Verasys® Constant Volume Controller

Application Note

LC-VAC1000-0, LC-VAC3000-0

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Refer to the QuickLIT website for the most up-to-date version of this document.
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Verasys® Constant Volume Controller

Application Note

LC-VAC1000-0, LC-VAC3000-0

Introduction

The Verasys® Constant Volume Controller application is part of an application library available for Verasys. You can access updates to the application library by logging in to verasyscontrols.com.

Constant Volume Controller applications for both LC-VAC1000-0, and LC-VAC3000-0 are available on verasyscontrols.com. Both controllers come without factory-loaded applications. Complete the application update process for a fully-functioning controller.

If you have further questions about the application, please contact:

Verasys Pre-Sales and Post-Sales Support

1-866-663-6105 Monday through Friday 8:00am - 4:00pm CST BE-VerasysSupport@jci.com verasyscontrols.com

Constant volume control options

Verasys Constant Volume Controller overview

The Verasys Constant Volume Controller is an application-specific controller that covers single zone constant volume systems. Verasys can connect directly to any smart equipment controllers that are mounted to equipment. If there are no smart equipment controllers mounted, and the equipment has a conventional thermostat interface, you can use application controllers or a TEC3000 thermostat to connect them to Verasys.

The TEC3000 can also be used for constant volume, or single zone systems. However, the constant volume controller has more inputs and outputs than the TEC3000. Table 1 compares of the capabilities of the TEC3000, the constant volume controllers and Smart Equipment controllers.

Available applications

You can add the LC-IOM3711-0 to the LC-VAC1000-0 or the LC-VAC3000-0 to increase the number of applications. For example, the LC-VAC3000-0 is a 32 point controller with all applications available on the base controller except for humidification, for which you must add the LC-IOM3711-0.

Note: When you add LC-IOM3711-0, you must use address 4.

Table 1: Controller feature comparison (Part 1 of 2)

Feature	Smart Equipment	TEC3000	LC-VAC1000-0	LC-VAC3000-0
Up to two stage cooling	Yes	Yes	Yes	Yes
Up to four stage cooling	Yes	No	Yes	Yes
Modulated cooling	No	No	Yes*	Yes
Up to two stage heating	Yes	Yes	Yes	Yes
Up to three stage heating	Yes	No	Yes*	Yes
Heat pump	Yes	No	Yes*	Yes
Economizer	Yes	Yes	Yes	Yes

Table 1:	Controller feature	comparison	(Part 2	of 2)
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Feature	Smart Equipment	TEC3000	LC-VAC1000-0	LC-VAC3000-0
Title 24 economizer **	Yes	Yes	Yes	Yes
Demand ventilation control	Yes	No	Yes	Yes
Dehumidification	Yes	No	Yes	Yes
Humidification	No	No	Yes*	Yes*
Fixed variable fan	Yes	No	Yes	Yes

* Requires the LC-IOM3711-0 to use these features

** Title 24 sequence and alarm notification is implemented from within the application. State of California certification is pending.

Application flow diagram

The flow drawing for the application varies based on the features you select. Figure 1 shows all the options you can apply to the system. Table 2 shows what the callouts in Figure 1 refer to. Table 2 describes each tag, provides a part number, and shows the point type required for each application.

Figure 1: Application flow diagram



Table 2: Application flow di

Number	Description
1	Rooftop or packaged unit enclosure
2	Up to four stages or modulated 0 V to 10 V Note: The controllers can also support a heat pump instead of modulated or staged coils up to two stages and two stages of supplemental heat

Table 2: Application flow diagram

Number	Description
3	Up to four stages or modulated 0 V to 10 V
4	Allow 10 in. (25.4 cm) minimum between humidifier and element
5	Humidifier control cabinet
6	Optional space sensor types

Table 3:Point list (Part 1 of 4)

Point type	Object name	Expanded ID	Johnson Controls part numbers	Required or optional
Binary input	SF-S	Supply Fan Status	CSDESM-C35200	Optional: Use this input if you want a supply fan alarm.
Binary input	FILTER-S	Filter Status	P32AC-2C FTG18A-600R	Optional: Use this input when you require a contact for filter status. Note: The controller also has a runtime limit alarm that you can use as a maintenance alarm for filters.
Binary input	PURGE-S	Purge Status	n/a	Optional: Dry contact input. Use this input when you want to purge the facility of smoke with the unit's dampers.
Binary input	SERVICE-A	Service Alarm	n/a	Optional: Dry contact input. Use this input to give a general service alarm.
Binary input	LT-A	Low Temperature Alarm	A70HA-1C TE-6001-8	Required: Use this input if you have water coils and an economizer.
Binary input	OCC-S	Occupancy Sensor	OLS-2100-1 RIBU1C	Optional: Lighting switch plus relay. Use this input to switch off the lights when motion is not sensed. The relay connects to the light circuit and wires to this input with the normal open contact. When energized, the unit is in occupied mode. When de-energized, the unit is in standby mode.
Analog input	SA-T	Supply Air Temperature	TE-6311M-1	Required: Use this input if you have an economizer and no mixed air temperature.
Analog input	MA-T	Mixed Air Temperature	TE-6315M-1	Required: Use this input if you have proportional heating or cooling and an economizer. If you have staged heating and cooling, and you do not have water, you can use a supply air temperature for the economizer control.
Analog input	OA-T	Outdoor Air Temperature	TE-6313P-1	Required: Use this input if you have economizer control. This input is for a hardwired sensor. The controller has the option to data share an outside air temperature to the controller.
Analog input	RA-Q	Return Air Quality	CD-P1000-00-00	Optional: Use this input when you have an economizer and you want demand ventilation control sequence. The RA-Q sensor or the ZN-Q sensor is necessary for this sequence to work. RA-Q has priority.

Point type	Object name	Expanded ID	Johnson Controls part numbers	Required or optional
Analog input	RA-T	Return Air Temperature	TE-6311M-1	Optional: Use this input to control instead of a zone temperature sensor. If a zone temperature sensor is present it takes priority and the RA-T monitors only.
Analog input	MAD-FB	Mixed Air Damper Feedback	n/a	Optional: Required when you want Title 24 economizer fault detection diagnostics as part of the unit sequence. It is assumed the actuators connected to the economizer have a voltage feedback signal. Input range is adjustable but assumed to be voltage.
Analog input	ZN-H	Zone Humidity	HE-67N3-0N00P	Optional: Use this input this hardwired input when you want to control to a humidity level but want to use a hardwired humidity sensor instead of a NS humidity sensor. Using this option means you can use a duct-mounted sensor. The NS humidity sensor takes priority.
Analog output	MAD-O	Mixed Air Damper Output	Actuator (part requires sizing)	Required: Use this input when you have a mixed air damper with a two-position option, or use as an economizer. Output range is adjustable but assumed to be voltage.
Analog output	CLG-O	Cooling Output	Actuator (part requires sizing)	Optional: Required when you have proportional cooling. Output range is adjustable but assumed to be voltage.
Analog output	HTG-O	Heating Output	Actuator (part requires sizing) or signal to modulated gas valve	Optional: Required when you have proportional heating. Output range is adjustable but assumed to be voltage
Analog output	HUM-O / HUM-HL	Humidifier Output and Humidity High Limit	HL-67N5-8N00P	Optional: Required when you have a humidifier. The high limit sensor is required to back the signal off when high discharge humidity is sensed
Analog output	SF-O	Supply Fan Output	n/a	Optional: Required when you have a fixed variable fan.
Binary output	SF-C	Supply Fan Command	Conventional Thermostat Interface (CTI) or RIBU1C	Required: If you are going to a starter you need a RIBU1C relay wired to the output. You require a conventional thermostat interface when you have staged heating and cooling.
Binary output	HTG1-C / SHTG1-C	Heating Stage 1 Command / Supplemental Htg Stage 1 Command	СТІ	Optional: If you have staged heating or if you have a heat pump with supplemental heat, use this binary output. You require a conventional thermostat interface or field relays.
Binary output	HTG2-C / SHTG2-C	Heating Stage 2 Command / Supplemental Htg Stage 2 Command	СТІ	Optional: If you have 2+ stages of heat or if you have a heat pump with 2 stages of supplemental heat, use this binary output. You require a conventional thermostat interface or field relays.

Table 3: Point list (Part 2 of 4)

Point type	Object name	Expanded ID	Johnson Controls part numbers	Required or optional
Binary output	HTG3-C	Heating Stage 3 Command	СТІ	Optional: If you have 3+ stages of heat, use this output. You require a conventional thermostat interface or field relays.
Binary output	HTG4-C	Heating Stage 4 Command	СТІ	Optional: If you have 4+ stages of heat, use this output. You require a conventional thermostat interface or field relays.
Binary output	CLG1-C/ COMP1-C	Cooling Stage 1 Command/ Compressor 1 Command	СТІ	Optional: If you have staged cooling or if you have a heat pump, use this binary output. You require a conventional thermostat interface or field relays.
Binary output	CLG2-C/ COMP2-C	Cooling Stage 2 Command/ Compressor 2 command	СТІ	Optional: If you have 2+ stages of cooling or if you have a heat pump with 2 stages, use this binary output. You require a conventional thermostat interface or field relays.
Binary output	CLG3-C/ REV-C	Cooling Stage 3 Command/ Reversing Valve	СТІ	Optional: If you have 3+ stages of cooling or if you have a heat pump, use this binary output. You require a conventional thermostat interface or field relays.
Binary output	CLG4-C	Cooling Stage 4 Command	СТІ	Optional: If you have 4+ stages of cooling, use this output. You require a conventional thermostat interface or field relays.
Binary output	HGBYP-C	Hot Gas Bypass Coil Command	RIBU1C	Optional: Use when you want to use a hot gas bypass coil to reheat when you dehumidify.
Binary output	HUM-C	Humidifier Command	RIBU1C	Optional: Use when you want to cycle the humidifier.
Sensor bus	ZN-T	Zone Temperature	NS-BTN7003-2	Optional: Use for zone control NS Sensor Type - Net Sensor, 120x80, No Logo, No Display, No Setpoint, Terminals
Sensor bus	ZN-T ZN-TOCC WC-ADJ	Zone Temperature Zone Temporary Occupancy Warmer Cooler Adjustment	NS-BTP7002-2	Optional: NS Sensor Type - Net Sensor, 120x80, No Logo, No Display, Warmer/ Cooler Adjustment, Terminals
Sensor bus	ZN-T ZN-TOCC WC-ADJ	Zone Temperature Zone Temporary Occupancy Zone Setpoint	NS-BTJ7002-2	Optional: NS Sensor Type - Net Sensor, 120x80, JCI Logo, LCD Display, Local Setpoint, Terminals (Up/Down Buttons)
Sensor bus	ZN-T ZN-H	Zone Temperature Zone Humidity	NS-BHN7003-0	Optional: NS Sensor Type - Net Sensor, 120x80, JCI Logo, No Display, No Setpoint, Humidity 3%, Terminals

 Table 3:
 Point list (Part 3 of 4)

Point type	Object name	Expanded ID	Johnson Controls part numbers	Required or optional
Sensor bus	ZN-T ZN-H ZN-TOCC WC-ADJ	Zone Temperature Zone Humidity Zone Temporary Occupancy Warmer Cooler Adjustment	NS-BHP7003-0	Optional: NS Sensor Type - Net Sensor, 120x80, JCI Logo, No Display, Warmer/ Cooler Adjustment, Humidity 3%, Terminals
Sensor bus	ZN-T ZN-H ZN-TOCC ZN-SP	Zone Temperature Zone Humidity Zone Temporary Occupancy Zone Setpoint	NS-BHM7103-2	Optional: NS Sensor Type - Net Sensor, 120x80, JCI Logo, LCD Display, Local Setpoint, Humidity 3%, Terminals (Up/ Down Buttons)
Sensor bus	FDD ZN-T ZN-SP ZN-TOCC	FDD NS Sensor Zone Temperature Zone Setpoint Zone Temporary Occupancy	NS-BTB7F03-1	Optional: NS Sensor Type – Special NS Sensor to report Economizer FDD Alarms in the Space. 120x80, No Logo, LCD Display, Local Setpoint, Terminals (Setpoint Dial)
Sensor bus	ZN-Q	Zone Air Quality	NS-BCN7004-0	Optional: NS Sensor Type - Net CO2 sensor 80 mm x 120 mm, requires 24VAC power

Table 3: Point list (Part 4 of 4)

Detailed procedures

Updating the VAC controller firmware

- 1. Log in to verasyscontrols.com to locate the controller updates.
- 2. Download the package file for the constant volume controller to a USB 2.0 drive root directory.

Note: Ensure that the USB drive is formatted as FAT or FAT32.

Note: The package file format is: Constant Volume LC-VACx000-0_vvvv.pkg

- 3. Insert the USB drive into the USB port on the controller.
- 4. On the controller local display, navigate to the **Update and Load Firmware** section and select the package file on the USB drive.
- 5. Press Enter. The controller updates.
- 6. When the application update is finished, use the Verasys Smart Building Hub (SBH) or the local display to configure the controller.

Setting the VAC controller address

Choose between setting the VAC controller address using the local display, or using the SBH.

Setting up the VAC controller address using the local display

1. Press the ENT (Enter) button to access the menu.

- 2. Use the up and down arrows to navigate to the **Controller** menu. Press the **ENT** button to select the **Controller** menu.
- 3. Navigate to the **Network** section of the **Controller** menu and press the **ENT** button. This takes you to the **Network Parameters** section.
- 4. Navigate to **Address** and press the **ENT** button. The address defaults to 4.
- 5. Press the ENT button. The address blinks.
- 6. Use the up or down arrow to increase or decrease the address to the value you require. Press the **ENT** button. The address stops blinking and the display shows the old address.
- 7. Press either the up or down arrow. The screen refreshes to the new address.
- 8. Press **ESC (Escape)** to go back a single menu level. Keep pressing **ESC** and you return to the main screen that shows the system is operational.

Setting up the VAC controller address using the Smart Building Hub

- 1. Use the SBH to navigate to the VAC controller.
- 2. Navigate to the **Network** section of the **Controller** menu to set the address.
 - **Note:** The default address is 4; so if another controller conflicts with this address, disconnect the other address 4 from the trunk temporarily while you configure the controller or use the <u>Setting up the VAC controller</u> <u>address using the local display</u> procedure.
- 3. Use the up and down arrows to select address 4, or enter the address directly.
- 4. Press Save.

Product options

Table 4: Product code numbers

Product code number	Description
LC-VAC1000-0	18pt Constant Volume Controller only, with LCD display
LC-VAC3000-0	32pt Constant Volume Controller only, with LCD display
LC-IOM3711-0	Input Output Expansion Module

Sequence of operation

Occupancy mode

Setting schedules on the controller defines the occupancy mode. You can also synchronize schedules from the SBH. In the **Status** menu of the controller, you can override occupancy mode by changing the **Occupancy Override**. If you override the schedule, the controller disregards the schedule until you reset the **Occupancy Override** to the **Not Set** state. From the **Status** menu on the homepage, you can see the current **Occupancy Status**.

On the **Commissioning** menu, in the **Setpoints** section, the controller uses the **Temperature Setpoint** and **Deadband** to configure setpoints in the occupied state. The **Deadband** determines the difference between the heating and cooling setpoints. The system cools or heats to the **Effective Heating and Cooling Setpoints**.

In occupied mode, you can enable the **Occupancy BI Enabled** input in the **Sensors** section of the **Details** menu. If you configure the binary input, the unit expects a contact that results in different outcomes depending on whether or not the contact is made:

- If the contact occurs, the binary input sets the unit to occupied mode.
- If the contact does not occur, the binary input sets the unit to standby mode.

An example of a typical device that you can use as a binary input is a motion sensor or relay connected to a lighting circuit.

Standby mode

Standby mode occurs when the schedule is set to occupied and the sensor is set to unoccupied. During standby mode, standby setpoints are active and the effective heating and cooling setpoints adjust accordingly. In the unoccupied mode, the unit remains off until the zone temperature rises above or falls below the unoccupied cooling or heating setpoints. When this occurs, the system reactivates to satisfy the zone temperature.

NS sensor

If the system has an NS sensor that has a warmer-cooler adjustment or setpoint adjustment, you can perform the following actions:

- Initiate a temporary occupancy state by adjusting the knob or pressing a button on the unit. You can adjust
 the amount of time that the unit remains in this temporary occupancy state by adjusting Temp Occupancy
 Time in the Setpoints section of the Commissioning menu. Set the time to zero to disable this feature.
- Configure the amount of adjustability the occupants have with the warmer-cooler adjustment or Warm/ Cool Adjust Range on the Details menu, in the Sensor section.
- On the **Setpoints** section of the **Commissioning** menu, configure the following parameters:
 - Deadband
 - Temperature Setpoint
 - Standby Setpoints
 - Unoccupied Setpoints
 - Temp Occupancy Time

Supply fan control

Use the **Fan Cycling** parameter on the **System Configuration** section of the **Details** menu to cycle the fan for heating and cooling. If it is set to **No**, the fan runs continuously during occupied and standby modes. If it is set to **Yes**, the fan cycles off when the temperature setpoints are satisfied.

Supply fan status alarm

You can install a device to monitor the fan status by wiring a fan status input to the controller. This input can generate an alarm if the fan command does not match the status input that you set. If you do not install the monitoring device, the control starts when the supply fan command starts and there is no diagnostic for fan failure. If there is a loss of airflow, the system automatically attempts to restart until it receives positive status. If the status indicates that there is no airflow present, the unit does not heat or cool.

To configure the fan status alarm:

- 1. From the Details menu, navigate to the Sensors section.
- 2. In the field for Supply Fan Status Installed select Yes.
- 3. In the **Diagnostics** section of the **Commissioning** menu, adjust the **SF Alarm Delay** to suit your requirements.

Fixed variable fan control (optional)

In the **System Configuration** section of the **Details** menu, you can select a constant volume fan for the supply fan type. If selected, the fan modulates with the heating or cooling command. The relationship varies depending on the type of heating and cooling equipment present. In the **Fan** section of the **Commissioning** menu, you can configure the type of heating and cooling equipment.

Economizer control (optional)

You can configure an economizer with the following settings.

From the **Details** menu, click **System Configuration** and select to set the economizer damper type. Use the following list to understand the available settings:

- **None** There is no economizer connected, or another device controls an economizer.
- **Min OA** The damper opens to a minimum position when the unit is in the occupied mode. Low limit logic does not affect this position and it remains constant.
- **Economizer** The controller modulates the damper section when the outdoor air temperature is cooler than the economizer setpoint. The economizer acts as the initial stage of cooling and works in sequence with the cooling output.

In the **Economizer** section of the **Commissioning** menu, the low limit control is active when the **Economizer Damper Type** is set to **Economizer** and the low limit temperature is below the **Low Limit Temp Setpoint**. The **Low Limit Temp Setpoint** is either **Mixed Air** or **Supply Air** as dictated by **Min OA Sensor**.

Note: If the cooling coil control or heating coil control is modulated, this feature is not optional and requires a mixed-air sensor, not a supply air sensor.

To set the option for demand control ventilation, set the **CO2 Sensor Installed** parameter on the **Sensors** section of the **Details** menu. Change the setting from **Not Installed** to one of the three following settings:

- SAB sensor (ZN-Q)
- Hardwired sensor (RA-Q)
- Both

When you choose one of these settings, the sensors reset the damper minimum position as the CO2 sensor rises above the CO2 setpoint. If both sensors are installed, the hardwired sensor (RA-Q) takes priority.

Note: From the Commissioning menu, navigate to the Economizer section to configure the CO2 reset settings. The true minimum position output of the economizer spans between user-adjustable **Minimum OA Percent** and **Min Pos High Setpoint** based on the **CO2 Reset A, CO2 Reset B,** and measured CO2.

Title 24 economizer diagnostics (optional)

The controller can conduct Title 24 diagnostics in accordance with the California Building Standards Code of the California Code of Regulations (CCR). On the **System Configuration** section of the **Details** menu, enable **Economizer Fault Detection** for the controller to conduct Title 24 diagnostics.

If you are using an NS-BTB7F03-1 sensor, the controller monitors the mixed air damper position and uses the feedback of the damper and the mixed air temperature sensor to report alarms to the net sensor in the field. The network sensor reports the following alarm situations through Verasys as **Service Priority**:

- Air Temperature Sensor Fault
- Damper Modulation Fault
- Econ Excessive Outside Air
- Econ Operational Fault
- Econ Not Operational Fault

Temperature control

You can control using NS sensors for zone control or using a hardwired return air temperature sensor. If you are using NS sensors, you can connect up to five and the temperatures are averaged.

- If both an NS sensor and return air sensor are present, the unit controls using the NS sensor.
- If only a return air sensor is present, the unit controls to return air temperature.

Humidification control

Note: Humidification is possible only when you have extended the controller's features using LC-IOM3711-0.

From the **Sensors** section of the **Details** menu, you can see if a humidity sensor is installed. If a humidity sensor is set to something other than **Not Installed**, and the **Humidity Enable** parameter in the **System Configuration** section is set to **Enable**, the option for humidification is present. When humidification is present, the unit modulates the humidity output to maintain a humidity setpoint. A humidifier binary output is also energized when a required humidification is present. You must install a humidity high limit transmitter in the duct to limit the maximum humidity level discharged by the humidifier.

Dehumidification control

From the **Sensors** section of the **Details** menu, you can see if a humidity sensor is installed. If a humidity sensor is set to something other than **Not Installed**, and the **Dehumification Enable** parameter in the **System Configuration** section is set to **Enable**, the option for dehumidification is present.

When dehumidification is present, the unit cycles the cooling to maintain a dehumidification setpoint. If the cooling begins to overdrive the zone temperature, the heating cycles on to maintain zone temperature. You can choose to use a hot gas bypass coil as reheat. When the system is configured as staged cooling with reheat, it energizes whenever a dehumidification call is present. If configured as a heat pump with supplemental heat, the hot gas bypass is energized when a dehumidification call is present and a supplemental stage is requested.

Cooling coil

From the **System Configuration** section of the **Details** menu, you can select staged cooling, modulated cooling, or heat pump.

Note: A parameter for outside air temperature low limit locks out the cooling if the outside air falls below a setpoint.

Staged cooling

From the **Commissioning** menu, in the **Cooling** section, you can configure staged cooling. The cooling coil is staged in sequence to maintain the zone temperature setpoint. You can set the **Number of Stages Installed** from the controller interface. If the cooling is set to **0** stages, cooling is not installed. A sequencer cycles through the following stages:

- The first stage activates at 25% command and stops at 12.5% command.
- The second stage activates at 50% command and stops at 37.5% command.
- The third stage activates at 75% command and stops at 62.5% command.
- The fourth stage activates at 100% command and stops at 87.5% command.

When set to **Enable**, **Rotate Enable** controls the stages to balance the runtime equally. You can also set the discharge low limit parameter. If the discharge falls below a **Supply Air Setpoint Cooling Min** parameter, which is initially set to **50 degrees F**, cooling slows or stops.

Modulated cooling

From the **Commissioning** menu, in the **Cooling** section, you can configure modulated cooling. The cooling coil output modulates to maintain zone temperature. The output ranges from 0%-100% based on demand. You can also set the discharge low limit parameter. If the discharge falls below a **Supply Air Setpoint Cooling Min** parameter, which is initially set to **50 degrees F**, cooling slows or stops.

Heat pump

From the **Commissioning** menu, in the **Heat Pump** section, you can configure the heat pump. The controller supports up to two stages of heat pump compressors that you can set as follows:

- The output used by cooling stage 1 is for compressor 1
- The output used by cooling stage 2 is for compressor 2

The compressors are staged in sequence to maintain the zone temperature setpoint and the reversing valve is indexed to cooling. However, you can also set the **Reversing Valve Polarity** to switch the reversing valve output for heating or cooling.

Reheat coil

From the **System Configuration** section of the **Details** menu, you can select staged heating, modulated heating, heat pump, or heat pump with supplemental heat by changing the **Heating Device Type** parameter. You can also set an outside air temperature high limit from the **Commissioning** menu. If the outside air rises above this setpoint, the unit prevents heating.

Staged heating

From the **Commissioning** menu, in the **Heating** section, you can configure staged heating. The reheat coil is staged in sequence to maintain the zone temperature setpoint. You can set the number of stages with the interface. If the reheat coil is set to **0** stages, heating is not installed. A sequencer cycles through the following stages:

- The first stage activates at 25% command and stops at 12.5% command.
- The second stage activates at 50% command and stops at 37.5% command.
- The third stage activates at 75% command and stops at 62.5% command.
- The fourth stage activates at 100% command and stops at 87.5% command.

The **Rotate Enable** option, when set to **Enable**, controls the stages to balance runtime equally. You can also set the discharge high limit. If the discharge rises above the **Supply Air Setpoint Heating Max setpoint**, which is initially set to **130 degrees F**, heating slows or stops.

Modulated heating

From the **Commissioning** menu, in the **Heating** section, you can configure modulated heating. The heating coil output modulates to maintain zone temperature. The output ranges from 0-100% based on demand. You can also set the **Supply Air Setpoint Heating Max** parameter. If the discharge starts to rise above this setpoint, initially set to **130 degrees F**, heating slows or stops.

Heat pump

From the **Commissioning** menu, in the **Heat Pump** section, you can configure the heat pump. The controller supports up to two stages of heat pump compressors that you can set as follows:

• The output used by cooling stage 1 is for compressor 1

• The output used by cooling stage 2 is for compressor 2

The compressors are staged in sequence to maintain the zone temperature setpoint and the reversing valve is indexed to cooling. However, you can also set the **Reversing Valve Polarity** to switch the reversing valve output for heating or cooling.

Safeties

A shutdown procedure activates when a low temperature alarm input is closed. The procedure varies depending on the following two situations:

- When triggered and proportional heating or cooling is defined, the dampers fully close and the cooling or heating output is set to the failsafe position, and the fan stops.
- When triggered and no proportional heating or cooling is defined, the dampers fully close and the unit remains operating.

Diagnostics

From the **Diagnostic** section of the **Commissioning** menu, you can configure the following diagnostic alarms:

- Fan Runtime generates a maintenance alarm with a fan runtime counter, a fan runtime reset, and a fan runtime limit setpoint. Set the runtime limit to a level at which you want to receive the alarm. When the limit is reached, the alarm generates. Use the runtime reset to reset the alarm when maintenance is finished.
- **Supply Fan Alarm** generates an alarm if the supply fan command does not match the status input within the time frame you set.

Note: For the supply fan alarm you must install a device to monitor fan functionality and wire it to the fan status input. See the <u>Supply fan status alarm</u> section for more details.

- Heat Cool Alarm generates an alarm if there is a heating or cooling request and the temperature does not fall below the heat cool alarm differential setting within the heat cool alarm delay. This indicates that there is a fault with the heating or cooling.
- **Zone Temperature** an alarm generates if the following situation occurs: the zone temperature rises or falls below the effective cooling or effective heating setpoint greater or less than the zone temperature alarm offset value, and it remains above or below that band for more than the zone temperature alarm delay.
- Title 24 Economizer Alarm
- Service Alarm Point generates an alarm to Verasys to perform a service. Choose between Service, Service Priority, or Critical.

Tuning

Use the following list to understand the tuning parameters you can select:

- **Proportional Band** refers to the change in zone temperature results in a full range change in the equipment outputs. The smaller the **Proportional Band**, the more aggressively the proportional integral derivative (PID) responds.
- **Integral Time** is the amount of time it takes until the integral term of the PID matches the proportional term when the PID has a constant error.
- **Saturation Time** is the amount of time the PID loop is at its limit, either 0% or 100%, before saturating low or high. For example, in order to transition from economizer control to economizer + mechanical cooling, the PID for economizer must first saturate high, which is 100% output for **Saturation Time**.

From the **PID Data** section of the **Commissioning** menu, you can set the proportional and integral parameters for each of the control loops. If **PID Tuning Type** is set to **Manual**, the **Proportional Band**, **Integral Time**, and **Saturation Time** are adjustable for each loop. If switched to auto tune, the PID loop starts with the default manual values and then automatically tunes them. For each loop you can see the effective proportional band and integral time. **Saturation Time** is manually adjustable.

Data share

Data share facilitates the sharing of meaningful data between SMART system components. You can share the following objects using data share:

- Outdoor Air Temperature
- Temperature Setpoint
- Unoccupied Cooling Setpoint
- Unoccupied Heating Setpoint
- Standby Cooling Setpoint
- Standby Heating Setpoint

Note: If you do not have an outside air temperature sensor installed, the controller can share the value from another controller that does have one.

Load shed

Note: You must have a LC-VAC1002-0 to initiate a load shed command to Verasys.

You can set the built-in load shed feature to automatically raise and lower the effective heating and cooling setpoints when triggered. To set the rate and limit of the load shed, complete the following steps:

- 1. Navigate to the **Details** menu.
- 2. Navigate to the System Configuration section.
- 3. Change Load Shed Allowed to Yes.
- 4. Navigate to the **Commissioning** menu.
- 5. Navigate to the Load Shed section.
- 6. Change the Load Shed Adjust and Load Shed Rate Limit according to your needs.

Shutdown

From the **Status** menu, use the built-in **Unit Enable** setting to manually shut down the unit. You can also use the global shutdown feature in Verasys to shut down the controller.

Note: To initiate the global shutdown command feature in Verasys, you must have a LC-VAC1002-0.

Economizer fault detection

To use this feature, you must wire the mixed air feedback to the controller with the mixed air temperature sensor. The controller uses the sensors to detect the five faults shown in Figure 5.

Note: You can use the NS sensor NS-BTB7F03-x to display the error code, the temperature, and the local setpoint for the controller.

Note: You can also view the faults on the on-board display or on the SBH for further notifications.

Table 5: Economizer fault list

Display text	Display text California Title 24 economizer fault condition	Possible problem
Err 00	Air temperature sensor failure/fault	There is a problem with one of the air temperature sensors. Check the Outdoor Air, Return Air, or Supply Air sensors.
Err 01	Not economizing when it should	The economizer is not using outdoor air when it should.
Err 02	Economizing when it should	The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation.
Err 03	Damper not modulating	The economizer damper does not modulate properly. Check the damper, linkage to actuator, or the actuator.
Err 04	Excess outdoor air	The economizer is allowing excess outdoor air inside.

Point to point wiring diagrams

You can expand the features of the LC-VAC1000-0 and the LC-VAC3000-0 when you combine either controller with the LC-IOM3711-0. Below are the wiring diagrams for combining both controllers with the LC-IOM3711-0.

LC-VAC1000-0 and LC-IOM3711-0 wiring

Figure 2 shows the wiring for the LC-VAC1000-0. Figure 3 shows the wiring necessary to expand the LC-VAC1000-0 with the LC-IOM37011-0.

Note: When you add LC-IOM3711-0, you must use address 4.



Notes: Terminals may vary based on speed control only on units that are fixed variable. The number of stages can vary with configuration. Heating stages 3 and 4 wire to the LC-IOM3711-0.

Verasys® Constant Volume Controller Application Note

Table 6:	Wiring	diagram	LC-VAC1000-0
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Number	Description				
1	Mixed air damper output				
2	Speed control for supply fan				
	Staged unit	Heat pump			
3	Fan	Fan			
4	Heating stage 1	Supplemental heating stage 1			
5	Heating stage 2	Supplemental heating stage 2			
6	Cooling stage 1	Compressor 1 command			
7	Cooling stage 2	Compressor 2 command			
8	Cooling stage 3	Reversing valve			
9	Cooling stage 4	Not used			
10	24 VAC COM	24 VAC COM			
11	24 VAC	24 VAC			
12	24 V COM power transformer				
13	24 V HOT power transformer				
14	From last device				
15	To next device				
16	NS zone sensor. This sensor is required if you do not co	ontrol from the RA-T sensor.			
17	Zone sensor. This sensor is optional. The connector is located on the back of the sensor. Note: Wire the sensor bus to any other network sensors in a daisy-chain configuration				
18	Return air temperature. This sensor is optional and you sensor.	can use it to control instead of a zone temperature			
19	Mixed air damper feedback. Required for Title 24 econo	mizer fault detection diagnostics.			
20	Outside air temperature. Optional. For a hardwired sense	sor. You can also data share the outside air temperature.			
21	Mixed air temperature. Required if you have proportiona	al heating or cooling and an economizer.			
22	Supply air temperature. Required if you have an econor	mizer and no mixed air temperature.			
23	Service alarm. Optional. Dry contact input used to give	a general service alarm.			
24	Occupancy sensor. Optional. Used to reset setpoints whether the setpoint of the setpoint of the set	hen the room is unoccupied.			
25	Low temperature alarm. Required when you have water	r coils and an economizer.			
26	Fan status. Optional.				



Figure 3: Wiring diagram to add LC-IOM3711-0 to LC-VAC1000-0



Number	Description
1	Continuation of unit terminal strip: Heating stage 3
2	Continuation of unit terminal strip: Heating stage 4
3	Continuation of unit terminal strip: 24 VAC
4	Hot gas bypass solenoid
5	Humidifier: Output 0 VDC -10VDC
6	Humidifier Enable
7	Cooling output

Number	Description
8	Heating output
9	Humidifier high limit: Control signal out
10	Humidifier high limit: Control signal in
11	Humidifier high limit: Common
12	Humidifier high limit: 24 VAC
13	24 V COM power transformer
14	24 V HOT power transformer
15	Sensor bus. Wire with the sensor bus on the VAC in a daisy-chain configuration
16	Optional sensor: Purge command
17	Optional sensor: Filter status
18	Optional sensor: Return air CO2
19	Optional sensor: Zone humidity

LC-VAC3000-0 and LC-IOM3711-0 wiring

Figure 4 shows the wiring for the LC-VAC3000-0. Figure 5 shows the wiring necessary to expand the LC-VAC3000-0 with the LC-IOM37011-0.

Note: When you add LC-IOM3711-0, you must use address 4.

Figure 4: Wiring diagram VAC3000-0



Number Description 1 Mixed air damper output 2 Cooling output 3 Cooling output Staged unit Heat pump Speed control 4 5 Fan Fan 6 Heating stage 1 Supplemental heating stage 1 7 Heating stage 2 Supplemental heating stage 2 Heating stage 3 8 9 Heating stage 4 10 Cooling stage 1 Compressor 1 command 11 Cooling stage 2 Compressor 2 command 12 Reversing valve Cooling stage 3 13 Cooling stage 4 Not used 14 24 VAC COM 24 VAC COM 15 24 VAC 24 VAC 16 24 V COM power transformer 17 24 V HOT power transformer From last device 18 19 To next device 20 NS zone sensor. This sensor is required if you do not control from the RA-T sensor. 21 Zone sensor. Optional. The connector is located on the back of the sensor. **Note:** Wire the sensor bus to any other network sensors in a daisy-chain configuration. 22 Mixed air damper feedback. Required for Title 24 economizer fault detection diagnostics. Return air temperature. Optional. Can be used to control instead of a zone temperature sensor. 23 24 Return air CO2. Optional. Range 0ppm - 2000ppm / 0 VDC - 10 VDC 25 Outside air temperature. Optional. For a hardwired sensor. You can also data share the outside air temperature. 26 Mixed air temperature. Required if you have proportional heating or cooling and an economizer. 27 Supply air temperature. Required if you have an economizer and no mixed air temperature. 28 Input 1. Optional. Use if you want a supply fan alarm. Fan status 29 Input 2. Optional sensor. Filter status 30 Input 3. Optional command. Purge command 31 Input 4. Optional. Dry contact input with a general service alarm. Service alarm 32 Input 5. Required when you have water coils and an economizer. Low temperature alarm 33 Input 6. Optional. To reset setpoint when a room is unoccupied. Occupancy sensor

Table 8: Wiring diagram LC-VAC3000-0



Figure 5: Wiring diagram to add LC-IOM3711-0 to LC-VAC3000-0



Number	Description
1	Hot gas bypass solenoid
2	Humidifier: Control signal input
3	Humidifier: Enable
4	Humidifier high limit: Control signal out
5	Humidifier high limit: Control signal in
6	Humidifier high limit: Common
7	Humidifier high limit: 24 VAC
8	24 V COM power transformer
9	24 V HOT power transformer
10	Sensor bus. Wire with the sensor bus on the VAC in a daisy-chain configuration.
11	Zone humidity. Optional sensor. Range: 0% - 100% / 0 VDC - 10 VDC

Verasys parameters and objects

Table 10: Parameters and objects (Part 1 of 26)

Monu	Object or	Description	Adjustable	Defeulte	Banga	BACnet
wenu	parameter	Description	Adjustable	Defaults	Range	exposed
Critical	Low Temperature Alarm	This alarm occurs when the low temperature alarm binary input is triggered. If either heating or cooling output is proportional, the unit shuts down if triggered. If the unit does not have proportional outputs and has an economizer, the system commands the economizer to close and the unit runs.	Read only			
	Emergency Shutdown Alarm	This alarm occurs if someone triggers the emergency shutdown object under the status menu.	Read only			
	Zone High Temperature Alarm	If the zone temperature exceeds the cooling setpoint by 5°F this alarm occurs.	Read only			
	Zone Low Temperature Alarm	If the zone temperature drops below the heating setpoint by 5°F this alarm occurs.	Read only			
	Supply Fan Fault	If you add a supply fan status sensor and the commanded value of the fan does not match the binary input for fan status, this alarm occurs.	Read only			
	Unit in Purge Mode	If either the emergency mode or binary input triggers a purge, this alarm occurs and the unit opens the dampers to 100 percent.	Read only			
Alarm: Service Priority	Heating Ineffective Alarm	This alarm occurs if the heat cool diagnostics are set to True and you have a supply air temperature sensor. If you request heating and the temperature does not rise by an expected amount of a defined period of time, an alarm occurs.	Read only			
	Cooling Ineffective Alarm	This alarm occurs if the heat cool diagnostics are set to True and you have a supply air temperature sensor. If you request cooling and the temperature does not fall by an expected amount of a defined period of time, an alarm occurs.	Read only			
	Zone Temperature Sensor Failure	This alarm occurs if a zone temperature sensor is connected and receives a reliable input that is suddenly disconnected. Note: If the sensor was connected by mistake, you can trigger the relearn system input from the Details menu on the Sensors section.	Read only			

Table 10:	Parameters	and object	cts (Part 2	? of 26)
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Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Alarm: Service Priority	Return Air Temperature Sensor Failure	This alarm occurs if a return air temperature sensor is connected and receives a reliable input that is suddenly disconnected. Note: If the sensor was connected by mistake, you can trigger the relearn system input from the Details menu on the Sensors section.	Read only			
	Supply Air Temperature Sensor Failure	This alarm occurs if a supply air temperature sensor is connected and receives a reliable input that is suddenly disconnected. Note: If the sensor was connected by mistake, you can trigger the relearn system input from the Details menu on the Sensors section.	Read only			
	Outside Air Temperature Sensor Failure	This alarm occurs if an outside air temperature sensor is connected and receives a reliable input that input is suddenly disconnected. Note: If the sensor was connected by mistake, you can trigger the relearn system input from the Details menu on the Sensors section.	Read only			
	Mixed Air Temperature Sensor Failure	This alarm occurs if a mixed air temperature sensor is connected and receives a reliable input that is suddenly disconnected. Note: If the sensor was connected by mistake, you can trigger the relearn system input from the Details menu on the Sensors section.	Read only			
	Air Temperature Sensor Fault	This alarm occurs if the economizer fault detection is enabled and the mixed air or outside air temperature sensor becomes unreliable.	Read only			
	Damper Modulation Fault	This alarm occurs if the economizer fault detection is enabled and the difference between the Economizer Damper % Command and the Economizer Damper Position is greater than the Damper Position Error, this fault occurs.	Read only			
	Econ Excessive Outside Air	This alarm occurs if the Economizer fault detection is Enabled and the Economizer Damper Position (feedback) is higher than the Minimum Position by more than the Damper Min Pos Fault Tolerance. This check is performed when the mixed air damper is at its minimum position or is fully closed.	Read only			

Table 10: Parameters and objects (Part 3 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Alarm: Service Priority	Econ Operational Fault	This alarm occurs if the economizer fault detection is enabled and Economizer Damper Position (feedback) is higher than the minimum position plus the Damper Min Position Fault Tolerance. This check is performed when the mixed air damper is at its minimum position.	Read only			
	Econ Not Operational Fault	This alarm occurs if the economizer fault detection is enabled and Economizer Damper Position (feedback) is less than the minimum position plus the Damper Min Position Fault Tolerance. This check is performed when the economizer is in control.	Read only			
Alarm: Service	Dirty Filter	This alarm occurs when the binary input for the filter status is triggered	Read only			
	Fan Runtime Alarm	This alarm occurs when the runtime of the fan exceeds the runtime limit	Read only			
	Service Alarm	This alarm occurs when the binary input for the service alarm is triggered	Read only			
Status	Unit Status	The current status or state of the unit	Read only			
	Unit Enable	Disables the unit if set to shutdown	Adjustable	Shutdown		Yes
	Emergency Mode	Use to manually control the unit to pressurize, depressurize, purge, or shut down. Note: Generally this point is used in conjunction with an economizer to try to control smoke.	Adjustable	Normal		Yes
	System Mode	Use to control the various states of the unit.	Adjustable	Auto		Yes
	Occupancy Override	Use to override any occupied control condition. If this is set to anything besides Not Set , the unit remains in the mode you selected until you return this object to Not Set .	Adjustable	Not Set		Yes
	Occupied Status	Displays the current occupancy mode of the unit	Read only			Yes
	Zone Temperature	Present value of the zone temperature NS sensor	Read only			
	Return Air Temperature Al	Present value of the return air temperature	Read only			Yes
	Supply Air Temperature Al	Present value of the supply air temperature analog input	Read only			Yes
	Mixed Air Temperature Al	Present value of the mixed air temperature analog input	Read only			Yes

BACnet Object or parameter Menu Description Adjustable Defaults exposed Range Status Zone Humidity Present value of the zone humidity Read only NS sensor Read only **Zone Humidity** Present value of the zone humidity Yes analog input AI **Zone Quality** Present value of the zone air Read only quality NS sensor Return CO2 Present value of the return CO2 Read only Yes Sensor Al sensor analog input Operational Present value of the outdoor air Read only Yes **Outdoor Air** temperature analog input Temperature Economizer The current status of the Read only Status economizer Fan Status The current status of the fan Read only **Cooling Status** The current state of the cooling Read only **Heating Status** The current state of heating Read only Humidification The current state of humidification Read only Dehumidification The current state of Read only dehumidification Hot Gas Reheat The current state of the hot gas Read only Status reheat Summary: Zone Present value of the zone Read only **HVAC Zone** Temperature temperature NS sensor **Return Air** Present value of the return air Read only Yes Temperature AI temperature The occupied temperature 72°F 61°F to 85°F Temperature Adjustable Yes Setpoint setpoint that the unit is trying to achieve Setpoint Adjust The adjustment that the zone Read only temperature NS sensor adds or subtracts from the temperature setpoint **Zone Humidity** Present value of the zone humidity Read only NS sensor **Zone Humidity** Present value of the zone humidity Read only Yes AI analog input **Zone Quality** Present value of the zone air Read only quality NS sensor Return CO2 Present value of the return CO2 Read only Yes Sensor Al sensor input Supply Fan BO Present value of the supply fan Summary: Read only Yes Fan binary output Fan Status Bl Present value of the supply fan Read only Yes status binary input Supply Fan Present value of the Supply fan Read only Speed AO speed analog output

Table 10: Parameters and objects (Part 4 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Summary: Cooling	Effective Cooling Setpoint	The temperature setpoint the cooling tries to achieve. This setpoint is calculated with the occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			
	Cooling Status	The current state of the cooling	Read only			
	Cooling % Command	The current percent command for cooling	Read only			
	Cooling Stage 1 BO	Present value of cooling stage 1 output	Read only			Yes
	Compressor Stage 1 Accumulated Runtime	The accumulated runtime of stage 1	Read only			
	Cooling Stage 2 BO	Present value of cooling stage 2 output	Read only			Yes
	Compressor Stage 2 Accumulated Runtime	The accumulated runtime of stage 2	Read only			
	Cooling Stage 3 BO	Present value of cooling stage 3 output	Read only			Yes
	Compressor Stage 3 Accumulated Runtime	The accumulated runtime of stage 3	Read only			
	Cooling Stage 4 BO	Present value of cooling stage 4 output	Read only			Yes
	Compressor Stage 4 Accumulated Runtime	The accumulated runtime of stage 4	Read only			
Summary: Heating	Effective Heating Setpoint	The temperature setpoint the heating tries to achieve. This setpoint is calculated with the occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			
	Heating Control Status	The current state of the heating	Read only			
	Heating % Command	The current percent command for heating	Read only			
	Heating Stage 1 BO	Present value of heating stage 1 output	Read only			Yes
	Heating Stage 1 Accumulated Runtime	The accumulated runtime of stage 1	Read only			
	Heating Stage 2 BO	Present value of heating stage 2 output	Read only			Yes
	Heating Stage 2 Accumulated Runtime	The accumulated runtime of stage 2	Read only			

Table 10: Parameters and objects (Part 5 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Summary: Heating	Heating Stage 3 BO	Present value of heating stage 3 output	Read only			Yes
	Heating Stage 3 Accumulated Runtime	The accumulated runtime of stage 3	Read only			
	Heating Stage 4 BO	Present value of heating stage 4 output	Read only			Yes
	Heating Stage 4 Accumulated Runtime	The accumulated runtime of stage 4	Read only			
Summary: Heat Pump	Effective Cooling Setpoint	The temperature setpoint the cooling tries to achieve This setpoint is calculated with the occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			
	Effective Heating Setpoint	The temperature setpoint the heating tries to achieve. This setpoint is calculated with the occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			
	Heat Pump % Command	The current percent command for heat pump	Read only			Yes
	Compressor Stage 1 BO	The present valve of compressor stage 1	Read only			Yes
	Compressor Stage 2 BO	The present valve of compressor stage 2	Read only			Yes
	Reversing Valve BO	The present valve of the reversing valve	Read only			Yes
	Cooling Status	The current state of the cooling	Read only			
	Heating Status	The current state of the heating	Read only			
Summary: Supplemental Heating	Supp Heating Stage 1 BO	The present valve of supplemental heating stage 1	Read only			Yes
	Supp Heating Stage 2 BO	The present valve of supplemental heating stage 2	Read only			Yes
Summary: OA Damper	Minimum OA Damper AO	The present valve of outside air damper analog output	Read only			Yes
	Minimum OA Percent	The minimum outside air damper percent setpoint	Adjustable	10%	0% to 100%	Yes
Summary: Economizer	Economizer Status	The current state of the economizer	Read only			
	Mixed Air Damper Position Al	The present value of the mixed air damper feedback analog input	Read only			
	Mixed Air Damper AO	The present value of the mixed air damper analog output	Read only			Yes
	Minimum OA Percent	The minimum outside air damper percent setpoint	Adjustable	10%	0% to 100%	Yes

Table 10: Parameters and objects (Part 7 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Summary: Economizer	Economizer Switchover Setpoint	The setpoint at which the economizer switches to use the damper for free cooling	Adjustable	68°F	40°F to 80°F	Yes
	Operational Outdoor Air Temperature	The present value of the outside air temperature analog input	Read only			Yes
	Mixed Air Temperature Al	The present value of the mixed air temperature analog input	Read only			Yes
	Supply Air Temperature Al	The present value of the supply air temperature analog input	Read only			Yes
	Low Limit Temp Setpoint	The setpoint at which the damper starts to modulate closed if the mixed air sensor senses a temperature that is colder than this setpoint	Adjustable	45°F	-50°F to 250°F	Yes
	Supply Air Low Limit Setpoint	The setpoint at which the damper starts to modulate closed if the supply air sensor senses a temperature that is colder than this setpoint	Adjustable	55°F	-50°F to 250°F	Yes
	Zone Quality	The present value of the zone air quality sensor	Read only			
	Return CO2 Sensor Al	The present value of the return air quality analog input	Read only			Yes
	CO2 Reset A	The low setpoint for the demand ventilation control. This is the setpoint at which the damper minimum position starts to increase.	Adjustable	800 ppm	0 to 2000 ppm	Yes
	CO2 Reset B	The high setpoint for the demand ventilation control. This is the setpoint at which the damper minimum position meets the maximum position.	Adjustable	1000 ppm	0 to 2000 ppm	Yes
Summary: Humidifier	Humidity Setpoint	The setpoint that the humidifier controls to	Adjustable	40%	0% to 100%	Yes
	Humidifier BO	The present value of the humidifier enable binary output	Read only			Yes
	Humidification AO	The present value of the humidifier analog output	Read only			
	Humidification	The current status of the humidifier	Read only			
	Zone Humidity	The present value of the zone humidity sensor	Read only			
	Zone Humidity Al	The present value of the zone humidity analog input	Read only			Yes
Summary: Dehumidification	Dehumidification Setpoint	The setpoint that the unit dehumidifies to.	Adjustable	60%	0% to 100%	Yes
	Dehumidification	The current status of the dehumidification control	Read only			

Table 10:	Parameters	and obj	jects (Pa	art 8 of 2	26)
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Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Summary:	Hot Gas Reheat	The current status of the hot gas	Read only			
Dehumidification	Status	bypass.				
	Zone Humidity	The present value of the zone humidity sensor	Read only			
	Zone Humidity Al	The present value of the zone humidity analog input	Read only			Yes
	Hot Gas Bypass Valve BO	The present value of the hot gas bypass valve binary output	Read only			Yes
Summary: Diagnostic	Econ Fault Active	The present value of the economizer fault. Forms part of the economizer fault detection diagnostics (FDD) alarms	Read only			Yes
	Air Temperature Sensor Fault	The present value of the air temperature sensor fault. Forms part of the economizer FDD alarms	Read only			Yes
	Econ Operational Fault	The present value of the economizer operational fault. Forms part of the economizer FDD alarms.	Read only			Yes
	Econ Not Operational Fault	The present value of the economizer not operational fault. Forms part of the economizer FDD alarms.	Read only			Yes
	Economizer Excessive Outside Air	The present value of the economizer excessive outside air fault. Forms part of the economizer FDD alarms	Read only			Yes
	Damper Modulation Fault	The present value of the economizer damper failure to modulate fault. Forms part of the economizer FDD alarms	Read only			Yes
	Fan Runtime	The present value of the fan runtime	Read only			Yes
	Fan Runtime Alarm	The present value of the fan runtime alarm	Read only			Yes
	Cooling Ineffective Alarm	The present value of the cooling ineffective alarm. Part of the heat cool alarms based on supply air temperature	Read only			Yes
	Heating Ineffective Alarm	The present value of the heating ineffective alarm. Part of the heat cool alarms based on supply air temperature	Read only			Yes
Summary Load Shed	Load Shed Active	The present value of the load shed command	Read only			Yes

Table 10: Parameters and objects (Part 9 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Summary: Load Shed	Load Shed Adjust	The limit that the setpoints separate when a load shed adjustment command occurs	Adjustable	4°F	0°F to 5°F	Yes
	Load Shed Rate Limit	The rate that the setpoints separate at when a load shed adjustment command occurs	Adjustable	0.066°F / Min	0°F to 1°F / Min	Yes
Commissioning: Commission Outputs	Start Commissioning	To start the commissioning process set this to trigger, then command the outputs below.	Adjustable	Normal	Normal / Trigger	
	Supply Fan	When you set Start Commissioning to trigger this object, it tests the supply fan.	Adjustable	Off	Off / On	
	Fan Speed Command	When you set Start Commissioning to trigger this object, it tests the supply fan output.	Adjustable	0%	0% to 100%	
	Cooling Command	When you set Start Commissioning to trigger this object, it tests the cooling command output.	Adjustable	0%	0% to 100%	
	Cool Stage 1	When you set Start Commissioning to trigger this object, it tests the cooling stage 1 output.	Adjustable	Off	Off / On	
	Cool Stage 2	When you set Start Commissioning to trigger this object, it tests the cooling stage 2 output.	Adjustable	Off	Off / On	
	Cool Stage 3	When you set Start Commissioning to trigger this object, it tests the cooling stage 3 output.	Adjustable	Off	Off / On	
	Cool Stage 4	When you set Start Commissioning to trigger this object, it tests the cooling stage 4 output.	Adjustable	Off	Off / On	
	Compressor 1	When you set Start Commissioning to trigger this object, it tests the compressor 1 output.	Adjustable	Off	Off / On	
	Compressor 2	When you set Start Commissioning to trigger this object, it tests the compressor 2 output.	Adjustable	Off	Off / On	
	Reversing Valve	When you set Start Commissioning to trigger this object, it tests the reversing valve output.	Adjustable	Off	Off / On	
	Heating Command	When you set Start Commissioning to trigger this object, it tests the heating command output.	Adjustable	0%	0% to 100%	
	Heat Stage 1	When you set Start Commissioning to trigger this object, it tests the heating stage 1 output.	Adjustable	Off	Off / On	

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Commission Outputs	Heat Stage 2	When you set Start Commissioning to trigger this object, it tests the heating stage 2 output.	Adjustable	Off	Off / On	
	Heat Stage 3	When you set Start Commissioning to trigger this object, it tests the heating stage 3 output.	Adjustable	Off	Off / On	
	Heat Stage 4	When you set Start Commissioning to trigger this object, it tests the heating stage 4 output.	Adjustable	Off	Off / On	
	Supplemental Heat Stage 1	When you set Start Commissioning to trigger this object, it tests the supplemental heat stage 1 output.	Adjustable	Off	Off / On	
	Supplemental Heat Stage 2	When you set Start Commissioning to trigger this object, it tests the supplemental heat stage 2 output.	Adjustable	Off	Off / On	
	Hot Gas Bypass Valve	When you set Start Commissioning to trigger this object, it tests the hot gas bypass valve output.	Adjustable	Off	Off / On	
	Damper Command	When you set Start Commissioning to trigger this object, it tests the damper command output.	Adjustable	0%	0% to 100%	
	Humidifier	When you set Start Commissioning to trigger this object, it tests the humidifier output.	Adjustable	Off	Off / On	
	Humidifier Command	When you set Start Commissioning to trigger this object, it tests the humidifier command output.	Adjustable	0%	0% to 100%	
Commissioning: Setpoints	Zone Temperature	The present value of the zone temperature	Read only			
	Return Air Temperature Al	The present value of the return air temperature analog input	Read only			
	Temperature Setpoint	The zone temperature setpoint when the unit is in the occupied mode. You can raise and lower the control point with this object.	Adjustable	72°F	60°F to 85°F	Yes
	Deadband	The deadband is used to separate the effective heating and cooling setpoints so that the unit does not try to control heating and cooling at the same time. For example, setting the temperature setpoint to 72 with a deadband of 2 means the effective cooling is 73 and the effective heating is 71 when the unit is occupied and the setpoint adjust is set to 0.	Adjustable	2°F	1-5 delta °F	Yes

Table 10: Parameters and objects (Part 10 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Setpoints	Setpoint Adjust	This is the adjustment value set at the NS sensor. The effective cooling and heating setpoints shift by this amount when the unit is in the occupied mode.	Read only			Yes
	Effective Cooling Setpoint	The temperature setpoint the cooling tries to achieve. This setpoint is calculated with occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			Yes
	Unocc Cooling Setpoint	This is the setup setpoint when the unit is in the unoccupied mode. When the zone temperature rises above this value during unoccupied mode the unit cycles on to reduce the temperature.	Adjustable	82°F	60°F to 85°F	Yes
	Standby Cooling Setpoint	The system uses the standby cooling setpoint when the occupied status input is set to sense motion and it does not sense motion.	Adjustable	77°F	60°F to 85°F	Yes
	Effective Heating Setpoint	The temperature setpoint the heating tries to achieve. This setpoint is calculated with occupancy state, load shed command, temperature setpoints, setpoint adjustments, and deadband.	Read only			Yes
	Unocc: Heating Setpoint	This is the setback setpoint when the unit is placed in unoccupied mode. When the zone temperature drops below this value during unoccupied mode, the unit cycles on to reduce the temperature.	Adjustable	61°F	60°F to 85°F	Yes
	Standby Heating Setpoint	The system uses the standby heating setpoint when the occupied status input is set to sense motion and it does not sense motion.	Adjustable	66°F	60°F to 85°F	Yes
	Temp Occupancy Time	If a person presses the NS sensor temporary occupancy button, this is how long the unit is set to the occupied mode. Adjusting to 0 disables this feature.	Adjustable	60 Minutes	0 to 120 Minutes	Yes
Commissioning: Fan	Fan Only Speed	The speed of the fan when the system is satisfied	Adjustable	50%	0% to 100%	Yes
	Min Fan Speed	The minimum speed the fan starts at when heating and cooling starts and is proportional	Adjustable	20%	0% to 100%	Yes
	Max Fan Speed	The maximum speed the fan modulates to when heating and cooling starts and is proportional	Adjustable	100%	0% to 100%	Yes

Table 10: Parameters and objects (Part 11 of 26)

Table 10: Parameters and objects (Part 12 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Fan	Clg Stage 1 Speed	When you have staged cooling and activate 1 stage, the system indexes to this speed.	Adjustable	70%	0% to 100%	Yes
	Clg Stage 2 Speed	When you have staged cooling and activate 2 stage, the system indexes to this speed.	Adjustable	80%	0% to 100%	Yes
	Clg Stage 3 Speed	When you have staged cooling and activate 3 stage, the system indexes to this speed.	Adjustable	90%	0% to 100%	Yes
	Clg Stage 4 Speed	When you have staged cooling and activate 4 stage, the system indexes to this speed.	Adjustable	100%	0% to 100%	Yes
	Htg Stage 1 Speed	When you have staged heating and activate 1 stage, the system indexes to this speed.	Adjustable	70%	0% to 100%	Yes
	Htg Stage 2 Speed	When you have staged heating and activate 2 stage, the system indexes to this speed.	Adjustable	80%	0% to 100%	Yes
	Htg Stage 3 Speed	When you have staged heating and activate 3 stage, the system indexes to this speed.	Adjustable	90%	0% to 100%	Yes
	Htg Stage 4 Speed	When you have staged heating and activate 4 stage, the system indexes to this speed.	Adjustable	100%	0% to 100%	Yes
Commissioning: Cooling	OAT Cooling Lockout Enabled	Enables the outdoor cooling lockout sequence	Adjustable	Disable	Disable / Enable	Yes
	OA Cooling Lockout Setpoint	Setpoint at which outside cooling lockout occurs	Adjustable	60°F	-50°F to 250°F	Yes
	Supply Air Setpoint Cooling Min	Sets how low the supply air temperature is allowed to reach	Adjustable	50°F	-50°F to 250°F	Yes
	Cooling Min On Time	Sets the minimum on time for the cooling stages	Adjustable	30 Sec	30 to 1800 Sec	Yes
	Cooling Min Off Time	Sets the minimum off time for the cooling stages	Adjustable	30 Sec	30 to 1800 Sec	Yes
	Interstage On Delay	Sets the delay between turning on the cooling stages after a stage has been energized	Adjustable	30 Sec	30 to 900 Sec	Yes
	Interstage Off Delay	Sets the delay turning off the cooling stages after a stage has been energized	Adjustable	30 Sec	30 to 900 Sec	Yes
	Rotate Enable	Sets the ability to rotate the stages based on runtime	Adjustable	Disable	Disable/ Enable	Yes
	Rotate Cooling Stage	Sets the ability to rotate the cooling stages manually	Adjustable	Normal	Normal / Trigger	Yes
	Failsoft Cooling Value	If the cooling is proportional, this is the position the cooling output adjusts to when there is a low limit alarm.	Adjustable	100%	0% to 100%	Yes
Commissioning: Heating	OAT Heating Lockout Enabled	Enables the outdoor heating lockout sequence	Adjustable	Disable	Disable / Enable	Yes

Table 10: Parameters and objects (Part 13 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Heating	OA Heating Lockout Setpoint	Setpoint at which outside heating lockout occurs	Adjustable	69°F	-50°F to 250°F	Yes
	Supply Air Setpoint Heating Max	Sets how low the supply air temperature is allowed to reach	Adjustable	130°F	-50°F to 250°F	Yes
	Heating Min On Time	Sets the minimum on time for the heating stages	Adjustable	30 Sec	30 to 1800 Sec	Yes
	Heating Min Off Time	Sets the minimum off time for the heating stages	Adjustable	30 Sec	30 to 1800 Sec	Yes
	Interstage On Delay	Sets the delay between turning on the heating stages after a stage has been energized	Adjustable	30 Sec	30 to 900 Sec	Yes
	Interstage Off Delay	Sets the delay turning off the heating stages after a stage has been energized	Adjustable	30 Sec	30 to 900 Sec	Yes
	Rotate Enable	Sets the ability to rotate the stages based on runtime	Adjustable	Disable	Disable / Enable	Yes
	Rotate Heating Stage	Enables rotate the heating stages manually	Adjustable	Normal	Normal / Trigger	Yes
	Failsoft Heating Value	If the heating is proportional this is the position the heating output adjusts to when there is low limit alarm.	Adjustable	100%	0% to 100%	Yes
Commissioning: Heat Pump	Low OA Lockout Setpoint	Setpoint at which the compressors are locked out when the outside air gets too low.	Adjustable	48°F	-50°F to 250°F	Yes
	Reversing Valve Polarity	Sets whether the output is on for cooling or on for heating. Normally Cool is on for cooling. Normally Heat is on for heating.	Adjustable	Normally Cool	Normally Heat/ Normally Cool	Yes
	OA Heating Lockout Setpoint	Setpoint at which outside heating lockout occurs	Adjustable	69°F	-50°F to 250°F	Yes
	Compressor Min On Time	Sets the minimum on time for the compressors	Adjustable	60 Sec	30 to1800 Sec	Yes
	Compressor Min Off Time	Sets the minimum off time for the compressors	Adjustable	60 Sec	30 to1800 Sec	Yes
	OAT Cooling Lockout Enabled	Enables the outdoor cooling lockout sequence	Adjustable	Disable	Disable/ Enable	Yes
	OA Cooling Lockout Setpoint	Setpoint at which outside cooling lockout occurs	Adjustable	60°F	-50°F to 250°F	Yes
	OAT Heating Lockout Enabled	Enables the outdoor heating lockout sequence	Adjustable	Disable	Disable / Enable	Yes
Commissioning: Supplemental	Supp Min On Time	Sets the minimum on time for the supplemental heat stages	Read only			Yes
Heating	Supp Min Off Time	Sets the minimum off time for the supplemental heat stages	Read only			Yes
Commissioning: OA Damper	Minimum OA Percent	Sets the minimum outside air damper position	Adjustable	10%	0% to 100%	Yes
Commissioning: Economizer	Minimum OA Percent	Sets the minimum outside air damper position	Adjustable	10%	0% to 100%	Yes

Table 10: Parameters and objects (Part 14 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Economizer	Economizer Switchover Setpoint	Setpoint at which the economizer switches to control for cooling	Adjustable	68°F	40°F to 0°F	Yes
	Low Limit Temp Setpoint	Setpoint at which the damper starts to modulate closed if the mixed air sensor senses a temperature that is colder than this setpoint	Adjustable	45°F	-50°F to 250°F	Yes
	Supply Air Low Limit Setpoint	Setpoint at which the damper starts to modulate closed if the supply air sensor senses a temperature that is colder than this setpoint	Adjustable	55°F	-50°F to 250°F	Yes
	CO2 Reset A	Low setpoint for the demand ventilation control. This is the setpoint at which the damper minimum position starts to increase.	Adjustable	800 ppm	0 to 2000 ppm	Yes
	CO2 Reset B	High setpoint for the demand ventilation control. This is the setpoint at which the damper minimum position reaches the maximum position.	Adjustable	1000 ppm	0 to 2000 ppm	Yes
	Min Pos High Setpoint	The minimum position high setpoint for demand ventilation control.	Adjustable	90%	0% to 100%	Yes
Commissioning: Humidifier	Humidity Setpoint	Sets the humidity setpoint that the humidifier control to	Adjustable	40%	0% to 100%	Yes
Commissioning: Dehumidification	Dehumidification Setpoint	Sets the humidity setpoint that the dehumidification sequence controls to.	Adjustable	60%	0% to 100%	Yes
Commissioning: Diagnostic	Fan Runtime Limit	Sets the runtime limit at which the fan alarm triggers on	Adjustable	10000 Hrs	0 to 20000 Hrs	Yes
	Fan Runtime	This parameter displays the current runtime hours of the fan	Read only			Yes
	Fan Runtime Reset	This parameter resets the runtime of the fan	Adjustable	Normal		Yes
	SF Alarm Delay	If a supply fan status binary is defined and connected this sets the delay of the supply fan mismatch alarm.	Adjustable	60 Sec	60 to 1200 Sec	Yes
	Heat Cool Alarm Differential	Sets how much the supply air temperature must rise or fall for heating or cooling to initiate	Adjustable	2°F	0°F to 5°F	Yes
	Zone Temperature Alarm Delay	Sets the zone temperature alarm delay. Note: See Zone Alarm Offset for details on the alarm.	Adjustable	900	300 to 1200 Sec	
	Heat Cool Alarm Delay	Sets the amount of time that must pass before the alarm occurs	Adjustable	5 minutes	5 to 60 minutes	Yes

Table 10: Parameters and objects (Part 15 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Commissioning: Diagnostic	Zone Alarm Offset	Sets how far from the heating or cooling setpoints the zone temperature can reach before an alarm occurs. The zone alarm offset prevents startup from triggering the alarm.	Adjustable	5°F	3°F to 8°F	
	Damper Pos Error	Sets the amount of error between the mixed air damper command and the mixed air damper feedback before an alarm occurs	Adjustable	8%	0% to 100%	Yes
	Damper Min Pos Fault Tolerance	Sets the amount of error the mixed air damper feedback can have compared to the minimum position	Adjustable	5%	0% to 100%	Yes
	Econ Fault Delay	Sets delays for the above alarms so that the moving damper does not trigger False alarms	Adjustable	10 Minutes	5 to 60 Minutes	Yes
Commissioning: Load Shed	Load Shed Adjust	The limit that the setpoints separate when a load shed adjustment command occurs	Adjustable	4°F	0°F to 5°F	Yes
	Load Shed Rate Limit	The rate that the setpoints separate when a load shed adjustment command occurs	Adjustable	0.066°F / Min	0°F to 1°F /Min	Yes
Commissioning: PID: Tuning Reset	PID Tuning Reset	Resets the tuning to defaults for all PIDs that use autotuning	Adjustable	Off	Off / Reset	
Commissioning:	PID Tuning Type	Enables you to tune manually	Adjustable	Automatic	Automatic / Manual	
Economizer: Econ Temp PID Data	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100	
	Disable Integral Time	If the PID Tuning Type is set to manual, you can turn this PID loop into a proportional only loop.	Adjustable	Enable	Disable / Enable	
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)	
	Saturation Time	If the PID Tuning Type is set to manual, this sets the saturation time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs.	Adjustable	600 Sec	Min > = Interval (60) Max 3600	
	Econ T Eff Proportional Band	Shows the proportional band the PID loop is using	Read only			
	Econ T Eff Integral Time	Shows the integral time the PID loop is using	Read only			

Мори	Object or	Description Adjustable Defaults Range						
Menu Commissioning:	PID Tuning Type	Enables you to tune manually Adjustable Automatic Automatic / Manual						
PID: Economizer: Econ Low Temp PID Data	Fib fulling type		Aujustable	Automatic	Automatic / Wandai			
	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100			
	Disable Integral Time	If the PID Tuning Type is set to manual, you can turn this PID loop into a proportional only loop.	Adjustable	Enable	Disable / Enable			
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)			
	Saturation Time	If the PID Tuning Type is set to manual, this sets the saturation time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs.	Adjustable	600 Sec	Min > = Interval (60) Max 3600			
	Econ LT Eff Proportional Band	Shows the proportional band the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only					
	Econ LT Eff Integral Time	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only					
Commissioning: PID:	PID Tuning Type	You can tune manually with this parameter.	Adjustable	Automatic	Automatic / Manual			
Cooling	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100			
	Disable Integral Time	If the PID Tuning Type is set to manual, you can change this PID loop into a proportional only loop with this parameter.	Adjustable	Enable	Disable / Enable			
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)			
	Saturation Time	If the PID Tuning Type is set to manual, this sets the saturation time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs.	Adjustable	600 Sec	Min > = Interval (60) Max 3600			

Table 10: Parameters and objects (Part 16 of 26)

Мори	Object or Description Adjustable Defaulte Description					
Wenu	parameter	Chows the propertiened hand the		Delauits	Range	exposed
PID: Cooling	Proportional Band	PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	Clg Eff Integral Time	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	HP Eff Proportional Band	Shows the proportional band the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	HP Eff Proportional Band	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
Commissioning: PID:	PID Tuning Type	You can tune manually with this parameter.	Adjustable	Automatic	Automatic / Manual	
Heating	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100	
	Disable Integral Time	If the PID Tuning Type is set to manual, you can turn this PID loop into a proportional only loop.	Adjustable	Enable	Disable / Enable	
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)	
	Saturation Time	If the PID Tuning Type is set to manual, this sets the saturation time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs.	Adjustable	600 Sec	Min > = Interval (60) Max 3600	
	Htg Eff Proportional Band	Shows the proportional band the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	Htg Eff Integral Time	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	Htg LT Eff Proportional Band	Shows the proportional band the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			

Table 10: Parameters and objects (Part 17 of 26)

Table 10: Parameters and objects (Part 18 of 26)

Menu	Object or parameter Description Adjustable Defaults Range					
Commissioning: PID: Heating	Htg LT Eff Integral Time	Shows the integral time the PID loop is using. The value only updates when the PID loop is running for that process at the time.	Read only			
	HP Eff Proportional Band	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	HP Eff Integral Time	Shows the integral time the PID loop is using. The value only updates when the PID loop is running for that process at the time.	Read only			
Commissioning:	PID Tuning Type	Enables you to tune manually	Adjustable	Automatic	Automatic / Manual	
Economizer: Supplemental Heating PID Data	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100	
	Disable Integral Time	If the PID Tuning Type is set to manual, you can turn this PID loop into a proportional only loop.	Adjustable	Enable	Disable / Enable	
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)	
	Saturation Time	If the PID Tuning Type is set to manual, this sets the saturation time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs.	Adjustable	600 Sec	Min > = Interval (60) Max 3600	
	SHtg Eff Proportional Band	Shows the proportional band the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
	SHtg Eff Integral Time	Shows the integral time the PID loop is using. The value updates when the PID loop is running for that process at the time.	Read only			
Commissioning: PID:	PID Tuning Type	You can tune manually with this parameter.	Adjustable	Automatic	Automatic / Manual	
numiaitier	Proportional Band	If the PID Tuning Type is set to manual, this sets the proportional band for the loop.	Adjustable	16	-100 to 100	
	Disable Integral Time	If the PID Tuning Type is set to manual, you can change this PID loop into a proportional only loop.	Adjustable	Enable	Disable / Enable	
	Integral Time	If the PID Tuning Type is set to manual, this sets the integral time for the loop.	Adjustable	729 Sec	Min 2 times Interval (60) Max 30 times Interval (60)	

Verasys® Constant Volume Controller Application Note

BACnet Object or Menu parameter Description Adjustable Defaults exposed Range Commissioning: Saturation Time If the PID Tuning Type is set to Adjustable 600 Sec Min > = Interval (60) manual, this sets the saturation PID. Max 3600 Humidifier time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs. Hum Eff Shows the proportional band the Read only Proportional PID loop is using. The value Band updates when the PID loop is running for that process at the time. Hum Eff Integral Shows the integral time the PID Read only Time loop is using. The value updates when the PID loop is running for that process at the time. Commissioning: **PID Tuning Type** You can tune manually with this Adjustable Automatic Automatic / Manual PID: parameter. Dehumidification -100 to 100 Proportional If the PID Tuning Type is set to Adjustable 16 Band manual, this sets the proportional band for the loop. **Disable Integral** If the PID Tuning Type is set to Adjustable Enable Disable / Enable manual, you can turn this PID loop Time into a proportional only loop Integral Time If the PID Tuning Type is set to Adjustable 729 Sec Min 2 times manual, this sets the integral time Interval (60) Max 0 times Interval for the loop. (60) Saturation Time If the PID Tuning Type is set to 600 Sec Min > = Interval (60)Adjustable manual, this sets the saturation Max 3600 time for the loop. You can use the saturation timer to set timing from one state to another. For example, if you switch from heat to cool, the heating loop reaches 0% and the saturation timer must finish before the switch to cooling occurs. Dehum Eff Shows the proportional band the Read only Proportional PID loop is using. The value Band updates when the PID loop is running for that process at the time. Dehum Eff Shows the integral time the PID Read only **Integral Time** loop is using. The value updates when the PID loop is running for that process at the time. HP Dehum Eff Shows the proportional band the Read only Proportional PID loop is using. The value Band updates when the PID loop is running for that process at the time.

Table 10: Parameters and objects (Part 19 of 26)

Table 10: Parameters and objects (Part 20 of 26)

Menu	Object or parameter	Object or Description Adjustable Defaults Range				
Commissioning: PID: Dehumidification	HP Dehum Eff Integral Time	Shows the integral time the PID loop is using. The value only updates when the PID loop is running for that process at the time.	Read only	Donano		
Commissioning: Network	Device Name	Sets the name of the controller	Adjustable		30 characters	
	Address	Sets the address of the controller	Adjustable		4 to 127	
Controller: Firmware	Firmware Main Version	Indicates what firmware is in the controller	Read only			
	Appl SW Version	Indicates the software version of the software in the controller	Read only			
	Application name	The name of the application loaded in the controller	Read only			
	Equipment Template Version	The equipment template version	Read only			
	Equipment Archive Version	The equipment archive version	Read only			
	Equipment View Version	The equipment view version	Read only			
Controller: Time	Time	The time the controller is using	Read only			
	Date	The date the controller is using	Read only			
	Time Zone	The time zone the controller is using	Adjustable			
Controller: Network	Communication Status	The status of the controller communication	Read only			
	Device name	Sets the name of the device	Adjustable		30 characters	
	Description	Sets the description of the device	Adjustable		30 characters	
	Address	Sets the address of the device	Adjustable		4 to 127	
	Operating Baud Rate	Shows the operating baud rate of the controller	Read only			
	Baud Rate	Sets the baud rate of the device	Adjustable		Auto / 1200 / 9600 / 19200 / 38400 / 76800	
	Bacnet Encoding Type	Sets the encoding type the device is using	Adjustable		ISO 1646 (UCS-2) / ANSI X3.4 (US-ASCII) / Microsoft DBCS code page 932 (Japanese Shift JIS) /ISO 10646 (UTF-8)	
	FC Comm Mode	Shows what communication mode the device is using	Read only			
	Device OID	Sets the BACnet ID of the device	Adjustable		1-4, 194, 303	
Controller: Misc	Language	Sets the language the controller uses	Adjustable		English / French / Spanish	
	Units	Sets the units the controller uses	Adjustable		Imperial / Metric	

Table 10: Parameters and objects (Part 21 of 26)

Menu	Object or parameter	er Description Adjustable Defaults Range e						
Controller: Misc	Display Contrast	Sets the display contrast for the display on the controller	Adjustable		2 to 6			
	Relearn System	Relearns the sensors connected to the controller	Adjustable	False	False / True			
Controller: System Configuration	Supply Fan Type	Set the fan to constant volume or a fixed variable strategy	Adjustable	Constant Volume	Constant Volume Fan / Fixed Variable Fan			
	Fan Cycling	Cycles off the fan if satisfied	Adjustable	No	No / Yes			
	Cooling Device Type	Sets the type of cooling the device uses	Adjustable	None	None / Proportional / Staged / Heat Pump			
	Number of Cooling Stages Installed	Sets the number of stages that the device is set to if the cooling device type is set to staged.	Adjustable	0	0 to 4			
	Number of Heat Pump Stages Installed	If the cooling device type is set to heat pump, this sets the number of stages	Adjustable	0	0 to 2			
	Reversing Valve Polarity	If the cooling device type is set to heat pump, this sets the reversing valve polarity.	Adjustable	Normal	Normally Heat / Normally Cool			
	Heating Device Type	Sets the type of heating used on the unit	Adjustable	None				
	Number of Heating Stages Installed	If the heating device type is set to staged, this sets the number of stages.	Adjustable	0	0 to 4			
	Number of Supp Heating Stages Installed	If the heating device type is set to heat pump with supplemental heating, this sets the number of supplemental heat stages.	Adjustable	1	0 to 2			
	Hot Gas Bypass Enable	If the system has staged cooling and dehumidification is enabled, this enables a hot gas reheat valve to be energized when dehumidifying.	Adjustable	Disable	Disable / Enable			
	Economizer Damper Type	Defines an economizer or a minimum outside air damper	Adjustable	None	None / Economizer			
	Min OA Control Sensor	When an economizer is present the system requires a supply air temperature or mixed air temperature to limit the economizer control. This selects which one controls the low limit. Note: If you select proportional heating or cooling, the mixed air temperature must be present.	Adjustable	MA-T	MA-T / SA-T			
	Economizer Fault Detection	Enables the economizer fault detection diagnostic sequences	Adjustable	Disable	Disable / Enable			
	Humidity Enable	Enables the humidity control sequences	Adjustable	Disable	Disable / Enable			
	Dehum Enable	Enables the dehumidification control sequences	Adjustable	Disable	Disable / Enable			

Table 10: Parameters and objects (Part 22 of 26)

Menu	Object or parameter	er Description Adjustable Defaults Range					
Controller: System Configuration	Heat Cool Diagnostics	Enables the heat cool alarms. The heat cool alarms use a supply air sensor to determine if the heating or cooling is working correctly.	Adjustable	Disable	Disable / Enable		
	Allowed global loa feature, y from imp		Adjustable	No	No / Yes		
Details: Sensors	Supply Fan Status Installed	If set to yes, the controller generates an alarm when the fan does not match the command value.	Adjustable	No	Yes / No		
	SAT Sensor Type	Sets the resistive curve that the controller uses for the supply air temperature sensor	Adjustable	Nickel	Nickel / Platinum / A99B / 2.25K NTC / 10K NTC / 10K NTC Type 3		
	SAT Sensor Offset	Sets the offset for the sensor and can calibrate the sensor if it is reading incorrectly	Adjustable	0	- 5°F to +5°F		
	MAT Sensor Type	Sets the resistive curve that the controller uses for the mixed air temperature sensor	Adjustable	Nickel	Nickel / Platinum/ A99B / 2.25K NTC 10K NTC / 10K NTC Type 3		
	MAT Sensor Offset	Sets the offset for the sensor and can calibrate the sensor if it is reading incorrectly	Adjustable	0	- 5°F to +5°F		
	OAT Sensor Type	Sets the resistive curve that the controller uses for the outside air temperature sensor	Adjustable	Nickel	Nickel / Platinum/ A99B / 2.25K NTC 10K NTC / 10K NTC Type 3		
	OAT Sensor Offset	Sets the offset for the sensor and can calibrate the sensor if it is reading slightly off	Adjustable	0	- 5°F to +5°F		
	RAT Sensor Type	Sets the resistive curve that the controller uses for the return air temperature sensor	Adjustable	Nickel	Nickel / Platinum/ A99B / 2.25K NTC 10K NTC / 10K NTC Type 3		
	RAT Sensor Offset	Sets the offset for the sensor and can calibrate the sensor if it is reading slightly off	Adjustable	0	- 5°F to +5°F		
	Warm/Cool Adjust Range	Sets the setpoint adjustability of the NS sensors	Adjustable	3	0 to 5 delta °F		
	Humidity Sensor Installed	Shows if there is an installed sensor and its type	Adjustable	Not Installed	Not Installed / SAB Sensor / Wired AI Sensor / SAB & Wired Sensor		
	CO2 Sensor Installed	Shows if there is CO2 sensor installed sensor and its type	Adjustable	Not Installed	Not Installed / SAB Sensor / Wired AI Sensor / SAB & Wired Sensor		
	Return CO2 Sensor Offset	If the hardwired return air CO2 sensor is installed, you can offset it	Adjustable	0	-250 to 250 ppm		

Table 10: Parameters and objects (Part 23 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Details: Sensors	Occupancy BI Enabled	You can use the occupancy binary input to reset the temperature setpoints if motion is not sensed	Adjustable	No	No / Yes	
	Relearn System	Relearns the sensors connected to the controller	Adjustable	False	False / True	
Details: Inputs	Supply Fan Status Bl	The status of the supply fan status binary input	Read only			Yes
	Purge Bl	The status of the purge command binary input	Read only			Yes
	Filter Status BI	The status of the filter status binary input	Read only			Yes
	Service Alarm	The status of the service alarm binary input	Read only			Yes
	Low Temperature Limit Fault Bl	The status of the low temperature limit binary input	Read only			Yes
	Outdoor Air Temperature Sensor Al	The present value of the outdoor air temperature analog input	Read only			Yes
	Mixed Air Damper Position Al	The present value of the mixed air damper position analog input	Read only			Yes
	Supply Air Temperature Al	The present value of the supply air temperature analog input	Read only			Yes
	Mixed Air Temperature Al	The present value of the mixed air temperature analog input	Read only			Yes
	Return Air Temperature Al	The present value of the return air temperature analog input	Read only			Yes
	Zone Temperature	The present value of the zone temperature NS Sensor	Read only			Yes
	Zone Humidity	The present value of the zone humidity NS Sensor	Read only			Yes
	Zone Humidity Al	The present value of the zone humidity analog input	Read only			Yes
	Zone Quality	The present value of the zone quality NS Sensor	Read only			Yes
	Return CO2 Sensor Al	The present value of the return air quality analog input	Read only			Yes
	Zone Occupancy	The status of the zone occupancy of the NS Sensor	Read only			Yes
	Occupancy Sensor Bl	The status of the occupancy sensor binary input	Read only			Yes
	Setpoint Adjust	The present value of the setpoint adjustment of the NS Sensor	Read only			
Details: Outputs: Ean	Supply Fan BO	The present value of the supply fan binary output	Read only			Yes
FdII	Supply Fan Speed AO	The present value of the supply fan speed analog output	Read only			Yes
	AO Min Out Value	Sets the minimum output voltage for the fan speed	Adjustable	0 V	0 V to 10 V	
	AO Max Out Value	This parameter sets the maximum output voltage for the fan speed	Adjustable	10 V	0 V to 10 V	

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Table 10: Parameters and objects (Part 24 of 26)

Menu	Object or parameter	oject or Description Adjustable Defaults Range					Description Adjustable Defaults Range		Description Adjustable Defaults Ran		BACnet exposed
Details: Outputs: OA Damper	Minimum OA Damper AO	The present value of the outdoor air damper analog output	Read only			Yes					
	AO Min Out Value	Sets the minimum output voltage for the outdoor air damper	Adjustable	0 V	0 V to 10 V						
	AO Max Out Value	Sets the maximum output voltage for the outdoor air damper	Adjustable	10 V	0 V to 10 V						
Details: Outputs:	Mixed Air Damper AO	The present value of the mixed air damper analog output	Read only			Yes					
Economizer Damper	AO Min Out Value	Sets the minimum output voltage for the mixed air damper	Adjustable	0 V	0 V to 10 V						
	AO Max Out Value	Sets the maximum output voltage for the mixed air damper	Adjustable	10 V	0 V to 10 V						
Details: Outputs: Cooling	Cooling % Command	The present value of the cooling command analog output	Read only			Yes					
	AO Min Out Value	Sets the minimum output voltage for the cooling command	Adjustable	0 V	0 V to 10 V						
	AO Max Out Value	Sets the maximum output voltage for the cooling command	Adjustable	10 V	0 V to 10 V						
	Cooling Stage 1 BO	The present value of the cooling stage 1 binary output.	Read only			Yes					
	Cooling Stage 2 BO	The present value of the cooling stage 2 binary output.	Read only			Yes					
	Cooling Stage 3 BO	The present value of the cooling stage 3 binary output.	Read only			Yes					
	Cooling Stage 4 BO	The present value of the cooling stage 4 binary output.	Read only			Yes					
	Hot Gas Bypass Valve BO	The present value of the hot gas bypass valve binary output	Read only			Yes					
Details: Outputs: Heating	Heating % Command	The present value of the cooling command analog output	Read only			Yes					
	AO Min Out Value	Sets the minimum output voltage for the cooling command	Adjustable	0 V	0 V to 10 V						
	AO Max Out Value	Sets the maximum output voltage for the cooling command	Adjustable	10 V	0 V to 10 V						
	Heating Stage 1 BO	The present value of the cooling stage 1 binary output	Read only			Yes					
	Heating Stage 2 BO	The present value of the cooling stage 2 binary output	Read only			Yes					
	Heating Stage 3 BO	The present value of the cooling stage 3 binary output	Read only			Yes					
	Heating Stage 4 BO	The present value of the cooling stage 4 binary output	Read only			Yes					
Details: Outputs:	Compressor Stage 1 BO	The present value of the compressor stage 1 binary output	Read only			Yes					
пеат Ритр	Compressor Stage 2 BO	The present value of the compressor stage 2 binary output	Read only			Yes					
	Reversing Valve BO	The present value of the reversing valve binary output	Read only			Yes					

Menu	Object or parameter	Description	Adiustable	Defaults	Range	BACnet exposed
Details: Outputs: Heat Pump:	Hot Gas Bypass Valve BO	The present value of the hot gas bypass valve binary output	Read only			Yes
	Supp Heating Stage 1 BO	The present value of the supp heating stage 1 binary output	Read only			Yes
	Supp Heating Stage 2 BO	The present value of the supp heating stage 2 binary output	Read only			Yes
Details: Outputs:	Humidifier BO	The present value of the humidifier enable binary output	Read only			Yes
Humidifier	Humidification AO	The present value of the humidification analog output	Read only			Yes
	AO Min Out Value	Sets the minimum output voltage for the humidifier output	Adjustable	0 V	0 V to 10 V	
	AO Max Out Value	Sets the maximum output voltage for the humidifier output	Adjustable	10 V	0 V to 10 V	
Set Schedule	Occupancy Schedule	The internal occupancy schedule for the unit	Adjustable			Yes
Trends	Supply Air Temperature Al	96 trend samples at 15 minute increments	Read only			
	Mixed Air Temperature Al	96 trend samples at 15 minute increments	Read only			
	Outdoor Air Temperature Sensor Al	96 trend samples at 15 minute increments	Read only			
	Return Air Temperature Al	96 trend samples at 15 minute increments	Read only			
	Zone Temperature	96 trend samples at 15 minute increments	Read only			
	Zone Humidity Al	96 trend samples at 15 minute increments	Read only			
	Zone Return Humidity	96 trend samples at 15 minute increments	Read only			
	Zone Quality	96 trend samples at 15 minute increments	Read only			
	Return CO2 Sensor Al	96 trend samples at 15 minute increments	Read only			
	Mixed Air Damper Position Al	96 trend samples at 15 minute increments	Read only			
	Effective Cooling Setpoint	96 trend samples at 15 minute increments	Read only			
	Effective Heating Setpoint	96 trend samples at 15 minute increments	Read only			
	Supply Fan BO	20 Samples recorded for each change in value	Read only			
	Supply Fan Status	20 Samples recorded for each change in value	Read only			
	Unit Status	20 Samples recorded for each change in value	Read only			

Table 10: Parameters and objects (Part 25 of 26)

Table 10: Parameters and objects (Part 26 of 26)

Menu	Object or parameter	Description	Adjustable	Defaults	Range	BACnet exposed
Trends	Occupancy Status	20 Samples recorded for each change in value	Read only			
	Min OA Damper AO	96 trend samples at 15 minute increments	Read only			
	Economizer Damper AO	96 trend samples at 15 minute increments	Read only			
	Cooling % Command	96 trend samples at 15 minute increments	Read only			
	Cooling Stage 1 BO	20 Samples recorded for each change in value	Read only			
	Cooling Stage 2 BO	20 Samples recorded for each change in value	Read only			
	Cooling Stage 3 BO	20 Samples recorded for each change in value	Read only			
	Cooling Stage 4 BO	20 Samples recorded for each change in value	Read only			
	Heating % Command	96 trend samples at 15 minute increments	Read only			
	Heating Stage 1 BO	20 Samples recorded for each change in value	Read only			
	Heating Stage 2 BO	20 Samples recorded for each change in value	Read only			
	Heating Stage 3 BO	20 Samples recorded for each change in value	Read only			
	Heating Stage 4 BO	20 Samples recorded for each change in value	Read only			
	Compressor Stage 1 BO	20 Samples recorded for each change in value	Read only			
	Compressor Stage 1 BO	20 Samples recorded for each change in value	Read only			
	Reversing Valve BO	20 Samples recorded for each change in value	Read only			
	Supp Heating Stage 1 BO	20 Samples recorded for each change in value	Read only			
	Supp Heating Stage 2 BO	20 Samples recorded for each change in value	Read only			
	Hot Gas Bypass Valve BO	20 Samples recorded for each change in value	Read only			
	Humidification AO	96 trend samples at 15 minute increments	Read only			
	Humidifier BO	20 Samples recorded for each change in value	Read only			

Related documentation

Table 11: Related documentation

For information on	Refer to	LIT or Part No.
Setting up the Smart Building Hub	Verasys User's Guide	LIT-12012371
Wiring topology and Verasys (MS/TP) bus	Verasys BACnet MS/TP Communications Technical Bulletin	LIT-12012362

Appendix: BACnet exposed object list

Table 12: BACnet exposed object list (Part 1 of 6)

Attribute	Object type	Object Id	Enum set / range	Writeable
Unit status	MV	29500	0 = Idle 1 = SD Alarm 2 = Purge Command 3 = Self Test 	False
Time zone	MV	29501	 1 = (UTC+00:00) Monrovia, Reykjavik 2 = (UTC+00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London 3 = (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna 4 = (UTC+01:00) Belgrade, Bratislava, Budapest, Ljubljana, Prague 	True
Language	MV	29502	1 = Czech (Czech Republic) 2 = Chinese (China) 3 = Danish (Denmark) 4 = Dutch (Belgium) 	True
Units	MV	29503	0 = IP 1 = SI	True
FCB Baud Rate	MV	29504	0 = Auto 1 = 1200 2 = 9600 3 = 19200 	True
Supply Fan Status Bl	MV	29506	0 = Off 1 = On	False
Purge Bl	MV	29507	0 = Normal Operation 1 = Purge	False
Filter Status BI	MV	29508	0 = Clean 1 = Dirty	False
Service Alarm	MV	29509	0 = Normal 1 = Alarm	False
Low Temperature Limit Fault Bl	MV	29510	0 = Normal 1 = Alarm	False

Table 12: BACnet exposed	d object list (Part 2 of 6)
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Attribute	Object type	Object Id	Enum set / range	Writeable
Zone Occupancy	MV	29511	0 = Occupied 1 = Unoccupied 2 = Not Set	False
Occupancy Sensor Bl	MV	29512	0 = Unoccupied 1 = Occupied	False
Temporary Occupancy	MV	29513	0 = Normal 1 = Trigger	True
Supply Fan BO	MV	29514	0 = Off 1 = On	False
Cooling Stage 1 BO	MV	29515	0 = Off 1 = On	False
Cooling Stage 2 BO	MV	29516	0 = Off 1 = On	False
Cooling Stage 3 BO	MV	29517	0 = Off 1 = On	False
Cooling Stage 4 BO	MV	29518	0 = Off 1 = On	False
Heating Stage 1 BO	MV	29519	0 = Off 1 = On	False
Heating Stage 2 BO	MV	29520	0 = Off 1 = On	False
Heating Stage 3 BO	MV	29521	0 = Off 1 = On	False
Heating Stage 4 BO	MV	29522	0 = Off 1 = On	False
Compressor Stage 1 BO	MV	29523	0 = Off 1 = On	False
Compressor Stage 2BO	MV	29524	0 = Off 1 = On	False
Reversing Valve BO	MV	29526	0 = Off 1 = On	False
Reversing Valve Polarity	MV	29527	0 = Normally Heat 1 = Normally Cool	True
Hot Gas Bypass Valve BO	MV	29528	0 = Off 1 = On	False
Supp Heating Stage 1 BO	MV	29529	0 = Off 1 = On	False
Supp Heating Stage 2 BO	MV	29530	0 = Off 1 = On	False
Humidifier BO	MV	29531	0 = Off 1 = On	False
OAT Cooling Lockout Enabled	MV	29532	0 = Disable 1 = Enable	True
OAT Heating Lockout Enabled	MV	29533	0 = Disable 1 = Enable	True

Table 12: BACn	et exposed	object list	(Part 3 of 6)
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Attribute	Object type	Object Id	Enum set / range	Writeable
Rotate Cooling Stage	MV	29534	0 = Normal 1 = Trigger	True
Rotate Enable	MV	29535	0 = Disable 1 = Enable	True
Rotate Heating Stage	MV	29536	0 = Normal 1 = Trigger	True
Load Shed Active	MV	29537	0 = No 1 = Yes	False
Econ Fault Active	MV	29538	0 = Normal 1 = Alarm	False
Air Temperature Sensor Fault	MV	29539	0 = Normal 1 = Alarm	False
Econ Operational Fault	MV	29540	0 = Normal 1 = Alarm	False
Econ Not Operational Fault	MV	29541	0 = Normal 1 = Alarm	False
Econ Excessive Outside Air	MV	29542	0 = Normal 1 = Alarm	False
Damper Modulation Fault	MV	29543	0 = Normal 1 = Alarm	False
Cooling Ineffective Alarm	MV	29544	0 = Normal 1 = Alarm	False
Heating Ineffective Alarm	MV	29545	0 = Normal 1 = Alarm	False
Fan Runtime Alarm	MV	29546	0 = Normal 1 = Alarm	False
Fan Runtime Reset	MV	29547	0 = Off 1 = Reset	True
Occupancy Override	MV	29548	0 = Occupied 1 = Unoccupied 2 = Bypass 3 = Standby 4 = Not Set	True
Device Address	AV	29500	4 to 127	True
Device Object ID	AV	29501	0 to 4194302	True
Mixed Air Damper Position Al	AV	29502	0% to 00%	False
Outdoor Air Temperature Sensor Al	AV	29503	-50°F to 250°F (-45.6°C to 121.1°C)	False
Operational Outdoor Air Temperature	AV	29504	-50°F to 250°F (-45.6°C to 121.1°C)	False
Supply Air Temperature Al	AV	29505	-50°F to 250°F (-45.6°C to 121.1°C)	False

Table 12: BACnet exposed	d object list (Part 4 of 6)
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Attribute	Object type	Object Id	Enum set / range	Writeable
Mixed Air Temperature Al	AV	29506	-50°F to 250°F (-45.6°C to 121.1°C)	False
Return Air Temperature Al	AV	29507	-50°F to 250°F (-45.6°C to 121.1°C)	False
Zone Temperature	AV	29508	-50°F to 250°F (-45.6°C to 121.1°C)	False
Setpoint Adjust	AV	29509	-5°F to 5°F (-20°C to -15°C)	False
Zone Humidity	AV	29510	0% to 100%RH	False
Zone Humidity Al	AV	29511	0% to 100%RH	False
Zone Quality	AV	29512	0 to 2000 ppm	False
Return CO2 Sensor Al	AV	29513	0 to 2000 ppm	False
Supply Fan Speed AO	AV	29514	0% to 100%	False
Mixed Air Damper AO	AV	29515	0% to 100%	False
Minimum OA Damper AO	AV	29516	0% to 100%	False
Cooling % Command	AV	29517	0% to 100%	False
Heating % Command	AV	29518	0% to 100%	False
Heat Pump % Command	AV	29519	0% to 100%	False
Humidification AO	AV	29520	0% to 100%	False
Warm/Cool Adjust Range	AV	29521	0.01°F to 5°F (-17.7°C to -15°C)	True
Temperature Setpoint	AV	29522	60°F to 85°F (15.5°C to 29.4°C)	True
Deadband	AV	29523	1°F to 5°F (-17.2°C to -15°C)	True
Effective Cooling Setpoint	AV	29524	-50°F to 250°F (-45.6°C to 121.1°C)	False
Unocc Cooling Setpoint	AV	29525	60°F to 85°F (15.5°C to 29.4°C)	True
Standby Cooling Setpoint	AV	29526	60°F to 85°F (15.5°C to 29.4°C)	True
Effective Heating Setpoint	AV	29527	-50°F to 250°F (-45.6°C to 121.1°C)	False
Standby Heating Setpoint	AV	29528	-50°F to 250°F (-45.6°C to 121.1°C)	True
Unocc Heating Setpoint	AV	29529	60°F to 85°F (15.5°C to 29.4°C)	True
Temp Occupancy Time	AV	29530	0 to 240 minutes	True
Fan Only Speed	AV	29531	0% to 100%	True
Min Fan Speed	AV	29532	0% to 100%	True
Max Fan Speed	AV	29533	0% to 100%	True

Table 12: BACnet exposed	l object list (Part 5 of 6)
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Attribute	Object type	Object Id	Enum set / range	Writeable
Clg Stage 1 Speed	AV	29534	0% to 100%	True
Clg Stage 2 Speed	AV	29535	0% to 100%	True
Clg Stage 3 Speed	AV	29536	0% to 100%	True
Clg Stage 4 Speed	AV	29537	0% to 100%	True
Htg Stage 1 Speed	AV	29538	0% to 100%	True
Htg Stage 2 Speed	AV	29539	0% to 100%	True
Htg Stage 3 Speed	AV	29540	0% to 100%	True
Htg Stage 4 Speed	AV	29541	0% to 100%	True
Minimum OA Percent	AV	29542	0% to 100%	True
Economizer Switchover Setpoint	AV	29543	40°F to 80°F (4.4°C to 26.6 °C)	True
Low Limit Temp Setpt	AV	29544	40°F to 80°F (4.4°C to 26.6 °C)	True
Supply Air Low Limit Setpoint	AV	29545	-50°F to 250°F (-45.6°C to 121.1°C)	True
CO2 Reset A	AV	29546	0 to 2000 ppm	True
CO2 Reset B	AV	29547	0 to 2000 ppm	True
Min Pos High Setpoint	AV	29548	0% to 100%	True
Failsoft Cooling Value	AV	29549	0% to 100%	True
Failsoft Heating Value	AV	29550	0% to 100%	True
OA Cooling Lockout Setpoint	AV	29551	-50°F to 250°F (-45.6°C to 121.1°C)	True
OA Heating Lockout Setpoint	AV	29552	-50°F to 250°F (-45.6°C to 121.1°C)	True
Supply Air Setpoint Cooling Min	AV	29553	-50°F to 250°F (-45.6°C to 121.1°C)	True
Supply Air Setpoint Heating Max	AV	29554	-50°F to 250°F (-45.6°C to 121.1°C)	True
Cooling Min On Time	AV	29555	0 to 3600 seconds	True
Cooling Min Off Time	AV	29556	0 to 3600 seconds	True
Interstage On Delay Time	AV	29557	30 to 900 seconds	True
Interstage Off Delay Time	AV	29558	30 to 900 seconds	True

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Table 12: BACnet expose	d object list (Part 6 of 6)
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Attribute	Object type	Object Id	Enum set / range	Writeable
Heating Min On Time	AV	29559	30 to 1800 seconds	True
Heating Min Off Time	AV	29560	30 to 1800 seconds	True
Low OA Lockout Setpoint	AV	29561	-50°F to 250°F (-45.6°C to 121.1°C)	True
Compressor Min On Time	AV	29562	30 to 1800 seconds	True
Compressor Min Off Time	AV	29563	30 to 1800 seconds	True
Supp Min On Time	AV	29564	30 to 1800 seconds	True
Supp Min Off Time	AV	29565	30 to 1800 seconds	True
Humidity Setpoint	AV	29566	0% to 100%RH	True
Dehumidificatio n Setpoint	AV	29567	0% to 100%RH	True
Load Shed Adjust	AV	29568	0°F to 5°F (-17.7°C to -15°C)	True
Load Shed Rate Limit	AV	29569	0°F to 1°F /min (-17.7°C to -17.2°C /min)	True
Damper Pos Error	AV	29570	0% to 100%	True
Damper Min Pos Fault Tolerance	AV	29571	0% to 100%	True
Econ Fault Delay	AV	29572	5 to 60 minutes	True
Heat Cool Alarm Differential	AV	29573	0°F to 5°F (-17.7°C to -15°C)	True
Heat Cool Alarm Delay	AV	29574	5 to 60 minutes	True
Fan Runtime	AV	29575	0 to 20000 hours	False
SF Alarm Delay	AV	29576	60 to 1200 seconds	True
Fan Runtime Limit	AV	29577	0 to 20000 hours	True

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