

Outside Airflow Measurement for Unit Ventilators

System Features

- Designed specifically for mounting in the outside air intake of unit ventilators.
- Each sensor is factory calibrated to NIST traceable airflow and temperature standards.
- Accurate and repeatable measurement from still air (0 ft./min.).
- True average, independent multi-point sensing.
- Advanced Thermal Dispersion (TD) airflow measurement technology.
- Sensor and transmitter diagnostics with intelligent sensor detection system.
- 304 stainless steel mounting brackets.
- Stable, hermetically sealed "bead in glass" thermistor sensors.
- Exclusive "plug and play" SMART sensor design.
- Microprocessor based digital circuitry with FLASH memory.
- Fully temperature compensated.
- Provides direct signal(s) to all B.A.S.



Application

Thermal dispersion technology can accurately determine airflow in traditionally difficult locations since each sensor is independent and does not require that a stable total and static pressure profile be developed. **Laboratory test data demonstrates that thermal dispersion airflow measurement can be applied closer to duct fittings and accessories than any other technology¹.**

The STA104-U uses two independent sensing probes and is ideal for the direct measurement of outdoor air intake flow rates for dilution air control at unit ventilators and for **ASHRAE 62** compliance. Sensor probes can be located immediately upstream of intake dampers and a special internal bracket that allows for the direct mounting to the intake damper frame when there is no ductwork immediately upstream.

The sensor probes connect to a transmitter that is generally mounted inside the unit ventilator cabinet. The system requires 24 VAC power. An ISOLATED linear velocity output signal can be field selected to either 4-20 mA or 0-10 VDC. Both power and signal connections are fused and fault protected.

Sensor probes are "plug and play" and do not require a matched transmitter, simplifying installation, damage repairs and trouble-shooting. No additional transmitters or transducers are required.

For detailed application information refer to **EBTRON** application design guides, available in your engineer's catalog, online at www.ebtron.com or from your local **EBTRON Representative**.



¹ Contact EBTRON for more information.

Selection

The **STA104-U** has been developed to continuously measure intake rates in the unit ventilator for precise control, where no other technology is able. Each transmitter is intended to serve a single ventilator intake. The transmitter requires 24 VAC and provides the host controller with a linear output signal for airflow and temperature.

Each transmitter is fully independent of the sensor probes. “Smart” sensor technology embeds the calibration data of each sensor in the probe cable assembly. Each transmitter is provided with field selectable, isolated 4-20 mA and 0-10 VDC analog output signals for airflow and temperature. Output scales can be configured easily in the field (see **Technical Specifications** for factory default settings). Each transmitter is provided with a “digital potentiometer” for airflow signal gain adjustment, when field changes are required by the user.

Sensor probes are available with a mounting designed to be installed upstream of the intake control damper, in the opening of approved unit ventilators. Each sensor probe is provided with a standard 5 foot plenum rated cable to connect to the remote transmitter with a small circular terminal connector. Mounting brackets are constructed of corrosion resistant 304 stainless steel. The model **STA104-U** has a typical installed accuracy of $\pm(3\%$ to $6\%)$ of reading when installed in accordance with **EBTRON** installation guides without any field adjustment (see: **Locating Probes**). Installed accuracy is a function of the velocity profile of the intake.



The **STA104-U** has been designed for installation in the opening of several common unit ventilators. Consult **EBTRON** or your local **EBTRON Representative** for compatibility in specific manufacturer's units.

Locating Probes

General

EBTRON thermal dispersion probes can be applied in locations traditionally considered to be a poor choice for other airflow measurement technologies. Contact **EBTRON** or your local **EBTRON Representative** for assistance in locating airflow stations.

Outside Air Intakes

Airflow measuring probes should be mounted upstream of the outside air intake damper in approved unit ventilators. Contact **EBTRON** or your **EBTRON Representative** to obtain a current list of approved unit ventilator manufacturers.



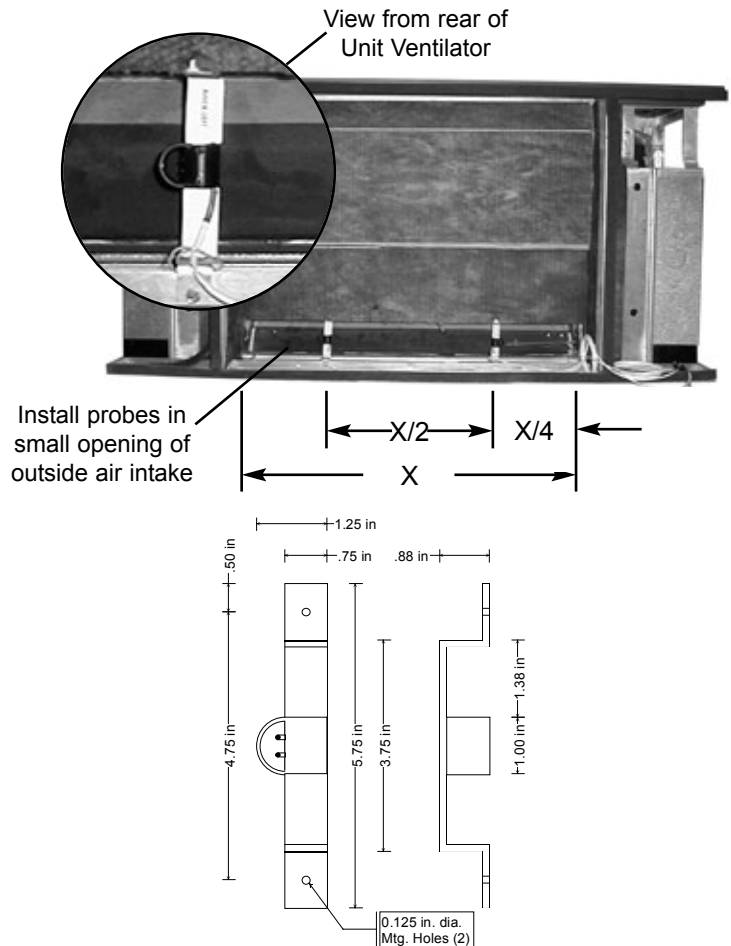
Although **STA104-U** sensor probes are water resistant, avoid locating stations where they will be subject to frequent water exposure.

Probe and Sensor Density

The **STA104-U** is available as a dual probe configuration using a total of two sensors per intake. Probes are designed to fit in a 4 to 12 inch opening of approved unit ventilators.

Probe Installation

STA104-U probes have one internal mounting design for field installation. Probes should always be mounted vertically in the intake opening (see details below). All probes have a standard 5 foot plenum-rated cable (optionally up to 50 feet) for connection to the remotely located transmitter (required). Each Sensor probe is connected to the transmitter with a simple, positive-locking, DIN connector. The connector is 5/8" O.D. The length of the cable is measured from the end of the sensor probe and is the same length for each probe in a given location. Probes should be installed with the airflow arrow pointing in the appropriate direction and fastened with suitable hardware.



Transmitter Installation

The **STA104-U** transmitter aluminum chassis has been designed for use in a protected environment between -20° F and 120° F where it will not be exposed to rain or snow.



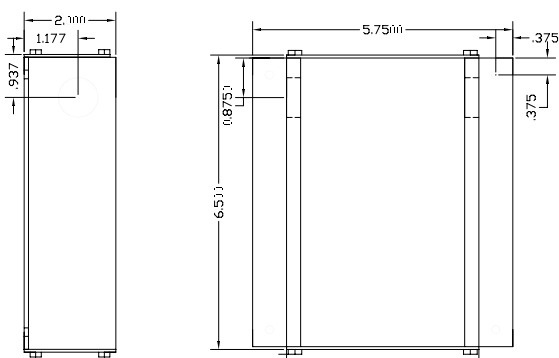
Do not expose the transmitter to rain or snow without providing a NEMA4 enclosure.

The transmitter should be mounted in a field accessible location. The chassis is designed to accept 3/4" conduit fittings for power and signal wiring at the top left and right of the enclosure. The transmitter should be located such that the connecting cables from all of the sensor probes reach the receptacles on the bottom of the transmitter enclosure.



The cable length ordered must be long enough to accommodate the distance between the transmitter and furthest sensor probe.

STA104-U Transmitter Dimensions



Electrical Connections

After mounting the sensor probes and transmitter, connect the sensor probe cable plugs to the circular receptacles located at the bottom of the **STA104-U** transmitter enclosure. Probes are “plug and play” and do not have to be connected to a specific receptacle on the transmitter. **STA104-U** transmitters have two receptacles.

To wire the output signal and power, slide the cover plate up and out of the extruded chassis. Signal wires for airflow and temperature should be connected to the small, three position output terminal labeled “OUTPUT” on the upper left hand side of the main circuit board.



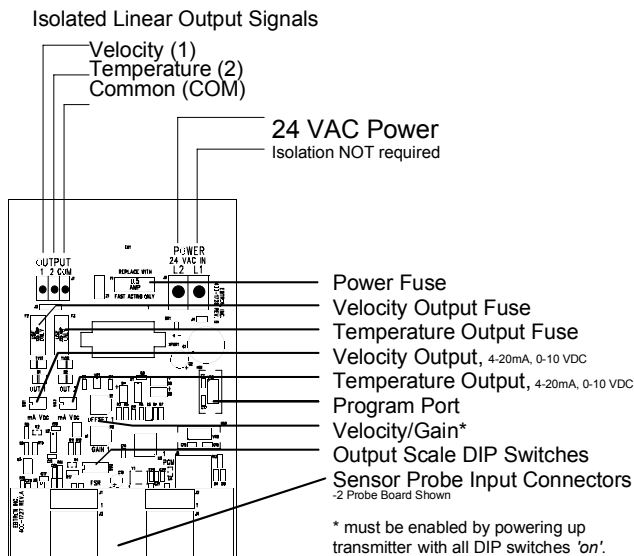
When configured for a 4-20 mA output, the STA104-U is a “4-wire” device. The host controls should not provide an excitation voltage to the output of the STA104-U.

Make sure that the 24 VAC power source is not energized. 24 VAC power should be connected to the large, two position power input terminal labeled “POWER” on the upper right hand side of the main circuit board. Since the output signals are isolated from the power supply, it is not necessary to provide an isolated (secondary not grounded) power source.



Multiple STA104-U transmitters wired on a single transformer must be wired “in-phase”.

STA104-U Transmitter Wiring and Circuit Board Functions



Start-up

To assure a successful startup, check that the airflow measuring station is installed in accordance with this document.



Check the physical installation, power connections, and signal wiring prior to applying 24 VAC power.

The transmitter is factory shipped with the analog output signals set to the 4-20mA default. If a 0-10 VDC output is desired, simply move the corresponding switch (SW1 for velocity, SW2 for temperature) to the 0-10 VDC position prior to power-up. All output signals are linear. The factory default scaling for velocity is 0 to 1,500 FPM. To convert to CFM simply multiply the full scale velocity output by the intake opening area, in square feet. The temperature output factor default scaling is -20 to 160° F. To change the factory default scaling, refer to the DIP switch diagram below.

Output Scale DIP Switch Settings

DIP Switch Position				Output 1	Output 2
1	2	3	4		
off	off	off	off	Output = null	Output = null
off	off	off	on	0-250 FPM	0 to 160 F
off	off	on	off	0-250 FPM	-20 to 160 F
off	off	on	on	0-500 FPM	30 to 160 F
off	on	off	off	0-500 FPM	30 to 80 F
off	on	off	on	0-500 FPM	0 to 160 F
off	on	on	off	0-500 FPM	-20 to 160 F
off	on	on	on	0-1,000 FPM	30 to 160 F
on	off	off	off	0-1,000 FPM	30 to 80 F
on	off	off	on	0-1,000 FPM	0 to 160 F
on	off	on	off	0-1,000 FPM	-20 to 160 F
on	off	on	on	0-1,500 FPM	30 to 160 F
on	on	off	off	0-1,500 FPM	30 to 80 F
on	on	off	on	0-1,500 FPM	0 to 160 F
on	on	on	off	0-1,500 FPM	-20 to 160 F
on	on	on	on	Output = 1/2 F.S.	Output = 1/2 F.S.

Underlined items indicate the factory default settings.

Energize the 24VAC power source. The transmitter executes a complete self-check each time that power is applied. Check that scaling in the host control system returns an output that matches the output of the **STA104-U**.

Maintenance

In most HVAC environments, periodic maintenance or recalibration is neither required nor recommended¹.

Standard Limited Parts Warranty

if the **STA104-U** 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.

¹In extremely dirty environments, periodic inspection of the sensor element is advised. Carefully remove any excessive buildup of material with compressed air or with a small brush. Recalibration is not required.

STA104-U Technical Specifications

System Performance

STA104-U Installed Airflow Accuracy (typ. \pm of reading): 3% to 6%
Repeatability (\pm of reading): 0.25%

Sensor Probe Specifications

Sensor Assembly Model: SU1

Sensor Assembly: Two hermetically sealed "bead-in-glass" thermistors in a glass filled polypropylene housing.

Mounting Brackets: 304 Stainless Steel

Probe Size: 4" to 12"

Cable Assembly:

Type: Plenum Rated

Length: 5' std. (50' opt.)

Connection to Transmitter: 5/8" Circular DIN connectors

Number of Air Velocity Calibration Points: 16

Number of Temperature Calibration Points: 3

Maximum Number of Sensors per Sensor Probe: 1

Sensor Distribution: Equal area

Airflow Sensor Accuracy (\pm of reading): 2%

Calibrated Range: 0-5,000 FPM

Temperature Sensor Accuracy: 0.15° F

Sensor Temperature Range:

0-1,500 FPM: -20° F to 160° F

>1,500 FPM: 30° F to 160° F

Humidity range: 0 to 99% RH, non-condensing

Transmitter Specifications

Transmitter Model: STA104

Maximum Number of SU1 Sensors per Location: 2

A/D Converter: 12 bit

Sensor Independent Electronics: Yes

Power Requirement: 24 VAC @ 8 VA max. (fused and protected on transmitter, isolation not required)

Chassis (enclosure): Aluminum (protect from water and condensation)

Output Signal Adjustments: Field adjustable digital airflow output gain

Analog Output protection: Fused and protected, ISOLATED analog outputs

Analog Output Signals: Field selectable, linear analog output signals of 4-20mA and 0-10 VDC for airflow and temperature

Airflow Analog Output Scaling (0 to selected F.S.): Field selectable

Factory Default: 1,500 FPM

Temperature Analog Output Scaling (Min.S. to F.S.): Field selectable

Factory Default: -20° F to 160° F

Transmitter Temperature Range: -20° F to 120° F

Analog Output Resolution (full scale output): 0.025%

Warranty

Standard Warranty: 36 months from shipment.

Underlined items indicate *Factory Default* settings.

