



Installation and Operation Guide



BAC-5831 Advanced Applications Controller

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Important notices

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SECTION 1

About the BAC-5831

This section provides a general description of the KMC Controls BAC-5831 controller. It also introduces safety information. Review this material before installing or operating the controller.

The BAC-5831 is a native BACnet, fully programmable, direct digital controller. Use this versatile general purpose controller in stand-alone environments or networked to other BACnet devices. As part of a complete facilities management system, the BAC-5831 controller provides precise monitoring and control of connected points. Controller features include:

- ◆ BACnet MS/TP compliant
- ◆ Automatically assigns the MAC address and the device instance
- ◆ Easy to install, simple to configure, and intuitive to program
- ◆ Controls room temperature, humidity, fans, monitors refrigeration, lighting, and other building automation functions

If using this controller in a smoke control system application, see Smoke Control Manual For BACnet Systems (000-35-08). Note that inputs and outputs of this controller are not supervised in (non-dedicated) smoke control applications.

Specifications

Inputs	16
Key features	Universal inputs programmable as analog, binary, or accumulator objects (accumulators limited to three per controller) Standard units of measure Overvoltage input protection
Pull-up resistors	Switch selectable none or 10k ohms
Connector	Removable screw terminal block, wire size 14–22 AWG
Conversion	10-bit analog-to-digital conversion
Pulse Counting	Up to 16 Hz
Input range	0–5 volts DC
NetSensor	Compatible with KMD-1160/1180 series NetSensors

Outputs	12
Key features	Output short protection Universal outputs programmable as analog or binary objects. Standard units of measure
Connector	Removable screw terminal block, wire size 14–22 AWG
Output voltage	0–10 volts DC analog 0–12 volts DC binary
Output current	100 mA per output maximum (or 450 mA total)

Programmable features	
Control Basic	10 program areas
Value objects	40 analog and 40 binary Real time clock with power backup for 72 hours
PID loop	12 objects See PIC statement for supported objects

Schedule	
Schedule objects	8
Calendar objects	3

Alarms and events	
Intrinsic reporting	Supported for input, output, value, accumulator, trend, and loop objects.
Notification class objects	8

Trend objects	8 objects, each of which holds 256 samples
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Memory	Programs and program parameters are stored in nonvolatile memory Auto restart on power failure
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Communications	
BACnet MS/TP	EIA-485 operating at rates up to 76.8 kilobaud Removable screw terminal block connector, wire size 14–22 AWG Automatic baud detection. Automatically assigns MAC addresses and device instance numbers Network connections are supervised in smoke control applications
NetSensor	Compatible with models KMD-1160/1180 series NetSensors via modular jack that supplies 5 volts DC @ 25 mA, typical

Regulatory	FCC Class B, Part 15, Subpart B BACnet Testing Laboratory listed CE compliant UL 916 Energy Management Equipment UL 864 Smoke Control Equipment listed (UUKL) (For smoke control applications, see Smoke Control Manual for BACnet Systems, P/N 000-035-08) SASO PCP Registration KSA R-103263
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Installation	
Supply voltage	24 volts AC (-15%, +20%), 50-60 Hz, 36 VA, Class 2 only, non-supervised (all circuits including supply voltage are power limited circuits)
Weight	2.4 lb. (1.1 kg)
Case material	Black powder-coated steel

Environmental limits	
Operating	32 to 120° F (0 to 49° C)
Shipping	-40 to 140° F (-40 to 60° C)
Humidity	0 to 95% relative humidity (non-condensing)

Dimensions

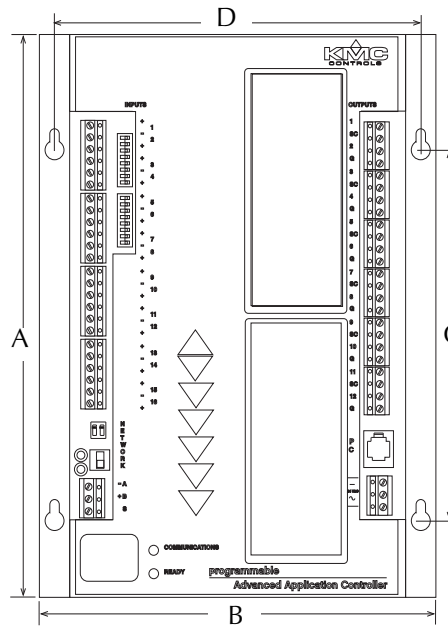


Table 1-1 BAC-5831 dimensions

A	B	C	D	Height (not shown)
9.00 in.	6.50 in.	6.00 in.	6.00 in.	0.98 in.
229 mm	165 mm	152 mm	152 mm	25 mm

Accessories

Output override boards	
HPO-6701*	For more details, see the HPO-6700 Series data sheet (P/N 902-035-10); only the HPO-6701 and HPO-6704 are approved for smoke control applications Triac output with zero-cross switching 0–10 VDC analog with override potentiometer Relay, normally open contacts 4–20 mA current loop with override potentiometer Relay, normally closed contacts Cover for output cards Replacement board guide rack insert Replacement flat cover
HPO-6702	
HPO-6703	
HPO-6704*	
HPO-6705	
HPO-6802	
883-319-01	
902-305-02	

Connectors and fuses

902-602-04	Replacement three-pin removable terminal block
031-602-02	Replacement four-pin removable terminal block
883-602-17	Replacement six-pin removable terminal block
902-600-05	Replacement fuse, 1.6 A, fast acting, 5 x 20 mm
HPO-0054	Replacement fuse bulb
HPO-0063	Replacement two-pin jumper

Surge suppressors

HPO-0070	Twelve-output transient suppressor board
HPO-0071	Eight-input transient suppressor board
KMD-5567	EIA-485 surge suppressor

Power transformer

XEE-6111-40	Transformer, 120-to-24 VAC, 40 VA, single-hub
XEE-6112-40	Transformer, 120-to-24 VAC, 40 VA, dual-hub
XEE-6112-100	Transformer, 120-to-24 VAC, 96 VA, dual-hub (the XEE-6112-100 must be used in smoke control applications)

Enclosures

HCO-1034	Energy management equipment enclosure 16 x 18 x 6 inches (406 x 457 x 152 mm)
HCO-1035	Energy management equipment enclosure 20 x 24 x 6 inches (508 x 610 x 152 mm)
HCO-1036	Energy management equipment enclosure 24 x 36 x 6 inches (610 x 914 x 152 mm)



Note

For smoke control applications, the controller must be mounted in a UL Listed FSCS enclosure or listed enclosure with minimum dimensions. A KMD-5567 is also required for the EIA-485 terminals of every controller and repeater. HPO-0070/0071s are also required on the controller inputs and outputs. See Smoke Control Manual for BACnet Systems (000-035-08) for smoke control application information.

Safety considerations

KMC Controls assumes the responsibility for providing you a safe product and safety guidelines during its use. Safety means protection to all individuals who install, operate, and service the equipment as well as protection of the equipment itself. To promote safety, we use hazard alert labeling in this manual where applicable. Follow the associated guidelines to avoid hazards.



Danger

Danger represents the most severe hazard alert. Bodily harm or death will occur if danger guidelines are not followed.



Warning

Warning represents hazards that could result in severe injury or death.



Caution

Caution indicates potential personal injury or equipment or property damage if instructions are not followed.



Note

Notes provide additional information that is important.



Detail

Provides programming tips and shortcuts that may save time.

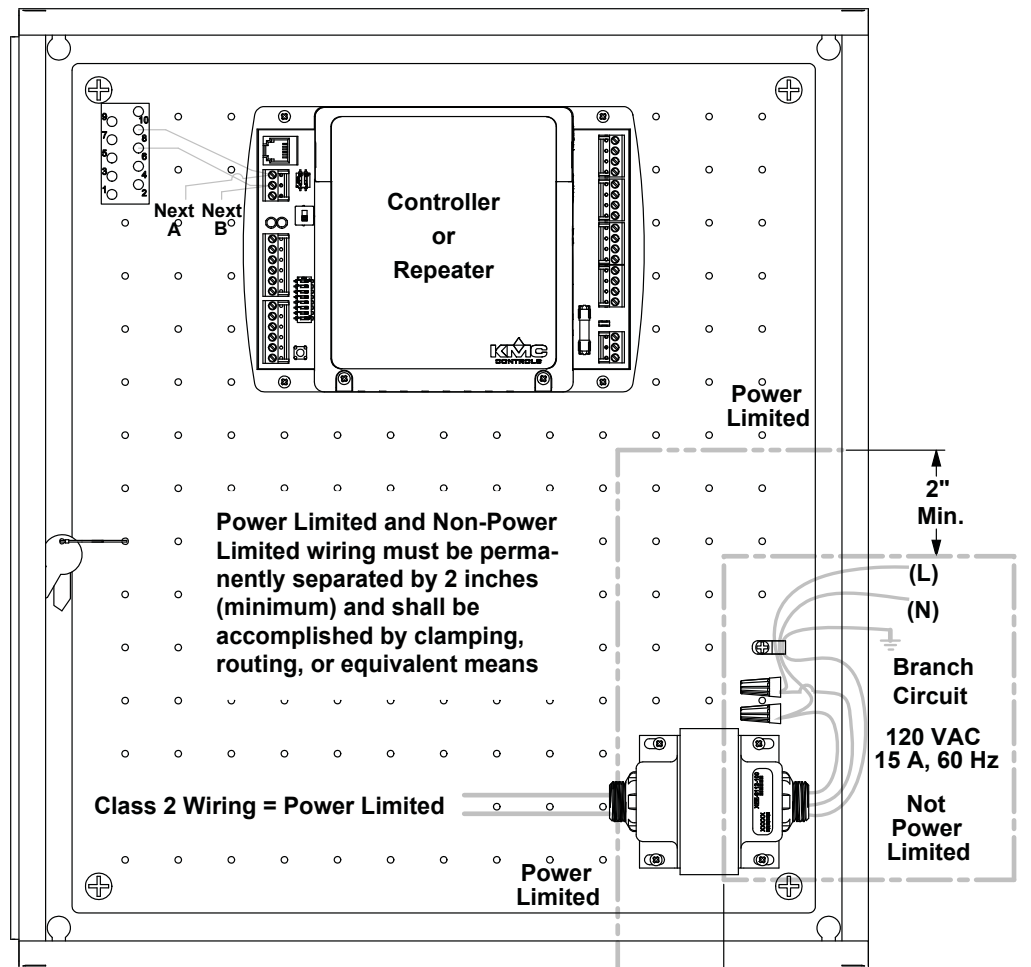
SECTION 2

Installing the controller

This section provides important instructions and guidelines for installing the BAC-5831 controller. Carefully review this information before installation.

Mounting

Mount the controller inside of a metal enclosure. For HVAC applications, KMC Controls recommends using a UL Listed enclosed energy management equipment panel such as a KMC model HCO-1034, HCO-1035, or HCO-1036.



Provide 15 Amp Branch Circuit:
 120 VAC, 60 Hz, 60°C, Cu Wire 14 AWG
 Panel Disconnect Provided by Installer
 Follow all local regulations and wiring codes when installing these products

Illustration 2-1 Enclosure mounting and wiring

For smoke control applications, the controller must be mounted in a UL Listed Firefighter's Smoke Control Station (FSCS) enclosure or listed enclosure with minimum dimensions. The minimum enclosure size is 16 x 18 x 6 inches. See [Illustration 2-1 on page 9](#) and Smoke Control Manual For BACnet Systems (P/N 000-035-08).

Use the four mounting holes on the top and bottom of the controller to fasten it securely to a flat surface with #6 or #8 hardware and spacers. Put spacers between the controller and the surface to maintain a minimum 1/4-inch space between the printed circuit board and the surface. See [Dimensions on page 5](#) for mounting hole locations and dimensions. To maintain RF emission specifications, use either shielded connecting cables or enclose all cables in conduit.

Wiring and terminal blocks

Terminal blocks are removable for wiring convenience. Wire sizes 14–22 AWG can be clamped into each terminal. No more than two (16 AWG) wires can be joined at a common point.

Connecting inputs

The BAC-5831 controller has 16 universal inputs. Each input can be configured to receive either analog or digital signals. Inputs of this controller are *not* supervised in smoke control applications.

For smoke control applications, an HPO-0071 Transient Suppressor Board must be used with all inputs. If a more than eight inputs are used, two HPO-0071s will be needed. See the HPO-0070/0071 installation guide (717-019-11) for installation details.

By using the optional pull-up resistors, either passive or active devices may be connected to the inputs.

Pull-up resistors

For passive input signals, such as thermistors or switch contacts, use a pull-up resistor. For KMC thermistors and most other applications set the switch to the *On* (right) position. For active voltage devices, set the switch to the *Off* (left) position. See [Illustration 2-2](#) and [Illustration 2-3](#).

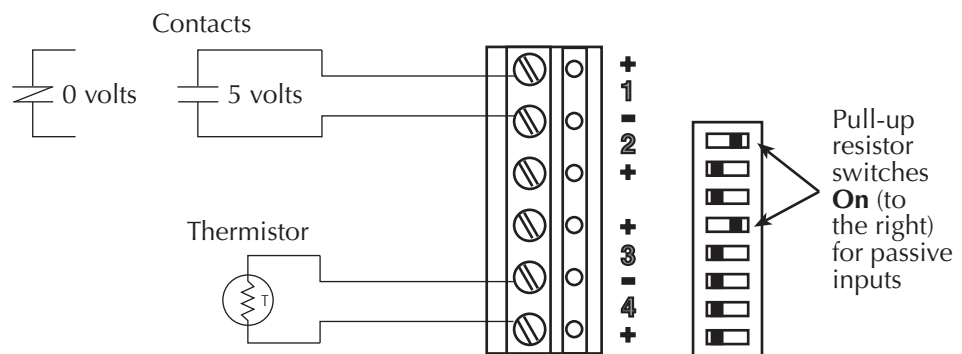


Illustration 2-2 Pull-up resistors On with passive devices

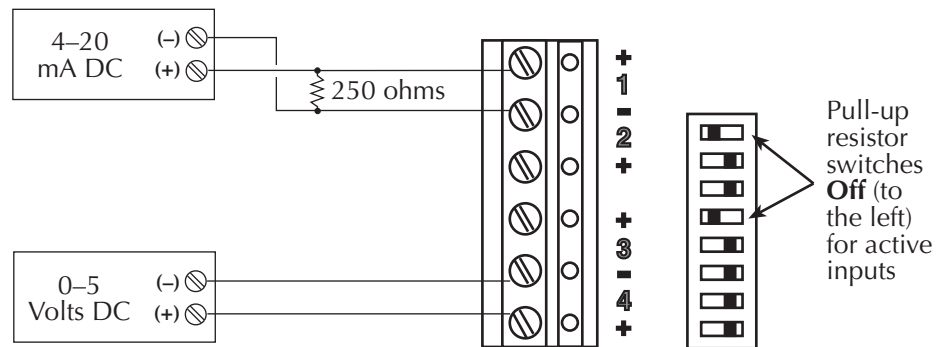


Illustration 2-3 Pull-up resistors Off with active devices

4–20 mA inputs

To use a 4–20 current loop input, connect a 250 ohm resistor from an input to ground. See [Illustration 2-3](#). The resistor will convert the current input to a voltage that can be read by the controller’s analog-to-digital converter. Set the pull-up switch to the *Off* position.

Ground terminals

Input ground terminals are located next to the input terminals.

Pulse inputs

Connect pulse inputs by the relevant means:

- ◆ If the pulse input is a passive input such as switch contacts, then place the input pull-up in the *On* position.
- ◆ If the pulse is an active voltage (up to a maximum of +5 volts DC), then place the input pull-up in the *Off* position.

For a **smoke control** Style “A” (Class B), contact only, initiating circuit (non-supervised): 5 volt DC nominal circuit voltage, 0.5 mA maximum short-circuit current, 5K ohms maximum line impedance.

Connecting outputs

All 12 controller outputs are universal and are configurable to produce either analog or binary signals. (Outputs of this controller are *not* supervised in smoke control applications.) For loads that exceed the output specifications of the controller, including loads that require AC, use an output override board (see [Override boards \(HPO-6700 series\) on page 13](#)).

For smoke control applications, an HPO-0070 Transient Suppressor Board must be used with all outputs. See the HPO-0070/0071 installation guide (717-019-11) for installation details.

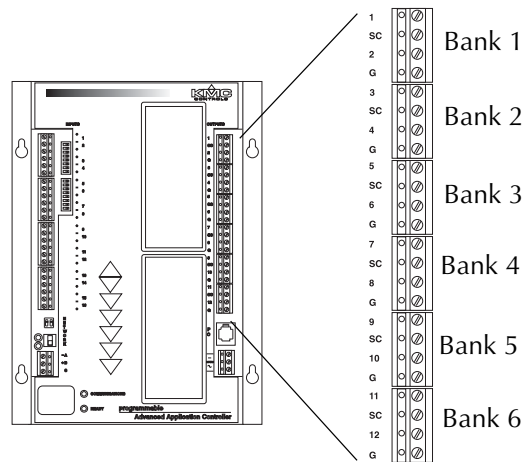


Illustration 2-4 Output terminals

Universal outputs

Connect the device under control between the output terminal and one of the ground (G) terminals on the same bank. The KMC BACnet controller universal outputs can be configured as **0 to 10 volts DC analog objects** or as **0 or 12 volts DC binary objects** in BACstage or TotalControl. For either type of output, the DC voltage signals can—within the specification of the output—connect directly to most equipment. For either type of output, the DC voltage signals can—within the specification of the output—connect directly to most equipment.

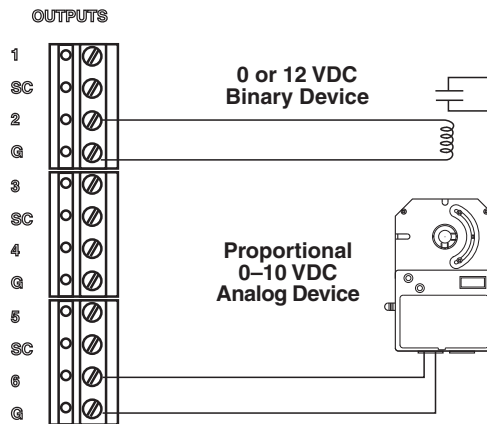


Illustration 2-5 Typical binary and analog output devices

Override boards (HPO-6700 series)

For enhanced output options, such as manual control or using large relays or devices that cannot be powered directly from a standard output, install output override boards (also called “cards”). The following output boards are available from KMC Controls (but only the HPO-6701 and HPO-6704 are approved for smoke control applications).

Table 2-1 Output override boards

Model number	Output type
HPO-6701*	Triac (AC only): zero-cross switching, optical isolation, 12 VAC min. and 30 VAC max. voltage, 20 mA min. current and max. current = 1A for 1 board (0.8 A max. for 2 boards, 0.6 A max. for 3–4 boards, and 0.5 A max. for 5–8 boards)
HPO-6702	0–10 VDC analog: short protection, 100 mA max., adjustable override potentiometer
HPO-6704**	4–20 mA (@ 10 VDC) current loop: short protection, 100 ohm min. and 500 ohm max., adjustable override potentiometer (since the HPO-6704 supplies the power, it will not work with a 4–20 mA device that also supplies its own power)
HPO-6703*	Normally open relay: 30 VAC/VDC, 2 A max., power factor 0.4
HPO-6705*	Normally closed relay: 30 VAC/VDC, 2 A max., power factor 0.4

**Note**

*With the **HPO-6701 triac** and **HPO-6703/6705 relays**, use only the Switched Common instead of Ground.

**Note**

The **HPO-6704 4–20 mA board supplies the power and will not work with a 4–20 mA device that also supplies its own power.

Install the output override cards in the area under the plastic cover at the top of the controller.

**Caution**

Connecting 24 volts AC or other signals that exceed the operation specifications of the controller before the output jumper is removed will damage the controller. Remove the jumper and install the override board before connecting AC or other voltage to output terminals of the controller.

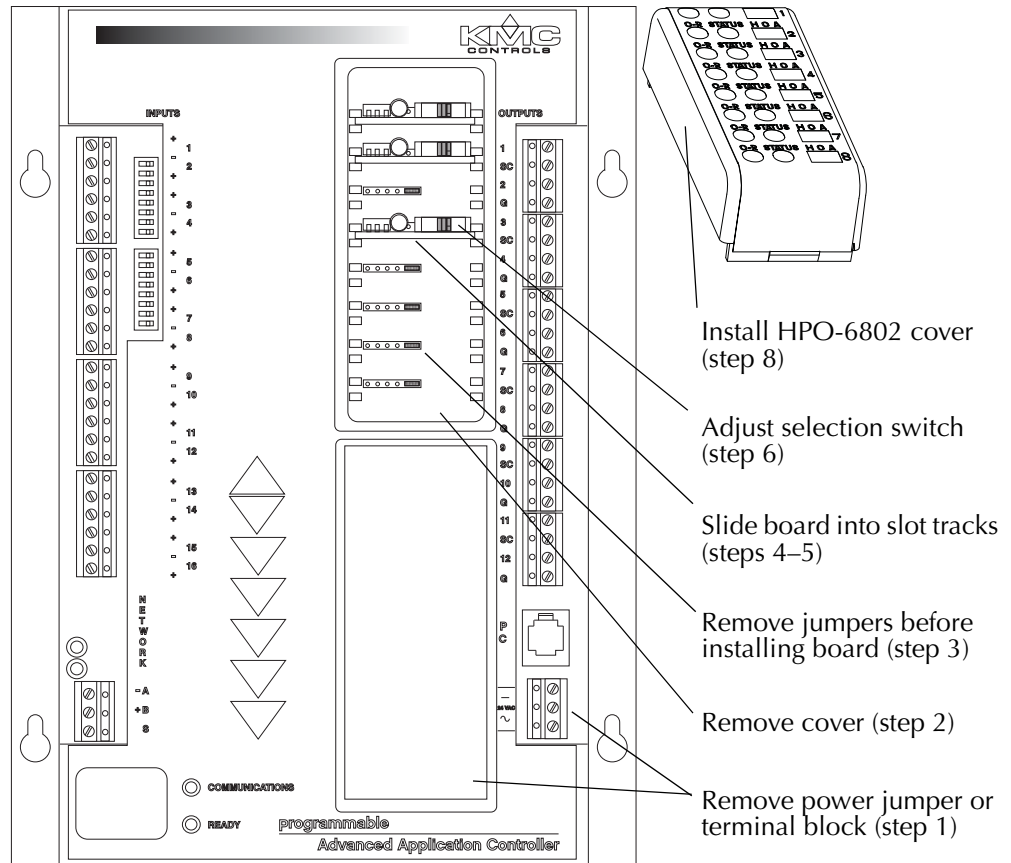


Illustration 2-6 Override boards

Installing Override Boards

Review the installation guide supplied with the override boards for complete operating and wiring instructions. To install an Override Board:

1. Disconnect the power by removing the power jumper (behind the lower cover) or power terminal block.
2. Remove the upper cover by lifting the right-hand side of the cover (within the plastic frame) toward you.
3. Remove the jumper from the mounting header.
4. Position the board above the relevant slot with the Hand-Off-Auto selection switch positioned toward the top.
5. Slide it down the integral board tracks onto the header pins.
6. If required, set the selection switch on the override board to the appropriate position. A (Automatic) is the upper position of the switch, O (Off) is the middle position, and H ("Hand" or On) is on the lower position.
7. Repeat steps 3 through 6 for all desired boards.
8. Snap the HPO-6802 cover over the boards.
9. Connect output devices to the controller.
10. Reinstall the power jumper or power terminal block.

Grounds and switched commons



Caution

Connecting 24 volts to an analog ground will result in improper operation and may result in equipment damage. **Use the appropriate Switched Common terminals instead of Ground with the HPO-6701 triac and HPO-6703/6705/6706 relays.**

Switched Common (SC) output terminals are unconnected in the controller unless an appropriate override output board is installed. Use only the Switched Common instead of Ground (GND) with the HPO-6701 triac and HPO-6703/6705/6706 relays. The switched common terminals are isolated from the circuit grounds used for the universal output analog circuitry in the controller.

Use the SC terminal in the same output bank as the output terminal. See [Illustration 2-4 on page 12](#) for bank locations. See also [Illustration 2-7](#) for wiring details (but only the HPO-6701 and HPO-6704 are approved for smoke control applications).

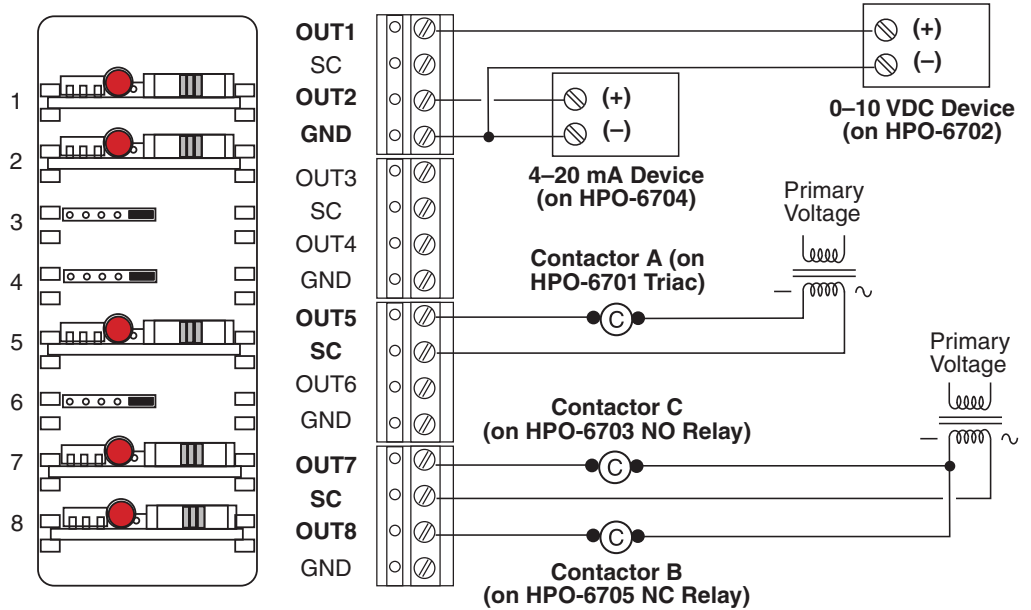


Illustration 2-7 Output override board options and connections

Connecting to a NetSensor

The Network modular connector provides a connection port to a KMD-1160/1180 series NetSensor. Link the controller to a NetSensor with a KMC Controls approved cable up to 75 feet long. See the installation guide supplied with the NetSensor for complete NetSensor installation instructions. (NetSensors are not part of smoke control applications.)

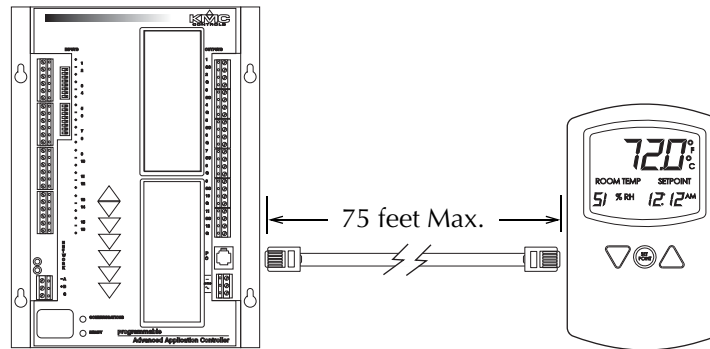


Illustration 2-8 Connection to a NetSensor

Connecting to an MS/TP

Connections and wiring

For HVAC applications, use the following general principles when connecting a controller to an MS/TP network:

- ◆ Connect no more than 128 addressable master BACnet devices to one MS/TP network. The devices can be any mix of controllers or routers.
- ◆ Use 18 gauge, twisted pair, shielded cable with capacitance of no more than 50 picofarads per foot for all network wiring. Belden cable model #82760 meets the cable requirements.
- ◆ Connect the $-A$ terminals in parallel with all other $-A$ terminals and the $+B$ terminals in parallel with all other $+B$ terminals.
- ◆ To maintain communications in case of an open conductor on the network cable (especially recommended in smoke control applications), redundant wiring routed separately enhances reliability.
- ◆ Connect the shields of the cable together at each device. For KMC BACnet controllers use the S terminal. Connect the shield to a good earth ground at one end only.
- ◆ Use a KMC KMD-5575 repeater after every 31 MS/TP devices or if the cable length exceeds 4,000 feet (1,220 meters). Generally, use no more than **four** repeaters per MS/TP network. (For smoke control applications, the maximum total length of the MS/TP network cable, including all repeaters, is 4,000 feet.) Do not connect the cable shield to the circuit GND terminal on the KMD-5575. For each network segment, connect the shields to a good earth ground at only one end of the segment; tape back the shield ground at the other end.
- ◆ Place a KMC KMD-5567 surge suppressor in the cable where it exits a building.

For more information on installing HVAC system controllers, see Planning BACnet Networks (Application Note AN0404A).

For **smoke control applications**, the maximum total length of the MS/TP network cable, including all repeaters, is 4,000 feet. The KMD-5575 repeater must also be powered by an approved XEE-6112-100 (96 VA) transformer in smoke control applications. The maximum number of KMC controllers (with optimized programming and on an optimized network) is **60** (including the controllers inside the FSCS). A KMD-5567 surge suppressor is also required for the MS/TP terminals of every controller and repeater. The MS/TP communications network is supervised in smoke control applications, and the ground fault impedance value for the circuit is 0 ohms. For specific information on smoke control systems, see Smoke Control Manual For BACnet Systems (000-35-08).

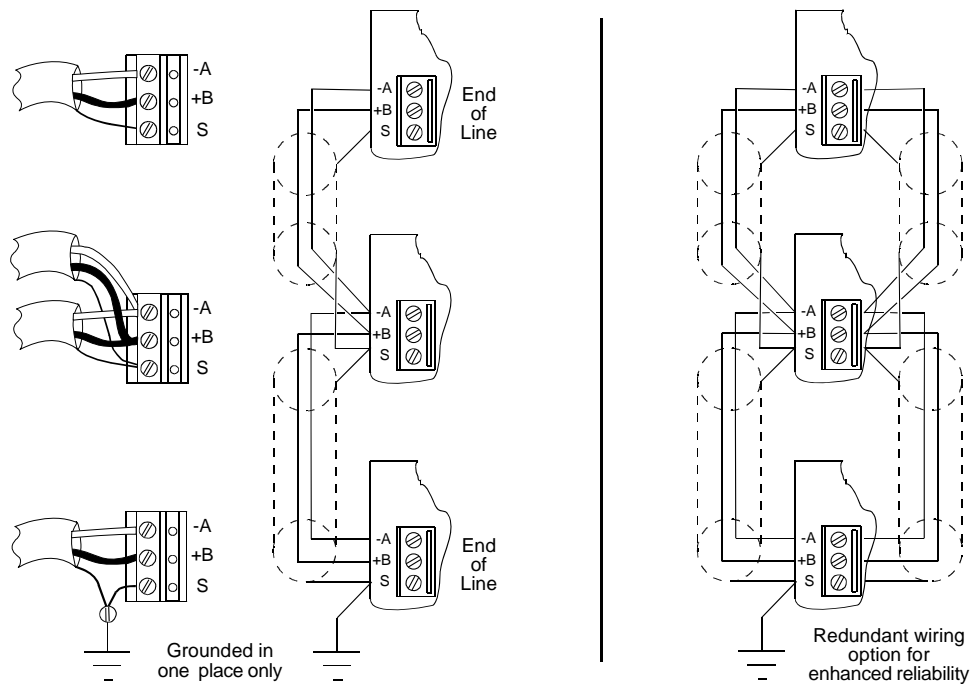


Illustration 2-9 MS/TP network wiring (standard and redundant option)



Note

The BAC-5831 EIA-485 terminals are labeled *-A*, *+B*, and *S*. The *S* terminal is provided as a connecting point for the shield. The terminal is not connected to the ground of the controller. When connecting to controllers from other manufacturers, verify the shield connection is not connected to ground.

End-of-line termination switches

The controllers on the physical ends of the EIA-485 wiring segment must have end-of-line termination installed for proper network operation. Set the end-of-line termination to *On* using the *EOL* switches.

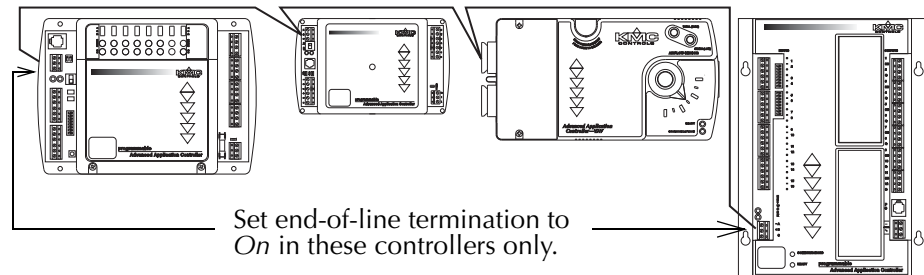


Illustration 2-10 End of line termination

[Illustration 2-11](#) shows the position of the end-of-line switches associated with the EIA-485 inputs in the BAC-5831.

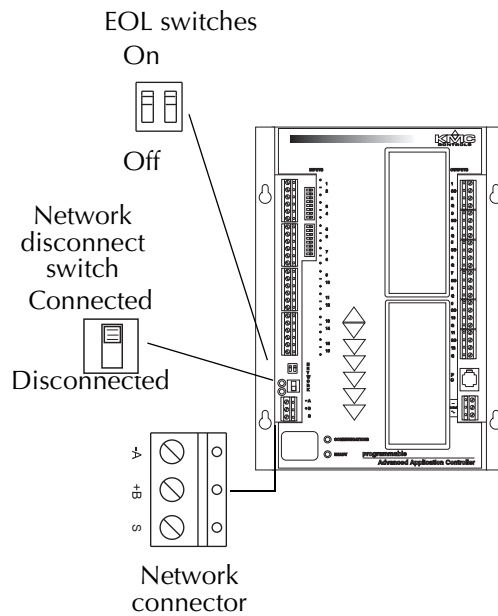


Illustration 2-11 Location of EOL switch

Connecting power

The BAC-5831 requires an external, 24 volt, AC power source. Use the following guidelines when choosing and wiring transformers.

- ◆ Use a KMC Controls Class-2 transformer of the appropriate size to supply power to the controllers. KMC Controls recommends powering only one controller from each transformer. (Only transformer model XEE-6112-100 is approved for smoke control applications.)
- ◆ All circuits, including supply voltage, are power limited circuits.
- ◆ AC power is non-supervised in smoke control applications.
- ◆ When installing a controller in a system with other controllers, you may power multiple controllers with a single transformer as long as the total power drawn from the transformer does not exceed its rating and phasing is correct.
- ◆ If several controllers are mounted in the same cabinet, you can share a transformer between them provided the transformer *does not exceed* 100 VA or other regulatory requirements.
- ◆ Do not run 24 volt, AC power from within an enclosure to external controllers.

Connect the 24 volt AC power supply to the power terminal block on the lower right side of the controller near the power jumper. Connect the ground side of the transformer to the – or GND terminal and the AC phase to the ~ (phase) terminal. Power is applied to the controller when the transformer is plugged in and the power jumper is in place. See also [Illustration 2-1 on page 9](#).

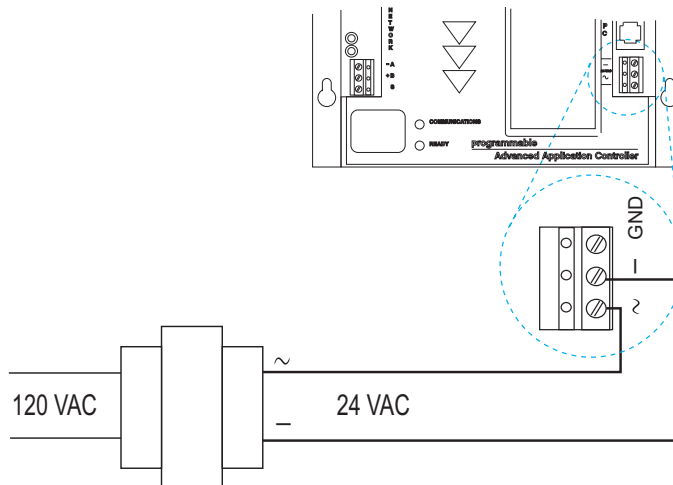


Illustration 2-12 Power terminal and jumper

Configuration and programming

Network configuration and programming

For more information on installing, configuring, and programming HVAC system controllers, see the following documents available on the KMC Controls web site:

- ◆ *BACstage User's Guide to Installation and Getting Started (902-019-62)*
- ◆ *BAC-5000 Reference Guide (902019-63)*
- ◆ *TotalControl Reference Guide*
- ◆ *Application Note AN0404A Planning BACnet Networks.*
- ◆ *MS/TP Automatic MAC Addressing Installation Instructions*

For more information on smoke control systems, see Smoke Control Manual For BACnet Systems (000-35-08).

Real Time Clock (RTC) and Time Updates

The BAC-5831 has a (hardware) RTC; other controllers may have only a software-based clock. Both the RTC and software-based clocks are updated by time synchronization messages from a time master device, such as computer with BACstage or TotalControl connected to the network

Controllers with an RTC are guaranteed to maintain accurate time for 72 hours without power being supplied to the controller.

Controllers with a software-based clock can be updated (in addition to the time master device) by a controller with an RTC through the unconfirmed private transfer (UPT) time synchronization method. Without supplied power, the value of a software-based clock will be retained for at least six hours (but not maintaining current time). When power is off for longer than six hours, the time and date may reset to the default values (1/1/2000 12:00:00 a.m.). After power is restored, the controller with a software-based clock will automatically send out a Time_Request message to each controller on the network (starting with address MAC 1) until it receives a valid Time_Announce message or a time synchronization service. Until then, it will remain behind by the amount of time the power was off or (if longer than six hours) start over at the default values.

In a stand-alone controller with a connected NetSensor, the time can also be manually adjusted by pressing the designated system time button on the NetSensor and then pressing the up or down arrow button.

SECTION 3

Operating the controller

This section provides a brief overview of the controller operation. Review this material before you attempt to install the controller.

Normal operation

Once configured, programmed and powered up, the controller requires very little user intervention.

Controls and indicators

The following topics describe the controls and indicators found on the controller. Additional information for automatic addressing functions are described in the guide *MS/TP Automatic MAC Addressing Installation Instructions* that is available from the KMC Controls web site.

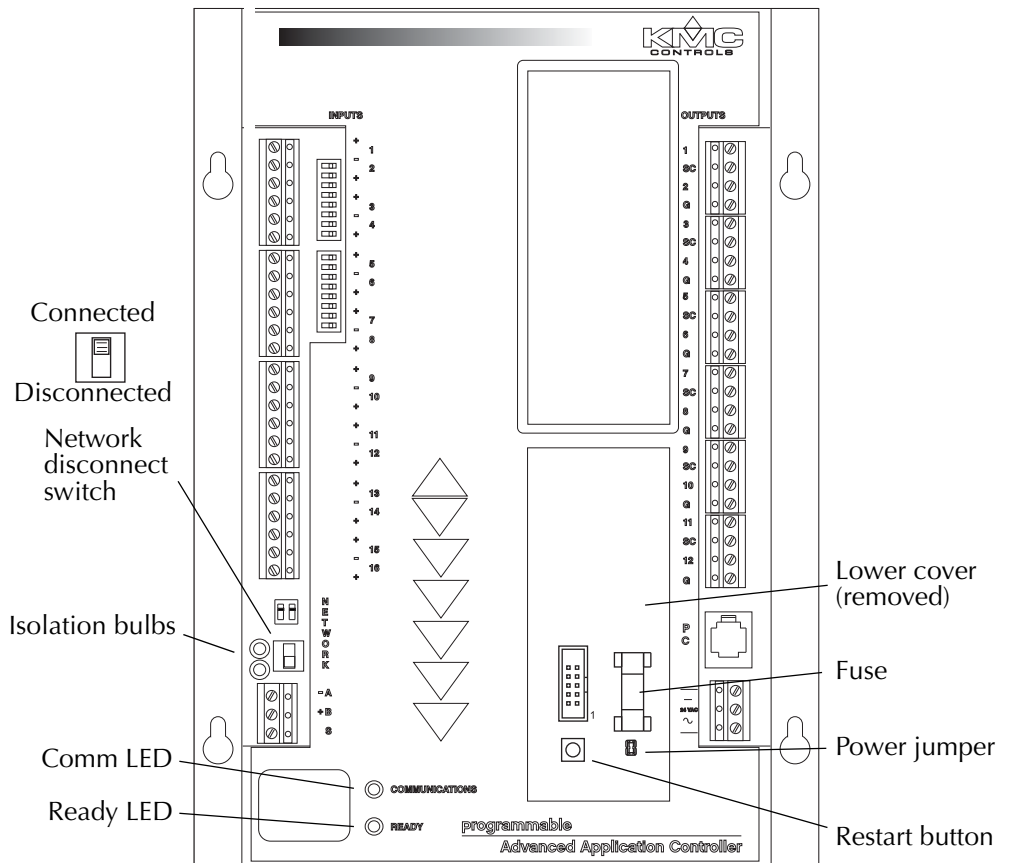


Illustration 3-1 Controls and indicators

Network disconnect switch

The network disconnect switch is located on the left side of the controller. Use this switch to enable or disable the MS/TP network connection. When the switch is *On* the controller can communicate on the network; when it is *Off*, the controller is isolated from the network.

Alternately, you may remove the isolation bulbs to isolate the controller from the network.

Ready LED

The green Ready LED indicates the state of the controller. This includes automatic addressing functions that are fully described in the guide *MS/TP Addressing For BACnet Controllers*.

Power up During controller initialization, the Ready LED is continuously illuminated for 5 to 20 seconds. Once initialization is complete, the Ready LED begins flashing to indicate normal operation.

Normal operation During normal operation, the Ready LED flashes a repeating pattern of one second on and then one second off.

Restart button acknowledge The restart button includes several functions for automatic addressing that are acknowledged with the Ready LED. When the restart button is pressed, the Ready LED illuminates continuously until either of the following take place:

- The restart button is released.
- The restart button time-out period is reached and a restart operation is complete. Restart button operations are listed in the following table.

Table 3-1 Ready LED patterns for restart button operations

Controller state	LED pattern
The controller is set as an automatic addressing anchor. The MAC in the controller is set to 3	A rapid repeating pattern of a short flash followed by a short pause.
The controller has sent the automatic addressing lock command to the network	Two short flashes followed by a long pause. The pattern repeats until the restart button is released.
No restart operation	Ready LED remains unlit until the restart button is released.

Communications (Com) LED

The yellow Communications LED indicates how the controller is communicating with other controllers on the network.

Sole master Repeating pattern of a long flash and a short pause that repeats once a second. It indicates that the controller has either generated the token or is a sole MS/TP master and has yet to establish communications with other MS/TP devices.

Token passing A short flash each time the token is passed. The frequency of the flash is an indication of how often the device receives the token.

Nomad patterns There are three Com LED patterns that indicate that the controller is an automatic addressing nomad controller that is receiving valid MS/TP traffic.

Table 3-2 Automatic addressing nomad patterns

Controller state	LED pattern
Lost nomad	A long flash
Wandering nomad	A long flash followed by three short flashes
Assigned nomad	Three short flashes followed by a long pause.

Error conditions for the LEDs

The two network isolation bulbs, located next to the network switch, serve three functions:

- ◆ Removing the bulbs opens the EIA-485 circuit and isolates the controller from the network.
- ◆ If one or both bulbs are lit, it indicates the network is improperly phased. This means that the ground potential of the controller is not the same as other controllers on the network.
- ◆ If the voltage or current on the network exceeds safe levels, the bulbs operate as fuses and may protect the controller from damage.

Isolation bulbs

The two network isolation bulbs, located next to the network switch, serve three functions:

- ◆ Removing the bulbs opens the EIA-485 circuit and isolates the controller from the network.
- ◆ If one or both bulbs are lit, it indicates the network is improperly phased. This means that the ground potential of the controller is not the same as other controllers on the network.
- ◆ If the voltage or current on the network exceeds safe levels, the bulbs operate as fuses and may protect the controller from damage.

Replacing the fuse

KMC controllers do not require routine maintenance. If a fuse blows, investigate the cause, and then replace the fuse. To replace the fuse:

1. Remove the lower cover by lifting the right-hand side of the cover (within the plastic frame) toward you. See [Illustration 3-1](#).
2. Disconnect the power by removing the power jumper.
3. Carefully pull out the blown fuse from the fuse holder.
4. Carefully snap an identical (KMC P/N 902-600-05) 1.6 A, fast-acting, 5 x 20 mm fuse into the fuse holder.
5. Reinstall the power jumper and cover.

Viewing the firmware version

The controller's firmware is viewable through the software. To view the controller's firmware version in **BACstage**:

1. Start BACstage and select System List from under the Access menu.
2. Click the # of the appropriate network and enter the appropriate user name and password.
3. Select the appropriate controller from the Device List.
4. Select Device from under the Objects menu, and that controller's firmware version will be displayed in the middle of the Device Object/Parameters dialog box.

To view the controller's firmware version in **TotalControl**:

1. Log on to the site with Design Studio.
2. Expand the Network Manager list to reveal the device.
3. Point to the device.
4. TotalControl displays a Tool Tip with the model number and firmware build revision.

Resetting the controller

If the controller appears to be operating incorrectly, or is not responding to commands, you may need to reset or restart the controller. **Read ALL the information in this section before proceeding!** To perform a reset or restart, remove the cover to expose the red restart push-button and then use one of the following procedures.

To perform a reset or restart, locate the red restart push-button and then—in order—use one of the following procedures.

1. A warm start is the option least disruptive to the network and should be tried first.
2. If problems persist, then try a cold start.
3. If the problems continues, restoring the controller to factory settings may be required.



Caution

Read all of the information in this section before proceeding!



Note

Momentarily pushing the red restart button while the controller remains powered will have no effect on the controller.

Performing a warm start

A warm start changes the controller as follows:

- ◆ Restarts the controller's Control Basic programs.
- ◆ Leaves object values, configuration, and programming intact.



Caution

In the unlikely event that the checksum test in RAM fails during the warm start, the controller will automatically perform a cold start. During a cold start, controller outputs may abruptly turn connected equipment on and off. To prevent equipment damage, turn connected equipment off or temporarily remove the output terminal blocks from the controller before performing a warm start.

Do either of the following to perform a warm start:

- ◆ Reinitialize the controller with either BACstage or TotalControl Design Studio.
- ◆ Remove the power jumper for a few seconds and then replace it.

Performing a cold start

Performing a cold start changes the controller as follows:

- ◆ Restarts the controller programs.
- ◆ Returns all object states to their initial factory settings until the controller programs update them.
- ◆ Leaves configuration and programming intact.



Caution

Returning object values to their relinquished defaults during a cold start may abruptly turn connected equipment on or off. To prevent equipment damage, turn connected equipment off or temporarily remove the output terminal blocks from the controller before performing a warm start.

To perform a cold start:

1. While the controller is powered, press and hold the restart button.
2. Remove the power jumper.
3. Release the red button *before* replacing the power jumper.



Note

A cold start performed by this method is the same as performing a cold start with BACstage or from TotalControl Design Studio.

Restoring to factory settings

Restoring a controller to factory settings changes the controller as follows:

- ◆ Removes all programming.
- ◆ Removes all configuration settings.
- ◆ Restores the controller to factory default settings.



Caution

Resetting the controller erases all configuration and programming. After resetting to factory settings, you must configure and program the controller to establish normal communications and operation.

To reset the controller to factory settings.

1. If possible, use BACstage or TotalControl Design Studio to back up the controller.
2. Remove the power jumper.
3. Press and hold the red restart button.
4. Replace the power jumper while continuing to hold the restart button.
5. Restore configuration and programming with BACstage or TotalControl Design Studio.