REZNOR®

Revision: PREEVA-CONTROLS (06-26) REV-A

Supersedes: CP-PREEVA-D12 B,C,D,E,F,G (12-15) PN235267R7
CP-PREEVA DG with FX05 (12-15) PN254027R3
CP-AHU D19_D21_D22 (11-17) D303072-A

CONTROL SYSTEM GUIDE FOR AIR HANDLERS

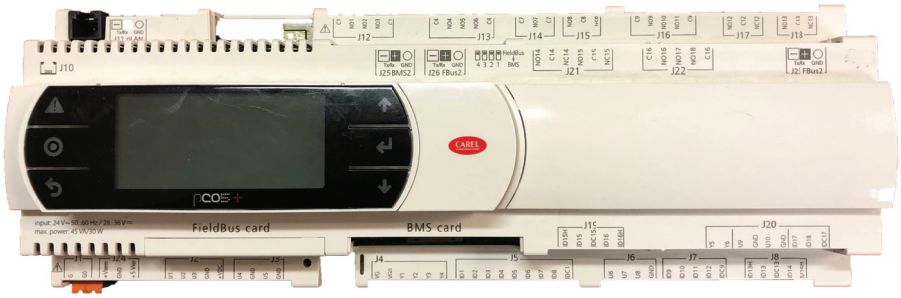
OPTIONS DG1, DG2, DG5, DG6, D12B, D12C, D12D, D12E, D12F, D12G, D19, D21, AND D22 FOR DISCONTINUED PREEVA MODELS PDH, PEH, PXH, RDH, REH, RHH, RXH, SDH, AND SHH



DG1, DG2, DG5, AND DG6



D12B, D12C, D12D, D12E, D12F, D12G



D19, D21, D22

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

Applies to: PREEVA Models PDH, SDH, and RDH with Control Option DG1, DG2, DG5, or DG6

Application and Instructions for Field Adjustment of the Control (Model FX05) in Digital Control Option DG1, DG2, DG5, and DG6

Control Options Apply to PREEVA Models SDH, PDH, and RDH (without optional dehumidiication)

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Introduction

The microprocessor unit (Model FX05) in control Options DG1/2/5/6 is custom programmed for pre-engineered ventilation air handlers (PREEVA) split system HVAC systems. Control features include:

- Custom 3-step control sequence of heating and cooling
- Gas heating modulation control option
- Fully integrated outdoor ambient lockouts based on outdoor dry bulb
- Alarm and equipment shutdown features
- Service/Commissioning Test Mode
- Integrated timer functions for cooling and heating (optional)



FX05

There are four buttons that can be used for adjusting setpoints, viewing unit status; and enabling unit test or shut down modes. The controller display will indicate unit status (on, off, or alarm), discharge air

Installation Warnings and Notes

DANGER: Risk of Electrical Shock - To avoid possible electrical shock or equipment damage, disconnect power supply before making electrical connections.

IMPORTANT: The Model FX05 controller is designed for use only as an operating control. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices (safety and/or limit controls) or systems (alarm and/or supervisory systems) that provide protection from or warning of control failure.

IMPORTANT INSTALLATION NOTES

1) All Installations - The FX05 control is DC voltage. DC voltage wires must not be run in the same conduit as the 24V or line voltage wiring. Use of shielded cable wire is recommended for DC voltage.

2) The discharge air sensor is factory wired in the low voltage control box. The installer must relocate the discharge air sensor to the heater discharge or ductwork for proper heating discharge air control.

3) Installation with an optional communication or time clock card insert (Option BHB1, BHB2, or BHB3) - Always remove controller power when installing or removing a communication or time clock card insert.

General Sequence of Operation

The four DG control sequences include a wall-mounted Fan/Heat/Cool/Auto Switch.

Option DG1 - Room control with 2-stage gas heating and 3-stage cooling control. The wall mount interface allows the user to adjust the space setpoint from 45°F to 95°F and select the unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

Option DG2 - Room control with 4:1 modulated gas heat and 3-stage cooling control The wall mount interface allows the user to adjust the space setpoint from 45°F to 95°F and select the unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off.

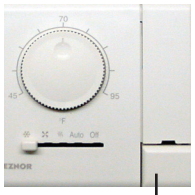
Option DG5 - Room control with 2-stage gas heating and 3-stage cooling control. The wall mount interface allows the user to adjust the discharge air temperature ± 6°F from the factory-mounted controller setpoint and select unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

Option DG6 - Room control with 4:1 modulated gas heat and 3-stage cooling control. The wall mount interface allows the user to adjust the discharge air temperature ± 6°F from the factory-mounted controller setpoint and select unit mode. Unit modes are Cool Only, Heat Only, Fan Only, Auto Mode, and Off

The heating and cooling equipment will cycle to maintain the active heating discharge or space temperature setpoint, based upon the unit mode and time of day schedule.

Unit Control Points - DG1, DG2, DG5, DG6	
Analog Inputs	**Digital Inputs**
1) Space Temperature/Discharge Air Temperature	1) Dirty Filter
2) Space Temperature Setpoint (45 - 90°F) or (± 6°F Warmer/Cooler)	2) Temporarily Unoccupied Override
3) Outdoor Air Temperature	3) Occupied/Unoccupied
4) Mode Slider - Heat, Cool, Auto, Fan, Off	4) Air Proving/Phase Loss
	5) Boost Mode
Digital Outputs	**Analog Outputs**
1) Fan	1) Modulating Gas Valve
2) Heat Stage 1	
3) Heat Stage 2	
4) Cool Stage 1	
5) Cool Stage 2	
6) Cool Stage 3	

FIGURE 1A - Room Command Module, P/N 211423, in Option DG1 and Option DG2



Push Button

Provides on-off and heat/vent/cool mode selection; room temperature selection; and has a push button for unoccupied override.

FIGURE 1B - Room Command Module, P/N 211424, in Option DG5 and Option DG6



Push Button

Provides on-off and heat/vent/cool mode selection; adjusts discharge air temperature ±6°; and has a push button for unoccupied override.

Sequence of Operation

Options DG1 and DG2 are space temperature control. Options DG5 and DG6 are discharge air temperature control. With all four options, a wall-mounted sensor and setpoint dial controls the functionality. With discharge air temperature control (DG5 and DG6), the wall sensor is disabled and a discharge sensor is used to control the temperature. The wall unit shown in **FIGURE 1A** is used with Options DG1 and DG2; it has a 45°F to 95°F adjustment dial to set the desired space temperature. The wall unit shown in **FIGURE 1B** is used with Options DG5 and DG6; it has a ±6°F warmer/cooler adjustment dial for the discharge air temperature setpoint. Both wall units have a mode slider and an unoccupied mode override button. The slider selects the functionality of the unit: Cool Only, Heat Only, Fan Only, Auto Mode, Off.

The dial value will be the working heating or cooling setpoint depending on the mode. In the **auto mode,** the dial is the midpoint value between the cooling and heating setpoint. Example: (variable DB = 2°F default) If the dial is set to 72°F, the cooling and heating setpoints for unit operation are 70°F and 74°F respectively.

Mode Slider Function

Cool Only - The unit will allow only the cooling to function. There is an adjustable parameter “OC” outdoor ambient temperature lockout setting below which mechanical cooling will not be allowed to operate.

Heat Only - The unit will allow only the heating to function. There is an adjustable parameter “OH” outdoor ambient temperature setting above which heating will not be allowed to operate.

Fan Only - The unit will allow only the fan to run. The fan will run only in occupied mode if the external contact is closed (Binary input #3). If the contact is open, the fan will not run.

Auto Only - The unit will be allowed to provide heating and cooling, providing the outdoor ambient conditions are met. The heating setpoint and cooling setpoint are controlled by “HSP” and “CSP” settings and the setpoint dial (warmer/cooler adjust or the Setpoint dial setting), and the value of DB. **NOTE: The slider must be in “Auto” for automatic occupied/unoccupied change to work.**

Off - The unit will shut down all functionality – neither heating, cooling nor fan will be allowed to operate.

Note: Hold the Enter key on the controller for 15 seconds to access the variable screens. (SUO should appear.) Use the down arrow to go to SSI. Press the enter button. If the value is ON, the sensor with the setpoint overlay is active. If the value is OFF, the sensor with the warmer/cooler adjust should be used. Use the up/down arrows to toggle between ON/OFF and press the enter button to save. This setting can also be changed in CommPro (nciWallStatSelect). See the control instruction manual for more information.

Fan Operation

When the slide in not in the OFF position and the unit is in the Occupied Mode based upon the input, the fan will run continuously. In the Unoccupied Mode, the fan will only run on a call for heating or cooling. The fan will be off if the slide is in the OFF mode. Upon a call for the fan to run, if the air proving switch does not make after 180 seconds, the unit shuts down. Turn the unit FX-05 controller OFF then ON, or press the UP and Down arrows simultaneously for 5 seconds, to reset the alarm condition. When the unit is locked out, heating and cooling functions will be disabled. Control will display a flashing “AP”

If cooling or heating operations are energized and fan proof is lost for three seconds, the cooling or heating functions will be shut down, fan will be de-energized, and “AP” will flash on the display.

In the unoccupied mode, when the slider switch is moved to the OFF position, or the call for heating or cooling ends, the fan will run for an additional 30 seconds before shutting off. This fan delay time is adjustable using variable “Fod”.

General Sequence of Operation (cont'd)

Occupied Mode

Unit will control to the Occupied Setpoints.

Cooling or Heating Slider Mode & Dial Setpoint (Options DG1 and DG2): The dial setting is the working heating or cooling setpoint.

Auto Slider Mode & Dial Setpoint (Options DG1 and DG2): The dial setting is the midpoint for the working heating and cooling setpoint. The actual setpoint is adjusted by a value of "db" (deadband) which has a default value of 2°F.

The cooling setpoint = dial setting + db = 72°F + 2°F = 74°F

The heating setpoint = dial setting + db = 72°F - 2°F = 70°F

Auto, Cooling, or Heating Slider Mode, & Warmer/Cooler Dial (Options DG5 and DG6): The value HSP or CSP in the controller becomes the active heating and cooling setpoint basis. The warmer/cooler adjusts the setpoint by ±6°F.

"HSP," default 68°F

"CSP," default 72°F

The cooling setpoint = dial setting + CSP = +6°F + 72°F = 78°F

The cooling setpoint = dial setting + CSP = -6°F + 72°F = 66°F

The heating setpoint = dial setting + HSP = +6°F + 68°F = 74°F

The heating setpoint = dial setting + HSP = -6°F + 68°F = 62°F

Note: When variable SSI = ON, Room Command Module with setpoint scale should be used (DG1 or DG2). When SSI = OFF, Room Command Module with warmer/cooler scale should be used (DG5 or DG6).

Unoccupied Mode

(NOTES: Option BHB1 time clock card is required. Unoccupied Mode is not available with Option DG6.)

Unit will control to the unoccupied temperature setpoints.

The unoccupied setpoints are the working Heating Setpoint minus the value of "UoU" which has a default of 10°F and the working Cooling Setpoint plus the value of "UoU".

Auto Slider Mode & Dial Setpoint (Options DG1 and DG2):

The cooling setpoint = dial setting + db + UoU = 72°F + 2°F + 10°F = 84°F
NOTE: The automatic change to unoccupied mode will only occur with the slider in "Auto" position. Unoccupied mode will not work with slider in Heat or Cool position.

Boost Mode: Unit will add an adjustable amount BOU (nciBoostModeOffset) (default 5°F) to the working heating setpoint and subtract from the working cooling setpoint. **NOTE: Boost Mode will only operate with the slider in Heat or Cool position. Boost is not available when slider is in Auto position.**

Example: Cooling Slider Mode & Dial Setpoint:

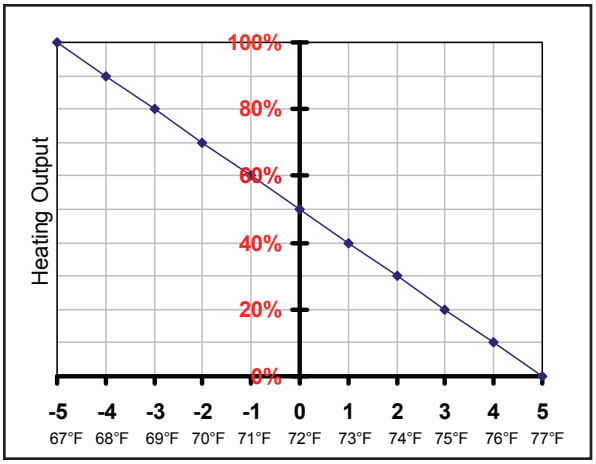
The cooling setpoint = dial setting + BOU = 72°F - 5°F = 67°F

Heating Operation

The unit will initiate heating if the temperature sensed at the space sensor or discharge falls below the "HSP" setpoint by the value of the heating proportional band, "HPB" (Default value 5°F). When it does, full heating turns on (high fire).

The analog output will modulate to 100% full fire for 180 seconds to ensure proper burner ignition. After the burner ignition, the gas valve will modulate to maintain the space or discharge air temperature setpoint.

Temperature Difference From Setpoint and Heating Output



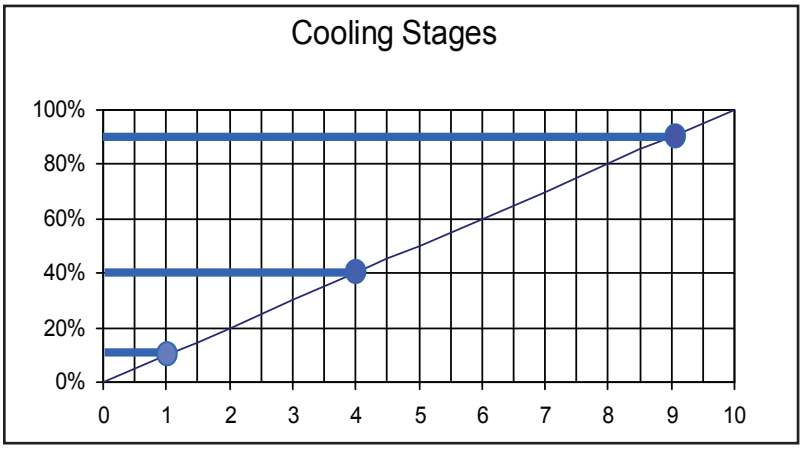
Example: Heating will enable when

Temperature < *WHSP* – *HSP* – *HDB* < *72*°F – *5*°F – *0*°F < *67*°F

So, when the space temperature drops below 67°F, the signal to the gas valve is 100% and the burner ignites. After the 180 seconds, if the temperature is 72°F, the signal to the gas valve will be 50%.

Heating is disabled when the ambient temperature is above the lockout value "oH" (default 62°F).

Cooling Operation



The unit will initiate cooling if the temperature sensed at the space sensor (discharge air sensor) climbs above the WCSP into the Cooling proportional band, CPB. The cooling stages are based on C1, C2 and C3 value.

Example: WCSP = 72°; CPB = 10°

Cooling Stage 1 will enable when:

Temperature > WCSP + 10% of CPB or 72° +1° = 73°

Stage 2 will enable when:

Temperature > WCSP + 40% of CPB or 72° + 4° = 76°

Stage 3 will enable when:

Temperature > WCSP + 90% of CPB or 72° + 9° - 81°

Cooling is disabled by the following percentages of CPB:

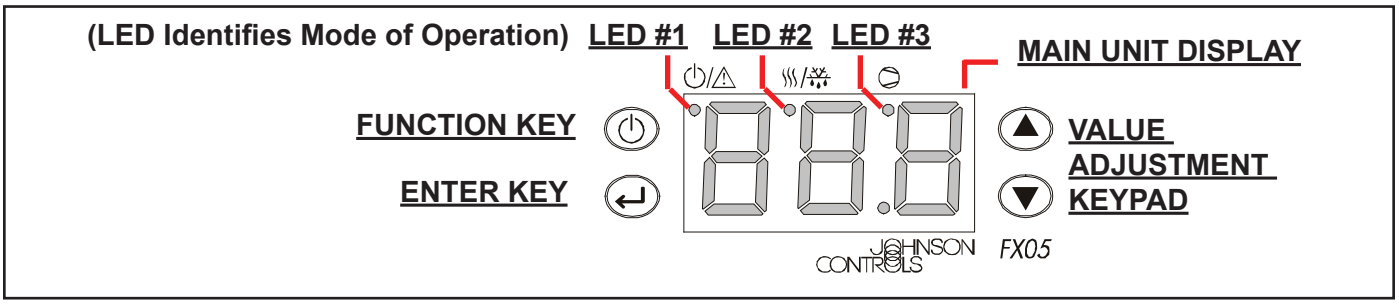
Stage 3 will disable when temperature drops to WCSP + 40% of CPB or 72° + 4° = 76°

Stage 2 will disable when temperature drops to WCSP + 10% of CPB or 72° + 1° = 73°

Stage 1 will disable when temperature drops to WCSP + 5% of CPB or 72° + .5° = 72.5°

Controller Display

The display of the FX05 controller is designed to allow the user to identify the current operating mode of the system, change key functional settings, and to aid in troubleshooting. The key controller parameters are shown in **the illustration below**.



LED #1, #2, and #3 Identify Operation Mode

If LED#1 is **ON**, the unit is on at the FX05 control. If the LED#1 is OFF, the unit is off at the FX05 control. The FX05 must be ON, before any heating/cooling/fan functions can occur. To turn FX05 control ON/OFF, push and hold the Function Key (upper left) for 5 seconds. If the unit is on at the FX05 control, the slider switch on the room stat will then take over control.

LED#2 is ON if the unit is in Occupied Mode. **LED#2 is OFF** if the unit is in Unoccupied Mode. **If LED#2 FLASHES**, the unit is in Temporary Occupied Mode (i.e. unit is in unoccupied, and the button on the space sensor is pushed, forcing the control to produce heat or cool to meet occupied setpoints for the temporary occupied time period default of 60 minutes.)

LED#3 is ON if the blower **is on. LED#3 is OFF** if the blower is off.

Main Display

The unit-mounted controller main display is shown below. *Use the up or down arrow to move through the menu. Press the enter key to view the current value.*

FX-05 Display	Lon Variable	Description	Default / Range
oFF, FAn, CLg, Htg, AUt	-	The Unit status or current mode is controlled by the user interface *oFF: The unit is "off" providing no control *FAn: Blower operation only *CLg: Blower and cooling control *Htg: Blower and heating control *AUt: Blower, heating, and cooling control with deadband between heating and cooling modes	N/A
SAt	nvoSpaceTemp	**SAt** - Current space (or discharge) temperature value.	N/A
OAt	nvoOutdoorTemp	**OAt** - Outdoor Air Temperature	N/A
CSP	nvoWHSP	**CSP** - Working Heating Setpoint	N/A
HSP	nvoWCSP	**HSP** - Working Cooling Setpoint	N/A
oS	Occupancy PLC / Output 1	**oS** - Occupied Status Occupied Mode - OCC (DI-3 closed) or Unoccupied Mode – UNO (DI-3 Open).	N/A

ERROR CODES

Error Codes on FX05 Display and LED on the Room Command Module

On Option DG1 and DG2 systems, the software is configured so the analog output will turn on the LED of the space sensor when any of the following errors occur. On all DG options, the main display on the FX05 control will flash the error codes listed below.

Display	Error
AP	**AP** – **Air Proving Switch Lockout** – When switching into Occupied Mode or on a call for heating or cooling in the Unoccupied Mode, the blower will be initiated. If after 180 seconds the air proving switch does not close, the unit will be locked out on manual reset (i.e. reset by cycling power (24VAC), turning the unit off then on, or pressing the Up and Down Arrows simultaneously for 5 seconds). When the unit is locked out because air proving switch does not close, heating and cooling functions will be disabled. Control will display a flashing “AP”.
FS	**FS** – **Low Limit Freeze Lockout** – If the space temperature (Options DG1 & DG2) or discharge air temperature (Options DG5 & DG6) is below the “LSP” (low limit freeze protection setpoint) for 600 seconds, the unit is shutdown (blower off and no heating/cooling functions). Pressing and holding the up and down arrows simultaneously for 5 seconds will reset the controller, allowing it to continue from its final position. Cycling of power to the FX05 control will reset the alarm as well. If the space temperature (Options DG1 & DG2) or discharge air temperature (Options DG5 & DG6) increases 30°F above the low limit setpoint (LSP), the unit will resume operation without being physically reset.
St	**St** – **Failed Space/Discharge Temperature Sensor** – The display will flash ST, and the unit will not be allowed to operate.
ot	**ot** – **Failed Outside Air Temperature Sensor** – Heating /cooling functions will be disabled; blower will still run if unit is in Occupied Mode.
dF	**dF** – If the dirty filter pressure switch option is ordered, display will flash when the pressure switch closes.

Reviewable Parameters on Main FX05 Display

Control Parameters - Hold ENTER Key on FX05 Control for 5 seconds to show:	
Display	**Use UP and DOWN arrow keys to view the following codes**
St1	**ST1**
db	**db** = Unit is within Heating & Cooling dead band
C1	**C1** = Unit is in 1st Stage Cooling
C2	**C2** = Unit is in 2nd Stage Cooling
C3	**C3** = Unit is in 3rd Stage Cooling
H1	**H1** = Unit is in Active Heating
St2	**ST2**
oCC	**oCC** = Unit is in Occupied Mode via Time Clock Card
UnO	**UnO** = Unit is in Unoccupied Mode via Time Clock Card
ntC	**ntC** = No Time Clock Attached

Reviewable Parameters on Main FX05 Display (cont'd)

Commissioning Parameters - Hold ENTER Key on FX05 Control for 10 seconds to show:

The initial screen text will appear. Use the "up" and "down" arrow key to scroll through the parameters. To view a parameter setpoint, select it and push "enter". To change the parameter setpoint, use the "up" or "down" keys and press "enter" to accept new setting and "enter" again to exit.

Display	Description	Range	Default
CSP	**CSP -** This is the (discharge or space) Cooling setpoint. The Working Cooling setpoint is this value, +/- the warmer-cooler adjust, and if the unit is Occupied, Unoccupied, Boost.	100 to 49°F	**72°F**
CPb	**CPb -** This is the cooling proportional band. As the zone temperature increases above the working cooling setpoint, the proportion of cooling activated depends upon this value. For instance if the working cooling setpoint is 72°F, and the cooling proportional band is 10°F, as the zone temperature increases from 72°F to 82°F, the proportion of cooling will increase from 0% to 100%.	41 to 0°F	**10°F**
HSP	**HSP -** This is the (discharge or space) Heating setpoint. The Working Heating setpoint is this value, +/- the warmer-cooler adjust, and if the unit is Occupied, Unoccupied, Boost.	120 to 45°F	**68°F**
HPb	**HPb -** This is the heating proportional band. As the zone temperature decreases below the working heating setpoint, the proportion of heating activated depends upon this value. For instance if the working heating setpoint is 68°F, and the heating proportional band is 5°F, as the zone temperature decreases from 68°F to 63°F, the proportion of heating will increase from 0% to 100%.	41 to 0°F	**5°F**
Hdb	**Hdb -** This value adjusts the point at which the proportional band begins working. For instance if this value is 2°F, and the above scenario describing the proportional band is used, the heating output would not begin increasing until 66°F (i.e. 68°F-2°F).	2.7to0°F	**0°F** (DG1&5) **2°F** (DG2&6)
iCt	**iCt -** This value will force the heating call to increase in a quicker fashion than standard proportional control. The lower the value the quicker the integration, the higher the value the slower. This value should remain at the default setting, and if it is changed, the action should be observed very closely.	999 to 0 seconds	**0** (DG1&5) **300** (DG2&6)
SSH	**SSH -** When the call for heating is 90%, DO-3 will close (Option DG2 or DG6). A default value of 50% is used as second stage of heat when the unit has a 2-stage heating system (Option DG1 or DG5).	100% to 10%	**50%** (DG1&5) **90%** (DG2&6)
SSo	**SSo -** When DO-3 is closed and the call for heating drops to 5%, DO-3 will open.	10%to0%	**5%**
LSP	**LSP -** If the space sensor (discharge air sensor) reads a value below this value for 10 minutes, the unit will stop all heating or cooling or blower functions.	40to-40°F	**36°F**
UoU	**UoU -** This is the value added to the working cooling setpoint and subtracted from the working heating setpoint when the unit is in unoccupied mode – BI-3 Open. **NOTE: Slider must be in "Auto" position for unoccupied to work.**	45 to 0°F	**10°F**
boU	**boU -** This is the amount subtracted from the working cooling setpoint and added to the working heating setpoint when the unit is in Boost Mode – BI-5 Closed. **NOTE: Slider must be in either heat or cool position for Boost to operate.**	45 to 0°F	**5° F**
oC	**oC -** This is the outdoor air setpoint below which mechanical cooling is not allowed to function.	131 to 57°F	**68°F**
oC2	**oC2 -** The outside air setpoint that must be met to energize stage 2 of cooling.		**75°F**
oC3	**oC3 -** The outside air setpoint that must be met to energize stage 3 of cooling.		**80°F**
oH	**oH -** This is the outdoor air setpoint above which heating is not allowed to function.	105 to 22°F	**62°F**
C1	**C1 -** Percentage of **Cpb** above working cooling setpoint required to energize cooling Stage 1.		**10%**
C2	**C2 -** Percentage of **Cpb** above working cooling setpoint required to energize cooling Stage 2.		**40%**
C3	**C3 -** Percentage of **Cpb** above working cooling setpoint required to energize cooling Stage 3.		**100%**

Hold ENTER Key on FX05 Control for 20 seconds to show:			
Display	Description	Range	Default
SoU	**SoU -** This is the amount added or subtracted from the HSP and CSP when the warmer/cooler adjust dial is turned. 6°F means that if HSP = 68°F when the notch on the dial is in the center, moving the dial fully counterclockwise subtracts 6°F, moving the dial fully clockwise adds 6°F.	16to-16°F	**6°F**
So1	**So1 -** This value is used to correct any error due to wiring lead lengths for the space or discharge air sensor.	16to-16°F	**0°F**
So2	**So2 -** This value is used to correct any error due to wiring lead lengths for the outdoor air sensor.	16to-16°F	**0°F**
SSi	**SSi -** If this value is Log Off, the room sensor with warmer/cooler adjust should be used. If it is Log On, the room sensor with the setpoint dial should be used.	Off or On	**Log Off**
db	**db -** If the unit is in the Auto Mode, and the room sensor with the setpoint dial is used, this is the offset from the dial setting at which heating and cooling occurs. For instance, if the dial is set at 71°F, the heating setpoint will be 69°F and cooling setpoint will be 73°F (i.e. 2°F offset from the dial).	45 to 0°F	**2°F**
tot	**tot -** When the unit is in Unoccupied Mode and the button on the Space sensor is pressed, the unit will control to the occupied setpoints for this period of time.	999 to 0 minutes	**60Minutes**
APt	**Apt -** When the unit goes into Occupied Mode, or there is a call for heat or cool in Unoccupied Mode, the blower starts. The air-proving switch must be made before this time limit to avoid lockout.	999 to 0 seconds	**180 Seconds**
LEd	**LEd -** If the unit does not have modulating gas (Options DG1 and DG5), this parameter can be set to Log On. When this occurs, and the space sensor is wired to the analog output, the room sensor LED will light if there is an error at the FX05 control.	Off or On	**Log Off**
FOd	**FOd** - When the blower is commanded off, it will remain on for this delay time after the command is given.	999 to 0 seconds	**30Seconds**

Time Clock

(Option BHB1 required.)

NOTE: Time clock is not available with Option DG6.

Current Status

To view the current time clock status on the FX05, hold the “Enter” and “Function” key for 5 seconds. The initial display text will appear as “**Uni**” or Units of measure. The time clock variables are only valid if a time clock card (Option BHB1) is installed in the controller.

Display	Description	Value
Uni	**Uni** - Unit of Measure	°C or °F
tS	**tS** - Time Clock Status - Press Enter to view	OFF= not active, ON = Active, URL = card not installed.
Add	**Add** - Lon or N2 Network Address (Option BHB2 or BHB3 required)	
Hr	**Hr** - Current Time Clock - Hour	0-23 Hours (Military Time)
in	**in** - Current Time Clock - Minutes	0-59 Minutes
dAy	**dAy** - Current Time Clock - Day	Sunday thru Saturday -- = 0 thru 7 value

Time Clock (cont'd)

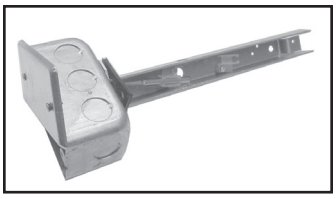
Time Clock Variables

To access the time clock variables, hold the "Enter" key for the 10 seconds. (The initial screen text will appear as "**SSP**".) Use the "Up" or "Down" arrow key to scroll through the parameters. If you would like to view a parameter setpoint, select the desired parameter and push the "Enter" key once. Use the "Up" or "Down" arrow key to change the parameter. To exit, press "enter "(to accept the value displayed) and "enter" again to exit. A description for each of the field adjustable time clock parameters is shown below.

Variable Displayed	Description	Default Value	Range
H1	**H1** - Defines the hour in which to start the occupied cycle from Monday to Friday	6	0 - 23
t1	**t1** - Defines the minute in which to start the occupied cycle from Monday to Friday	0	0 - 59
H2	**H2** - Defines the hour in which to stop the occupied cycle from Monday to Friday	18	0 - 23
t2	**t2** - Defines the minute in which to stop the occupied cycle from Monday to Friday	0	0 - 59
H3	**H3** - Defines the hour in which to start the occupied cycle on Weekends	6	0 - 23
t3	**t3** - Defines the minute in which to start the occupied cycle on Weekends	0	0 - 59
H4	**H4** - Defines the hour in which to stop the occupied cycle on Weekends	18	0 - 23
t4	**t4** - Defines the minute in which to stop the occupied cycle on Weekends	0	0 - 59

Discharge/Duct Sensor

Discharge Air Sensor, P/N 206112, and Holder, P/N 115850, for Ductwork Installation



Maximum Sensor Wire Length for less than 1°F Error

Wire Gauge	Maximum Sensor Wire Length	
AWG	Feet	Meters
14	800	244
16	500	152
18	310	94
20	200	61
22	124	38

All makeup air digital controls have a discharge air sensor and require field installation of the discharge air sensor holder. The discharge air sensor holder and a holder bracket are shipped with all units.

Digital control inputs are low-current, resistance-based signals. The manufacturer recommends for optimum temperature control performance that the analog and digital inputs (zone sensors, discharge air sensors, etc.) that are connected to the main controller be routed to the unit in one of the following manners:

- In separate conduits, isolated from 24 VAC controls and line voltage power to the unit, ***OR***
- If the main control sensor wires are to be run in the same conduit as the 24 VAC control wiring, the control wiring must be completed using shielded cable and bundled separately from the 24 VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

See the table on the left for wire gauge and length requirements of digital control signal wiring.

If the installation has supply ductwork, the sensor holder must be installed in the ductwork. If the installation does not have supply ductwork, the sensor holder must be installed at the unit discharge. A bracket is supplied to use when there is no ductwork.

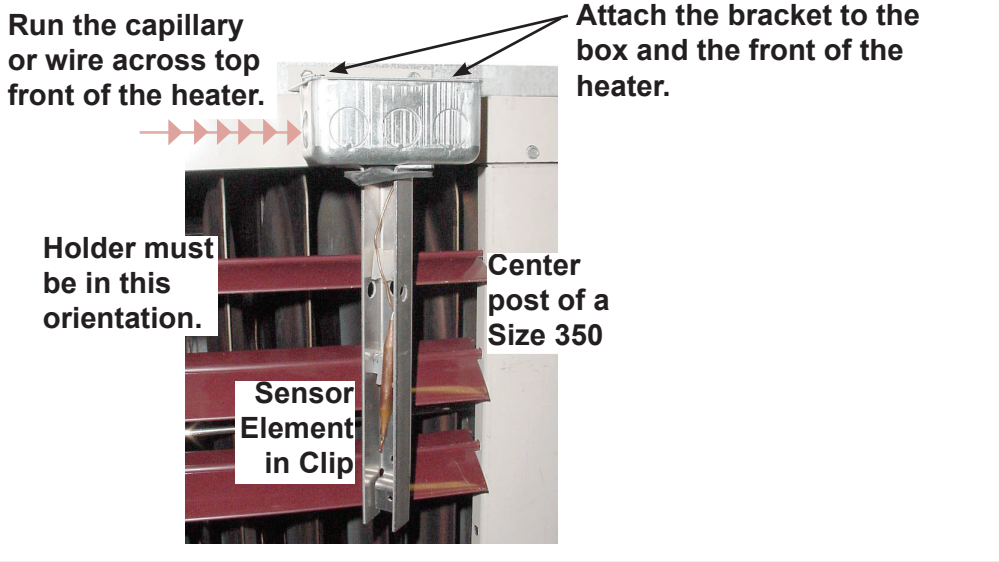
Instructions for Installing Discharge Air Sensor Holder in Ductwork

1. Installation requires the discharge air sensor holder including the box cover. (The bracket will not be used.)
2. Determine a location in the ductwork to install the sensor. Select a location a sufficient distance from the outlet to provide a good mixture of discharge air temperature. The holder will extend 9-3/16" (233mm) into the ductwork.
3. The position of the sensor holder is important. Turn the holder so that the element will be shielded from direct airflow and will sense the air temperature as it flows through the holes in the holder. At the selected location in the ductwork, mark the diamond-shaped hole required for the sensor holder. Cut the hole no larger than required, approximately 1" x 1" (25mm x 25mm).
4. Push the element into the clip in the holder. Determine where the sensor wire should enter the box and remove the knockout. Slide the holder into the ductwork. Using four field-supplied No. 6 sheetmetal screws, attach the box portion of the holder to the ductwork. Attach a field-supplied cable connector to the box, connect the sensor wire, and attach the box cover.

Instructions for Installing Discharge Air Sensor Holder <u>on the Heater - applies only to Models PDH and SDH without ductwork</u>

1. Installation requires the discharge air sensor holder and the bracket. (If attached, remove the box cover; it will not be used.)

Discharge Air Sensor Holder, P/N 115850, and Bracket, P/N 213612



2. Select a location for the box on the front near the center of the heater as shown on the Model Size 350 in the illustration. Orientation of the sensor holder is important. Position the box so that the element will be sensing the air temperature as it flows through the holes in the holder.
3. Push the element into the clip in the holder. Determine where the sensor wire should go through the box and remove the knockout at that location. Attach a field-supplied cable connector to the box. Connect the sensor wire. Attach the bracket to the box. Attach the bracket to the front of the heater.

Sensor Data for Johnson A99 Series Temperature Sensors - Resistance vs Temperature (applies to both discharge and outside air sensor)

°F	°C	Ohms
-40	-40	613
-31	-35	640
-22	-30	668
-13	-25	697
-4	-20	727
5	-15	758
14	-10	789
23	-5	822
32	-0	855
41	5	889
50	10	924
59	15	960
68	20	997
77	25	1035
86	30	1074
95	35	1113
104	40	1153
113	45	1195
122	50	1237
131	50	1279
140	60	1323
149	65	1368
158	70	1413
167	75	1459
176	80	1506
185	85	1554
194	90	1602
203	95	1652
212	100	1702
221	105	1753
230	110	1804
239	115	1856
248	120	1908

Outside Air Dry Bulb Sensor The outside air sensor (P/N 206112) for the FX05 is the same as the discharge sensor. The Johnson A99 Series Temperature Sensor Chart below applies to both the discharge and outside air sensors.

If the application uses mixed air (return and outside air), the outside air temperature sensor and optional humidity transmitter must be mounted together to sense outdoor air conditions. Verify that factory mounted positions provide acceptable performance.

Outside Air Dry Bulb Sensor, P/N 206112



WORKSHEET for Adjustable Parameters
(See pages 6-9 for explanations.)

Display	PARAMETER	Adjustable Range	DEFAULT Setting	Field Value
Hold ENTER Key for 10 seconds to show. To change, use UP or DOWN key, press ENTER to accept, press ENTER again to exit				
CSP	**CSP - <u>Occupied COOING SETPOINT</u>** (discharge air or space)	100 to 49°F	72°F	
CPb	**CPb - Cooling Proportional Band**	41 to 0°F	10°F	
HSP	**HSP - <u>Occupied HEATING SETPOINT</u> (discharge air or space)**	100 to 45°F	68°F	
HPb	**HPb - Heating Proportional Band**	41 to 0°F	5°F	
Hdb	**Hdb - Heating Deadband**	2.7 to 0°F	0°F (DG1&5)	
			2°F (DG2&6)	
iCt	**iCt - Value** to force heating call to increase in a quicker fashion than standard proportional control	999 to 0 seconds	0 (DG1&5)	
			300 (DG2&6)	
SSH	**SSH - Second Stage Heat Energizing**	100% to 10%	50% (DG1&5)	
			90% (DG2&6)	
SSo	**SSo - Second Stage Heating Disable**	10% to 0%	5%	
LSP	**LSP - Low Limit Freeze Protection**	40 to -40°F	36°F	
UoU	**UoU - Unoccupied Mode Value**	45 to 0°F	10°F	
boU	**boU - Boost Mode Value**	45 to 0°F	5°F	
oC	**oC -** Outdoor air setpoint below which cooling is not allowed	131 to 57°F	68°F	
oC2	**oC2** - Outside air setpoint that must be met to energize stage 2 of cooling.		75°F	
oC3	**oC3** - Outside air setpoint that must be met to energize stage 3 of cooling.		80°F	
oH	**oH** - Outdoor air setpoint above which heating is not allowed	105 to 22°F	62°F	
C1	**C1** - Percentage of **CPb** above **CSP** required to energize cooling Stage 1.		10%	
C2	**C2** - Percentage of **CPb** above **CSP** required to energize cooling Stage 2.		40%	
C3	**C3** - Percentage of **CPb** above **CSP** required to energize cooling Stage 3.		100%	

Applies to: **PREEVA® Models SDH, PDH, RDH, PXH, RXH, PEH, and REH and High Efficiency Models SHH and RHH with Digital Controls, Option D12B, D12C, D12D, D12E, D12F, or D12G**

Application and Instructions for Field Adjustment of the Control (Model FX06) in Digital Control Options D12B, D12C, D12D, D12E, D12F, D12G

- **Control Option D12B applies to gas-fired heat Models PDH, SDH, & RDH.**
- **Control Option D12C applies to no-heat Models PXH & RXH and gas-fired Models PDH, SDH, & RDH.**
- **Control Options D12D and D12E apply to electric heat Models PEH & REH.**
- **Control Option D12F applies to high efficiency gas-fired Model SHH.**
- **Control Option D12G applies to indoor high efficiency gas-fired Model SHH, outdoor gas-fired Model RDH (Sizes 175-400), and outdoor gas-fired high effciency Model RHH.**
- **A D12 Digital Control is required with Reheat Option AU7.**

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Introduction

NOTE: Information does not apply to an FX07 controller. If unit is equipped with an FX07 (ordered as a special), contact your Representative or the factory for control information.

The microprocessor unit (Model FX06) in control Options D12B, D12C, D12D, D12E, D12F, and D12G is custom programmed for the Models listed above. Controller features include

- Custom 3-step control sequence of cooling and dehumidification (reheat)
- 8:1 or 4:1 Gas heating modulation control or two stage heating
- Electric heat with SCR (modulating) control or two stage
- Fully integrated outdoor ambient lockouts based on outdoor dry bulb/dewpoint or enthalpy
- Alarm and equipment shutdown features
- Service/Commissioning Test Mode
- Integrated timer functions for cooling and heating



FX06

(**NOTE**: Not all control features apply to all Models)

There are four buttons that can be used for adjusting setpoints, viewing unit status, and enabling unit test or shut down modes (See page 4). The controller display will indicate unit status (on, off, or alarm), discharge air temperature, outdoor air temperature, dewpoint, and enthalpy. When equipped with a wall-mounted sensor, space temperature will be displayed.

General Sequence of Operation

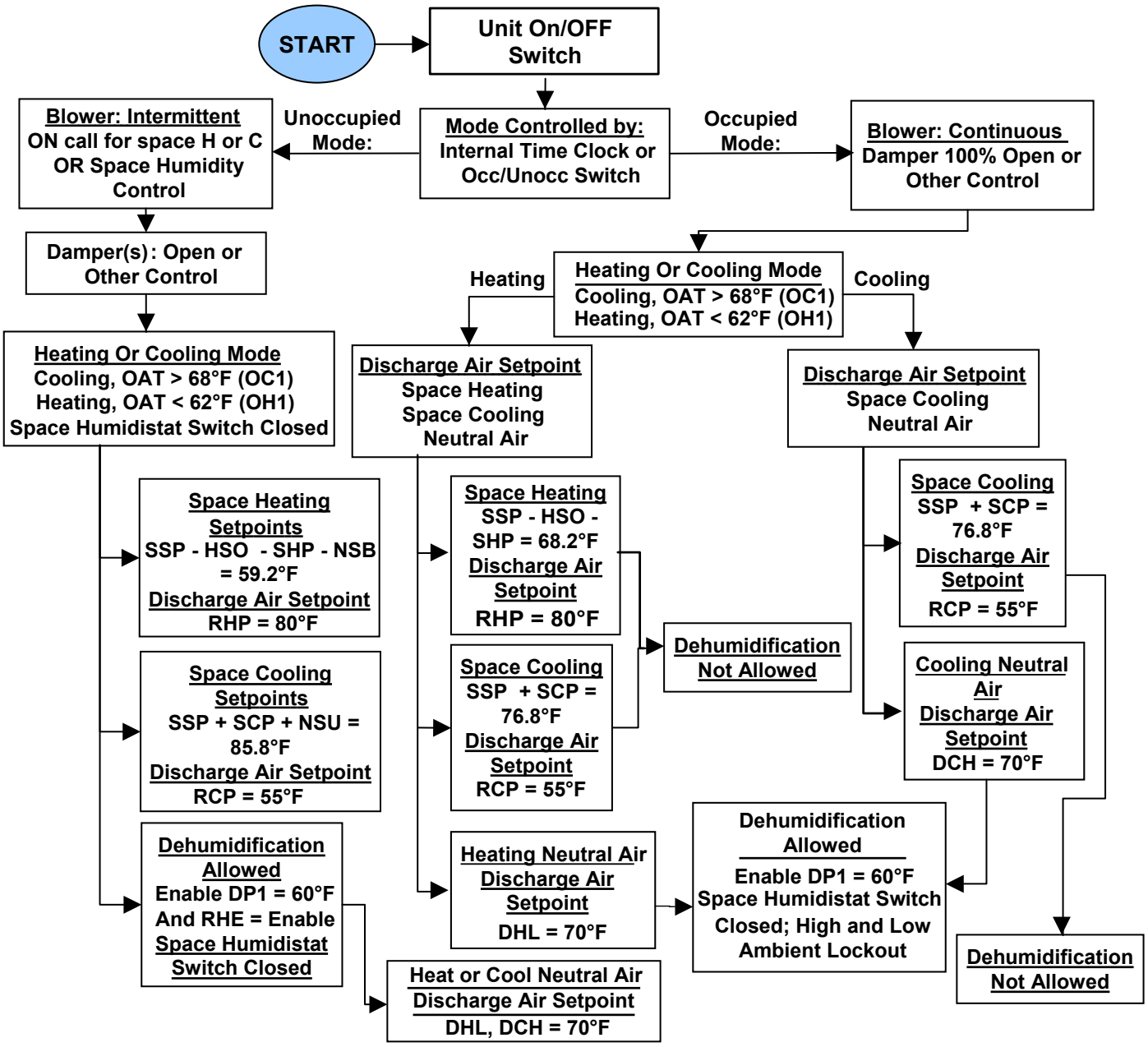
When the unit is called to operate, the main blower will run continuously in occupied mode and intermittently in unoccupied mode. The unit operates based on four Discharge Air Temperature Setpoints listed below.

1. Standard (Neutral) Heating Discharge Air Temperature Setpoint
2. Space Heating Discharge Air Temperature Setpoint
3. Standard (Neutral) Cooling Discharge Air Temperature Setpoint
4. Space Cooling Discharge Air Temperature Setpoint

The heating and cooling equipment will cycle to maintain the active discharge air temperature setpoint for occupied and unoccupied modes. Heating and cooling may be locked out of operation based upon outdoor air temperature and enthalpy conditions.

If equipped with reheat, the control will also activate the dehumidification circuit to maintain a neutral discharge air temperature setpoint and related dewpoint based upon outdoor air and space conditions.

FIGURE 1 - Sequence of Operation with Default Settings



Application

All D12 options have a unit-mounted FX06 controller that is factory-programmed for the application identified by the option code. Each application is available with a remote user interface as shown on page 5 and/or a space reset control as shown on page 24.

Option D12B - applies to PDH, SDH, & RDH - Control is factory programmed for electronic modulation (4:1) gas heating, 3-stage cooling, and dehumidification (reheat). An FX06 controller that is programmed for D12B application is **P/N 223485**.

Option D12C - applies to PDH, SDH, RDH, PXH, & RXH - Control is factory programmed for 2-stage heating, 3-stage cooling, and dehumidification (reheat). FX06 controller programmed for D12C application is **P/N 223486**.

Option D12D - applies to PEH & REH - Control is factory programmed for electric heat with SCR modulation, 3-stage cooling, and dehumidification (reheat). FX06 controller programmed for D12D application is **P/N 234685**.

Option D12E - applies to PEH & REH - Control is factory programmed for 2-stage electric heat, 3-stage cooling, and dehumidification (reheat). FX06 controller programmed for D12E application is **P/N 234686**. **NOTE:** Option D12E is not recommended for a makeup air application.

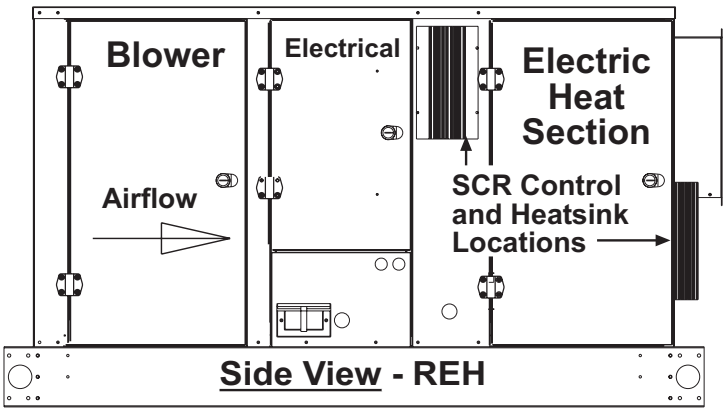
Option D12F - applies to SHH* - Control is factory programmed space temperature control for 2-stage gas heat, 3-stage cooling. The wall-mounted adjustable setpoint module (Option CL67) is required. FX06 controller programmed for D12F application is **P/N 257432.**

Option D12G - applies to RDH (Sizes 175-400), RHH & SHH* - Control is factory programmed for electronic modulation (8:1) gas heating, 3-stage cooling, and dehumidification (reheat). FX06 controller programmed for D12G application is **P/N 260087**.

***SHH NOTE**: Model SHH manufactured prior to 2/13 was not a makeup air heating unit; therefore, some control functions do not apply. Option D12F would be used with a mixing box with economizer cooling controls (Opt GE21 or GE22) or to interface with a LON or N2 system.

Option D12D Control for Modulating Electric Heat - Model PEH or REH units with Option D12D have additional controls to provide the electric heat modulation. Depending on their size and voltage, PEH and REH units with Option D12D are equipped with one or two SCR power controllers. The SCR controllers cause modulation of specified heating elements while other elements are turned on and off or staged. Depending on the size of the heating unit, staging is controlled either by the FX06 controller or an additional staging module,

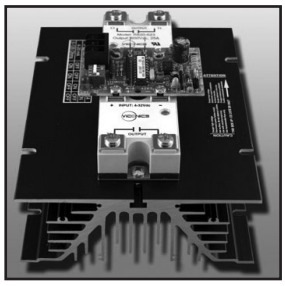
FIGURE 2 - Locations of the SCR Power Controller(s) with Heatsink used on Models REH and PEH with Modulating Heat Control Option D12D



WARNING

The heatsink on the SCR power controllers is HOT to the touch.

SCR Power Controller and Heatsink in Option D12D (one or two required depending on size and voltage)



Voltage	P/N
208/230-1 (AK2/3)	**223175**
208/230-3 (AK5/6)	**234057**
460/3 (AK7)	**220688**
575/3 (AK8)	**234058**

DANGER

High voltages are present on the terminals of the SCR power controller(s).

FX06 Controller Display



"C" Cancel Key
"Return or Move Back"
- Push for Menus

Up & Down Arrows - Scrolling

"OK" or "Enter" - Push to Select/Accept

Upon Start-up or power on, the FX06 controller provides data from the home page variables. Pressing the up and down arrows will display one item from the home page menu.

- The control once powered up will operate based upon the time schedule or occupancy physical point state. Press and hold the "C" key to turn the controller OFF/ON.
- Pressing the "C" button, displays the menu pages. Use the "Up" or "Down" to move between menu selections. Press the "OK" button to view menu variables.
- Press the "OK" key to select a variable to change. Use the "up" or "down" button to change the values. Press the "OK" key again to accept the change or the "C" key to move back to previous level.

Menu Options	
Item	**Description**
Home Page	Unit ON/OFF Status
01	Unit Status & Modes
02	Temperature Setpoints
03	OA Reset Schedule
04	Commissioning Parameters
05	Sensor Calibration
06	Controller Setup : Time, Address, Date
07	Time Schedules
08	Alarm Events
See Variable List for location and functionality of all parameters. See pages 15-22.	

Optional Remote Medium User Interface, Option RB2A, P/N 223125

The remote user interface display mimics all menus and functions on the FX06 controller except the "Test Function".



"ESC or Move Back"
Push for Menus

"OK" or "Enter"
Push to Select/Accept

"Scroll Buttons"

Display Lights	
Symbol and 01 - 08	
Unit ON/OFF	Alarm
Comp #1 ON	Reheat ON
Comp #1 ON	Not Used
Stg #1 Heat ON	Not Used
Stg #1 Heat ON	Not Used

The remote user interface display is a four-line, backlit unit requiring 24Vac/dc power and a two wire network connection between the unit controller and the display. The display receives all of its programming and functionality from the controller located in the unit. The display can be mounted 500 ft (152M) away from the controller. (Consult the factory for longer distances.) Refer to the wiring diagram for details.

Upon startup or power on, the remote display provides data from the home page variables. Pressing the up and down arrows will display four lines of text, a single variable and data per line.

- Pressing the “ESC” button displays the menu pages. Use the “left” or “right” arrows to move between menu pages. Press the “return” key to select a menu. The menu options are the same for the local and remote display.
- Some menus have more than one page of data. You can use the left/ right arrows to move between pages and use the up/down arrows to scroll between variable data.
- Press the “OK” key to select a variable to change. Use the “up” or “down” button to change the values. Press the “OK” key again to accept the change or the “ESC” key to move back to the previous level.
- Pressing the ESC for 10 seconds will reset the FX06 controller which clears the alarms.

Installation Warnings and Notes

DANGER:

Risk of Electrical Shock - To avoid possible electrical shock or equipment damage, disconnect power supply before making electrical connections.

IMPORTANT INSTALLATION NOTES

1) **All Installations** - The FX06 control is DC voltage. DC voltage wires must not be run in the same conduit as the 24V or line voltage wiring. All field-installed DC sensor wire must be in shielded cable.
2) The discharge air sensor is factory wired in the low voltage control box. The installer must relocate the discharge air sensor to the supply ductwork or unit discharge for proper heating discharge air control. (See instructions on page 25.)
3) **Installation with an optional communication card insert (Option BHB2 or BHB3)** - Always remove controller power when installing or removing a communication card insert.

IMPORTANT: The Model FX06 controller is designed for use only as an operating control. Where an operating control failure would result in personal injury or loss of property, it is the responsibility of the installer to add devices (safety and/or limit controls) or systems (alarm and/or supervisory systems) that provide protection from or warning of control failure.

Unit Power and Blower Operation

General Operation

The FX06 controller also has an ON/OFF button (function key). When the FX06 (on/ off) input (Point BI-3) is closed, the unit will operate in either occupied or unoccupied mode. When the occupied / unoccupied switch (Point BI-4) is closed, the unit will run in occupied mode; otherwise the unit operates in unoccupied mode.

Time Clock

An FX06 controller has a built-in real-time clock that supports all real-time functions including the display of time and date on the screen and the time stamping of each event. The unit will switch between occupied and unoccupied mode based upon a time of day schedule.

Installation Warnings and Notes (cont'd)

The unit will run in occupied mode when either BI-4 or the time clock calls for occupied mode. If both the internal time clock and external contacts are used, the physical input (point BI-4) will override the air handler to occupied mode if the physical point is closed. If the physical point is open, the internal time clock dictates the state.

Time Clock NOTE 1: Space sensor is required for unoccupied mode.

Time Clock NOTE 2: Make sure the BI-4 jumper is open when the internal time clock is used to avoid conflict of settings.

Occupied Mode

Blower operation is continuous in occupied mode. The FX06 contact BO-1 will close providing power for the outside air damper to open. If equipped with a 2-position damper, the outdoor air damper is electrically interlocked with the blower circuit. When the damper actuator opens to 80%, the blower is allowed to run. If power is lost, the mechanical spring will drive the damper closed.

If the unit is equipped with return air dampers, the blower control relay is not interlocked with the dampers.

Unoccupied Mode

The blower cycles ON/OFF with a call for either heating or cooling from the space sensor. Once the space heating or cooling unoccupied setpoints are satisfied, the blower will continue to run for 60 seconds then shut OFF.

During the Unoccupied Cycle the space setpoints will increase as follows:

Space Cooling Setpoint (SSP) = (SSP + SCP + NSU) = 75°F + 1.8 + 9°F = 85.8°F

Space Heating Setpoint = (SSP - HSO - SHP - NSB) = 75°F - 5°F - 1.8 - 9°F = 59.2°F

(NSU and NSB default value = 9°F, adjustable from 0-35°F)

Unoccupied Override Mode

If the space override dial on the space sensor is turned during an unoccupied period, the air handling unit will operate in occupied mode for a period of four hours. (UOT = 240 minutes)

Heating and Cooling Control Modes

The unit operates based upon four **Discharge Air Temperature Setpoints**.

1. Standard (Neutral) Heating Discharge Air Setpoint
2. Space Heating Discharge Air Setpoint
3. Standard (Neutral) Cooling Discharge Air Setpoint
4. Space Cooling Discharge Air Setpoint

With the space sensor installed, the unit will operate to maintain the space heating and cooling setpoints as required. When the space temperature sensor is satisfied (or not installed), the unit will operate to maintain the standard (neutral) discharge air setpoint. The space cooling setpoint (SSP) default value is 75ºF. The space heating setpoint is a given differential (HSO) below the space cooling setpoint. The differential (HSO) can be adjusted from 1-30ºF. The default value of 5ºF makes the default heating setpoint 70ºF.

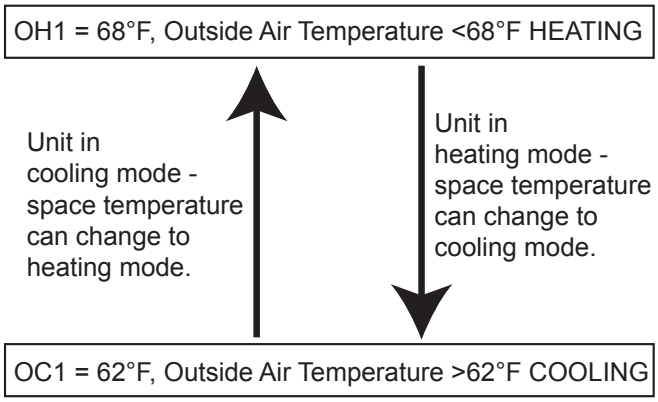
When the space temperature sensor is satisfied (or not installed), the unit will discharge standard (neutral) air. The default cooling mode setpoint (DCH) value is 70ºF. The default heating mode setpoint (DHL) is 70ºF. These setpoints can automatically be adjusted by a user defined reset schedule.

The heating or cooling mode is determined by outside air conditions and mode lockout values. If the outside air temperature value (Point AI-3) is greater than the cooling mode lockout value (OC1, default 68°F), the unit is in cooling mode. If the outside air temperature is lower then the heating mode lockout value (OH1, default 62°F), the unit is in heating mode (gas or electric).

Unit is in Cooling Mode when outside air temperature **rises** above OC1

Unit is in Heating Mode when outside air temperature **falls** below OH1

FIGURE 3 - Reverse Lockout Values to switch between heating and cooling based on space temperature (instead of outside air temperature).



*If the lockout values are reversed as shown in **FIGURE 3**, and a space sensor (CL67) is installed, the unit will switch between heating and cooling modes based upon space requirements. Example: If the outside air temperature rises from 50ºF to 65ºF, the unit will be in cooling mode. If the space sensor calls for heating when the outside air temperature is 65ºF, the unit will switch to heating mode. Once the space is satisfied, the unit will operate in heating mode for neutral air control. The unit will not switch to cooling mode until the space sensor calls for cooling.*

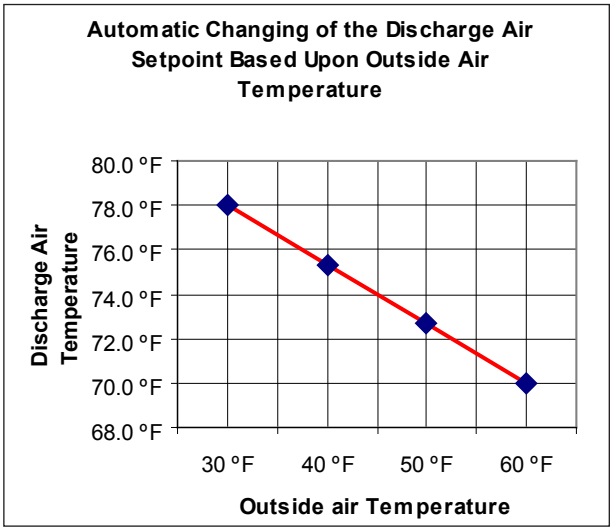
***NOTE:** If a space sensor is not installed, this function is not available.*

Heating Mode

When the unit is in heating mode, the unit will discharge air based upon the neutral air discharge heating setpoint point (DHL) or the room discharge air heating setpoint (RHP). If the space sensor is not installed, the unit will operate to provide neutral air only.

FIGURE 4 - Outside Air Reset (DHH) allows automatic changing of discharge air temperature based on outside air temperature.

Discharge Air Setpoint	Outside Air Temperature
DHL = 70ºF	OH2 = 60ºF
DHH = 78ºF	OH3 = 30ºF



Variable Name	Description	Default Value (Range)
DHL	**Standard Discharge Air Setpoint (Primary Setpoint) -** DHL is the value of the discharge air heating setpoint when the outside air temperature is at its warmest value to allow minimum heating. The discharge air temperature will not change to a lower value than DHL regardless of the outside air temperature. If the reset option is disabled, the DHL becomes the primary neutral air heat discharge air setpoint.	70ºF (50 to 115ºF)
DHH	**Outdoor Air Reset Option** - Duct Discharge Air Temperature Heating Setpoint When used in conjunction with DHL, OH2 and OH3, the neutral discharge air heating setpoint will be adjusted based on the outdoor air temperature. If DHH is higher than DHL, the controller will reset the discharge air temperature setpoint from the low value of DHL to the high value of DHH as the outdoor air goes from the high valve of OH2 to the low value of OH3. The default value disables this feature.	78ºF (45 to 120ºF)
OH2	**Outdoor Reset Dry Bulb Heating – High Setting -** The value of the outside air temperature corresponding to the DHL low heating setpoint value.	60ºF (20 to 70ºF)
OH3	**Outdoor Reset Dry Bulb Heating – Low Setting -** The value of the outside air temperature corresponding to the DHH high heating setpoint value.	30ºF (-40 to 65ºF)
Disable	Making the DHH value lower than the DHL value disables this functionality.	Disabled

Heating and Cooling Control Modes (cont'd)

Heating Mode (cont'd)

If a local space sensor is installed, the unit will change the neutral air discharge setpoint to the room discharge air heating setpoint (RHP) whenever the space requires heating. Whenever the space temperature is below the setpoint by a value greater than the space heating proportional band (SHP), then space heating is required. The SHP default value is 1.8ºF, adjustable from 1 to 8 ºF.

Example:

Space heating setpoint = (*SSP - HSO) = 75ºF - 5ºF = 70ºF*

Space heating proportional band (SHP) = 1.8ºF *(Range 1 to 8ºF)*

Space heating active [(SSP - HSO) - SHP]: 70ºF - 1.8ºF = 68.2ºF

Room discharge air temperature heating setpoint (RHP) = 80ºF

During the Unoccupied Cycle the space setpoints will increase as follows:

Space Heating Setpoint = (SSP - HSO - SHP - NSB) =
75°F - 5°F - 1.8 - 9°F = 59.2°F

(NSB default value = 9°F; adjustable from 0 to 35°F)

When the space temperature is more than SHP above the setpoint (71.8ºF), the unit will switch to neutral air control and space heating requirements will be OFF. The neutral discharge air control setpoint value will be the DHL value.

It may be useful to change the neutral air setpoint if the indoor ambient comfort conditions significantly change based upon outdoor air conditions. The discharge air setpoint can be set to automatically adjust between the DHL and the DHH values depending upon the outside air conditions.

Example: Elder care centers tend to require higher space temperatures during the winter season (example 78ºF). Therefore, when the outside air is 60ºF, the unit can deliver 70ºF neutral air. And, when the outside air temperature drops to 30ºF, the unit can provide 78ºF neutral air. The higher neutral air setpoint provides neutral air matching the space temperature, thus better comfort control.

Gas Heat Staging and Modulation

Upon a call for heat to maintain the active discharge air setpoint, the unit will fire both stages for 20 seconds. Upon proof of ignition, the unit switches to low fire. If the discharge air temperature (DAT) rises above 1/2 HPP value above the setpoint (70ºF + 2.5ºF = 72.5ºF) after initially starting, the 1st stage will remain ON for 180 seconds then turn OFF. After the first 120 seconds from the 1st stage activating, if the DAT does not increase above 1/2 of the band (67.5°F), the controller will turn on 2nd stage or high fire. If the DAT increases above 72.5ºF, then the stages start turning OFF in the reverse sequence. If the DAT remains between the proportional band (HPP = 5, 67.5ºF to 72.5ºF), the unit will not add or subtract a stage of heating.

The modulating gas control systems do not have a second stage. The modulating gas valve will modulate gas flow to maintain the temperature setpoint.

Electric Heat Staging and Modulation

Upon a call for heat to maintain the active discharge air setpoint, the unit will turn on both stages for 20 seconds. If the discharge air temperature (DAT) rises above 1/2 HPP value above the setpoint (70ºF + 5ºF = 75ºF) after initially starting, the 1st stage will remain ON for 180 seconds then turn OFF. After the first 180 seconds from the 1st stage activating, if the DAT does not increase above 1/2 of the band (65°F), the controller will turn on 2nd stage. If the DAT increases above 75ºF, then the stages start turning OFF in the reverse sequence. If the DAT remains between the proportional band (HPP = 10, 65ºF to 75ºF), the unit will not add or subtract a stage of heating.

The SCR controller accepts the 0-10v modulating signal from the FX06 controller. The control stages the electric heat value to maintain the electric heat output based upon the 0-100% control signal.

Heating Mode Lockout

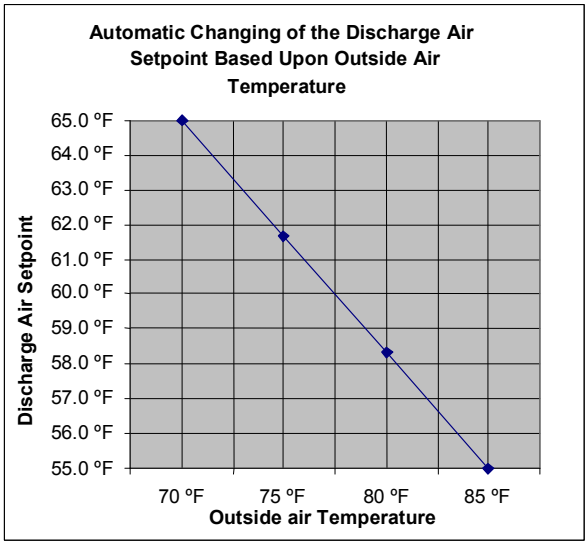
If the Discharge Air Temperature (Point AI-4), does not rise above LSP (36ºF) in 600 seconds after blower enables, the unit will shut down. Upon a rise in discharge air temperature (LSP + 30ºF = 66ºF), the unit is enabled. Three consecutive lockouts within one hour will result in a continuous lockout state (24 VAC power must be cycled to reset the controller). If the Outdoor Air Temperature sensor fails, the blower will operate without cooling, reheat, or heating equipment active. If the Outdoor Air Temperature rises above the OH1 heating lockout (62ºF), the heating equipment will be turned OFF after the minimum run times.

Cooling Mode

When the unit is in cooling mode, the unit will discharge air based upon the neutral air cooling setpoint point (DCH) and the room discharge air cooling setpoint (RCP). If the space sensor is not installed, the unit will operate to provide neutral air only.

FIGURE 5 - Outside Air Reset (DCL) allows automatic changing of discharge air temperature based on outside air temperature.

Discharge Air Setpoint	Outside Air Temperature
DCL = 55°F	OC2 = 85°F
DCH = 65°F	OC3 = 70°F



Variable Name	Description	Default Value (Range)
DCH	**Standard Discharge Air Setpoint (Primary Setpoint)** DCH is the value of the discharge air cooling setpoint when the outside air temperature is at its coldest value to allow minimum cooling. The discharge air temperature will not change to a higher value than DCH regardless of the outside air temperature. If the reset option is disabled, the DCH becomes the primary neutral air cooling discharge air setpoint.	65ºF (50° to 115ºF)
DCL	**Outdoor Air Reset Option** The value of the neutral discharge air cooling setpoint when the outside air temperature is at its warmest value to allow maximum cooling. The discharge air temperature will not change to a lower value than DCL regardless of the outside air temperature. The default value disables reset functionality.	55ºF (49° to 115ºF)
OC2	**Outdoor Reset Dry Bulb Cooling – High Setting** The value of the outside air temperature corresponding to the DCL coldest cooling setpoint value.	85ºF (20° to 70ºF)
OC3	**Outdoor Reset Dry Bulb Cooling – Low Setting** The value of the outside air temperature corresponding to the DCH warmest cooling setpoint value.	70ºF (-40° to 65ºF)
Disable	Making the DCL value higher than the DCH value disables this functionality.	Disabled

If a space sensor is installed, the unit will change from the neutral discharge air temperature setpoint to the room discharge air heating setpoint (RCP) value whenever the space requires cooling. Whenever the space temperature is above the setpoint by a value greater than the space cooling proportional band (SCP), the space will call for space cooling to be ON. The SCP default value is 1.8ºF.

Example:

Space cooling setpoint SSP = 75°F (Default)

Space cooling proportional band (SCP) = 1.8ºF (adjustable 1 to 8ºF)

Space cooling active above: (SSP + SCP) = 75ºF + 1.8ºF = 76.8ºF

Space cooling discharge air setpoint (RCP) = 55ºF

During the Unoccupied Cycle the space setpoints will increase as follows:

Space Cooling Setpoint = (SSP + SCP + NSU) = 75°F + 1.8°F + 9°F = 85.8°F

(NSU default value = 9°F, adjustable from 0-35°F)

When the space temperature is more than SCP below the setpoint (73.2ºF), the unit will switch to neutral air control. The control setpoint value will be the DCH value.

Heating and Cooling Control Modes (cont'd)

Cooling Mode (cont'd)

The neutral air setpoint can be automatically adjusted based on outside air values. The discharge air setpoint will float between the DCL value and the DCH value depending upon the outside air conditions. In low humidity applications where the unit may serve other mechanical equipment directly, it may be beneficial to automatically adjust the setpoint to minimize the use of mechanical equipment. **NOTE: <u>This function is not recommended for humidity sensitive applications</u>.**

Cooling Staging

Upon a call for cooling mode to maintain the active discharge air setpoint, the unit will enable a stage when the discharge air temperature is more than ½ of the cooling proportional band (CPP) above the setpoint. (Default CPP value is 10ºF.)

> **<u>Example</u>:** Active setpoint = 70ºF. The 1st stage enables when the discharge air temperature is greater than 75ºF. Likewise if the discharge air temperature is below 65ºF, an active stage of cooling is turned OFF.

The system has intra-stage time delays of 4.5 minutes. Thus, compressors have a <u>minimum ON and OFF time of 4.5 minutes</u>. After the first stage has been turned ON and the discharge air temperature is still 5ºF greater than the setpoint (1/2 CPP) and 4.5 minutes has passed, the unit will turn on stage 2 cooling.

If after 4.5 minutes the same condition exists, stage 3 will be active. If the discharge air temperature value is within the cooling proportional band (CPP is 65ºF - 75ºF), the active stage will remain ON. If the DAT falls 5ºF below the setpoint, the staging control will act in reverse, turning OFF stages.

Cooling Mode Lockout

The unit is equipped with a manual reset high pressure switch and an auto-reset low pressure switch for each compressor circuit. If any pressure switch trips, that particular mechanical cooling circuit is disabled. Each circuit on the evaporator coil has an auto-reset frostat which will disable the cooling circuit if the temperature drops below 36ºF.

To reduce compressor cycling, the compressors are enabled to run based upon outdoor dry bulb temperature and enthalpy settings. No mechanical cooling is allowed to operate if the outside air temperature is below the cooling mode lockout (OC1). Default OC1 setting is 68ºF; adjustable range is 58 to 130ºF. If the compressors are enabled and the temperature falls below the OC1 setting, the minimum run time will keep the compressors ON. **<u>ALL</u>** compressors will immediately turn OFF after the current minimum run time expires; the unit does not stage down.

If the unit is equipped with an outdoor air humidity sensor (Point AI-2), the compressors are locked out until the outside air enthalpy value rises above the lockout settings

- Stage 1 compressor is locked out when the outdoor air enthalpy is below EN1 settings.
- Stage 2 compressor is locked out when the outdoor air enthalpy is below EN2 setting.
- Stage 3 compressors are locked out when the outdoor air enthalpy is below EN3 settings.

Dehumidification (Reheat)

All of the D12 options used with dehumidification (Option AU7 or AU8) include a relative humidity transmitter. Depending on whether the unit includes a mixing box, the sensor is either factory-mounted in the mixing box or shipped separately for field installation in the outside air inlet. On indoor units the sensor should be mounted near the inlet of the outdoor air duct.

The sensor sequences compressor operation based on outdoor dewpoint.

Reheat control is enabled based on the outdoor dewpoint temperature setpoint (DP1). If the outside air dewpoint is above the setpoint (DP1 = 60ºF), BO-4 will be ON activating the reheat system. The reheat circuit adds 7 to 17°F to the discharge air temperature after it leaves the main cooling section of the unit. The reheat control output will be OFF based upon any of the following conditions:

1. The space temperature sensor calls for the unit to provide space cooling. In this mode the reheat is OFF. Once space cooling (SSP) is satisfied, reheat can restart.
2. The unit is equipped with a space humidistat with setpoint control. If the humidistat is not calling for dehumidification, thus the switch is open to BI-2, the reheat circuit is OFF.
3. If the outdoor air temperature is below the low ambient lockout (ROL), the reheat circuit will be OFF. The ROL default value is 65ºF.
4. If the outdoor air temperature is above the high ambient lockout (ROH), the reheat circuit will be OFF. The ROH default value is 120ºF.
5. If the unit is in unoccupied mode and the (RHE) reheat value is NO, reheat is not allowed in the unoccupied mode. If the RHE default value is YES, reheat

is allowed in the unoccupied mode based upon space humidistat. If a space humidistat is not installed, the contact is wired closed thus allowing reheat in the unoccupied mode.

6. If the outdoor air temperature sensor fails, cooling, reheat, and heating equipment are not allowed to operate.

Control Adjustment Guidelines for a Reheat System

The discharge air temperature can be adjusted when the reheat point is ON. When reheat is ON, the discharge air temperature can be reset as follows.

DCH = DCH + RSP

NOTE: If outdoor reset is used, DCL must replace DCH.

NOTE: It is important that RSP be used when the DCH value is lower than 65°F. Because the reheat system adds 7 to 17°F to reheat, a DCH setpoint of 55°F must discharge 40°F from the main coil to maintain a 55°F setpoint value. This low discharge temperature may damage the unit.

There are many ways to combine settings based on each application. The type of reheat application will determine the setting for **DCH** and **RSP**. The typical application requires RSP to be 0°F when DCH is 70°F. The unit will discharge a dewpoint of 52 to 55°F at 70°F discharge air temperature.

EXAMPLE 1) Neutral Air Application (corridor or kitchen makeup air)

Since the unit reheat override is based primarily on space temperature, the reheat override parameter ROH will be adjusted outside of operating range. Below are the proposed settings:

DP1 = 58; reheat enabled above 58°F dewpoint

ROL = 58; reheat compressor locked out below 58°F dry bulb

OC1 = 65; cooling compressors locked out below 65°F (Assumes reheat pump alone is adequate.)

EN1 = 29; 1st stage cooling compressor enabled above 29 btu/lb

OH1 = 70; heating locked out above 70°F ambient

DCH = 70; cooling duct discharge air setpoint with RSP = 0 (use DCL with outdoor reset)

RSP = 0; regardless of ambient dewpoint, the duct discharge air temperature setting is 70°F

ROH = 115; high ambient reheat override is set where reheat is not disabled

RCP = 55; if the space temperature exceeds the cooling setpoint, reheat is disabled and discharge air is supplied at 55°F

EXAMPLE 2) Neutral Air Application (Space Temperature Override – RH input Jumpered and Reheat Override)

If space sensible loads increase with outdoor ambient dry bulb, it may be preferred to override reheat mode by using the **ROH** reheat override in conjunction with space temperature override. Below are the proposed settings:

DP1 = 58; reheat enabled above 58°F dewpoint

ROL = 58; reheat compressor locked out below 58°F dry bulb

OC1 = 68; cooling compressors locked out below 68°F (Assumes reheat pump alone is adequate.)

EN1 = 29; 1st stage cooling compressor enabled above 29 btu/lb

OH1 = 72; heating locked out above 72°F ambient

DCH = 62; cooling duct discharge air with reheat overrides (use DCL with outdoor reset)

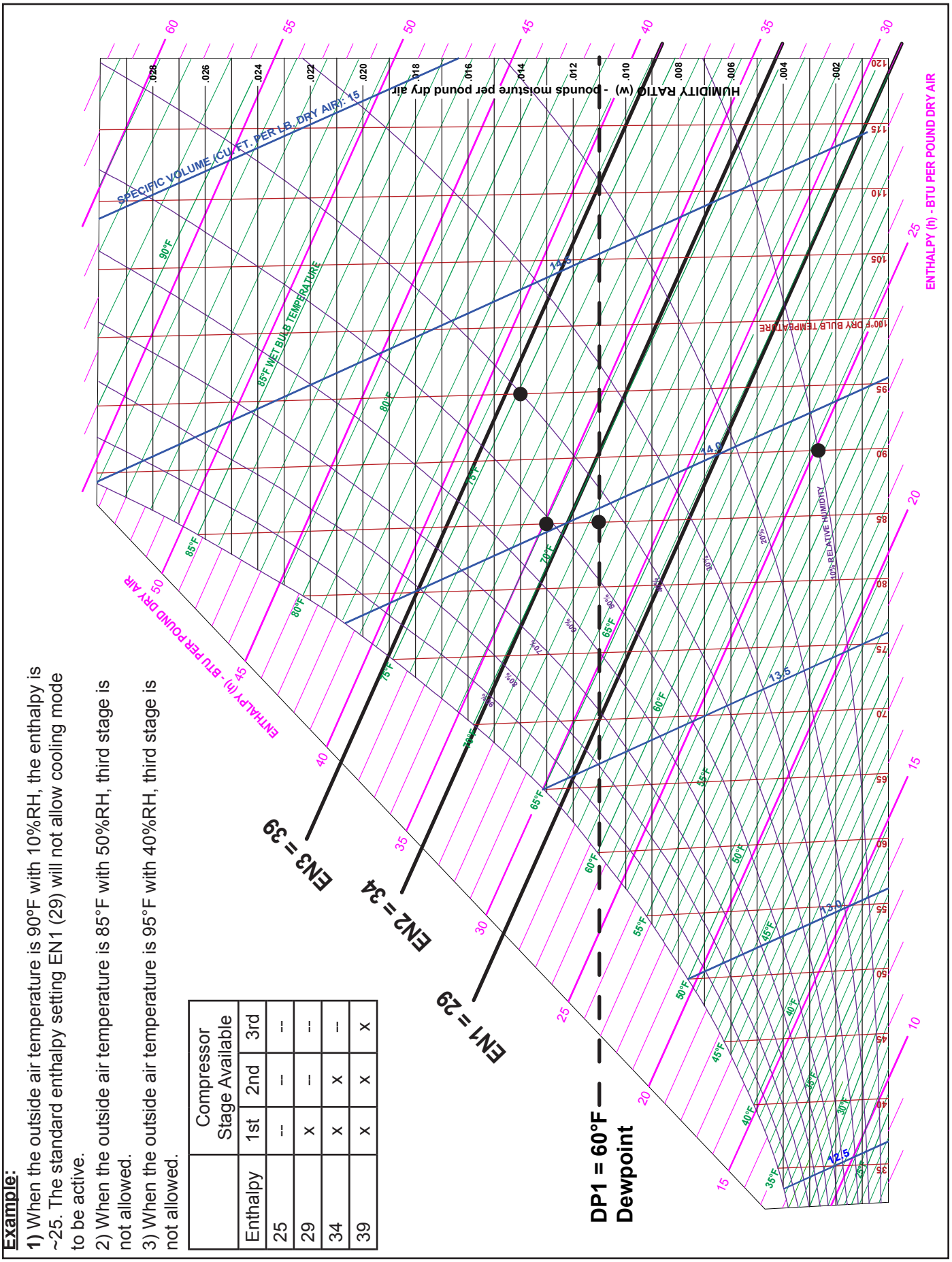
RSP = 8; the duct discharge air temperature setting with reheat is 70°F (62 + 8)

ROH = 92; reheat mode is disabled over 92°F ambient dry bulb with a supply air temperature of 62°F

RCP = 55; if the space temperature exceeds the cooling setpoint, reheat is disabled and discharge air is supplied at 55°F

In this mode, if the dewpoint is below 58°F, the unit will discharge 62°F air to the space in neutral air mode. If the dewpoint rises above 58°F, the unit will discharge 70°F air to the space in neutral air mode. If the space requires cooling, the unit will discharge 55°F air to the space until the space setpoint is satisfied.

FIGURE 6 - Optional humidity transmitter measures outdoor air humidity and controls compressor operation based on enthalpy settings EN1, EN2, EN3



Example:

1) When the outside air temperature is 90°F with 10%RH, the enthalpy is ~25. The standard enthalpy setting EN1 (29) will not allow cooling mode to be active.

2) When the outside air temperature is 85°F with 50%RH, third stage is not allowed.

3) When the outside air temperature is 95°F with 40%RH, third stage is not allowed.

	Compressor Stage Available		
Enthalpy	1st	2nd	3rd
25	--	--	--
29	X	--	--
34	X	X	--
39	X	X	X

Menu Pages

To access Menu Pages, press the “C” Key; choose Menu #1 - Unit Status.

Menu 01	Unit Status and Modes	
Display Name	**Control Variable Description**	**Reading or Status**
SPCT	Space Temperature Value from Sensor (Option CL67) “--” if not installed	XXX.X°F
DAT	Discharge Air Temperature	XXX.X°F
OAT	Outside Air Temperature	XXX.X°F
Enth	Outside Air Enthalpy Value (BTU/LBS)	XXX.X
DP	Outside Air Dewpoint Temperature	XXX.X°F
OA HUM PERC	Outside Air Relative Humidity Percent	XXX.X%
DA WHSP	The active discharge air heating setpoint for the given conditions	XXX.X°F
DA WCSP	The active discharge air cooling setpoint for the given conditions	XXX.X°F
MODE	The active stages of cooling or heating the controller has requested. Cooling = CLG1, CLG2, CLG3; Heating = HTG1, HTG2, HTG3, Reheat. When the unit is not requiring heating, cooling, or reheat, the controller display shows “OFF”.	Status only
OCC STATUS	Current Unit Mode - Occupied or Unoccupied	Status only
OCC OVRD STAT	**Temporary Occupied Override -** When the wall switch occupied button is pushed, the unit switches from unoccupied mode to occupied mode for the given time	Status only
SHUTDOWN	**Normal Operation or Shutdown** - When the remote ON/OFF contact closure is open, the unit will be OFF (SHUTDOWN). If the contact closure is closed, the controller display shows “ON”, and the unit will follow its sequence of operation.	Status only
DA CNTRL MODE	**Active Discharge Air Control Mode** - Neutral Air Heating (DAH), Neutral Air Cooling (DAC); Room Air Cooling (RMC), Room Air Heating (RMH)	Status only
RM WHSP	**Active Space Heating Setpoint** - Displays the active setpoint determined by occupied or unoccupied mode.	XXX.X°F
RM WCSP	**Active Space Cooling Setpoint** - Displays the active setpoint determined by occupied or unoccupied mode.	XXX.X°F
HTG OUTPUT PCT	**Percentage of Heating Output** - Displays the percentage of heating output from 0-100%.	XXX.X%

FX06 Commissioning Parameters Level

Menu 02	Temperature Setpoints			
Display	**Control Variable Description**	**Default Value**		**Range**
SSPHI	The maximum value that the space setpoint dial can be set	D12B	78°F	55° to 90°F
		D12C	78°F	
		D12D	78°F	
		D12E	78°F	
		D12F	78°F	
		D12G	78°F	
SSPLO	The minimum value that the space setpoint dial can be set	D12B	72°F	55° to 90°F
		D12C	72°F	
		D12D	72°F	
		D12E	72°F	
		D12F	72°F	
		D12G	72°F	
SSP (status only)	**Space Cooling Temperature Setpoint (SSP)** - This is a setpoint from the space sensor (Option) above which the unit will begin to initiate space cooling. As the space temperature increases above this value, the space cooling discharge air setpoint will become active (RCP). The range of the dial is governed by the high (SSPHI) and low (SSPLO) values above.			

(continued)

Menu 02 (cont'd) — Temperature Setpoints (cont'd)

Display	Control Variable Description	Default Value		Range
HSO	**Space Heating Setpoint Offset** This value is subtracted from the SSP value to calculate the space heating setpoint. (Example: SSP - HSO = 75° - 5° = 70°.) As the space temperature drops below 70°F, the space heating discharge air setpoint will become active (rHP).	D12B	5°F	1° to 30°F
		D12C	5°F	
		D12D	5°F	
		D12E	5°F	
		D12F	5°F	
		D12G	5°F	
DP1	**Reheat Enabled Setpoint – Ambient Dewpoint** At dewpoints below this value, reheat will not be enabled.	D12B	60°F	52° to 80°F
		D12C	60°F	
		D12D	60°F	
		D12E	60°F	
		D12F	60°F	
		D12G	60°F	
DCH	**Standard (Neutral) Cooling Discharge Air Temperature Setpoint (Primary Setpoint)** If the reset option is disabled, the DCH becomes the primary neutral air cooling discharge air temperature setpoint. If the reset option is active, this is the maximum cooling value based on outdoor air conditions. The discharge air temperature will not change to a higher value than DCH regardless of the outside air temperature.	D12B	70°F	50° to 115°F
		D12C	70°F	
		D12D	70°F	
		D12E	70°F	
		D12F	70°F	
		D12G	70°F	
DHL	**Standard (Neutral) Heating Discharge Air Temperature Setpoint (Primary Setpoint)** . If the reset option is disabled, the DHL becomes the primary neutral air heating discharge air temperature setpoint. If the reset option is active, this is the lowest heating value based on outdoor air conditions. The discharge air temperature will not change to a lower value than DHL regardless of the outside air temperature.	D12B	70°F	50° to 115°F
		D12C	70°F	
		D12D	70°F	
		D12E	70°F	
		D12F	70°F	
		D12G	70°F	
RCP	**Room (space) Discharge Air Cooling Temperature Setpoint** When a space temperature sensor is installed and the temperature in the space increases above the space cooling setpoint (SSP) through the space cooling prop band (SCP), the RCP value will become the active discharge air setpoint. The value of RCP will only be used by the unit if a space temperature sensor is used.	D12B	55°F	49° to 115°F
		D12C	55°F	
		D12D	55°F	
		D12E	55°F	
		D12F	55°F	
		D12G	55°F	
RHP	**Room Discharge Air Temperature Heating Setpoint** When the temperature in the space decreases below the space heating setpoint (SSP-HSO) through the space heating prop band (SHP), the RHP value will become the active discharge air setpoint. This value will only be used by the unit if a space temperature sensor is installed.	D12B	80°F	45° to 120°F
		D12C	80°F	
		D12D	80°F	
		D12E	80°F	
		D12F	80°F	
		D12G	80°F	

Menu 03 — OA Reset Schedule

Display	Control Variable Description	Default Value		Range
DCL	**Outside Air Reset Option** The value of the neutral discharge air cooling setpoint when the outside air temperature is at its warmest value to allow maximum cooling. The discharge air temperature will not change to a higher value than DCL regardless of the outside air temperature. The default value disables reset functionality.	D12B	90°F	49° to 115°F
		D12C	90°F	
		D12D	90°F	
		D12E	90°F	
		D12F	90°F	
		D12G	90°F	
DCH	**Standard Cooling (Neutral) Discharge Air Temperature Setpoint (Primary Setpoint)** . If the reset option is disabled, the DCH becomes the primary neutral air cooling discharge air temperature setpoint. If the reset option is active, this is the maximum cooling value based on outdoor air conditions. The discharge air temperature will not change to a higher value than DCH regardless of the outside air temperature.	D12B	70°F	50° to 115°F
		D12C	70°F	
		D12D	70°F	
		D12E	70°F	
		D12F	70°F	
		D12G	70°F	

DHL	**Standard Heating (Neutral) Discharge Air Temperature Setpoint (Primary Setpoint)** . If the reset option is disabled, the DHL becomes the primary neutral air heating discharge air temperature setpoint. If the reset option is active, this is the lowest heating value based on outdoor air conditions. The discharge air temperature will not change to a lower value than DHL regardless of the outside air temperature.	D12B	70°F	50° to 115°F
		D12C	70°F	
		D12D	70°F	
		D12E	70°F	
		D12F	70°F	
		D12G	70°F	
DHH	**Outdoor Reset Option - Duct Discharge Air Temperature Heating Setpoint** When used in conjunction with DHL, OH2 and OH3, the neutral discharge air heating setpoint will be adjusted based on the outdoor air temperature. If DHH is higher than DHL, the controller will reset the discharge air temperature setpoint from the low value of DHL to the high value of DHH as the outdoor air goes from the high value of OH2 to the low value of OH3. The default value disables this feature.	D12B	50°F	45° to 120°F
		D12C	50°F	
		D12D	50°F	
		D12E	50°F	
		D12F	50°F	
		D12G	50°F	
OH2	**Outdoor Reset Dry Bulb Heating – High Setting** The value of the outside air temperature corresponding to the DHL low heating setpoint value.	D12B	60ºF	20° to 70ºF
		D12C	60ºF	
		D12D	60ºF	
		D12E	60ºF	
		D12F	60ºF	
		D12G	60ºF	
OH3	**Outdoor Reset Dry Bulb Heating – Low Setting** The value of the outside air temperature corresponding to the DHH high heating setpoint value.	D12B	30ºF	-45° to 65ºF
		D12C	30ºF	
		D12D	30ºF	
		D12E	30ºF	
		D12F	30ºF	
		D12G	30ºF	
OC2	**Outdoor Reset Dry Bulb Cooling – High Setting** The value of the outside air temperature corresponding to the DCL coldest cooling setpoint.	D12B	60°F	20° to 70°F
		D12C	60°F	
		D12D	60°F	
		D12E	60°F	
		D12F	60°F	
		D12G	60°F	
OC3	**Outdoor Reset Dry Bulb Cooling – Low Setting** The value of the outside air temperature corresponding to the DCH warmest cooling setpoint.	D12B	20°F	-40° to 65°F
		D12C	20°F	
		D12D	20°F	
		D12E	20°F	
		D12F	20°F	
		D12G	20°F	

Menu 04 — Commissioning Parameters

Display	Control Variable Description	Default Value		Range
SCP	**Space Cooling Proportional Band** This value determines when the unit switches between space cooling and neutral air control. When the space temperature rises or falls greater than this amount, the unit switches states. **Example**: SSP + SCP = 75° + 1.8° = 76.8°, space cooling mode. **Example:** SSP - SCP = 75° - 1.8° = 73.2°, neutral air cooling mode.	D12B	1.8°F	1° to 8°F
		D12C	1.8°F	
		D12D	1.8°F	
		D12E	1.8°F	
		D12F	1.8°F	
		D12G	1.8°F	
SHP	**Space Heating Proportional Band** This value determines when the unit switches between space heating and neutral air control. When the space temperature rises or falls greater than this amount, the unit switches states. **Example**: (SSP - HSO) + SHP = 70° + 1.8° = 71.8°, neutral air heating mode. **Example:** (SSP - HSO) - SHP = 70° - 1.8° = 68.2°, space heating mode.	D12B	1.8°F	1° to 8°F
		D12C	1.8°F	
		D12D	1.8°F	
		D12E	1.8°F	
		D12F	1.8°F	
		D12G	1.8°F	

(continued)

Menu 04 (cont'd)

Commissioning Parameters (cont'd)

Display	Control Variable Description	Default Value		Range
CPP	**CPP - Cooling Discharge Air Prop Band** The value of CPP is divided in half around the value of DCH (duct discharge cooling setpoint). When the discharge air temperature goes above DCH + ½ CPP, a stage of cooling is activated. When the discharge air temperature goes below DCH – ½ CPP value, a stage of cooling is deactivated.	D12B	10°F	2° to 40°F
		D12C	10°F	
		D12D	10°F	
		D12E	10°F	
		D12F	10°F	
		D12G	10°F	
HPP	**Heating Discharge Air Proportional Band** The value of HPP is divided in half around the value of DHL (duct discharge heating setpoint). When the discharge air temperature goes below DHL + ½ HPP, a stage of heating is activated. When the discharge air temperature goes below DHL – ½ HPP value, a stage of heating is deactivated.	D12B	4°F	4° to 30°F
		D12C	5°F	
		D12D	20°F	
		D12E	5°F	
		D12F	5°F	
		D12G	5°F	
ICT	**Heating Integration Constant** This adjustable parameter defines the integration time used with proportional-integral (PI) control of discharge air.	D12B	40	0 - 999 seconds
		D12C	1	
		D12D	40	
		D12E	0	
		D12F	1	
		D12G	40	
HDB	**Space Heating Dead Band** The space heating dead band is a value around the heating setpoint at which nothing will occur -- hence "dead band". For instance, if the space heating setpoint is 70°F and the Space Heating Dead Band has a value of 2°, then the temperature in the space drops below 70° (SSP - HSO - 1/2 HDB) to 67.2° before the unit will switch to space heating control. Likewise, a value of 72.8° will switch back to neutral air heating control.	D12B	2°F	0° to 9°F
		D12C	0°F	
		D12D	2°F	
		D12E	0°F	
		D12F	0°F	
		D12G	2°F	
OC1	**Cooling Mode Lockout – Ambient Dry Bulb** If the outdoor air temperature is less than the value of oC1, cooling mode will be disabled. When the outside air temperature rises above oC1, the unit will be in cooling mode.	D12B	68°F	58° to 130°F
		D12C	68°F	
		D12D	68°F	
		D12E	68°F	
		D12F	68°F	
		D12G	68°F	
OH1	**Heating Mode Lockout - Ambient Dry Bulb** If the outside air temperature is greater than the value of OH1, heating mode will be disabled. When the outside air falls below OH1, the unit will be in heating mode.	D12B	62°F	20° to 105°F
		D12C	62°F	
		D12D	62°F	
		D12E	62°F	
		D12F	62°F	
		D12G	62°F	
DP1	**Reheat Enabled Setpoint – Ambient Dewpoint** At dewpoints below this value, reheat will not be enabled.	D12B	60°F	52° to 80°F
		D12C	60°F	
		D12D	60°F	
		D12E	60°F	
		D12F	60°F	
		D12G	60°F	
ROL	**Low Ambient Reheat Override – Dry Bulb** If the outdoor air temperature is below this setpoint, the reheat will not be enabled.	D12B	65°F	54° to 75°F
		D12C	65°F	
		D12D	65°F	
		D12E	62°F	
		D12F	65°F	
		D12G	65°F	

ROH	**High Ambient Reheat Override – Dry Bulb** If the outdoor air temperature is above this setpoint, the reheat will not be enabled.	D12B	120°F	60° to 120°F
		D12C	120°F	
		D12D	120°F	
		D12E	120°F	
		D12F	120°F	
		D12G	120°F	
LSP	**Low Limit Freeze Protection Setpoint** If the discharge air temperature sensor senses discharge air temperature below the value of LSP for 600 seconds, the blower will be disabled and the outside air damper will close. The control will reset when the discharge air sensor senses discharge air 30° above the value of LSP. If this sequence occurs three times within one hour, the control will go to continuous lockout.	D12B	36°F	-40° to 40°F
		D12C	36°F	
		D12D	36°F	
		D12E	36°F	
		D12F	36°F	
		D12G	36°F	
EN1	**1st Stage Enthalpy Cooling Reference Lockout** If the outdoor enthalpy is below this value, cooling mode is not allowed. Above this value, 1st stage cooling is allowable.	D12B	29°	15° to 40°
		D12C	29°	
		D12D	29°	
		D12E	29°	
		D12F	29°	
		D12G	29°	
EN2	**2nd Stage Enthalpy Cooling Lockout** Provides an enthalpy differential to the EN1 setting (add this differential to the EN1 value). If outdoor enthalpy is below this value, the 2nd or 3rd stage cooling control is not allowed	D12B	5°	0° to 20°
		D12C	5°	
		D12D	5°	
		D12E	5°	
		D12F	5°	
		D12G	5°	
EN3	**3rd Stage Enthalpy Cooling Lockout** EN3 provides an enthalpy differential to the EN2 setting (add this differential to the EN2 value). If outdoor enthalpy is below this value, the 3rd stage of cooling is not allowed.	D12B	5°	0° to 20°
		D12C	5°	
		D12D	5°	
		D12E	5°	
		D12F	5°	
		D12G	5°	
NSU	**Night Setup - Cooling** This value is added to the space cooling setpoint (SSP) for unoccupied periods. If the cooling setpoint (SSP) is 75° during the occupied mode, and NSU is 9, then during unoccupied modes, the cooling setpoint will be 84°F (75 +9).	D12B	9°F	0° to 35°F
		D12C	9°F	
		D12D	9°F	
		D12E	9°F	
		D12F	9°F	
		D12G	9°F	
NSB	**Night Set Back – Heating** This value is the amount subtracted from the space heating setpoint in the unoccupied mode. Example: SSP - HSO - NSB ~ 75 - 5 - 9 = 61°F space heating setpoint in the unoccupied mode.	D12B	-9°F	-35° to 0°F
		D12C	-9°F	
		D12D	-9°F	
		D12E	-9°F	
		D12F	-9°F	
		D12G	-9°F	
RCP	**Room (space) Discharge Air Cooling Temperature Setpoint** When a space temperature sensor is installed and the temperature in the space increases above the space cooling setpoint (SSP) through the space cooling prop band (SCP), the RCP value will become the active discharge air setpoint. The value of RCP will not be used by the unit if a space temperature sensor is not used.	D12B	55°F	49° to 115°F
		D12C	55°F	
		D12D	55°F	
		D12E	55°F	
		D12F	55°F	
		D12G	55°F	
RHP	**Room (space) Discharge Air Heating Temperature Setpoint** When a space temperature sensor is installed and the temperature in the space falls below the space cooling setpoint (SSP - HSO) by a difference of the space heating prop band (SHP), the RHP value will become the active discharge air setpoint. The value of RHP will only be used by the unit if a space temperature sensor is installed.	D12B	80°F	45° to 120°F
		D12C	80°F	
		D12D	80°F	
		D12E	80°F	
		D12F	80°F	
		D12G	80°F	

(continued)

Menu 04 (cont'd)	Commissioning Parameters (cont'd)			
Display	**Control Variable Description**	**Default Value**		**Range**
RSP	**Reheat Setpoint Offset** If the unit is equipped with reheat and conditions are such that reheat is being called for, the neutral air cooling setpoint value will increase by RSP amount. This value should not be used unless the neutral air discharge air temperature setpoint (DCH) is lower than 65°F.	D12B	0°F	0° to 30°F
		D12C	0°F	
		D12D	0°F	
		D12E	0°F	
		D12F	0°F	
		D12G	0°F	
UOT	**Temporary Occupied Button Timer** Amount of time the system will remain in occupied mode when the occupancy override button is pressed with the system in an occupied condition.	D12B	60 min	0 to 240 min
		D12C	60 min	
		D12D	60 min	
		D12E	60 min	
		D12F	60 min	
		D12G	60 min	
HHR	**Humidity High Range** This allows adjustment of the humidity sensor range. The default is 5 for a 0-5v sensor. Adjusting this value to 10 will allow a 0-10v humidity sensor to be used.	D12B	5	0 to 10
		D12C	5	
		D12D	5	
		D12E	5	
		D12F	5	
		D12G	5	
HTGINTSTG DELAY	**Heating Interstage Delay** The amount of time required to expire before a stage of heating can turn on or off. (seconds)	D12B	8	30 to 300
		D12C	120	
		D12D	8	
		D12E	8	
		D12F	120	
		D12G	8	
CLGINTSTG DELAY	**Cooling Interstage Delay** The amount of time required to expire before a stage of cooling can turn on or off (seconds)	D12B	120	30 to 300
		D12C	120	
		D12D	120	
		D12E	120	
		D12F	120	
		D12G	120	
MIN CLG ON TIME	**Minimum Cooling Stage Time** The amount of time required to expire before a stage of cooling can turn off. (minutes)	D12B	1	0 to 5
		D12C	1	
		D12D	1	
		D12E	1	
		D12F	1	
		D12G	1	

Menu 05	Sensor Calibration (DO NOT change these default values unless advised by the factory.)		
Display	**Control Variable Description**	**Default Value**	
RMTO	**Space Temperature Sensor Calibration** Allows a small sensor offset when space wires add significant resistance. Used to offset wire resistance.	D12 B, C, D, E, F, G	0
DAO	**Discharge Air Temperature Sensor Calibration** Allows a small sensor offset when space wires add significant resistance. Used to offset wire resistance.	D12 B, C, D, E, F, G	-1

Menu 06	Controller Set-up: Time, Address, Date			
Display	**Control Variable Description**	**Default Value**		**Range**
Unit of Measure	Degree F or Degree C	°F		-
N2 Address	Network Communication Address	255		0 to 999
Year	4 digit Year code	-		
Month	2 Digit Month code	-		01 to 12
Day of Month	2 digit day code	-		01 to 31
Hour	24 hour time code	-		1 to 24
Minute	Standard Minute code	-		01 to 60
HTG POLARITY	Setting the Parameter allows the 0-100% analog heating output to be direct acting or reverse acting. The default setting is direct acting.	Direct Acting		REV or DIR
HTGOUTLOWLIMIT	Low limit for the heating output. **This value should not be changed.**	20%		0 to 30%
HTGOUTHIGHLIMIT	High limit for the heating output. This variable should only be changed on a Model PEH or REH.	D12B	100%	60 to 100%
		D12C	100%	
		D12D	100%	
		D12E	100%	
		D12F	100%	
		D12G	100%	

There is a 10-day battery backup to maintain the clock time during brief power outages. If the power is off for greater than ten days, the time and date must be reset.

Menu 07	**Schedule** (See “Time Schedule”, below.)		
Display	**Control Variable Description**	**Default Value**	**Range**
--01--	Occupancy Schedule 1	-	00:00 to 24:00
--02--	Occupancy Schedule 2	-	00:00 to 24:00
--03--	Occupancy Schedule 3	-	00:00 to 24:00
--04--	Occupancy Schedule 4	-	00:00 to 24:00
--05--	Occupancy Schedule 5	-	00:00 to 24:00
--06--	Occupancy Schedule 6	-	00:00 to 24:00
--07--	Occupancy Schedule 7	-	00:00 to 24:00
--08--	Occupancy Schedule 8	-	00:00 to 24:00
--09--	Occupancy Schedule 9	-	00:00 to 24:00
--10--	Occupancy Schedule 10	-	00:00 to 24:00
--11-	Occupancy Schedule 11	-	00:00 to 24:00
--12--	Occupancy Schedule 12	-	00:00 to 24:00
--13--	Occupancy Schedule 13	-	00:00 to 24:00
--14--	Occupancy Schedule 14	-	00:00 to 24:00
--15--	Occupancy Schedule 15	-	00:00 to 24:00
--16--	Occupancy Schedule 16	-	00:00 to 24:00
--17--	Occupancy Schedule 17	-	00:00 to 24:00
--18--	Occupancy Schedule 18	-	00:00 to 24:00
--19--	Occupancy Schedule 19	-	00:00 to 24:00
--20--	Occupancy Schedule 20	-	00:00 to 24:00
--21--	Occupancy Schedule 21	-	00:00 to 24:00

Time Schedule

If no schedule is provided, the unit will run in occupied mode. The schedule is a given time start/stop time assign to any day of a seven day week. (The holiday is not used.)

To access the schedule from the controller display, press the “C” key until the display shows “menu” in small letters. Press the up/down arrows until you reach Menu 07 with a scrolling “schedule” message.

Press the “OK” key to select the schedule menu

At this point you can choose from 1-21 time schedules. Each time schedule has a single starting and stopping time using standard 24 hour and 60 minute time increments. This time can be individually assigned to any day of a 7-day week plus a holiday.

Menu Pages (cont'd)

FX06 Commissioning Parameters Level (cont'd)

Time Schedule (cont'd)

1. Press the up/down arrows until you reach the time schedule that you want to view/set. Press "OK" to enter that time schedule.
2. Press the up/down arrows to view the setting. The unit scrolls from start time; end time; sun-sat; holiday.
3. At any point press the "OK" key to select the item to be changed. Use the up/down arrow to change the value. Press "OK" to accept the value. When assigning a time to a day, the display will show the day with or without an asterisk next to it (MON*, TUE, WED*….). Days with an asterisk have been assigned to use the given start/stop. Press "OK" to change

   Upon selecting a value, the screen will show a start time or "FROM" time. Press OK to change that time. Press the up/down arrow to move to the end time or "TO" time. To change the time, press the OK button. The hours will flash as the up/down arrows change the hour settings; press OK to accept the hour setting. The unit will then allow the minutes to be changed. The minutes will flash as they are changed.

Menu 08	Events		
Display	**Control Variable Description**	**Default Value**	**Range**
Event Summary	Shows all current Alarms		
Event History	Stores alarms that are no longer active		

Alarm Displays

When an alarm is triggered, one of the following codes will flash on the FX06 display window and the background will change from blue to red.

AP	Air Proving
FS	Low Limit Freeze Protection Lockout
ST	Discharge Air Temperature Sensor Failure
OT	Outdoor Air Temperature Sensor Failure
EE	FX06 Controller Low Voltage Lockout
Phase Loss Switch (optional) - Nothing Displayed (Lockout)	

AP – Air Proving - When the blower is called to be ON (point BO-1), the blower starts, and the blower status switch must close proving blower operation. If the blowers status does not show blower operation within 180 seconds, the unit shuts down. The unit must be restarted by cycling power to the FX06 controller or opening/closing the "Unit ON/OFF" switch (point BI-3).

During normal operation after initial blower startup, if the blower status input shows open for more than three seconds, the unit will shut down cooling and heating equipment. If the AP input continues to remain open for an additional 180 seconds, the blower is shutdown, and the FX06 controller will be in lockout mode. The controller can be reset by cycling power to the FX06 controller or toggling the BI-3 system on/off switch. If the blower status switch is made before the unit reaches lockout mode, cooling and heating operation will restart.

Troubleshooting - A flashing AP is caused due to an open circuit on Terminals 48 and 46. Check the air proving switch to ensure it is operational (be sure the blower cabinet door is closed). If equipped with an Option BF15 phase loss monitor (in the high voltage box), check the indicator light. The green light indicates the unit is in phase. Red light indicates out of phase. Recycle power to the unit to clear out the alarm.

FS – Low Limit Freeze Protection Lockout - When the blower is called to be ON and the discharge air temperature is below the low limit freeze setpoint (LSP = 36°F) for 600 seconds, the unit is shutdown (blower OFF). The display will flash "FS". When the discharge air rises above the low limit freeze setpoint plus 30°F, the low limit freeze lockout is disabled, allowing the unit to operate. Three (3) consecutive lockouts within one hour will result in a continuous lockout state. The FX06 power must be cycled before operation can continue. Toggling the BI-3 input will **not** reset the unit.

Troubleshooting - A flashing FS indicates the unit has encountered a low discharge air temperature (below 36°F) for over 7 minutes. Investigate the heating system and recycle the power to clear out the alarm. Verify that the gas valve is open and the heating board is operational.

Sensor Failures (flashing "OT" or "ST") - If a temperature sensor value reads (999) or open circuit, the sensor is in a failed condition.
If the discharge air dry bulb sensor fails, the controller will lock out the unit. No mechanical equipment will be allowed to run. The display will flash "**ST**". Installing or replacing the sensor will allow immediate restarting of the equipment.

A failed outdoor air sensor (flashing "**OT"**) will lock out cooling mode and heating operation. However, the blower will continue to operate.

Troubleshooting - A flashing **ST** means the discharge air sensor may not be connected (check for two white wires on terminals 54 and 57). To check the sensor for failure, remove the two wires and check resistance against temperature (See chart on page 26). Make sure that the sensor is properly located in the ductwork.

A flashing **"ot"** means the outdoor air sensor may not be connected or has failed. Check terminals 54 and 56 and sensor operation.

"EE" – Controller Low Voltage Lockout - If the FX06 controller power drops below the minimum level, the display will read EE and all controller functions will be OFF. The controller will restart when power level returns to normal.

Phase Loss Switch - No Display (Lockout) - (Option BF14 or BF15 is required.) - If the phase monitor detects a poor power condition, the phase loss switch will cut power to the control circuit. The phase loss switch will automatically reset when the poor power condition is no longer detected.

Test Mode Keys

Press both the up and down arrows for 2 seconds at the home page to force the unit into a test mode. The display will scroll "unit test." If no other action is taken the unit will cycle through the outputs in 1 minute intervals.

1. Blower ON
2. Blower plus 1st stage Heating ON (display HTGSTG 1)
3. Blower plus ALL Heating ON (display HTGSTG 2)
4. Blower plus reheat pump ON (display Reheat Compressor)
5. Blower plus 1st stage compressor ON (display CLGSTG 1)
6. Blower plus 2nd stage compressor ON (display CLGSTG 2)

Using the following keys will change

1. Press the "Up" for 1 second to Extend Test Mode (15 minutes).
2. Press the "Down" key for 1 second to cancel the test mode.
3. Press the "C" key for 1 second to manual Jump test mode.

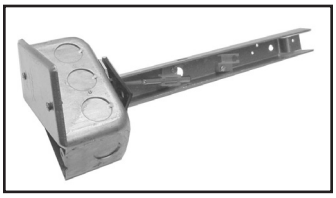
Sensor Data and Application

FIGURE 7 - Optional Wall-Mount Space Air Sensor, Option CL67, P/N 260599



Discharge/Duct Sensor

FIGURE 9A - Discharge Air Sensor, P/N 206112, and Holder, P/N 115850, for Ductwork Installation



Maximum Sensor Wire Length for less than 1°F Error

Wire Gauge	Maximum Sensor Wire Length	
AWG	Feet	Meters
14	800	244
16	500	152
18	310	94
20	200	61
22	124	38

IMPORTANT: All field-installed sensors MUST be run in shielded cable.

Optional Space (Wall-Mounted) Sensors

Communication Space Temperature Sensor - The wall mounted sensor should be located on an interior wall (avoid direct placement in the sun), the wall opening should be insulated to prevent cold drafts and the sensor located for sampling representative space air.

The optional space sensor with setpoint adjust uses communication to transfer the data back to the unit controller. The sensor requires 24VAC power and two wiring communication. Please see unit wiring diagram for wiring details. The unit displays the current space temperature value.

When the dial is turned, the space cooling setpoint (SSP) will be displayed. The user can turn the dial to adjust the space cooling setpoint. The space heating setpoint is a given differential below the cooling setpoint. See variable HSO for details.

Room RH Input with Reheat Mode - Since reheat is already enabled based on outdoor dewpoint, a room RH control is typically not required for units that condition 100% outside air. A wall mounted RH control (**FIGURE 8**) is typically specified when internal latent loads vary considerably, the rooftop is applied with return air, or an unoccupied space RH control is desired. When applied with an RH input, reheat is enabled if space RH is above setpoint and the space cooling load is satisfied. During unoccupied mode, a rise in room RH will enable the dehumidification and reheat circuit. If there is no call for space cooling, only the reheat pump is enabled (cooling compressors are locked out).

FIGURE 8 - Wall-Mounted Dehumidistat, Option CL47, P/N 177231



All makeup air controls have a discharge air sensor and require field installation of the discharge air sensor holder. The discharge air sensor holder (See **FIGURE 9A**) is shipped with all units ordered with makeup air controls. Indoor gas-fired units also include a mounting bracket. Digital makeup air controls are Option DG5, DG6, D12B, D12C, D12D, D12E, D12F (cooling only), and D12G.

Digital control inputs are low-current, resistance-based signals. The manufacturer recommends for optimum temperature control performance that the analog and digital inputs (zone sensors, discharge air sensors, etc.) that are connected to the main controller be routed to the unit in one of the following manners:

- In separate conduits, isolated from 24 VAC controls and line voltage power to the unit, ***OR***
- If the main control sensor wires are to be run in the same conduit as the 24 VAC control wiring, the control wiring must be completed using shielded cable and bundled separately from the 24 VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

See the table (top of next page) for wire gauge and length requirements of digital control signal wiring.

If the installation has supply ductwork, the sensor holder (**FIGURE 9A**) must be installed in the ductwork. If the installation is a Model SDH, PDH, PXH, or SHH without supply ductwork, the sensor holder must be installed at the unit discharge. A bracket is supplied to use when there is no ductwork

Instructions for Installing Discharge Air Sensor Holder in Ductwork - applies to all Models

1. Installation requires the discharge air sensor holder including the box cover. (The bracket will not be used.)
2. Determine a location in the ductwork to install the sensor. Select a location a sufficient distance from the outlet to provide a good mixture of discharge air temperature. The holder will extend 9-3/16” (233mm) into the ductwork.
3. The position of the sensor holder is important. Turn the holder so that the element will be shielded from direct airflow and will sense the air temperature as it flows through the holes in the holder. At the selected location in the ductwork, mark the

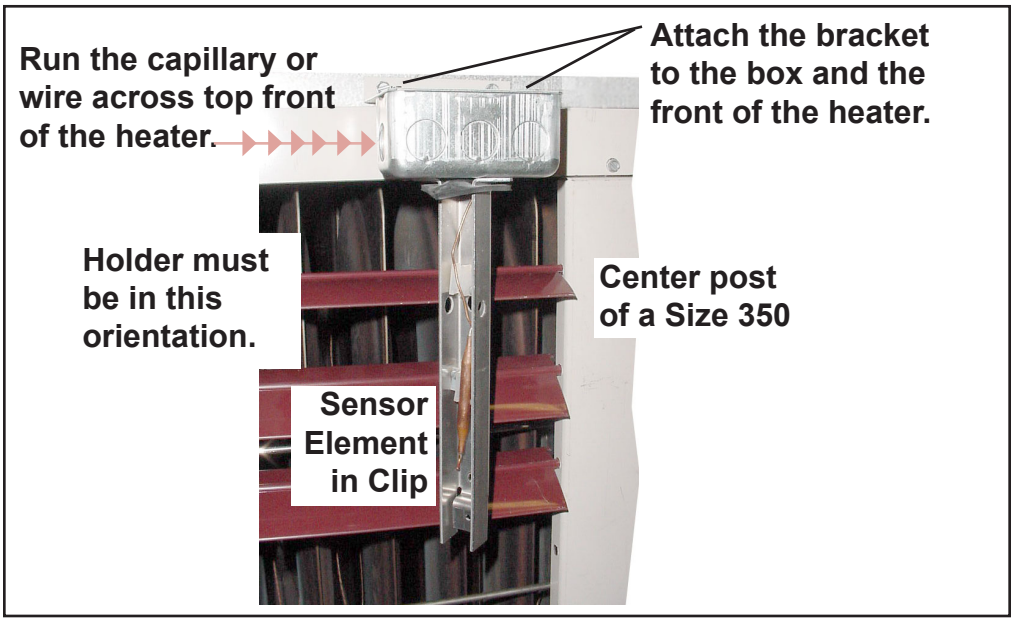
diamond-shaped hole required for the sensor holder. Cut the hole no larger than required, approximately 1” x 1” (25mm x 25mm).

4. Push the element into the clip in the holder. **NOTE:** Be sure that the element is not directly over an airflow hole. This is especially important with electric heat Model PEH or REH) Determine where the sensor wire should enter the box and remove the knockout. Slide the holder into the ductwork. Using four field-supplied No. 6 sheetmetal screws, attach the box portion of the holder to the ductwork. Attach a field-supplied cable connector to the box, connect the sensor wire, and attach the box cover.

Instructions for Installing Discharge Air Sensor Holder <u>on Heater - applies only to indoor Models without ductwork</u>

1. Installation requires the discharge air sensor holder and the bracket in **FIGURE 9B**. (If attached, remove box cover; it will not be used.)
2. Select a location for the box on the front near the center of the heater. Orientation of the sensor holder is important. Position the box so that the element will be sensing the air temperature as it flows through the holes in the holder.

FIGURE 9B - Discharge Air Sensor Holder, P/N 115850, and Bracket, P/N 213612 used with Model PDH, SDH, PXH, and SHH without ductwork



3. Push the element into the clip in the holder. NOTE: Be sure that the element is directly over an airflow hole.) Determine where the sensor wire should go through the box and remove the knockout at that location. Attach a field-supplied cable connector to the box. Connect the sensor wire. Attach the bracket to the box. Attach the bracket to the front of the heater.

Sensor Data for Johnson A99 Series Temperature Sensors - Resistance vs Temperature (applies to both discharge and outside air sensor)

°F	°C	Ohms
-40	-40	613
-31	-35	640
-22	-30	668
-13	-25	697
-4	-20	727
5	-15	758
14	-10	789
23	-5	822
32	-0	855
41	5	889
50	10	924
59	15	960
68	20	997
77	25	1035
86	30	1074

°F	°C	Ohms
95	35	1113
104	40	1153
113	45	1195
122	50	1237
131	50	1279
140	60	1323
149	65	1368
158	70	1413
167	75	1459
176	80	1506
185	85	1554
194	90	1602
203	95	1652
212	100	1702
221	105	1753

°F	°C	Ohms
230	110	1804
239	115	1856
248	120	1908

Sensor Data and Application (cont'd)

Outside Air Sensors

Outside Air Dry Bulb Sensor and Dewpoint or Enthalpy Permissive Control

The outside air sensor (**FIGURE 10A**) is the same as the discharge sensor. The Johnson A99 Series Temperature Sensor Chart above applies to both the discharge and outside air sensors.

If the application uses mixed air (return and outside air), the outside air temperature sensor and optional humidity transmitter (**FIGURE 10B**) must be mounted together to sense outdoor air conditions. On indoor units the sensor should be mounted near the inlet of the outdoor air duct. Verify that factory mounted positions provide acceptable performance.

FIGURE 10A - Outside Air Dry Bulb Sensor, P/N 206112



FIGURE 10B - Outside Air Relative Humidity Transmitter, Option DT5, P/N 206081



Sensor Accuracy and Outside Air Changeover Differential

Dry bulb sensor accuracy is within 1°F between 5° and 167°F. Outside air dewpoint is calculated based on a humidity transmitter **(FIGURE 10B)** input. Accuracy is rated as follows:

Humidity transmitter ± 3% RH for 20 to 80% RH at 77°F and ±5% RH for 10 to 20% and 80 to 90% RH at 77°F. The dewpoint calculation is within 1% error at sea level. Hysteresis and the rate of moisture change also have an impact on sensor accuracy. Prolonged periods of high humidity (above 95% RH) can affect sensor accuracy (the bias is towards a higher RH reading than actual). *The calculated outdoor dewpoint should be verified on an annual basis to ensure proper changeover operation.*

Wall-Mounted Sensor and Communication Wire Installation

Before connecting or disconnecting any wires, ensure that all power supplies have been switched off and all wires are potential-free to prevent equipment damage and avoid electric shock.

IMPORTANT: The FX06 control wiring control inputs are low-current, resistance-based signals. The control manufacturer recommends for optimum temperature control performance that the analog and digital inputs (space sensor, discharge air sensors, etc.) that are connected to the FX06 controller be routed to the unit in one of the following manners:

- In separate conduits, isolated from 24VAC controls and line voltage power to the unit.

OR

- If the FX06 wires are to be run in the same conduit as the 24VAC control wiring, the FX06 wiring must be completed using shielded cable and bundled separately from 24VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

Control Wiring

Wiring terminations in space sensor, Option CL67 (**FIGURE 7**), are made at the terminal blocks in the base of the module. Those terminal blocks will accept up to 1.5 mm^2 (AWG 16) wires. To access the terminals, remove the cover from the base of the module by inserting a pointed tool into the small hole at the center top of the cover. While pressing down gently, pry the cover away from the base. As the two parts separate, remove the tool and continue to pull the cover away from the base until the cover is free.

All wiring to the module is at extra low (safe) voltage and must be separated from line voltage wiring. All field-installed sensor wiring must be in shielded cable. Do not run wiring close to transformers or high frequency generating equipment such as a lighting ballast.

Complete and verify all wiring connections before applying power to the controller connected to the module. Under the lateral cover on the space sensor, service connector pins provide for serial connection if the optional serial card (N2Open or LON) is inserted in the FX06 controller and properly connected to the room command module pins 10, 11, and 12.

Physical Point List

When the FX06 controller is “on” and operational, the FX06 controller will operate the air handling equipment based upon the following physical points list and D12B, D12C, D12D, D12E, D12F, or D12G control sequence.

Controller Physical Points List						
Point Description	**AI**	**AO**	**BI**	**BO**	**Elec Component**	**Comment**
Occupied Override Switch (BI-1)			√		CL67 Push button	The wall-mounted temperature sensor with override push button.
Relative Humidity Switch (BI-2)			√		CL47 Humidistat	
On/Off Switch (BI-3)			√		External dry contact	Factory jumper wire installed
Occupied Switch (BI-4)			√		External dry contact	
Air Proving (BI-5)			√		Differential Pressure Switch	
Outdoor Air Humidity (AI-2)	√				Humidity Sensor	0-5V = 0-100% RH
Outdoor Air Temperature (AI-3)	√				A99 Thermistor	Resistance = –40 to 100°C
Discharge Air Temperature (AI-4)	√				A99 Thermistor	
Modulating Heat Control (AO-1)		√			Gas Valve / SCR Power Controller	Direct Acting Gas Valve/SCR Power Controller : Gas pressure/heat output increases with increase of signal voltage.
Reheat Start (AO-2)				√	Sensitive Relay converts AO to BO	10V = Activate relay to start reheat.
Fan Start/Stop (Damper) (BO-1)				√	Relay	OA Damper Interlock to Fan
1st Stage Heating (On/Off) (BO-2)				√	Relay	
2nd Stage Heating (On/Off) (BO-3)				√	Relay	
1st Stage Cooling (BO-4)				√	Relay	
2nd Stage Cooling (BO-5)				√	Relay	
3rd Stage Cooling (BO-6)				√	Relay	
NOTE: AI = Analog Input, AO = Analog Output, BI = Binary Input, BO = Binary Output.						

BAS Card Options

Pin	RS485
1	COM
2	RT-
3	RT+

Lon Card, Option BHB3, P/N 255375

The LON Serial Card is a plug-in card that allows the FX06 control to be connected to a LON network. The connection to the network is made by means of the 3 pins on the plug-in connector. .

The network cable must be laid along a low voltage cable path. It must be placed at least 12” (30 cm) from cables carrying high voltages or currents (>230V or >30A). If strong interference fields are expected, the cable must be located at the greatest distance possible from the source. The TP/FT-10 network is designed to support free topology wiring, and will accommodate bus, star, loop or any combination of these topologies. FTT-10A transceivers can be located at any point along the network wiring.

LON Network: Doubly-Terminated Bus Topology; Free topology (single terminator required).

Lon Card Network Variables:

LON View

Network Variables:

Name	Direction	SNVT Type	Unit of measure	COV apply to NVO	RCVHRTBT apply to NVI	Index	SISD
nviRequest	Input	92 - obj_request			False	0	@0|1
nvoStatus	Output	93 - obj_status		False		1	@0|2
nvoFileDirectory	Output	114 - address	#	False		2	@0|8
nviUnitEnable	Input	95 - switch			False	3	@1|1
nvoTempOccupiedStatus	Output	22 - lev_disc		False		4	@1|2
nvoSpaceTemp	Output	105 - temp_p	°F	False		5	@1|3
nvoDewPoint	Output	105 - temp_p	°F	False		6	@1|4
nvoEnthalpy	Output	51 - count_f	#	False		7	@1|5
nvoClgTimerStatus	Output	22 - lev_disc		False		8	@1|6
nvoRH_Status	Output	22 - lev_disc		False		9	@1|7
nvoTimeclockStatus	Output	22 - lev_disc		False		10	@1|8
nvoOA_Humidity	Output	81 - lev_percent	%	False		11	@1|9
nvoOA_Temperature	Output	105 - temp_p	°F	False		12	@1|10
nvoDA_Temperature	Output	105 - temp_p	°F	False		13	@1|11
nviUnitShutdown	Input	22 - lev_disc			False	14	@1|12
nvoWHSP	Output	105 - temp_p	°F	False		15	@1|13
nvoWCSP	Output	105 - temp_p	°F	False		16	@1|14
nvoRm_Clg_SP	Output	105 - temp_p	°F	False		17	@1|15
nvoRm_Htg_SP	Output	105 - temp_p	°F	False		18	@1|16
nvoRoomHumiditySwitch	Output	22 - lev_disc		False		19	@1|17
nvoOn_OffInputSwitch	Output	22 - lev_disc		False		20	@1|18
nvoOcc_UnoccSwitch	Output	22 - lev_disc		False		21	@1|19
nvoAirProvingSwitch	Output	22 - lev_disc		False		22	@1|20
nvoFan_DamperStatus	Output	22 - lev_disc		False		23	@1|21
nvoHtgStg1Status	Output	22 - lev_disc		False		24	@1|22
nvoHtgStg2Status	Output	22 - lev_disc		False		25	@1|23
nvoClgStg1Status	Output	22 - lev_disc		False		26	@1|24
nvoClgStg2Status	Output	22 - lev_disc		False		27	@1|25
nvoSpaceClgSetpt	Output	105 - temp_p	°F	False		28	@1|26
nviUnitOccupied	Input	95 - switch			False	29	@1|27
nvoHtgOutput	Output	81 - lev_percent	%	False		30	@1|28
nviOA_Hum_Sim	Input	81 - lev_percent	%		False	31	@1|29
nviOA_Temp_Sim	Input	105 - temp_p	°F		False	32	@1|30
nvoClgStg3Status	Output	22 - lev_disc		False		33	@1|31
nviSpaceTemp	Input	105 - temp_p	°F		False	34	@1|32
nviDischargeTemp	Input	105 - temp_p	°F		False	35	@1|33
nviAirflowSwitch	Input	95 - switch			False	36	@1|34
nvofiltered_dat	Output	105 - temp_p	°F	False		37	@1|35

Configuration Parameters:

Name	Default value	SNVT Type	Unit of measure	Index	SISD
cpSendHeartBeat	30	107 - time_sec	s	0	0,,0\x80,49,2,1
cpOccOvrdTimeMn	60	123 - time_min	min	1	1,1,6\x80,1,2,1
cpHSPOffset	2.8	147 - temp_diff_p	°F [dif]	2	1,1,6\x80,2,2,1
cpDaHtgDb	0	147 - temp_diff_p	°F [dif]	3	1,1,6\x80,3,2,1
cpNightSetup	5	147 - temp_diff_p	°F [dif]	4	1,1,6\x80,4,2,1
cpNightSetback	-5	147 - temp_diff_p	°F [dif]	5	1,1,6\x80,5,2,1
cpZoneClgPb	1	147 - temp_diff_p	°F [dif]	6	1,1,6\x80,6,2,1
cpZoneHtgPb	1	147 - temp_diff_p	°F [dif]	7	1,1,6\x80,7,2,1
cpOaHtgLow	-1.1	105 - temp_p	°F	8	1,1,6\x80,8,2,1
cpOaHtgHigh	15.56	105 - temp_p	°F	9	1,1,6\x80,9,2,1
cpOaClgLow	-6.67	105 - temp_p	°F	10	1,1,6\x80,10,2,1
cpOaClgHigh	15.56	105 - temp_p	°F	11	1,1,6\x80,11,2,1
cpRmDaClgSp	12.8	105 - temp_p	°F	12	1,1,6\x80,12,2,1
cpDAClgHigh	21.1	105 - temp_p	°F	13	1,1,6\x80,13,2,1
cpDaClgLow	32.2	105 - temp_p	°F	14	1,1,6\x80,14,2,1
cpDaHtgLow	21.1	105 - temp_p	°F	15	1,1,6\x80,15,2,1
cpDaHtgHigh	10	105 - temp_p	°F	16	1,1,6\x80,16,2,1
cpCalcBtu	7.68	51 - count_f	#	17	1,1,6\x80,17,4,1
cpClgOaSetpt	20	105 - temp_p	°F	18	1,1,6\x80,18,2,1
cpReheatDpSetpt	15.56	105 - temp_p	°F	19	1,1,6\x80,19,2,1
cpHtgOaSetpt	16.67	105 - temp_p	°F	20	1,1,6\x80,20,2,1
cpReheatSetptLoLow	18.33	105 - temp_p	°F	21	1,1,6\x80,21,2,1
cpReheatSetptHiLow	48.9	105 - temp_p	°F	22	1,1,6\x80,22,2,1
cpEnthalpySp	29	51 - count_f	#	23	1,1,6\x80,23,4,1
cpEnthalpy2Diff	5	51 - count_f	#	24	1,1,6\x80,24,4,1
cpEnthalpy3Diff	5	51 - count_f	#	25	1,1,6\x80,25,4,1
cpRhtSpOffset	0	147 - temp_diff_p	°F [dif]	26	1,1,6\x80,26,2,1
cpLowLimSetpt	2.2	105 - temp_p	°F	27	1,1,6\x80,27,2,1
cpDaPropBand	22.2	147 - temp_diff_p	°F [dif]	28	1,1,6\x80,28,2,1
cpDaDeadBand	1.1	147 - temp_diff_p	°F [dif]	29	1,1,6\x80,29,2,1
cpDaIntTime	40	107 - time_sec	s	30	1,1,6\x80,30,2,1
cpDaLowSatTime	40	107 - time_sec	s	50	1,1,6\x80,31,2,1
cpDaHighLimit	70	81 - lev_percent	%	31	1,1,6\x80,32,2,1
cpDaLowLimit	25	81 - lev_percent	%	32	1,1,6\x80,33,2,1
cpDaClgPropBand	5.6	147 - temp_diff_p	°F [dif]	33	1,1,6\x80,34,2,1
cpClgLowLimSp	9.44	105 - temp_p	°F	34	1,1,6\x80,35,2,1
cpClgBoost	-1.67	147 - temp_diff_p	°F [dif]	35	1,1,6\x80,36,2,1
cpHtgBoost	2.2	147 - temp_diff_p	°F [dif]	36	1,1,6\x80,37,2,1
cpRmDaHtgSp	26.67	105 - temp_p	°F	37	1,1,6\x80,38,2,1
cpWrmupTmMin	15	123 - time_min	min	38	1,1,6\x80,39,2,1
cpAlarmReset	0, LOG_OFF	10149 - UNVT_logic		39	1,1,6\x80,40,1,1
cpnciOnOffSched	-	40060 - UNVT_OnOffSched		40	1,1,6\x80,41,126,1
cpSpaceSetptHighLimit	25.56	105 - temp_p	°F	41	1,1,6\x80,42,2,1
cpSpaceSetptLowLimit	22.2	105 - temp_p	°F	42	1,1,6\x80,43,2,1
cpHum_Hi_Range	5	51 - count_f	#	43	1,1,6\x80,44,4,1
cpHtgIntStgDelay	8	107 - time_sec	s	44	1,1,6\x80,45,2,1
cpDaClgLowSatTime	60	107 - time_sec	s	45	1,1,6\x80,46,2,1
cpClgIntStgDelay	120	107 - time_sec	s	46	1,1,6\x80,47,2,1
cphtg_pid_ffset	50	81 - lev_percent	%	47	1,1,6\x80,48,2,1
cpHtgIntStgDelayTmr1	0	107 - time_sec	s	48	1,1,6\x80,49,2,1
cpDAHighSatTime	3	107 - time_sec	s	49	1,1,6\x80,50,2,1

N2 Open Card, Option BHB2, P/N 222054

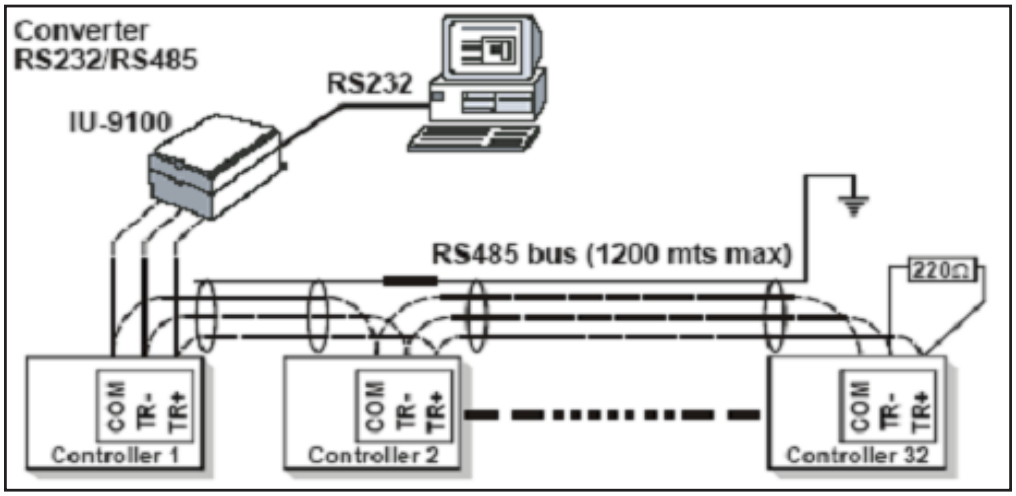
The N2Open serial card is a plug-in, optional card that allows the controllers of the FX06 line to be connected in an N2Open serial network through the RS485 standard. The connection to the network is made by means of 3 pins on the plug-in connector.

The network cable must be laid along a low voltage cable path. It must be placed at least at 12" (30 cm) from cables carrying high voltages or currents (>230V or >30A). If strong interference fields are expected, the cable must be located at the greatest distance possible from the source. The communication line must be laid out on the multi-drop line principle, i.e. from one controller to the next until the last controller has been connected. The line must be terminated at both ends with a 220 Ohm resistor between RT+ and RT-.

RS485 line: maximum length without repeater: 3937 ft (1200 M), AWG26 twisted pair with shield.

RS232C line: maximum length: 33 ft (10 m)

Devices: maximum of 32 per 3937 ft (1200 m) bus segment



N2 Network Points List

Points List Notes:

*When applied with N2open systems, the BD points are multistage and mapped as an Msi point.

Room Discharge air heating setpoint = Supply air temperature to offset heating losses in the space

Room Discharge Air Cooling Setpoint = Supply air temperature to offset heat gains in the space

Duct Discharge Air Cooling Setpoint = Supply air value when there is no call for cooling from the space (typically equals the space temperature)

Duct Discharge Air Heating Setpoint = Supply air value when there is no call for heat from the space (typically equals the space temperature)

N2Open View

Point Type	Point Address	Direction	Long name	Short name	Default value	Unit of measure
ADF	1	Input	Unit Enable Value	UNITENA-V	-	%
ADF	2	Output	Room Temperature	RM-T	-	°F
ADF	3	Output	OA Dewpoint Temp	OADEWPT-T	-	°F
ADF	4	Output	OA Enthalpy	OA-E	-	#
ADF	5	Output	OA Humidity	OA-H	-	%
ADF	6	Output	Outside Air Temp	OA-T	-	°F
ADF	7	Output	Discharge Air Temp	DA-T	-	°F
ADF	8	Output	Working Htg Sp	WRKHTG-SP	-	°F
ADF	9	Output	Working Clg Sp	WRKCLG-SP	-	°F
ADF	10	Output	Room Clg Sp	RMCLG-SP	-	°F
ADF	11	Output	Room Htg Sp	RMHTG-SP	-	°F
ADF	12	Input	Room Temp Offset	RMT-OS	-1.0	°F [dif]
ADF	13	Input	Disch Air Temp Offset	DAT-OS	-1.0	°F [dif]
ADF	14	Input	Room Htg Sp Offset	RMHTGSPOS	5.0	°F [dif]
ADF	16	Input	Night Setup Sp	SETUP-SP	9.0	°F [dif]
ADF	17	Input	Night Setback Sp	SETBACK-SP	-9.0	°F [dif]
ADF	18	Input	Room Clg PB	RMCLGPB	1.8	°F [dif]
ADF	19	Input	Room Htg PB	RMHTGPB	1.8	°F [dif]
ADF	20	Input	OA Htg Low Sp	OAHTGLWSP	30.0	°F
ADF	21	Input	OA Htg High Sp	OAHTGHISP	60.0	°F
ADF	22	Input	OA Clg Low Sp	OACLGLWSP	20.0	°F
ADF	23	Input	OA Clg High Sp	OACLGHISP	60.0	°F
ADF	24	Input	RM DA Clg Sp	RMDACLGSP	55.0	°F
ADF	25	Input	DA Clg High Sp	DACLGHISP	70.0	°F
ADF	26	Input	DA Clg Low Sp	DACLGLOW	90.0	°F
ADF	27	Input	DA Htg Low Sp	DAHTGLWSP	70.0	°F
ADF	28	Input	DA Htg High Sp	DAHTGHISP	50.0	°F
ADF	29	Input	OA Clg Sp	OACLGSP	68.0	°F
ADF	30	Input	Reheat Dewpoint Sp	RHDP-SP	60.0	°F
ADF	31	Input	OA Htg Sp	OAHTGSP	62.0	°F

Point Type	Point Address	Direction	Long name	Short name	Default value	Unit of measure
ADF	32	Input	Reheat Sp Low LO	PRHTSPLW	65.0	°F
ADF	33	Input	Reheat Sp High LO	RHTSPHIGH	120.0	°F
ADF	34	Input	Enthalpy Sp 1	ENTHLPY1	29.000000	#
ADF	35	Input	Enthalpy SP 2 Diff	ENTHLPY2D	5.000000	#
ADF	36	Input	Enthalpy Sp 3 Diff	ENTHLPY3D	5.000000	#
ADF	37	Input	Reheat Sp Offset	RHTSP-OS	0.0	°F [dif]
ADF	38	Input	DAT Low Limit Sp	DATLLSP	36.0	°F
ADF	39	Input	DAT Htg PB	DATHTGPB	40.0	°F [dif]
ADF	40	Input	Da_Htg_DB	DATHTGDB	2.0	°F [dif]
ADF	41	Input	DA Htg Iterm	DATHTGIT	40.0	s
ADF	42	Input	DA Htg Low SAT Time	DATLWSAT	40.0	s
ADF	43	Input	DA Htg High Limit	DAHTGHL	70.00	%
ADF	44	Input	DA Htg Low Limit	DAHTGLL	25.00	%
ADF	45	Input	DA Clg PB	DATCLGPB	10.1	°F [dif]
ADF	46	Input	Clg Low Lim Sp	CLGLOWLM	49.0	°F
ADF	47	Input	Clg Boost Sp	CLGBST-SP	-3.0	°F [dif]
ADF	48	Input	Htg Boost Sp	HTGBST-SP	4.0	°F [dif]
ADF	49	Input	RM DA Htg Sp	RMDAHTGSP	80.0	°F
ADF	50	Output	Space Clg Setpt	RMCLGSP	-	°F
ADF	51	Input	Space Setpt High Limit	SSPHL	78.0	°F
ADF	52	Input	Space Setpt Low Limit	SSPLL	72.0	°F
ADF	53	Input	Unit Occupied Value	UNITOCC-V	-	%
ADF	54	Output	Htg Output	HTG-OUT	-	%
ADF	55	Input	Hum_Hi_Range	PHM_H_RN	5.000000	#
ADF	56	Input	nviSpaceTemp	ISPCTSpa	-	°F
ADF	57	Input	HtgIntStgDelay	PHTGNTST	8.0	s
ADF	58	Input	DaClgLowSatTime	PDCLGLWS	60.0	s
ADF	59	Input	ClgIntStgDelay	PCLGNTST	120.0	s
ADF	63	Input	da_filter_timer	ID_FLTR_	0.0	s
ADF	15	Input	Space_Htg_DB	PDaHtgDb	0.0	°F [dif]
ADF	60	Input	HtgIntStgDelayTmr1	PHADF_60	0.0	s
ADF	61	Input	htg_pid_ffset	PHTG_PD_	50.00	%
ADF	62	Input	DAHighSatTime	PDHGHSTT	3.0	s
ADF	68	Input	htg_purg_tmr	PHTG_PRG	80.0	s
ADI	1	Input	Occ Ovr Time	OCCOVR-T	60	min
ADI	2	Input	Htg Warmup Time	HTGWARMUP	15	min
BD	1	Input	Unit Enable State	UNITENA-ST	-	
BD	2	Output	Temp Occupied	TEMP-OCC	-	
BD	3	Output	Clg Timer	CLG-TIMER	-	
BD	4	Output	Reheat Pump Output	RH-STATUS	-	
BD	5	Output	Timeclock Status	TIMECLOCK	-	
BD	6	Input	Unit Shutdown	UNITSHUTDN	-	
BD	7	Output	Htg-Clg State	HTGCLG-ST	-	
BD	8	Output	Room State	RM-STATE	-	
BD	9	Output	Occupied Status	OCCD-S	-	
BD	10	Output	Room Humidity Switch	RMHUM-SW	-	
BD	11	Output	On_Off Input Switch	ONOFF-S	-	
BD	12	Output	Occ_Unocc Switch	OCCD-SW	-	
BD	13	Output	Air Proving Switch	AIRPRV-S	-	
BD	14	Output	Fan Damper Status	FANDMP-S	-	
BD	15	Output	Htg Stage 1 Status	HTGSTG1-S	-	
BD	16	Output	Htg Stage 2 Status	HTGSTG2-S	-	
BD	17	Output	Clg Stage 1 Status	CLGSTG1-S	-	
BD	18	Output	Clg Stage 2 Status	CLGSTG2-S	-	
BD	19	Input	Test Start	TSTSTART	0, LOG_OFF	
BD	20	Input	Test Kill	TSTKILL	0, LOG_OFF	
BD	21	Input	Test Extend	TSTXTND	0, LOG_OFF	
BD	22	Input	Manual Jump	MANJUMP	0, LOG_OFF	
BD	23	Input	UnOcc Reheat Enable	UNCRHTENA	1, LOG_ON	
BD	24	Input	Alarm Reset	ALMRESET	0, LOG_OFF	
BD	25	Input	No Modulating Heat	NOMODHEAT	0, LOG_OFF	
BD	26	Input	Heat Polarity	HEATACT	0, Direct	
BD	27	Input	Unit Occupied State	UNITOCC-ST	-	
BD	28	Output	ClgStage3Status	CLGSTG3	-	

WORKSHEET

Display	Parameter	Range	Default Value by Option						Field Value
			D12B	D12C	D12D	D12E	D12F	D12G	
MENU 02 - Temperature Setpoints									
SSPHI	The maximum value that the space setpoint dial can be set	55° to 90°F	78°F	78°F	78°F	78°F	78°F	78°F	
SSPLO	The minimum value that the space setpoint dial can be set	55° to 90°F	72°F	72°F	72°F	72°F	72°F	72°F	
HSO	**Space Heating Setpoint Offset**	1° to 30°F	5°F	5°F	5°F	5°F	5°F	5°F	
DP1	**Reheat Enabled Setpoint – Ambient Dewpoint**	52° to 80°F	60°F	60°F	60°F	60°F	60°F	60°F	
DCH	**Standard Cooling (Neutral) Discharge Air Temperature Setpoint (Primary Setpoint)**	50° to 115°F	70° F	70° F	70° F	70° F	70° F	70° F	
DHL	**Standard (Neutral) Heating Discharge Air Temperature Setpoint (Primary Setpoint)**.	50° to 115°F	70° F	70° F	70° F	70° F	70° F	70° F	
RCP	**Room (space) Discharge Air Cooling Temperature Setpoint**	49° to 115°F	55°F	55°F	55°F	55°F	55°F	55°F	
RHP	**Room Discharge Air Temperature Heating Setpoint**	45° to 120°F	80°F	80°F	80°F	80°F	80°F	80°F	
MENU 03 - OA Reset Schedule									
DCL	**Outside Air Reset Option**	49° to 115°F	90°F	90°F	90°F	90°F	90°F	90°F	
DCH	**Standard (Neutral) Cooling Discharge Air Temperature Setpoint (Primary Setpoint)**.	50° to 115°F	70°F	70°F	70°F	70°F	70°F	70°F	
DHL	**Standard (Neutral) Heating Discharge Air Temperature Setpoint (Primary Setpoint)**	50° to 115°F	70°F	70°F	70°F	70°F	70°F	70°F	
DHH	**Outdoor Reset Option – Duct Discharge Air Temperature Heating Setpoint**	45° to 120°F	50°F	50°F	50°F	50°F	50°F	50°F	
OH2	**Outdoor Reset Dry Bulb Heating – High Setting**	20° to 70ºF	60°F	60°F	60°F	60°F	60°F	60°F	
OH3	**Outdoor Reset Dry Bulb Heating – Low Setting**	-45° to 65ºF	30°F	30°F	30°F	30°F	30°F	30°F	
OC2	**Outdoor Reset Dry Bulb Cooling – High Setting**	20° to 70°F	60°F	60°F	60°F	60°F	60°F	60°F	
OC3	**Outdoor Reset Dry Bulb Cooling – Low Setting**	-40° to 65°F	20°F	20°F	20°F	20°F	20°F	20°F	
MENU 04 - Commissioning Parameters									
SCP	**Space Cooling Proportional Band**	1° to 8°F	1.8°F	1.8°F	1.8°F	1.8°F	1.8°F	1.8°F	
SHP	**Space Heating Proportional Band**	1° to 8°F	1.8°F	1.8°F	1.8°F	1.8°F	1.8°F	1.8°F	
CPP	**CPP - Cooling Discharge Air Prop Band**	2° to 40°F	10°F	10°F	10°F	10°F	10°F	10°F	
HPP	**Heating Discharge Air Proportional Band**	4° to 30°F	4°F	5°F	20°F	5°F	5°F	4°F	
ICT	**Heating Integration Constant**	0 to 999 seconds	40	1	40	0	1	40	
HDB	**Space Heating Dead Band**	0° to 9°F	2°F	0°F	2°F	0°F	0°F	2°F	
EN1	**1st Stage Enthalpy Cooling Reference Lockout**	15 to 40	29°F	29°F	29°F	29°F	29°F	29°F	
EN2	**2nd Stage Enthalpy Cooling Lockout**	0 to 20	5°F	5°F	5°F	5°F	5°F	5°F	
EN3	**3rd Stage Enthalpy Cooling Lockout**	0 to 20	5°F	5°F	5°F	5°F	5°F	5°F	
NSU	**Night Setup - Cooling**	0° to 35°F	9°F	9°F	9°F	9°F	9°F	9°F	
NSB	**Night Set Back – Heating**	-35° to 0°F	-9°F	-9°F	-9°F	-9°F	-9°F	-9°F	
RCP	**Room (space) Discharge Air Cooling Temperature Setpoint**	49° to 115°F	55°F	55°F	55°F	55°F	55°F	55°F	
RHP	**Reheat Enabled or Disabled during Unoccupied Mode**	45° to 120°F	80°F	80°F	80°F	80°F	80°F	80°F	
RSP	**Reheat Setpoint Offset**	0° to 30°F	0°F	0°F	0°F	0°F	0°F	0°F	
UOT	**Temporary Occupied Button Timer**	0 to 240 minutes	60	60	60	60	60	60	

Display	Parameter	Range	Default Value by Option						Field Value
			D12B	D12C	D12D	D12E	D12F	D12G	
MENU 04 (cont'd) - Commissioning Parameters									
HHR	**Humidity High Range**	0 to 10	5	5	5	5	5	5	
HTGINTSTG DELAY	**Heating Interstage Delay**	30 to 300 seconds	8	120	8	8	120	8	
CLGINTSTG DELAY	**Cooling Interstage Delay**	30 to 300 seconds	120	120	120	120	120	120	
MIN CLG ON TIME	**Minimum Cooling Stage Time**	0 to 5 minutes	1	1	1	1	1	1	
MENU 05 - Calibration Page (DO NOT change these default values unless advised by the factory.)									
RMTO	**Space Temperature Sensor Calibration**		0	0	0	0	0	0	
DAO	**Discharge Air Temperature Sensor Calibration**		-1	-1	-1	-1	-1	-1	

Display	Parameter	Range	Default Value by Option						Field Value
			D12B	D12C	D12D	D12E	D12F	D12G	
MENU 06 - Controller Set-up									
Unit of Measure	°F or °C	-	°F	°F	°F	°F	°F	°F	
N2 Address	Network Communication Address	0 to 999	255	255	255	255	255	255	
Year	4 digit Year code	-	-	-	-	-	-	-	
Month	2 Digit Month code	01 to 12	-	-	-	-	-	-	
Day of Month	2 digit day code	01 to 31	-	-	-	-	-	-	
Hour	24 hour time code	01 to 24	-	-	-	-	-	-	
Minute	Standard Minute code	01 to 60	-	-	-	-	-	-	
HTG POLARITY	Setting the Parameter allows the 0-100% analog heating output to be direct acting or reverse acting. The default setting is direct acting.	DIR or REV	Direct Acting	Direct Acting	Direct Acting	Direct Acting	Direct Acting	Direct Acting	
HTGOUTLOWLIMIT	Low limit for the heating output. This value should not be changed.	0 to 30	20	20	20	20	20	20	
HTGOUTHIGHLIMIT	High limit for the heating output. This variable should only be changed on a Model PEH or REH.	60 to 100	70	100	100	100	100	70	

NOTES

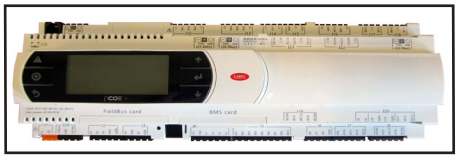
Applies to: **Preeva , MAPS, MAPS II, RPB, RPBL & SSCBL Series**
For Air Handler System Control Options D19, D21 & D22

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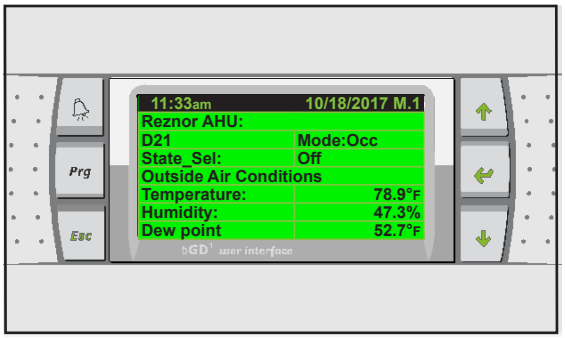
1.0 Digital Controller



The control system utilizes a factory installed remote display which allows for complete access to unit test features, schedules, discharge air setpoints, fan control, alarms, and other unit operational setpoints. The control 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
- Optional wall mounted or handheld remote display
- Energy conscious applications
- TAB menu for creating a backup of setpoints

1.1 Display Function Keys



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	↑	↵	↓

1.2 Thermostat Display

User Space Mounted Thermostat, Option CL78

NOTE: Optional with D19 & D21
Not available with D22

The user display shall show space temperature, space humidity, unit status, and time in its normal state.



Mode Button: When pressed will allow a State Selection of Heat, Cool or Auto



Fan Button: When pressed will initiate the temporary occupied period.

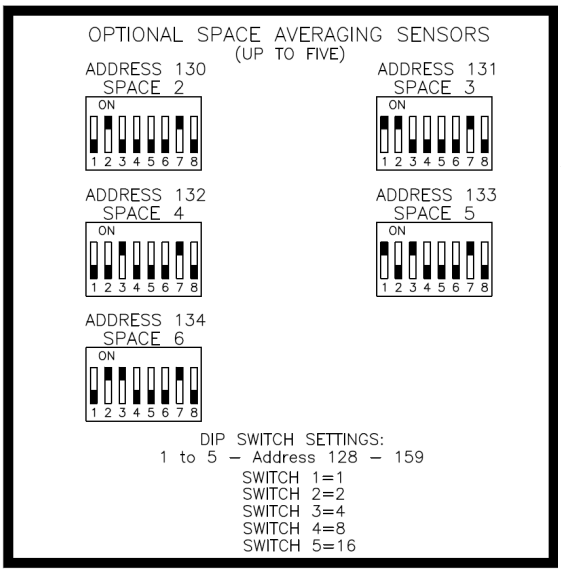
On / Off Button: When pressed while the unit is in the Heat, Cool, or Auto State, will set the unit State to OFF. When Pressed while the unit is in the Off State, will set the Unit State to the previous Heat, Cool or Auto State.

Set Point Adjustment Dial: For temperature adjustments, press inward on the dial once and turn the dial clockwise to increase and counterclockwise to decrease the desired temperature setpoint. For humidity setpoint adjustments, press the dial inward twice and turn the dial clockwise to increase and counterclockwise to decrease the desired humidity setpoint.

Optional Space Temperature and Humidity Averaging Feature:
Up to 5 space sensors may be added to the control system in addition to the CL78 for a total of 6 space inputs. These devices are combination temperature and humidity sensors and operate on a RS-485 communication trunk.



Note: Refer to the Installation manual and or unit wiring drawings for specific wiring information.



Space Averaging Sensor Addressable Dip Switch Settings: User must set the addresses accordingly in the field.

1.3 Controller hardware input – output points

Input Terminal	Input Point Name	Input Description	Signal type	Signal Range	Always Active
J26	Spc_Temp	Space Temp - up to a total of 6 inputs	RS-485		
FB2	Spc_Humidity	Space Humidity - up to a total of 6 inputs	Communication		
U1	OA_Hum_Raw	Outside Air Humidity	0 -10 Vdc	0 to 100% RH	x
U2	OA_Temp_Raw	Outside Air Temp	Thermistor 10K-2	-35 °F to 240 °F (-37°C to 115°C)	x
U3	DA_Temp	Discharge Air Temp	Thermistor 10K-2	-35 °F to 240 °F (-37°C to 115°C)	x
U4	CC_Temp	Cooling Coil Discharge Air Temp	Thermistor 10K-2	-35 °F to 240 °F (-37°C to 115°C)	
U5	MA_Temp	Mixed Air Temp	Thermistor 10K-2	-35 °F to 240 °F (-37°C to 115°C)	
U6	Bldg_Pressure	Building Static Pressure	0 - 10 Vdc	-0.5” iwc thru + 0.5”iwc	
U7	Duct_Pressure	Duct Static Pressure	0 - 10 Vdc	0 - 2.5” iwc	
U8	Spc_CO2	Space CO2	0 - 10 Vdc	0 - 2,000 rpm	
ID1	SF_Sts	Supply Fan Status	Dry Contact	Open = “OFF” / Close = “ON”	x
ID2	Filter_Sts	Main or ERV Dirty Filter Status	Dry Contact	Open = “OFF” / Close = “ON”	
ID3	Safety_Sts	Safety Input Status	Dry Contact	Open = “ALARM” / Close = “NORMAL”	x
ID4	Ext_OCC	Occupied Mode Input	Dry Contact	Open = “OFF” / Close = “ON”	
ID5	Ext_Call_Fan	External Fan Call Input (G)	Dry Contact	Open = “OFF” / Close = “ON”	
ID6	Ext_Call_Heat	External Heat Call Input (W1)	Dry Contact	Open = “OFF” / Close = “ON”	
ID7	Ext_Call_Cool	External Cool Call Input (Y1)	Dry Contact	Open = “OFF” / Close = “ON”	
ID8	Ext_Call_Dh	External Dehum Call Input	Dry Contact	Open = “OFF” / Close = “ON”	
ID9	Ext_ Switch_1	External Damper Position Sw 1	Dry Contact	Open = “OFF” / Close = “ON”	
ID10	Ext_ Switch_2	External Damper Position Sw 2	Dry Contact	Open = “OFF” / Close = “ON”	
ID11	Phase_Alarm	Phase Protection Alarm	Dry Contact	Open = “OFF” / Close = “ON”	

Output Terminal	Output Point Name	Output Description	Signal / Range	Signal Range	Always Enabled
Y1	Damper_Cmd	Damper Output Command	0 – 10Vdc	0 – 100% Open	
Y2	SF_VFD_Cmd	Supply Fan VFD Command	0 – 10Vdc	0 – 100% Flow	
Y3	HX_Mod_Cmd	Gas Heating Modulation Command (AG40)	0 – 10Vdc	0 – 100% Capacity	
		Gas Heating Modulation Command (AG58)	2 – 10Vdc	0 – 100% Capacity	
		Electric Heating Modulation Command	0 – 10Vdc	0 – 100% Capacity	
Y4	RH_Mod_Cmd	Reheat Modulation Command	0 - 10 Vdc	0 – 100% Capacity	
NO1	SF_Cmd	Supply Fan Command	24Vac Contact	Open = “OFF” / Close = “ON”	x
NO2	Comp_Stg1_Cmd	Compressor Stage 1 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO3	Comp_Stg2_Cmd	Compressor Stage 2 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO4	Comp_Stg3_Cmd	Compressor Stage 3 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO5	Alm_Rly_Cmd	Unit General Alarm Relay Command	24Vac Contact	Open = “OFF” / Close = “ON”	x
NO6	HX_Stg1_Cmd	Heating Stage 1 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO7	HX_Stg2_Cmd	Heating Stage 2 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO8	HX_Stg3_Cmd	Heating Stage 3 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO9	HX_Stg4_Cmd	Heating Stage 4 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO10	HX_Stg5_Cmd	Heating Stage 5 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO11	HX_Stg6_Cmd	Heating Stage 6 Command	24Vac Contact	Open = “OFF” / Close = “ON”	
NO12	RH_Cmd	Reheat Compressor Command	24Vac Contact	Open = “OFF” / Close = “ON	
NO13	EVAP_Stg1_Cmd	Evap Cooling Command	24Vac Contact	Open = “OFF” / Close = “ON	

2.0 D19 Sequence of Operation

The control system operates the supply fan, dampers, DX cooling, and gas/electric heat to maintain a set of discharge air temperature control setpoints.

The unit discharge air temperatures fall within the following three categories:

1. Unit supplies Neutral air temperature that does not affect space conditions.
2. Unit supplies Cold air temperature to provide space cooling.
3. Unit supplies Hot air temperature to provide space heating.

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

2.1 D19 Conventional Input States of Operation

The unit operates in the following states of operation:

1. **Enable ON**

   The unit is permitted to operate based upon the automatic control system. The unit will only switch to the Enable ON state when the state is manually selected through the user interface device, unit display, or building automation network communication point.

2. **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 will only switch to the OFF state when the state is manually selected through the user interface device, unit display, or building automation network communication point.

   Mechanical System Selections are only permitted in the Enable OFF State.

3. **Enable OFF / Alarm**

   The Enable OFF / Alarm state can only occur from a sequence “failure”. The unit will stop all mechanical operation until the “failure” condition(s) are resolved. Upon resolving the failure, the unit will return to its externally commanded condition. Alarms can also be cleared by resetting power to the unit.

2.2 D19 Conventional Input Modes of Operation

Occupied & Unoccupied

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

1. Internal Time Clock Schedule Selects Occupied or Unoccupied Mode.
2. Physical input point (ID4) (Contact closed = Occupied)
3. Building Automation Command (Option BHB8 Required).

2.3 D19 Conventional Input Descriptions

The unit is capable of running via either conventional thermostat inputs or conventional based BMS input points. **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 will follow the occupied mode sequences. When the dampers will operate in the unoccupied mode sequences. (See the damper control section, (Paragraph 6.2 Pg 14 for specific details.)

2. **Fan Call - Fan Contacts (ID5) or BMS Input**

   The unit supply fan will be on whenever the supply fan call is on.

   The fan will also automatically start whenever the heating, cooling or dehumidification calls are on, otherwise the fan will be OFF. The auto sequence will be 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**

   Whenever the heating call is on, the supply fan will start and the heating sequence will be enabled. Mechanical heat will operate to maintain the following heating discharge air temperature setpoint.

Unit Discharge Setpoints					
#	**State**	**Discharge Air Control**	**Variable**	**Default Setpoint**	**Setpoint Range**
1	Heating Contacts	Space Heating Air Temperature	DA_SpcHtg_SP	90°F (32°C)	50 -140°F (10 - 60°C)

4. Cooling Call - Cooling Contacts (ID7) or BMS Input

Whenever the cooling call is on, the supply fan will start. The mechanical cooling will operate to maintain the cooling unit discharge air temperature setpoint.

Unit Discharge Setpoints					
#	State	Discharge Air Control	Variable	Default Septoint	Range
1	Cooling Contacts	Space Cooling Air Temperature	DA_SpcClg_SP	55°F (12°C)	50 -100°F (10 - 37°C)

5. Dehumidification Call - Dehumidification Contacts (ID8) or BMS Input

Whenever the dehumidification call is on and the cooling and heating contacts are open, the supply fan will start and the unit reheat system will be active.

6. Auto Sequence

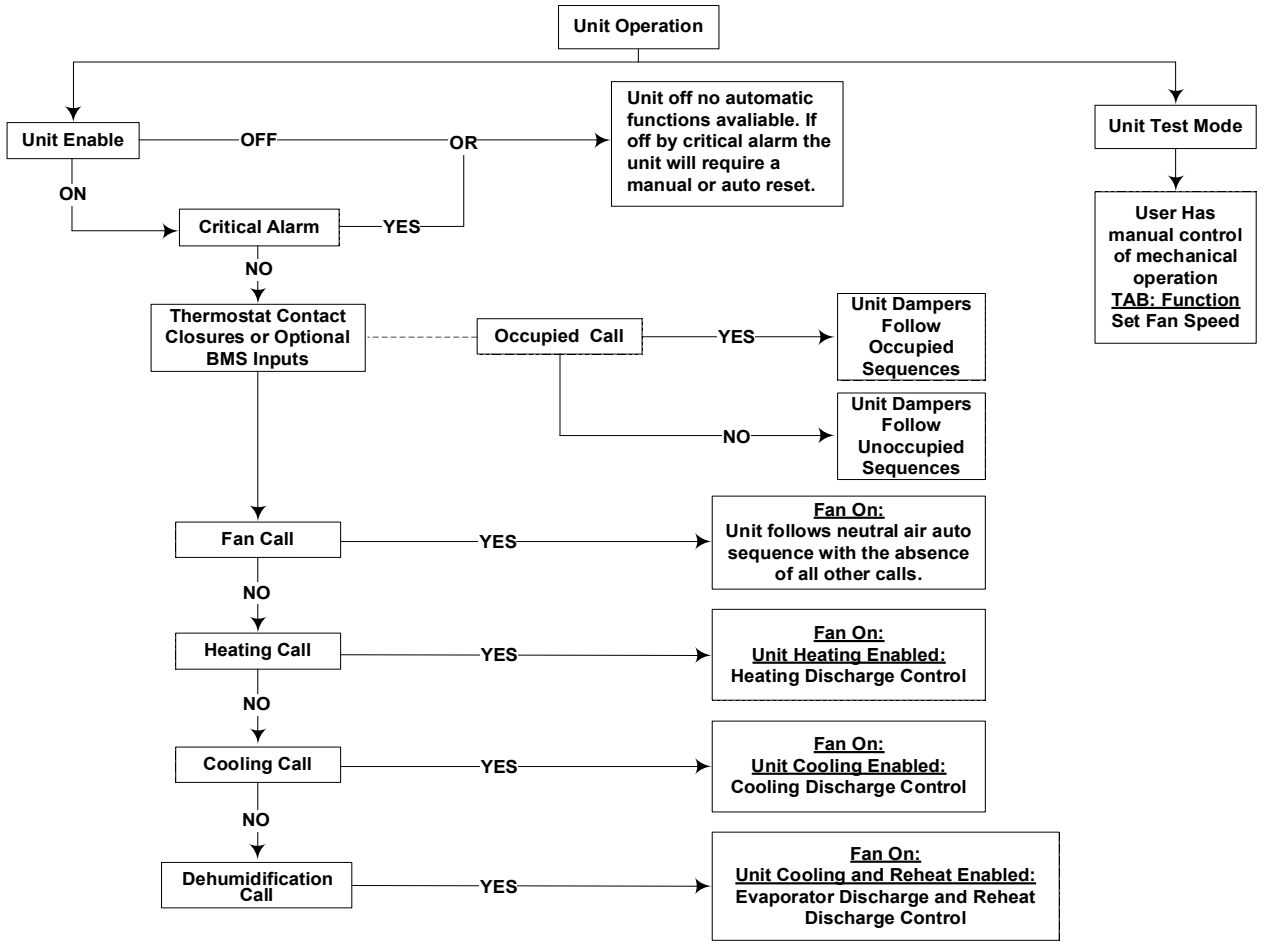
When the fan call is on and the mechanical cooling, heating and dehumidification calls are off, the unit will operate in the auto sequence.

The unit will operate to maintain one of the following discharge air temperature setpoints based on the outside air temperature.

If both heating and cooling calls are on, the unit will not turn on any mechanical system until the condition is removed.

Unit Discharge Setpoints						
#	State	OAT Allowed	Discharge Air Control	Variable	Default Septoint	Range
1	Auto Sequence Cool	OAT > 65F	Neutral Air Temperature	DA_NAClg_SP	70°F (21°C)	50 -100°F (10 - 37°C)
2	Auto Sequence Heat	OAT < 65F	Neutral Air Temperature	DA_NAHtg_SP	70°F (21°C)	50 -140°F (20 - 60°C)

D19 Conventional Thermostat / Conventional BMS Input Sequence Block Diagram



3.0 D19 CL78 Space Sensor Sequence of Operation

The control system operates the supply fan, dampers, DX cooling, and gas or electric heat to maintain a set of discharge air temperature control setpoints.

The unit discharge air temperatures fall within the following three categories:

1. Unit supplies neutral temperature air that does not affect space conditions.
2. Unit supplies cold temperature air to provide space cooling.
3. Unit supplies hot temperature air to provide space heating.

If the space temperature sensor option CL78 fails, the logic will ignore the space requirements and operate to maintain neutral air temperature and neutral air dehumidification control. Heating applies only when a unit is ordered with a gas or electric heat section.

3.1 D19 CL78 Space Sensor States of Operation

The sequence is broken into five primary states of operation. The unit state is the primary determination of individual component function. The unit can switch between states based on the following:

- Controller Display
- th-tune Space Control Device (Option CL78)
- Building Automation Command (Option BHB8 required)
- Automatically based upon sequence of operation.

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 will only switch to the OFF state when the state is manually selected through the th-tune device (Option CL78), unit display, or building automation network communication point. Upon initial power, Unit OFF is the default state.

2. Off / Alarm

The Off / Alarm state can only occur from a sequence “failure”. The unit will switch to this state from the heating, cooling, or auto state. The unit will stop all mechanical operation until the “failure” condition(s) are resolved. The unit will be OFF. Upon resolving the failure, the unit will return to heating, cooling, or auto state. Alarms can also be cleared by resetting power to the unit.

3. Heat

From the th-tune device (Option CL78), controller display, or BMS, the heat state can be selected. The supply fan will run and the mechanical heating and the dampers will be operated to maintain heating sequence of operation. The unit will not automatically switch to other states except Off / Alarm.

4. Auto

From the th-tune device (Option CL78), controller display, or BMS, the auto state can be selected. When in auto the CL78 space sensor will be the primary controlling device for the unit. The unit will switch between space heating and space cooling based upon the zone temperature and setpoint. When the space conditions are satisfied the unit will maintain neutral discharge air temperature. When the unit is providing neutral air temperature it will switch between two adjustable neutral setpoints. The switch between the setpoints is based on outside air temperature. When the outdoor air temperature is below 65°F(18°C) the unit will use the neutral air heating setpoint. When the outdoor air temperature is above 65°F(18°C) the unit will use the neutral air cooling setpoint..

5. Cool

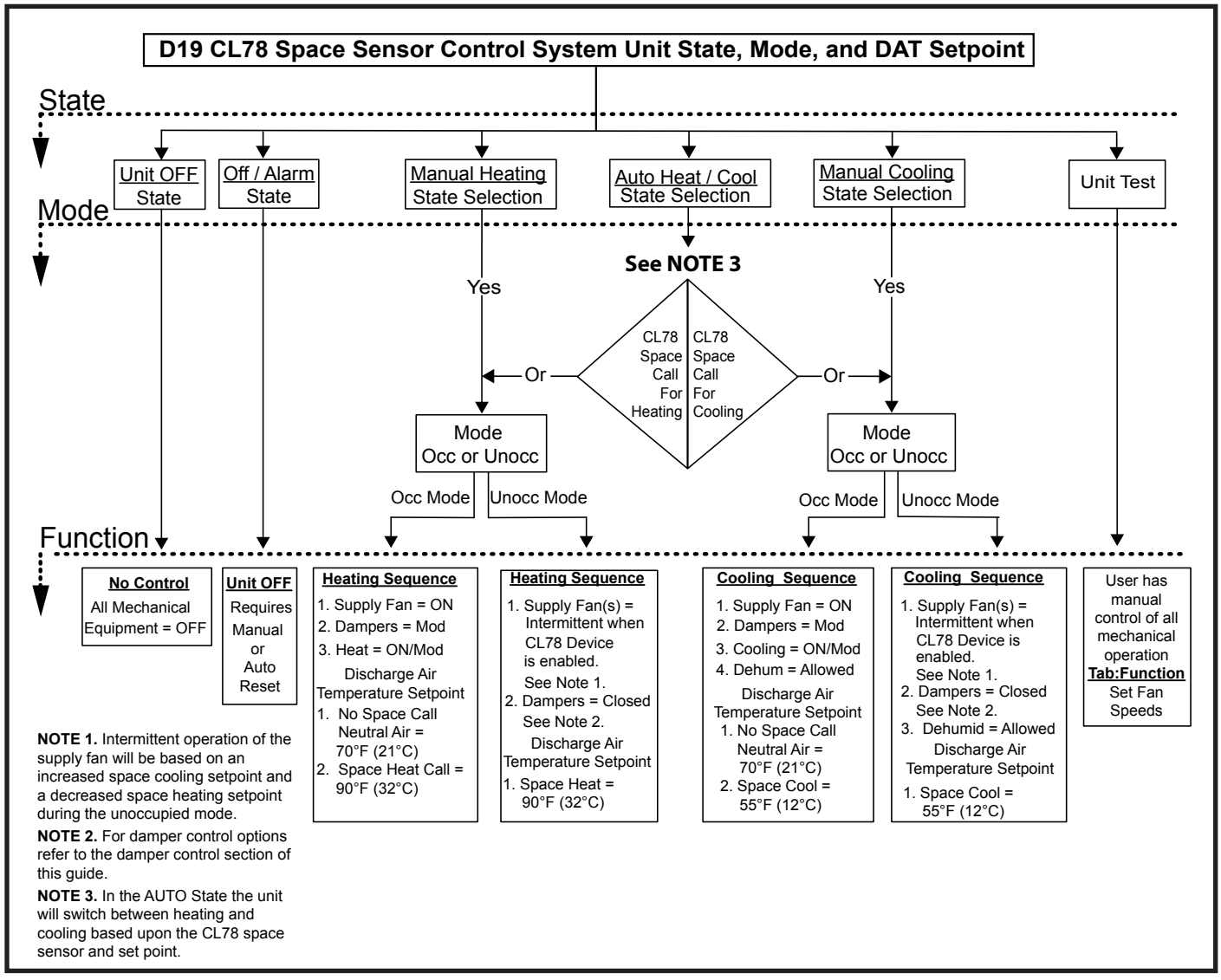
From the th-tune device (Option CL78), controller display, or BMS, the cool state can be selected. The unit supply fan will run and the mechanical cooling and the dampers will be operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except Off / Alarm.

3.2 D19 CL78 Space Sensor Modes of Operation

Occupied & Unoccupied

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

1. Internal Time Clock Schedule Selects Occupied or Unoccupied Mode.
2. Physical input point (ID4) (Contact closed = Occupied)
3. Building Automation command (Option BHB8 is required).



NOTE 1. Intermittent operation of the supply fan will be based on an increased space cooling setpoint and a decreased space heating setpoint during the unoccupied mode.

NOTE 2. For damper control options refer to the damper control section of this guide.

NOTE 3. In the AUTO State the unit will switch between heating and cooling based upon the CL78 space sensor and set point.

4.0 D21 Sequence of Operation

The control system operates the supply fan, dampers, DX cooling, and gas or electric heat to maintain a set of discharge air temperature control setpoints.

The unit discharge air temperatures fall within the following three categories:

1. Unit supplies neutral temperature air that does not affect space conditions.
2. Unit supplies cold temperature air to provide space cooling.
3. Unit supplies hot temperature air to provide space heating.

If the space temperature sensor option CL78 is not enabled or fails, the logic will ignore the space requirements and operate to maintain neutral air temperature and neutral air dehumidification control. Heating applies only when a unit is ordered with a gas or electric heat section.

4.1 D21 States of Operation

The sequence is broken into five primary states of operation. The unit state is the primary determination of individual component function. The unit can switch between states based on the following:

- Controller Display
- th-tune Space Control Device (Option CL78)
- Building Automation Command (Option BHB8 required)
- Automatically based upon sequence of operation.

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 will only switch to the OFF state when the state is manually selected through the th-tune device (Option CL78), unit display, or building automation network communication point. Upon initial power, Unit OFF is the default state.

2. Off / Alarm

The Off / Alarm state can only occur from a sequence “failure”. The unit will switch to this state from the heating, cooling, or auto state. The unit will stop all mechanical operation until the “failure” condition(s) are resolved. The unit will be OFF. Upon resolving the failure, the unit will return to heating, cooling, or auto state. Alarms can also be cleared by resetting power to the unit.

3. Heat

From the th-tune device (Option CL78), controller display, or BMS, the heat state can be selected. The supply fan will run and the mechanical heating and the dampers will be operated to maintain heating sequence of operation. The unit will not automatically switch to other states except Off / Alarm.

4. Auto

From the th-tune device (Option CL78), controller display, or BMS, the auto state can be selected. Upon initial selection of the auto state, the unit will be in the auto-heating state (if equipped) whenever the outdoor air temperature is below 65°F(18°C), otherwise the unit will be in the auto-cooling state. The unit will change to auto cooling/auto-heating state whenever 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 outside air temperature. Space temperature does not dictate heating or cooling mode.

5. Cool

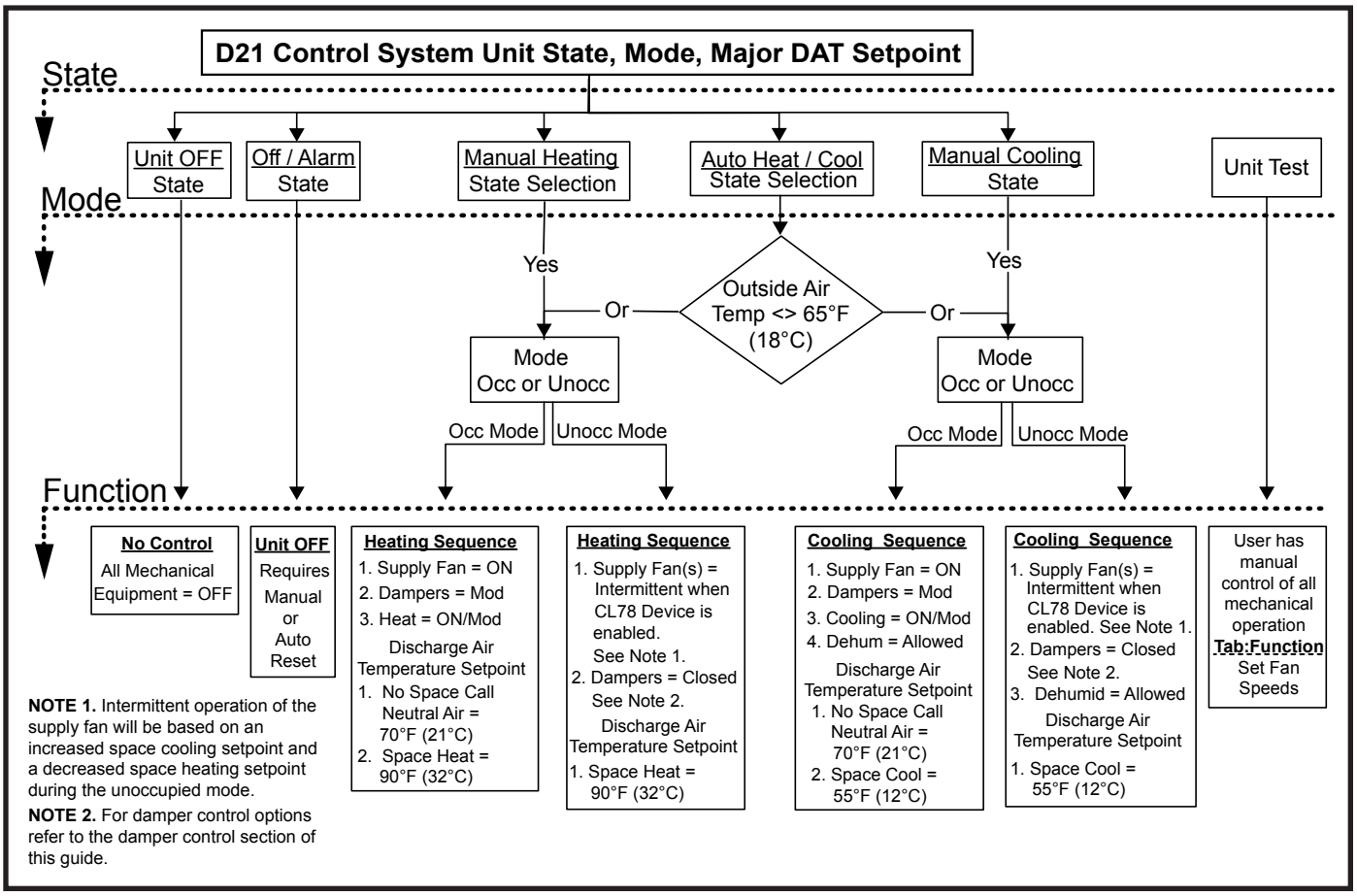
From the th-tune device (Option CL78), controller display, or BMS, the cool state can be selected. The unit supply fan will run and the mechanical cooling and the dampers will be operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except Off / Alarm.

4.2 D21 Modes of Operation

Occupied & Unoccupied

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

1. Internal Time Clock Schedule Selects Occupied or Unoccupied Mode.
2. Physical input point (ID4) (Contact closed = Occupied)
3. Building Automation Command (Option BHB8 required).



5.0 D22 Sequence of Operation

The D22 control option is a discharge air temp control strategy that allows the end user to set the desired discharge air temperature for the unit via a single setpoint. The control system operates the supply fan, dampers, DX cooling, and gas or electric heat to maintain the discharge air temperature control setpoint. The setpoint is selectable between the following two values:

Discharge Air Temp Local SP - This value is accessible from the unit display and allow the unit to operate stand alone without the need of a third party BMS system.

Discharge Air Temp BMS SP - This value in intended for use by a third party BMS system for external temperature setpoint adjustment.

NOTE: The selected value is the single discharge air setpoint for the unit.

Unit Discharge Setpoints				
#	**Variable Name**	**Variable Description**	**Default Setpoint**	**Range**
1	DA_Loc_SP	Discharge Air Temp Local SP	70°F (21°C)	50 -140°F (10 - 60°C)
2	DA_BMS_SP	Discharge Air Temp BMS SP	NA	50 -140°F (10 - 60°C)

5.1 D22 States of Operation

The unit operates in the following states of operation:

1. **Enable ON**

   The unit is permitted to operate based upon the automatic control system. The unit will only switch to the Enable ON state when the state is manually selected through the user interface device, unit display, or building automation network communication point.

2. **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 will only switch to the OFF state when the state is manually selected through the user interface device, unit display, or building automation network communication point.

   Mechanical System Selections are only permitted in the Enable OFF State.

3. **Enable OFF / Alarm**

   The Enable OFF / Alarm state can only occur from a sequence “failure”. The unit will stop all mechanical operation until the “failure” condition(s) are resolved. Upon resolving the failure, the unit will return to its externally commanded condition. Alarms can also be cleared by resetting power to the unit.

5.2 D22 Modes of Operation

Occupied & Unoccupied

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

1. Internal Time Clock Schedule Selects Occupied or Unoccupied Mode.
2. Physical input point (ID4) (Contact closed = Occupied)
3. Building Automation Command (Option BHB8 required).

6.0 Unit Operating Controls

This section describes the operating controls for the supply fan, dampers, heating systems, cooling systems, temperature and humidity control.

6.1 Temperature And Humidity Control

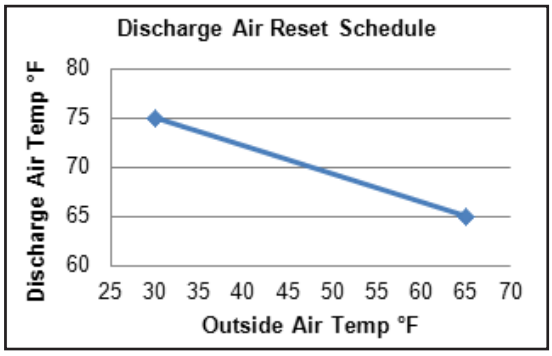
The unit is inherently a discharge air temperature control system. The unit will operate to maintain one of the following discharge air setpoints depending on the state, mode and control option. Selected setpoints are user adjustable from the unit display, optional wall mounted user interface, or optional BMS card.

Unit Discharge Setpoints				
Applicable Control Option Code	**Variable Name**	**Variable Description**	**Default Setpoint**	**Range**
D19, D21	DA_SpcHtg_SP	Discharge Air Temp Space Heating SP	90°F (32°C)	50 -140°F (10 - 60°C)
D19, D21	DA_SpcClg_SP	Discharge Air Temp Space Cooling SP	55°F (12°C)	50 -100°F (10 - 37°C)
D19, D21	DA_NAHtg_SP	Discharge Air Temp Neutral Heating SP	70°F (21°C)	50 -140°F (20 - 60°C)
D19, D21	DA_NAClg_SP	Discharge Air Temp Neutral Cooling SP	70°F (21°C)	50 -100°F (10 - 37°C)
D21	DA_SpcHtCl_SP	Discharge Air Temp Space Heat Mode Cooling SP	55°F (12°C)	50 -100°F (10 - 37°C)
D22	DA_Loc_SP	Discharge Air Temp Local SP	70°F (21°C)	50 -140°F (10 - 60°C)
D22	DA_BMS_SP	Discharge Air Temp BMS SP	NA	50 -140°F (10 - 60°C)
AUR1	DA_Dh_SP	Discharge Air Temp Dehum SP	70°F (21°C)	50 -100°F (10 - 37°C)
AUR1	CC_DA_SP	Cooling Coil Dehum DA SP	52°F (11°C)	45 -80°F (7 - 26°C)

Optional Neutral Air Heating Sliding Scale Temperature Reset Schedule Setpoint D19 & D21 only.

The user can also select a reset schedule for the discharge setpoint used when in neutral air heating mode.

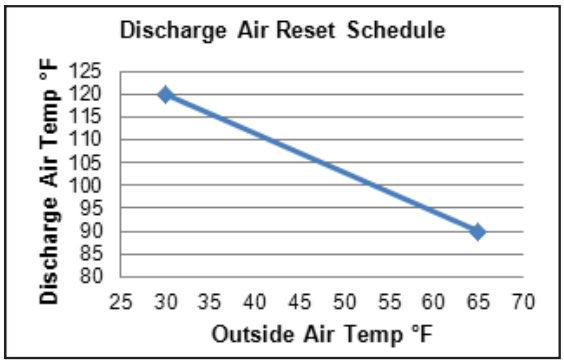
Reset Schedule	
Outside Air Temperature	**Discharge Air Temperature**
30°F (-1.1°C)	75°F (23.8°C)
65°F (18.3°C)	65°F (18.3°C)



Optional Space Heating Sliding Scale Temperature Reset Schedule Setpoint D19 & D21 only.

The user can also select a reset schedule for the discharge setpoint used when in space heating mode.

Reset Schedule	
Outside Air Temperature	Discharge Air Temperature
30°F (-1.1°C)	120°F (48.9°C)
65°F (18.3°C)	90°F (32.2°C)



6.2 Space Temperature Setpoint Definitions

6.2.1 Occupied Space Temperature Setpoint Definitions

Occupied Heating

SpcTempSP: Base Space Temp Setpoint 72°F(22°C) minus the **SpcHtgDB:** Space Heating Dead Band 2°F(1.1°C) = **SpcHtgSP:** Space Heating Setpoint 70°F(21°C)

When in the occupied mode, the **SpcHtgSP:** Space Heating Setpoint is the **SpcEffHtgSp:** Space Effective Heating Setpoint.

SpcEffHtgSp: Space Effective Heating Setpoint 70°F(21°C) minus the **SpcHtgOnDiff:** Space Heating on Differential 1°F(.4°C) = 69°F(21°C)

Space Temp less than or equal to 69°F(21°C) = Space Heating Mode ON.

SpcEffHtgSp: Space Effective Heating Setpoint 70°F (21°C) plus the **SpcHtgOffDiff:** Space Heating off Differential 1°F(.4°C) = 71°F(22°C)

Space Temp greater than or equal to 71°F(22°C) = Space Heating Mode OFF.

Occupied Cooling

SpcTempSP: Base Space Temp Setpoint 72°F(22°C) plus the **SpcClgDB:** Space Cooling Dead Band 2°F(1.1°C) = **SpcClgSP**: Space Cooling Setpoint 74°F(23°C)

When in the occupied mode, the **SpcClgSP:** Space Cooling Setpoint is the **SpcEffClgSp:** Space Effective Cooling Setpoint.

SpcEffClgSp: Space Effective Cooling Setpoint 74°F(23°C) plus the **SpcClgOnDiff:** Space Cooling on Differential 1°F(.4°C) = 75°F(24°C)

Space Temp greater than or equal to 75°F(24°C) = Space Cooling Mode ON.

SpcEffHtgSp: Space Effective Cooling Setpoint 74°F(23°C) minus the **SpcClgOffDiff:** Space Cooling off Differential 1°F(.4°C) = 73°F(23°C)

Space Temp less than or equal to 73°F(24°C) - Space Cooling Mode OFF.

Occupied Heating Cooling Mode

When the unit is set to auto heating it will use the following setpoints for space cooling:

SpcTempSP: Base Space Temp Setpoint 72°F(22°C) plus the **SpcClgDB:** Space Cooling Dead Band 2°F(1.1°C) = **SpcClgSP**: Space Cooling Setpoint 74°F(23°C)
SpcEffClgSp: Space Effective Cooling Setpoint 74°F(23°C) plus the **SpcHCOnDiff:** Space Heating Cooling on Differential 1°F(.4°C) = 75°F(24°C)

Space Temp greater than or equal to 75°F(24°C) = Space Heating Cooling Mode ON.

SpcEffClgSp: Space Effective Cooling Setpoint 74°F(23°C) minus the **SpcHCOffDiff:** Space Heating Cooling off Differential 1°F(.4°C) = 73°F(23°C)

Space Temp less than or equal to 73°F(24°C) = Space Heating Cooling Mode OFF.

6.2.2 Unoccupied Space Temp Setpoint Definitions

NOTE: ***By default Unoccupied heating & cooling are enabled when the system is equipped with a CL78 space sensor. If Unoccupied heating & cooling are not desired set the Ena_Unocc_Spc variable to OFF.***

Unoccupied Heating

SpcTempSP: Base Space Temp Setpoint 72°F(22°C) minus the **SpcHtgDB:** Space Heating Dead Band 2°F(1.1°C) = **SpcHtgSP** Space Heating Setpoint 70°F(21°C)
When in the unoccupied mode, the **SpcHtgSP** minus the **SpcHtgUnoOs** Space Heating Unoccupied Offset Setpoint 8°F(4.4°C) = 62°F(17°C) is the **SpcEffHtgSp:** Space Effective Heating Setpoint.

SpcEffHtgSp: Space Effective Heating Setpoint 62°F(17°C) minus the **SpcHtgOnDiff:** Space Heating on Differential 1°F(.4°C) = 61°F(16°C)

Space Temp less than or equal to 61°F(16°C) = Space Heating Mode ON.

SpcEffHtgSp: Space Effective Heating Setpoint 62°F (17°C) plus the **UnoHtgOffDiff:** Unoccupied Space Heating off Differential 4°F(2.2°C) = 66°F(19°C)

Space Temp greater than or equal to 66°F(19°C) = Space Heating Mode OFF.

Unoccupied Cooling

SpcTempSP: Base Space Temp Setpoint 72°F(22°C) plus the **SpcClgDB:** Space Cooling Dead Band 2°F(1.1°C) = **SpcClgSP** Space Cooling Setpoint 74°F(23°C) When in the unoccupied mode, the **SpcClgSP** plus the **SpcClgUnoOs** Space Cooling Unoccupied Offset Setpoint 8°F(4.4°C) = 82°F(28°C) is the **SpcEffClgSp:** Space Effective Cooling Setpoint.

SpcEffClgSp: Space Effective Heating Setpoint 82°F(28°C) plus the **SpcClgOnDiff:** Space Cooling on Differential 1°F(.4°C) = 83°F(28°C)

Space Temp greater than or equal to 83°F(28°C) = Space Cooling Mode ON.

SpcEffClgSp: Space Effective Cooling Setpoint 82°F (28°C) minus the **UnoClgOffDiff:** Unoccupied Space Cooling off Differential 4°F(2.2°C) = 78°F(26°C)

Space Temp less than or equal to 78°F(26°C) = Space Cooling Mode OFF.

Unoccupied Heating Cooling Mode

When the unit is set to auto heating it will use the following setpoints for space cooling: **SpcTempSP:** Base Space Temp Setpoint 72°F(22°C) plus the **SpcClgDB:** Space Cooling Dead Band 2°F(1.1°C) = **SpcClgSP** Space Cooling Setpoint 74°F(23°C) When in the unoccupied mode, the **SpcClgSP** plus the **SpcClgUnoOs** Space Cooling Unoccupied Offset Setpoint 8°F(4.4°C) = 82°F(28°C) is the **SpcEffClgSp:** Space Effective Cooling Setpoint.

SpcEffClgSp: Space Effective Cooling Setpoint 82°F(28°C) plus the **SpcHCOnDiff:** Space Heating Cooling on Differential 1°F(.4°C) = 83°F(28°C)

Space Temp greater than or equal to 83°F(28°C) = Space Heating Cooling Mode ON.

SpcEffClgSp: Space Effective Cooling Setpoint 82°F (28°C) plus the **UnoHCOffDiff:** Unoccupied Space Heating Cooling off Differential 4°F(2.2°C) = 78°F(26°C)

Space Temp less than or equal to 78°F(26°C) = Space Heating Cooling Mode OFF.

6.2.3 Space Dehumidification Control

SpcHumSP: Space Humidity Setpoint 55%

SpcHumSP: Space Humidity Setpoint 55% plus the SpcDhOnDiff: Space Dehum ON Differential 10% = 65%

Space Humidity greater than or equal to 65% = Space Dehumidification Mode ON.

SpcHumSP: Space Humidity Setpoint 55%

SpcHumSP: Space Humidity Setpoint 55% minus the **SpcDhOffDiff:** Space Dehum OFF Differential 5% = 50%

Space Humidity less than or equal to 50% = Space Dehumidification Mode OFF.

If the space temperature sensor (Option CL78 th-tune device) is not enabled or has failed, the logic will ignore the space requirements and operate to maintain neutral air temperature in the occupied mode.

If the space temperature sensor (Option CL78 th-tune device) is not enabled or has failed, the unit will remain OFF in the unoccupied mode.

If the th-tune is enabled and fails, an alarm condition is created.

6.3 Heating Control

6.3.1 Electric Heat Staging

Electric heat staging will start when the discharge air temperature is 5°F(2.8°C) below the active setpoint and the OAT is below the (Heating Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. The units may be equipped with up to six stages of electric heat. The number of stages and modulated capacity control is determined by the model, series, and heating size.

Electric Heat Staging					
PID Loop Control: All Statements Must Be True To Activate or De-Activate. All stages will have an adjustable min ON and OFF time.					
Stage	**Outputs**	**Increase Inter-Stg Timer**	**Activate**	**Decrease Inter-Stg Timer**	**De-activate**
Stg 1	NO6 = ON	N/A	DAT 5°F (2.8°C) below setpoint (Y3 Modulates via Heating Demand) See NOTE 1	15 min. For modulated systems. 5 min. for non modulated systems. See NOTE 3	Heating Demand < 2.5% & DAT 5°F (2.8°C) above setpoint
Stg 2	NO7 = ON	5 min	Heating Demand > 70% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 5% & DAT 5°F(2.8°C) above setpoint
Stg 3	NO8 = ON	5 min	Heating Demand > 75% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 10% & DAT 5°F(2.8°C) above setpoint
Stg 4	NO9 = ON	5 min	Heating Demand > 80% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 20% & DAT 5°F(2.8°C) above setpoint
Stg 5	NO10 = ON	5 min	Heating Demand > 85% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 30% & DAT 5°F(2.8°C) above setpoint
Stg 6	NO11 = ON	5 min	Heating Demand > 90% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 40% & DAT 5°F(2.8°C) above setpoint
NOTE 1 Y3 Capacity modulation only applies to units equipped with SCR Controllers.					

6.3.2 General Gas Heat Staging

Gas heat staging will start when the discharge air temperature is 5°F(2.8°C) below the active setpoint and the OAT is below the (Heating Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. The units may be equipped with up to six stages of gas heat. The number of stages and modulated capacity control is determined by the model, series, and heating size.

General Gas Heat Staging					
PID Loop Control: All Statements Must Be True To Activate or De-Activate. All stages will have an adjustable min ON and OFF time.					
Stage	**Outputs**	**Increase Inter-Stg Timer**	**Activate**	**Decrease Inter-Stg Timer**	**De-activate**
Stg 1	NO6 = ON Y3 = to light off % value for 30 seconds & NO6 = ON See NOTE 1	N/A	DAT 5°F (2.8°C) below setpoint (Y3 Modulates Heat Exchanger 1 via (Heating Demand) See NOTE 2	15 min. For modulated systems. 5 min. for non modulated systems. See NOTE 3	Heating Demand < 2.5% & DAT 5°F (2.8°C) above setpoint
Stg 2	NO7 = ON	5 min	Heating Demand > 70% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 5% & DAT 5°F(2.8°C) above setpoint
Stg 3	NO8 = ON	5 min	Heating Demand > 75% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 10% & DAT 5°F(2.8°C) above setpoint
Stg 4	NO9 = ON	5 min	Heating Demand > 80% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 20% & DAT 5°F(2.8°C) above setpoint
Stg 5	NO10 = ON	5 min	Heating Demand > 85% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 30% & DAT 5°F(2.8°C) above setpoint
Stg 6	NO11 = ON	5 min	Heating Demand > 90% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 40% & DAT 5°F(2.8°C) above setpoint
NOTE 1 Light off value for natural gas = 100% Light off value for Propane = 100%					
NOTE 2 Y3 Capacity modulation applies only to units equipped with modulating gas valves.					
NOTE 3 15 min timer used on modulated systems to allow capacity control to achieve low fire rate.					

6.3.3 Gas Heat Staging for gas heating options AG55 & AG57

Gas heat staging will start when the discharge air temperature is 5°F(2.8°C) below the active setpoint and the OAT is below the (Heating Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. Option AG55 is non modulating and AG57 is equipped with a modulating gas valve. These gas control options are equipped with a 1/3 , 2/3, and a full (non-split) burner valve.

The burner valves are controlled for three stage operation via two DDC outputs based on the following sequence:

On initial start up the 1/3 burner valve and the 2/3 burner valve are energized. (After 20 seconds via a hardwired time delay relay) the 1/3 burner valve is de-energized (This is stage 1). For Stage 2, the full non-split burner valve and the 1/3 burner valve are energized, while the 2/3 burner valve is de-energized. Stage 3 brings the 2/3 burner valve back on so all valves are energized.

Gas Heat Staging AG55 & AG57 Sizes 450-700 See NOTE 4					
PID Loop Control: All Statements Must Be True To Activate or De-Activate. All stages will have an adjustable min ON and OFF time.					
Stage	**Outputs**	**Increase Inter-Stg Timer**	**Activate**	**Decrease Inter-Stg Timer**	**De-activate**
Stg 1 2/3 Burner Valve	NO6 = ON NO7 = OFF Y3 = to light off % value for 30 seconds See NOTE 1	N/A	DAT 5°F (2.8°C) below setpoint (Y3 Modulates Heat Exchanger 1 via (Heating Demand) See NOTE 2	15 min. For modulated systems. 5 min. for non modulated systems. See NOTE 3	Heating Demand < 2.5% & DAT 5°F (2.8°C) above setpoint
Stg 2 1/3 Burner Valve and Full Non-Split Burner Valve	NO6 = OFF NO7 = ON	5 min	Heating Demand > 70% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 5% & DAT 5°F(2.8°C) above setpoint
Stg 3 1/3, 2/3 Burner Valves and Full Non-Split Burner Valve	NO6 = ON NO7 = ON	5 min	Heating Demand > 75% & DAT 5°F(2.8°C) below setpoint	5 min	Heating Demand < 10% & DAT 5°F(2.8°C) above setpoint
NOTE 1 Light off value for natural gas = 100% Light off value for Propane = 100%					
NOTE 2 Y3 Capacity modulation applies only to AG57 units equipped with a modulating gas valve.					
NOTE 3 15 min timer used on AG57 modulated systems to allow capacity control to achieve low fire rate.					
NOTE 4 For heat sizes 450- 700 refer to this table. For heat sizes 100- 400 refer to the General Gas Heat Staging Table					

6.4 Cooling & Dehumidification Control

6.4.1 Cooling Staging Control Options AUD 1 thru 3 or MAPS Single Stage

Mechanical cooling staging will start when the discharge air temperature is 5°F(2.8°C) above the active setpoint and the OAT is above the (Cooling Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. The units may be equipped with up to three stages of cooling. The number of stages is determined by the model, series, and cooling size.

Cooling Staging Control Options AUD 1 thru 3 or MAPS Single Stage					
PID Loop Control: All Statements Must Be True To Activate or De-Activate All stages will have an adjustable min ON and OFF time					
Stage	**Output**	**Increase Stage Timing**	**Activate**	**Decrease Stage Timing**	**De-activate**
Stg 1	NO2	5 min	DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 10% & DAT 5°F(2.8°C) below setpoint
Stg 2	NO3	5 min	Cooling Demand > 70% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 50% & DAT 5°F(2.8°C) below setpoint
Stg 3	NO4	5 min	Cooling Demand > 80% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 60% & DAT 5°F(2.8°C) below setpoint

6.4.2 Cooling Staging Control with Options ECD1 or ECD2

Mechanical cooling staging will start when the discharge air temperature is 5°F(2.8°C) above the active setpoint and the OAT is above the (Cooling Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. The units may be equipped with up to four stages of cooling. The number of stages is determined by the model, series, and cooling size. When the outside air relative humidity is less than 50.0% RH options ECD1 or ECD2 are used as stage one.

Cooling Staging Control with Options ECD1 or ECD2 Outside Air Humidity GREATER than 50.0%					
PID Loop Control: All Statements Must Be True To Activate or De-Activate All stages will have an adjustable min ON and OFF time					
Stage	**Output**	**Increase Stage Timing**	**Activate**	**Decrease Stage Timing**	**De-activate**
Stg 1	NO2	5 min	DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 10% & DAT 5°F(2.8°C) below setpoint
Stg 2	NO3	5 min	Cooling Demand > 70% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 50% & DAT 5°F(2.8°C) below setpoint
Stg 3	NO4	5 min	Cooling Demand > 80% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 60% & DAT 5°F(2.8°C) below setpoint

Cooling Staging Control with Options ECD1 or ECD2 Outside Air Humidity LESS than 50.0%					
PID Loop Control: All Statements Must Be True To Activate or De-Activate All stages will have an adjustable min ON and OFF time					
Stage	**Output**	**Increase Stage Timing**	**Activate**	**Decrease Stage Timing**	**De-activate**
Stg 1 ECD Option	NO13	5 min	DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 10% & DAT 5°F(2.8°C) below setpoint
Stg 2	NO2	5 min	Cooling Demand > 70% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 50% & DAT 5°F(2.8°C) below setpoint
Stg 3	NO3	5 min	Cooling Demand > 80% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 60% & DAT 5°F(2.8°C) below setpoint
Stg 4	NO4	5 min	Cooling Demand > 90% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 70% & DAT 5°F(2.8°C) below setpoint

6.4.3 MAPS & MAPS II Cooling Staging Control Three Stage

Mechanical cooling staging will start when the discharge air temperature is 5°F(2.8°C) above the active setpoint and the OAT is above the (Cooling Lockout SP). The PID loop will activate and the unit will stage as shown in the staging chart to maintain the active discharge air setpoint. Units with the three stage cooling function may be equipped with either two or three compressors that will make up a low tonnage and a high tonnage circuit.

The the cooling circuits are controlled for three stage operation via two DDC outputs based on the following sequence:

On an initial call for stage 1 the low tonnage circuit will start with DDC controller output (NO2). On a call for stage 2 the low tonnage circuit will turn off and the high tonnage circuit will start with DDC controller output (NO3). On a call for stage 3 the low tonnage circuit will restart with DDC output (NO2).

MAPS & MAPS II Cooling Staging Control Three Stage					
PID Loop Control: All Statements Must Be True To Activate or De-Activate All stages will have an adjustable min ON and OFF time					
Stage	Output	Increase Stage Timing	Activate	Decrease Stage Timing	De-activate
Stg 1	NO2 = ON NO3 = OFF	5 min	DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 10% & DAT 5°F(2.8°C) below setpoint
Stg 2	NO2 = OFF NO3 = ON	5 min	Cooling Demand > 70% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 50% & DAT 5°F(2.8°C) below setpoint
Stg 3	NO2 = ON NO3 = ON	5 min	Cooling Demand > 80% & DAT 5°F(2.8°C) above setpoint	5 min	Cooling Demand < 60% & DAT 5°F(2.8°C) below setpoint

6.4.4 Option AUR1 Dehumidification Control

AUR1 Dehumidification Control (Space Dehumidification Mode not available with D22)

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

1. The outdoor air temperature is above the reheat low lockout setpoint, (58°F/14°C, reheat lockout, range 50-100°F/10-37°C) Drybulb.
2. The outdoor air temperature is below the reheat high lockout setpoint. (100°F/37°C, reheat high lockout, range 50-120°F/10-48°C) Drybulb
3. The Space Cooling Mode is not active.
4. The unit Cooling Coil Sensor is not in a failed condition.
5. The Space dehumidification call is active.

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

1. The outdoor air temperature is above the reheat low lockout setpoint, (58°F/14°C, reheat lockout, range 50-100°F/10-37°C) Drybulb
2. The outdoor air temperature is below the reheat high lockout setpoint. (100°F/37°C), reheat high lockout, range 50-120°F/10-48°C) Drybulb
3. The unit Outside Air Humidity Sensor is not in a failed condition.
4. The unit Cooling Coil Sensor is not in a failed condition.
5. OA dewpoint greater than 58°F(14°C).
6. The Space dehumidification call is not active.
7. The Space Cooling Mode is not active.
8. For units selected for D22 the active discharge air setpoint must be 15°F/8.3°C greater than the cooling coil discharge setpoint.

AUR1 Sequence of Operation

When either the space dehumidification mode or the 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 U4 CC_Temp sensor. The reheat compressor will start and the reheat valve output Y4 will be enabled to modulate to maintain the reheat setpoint 70°F(21°C) via the U3 DAT temp sensor.

6.4.5 MAPS & MAPS II Dehumidification Control (Not available with D22)

Dehumidification Control

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

1. The outdoor air temperature is above the reheat low lockout setpoint, (58°F/14°C, reheat lockout, range 50-100°F/10-37°C) Drybulb.
2. The outdoor air temperature is below the reheat high lockout setpoint. (100°F/37°C, reheat high lockout, range 50-120°F/10-48°C) Drybulb
3. The Space Cooling Mode is not active.
4. The Space dehumidification call is active.

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

1. The outdoor air temperature is above the reheat low lockout setpoint, (58°F/14°C, reheat lockout, range 50-100°F/10-37°C) Drybulb
2. The outdoor air temperature is below the reheat high lockout setpoint. (100°F/37°C), reheat high lockout, range 50-120°F/10-48°C) Drybulb
3. The unit Outside Air Humidity Sensor is not in a failed condition.
4. OA dewpoint greater than 58°F(14°C).
5. The Space dehumidification call is not active.
6. The Space Cooling Mode is not active.

MAPS & MAPS II Dehumidification Sequence of Operation

When either the space dehumidification mode or the neutral air dehumidification mode is active, the reheat compressor will start and the main evaporator compressor(s) will be enabled to maintain the discharge air temperature setpoint via the U3 DAT temp sensor.

6.5 Supply Fan Control

Supply Fan Control : Occupied Mode

The supply fan provides the total volume of conditioned air to the space at a given rate. The rate is controlled by unit state, mode, and the selection of one of the six sequences of operation When the unit is called to be in occupied mode, the supply fan will start. If the unit is configured with a 100% outside air damper, the damper actuator is electrically interlocked such that the supply fan cannot start until the damper is 80% open.

When the Supply fan is commanded OFF, any active heating or cooling operations will be shut down and the supply fan will stop after an adjustable time delay.

The rate is controlled by unit state, mode and the selection of one of the following sequences of operation:

1. **High - Low Fan Speed Control (VFC1)** The variable frequency drive is commanded ON from NO1. There are two fan speed states - active heating/ cooling and fan only. When the fan is ON and the system is in either the space heating or space cooling mode, the unit will operate on high fan speed. When the fan is ON and the system is not in either the space cooling or space heating mode, the supply fan will operate on low fan speed.
2. **Duct Static Pressure Control (0.0" to 2.5" iwc) (Option VFC3)** The variable frequency drive is commanded ON from NO1. The fan modulates between the user adjustable minimum and maximum fan speed setpoints using a PI loop to maintain the duct static pressure setpoint, +0.5"iwc default.
3. **Building Static Pressure Control (-0.5" to 0.5" iwc) (Option VFC4)** The variable frequency drive is commanded ON from NO1. The fan modulates between the user adjustable minimum and maximum fan speed setpoints using a PI loop to maintain the building static pressure setpoint, +0.1"iwc default.
4. **Summer/Winter Constant Volume (Option VFC9)** The variable frequency drive is commanded ON from NO1. The unit ramps up to a user set supply fan speed setting. 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, the supply fan will use the heating speed % setpoint. When the unit is in any other mode, the supply fan will use cooling speed % setpoint.
5. **External Source 0 to 10 vdc (Option VFC2)**
   The variable frequency drive is commanded ON from NO1. The supply fan will modulate from 0-100%. The speed control signal is sourced by others and a direct connection of a 0 to 10 vdc input to the unit terminal strip must be provided.
6. **BMS Source (Option VFCC)**
   The variable frequency drive is commanded ON from NO1. The fan will modulate between the user adjustable minimum & maximum fan speed setpoints. The speed control signal is sourced by others, communicated via a BMS network and a connection to a BHB8 BMS card is required.
7. **Two Speed CO2 Control (VFCD)** The variable frequency drive is commanded ON from NO1. There are two fan speed states - Low speed and High speed. When the fan is ON and the CO2 is below the space CO2 setpoint the fan will operate in Low speed, when the CO2 is above the CO2 space setpoint the fan will operate in high speed.

Supply Fan Control : Unoccupied Mode

When configured for space control, the supply fan operation will be intermittent based on the zone temperature. See Temperature and Humidity Control section, Paragraph 6.2, for space control and setpoint definitions.

6.6 Damper Control

The dampers operate based upon state, mode and one of the following user selected sequences. The dampers are normally open and operational in the occupied mode and closed to outside air in the unoccupied mode depending on the user selection.

1. **100% OA, (Option GF2A)** When the unit is to start, the outside air damper will modulate (point Y1 = 10Vdc) and the supply fan will be commanded ON (point NO1 = On). If the unit is equipped with an outside air damper, the damper actuator is electrically interlocked to the fan start/stop such that the supply fan cannot start until the damper is 80% open.

   OFF and Alarm Modes - The damper will be closed (Y1 = 0%).

2. **External 0-10vdc Input, (Option GF1)**

   Occupied & Unoccupied Mode

   The dampers will modulate from 0-100%. The control signal is sourced by others and a direct connection of a 0 to 10 vdc input to the unit terminal strip must be provided. The damper is NOT electrically interlocked with the supply fan.

3. **Two-Position Dampers (Option GF2)**

   Occupied Mode

   The damper will open to the user adjustable occupied damper position setpoint value (point Y1=10Vdc).

   Unoccupied Mode

   The damper will open to the user adjustable unoccupied damper position setpoint value (point Y1=0Vdc).

   OFF and Alarm Modes - The damper will be closed. Y1 = 0%.

4. **Four Positions based on 2 Digital Inputs (Option GF4)**

   Occupied Mode

   The damper will open to the user adjustable defined position based upon two hardware input switches (ID9 & ID10).

Variable Name	Input Switch		Default Dmpr 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

   Unoccupied Mode With the unoccupied ventilation variable set to ON the dampers will run according to input switches (ID9 & ID10). With the unoccupied ventilation enable variable set to OFF, the damper will be commanded to 0%.

   OFF and Alarm Modes - The damper will be closed (Y1 = 0%).

5. **Building Pressure Control (Range -0.5 to 0.5” iwc) (Option GF5)**

   Occupied Mode

   The dampers will modulate using a PI loop to maintain the building static pressure setpoint, default 0.1” iwc Y1 will modulate from 0-100% open, 0-10V.

   Unoccupied Mode With the unoccupied ventilation variable set to ON the dampers will run according to according to the building pressure.

   With the unoccupied ventilation enable variable set to OFF, the damper will be commanded to 0%.

   OFF and Alarm Modes - The damper will be closed (Y1 = 0%).

6. **BMS Source (Option GF1A)**

   The dampers will modulate from 0-100%. The damper control signal is sourced by others, communicated via a BMS network and a connection to a BHB8 BMS card is required.

7. Economizer Package (Option GF8)

Occupied Mode

The dampers will modulate to the user adjustable minimum position setting when the unit is in occupied mode (**MinDmprSP**, Default = 10%). When the CO_2 sensor option is selected (input U8), the minimum damper position will be determined as follows: If the Space CO_2 level exceeds the (**SpcCO2SP**, default = 1000 ppm) with a 200 ppm differential (**SpcCO2Diff**, default = 200 ppm), the user adjustable (**CO2DmprOsSP**, Default = 10%) value will be added to the (**MinDmprSP**, Default = 10%)

CO_2 > 1000 ppm = Active Minimum Damper Position 20%

CO_2 < 800 ppm = Active Minimum Damper Position 10%

When cooling is required via the thermostat input ID7 or BMS Call and the outdoor air temperature is less than the economizer temperature lockout and the economizer dewpoint lockout, the dampers will modulate using a PID 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° subtracted by the **MA_Diff** default 3° **MAEff_Temp_SP** = 52°

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

Unoccupied With the **Unocc_Eco_Ena -** Unoccupied Enable Econ Mode variable set to ON the dampers will be permitted to operate. With the **Unocc_ Eco_Ena -** Unoccupied Enable Econ Mode variable set to OFF. The damper will be commanded to 0%.

OFF and Alarm Modes -The damper will be closed (Y1 = 0%).

8. Non DDC

No DDC function, set when the unit damper actuator(s) are controlled by an auxiliary device independent from the digital control system.

7.0 Safeties & Alarms

7.1 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 cycled.

Alarm ID: 1 Unit Safety Alarm (Critical Shutdown Alarm)

The unit is equipped with a safety status relay which is energized in the normal state. The coil of the safety relay is piloted by an optional firestat and/or a duct smoke detector. If at any time the status of the safety relay (ID3 = Alarm contact closure opens), the unit will immediately shut down. All mechanical equipment will be turned OFF. The unit alarm display shall show **"Unit Safety Alarm Unit OFF"**. The unit will not restart until the condition has cleared and the alarm is acknowledged via the unit controller or remote display.

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

Alarm ID: 2 Supply Fan Failure (Critical Shutdown Alarm)

If at any time after an adjustable 120-second time delay from a supply fan start command, (NO1="ON") fan operation does not prove via airflow switch (ID1=OFF), the controller shuts down the system. The unit alarm display shall show **"Supply Fan Failure Unit OFF"**. The unit will not restart until the alarm is acknowledged via the unit controller or remote display.

Alarm ID: 3 Low Discharge Temperature Alarm (Critical Shutdown Alarm)

When the heat is called to be ON and the 1st stage is enabled, the low discharge temperature limit alarm will be allowed. If the Discharge air temperature (U3) falls below 33°F/1°C (Low Limit Alarm Setpoint) for more than 10 minutes, the controller shuts down the system. The unit alarm display shall show **"Low Discharge Air Temperature Alarm Unit OFF"**. The unit will not restart until the alarm is acknowledged via the unit controller or remote display.

Alarm ID: 4 Filter Status

When the main unit filter pressure switch activates ID2 = ON, the unit alarm display shall show **"Dirty Filter Status Check Filters"**. No other action will be taken by the control system

Alarm ID: 5 Phase Loss (Critical Shutdown Alarm)

If at any time the phase loss input ID11 shows ON, the unit shuts down. All equipment will be turned OFF. The unit alarm display shall show **"Phase Loss Unit OFF"**. The unit will not restart until the condition has cleared and the alarm is acknowledged via the unit controller or remote display.

Alarm ID: 6 Outside Air Humidity Sensor Failure

If the outdoor air humidity sensor reading (U1) is "invalid", the unit will turn off the OA dewpoint enabled dehumidification mode. The unit alarm display shall show **"Outdoor Air Humidity Sensor Failure"**. The unit will automatically return to normal operation when the humidity sensor value returns.

Alarm ID: 7 Outside Air Temperature Sensor Failure

If the outdoor air temperature sensor reading (U2) is "invalid", the unit will turn off heating and cooling functions. The unit alarm display shall show **"Outside Air Temperature Sensor Failure Blower Only"**. The unit will automatically return to normal operation when the temperature sensor value returns.

Alarm ID: 8 Discharge Air Temperature Sensor Failure (Critical Shutdown Alarm)

If the discharge air temperature sensor reading (U3) is "invalid", the unit will shut down. All equipment will be turned OFF. The unit alarm display shall show **"Discharge Air Temperature Sensor Failure Unit OFF"**. The unit will not restart until the condition has cleared and the alarm is acknowledged via the unit controller or remote display.

Alarm ID: 9 Cooling Coil Temp Sensor Failure

If the cooling coil temperature sensor reading (U4) is "invalid", the unit will turn off all dehumidification functions. The unit alarm display shall show **"Cooling Coil Temp Sensor Failure"**. The unit will automatically return to normal operation when the temperature sensor value returns.

Alarm ID: 10 Mixed Air Temp Sensor Failure

If the mixed air temperature sensor reading (U5) is "invalid", the unit alarm display shall show **"Mixed Air Temp Sensor Failure"**.

Alarm ID: 11 Building Pressure Sensor Failure

If the pressure sensor reading (U6) is “invalid”, the unit alarm display shall show **“Building Pressure Sensor Failure”**.

Alarm ID: 12 Duct Pressure Sensor Failure

If the pressure sensor reading (U7) is “invalid”, the unit alarm display shall show **“Duct Pressure Sensor Failure”**.

Alarm ID: 13 CO2 Sensor Failure

If the CO2 sensor reading (U8) is “invalid”, the unit alarm display shall show **“CO2 Sensor Failure”**.

Alarm ID: 14 Space Sensor thTune (Option CL78) Offline

When an optional CL78 space sensor is enabled and the serial communication fails, the unit alarm display shall show **“CL78 thTune Serial Sensor Add 1 Space 1 Offline”**. The unit will continue to operate and revert to neutral discharge air temperature control.

Alarm ID: 15 Space Sensor thTune (Option CL78) Temperature Sensor Broken

When an optional CL78 space sensor is enabled and the space temp sensor fails, the unit alarm display shall show **“CL78 thTune Serial Sensor Add 1 Space 1 Temperature Probe broken”**. The unit will continue to operate and revert to neutral discharge air temperature control.

Alarm ID: 16 Space Sensor thTune (Option CL78) Humidity Sensor Broken

When an optional CL78 space sensor is enabled and the space humidity sensor fails, the unit alarm display shall show **“CL78 thTune Serial Sensor Add 1 Space 1 Humidity probe broken”**. The unit will continue to operate and revert to neutral discharge air temperature control.

Alarm ID: 17 Space 2 Sensor Offline

When an optional return air probe is enabled and the serial communication fails, the unit alarm display shall show **“Serial Sensor Add 130 Space 2 Probe Offline”**.

Alarm ID: 18 Space 2 Sensor Temperature Probe Broken

When an optional return air probe is enabled and the temperature sensor fails, the unit alarm display shall show **“Serial Sensor Add 130 Space 2 Temperature Probe Broken”**.

Alarm ID: 19 Space 2 Sensor Humidity Probe Broken

When an optional return air probe is enabled and the humidity sensor fails, the unit alarm display shall show **“Serial Sensor Add 130 Space 2 Humidity Probe Broken”**.

Alarm ID: 20 Space 3 Sensor Offline

When an optional return air probe is enabled and the serial communication fails, the unit alarm display shall show **“Serial Sensor Add 131 Space 3 Probe Offline”**.

Alarm ID: 21 Space 3 Sensor Temperature Probe Broken

When an optional return air probe is enabled and the temperature sensor fails, the unit alarm display shall show **“Serial Sensor Add 131 Space 3 Temperature Probe Broken”**.

Alarm ID: 22 Space 3 Sensor Humidity Probe Broken

When an optional return air probe is enabled and the humidity sensor fails, the unit alarm display shall show **“Serial Sensor Add 131 Space 3 Humidity Probe Broken”**.

Alarm ID: 23 Space 4 Sensor Offline

When an optional return air probe is enabled and the serial communication fails, the unit alarm display shall show **“Serial Sensor Add 132 Space 4 Probe Offline”**.

Alarm ID: 24 Space 4 Sensor Temperature Probe Broken

When an optional return air probe is enabled and the temperature sensor fails, the unit alarm display shall show **"Serial Sensor Add 132 Space 4 Temperature Probe Broken"**.

Alarm ID: 25 Space 4 Sensor Humidity Probe Broken

When an optional return air probe is enabled and the humidity sensor fails, the unit alarm display shall show **"Serial Sensor Add 132 Space 4 Humidity Probe Broken"**.

Alarm ID: 26 Space 5 Sensor Offline

When an optional return air probe is enabled and the serial communication fails, the unit alarm display shall show **"Serial Sensor Add 133 Space 5 Probe Offline"**.

Alarm ID: 27 Space 5 Sensor Temperature Probe Broken

When an optional return air probe is enabled and the temperature sensor fails, the unit alarm display shall show **"Serial Sensor Add 133 Space 5 Temperature Probe Broken"**.

Alarm ID: 28 Space 5 Sensor Humidity Probe Broken

When an optional return air probe is enabled and the humidity sensor fails, the unit alarm display shall show **"Serial Sensor Add 133 Space 5 Humidity Probe Broken"**.

Alarm ID: 29 Space 6 Sensor Offline

When an optional return air probe is enabled and the serial communication fails, the unit alarm display shall show **"Serial Sensor Add 134 Space 6 Probe Offline"**.

Alarm ID: 30 Space 6 Sensor Temperature Probe Broken

When an optional return air probe is enabled and the temperature sensor fails, the unit alarm display shall show **"Serial Sensor Add 134 Space 6 Temperature Probe Broken"**.

Alarm ID: 31 Space 6 Sensor Humidity Probe Broken

When an optional return air probe is enabled and the humidity sensor fails, the unit alarm display shall show **"Serial Sensor Add 134 Space 6 Humidity Probe Broken"**.

Alarm ID: 38 Concurrent Calls for Heating (W1) and Cooling (Y1) (Critical Shutdown Alarm)

When either the external or BMS conventional calls for heating and cooling are active at the same time, the unit alarm display shall show **"Concurrent Calls for Heating (W1) and Cooling (Y1) Unit Off"**.

7.2 Alarm Management

When the unit controller has an active or unacknowledged alarm, the alarm status will be reflected by a flashing alarm key on the unit display and on a flashing alarm bell symbol on the face of the optional CL78 space sensor.

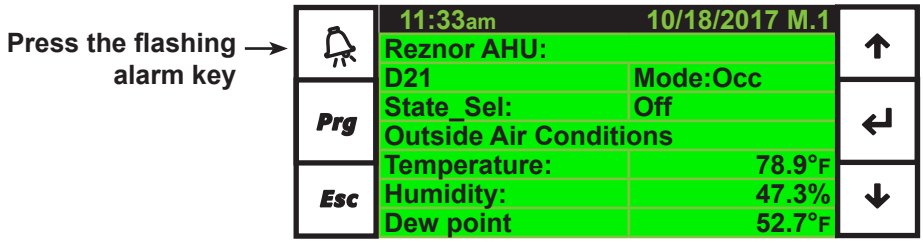
The unit controller is also equipped with an output configured to energize a factory mounted Unit General Alarm Relay (NO5). The alarm relay has a set of normally open and normally closed contacts available for customer use. The status of the controller output (NO5) is also reported to the optional BAS communication card.

The following active alarms will energize the unit general alarm relay:

Alarm ID: 1 Unit Safety Alarm (Critical Shutdown Alarm)
Alarm ID: 2 Supply Fan Failure (Critical Shutdown Alarm)
Alarm ID: 3 Low Discharge Temperature Alarm (Critical Shutdown Alarm)
Alarm ID: 5 Phase Loss (Critical Shutdown Alarm)
Alarm ID: 6 Outside Air Humidity Sensor Failure
Alarm ID: 7 Outside Air Temperature Sensor Failure
Alarm ID: 8 Discharge Air Temperature Sensor Failure (Critical Shutdown Alarm)
Alarm ID: 9 Cooling Coil Temp Sensor Failure
Alarm ID: 10 Mixed Air Temp Sensor Failure
Alarm ID: 11 Building Pressure Sensor Failure
Alarm ID: 12 Duct Pressure Sensor Failure
Alarm ID: 13 CO2 Sensor Failure
Alarm ID: 14 Space Sensor thTune (Option CL78) Offline
Alarm ID: 15 Space Sensor thTune (Option CL78) Temperature Sensor Broken
Alarm ID: 16 Space Sensor thTune (Option CL78) Humidity Sensor Broken
Alarm ID: 17 Space 2 Sensor Offline
Alarm ID: 18 Space 2 Sensor Temperature Probe Broken
Alarm ID: 19 Space 2 Sensor Humidity Probe Broken
Alarm ID: 20 Space 3 Sensor Offline
Alarm ID: 21 Space 3 Sensor Temperature Probe Broken
Alarm ID: 22 Space 3 Sensor Humidity Probe Broken
Alarm ID: 23 Space 4 Sensor Offline
Alarm ID: 24 Space 4 Sensor Temperature Probe Broken
Alarm ID: 25 Space 4 Sensor Humidity Probe Broken
Alarm ID: 26 Space 5 Sensor Offline
Alarm ID: 27 Space 5 Sensor Temperature Probe Broken
Alarm ID: 28 Space 5 Sensor Humidity Probe Broken
Alarm ID: 29 Space 6 Sensor Offline
Alarm ID: 30 Space 6 Sensor Temperature Probe Broken
Alarm ID: 31 Space 6 Sensor Humidity Probe Broken
Alarm ID: 38 Concurrent Calls for Heating (W1) and Cooling (Y1)

Acknowledging Unit Alarms and Viewing the Alarm Logger

When a unit has an active and or unacknowledged alarm, it needs to be managed locally from the unit display or from an optional remote display.



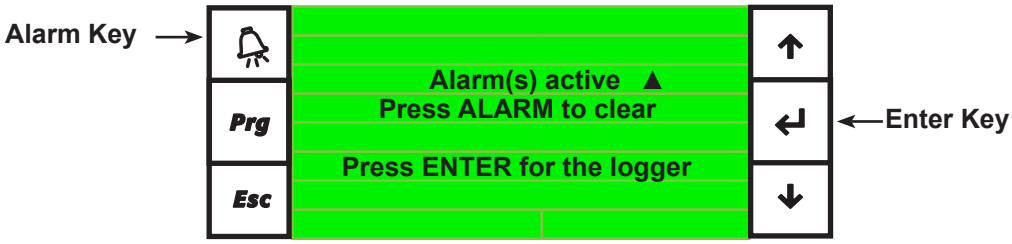
The most recently queued active and or unacknowledged alarm and message will be displayed.



When you reach the end of the queued alarm list, you will be prompted to either press the alarm key to clear the alarms or press the enter key to display the alarm logger.

Pressing the alarm key will perform the following two functions:

1. The controller will be prompted to attempt a reset of any critical shutdown alarms that have occurred. If the critical shutdown condition is no longer active, the controller will re-enable the unit.
2. The controller will clear any of the non-critical alarms that are no longer active.



Pressing the enter key will display the first page of the alarm logger. The first page of the alarm logger will contain the most recently logged alarm with a date, time, Alarm ID and a snapshot of the OA Temp, OA Humidity, DA Temp, CC Temp (Optional), and MA Temp (Optional) sensors at the time the alarm was logged. Pressing the up key in succession will display any remaining logged alarms from the most recent to least recent entry.



8.0 Start Up

8.1 Unit Test Mode

The test mode is accessed via the service menu and can only be entered when the unit is in the off state. Once the test mode is enabled, it remains active for a 2 hour time period. When the timer expires or test mode is disabled, the unit will return to the off state. In the test mode, all sequences of operation stop. Upon the test mode being enabled the following devices shall be automatically commanded:

1. The Unit Damper Position Y1 (If Equipped) shall be automatically be commanded to = 100%.
2. The Unit Supply Fan NO1 will be automatically commanded ON.
3. The Unit Supply Fan Speed Y2 (If Equipped) will be automatically commanded to the supply fan maximum Speed% setpoint value.

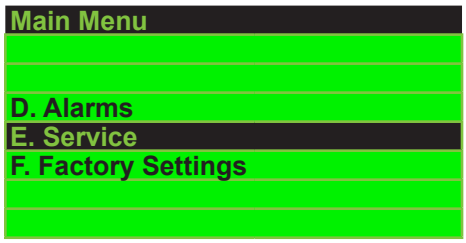
Once supply airflow is proven via Supply Fan Status ID1, the user can manually select all of the remaining controller outputs to be commanded ON and OFF or adjusted between 0-100%.

Note: The points that are available to be commanded / adjusted in the test mode feature are dependent upon the specific unit hardware configuration.

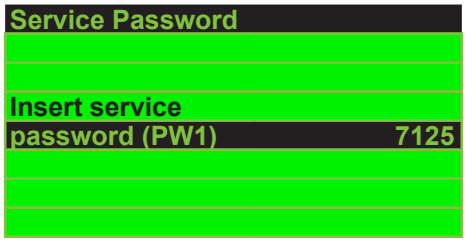
Test Mode Detailed Description

With the unit de-energized, open and secure the supply fan access door and the damper access door. Turn on the main unit disconnect to energize the unit. The unit digital controller will take two to three minutes to initialize.

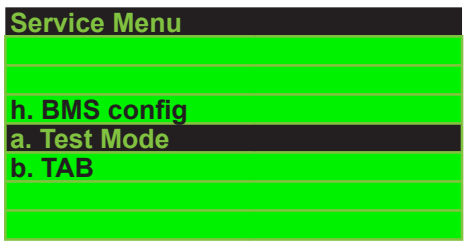
1. From the **Main Menu** use the up or down arrow key to reach the service menu and press the enter key to select it.



2. When prompted to enter the service password, use the up or down arrow key and enter the service password of **7125**, and press the enter key.



3. From the **Service Menu** use the up or down arrow key to reach the Test Mode menu and press the enter key to select it.



4. From the test mode **Screen E.a.1**, press the enter key to select the **Enable:** field, and press the up or down arrow key to turn the test mode ON.



Once enabled ON, press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to advance to the next test mode **Screen E.a.2**.

5. If applicable, visibly check that the optional unit dampers have actuated to the full open position (Outside Air) and full closed position (Return Air). The damper actuators will have up to a 120 second time period for full stroke.

NOTE: (If Equipped) Damper operation is required in order to complete the Test Mode. With proper damper operation, close the damper access door and resume the test at Step 6.

6. Visibly check for proper rotation of the unit supply fan. If the fan rotation is incorrect, the main unit electrical supply must be de-energized. Once de-energized, the electrical phasing will need to be switched at the main unit disconnect. After the unit phasing is corrected, re-verify the unit supply fan rotation.

   With proper supply fan rotation, close the supply fan access door, and resume the test mode at Step 7.

7. From the Test Mode **Screen E.a.2**, verify that the **Supply Fan Airflow Status:** is reading ON.

   NOTE: Proof of supply fan airflow is required in order to complete the Test Mode.

Test Mode	E.a.2
Damper:	100%
Manual Control Fans	
Supply: On	
Supply:	100%
Airflow Status:	ON

8. Instructions for Setting Supply Fan to Test and Balance Airflow

   Note: this step only applies to units equipped with options VFD1,2 or 3

   Adjusting the unit fan speed to achieve the desired airflow volume is accomplished on test mode **screen E.a.2**. Reference an auxiliary air measuring device for setting the maximum fan speeds. If an adjustment is required use the **Supply**: % modifiable field and use the up and down keys to increase or decrease the commanded fan speed until the desired air flow volume is achieved. If an adjustment is required, the adjusted value will need to be saved in the TAB Menu. Instructions for saving set point values are in Step 13 at the end of this section.

   Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next test mode screen.

9. If the unit is equipped with cooling the test points are located on **Screen E.a.3**. Press the enter key until the cursor is flashing on the **Stage 1:** field. Press the up arrow key to set the Stage 1 value to On. Verify the first stage or operation and repeat this step for remaining applicable stages. **Once verified, turn all cooling stage values off.**

Test Mode	E.a.3
Manual Control	
Cooling Stages	
Evap Stage 1 :	On
Stage 1:	Off
Stage 2:	Off
Stage 3:	Off

   Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next Test Mode Screen.

10. If the unit is equipped with a reheat system the test points are located on **Screen E.a.4**. Press the enter key until the cursor is flashing on the **Reheat Comp:** field. Press the up arrow key to set the **Reheat Comp:** value to On. (If Equipped) press the enter Key until the cursor is flashing on the **Reheat Capacity:** field and use the up arrow key to set the capacity to 100%. Verify that the Reheat Compressor is operating and that the refrigerant gas is now being diverted into the indoor condenser reheat coil. **Once verified, set the Reheat Comp: value to Off and the Reheat Capacity: value to 0%.**

Test Mode	E.a.4
Manual Control Reheat	
Reheat Comp:	On
Reheat Capacity:	79.3%
Output:	7.93vdc

   Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next test mode screen.

11. If the unit is equipped with gas heating the test points are located on **Screen E.a.5**. If the unit is equipped with a modulating gas valve use the **Heat Capacity:** field to increase / decrease the voltage signal to the modulating heating component. The **Stg#:** fields are used to enable the contact closures to the ignition system.

The **Heat Capacity:** and **Stg#:** fields will need to be used to verify and (if required) adjust the manifold pressure settings. See the applicable installation manual for manifold pressure adjustment instructions. **Once verified, set all of the Stg# values back to OFF and set the Heat Capacity: field to 0.0%.**

Test Mode			E . a . 5
Manual Control			
Heat Capacity :			100.0 %
Output :			10.00vdc
Heat Stages :			
Stg 1:	On	Stg 2:	Off
Stg 3:	Off	Stg 4:	Off
Stg 5:	Off	Stg 6:	Off

12. If the unit is equipped with electric heating the test points are located on **Screen E.a.5**. If the unit is equipped with an adjustable SCR use the **Heat Capacity:** field to increase / decrease the voltage signal. The **Stg#:** fields are used to enable the applicable contact closures to the fixed stages. **Once verified, set all of the Stg# values back to OFF and set the Heat Capacity: field to 0.0%.**

NOTE: The **Heat Capacity:** field is only associated with the SCR for **Stg 1:**

Test Mode			E . a . 5
Manual Control			
Heat Capacity :			100.0 %
Output :			10.00vdc
Heat Stages :			
Stg 1:	On	Stg 2:	Off
Stg 3:	Off	Stg 4:	Off
Stg 5:	Off	Stg 6:	Off

Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the up arrow key to navigate to Test Mode **Screen E.a.1.** Press the enter key to select the **Enable:** field. Press the down arrow key to set the value to OFF.

Test Mode	E.a.1
Manual Control	
Enable:	Off
Time Out:	120m
Countdown:	120m

13. <u>**Saving Adjusted Maximum Fan Speed Values**</u>

Press the escape key to return to the service menu and navigate to the TAB sub menu.

Service Menu
a. Test Mode
b. TAB
c. Supply Fan

Press the enter key to access the **TAB menu screen E.b.1**

This screen is used to save all adjustable unit parameters. The Set Max SF Spd? modifiable field is used to set the maximum fan speed setpoint for saving to the maximum fan speed value determined in Step 8.

Press the enter key to navigate to the **Set SF Max Spd?** Modifiable field and press the up key to set the value to YES. After a two-second period, the value will automatically return to the NO state.

To save unit and fan speed parameters press the enter key to navigate to the **Save?** Modifiable field and press the up key to set the value to YES. After a two-second period, the value will automatically return to the NO state.

Unit parameters have now been successfully saved to the controller permanent memory. From this point forward the **most recently saved** unit parameters can be restored using the **Restore?** Modifiable field

TAB : Service Save	E.b.1
Set Max SF Spd?	No
Save?	No
Restore?	No

The unit test procedure is now complete. Press The escape key in succession to return to the main screen.

8.2 Set the Date, Time on the controller Clock

1. From the **Main Screen**, press the program key to access the main menu.

11:33am	10/18/2017 M.1
Reznor AHU:	
D21	Mode:Occ
State_Sel:	Off
Outside Air Conditions	
Temperature:	78.9°F
Humidity:	47.3%
Dew point	52.7°F

2. Press the up or down arrow key to navigate to the **B. Schedule** submenu and press the enter key to select.

Main Menu
F. Factory Settings
A. Quick Setpoints
B. Schedule

3. From **Screen B.1,** press the enter key to access the modifiable date and time fields and set them to the current date and time.

Clock	B.1
	10:32:08am 10/18/17
Date:	10/18/17
Hour:	10:32:08am
Day:	Wednesday

4. Once set, press the enter key in succession until the cursor is blinking in the uppermost left hand corner of the screen and press the down arrow key to advance to **Screen B.2**.

   From **Screen B.2,** press the enter key to access the modifiable DST fields and set the values accordingly.

   Once set, press the escape key in succession to return to the main screen.

Clock	B.2
DST:	ENABLE
Transition Time:	60min
Start:	LAST SUNDAY
in MARCH	at 2.00AM
End:	LAST SUNDAY
in NOVEMBER	at 2.00AM

8.3 Selecting the Unit Occupancy Type and Enabling the System

8.3.1 Selecting Unit Occupancy Type

1. From the **Main Screen**, press the program key to access the main menu.

11:33am	10/18/2017 M.1
Reznor AHU:	
D21	Mode:Occ
State_Sel:	Off
Outside Air Conditions	
Temperature:	78.9°F
Humidity:	47.3%
Dew point	52.7°F

2. From the **Main Menu**, press the up or down arrow keys to navigate to the **A. Quick Setpoints** submenu and press the enter key to select.

Main Menu
F. Factory Settings
A. Quick Sepoints
B. Schedule

3. From **Screen A.1,** press the enter key to access the **OccMode_Sel:** field and set the value to one of the following choices:

   Digital Input (default value) The unit ships with a jumper wired on the occupied digital input. The unit will remain in the occupied status until the occupied jumper is removed and replaced with an external field supplied contact.

   Schedule The unit will operate based on local time of day schedule. The schedule feature is configurable for up to 10 weekly schedules and 16 holidays. See Section 8.3.2 for instructions.

BMS The unit will operate based on a command from a third party Bacnet system. The BMS occupancy type requires the BHB8 Bacnet card option.

Quick Setpoints	A.1
OccMode_Sel:	
Digital Input	

8.3.2 Setting a Weekly Schedule

1. From the **Main Menu** select the **B. Schedule** sub menu press the enter key to access the schedule feature.

Main Menu
F. Factory Settings
A. Quick Setpoints
B. Schedule

Press the down arrow to advance to **screen B.3**

From **Screen B.3** press the enter Key to access the modifiable Schedule fields and set the desired **Time ON**, **Time OFF**, and **Days Enabled:** values. When complete, press the program Key to return to the main menu.

Scheduler	B.3
Schedule #1:	1
Time On:	9:00am
Time Off:	5:00pm
Days Enabled:	MTWTF**

8.2.3 Enabling the System

1. From the **Main Menu**, press the up or down arrow keys to navigate to the **A. Quick Setpoints** submenu and press the enter key to select it.

Main Menu
F. Factory Settings
A. Quick Sepoints
B. Schedule

Press the down arrow to advance to **screen A.2.** For option D19 units with conventional inputs or option D22 set the **System Enable Value to** ON

Quick Setpoints	A.2
Unit Setup:	
System Enable:	On

For option D19 units with option CL78 or option D21 set the **State Selection Value to either Heat, Cool or Auto.**

Quick Setpoints	A.2
Unit Setup:	
State_Sel:	Auto

9.0 Controller Display Menus

Control System Display Menu Structure

Main Screen M.1	Main Screen M.1 (Monitor Only)				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Control Option Code	Current Control Option Code - D19 TStat, D19 CL78, D21, D21 CL78 or D22				
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		Deg F		
Humidity:	Current Outside Air Humidity		%rH		
Dew Point:	Current Outside Air Dew Point		Deg F		

Main Screen M.2	Main Screen M.2 will be displayed when the unit is selected with the CL78 Space Sensor Option (Monitor Only)				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Spc_Temp:	Space Temp - Current Space Temperature		Deg F		
SpcTempSP:	Space Temp SP - Base space temp setpoint value from the space thermostat or controller display adjustment	72	Deg 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	Main Screen M.3 (Monitor Only)				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Fan:	Current Supply Fan Commanded Speed		%		
DA_Temp:	Discharge Air Temp - Current Discharge Air Temperature		Deg F		
DA_SP:	Discharge Air Temp Active SP - Active Discharge Air Temperature Setpoint		Deg F		

Main Screen M.4	Main Screen M.4 will be displayed when the unit is selected with Control option D19 - TStat (Monitor Only)				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
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 the External Occupied Input			Off	On
Fan:	External Fan Call Input (G) - Current Status of the External Fan Input			Off	On
Htg:	External Heat Call Input (W1)- Current Status of the External Heat Input			Off	On
Clg:	External Cool Call Input (Y1) - Current Status of the External Cool Input			Off	On
Dehum:	External Dehum Call Input - Current Status of the External Dehum Input			Off	On

Main Screen M.x	Main Screen M.5, M.6, M.7, M.8, M.9, or M.10 will be displayed depending upon unit configuration (Monitor Only)				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Spc_Clg_Md:	Space Cooling Mode - Unit controls applicable cooling stages to maintain the **DA_SpcClg_SP**			Off	On
Spc_Dehum_Md:	Space Dehum Mode - Unit controls reheat compressor to maintain the **DA_Dh_SP** and applicable cooling stages to maintain the **CC_DA_SP**			Off	On
Spc_Htg_Md:	Space Heating Mode - Unit controls applicable heating stages to maintain the **DA_SpcHtg_SP**			Off	On
Spc_HtgClg_Md:	Space Heating Cooling Mode - Unit controls applicable heating stages to maintain the **DA_SpcHtCl_SP** (D21 Auto Heating Only)			Off	On
NA_Clg_Md:	Neutral Air Cooling Mode - Unit controls applicable cooling stages to maintain the **DA_NAClg_SP**			Off	On
NA_Dehum_Md:	Neutral Air Dehum Mode - Unit controls reheat compressor to maintain the **DA_Dh_SP** and applicable cooling stages to maintain the **CC_DA_SP**			Off	On
NA_Htg_Md:	Neutral Air Heating Mode - Unit controls applicable heating stages to maintain the **DA_NAHtg_SP**			Off	On

Main Menu					
A. Quick Setpoints	**Quick Setpoints Menu**				
Quick Setpoints A.1	**Quick Setpoints Screen A.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OccMode_Sel:	Occupied Mode Select - Schedule, Digital Input or BMS - Sets Desired Unit Occupancy Type	Digital Input			

Quick Setpoints A.2	**Quick Setpoints Screen A.2 will be displayed when the unit is selected with control option D19**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
System Enable:	System Enable - Sets System enabled and available for operation (Applies to D19 TStat)	Off			
State_Sel:	State Select 2=AUTO 3=COOL 4=HEAT 5=OFF - Sets Unit State (Applies to D19 CL78)	5		2	5

Quick Setpoints A.3	**Quick Setpoints Screen A.3 will be displayed when the unit is selected with control option D21**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
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 temp setpoint used to enable heating and cooling when the unit is in the auto state	65	Deg F	45	80
OAChgOvDiff:	OA Change Over SP Differential - Sets the differential for the **OAChgOv_SP**	5	Deg F	0.5	10
OAChgOvDel:	OA Change Over Delay Time - Delay period required to switch between heating and cooling when the unit is in the auto state	15	min	5	30
TempOcc:	Temporary Occupied Status from Space Thermostat - Indexed on when the thermostat fan button is pressed	Off		Off	On
TempOcc_Time:	Temporary Occupied Time Duration - Sets time duration for Temporary Occupancy	240	min	0	480

Quick Setpoints A.4	**Quick Setpoints Screen A.4 will be displayed when the unit is selected with control option D22**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
System Enable:	System Enable - Sets System enabled and available for operation	Off			
Setpoint Type::	Setpoint Type -Sets the discharge air temp setpoint type between BMS or Local.	Local			
DA_BMS_SP:	Discharge Air Temp BMS SP - Sets the discharge air setpoint via a BMS system			50	140
DA_Loc_SP:	Discharge Air Temp Local SP - Sets the discharge air setpoint via a Local Display.			50	140
DA_SP:	Discharge Air Temp Active SP - Active Discharge Air Temperature Setpoint				

Quick Setpoints A.5	**Quick Setpoints Screen A.5 will be displayed when unit is selected with the CL78 Space Sensor Option**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Spc_Temp:	Space Temp - Current Space Temperature		Deg F		
SpcTempSP:	Space Temp SP - Base space temp setpoint value from the space thermostat or controller display adjustment	72	Deg F	65	85
SpcHtgSp:	Space Heating SP - Value is equal to the **SpcTempSP** minus the **SpcHtgDB**	70	Deg F		
SpcClgSp:	Space Cooling SP - Value is equal to the **SpcTempSP** plus the **SpcClgDB**	74	Deg F		
SpcHtgDB:	Space Heating Dead Band - Sets value subtracted from the **SpcTempSP** for the **SpcEffHtgSP** definition	2	Deg F	0	5
SpcClgDB:	Space Cooling Dead Band - Sets value added to the **SpcTempSP** for the **SpcEffClgSP** definition	2	Deg F	0	5

Quick Setpoints A.6	**Quick Setpoints Screen A.6 will be displayed when unit is selected with the CL78 Space Sensor Option**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
SpcEffClgSP:	Space Effective Cooling SP - Defined by the **SpcClgDB** and the **SpcClgUnoOs** setpoints		Deg F		
SpcClgOnDiff:	Space Cooling On Differential - Sets the differential required above the **SpcEffClgSP** for the space cooling call to turn on	1	Deg F	0.5	10
SpcClgOffDiff:	Space Cooling Off Differential - Sets the differential required below the **SpcEffClgSP** for the space cooling call to turn off	1	Deg F	0.5	10
SpcClgUnoOs:	Space Cooling Unoccupied Offset - Sets the value added to the **SpcTempSP** when in the unoccupied mode for the **SpcEffClgSP** definition	8	Deg F	0	15
UnoClgOffDiff	Unoccupied Space Cooling Off Differential - Sets the differential required below the **SpcEffClgSP** for the space cooling call to turn off when in the unoccupied mode	4	Deg F	0	10
DA_SpcClg_SP:	Discharge Air Temp Space Cooling SP - Sets the discharge setpoint used when in Space Cooling Mode	55	Deg F	50	100

Quick Setpoints A.7	Quick Setpoints Screen A.7 will be displayed when unit is selected with the CL78 Space Sensor Option				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
SpcEffHtgSP:	Space Effective Heating SP - Defined by the **SpcHtgDB** and the **SpcHtgUnoOs** setpoints		Deg F		
SpcHtgOnDiff:	Space Heating On Differential - Sets the differential required below the **SpcEffHtgSP** for the space heating call to turn on	1	Deg F	0.5	10
SpcHtgOffDiff:	Space Heating Off Differential - Sets the differential required above the **SpcEffHtgSP** for the space heating call to turn off	1	Deg F	0.5	10
SpcHtgUnoOs:	Space Heating Unoccupied Offset - Sets the value subtracted from the **SpcTempSP** when in the unoccupied mode for the **SpcEffHtgSP** definition	8	Deg F	0	15
UnoHtgOffDiff	Unoccupied Space Heating Off Differential - Sets the differential required above the **SpcEffHtgSP** for the space heating call to turn off when in the unoccupied mode	4	Deg F	0	10
DA_SpcHtg_SP:	Discharge Air Temp Space Heating SP - Sets the discharge setpoint used when in Space Heating Mode	90	Deg F	50	140

Quick Setpoints A.8	Quick Setpoints Screen A.8 will be displayed when unit is selected with D21 and the CL78 Space Sensor Option				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
SpcEffClgSP:	Space Effective Cooling SP - Defined by the **SpcClgDB** and the **SpcClgUnoOs** setpoints		Deg F		
SpcHCOnDiff:	Space Heating Cooling On Differential - Sets the differential required above the **SpcTempSP** for the space cooling call to turn on (Auto Heating Only)	1	Deg F	0.5	10
SpcHCOffDiff:	Space Heating Cooling Off Differential - Sets the differential required below the **SpcTempSP** for the space cooling call to turn off (Auto Heating Only)	1	Deg F	0.5	10
UnoHCOffDiff	Unoccupied Space Heating Cooling off Differential - Sets the differential required above the **SpcEffHtgSP** for the space heating call to turn off when in the unoccupied mode	4	Deg F	0	10
DA_SpcHtCl_SP:	Discharge Air Temp Space Heat Mode Cooling SP - Sets the discharge air setpoint used when in Space Heat Cooling Mode (Auto Heating Only)	55	Deg F	50	100

Quick Setpoints A.9	Quick Setpoints Screen A.9 will be displayed when unit is configured for Space Control and Dehumidification				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Spc_Humidity:	Space Humidity - Current Space Humidity		%rH		
SpcHumSP:	Space Humidity SP - Sets the Space Humidity Setpoint	55	%rH	35	75
SpcDhOnDiff:	Space Dehum On Differential - Sets the differential required above the **SpcHumSP** for the space dehum call to turn on	10	%rH	1	10
SpcDhOffDiff:	Space Dehum Off Differential - Sets the differential required below the **SpcHumSP** for the space dehum call to turn off	5	%rH	1	10

Quick Setpoints A.10	Quick Setpoints Screen A.10 Shown with control options D19 and D21				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
DA_NAClg_SP:	Discharge Air Temp Neutral Cooling SP - Sets the discharge setpoint used when in Neutral Air Cooling Mode	70	Deg 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	Setpt		Setpt	Reset
DA_NAHtg_SP:	Discharge Air Temp Neutral Heating SP - Sets the discharge setpoint used when in Neutral Air Heating Mode	70	Deg 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		Deg F	50	140

Quick Setpoints A.11	Quick Setpoints Screen A.11 Shown with control options D19 and D21				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OA_Temp:	Current Outside Air Temp		Deg 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		Deg F	50	140
NAHRDAMax:	Neutral Air Heat DA SP Reset DA Max - Sets the maximum neutral air heating discharge air temp reset setpoint	75	Deg F	50	140
NAHRDAMin:	Neutral Air Heat DA SP Reset DA Min - Sets the minimum neutral air heating discharge air temp reset setpoint	65	Deg F	50	140
NAHROAMax:	Neutral Air Heat DA SP Reset OA Max - Sets the maximum neutral air heating outside air temp reset setpoint	65	Deg F	0	100
NAHROAMin:	Neutral Air Heat DA SP Reset OA Min - Sets the minimum neutral air heating outside air temp reset setpoint	30	Deg F	0	100

Quick Setpoints A.12	Quick Setpoints Screen A.12 Shown with control options D19, D21 and space control				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
System Enable:	Unit Enable - Sets unit enabled and available for operation	5		2	5
DA_SpcClg_SP:	Discharge Air Temp Space Cooling SP - Sets the discharge setpoint used when in Space Cooling Mode.	55	Deg 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.	Setpt		Setpt	Reset
DA_SpcHtg_SP:	Discharge Air Temp Space Heating SP - Sets the discharge setpoint used when in Space Heating Mode.	90	Deg 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.		Deg F	50	140

Quick Setpoints A.13	Quick Setpoints Screen A.13 Shown with control options D19, D21 and space control				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OA_Temp:	Current Outside Air Temp		Deg F		
DA_SpcHRst_SP:	Discharge Air Temp Space Heating Reset SP - Display of optional calculated reset schedule setpoint used when in Space Heating Mode.		Deg F	50	140
SpcHRDaMax:	Space Heat DA SP Reset OA Max - Sets the maximum space heating discharge air temp reset setpoint.	120	Deg F	50	140
SpcHRDaMin:	Space Heat DA SP Reset DA Min - Sets the minimum space heating discharge air temp reset setpoint.	90	Deg F	50	140
SpcHROaMax:	Space Heat DA SP Reset OA Max - Sets the maximum space heating outside air temp reset setpoint.	65	Deg F	0	100
SpcHROaMin:	Space Heat DA SP Reset OA Min - Sets the minimum space heating outside air temp reset setpoint.	30	Deg F	0	100

Quick Setpoints A.14	Quick Setpoints Screen A.14 will Be displayed when the unit is configured for Dehumidification				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
DhOADP_SP:	Sets the Dehum OA Dew Point SP - Used to allow Neutral Air Dehumidification Mode when the OA dew point is greater than SP	58	Deg F	50	100
DhOADP_Diff:	Dehum OA Dew Point SP Differential - Sets the differential for the **DhOADP_SP**	2	Deg F	0.5	10

Quick Setpoints A.15	Quick Setpoints Screen A.15 will Be displayed when the unit is selected with Building Pressure Control				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Pressure Control	Factory Selection: Building				
Controlled Device	Factory Selection: Supply Fan - Dampers				
Bldg_Pressure	Building Static Pressure				
Setpoint:	Building Static Pressure SP	0.1	iwc	-0.5	0.5

Quick Setpoints A.16	Quick Setpoints Screen A.16 will Be displayed when the unit is selected with Duct Pressure Control				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
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

Quick Setpoints A.17	Quick Setpoints Screen A.17 will be displayed when the unit is selected with VFCD or BE15				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
SpcCO2SP:	Space CO2 SP - Current Space CO2 Setpoint	1000	ppm	0	2000
SpcCO2Diff:	Space CO2 SP Differential - Differential for the **SpcCO2SP.**	200	ppm	10	500

Main Menu					
B. Schedule	**Schedule Menu**				
Schedule B.1	**Schedule Screen B.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Date:	Sets the current month day and year - Default Value: Factory Date				
Hour:	Sets the current time - Default Value: Factory Time				

Schedule B.2	**Schedule Screen B.2**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
DST:	Set to enable DST - Default Value: Enable				
Transition Time:	Sets Transition Time - Default Value: 60 min				
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				

Schedule B.3	**Schedule Screen B.3 will be displayed if unit OccMode_Sel is set to Schedule**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Schedule #:	Modifiable Field used to advance through 10 available Weekly Schedules				
Time On:	Sets the desired On time for selected Schedule #				
Time Off:	Sets the desired Off time for selected Schedule #				
Days Enabled:	Sets the desired days of the week for the selected Schedule #				

Schedule B.4	**Schedule Screen B.4 will be displayed if unit OccMode_Sel is set to Schedule**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
1:	Sets the desired Holiday Range 1: For Extended Unoccupied Mode 0/0 - 0/0				
2:	Sets the desired Holiday Range 2: For Extended Unoccupied Mode 0/0 - 0/0				
3:	Sets the desired Holiday Range 3: For Extended Unoccupied Mode 0/0 - 0/0				
4:	Sets the desired Holiday Range 4: For Extended Unoccupied Mode 0/0 - 0/0				

Schedule B.5	**Schedule Screen B.5 will be displayed if unit OccMode_Sel is set to Schedule**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
5:	Sets the desired Holiday Range 5: For Extended Unoccupied Mode 0/0 - 0/0				
6:	Sets the desired Holiday Range 6: For Extended Unoccupied Mode 0/0 - 0/0				
7:	Sets the desired Holiday Range 7: For Extended Unoccupied Mode 0/0 - 0/0				
8:	Sets the desired Holiday Range 8: For Extended Unoccupied Mode 0/0 - 0/0				

Schedule B.6	**Schedule Screen B.6 will be displayed if unit OccMode_Sel is set to Schedule**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
9:	Sets the desired Holiday Range 9: For Extended Unoccupied Mode 0/0 - 0/0				
10:	Sets the desired Holiday Range 10: For Extended Unoccupied Mode 0/0 - 0/0				
11:	Sets the desired Holiday Range 11: For Extended Unoccupied Mode 0/0 - 0/0				
12:	Sets the desired Holiday Range 12: For Extended Unoccupied Mode 0/0 - 0/0				

Schedule B.7	**Schedule Screen B.7 will be displayed if unit OccMode_Sel is set to Schedule**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
13:	Sets the desired Holiday Range 13: For Extended Unoccupied Mode 0/0 - 0/0				
14:	Sets the desired Holiday Range 14: For Extended Unoccupied Mode 0/0 - 0/0				
15:	Sets the desired Holiday Range 15: For Extended Unoccupied Mode 0/0 - 0/0				
16:	Sets the desired Holiday Range 16: For Extended Unoccupied Mode 0/0 - 0/0				

Main Menu					
C. Points List	**Points List Menu - Applicable screens and content will be displayed depending upon unit configuration**				
	See Hardware Point Table on page 4 for Complete List of IO Points and Serial Communication Connections				
Points List C.1	**Points List Screen C.1**				
	Applicable Analog Outputs for Unit Configuration				
Points List C.2	**Points List Screen C.2 thru C.4**				
Thru C.4	Applicable Relay Outputs for Unit Configuration				
Points List C.5	**Points List Screen C.5**				
	Applicable Analog Inputs for Unit Configuration				
Points List C.6	**Points List Screen C.6**				
	Applicable Analog Inputs for Unit Configuration				
Point Lists C.7 thru C.14	**Points List Screens C.7 thru C.14 contain the temp & humidity values for the optional space sensors 1 thru 6.**				

Points List C.15	**Points List Screen C.15**				
	Applicable Digital Inputs for Unit Configuration				
Points List C.16	**Points List Screen C.16**				
	Applicable Digital Inputs for Unit Configuration				

Main Menu	
D. Alarms	Alarms Menu - Active Alarms are displayed with the option of entering the Alarm Logger
	See Alarm Management Section paragraph 7.2 of this document for detailed information on Active and Logged alarms

Main Menu					
E. Service	**Service Menu**				
a. Test Mode	**Test Mode Menu The following test mode screens will display the applicable content based upon the unit configuration**				
Test Mode E.a.1	**Test Mode Screen E.a.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Enable:	Modifiable Field Used to enable the Test Mode				
Time Out:	Modifiable Field Used to adjust the test mode time duration	120	min	0	240

Test Mode E.a.2	**Test Mode Screen E.a.2**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Damper:	Automatically Commanded Percentage Output to unit Damper(s)	100	%	100	100
Supply:	Automatically Commanded Supply Fan Start Output				
Supply:	Supply Fan Speed Output Modifiable Field used to test unit Supply Fan VFD and set Air Balance fan speed adjustment	100	%	30	100
Airflow Status:	Status of Supply Fan Air Proving Switch			Off	On
Test Mode E.a.3	**Test Mode Screen E.a.3**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Evap Stage 1:	Modifiable Field used to turn on Evap Stage 1	Off		Off	On
Comp Stage 1:	Modifiable Field used to turn on Compressor Stage 1	Off		Off	On
Comp Stage 2:	Modifiable Field used to turn on Compressor Stage 2	Off		Off	On
Comp Stage 3:	Modifiable Field used to turn on Compressor Stage 3	Off		Off	On

Test Mode E.a.4	**Test Mode Screen E.a.4 will be displayed if unit is configured with a Reheat Option**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Reheat Comp:	Modifiable Field used to turn on Reheat Compressor	Off		Off	On
Reheat Capacity:	Modifiable Field used to set percentage command to Reheat Valve	0	%	0	100
Output:	Output in vdc to Reheat Valve	0	vdc	0	10

Test Mode E.a.5	**Test Mode Screen E.a.5**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Heat Capacity:	Modifiable Field used to adjust the output to the Gas Heating Mod or SCR Controller	0	%	0	100
Output:	Output in vdc to modulated heating component: Gas = 2-10 Electric = SCR 0-10	0	vdc	0	10
Stg 1:	Modifiable Field used to turn on Heating Stage 1	Off		Off	On
Stg 2:	Modifiable Field used to turn on Heating Stage 2	Off		Off	On
Stg 3:	Modifiable Field used to turn on Heating Stage 3	Off		Off	On
Stg 4:	Modifiable Field used to turn on Heating Stage 4	Off		Off	On
Stg 5:	Modifiable Field used to turn on Heating Stage 5	Off		Off	On
Stg 6:	Modifiable Field used to turn on Heating Stage 6	Off		Off	On

Test Mode Screens E.a.6 thru E.a.17	**Test Mode Screens E.a.6 through E.a.17 contain all applicable analog and binary hardware sensor inputs, including any serial communicated sensors depending upon unit configuration.**

b. TAB	**TAB Menu - Used to perform a Service Save of controller setpoints and to perform a Service Restore of previously saved setpoints**				
TAB E.b.1	**TAB Screen E.b.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Set Max SF Spd?	Modifiable Field used to set the maximum allowable fan speed for saving (this field will be shown if VFD options 1, 2 or 3 are selected).	No		No	Yes
Save?	Modifiable Field used to perform a Service Save of current setpoints	No		No	Yes
Restore?	Modifiable Field used to perform a Service Restore of current setpoints	No		No	Yes

c. Supply Fan	Supply Fan Menu - Applicable screens and content will be displayed depending upon unit configuration				
Supply Fan E.c.1	**Supply Fan Screen E.c.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Control:	Selected Fan Control Strategy - AN2 Contactor, AN10 Starter, VFC9 Constant Vol, VFC4 Bldg Pressure, VFC3 Duct Pressure, VFC2 0-10vdc input, VFCD 2 Speed CO2,VFC1 or VFCC BMS source				
SFSpdClgSP:	Supply Fan Speed Cooling SP - Sets commanded speed for the supply fan when in cooling mode (Applies to VFC9)	100	%	30	100
SFSpdHtgSP:	Supply Fan Speed Heating SP - Sets commanded speed for the supply fan when in heating mode (Applies to VFC9)	100	%	30	100
SFSpdLoSP:	Supply Fan Speed Low SP - Sets commanded speed for the supply fan when the unit is not in either the heating or the cooling mode. (Applies to VFC1)	100	%	30	100
SFSpdHiSP:	Supply Fan Speed High SP - Sets commanded speed for the supply fan when the unit is in either the heating or the cooling mode. (Applies to VFC1)	100	%	30	100
SFSpdLoCO2SP:	Supply Fan Speed Low SP - Sets commanded speed for the supply fan when the unit is below the CO2 Setpoint. (Applies to VFCD)	100	%	30	100
SFSpdHiCO2SP:	Supply Fan Speed High SP - Sets commanded speed for the supply fan when the unit is above the CO2 Setpoint. (Applies to VFCD)	100	%	30	100
SF_BMS:	Supply Fan Speed BMS - Value of the current commanded fan speed from the BMS		%	30	100

Supply Fan E.c.2	Supply Fan Screen E.c.2 will be displayed if Supply Fan is selected for Bldg Pressure Control				
Name	**Description - Supply Fan Bldg Pressure Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
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 the control loop		%	0	100
SF_VFD_Cmd	Current Supply Fan VFD Command in vdc		vdc	0	10

Supply Fan E.c.3	Supply Fan Screen E.c.3 will be displayed if Supply Fan is selected for Duct Pressure Control				
Name	**Description - Supply Fan Duct Pressure Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
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 the control loop		%	0	100
SF_VFD_Cmd	Current Supply Fan VFD Command in vdc		vdc	0	10

d. Capacity	Capacity Menu - Applicable screens and content will be displayed depending upon unit configuration				
Capacity E.d.1	**Capacity Screen E.d.1 (Monitor Only)**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Heat Type:	None, AG40, AG58, AG21, AG42, AG55, AG57, AG2, MAPS Electric or EG4 Electric				
Fuel Type/AK/kw:	AA1 Natural Gas or AA2 Propane/AK Option/kw Option				
Cooling Type:	None, AUD1 Single stage, AUD2 Two Stage or AUD3 Three stage, MAPS Single Stage or MAPS Three Stage				
Reheat:	None, MAPS Reheat or AUR1				
Evap Cooling	ECD1 or ECD2				

Capacity E.d.2	Capacity Screen E.d.2				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
th- Space Sens:	th- Space Sens - Enables and 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 the number of sensors to average including the th-Tune	2		2	6
Ena_Unocc_Spc:	Enabled Unoccupied Space Control - Enables night setback & night setup operation	On		Off	On

Capacity E.d.3	Capacity Screen E.d.3 will be displayed when the unit is selected with the Control Option D21				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OAHtgLo_SP	OA Heating Lockout SP - Sets OA setpoint used to disable heating	65	Deg F	0	150
OAHtgLoDiff	OA Heating Lockout SP Differential - Sets differential used for the **OAHtgLo_SP**	2	Deg F	0.5	10
OAClgLo_SP	OA Cooling Lockout SP - Sets OA setpoint used to disable mechanical cooling	65	Deg F	-10	150
OAClgLoDiff	OA Cooling Lockout SP Differential - Sets differential used for the **OAClgLo_SP**	2	Deg F	0.5	10

Capacity E.d.4	Capacity Screen E.d.4 will be displayed if the unit is configured with Heating				
Name	**Description - Heating Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
DA_Temp	Current Discharge Air Temp		Deg F		
Setpoint:	Current Discharge Air SP		Deg F		
PI Output:	Current output of the control loop		%	0	100
HX_Mod_Cmd	Heating Modulation Command in vdc		vdc	0-2	10

Capacity E.d.5	Capacity Screen E.d.5 will be displayed if the unit is configured with Heating				
Name	**Description - Heating Stages**	**Default**	**Unit**	**Min**	**Max**
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

Capacity E.d.6	Capacity Screen E.d.6				
Name	**Description - Cooling Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
Active Input:	Current controlling input for cooling - DA_Temp or (CC_Temp used in Dehumidification Mode)		Deg F		
Setpoint:	Current Discharge SP or (Cooling Coil SP used in Dehumidification Mode)		Deg F		
PI Output:	Current output of the control loop		%	0	100

Capacity E.d.7	Capacity Screen E.d.7				
Name	**Description - Cooling Stages**	**Default**	**Unit**	**Min**	**Max**
Comp_Stg1_Cmd	Current Compressor Stage 1 Command			Off	On
Comp_Stg2_Cmd	Current Compressor Stage 2 Command			Off	On
Comp_Stg3_Cmd	Current Compressor Stage 3 Command			Off	On
Evap _Cmd	Current Evap Cooling Command			Off	On

Capacity E.d.8	Capacity Screen E.d.8 will be displayed if the unit is configured with Reheat option AUR1				
Name	**Description - Reheat Valve Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
DA_Temp	Current Discharge Air Temp		Deg F		
Setpoint:	Current Reheat Discharge Air Temp SP		Deg F		
PI Output:	Current output of the control loop		%	0	100
RH_Mod_Cmd	Current Reheat Modulation Command in vdc		vdc	0	10

Capacity E.d.9	Capacity Screen E.d.9 will be displayed if the unit is configured with a Reheat option				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OADhHLo_SP	OA Dehum High Lockout SP - Sets OA setpoint used to disable dehumidification	110	Deg F	0	110
OADhHLoDiff	OA Dehum High Lockout SP Differential - Sets differential used for the **OADhHLo_SP**	2	Deg F	0.5	10
OADhLLo_SP	OA Dehum Low Lockout SP - Sets OA setpoint used to disable dehumidification	58	Deg F	50	100
OADhLLoDiff	OA Dehum Low Lockout SP Differential - Sets differential used for the **OADhLLo_SP**	2	Deg F	0.5	10
Capacity E.d.10	**Capacity Screen E.d.10 will be displayed if the unit is configured with a Reheat option**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
DA_Dh_SP	Discharge Air Temp Dehum SP - Sets the discharge air setpoint used to control the reheat compressor during dehumidification mode	70	Deg F	50	100
CC_DA_SP	Cooling Coil Dehum DA SP - Sets the discharge air setpoint used to control unit primary cooling when in dehumidification Mode (AUR1 Only)	52	Deg F	45	80

Capacity E.d.11	Capacity Screen E.d.11				
Name	**Description - Fixed Capacity Compressor 1**	**Default**	**Unit**	**Min**	**Max**
Run Hours:	Accumulated Total Run Hours		hrs		
Num Starts:	Accumulated Total Number of Starts				
Reset to Zero?	Used to reset accumulators to zero				

Capacity E.d.12	Capacity Screen E.d.12				
Name	**Description - Fixed Capacity Compressor 2**	**Default**	**Unit**	**Min**	**Max**
Run Hours:	Accumulated Total Run Hours		hrs		
Num Starts:	Accumulated Total Number of Starts				
Reset to Zero?	Used to reset accumulators to zero				

Capacity E.d.13	Capacity Screen E.d.13				
Name	**Description - Fixed Capacity Compressor 3**	**Default**	**Unit**	**Min**	**Max**
Run Hours:	Accumulated Total Run Hours		hrs		
Num Starts:	Accumulated Total Number of Starts				
Reset to Zero?	Used to reset accumulators to zero				

Capacity E.d.14	Capacity Screen E.d.14 will be displayed if the unit is configured with a Reheat Compressor				
Name	**Description - Reheat Compressor**	**Default**	**Unit**	**Min**	**Max**
Run Hours:	Accumulated Total Run Hours		hrs		
Num Starts:	Accumulated Total Number of Starts				
Reset to Zero?	Used to reset accumulators to zero				

Capacity E.d.15	Capacity Screen E.d.15 will be displayed if the unit is configured with a Evaporative Cooling				
Name	**Description - Reheat Compressor**	**Default**	**Unit**	**Min**	**Max**
Run Hours:	Accumulated Total Run Hours		hrs		
Num Starts:	Accumulated Total Number of Starts				
Reset to Zero?	Used to reset accumulators to zero				

Capacity E.d.16	Capacity Screen E.d.16 will be displayed when the unit is selected with control option D22				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Setpoint Type::	Setpoint Type -Sets the discharge air temp setpoint type between BMS or Local.	Local			
DA_BMS_SP:	Discharge Air Temp BMS SP - Sets the discharge air setpoint via a BMS system			50	140
DA_Loc_SP:	Discharge Air Temp Local SP - Sets the discharge air setpoint via a Local Display.			50	140
DA_SP:	Discharge Air Temp Active SP - Active Discharge Air Temperature Setpoint				

Capacity E.d.17	Capacity Screen E.d.17 will be displayed when the unit is selected with control options D19 or D22				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OAHtgLo_SP_2	OA Heating Lockout SP_2 - Sets OA setpoint used to disable heating	60	Deg F	0	150
OAHtgLoDiff_2	OA Heating Lockout SP_2 Differential - Sets differential used for the **OAHtgLo_SP**	2	Deg F	0.5	10
OAClgLo_SP_2	OA Cooling Lockout SP_2 - Sets OA setpoint used to disable mechanical cooling	60	Deg F	-10	150
OAClgLoDiff_2	OA Cooling Lockout SP_2 - Differential - Sets differential used for the **OAClgLo_SP**	2	Deg F	0.5	10

Capacity E.d.18	Capacity Screen E.d.18 will be displayed when the unit is selected with control option D19 and TStat				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Input Type:	Input Type - Sets the selected input type for D19 conventional inputs External or BMS	External			
Ext Occ:	External Occupancy Call - Current Status of the External Occupied Input			Off	On
Fan:	External Fan Call Input (G) - Current Status of the External Fan Input			Off	On
Htg:	External Heat Call Input (W1)- Current Status of the External Heat Input			Off	On
Clg:	External Cool Call Input (Y1) - Current Status of the External Cool Input			Off	On
Dehum:	External Dehum Call Input - Current Status of the External Dehum Input			Off	On

Capacity E.d.19	Capacity Screen E.d.19 will be displayed when the unit is selected options ECD1 or ECD2				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OAHumEvap_SP:	OA Humidity Evap Enable Setpoint - Sets the outside air humidity enable setpoint for evaporative cooling options EDC1 and ECD2	50%	RH	0%	100%
OAHumEvap_Diff:	OA Humidity Evap Enable Differential - Sets the outside air humidity setpoint differential for evaporative cooling options EDC1 and and ECD2	3%	RH	1%	10%

e. Dampers	Damper Menu - Applicable screens and content will be displayed depending upon unit configuration				
Dampers E.e.1	**Dampers Screen E.e.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Control:	Selected Damper Control Strategy - Non DDC, GF2A 100% OA, GF1 0-10Vdc Input, GF2 Two Position, GF4 Four Position, GF5 Bldg Pressure, GF8 Economizer or GF1A BMS Control				
UnoccVnt_Ena:	Unoccupied Ventilation Enable - Allows OA during the unoccupied mode for damper control option Two Position	Off			
Dmpr_SP_Occ:	Two Position Damper Occ SP - Sets the value that the unit dampers will be commanded to when the unit is occupied (Applies to GF2)	100	%	0	100
Dmpr_SP_Unocc:	Two Position Damper Unocc SP - Sets the value that the unit dampers will be commanded to when the unit is unoccupied For an unoccupied setpoint above zero **UnoccVnt_Ena** must be turned on (Applies to GF2)	0	%	0	100
Aux_1_SP:	Aux 1 Damper Position SP - Damper position setpoint (Applies to GF4)	20	%	0	100
Aux_2_SP:	Aux 2 Damper Position SP - Damper position setpoint (Applies to GF4)	40	%	0	100
Aux_3_SP:	Aux 3 Damper Position SP - Damper position setpoint (Applies to GF4)	60	%	0	100
Aux_4_SP:	Aux 4 Damper Position SP - Damper position setpoint (Applies to GF4)	80	%	0	100
Damper_BMS	Damper BMS - Current value commanded to the unit damper(s) from the BMS system				

Dampers E.e.2	Dampers Screen E.e.2 will be displayed if the Dampers are selected for Bldg Pressure Control				
Name	**Description - Dampers Bldg Pressure Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
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 the control loop		%	0	100
Damper_Cmd	Current Damper Output Command in vdc		vdc	0	10

Dampers E.e.3	Dampers Screen E.e.3 will be displayed if the unit is selected for option GF8 Economizer Control.				
Name	**Description - Dampers Econ Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
Unocc_Econ_Ena:	Unoccupied Enable Economizer Mode - Allows Economizer during the unoccupied mode	Off		Off	On
Ec_OALO_SP:	Economizer OA Temp Lockout SP - OA Temp setpoint value that economizer is enabled.	60	Deg F	0	120
Ec_OALODiff:	Economizer OA Temp Lockout Diff - Differential for the **Ec_OALO_SP**	2	Deg F	0.5	10
Ec_OADPLO_SP:	Economizer OA Dew Point Lockout SP - OA Dew Point setpoint value that economizer is enabled.	58	Deg F	0	120
Ec_OADPLODiff:	Economizer OA Dew Point Lockout Diff - Differential for the **Ec_OADPLO_SP**	2	Deg F	0.5	10
MinDmprSP:	Minimum Damper SP - Sets the unit minimum damper position.	10	%	0	100
CO2DmprOsSP	CO2 Minimum Damper Offset SP - Value added to the **MinDmprSP** when CO2 is above setpoint.	10	%	0	100

Dampers E.e.4	Dampers Screen E.e.4 will be displayed if the unit is selected for option GF8 Economizer Control.				
Name	**Description - Dampers Econ Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
MA_Diff:	MIxed Air Setpoint Differential - Sets the differential between the unit discharge air setpoint and the mixed air temperature setpoint .	3	Deg F	0	5
En_DX_Econ:	Enable DX Economizer - When set to on it allows mechanical cooling to operate when the unit economizer is active.	Off			

Dampers E.e.5	Dampers Screen E.e.5 will be displayed if the unit is selected for option GF8 Economizer Control.				
Name	**Description - Dampers Econ Demand Control Loop Monitoring**	**Default**	**Unit**	**Min**	**Max**
MA_Temp	Current Mixed Air Temp		Deg F		
Setpoint:	Current Mixed Air Temp SP **- DA_SpcClg_SP =** 55 Deg F minus the value of the **MA_Diff** setpoint		Deg F		
PI Output:	Current output of the control loop		%	0	100
Damper_Cmd	Current Damper Output Command in vdc		vdc	0	10

f. Alarm Config	Alarm Config Menu				
Alarm Config E.f.1	**Alarm Config E.f.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Auto Reset Safety Alarm:	Sets automatic reset of unit safety alarm when the condition is cleared	Off			
Auto Reset Phase Alarm:	Sets automatic reset of unit phase alarm when the condition is cleared	Off			
AutoRst_AlDel:	Auto Reset Delay Time - Sets the time delay period required for the auto reset	300	Sec		

g. Information	Information Menu				
Information E.g.1	**Information Screen E.g.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Control Program:	Program Option currently loaded into the controller				
Ver:	Current Software Version (number and date)				
Bios:	Current Bios Version (number and date)				
Boot:	Current Boot Version (number and date)				

h. BMS Config	BMS Config Menu - Applicable screens and content will be displayed depending upon unit configuration				
BMS Config E.h.1	**BMS Config Screen E.h.1**				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Protocol:	Sets BMS Protocol - BACnet MSTP or Lon - Default = BACnet MSTP				

BMS Config E.h.2	BMS Config Screen E.h.2 will be shown when the BMS Protocol is set to BACnet MSTP				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Termconf PlugIn?	Sets the BACnet Plugin command	No			

BMS Config E.h.4	BMS Config Screen E.h.4 will be shown when the BMS Protocol is set to BACnet MSTP				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Instance:	Sets the Instance	77000			
Baudrate:	Sets the Baudrate - 9600, 19200, 38400 or 76800	38400			
MAC Addr:	Sets the Mac Address	0		0	127
MaxMasters:	Sets the Max Masters	127		0	127
MaxInfoFrames:	Sets the Max Info Frames	20		0	255

BMS Config E.h.7	BMS Config Screen E.h.7 will be shown when the BMS Protocol is set to BacNet MSTP				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
Function:	Sets Function - Read or Write	Read			
Update:	Sets Update - Yes or No	Yes			

BMS Config E.h.8	BMS Config Screen E.h.8				
Name	**Description**	**Default**	**Unit**	**Min**	**Max**
OA_Hum_Sel:	Share OA Humidity from BMS (0=Probe, 1=BMS) - Set value to BMS for OA humidity share from BMS	Probe		Probe	BMS
OA_Temp_Sel:	Share OA Temp from BMS (0=Probe, 1=BMS) - Set value to BMS for OA temp 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	Un-occ

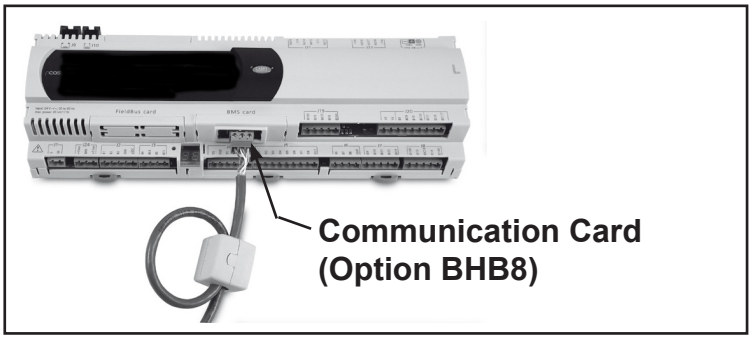
Main Menu	
F. Factory Settings	Factory Settings Menu is password protected Consult factory for access

10.0 BACnet® MSTP (Option BHB8)

With the addition of an optional BMS Communication card, the building automation system can remotely adjust setpoints and view status points and alarms. The current supported building automation protocols are:

- **BACnet® MSTP (Option BHB8)**

Contact factory if additional protocol support is needed.



The BACnet® MSTP (Option BHB8) communication allows access to selected unit function parameters. The standard communication protocol is identified as BACnet® over MS/TP (Master Slave / Token Passing). This protocol is used for communicating BACnet® over a network of BACnet® only controllers. The network is considered open communication, whereas any device on the network has the capability to receive input from any other controller on the network. In all Preeva Series units included on a BACnet® network, there are certain configuration parameters that need to be met before communication can be established with other devices. These settings and configuration parameters must be set properly or the device will not respond when prompted by other devices in the network. Follow the procedure below to modify the Bacnet MSTP parameters required by the BMS network.

1. From the main menu navigate to E. Service and press the enter key to access the service menu.

Main Menu
D. Alarms
E. Service
F. Factory Settings

2. From the service menu navigate to the h. BMS Config submenu and press the enter key to select.

Service Menu
g. Information
h. BMS Config
a. Test Mode

3. From the BMS Config screen E.h.1 verify that the Protocol: field is set to Bacnet MSTP. On a BAS card retrofit the Protocol: field may need to be set. To change the protocol press the enter key until the cursor is flashing on the Protocol: field and use the up or down key to scroll through the available choices and select Bacnet MSTP then press enter to confirm the protocol change.

Bms Config	E.h.1
BMS PORT 1	
Protocol : BACnet MSTP	

Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next screen.

4. From the BMS Config screen E.h.2 Press the enter key to access the Termconf PlugIn? Field and set the value to yes.

Bms Config	E.h.2
Termconf PlugIn?	YES

Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next screen.

5. From Screen E.h.4 Set the desired values for the Instance:,Baudrate:, and Mac Addr:. typically the MaxMasters: and MaxInfoFrames: do not need to be modified.

MSTP SETUP	E.h.4
Instance:	76000
Baudrate:	38400
MAC Addr:	0
MaxMasters:	127
MaxInfoFrames:	20

Press the enter key in succession until the cursor is flashing in the uppermost left hand corner of the screen and use the down arrow key to navigate to the next screen.

6. The modified values from the previous screen E.h.4 will need to be saved. From Screen E.h.7 press the enter key to access the Function: field and use the up arrow key to set the value to Write and then press the enter key to access the update field and use the up arrow key to set the value to yes. After a two second pulse the update value will return to the value of NO. the modified bacnet values are now saved.

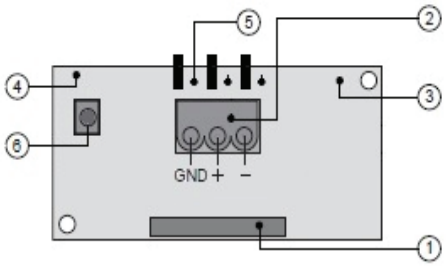
BACnet R/W	E . h . 7
Function:	Write
Update?	YES

After saving the new setpoints, the controller must be power cycled to complete the process. Once the power has been restored and the bacnet card has initialized, return to the MSTP Setup screen E.h.4 to confirm the changes were accepted.

BACnet® Communication Card Layout

The BACnet® communication card has two sets of LEDs (Controller Status and MSTP Status), a push button, and three jumpers. **The controller status LED** indicates the status of communication between the card and the controller. It is located above the push button.

1) Serial port connection
2) Terminal block for BACnet® network (GND, +, -)
3) MSTP status LED
4) Controller status LED
5) Line resistance jumpers
6) Factory configuration push button



LED Lights (4 above)	Description	Troubleshooting
Quick green-off-green	Communication with controller is established and working.	-
Slow red-off-red	Communication is not established and no data is passing to card.	1. Confirm card is firmly plugged in. 2. Confirm BMS Protocol is set to BACnet MSTP

The MSTP status LED lights are located on the bottom side of the communication card below the controller status LED. The MSTP LED indicates the status of communication **between the card and the network**. Wait at least one minute after setting the communication parameters and plugging in the communication cable before determining the status of the network communication.

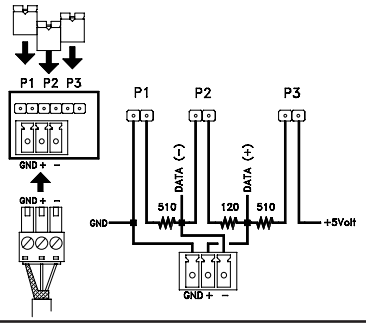
LED Lights (3 above)	Description	Troubleshooting
Green with occasional red	Communication with network is established and working.	-
Green and red both on	Communication is not established and no data is passing to the card.	1. Confirm system and card baudrate are the same. 2. Confirm card Max Master is equal to or greater than the Station (MAC) Address of the Master with the highest address.

The push button on the communication card is used to return the card to factory configuration. Read and follow the procedure below to reset the card.

1. With controller OFF, depress and hold the push button located on the BACnet board while powering the controller back ON.
   Continue to hold the button, while watching the Status LEDs. Wait at least 20 seconds; the Status LED will flash SLOWLY 3 times, red-off.

2. Once the flashing begins, release the push button. After the 3 red flashes, the LED comes on green. The LED then confirms recognition of the button by flashing QUICKLY 3 times red-off, and then comes on green again.
3. Wait for about one minute for the factory parameters to be loaded.

The jumpers are used to create built in end-of-line resistance for a BACnet® MSTP network.



- Jumper P1 adds a 510 ohm polarization resistance between the negative data line (-) and GND;
- Jumper P2 adds a 120 ohm terminal resistance between the two data lines (+) and (-);
- Jumper P3 adds a 510 ohm polarization resistance between the positive data line (+) and the +5 Vdc internal voltage.

Insert all three jumpers on the unit at the start of network and the unit at the end of the network. DO NOT insert the jumpers on the intermediate units.

BACnet® Point List

R = Read **AV** = Analog Variable
W = Write **BV** = Binary Variable

BACnet® Point List

Analog Variables

Name	Description	R/W	BMS Address	Unit	Default	Min	Max
OA_Temp_Raw	Outside Air Temp	R	AV1	Deg F			
OA_Hum_Raw	Outside Air Humidity	R	AV2	%rH			
OA_Temp_BMS	Outside Air Temp BMS - Sets OA Temp when OA_Temp_Sel is set to 1=BMS	R/W	AV3	Deg F			
OA_Hum_BMS	Outside Air Humidity BMS -Sets OA Humidity when OA_Hum_Sel is set to 1=BMS	R/W	AV4	%rH			
OA_Dew_Point	Outside Air Dew Point	R	AV5	Deg F			
DA_Temp	Discharge Air Temp	R	AV6	Deg F			
CC_Temp	Cooling Coil Discharge Air Temp	R	AV7	Deg F			
MA_Temp	Mixed Air Temp	R	AV8	Deg F			
DA_SpcClg_SP	Discharge Air Temp Space Cooling SP	R/W	AV9	Deg F	55	50	100
DA_SpcHtg_SP	Discharge Air Temp Space Heating Sp	R/W	AV10	Deg F	90	50	140
DA_NAClg_SP	Discharge Air Temp Neutral Cooling SP	R/W	AV11	Deg F	70	50	100
DA_NAHtg_SP	Discharge Air Temp Neutral Heating SP	R/W	AV12	Deg F	70	50	140
DA_SpcHtCl_SP	Discharge Air Temp Space Heat Mode Cooling SP	R/W	AV13	Deg F	55	50	100
DA_SP	Discharge Air Temp Active SP	R	AV14	Deg F			
SpcTempSP	Space Temp SP	R/W	AV15	Deg F	72	65	85
SpcEffClgSP	Space Effective Cooling SP	R	AV16	Deg F			
SpcEffHtgSP	Space Effective Heating SP	R	AV17	Deg F			
Spc_Temp	Space Temp	R	AV18	Deg F			
OAChgOv_SP	OA Change Over SP	R/W	AV19	Deg F	65	45	80
DhOADP_SP	Dehum OA Dew Point SP	R/W	AV20	Deg F	58	50	100
Damper_BMS	Damper Output BMS Command	R/W	AV21	%		0	100
Damper_Cmd	Damper Output Command	R	AV22	%		0	100
SF_BMS	Supply Fan Output BMS Command	R/W	AV23	%		0	100
SF_VFD_Cmd	Supply Fan VFD Command	R	AV24	%		0	100
HX_Mod_Cmd	Heating Modulation Command	R	AV25	%		0	100
RH_Mod_Out	Reheat Modulation Output %	R	AV26	%		0	100
MinDmprSP	Minimum Damper SP	R/W	AV27	%	10	0	100
EC_OADPLO_SP	Economizer OA Dew Point Lockout SP	R/W	AV28	Deg F	58	0	120
EC_OALO_SP	Economizer OA Temp Lockout SP	R/W	AV29	Deg F	60	0	120
CO2DmprOsSP	CO2 Minimum Damper Offset SP	R/W	AV30	%	10	0	100
DA_BMS_SP	Discharge Air Temp BMS SP	R/W	AV31	Deg F		50	140
DA_Dh_SP	Discharge Air Temp Dehum SP	R/W	AV32	Deg F	70	50	100

BACnet® Points List (Cont'd)

Integer Variables

Name	Description	R/W	BMS Address	Unit	Default	Min	Max
Bldg_Press_SP*	Building Static Pressure SP	R/W	AV1001	iwc	100	-500	500
Bldg_Pressure*	Building Static Pressure	R	AV1002	iwc			
Duct_Press_SP*	Duct Static Pressure SP	R/W	AV1003	iwc	500	0	2500
Duct_Pressure*	Duct Static Pressure	R	AV1004	iwc			
SpcCO2SP	Space CO2 SP	R/W	AV1005	ppm	1,000	0	2,000
Spc_CO2	Space CO2	R	AV1006	ppm			
SpcHumSP	Space Humidity SP	R/W	AV1007	%rH	55	35	75
Spc_Hum	Space Humidity	R	AV1008	%rH			
OccMode_Sel	Occ Mode Select 0= Schedule 1= Digital Input 2= BMS	R/W	AV1009		1	0	2
State_Sel	State Select 2=AUTO 3=COOL 4=HEAT 5=OFF	R/W	AV1010		5	2	5

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

Digital Variables

Name	Description	R/W	BMS Address	Unit	Default	Min	Max
Ext_OCC	Occupied Mode Input	R	BV1			Off	On
NA_Clg_Md	Neutral Air Cooling Mode	R	BV2			Off	On
NA_Htg_Md	Neutral Air Heating Mode	R	BV3			Off	On
NA_Dehum_Md	Neutral Air Dehum Mode	R	BV4			Off	On
Spc_Clg_Md	Space Cooling Mode	R	BV5			Off	On
Spc_Htg_Md	Space Heating Mode	R	BV6			Off	On
Spc_Dehum_Md	Space Dehum Mode	R	BV7			Off	On
Spc_HtgClg_Md	Space Heating Cooling Mode	R	BV8			Off	On
SF_Cmd	Supply Fan Command	R	BV9			Off	On
Comp_Stg1_Cmd	Compressor Stage 1 Command	R	BV10			Off	On
Comp_Stg2_Cmd	Compressor Stage 2 Command	R	BV11			Off	On
Comp_Stg3_Cmd	Compressor Stage 3 Command	R	BV12			Off	On
HX_Stg1_Cmd	Heating Stage 1 Command	R	BV13			Off	On
HX_Stg2_Cmd	Heating Stage 2 Command	R	BV14			Off	On
HX_Stg3_Cmd	Heating Stage 3 Command	R	BV15			Off	On
HX_Stg4_Cmd	Heating Stage 4 Command	R	BV16			Off	On
HX_Stg5_Cmd	Heating Stage 5 Command	R	BV17			Off	On
HX_Stg6_Cmd	Heating Stage 6 Command	R	BV18			Off	On
RH_Cmd	Reheat Compressor Command	R	BV19			Off	On
Alm_Rly_Cmd	Unit General Alarm Relay Command	R	BV20			Off	On
SF_Sts	Supply Fan Status	R	BV21			Off	On
Filter_Sts	Dirty Filter Status	R	BV22			Off	On
Safety_Sts	Safety Input Status	R	BV23			Normal	Alarm
Phase_Alarm	Phase Protection Alarm	R	BV24			Off	On
Ext_Switch_1	External Damper Position Sw 1	R	BV25			Off	On
Ext_Switch_2	External Damper Position Sw 2	R	BV26			Off	On
OA_Temp_Sel	Share OA Temp from BMS (0=Probe 1=BMS)	R/W	BV27		Off	Off	On
OA_Hum_Sel	Share OA Humidity from BMS (0=Probe 1=BMS)	R/W	BV28		Off	Off	On
Occupied	Occupied Mode Status	R	BV29			Off	On
Occupied_BMS	Occupied Mode BMS - Sets Unit Occupancy when OccMode_Sel is set to 2=BMS	R/W	BV30		Off	Off	On
BMS_Alm_Rst	BMS Alarm Reset	R/W	BV31		Off	Off	On
Unit_Enable	Unit Enable	R/W	BV32		Off	Off	On
Ext_Call_Fan	External Call Fan Input (G)	R	BV33			Off	On
Ext_Call_Heat	External Call Heat Input (W1)	R	BV34			Off	On
Ext_Call_Cool	External Call Cool Input (Y1)	R	BV35			Off	On

BACnet® Points List (Cont'd)

Ext_Call_Dh	External Call Dehum Input	R	BV36			Off	On
BMS_Call_Fan	BMS Fan Call Input (G)	R/W	BV37		Off	Off	On
BMS_Call_Heat	BMS Heat Call Input (W1)	R/W	BV38		Off	Off	On
BMS_Call_Cool	BMS Cool Call Input (Y1)	R/W	BV39		Off	Off	On
BMS_Call_Dh	BMS Call Dehum Input	R/W	BV40		Off	Off	On
Evap_Stg1_Cmd	Evap Cooling Command	R	BV41			Off	On

Specifications and illustrations subject to change without notice or incurring obligations.
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