

Installation and Applications Guide

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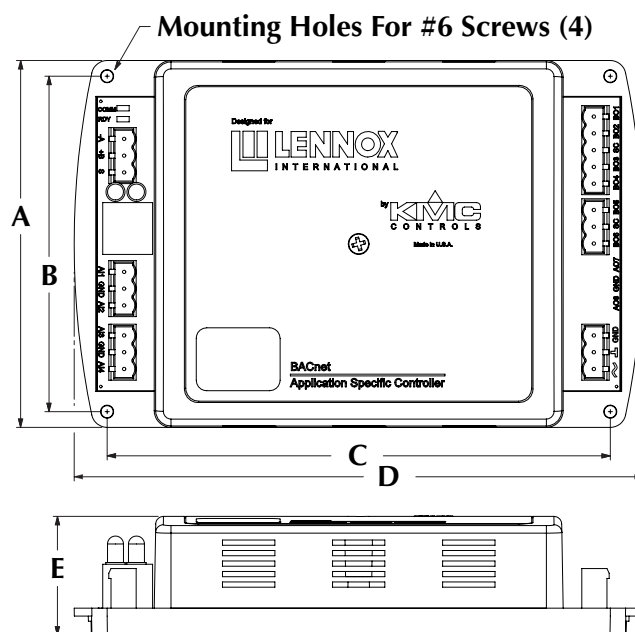
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Introduction

This document provides controller and sensor application and integration information for the Lennox International 16X70/16X71/16X72/17A08 (KMC BAC-8304) controller.

See also the Lennox International installation instructions 507411-03.

Dimensions



A	B	C	D	E
4.36 in.	4.0 in.	6.0 in.	6.79 in.	1.42 in.
111 mm	102 mm	152 mm	172 mm	36 mm



P/N:
103902-01
E

Wiring and Switches

Network Wiring

⚠ CAUTION

Use electrostatic discharge precautions during installation. Do not exceed the device ratings.

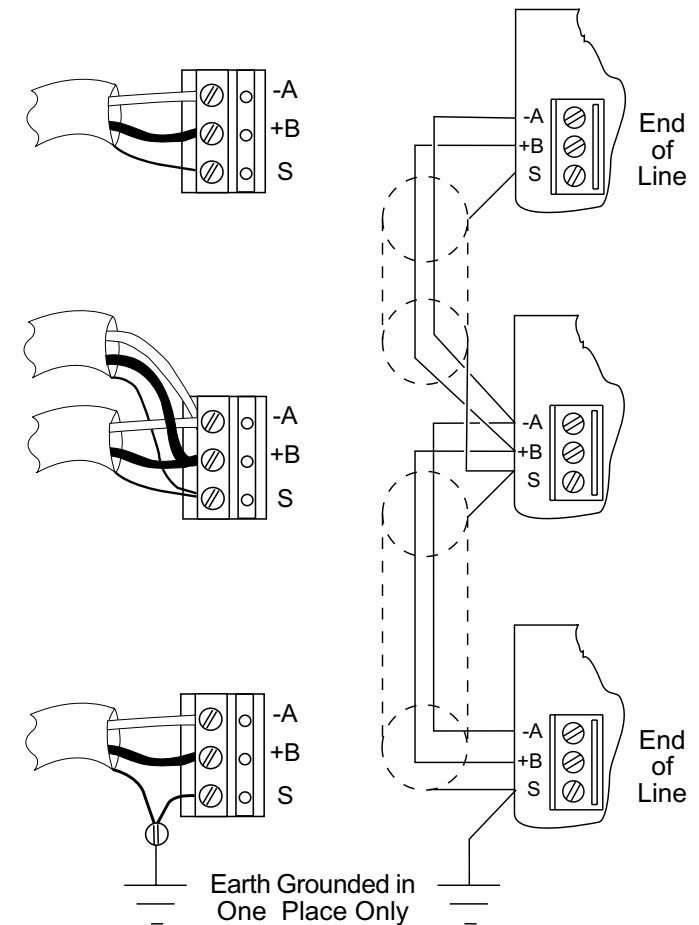
⚠ CAUTION

To avoid damage from ground loops and other communication issues in networked controllers, correct phasing on MS/TP network and power connections on ALL the networked controllers is critically important.

1. Connect the $-A$ terminals in parallel with all other $-A$ terminals on the network and the $+B$ terminals in parallel with all other $+B$ terminals. (See [MS/TP Wiring on page 2](#) and the network wiring principles below.)
2. Connect the shields of the cable together at each device. Connect the cable shield to a good earth ground **at one end only**.

Use the following **network wiring principles** when connecting a controller to an MS/TP network:

- Terminal blocks accept 14 to 22 AWG wire. Use twisted-pair, shielded 22 AWG (minimum) cable, such as Belden part numbers 8761 or 88761 and Lennox International catalog numbers 27M19, 94L63, or 68M25.
 - When connecting cable shields together at each controller, the S terminal in KMC controllers 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 the controller's ground.
 - Connect no more than 128 addressable BACnet master devices (total) to one MS/TP network. The devices can be any mix of controllers or routers. (Up to 127 slave devices can also be connected.)
 - Limiting the MS/TP network size to no more than about 60 controllers will optimize network performance.
- 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. 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.



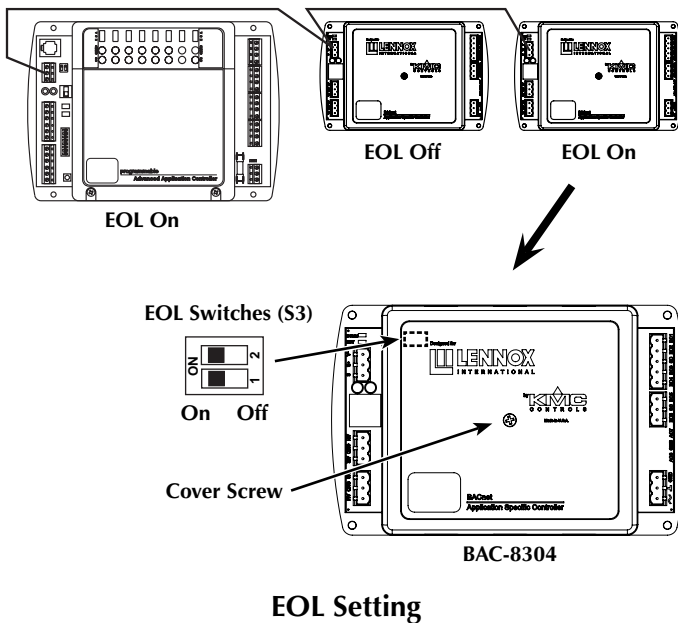
MS/TP Wiring

For more information on principles and good practices when connecting an MS/TP network, see KMC Control's Planning BACnet Networks (Application Note AN0404A).

Network End-Of-Line Termination

The controllers on the physical ends of an EIA-485 MS/TP wiring segment must have EOL (End Of Line) termination installed for proper network operation. (See [EOL Setting on page 3](#).) If the controller is at the physical **end** of the network line:

1. Remove the controller cover. One screw in the center of the cover secures the cover in place.
2. Set **both** the (S3) EOL termination DIP switches on the circuit board to **On** (to the **left**). If not on the end, ensure both switches are Off (to the right).
3. Reinstall the controller cover. (The screw should be snug, but do not overtighten it.)

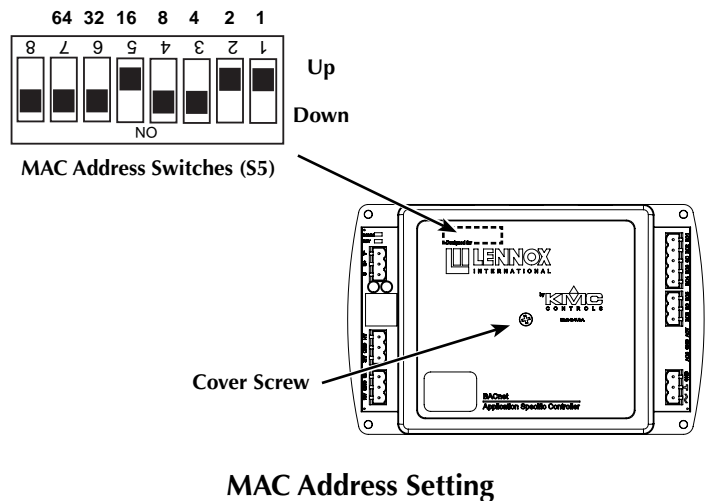


MAC Address

NOTE: The controller's current MAC address can be viewed in a connected STE-8001. See [Network Communication Settings on page 6](#). The factory default is 3.

1. Remove the controller cover. One screw in the center of the cover secures the cover in place.
2. Set DIP switch array S5 (see [MAC Address Setting on page 3](#)) to the desired address combination. The individual DIP switch channels will be summed to determine the MAC address. For a MAC address of 19 (as shown in the example illustration below), slide 1, 2, and 16 **Up** (and all others Down).
3. Reinstall the controller cover.

NOTE: If the controller is powered when DIP switches are changed, the controller will need to be power cycled to make the new MAC address change active.



Input/Sensor Connections and Installation

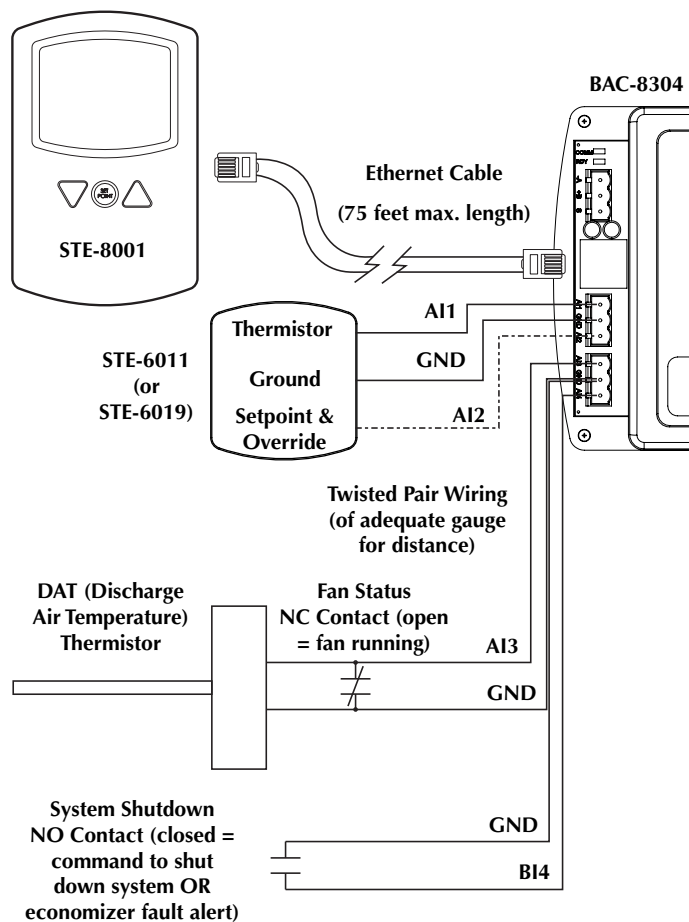
Connect a DAT (10K thermistor) sensor and/or a Fan Status (NC) switch to the AI3 terminal. Connect a System-Shutdown/Fault-Alert (NO) switch to the BI4 terminal. See [Input Connections on page 4](#) and the manufacturer's installation guides. See also [Fan on page 10](#) for how these inputs operate.

The controller uses one of the following sensors for space temperature STE-8001 via RJ-45 modular jack (using a standard Ethernet cable up to 75 feet long).

- STE-6011 or existing 10K ohm thermistor room sensor via the AI1 terminal.
- A (KMC STE-6019 or similar) sensor with a 10K thermistor (on AI1) and 10K ohm setpoint dial and/or a local override button (on AI2).

See relevant sections of the KMC STE-601x installation guide for additional information.

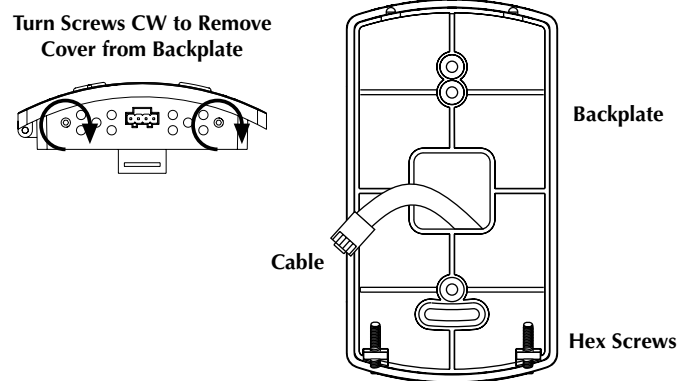
Connect the STE-8001 sensor to the controller with a standard Ethernet cable with RJ-45 connectors on each end. Maximum cable length is 75 feet (22.9 meters). Plenum-rated preassembled cables are recommended (Lennox International 97W25).



Input Connections

To install an STE-8001 sensor, do the following (see [STE-8001 Installation on page 4](#)):

1. Turn the hex screws in the base **clockwise** until they clear the cover. Swing the sensor's bottom away from the backplate to remove it.
2. Route the Ethernet cable through the center hole of the backplate.
3. Fasten the backplate directly to a standard 2 x 4 inch outlet box (or to a KMC HMO-1161W mounting plate for 4 x 4 box) with the hex screws toward the floor.
4. Plug the Ethernet cable into the sensor's jack.
5. Place the top of the sensor over the top of the backplate and swing it down over the hex screw brackets. Be careful not to pinch the wiring.
6. Back the hex screws out of the brackets (counter-clockwise) until they engage the sensor cover and hold it in place.



STE-8001 Installation

System Shutdown or Economizer Alert

Switch closure of a Normally Open switch wired across BI4 and GND can be configured for:

- Economizer fault alert to comply with FDD and other code requirements.
- Or (the default) command a system (emergency) shutdown.

If the default system shutdown option is desired, no configuration is required. To change options, use BACnet software to set the Relinquish Default of MSV8 to the desired value:

- 1 = Economizer fault alert
- 2 = System shutdown (default)

Output Connections

See the Lennox International installation instructions (507411-03) for wiring details.

Connect the device under control between the desired output terminal and the related SC (Switched Common) terminal. (See [Outputs and Power on page 5.](#)) For each bank of triac outputs, there is one Switched Common connection.

NOTE: The phase side of the transformer connects to the SC terminal.

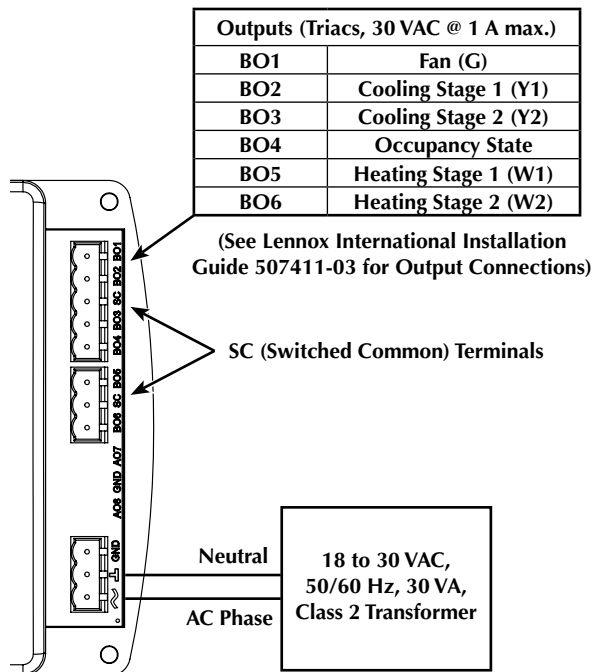
⚠ CAUTION

Triac outputs are for Class-2 voltages (24 VAC) only. Do not connect line voltage to the outputs!

Power Connection

Use a 24 VAC, Class 2 transformer to supply power. Connect the transformer's **neutral** lead to the 24 VAC **Common/L** terminal and the AC **phase** lead to the 24 VAC **Phase/~** terminal. (See [Outputs and Power on page 5.](#))

NOTE: KMC Controls recommends powering only one controller from each transformer. If installing multiple controllers powered from a single transformer, however, phasing must be correct and the total power drawn from the transformer must not exceed its rating.



Outputs and Power

Passwords

The STE-8001 allows two levels of password protection. The Level 1 password (if configured) must be entered to adjust the occupied cooling and heating setpoints. The Level 2 password (if configured) must be entered to change the controller configuration.

Set new four-digit passwords in the Advanced menu. (See [Advanced Settings on page 6.](#)) **If the password is unconfigured (set to all zeros, 0000), no password is required to advance the display into additional displays.** The default Level 1 and Level 2 passwords are 0000.

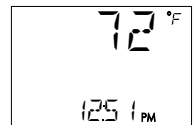
If a password is forgotten, passwords may be reset. To reset the password, remove the power connection and the controller's cover. Slide S5 DIP switch #8 **Up** while the controller is not powered. (See [MAC Address Setting on page 3.](#)) Power up the controller until the green Ready LED blinks in **rapid** sequence. Remove power. Slide S5 DIP switch #8 back **Down**. The controller can then be powered normally, and the passwords are reset to 0000.

Setpoint Adjustment (via STE-8001)

NOTE: The sensor will display the time (only) if the controller has been synchronized with system time within the previous 24 hours.

From the temperature display (main screen):

1. Press the **Setpoint** button.
2. If a Level 1 password is required, press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. The display will show the occupied cooling setpoint.
3. To change the occupied cooling setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.
4. To change the occupied heating setpoint, press the Up/Down buttons and press the Setpoint button to save and return to the main screen.



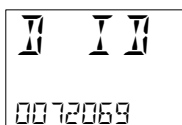
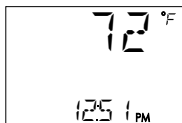
Configuration (via STE-8001)

NOTE: The STE-8001 sensor supports other applications (e.g., VAV) that are not applicable to this controller.

Network Communication Settings

Configure the network communication settings before placing a controller on the network. From the temperature display (main screen):

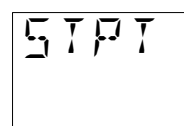
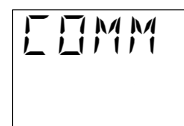
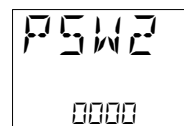
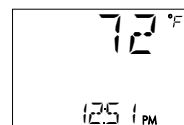
1. Press and hold both the **Up and Down** buttons for at least five seconds.
2. If a Level 2 password is required, press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. If a password has not previously been entered, the display will change to the COMM display. Press the Setpoint button.
3. To change the device instance, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.
4. The MAC address menu is **read only**—attempted changes will not be saved. (To set the address, see [MAC Address on page 3](#).) Press the Setpoint button to move to the next screen.
5. Set the baud rate. Press the Up/Down buttons and press the Setpoint button to save and advance to the next function.
6. When COMM is displayed, press the Up/Down buttons until EXIT is displayed. Press the Setpoint button to exit configuration and return to the main screen. Alternatively, select CNFG to continue configuration.



Advanced Settings

From the temperature display (main screen):

1. Press and hold the **Up and Down** buttons for at least five seconds.
2. If a Level 2 password is required, press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. If a password has not previously been entered, the display will change to the COMM display. From the COMM display, press the Up/Down buttons to show the CNFG display and press the Setpoint button.
3. After the display changes to STPT, press the Up/Down buttons to change the display to ADVC.
4. Enter a new Level 1 password. Press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. When the Setpoint button is pressed for the last digit, the new password is saved and the display advances.



NOTE: Entering four zeros (0000) removes the password.

5. Enter a new Level 2 password. Press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. When the Setpoint button is pressed for the last digit, the new password is saved and the display advances.



NOTE: The local unoccupied override timer function applies only to controllers that will use an STE-6019 sensor available from KMC Controls.

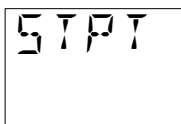
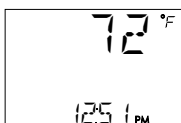
6. Press the Up/Down buttons to set the local unoccupied override timer. The value will change in 1 minute increments. Press the Setpoint button to save the value and advance to the next function.
7. To change the sensor calibration, press the Up/Down buttons (changes in 0.1° increments) and press the Setpoint button to save and advance to the next function.
8. Press the Up/Down buttons until EXIT is displayed Press the Setpoint button to exit. Alternately, select STPT to configure setpoints.



Setpoint Settings

From the temperature display (main screen):

1. Press and hold the **Up and Down** buttons for at least five seconds.
2. If a Level 2 password is required, press the Up/Down buttons to change the first digit, press the Setpoint button to select the next digit, and repeat for all four digits. If a password has not previously been entered, the display will change to the COMM display.
3. From the COMM display, press the Up/Down buttons to show the CNFG display and press the Setpoint button.
4. After the display changes to STPT, press the Enter button.



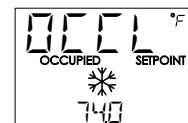
5. To change the Minimum Cooling Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



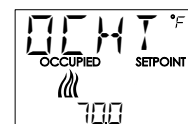
6. To change the Maximum Heating Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



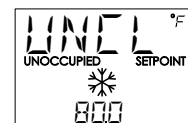
7. To change the Occupied Cooling Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



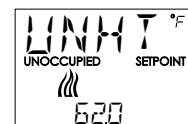
8. To change the Occupied Heating Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



9. To change the Unoccupied Cooling Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



10. To change the Unoccupied Heating Setpoint, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



11. To change the Minimum Temperature Differential, press the Up/Down buttons and press the Setpoint button to save and move to the next screen.



12. When STPT is displayed, press the Up/Down buttons until EXIT is displayed Press the Setpoint button to exit configuration and return to the main screen.



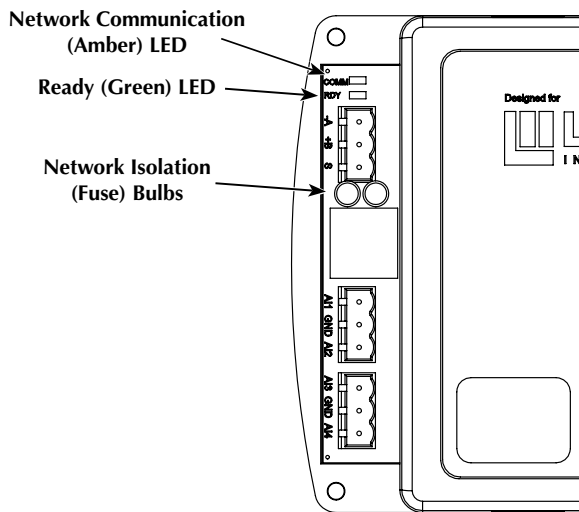
Troubleshooting

Communication Issues

- Check power—see Power/Ready (Green) LED Issues section.
- Check network wiring/connections.
- Check MAC address and Network ID.
- Check the baud rate. (This controller autobauds by default but a desired speed must be set when going through the Communications menu.) On the MS/TP network, the baud rate on all devices must match.
- Check other controllers.

Inputs or Outputs Are Not Working

- Check power—see Power/Ready (Green) LED Issues section.
- Check input wiring/connections.
- Check configuration.
- Check network communications—see Network (Amber) LED Issues section.



Troubleshooting Indicators

Network (Amber) LED Issues

The amber LED flickers as the controller receives and passes the token during communication with the network. When the controller is powered up (but not communicating), the amber LED flashes slowly, about once per second. When the MS/TP port establishes communications with the network, the amber LED flashes rapidly as it receives and passes the token. If it is **not flashing rapidly**:

- Check power—see Power/Ready (Green) LED Issues section.
- Check the isolation (fuse) bulbs.
- Check network connections and configuration.
- Cycle the power to the controller.

Network Isolation (Fuse) Bulbs Issues

Two isolation bulbs are next to the network terminals. These bulbs serve three functions:

- **Removing the bulbs** opens the MS/TP port and isolates the controller from the network.
- **If one or both bulbs is illuminated**, it indicates the network is improperly phased (the ground potential of the controller is not the same as other controllers on the network). Remove power and check the network and power connections.
- **If one or both bulbs is blown**, it indicates the voltage or current on the network exceeded safe levels. Correct the conditions and replace the bulbs. Replacement bulbs (P/N HPO-0054) are available from KMC Controls. See also Power/Ready (Green) LED Issues section.

Power/Ready (Green) LED Issues

A few seconds after power is first applied, the green Power/Ready LED will begin flashing about once a second if the device is functioning normally. If it is **not flashing slowly**:

- Check wiring/connections.
- Cycle the power to the controller.

Maintenance

Careful installation and maintenance will ensure long-term reliability and performance.

Remove dust as necessary from holes in the top and bottom of the controller and sensor. Clean the sensor display with a soft, damp cloth and mild soap.

BACnet Objects List

AI/BI (Analog/Binary Input) Objects			
Inputs	Name	Default	Units
AI1	SPACE SENSOR	N/A	Degrees F
AI2	ROOM_SETPPOINT	N/A	Degrees F
AI3	DISCHARGE_TEMP	N/A	Degrees F
BI4	DISABLE_SYSTEM or ECONOMIZER_ALERT	N/A	Enable/Disable

BO (Binary Output) Objects			
Outputs	Name	Default	Units
BO1	FAN	Off	On/Off
BO2	COOL_STAGE_1	Off	On/Off
BO3	COOL_STAGE_2	Off	On/Off
BO4	OCC_OUTPUT	Off	On/Off
BO5	HEAT_STAGE_1	Off	On/Off
BO6	HEAT_STAGE_2	Off	On/Off

AV (Analog Value) Objects			
Values	Name	Default	Units
AV1	STE-8_SENSOR	72	Degrees F
AV2*	SETPPOINT_REF-EREN	72	Degrees F
AV3	ACT_COOL_STPT	74	Degrees F
AV4	ACT_HEAT_STPT	70	Degrees F
AV5	OCC_CL_STPT	74	Degrees F
AV6	OCC_HT_SPT	70	Degrees F
AV7	UNOCC_CL_STPT	80	Degrees F
AV8	UNOCC_HT_STPT	65	Degrees F
AV9	MIN_CL_STPT	68	Degrees F
AV10	MAX_HT_STPT	78	Degrees F
AV11	MIN_STPT_DIFF	3	Degrees F
AV12	STBY_DIFF	3	Degrees F
AV13*	SPACE_TEMP	N/A	Degrees F
AV32	STG_DELAY	5	Minutes
AV33	FAN_OFF_DELAY	0	Seconds
AV34	COMPRES-SOR_DELAY	5	Minutes
AV38	LOCAL_OVRD_TIME	60	Minutes
AV39	STANDBY_DELAY	15	Minutes
AV40**	MOTION_TIMER	10	Seconds

BV (Binary Value) Objects			
Val-ues	Name	Default	Units
BV6**	MOTION_SENSOR	Inactive	Inactive/Active
BV8	MODE	Heat	Heat/Cool
BV9	FAN_NEED	No	No/Yes
BV10	HEAT_COOL_NEED	No	Heat/Cool
BV14	FAN_STATUS	Inactive	Inactive/Active
BV16	SYSTEM_DISABLE	Off	Off/On
BV17	FAULT_DETECTED	Off	Off/On
BV20	COOL_STG_1	Off	Off/On
BV21	COOL_STG_2	Off	Off/On
BV22	HEAT_STG_1	Off	Off/On
BV23	HEAT_STG_2	Off	Off/On
BV28	LOCAL_OVRD	Off	Off/On
BV29**	MOTION_OVRD	Off	Off/On

MSV (Multi-State Value) Objects			
Values	Name	Default	Units
MSV1*	OCCUPIED MODE	Occupied (1)	1 = Occupied 2 = Standby 3 = Unoccupied
MSV2	SYSTEM_MODE	Auto (2)	1 = Off 2 = Auto 3 = Cool 4 = Heat
MSV3	FAN_MODE	Auto (1)	1 = Auto 2 = On
MSV6	WALL SENSOR	STE-8001 (1)	1 = STE-8001 2 = STE-8201 w/ Motion** 3 = STE-6019 4 = STE-6011 5 = None
MSV8	BI4 FUNCTION	System Disable (2)	1 = Economizer Fault Alert 2 = System Disable

**NOTE: Motion sensing is not currently supported by Lennox International.

*NOTE: AV2, AV13, and MSV1 are the objects most generally used in integration. See also [Sequence of Operation on page 10](#).

Sequence of Operation

NOTE: See also [BACnet Objects List on page 9](#).

NOTE: The controller has no schedule. **The default mode is Occupied.** A building automation system can command it (via MSV1) to Unoccupied or Standby.

Control Loops

Individual control loops for heating and cooling are driven from the respective active heating or cooling setpoints and referenced to the current room temperature.

Fan

Fan Operation

NOTE: **If a switch across BI4 and ground is closed (see [Input Connections on page 4](#)), the system is shut down** (with the default option). When the other option is selected, a switch closure issues an economizer alert to comply with FDD and other code requirements. (See [System Shutdown or Economizer Alert on page 4](#).)

The fan runs only if the System Shutdown input (BI4) is active (i.e., an open switch). If a System Status contact is not available in the system, the unit will operate normally as if the System Status is active.

Fan operation can be set for AUTO or ON modes (MSV3). If the fan is set to AUTO, the fan runs (only) on a call for heating or cooling. If the fan is set to ON, the fan runs continuously during occupied or standby modes, but the fan runs only on a call for heating or cooling during unoccupied mode.

If the fan is in AUTO mode, after the heating or cooling stages transition to inactive, the fan remains on for the duration of the Fan Delay Timer (AV33) prior to being disabled.

Fan Status

Fan Status is reflected in the binary variable BV14.

AI3 (Discharge Air Temperature) can be used for both Fan Status and DAT. (See [Input Connections on page 4](#).) If the switch closes, the DAT sensor is shorted and the Fan Status is signaled as inactive. For Fan Status, AI3 expects a NC status contact (i.e., the contact is closed when the fan is inactive). If a Fan Status contact is not available in the system, the unit operates normally as if the Fan Status is active.

Staged Heating and Staged Cooling

The heating and cooling outputs are active when the System Enable input (BI4) is active (i.e., open dry contact) and the Fan Status variable is active.

Auto, Heat, Cool, or Off can be selected for System Mode (MSV2). If System Mode is Heat, only the heating outputs will be allowed to be active. If System Mode is Cool, only the cooling outputs will be allowed to be active.

If the System Mode is Auto, the controller determines if heating or cooling is active, based on the active control loop (heating or cooling). If the controller determines that the active mode should switch (either heating to cooling or cooling to heating), the current mode stages is inactive for at least the Fan Delay Off timer (AV33) prior to the new mode stages becoming active. The current mode is determined by the control loop (heating loop or cooling loop) with the greatest value.

The heating (cooling) stages are controlled from the heating (cooling) control loops. The first stage is enabled when the control loop is greater than 50% and disabled when less than 1%. The second stage is enabled when the control loop is greater than 99% and if the first stage has been active for at least the duration of the Stage Delay Timer (AV32). The State Delay Timer applies when enabling stages; it does not apply when disabling stages. The second stage is disabled if the control loop is less than 50%.

The cooling stages are subject to a Compressor Delay (AV34). Once inactive, a cooling stage remains off for the duration of the Compressor Delay prior to being enabled.

Occupancy

There is no internal schedule.

The following occupancy states (MSV1) are valid: occupied, standby, and unoccupied. Occupied denotes local occupancy and building occupancy; standby denotes local non-occupancy and building occupancy; unoccupied denotes local and building non-occupancy.

The default mode is occupied. A building automation system can command it to unoccupied or standby.

The occupancy output (BO4) is active if the occupancy state is either occupied or in standby. The occupancy output is inactive if the occupancy state is unoccupied.

If the controller detects an STE-8001 or STE-601x sensor (i.e., sensors without motion), the controller defaults to occupied operation.

NOTE: *If the controller detects a digital sensor with motion, the unit toggles between occupied and standby based on observed local motion. To remain in the occupied state for the duration of the standby timer, local motion must be observed twice within a 30 second window.*

Setpoints

The following space setpoints (AV3–AV8) are used to control the unit operation: Active Cooling, Active Heating, Occupied Cooling, Occupied Heating, Unoccupied Cooling, Unoccupied Heating, Standby Cooling (internally calculated), Standby Heating (internally calculated). The space setpoints have default values, but may be manipulated depending on which Wall Sensor Type (MSV6) is connected. Standby setpoints are calculated by applying the Standby Offset to the Occupied Heating and Cooling Setpoints.

NOTE: **When any space setpoint is manipulated, by any means, a limit is applied (at BACnet Priority 9). No cooling setpoint (Occupied, Standby, or Unoccupied) shall be lower than the Min Cooling Setpoint (AV9). No heating setpoint (Occupied, Standby, or Unoccupied) shall be higher than the Max Heating Setpoint (AV10).**

During Unoccupied Mode, Active Cooling Setpoint is set to the Unoccupied Cooling Setpoint; the Active Heating Setpoint is set to the Unoccupied Heating Setpoint.

During Standby Mode, the Active Cooling Setpoint is set to the previously calculated standby cooling setpoint; the Active Heating Setpoint is set to the previously calculated standby heating setpoint.

During Occupied Mode, the Active Cooling Setpoint is set to the Occupied Cooling Setpoint and the Active Heating Setpoint is set to the Occupied Heating Setpoint.

Occupied and Unoccupied

If Wall Sensor Type (MSV6) is detected as STE-8x01, then the cooling and heating setpoints are mapped and manipulated directly from STE-8x01.

If Wall Sensor Type is detected as STE-6019, Occupied Cooling Setpoint and Occupied Heating Setpoint are determined from the rotary setpoint dial. The reading on input is mapped to Space Setpoint

Reference (AV2). Occupied Cooling Setpoint is then set to the Space Temp Reference plus one half of the Minimum Setpoint Differential (AV11). Likewise the Occupied Heating Setpoint is set to the Space Temp Reference minus one half the Minimum Setpoint Differential. Unoccupied Cooling and Heating Setpoints remain their default values or those set during unit configuration.

If any setpoint is adjusted and comes within Minimum Setpoint Differential (AV11) of its corresponding opposite heating or cooling setpoint, the opposite setpoint from the one adjusted is “pushed” to maintain the Minimum Setpoint Differential between the two. For example, if Minimum Setpoint Differential is set to 4° F, the Occupied Heating Setpoint is set to 70° F and the Occupied Cooling Setpoint is lowered from 74° F to 71° F, the Occupied Heating Setpoint is reset to 67° F.

Standby

Standby mode (on MSV1) is entered if:

- Commanded by a building automation system.
- *Local motion (via a KMC STE-8201W) is not observed for the duration of the Standby Timer. The STE-8201W is not currently supported by Lennox International.*

During Standby Mode, the standby cooling setpoint is calculated by adding the Occupied Cooling Setpoint and the Standby Differential. Similarly, the standby heating setpoint is calculated by subtracting the Standby Differential from the Occupied Heating Setpoint.

Sequence Configuration

The following sequence parameters are adjustable through the STE-8001 digital wall sensor:

- Occupied Heating (AV4) and Cooling (AV3) Setpoints
- Unoccupied Heating (AV8) and Cooling (AV7) Setpoints
- Standby Setpoint Setback (AV12)
- Maximum Heating Setpoint Limit (AV10)
- Minimum Cooling Setpoint Limit (AV9)
- Minimum Setpoint Differential (AV11)
- Standby timer (AV39)
- Fan Operation Mode (MSV3)
- Fan Off Delay (AV33)
- System Mode (MSV2)
- Heating and Cooling Stage Delay (AV32)

Specifications

BAC-8304 Controller Specifications

Supply voltage	18 to 30 VAC, 50/60 Hz, Class 2, non-supervised
Supply power	3 VA (not including triac output loads)
Inputs	4 analog inputs, with overvoltage input protection
Connectors	Removable screw terminal blocks, wire size 14–22 AWG
Conversion	10-bit analog-to-digital conversion
Outputs	Six single-stage optically isolated triacs; maximum switching 30 VAC at 1 ampere each or 3.5 amperes total
Communications	BACnet MS/TP EIA-485 operating at 9.6, 19.2, 38.4 or 76.8 kilobaud (with default automatic baud detection)
Memory	Programs and program parameters are stored in internal nonvolatile memory; auto restart on power failure
Application	RTU 2H/2C with economizer occupancy enable
Regulatory	FCC Class A, Part 15, Subpart B; UL 916 Energy Management Equipment; BACnet Testing Laboratory (ASC) listed
Weight	8.8 ounces (249 grams)
Case material	Flame retardant green and black plastic
Conformal coating	Dow Corning 3-1953 or Shin-Etsu KE-3421
Environmental limits	
Operating	–40 to 158° F (–40 to 70° C)
Shipping	–40 to 160° F (–40 to 71° C)
Humidity	0 to 95% relative humidity (non-condensing)

STE-8001 Sensor Specifications

Power	3.3 VDC supplied by connected controller
Display	Multifunctional LCD 1.88 x 1.25 in. (48 x 32 mm)
Connector	Eight-wire RJ-45 modular jack for standard Ethernet cable up to 75 feet (22.9 meters)
Mounting	Surface mount directly to any flat surface or to a 2 x 4 inch handy-box; mounting on a 4 x 4 inch box requires an HMO-1161W mounting plate
Weight	2.8 ounces (80 grams)
Material	Flame retardant white plastic
Environmental limits	
Operating temp.	34 to 125° F (1.1 to 51.6° C)
Shipping temp.	–40 to 140° F (–40 C to 60° C)
Humidity	0 to 95% relative humidity (non-condensing)

Important Notices

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