BAC-5971A Series Controller

Installation Guide

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INTRODUCTION

Complete the following steps to install a KMC Conquest BAC-5971A Series BACnet General Purpose Controller. For controller specifications, see the **data sheet** at **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. Input accuracy can be directly affected by both internal and external factors. Pay close attention to installation best practices, such as mounting product and temperature measuring devices and other input devices away from outside walls and drafts that can Interfere with accurate measurements.

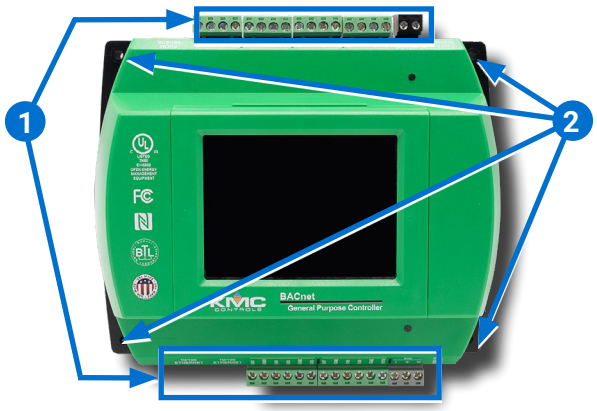
NOTE: To mount the controller with **screws** on a flat surface, complete the steps in **On a Flat Surface on page 1**. Or to mount the controller on a 35 mm **DIN rail**, complete the steps in **On a DIN Rail on page 1**.

On a Flat Surface

1. Position the controller on a flat surface so that the color-coded **terminal blocks** (1) are easy to access for wiring after the controller is mounted.

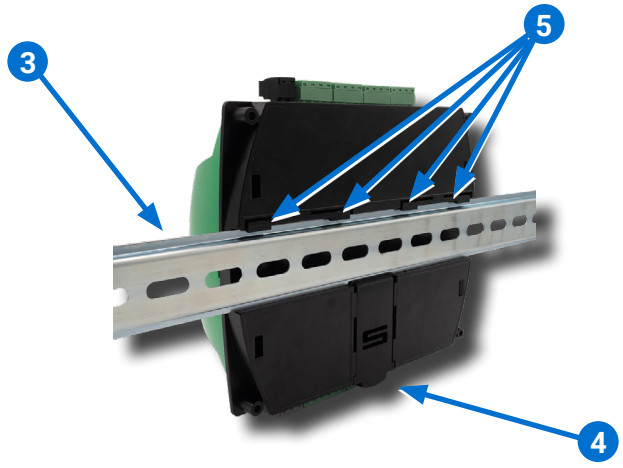
   NOTE: The black terminals are for power. The green terminals are for inputs and outputs. The gray terminals are for communication.

2. Secure a #6 sheet metal screw through each **corner** (2) of the controller.



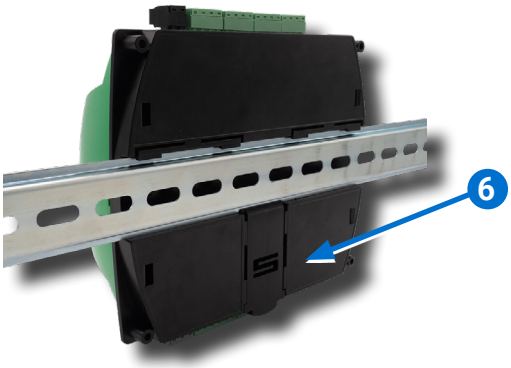
On a DIN Rail

1. Position the **DIN rail** (3) so that the color-coded terminal blocks are easy to access for wiring after the controller is mounted.
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 rail.

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

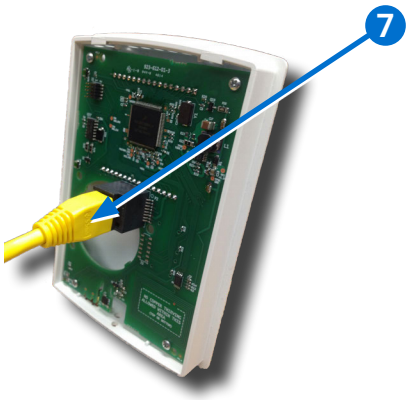


CONNECT SENSORS AND EQUIPMENT

NOTE: A digital **STE-9000 Series NetSensor** can be used for configuring the controller (see **Configure/Program the Controller on page 7**). 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.

NOTE: See **Sample (BAC-5971A) Wiring on page 8** for more information.

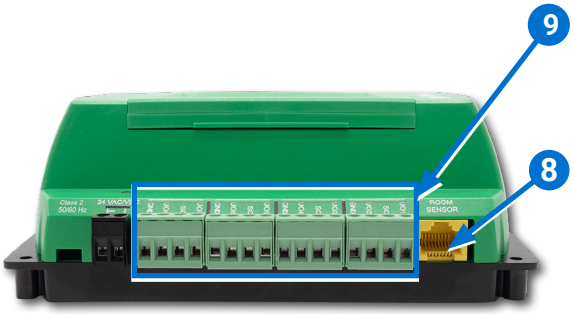
1. Plug an **Ethernet patch cable** 7 connected to an STE-9000 Series or STE-6010/6014/6017 sensor into the (yellow) **ROOM SENSOR** port 8 of the controller.



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

⚠ CAUTION

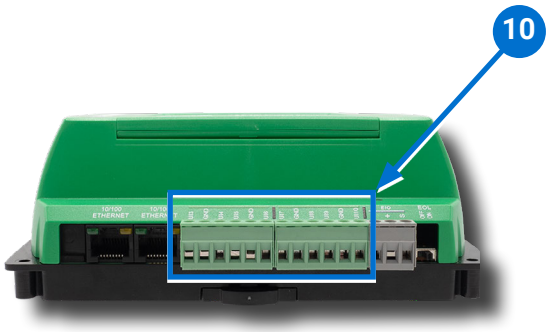
On Conquest "E" models, do NOT plug a cable meant for Ethernet communications into the Room Sensor port! The Room Sensor port powers a NetSensor, and the supplied voltage may damage an Ethernet switch or router.



2. Verify the controller is not connected to power.
3. Wire any additional sensors to the **green (input) terminal blocks** 9. See **Sample (BAC-5971A) Wiring on page 8**.

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.



4. Connect equipment to the **green (output) terminals** 10. See **Sample (BAC-5971A) Wiring on page 8** and BAC-5900A series videos on the **KMC Conquest Controller Wiring** playlist.

⚠ CAUTION

Do NOT connect 24 VAC to any output without first installing an HPO-6701, HPO-6703, or HPO-6705 override board first!

INSTALL (OPTIONAL) OVERRIDE BOARDS

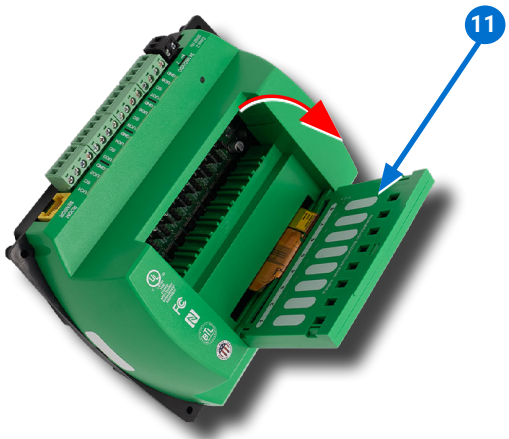
NOTE: Install output override boards for enhanced output options, such as manual control, using large relays, or for devices that cannot be powered directly from a standard output.

1. Verify the controller is not connected to power.

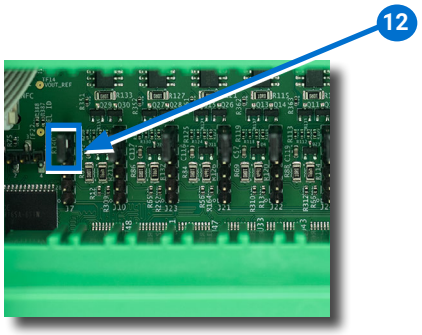
⚠ CAUTION

Connecting 24 VAC or other signals that exceed the operation specifications of the controller before an override board is installed will damage the controller.

2. Open the **plastic cover** 11.

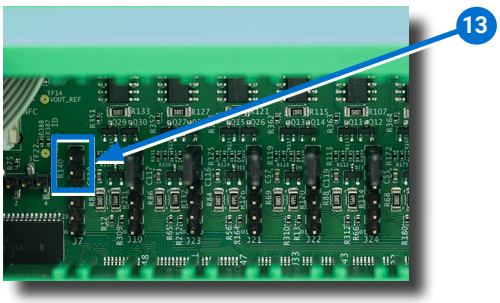


3. Remove the **jumper** 12 from the slot in which the override board will be installed.

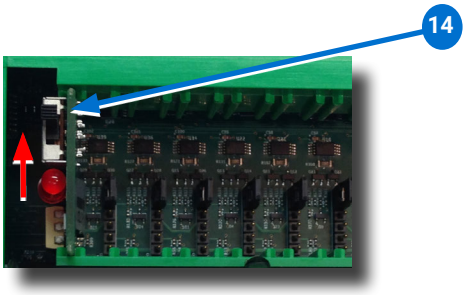


NOTE: Each of the eight override slots ships from KMC with a jumper installed on the two pins closest to the output terminal blocks. Only remove a jumper if an override board will be installed.

4. Install the override board in the slot in which the jumper was removed 13.



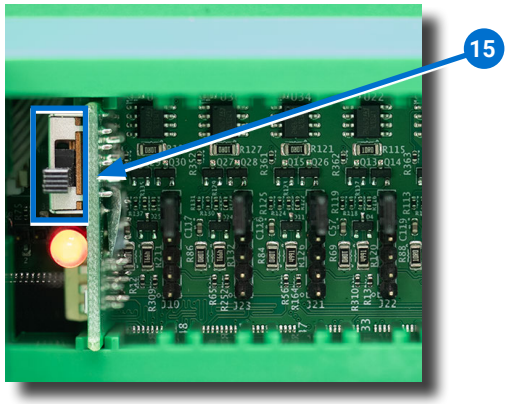
NOTE: Position the board with the **selection switch** 14 towards the top of the controller.



5. Close the plastic cover.

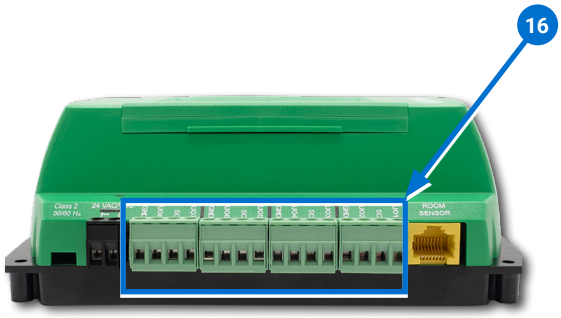
6. Move the **A-O-H selection switch** 15 on the override board to the appropriate position.

NOTE: Up = A = Automatic (Controller Operated)
Middle = O = Off
Down = H = Hand (Manually Operated (On))



NOTE: For more information, see the **HPO-6700 Series** installation guide and the HPO-6700 series videos in the **KMC Conquest Controller Wiring** playlist.

7. Wire the output device to the corresponding **green (output) terminal block** 16 of the override board.



NOTE: HPO-6701 triac and HPO-6703/6705 relay board circuits use the Switched Common **SC** terminal—not the Ground Common **GND** terminal.

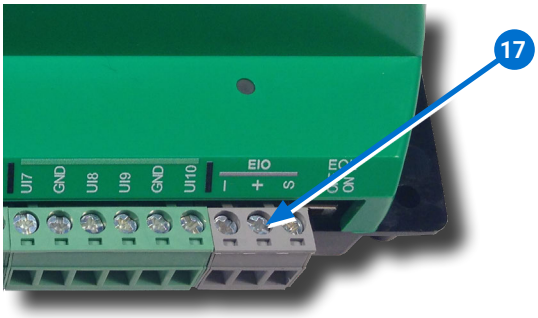
NOTE: HPO-6701 triac outputs are for 24 V**AC** only.

CONNECT (OPT.) EXPANSION MODULES

NOTE: Up to four CAN-5901 I/O expansion modules can be connected in series (daisy-chained) to a BAC-5971AC(E) A series controller to add additional inputs and outputs.

1. Wire the **gray EIO (Expansion Input Output) terminal block** 17 of the BAC-5971A series controller to the **gray EIO terminal block** of the CAN-5901.

NOTE: See the **CAN-5901 I/O Expansion Module Installation Guide** for details.



CONNECT (OPT.) ETHERNET NETWORK

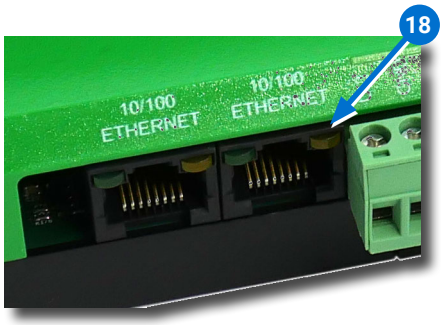
1. For a BAC-5971AC**E**, connect an **Ethernet patch cable** 7 to the **10/100 ETHERNET port** 18.

⚠ 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: BAC-5971ACE models have **dual Ethernet ports** 18, enabling daisy-chaining of controllers. See the **Daisy-Chaining Conquest Ethernet Controllers Technical Bulletin** for more information.



CONNECT (OPTIONAL) MS/TP NETWORK

1. For a BAC-5971AC, connect the network to the **gray BACnet MS/TP terminal block** 19.

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).

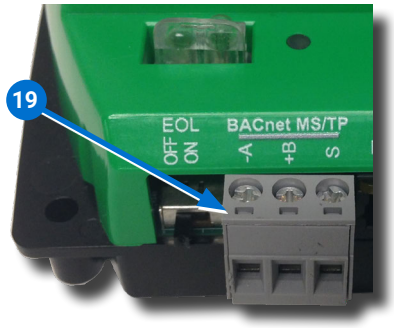
A. Connect the **–A** terminals in parallel with all other **–A** terminals on the network.

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** on KMC controllers.

NOTE: For more information, see **Sample (BAC-5971A) Wiring on page 8** and the BAC-5900 series videos in the **KMC Conquest Controller Wiring** playlist.

2. Connect the cable shield to a good earth ground at **one end only**.



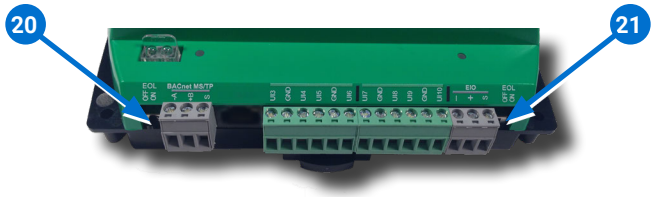
NOTE: For principles and good practices when connecting an MS/TP network, see **Planning BACnet Networks (Application Note AN0404A)**.

SELECT END OF LINES (EOL)

NOTE: EOL switches are shipped in the OFF position.

1. If the controller is at either end of a **BACnet MS/TP** network (with only one wire under each terminal), turn that **EOL switch** 20 to **ON**.

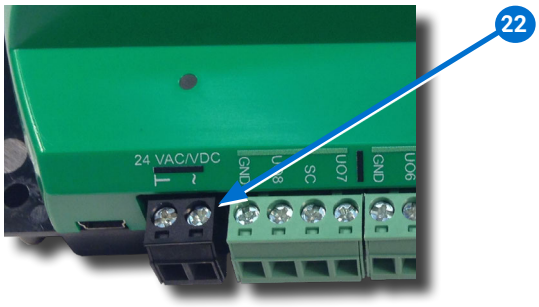
2. If the controller is at the end of an **EIO** (Expansion Input Output) network, turn that **EOL switch** 21 to **ON**.



CONNECT POWER

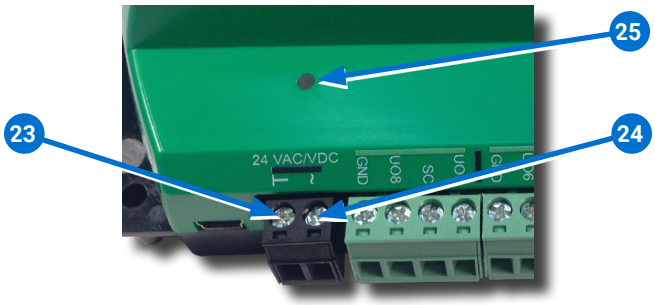
NOTE: Follow all local regulations and wiring codes.

1. Connect a 24 VAC, Class-2 transformer to the **black power terminal block** 22 of the controller.



A. Connect the neutral side of the transformer to the controller's **common terminal** 23.

B. Connect the AC phase side of the transformer to the controller's **phase terminal** 24.



NOTE: Connect only one controller to each 24 VAC, Class-2 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: To use **DC** power supply instead of AC, see the Power (Controller) Connections section of the **KMC**

Conquest Controller Application Guide.

NOTE: For more information, see **Sample (BAC-5971A) Wiring on page 8** and the BAC-5900 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 detail 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 25

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 26

- 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).

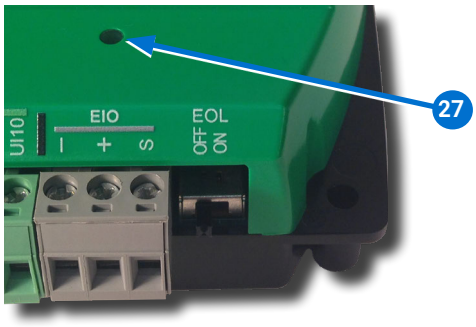
Green (EIO) COMM LED 27

The **Expansion Input Output (EIO) status LED** indicates EIO network communication with one or more CAN-5901 expansion modules.

After controller power-up or restart, the LED flickers as it receives and passes the token:

- The EIO LED flashes when the controller is communicating with the EIO network
- The EIO LED remains OFF when the (powered) controller is **not** communicating with the EIO network. Check the power and EIO network connections.

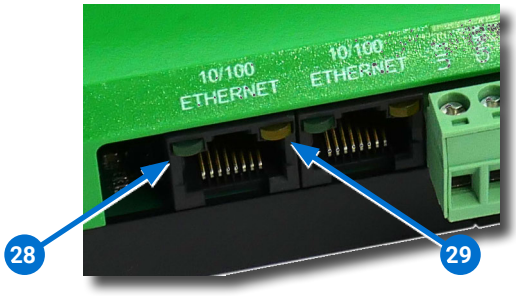
NOTE: See the **CAN-5901 I/O Expansion Module Installation Guide** for more information.



Green ETHERNET LED 28

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

- The green Ethernet LED is 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.

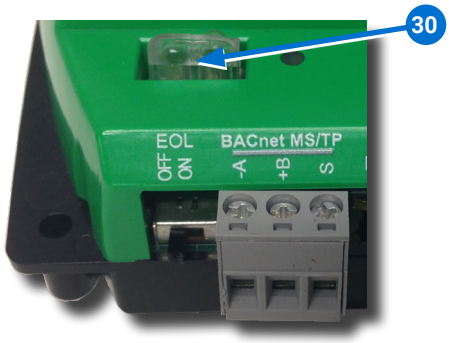


Amber ETHERNET LED 29

- 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 **MS/TP network isolation bulbs** 30 serve three functions:

- Removing the (**HPO-0055**) bulb assembly opens the MS/TP circuit and isolates the controller from the network.
- 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 4**.
- 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.

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 tools' documents or Help systems for more information.

SETUP PROCESS				KMC CONTROLS TOOL
Configuration	**Touchscreen UI Setup**	**Programming (Control Basic)**	**Web Page Graphics***	
✓				Built-in touchscreen display
✓				Conquest NetSensor
✓				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

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

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 (192.168.251). For information, see the **Conquest Ethernet Controller Configuration Web Pages Application Guide.

***Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app.

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

SAMPLE (BAC-5971A) WIRING

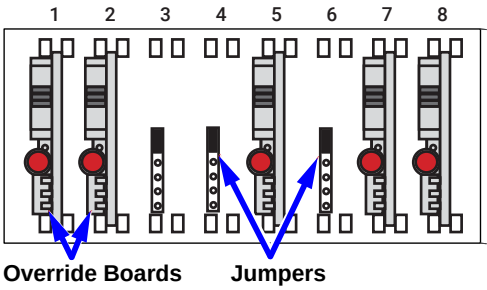
(General Purpose Applications)

CAUTION: Do NOT connect 24 VAC to the outputs unless an HPO-6701, HPO-6703, or HPO-6705 are installed!

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: To use an **override board** instead of the default universal output, remove the jumper and insert a board in that slot. For more information, see the installation guide for the HPO-6700 output override board series.



Override Boards **Jumpers**

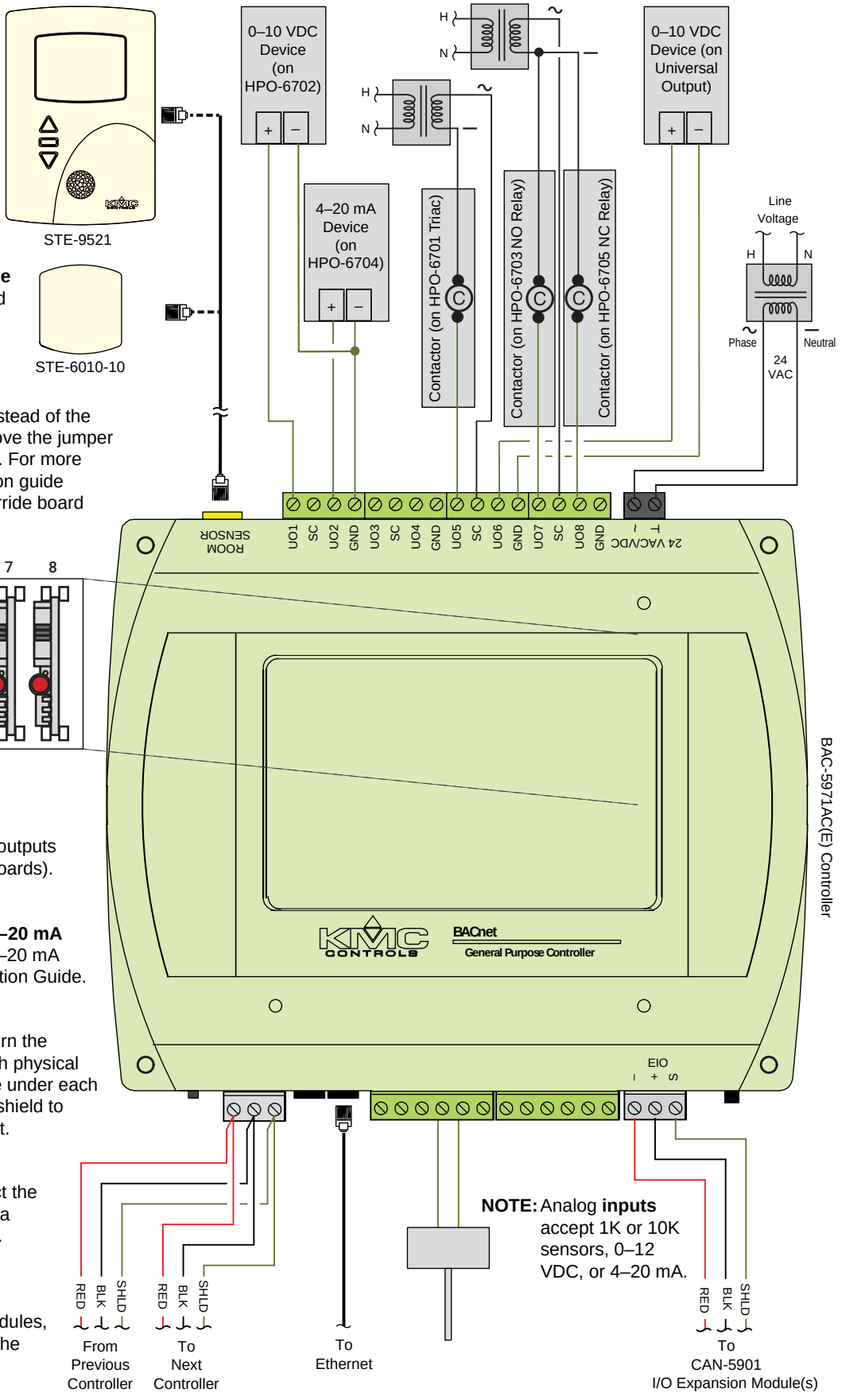
NOTE: Use 24 V**AC** (only) with triac outputs (HPO-6701 output override boards).

NOTE: For more information about **4–20 mA** inputs and outputs, see the 4–20 mA Wiring for Controllers Application Guide.

NOTE: For **EIO** and **MS/TP** wiring, turn the End Of Line switch ON at both physical ends of the network (one wire under each terminal). 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 information about connections to expansion modules, see the installation guide for the **CAN-5901**.



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

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:

Terminal Blocks	DIN Clips
(1) Black 2 Position Small	(2)
(2) Grey 3 Position Large	(1)
(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.

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The KMC Connect Lite™ app for NFC configuration is protected under United States Patent Number 10,006,654. Pat. https://www.kmccontrols.com/patents/

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