
Add contractor logo here

Add supplier logo here

VERASYS™

**Support:**

Contractor Phone # Insert Info
Distributor Phone # Insert Info
Verasys Tech Support (866) 663-6105
be-verasyssupport@jci.com

**Warranty: 3 year limited warranty**

https://www.johnsoncontrols.com/-/media/jci/be/united-states/legal/warranty/files/jci-3y-warranty-final-11202018.pdf?la=en&hash=DD21C45A73770C636ED6088662E78EB0ACD02FC9

**Drawings:**



**Disclosure:**

The following drawings & parts quote is our best interpretation of the parts needed based on the information given for this specific project. It is your (the contractor's) responsibility to verify that the parts quoted meet the requirements (ex. quantities needed, parts required) and specifications of the project being quoted. If additional or different parts are needed in order to complete the project or meet the specification; please reach out to the distributor listed on your quote to address the issues before using this quote to bid to your customer. ADDITIONAL OR DIFFERENT PARTS MAY RESULT IN A PRICE DIFFERENCE.

Drawing Title
**Cover**

| REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY |
|---|---|---|---|---|---|
| | | | | | |

| Sales Engineer | Project Manager | Application Engineer | DRAWN | APPROVED |
|---|---|---|---|---|
| | | | BY Steve Nichols DATE 1-1-2022 | BY DATE |

Project Title
**3rd Party VAV**

VERASYS™

Branch Information

CONTRACT NUMBER

DRAWING NUMBER
**1**

# Job Bill Of Material

## Verasys Bill of Materials

| System | Function | JCI Part No | Description | Qty |
|---|---|---|---|---|
| Network | Smart Building Hub | LC-SBH200-0S | Verasys Smart Building Hub | 1 |
| Network | Communication Wire | CBL-22/3-FC-PLN | System/Zone Bus Cable 22-3C Shielded Plenum Wire | 1 |
| Network | Communication Wire | CBL-22/2P-SAPLN | Sensor Bus Cable 22-2P Shielded Plenum Wire | 1 |
| Network | Battery Backup | UPSPNL550-0 | 550 VA/330W Power System Battery Backup and Surge Protection | 1 |
| MZ- Zone Coordinator | Zone Coordinator | LC-VZCPNL-0 | Verasys Zoning Coordinator for VAV and COBP applications (Panel Version) | 1 |
| MZ- Zone Coordinator | Zone Power | PSH300A | 480/277/240/120V to 24V XFR, 3 Circuits 100VA each (Power for 18 Boxes) | 1 |
| MZ- 3rd Party Units | 3rd Party Controller | LC-VEC100-0 | 3rd Party RTU (VAV, COPB) | 1 |
| MZ- 3rd Party Units | Duct Sensors | TE-6311M-1 | 8" Duct Sensor Metal Enclosure, Nickel | 2 |
| MZ- 3rd Party Units | Static Pressure Sensor | DPT2640-005D | Low Differential Pressure Transducer 0-5 in WC, 0-5VDC | 1 |
| MZ- 3rd Party Units | Static Pressure Probe | FTG18A-600R | Duct Static Pressure Probe (Need 1 Per Sensor) | 1 |
| MZ- 3rd Party Units | Outside Temp | TE-6313P-1 | Outside Air Sensor, Nickel | 1 |
| MZ- 3rd Party Units | Damper Actuator | M9208-GGA-3 | 70in-lb spring return actuator proportional | 1 |
| MZ- VAV Zones | Controller | LC-ZEC510-1 | Configurable VAV Box Controller, All Fan Types, Stg/Inc/SCR Box Htg | 12 |
| MZ- VAV Zones | NS Sensor | NSB8BTN240-0 | TEMP, DISPLAY, SETPOINT, WHITE, LOGO | 12 |
| MZ- VAV Zones | Discharge Temp | TE-631GV-2 | 4" Duct Sensor for VAV Flange Mount, Nickel, 10ft plenum Cable | 12 |

**This is a sample of the parts I'd use for a 12 zone VAV job**

**Copy & Paste Bill of Material from the Project Estimation Tool**

*** add a 12awg 2 conductor stranded wire 1k foot roll of wire to your estimate for power to the controllers**

| | Unit Controller | | |
|---|---|---|---|
| Feature | Simplicity Smart Equipment | 3rd Party Controller (VEC100) | VEC100 App |
| Up to 2 Stage Cooling | Yes | Yes | Yes |
| Up to 4 Stage Cooling | Yes | Yes | Yes |
| Modulated Cooling | No | No | Yes |
| Up to 2 Stage Heating | Yes | Yes | Yes |
| Up to 3 Stage Heating | Yes | No | Yes |
| Modulated Heating | Yes | No | Yes |
| Heat Pump | Yes | No | Yes |
| Economizer | Yes | Yes | Yes |
| Title 24 Economizer | Yes | No | No |
| Demand Ventilation Control | Yes | Yes | Yes |
| Dehumidification | Yes | No | No |
| Humidification | No | No | No |
| Variable Frequency Drive For COBP | Yes | No | No |

Drawing Title

**Bill Of Material**

| REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY |
|---|---|---|---|---|---|
| | | | | | |

| Sales Engineer | Project Manager | Application Engineer | DRAWN BY: Steve Nichols DATE: 1-1-2022 | APPROVED BY | APPROVED DATE |
|---|---|---|---|---|---|
| | | | | | |

Project Title

**3rd Party VAV**

VERASYS™

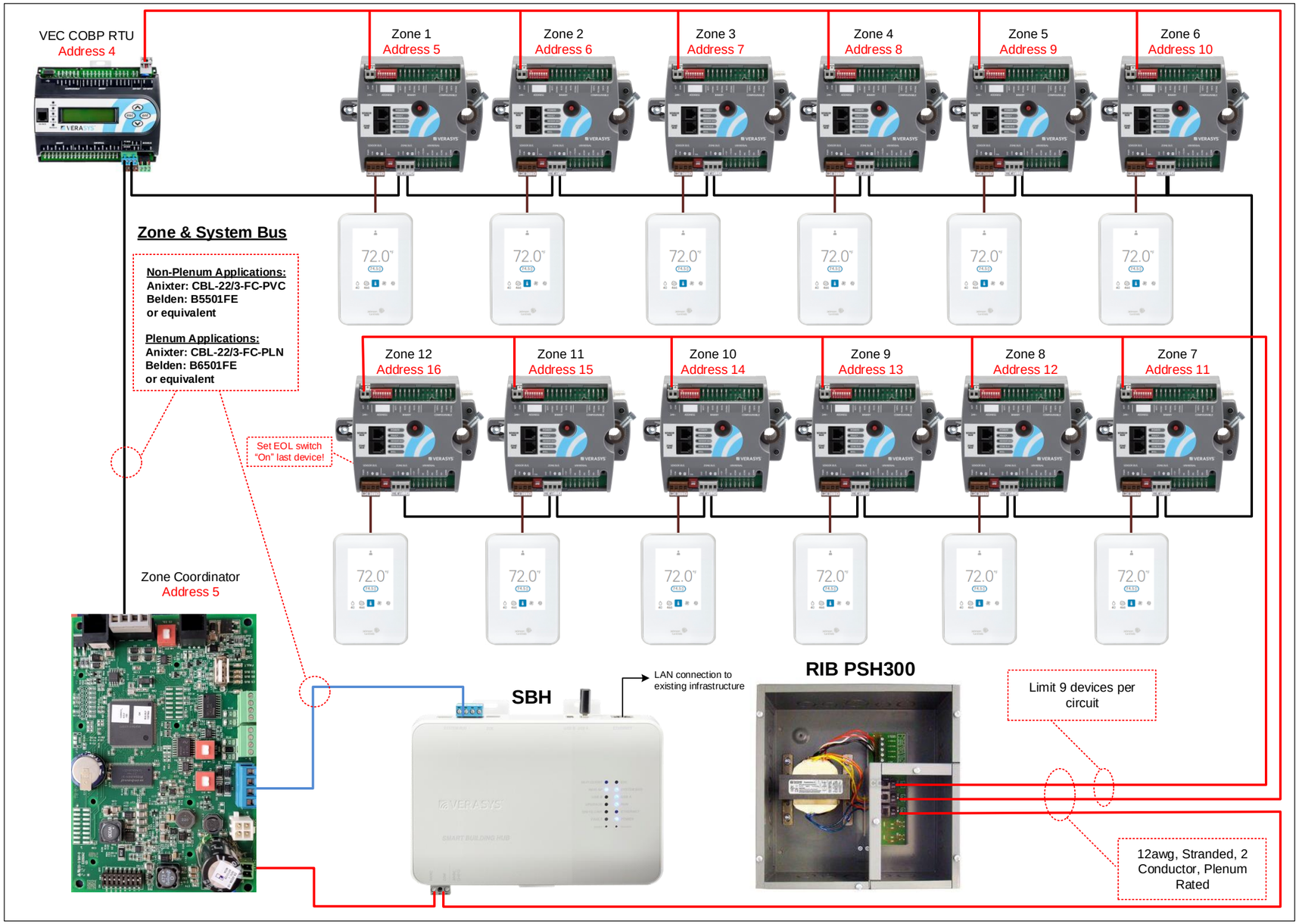
Branch Information

CONTRACT NUMBER

DRAWING NUMBER

**2**

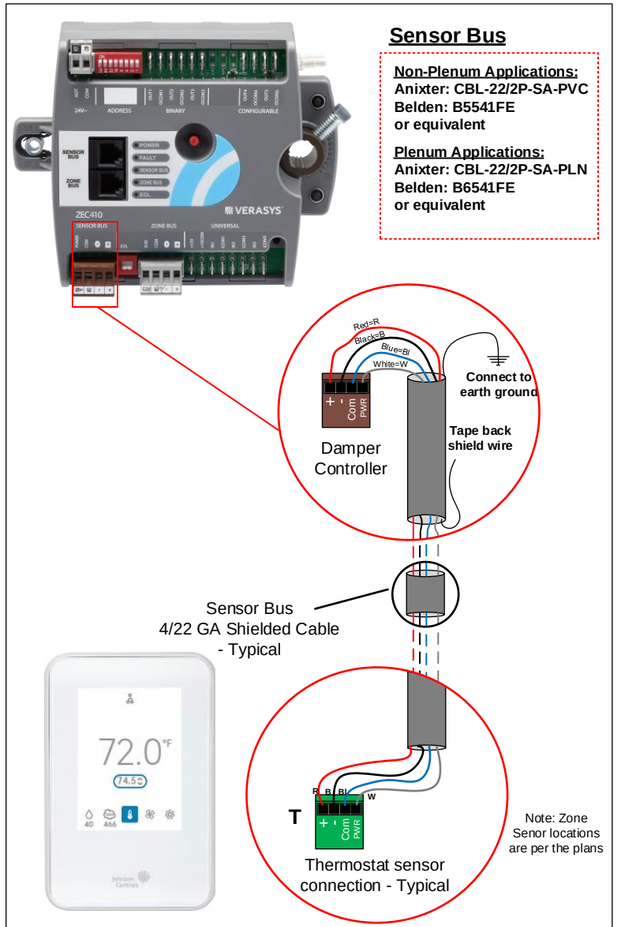
# System Riser

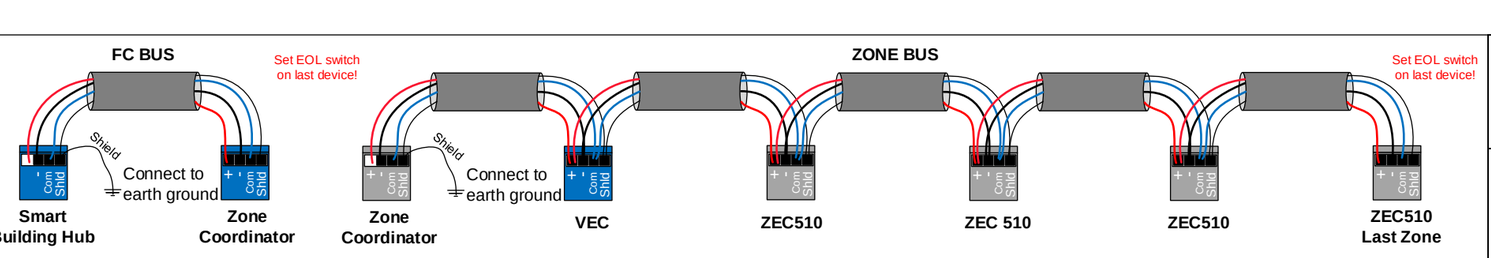



## Additional Notes

The system bus and zone bus trunk wiring is shown as a guide.

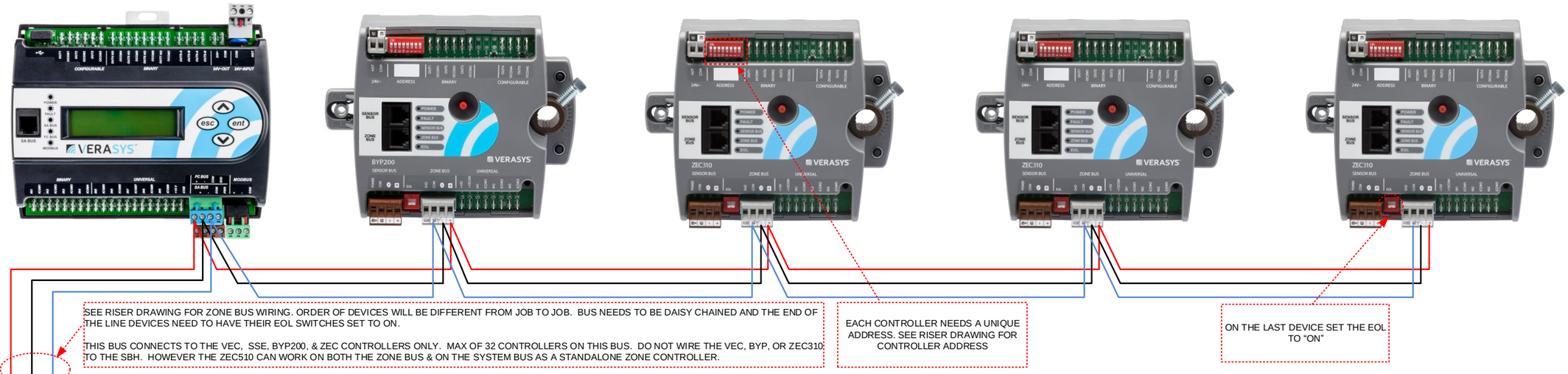
- The controllers on the system bus can be in a different order but you still must follow the rules for end of line (EOL).
- The controllers for the zone bus must go to the appropriate zone coordinator but can in a different order but you still must follow the rules for end of line (EOL).




| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **Riser Detail** | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY: Steve Nichols | DATE: 1-1-2021 | APPROVED BY | DATE |
| Project Title: **3rd Partry VAV** | Branch Information | | CONTRACT NUMBER | | DRAWING NUMBER: **3** | |

# Verasys Zone Coordinator

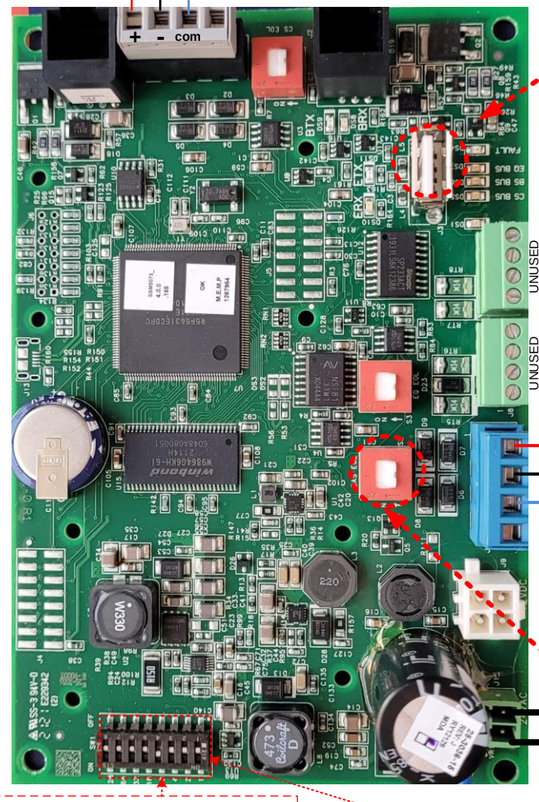



SEE RISER DRAWING FOR ZONE BUS WIRING. ORDER OF DEVICES WILL BE DIFFERENT FROM JOB TO JOB. BUS NEEDS TO BE DAISY CHAINED AND THE END OF THE LINE DEVICES NEED TO HAVE THEIR EOL SWITCHES SET TO ON.

THIS BUS CONNECTS TO THE VEC, SSE, BYP200, & ZEC CONTROLLERS ONLY. MAX OF 32 CONTROLLERS ON THIS BUS. DO NOT WIRE THE VEC, BYP, OR ZEC310 TO THE SBH. HOWEVER THE ZEC510 CAN WORK ON BOTH THE ZONE BUS & ON THE SYSTEM BUS AS A STANDALONE ZONE CONTROLLER.

EACH CONTROLLER NEEDS A UNIQUE ADDRESS. SEE RISER DRAWING FOR CONTROLLER ADDRESS

ON THE LAST DEVICE SET THE EOL TO "ON"



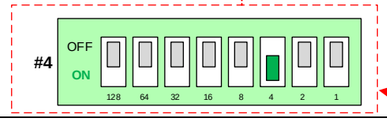

USB PORT IS USED FOR UPDATING FIRMWARE

**Tech Tip:** To upgrade firmware on the VZC download it from the verasyscontrols.com website. This firmware will also load new firmware on all the controllers connected to the Zone Bus. This update will take awhile depending on how many controllers are connected.

**Tech Tip:** If you change a dipswitch while the device is powered you will need to do a power cycle for the new address to show up.

**Tech Tip:** Get the VZC communicating with the SBH first. Then add a controller at a time. It can take a long time for devices to show up under the VZC. You may even need to do a power cycle on the VZC to force it to look for new controllers.

SEE RISER DRAWING FOR SYSTEM BUS WIRING


EACH CONTROLLER NEEDS A UNIQUE ADDRESS. SEE RISER FOR VZC ADDRESS

SEE RISER SCHEDULE SET EOL TO ON IF VZC100 IS THE END OF THE LINE ON THE SYSTEM BUS

See page 16 for more dipswitch addresses

**SCHEDULING:** THE ZONE COORDINATOR WILL HOLD A SCHEDULE FOR THE UNIT AND ASSOCIATED ZONES. WHEN THE SCHEDULE IS OCCUPIED THE UNIT AND ZONES ASSOCIATED TO THE COORDINATOR WILL BE INDEXED TO OCCUPIED. WHEN THIS SCHEDULE IS SET TO UNOCCUPIED THE UNIT AND THE ZONES WILL BE SET TO UNOCCUPIED.

**SYSTEM TYPE:** THRU THE INTERFACE IN ZONE COORDINATOR THE COORDINATOR CAN BE SET TO CONTROL A VAV SYSTEM OR A CHANGE OVER BYPASS SYSTEM DEPENDING UPON SELECTION THE UNIT AND ZONE WILL OPERATE AS FOLLOWS.

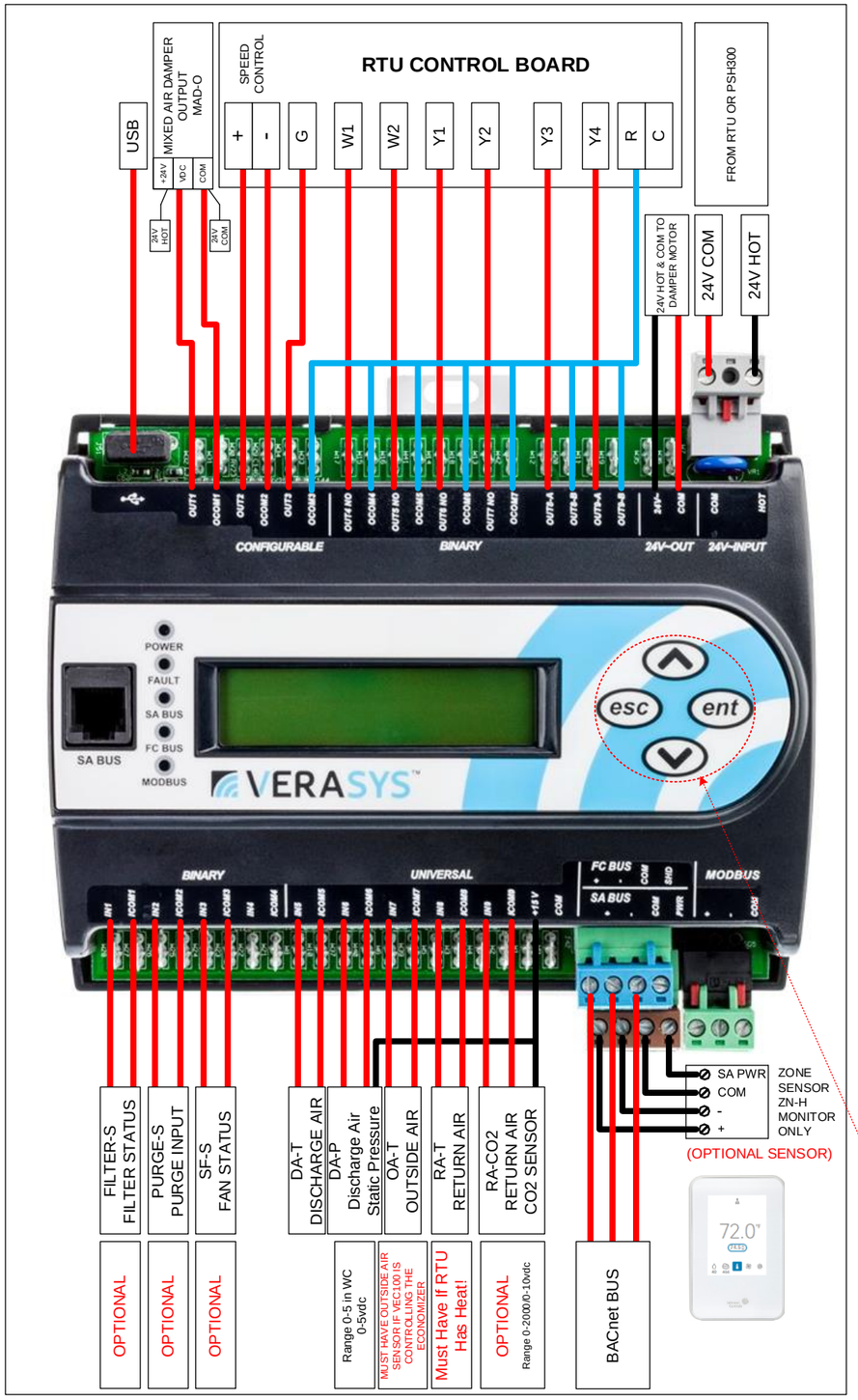
**VAV SYSTEM:** WHEN SET TO VAV, THE UNIT WILL CONTROL TO THE DISCHARGE AIR TEMPERATURE SETPOINT WHICH IS RESET BASED ON A REPRESENTATIVE ZONE. IF THIS FEATURE IS DISABLED THE UNIT WILL CONTROL TO A FIXED DISCHARGE AIR TEMPERATURE. IN ADDITION TO TEMPERATURE THE UNIT WILL CONTROL THE PRESSURE WHICH MAYBE RESET BASED ON THE DAMPER OF THE ZONE CALLING FOR THE MOST COOLING. IT TOO MAYBE DISABLED AND A FIXED SETPOINT CAN BE SET. THE VAV BOXES WILL CONTROL EACH ZONE TO THE ZONE SETPOINT USING THE UNITS COOLING FOR COOLING AND THE BOX HEAT FOR REHEAT (IF AVAILIBLE).

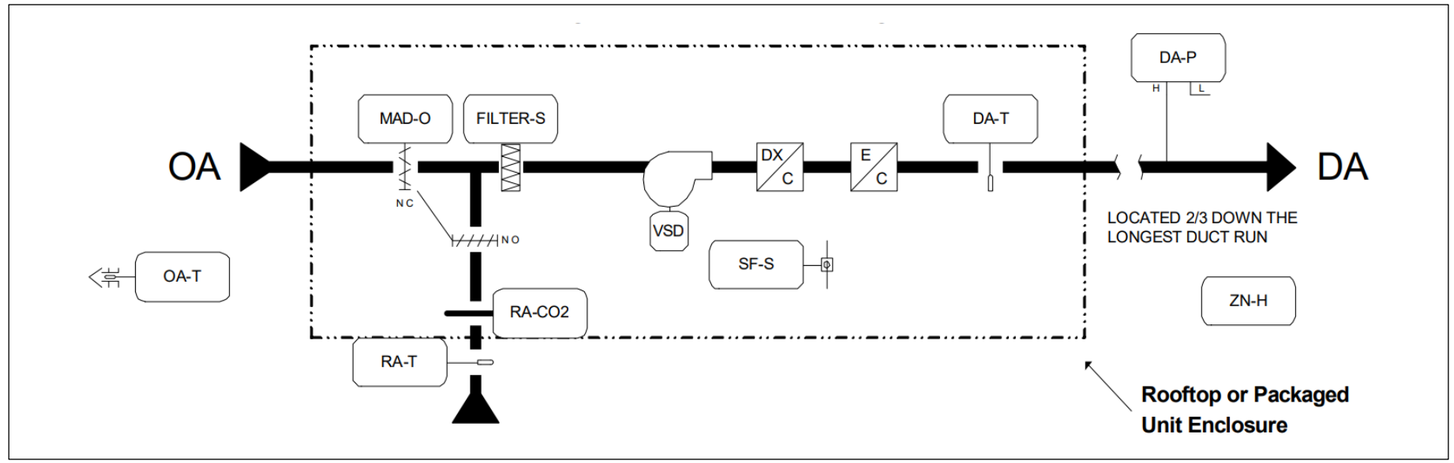
**CHANGE OVER BYPASS SYSTEM:** WHEN SET TO CHANGE OVER BYPASS, THE UNIT WILL CONTROL THE DISCHARGE AIR TO PROVIDE EITHER HEATING OR COOLING DEPENDING UPON THE VOTE OF THE ZONES. THE USER WILL HAVE THE ABILITY TO DECLARE WHICH ZONE CAN VOTE AND HOW MUCH VOTING POWER THEY WILL HAVE. THE PRESSURE IN THE DUCT WILL BE CONTROLED BY THE BYPASS DAMPER CONTROLLER. EACH ZONE DAMPER WILL INDEPENDANTLY CONTROL TO HEATING OR COOLING DEPENDING UPON THE DISCHARGE OF THE UNIT. IF THE ZONE IS CONTROLLED BY A VAV BOX THE ZONE MAYBE ABLE TO PROVIDE HEATING WHEN THE DISCHARGE IS COOLING. WHEN THE UNIT IS OFF THE BYPASS DAMPER WILL INDEX TO 50%.

THIS IS A SIMPLIFIED SEQUENCE FOR HOW THE VAV AND CHANGE OVER BYPASS SYSTEM WILL WORK. FOR MORE DETAILED INFORMATION SEE THE VERASYS USER MANUAL.

| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **VZC Detail** | | | | | | |
| | | | | | | |
| | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN: BY Steve Nichols DATE 8-30-2022 | | APPROVED: BY | DATE |
| Project Title: **3rd Party VAV** | | | Branch Information | | CONTRACT NUMBER | |
| | | | | | DRAWING NUMBER: **4** | |

# VEC RTU Controller




## VAV Sequence of Operation

**Supply Fan Start/Stop:** The Supply Fan starts according to the schedule and the control sequence enables. If the supply fan status does not match the commanded value after an adjustable period of time, an alarm generates and this feature is disabled. You can also set up a totalization alarm to generate an alarm after the fan has reached the run hours. This limit can be used to set service activities, such as filter replacement. Setting the limit to 0 disables the alarm.
**Static Pressure Control:** The variable frequency drive modulates to maintain the discharge static pressure at setpoint.
**Discharge Air Temperature Control:** The mixed air dampers, electric heating stages, and the DX Cooling stages module (cycle) to maintain the discharge air setpoint. This setpoint is adjusted to provide hot or cold air, depending on what the majority of the zones' demands. If the controller is calling for cooling and the discharge air does not drop over an adjustable period of time, a cooling alarm generates. Similarly, if a call for heating occurs and the temperature does not rise over a period of time, a heating alarm generates. Setting the limit to 0 disables the alarm.
**Economizer Dry Bulb Switchover:** When the outside air temperature is below the switchover setpoint, the economizer enables. When the outside air temperature rises above the switchover setpoint, plus a differential, the economizer disables. If enabled, the Economizer Low Limit modulates the damper closed when the discharge air reaches a low limit setpoint. If at anytime the purge contact is initiated, the dampers change position to wide open.
**Demand Ventilation Control:** When a return air CO2 sensor is connected, the minimum outside air damper position proportionally increases if the return air CO2 rises above the setpoint until the maximum position setpoint is reached.
**Night Setback/Night Setup:** When in Occupied mode, the unit cycles as necessary to maintain the shared night setback zone temperature at setpoint. A differential prevents the unit from cycling excessively.
**Shutdown:** When the unit is in shutdown mode, by either a stop command or system safety, the unit sets as follows:
- supply fan = Off
- bypass damper = modulates to 50%
- outside air damper control = closes
- return air damper = opens
- DX Cooling = Off
- electric reheat = Off

You have 2 options when addressing a VEC zone controller:

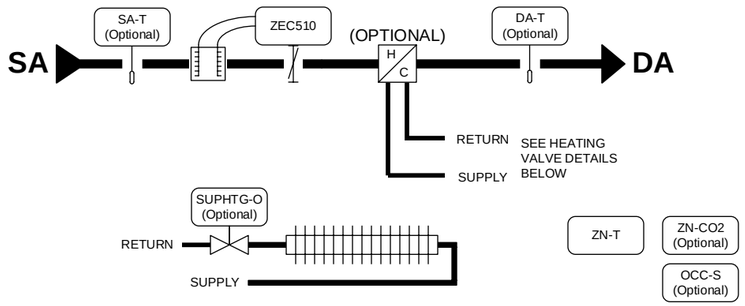
1-From the display on the front of the VEC press "**ent**", arrow down to "**Controller**" & press "**ent**", arrow down to "**Network**" & press "**ent**", arrow down to "**Address**" & press "**ent**", press "**ent**" a 2nd time & the screen will blink, use the up or down arrow to change the address & press "**ent**". Note: You may need to do this 2 times for the address to stick

2-Connect the VEC to the smart building hub & power up the VEC. Once the SBH recognizes the VEC click on "Controller", "Network", & change "Address".

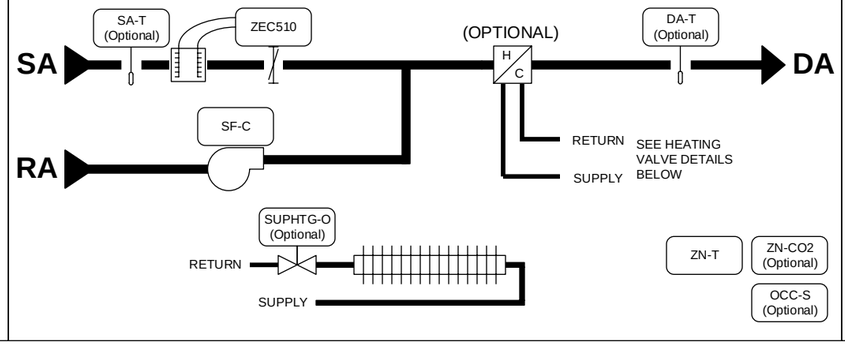
| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **VEC Detail** | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN: BY Steve Nichols DATE 1-1-2022 | | APPROVED: BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS | Branch Information | | CONTRACT NUMBER | | |
| | | | | DRAWING NUMBER: **5** | | |

# Multizone Unit - VAV with Increment Reheat Control

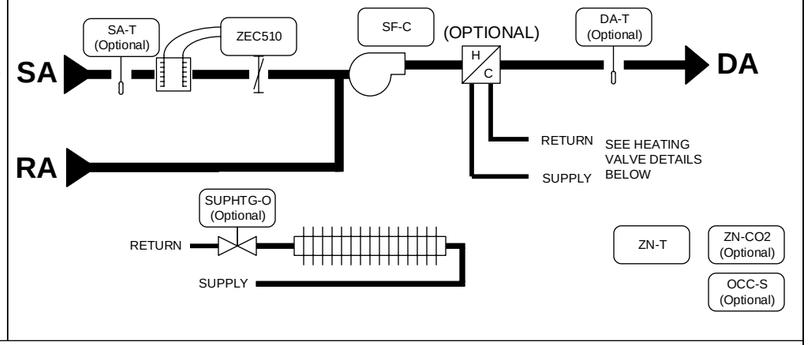
## VAV with No Fan

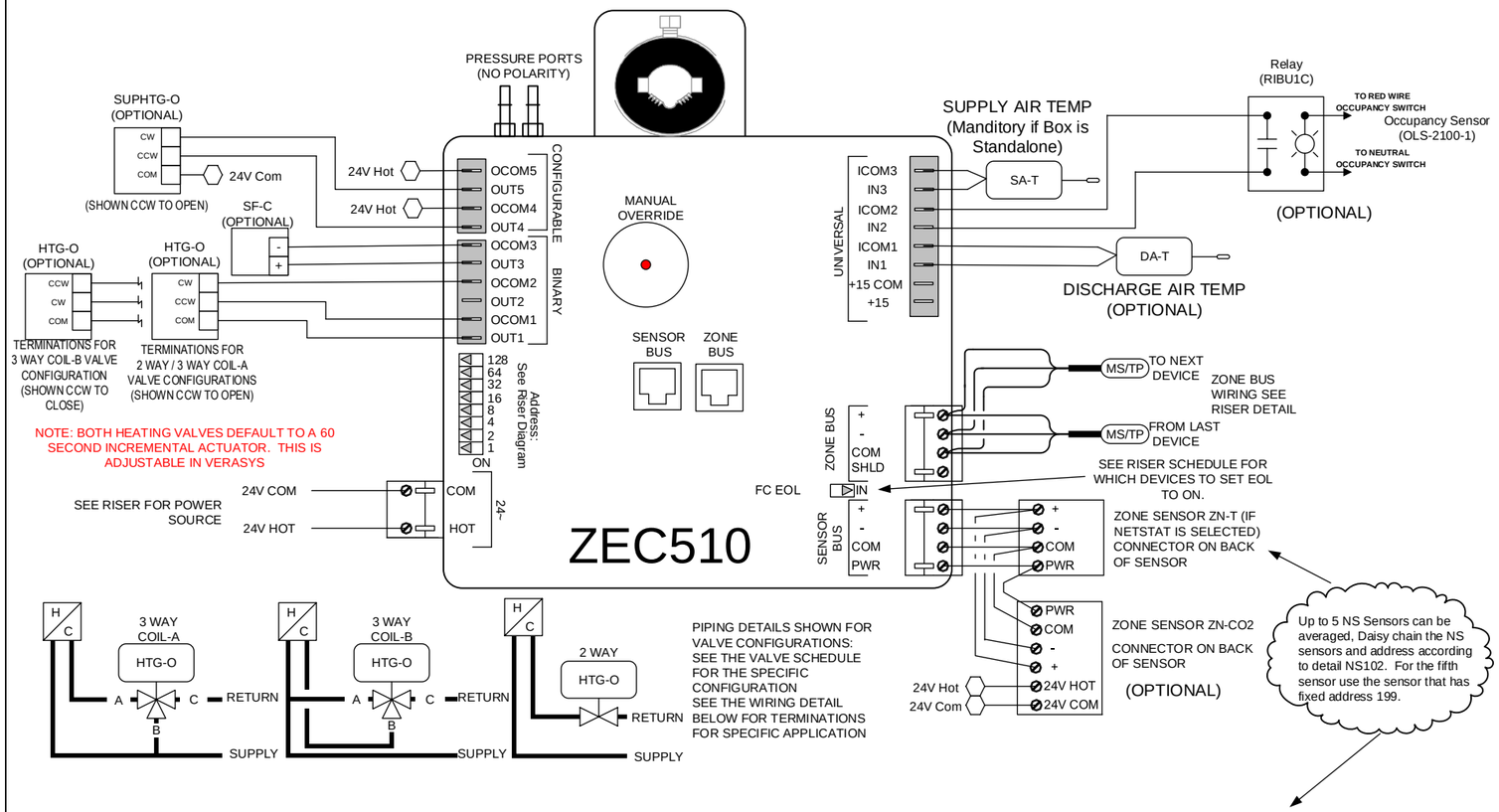



## VAV with Parallel Fan




## VAV with Series Fan




**OCCUPIED MODE:**

When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum cfm and there will be no mechanical heating. On a rise in zone temperature above the cooling setpoint, the primary air damper will increase the cfm and there will be no mechanical heating. On a drop in zone temperature below the heating setpoint, the supplemental heating coil will be fully utilized before the reheat heat coil is enabled, the damper is controlled to provide a minimum cfm. Note: the box reheat and supplemental reheat is an option to have on the box. If neither is selected you have a cooling only box.

**UNOCCUPIED MODE:**

When in this mode, while the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum cfm, there will be no mechanical heating. On a rise in zone temperature above the unoccupied cooling setpoint, the primary air damper will increase the cfm (if available), and there will be no mechanical heating. On a drop in zone temperature below the unoccupied heating setpoint, the supplemental heating coil will be fully utilized before the reheat heat coil is enabled, the damper will be at the minimum cfm.

**UNIT ENABLE:**

A network unit enable signal will control the mode of the box.

**FAN CONTROL (OPTIONAL):**

Parallel fan - upon a call for heat the fan will cycle on. All other states it will be off. Series fan – during the occupied mode the fan will run continuously. During the unoccupied mode it will cycle on with a call for heating or cooling.

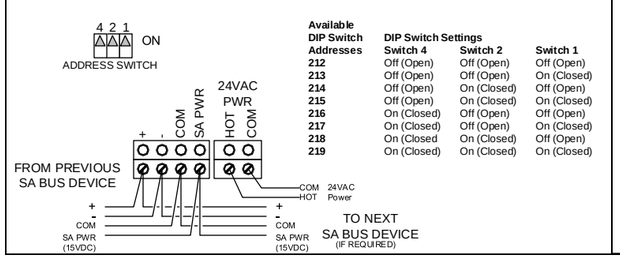
**OCCUPANCY LIGHTING SWITCH (OPTIONAL):**

An occupancy lighting switch can be added to the box, temporarily setting the vav box to standby mode when the occupancy is not being sensed. When the box senses occupancy, the zone will switch back to occupied. Standby mode uses standby temperature setpoints that are slightly higher or lower than the occupied cooling or heating setpoints respectively. The vav box will also use unoccupied flow setpoints in addition to the low temperatures.

**DEMAND CONTROL VENTILATION (OPTIONAL):**

When zone CO2 sensor(s) are wired to the boxes to sense the air quality in the zone, the minimum damper flows are proportionally reset based on an air quality (CO2) setpoint. The reset of the damper minimum flows do not exceed the maximum value that the user sets. The CO2 sensor with the highest value will determine the reset if more than one are wired up.

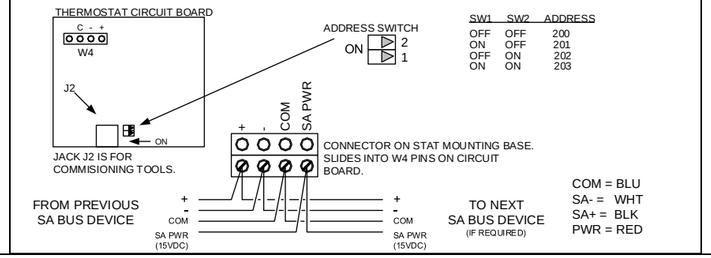
## CO2 NET STAT WITH TERMINALS ADDRESSABLE




| Available DIP Switch Addresses | DIP Switch Settings Switch 4 | Switch 2 | Switch 1 |
|---|---|---|---|
| 212 | Off (Open) | Off (Open) | On (Closed) |
| 213 | Off (Open) | Off (Open) | On (Closed) |
| 214 | Off (Open) | On (Closed) | Off (Open) |
| 215 | Off (Open) | On (Closed) | On (Closed) |
| 216 | On (Closed) | Off (Open) | Off (Open) |
| 217 | On (Closed) | Off (Open) | On (Closed) |
| 218 | On (Closed | On (Closed) | Off (Open) |
| 219 | On (Closed) | On (Closed) | On (Closed) |

## DETAIL NS102

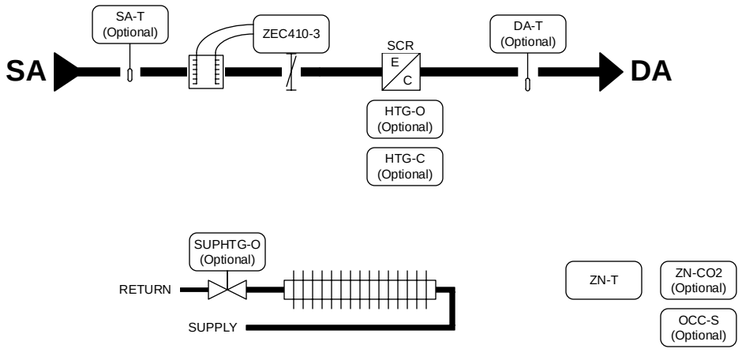
## NET STAT WITH TERMINALS ADDRESSABLE



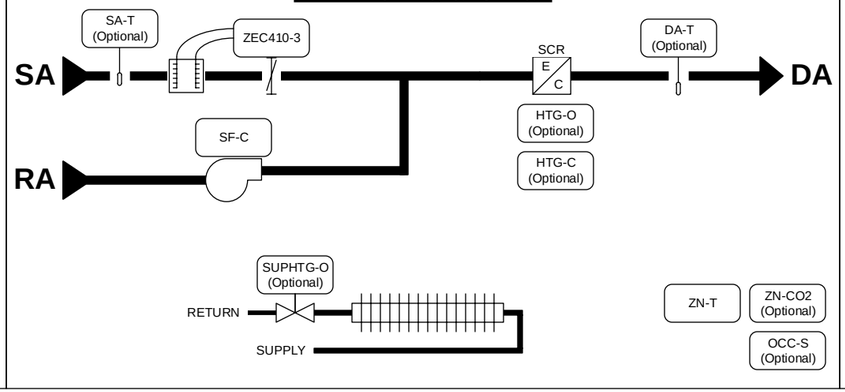

| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **VEC Detail** | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY: Steve Nichols, Branch Information, DATE: 1-1-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS™ | | | CONTRACT NUMBER | | |
| | | | | DRAWING NUMBER: **6** | | |

# Multizone Unit - VAV with Proportional Reheat Control

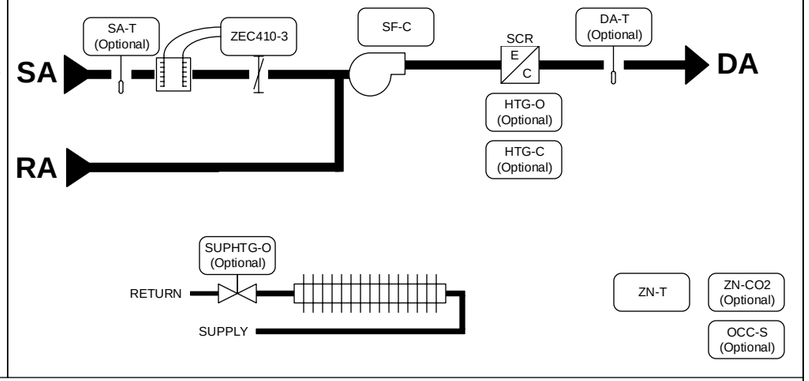
## VAV with No Fan




## VAV with Parallel Fan

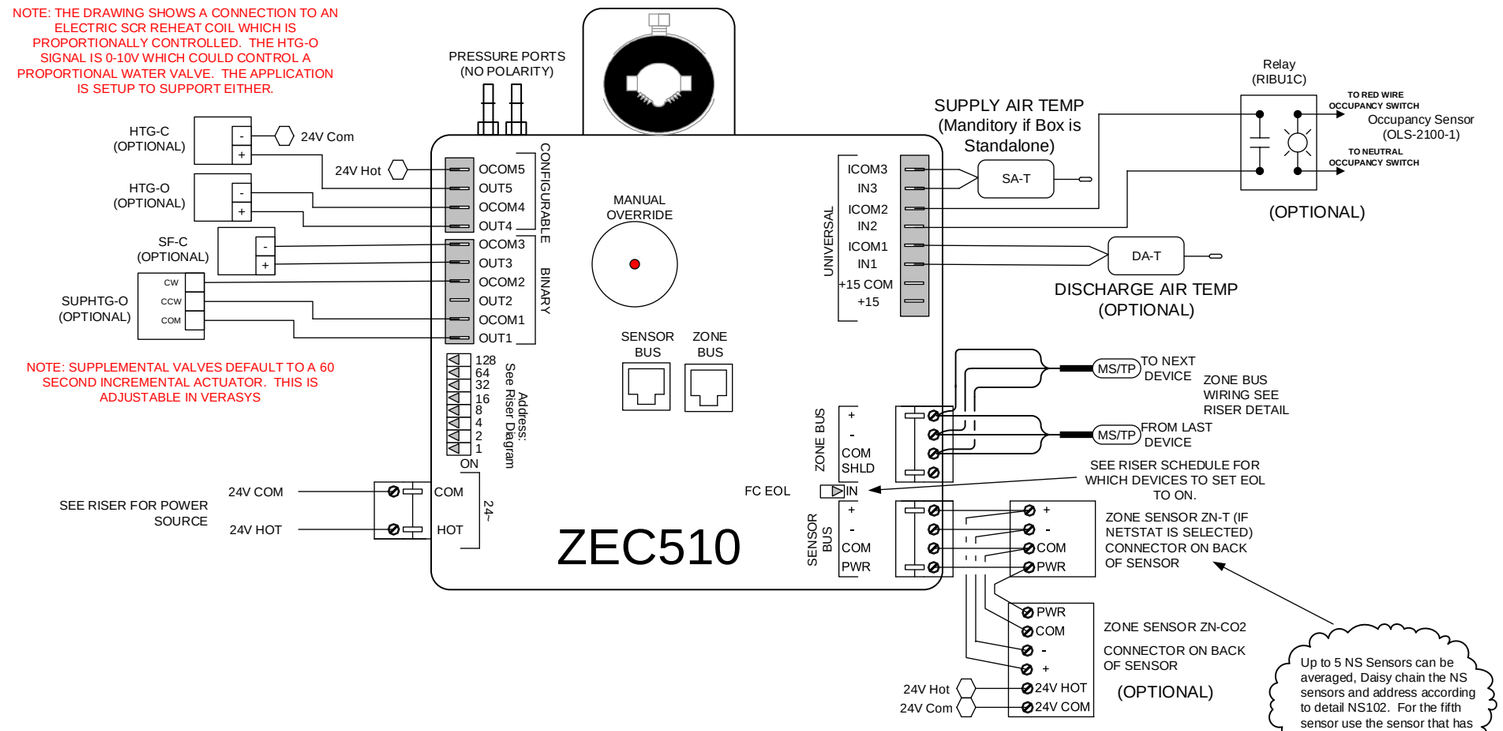



## VAV with Series Fan




NOTE: THE DRAWING SHOWS A CONNECTION TO AN ELECTRIC SCR REHEAT COIL WHICH IS PROPORTIONALLY CONTROLLED. THE HTG-O SIGNAL IS 0-10V WHICH COULD CONTROL A PROPORTIONAL WATER VALVE. THE APPLICATION IS SETUP TO SUPPORT EITHER.

NOTE: SUPPLEMENTAL VALVES DEFAULT TO A 60 SECOND INCREMENTAL ACTUATOR. THIS IS ADJUSTABLE IN VERASYS




**OCCUPIED MODE:**

When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum cfm and there will be no mechanical heating. On a rise in zone temperature above the cooling setpoint, the primary air damper will increase the cfm and there will be no mechanical heating. On a drop in zone temperature below the heating setpoint, the supplemental heating coil will be fully utilized before the reheat heat coil is enabled, the damper is controlled to provide a minimum cfm. Note: the box reheat and supplemental reheat is an option to have on the box. If neither is selected you have a cooling only box.

**UNOCCUPIED MODE:**

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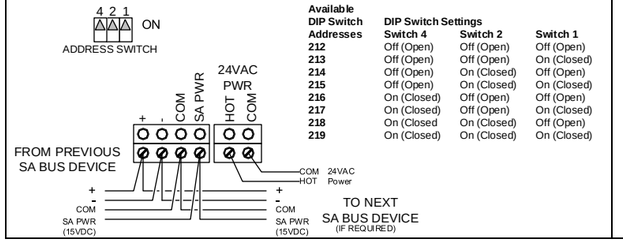
When zone CO2 sensor(s) are wired to the boxes to sense the air quality in the zone, the minimum damper flows are proportionally reset based on an air quality (CO2) setpoint. The reset of the damper minimum flows do not exceed the maximum value that the user sets. The CO2 sensor with the highest value will determine the reset if more than one are wired up.

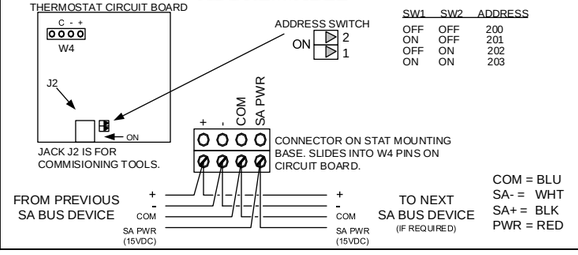
## CO2 NET STAT WITH TERMINALS ADDRESSABLE




| Available DIP Switch Addresses | DIP Switch Settings Switch 4 | Switch 2 | Switch 1 |
|---|---|---|---|
| 212 | Off (Open) | Off (Open) | Off (Open) |
| 213 | Off (Open) | Off (Open) | On (Closed) |
| 214 | Off (Open) | On (Closed) | Off (Open) |
| 215 | Off (Open) | On (Closed) | On (Closed) |
| 216 | On (Closed) | Off (Open) | Off (Open) |
| 217 | On (Closed) | Off (Open) | On (Closed) |
| 218 | On (Closed | On (Closed) | Off (Open) |
| 219 | On (Closed) | On (Closed) | On (Closed) |

## DETAIL NS102

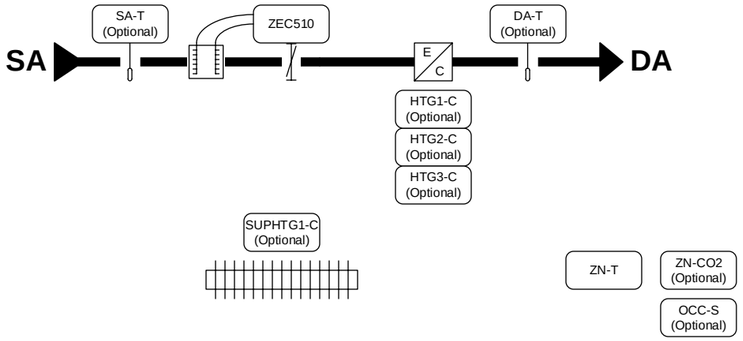
## NET STAT WITH TERMINALS ADDRESSABLE



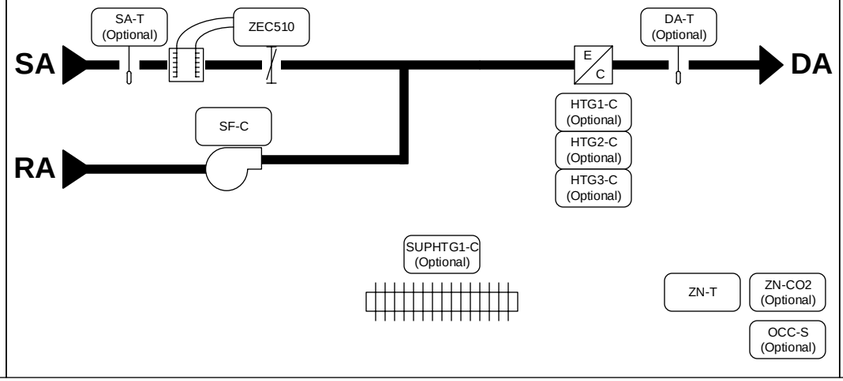

| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **VEC Detail** | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 1-1-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS | Branch Information | CONTRACT NUMBER | DRAWING NUMBER: **7** | | |

# Multizone Unit - VAV with Staged Reheat Control

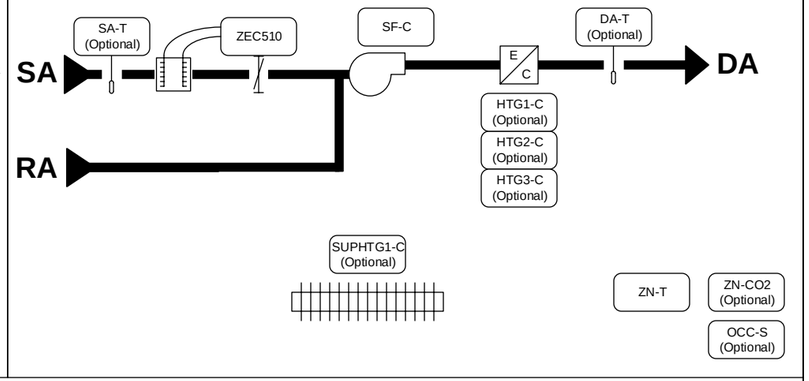
## VAV with No Fan

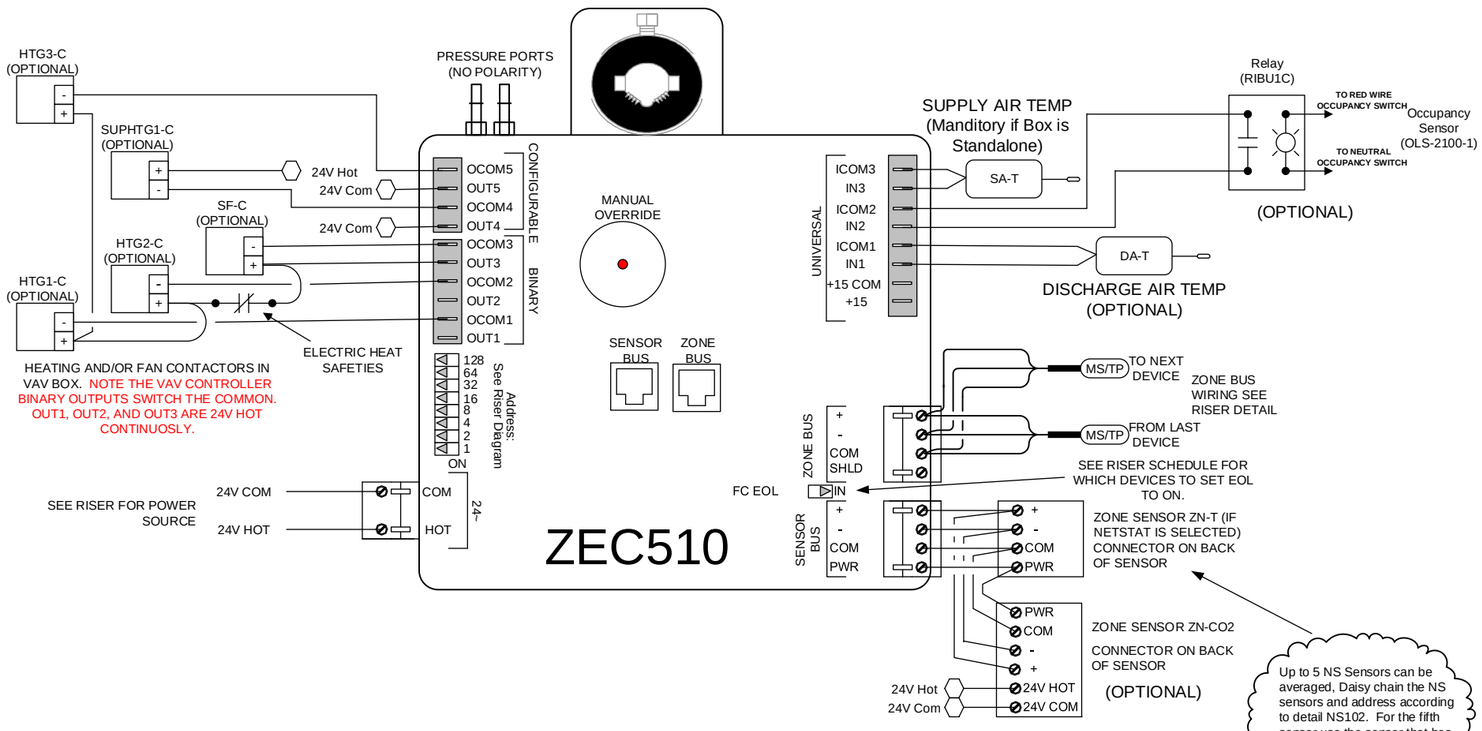



## VAV with Parallel Fan




## VAV with Series Fan




**OCCUPIED MODE:**

When the zone temperature is between the occupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum cfm and there will be no mechanical heating. On a rise in zone temperature above the cooling setpoint, the primary air damper will increase the cfm and there will be no mechanical heating. On a drop in zone temperature below the heating setpoint, the supplemental heating coil will be fully utilized before the reheat heat coil is enabled, the damper is controlled to provide a minimum cfm. Note: the box reheat and supplemental reheat is an option to have on the box. If neither is selected you have a cooling only box.

**UNOCCUPIED MODE:**

When in this mode, while the zone temperature is between the unoccupied heating and cooling setpoints (inside of the bias), the primary air damper will be at the minimum cfm, there will be no mechanical heating. On a rise in zone temperature above the unoccupied cooling setpoint, the primary air damper will increase the cfm (if available), and there will be no mechanical heating. On a drop in zone temperature below the unoccupied heating setpoint, the supplemental heating coil will be fully utilized before the reheat heat coil is enabled, the damper will be at the minimum cfm.

**UNIT ENABLE:**

A network unit enable signal will control the mode of the box.

**FAN CONTROL (OPTIONAL):**

Parallel fan - upon a call for heat the fan will cycle on. All other states it will be off. Series fan – during the occupied mode the fan will run continuously. During the unoccupied mode it will cycle on with a call for heating or cooling.

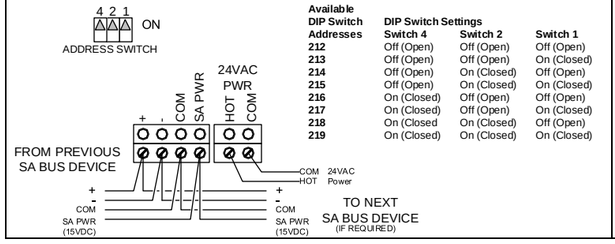
**OCCUPANCY LIGHTING SWITCH (OPTIONAL):**

An occupancy lighting switch can be added to the box, temporarily setting the vav box to standby mode when the occupancy is not being sensed. When the box senses occupancy, the zone will switch back to occupied. Standby mode uses standby temperature setpoints that are slightly higher or lower than the occupied cooling or heating setpoints respectively. The vav box will also use unoccupied flow setpoints in addition to the low temperatures.

**DEMAND CONTROL VENTILATION (OPTIONAL):**

When zone CO2 sensor(s) are wired to the boxes to sense the air quality in the zone, the minimum damper flows are proportionally reset based on an air quality (CO2) setpoint. The reset of the damper minimum flows do not exceed the maximum value that the user sets. The CO2 sensor with the highest value will determine the reset if more than one are wired up.

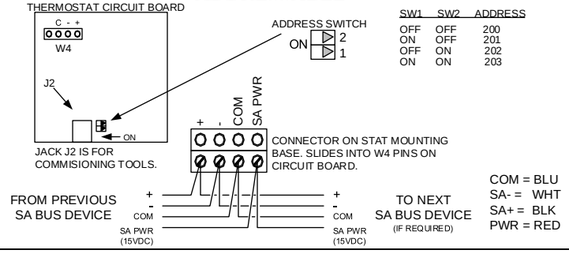
## CO2 NET STAT WITH TERMINALS ADDRESSABLE




| Available DIP Switch Addresses | DIP Switch Settings Switch 4 | Switch 2 | Switch 1 |
|---|---|---|---|
| 212 | Off (Open) | Off (Open) | Off (Open) |
| 213 | Off (Open) | Off (Open) | On (Closed) |
| 214 | Off (Open) | On (Closed) | Off (Open) |
| 215 | Off (Open) | On (Closed) | On (Closed) |
| 216 | On (Closed) | Off (Open) | Off (Open) |
| 217 | On (Closed) | Off (Open) | On (Closed) |
| 218 | On (Closed | On (Closed) | Off (Open) |
| 219 | On (Closed) | On (Closed) | On (Closed) |

## DETAIL NS102

## NET STAT WITH TERMINALS ADDRESSABLE




Drawing Title

**VEC Detail**

| REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY |
|---|---|---|---|---|---|
| | | | | | |

| Sales Engineer | Project Manager | Application Engineer | DRAWN | APPROVED |
|---|---|---|---|---|
| | | | BY Steve Nichols DATE 1-1-2022 | BY DATE |

Project Title

**3rd Party VAV**

VERASYS™

Branch Information

CONTRACT NUMBER

DRAWING NUMBER

**8**

# ZEC510 VAV Quick Start Guide

This guide provides you with the minimum configuration requirements that you need to quickly bring the system communication and controls online with the Smart Building Hub (SBH).

**Setting the control application type:**
To set the control application type, complete the following steps:
1. Log in to the SBH.
2. Navigate to the Devices tab.
3. Select the ZEC510 from the device list.
4. Navigate to the Control Setup tab.
5. Click Control Application Type.
6. From the drop-down list, select one of the following according to your needs:
• Incremental
• Staged
• Proportional SCR

**Equipment setup menu:**
To set the Equipment Setup parameters, complete the following steps:
1. Login to the SBH.
2. Navigate to the Devices tab.
3. Select the ZEC510 from the device list.
4. Navigate to the Equipment Setup tab and adjust the following parameters:
• Damper Polarity: Sets the direction to close the zone damper. You can adjust this clockwise or counterclockwise. Check which direction closes the dampers and use the Damper Polarity parameter to set that position.
• Box Heating Installed: When set to True, the controller uses the outputs to control the heat in the VAV box.
Note: The type of box heating used is dependent on the Control Application Type: either Incremental, Staged, or Proportional SCR.
• Supplemental Heating Installed: When set to True, the controller uses the outputs to control the supplemental heat in the space.

**Commissioning Menu –Flow:**
To set the flow parameters, complete the following steps:
1. Log in to the SBH.
2. Navigate to the Devices tab.
3. Select the ZEC510 from the device list.
4. Navigate to the Commissioning tab to set the following flow parameters:
• Cooling Max Flow: Sets the maximum supply aiflow of the VAV box when cooling. Adjustable: 0 cfm to 10,000 cfm.
• Occupied Cooling Min Flow: Sets the minimum supply airflow of the VAV box when cooling. Adjustable: 0 cfm to 10,000 cfm.
• Occupied Heating Min Flow: Sets the minimum supply airflow of the VAV box when heating. Adjustable: 0 cfm to 10,000 cfm.
Note: When the zone is heating, the supply airflow is constant and there is no maximum heating air-flow.
• Supply Area: The supply inlet area used to calculate the supply flow. Adjustable: 0 sq ft to 8.0 sq ft.
• Pickup Gain: Shows the K factor for the box. This parameter calibrates the flow. Adjustable: 0 to 9.
• Unoccupied Cooling Min Flow: Sets the minimum supply airflow of the VAV box when in unoccupied cooling and cooling mode. Adjustable: 0 cfm to 10,000 cfm.
• Unoccupied Heating Min Flow: Sets the minimum supply airflow of the VAV box when in unoccupied
• heating and heating mode. Adjustable: 0 cfm to 10,000 cfm.
• Warmup Min Flow: Displays the minimum flow to the VAV box during morning warm-up. Adjustable: 0 cfm to 10,000 cfm.
• Staged Reheat Min Flow: Sets the minimum heating flow for staged reheat control. Adjustable: 0 cfm to 10,000 cfm.

**Setpoints Menu:**
1. Log in to the SBH.
2. Navigate to the Devices tab.
3. Select the ZEC510 from the device list.
4. Navigate to the Setpoints tab to set the following parameters:
• Occupied Cooling Setpoint: When occupied, the thermostat controls cooling to this level. Set above occupied heating setpoint. Adjustable: 46°F to 99°F.
• Occupied Heating Setpoint: When occupied, the thermostat controls heating to this level. Set below occupied cooling setpoint. Adjustable: 45°F to 98°F.
• Unoccupied Cooling Setpoint: When unoccupied, the thermostat controls cooling to this level. Adjustable: 46°F to 99°F.
• Unoccupied Heating Setpoint: When unoccupied, the thermostat controls heating to this level. Adjustable: 45°F to 98°F.
• Warmer/Cooler Adjust Range: This is the range that the warmer cooler adjustment on the thermostat can affect. Adjustable: 0°F to 5°F.
Manufacturer damper data

Manufacturer Default direction to close
ETI Clockwise
Krueger Counterclockwise

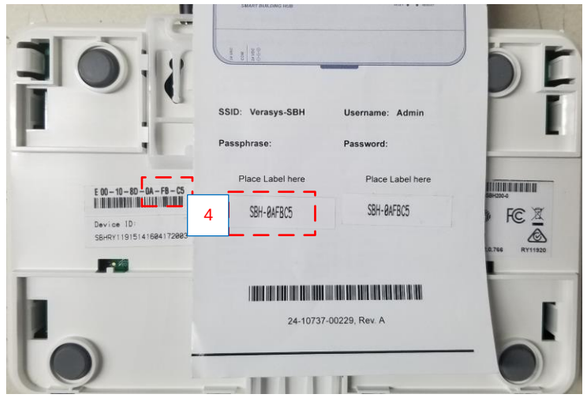
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drawing Title: **ZEC Quick Start** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| | Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 1-1-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS | | Branch Information | | CONTRACT NUMBER | | |
| | | | | | DRAWING NUMBER **9** | | |

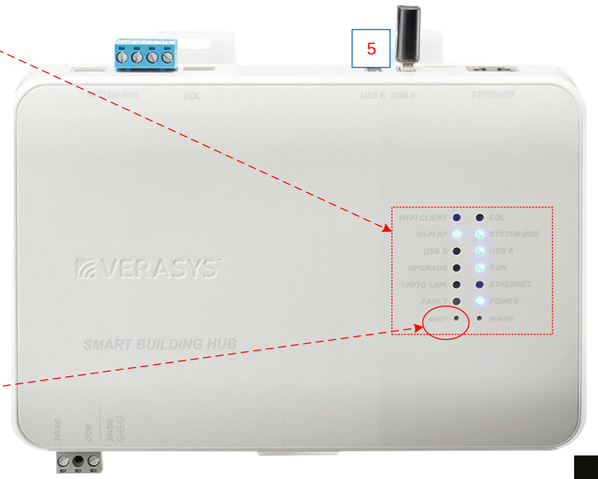
# Smart Building Hub Information

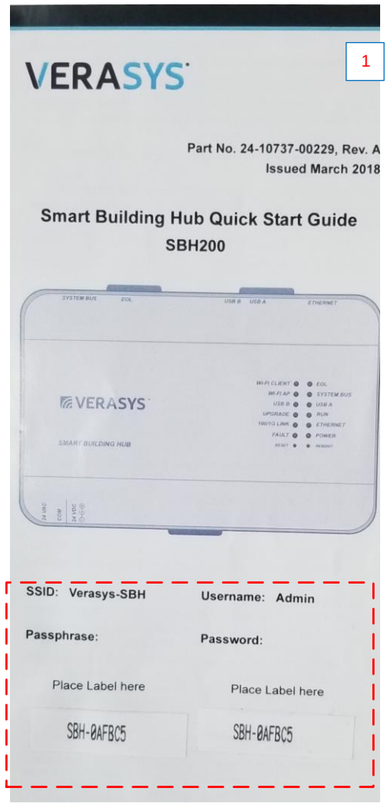
| LED Name | Color | Normal | Descriptions/Other Conditions |
|---|---|---|---|
| **Power** | Blue or Purple | On steady | **Off** = No power<br>**On Purple** = Power is supplied by primary voltage<br>**On Blue** = OS booted and power is supplied by primary voltage |
| **Fault** | Red | Off | **Off** = No faults/normal operation<br>**On steady** = Missing hardware, missing software, operating system has not yet been initialized, or reset is in progress<br>**Slow flicker then fast flicker** = Reset button is being pressed<br>**Medium flicker** (2 blinks per second) = Startup sequence<br>**Fast flicker** (5 blinks per second) = Fault |
| **Ethernet** | Blue | Flicker with activity | **Off** = Receiving data<br>**On steady** = Transmitting data<br>**Flicker** = Data transmission |
| **100/1G Link** | Blue | On steady | **Off** = no network connection<br>**On steady** = network is connected |
| **Run** | Blue | On steady | **Off** = No power or waiting for processes to start<br>**On steady** = OS and all monitored processes have started and the device is ready to use |
| **Upgrade** | Blue | On steady | **Off** = No upgrade in progress<br>**On steady** = upgrade in progress |
| **USB A** | Blue | On when a device is connected | **Off** = No device is connected<br>**On steady** = a device is connected |
| **USB B** | Blue | On when a device is connected | **Off** = No device is connected<br>**On steady** = A device is connected |
| **System Bus** | Blue | Flicker with activity | **Off** = Not receiving data<br>**On steady** = Transmitting data<br>**Flicker** = Data transmission |
| **Wi-Fi AP** | Yellow | Flicker with activity | **Off** = No Wi-Fi adapter connected<br>**On steady** = A device is connected to the Wi-Fi Network of the SBH<br>**Flicker** = Wifi adapter is connected but no devices are connected |
| **EOL** | Yellow | On if the device is the end of the line<br>Off if it is in the middle of the bus | **Off** = EOL not switched on<br>**On steady** = EOL is switched on |
| **W-Fi Client** | Yellow | Not Used | Not Used - This will be used at a future date |

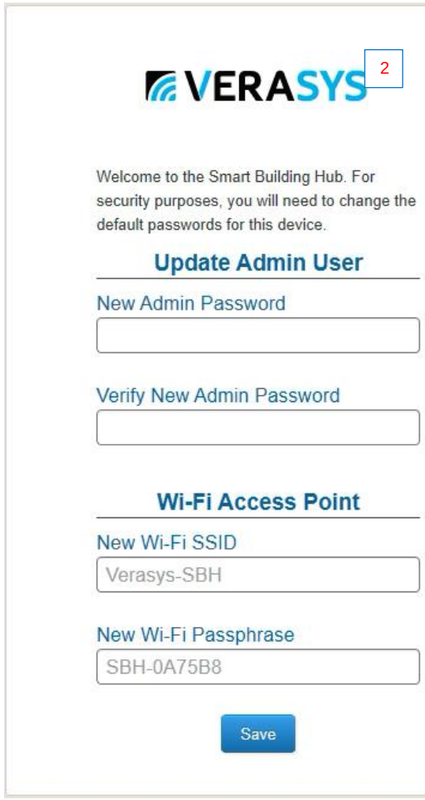
| Reset Function | Reset Operation[1] |
|---|---|
| **Reset the Wi-Fi and Ethernet Settings** | 1. Press and hold the **RESET** button for two seconds. The **FAULT** LED displays slow flicker behavior.<br>2. Release the **RESET** button within three seconds. The **FAULT** LED continues slow flicker behavior.<br>3. Within five seconds, press the **RESET** button again, and then immediately release it to confirm that you want to reset Wi-Fi and Ethernet settings. If you do not press the reset button to confirm within five seconds, the reset operation is canceled.<br>**Result**: You have reset the Wi-Fi SSID and passphrase and Ethernet settings to factory defaults. The LEDs stop flickering for two seconds, then the LEDs return to normal operation, based on the current state of the device. |
| **Reset to Factory Defaults[2]** | 1. Press and hold the **RESET** button for six seconds. After two seconds, the **FAULT** LED displays slow flicker behavior. This changes to fast flicker behavior after an additional four seconds of holding the **RESET** button.<br>2. Release the **RESET** button within three seconds of seeing fast flicker behavior. The **FAULT** LED continues fast flicker behavior.<br>3. Within five seconds, press the **RESET** button again, and then immediately release it to confirm that you want to reset to factory defaults. If you do not press the **RESET** button to confirm within five seconds, the reset operation is canceled.<br>**Result**: You have reset all unit settings to factory defaults. The LEDs stop flashing for two seconds, then the LEDs return to normal operation, based on the current state of the device. |

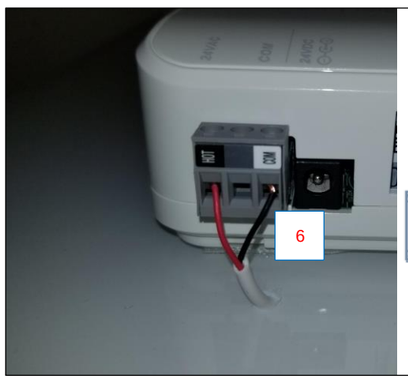
3

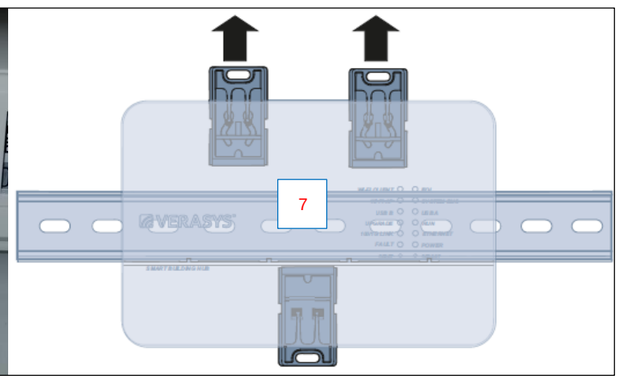



| | |
|---|---|
| 1 | Every SBH comes with a Quick Start Guide that gives you the login information |
| 2 | When you first login into the SBH it will prompt you to change the default login (SAVE THIS NEW LOGIN INFO) |
| 3 | If you forget or lose the login information follow the info above |
| 4 | If you don't have the Quick Start Guide & need the default login use the following... Verasys-SBH<br>SBH-XXXXXX(last 6 digits of your mac address on the back of the SBH)<br>Admin<br>SBH-XXXXXX(last 6 digits of your mac address on the back of the SBH) |
| 5 | The Wi-Fi dongle can be used in either USB port |
| 6 | The SBH can be powered by a 24vdc, 50w, Class II power supply or you can use a 24vac , 75va Class II transformer |
| 7 | The SBH can be mounted on denrail or screwed down using the standoffs |

Drawing Title
**SBH Detail**

| REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY |
|---|---|---|---|---|---|
| | | | | | |

| Sales Engineer | Project Manager | Application Engineer | DRAWN BY | DRAWN DATE | APPROVED BY | APPROVED DATE |
|---|---|---|---|---|---|---|
| | | | Steve Nichols | 1-1-2022 | | |

Project Title
**3rd Party COBP**

VERASYS™

Branch Information

CONTRACT NUMBER

DRAWING NUMBER
**10**

# Smart Building Hub Information

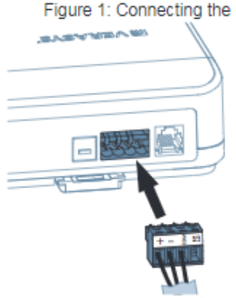
## 1. Connect the Smart Building Hub to Equipment

The Smart Building Hub (SBH) permanently connects to the Verasys™ system using the 4-terminal System bus port. Wire the system bus communications to the blue, 4-terminal connector and plug it into the port.

Note: If this device is at the end of a line, set the end of the line switch to on.

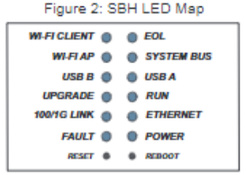
Note: The RJ-12 jack next to the 4-terminal block can be used as a temporary connection to the System bus using the RJ-12 cable supplied with the SBH.

Figure 1: Connecting the SBH



a. Wire your cable to the supplied four-pin adapter as illustrated.
b. Plug the Wi-Fi adapter that comes with the SBH into either of the USB ports.
c. Connect the RJ45 Ethernet port to the building Ethernet network as instructed by the building IT department. The Ethernet must be plugged into the device if you choose the (optional) Ethernet setup in step 6.
d. Connect power to the Smart Building Hub.
Once power is supplied to the SBH, the **WiFi AP** LED flashes to indicate that the device is initializing. When the **Fault** LED turns off, the **WiFi AP** LED flashes, and the **RUN** LED is on, you can connect the SBH using the built-in Wifi access point.

Figure 2: SBH LED Map




## 2. Connect to the Smart Building Hub Wi-Fi access point

The SBH can be configured over Wi-Fi using a mobile device or laptop.

a. In your Wi-Fi enabled device, access the Wi-Fi settings and select the Verasys-SBH access point name.
b. Connect to the SBH Wi-Fi network using the supplied credentials from the beginning of this guide.

## 3. Open a Web Browser

a. Navigate to the following URL: www.smartbuildinghub.com, to open the SBH browser interface.

**Note:** The SBH ships with a private smartbuildinghub.com SSL certificate installed to ensure secure communication with the SBH. However, this certificate does not indicate that it is trusted in a browser. If you wish to install your own certificate, refer to the *Smart Building Hub Network and IT Guidance Technical Bulletin (LIT-12012324)* for more information.

## 4. Log in to the Smart Building Hub

a. Use the default Admin login credentials from the beginning of this guide.
b. Read and accept the SBH license agreement.

## 5. Change Passwords and SSID

The first time you log into the SBH, the **Change Password and Passphrase** web page appears. You must change the Admin password, Wi-Fi passphrase, and the SSID.

IMPORTANT: After you change the Wi-Fi passphrase or SSID, the web server restarts and you must rejoin the SBH Wi-Fi network using the new passphrase. On some mobile devices, you must select and forget the original SBH Wi-Fi network before rejoining the network with the new passphrase. A laptop running Microsoft Windows is a device that behaves this way.

a. In the **New Admin Password** field, enter a new password.
b. In the **Verify New Admin Password** field, enter the same new password.
c. In the **New Wi-Fi SSID** field, enter the new Wi-Fi SSID.
d. In the **New Wi-Fi Passphrase** field, enter the new Wi-Fi Passphrase.
e. Click the **Save** button.

Navigate to the following URL: www.smartbuildinghub.com, to open the SBH browser interface.
**Note:** The SBH ships with a private smartbuildinghub.com SSL certificate installed to ensure secure communication with the SBH. However, this certificate does not indicate that it is trusted in a browser. If you wish to install your own certificate, refer to the *Smart Building Hub Network and IT Guidance Technical Bulletin (LIT-12012324)* for more information.

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## 6. Ethernet Setup (Optional)

This step describes how to access the SBH over an Ethernet network.

a. In the SBH UI, navigate to **Settings** > **Ethernet**.
b. On the **Ethernet** drop-down list, select **On** to enable the SBH Ethernet port.
c. Click the **Save** button.
d. Take note of the address in the IP Address field. By default, the SBH is configured to dynamically receive an IP address from your network using DHCP.
**Note:** If the IP Address does not appear, refresh the screen.
e. Enter the IP address from the previous step. You now have access to the SBH over an Ethernet network.
Refer to the *Smart Building Hub Network and IT Guidance Technical Bulletin (LIT-12012324)* for more options.

## 7. Use the Smart Building Hub

Select a device from the equipment list and use the web pages from the SBH to view, commission, and configure devices as needed.

IMPORTANT: Save this guide. It contains your default user name and password information. This information may be needed to reset your Smart Building Hub to factory defaults.

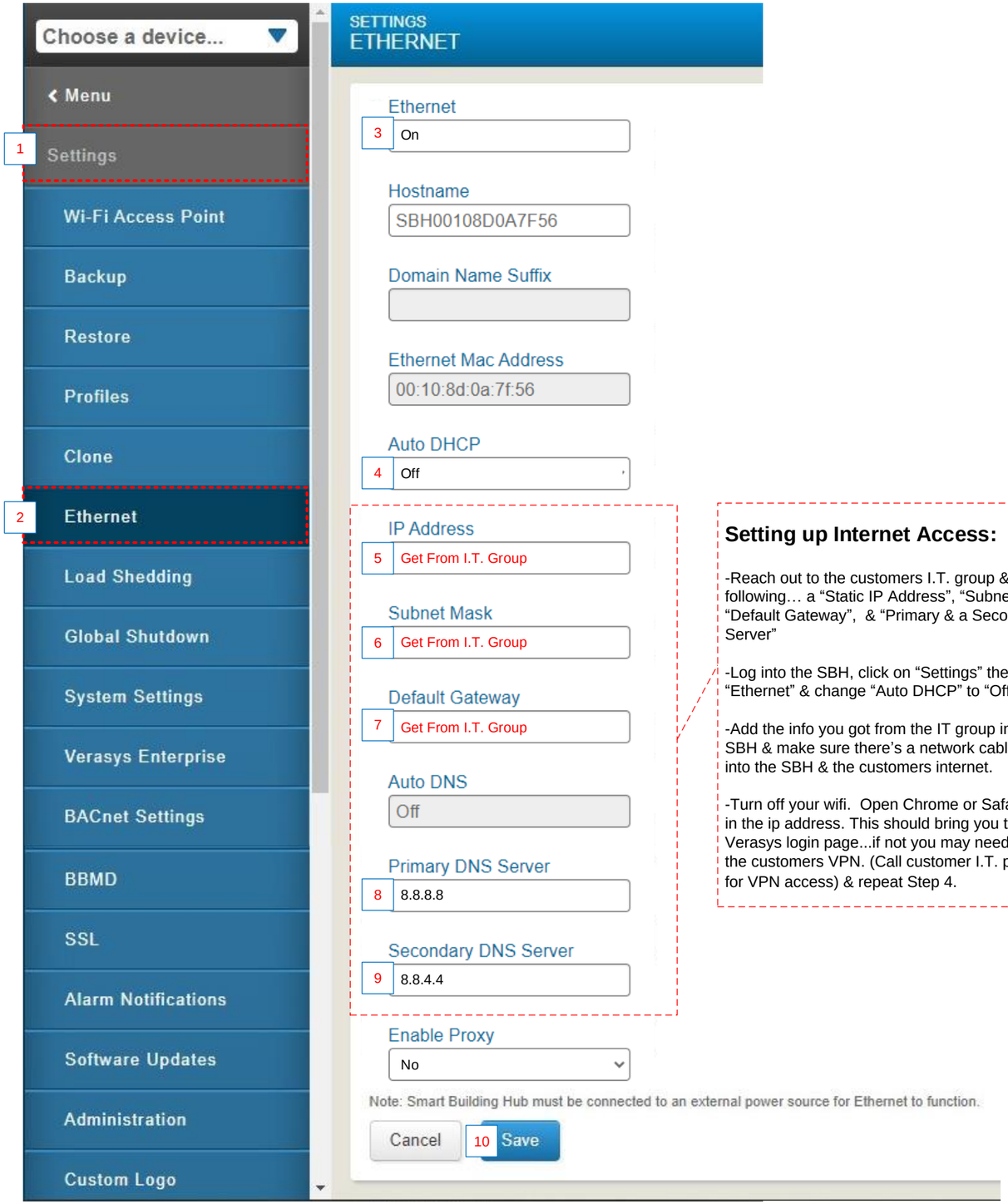
### Technical Specifications

Smart Building Hub

| | |
|---|---|
| **Power Consumption** | 38W maximum |
| **Ambient Temperature Conditions** | **Operating:** 0 to 50°C (32 to 122°F)<br>**Operating Survival:** -30 to 60°C (-22 to 140°F)<br>**Non-Operating:** -40 to 70°C (-40 to 158°F) |
| **Ambient Humidity Conditions** | **Storage:** 5 to 95% RH 30°C (86°F) maximum dew point conditions<br>**Operating:** 10-90% RH, 30°C (86°F) maximum dew point conditions |

| | | | | | | |
|---|---|---|---|---|---|---|
| Drawing Title: **SBH Setup** | | | | | | |
| | | | | | | |
| | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer / Project Manager / Application Engineer | | DRAWN BY Steve Nichols DATE 1-3-2022 | APPROVED BY DATE | | | |
| Project Title: **3rd Party VAV** | VERASYS™ | Branch Information | CONTRACT NUMBER | | | |
| | | | DRAWING NUMBER **11** | | | |

# Smart Building Internet Settings




## Setting up Internet Access:

-Reach out to the customers I.T. group & get the following… a “Static IP Address”, “Subnet Mask”, “Default Gateway”, & “Primary & a Secondary DNS Server”

-Log into the SBH, click on “Settings” then “Ethernet” & change “Auto DHCP” to “Off”

-Add the info you got from the IT group into the SBH & make sure there’s a network cable plugged into the SBH & the customers internet.

-Turn off your wifi. Open Chrome or Safari & type in the ip address. This should bring you to the Verasys login page...if not you may need to log into the customers VPN. (Call customer I.T. people up for VPN access) & repeat Step 4.

**Get This Info From Customer I.T. Group or I.S.P. Then Write Info Here:**

Static IP Address:_____

Subnet Mask:_____

Default Gateway:_____

Primary DNS Server:_____

Secondary DNS Server:_____

Email Host:_____

Email Port:_____

Mail Server User Name:_____

Mail Server Password:_____

VPN Address:_____

VPN User:_____

VPN Password:_____

**After you set up the SBH write down login info here**

SSID:_____

Wi-Fi Password:_____

User Name:_____

User Password:_____

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drawing Title: **SBH Internet Info** | | | | | | | |
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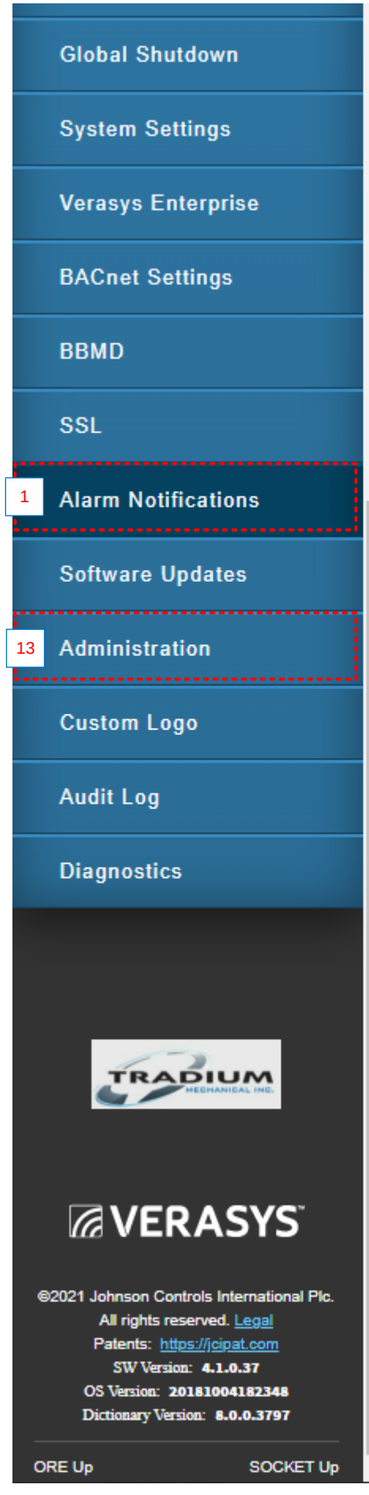
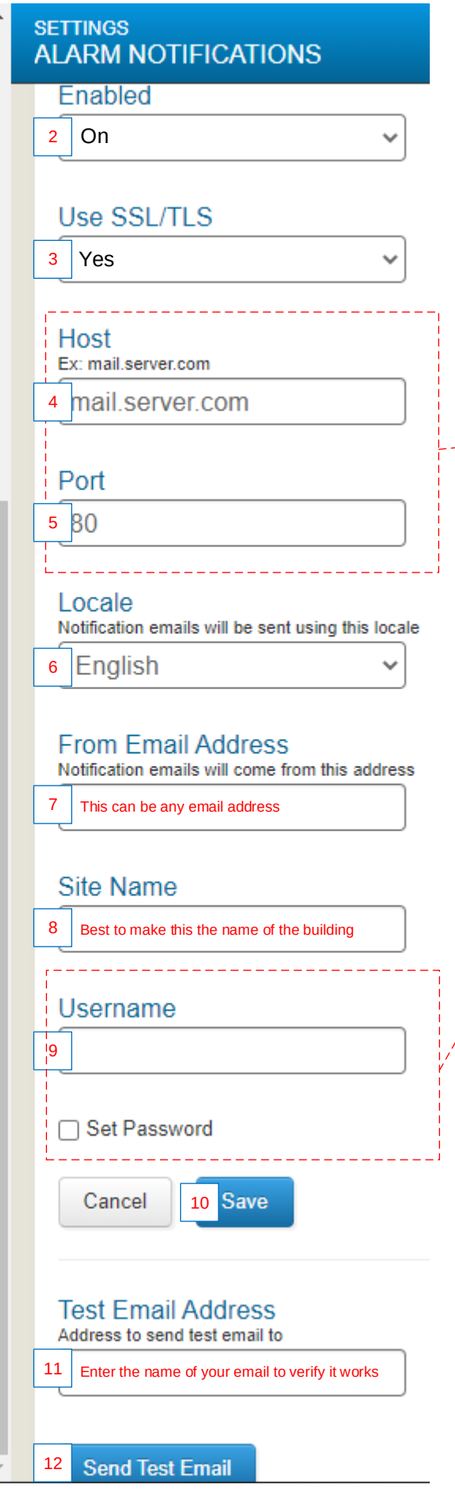
| | | | | | | | |
| | REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| | Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 8-30-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS | | Branch Information | | CONTRACT NUMBER | | |
| | | | | | DRAWING NUMBER **12** | | |

# Smart Building Alerts & Email Settings




Note: To get text & email alerts you need to be connected to the internet & set up a user for each person who needs to get alerts. Follow Steps 1-23

**Setting Up Text & Email Alerts:**

-Reach out to the customers I.T. group & get the following… a mail server "Host", "Port #"

**Setting Up Text & Email Alerts:**

-Reach out to the customers I.T. group & get the following…
Mail Server "User Name" & "Password"

**Adding Text Alerts:**

AT&T phone#nodashes@txt.att.net

Verizon phone#nodashes@vtext.com

T-Mobile phone#nodashes@tmomail.net

Sprint phone#nodashes@messaging.sprintpcs.com

Cricket phone#nodashes@mms.cricketwireless.net

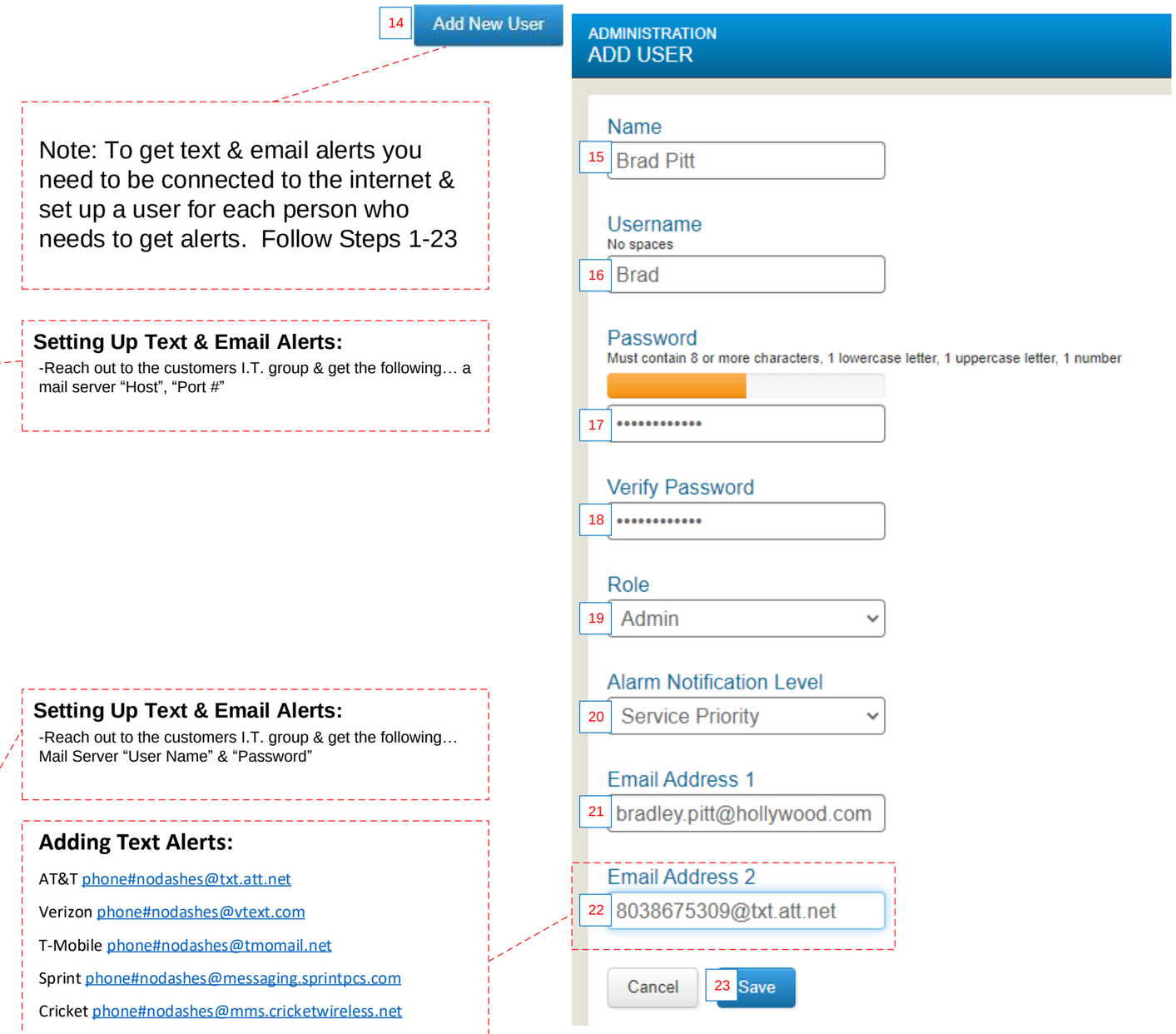
Virgin phone#nodashes@vmobl.com

Tracfone phone#nodashes@mmst5.tracfone.com

Metro PCS phone#nodashes@mymetropcs.com

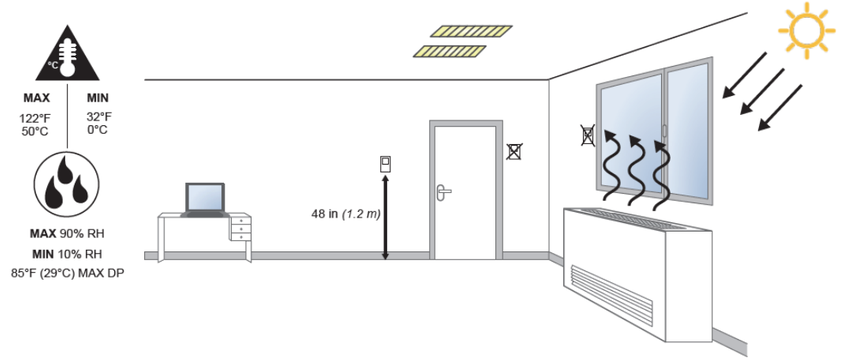
Boost phone#nodashes@myboostmobile.com

If your cell carrier is not displayed go to Google & search for their text address




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drawing Title: **Alert & Email Setup** | | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY | |
| Sales Engineer | Project Manager | Application Engineer | DRAWN: BY Steve Nichols DATE 1-3-2022 | | APPROVED: BY DATE | | |
| Project Title: **3rd Party VAV** | VERASYS | Branch Information | CONTRACT NUMBER | DRAWING NUMBER: **13** | | | |

# NS8000 Zone Sensor Information




**Note:**
- Locate the network sensor away from steam or water pipes, warm air stacks, unconditioned areas (not heated or cooled), or sources of electrical interference.
- Height requirements may vary depending on the site.
- Network sensors without $CO_2$ sensing are shock and vibration resistant, but not shock and vibration proof. Be careful not to drop the unit or mount it where it could be exposed to excessive vibration. Dropping a $CO_2$ network sensor may result in readings outside of the specified accuracy tolerance.

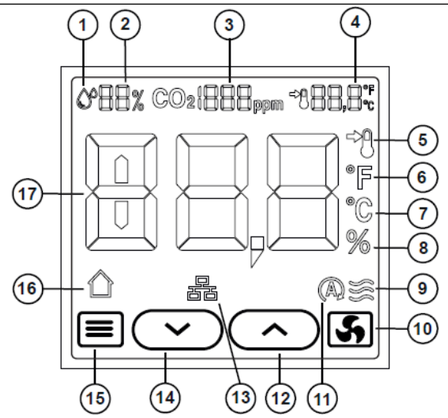



Table 1: Display icons

| Icon | Description |
|---|---|
| 1 | Humiditiy indicator icon |
| 2 | Humidity measurement |
| 3 | $CO_2$ measurement |
| 4 | Configurable setpoint or current temperature |
| 5 | Setpoint indicator icon |
| 6 | Fahrenheit icon |
| 7 | Celsius icon |
| 8 | Percent relative humidity icon |
| 9 | Fan speed bars |
| 10 | Fan icon |
| 11 | Automatic fan speed icon |
| 12 | Up adjustment or navigation icon |
| 13 | SA bus online indicator |
| 14 | Down adjustment or navigation icon |
| 15 | Menu or enter icon |
| 16 | Occupancy indicator |
| 17 | Default display value (setpoint, zone temperature, relative humidity) |

-To change the display from °C to °F hold down

-Once you connect the NS to a controller that is connected to a SBH it will hold it's parameters when there's a power cycle

-The NS8000 uses a dipswitch to address it

-If the sensor is the only one on the bus there is no need to change the default address of 199

-You can have a max of 8 NS sensors on the sensor bus that can be daisy chained for averaging. You can use addresses (199-206) You do not need to do additional steps it will average automatically.

-Each averaging sensor will display it's local temp not the average. While looking at the SBH for that SA bus it will display the average. If you want to see the individual averaging sensor temp click on the **controller>details>netsensor plug and play**.

-This is a 4 wire bus & will not work on 3 wires. Use 18awg to 22awg

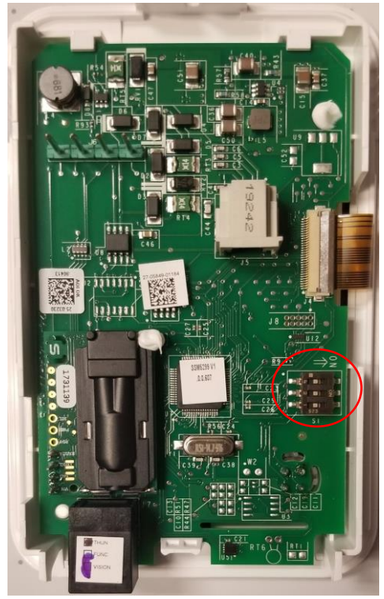
-In a retrofit application existing stat wire maybe used as long as you have 4 conductors

-If you are using a sensor with CO2 it's lifespan is 10 years under standard operating conditions

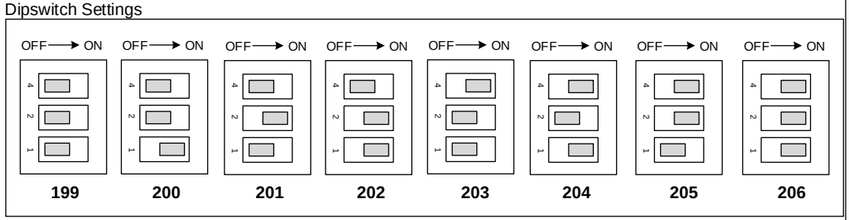
-If you are using a sensor with PIR it can work up to 26ft with clear line of site

-You can add a MAP tool on the bottom of the sensor to access the devices on the bus

-You have the option to terminate to the sensor with a modular jack or screw terminals

Dipswitch Settings




**Tech Tip:** In order for an NS8000 sensor to work properly you need to be running 4.1 firmware or newer.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |

Drawing Title: **Sensor Detail**

Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 1-3-2022 | APPROVED BY | DATE

Project Title: **3rd Party VAV**

VERASYS™

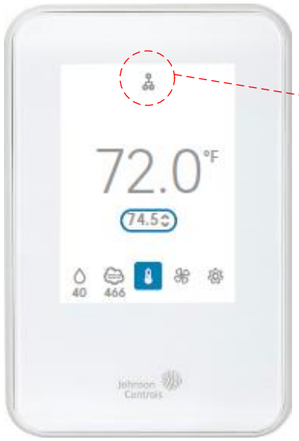
Branch Information

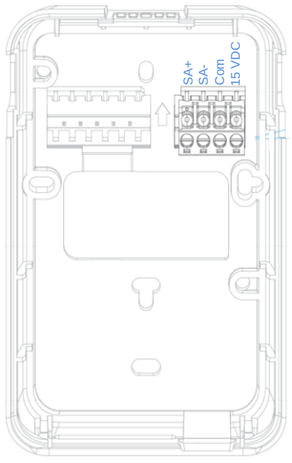
CONTRACT NUMBER

DRAWING NUMBER **14**

# NS8000 Color Sensor Detail

- Up Arrow-Cannot Hide Icon
- Down Arrow-Cannot Hide Icon
- Background Light-Cannot Hide Icon
- Background Dark-Cannot Hide Icon
- Brightness Bar-Cannot Hide Icon
- Brightness-Cannot Hide Icon
- Cancel-Cannot Hide Icon
- Checkmark-Cannot Hide Icon
- Fan Speed-Can Hide Icon
- Fan Auto-Can Hide Icon
- Fan Speed Bars-Can Hide Icon
- Relative Humidity-Can Hide Icon
- CO2-Can Hide Icon
- Occupancy-Can Hide Icon
- Setpoint-Can Hide Icon
- Occupancy-Cannot Hide Icon
- Setpoint-Cannot Hide Icon
- Settings-Can Hide Icon
- Settings Lock-Can Hide Icon
- Temperature-Cannot Hide Icon
- Settings Enabled-Cannot Hide Icon
- Settings Disabled-Cannot Hide Icon
- Error-Cannot Hide Icon
- Page Indicator-Cannot Hide Icon
- Scroll Arrows-Cannot Hide Icon
- Timeout-Cannot Hide Icon
- Screen Dim-Cannot Hide Icon
- Screen Off-Cannot Hide Icon




-Once you connect the NS to a controller that is connected to a SBH it will hold it's parameters when there's a power cycle

-To change the address hold the network icon for 3 seconds, then hold the "SA Bus" for 3 seconds then use the arrow & save

-If the sensor is the only one on the bus there is no need to change the default address

-You can have a max of 8 NS sensors on the sensor bus that can be daisy chained for averaging. You can use addresses (199-206) You do not need to do additional steps it will average automatically.

-Each averaging sensor will display it's local temp not the average. While looking at the SBH for that SA bus it will display the average. If you want to see the individual averaging sensor temp click on the **controller>details>netsensor plug and play**.

-This is a 4 wire bus & will not work on 3 wires. Use 18awg to 22awg

-In a retrofit application existing stat wire maybe used as long as you have 4 conductors

-If you are using a sensor with CO2 it's lifespan is 10 years under standard operating conditions

-If you are using a sensor with PIR it can work up to 26ft with clear line of site

-You can add a MAP tool on the bottom of the sensor to access the devices on the bus

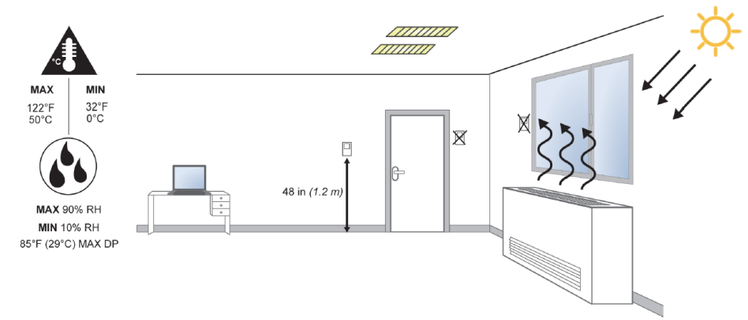
-You have the option to terminate to the sensor with a modular jack or screw terminals

-To change the set point range log into the **Smart Building Hub, Devices,** click on the controller your stat is attached to & go to **Setpoints**,

-To lock out the color screen see the installation guide in the link below

-To hide icons on the color display refer to the installation guide in the link below

https://docs.johnsoncontrols.com/bas/r/Johnson-Controls/en-US/Vertical-Wallbox-Mounted-or-Surface-Mounted-NS8000-Series-Network-Sensors-Graphical-Display-Models-Installation-Guide/D




Locate sensor away from steam, water pipes, warm air stacks, unconditioned areas (not heated or cooled), sources of electrical interference, or on walls that radiate the temperature from the outside (you can use a thermal barrier)

Make sure to plug conduit coming from an unconditioned space to keep cold or warm air from being pushed down conduit to the back of the sensor

Height requirements may very depending on the site & ADA requirements

Network sensors without CO 2sensing are shock & vibration resistant, but not shock & vibration proof. Be careful not to drop the unit or mount it where it could be exposed to excessive vibration. Dropping CO2 network sensor may result in reading outside of the specified accuracy tolerance

| Display Text | Economizer Fault Condition | Possible Problem |
|---|---|---|
| E0 | Air Temp Sensor Failure or Fault | Problem with one of the air temperature sensors. Check outdoor air, return air, or supply air sensors |
| E1 | Not economizing when it should | The economizer is not using outdoor air when it should |
| E2 | Economizing when it should not | The economizer is allowing outdoor air inside when the conditions are not suitable for economizer operation |
| E3 | Damper not modulating | The economizer damper is not able to modulate properly, Check damper, linkage to actuator, or the actuator |
| E4 | Excess outdoor air | The economizer is allowing excess air inside |

**Tech Tip:**

**In order for an NS8000 C02 sensor to work properly your SSE card needs to be running 4.0.1 firmware or higher. SSE cards with 4mb or 3.0 firmware will not work with 4.0.1 firmware. An SSE card needs at least 8mb to run the 4.0.1 firmware & pretty much any SSE card made before 2017 only has 4mb of memory.**


Drawing Title

| REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY |
|---|---|---|---|---|---|
| | | | | | |

| Sales Engineer | Project Manager | Application Engineer | DRAWN | APPROVED |
|---|---|---|---|---|
| | | | BY SJN DATE 6-20-2022 | BY DATE |

Project Title

**SMART RTU**

VERASYS™

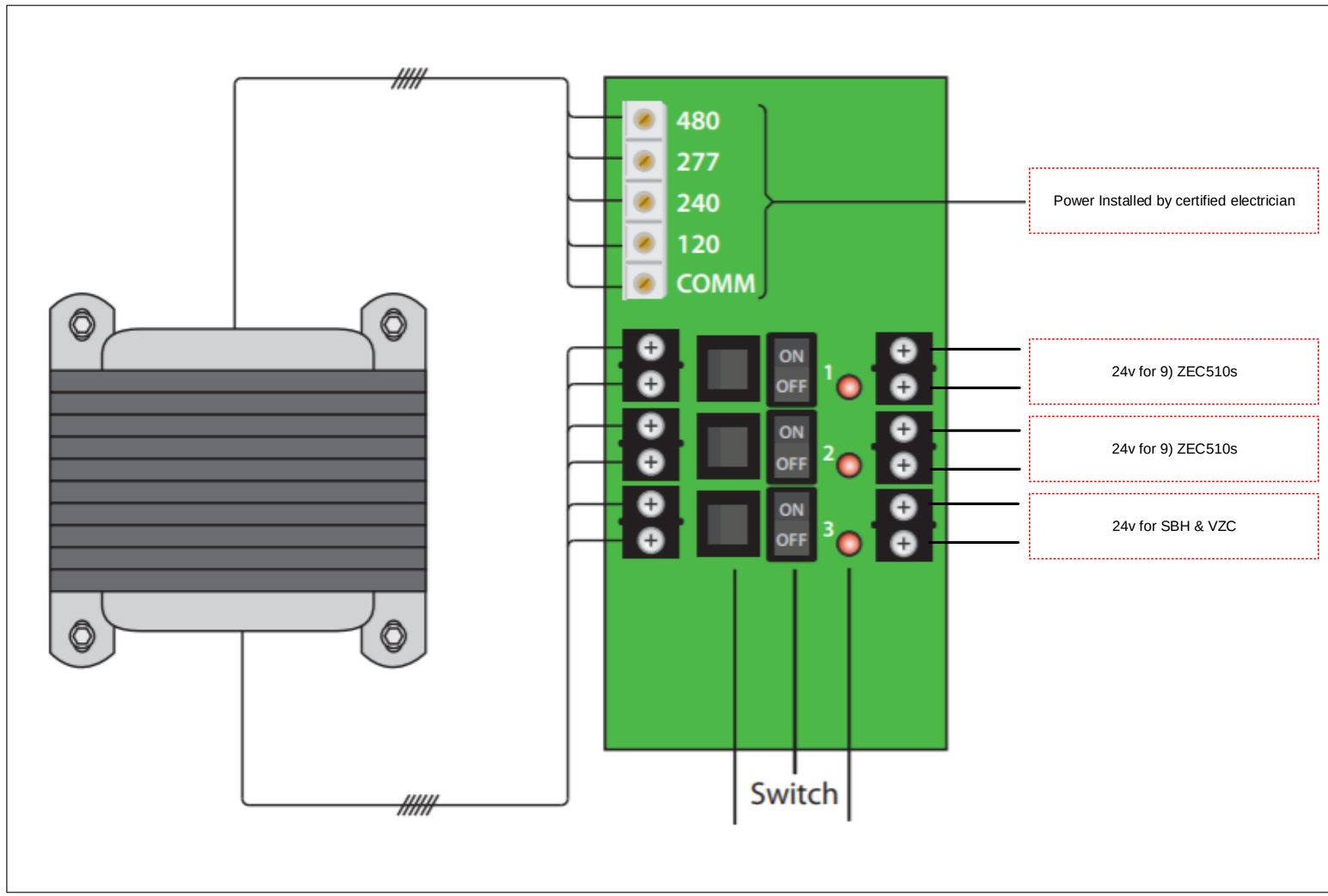
Branch Information

CONTRACT NUMBER

DRAWING NUMBER

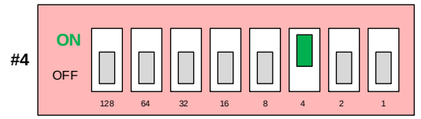
**14**

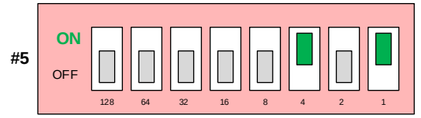
# RIB PSH300 Detail

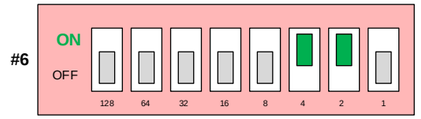


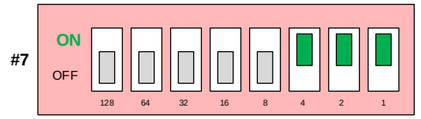

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drawing Title: **Power Supply Detail** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY | |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 1-3-2022 | | APPROVED BY | DATE | |
| Project Title: **3rd Party VAV** | VERASYS | Branch Information | | CONTRACT NUMBER | | | |
| | | | | DRAWING NUMBER **15** | | | |

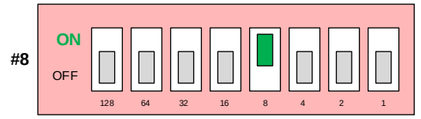
# Dip Switch Addresses

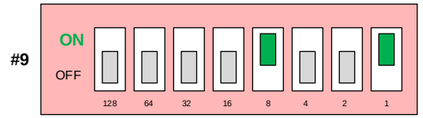


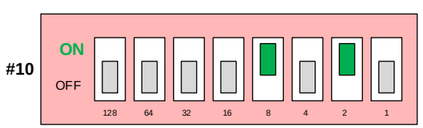



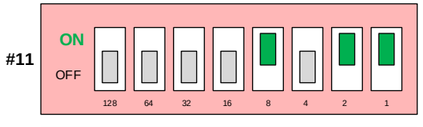



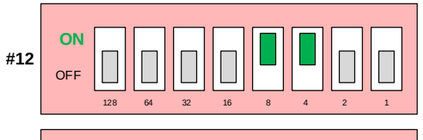



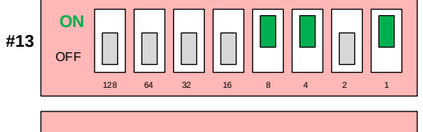



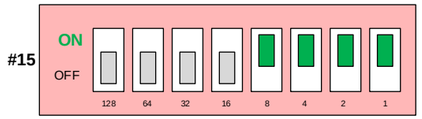



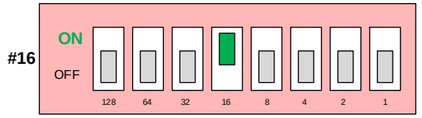



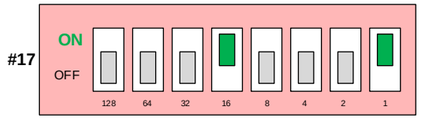



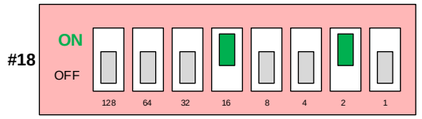



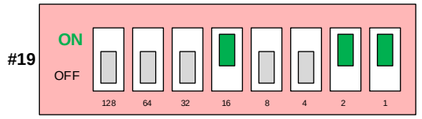


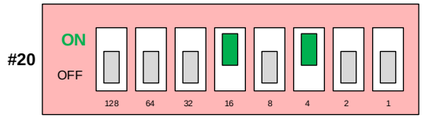


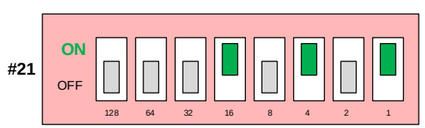



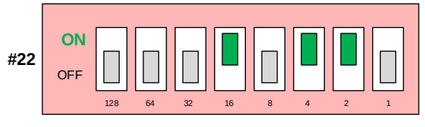



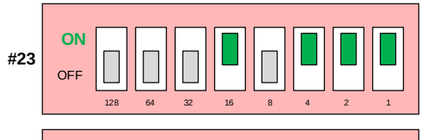



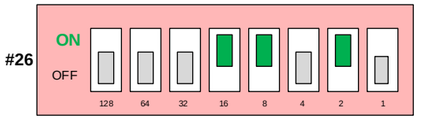



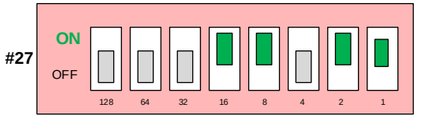



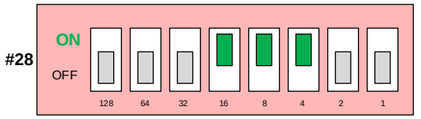



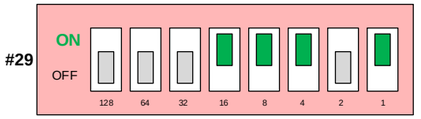



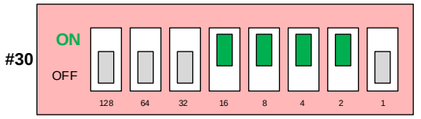


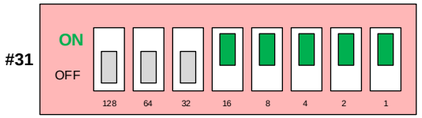



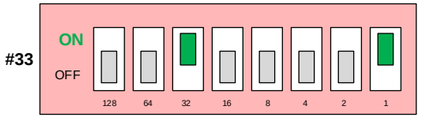



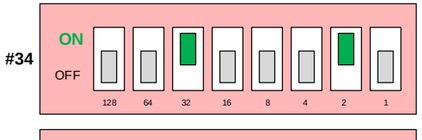



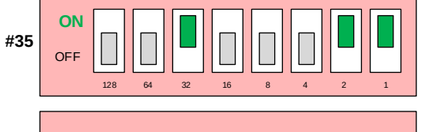



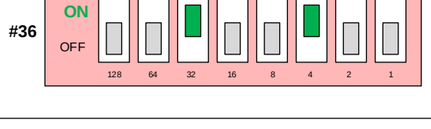





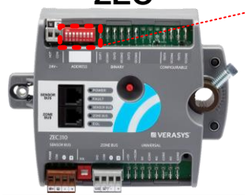


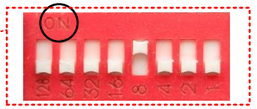



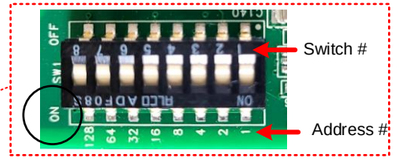

## ZEC

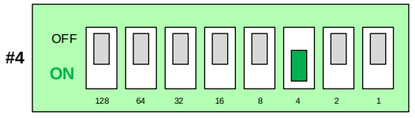


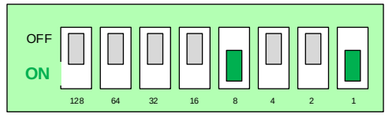



**Tech Tip:** If you change a dipswitch while the ZEC is powered you will need to do a power cycle for it to change.

## VZC

























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| **Addressing Detail** | | | | | | |
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| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer / Project Manager / Application Engineer | DRAWN BY Steve Nichols DATE 8-30-2022 | APPROVED BY | DATE | | | |
| Project Title: **3rd Party VAV** | VERASYS™ | Branch Information | CONTRACT NUMBER | DRAWING NUMBER: **16** | | |

# Verasys Enclosure

**Tech Tip:** **High voltage wire & comm wire should never be in the same conduit or zipped tied together**

120vac
Installed by electrician

Installed By HVAC Contractor

24v

Zone Bus

HVAC Contractor works with I.T. Group

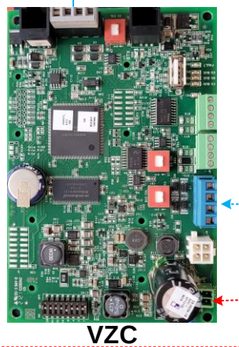
1) Network cable

**HVAC Contractor provides panel enclosure**

**RIB PSH300 #1**

**Tech Tip:** **A PSH300A can power 18 devices.**


**Tech Tip:** **Install SBH & connect to internet before job starts. See page 12 & 13**



**VZC**

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| Drawing Title: **Enclosure** | | | | | | |
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| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY: Steve Nichols | DATE: 8-30-2022 | APPROVED BY | DATE |
| Project Title: **3rd Part VAV** | | | Branch Information | | CONTRACT NUMBER | |
| | | | | | DRAWING NUMBER: **17** | |

# Verasys Enclosure

**Tech Tip:** **High voltage wire & comm wire should never be in the same conduit or zipped tied together**

120vac
Installed by electrician

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24v

Zone Bus

HVAC Contractor works with I.T. Group

1) Network cable

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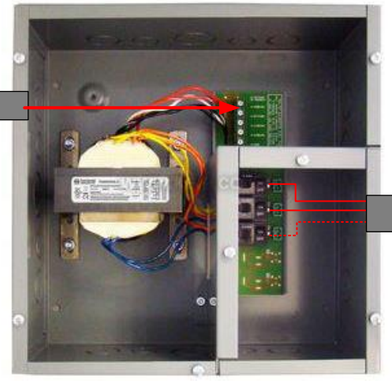
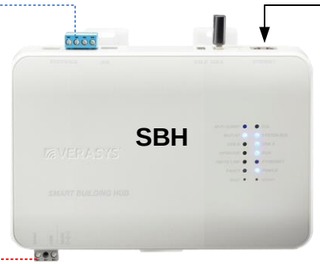
**RIB PSH300 #1**

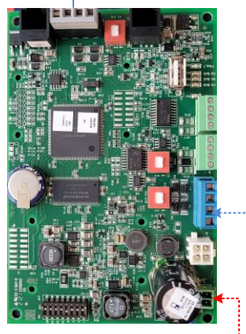


**RIB PSH300 #2**

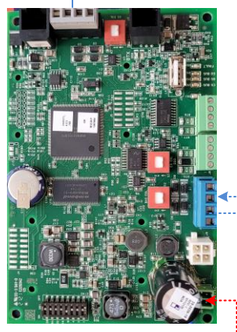



**Tech Tip:** **Install SBH & connect to internet before job starts. See pages 12 & 13**

**VZC RTU 1**



**VZC RTU 2**



**Tech Tip:** **A PSH300A can power 18 devices.**

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| Drawing Title: **Enclosure** | | | | | | |
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| Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 8-30-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Part VAV** | VERASYS™ | Branch Information | | CONTRACT NUMBER | | |
| | | | | DRAWING NUMBER **17** | | |

# Verasys Enclosure

120vac
Installed by
electrician

120vac

Installed By HVAC
Contractor

24v to AC1
24v to AC3
24v to AC7
24v to AC8
24v to AC9
24v to AC12
24v to AC13
24v to AC14
24v to AC15
24v to AC18

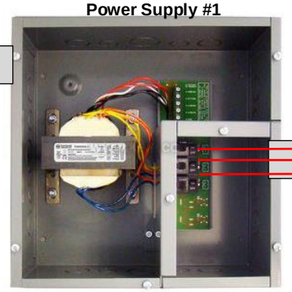
HVAC Contractor
works with I.T.
Group

Internet

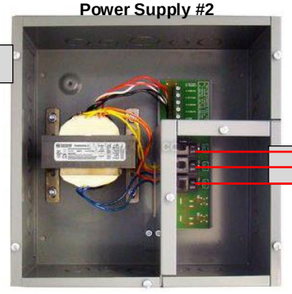
Installed By HVAC
Contractor

Zone Bus AC1
Zone Bus AC3
Zone Bus AC7
Zone Bus AC8
Zone Bus AC9
Zone Bus AC12
Zone Bus AC13
Zone Bus AC14
Zone Bus AC15
Zone Bus AC18

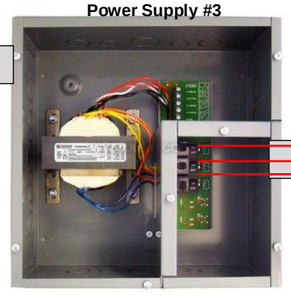
Power Supply #1



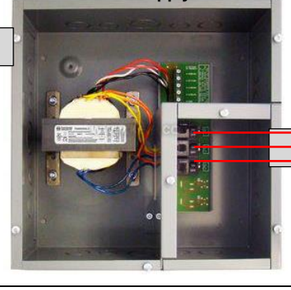
Power Supply #2



Power Supply #3



Power Supply #4



SBH200

AC1 VZC
Address 4

AC3 VZC
Address 5

AC7 VZC
Address 6

AC8 VZC
Address 7

AC9 VZC
Address 8

AC12 VZC
Address 9

AC13 VZC
Address 10

AC14 VZC
Address 11

AC15 VZC
Address 12

AC18 VZC
Address 13

Set EOL
to “On”

**Tech Tip:**

**Install SBH & connect to internet before job starts. See pages 12 & 13**

**Tech Tip:**

**High voltage wire & comm wire should never be in the same conduit or zipped tied together**

**Tech Tip:**

**An SBH can talk to 100 controllers or 10 VZCs. Each VZC counts as 10 controllers. If you have 7 VZCs you are using 70 controllers & have 30 controller spaces left.**

**Tech Tip:**

**Each VZC can talk to 32 zone controllers.**

**Tech Tip:**

**A PSH300A can power 18 devices.**

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| Drawing Title: **Enclosure** | | | | | | |
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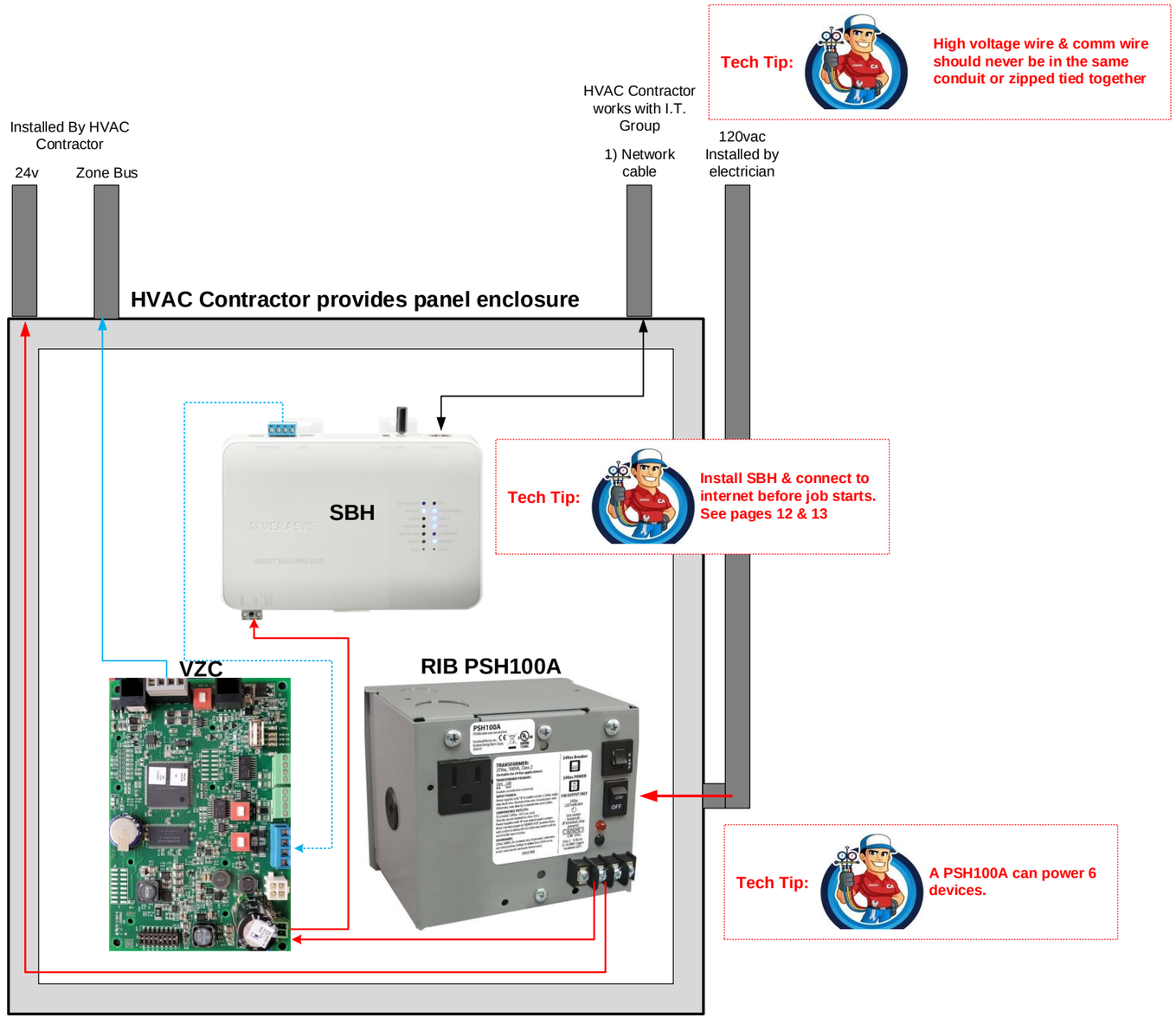
| REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 8-30-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS™ | | Branch Information | | CONTRACT NUMBER | |
| | | | | | DRAWING NUMBER **17** | |

# Verasys Enclosure

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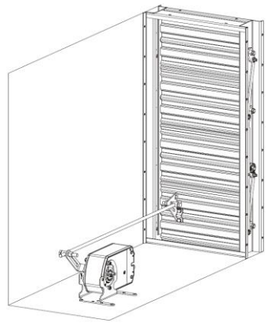
| Sales Engineer | Project Manager | Application Engineer | DRAWN: BY Steve Nichols DATE 8-30-2022 | | APPROVED: BY | DATE | |
| Project Title: **3rd Part VAV** | VERASYS™ | Branch Information | CONTRACT NUMBER | | | | |
| | | | DRAWING NUMBER: **17** | | | | |

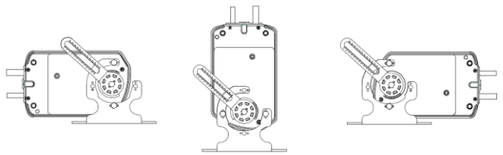
# Damper Wiring Detail

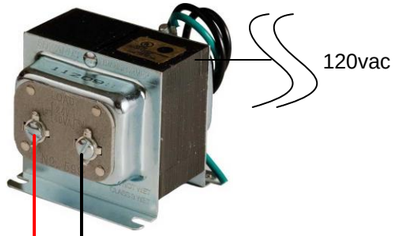
OUTSIDE AIR DAMPER

**Tech Tip:**

**An M9208-250 Mounting Bracket Kit may be needed for this application. Verify existing damper needs & order as needed.**





120vac


MIXED AIR DAMPER


**Tech Tips:**

**Make sure the 2nd actuator is set to reverse 0-10**

**It's also mandatory that the 2nd actuator connects to the damper position of the previous actuator.**

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| Drawing Title: **Actuator Detail** | | | | | | | |
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| | REFERENCE DRAWING | NO. | REVISION-LOCATION | | ECN | DATE | BY |
| | Sales Engineer / Project Manager / Application Engineer | | DRAWN: BY Steve Nichols DATE 8-30-2022 | | APPROVED: BY | DATE | |
| Project Title: **3rd Party VAV** | VERASYS | | Branch Thomson | | CONTRACT NUMBER | | |
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# Standard Installation Proceedures

Step 1: At your office pull out all the controllers & wire them up to the SBH referring to Page 3 Riser Diagram. (do not apply power yet)
Step 2: Address the VZCs & ZECs according to Page 3 Riser Diagram & label each.
Step 3: Power up & log into your SBH & verify firmware & update if needed.
Step 4: Power up first VZC & verify it shows up in the SBH device list with the proper address.
Step 5: Verify the firmware is current on the VZC & update if needed. (is it best to do this now or after all devices are talking to VZC)
Step 6: Power up the VEC, change the address if needed, & install a new app if you need (Heat Pump, Mod Heat Mod Cool, Mod Heat Stage Cool, Stage Heat Mod Cool, Stage Heat Stage Cool)
Step 7: Log into the VEC & configure it for COBP. “Details” \ “Service” \ “Factory” \ “Rooftop Controller Type”=Changeover Bypass
Step 8: Power up each ZEC510 & Verify they show up under the VZC.
Step 10: Back on the SBH give each controller a descriptor. Write a descriptor as if you showed up on job after the install & don’t know where anything is.
Step 11: Log into each ZEC510 & configure according to steps on page 9.
Step 12: Create a schedule for your VZC. (Each VZC is capable of having 4 schedules)
Step 13: Attach 1 of the 4 schedules to each ZEC510.
Step 14: If you have a 2nd VZC repeat steps 2-13.
Step 15: At the jobsite Install PSH300 power supply. See page 13. Have licensed Electrician terminate high voltage to power supply.
Step 16: Install SBH & apply power to it from PSH300. Get SBH connected to internet. See pages 9-11, 13.
Step 17: Install VZC next to SBH, terminate BACnet bus from VZC to SBH, power up VZC, & verify it shows up on SBH. See page 4.
Step 18: Pull BACNet wire from VZC to all the controllers (strip but don’t terminate wires yet). See pages 3 & 4.
Step 19: While pulling the BACnet wire pull a 2 conductor 12awg power bus to all controllers. See page 3 Riser Diagram.
Step 20: Check all wires you just pulled for ground faults before you apply power or terminate BACnet bus.
Step 21: Install VEC controller inside RTU (leave powered down)
Step 22: Install DA & OA sensors & terminate to VEC checking all wires for ground faults. See page 5.
Step 23: Terminate all outputs on the VEC checking all wires for ground faults. See page 5.
Step 24: Power up VEC & verify it shows up on the SBH under the VZC.
Step 25: Install the BYP200 on the bypass damper & terminate BACnet wire checking for ground faults first.
Step 26: Install Discharge Air Static Pressure Sensor & terminate to BYP200. See page 7.
Step 27: If you have a 2nd Bypass Damper install actuator following wiring on page 7.
Step 28: Apply power to the BYP & verify it shows up on the SBH under the VZC.
Step 29: Install ZEC310 on each of the zone dampers & terminate BACnet wires.
Step 30: Unless there’s existing stat wire from controller to wall\zone sensor pull a 4 conductor wire. See page 9.
Step 31: On SA bus wires check for ground faults. Terminate the SA bus to controller & wall module. See page 9.
Step 32: Power up first ZEC310 controller & verify it shows up on the SBH. Repeat step 32 until all ZECs are showing up on SBH.
Step 33: Test your VEC. On the SBH click on “Devices”, select your VZC then VEC \ “Commissioning” \ “Commission Output” \ “Start Commissioning” \ set to “Trigger” \ now test each option verifying functionality.
Step 34: Go Back to “Start Commissioning” & set to “Normal”.
Step 35: Test each ZEC310. On the SBH click on “Devices”, select your VZC then VEC “Commissioning” & test functionality.
Step 36: Cause a trouble condition & verify email & text alerts are sent.
Step 37: Add login info (IP Address, User, & Password) to these drawings on Page 6.
Step 38: Redline these drawings & then print a new set to leave at the SBH & a copy to end user.

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| Drawing Title: **Standard Installation** | | | | | | | |
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| | REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY | |
| | Sales Engineer | Project Manager | Application Engineer | DRAWN BY Steve Nichols DATE 8-30-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Part VAV** | VERASYS™ | | Branch Thomson | CONTRACT NUMBER | | | |
| | | | | DRAWING NUMBER **19** | | | |

# Verasys Appendix

## Definitions:

**Actuator**-A controlled piece of hardware that rotates to open & close valves or dampers
**AHU**-Air Handling Unit. Typically heat supplied by a boiler & cool water supplied by a chiller
**BACnet IP**-BACnet communication over the internet
**BACnet MS\TP**-Master-Slave/Token Passing. 3 wire communication bus
**BACnet**-A data communication protocol for building automation & control networks
**BAS**-Building Automation System.
**BBMD**-BACnet/IP Broadcast Management Device. Not used unless your using BACnet/IP
**BYP200**-Bypass Damper Controller used for COBP.
**CO2**-Carbon Dioxide. Our bodies breathe in Oxygen & breath out CO2.
**COBP**-Change Over Bypass may also be called VVT. A type of zoning for your building using a bypass damper & zone dampers. Each zone gets a vote & the VZC determines the order of attention for each zone.
**DHCP**-When a router or gateway assigns an address to each device plugged into it (Can change with power cycle)
**Differential Pressure**-The difference in pressure between 2 given points. (like a VAV box or a filter)
**DNS**-Domain Name System. Similar to a phone book for the internet.
**DVC or DCV**-Demand Ventilation Control. A method to add fresh air in a room using CO2 sensors.
**ECM**-Electronically Commutated Controller. A DC powered motor that can vary the speed & torque.
**Ethernet**-A system for connecting a number of computers or controllers to form a local area network.
**FC**-BACnet ms\tp bus. Verasys can have up to 100 devices on this bus or 10 VZCs.
**Gateway**-The network hardware that routes information in your building.
**ISP**-Internet Service Provider. (Comcast, Century Link, Cox,….)
**LAN**-Local Area Network. A collection of devices connected together in one physical location, such as a building, office, or home.
**MA**-Mixed Air. Where outside air & return air from the building mix.
**OA**-Outside Air. Fresh air from outside the building.
**RA**-Return Air. Air from the building coming back into the duct work to be reused or cycled outside.
**RTU**-Rooftop Unit. A packaged unit that contains heating & cooling.
**SA-**Sensor Bus. Verasys can have 8 devices on this bus. It has to have 4 wires. 2 for power & 2 for data.
**SA**-Supply Air. May also be referred to as Discharge Air. This is the conditioned air from the RTU or AHU going into the space
**SBH**-Smart Building Hub. The internet hub for Verasys.
**SMART**-A software layer on many JCI products that allows them to be a plug & play device with Verasys.
**SSE**-Simplicity Smart Equipment. Many York RTU\AHU\Chillers, Coleman, Lux Air, Tempmaster, Quantech Chillers have the SSE card installed. This makes them a SMART plug & play device with Verasys.
**SSL**-Secure Sockets Layer. A computing protocol that ensures the security of data sent via the internet by using encryption.
**Static I.P. Address**- Similar to a phone number but on the internet. (Fixed) Used to access the SBH.
**Subnet**-A method used to separate a network in a building. BAS should be on it's own Subnet.
**TEC**-BACnet Stat for 3rd Party RTU, Heat Pumps, Unit Heaters, & Splits. Has a built in economizer. Can't control VFDs.
**TLS**-Transport Layer Security. A security protocol designed to facilitate privacy and data security for communications over the Internet.
**VAC-**RTU Controller for 3rd Party Units. Can also be used for IOM, Lighting, Boiler, Chiller, & Sideloop applications.
**VAV**-Variable Air Volume. A type of zoning for your building using VAV boxes & a VFD. RTU is usually cooling only.
**VEC**-RTU Controller for Zoning. There are multiple apps you can install on the VEC. (Heat Pump, Mod Heat Mod Cool, Mod Heat Stage Cool, Stage Heat Mod Cool, Stage Heat Stage Cool)
**VFD**-Variable Frequency Drive. Hardware that allows you to vary the speed of a fan or pump. Great for saving energy!
**VPN**-Virtual Private Network. A layer of internet security end user typically use requiring you to have a login to access their network.
**VZC**-Verasys Zone Coordinator. Verasys can have up to 10 VZCs on the FC System bus.
**ZA**-Zone Bus. Verasys can have up 33 controllers on this bus. 32 zones & 1 controller for RTU.
**ZEC310**-Damper Controller used for COBP.
**ZEC510**-VAV Box Controller. Can be used as stand alone zone control.

## The Gotchas:

#1-Current firmware is loaded at the factory. However we don't know how long a part will sit before installation. On every job update all hardware to current firmware versions.

#2-Identify what kind of system this is? SMART, 3rd Party, CV, VAV, VVT, Boiler, Chiller, Lighting, Power Monitoring? This will determine what parts & apps you need.

#2-Is the RTU or AHU motor an ECM? (variable speed motor...no need for a VFD)

#3-Is the fan motor single phase? (VFDs typically don't work on single phase)

#4-Does the OA Damper have an existing actuator & if so can you re-use it?

#5-Does the existing actuator even work?

#6-How does the actuator mount & will we need mounting hardware to mount a new actuator?

#7-How are you going to run the BACnet wire & how much do you need?

#8-Where will everything mount in RTU or AHU?

#9-Do the RTUs already have DCV & VFD's?

#10-Where am I going to mount the SBH & can I get internet access?

#11-Have you read the spec & have you reviewed the notes in the drawings?

#12-Can the RTU or AHU be used for VAV? Does it have a VFD or differential pressure?

#13-Is there already a BACnet Com card on the SSE board?

#14-Does the SSE board have 8mb of memory? If not it will lock up the board if you load the Verasys firmware on it.

#16-Make sure your power supply can handle the number of controllers you have on this job.

**Suggestion:** When bidding a job get pictures of the RTU TAG, nameplate on the fan motor, the inside of the RTU where equipment will mount, OA damper & how it mounts. If the RTU has an SSE card then take a detailed picture of the board & barcode on it to determine if it will work with Verasys. This is also a good time to meet with the I.T. group to see if you can be on their network. If they say "yes" then ask for: Static IP Address, Subnet Mask, Default Gateway, & Primary & a Secondary DNS Server. If they say "no" talk to the end user about getting internet from a local ISP. There's even a cellular option we could recommend for Vearsys.

## Helpful Links:

http://www.verasyscontrols.com/resources/training-and-education
http://www.verasyscontrols.com/resources/technical-literature-and-documentation#installation

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|---|---|---|---|---|---|---|---|
| Drawing Title: **Appendix** | | | | | | | |
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| | REFERENCE DRAWING | NO. | REVISION-LOCATION | ECN | DATE | BY | |
| | Sales Engineer | Project Manager | Application Engineer | DRAWN BY: Steve Nichols DATE: 1-3-2022 | | APPROVED BY | DATE |
| Project Title: **3rd Party VAV** | VERASYS | | Branch Information | CONTRACT NUMBER | | | |
| | | | | DRAWING NUMBER: **20** | | | |