VEC100 Generic RTU Heat Pump Controller Application Note

LC-VEC100-0

Building Technologies and Solutions

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Introduction

The Verasys generic rooftop unit (RTU) heat pump controller application is part of the Verasys application library.

To use the application, log in to verasyscontrols.com and access the application library in the ***Product Information & Support*** > ***Device Updates*** section. Download the application package file and install it on the Verasys Equipment Controller (VEC), LC-VEC100-0. For more information, see Updating the VEC.

This document describes the application, wiring, and characteristics of the controller. The parameters for this controller are adjustable in the field, but the application is fixed.

If you have further questions about the application, contact Verasys support:

BE-VerasysSupport@jci.com

verasyscontrols.com

Application overview

The VEC100 heat pump application controls a third-party changeover bypass (COBP) system or a third-party variable air volume (VAV) unit.

Table 1: Application features

Options available	Possible values
Number of Heat Pump Stages Installed	0 to 2
Supplemental Heat Installed	• State 0: No • State 1: Yes
Economizer Installed	• State 0: the economizer is not available. • State 1: the economizer is available.
Air Proving Switch Setup	• State 0: fan status device • State 1: duct static pressure sensor • State 2: none
Runtime Equalization	• State 0: heat pump activation is not based on runtime. • State 1: heat pump activation is based on runtime.
Rooftop Controller Type	• State 0: changeover bypass • State 1: VAV
Cancel ASCD Timers	• State 0: false • State 1: true

Table 1: Application features

Options available	Possible values
Demand Ventilation Feature	• State 0: demand ventilation is off. • State 1: demand ventilation is on.
Reversing Valve Config	• State 0: on for heating • State 1: on for cooling
Condensate Alarm	• State 0: the condensate alarm does not shut down the system. • State 1: the condensate alarm shuts down the whole system.

Detailed procedures

The following sections contain procedures that you need to do before you start to use the application.

Updating the VEC

To update the VEC with the heat pump application, complete the following steps:

1. Go to verasyscontrols.com, and log in with your credentials.
2. Navigate to ***Product Information & Support*** > ***Device Updates***.
3. Download the package file for the application to the root folder of a USB 2.0 drive. The package file name is the following: `VEC100-Heat Pump_xxxx.pkg`

   ⓘ **Note:** Ensure that the USB drive is formatted as FAT or FAT32.
4. Insert the USB drive into the USB port on the VEC.
5. If the download does not start immediately, then in the controller's local display, select the **Update and Load Firmware** option, then choose the package file on the USB drive, and press **Enter**.
6. When the application update finishes, use the Verasys Smart Building Hub (SBH) or the local display to configure the controller.

Setting the VEC address

You can choose to set the VEC address using the local display, or using the SBH.

Setting the VEC address using the local display

To set the VEC address using the local display, complete the following steps:

1. To access the menu, press the **ENT (Enter)** button.
2. Navigate to the **Controller** menu with the up and down arrows, and press the **ENT** button.
3. In the **Controller** menu, navigate to **Network** and press the **ENT** button.
4. In the **Network Parameters** section, navigate to **Address** and press the **ENT** button.
   The display shows the default address value.
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 want. 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)** repeatedly, until you return to the main screen. Ensure that the main screen shows that the system is operational.

Setting the VEC address using the SBH

To set the VEC address using the SBH, complete the following steps:

1. In the SBH menu, navigate to the VEC controller.
2. Navigate to the ***Controller*** > ***Network*** menu, and find the **Device Address** parameter.

   ⓘ **Note:** The default address is 4. If another controller uses this address and both controllers are connected to the zone bus, temporarily disconnect the other address 4 controller from the trunk while you configure the controller, or use the procedure in Setting the VEC address using the local display.
3. Use the up and down arrows to select the address, or enter the address directly.
4. Click **Save**.

Using the application in a COBP system

The following sections contain information about using the application in a COBP system.

COBP flow diagram

The following figure and table describe the application flow in a COBP system.

Figure 1: COBP flow diagram

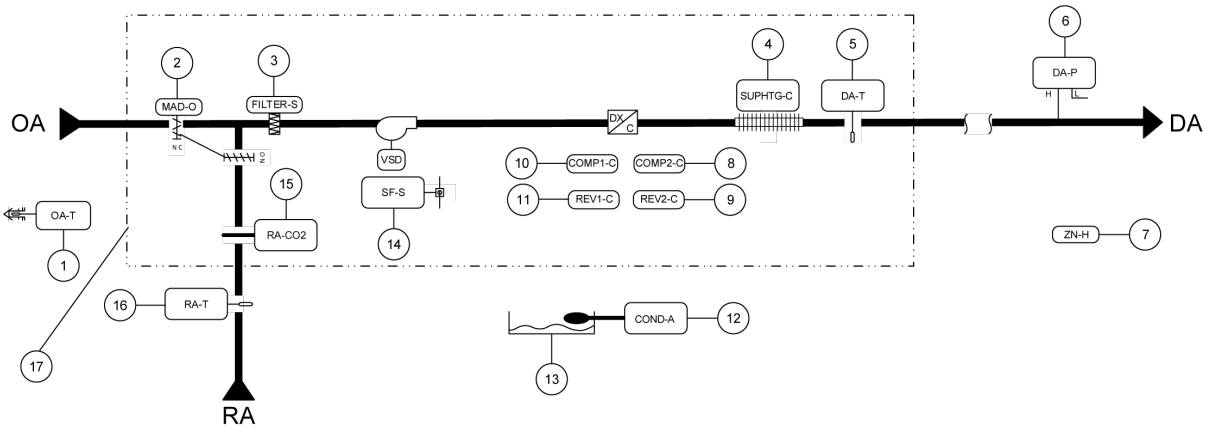

Table 2: COBP flow diagram

Number	Object name (if given)	Description
1	OA-T	Outside air temperature ⓘ **Note:** This is a required sensor if the VEC100 controls the economizer. Position the sensor in a shaded area on the north side of the building.
2	MAD-O	Economizer Damper Output
3	FILTER-S	Filter status

Table 2: COBP flow diagram

Number	Object name (if given)	Description
4	SUPHTG-C	Supplemental heat command
5	DA-T	Discharge and supply air temperature
6	DA-P	Discharge air static pressure ⓘ **Note:** Position this sensor two-thirds down the longest duct run.
7	ZN-H	Zone humidity
8	COMP2-C	Compressor stage 2 command
9	REV2-C	Reversing valve 2 command
10	COMP1-C	Compressor stage 1 command
11	REV1-C	Reversing valve 1 command
12	COND-A	Condensate alarm
13	n/a	Condensate pan
14	• SF-S • SF-C • SF-O	• Supply fan status (air proving switch) • Supply fan command • Supply fan output
15	RA-CO2	Return air quality
16	RA-T	Return air temperature
17	n/a	Rooftop or packaged unit enclosure

COBP sequence of operation

Supply fan start and stop

The supply fan runs continuously during the occupancy period, and cycles according to the heating and cooling calls during the unoccupied period. If you set ***Details*** > ***Service*** > ***Factory*** > ***Air Proving Switch Setup*** to a state other than **None**, and the fan status does not match your setting after 90 seconds, the controller generates an alarm.

You can also configure a limit for the fan runtime. When the fan reaches the number of hours of runtime that you configure, the controller generates an alarm. To configure a limit for the fan runtime, navigate to ***Details*** > ***Control*** > ***Fan***, and set the **Fan Runtime Limit** to the appropriate amount of hours.

You can configure whether the system shuts down when the condensate float switch is in alarm mode. To configure a system shutdown for the condensate alarm, set ***Details*** > ***Service*** > ***Factory*** > ***Condensate Alarm*** to **Yes**.

Static pressure control

The bypass damper modulates to maintain the discharge static pressure at the setpoint. Optionally, if a bypass damper is not present, you can use a variable-frequency drive (VFD).

Discharge air temperature control

The heat pump compressor stages modulate to maintain the discharge air setpoint. The reversing valves operate in cooling or heating mode to satisfy a cooling or heating requirement. If compressor heating is not sufficient to meet the demand, or if compressor heating is not available, the controller can activate a single stage of supplemental heating. The VEC100 can act like a

thermostat to the third-party RTU. To observe the current output statuses, navigate to ***Details*** > ***Service*** > ***Outputs***. You can find the setpoints for the zoning system in the Verasys Zone Coordinator **Details** view: **Supply Temperature Cooling Setpoint** and **Supply Temperature Heating Setpoint**.

The device monitors the supply air temperature, and generates an alarm if the temperature does not change during a heating or cooling call. To adjust this alarm, navigate to ***Details*** > ***Service*** > ***Factory***, and modify the **Supply Air Temperature Alarm Offset** and **Supply Air Temperature Alarm Delay**. To disable the alarm feature, set either of these parameters to 0.

Economizer dry bulb switchover

The VEC100 can control an outside air damper. To use this feature, navigate to ***Details*** > ***Service*** > ***Factory***, and set **Economizer Installed** to **Yes**. When the outside air temperature drops below the **Economizer Outdoor Air Temp Enable Setpoint**, the controller uses the economizer as the first stage of cooling. If the temperature rises above the setpoint, it stops using the economizer. If, at any time, the purge contact is initiated, the controller opens the dampers completely.

Demand ventilation control

You can use the demand ventilation feature if you connect a return air CO_2 sensor to the controller. To use this feature, navigate to ***Details*** > ***Service*** > ***Factory***, and set **Demand Ventilation Feature** to **On**. Settings for the feature include the following parameters in the **Commissioning** view:

- **Demand Ventilation Maximum Position**: You can set the maximum open position of the damper.
- **Demand Ventilation Indoor Air Quality Setpoint**: You can set the CO_2 level that triggers the damper to open.
- **Indoor Air Quality Sensor Range**: You can configure the upper bound of a 0 VDC to 10 VDC sensor.

Night setback and night setup

During the unoccupied period, the zone controllers widen their setpoints, but the zone coordinator continues to monitor all zones. If there is a heating or cooling request, the zone coordinator commands the VEC100 to run heating or cooling, and the VEC100 controls to the same **Supply Temperature Heating Setpoint** and **Supply Temperature Cooling Setpoint** as in the occupied mode.

Shutdown

When the unit is in shutdown mode, by either a stop command or system safety, the unit sets the system as shown in the following table.

Table 3: Shutdown settings

Component	Setting
Supply fan	Off
Supply fan VFD (if used)	0%
Outside air damper	Closed
Heat pump cooling and heating	Off
Supplemental heat	Off

COBP wiring diagram

Figure 2: Changeover bypass wiring diagram - VEC100

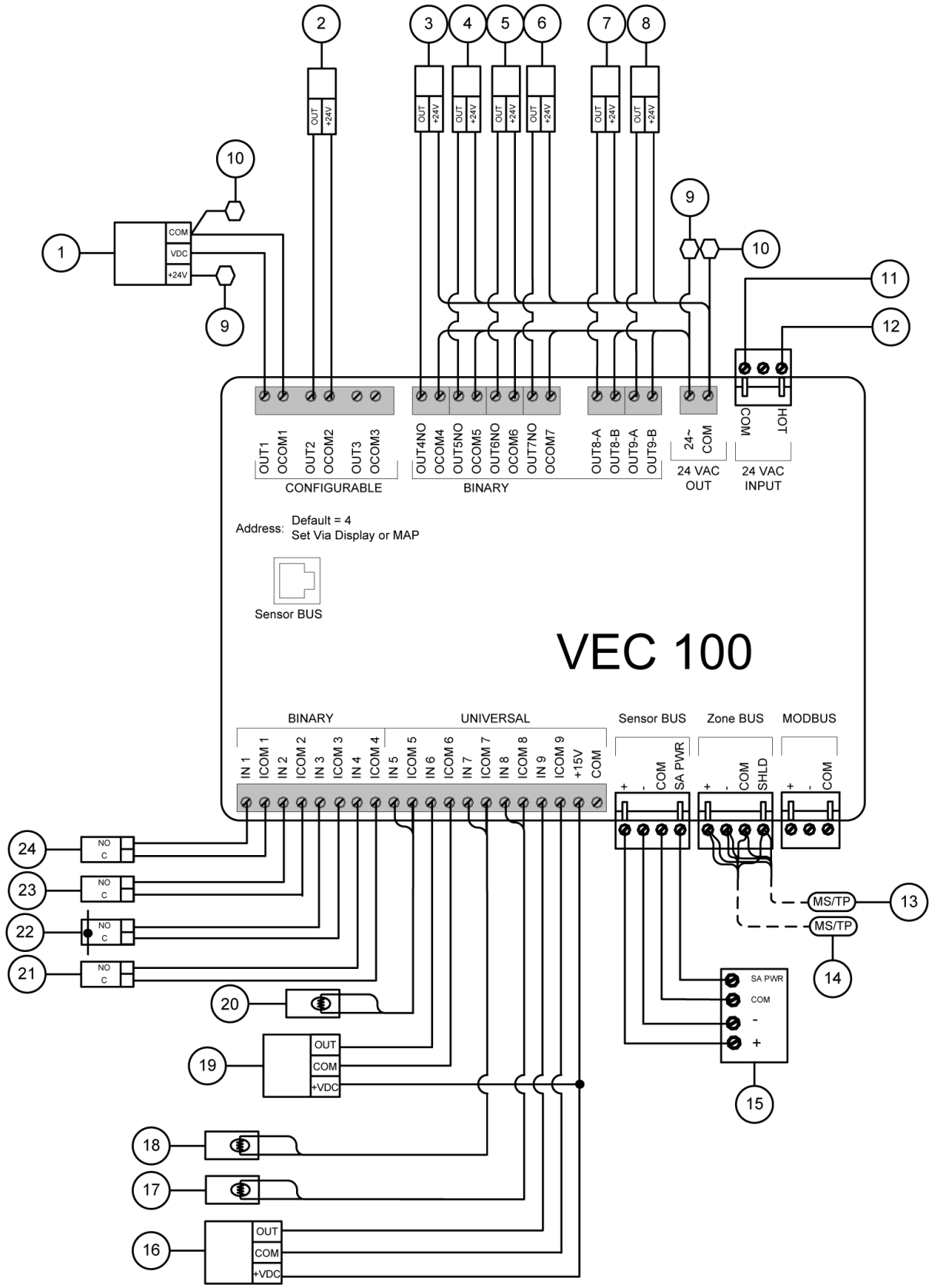

Table 4: Changeover bypass wiring diagram

Number	Description	Object name (if given)
1	Economizer Damper Output (optional)	MAD-O
2	Supply fan output (to fan VFD)	SF-O
3	Supply fan command (to fan VFD)	SF-C
4	Compressor stage 1 command	COMP1-C
5	Reversing valve 1 command	REV1-C
6	Compressor stage 2 command	COMP2-C
7	Reversing valve 2 command	REV2-C
8	Supplemental heat command	SUPHTG-C
9	24 V HOT to damper motor	n/a
10	24 V COM to damper motor	n/a
11	24 V COM	n/a
12	24 V HOT	n/a
13	From last device	n/a
14	To next device	n/a
15	Zone humidity sensor - monitor only (optional)	ZN-H
16	Return air CO_2 Range: 0 ppm to 2,000 ppm, 0 VDC to 10 VDC	RA-CO2
17	Return air temperature sensor	RA-T
18	Outside air temperature sensor ⓘ **Note:** This is a required sensor if the VEC100 controls the economizer. Position the sensor in a shaded area on the north side of the building.	OA-T
19	Discharge air static pressure sensor Range: 0 in. W.C. to 5 in. W.C., 0 VDC to 5 VDC	DA-P
20	Discharge air temperature sensor	DA-T
21	Condensate alarm	COND-A
22	Supply fan status (air proving switch, optional)	SF-S
23	Purge input (optional)	PURGE-S
24	Filter status (optional)	FILTER-S

COBP point list

Table 5: LC-VEC100-0 point list for COBP

Point Type	Object Name	Point Type	Expanded ID	Johnson Controls part numbers	Required or optional
Binary Input	FILTER-S	IN1	Filter Status	P32AC Differential pressure switch	Optional, dry contact from RTU filter
Binary Input	PURGE-S	IN2	Purge Input Status	n/a	Optional
Binary Input	SF-S	IN3	Supply Fan Status	CSDECMC35200L1	Optional, air proving switch

Table 5: LC-VEC100-0 point list for COBP

Point Type	Object Name	Point Type	Expanded ID	Johnson Controls part numbers	Required or optional
Binary Input	COND-A	IN4	Condensate Alarm	n/a	Required, dry contact
Analog Input	DA-T	IN5	Discharge Air Temperature	TE-6311P-1 (if Nickel 1K RTD)	Required sensor, user-configurable, Nickel 1K RTD
Analog Input	DA-P	IN6	Discharge Air Static Pressure	DPT2640-005D-1	Required sensor, 0 VDC to 5 VDC (0 in. W.C. to 5 in. W.C.)
Analog Input	OA-T	IN7	Outdoor Air Temperature	TE-6313P-1 (if Nickel 1K RTD)	Required sensor if economizer is controlled. User-configurable, Nickel 1K RTD.
Analog Input	RA-T	IN8	Return Air Temperature	TE-6311P-1 (if Nickel 1K RTD)	Optional sensor, user-configurable, Nickel 1K RTD
Analog Input	RA-CO2	IN9	Return Air CO2	CD-P1000-00-00	Optional sensor, 0 VDC to 10 VDC (0 ppm to 2,000 ppm)
Analog Output	MAD-O	OUT1	Economizer Damper Output	M92xx-GGA-x	Required if Economizer is installed.
Analog Output	SF-O	OUT2	Supply Fan Output	VFD	Optional, use if you control a VFD instead of a bypass damper (0 VDC to 10 VDC).
Analog Output	Spare	OUT3	Spare	Spare	Spare
Binary Output	SF-C	OUT4	Supply Fan Command	RIBU1C or Conventional Thermostat Interface (CTI)	Required
Binary Output	COMP1-C	OUT5	Compressor Stage 1 Command	RIBU1C or CTI	Required if one or more heat pump stages are installed.
Binary Output	REV1-C	OUT6	Reversing Valve 1 Command	RIBU1C or CTI	Required if one or more heat pump stages are installed.

Table 5: LC-VEC100-0 point list for COBP

Point Type	Object Name	Point Type	Expanded ID	Johnson Controls part numbers	Required or optional
Binary Output	COMP2-C	OUT7	Compressor Stage 2 Command	RIBU1C or CTI	Required if two heat pump stages are installed.
Binary Output	REV2-C	OUT8	Reversing Valve 2 Command	RIBU1C or CTI	Required if two heat pump stages are installed.
Binary Output	SUPHTG-C	OUT9	Supplemental heat command	n/a	Required if supplemental heating is installed.

Using the application in a VAV system

The following sections contain information about using the application in a VAV system.

VAV flow diagram

The following figure and table describe the application flow in a VAV system.

Figure 3: VAV flow diagram

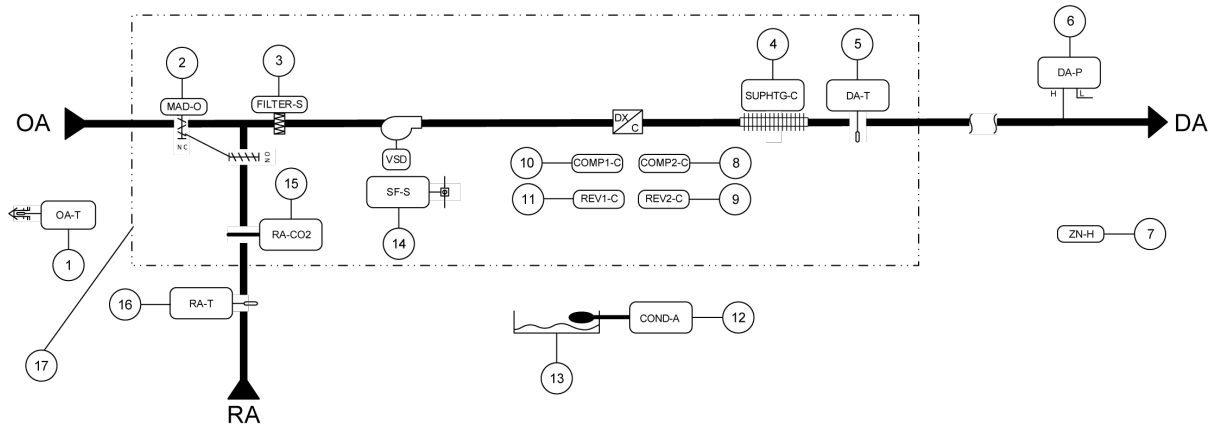

Table 6: VAV flow diagram

Number	Object name (if given)	Description
1	OA-T	Outside air temperature ⓘ **Note:** This is a required sensor if the VEC100 controls the economizer. Position the sensor in a shaded area on the north side of the building.
2	MAD-O	Economizer Damper Output
3	FILTER-S	Filter status
4	SUPHTG-C	Supplemental heat command
5	DA-T	Discharge and supply air temperature

Table 6: VAV flow diagram

Number	Object name (if given)	Description
6	DA-P	Discharge air static pressure ⓘ **Note:** Position this sensor two-thirds down the longest duct run.
7	ZN-H	Zone humidity
8	COMP2-C	Compressor stage 2 command
9	REV2-C	Reversing valve 2 command
10	COMP1-C	Compressor stage 1 command
11	REV1-C	Reversing valve 1 command
12	COND-A	Condensate alarm
13	n/a	Condensate pan
14	• SF-S • SF-C • SF-O	• Supply fan status (air proving switch) • Supply fan command • Supply fan output
15	RA-CO2	Return air quality
16	RA-T	Return air temperature
17	n/a	Rooftop or packaged unit enclosure

VAV sequence of operation

Supply fan start and stop

The supply fan runs continuously during the occupancy period, and cycles according to the heating and cooling calls during the unoccupied period. If you set ***Details*** > ***Service*** > ***Factory*** > ***Air Proving Switch Setup*** to a state other than **None**, and the fan status does not match your setting after 90 seconds, the controller generates an alarm.

You can also configure a limit for the fan runtime. When the fan reaches the number of hours of runtime that you configure, the controller generates an alarm. To configure a limit for the fan runtime, navigate to ***Details*** > ***Control*** > ***Fan***, and set the **Fan Runtime Limit** to the appropriate amount of hours.

You can configure whether the system shuts down when the condensate float switch is in alarm mode. To configure a system shutdown for the condensate alarm, set ***Details*** > ***Service*** > ***Factory*** > ***Condensate Alarm*** to **Yes**.

Static pressure control

The variable frequency drive modulates to maintain the duct static pressure at the **Duct Static Pressure Setpoint**.

Discharge air temperature control

The reversing valves operate in cooling or heating mode to satisfy a cooling or heating requirement. The VEC100 can act like a thermostat to the third-party RTU. To observe the current output statuses, navigate to ***Details*** > ***Service*** > ***Outputs***. The heat pump compressor stages modulate (cycle) to maintain the **Supply Air Temperature Setpoint** in the Verasys Zone Coordinator **Details** menu.

The heat pump compressor stages modulate (cycle) to maintain the **VAV RAT Heating Setpoint** parameter in the ***Details*** > ***Setpoints*** view. Configure this setpoint so that the RTU brings enough

heat to the zoning system on a transition from unoccupied mode to occupied mode. If compressor heating is not sufficient to meet the demand, or if compressor heating is not available, the controller can activate a single stage of supplemental heating.

The device monitors the supply air temperature, and generates an alarm if the temperature does not change during a heating or cooling call. To adjust this alarm, go to ***Details*** > ***Service*** > ***Factory***, and modify the **Supply Air Temperature Alarm Offset** and **Supply Air Temperature Alarm Delay**. To disable the alarm feature, set either of these parameters to 0.

Economizer dry bulb switchover

The VEC100 can control an outside air damper. To use this feature, navigate to ***Details*** > ***Service*** > ***Factory***, and set **Economizer Installed** to **Yes**. When the outside air temperature drops below the **Economizer Outdoor Air Temp Enable Setpoint**, the controller uses the economizer as the first stage of cooling. If the temperature rises above the setpoint, it stops using the economizer. If, at any time, the purge contact is initiated, the controller opens the dampers completely.

Demand ventilation control

You can use the demand ventilation feature if you connect a return air CO_2 sensor to the controller. To use this feature, navigate to ***Details*** > ***Service*** > ***Factory***, and set **Demand Ventilation Feature** to **On**. Settings for the feature include the following parameters in the **Commissioning** view:

- **Demand Ventilation Maximum Position**: You can set the maximum open position of the damper.
- **Demand Ventilation Indoor Air Quality Setpoint**: You can set the CO_2 level that triggers the damper to open.
- **Indoor Air Quality Sensor Range**: You can configure the upper bound of a 0 VDC to 10 VDC sensor.

Night setback and night setup

During the unoccupied period, the representative zone of the zoning system drives heating and cooling. The zone coordinator commands the VEC100 to run maximum heating or cooling until it meets the request from the representative zone.

Shutdown

When the unit is in shutdown mode, by either a stop command or system safety, the unit sets the system as shown in the following table.

Table 7: Shutdown settings

Component	Setting
Supply fan	Off
Supply fan VFD	0%
Outside air damper	Closed
Heat pump cooling and heating	Off
Supplemental heat	Off

VAV wiring diagram

Figure 4: VAV wiring diagram - VEC100

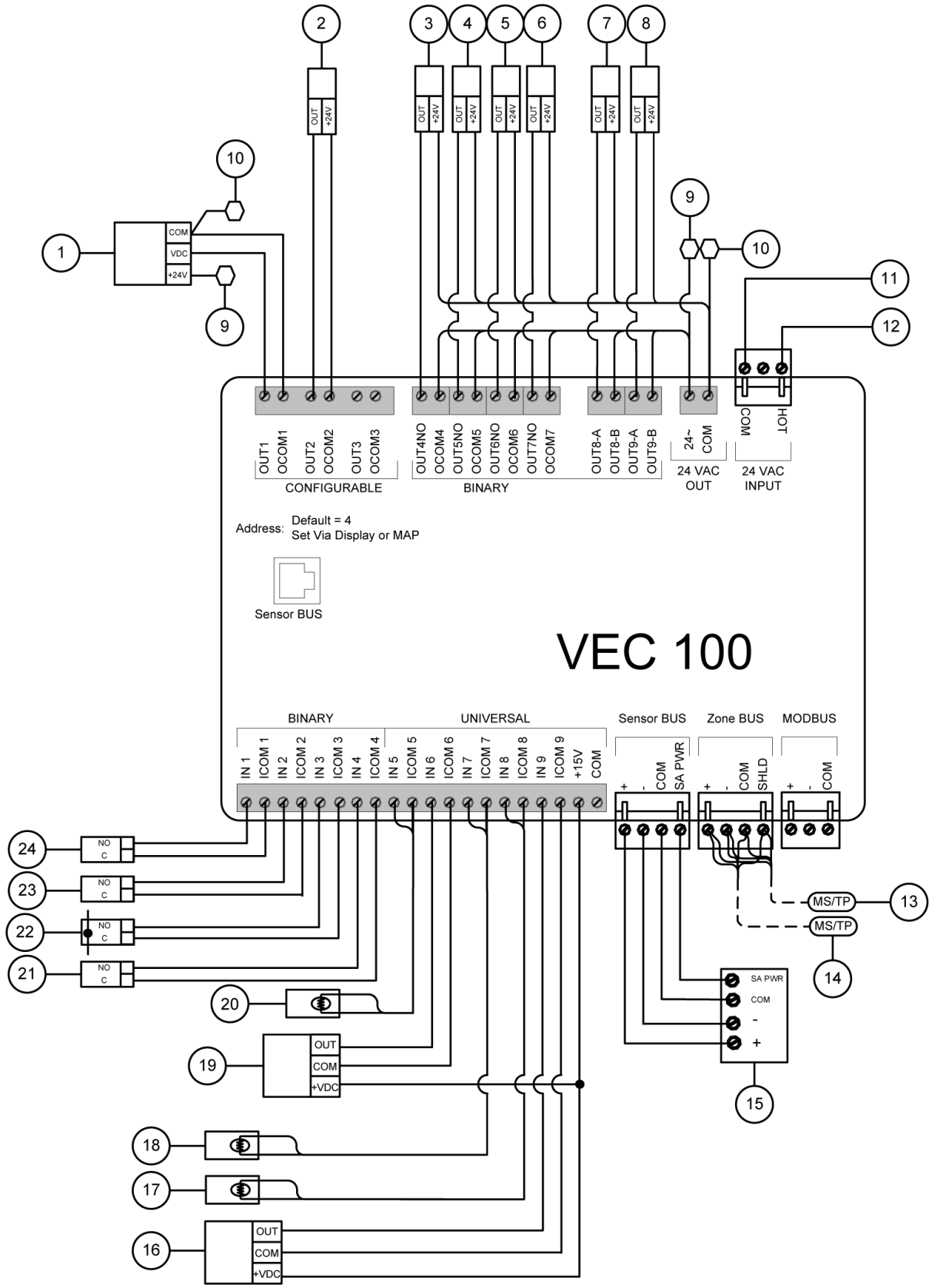

Table 8: VAV wiring diagram

Number	Description	Object name (if given)
1	Economizer Damper Output (optional)	MAD-O
2	Supply fan output (to fan VFD)	SF-O
3	Supply fan command (to fan VFD)	SF-C
4	Compressor stage 1 command	COMP1-C
5	Reversing valve 1 command	REV1-C
6	Compressor stage 2 command	COMP2-C
7	Reversing valve 2 command	REV2-C
8	Supplemental heat command	SUPHTG-C
9	24 V HOT to damper motor	n/a
10	24 V COM to damper motor	n/a
11	24 V COM	n/a
12	24 V HOT	n/a
13	From last device	n/a
14	To next device	n/a
15	Zone humidity sensor - monitor only (optional)	ZN-H
16	Return air CO_2 Range: 0 ppm to 2,000 ppm, 0 VDC to 10 VDC	RA-CO2
17	Return air temperature sensor	RA-T
18	Outside air temperature sensor ⓘ **Note:** This is a required sensor if the VEC100 controls the economizer. Position the sensor in a shaded area on the north side of the building.	OA-T
19	Discharge air static pressure sensor Range: 0 in. W.C. to 5 in. W.C., 0 VDC to 5 VDC	DA-P
20	Discharge air temperature sensor	DA-T
21	Condensate alarm	COND-A
22	Supply fan status (air proving switch, optional)	SF-S
23	Purge input (optional)	PURGE-S
24	Filter status (optional)	FILTER-S

VAV point list

Table 9: LC-VEC100-0 point list for VAV

Point Type	Object Name	Point Type	Expanded ID	Johnson Controls part numbers	Required or optional
Binary Input	FILTER-S	IN1	Filter Status	P32AC Differential pressure switch	Optional, dry contact from RTU filter
Binary Input	PURGE-S	IN2	Purge Input Status	n/a	Optional
Binary Input	SF-S	IN3	Supply Fan Status	CSDECMC35200L1	Optional, air proving switch

Table 9: LC-VEC100-0 point list for VAV

Point Type	Object Name	Point Type	Expanded ID	Johnson Controls part numbers	Required or optional
Binary Input	COND-A	IN4	Condensate Alarm	n/a	Required, dry contact
Analog Input	DA-T	IN5	Discharge Air Temperature	TE-6311P-1 (Nickel 1K RTD)	Required sensor, user-configurable, Nickel 1K RTD
Analog Input	DA-P	IN6	Discharge Air Static Pressure	DPT2640-005D-1	Required sensor, 0 VDC to 5 VDC (0 in. W.C. to 5 in. W.C.)
Analog Input	OA-T	IN7	Outdoor Air Temperature	TE-6313P-1 (Nickel 1K RTD)	Required sensor if economizer is controlled. User-configurable, Nickel 1K RTD.
Analog Input	RA-T	IN8	Return Air Temperature	TE-6311P-1 (Nickel 1K RTD)	Optional sensor, user-configurable, Nickel 1K RTD
Analog Input	RA-CO2	IN9	Return Air CO2	CD-P1000-00-00	Optional sensor, 0 VDC to 10 VDC (0 ppm to 2,000 ppm)
Analog Output	MAD-O	OUT1	Economizer Damper Output	M92xx-GGA-x	Required if Economizer is installed.
Analog Output	SF-O	OUT2	Supply Fan Output	VFD	Required
Analog Output	Spare	OUT3	Spare	Spare	Spare
Binary Output	SF-C	OUT4	Supply Fan Command	RIBU1C or Conventional Thermostat Interface (CTI)	Required
Binary Output	COMP1-C	OUT5	Compressor Stage 1 Command	RIBU1C or CTI	Required if one or more heat pump stages are installed.
Binary Output	REV1-C	OUT6	Reversing Valve 1 Command	RIBU1C or CTI	Required if one or more heat pump stages are installed.
Binary Output	COMP2-C	OUT7	Compressor Stage 2 Command	RIBU1C or CTI	Required if two heat pump stages are installed.
Binary Output	REV2-C	OUT8	Reversing Valve 2 Command	RIBU1C or CTI	Required if two heat pump stages are installed.
Binary Output	SUPHTG-C	OUT9	Supplemental heat command	n/a	Required if supplemental heating is installed.

Product options

Table 10: Product options

Type of unit	Description	Product Code
Controller	**VEC SMART Equipment Controllers** LC-VEC100-0, 24 Volts with Display – 5 UI, 4 BI, 2 BO, 4 RO and 3 CO	LC-VEC100-0
Expansion Module	**IOM SMART Equipment Controllers** VEC controller expansion module, 24 Volts – 12-Point IOM with 4 UI, 4 BO, 4 CO, SA Bus Support	LC-IOM3711-0
Verasys Smart Building Hub (SBH)	**Verasys Smart Building Hub** Verasys system gateway and supervisor	LC-SBH200-0
Mobile Access Portal (MAP)	**Mobile Access Portal** Portable/carry-on commissioning gateway. The MAP is not needed if an SBH is available on site.	TL-MAP1810-0PE

Verasys parameters and objects

Table 11: Status menu

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Unit Status	Shows the status of the unit.	Read Only		0 = Idle 1 = SD Alarm 2 = Purge Command 3 = Self Test 4 = Morning Warm Up 5 = Air Tempering 6 = Dehumidification 7 = Heating 8 = Cooling ...
Economizer Status	Shows the status of the economizer.	Read Only		0 = Disabled 1 = Damper Not Functional 2 = Purge 3 = Unavailable-Sensor Fault 4 = Econ Loading 5 = SA-T High Limit 6 = Mixed Air Low Limit Cycle 7 = Demand Ventilation Air Quality 8 = Outdoor Airflow Control ...
Fan Status	Shows the status of the fan.	Read Only		0 = Off-Idle 1 = On-Purge 2 = On-Gas Valve or Limit Fault 3 = On-Defrost 4 = On-Thermostat Request 5 = On-Fan Off Delay For Cool 6 = On-Fan Off Delay For Heat 7 = On-Continuous Fan Occupied Operation 8 = On-Normal Command ...

Table 11: Status menu

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Cooling Status	Shows the status of cooling.	Read Only		0 = Off-Idle 1 = Thermostat Cooling 2 = Unoccupied Cooling 3 = Occupied Cooling 4 = Off-OAT Lockout 5 = Off-Disabled 6 = Off-Lockout 7 = Off-Low Supply Voltage 8 = Off-Low Ambient ...
Heating Status	Shows the status of heating.	Read Only		0 = Off-Idle 1 = On-Defrost 2 = SAT Tempering 3 = Morning Warmup 4 = Thermostat Heating 5 = Unoccupied Heating 6 = Occupied Heating 7 = Off-Disabled 8 = Off-OAT Lockout ...
Supply Air Temperature	Shows the present value of the SAT analog input.	Read Only		°F (°C)
Return Air Temperature	Shows the present value of the RAT analog input.	Read Only		°F (°C)
Space Humidity Input	Shows the present value of the space humidity input.	Read Only		%RH
Outdoor Air Temperature	Shows the present value of the OAT analog input.	Read Only		°F (°C)

Table 12: Summary : RTU

Object or parameter	Description	Adjustable	Defaults	Enum set or range
VAV RAT Heating Setpoint	If you have heating installed on a VAV RTU, you need a return air temperature sensor so the unit can enter into heating mode. If the return air temperature drops below this setpoint, the RTU switches to heating. The RTU stops heating when the temperature goes above this setpoint by 2°F.	Adjustable	70°F (21.1°C)	40°F to 85°F (4°C to 30°C)
Supply Air Temperature Setpoint	The system uses this setpoint to determine the effective heating, cooling, and SAT setpoint based on the RTU controller type selected.	Read Only		°F (°C)

Table 13: Summary : Fan

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Fan Command	Shows the present value of the supply fan binary output.	Read Only		0 = Off 1 = On
Fan % Output	Shows the present value of the supply fan analog output.	Read Only		%
Duct Static Pressure Setpoint	This is the setpoint based on which the supply fan modulates.	Adjustable	1 in. W.C. (0.25 kPa)	0 in. W.C. to 5 in. W.C. (0 kPa to 1.25 kPa)
Duct Static Pressure	It shows the present value of the duct static pressure.	Read Only		in. W.C. (kPa)

Table 14: Summary : Heat Pump

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 1 Command	Present value of compressor stage 1 command binary output	Read Only		0 = Off 1 = On
Reversing Valve 1 Command	Present value of reversing valve 1 command binary output	Read Only		0 = Off 1 = On
Compressor Stage 2 Command	Present value of compressor stage 2 command binary output	Read Only		0 = Off 1 = On
Reversing Valve 2 Command	Present value of reversing valve 2 command binary output	Read Only		0 = Off 1 = On
Heat Pump % Command	The current percent output for heat pump	Read Only		0% to 100%
Supplemental Heating Stage Command	The present value of the supplemental heating stage binary output	Read Only		0 = Off 1 = On

Table 16: Summary : Economizer

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Free Cooling Available	Shows the current state of the economizer free cooling.	Read Only		0 = No 1 = Yes
Economizer Damper % Output	Shows the current percentage output for the economizer damper.	Read Only		%
Economizer Outdoor Air Temp Enable Setpoint	The setpoint that enables the economizer free cooling when the OAT falls below it.	Adjustable	55°F (12.7°C)	40°F to 80°F (4°C to 27°C)
Operational Outdoor Air Temperature	Shows the present value of the OAT analog input.	Read Only		°F (°C)
Space Humidity Input	Shows the present value of the space humidity input.	Read Only		%RH

Table 17: Summary : Demand Ventilation

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Demand Ventilation Indoor Air Quality Setpoint	The setpoint for the demand ventilation control. This is the setpoint at which the damper minimum position starts to increase.	Adjustable	800 ppm	0 ppm to 5,000 ppm
Operational Indoor Air Quality	Shows the present value of the return air quality analog input.	Read Only		ppm

Table 18: Summary : Sensors

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Supply Air Temperature	Shows the present value of the SAT analog input.	Read Only		°F (°C)
Return Air Temperature	Shows the present value of the RAT analog input.	Read Only		°F (°C)
Space Humidity Input	Shows the present value of the space humidity input.	Read Only		%RH
Operational Outdoor Air Temperature	Shows the present value of the OAT analog input.	Read Only		°F (°C)

Table 19: Summary : Network

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Communication Status	Shows the status of the zone bus communication.	Read Only		0 = Not Configured 1 = Active 2 = Waiting For Poll For Master 3 = Not Received Token For Long 4 = Duplicate MAC Address 5 = Forcing BAUD 6 = Remote Trunk

Table 20: Commissioning : Commissioning

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Start Commission	To start the commissioning process, set this to **Trigger**, then command the outputs below. If set to **Trigger**, the controller returns to **Normal** after two hours.	Adjustable	Normal	0 = Normal 1 = Trigger
Compressor Stage 1 Command	When you set **Start Commission** to **Trigger**, it tests the compressor stage 1 output.	Adjustable	Off	0 = Off 1 = On
Reversing Valve 1 Command	When you set **Start Commission** to **Trigger**, it tests the reversing valve 1 output.	Adjustable	Off	0 = Off 1 = On
Compressor Stage 2 Command	When you set **Start Commission** to **Trigger**, it tests the compressor stage 2 output.	Adjustable	Off	0 = Off 1 = On
Reversing Valve 2 Command	When you set **Start Commission** to **Trigger**, it tests the reversing valve 2 output.	Adjustable	Off	0 = Off 1 = On
Supply Fan	When you set **Start Commission** to **Trigger**, it tests the supply fan.	Adjustable	Off	0 = Off 1 = On
Supply Fan Command	When you set **Start Commission** to **Trigger**, it tests the supply fan output.	Adjustable	0%	0% to 100%
Econ Command	When you set **Start Commission** to **Trigger**, it tests the economizer damper command output.	Adjustable	0%	0% to 100%
Supplemental Heating Stage Command	When you set **Start Commission** to **Trigger**, it tests the supplemental heating command output.	Adjustable	Off	0 = Off 1 = On

Table 21: Commissioning : RTU

Object or parameter	Description	Adjustable	Defaults	Enum set or range
PID Tuning Reset	Resets the pattern recognition adaptive control (PRAC+) tuning to the default values for all proportional-integral-derivative (PID) loops that use auto tuning.	Adjustable	No	0 = No 1 = Yes
Temporary Occupancy Timeout	The duration of a temporary occupancy request. This value is also set by the zone coordinator.	Adjustable	120 min	30 min to 480 min

Table 22: Commissioning : Fan

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Duct Static Pressure Setpoint	This is the setpoint based on which the supply fan modulates.	Adjustable	1 in. W.C. (0.25 kPa)	0 in. W.C. to 5 in. W.C. (0 kPa to 1.25 kPa)

Table 23: Commissioning : Heat Pump Clg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Cooling Mode Enabled For Operation	Enables or disables cooling	Adjustable	Yes	0 = No 1 = Yes
OAT Cooling Lockout Enabled	If an OAT sensor is installed, you can use this parameter to enable cooling lockout when the temperature falls below the setpoint.	Adjustable	No	0 = No 1 = Yes
Runtime Equalization	Enable the device based on runtime	Adjustable	No	0 = No 1 = Yes
Supply Air Temperature Setpoint	The system uses this setpoint to determine the effective heating, cooling, and SAT setpoint based on the RTU controller type selected.	Read Only		°F (°C)

Table 24: Commissioning : Heat Pump Htg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Heating Mode Enabled For Operation	Enables or disables heating.	Adjustable	Yes	0 = No 1 = Yes
OAT Heating Lockout Enabled	If an OAT sensor is installed, you can use this parameter to enable heating lockout when the temperature rises above the setpoint.	Adjustable	Yes	0 = No 1 = Yes
Runtime Equalization	Enables the device based on runtime	Adjustable	No	0 = No 1 = Yes
VAV RAT Heating Setpoint	If you have heating installed on a VAV RTU, you need a return air temperature sensor so the unit can enter into heating mode. If the return air temperature drops below this setpoint, the RTU switches to heating. The RTU stops heating when the temperature goes above this setpoint by 2°F.	Adjustable	70°F (21.1°C)	40°F to 85°F (4°C to 30°C)

Table 25: Commissioning : Economizer

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Outdoor Air Temp Enable Setpoint	This is the setpoint which enables the economizer free cooling when the OAT falls below it.	Adjustable	55°F (12.7°C)	40°F to 80°F (4°C to 27°C)

Table 26: Commissioning : Demand Ventilation

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Demand Ventilation Maximum Economizer Position	Sets the maximum open position of the economizer damper when the unit is in a demand ventilation cycle.	Adjustable	50%	0% to 100%
Demand Ventilation Indoor Air Quality Setpoint	The setpoint for the demand ventilation control. This is the setpoint at which the damper position starts to increase from the minimum position.	Adjustable	800 ppm	0 ppm to 5,000 ppm
Indoor Air Quality Sensor Range	Sets the high point of the range of the installed sensor. 0 V = 0 ppm. This parameter is the CO_2 level for 10 V.	Adjustable	2,000 ppm	0 ppm to 5,000 ppm

Table 27: Commissioning : Network

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Device Name	Sets the name of the controller. This name appears on the device list.	Adjustable		
Address	Sets the address of the controller. You can adjust the address on the local display of the controller, or in the SBH.	Adjustable	4	4 to 127

Table 28: Commissioning : Econ Temp PID Data

Object or parameter	Description	Adjustable	Defaults	Enum set or range
PID Tuning Type	Sets the PID tuning to automatic or manual.	Adjustable	Automatic	0 = Automatic 1 = Manual
Proportional Band	If the **PID Tuning Type** is set to **Manual**, this sets the proportional band for the loop.	Adjustable	60.8	-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	0 = Disable 1 = Enable
Integral Time	If the **PID Tuning Type** is set to **Manual**, this sets the integral time for the loop.	Adjustable	124 s	**Interval** x 2 to **Interval** x 30
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	180 s	0 s to 3600 s

Table 28: Commissioning : Econ Temp PID Data

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Interval	If the **PID Tuning Type** is set to **Manual**, this sets the interval for the loop.	Adjustable	12 s	1 s to 3600 s
Eff Proportional Band	Shows the proportional band the PID loop is using.	Read Only		
Eff Integral Time	Shows the integral time the PID loop is using.	Read Only		

Table 29: Commissioning : Heating PID Data

Object or parameter	Description	Adjustable	Defaults	Enum set or range
PID Tuning Type	Sets the PID tuning to automatic or manual.	Adjustable	Automatic	0 = Automatic 1 = Manual
Proportional Band	If the **PID Tuning Type** is set to **Manual**, this sets the proportional band for the loop.	Adjustable	60.8	-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	0 = Disable 1 = Enable
Integral Time	If the **PID Tuning Type** is set to **Manual**, this sets the integral time for the loop.	Adjustable	124 s	**Interval** x 2 to **Interval** x 30
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	180 s	0 s to 3600 s
Interval	If the **PID Tuning Type** is set to **Manual**, this sets the interval for the loop.	Adjustable	12 s	1 s to 3600 s
Eff Proportional Band	Shows the proportional band the PID loop is using.	Read Only		
Eff Integral Time	Shows the integral time the PID loop is using.	Read Only		

Table 30: Commissioning : Cooling PID Data

Object or parameter	Description	Adjustable	Defaults	Enum set or range
PID Tuning Type	Sets the PID tuning to automatic or manual.	Adjustable	Automatic	0 = Automatic 1 = Manual
Proportional Band	If the **PID Tuning Type** is set to **Manual**, this sets the proportional band for the loop.	Adjustable	60.8	-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	0 = Disable 1 = Enable
Integral Time	If the **PID Tuning Type** is set to **Manual**, this sets the integral time for the loop.	Adjustable	124 s	**Interval** x 2 to **Interval** x 30
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	180 s	0 s to 3600 s

Table 30: Commissioning : Cooling PID Data

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Interval	If the **PID Tuning Type** is set to **Manual**, this sets the interval for the loop.	Adjustable	12 s	1 s to 3600 s
Eff Proportional Band	Shows the proportional band the PID loop is using.	Read Only		
Eff Integral Time	Shows the integral time the PID loop is using.	Read Only		

Table 31: Controller : Firmware

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Firmware Main Version	Indicates what firmware is 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		

Table 32: Controller : Time

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Time	The time that was set by the SBH. To change the date and time, go to ***Settings*** > ***System Settings*** on the SBH. This adjustment syncs to all online devices.	Read Only		
Date	Shows the date the controller is set to.	Read Only		
Time Zone	Sets the time zone the controller uses.	Adjustable	5 = (UTC-06:00) Central Time (US & Canada)	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 ...

Table 33: Controller : Network

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Device Name	Sets the name of the controller. This name appears on the device list.	Adjustable		30 characters maximum
Description	The description of the device. This description appears on the device list.	Adjustable		30 characters maximum
Device Address	Sets the address of the controller. You can adjust the address on the local display of the controller, or in the SBH.	Adjustable	4	4 to 127
Device Object ID	Sets the BACnet ID of the device.	Adjustable	1	0 to 4,194,302

Table 33: Controller : Network

Object or parameter	Description	Adjustable	Defaults	Enum set or range
FC Comm Mode	Shows the current communication mode of the controller.	Read Only		0 = Wired Field Bus 1 = Wireless Field Bus 2 = N2 Subordinate Field Bus 3 = Modbus Field Bus 4 = Ethernet Field Bus 255 = Intermediate FC Bus Mode
Communication Status	Shows the status of the zone bus communication.	Read Only		0 = Not Configured 1 = Active 2 = Waiting For Poll For Master 3 = Not Received Token For Long 4 = Duplicate MAC Address 5 = Forcing BAUD 6 = Remote Trunk
FCB Baud Rate	Sets the baud rate of the device.	Adjustable	Auto	0 = Auto 1 = 1200 2 = 9600 3 = 19200 4 = 38400 5 = 76800
Operating Baud Rate	Shows the operating baud rate of the controller.	Read Only		0 = Auto 1 = 1200 2 = 9600 3 = 19200 4 = 38400 5 = 76800
BACnet Encoding Type	Sets the Encoding type for BACnet Communication.	Adjustable	ISO 10646 (UCS-2)	0 = ISO 10646 (UCS-2) 1 = ANSI X3.4 (US-ASCII) 2 = Microsoft DBCS code page 932 (Japanese Shift JIS) 3 = ISO 10646 (UTF-8)

Table 34: Controller : Misc

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Language	Sets the language the controller uses.	Adjustable	English	7 = English 10 = French 28 = Spanish
Units	Sets the units the controller uses.	Adjustable	IP	0 = IP 1 = SI
Display Contrast	Sets the display contrast of controller display	Adjustable	5	2 to 6
Relearn System	Relearns the sensors connected to the controller. Use when removing optional sensors to remove the unreliable readings from UI.	Adjustable	False	0 = False 1 = True
Number of Network Sensors Online	Shows the number of online network sensors.	Read Only		

Table 35: Details : Unit

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Unit Status	Shows the status of the unit.	Read Only		0 = Idle 1 = SD Alarm 2 = Purge Command 3 = Self Test 4 = Morning Warm Up 5 = Air Tempering 6 = Dehumidification 7 = Heating 8 = Cooling ...
Unit Model Number	The model number of the unit.	Adjustable	RTUxxxx	30 characters maximum
Unit Serial Number	The serial number of the unit.	Adjustable		30 characters maximum
Model Name	Shows the model name of the unit.	Read Only		
Reset Lockouts	This option is used to reset the system in case of mismatch alarms or faults.	Adjustable	Off	0 = Off 1 = Reset
Unit Enable	Enables or shuts down the unit. If set to **Shutdown**, the unit remains off until set to **Enable**.	Adjustable	Enable	0 = Shutdown 1 = Enable
Fan Runtime Reset	This parameter resets the runtime of the fan.	Adjustable	Off	0 = Off 1 = Reset
Condensate Alarm	The status of the condensate alarm	Read Only		0 = Occupied 1 = UnOccupied 2 = Bypass 3 = Standby

Table 36: Details : Setpoints

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Operational Occupancy	Shows the status of the occupancy of the system.	Read Only		0 = Occupied 1 = UnOccupied 2 = Bypass 3 = Standby
Supply Air Temperature Setpoint	The system uses this setpoint to determine the effective heating, cooling, and SAT setpoint based on the RTU controller type selected.	Read Only		°F (°C)
Supply Air Temperature	Shows the present value of the SAT analog input.	Read Only		°F (°C)
VAV RAT Heating Setpoint	If you have heating installed on a VAV RTU, you need a return air temperature sensor so the unit can enter into heating mode. If the return air temperature drops below this setpoint, the RTU switches to heating. The RTU stops heating when the temperature goes above this setpoint by 2°F.	Adjustable	70°F (21.1°C)	40°F to 85°F (4°C to 30°C)
Return Air Temperature	Shows the present value of the RAT analog input.	Read Only		°F (°C)
Duct Static Pressure	Shows the present value of the duct static pressure.	Read Only		in. W.C. (kPa)
Duct Static Pressure Setpoint	The setpoint based on which the supply fan modulates.	Adjustable	1 in. W.C. (0.25 kPa)	0 in. W.C. to 5 in. W.C. (0 kPa to 1.25 kPa)

Table 37: Details : Control : Fan : Status

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Fan Command	Shows the present value of the supply fan binary output.	Read Only		0 = Off 1 = On
Fan % Output	Shows the present value of the supply fan analog output.	Read Only		%
Fan Status	Shows the status of the fan.	Read Only		0 = Off-Idle 1 = On-Purge 2 = On-Gas Valve or Limit Fault 3 = On-Defrost 4 = On-Thermostat Request 5 = On-Fan Off Delay For Cool 6 = On-Fan Off Delay For Heat 7 = On-Continuous Fan Occupied Operation 8 = On-Normal Command ...
Air Proving Switch	Shows the status of the proof of airflow.	Read Only		0 = Off 1 = On
Duct Static Pressure	It shows the present value of the duct static pressure.	Read Only		in. W.C. (kPa)
Supply Air Temperature	Shows the present value of the SAT analog input.	Read Only		°F (°C)
Fan Accumulated Runtime	This parameter displays the current runtime hours of the fan.	Read Only		hours
Dirty Filter Switch	Shows the status of the filter switch binary input.	Read Only		0 = Normal 1 = Alarm

Table 38: Details : Control : Fan : Setup

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Duct Static Pressure Setpoint	This is the setpoint based on which the supply fan modulates.	Adjustable	1 in. W.C. (0.25 kPa)	0 in. W.C. to 5 in. W.C. (0 kPa to 1.25 kPa)
Fan Runtime Limit	Sets the runtime limit in hours. When the fan reaches this limit, the controller issues an alarm.	Adjustable	2,000 h	100 h to 10,000 h
Fan Runtime Reset	This parameter resets the runtime of the fan.	Adjustable	Off	0 = Off 1 = Reset

Table 39: Details : Control : Heat Pump : Status

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Cooling Status	Shows the current status of cooling.	Read Only		0 = Off-Idle 1 = Thermostat Cooling 2 = Unoccupied Cooling 3 = Occupied Cooling 4 = Off-OAT Lockout 5 = Off-Disabled 6 = Off-Lockout 7 = Off-Low Supply Voltage 8 = Off-Low Ambient
Heating Status	Shows the current state of heating.	Read Only		0 = Off-Idle 1 = On-Defrost 2 = SAT Tempering 3 = Morning Warmup 4 = Thermostat Heating 5 = Unoccupied Heating 6 = Occupied Heating 7 = Off-Disabled 8 = Off-OAT Lockout
Number of Heat Pump Stages Installed	Sets the number of heat pump stages installed.	Adjustable	2	0 to 2
Supply Air Temperature	Shows the present value of the supply air temperature analog input.	Read Only		°F (°C)
Heat Pump % Command	Shows the current percentage output for the heat pump.	Read Only		0% to 100%

Table 40: Details : Control : Heat Pump : Stage 1 : Compressor 1

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 1 Command	Shows the present value of the compressor stage 1 command binary output.	Read Only		0 = Off 1 = On
Reversing Valve 1 Command	Shows the present value of the reversing valve 1 command binary output.	Read Only		0 = Off 1 = On
Compressor Stage 1 Lockout	Enables the compressor stage 1 lockout sequence.	Adjustable	No	0 = No 1 = Yes
Compressor Stage 1 Accumulated Runtime	Indicates the accumulated runtime of compressor stage 1.	Read Only		hours

Table 41: Details : Control : Heat Pump : Stage 1 : Heat Pump Clg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 1 Status	Shows the current status of the compressor stage 1.	Read Only		0 = Off-Idle 1 = On-Minimum On Time 2 = On-Normal Command 3 = Off-Cooling Is Disabled 4 = Off-OAT Cutout 5 = Off-Low Ambient Temperature 6 = Off-Low Supply Voltage 7 = Off-High Pressure Lockout 8 = Off-Low Pressure Lockout
Min On Time Remaining Compressor 1	Indicates the minimum time that remains for the output to stay on before it can be deactivated again to an off condition following activation.	Read Only		seconds
Min Off Time Remaining Compressor 1	Indicates the minimum time that remains for the output to stay off before it can be reactivated to an on condition following deactivation.	Read Only		seconds

Table 42: Details : Control : Heat Pump : Stage 1 : Heat Pump Htg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 1 Status	Shows the current status of the compressor stage 1.	Read Only		0 = Off-Idle 1 = On-Minimum On Time 2 = On-Normal Command 3 = Off-Cooling Is Disabled 4 = Off-OAT Cutout 5 = Off-Low Ambient Temperature 6 = Off-Low Supply Voltage 7 = Off-High Pressure Lockout 8 = Off-Low Pressure Lockout
Min On Time Remaining Compressor 1	Indicates the minimum time that remains for the output to stay on before it can be deactivated again to an off condition following activation.	Read Only		seconds
Min Off Time Remaining Compressor 1	Indicates the minimum time that remains for the output to stay off before it can be reactivated to an on condition following deactivation.	Read Only		seconds

Table 43: Details : Control : Heat Pump : Stage 2 : Compressor 2

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 2 Command	Shows the present value of the compressor stage 2 command binary output.	Read Only		0 = Off 1 = On
Reversing Valve 2 Command	Shows the present value of the reversing valve 2 command binary output.	Read Only		0 = Off 1 = On
Compressor Stage 2 Lockout	Enables the compressor stage 2 lockout sequence.	Adjustable	No	0 = No 1 = Yes
Compressor Stage 2 Accumulated Runtime	Indicates the accumulated runtime of compressor stage 2.	Read Only		hours

Table 44: Details : Control : Heat Pump : Stage 2 : Heat Pump Clg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 2 Status	Shows the current status of the compressor stage 2.	Read Only		0 = Off-Idle 1 = On-Minimum On Time 2 = On-Normal Command 3 = Off-Cooling Is Disabled 4 = Off-OAT Cutout 5 = Off-Low Ambient Temperature 6 = Off-Low Supply Voltage 7 = Off-High Pressure Lockout 8 = Off-Low Pressure Lockout
Min On Time Remaining Compressor 2	Indicates the minimum time that remains for the output to stay on before it can be deactivated again to an off condition following activation.	Read Only		seconds
Min Off Time Remaining Compressor 2	Indicates the minimum time that remains for the output to stay off before it can be reactivated to an on condition following deactivation.	Read Only		seconds

Table 45: Details : Control : Heat Pump : Stage 2 : Heat Pump Htg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 2 Status	Shows the current status of the compressor stage 2.	Read Only		0 = Off-Idle 1 = On-Minimum On Time 2 = On-Normal Command 3 = Off-Cooling Is Disabled 4 = Off-OAT Cutout 5 = Off-Low Ambient Temperature 6 = Off-Low Supply Voltage 7 = Off-High Pressure Lockout 8 = Off-Low Pressure Lockout
Min On Time Remaining Compressor 2	Indicates the minimum time that remains for the output to stay on before it can be deactivated again to an off condition following activation.	Read Only		seconds
Min Off Time Remaining Compressor 2	Indicates the minimum time that remains for the output to stay off before it can be reactivated to an on condition following deactivation.	Read Only		seconds

Table 46: Details : Control : Heat Pump : Setup : Heat Pump Configuration

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Min On Time	Sets the minimum on time for the compressor.	Adjustable	180 s	120 s to 360 s
Compressor Min Off Time	Sets the minimum off time for the compressor.	Adjustable	300 s	120 s to 360 s
Interstage Delay	Sets the delay between turning on the stages after a stage has been energized.	Adjustable	30 s	30 s to 900 s
Runtime Equalization	Enables the device based on runtime.	Adjustable	No	0 = No 1 = Yes
Reversing Valve Config	Sets the reversing valve for heating or cooling.	Adjustable	On For Clg	0 = On For Htg 1 = On For Clg

Table 47: Details : Control : Heat Pump : Setup : Heat Pump Clg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Cooling Mode Enabled For Operation	Enables cooling mode.	Adjustable	Yes	0 = No 1 = Yes
OAT Cooling Lockout Enabled	Enables the outdoor cooling lockout sequence.	Adjustable	No	0 = No 1 = Yes
OAT Cooling Lockout Temperature	The temperature at which outside cooling lockout occurs.	Adjustable	50°F (10°C)	0°F to 100°F (18°C to 38°C)
SAT Limit for Cooling Enable	Enables the sequence of SAT limit control for cooling.	Adjustable	Yes	0 = No 1 = Yes
SAT Limit for Cooling Setpoint	The setpoint for SAT limit control for cooling.	Adjustable	44°F (6.66°C)	40°F to 65°F (4°C to 18°C)

Table 48: Details : Control : Heat Pump : Setup : Heat Pump Htg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Heating Mode Enabled For Operation	Enables heating mode.	Adjustable	Yes	0 = No 1 = Yes
OAT Heating Lockout Enabled	Enables the outdoor heating lockout sequence.	Adjustable	No	0 = No 1 = Yes
OAT Heating Lockout Temperature	The temperature at which outside heating lockout occurs.	Adjustable	55°F (12.77°C)	0°F to 100°F (-18°C to 38°C)
SAT Air Temp Limit for Heating Enabled	Enables the sequence of SAT limit control for heating.	Adjustable	Yes	0 = No 1 = Yes
SAT Air Temp Limit For Heating Setpoint	The setpoint for SAT limit control for heating.	Adjustable	140°F (60°C)	100°F to 180°F (38°C to 82°C)

Table 49: Details : Control : Economizer : Status

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Status	Shows the status of the economizer.	Read Only		0 = Disabled 1 = Damper Not Functional 2 = Purge 3 = Unavailable-Sensor Fault 4 = Econ Loading 5 = SA-T High Limit 6 = Mixed Air Low Limit Cycle 7 = Demand Ventilation Air Quality 8 = Outdoor Airflow Control ...
Economizer Damper % Output	Shows the current percentage output for the economizer damper.	Read Only		%
Economizer Free Cooling Available	Shows the current state of the economizer free cooling.	Read Only		0 = No 1 = Yes
Operational Outdoor Air Temperature	Shows the present value of the OAT analog input.	Read Only		°F (°C)
Space Humidity Input	Shows the present value of the space humidity input.	Read Only		%RH
Purge Input	Shows the status of the purge command binary input.	Read Only		0 = Off 1 = On

Table 50: Details : Control : Economizer : Setup

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Installed	Sets whether the economizer is installed.	Adjustable	No	0 = No 1 = Yes
Economizer Minimum Position Setpoint	Sets the minimum outside air damper position.	Adjustable	20%	0% to 100%
Economizer Outdoor Air Temp Enable Setpoint	This is the setpoint that enables the economizer free cooling when the OAT falls below it.	Adjustable	55°F (12.7°C)	40°F to 80°F (4°C to 27°C)
Economizer Damper Closed Voltage	Sets the voltage at which the economizer damper closes.	Adjustable	0 V	0 V to 10 V
Economizer Damper Open Voltage	Sets the voltage at which the economizer damper opens.	Adjustable	10 V	0 V to 10 V

Table 51: Details : Control : Demand Ventilation

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Operational Indoor Air Quality	Shows the present value of the return air quality analog input.	Read Only		ppm
Demand Ventilation Maximum Economizer Position	Sets the maximum damper position for demand ventilation control.	Adjustable	50%	0% to 100%
Demand Ventilation Indoor Air Quality Setpoint	The setpoint for the demand ventilation control. This is the setpoint at which the damper position starts to increase from the minimum position.	Adjustable	800 ppm	0 ppm to 5,000 ppm
Indoor Air Quality Sensor Range	Sets the high point of the range of the installed sensor. 0 V = 0 ppm. This parameter is the CO_2 level for 10 V.	Adjustable	2,000 ppm	0 ppm to 5,000 ppm

Table 52: Details : Control : Supplemental Htg

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Delay	For VAV units, sets a time to delay the start of supplemental heating after heat pump heating starts. If heat pump heating still operates when the delay time ends, supplemental heating starts.	Adjustable	10 min	0 min to 60 min

Table 53: Details : Service : Inputs : Sensors

Object or parameter	Description	Adjustable	Defaults	Enum set or range
IAQ Offset	If the hardwired return air CO_2 sensor is installed, you can calibrate it with this parameter.	Adjustable	0 ppm	-250 ppm to 250 ppm
Indoor Air Quality Input	Shows the present value of the return air quality analog input.	Read Only		ppm
Space Humidity Input	Shows the present value of the space humidity input.	Read Only		%RH

Table 53: Details : Service : Inputs : Sensors

Object or parameter	Description	Adjustable	Defaults	Enum set or range
OAT Sensor Type	Sets the OAT sensor type.	Adjustable	Nickel	3 = Nickel 4 = Platinum 5 = A99B 6 = 2.25K NTC 7 = 10K NTC 8 = 10K NTC Type 3
OAT Offset	Sets the OAT sensor offset to calibrate the sensor.	Adjustable	0 delta °F (0 delta °C)	-5 delta °F to 5 delta °F (-2.78 delta °C to 2.78 delta °C)
Outdoor Air Temperature Input	Shows the present value of the OAT analog input.	Read Only		°F (°C)
SAT Sensor Type	Sets the SAT sensor type.	Adjustable	Nickel	3 = Nickel 4 = Platinum 5 = A99B 6 = 2.25K NTC 7 = 10K NTC 8 = 10K NTC Type 3
SAT Offset	Sets the SAT sensor offset to calibrate the sensor.	Adjustable	0 delta °F (0 delta °C)	-5 delta °F to 5 delta °F (-2.78 delta °C to 2.78 delta °C)
Supply Air Temperature	Shows the present value of the SAT analog input.	Read Only		°F (°C)
RAT Sensor Type	Sets the RAT sensor type.	Adjustable	Nickel	3 = Nickel 4 = Platinum 5 = A99B 6 = 2.25K NTC 7 = 10K NTC 8 = 10K NTC Type 3
RAT Offset	Sets the RAT sensor offset to calibrate the sensor.	Adjustable	0 delta °F (0 delta °C)	-5 delta °F to 5 delta °F (-2.78 delta °C to 2.78 delta °C)
Return Air Temperature	Shows the present value of the RAT analog input.	Read Only		°F (°C)
Duct Static Pressure	Shows the present value of the duct static pressure.	Read Only		in. W.C. (kPa)

Table 54: Details : Service : Inputs : Binary Inputs

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Air Proving Switch	Shows the status of the proof of airflow.	Read Only		0 = Off 1 = On
Dirty Filter Switch	Shows the status of the filter switch binary input.	Read Only		0 = Normal 1 = Alarm
Purge Input	Shows the status of the purge command binary input.	Read Only		0 = Off 1 = On
Condensate Alarm	Shows the status of the condensate alarm binary input.	Read Only		0 = Normal 1 = Alarm

Table 55: Details : Service : Outputs : Binary

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Compressor Stage 1 Command	Shows the present value of the compressor stage 1 command binary output.	Read Only		0 = Off 1 = On
Reversing Valve 1 Command	Shows the present value of the reversing valve 1 command binary output.	Read Only		0 = Off 1 = On
Compressor Stage 2 Command	Shows the present value of the compressor stage 2 command binary output.	Read Only		0 = Off 1 = On
Reversing Valve 2 Command	Shows the present value of the reversing valve 2 command binary output.	Read Only		0 = Off 1 = On
Fan Command	Shows the present value of the supply fan binary output.	Read Only		0 = Off 1 = On
Supp Heat Output	Shows the present value of the supplemental heating command binary output.	Read Only		0 = Off 1 = On

Table 56: Details : Service : Outputs : Analog : Fan

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Fan % Output	Shows the present value of the supply fan analog output.	Read Only		%

Table 57: Details : Service : Outputs : Analog : Economizer

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Damper % Output	Shows the current percentage output for the economizer damper.	Read Only		%
Economizer Damper Closed Voltage	Sets the voltage at which the economizer damper closes.	Adjustable	0 V	0 V to 10 V
Economizer Damper Open Voltage	Sets the voltage at which the economizer damper opens.	Adjustable	10 V	0 V to 10 V

Table 58: Details : Service : Factory

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Number of Heat Pump Stages Installed	Sets the number of heat pump stages installed.	Adjustable	2	0 to 2
Supplemental Heat Installed	Sets whether supplemental heating is installed.	Adjustable	No	0 = No 1 = Yes
Economizer Installed	Sets whether the economizer is installed.	Adjustable	No	0 = No 1 = Yes
Air Proving Switch Setup	Selects the type of setup for airflow proof.	Adjustable	None	0 = Fan Status Device 1 = Duct Static Pressure Sensor 2 = None
Runtime Equalization	Enables the device based on runtime.	Adjustable	No	0 = No 1 = Yes
OAT Cooling Lockout Temperature	Sets the temperature at which outside cooling lockout occurs.	Adjustable	50°F (10°C)	0°F to 100°F (-18°C to 38°C)

Table 58: Details : Service : Factory

Object or parameter	Description	Adjustable	Defaults	Enum set or range
Economizer Minimum Position Setpoint	Sets the minimum outside air damper position.	Adjustable	20%	0% to 100%
Rooftop Controller Type	Sets the controller type to changeover bypass or VAV.	Adjustable	Changeover Bypass	0 = Changeover Bypass 1 = VAV
Variable Speed Drive	Sets whether the VEC100 controls a VFD fan instead of a bypass damper when the rooftop controller type is set to changeover bypass.	Adjustable	False	0 = False 1 = True
Supply Air Temperature Alarm Offset	If SAT is not in this value range, the SAT alarm delay starts. Examples: If the supply air setpoint is 55°F and this is set to 5°F, then the supply air must be under 60°F, or the delay timer starts. If the supply air setpoint is 110°F and this is set to 5°F then the supply air must be above 105°F, or the delay timer starts.	Adjustable	5 delta °F (2.78 delta °C)	0 delta °F to 25 delta °F (0 delta °C to 14 delta °C)
Supply Air Temperature Alarm Delay	Sets the amount of time that must pass before the SAT alarm occurs.	Adjustable	20 min	0 min to 120 min
Cancel ASCD Timers	Resets the minimum on and off timers.	Adjustable	False	0 = False 1 = True
Demand Ventilation Feature	Enables or disables the demand ventilation feature.	Adjustable	Off	0 = Off 1 = On
Reversing Valve Config	Sets the reversing valve for heating or cooling	Adjustable	On for Clg	0 = On For Htg 1 = On For Clg
Condensate Alarm	If you set this parameter to **Yes**, the condensate alarm shuts down the whole system.	Adjustable	No	0 = No 1 = Yes

Table 59: Trend : Status

Object or parameter	Description
Unit Status	The current status or state of the unit. 25 samples recorded for each change of value.
Fan Status	The current status of the fan. 25 samples recorded for each change of value.
Cooling Status	The current state of the cooling. 25 samples recorded for each change of value.
Heating Status	The current state of heating. 25 samples recorded for each change of value.
Economizer Status	The current status of the economizer. 25 samples recorded for each change of value.
Operational Occupancy	The status of the occupancy of the system. 25 samples recorded for each change of value.
Supply Air Temperature	The present value of the supply air temperature analog input. 100 trend samples at 15 minute increments.
Operational Outdoor Air Temperature	The present value of the outdoor air temperature analog input. 100 trend samples at 15 minute increments

Table 60: Trend : Heat Pump : General : Stage 1

Object or parameter	Description
Compressor Stage 1 Command	The current state of the compressor stage 1. 25 samples recorded for each change of value.
Reversing Valve 1 Command	The current state of the reversing valve 1. 25 samples recorded for each change of value.

Table 61: Trend : Heat Pump : General : Stage 2

Object or parameter	Description
Compressor Stage 2 Command	The current state of the compressor stage 2. 25 samples recorded for each change of value.
Reversing Valve 2 Command	The current state of the reversing valve 2. 25 samples recorded for each change of value.

Table 62: Trend : Heat Pump : Heat Pump Clg : Status

Object or parameter	Description
Cooling Status	The current state of cooling. 25 samples recorded for each change of value.

Table 63: Trend : Heat Pump : Heat Pump Clg : Stage 1

Object or parameter	Description
Compressor Stage 1 Status	The current state of the compressor stage 1. 25 samples recorded for each change of value.

Table 64: Trend : Heat Pump : Heat Pump Clg : Stage 2

Object or parameter	Description
Compressor Stage 2 Status	The current state of the compressor stage 2. 25 samples recorded for each change of value.

Table 65: Trend : Heat Pump : Heat Pump Htg : Status

Object or parameter	Description
Heating Status	The current state of heating. 25 samples recorded for each change of value.

Table 66: Trend : Heat Pump : Heat Pump Htg : Stage 1

Object or parameter	Description
Compressor Stage 1 Status	The current state of the compressor stage 1. 25 samples recorded for each change of value.

Table 67: Trend : Heat Pump : Heat Pump Htg : Stage 2

Object or parameter	Description
Compressor Stage 2 Status	The current state of the compressor stage 2. 25 samples recorded for each change of value.

Table 68: Trend : Supplemental Htg

Object or parameter	Description
Supp Heat Output	The present value of the supplemental heating binary output. 100 trend samples at 15 minute increments.

Table 69: Trend : Fan

Object or parameter	Description
Fan Command	Present value of the supply fan binary output. 25 samples recorded for each change of value.
Air Proving Switch	The status of the proof of air flow. 25 samples recorded for each change of value.
Fan Status	The current status of the fan. 25 samples recorded for each change of value.
Dirty Filter Switch	The status of the filter switch binary input. 25 samples recorded for each change of value.

Table 70: Trend : Sensors

Object or parameter	Description
Supply Air Temperature	The present value of the supply air temperature analog input. 100 trend samples at 15 minute increments
Operational Indoor Air Quality	The present value of the return air quality analog input. 100 trend samples at 15 minute increments.
Operational Outdoor Air Temperature	The present value of the outdoor air temperature analog input. 100 trend samples at 15 minute increments.
Return Air Temperature	The present value of the return air temperature analog input. 100 trend samples at 15 minute increments.
Space Humidity Input	The present value of the space humidity. 100 trend samples at 15 minute increments.

Table 71: Trend : Economizer

Object or parameter	Description
Economizer Status	The current status of the economizer. 25 samples recorded for each change of value.
Economizer Damper % Output	The current percent output for economizer damper. 100 trend samples at 15 minute increments.

Table 72: Alarm : Critical

Object or parameter	Description
Unit Locked Out Due to APS	This alarm indicates that the current fan status or the current value of the duct static pressure is not in line with the supply fan command. If **Air Proving Switch Setup** is set to **Fan Status Device**, this alarm indicates that the fan status mismatches the fan command. If **Air Proving Switch Setup** is set to **Duct Static Pressure Sensor**, this alarm indicates that the duct static pressure is less than the minimum required 0.05 in. W.C. to turn on the supply fan, or that the duct static pressure value is unreliable.
Unit Locked Out Due to High Duct-P	This alarm indicates that the current value of the duct static pressure is greater than the maximum allowed duct static pressure value.
Condensate Alarm	This alarm indicates the condensation condition.

Table 73: Alarm : Service Priority

Object or parameter	Description
Outdoor Air Temperature Sensor Failure	This alarm indicates that the current OAT value is unreliable.
Return Air Temperature Sensor Failure	This alarm indicates that the current RAT value is unreliable.
Supply Air Temperature Sensor Failure	This alarm indicates that the current SAT value is unreliable.
Main Controller Calibration Error	This alarm indicates that an error occurred during the calibration of the controller.
Unit Shutdown Due to Air Proving Switch	This alarm indicates the air proof loss state. If **Air Proving Switch Setup** is set to **Fan Status Device**, this alarm indicates that the fan status mismatches the fan command. If **Air Proving Switch Setup** is set to **Duct Static Pressure Sensor**, this alarm indicates that the duct static pressure is less than the minimum required 0.05 in. W.C. to turn on the supply fan, or that the duct static pressure value is unreliable.

Table 74: Alarm : Service

Object or parameter	Description
Duct Pressure Sensor Failure	This alarm indicates that the current duct static air pressure value is unreliable when the supply fan operates at variable speed.
Not Economizing – No Supply Air Sensor	This alarm indicates an SAT sensor fault that affects the economizer functionality. It indicates that the SAT value is unreliable, which disables economizer mode and causes the sequencer to operate in **Mech** state.
Fan Runtime Alarm	This totalization alarm indicates that the supply fan has reached the user defined run hours. It indicates the need for service activities.
SAT High Temp Alarm	This alarm indicates that the SAT value is greater than the user defined high limit for the cooling state of the controller. It indicates ineffective cooling.
SAT Low Temp Alarm	This alarm indicates that the SAT value is less than the user defined low limit for the heating state of the controller. It indicates ineffective heating.
Dirty Filter	This alarm indicates that the dirt content on the filter has reached the maximum allowed limit. It indicates the need for service activities, such as filter replacement.
Excessive Supply Air Temp Cooling	This alarm indicates that the SAT value is less than the user-defined low limit during cooling state. It causes the system to decrease the cooling output from the current value and monitor the change.
Excessive Supply Air Temp Heating	This alarm indicates that the SAT value is greater than the user-defined high limit during heating state. It causes the system to decrease the heating output from the current value and monitor the change.

Related documentation

Table 75: Related documentation

For information about:	Document title	LIT or part number
Setting up the SBH	Verasys System User's Guide	LIT-12012371
Wiring topology and Verasys MS/TP bus	Verasys BACnet MS/TP Communications Technical Bulletin	LIT-12012362
Installing the LC-VEC100-0	Verasys Equipment Controller (VEC) Installation Guide	Part No. 24-10143-1272

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

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