

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

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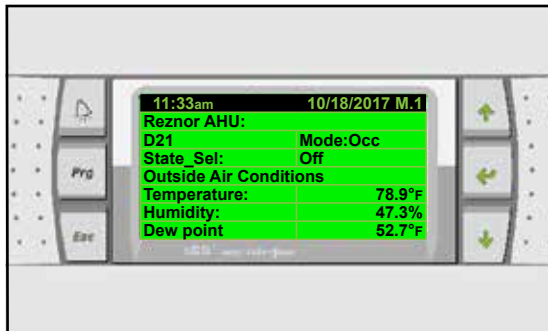
**1.0 Digital Controller**



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		<b>Prg</b>	<b>Esc</b>			

## 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:**

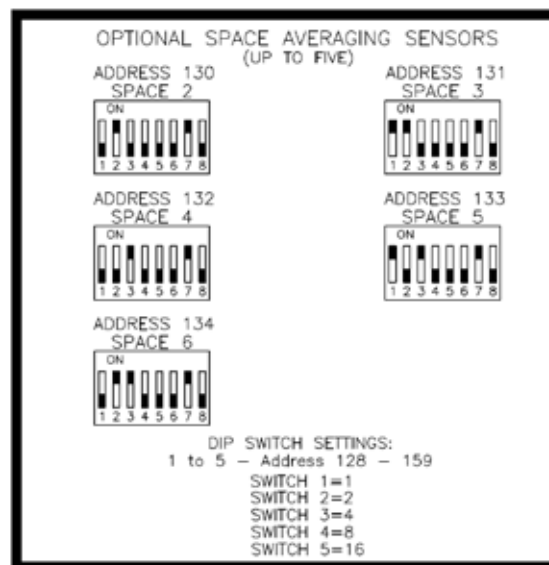
For temperature adjustments, press inward on the dial once and turn the dial clockwise to increase and counterclockwise to decrease the desired temperature setpoint. For humidity setpoint adjustments, press the dial inward twice and turn the dial clockwise to increase and counterclockwise to decrease 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 Setpoint	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

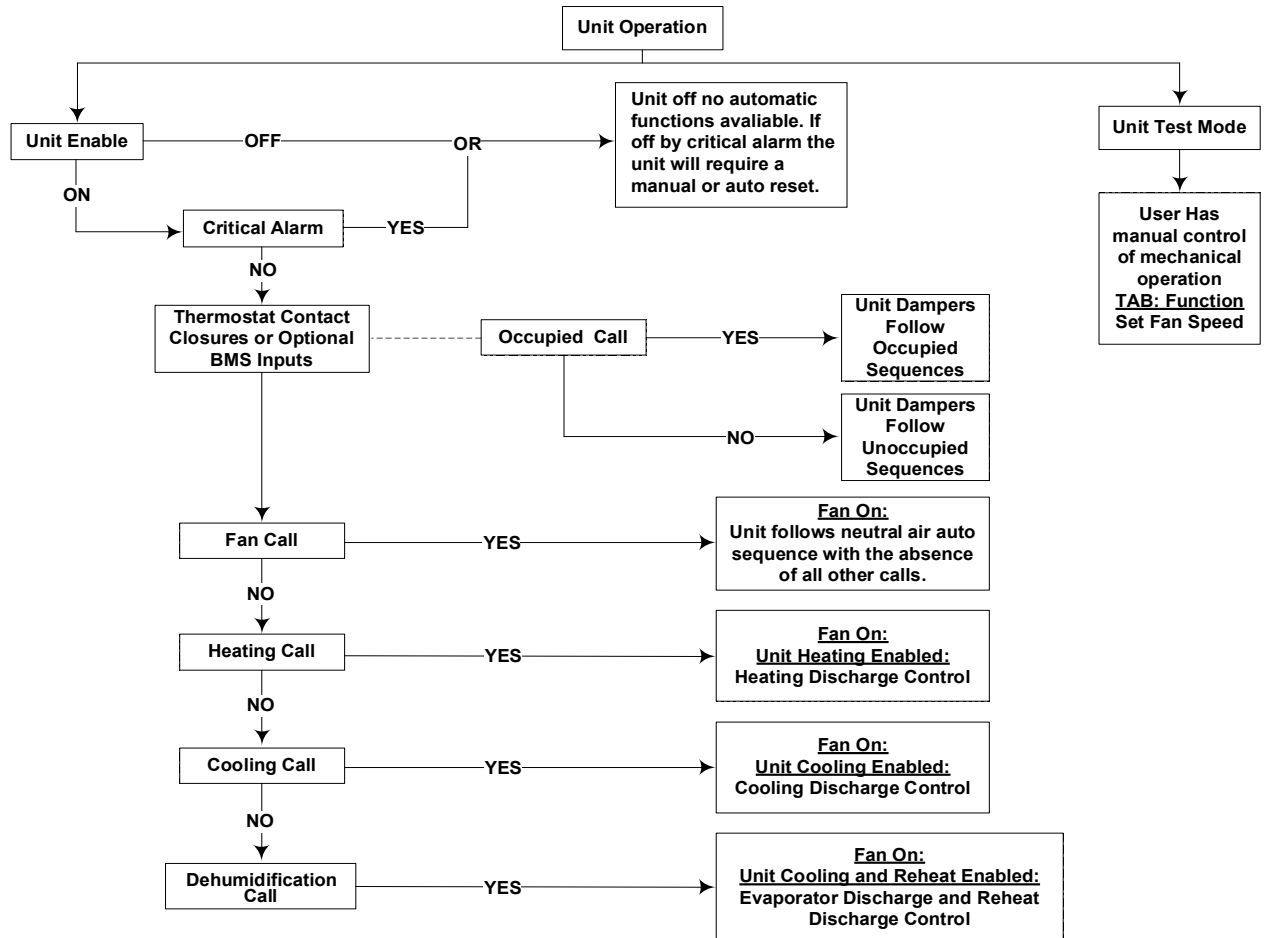
When the fan call is on and the mechanical cooling, heating and dehumidification calls are off, the unit will operate in the auto sequence.

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 Setpoint	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**

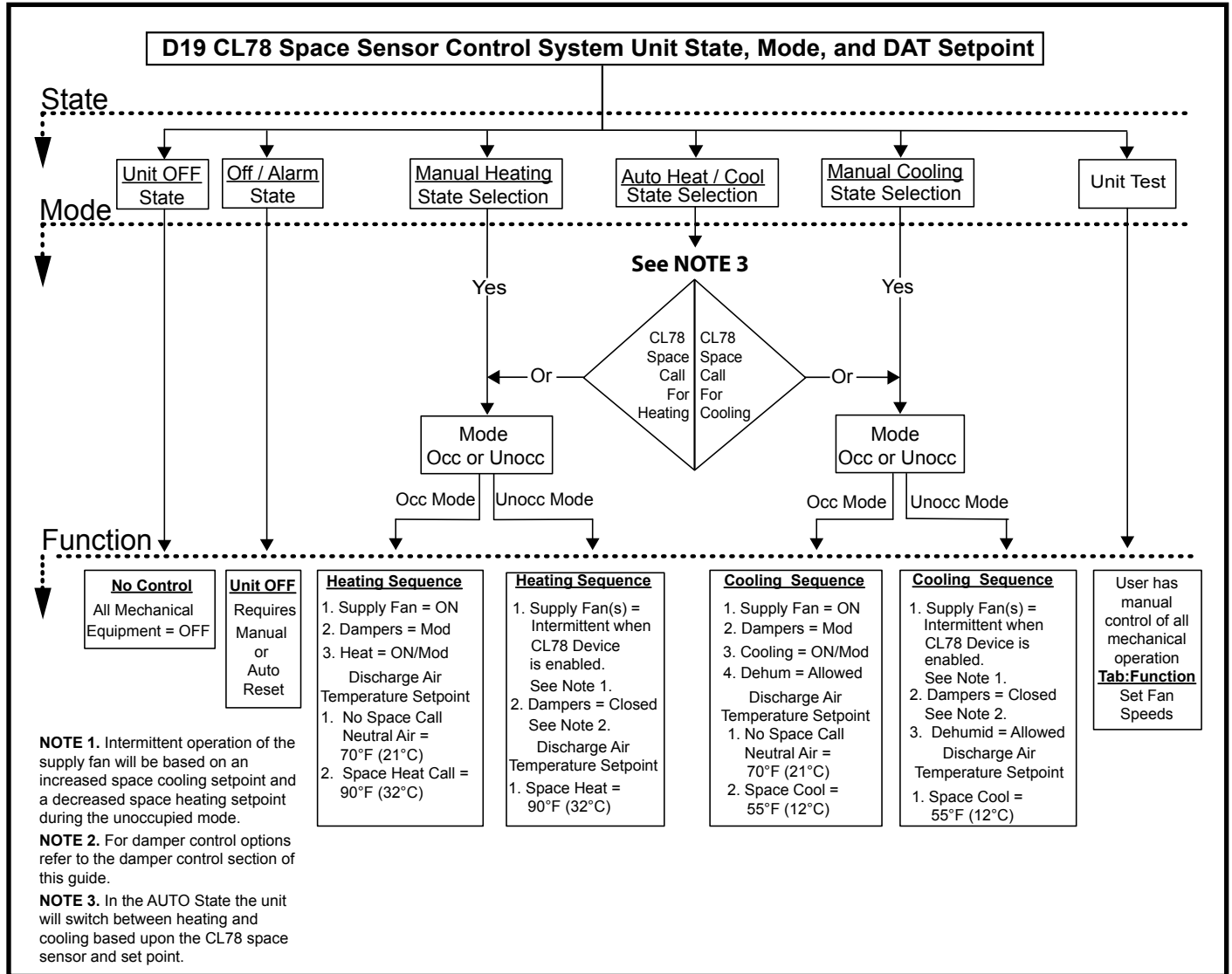
From the th-tune device (Option CL78), controller display, or BMS, the cool state can be selected. The unit supply fan will run and the mechanical cooling and the dampers will be operated to maintain the cooling sequence of operation. The unit will not automatically switch to other states except Off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



## 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.

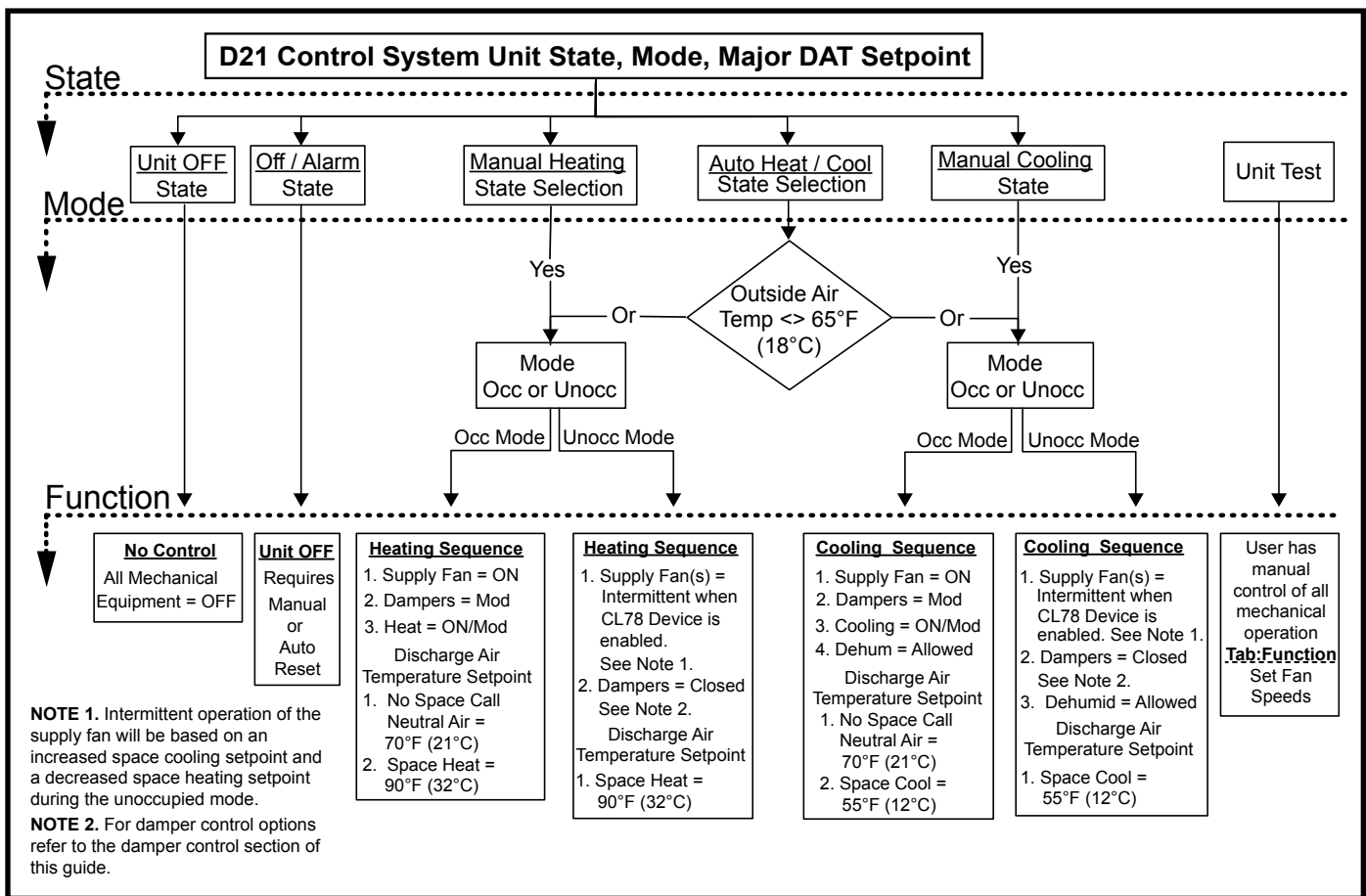


## 4.2 D21 Modes of Operation

### 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

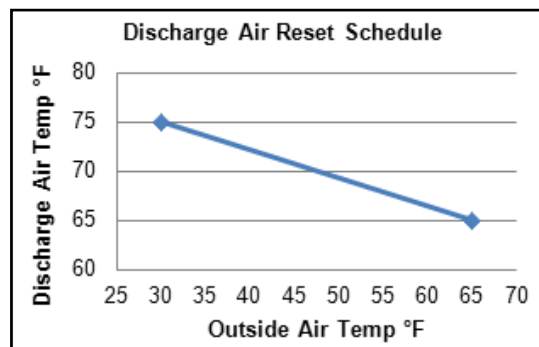
The unit is inherently a discharge air temperature control system. The unit will operate to maintain one of the following discharge air setpoints depending on the state, mode and control option. Selected setpoints are user adjustable from the unit display, optional wall mounted user interface, or optional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

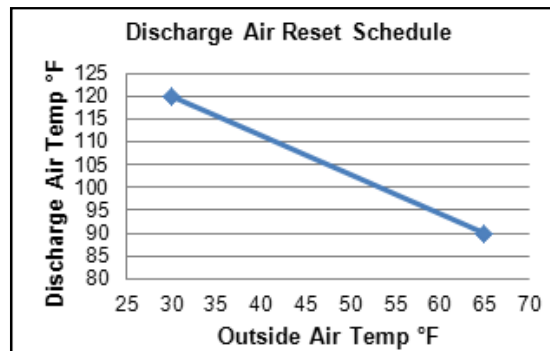
Reset Schedule	
Outside Air Temperature	Discharge Air Temperature
30°F (-1.1°C)	75°F (23.8°C)
65°F (18.3°C)	65°F (18.3°C)



#### 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.**

**SpcEffClgSp:** 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

#### 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.**

**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 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.

<b>Electric Heat Staging</b>					
<b>PID Loop Control: All Statements Must Be True To Activate or De-Activate.</b> 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
<b>NOTE 1</b> 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.

<b>General Gas Heat Staging</b>					
<b>PID Loop Control: All Statements Must Be True To Activate or De-Activate.</b> 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
<b>NOTE 1</b> Light off value for natural gas = 100% Light off value for Propane = 100%					
<b>NOTE 2</b> Y3 Capacity modulation applies only to units equipped with modulating gas valves.					
<b>NOTE 3</b> 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.

<b>Gas Heat Staging AG55 &amp; AG57 Sizes 450-700 See NOTE 4</b>					
<b>PID Loop Control: All Statements Must Be True To Activate or De-Activate. All stages will have an adjustable min ON and OFF time.</b>					
<b>Stage</b>	<b>Outputs</b>	<b>Increase Inter-Stg Timer</b>	<b>Activate</b>	<b>Decrease Inter-Stg Timer</b>	<b>De-activate</b>
<b>Stg 1 2/3 Burner Valve</b>	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
<b>Stg 2 1/3 Burner Valve and Full Non-Split Burner Valve</b>	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
<b>Stg 3 1/3, 2/3 Burner Valves and Full Non-Split Burner Valve</b>	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
<b>NOTE 1</b> Light off value for natural gas = 100% Light off value for Propane = 100%					
<b>NOTE 2</b> Y3 Capacity modulation applies only to AG57 units equipped with a modulating gas valve.					
<b>NOTE 3</b> 15 min timer used on AG57 modulated systems to allow capacity control to achieve low fire rate.					
<b>NOTE 4</b> 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).

<b>MAPS &amp; MAPS II Cooling Staging Control Three Stage</b>					
<b>PID Loop Control: All Statements Must Be True To Activate or De-Activate</b>					
<b>All stages will have an adjustable min ON and OFF time</b>					
<b>Stage</b>	<b>Output</b>	<b>Increase Stage Timing</b>	<b>Activate</b>	<b>Decrease Stage Timing</b>	<b>De-activate</b>
<b>Stg 1</b>	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
<b>Stg 2</b>	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
<b>Stg 3</b>	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<sub>2</sub> sensor option is selected (input U8), the minimum damper position will be determined as follows: If the Space CO<sub>2</sub> 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<sub>2</sub> > 1000 ppm = Active Minimum Damper Position 20%

CO<sub>2</sub> < 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.

Press the flashing alarm key →

		11:33am	10/18/2017 M.1	↑
		Reznor AHU:		
		D21	Mode:Occ	
<b>Prg</b>		State_Sel:	Off	↵
		Outside Air Conditions		
		Temperature:	78.9°F	
<b>Esc</b>		Humidity:	47.3%	↓
		Dew point	52.7°F	

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

		*** Alarm ***		↑
		Unit Safety Alarm		
		Unit Off		
<b>Prg</b>				↵
<b>Esc</b>				↓

Press the down key to scroll through the current list of active and or unacknowledged alarms.

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.

Alarm Key →

			↑
		Alarm(s) active ▲	
<b>Prg</b>		Press ALARM to clear	↵ ← Enter Key
		Press ENTER for the logger	
<b>Esc</b>			↓

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.

		11:33am	10/18/2017	↑ ← Up Key
		001:Alarm ID:1		
<b>Prg</b>		OA_Temp	78.9°F	↵
		OA_Humidity	21.0%	
		DA_Temp	70.0°F	
<b>Esc</b>		CC_Temp	49.0°F	↓
		MA_Temp	59.2°F	

## 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.

<b>Main Menu</b>	
<b>D. Alarms</b>	
<b>E. Service</b>	
<b>F. Factory Settings</b>	

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.

<b>Service Password</b>	
<b>Insert service</b>	
<b>password (PW1)</b>	<b>7125</b>

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.

<b>Service Menu</b>	
<b>h. BMS config</b>	
<b>a. Test Mode</b>	
<b>b. TAB</b>	

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.

<b>Test Mode</b>	<b>E.a.1</b>
<b>Manual Control</b>	
<b>Enable:</b>	<b>On</b>
<b>Time Out:</b>	<b>120m</b>
<b>Countdown:</b>	<b>120m</b>

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.

- 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.

- 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%
<b>Manual Control Fans</b>	
Supply:	On
Supply:	100%
Airflow Status:	ON

- 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.

- 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
<b>Manual Control</b>	
<b>Cooling Stages</b>	
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.

- 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
<b>Manual Control Reheat</b>	
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. Saving Adjusted Maximum Fan Speed Values

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?			
Set Max SF Spd?		No	
Save?			
Save?		No	
Restore?			
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.

<b>Quick Setpoints</b>	<b>A.1</b>
<b>OccMode_Sel:</b>	
<b>Digital Input</b>	

### 8.3.2 Setting a Weekly Schedule

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

<b>Main Menu</b>
<b>F. Factory Settings</b>
<b>A. Quick Setpoints</b>
<b>B. Schedule</b>

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.

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

### 8.2.3 Enabling the System

- 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.

<b>Main Menu</b>
<b>F. Factory Settings</b>
<b>A. Quick Sepoints</b>
<b>B. Schedule</b>

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**

<b>Quick Setpoints</b>	<b>A.2</b>
<b>Unit Setup:</b>	
<b>System Enable:</b>	<b>On</b>

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

<b>Quick Setpoints</b>	<b>A.2</b>
<b>Unit Setup:</b>	
<b>State_Sel:</b>	<b>Auto</b>

# 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_SpcHtCI_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					
<b>A. Quick Setpoints</b>	<b>Quick Setpoints Menu</b>				
<b>Quick Setpoints A.1</b>	<b>Quick Setpoints Screen A.1</b>				
Name	Description	Default	Unit	Min	Max
<b>OccMode_Sel:</b>	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
<b>System Enable:</b>	System Enable - Sets System enabled and available for operation (Applies to D19 TStat)	Off			
<b>State_Sel:</b>	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
<b>State_Sel:</b>	State Select 2=AUTO 3=COOL 4=HEAT 5=OFF - Sets Unit State	5		2	5
<b>OACHgOv_SP:</b>	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
<b>OACHgOvDiff:</b>	OA Change Over SP Differential - Sets the differential for the <b>OACHgOv_SP</b>	5	Deg F	0.5	10
<b>OACHgOvDel:</b>	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
<b>TempOcc:</b>	Temporary Occupied Status from Space Thermostat - Indexed on when the thermostat fan button is pressed	Off		Off	On
<b>TempOcc_Time:</b>	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
<b>System Enable:</b>	System Enable - Sets System enabled and available for operation	Off			
<b>Setpoint Type::</b>	Setpoint Type -Sets the discharge air temp setpoint type between BMS or Local.	Local			
<b>DA_BMS_SP:</b>	Discharge Air Temp BMS SP - Sets the discharge air setpoint via a BMS system			50	140
<b>DA_Loc_SP:</b>	Discharge Air Temp Local SP - Sets the discharge air setpoint via a Local Display.			50	140
<b>DA_SP:</b>	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
<b>Spc_Temp:</b>	Space Temp - Current Space Temperature		Deg F		
<b>SpcTempSP:</b>	Space Temp SP - Base space temp setpoint value from the space thermostat or controller display adjustment	72	Deg F	65	85
<b>SpcHtgSp:</b>	Space Heating SP - Value is equal to the <b>SpcTempSP</b> minus the <b>SpcHtgDB</b>	70	Deg F		
<b>SpcClgSp:</b>	Space Cooling SP - Value is equal to the <b>SpcTempSP</b> plus the <b>SpcClgDB</b>	74	Deg F		
<b>SpcHtgDB:</b>	Space Heating Dead Band - Sets value subtracted from the <b>SpcTempSP</b> for the <b>SpcEffHtgSP</b> definition	2	Deg F	0	5
<b>SpcClgDB:</b>	Space Cooling Dead Band - Sets value added to the <b>SpcTempSP</b> for the <b>SpcEffClgSP</b> 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
<b>SpcEffClgSP:</b>	Space Effective Cooling SP - Defined by the <b>SpcClgDB</b> and the <b>SpcClgUnoOs</b> setpoints		Deg F		
<b>SpcClgOnDiff:</b>	Space Cooling On Differential - Sets the differential required above the <b>SpcEffClgSP</b> for the space cooling call to turn on	1	Deg F	0.5	10
<b>SpcClgOffDiff:</b>	Space Cooling Off Differential - Sets the differential required below the <b>SpcEffClgSP</b> for the space cooling call to turn off	1	Deg F	0.5	10
<b>SpcClgUnoOs:</b>	Space Cooling Unoccupied Offset - Sets the value added to the <b>SpcTempSP</b> when in the unoccupied mode for the <b>SpcEffClgSP</b> definition	8	Deg F	0	15
<b>UnoClgOffDiff</b>	Unoccupied Space Cooling Off Differential - Sets the differential required below the <b>SpcEffClgSP</b> for the space cooling call to turn off when in the unoccupied mode	4	Deg F	0	10
<b>DA_SpcClg_SP:</b>	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
<b>SpcEffHtgSP:</b>	Space Effective Heating SP - Defined by the <b>SpcHtgDB</b> and the <b>SpcHtgUnoOs</b> setpoints		Deg F		
<b>SpcHtgOnDiff:</b>	Space Heating On Differential - Sets the differential required below the <b>SpcEffHtgSP</b> for the space heating call to turn on	1	Deg F	0.5	10
<b>SpcHtgOffDiff:</b>	Space Heating Off Differential - Sets the differential required above the <b>SpcEffHtgSP</b> for the space heating call to turn off	1	Deg F	0.5	10
<b>SpcHtgUnoOs:</b>	Space Heating Unoccupied Offset - Sets the value subtracted from the <b>SpcTempSP</b> when in the unoccupied mode for the <b>SpcEffHtgSP</b> definition	8	Deg F	0	15
<b>UnoHtgOffDiff:</b>	Unoccupied Space Heating Off Differential - Sets the differential required above the <b>SpcEffHtgSP</b> for the space heating call to turn off when in the unoccupied mode	4	Deg F	0	10
<b>DA_SpcHtg_SP:</b>	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
<b>SpcEffClgSP:</b>	Space Effective Cooling SP - Defined by the <b>SpcClgDB</b> and the <b>SpcClgUnoOs</b> setpoints		Deg F		
<b>SpcHCOndiff:</b>	Space Heating Cooling On Differential - Sets the differential required above the <b>SpcTempSP</b> for the space cooling call to turn on (Auto Heating Only)	1	Deg F	0.5	10
<b>SpcHCOffDiff:</b>	Space Heating Cooling Off Differential - Sets the differential required below the <b>SpcTempSP</b> for the space cooling call to turn off (Auto Heating Only)	1	Deg F	0.5	10
<b>UnoHCOffDiff:</b>	Unoccupied Space Heating Cooling off Differential - Sets the differential required above the <b>SpcEffHtgSP</b> for the space heating call to turn off when in the unoccupied mode	4	Deg F	0	10
<b>DA_SpcHtCl_SP:</b>	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
<b>Spc_Humidity:</b>	Space Humidity - Current Space Humidity		%rH		
<b>SpcHumSP:</b>	Space Humidity SP - Sets the Space Humidity Setpoint	55	%rH	35	75
<b>SpcDhOnDiff:</b>	Space Dehum On Differential - Sets the differential required above the <b>SpcHumSP</b> for the space dehum call to turn on	10	%rH	1	10
<b>SpcDhOffDiff:</b>	Space Dehum Off Differential - Sets the differential required below the <b>SpcHumSP</b> 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
<b>DA_NAClg_SP:</b>	Discharge Air Temp Neutral Cooling SP - Sets the discharge setpoint used when in Neutral Air Cooling Mode	70	Deg F	50	100
<b>DA_NAHSPSel:</b>	Neutral DA Heating SP Select - Used to select desired discharge setpoint for Neutral Air Heating Mode Single Setpoint or Reset Setpoint	Setpt		Setpt	Reset
<b>DA_NAHtg_SP:</b>	Discharge Air Temp Neutral Heating SP - Sets the discharge setpoint used when in Neutral Air Heating Mode	70	Deg F	50	140
<b>DA_NAHRst_SP:</b>	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
<b>OA_Temp:</b>	Current Outside Air Temp		Deg F		
<b>DA_NAHRst_SP:</b>	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
<b>NAHRDAMax:</b>	Neutral Air Heat DA SP Reset DA Max - Sets the maximum neutral air heating discharge air temp reset setpoint	75	Deg F	50	140
<b>NAHRDAMin:</b>	Neutral Air Heat DA SP Reset DA Min - Sets the minimum neutral air heating discharge air temp reset setpoint	65	Deg F	50	140
<b>NAHROAMax:</b>	Neutral Air Heat DA SP Reset OA Max - Sets the maximum neutral air heating outside air temp reset setpoint	65	Deg F	0	100
<b>NAHROAMin:</b>	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
<b>System Enable:</b>	Unit Enable - Sets unit enabled and available for operation	5		2	5
<b>DA_SpcClg_SP:</b>	Discharge Air Temp Space Cooling SP - Sets the discharge setpoint used when in Space Cooling Mode.	55	Deg F	50	100
<b>DA_SpcHSPSel:</b>	Space DA Heating SP Select - Used to select desired discharge setpoint for Space Heating Mode. Single Setpoint or Reset Setpoint.	Setpt		Setpt	Reset
<b>DA_SpcHtg_SP:</b>	Discharge Air Temp Space Heating SP - Sets the discharge setpoint used when in Space Heating Mode.	90	Deg F	50	140
<b>DA_SpcHRst_SP:</b>	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
<b>OA_Temp:</b>	Current Outside Air Temp		Deg F		
<b>DA_SpcHRst_SP:</b>	Discharge Air Temp Space Heating Reset SP - Display of optional calculated reset schedule setpoint used when in Space Heating Mode.		Deg F	50	140
<b>SpcHRDaMax:</b>	Space Heat DA SP Reset OA Max - Sets the maximum space heating discharge air temp reset setpoint.	120	Deg F	50	140
<b>SpcHRDaMin:</b>	Space Heat DA SP Reset DA Min - Sets the minimum space heating discharge air temp reset setpoint.	90	Deg F	50	140
<b>SpcHROaMax:</b>	Space Heat DA SP Reset OA Max - Sets the maximum space heating outside air temp reset setpoint.	65	Deg F	0	100
<b>SpcHROaMin:</b>	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
<b>DhOADP_SP:</b>	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
<b>DhOADP_Diff:</b>	Dehum OA Dew Point SP Differential - Sets the differential for the <b>DhOADP_SP</b>	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
<b>Pressure Control</b>	Factory Selection: Building				
<b>Controlled Device</b>	Factory Selection: Supply Fan - Dampers				
<b>Bldg_Pressure</b>	Building Static Pressure				
<b>Setpoint:</b>	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
<b>Pressure Control</b>	Factory Selection: Duct				
<b>Controlled Device</b>	Factory Selection: Supply Fan				
<b>Duct_Pressure</b>	Duct Static Pressure				
<b>Setpoint:</b>	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
<b>SpcCO2SP:</b>	Space CO2 SP - Current Space CO2 Setpoint	1000	ppm	0	2000
<b>SpcCO2Diff:</b>	Space CO2 SP Differential - Differential for the <b>SpcCO2SP</b> .	200	ppm	10	500

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

<b>Schedule B.2</b>	<b>Schedule Screen B.2</b>				
<b>Name</b>	<b>Description</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>DST:</b>	Set to enable DST - Default Value: Enable				
<b>Transition Time:</b>	Sets Transition Time - Default Value: 60 min				
<b>Start:</b>	Sets Start day , month and time - Default Value: Last Sunday in March at 2:00				
<b>End:</b>	Sets End day , month and time - Default Value: Last Sunday in October at 3:00				

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

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

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

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

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

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

Points List C.15	<b>Points List Screen C.15</b> Applicable Digital Inputs for Unit Configuration				
Points List C.16	<b>Points List Screen C.16</b> Applicable Digital Inputs for Unit Configuration				

<b>Main Menu</b>					
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				

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

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

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

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

Test Mode Screens E.a.6 thru E.a.17	<b>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>				
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b. TAB	<b>TAB Menu - Used to perform a Service Save of controller setpoints and to perform a Service Restore of previously saved setpoints</b>				
TAB E.b.1	<b>TAB Screen E.b.1</b>				
<b>Name</b>	<b>Description</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>Set Max SF Spd?</b>	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
<b>Save?</b>	Modifiable Field used to perform a Service Save of current setpoints	No		No	Yes
<b>Restore?</b>	Modifiable Field used to perform a Service Restore of current setpoints	No		No	Yes

<b>c. Supply Fan</b>	<b>Supply Fan Menu - Applicable screens and content will be displayed depending upon unit configuration</b>				
<b>Supply Fan E.c.1</b>	<b>Supply Fan Screen E.c.1</b>				
<b>Name</b>	<b>Description</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>Control:</b>	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				
<b>SFSpdCigSP:</b>	Supply Fan Speed Cooling SP - Sets commanded speed for the supply fan when in cooling mode (Applies to VFC9)	100	%	30	100
<b>SFSpdHtgSP:</b>	Supply Fan Speed Heating SP - Sets commanded speed for the supply fan when in heating mode (Applies to VFC9)	100	%	30	100
<b>SFSpdLoSP:</b>	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
<b>SFSpdHiSP:</b>	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
<b>SFSpdLoCO2SP:</b>	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
<b>SFSpdHiCO2SP:</b>	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
<b>SF_BMS:</b>	Supply Fan Speed BMS - Value of the current commanded fan speed from the BMS		%	30	100

<b>Supply Fan E.c.2</b>	<b>Supply Fan Screen E.c.2 will be displayed if Supply Fan is selected for Bldg Pressure Control</b>				
<b>Name</b>	<b>Description - Supply Fan Bldg Pressure Control Loop Monitoring</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>Bldg Pressure</b>	Current Building Static Pressure		iwc	-0.5	0.5
<b>Setpoint:</b>	Current Building Static Pressure SP	0.1	iwc	-0.5	0.5
<b>PI Output:</b>	Current output of the control loop		%	0	100
<b>SF_VFD_Cmd</b>	Current Supply Fan VFD Command in vdc		vdc	0	10

<b>Supply Fan E.c.3</b>	<b>Supply Fan Screen E.c.3 will be displayed if Supply Fan is selected for Duct Pressure Control</b>				
<b>Name</b>	<b>Description - Supply Fan Duct Pressure Control Loop Monitoring</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>Duct Pressure</b>	Current Duct Static Pressure		iwc	0	2.5
<b>Setpoint:</b>	Current Duct Static Pressure SP	0.5	iwc	0	2.5
<b>PI Output:</b>	Current output of the control loop		%	0	100
<b>SF_VFD_Cmd</b>	Current Supply Fan VFD Command in vdc		vdc	0	10

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

<b>Capacity E.d.2</b>	<b>Capacity Screen E.d.2</b>				
<b>Name</b>	<b>Description</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>th- Space Sens:</b>	th- Space Sens - Enables and disables option CL78 space sensor 1	Off			
<b>Spc_Avg_Ena:</b>	Spc_Avg_Ena - Enables averaging of multiple space sensors from 2 up to 6.	Off			
<b>Num_Avg_Sens:</b>	Num_Avg_Sens - Sets the number of sensors to average including the th-Tune	2		2	6
<b>Ena_Unocc_Spc:</b>	Enabled Unoccupied Space Control - Enables night setback & night setup operation	On		Off	On

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

<b>Capacity E.d.4</b>	<b>Capacity Screen E.d.4 will be displayed if the unit is configured with Heating</b>				
<b>Name</b>	<b>Description - Heating Demand Control Loop Monitoring</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>DA_Temp</b>	Current Discharge Air Temp		Deg F		
<b>Setpoint:</b>	Current Discharge Air SP		Deg F		
<b>PI Output:</b>	Current output of the control loop		%	0	100
<b>HX_Mod_Cmd</b>	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
<b>Bldg Pressure</b>	Current Building Static Pressure		iwc	-0.5	0.5
<b>Setpoint:</b>	Current Building Static Pressure SP	0.1	iwc	-0.5	0.5
<b>PI Output:</b>	Current output of the control loop		%	0	100
<b>Damper_Cmd</b>	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
<b>Unocc Econ Ena:</b>	Unoccupied Enable Economizer Mode - Allows Economizer during the unoccupied mode	Off		Off	On
<b>Ec_OALO_SP:</b>	Economizer OA Temp Lockout SP - OA Temp setpoint value that economizer is enabled.	60	Deg F	0	120
<b>Ec_OALODiff:</b>	Economizer OA Temp Lockout Diff - Differential for the <b>Ec_OALO_SP</b>	2	Deg F	0.5	10
<b>Ec_OADPLO_SP:</b>	Economizer OA Dew Point Lockout SP - OA Dew Point setpoint value that economizer is enabled.	58	Deg F	0	120
<b>Ec_OADPLODiff:</b>	Economizer OA Dew Point Lockout Diff - Differential for the <b>Ec_OADPLO_SP</b>	2	Deg F	0.5	10
<b>MinDmprSP:</b>	Minimum Damper SP - Sets the unit minimum damper position.	10	%	0	100
<b>CO2DmprOsSP</b>	CO2 Minimum Damper Offset SP - Value added to the <b>MinDmprSP</b> 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
<b>MA_Diff:</b>	Mixed Air Setpoint Differential - Sets the differential between the unit discharge air setpoint and the mixed air temperature setpoint .	3	Deg F	0	5
<b>En_DX_Econ:</b>	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
<b>MA_Temp</b>	Current Mixed Air Temp		Deg F		
<b>Setpoint:</b>	Current Mixed Air Temp SP - <b>DA_SpcCig_SP</b> = 55 Deg F minus the value of the <b>MA_Diff</b> setpoint		Deg F		
<b>PI Output:</b>	Current output of the control loop		%	0	100
<b>Damper_Cmd</b>	Current Damper Output Command in vdc		vdc	0	10

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

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

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

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

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

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

<b>BMS Config E.h.8</b>	<b>BMS Config Screen E.h.8</b>				
<b>Name</b>	<b>Description</b>	<b>Default</b>	<b>Unit</b>	<b>Min</b>	<b>Max</b>
<b>OA_Hum_Sel:</b>	Share OA Humidity from BMS (0=Probe, 1=BMS) - Set value to BMS for OA humidity share from BMS	Probe		Probe	BMS
<b>OA_Temp_Sel:</b>	Share OA Temp from BMS (0=Probe, 1=BMS) - Set value to BMS for OA temp share from BMS	Probe			
<b>Probe</b>	BMS				
<b>Occupied_BMS</b>	Occupied Mode BMS - Used to determine unit occupancy when <b>OccMode_Sel</b> is set to BMS	Occ		Occ	Un-occ

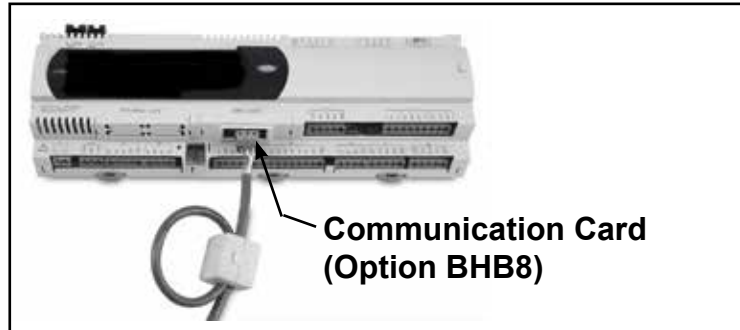
<b>Main Menu</b>					
<b>F. Factory Settings</b>	Factory Settings Menu is password protected Consult factory for access				

## 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
<b>E. Service</b>
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
<b>h. BMS Config</b>
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
<b>BMS PORT 1</b>	
<b>Protocol : BACnet MSTP</b>	

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
<b>Termconf PlugIn?</b>	<b>YES</b>

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.

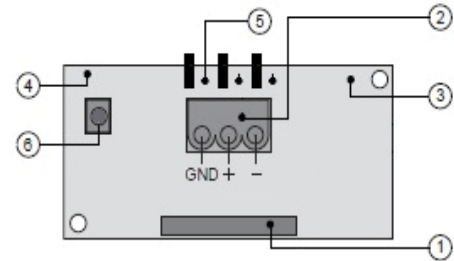
BACnet R/W		E. h. 7
Function:		Write
Update?		YES

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

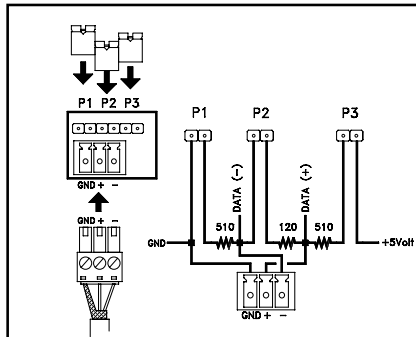
**The MSTP status LED** lights are located on the bottom side of the communication card below the controller status LED. The MSTP LED indicates the status of communication **between the card and the network**. Wait at least one minute after setting the communication parameters and plugging in the communication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

R = Read  
W = Write

AV = Analog Variable  
BV = Binary Variable

## BACnet<sup>®</sup> Point List

BACnet <sup>®</sup> 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)**

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

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