setpoint	15	%	15	100
g. Information Menu Screens						
E.g.1	**Control Program:**	Program option currently loaded into controller				
	Ver:	Current Software Version (number and date)				
	Bios:	Current Bios Version (number and date)				
	Boot:	Current Boot Version (number and date)				
E.g.5 (displayed when unit is configured with expansion module)	**Info c.pCOe**	Info for c.pCOe expansion point module				
	FW version:	Program option currently loaded into controller				
	FW date:	Current Software Version (number and date)				
h. BMS Config Menu Screens (see Modifying Bacnet Card Parameters section for instructions on addressing and parameter setup)						
E.h.1	**Protocol:**	Sets BMS Protocol (BACnet or Lon (Default = BACnet))				
E.h.8	**OA_Hum_Sel:**	Share OA humidity from BMS (0 = Probe, 1 = BMS) (sets value to BMS for OA humidity share from BMS)	Probe	—	Probe	BMS
	OA_Temp_Sel:	Share OA temperature from BMS (0 = Probe, 1 = BMS) (sets value to BMS for OA temperature share from BMS)	Probe	—	—	—
	Probe	BMS	—	—	—	—
	Occupied_BMS	Occupied Mode BMS (used to determine unit occupancy when OccMode_Sel is set to BMS)	Occ	—	Occ	Unocc
F. Factory Settings Menu (Factory Settings Menu is password protected; consult factory for access)						

*UOM = unit of measurement.

BACNET NETWORK

The Building Management System's (BMS) BACnet® network is considered open communication, whereas any device on the network has the capability to receive input from any other controller on the network. The BACnet communication cards allow access to selected unit parameters. The currently-supported interface types are MSTP and IP/Ethernet. Contact the factory if additional protocol support is needed.

BACnet MSTP Card

The BACnet® MSTP card user interface is shown in **Figure 7**. Refer to **Table 21** and **Table 22** for information about the BACnet MSTP card's dip switches and LED indications.

Figure 7. BACnet MSTP Card User Interface

BACnet MSTP Card—Continued

Table 21. BACnet MSTP Card Dip Switches

Location	Switch	Function
Inside front opening of cover	S1	Adds 511-ohm polarization resistance between negative data line (−) and GND
	S2	Adds 120-ohm terminal resistance between two data lines (+) and (−)
	S3	Adds 511-ohm polarization resistance between positive data line (+) and +VCC internal voltage
NOTE: Set all three dip switches to the ON position on the units at the start and end of the BACnet MSTP network. Ensure that all three dip switches on intermediate units are set to the OFF position.		

Table 22. BACnet MSTP Card LED (See Figure 7) Indications

LED	LED State	Indication
Status*	OFF	At power-up or after restarting BACnet MSTP network
	Quick flash: RED-GREEN	1 second after restarting BACnet MSTP network
	Steady: GREEN	3 seconds after restarting BACnet MSTP network
	Quick flash: GREEN-OFF-GREEN	45 seconds after restarting BACnet MSTP network, communication has been established with system programmable controller
	Slow flash: RED-OFF-RED	45 seconds after restarting BACnet MSTP network, communication has not been established with system programmable controller
	Flash: GREEN-RED-GREEN	45 seconds after restarting BACnet MSTP network, communication error or temporary lack of response from system programmable controller
Network**	OFF	At power-up or after restarting BACnet MSTP network
	Slow flash: GREEN-RED-GREEN-RED	45 seconds after restarting BACnet MSTP network, BACnet LED is active
	Steady: GREEN Occasional flashes: RED	BACnet MSTP communication has been established
	Steady: GREEN	BACnet MSTP network retains control (token) of MSTP network
	OFF: GREEN	BACnet MSTP network does not retain control (token) of MSTP network
	Steady: RED	Poll-For-Master (search for master to pass token to)
	Steady: GREEN Steady: RED	Continuous Poll-For-Master (communication not established because of connection problem or no network device found—may depend on electrical connection difficulties or communication settings that are not compatible with other connected network devices
*The status LED (green or red on the left) indicates the status of communication with the controller and the status of the BACnet MSTP card. Approximately 45 seconds after restarting, when the starting sequence has been completed, the status LED flashes to indicate the status of communication with the system programmable controller.		
**The network LED (red or green on the right) indicates the status of communication with the BACnet MSTP network (RS485). When the starting sequence has been completed, the network LED flashes to indicate the status of communication with the BACnet MSTP network.		

BACnet IP/Ethernet Card

The BACnet® IP/Ethernet card user interface is shown in **Figure 8**. Refer to **Table 23** for information about the BACnet IP/Ethernet card's LED indications.

Figure 8. BACnet IP/Ethernet Card User Interface

Table 23. BACnet IP/Ethernet Card LED (See Figure 8) Indications		
LED	**LED State**	**Indication**
Status*	OFF	At power-up or after restarting BACnet IP/Ethernet network
	Quick flash: RED-GREEN	1 second after restarting BACnet IP/Ethernet network
	Steady: GREEN	3 seconds after restarting BACnet IP/Ethernet network
	Quick flash: GREEN-OFF	45 seconds after restarting BACnet IP/Ethernet network, communication has been established with system programmable controller
	Slow flash: RED-OFF	45 seconds after restarting BACnet IP/Ethernet network, communication has not been established with system programmable controller
	Flash: GREEN-RED	45 seconds after restarting BACnet IP/Ethernet network, communication error or temporary lack of response from system programmable controller
Ethernet**	Steady: GREEN	Communication has been established with BMS system
	Flashing: GREEN	Exchanging data
	Steady: RED	Communication has not been established with BMS system (cable broken or problem at other end of cable)
*The status LED (green or red on the left) indicates the status of communication with the controller and the status of the board. During stable operation, the LED flashes to indicate the status of communication with the system programmable controller.		
**The Ethernet LED (red or green on the right) indicates the status of communication with the BACnet IP/Ethernet network.		

Modifying BACnet Parameters

For units configured with a BACnet® network, there are parameters that need to be set before communication can be established with other devices. Refer to **Table 24** and **Table 25** to modify the BACnet parameters required by the building maintenance system network.

Table 24. Modifying BACnet MSTP Card Parameters		
Step	**Description**	**Display Screen**
1	Simultaneously hold alarm and enter keys on system programmable controller (see **Figure 1**) until **SYSTEM INFORMATION** menu is displayed	SYSTEM INFORMATION LOG DATA > OTHER INFORMATION FLASH / USB MEMORY
	Select **OTHER INFORMATION** and press enter	
2	Select **PCOWEB / NET CONFIG**	ID / PRODUCT CODE > PCOWEB / NET CONFIG MEMORIES STATUS CHIP IO VERSION
3	Select **PCONET Settings**	PCOWEB Settings > PCONET Settings
4	Set **BACnet ID:** and **BACnet baud:** fields	BACnet ID: 77000 BACnet baud: 38400bps
	Press enter to advance to next screen	
5	Set **BACnet MAC:** field	BACnet MAC: --0 Max Masters: 127 MAX Frames: ---20
	NOTE: Typically, the Max Masters: and Max Frames: fields do not need to be changed from the default settings.	
	Press enter to advance to next screen.	
6	**NOTE: The modified values from the previous steps need to be saved.**	PCONET CONFIG ENABLE Update pCOnet? Yes
	Press up key	
	With **Update pCOnet?** field flashing **Yes**, press enter key	
7	Press enter key	PCONET CONFIG ENABLE Update complete Reboot pconet to Apply new setting
	Reboot prompt appears	
	Cycle power to controller	
	BACnet MSTP card parameter setup is now complete	

Modifying BACnet® Parameters—Continued

Table 25. Modifying BACnet IP/Ethernet Card Parameters

Step	Description	Display Screen
1	Simultaneously hold alarm and enter keys on system programmable controller (see **Figure 1**) until **SYSTEM INFORMATION** menu is displayed	SYSTEM INFORMATION LOG DATA > OTHER INFORMATION FLASH / USB MEMORY
	Select **OTHER INFORMATION** and press enter	
2	Select **PCOWEB / NET CONFIG**	ID / PRODUCT CODE > PCOWEB / NET CONFIG MEMORIES STATUS CHIP IO VERSION
3	Select **PCOWEB Settings**	> PCOWEB Settings PCONET Settings
4	Set **DHCP:** field to desired value Enter IP address if required Press enter to advance to next screen	DHCP: Off IP Address: --0.--0.--0.--0
5	Set **Netmask:** and **Gateway:** fields if required	Netmask: --0.--0.--0.--0 Gateway: --0.--0.--0.--0
6	Set DNS1: and DNS2: fields if required Press enter to advance to next screen	DNS1: --0.--0.--0.--0 DNS2: --0.--0.--0.--0
7	Set **BACnet ID:** field Set **Bacnet Type:** field to either **IP** or **Ethernet** Press enter to advance to next screen	BACnet ID: 77000 BACnet Type: ----------
8	**NOTE: The modified values from the previous steps need to be saved.** Press up key With **Update pCOWeb?** field flashing **Yes**, press enter key	PCONET CONFIG ENABLE Update pCOWeb? Yes
9	Press enter key Reboot prompt appears Cycle power to controller BACnet IP/Ethernet card parameter setup is now complete	PCONET CONFIG ENABLE Update complete Reboot pconet to Apply new setting

BACnet Points

Table 26 lists all BACnet® points.

Table 26. BACnet® Points List

Name	Description	R/W	BMS Address	Unit	Default	Min	Max
Analog Variables							
CC_Temp	Cooling coil DAT	R	AV1	°F	—	—	—
Comp_A_Cmd	Compressor a modulation command	R	AV2	%	—	0	100
DA_NAClg_SP	DAT neutral cooling setpoint	R/W	AV3	°F	70	50	100
DA_NAHtg_SP	DAT neutral heating setpoint	R/W	AV4	°F	70	50	140
DA_SP	DAT active setpoint	R	AV5	°F	—	—	—
DA_SpcClg_SP	DAT space cooling setpoint	R/W	AV6	°F	55	50	100
DA_SpcHtCl_SP	DAT space heat mode cooling setpoint	R/W	AV7	°F	55	50	100
DA_SpcHtg_SP	DAT space heating setpoint	R/W	AV8	°F	90	50	140
DA_Temp	DAT	R	AV9	°F	—	—	—
Damper_Cmd	Damper output command	R	AV10	%	—	0	100
DhOADP_SP	Dehumidification outside air dew point setpoint	R/W	AV11	°F	58	50	100
EF_Spd_Cmd	Exhaust fan speed command	R	AV12	%	—	15	100
ERV_DA_Temp	Energy recovery wheel DAT	R	AV13	°F	—	—	—
Damper_BMS	Damper output BMS command	R/W	AV14	%	—	0	100
HX_Mod_Cmd	Heating modulation command	R	AV15	%	—	0	100
MA_Temp	Mixed air temperature	R	AV16	°F	—	—	—
OA_Dew_Point	Outside air dew point	R	AV17	°F	—	—	—
OA_Hum_BMS	Outside air humidity BMS (sets outside air humidity when outside air_Hum_Sel is set to 1 = BMS)	R/W	AV18	%rH	—	—	—
OA_Hum_Raw	Outside air humidity	R	AV19	%rH	—	—	—
OA_Temp_BMS	OAT BMS (sets OAT when OA_Temp_Sel is set to 1 = BMS)	R/W	AV20	°F	—	—	—
OA_Temp_Raw	OAT	R	AV21	°F	—	—	—
OAChgOv_SP	Outside air change over setpoint	R/W	AV22	°F	65	45	80
RH_A_Cmd	Reheat A modulation command	R	AV23	%	—	0	100
SF_Spd_Cmd	Supply fan speed command	R	AV24	%	—	0	100
Spc_Temp	Space temperature	R	AV25	°F	—	—	—
SpcEffClgSP	Space effective cooling setpoint	R	AV26	°F	—	—	—
SpcEffHtgSP	Space effective heating setpoint	R	AV27	°F	—	—	—
SpcTempSP	Space temperature setpoint	R/W	AV28	°F	72	65	85
RA_Temp	Return air temperature	R	AV29	°F	—	—	—
RA_Humidity	Return air humidity	R	AV30	% rH	—	—	—
EA_Temp	Exhaust air temperature	R	AV31	°F	—	—	—
EA_Humidity	Exhaust air humidity	R	AV32	% rH	—	—	—
SF_BMS	Supply fan output BMS command	R/W	AV33	%	—	0	100
EF_BMS	Exhaust fan output BMS command	R/W	AV34	%	—	0	100
DA_Dh_SP	DAT dehumidification setpoint	R/W	AV35	°F	70	50	100
MinDmprSp	Minimum damper setpoint	R/W	AV36	%	10	0	100
EC_OADPLO_SP	Economizer outside air dew point lockout setpoint	R/W	AV37	°F	58	0	120
EC_OALO_SP	Economizer OAT lockout setpoint	R/W	AV38	°F	60	0	120
CO2DmprOsSP	CO_2 minimum damper offset setpoint	R/W	AV39	%	10	0	100
DA_BMS_SP	DAT BMS setpoint	R/W	AV40	°F	—	50	140

BACnet® Points—Continued

Table 26. BACnet® Points List—Continued

Name	Description	R/W	BMS Address	Unit	Default	Min	Max
Integer Variables							
Bldg_Pressure*	Building static pressure	R	AV1001	IN WC	—	—	—
Bldg_Press_SP*	Building static pressure setpoint	R/W	AV1002	IN WC	100	–500	500
Duct_Press_SP*	Duct static pressure setpoint	R/W	AV1003	IN WC	500	0	2500
Spc_Hum	Space humidity	R	AV1004	%rH	—	—	—
SpcHumSP	Space humidity setpoint	R/W	AV1005	%rH	55	35	75
State_Sel	State select (2 = AUTO, 3 = COOL, 4 = HEAT, 5 = OFF)	R/W	AV1006	—	5	2	5
OccMode_Sel	Occupied mode select (0 = Schedule, 1 = Digital Input, 2 = BMS)	R/W	AV1007	—	1	0	2
Spc_CO2	Space CO_2	R	AV1008	ppm	—	—	—
SpcCO2SP	Space CO_2 setpoint	R/W	AV1009	ppm	1000	0	2000
Duct_Pressure*	Duct static pressure	R	AV1010	IN WC	—	—	—
SF_CFM	Supply fan cfm	R	AV1011	cfm	—	—	—
SF_CFM_SP	Supply fan cfm setpoint	R/W	AV1012	cfm	3000	—	—
EF_CFM	Exhaust fan cfm	R	AV1013	cfm	—	—	—
EF_CFM_SP	Exhaust fan cfm setpoint	R/W	AV1014	cfm	3000	—	—
EF_CFMOs_SP	Exhaust fan cfm tracking offset setpoint	R/W	AV1015	cfm	0	—	—
OA_CFM	Outside air cfm	R	AV1016	cfm	—	—	—
OA_CFM_SP	Outside air cfm setpoint	R/W	AV1017	cfm	3000	—	—
MIN_CFM_SP	Minimum outside air cfm setpoint	R/W	AV1018	cfm	500	—	—
MIN_CFMOsSP	Minimum outside air cfm offset setpoint	R/W	AV1019	cfm	500	—	—
Digital Variables							
Alm_Rly_Cmd	Unit general alarm relay command	R	BV1	—	—	Off	On
Comp_A_Alarm	Modulating compressor A alarm	R	BV2	—	—	Off	On
Comp_B_Cmd	Compressor B command	R	BV3	—	—	Off	On
Comp_C_Cmd	Compressor C command	R	BV4	—	—	Off	On
Comp_D_Cmd	Compressor D command	R	BV5	—	—	Off	On
EF_Cmd	Exhaust fan command	R	BV6	—	—	Off	On
EF_Sts	Exhaust fan status	R	BV7	—	—	Off	On
ERV_Cmd	Energy recovery wheel command	R	BV8	—	—	Off	On
Ext_Switch_1	External position switch 1	R	BV10	—	—	Off	On
Ext_Switch_2	External position switch 2	R	BV11	—	—	Off	On
Htr_1_Sts	Gas heater 1 status	R	BV12	—	—	Off	On
Htr_2_Sts	Gas heater 2 status	R	BV13	—	—	Off	On
HX_Stg1_Cmd	Heating stage 1 command	R	BV14	—	—	Off	On
HX_Stg2_Cmd	Heating stage 2 command	R	BV15	—	—	Off	On
HX_Stg3_Cmd	Heating stage 3 command	R	BV16	—	—	Off	On
HX_Stg4_Cmd	Heating stage 4 command	R	BV17	—	—	Off	On
HX_Stg5_Cmd	Heating stage 5 command	R	BV18	—	—	Off	On
HX_Stg6_Cmd	Heating stage 6 command	R	BV19	—	—	Off	On
NA_Clg_Md	Neutral air cooling mode	R	BV20	—	—	Off	On
NA_Dehum_Md	Neutral air dehumidification mode	R	BV21	—	—	Off	On
NA_Htg_Md	Neutral air heating mode	R	BV22	—	—	Off	On
OA_Hum_Sel	Share outside air humidity from BMS (0 = Probe, 1 = BMS)	R/W	BV23	—	Off	Off	On
OA_Temp_Sel	Share OAT from BMS (0 = Probe, 1 = BMS)	R/W	BV24	—	Off	Off	On
Occupied	Occupied mode status	R	BV25	—	—	Off	On
Occupied_BMS	Occupied mode BMS (sets unit occupancy when OccMode_Sel is set to 2 = BMS)	R/W	BV26	—	Off	Off	On
Phase_Alarm	Phase protection alarm	R	BV27	—	—	Off	On
Preheat_Cmd	Electric preheat command	R	BV28	—	—	Off	On
RH_A_Alarm	Modulating reheat compressor A alarm	R	BV29	—	—	Off	On
Safety_Sts	Safety input status	R	BV30	—	—	Normal	Alarm

*Divide by 1000 with the supervisory system to reflect the appropriate decimal precision.

Table 26. BACnet® Points List—Continued							
Name	**Description**	**R/W**	**BMS Address**	**Unit**	**Default**	**Min**	**Max**
Digital Variables—Continued							
SF_Cmd	Supply fan command	R	BV31	—	—	Off	On
SF_Sts	Supply fan status	R	BV32	—	—	Off	On
Spc_Clg_Md	Space cooling mode	R	BV33	—	—	Off	On
Spc_Dehum_Md	Space dehumidification mode	R	BV34	—	—	Off	On
Spc_Htg_Md	Space heating mode	R	BV35	—	—	Off	On
Spc_HtgClg_Md	Space heating cooling mode	R	BV36	—	—	Off	On
Filter_Sts	Main or ERV dirty filter status	R	BV37	—	—	Off	On
BMS_Alm_Rst	BMS alarm reset	R/W	BV38	—	Off	Off	On
Unit_Enable	Unit enable	R/W	BV39	—	Off	Off	On
Ext_Call_Fan	External call fan input (G)	R	BV40	—	—	Off	On
Ext_Call_Heat	External call heat input (W1)	R	BV41	—	—	Off	On
Ext_Call_Cool	External call cool input (Y1)	R	BV42	—	—	Off	On
Ext_Call_Dh	External call dehumidification input	R	BV43	—	—	Off	On
BMS_Call_Fan	BMS call fan input (G)	R/W	BV44	—	—	Off	On
BMS_Call_Heat	BMS call heat input (W1)	R/W	BV45	—	—	Off	On
BMS_Call_Cool	BMS call cool input (Y1)	R/W	BV46	—	—	Off	On
BMS_Call_Dh	BMS call dehumidification input	R/W	BV47	—	—	Off	On

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