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### INTRODUCTION

Complete the following steps to install a KMC Conquest™ BAC-9300 Series Unitary Controller. For controller specifications, see the [data sheet](#) at [kmccontrols.com](http://kmccontrols.com). For additional information, see the [KMC Conquest Controller Application Guide](#).

### MOUNT CONTROLLER

- NOTE:** Mount the controller inside a metal enclosure for RF shielding and physical protection.
- NOTE:** To mount the controller with **screws** on a flat surface, complete the steps in **On a Flat Surface on page 1**. Or to mount the controller on a 35 mm **DIN rail** (such as integrated in an **HCO-1103** enclosure), complete the steps in **On a DIN Rail on page 1**.

#### On a Flat Surface

1. Position the controller so the color-coded **terminal blocks** **1** are easy to access for wiring.

**NOTE:** The black terminals are for power. The green

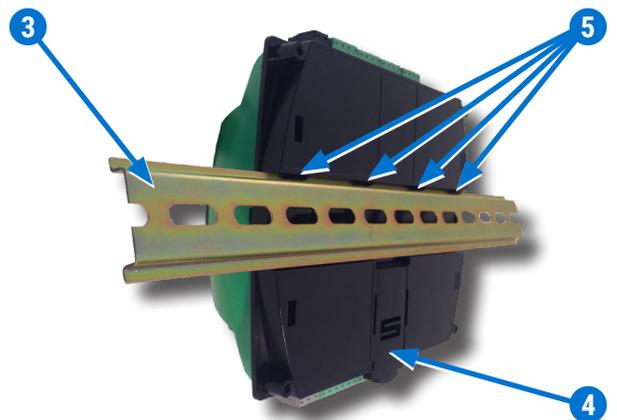
terminals are for inputs and outputs. The gray terminals are for communication.

2. Screw a #6 sheet metal screw through each corner of the **controller** **2**.



#### On a DIN Rail

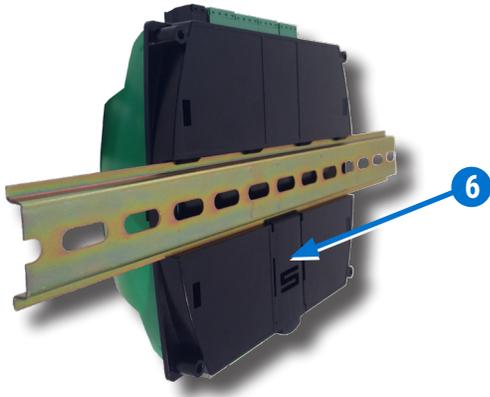
1. Position the **DIN rail** **3** so that when the controller is installed the color-coded terminal blocks are easy to access for wiring.
2. Pull out the **DIN Latch** **4** until it clicks once.
3. Position the controller so that the top **four tabs** **5** of the back channel rest on the DIN rail.



4. Lower the controller against the DIN rail.

5. Push in the **DIN Latch** **6** to engage the DIN rail.

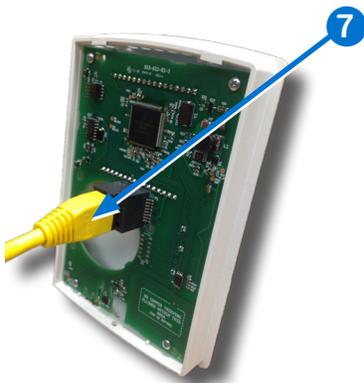
**NOTE:** To remove the controller, pull the DIN Latch until it clicks once and lift the controller off the DIN rail.



## CONNECT SENSORS AND EQUIPMENT

**NOTE:** See **Sample (BAC-9311) Wiring on page 7** and **Input/Output Objects/Connections on page 8** for more information. See also the BAC-9300 series videos in the **KMC Conquest Controller Wiring** playlist.

**NOTE:** A digital **STE-9000 Series NetSensor** can be used for configuring the controller (see **Configure/Program the Controller 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.



1. Plug an **Ethernet patch cable** **7** connected to an STE-9000 Series or STE-6010/6014/6017 sensor into the (yellow) **ROOM SENSOR port** **8** 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.



2. Wire any additional sensors to the **green (input) terminal block** **10**. See **Sample (BAC-9311) Wiring on page 7**.

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

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



3. Wire additional equipment (such as fans, heaters, dampers, and valves) to the **green (output) terminal block** **11**. See **Sample (BAC-9311) Wiring on page 7**.

**⚠ CAUTION**

**Do NOT connect 24 VAC to the analog outputs (U07–U010 and GNDs)!**

**NOTE:** Use 24 VAC (only) with triac outputs (B01–B06 with SCs).

### CONNECT (OPT.) PRESSURE FLOW SENSOR

**NOTE:** Complete the steps in this section to connect an air flow sensor to the BAC-9311/9311C/9311CE controller.

**NOTE:** BAC-9301/9301C/9301CE controllers do **not** have PRESSURE SENSOR ports.

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

1. Remove the **black shipping plugs 9** from the PRESSURE SENSOR ports.
2. Connect the high pressure tube from the pressure flow sensor to the **HIGH 12** port on the controller.
3. Connect the low pressure tube from the pressure flow sensor to the **LOW 13** port on the controller.



### CONNECT (OPT.) ETHERNET NETWORK

1. For BAC-93x1CE models (only), connect an **Ethernet patch cable 14** to the **10/100 ETHERNET** port ("E" models only).

**⚠ CAUTION**

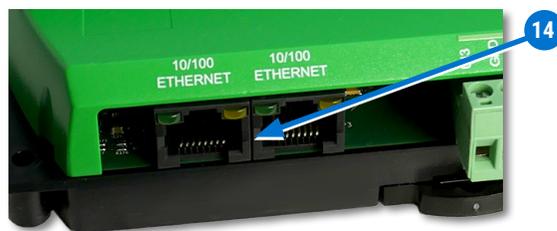
**On Conquest "E" models, do NOT plug a cable meant for Ethernet communications into the Room Sensor port! The Room Sensor port powers a NetSensor, and the supplied voltage may damage an Ethernet switch or router.**

**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-xxxxCE models had a single Ethernet port. They now have dual Ethernet ports, enabling daisy-chaining of controllers **14**. See the **Daisy-Chaining Conquest Ethernet Controllers Technical Bulletin** for more information.

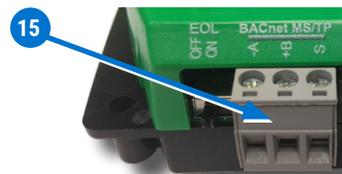
**NOTE:** On newer models, the Room Sensor port is yellow **8** instead of black to help differentiate it from the black Ethernet ports.

**NOTE:** For more information, see **Sample (BAC-9311) Wiring on page 7** and the BAC-9300 series videos in the **KMC Conquest Controller Wiring** playlist.



### CONNECT (OPTIONAL) MS/TP NETWORK

1. For BAC-93x1/93x1C models (only), connect the BACnet network to the **gray BACnet MS/TP terminal block 15**.



**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).

- A. Connect the **-A** terminals in parallel with all other **-A** terminals on the network.
- B. Connect the **+B** terminals in parallel with all other **+B** terminals on the network.

- C. Connect the **shields** of the cable together at each device using a wire nut or the **S** terminal in KMC BACnet controllers.
2. 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 \(Application Note AN0404A\)](#).

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

3. If the controller is at either end of a BACnet MS/TP network (only one wire under the terminals), turn the **EOL switch 16** to **ON**.

**NOTE:** For more information, see [Sample \(BAC-9311\) Wiring on page 7](#) and the BAC-9300 series videos in the [KMC Conquest Controller Wiring](#) playlist.



## CONNECT POWER

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

1. Connect a 24 VAC, Class-2 transformer to the **black power terminal block** of the controller.
  - A. Connect the neutral side of the transformer to the controllers **common terminal ⊥ 17**.
  - B. Connect the AC phase side of the transformer to the controllers **phase terminal ~ 18**.



**NOTE:** Connect only one controller to each transformer with 12–24 AWG copper wire.

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

**NOTE:** For more information, see [Sample \(BAC-9311\) Wiring on page 7](#) and the BAC-9300 series videos in the [KMC Conquest Controller Wiring](#) playlist.

## POWER AND COMMUNICATION STATUS

The **status LEDs** indicate power connection and network communication. The following descriptions explain their activity during **normal operation** (at least 5 to 20 seconds **after** power-up/initialization or restart).

**NOTE:** If both the green READY LED and the amber COMM LED remain OFF, check the power and cable connections to the controller.

### Green READY LED 19

After controller power-up or restart is complete, the READY LED flashes steadily about once per second, indicating normal operation.



### Amber (BACnet MS/TP) COMM LED 20

- During normal operation, the COMM LED flickers as the controller receives and passes the token over the BACnet MS/TP network.
- When the network is **not** connected or

communicating properly, the COMM LED flashes more slowly (about once a second).

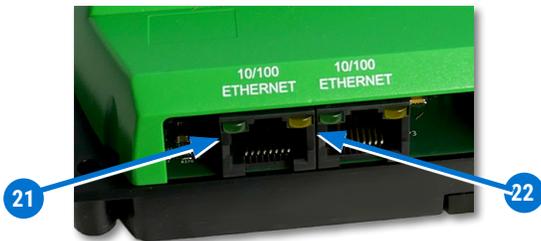
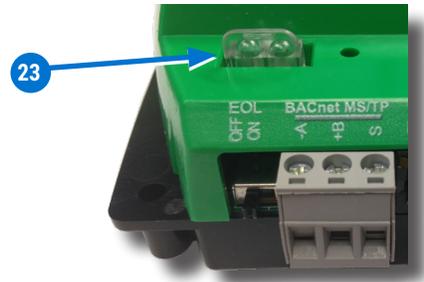


- If one or both bulbs are ON, the network is improperly phased. This means the ground potential of the controller is not the same as other controllers on the network. If this happens, fix the wiring. See **Connect (Optional) MS/TP Network on page 3**.
- If the voltage or current on the network exceeds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

### Green ETHERNET LED 21

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

- The green Ethernet LED stays ON when the controller is communicating with the network.
- The green Ethernet LED is OFF when the (powered) controller is **not** communicating with the network.



### Amber ETHERNET LED 22

- The amber Ethernet LED flashes when the controller is communicating with a 100BaseT Ethernet network.
- The amber Ethernet LED remains OFF when the (powered) controller is communicating with the network at only 10 Mbps (instead of 100 Mbps).

**NOTE:** If both the green and amber Ethernet LEDs remain OFF, check the power and network cable connections.

## MS/TP NETWORK ISOLATION BULBS

The two **network isolation bulbs** 23 serve three functions:

- Removing the (**HPO-0055**) bulb assembly opens the MS/TP circuit and isolates the controller from the network.

## CONFIGURE/PROGRAM THE CONTROLLER

See the table for the most relevant KMC Controls tool for configuring, programming, and/or creating graphics for the controller. See the documents or Help systems for the respective KMC tool for more information.

See the table (on the next page) for the most relevant KMC Controls tools for configuring, programming, and/or creating graphics for the controller. See the tools' documents or Help systems for more information.

**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:** A BAC-9301CE can be configured by connecting an HTML5-compatible web browser to the controller's default IP address (192.168.1.251). See the [Conquest Ethernet Controller Configuration Web Pages Application Guide](#) for more information about the built-in configuration web pages.

**NOTE:** To configure a VAV controller, enter the correct **K factor** for the VAV box. Typically, this is supplied by the manufacturer of the VAV unit. If this information is unavailable, use an approximate K factor from the chart in the Appendix: K Factors for VAV section in the [KMC Conquest Controller Application Guide](#).

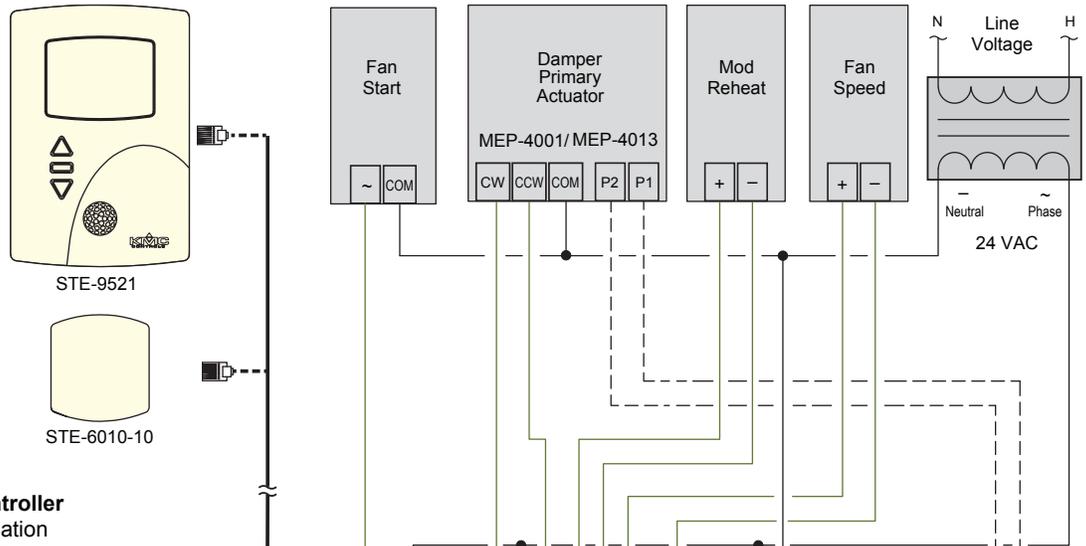
For instructions on **VAV balancing**:

- With an **STE-9000** series NetSensor, see the VAV Airflow Balancing with an STE-9xx1 section of the [KMC Conquest Controller Application Guide](#).
- With a **BAC-5051E Router**, see its [application and installation guide](#).
- With **KMC Connect** or **TotalControl**, see the Help system for the software.

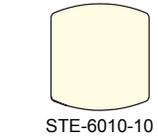
SETUP PROCESS			KMC CONTROLS TOOL
Configuration	Programming (Control Basic)	Web Page Graphics*	
✓			Conquest Net-Sensor
✓			Internal configuration web pages in Conquest Ethernet "E" models**
✓			KMC Connect Lite™ (NFC) app***
✓	✓		KMC Connect™ software
✓****	✓****	✓	TotalControl™ software
✓	✓		KMC Converge™ module for Niagara Workbench
		✓	KMC Converge <b>GFX</b> module for Niagara Workbench
<p>*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.</p> <p>**Conquest Ethernet-enabled "E" models with the latest firmware can be configured with an HTML5 compatible web browser from pages served from within the controller. For information, see the <a href="#">Conquest Ethernet Controller Configuration Web Pages Application Guide</a>.</p> <p>***Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app.</p> <p>****Full configuration and programming of KMC Conquest controllers is supported starting with TotalControl ver. 4.0.</p>			

# SAMPLE (BAC-9311) WIRING

## (Single Duct VAV, Series Fan Powered with Modulating Reheat and Vent Control)



**NOTE:** Connect the **STE-9xxx** (or **STE-6010/6014/6017** with no ventilation control) sensor to the Room Sensor port using a max. of 150 feet of Ethernet patch cable.



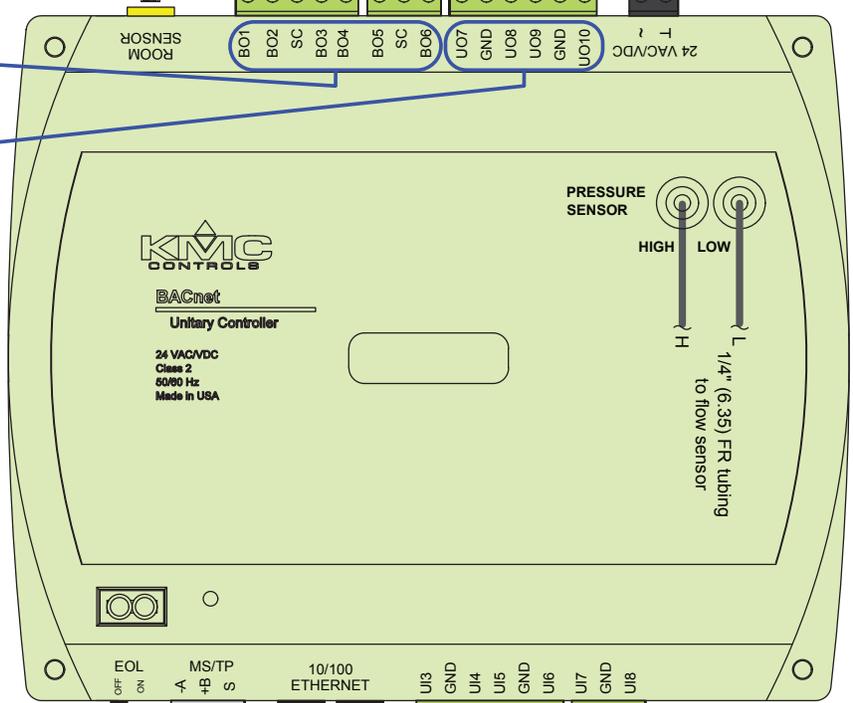
**NOTE:** See the **KMC Conquest Controller Application Guide** for information about switched commons (SC), using VDC power, and other issues.

**NOTE:** Use 24 VAC (only) on triac outputs (BO1–BO6 with SCs)!

**CAUTION:** Do NOT connect 24 VAC to the analog outputs (UO7–UO10 and GNDs)!

CONNECTIONS (SAMPLE)	
INPUTS	
U13	= DAT SENSOR
U18	= PRI POSITION
ROOM SENSOR	
OUTPUTS (Binary/Triac)	
BO1	= FAN ENABLE
BO5	= PRI DAMPER CW
BO6	= PRI DAMPER CCW
OUTPUTS (Universal/Analog)	
UO7	= MOD REHEAT
UO8	= FAN SPEED
NETWORK	
MS/TP OR ETHERNET	
POWER	

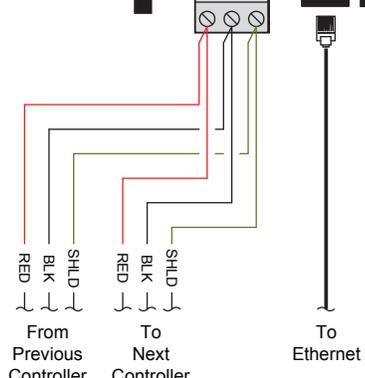
BAC-9311 Controller



**NOTE:** For **MS/TP** models, turn the End Of Line switch ON at both physical ends of the MS/TP network. Connect the cable shield to earth ground at only one point.

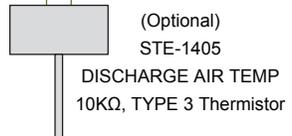
**NOTE:** For **Ethernet** models, connect the controller to the network with a standard Ethernet patch cord.

**NOTE:** For more **wiring examples**, see the wiring diagrams that are part of the application library in KMC Connect, Converge, or TotalControl. Early models shown in the drawings had different terminal locations. Follow the terminal **labels** (not location).



(From Optional MEP-4x13 10K Ohm Feedback Potentiometer)

**NOTE:** Analog inputs accept 1K or 10K sensors, 0–12 VDC, or 4–20 mA.



**INPUT/OUTPUT OBJECTS/CONNECTIONS**

<b>BAC-9301 FCU (2-PIPE)</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI6/UI6	Supply Water Temperature
AI8/UI8	Analog Input #8
BI7/UI7	Fan
<b>Outputs</b>	
AO7/UO7	Analog Heat/Cool Valve (Proportional)*
AO8/UO8	Auxiliary Heat (Proportional)**
AO9/UO9	Analog Output #9
AO10/UO10	Fan Speed Control
B01	Fan Low Speed
B02	Fan Medium Speed
B03	Fan High Speed
B04	Binary Heat/Cool Valve (On/Off)*
B05	Auxiliary Heat (On/Off)**
B06	Binary Output #6
*AO7 and B04 are controlled simultaneously.	
**AO8 and B05 are controlled simultaneously.	

<b>BAC-9301 FCU (4-PIPE)</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI7/UI7	Analog Input #7
AI8/UI8	Analog Input #8
BI6/UI6	Fan
<b>Outputs</b>	
AO7/UO7	Analog Cooling Valve (Proportional)*
AO8/UO8	Analog Heating Valve (Proportional)**
AO9/UO9	Analog Output #9
AO10/UO10	Fan Speed Control
B01	Fan Low Speed
B02	Fan Medium Speed
B03	Fan High Speed
B04	Binary Cooling Valve (On/Off)*
B05	Binary Heating Valve (On/Off)**
B06	Binary Output #6
*AO7 and B04 are controlled simultaneously.	
**AO8 and B05 are controlled simultaneously.	

<b>BAC-9301 HPU</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI7/UI7	Analog Input #7
AI8/UI8	Analog Input #8
BI6/UI6	Fan
<b>Outputs</b>	
AO7/UO7	Analog Output #7
AO8/UO8	Analog Output #8
AO9/UO9	Economizer Output
AO10/UO10	Analog Output #10
B01	Fan Start - Stop
B02	Stage 1 Compressor
B03	Stage 2 Compressor
B04	Reversing Valve
B05	Auxiliary Heat
B06	Binary Output #6

<b>BAC-9311 HPU</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI7/UI7	Analog Input #7
AI8/UI8	Analog Input #8
AI9	Duct Pressure ( <i>internal sensor</i> )
BI6/UI6	Fan
<b>Outputs</b>	
AO7/UO7	Analog Output #7
AO8/UO8	Analog Output #8
AO9/UO9	Economizer Output
AO10/UO10	Analog Output #10
B01	Fan Start - Stop
B02	Stage 1 Compressor
B03	Stage 2 Compressor
B04	Reversing Valve
B05	Auxiliary Heat
B06	Binary Output #6

<b>BAC-9301 RTU</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI7/UI7	Analog Input #7
AI8/UI8	Analog Input #8
BI6/UI6	Fan
<b>Outputs</b>	
A07/U07	Analog Cooling Output
A08/U08	Analog Heating Output
A09/U09	Economizer Output
A010/U010	Analog Output #10
B01	Fan Start - Stop
B02	Cool Stage 1
B03	Cool Stage 2
B04	Binary Output #4
B05	Heating Stage 1
B06	Heating Stage 2

<b>BAC-9311 RTU</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Outdoor Air Temp
AI5/UI5	Space Humidity
AI7/UI7	Economizer Feedback
AI8/UI8	Analog Input #8
AI9	Duct Pressure ( <i>internal sensor</i> )
BI6/UI6	Fan
<b>Outputs</b>	
A07/U07	Analog Cooling Output
A08/U08	Analog Heating Output
A09/U09	Economizer Output
A010/U010	Analog Output #10
B01	Fan Start - Stop
B02	Cool Stage 1
B03	Cool Stage 2
B04	Binary Output #4
B05	Heating Stage 1
B06	Heating Stage 2

<b>BAC-9311 VAV</b>	
<b>Inputs</b>	
AI1	Space Sensor ( <i>on Room Sensor port</i> )
AI2	Space Setpoint Offset ( <i>on port</i> )
AI3/UI3	Discharge Air Temperature
AI4/UI4	Analog Input #4
AI5/UI5	Analog Input #5
AI6/UI6	Analog Input #6
AI7/UI7	Analog Input #7
AI8/UI8	Primary Damper Position
AI9	Primary Duct Pressure ( <i>internal sensor</i> )
<b>Outputs</b>	
A07/U07	Analog Heat
A08/U08	Fan Speed
A09/U09	Analog Output #9
A010/U010	Analog Output #10
B01	Fan
B02	Heating Stage 1
B03	Heating Stage 2
B04	Heating Stage3
B05	Primary Damper CW
B06	Primary Damper CCW

**NOTE:** See [Sample \(BAC-9311\) Wiring on page 7](#) for more information.

**NOTE:** Universal Input (UIx) terminal = Analog Input (AIx) object or Binary Input (BIx). Universal Output (UOx) terminal = Analog Output (AOx) object.

**NOTE:** Universal (analog) inputs and outputs can be configured to emulate binary (on/off or voltage/no-voltage) objects. They are used with GND terminals.

**NOTE:** Binary Output (BOx) terminals are triacs and are used with SC terminals instead of GND terminals.

## REPLACEMENT PARTS

<b>HPO-0055</b>	Replacement Network Bulb Module for Conquest Controllers, Pack of 5
<b>HPO-9901</b>	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

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