

Advantage

Hybrid/Silver Series by Ebtron

Installation, Operation and Maintenance Technical Manual

HT1/ST1

Terminal Box/Small Duct Airflow Sensors
For use with Hybrid HTx104 and Silver STA102 Transmitters

Includes Analog output models: HTA104-T and STA102-T

Includes RS-485 output model: HTN104-T

Document Name: *TM_HT1_ST1_R2C*



TM_HT1_ST1_R2C

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Insert latest changed pages (in bold text); remove and dispose of superseded pages.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, 2	R2C	Updated document revision to R2C	12/13/2011
5	R2C	Clarified placement diagram.	12/13/2011
7	R2B	Updated maintenance note regarding filtering	10/17/2011
1-8	R2A	Incorporated all prior changes and re-issued document as R2A. Removed all references to Silver 104; Updated cover/title page and this page to R1J	04/14/2011
4	R2A	Changed temperature sensor type to bead-in-glass	04/14/2011
4	R1H	Added Sensor probe Configuration detail	06/01/2010
4	R1G	Added Sensor probe Configuration detail	04/08/2010
4	R1F	Added System Accuracy specification	11/24/2009
3-5	R1E	Calibrated range was wrong; (5,000fpm) changed to 3,000fpm	10/19/2009
1, 3, 6	R1D	Updated photo and detail views	06/05/2009
1, 2	R1C	Added part number; updated revision to R1C	03/19/2009
4	R1B	Updated to add stainless steel option	01/25/2009
5, 7, 8	R1A	Initial document release	11/17/2008

* R1A indicates an original page without change

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OVERVIEW

HT1/ST1 thermal dispersion terminal box/small duct probes are unique sensors designed for precise measurement and control of airflow/temperature in small duct and variable air volume (VAV) applications.

EBTRON's proprietary flow loss compensation techniques eliminate inaccuracies associated with small duct airflow measurement, where the inherently large ratio of duct wall surface to duct free area typically results in higher than actual airflow readings when using traditional multi-point traverse measurement techniques. HT1/ST1 sensor probes are calibrated for single, one or two sensor probe applications (regardless of the input maximum of the transmitter).

HT1/ST1 terminal box/small duct airflow sensors use "bead-in-glass" thermistors to determine the airflow rate and temperature at each sensing location. The sensor relates the thermal transfer rate of a heated element to airflow rate. As the velocity across the sensor increases, the thermal transfer rate increases. Accuracy is ensured through individual sensor characterization over a range of 0 to 3,000 fpm (0 to 15.24 m/s) in wind tunnels calibrated to NIST-traceable volumetric airflow standards. Accuracy is percent of reading (not percent of full scale) and performance is ensured throughout the entire calibrated range. The airflow rate can easily be converted to equivalent pressure by simply applying an appropriate correction factor.

An HT1/ST1 terminal box/small duct airflow sensor and a dedicated HTx104 transmitter provide airflow and temperature measurement capability as well as optional network availability options. Where only an analog output of airflow is required, without temperature measurement or network features, specify model STx102 transmitter.



Figure 1. HT1/ST1 Terminal Box/Small Duct Sensor

ADVANCED TECHNOLOGY

- **EBTRON** Advanced Thermal Dispersion (TD) airflow measurement technology ensures accurate, repeatable measurement starting at zero fpm (still air).
- Each sensor is factory calibrated to **NIST-traceable** volumetric airflow standards.
- True volumetric airflow rate using independent multi-point sensors.
- Superior performance compared to conventional differential pressure-based pitot arrays and flow rings.
- Highest quality and stability hermetically sealed "**bead-in-glass**" thermistors.
- Exclusive "**Plug and Play**" SMART sensor design.
- Simple field installation.

APPLICATIONS

- High accuracy airflow measurement in terminal boxes and small ducts for improved temperature control and energy conservation.
- Ideal for outside air measurement and control on dedicated outside air systems serving multiple spaces or floors.
- Use in small duct systems for volumetric flow tracking and pressure control.
- Combine with occupancy sensing and direct outdoor airflow measurement for continuous reset of intake flow rates for true demand controlled ventilation compliance with **ASHRAE 62.1-2007**.

SPECIFICATIONS

Sensor Probe Configurations (maximum)

- Each HT1/ST1 probe contains up to 2 sensors

HTx104 Type C transmitters accept up to four 4-inch single sensor HT1/ST1 probes.

HTx104 Type B transmitters accept up to two HT1/ST1 probes.

HTx104 and STx102 Type A transmitters accept one HT1/ST1 probe.

Accuracy

- Airflow: $\pm 3\%$ of reading (typical), $\pm 0.25\%$ repeatability
- Temperature: $\pm 0.15^\circ\text{F}$ (0.08°C)

Sensor Ranges

- Airflow rate: 0 to 3,000 fpm (0 to 15.24 m/s)
- Temperature: -20°F (-28.9°C) to 160°F (71.1°C)
- Humidity: 0 to 99% RH, non-condensing

Sensor Distribution

- Equal area

Sensor Assembly (each sensing point)

- Heated Element:
One bead-in-glass, hermetically sealed thermistor probe
- Temperature Sensor:
One bead-in-glass, hermetically sealed thermistor probe
- Sensor Housing:
Glass-filled polypropylene
- Sensor Potting Material:
Marine grade, waterproof epoxy
- Internal wiring: Kynar[®] coated copper

Terminal Box/Duct Sizes

- Std. Sizes (round ducts only¹):
4 to 10 inches (101.6 to 254 mm),
in 1 inch (25.4 mm) increments
- 10 to 16 inches (254 to 406.4 mm),
in 2 inch (50.8 mm) increments

Tube Construction

- Aluminum: 6063 aluminum alloy (standard)
Type 316 stainless steel (optional)
- Nominal Tube Diameter: 0.75 inches (19.05 mm)
- Mounting Bracket: Type 5052 Aluminum
- Mounting Style: Insertion

Cable Assembly

- Type: UL[®] Plenum Rated, PVC jacket; 3 feet [std.] (0.91 m), 50 feet (15.24 m) max.
- Termination: 0.625 inches circular DIN (15.86 mm) plug

"Plug and Play" Sensor Probes

- Probes do not require matching to transmitter

Compatible Transmitters:

- HTA104, HTN104
- STA102

HT1/ST1 SENSOR PROBE PLACEMENT

The following paragraphs detail the procedure required for determining the optimum placement of the HT1/ST1 sensor probe for most typical installation applications.

CAUTION



Installation of the HT1/ST1 probe at the exact location indicated in the Minimum Placement Guidelines below is critical for proper performance of the airflow measurement station.

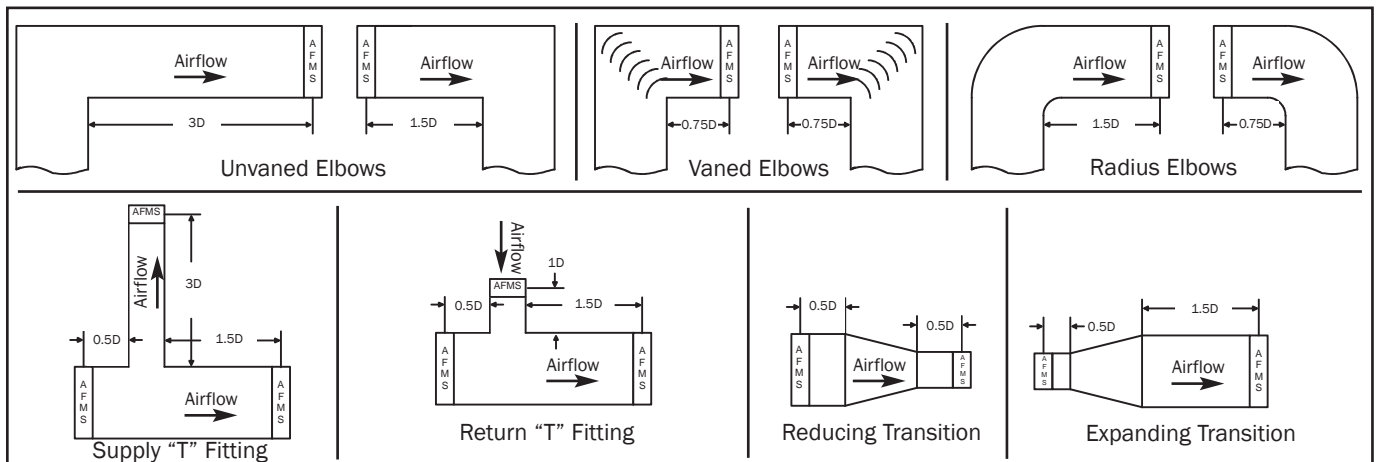
Minimum Placement Guidelines

HT1/ST1 terminal box/small duct sensor probes are computer calibrated between 0 and 3,000 fpm (0 and 15.24 m/s) in individual wind tunnels to volumetric airflow standards. As a result, performance on smaller ducts is improved by compensating for flow losses near the duct wall. Small ducts have a large duct wall surface to free area ratio that typically results in higher than actual flow measurement when traditional multi-point traverse airflow measurement techniques are used.

Placement of the HT1/ST1 sensor probe is critical for proper operation and accuracy of the airflow measurement station. Figure 2 shows minimum placement requirements for the HT1/ST1 sensor probe. Placement is expressed in multiples of Simple Equivalent Duct Diameter - 'D' which is calculated as follows.

$$'D' = \frac{(\text{duct width} + \text{duct height})}{2}$$

MINIMUM PLACEMENT GUIDE



Minimum placement is indicated in multiples of Simple Equivalent Duct Diameters 'D':
Refer to Figure 4 for mounting in VAV box collars. Consult **EBTRON** for applications not indicated in the diagrams above.

Figure 2. HT1/ST1 Terminal Box/ Small Duct Sensor Minimum Placement Dimensions

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HT1/ST1 INSTALLATION

HT1/ST1 terminal box/small duct sensor probes are designed for insertion mounting through one side of the duct. Figure 3 shows installation dimensions for the HT1/ST1 probe.

CAUTION



Location of the HT1/ST1 sensor probe is critical for proper performance of the airflow station. Refer to Minimum Placement Guidelines section of this document for information on recommended location of HT1/ST1 probes.



Ensure that adequate clearance exists on the top or side wall of the duct where the probe will be inserted.



External insulation that interferes with mounting should be temporarily removed prior to installation. Mounting requires a 0.875 inches (22.2 mm) hole on the insertion side of the duct.

1. Each HT1/ST1 sensor probe package is factory labeled for the location and duct size for which it was designed. Determine the specific duct location for the HT1/ST1 sensor probe as indicated on the engineer's plans showing where the airflow measuring station probe is to be located. Refer to illustrations of Figure 4 to determine the proper orientation of the probe.

2. Carefully open the package and inspect for damage.

3. FOR RECTANGULAR DUCTS

The first dimension of the probe size indicates the length of the probe. The second dimension indicates the specific duct insertion side dimension 'X'. Mark a point on the center of the duct insertion side (X/2) where the probe will be installed. Proceed to step 6, ALL DUCTS.

4. FOR ROUND DUCTS

Locate the point on the duct where the probe will be inserted. Proceed to step 6, ALL DUCTS.

5. FOR FLAT OVAL DUCTS

The probe can be mounted in either the major axis or the minor axis of flat oval ducts. Locate the point on the duct where the probe will be inserted. Continue to step 6, ALL DUCTS.

6. ALL DUCTS

- a. Using a 0.875 inches (22.2 mm) hole saw, drill the insertion side hole where marked.

- b. Place the probe assembly through the mounting hole. Ensure that the edge of the mounting plate, which mounts to the duct, is parallel to the edge of the duct and that the airflow arrow printed on it is oriented in the direction of duct airflow. Ensure that the gasket is firmly seated against the bracket, and then fasten the mounting bracket to the duct with appropriate sheet metal screws.

7. Connect sensor probe to the transmitter or controller. Refer to the separate transmitter or controller Technical Manual for information on set up and operation of the airflow measurement system.

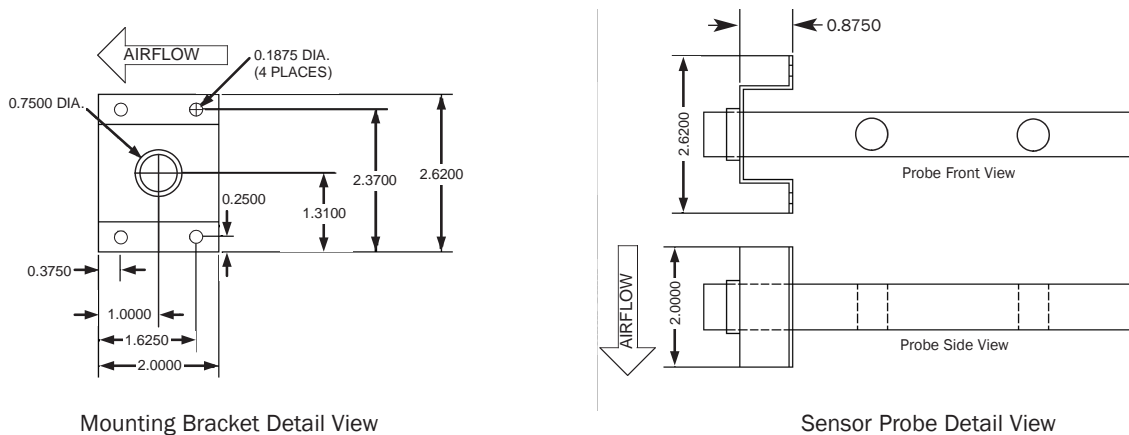


Figure 3. HT1/ST1 Terminal Box/ Small Duct Sensor Installation Dimensions

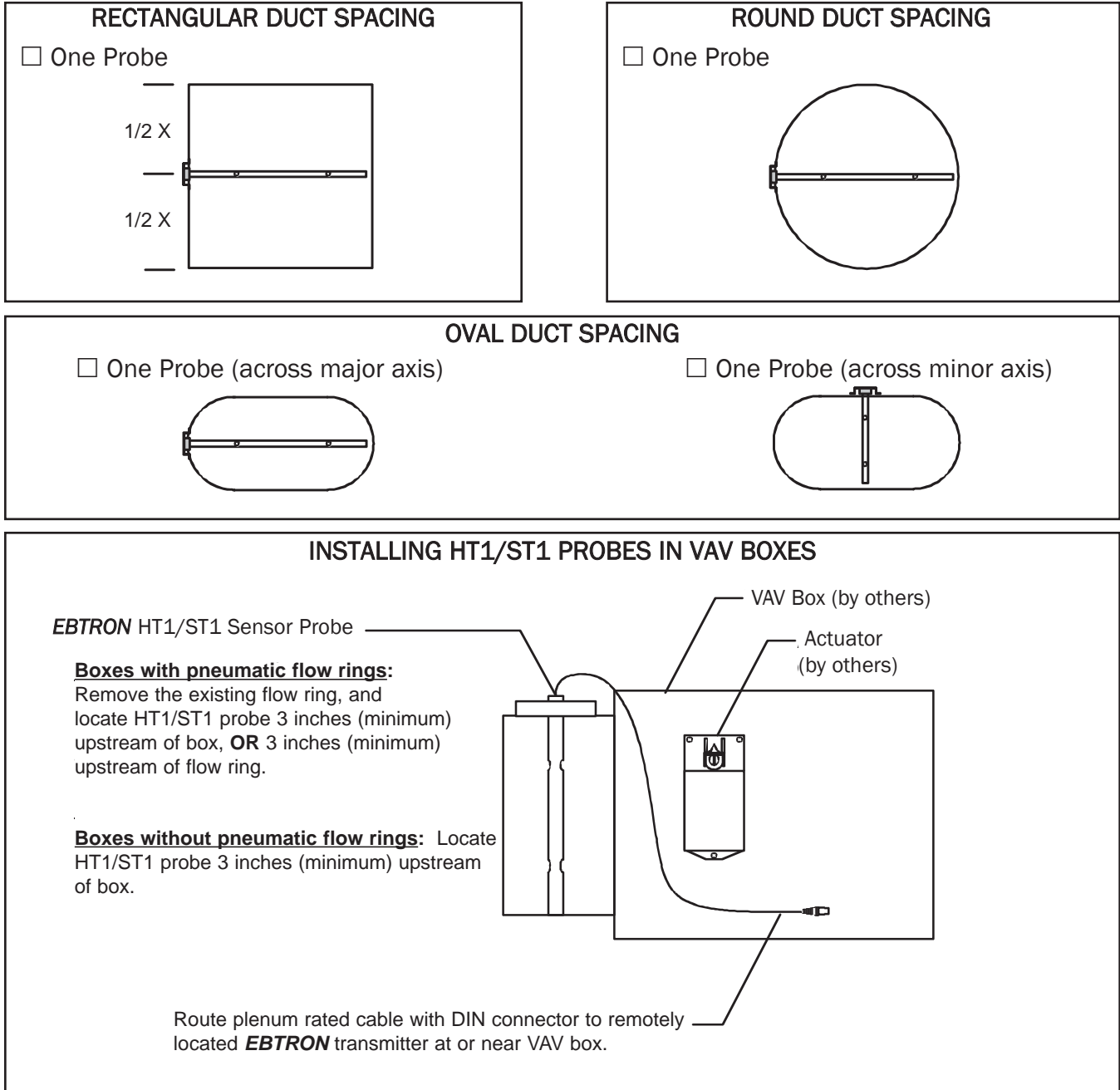


Figure 4. HT1/ST1 Terminal Box/ Small Duct Sensor Installation Orientation by Application

HT1/ST1 MAINTENANCE

In most HVAC environments, periodic maintenance and calibration is not required or recommended*.

*In certain applications where a large amount of airborne particulate is present, especially fibrous material such as lint, pre-filtering of the return air may be required to ensure optimum instrument performance. If no pre-filtering is provided, it may be necessary to periodically inspect and clean sensors using compressed air or a small brush. Factory performance returns immediately after cleaning. Recalibration is NOT required. Periodic inspection of the sensors is always advised, and accessibility must be considered in these applications.

HT1/ST1 STANDARD LIMITED PARTS WARRANTY

If any **EBTRON** product fails within 36 months from shipment, **EBTRON** will repair/replace the device free of charge as described in the company's warranty contained in **EBTRON's** Terms and Conditions of Sale. Defective equipment shall be shipped back to **EBTRON**, freight pre-paid, for analysis.

