

Quick installation Guide

TRI-STAT

CO₂, Relative Humidity and Temperature Sensor for RS-485 BACnet[®] and Modbus[®] RTU Applications

Model: TRS-0100
Tri-Stat Part number: 410-5300

Document: IG_TRI-STAT_R1A



TM TRI-STAT_R1D



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LIST OF EFFECTIVE AND CHANGED PAGES

Insert latest changed pages (in bold text); remove and dispose of superseded pages.
Total number of pages in this manual is **8**.

Page	Rev *	Description of Change	Date
1 through 8	R1A	Initial document release	01/21/2010

* R1A indicates an original page without change

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INTRODUCTION AND SCOPE

This Quick Installation Guide provides basic installation information for the instrument installer. Information includes placement considerations, physical instrument installation and cable connections to the instrument. For complete and detailed Tri-Stat specifications, setup, start up, operating instructions and calibration information, refer to the Installation, Operation and Maintenance Technical Manual **TM_TRI-STAT** under separate cover.

At the heart of the Tri-Stat is **EBTRON**'s proprietary microcontroller based sensor package featuring a patented, extremely stable CO₂ measurement system that requires no maintenance or calibration during its normal service life. The patented self-calibration feature virtually eliminates manual calibration in applications where indoor CO₂ levels drop to normal outdoor background levels during unoccupied periods (e.g. during evening hours).

The integral RS-485 BACnet[®] MS/TP and Modbus[®] RTU compatible communications interface includes options for setting address, device instance and baud rate. Coupled with complementary precision relative humidity and temperature sensors, the Tri-Stat provides an economical, simple and intelligent alternative to harnessing and coordinating the network operation of individual CO₂, humidity and temperature sensor devices. Simple field configuration is accomplished by DIP switches on the main circuit board and via the BACnet[®] and Modbus[®] RTU interface.

TRI-STAT PLACEMENT CONSIDERATIONS

The Tri-Stat sensor location selected is important to ensure accurate readings that are representative of the area to be monitored. Preferred mounting locations are:

- On an interior wall that has no direct sunlight exposure and is near (but not directly in the airstream of) a return air duct. In areas with multiple return air ducts, locate the sensor at a point between them, observing the same precautions. Avoid areas with poor air circulation, such as behind doors or in alcoves where temperature fluctuations and moisture accumulation can affect sensor performance. Also, avoid areas that may expose the Tri-Stat to direct occupant breathing (e.g. water coolers, coffee machines, etc.).
- At a height of 4 to 6 feet from floor level, and at least 3 ft from a corner and 2 ft from an open doorway.
- Away from the direct airflow of windows, doorways, halls or other heating and cooling sources.
- Away from other equipment that could affect the temperature of the sensor.

TRI-STAT INSTALLATION

Read and understand all installation instructions prior to installing the Tri-Stat. The Tri-Stat is designed for surface mount installation, or for installation onto a standard (field supplied) single gang electrical junction box. Installation and wiring of the Tri-Stat must be accomplished in accordance with all local electrical and mechanical codes to ensure safety and compliance. Refer to Figures 1 and 2 for Tri-Stat outline dimensions and mounting hole locations.



CAUTION

Deactivate 24 VAC power source until all connections to the Tri-Stat are complete.



When multiple devices are powered from a common 24VAC power source, ensure that all devices are wired in phase with 24VAC power at L1, and 24VAC return at L2! Damage will occur to the Tri-Stat and/or other devices if this caution is not observed.



The Tri-Stat contains electrostatic discharge (ESD) sensitive components. To prevent damage, observe ESD precautions when handling the instrument. Failure to comply can result in equipment damage.



The installed location of the Tri-Stat is critical for proper performance. Refer to the previous TRI-STAT PLACEMENT CONSIDERATIONS section of this document for additional recommendations.



Ensure that adequate clearance exists to permit installation and wiring of the Tri-Stat, and to allow for access to the board mounted instrument configuration switches.

1. Carefully open the Tri-Stat package and inspect for damage. If any damage is noted, immediately file a claim with carrier.
2. Determine the Tri-Stat installation location as indicated on the engineer's plans, or determine placement using the previous Tri-Stat Placement Considerations.
3. Install Tri-Stat wiring to the desired location, observing the previous placement considerations. Wiring may be routed directly through walls for surface mounting of the Tri-Stat, or may be brought through a junction box depending upon local requirements. All wiring must be accomplished in accordance with local regulations and national codes.
4. Carefully remove the cover of the Tri-Stat. Depress the enclosure tab at the bottom of the enclosure, and swing the cover upward to disengage it from the base. The Tri-Stat includes two mounting screws for standard electrical junction box installations, and one security/tamper resistant screw. After Tri-Stat installation and configuration is complete, this screw may be installed at the bottom of the enclosure to prevent inadvertent or unauthorized opening of the enclosure.
5. Using the Tri-Stat base as a template, mark the location for the wiring pass-through slot and for the mounting screws as shown in Figure 2. For mounting directly to a single-gang electrical junction box, proceed to step 8.
6. Drill holes sized for suitable wall anchors at the mounting locations marked, and install the wall anchors.
7. Drill another hole suitable to pass the Tri-Stat wiring through the wall at the marked wiring pass-through slot location. Pull wiring through hole, and allow a minimum of 6 inches of cable for wiring of the Tri-Stat.
8. Pass Tri-Stat wiring through the rear wiring pass-through opening of the Tri-Stat base, and mount the instrument at the desired location using appropriate hardware for the mounting method selected. Refer to the proceeding sections of this document for Tri-Stat wiring interconnections, initial instrument set up and normal operation.

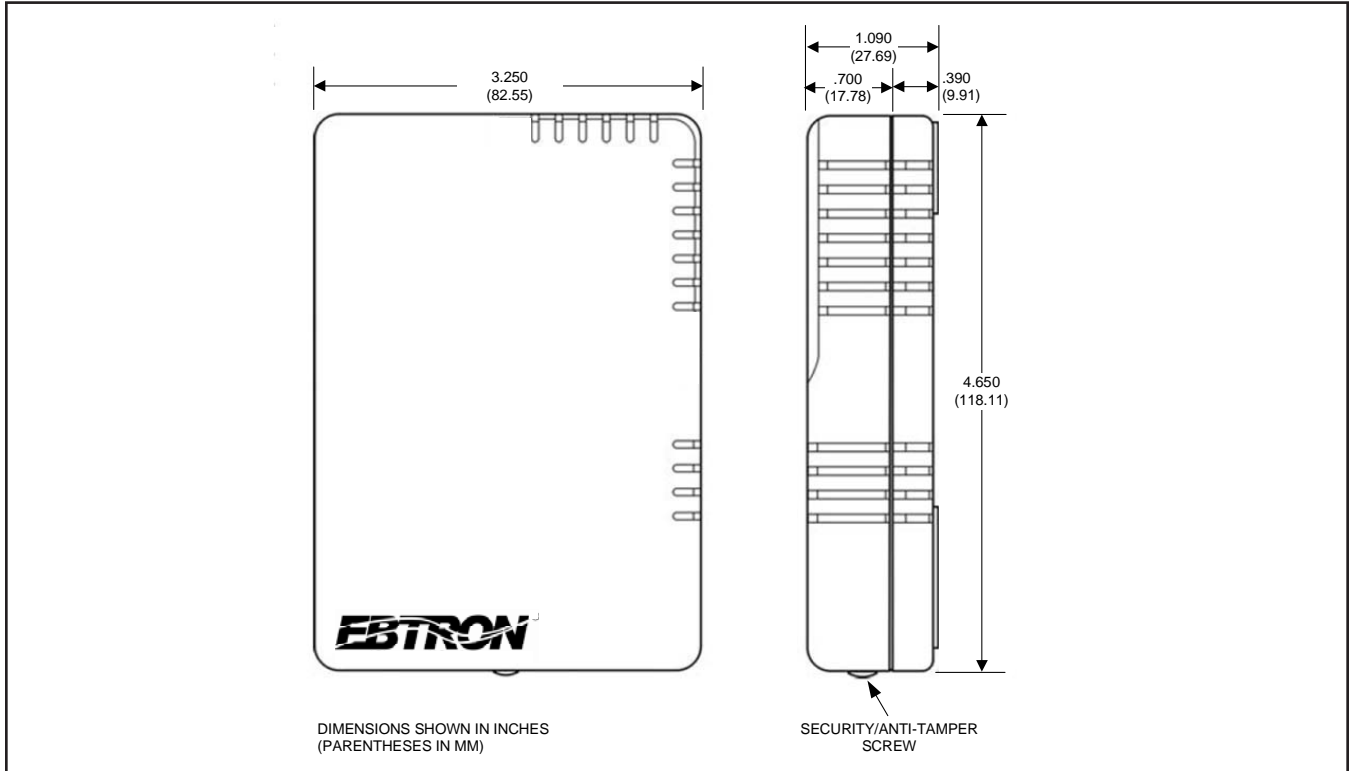


Figure 1. Tri-Stat Outline Dimensions

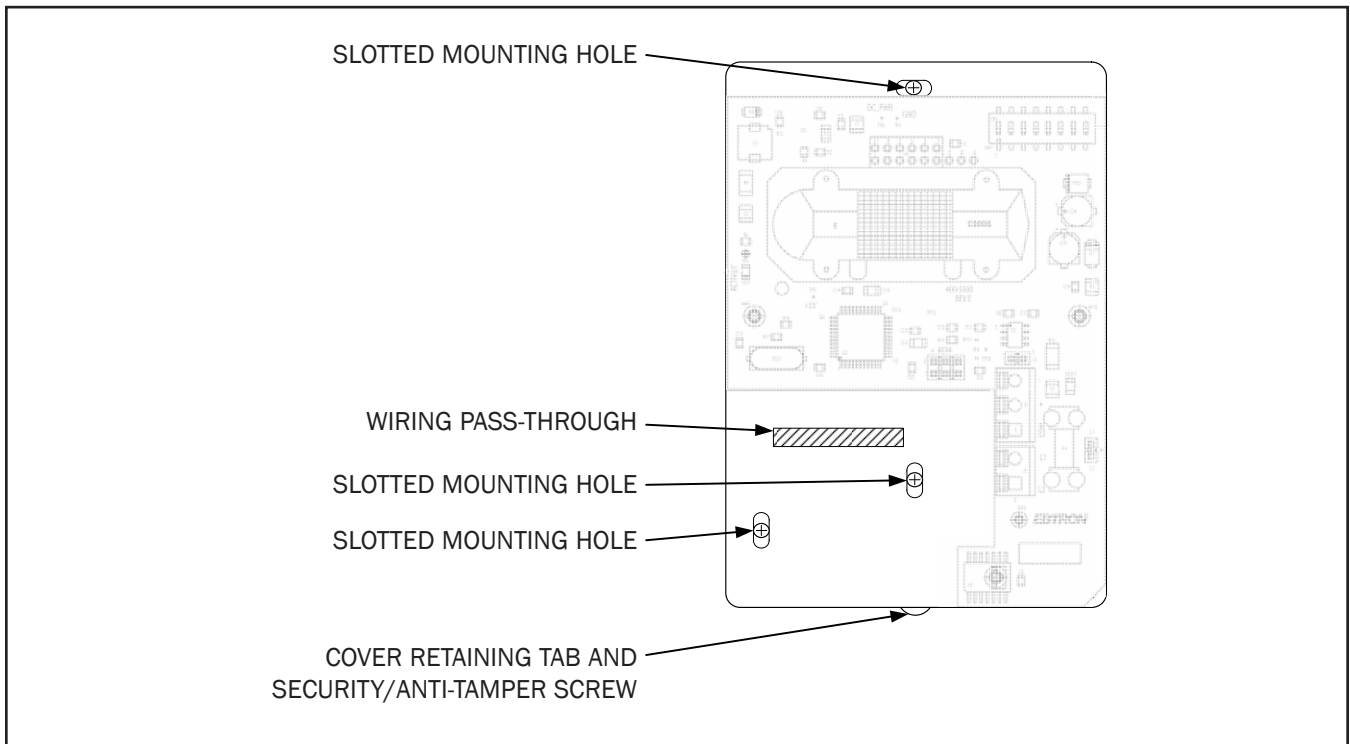


Figure 2. Tri-Stat Mounting Hardware Locations

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TRI-STAT INTERCONNECTIONS

CAUTION

- ⚠ Deactivate 24 VAC power source until all connections to the Tri-Stat are complete.
- ⚠ When multiple devices are powered from a common 24VAC power source, ensure that all devices are wired in phase with 24VAC power at L1, and 24VAC return at L2! Damage will occur to the Tri-Stat and/or other devices if this caution is not observed.
- ⚠ The Tri-Stat contains electrostatic discharge (ESD) sensitive components. Observe ESD precautions when handling the instrument to prevent damage. Failure to comply can result in equipment damage.

All connections are accomplished on the Tri-Stat circuit board at terminal blocks J2 and J3 as shown in Figures 3 and 4.

1. Connect 24VAC power to the Tri-Stat at terminal block J3 terminals L1 and L2. When powering multiple network devices from a common source, observe 24VAC phasing (24VAC to L1, return at L2 - see Caution above).
2. The L2 post of the 24VAC J3 terminal block can be connected to earth ground according to the following:

CAUTION

Damage to network devices may occur if L2 of the 24VAC J3 terminal block is connected to earth ground and the RS485 network is not earth grounded.

- a) If the RS485 network connection for the Tri-Stat is ground referenced to earth, the L2 post of the 24VAC J3 terminal block can also be connected to a wire that is ground referenced to earth.
 - b) If the RS485 network connection for the Tri-Stat is not ground referenced to earth, then the L2 post of the 24VAC J3 terminal block must not be connected to a wire ground referenced to earth, as damage to other network devices may occur.
3. Connect the RS485 network connections at terminal block J2 as follows:

<u>J2 Terminal Block</u>	<u>Network Connection</u>
-	NET -
+	NET +
COM	NETWORK COMMON

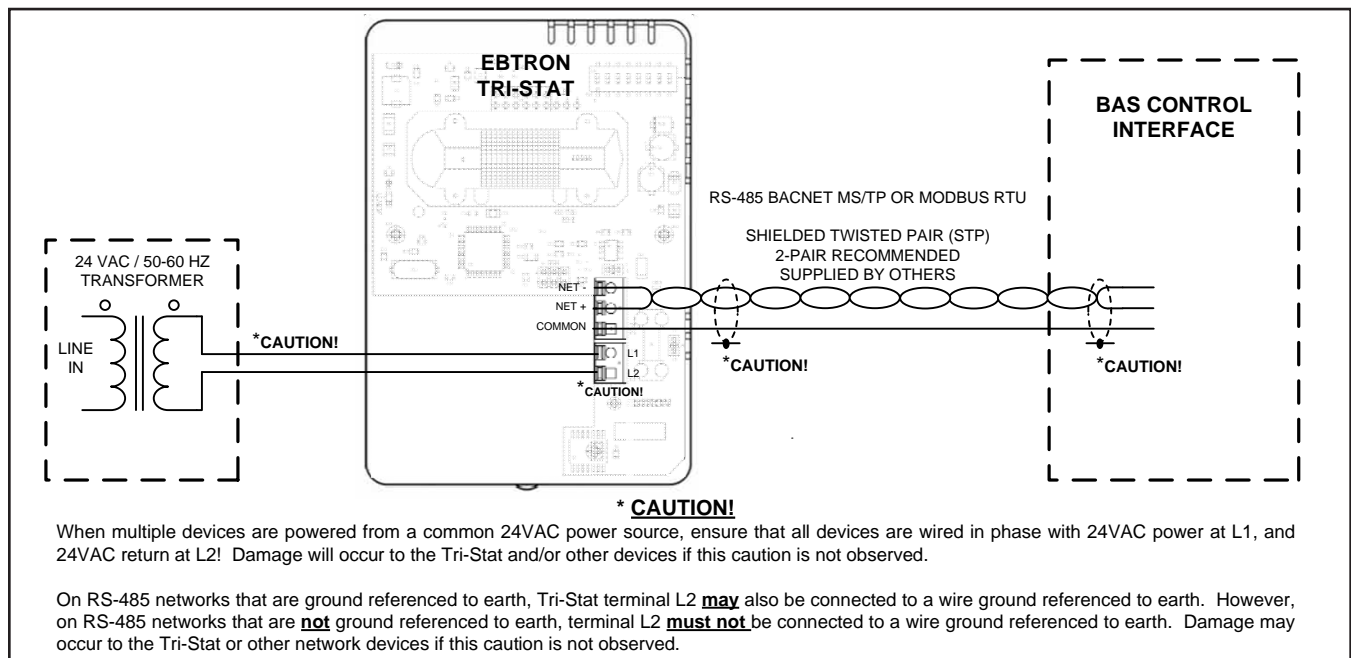


Figure 3. Tri-Stat Typical Wiring Diagram to BAS Control Interface

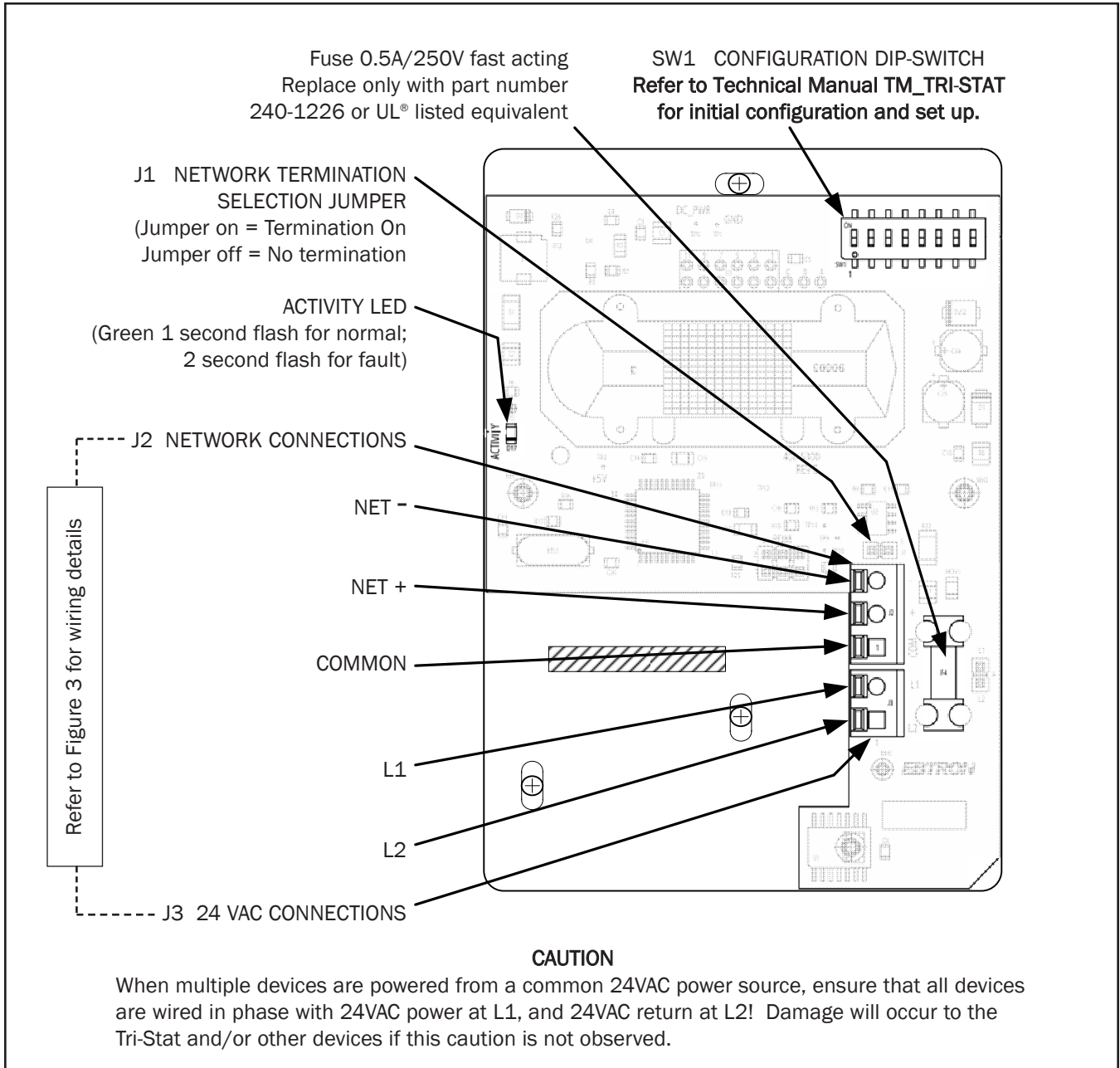


Figure 4. Tri-Stat Interior Detail View

TRI-STAT NETWORK CONFIGURATION

The Tri-Stat is shipped from the factory for BACnet[®] operation.

For BACnet configuration details refer to the **TRI-STAT BACnet[®] CONFIGURATION** section and Appendix A of Technical Manual **TM_Tri-Stat**, under separate cover.

For Modbus[®] configuration details, refer to the **TRI-STAT MODBUS[®] CONFIGURATION** section and Appendix B of Technical Manual **TM_Tri-Stat**, under separate cover.

TRI-STAT START-UP

The following procedure is intended for initial start up of the instrument.

1. Confirm that the Tri-Stat is installed and wired properly as outlined in the **TRI-STAT INSTALLATION** and **TRI-STAT INTERCONNECTIONS** sections of this document.
2. Confirm that network termination, address, baud rate and device object instance number (as applicable) have all been properly set as outlined in the **TRI-STAT BACnet[®] CONFIGURATION** or **TRISTAT MODBUS[®] CONFIGURATION** sections of Technical Manual **TM_Tri-Stat**, under separate cover.
3. Apply 24VAC power to the Tri-Stat. After a brief initialization (approximately 20 seconds) observe that the green Activity LED flashes on for 1 second, then OFF for one second indicating normal operation.
4. Install Tri-Stat cover by engaging the small molded hinges at the top of the cover with the base, and gently swinging the cover downward into the closed position. The cover will latch via the tab located at the bottom of the enclosure. If required, install the Security/Tamper resist screw at the bottom of the Tri-Stat enclosure (as shown in Figure 2).
5. Using suitable software, set current Tri-Stat Time and confirm network device settings (refer to Appendices A and B of Technical Manual **TM_Tri-Stat** for BACnet[®] and Modbus[®] network details).
6. The Tri-Stat is now ready for normal network operation.

TRI-STAT NORMAL OPERATION

During normal operation of the Tri-Stat, no further user activity is required.

The Tri-Stat features a green “Activity” light emitting diode (LED - see Figure 4) that flashes to indicate the operating status of the instrument. Following application of 24VAC power and a brief instrument initialization of approximately 20 seconds the LED will begin to flash.

During normal Tri-Stat operation the Activity LED will continuously flash ON for 1 second, then OFF for 1 second.

During Tri-Stat fault conditions, the LED will continuously flash ON for 2 seconds, and then OFF for 2 seconds.

Refer to Appendix A and Appendix B of Technical Manual **TM_Tri-Stat** for BACnet[®] and Modbus[®] device network values available during operation of the Tri-Stat.

TRI-STAT MAINTENANCE

In most HVAC environments, periodic maintenance and calibration are not required or recommended. If calibration of the CO2 sensor is required, refer to the applicable procedures within Technical Manual **TM_Tri-Stat** for BACnet[®] or Modbus[®] CO2 Sensor Calibration.

TRI-STAT ADDITIONAL INFORMATION

Refer to the separate Installation, Operation and Maintenance Technical Manual **TM_Tri-Stat** for additional information, or contact your local **EBTRON** representative or our Technical Support Team at 800.2**EBTRON** (1.800.232.8766).