



# BAC-9000 Series VAV Controller

## Installation Guide

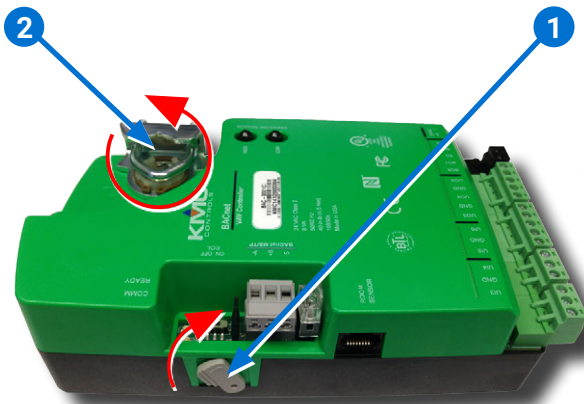
Complete the following steps to install a Conquest™ BAC-9000 Series VAV Controller-Actuator. For controller specifications, see the [data sheet](#) at [kmcccontrols.com](#).

### SET DRIVE HUB ROTATION LIMIT

**NOTE:** Complete Steps 1–5 if the VAV damper rotation limit is either 60 or 45 degrees.

**NOTE:** If the VAV damper rotates 90 degrees, go to step 6.

1. Push and hold the **gear release** **1** and rotate the **drive hub** and **V-clamp** **2** to the left.



**NOTE:** The **V-clamp nuts** **3** should be on top.



2. Turn the controller over.
3. Remove the **stop screw** **4** from the storage location and clean any debris from the threads.



4. Insert the stop screw into the **60** **5** or **45** **6** stop hole position.



5. Tighten the screw until the screw head touches the plastic in the bottom of the recess.

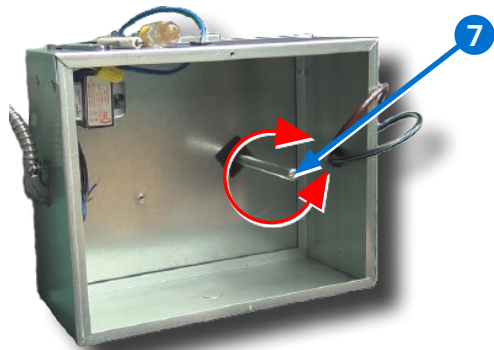
**NOTE:** Overtightening the screw can cause compression in the case which may interfere with the controller operation.

### MOUNT CONTROLLER

**NOTE:** The controller can be installed on a 3/8–5/8 inch (9.5–16 mm) round or 3/8–7/16 inch (9.5–11 mm) square damper shaft with a minimum length of 2 inches (51 mm).

**NOTE:** Install the controller in a metal enclosure.

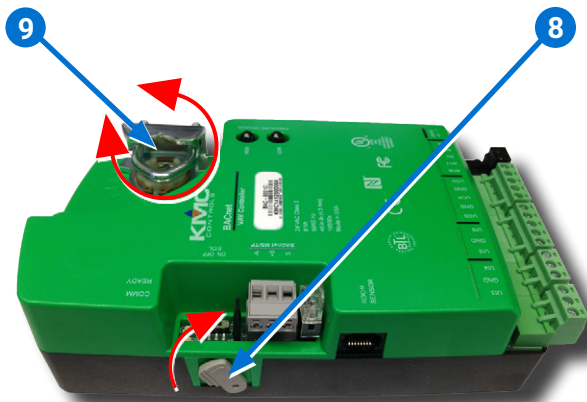
6. Manually rotate the **damper shaft** **7** on the VAV box to fully open the damper.



**NOTE:** The drive hub and V-clamp will be rotated in the same direction in Step 8.

7. Push and hold the **gear disengagement lever** **8** on the side of the controller.
8. Rotate the **drive hub and V-clamp** **9** in the same direction that opened the damper.

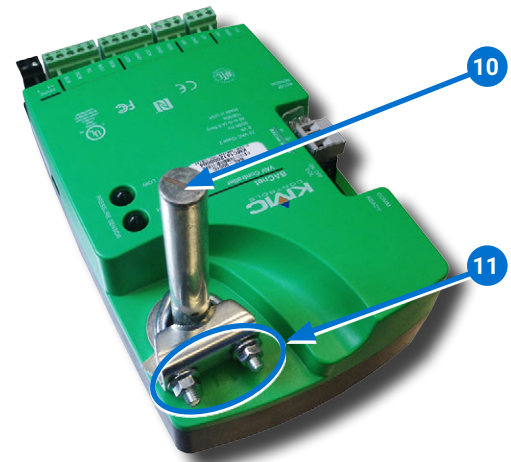
**NOTE:** Continue to rotate the drive hub and V-clamp until they reach a stop.



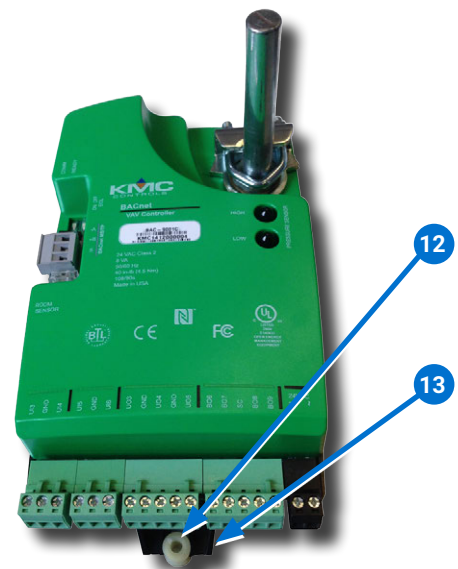
9. Position the controller over the **damper shaft** **10** so the color coded **terminal blocks** are easy to access for wiring.

**NOTE:** The black terminals are for power. The green terminals are for inputs and outputs. The gray terminals (if present) are for MS/TP communication.

10. Finger tighten the **V-clamp nuts** **11** to position the damper shaft in the drive hub.



11. Center the **mounting bushing** **12** in the **mounting tab** **13**.



12. Attach the controller to the VAV box with a **#8 sheet metal screw** through the **mounting bushing** **12**.

13. Evenly tighten the **V-clamp nuts** **11** on the drive hub to 30–35 in-lb.

## CONNECT SENSORS AND EQUIPMENT

**NOTE:** A digital **STE-9000 Series NetSensor** can be used for configuring the controller (see **Controller Setup on page 6**). After the controller has been configured, an **STE-6010**, **STE-6014**, or **STE-6017** analog sensor can be connected to the controller in place of the NetSensor. See the relevant installation guide for additional details.

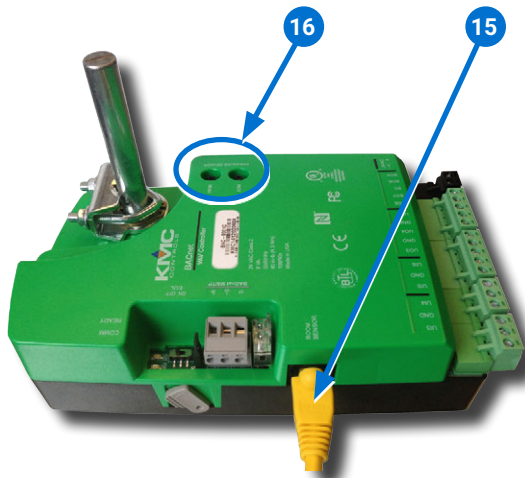
14. Plug an **Ethernet patch cable** 14 connected to an STE-9000 Series or STE-6010/6014/6017 sensor into the **ROOM SENSOR** 15 port of the controller.



**NOTE:** The Ethernet patch cable should be a maximum of 150 feet (45 meters).

**CAUTION**

**On Conquest “E” models, do NOT plug a cable meant for Ethernet communications into the Room Sensor port! The Room Sensor port powers a NetSensor, and the supplied voltage may damage an Ethernet switch or router.**

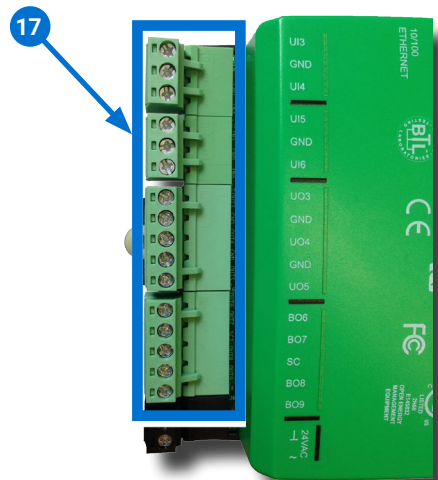


**NOTE:** Auxiliary VAV equipment such as fans, heaters, reheat valves, and discharge air temperature sensors can be connected to the controller.

15. Connect auxiliary VAV equipment to the **green terminal blocks** 17.

**NOTE:** Wire sizes 12–24 AWG can be clamped together into each terminal.

**NOTE:** No more than two (16 AWG) wires can be joined at a common point.



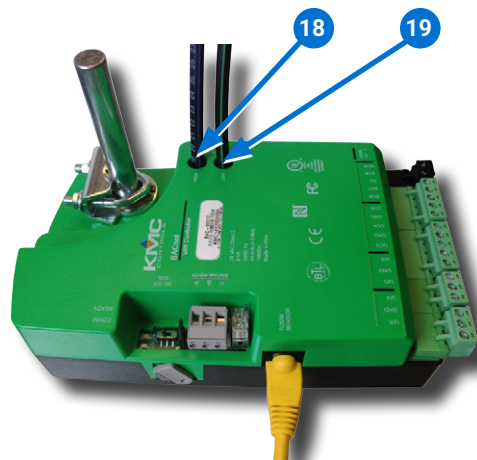
**CONNECT (OPT.) PRESSURE FLOW SENSOR**

**NOTE:** Complete Steps 16–18 if an air flow sensor is connected to the controller.

**NOTE:** The BAC-9021 controller does not have PRESSURE SENSOR ports.

**NOTE:** Use 1/4 inch (6.35 mm) FR tubing. Tubing should not be longer than 20 feet (6 meters).

16. Remove the **black shipping plugs** 16 from the PRESSURE SENSOR ports.
17. Connect the high pressure tube from the pressure flow sensor to the **HIGH** 18 port on the controller.
18. Connect the low pressure tube from the pressure flow sensor to the **LOW** 19 port on the controller.

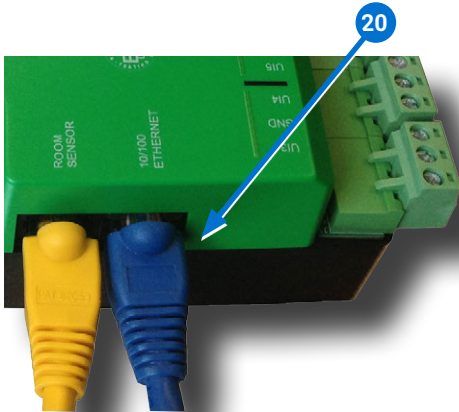


## CONNECT (OPTIONAL) ETHERNET NETWORK

19. Connect an **Ethernet patch cable 20** to the **10/100 ETHERNET** port (BAC-9001CE only).

### ⚠ CAUTION

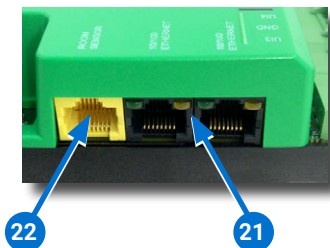
**On Conquest “E” models, do NOT plug a cable meant for Ethernet communications into the Room Sensor port! The Room Sensor port powers a NetSensor, and the supplied voltage may damage an Ethernet switch or router.**



**NOTE:** The Ethernet patch cable should be T568B Category 5 (or better) and a maximum of 328 feet (100 meters) between devices.

**NOTE:** Before May 2016, BAC-9001CE models had a single Ethernet port 20. They now have dual Ethernet ports 21, enabling daisy-chaining of controllers. See the **Daisy-Chaining Conquest Ethernet Controllers Technical Bulletin** in the Downloads section of the **KMC Partner web site** for more information.

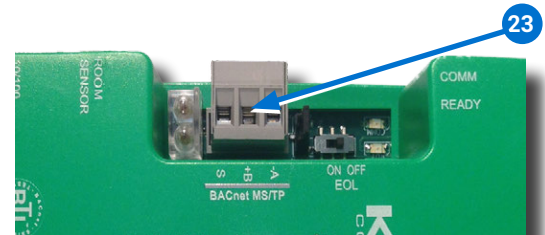
**NOTE:** On the newer models, the Room Sensor port is yellow 22 instead of black to help differentiate it from the black Ethernet ports.



## CONNECT (OPTIONAL) MS/TP NETWORK

20. Wire the network to the gray **BACnet MS/TP network terminal block 23**.

**NOTE:** Use 18 gauge AWG shielded twisted pair cable with maximum capacitance of 51 picofarads per foot (0.3 meters) for all network wiring (Belden cable #82760 or equivalent).



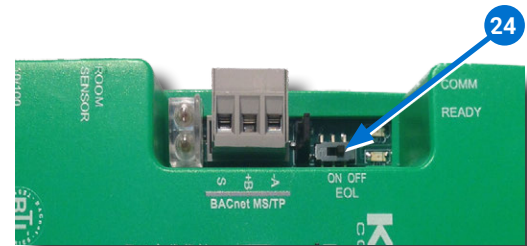
21. Connect the –A terminals in parallel with all other –A terminals on the network.
22. Connect the +B terminals in parallel with all other +B terminals on the network.
23. Connect the shields of the cable together at each device using a wire nut or the S terminal in KMC BACnet controllers.
24. Connect the cable shield to a good earth ground at **one end only**.

**NOTE:** For principles and good practices when connecting an MS/TP network, see **Planning BACnet Networks (Application Note AN0404A)**.

## SELECT END OF LINE (EOL)

**NOTE:** The EOL switch is shipped from the factory in the OFF position.

25. If the controller is at either end of a BACnet MS/TP network, turn the **EOL switch 24** to **ON**.



## CONNECT POWER

**NOTE:** Follow all local regulations and wiring codes.

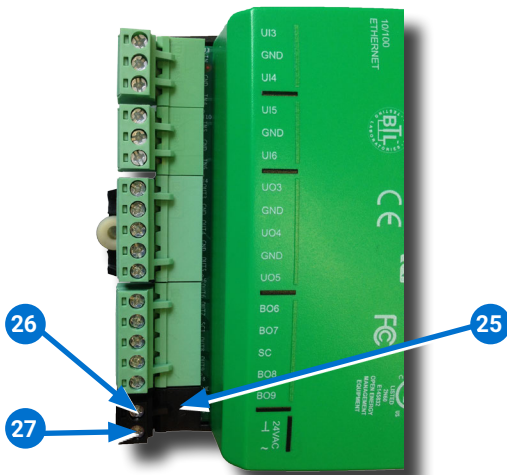
**NOTE:** Use either shielded connecting cables or enclose all cables in conduit to maintain RF emissions specifications.

**NOTE:** Connect a 24 VAC, Class-2 transformer to the **black power terminal block** 25 of the controller.

**NOTE:** Connect only one controller to each 24 VAC, Class-2 transformer with 12–24 AWG copper wire.

26. Connect the neutral side of the transformer to the controller's **common terminal** 26.

27. Connect the AC phase side of the transformer to the controller's **phase terminal** 27.



## POWER AND COMMUNICATION STATUS

The **status LEDs** indicate power connection and network communication.

**NOTE:** If neither the green READY LED nor the amber COMM LED is lit, check the fuse, power, and cable connections to the controller.

### GREEN READY LED 28

- ◆ During initialization, the green READY LED is ON for 5 to 20 seconds.
- ◆ Then, after initialization, it flashes once per second, indicating power.

### AMBER BACnet MS/TP COMM LED 29

- ◆ The amber COMM LED flashes at a one-half-second rate during power-up.
- ◆ Then it flickers as it receives and passes the token over the BACnet MS/TP network.



### GREEN ETHERNET LED 30

The **Ethernet status LEDs** indicate network connection and communication speed.

- ◆ The green Ethernet LED stays ON when the controller is connected to the network.
- ◆ The green Ethernet LED is OFF when the controller is not powered or not communicating with the network.

### AMBER ETHERNET LED 31

- ◆ The amber Ethernet LED flashes when the controller is communicating with the network.
- ◆ The amber Ethernet LED is OFF when the controller is communicating with the network at 10 Mbps.

**NOTE:** If neither the green Ethernet LED nor the amber Ethernet LED is lit, check the power and network cable connections.



## NETWORK ISOLATION BULBS

The two **network isolation bulbs** 32 serve three functions:

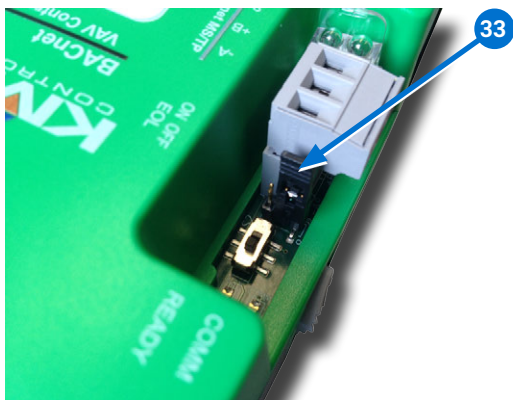
1. Removing the bulbs opens the MS/TP circuit and isolates the controller from the network.

2. If one or both bulbs are lit, it indicates the network is improperly phased.
  - ◆ This means the ground potential of the controller is not the same as other controllers on the network.
  - ◆ If this happens, fix the wiring. See **Connect (Optional) MS/TP Network on page 4**.
3. If the voltage or current on the network exceeds safe levels, the bulbs blow, opening the circuit. If this happens, fix the problem and replace the bulb assembly.

### WATCH DOG JUMPER

The **watch dog jumper 33** resets the controller if there is a power failure or a communication timeout between the controller and the network:

**NOTE:** The controller is shipped from KMC with the watch dog jumper installed on the outer two pins. Never remove it from the pins.



## CONTROLLER SETUP

Refer to the table below to set-up the controller. For more information, see the documents or Help systems for the respective KMC Tool.

SETUP PROCESS			KMC TOOL
Config-uration	Programming (Control Basic)	Web Page Graphics*	
✓			Conquest NetSensor
✓			KMC Connect Lite (NFC) app or software**
✓	✓		KMC Connect software
✓***	✓***	✓	TotalControl software
✓	✓		KMC Converge module for Niagara <sup>AX</sup> WorkBench
		✓	KMC Converge <b>GFX</b> module for Niagara <sup>AX</sup> WorkBench

\*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.

\*\*Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app or a PC (with an HPO-9003 NFC-Bluetooth/USB module/fob) running the KMC Connect Lite Desktop software.

\*\*\*Full configuration and programming of KMC Conquest controllers is supported starting with TotalControl ver. 4.0.

**NOTE:** After the controller has been configured, an STE-6010/6014/6017 series analog sensor can be connected to the controller in place of an STE-9000 series digital NetSensor.

**NOTE:** In addition to these methods of configuration for all Conquest controllers, a BAC-9001CE can also be configured by connecting an HTML5-compatible web browser to the controller's default IP address (192.168.1.251). Refer to the **Conquest Ethernet Controller Configuration Web Pages Application Guide** for more information about the built-in configuration web pages.

## REPLACEMENT PARTS

**HPO-0055** Replacement Network Bulb Module for Conquest Controllers, Pack of 5

**HPO-9901** Conquest Hardware Replacement Parts Kit

**NOTE:** HPO-9901 includes the following:

<b>Terminal Blocks</b>	<b>DIN Clips</b>
(1) Black 2 Position	(2) Small
(2) Grey 3 Position	(1) Large
(2) Green 3 Position	
(4) Green 4 Position	
(2) Green 5 Position	
(2) Green 6 Position	

**NOTE:** See the **Conquest Selection Guide** for more information about replacement parts and accessories.

## IMPORTANT NOTICES

The material in this document is for information purposes only. The contents and the product it describes are subject to change without notice.

KMC Controls, Inc. makes no representations or warranties with respect to this document. In no event shall KMC Controls, Inc. be liable for any damages, direct, or incidental, arising out of or related to the use of this document.

The KMC logo is a registered trademark of KMC Controls, Inc. All rights reserved.

TEL: 574.831.5250  
FAX: 574.831.5252  
EMAIL: [info@kmccontrols.com](mailto:info@kmccontrols.com)

