

Advantage II

Hybrid Series by Ebtron

HYBRID SERIES
INSTALLATION GUIDE

Quick Installation Guide

HTN104

RS-485 Output Transmitter

Document: IG-HTN104_R1A



IG-HTN104_R1A



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Insert latest changed pages (in bold text); remove and dispose of superseded pages.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 No	Revision *	Description of Change	Date
1 through 8	R1A	Initial Document Release	02/12/2010

* R1A indicates an original page without change

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IG-HTN104_R1A

OVERVIEW

This document provides only the instructions necessary to install the HTN104 Transmitter. Transmitter installation consists of mounting the transmitter, installing output/network cables, connecting the sensor probes cables and preparing the transmitter for operation. For complete setup and operating instructions refer to the HTx104 Installation, Operation and Maintenance technical manual, TM_HTx104 under separate cover.

Observe the following precautions during installation:

CAUTION



In locations exposed to direct rain and/or snow, the transmitter must be enclosed in a NEMA4 enclosure.

Leave at least 7" (177.8 mm) above, and 3" (76.2 mm) to each side and bottom, of unobstructed space around the transmitter to allow for heat dissipation and cover removal.

Locate the transmitter in a location that can be reached by all connecting cables from the sensor probes.

Do not drill into the transmitter enclosure since metal shavings could damage the electronics.

HTN104 TRANSMITTER INSTALLATION

The HTN104 transmitter is designed for use in an environment between -20° F to 120° F (-28.8° C to 48.8° C) where it will not be exposed to rain or snow. The transmitter shall be mounted upright in a field accessible location such that all power, network and sensor probe cables can reach the connections on the transmitter enclosure. The enclosure is designed to accept 3/4 in. (19.0 mm) conduit fittings for signal and power wiring at the top left and right sides as shown in Figure 1. Mount the transmitter using suitable hardware at the four 0.188 in (4.76 mm) diameter holes on the left and right mounting tabs.

Mechanical Dimensions

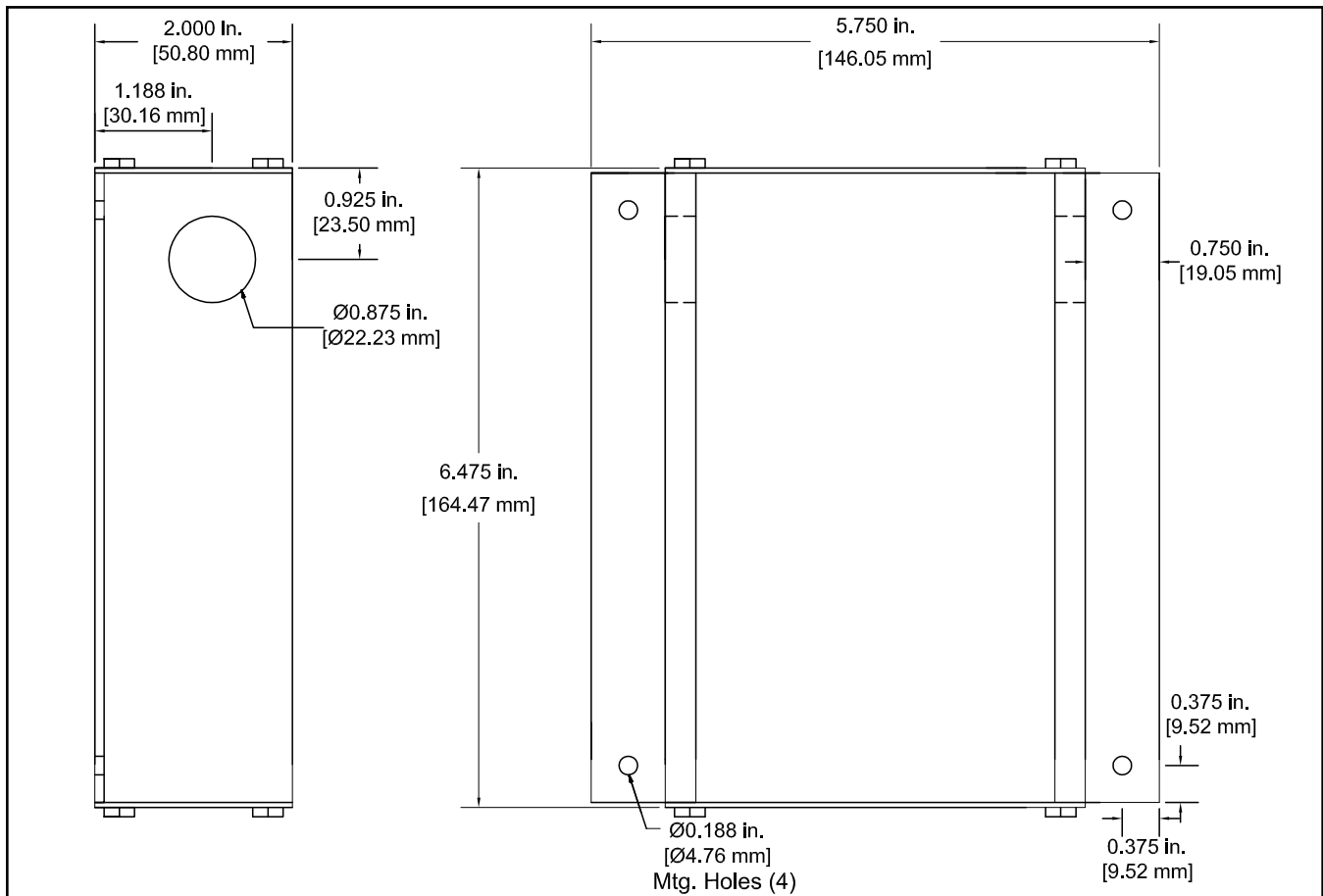


Figure 1. HTN104 Transmitter Mechanical Detail Drawing

HTN104 POWER TRANSFORMER SELECTION

Select a 24 VAC transformer based on the maximum power requirements indicated on the transmitter label (11 VA) or from the table below. The operating supply voltage (transmitter power “ON” with all sensor probes connected) should not be less than 22.8 VAC or greater than 26.4 VAC.

Table 1. HTN104 Power Transformer Selection Guide

Total Sensors	1	2	3	4
Minimum VA Req.	6	8	9	11

HTN104 POWER CONNECTIONS

Slide the cover plate up and off of the transmitter enclosure, and ensure that the power switch is in the “OFF” position before connecting the 24 VAC power source.

Connect 24 VAC power to the large, two position power input terminal labeled “POWER” on the upper right hand side of the main circuit board as shown below and in detail in the Wiring Diagram of Appendix A. Since the output signals are isolated from the power supply, it is not necessary to provide an isolated (secondary not grounded) power source.



Multiple HTx104 transmitters wired to a single transformer must be wired “in-phase” (L1 to L1, L2 to L2).



Sensor probes must be connected to the transmitter before turning the power switch to the “on” position to properly “flash” sensor calibration data to the transmitter.

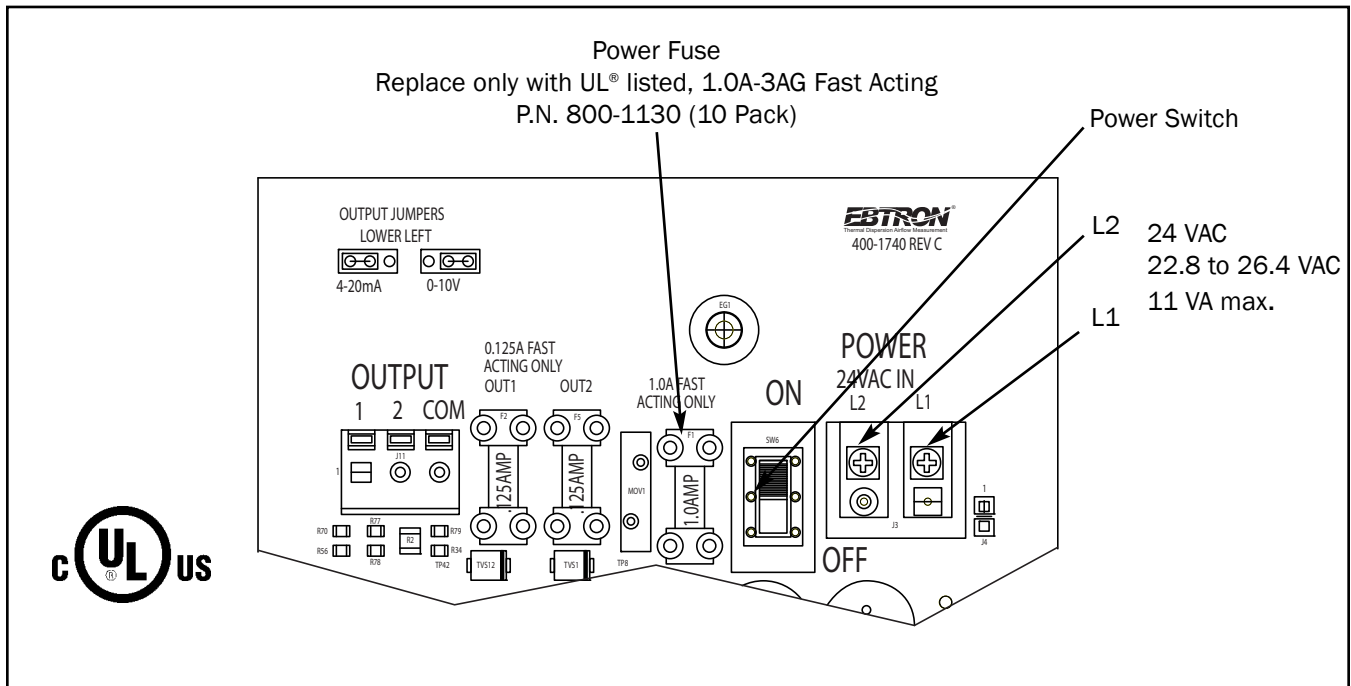


Figure 2. HTN104 Power Connections

CONNECTING SENSOR PROBES TO THE TRANSMITTER

After mounting the sensor probes and transmitter, connect the sensor probe cable plugs to the circular receptacles located at the bottom of the HTx104 transmitter enclosure. Probes are "Plug and Play" and do not have to be connected to a specific receptacle on the transmitter, **unless HE1 probes are used**. For HE1 probes with Type B transmitters, connect the probe in the OA (Outside) flow to the left connector; and the probe in the EX (Exhaust) flow to the right connector. Transmitters accept HP1, HF1, HB1, HT1, or HE1 sensors. Mixing sensor types on transmitter is not permitted. Match probes to transmitter by type (A, B or C) as indicated on transmitter and probe tags, and as shown in Figures 3 and 4.



Provide a "drip loop" at the transmitter if there will be the potential for water runoff or condensation along the sensor probe cable(s).



Sensor probe cable plugs are "keyed" as shown in the connector detail below. Line up plug with receptacle and push straight on to receptacle. **DO NOT TWIST**. Squeeze cable plug "ribs" towards receptacle when removing. Forcing the cable plug in or out of the receptacle will damage the connectors and void warranty.

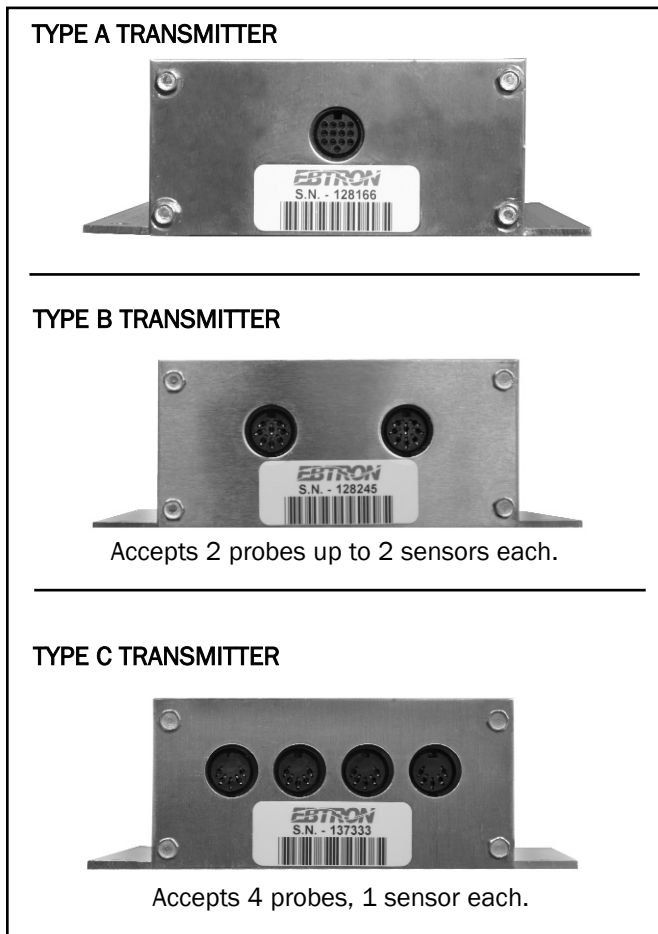


Figure 3. HTN104 Type A, B and C Transmitter Detail

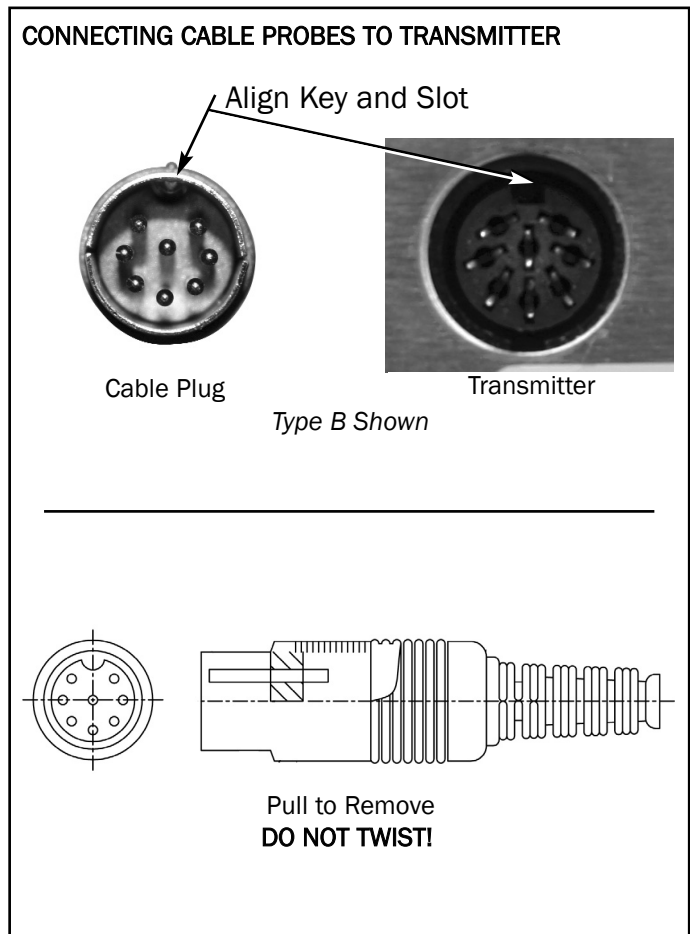


Figure 4. HTN104 Connector Detail

HTN104 RS-485 TRANSMITTER OUTPUT WIRING AND SET UP

The HTN104 features field selectable firmware menu options for address and protocol selection, and a termination DIP switch (as shown in Figure 5) for line termination selection to integrate with various network topologies. An advanced differential bus/line transceiver designed to meet RS-485 standards for multipoint data transmission provides protection for over-current and over-voltage bus contention/wiring faults, as well as automatic thermal shutdown protection.

RS-485 Network Cable Specifications

The RS-485 network cable shall be shielded twisted pair with a characteristic impedance of 100 to 130 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter. Distributed capacitance between conductors and shield shall be less than 200 pF per meter. The maximum recommended length of a network segment is 1200 meters with AWG 18 cable. A detailed wiring diagram is provided in Appendix A. Before making network connections, set network protocol, termination and address as follows:

HTN104 RS-485 Network Connections

The HTN104 RS-485 network circuitry is isolated from the 24VAC power and “floats” with respect to ground by default. This allows for the HTN104 to be interfaced with both isolated and non-isolated networks. To wire the output signal, slide the cover plate up and off of the enclosure. Ensure that the power switch is in the “OFF” position. Determine whether the RS485 network requires an isolated or non-isolated interface to the HTN104, and connect cables as outlined in the appropriate paragraph that follows. Pay particular attention to the network common connection and termination DIP switch requirements for each type of connection. Connections are made at the three position terminal block labeled “OUTPUT” on the upper left hand side of the main circuit board as shown in Figure 5. For additional detail, refer to the HTN104 Wiring Diagram of Appendix A.

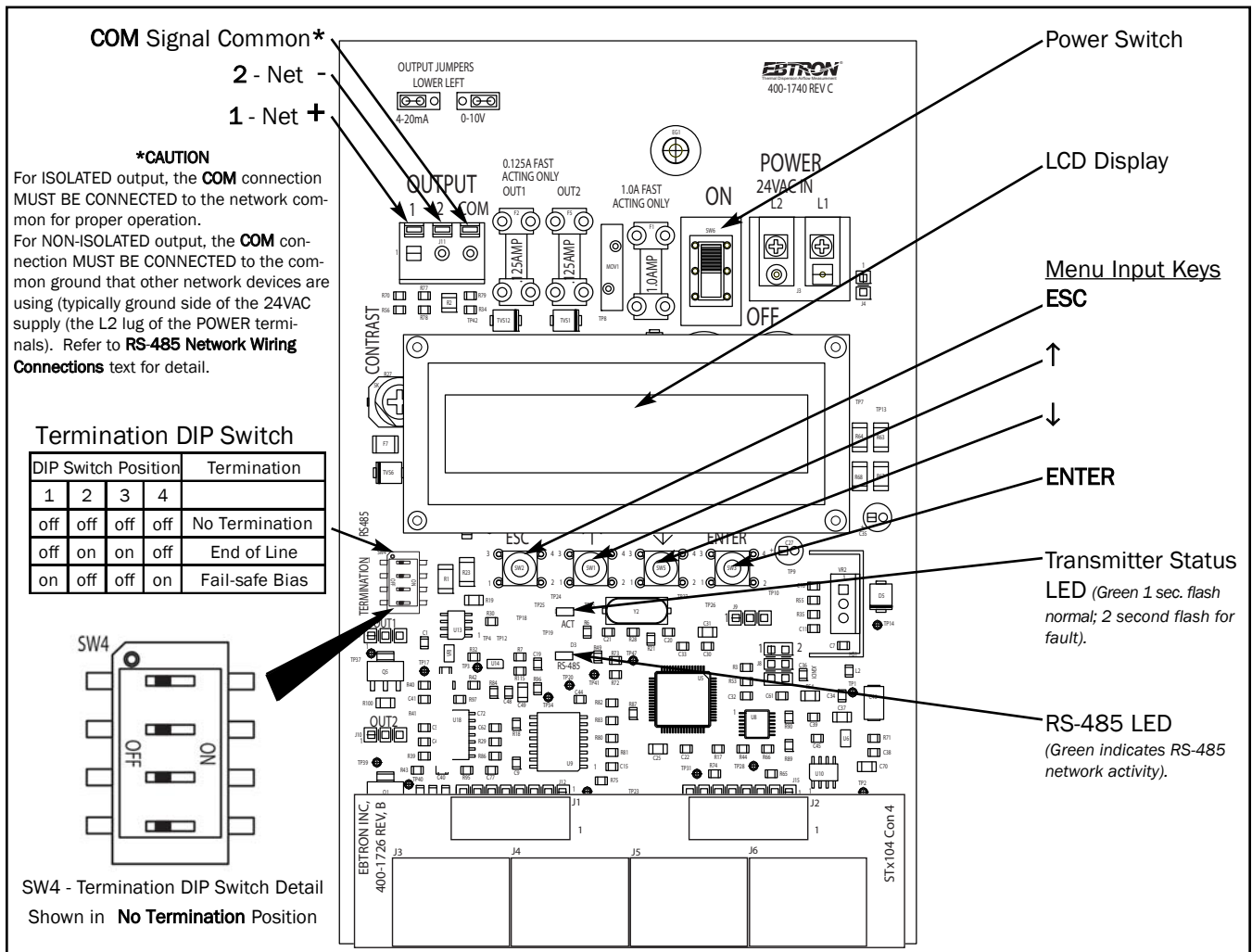


Figure 5. HTN104 RS-485 Transmitter Interior Detail

Connecting to an Isolated RS-485 Network:

Connect the NET+, NET- and COM terminals to the network with shielded twisted pair cable meeting the specifications defined in the previous paragraph (typically using two pairs, with one wire not used; one pair for +/- and both wires in other pair for GND when using 2-pair cable). The connection to the network must be made in a "daisy chain" configuration. "T" connections and stubs are NOT permitted. The shield should be terminated at one end on the network only. If the HTN104 is not the first or last device, set the on-board termination DIP switches for NO TERMINATION. If the HTN104 is the first or last device, set the on-board termination DIP switches to either END OF LINE or FAIL SAFE BIAS termination.



*CAUTION

For ISOLATED output, the **COM** connection MUST BE CONNECTED to the network common for proper operation.

Connecting to a Non-Isolated RS-485 Network:

Connect the NET+ and NET- terminals to the network with a shielded twisted pair cable meeting the specifications defined in the previous paragraph. The connection to the network must be made in a "daisy chain" configuration. No "T" connections or stubs are permitted. The shield should be terminated at one end on the network only. If the HTN104 is not the first or last device, set the on-board termination DIP switches for NO TERMINATION. If the HTN104 is the first or last device, set the on-board termination DIP switches to either END OF LINE or FAIL SAFE BIAS termination. Because the HTN104 output is isolated, the COM terminal must be connected to the "common ground" that the other devices on the network are using as their ground reference. This is typically the ground side of the 24VAC supply (L2 on the HTN104 POWER terminals).



*CAUTION

For NON-ISOLATED output, the **COM** connection MUST BE CONNECTED to the common ground used by the other network devices (typically the ground side of the 24VAC supply; the L2 terminal at the POWER connector block as shown in Figure 5).

HTN104 Setting Network Options

The transmitter must be configured for proper protocol address and termination prior to power up. The transmitter is shipped from the factory with the protocol set to BACnet[®] MS/TP Master, **address 1** and **no termination**. (Termination DIP switch is located on the circuit card - see Figure 5.) Refer to separate Technical Manual TM_HTx104 for COMM Setup Menu options.

HTN104 Setting the Network Protocol

Transmitter protocol can be changed in the field using the COMM setup menu as shown in Figure 10 of the separate Technical Manual, TM_HTx104. Refer also to TM_HTx104 Tables 4 through 6 for specific features of each protocol.

HTN104 Setting the Transmitter Address

Each transmitter must be assigned a **unique** address between 1 and 255 (127 BACnet[®]) prior to power up by setting the address in the COMM setup menu (as shown in technical manual TM_HTx104).

HTN104 Setting the Transmitter Termination

A termination resistor (typically 120 ohms) should be installed at each end of the bus between the NET+ and NET- (A and B) communication lines. The **EBTRON** transmitter provides the ability to select standard (120 ohm) or "fail-safe" termination whenever the device is installed at either end of the bus. When an **EBTRON** device is not installed at the end of the bus, the termination for that device should be disabled. The "fail-safe" termination will guarantee that the bus is in a known state during idle-line conditions (when no device is driving the bus). **EBTRON** recommends "fail-safe" termination at one end of the bus. Transmitter termination is selected by setting the DIP switch labeled "TERMINATION" (Figure 9) on the circuit card. Termination options are "No Termination", "End of Line" or "Fail-safe Bias" (recommended at one end of the bus).

HTx104 LCD Display Notifications

Following a brief initialization at power up, the LCD display automatically displays airflow and temperature as all upper case (caps) characters. The display provides additional information on system status and alarm conditions as follows:

Last LCD Character Shown in Lower Case (Probe Malfunction)

If the last character of the flow rate units on the LCD display is shown in lower case (for example **Fpm** or **CFm**), this indicates an improper or malfunctioning probe is connected to the transmitter. (Refer to Tables 9 through 11 of technical manual TM_HTx104 under separate cover for additional troubleshooting detail).

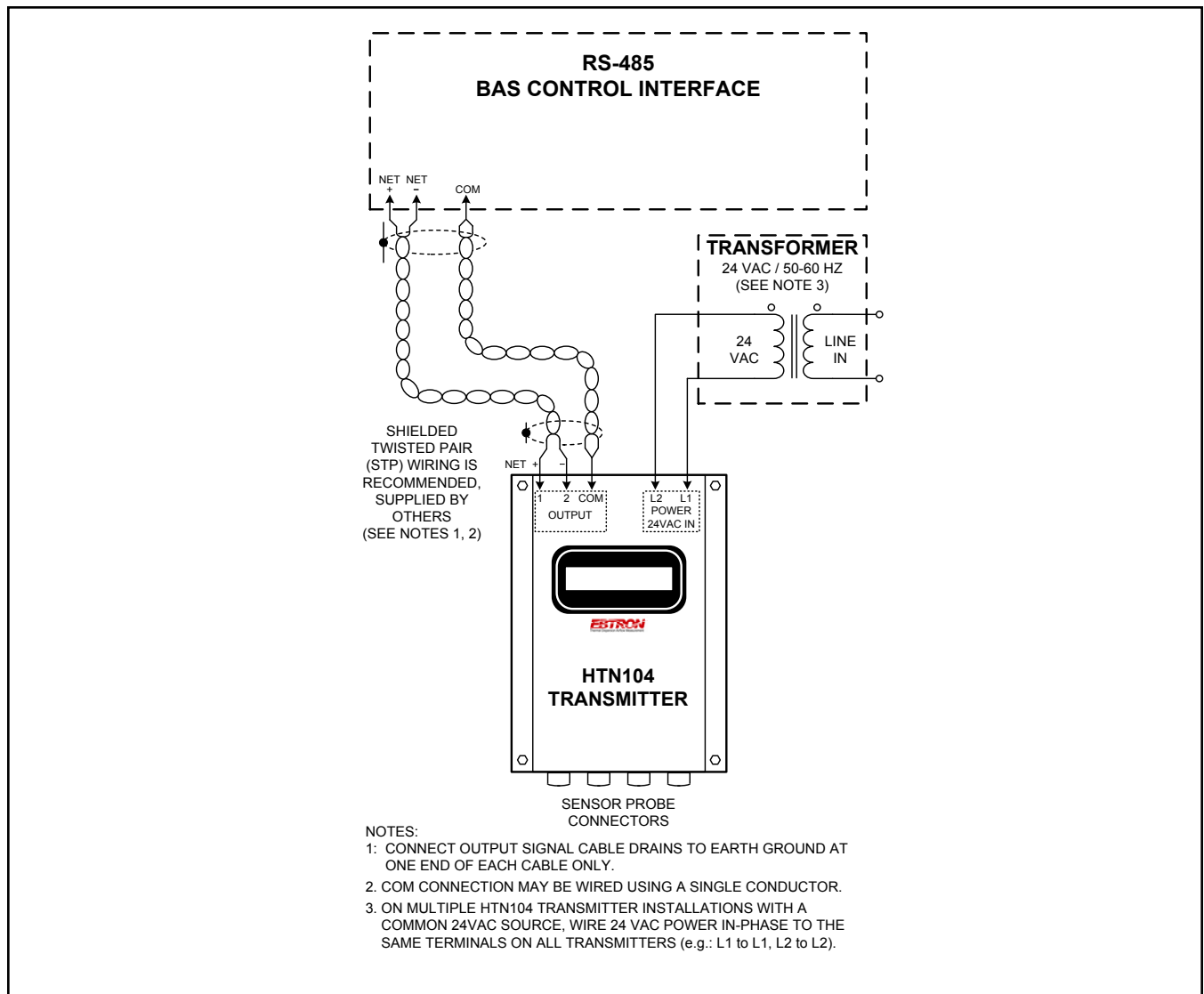
All LCD Characters Shown in Lower Case (Field Cal Wizard Engaged)

If all characters of the flow rate units on the LCD display are in lower case (for example fpm or cfm), this indicates that the transmitter is operating in the Field Calibration Wizard mode (see FIELD ADJUSTMENTS - Field Calibration Wizard section contained in technical manual TM_HTx104 under separate cover).

LCD Display when using HE1 ERV Probes

Following a brief initialization at power up, the LCD display automatically displays airflow and temperature when duct/plenum probes (**HP1 or HT1**), fan inlet probes (**HF1**) or bleed sensors (**HB1**) have been connected. When equipped with ERV probes (**HE1**), the HTx104 automatically cycles through and displays airflow and temperature of each ERV probe. A HOLD feature in the ERV firmware permits the user to hold the display at a particular probe at any time simply by depressing any of the Menu Item Keys (ESC, ↑, ↓, or ENTER - see Figure 5). The display will also indicate the letter "H" on the far right side of the display when it is in this hold state. To resume normal cycling through the probe readings, simply depress any key once again. Refer to the menus and descriptions which appear in the separate HTx104 Transmitter Technical Manual for complete Setup menu description and programming features.

**APPENDIX A -
HTN104 WIRING DIAGRAM**



IG-HTN104_P1A