

AIRFLOW MEASUREMENT WITH TEMPERATURE AND ALARM CAPABILITY



PRODUCT HIGHLIGHTS

- “Plug and Play” operation
- EBTRON exclusive bead-in-glass thermistor sensors
- NIST traceable calibration
- 0 to 3,000 FPM calibrated range with percent-of-reading accuracy
- Cost effective single probe
- Airflow and status alarm
- Temperature output capability
- Analog and RS-485 output models
- Dry contact relay
- Remote transmitter with LCD display
- Actual (CFM) or mass (SCFM) airflow measurement
- Velocity-weighted temperature measurement between -20° F to 160° F
- Smart *Sensor Detection System (SDS)* continuously monitors for sensor and transmitter faults
- Standard FEP plenum rated cable between sensor probes and transmitter
- Three-year warranty
- Toll-free customer support for the lifetime of the product

TYPICAL APPLICATIONS

- High performance CV/VAV terminal box measurement
- Small duct outdoor air delivery monitoring
- Small duct airflow tracking
- Hospital pressurization
- Laboratory pressurization

EBTRON ADVANCED THERMAL DISPERSION TECHNOLOGY

EBTRON pioneered bead-in-glass thermistor based thermal dispersion over 40 years ago. EBTRON’s thermal dispersion technology relates the power dissipated by a self-heated thermistor to the airflow rate at one or more sensor nodes in an airstream. All EBTRON airflow monitoring systems use this time-tested thermal dispersion technology.

MODEL DESCRIPTION

The EF-x2000-T is EBTRON’s measurement solution for round ducts between 4 and 16 inches in diameter when a remote display is desired. Ideal for small duct airflow measurement and airflow tracking applications. The EF-x2000-T’s remote transmitter and user interface provides more customization than the EF-x1000-T.

EF-x2000-T TECHNICAL SPECIFICATIONS

General

Probe and Sensor Node Configurations

- 1 probe x 1 sensor node/probe (4 inch [101.6 mm] probe)
- 1 probe x 2 sensor nodes/probe (5 to 16 inch [127.0 to 406.4 mm] probes)

Installed Airflow Accuracy¹

±3% of reading

Sensor Node Averaging Method

- Airflow:** Independent arithmetic average
- Temperature:** Independent, velocity weighted average

Listings and Compliance

- UL:** 60730-1, 60730-2-9; CAN E60730-1, E60730-2-9 (EF-A2000-T Only)
- FCC:** This device complies with Part 15 of the FCC rules
- RoHS:** This device is RoHS2 compliant

Environmental Limits

Temperature:

- Probes 0 to 2,000 fpm** [0 to 10.16 m/s]:
-20 to 160 °F [-28.9 to 71.1 °C]
- Probes 0 to 3,000 fpm** [0 to 15.24 m/s]:
0 to 160 °F [-17.8 to 71.1 °C]
- Transmitter:** -20 to 120 °F [-28.9 to 48.9 °C]

Humidity: (non-condensing)

- Probes:** 0 to 100%
- Transmitter:** 5 to 95%

Individual Sensing Nodes

Sensing Node Sensors

- Self-heated sensor:** Precision, hermetically sealed, bead-in-glass thermistor probe
- Temperature sensor:** Precision, hermetically sealed, bead-in-glass thermistor probe

Sensing Node Housing

- Material:** Glass-filled Polypropylene (Kynar[®] with /SS option)
- Sensor Potting Materials:** Waterproof marine epoxy

Sensing Node Internal Wiring

Type: Kynar[®] coated copper

Airflow Measurement

- Accuracy:** ±3% of reading to NIST-traceable volumetric airflow standards (includes transmitter uncertainty)
- Calibrated Range:** 0 to 3,000 FPM [0 to 15.24 m/s]
- Calibration Points:** 7

Temperature Measurement

- Type:** Velocity-weighted average
- Accuracy:** ±0.15°F [0.08 °C] to NIST-traceable temperature standards (includes transmitter uncertainty)
- Calibrated Range:** -20 to 160 °F [-28.9 to 71.1 °C]
- Calibration Points:** 3

Sensor Probe Assembly

Tube

Material: Mill finish 6063 aluminum (316 stainless steel with /SS option)

Mounting Brackets

Material: 304 stainless steel

Mounting Options & Size Limits

Insertion: 4, 5, 6, 7, 8, 9, 10, 12, 14, and 16 inch round [101.6, 127.0, 152.4, 177.8, 203.2, 228.6, 254.0, 304.8, 355.6 & 406.4 mm]

Probe to Transmitter Cables

Type: FEP jacket, plenum rated CMP/FT6/CL2P, UL/cUL listed, -67 to 302 °F [-55 to 150 °C], UV tolerant

Standard Lengths: 3, 10, 25 and 50 ft. [0.9, 3.1, 7.6 and 15.2 m]

Connecting Plug: 0.60" [15.24 mm] nominal diameter

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @8V-A

User Interface: 16-character LCD display and 4 button interface

B.A.S. Connectivity Options

EF-A2000 Transmitter: Two field selectable (0-5/1-5/0-10/2-10 VDC*), scalable and protected analog output signals (AO1=airflow, AO2 = temperature or alarm)

* The VDC output circuit of the EF-A2000 transmitter can drive the input circuit of devices designed to measure 4-wire current loops with a resistive load ≥250 ohms.

EF-N2000 Transmitter: One field selectable (BACnet MS/TP or Modbus RTU) and non-isolated RS-485 network connection - Individual sensor node airflow rates and temperatures are available via the network (provide individual 24 VAC transformers at each EF-N2000 transmitter for applications requiring isolated RS-485)

Relay

Type: Dry Contact w/ onboard jumper to drive a remote LED (R1=alarm)

Status: N.O. or N.C. via user setup configuration

Rating: 30 VDC or 24 VAC @ 3 amp. max.

Airflow Alarm

Type: Low and/or high user defined setpoint alarm

Tolerance: User defined % of setpoint

Delay: User defined

Zero Disable: Alarm can be disabled when the airflow rate falls below the low limit cutoff value (unoccupied periods)

Reset Method: Manual or automatic

Visual Indication: Yes, LCD display

Network Indication: Yes (EF-N2000 only)

Analog Signal Indication: Yes, on AO2 assignment (EF-A2000 only)

Contact Closure Relay: Yes, on R1 assignment

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes (EF-N2000 only)

Analog Signal Indication: Yes, on AO2 assignment (EF-A2000 only)

Contact Closure Relay: Yes, on R1 assignment

¹ Installed airflow accuracy is the actual system accuracy expected and includes sampling uncertainty of the sensor probes when installation meets or exceeds placement guidelines.

SENSOR PROBE PLACEMENT

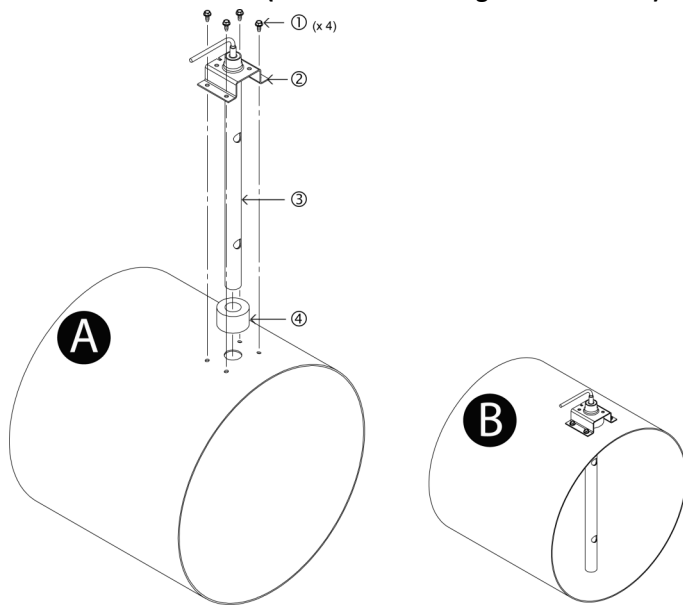
Determine the location where the sensor probes will be mounted. Refer to the O&M Manual for Duct and Plenum Probe Placement or contact EBTRON or your local EBTRON representative for assistance. A selection software tool is available at EBTRON.com that creates a placement schedule.

SENSOR PROBE INSTALLATION

Detailed installation guidelines for probes are provided in the O&M Manual for the following duct configurations.

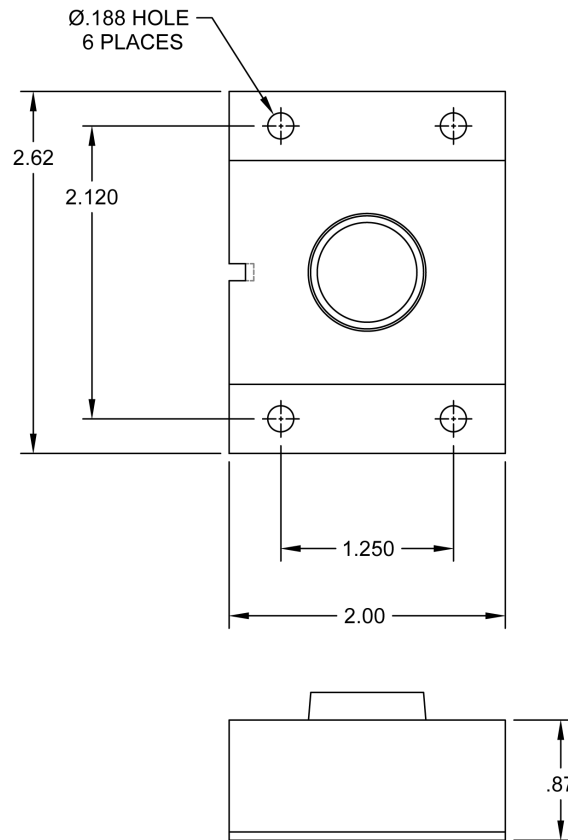
Sensor Probe Installation Diagrams

-T Probe Installation (Insertion Mounting—Round Ducts)



Sensor Probe Mounting Bracket Dimensions

INSERTION MOUNTING BRACKET - Insertion Side



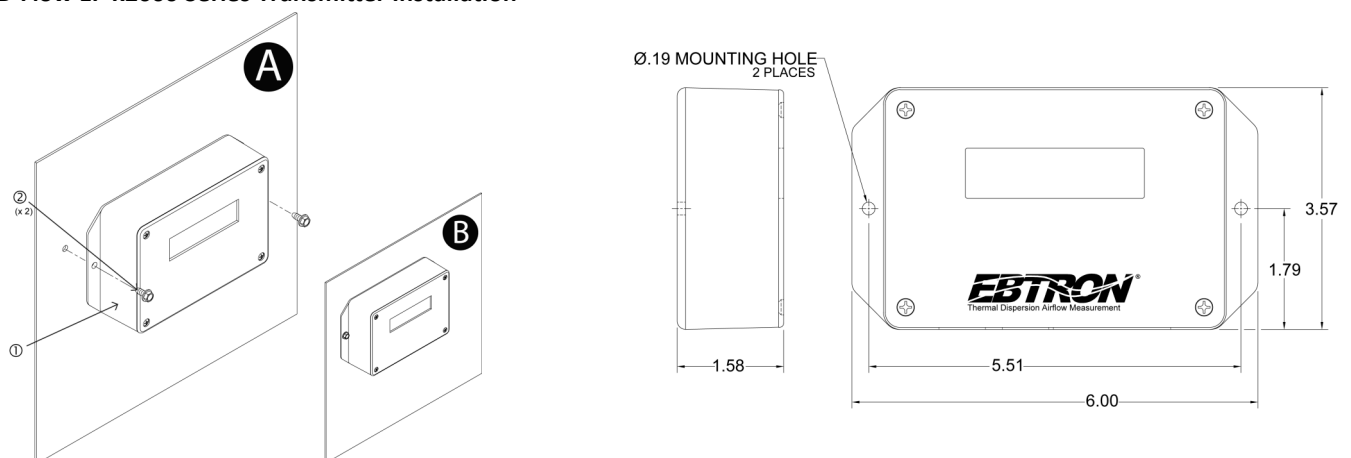
TRANSMITTER INSTALLATION AND WIRING

Detailed installation guides for transmitters are provided in the O&M Manual for the connectivity options that follow. All EF-x2000 transmitters are provided with either an analog (x = A) or a RS-485 (x = N) output.

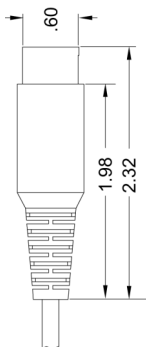
Locate the transmitter where all of the sensor probe connecting cables will reach the transmitter and it is protected from moisture, rain, and snow.

Transmitter Mounting Diagram and Dimensions

EB-Flow EF-x2000 Series Transmitter Installation

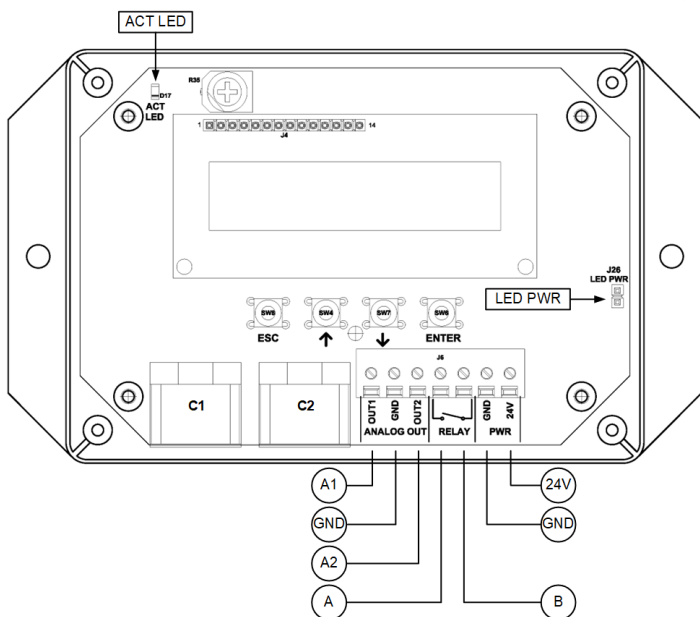


All Models - Probe Connector



- ⚠ Push in **keyed** connector plugs (sensor data is stored in serial memory chip in connector plug). **DO NOT TWIST!**
- i Cables have an FEP plenum rated jacket that are UV tolerant and suitable for operation over the entire operating temperature range of the device.

EF-A2000-T - Wiring and Probe Connections



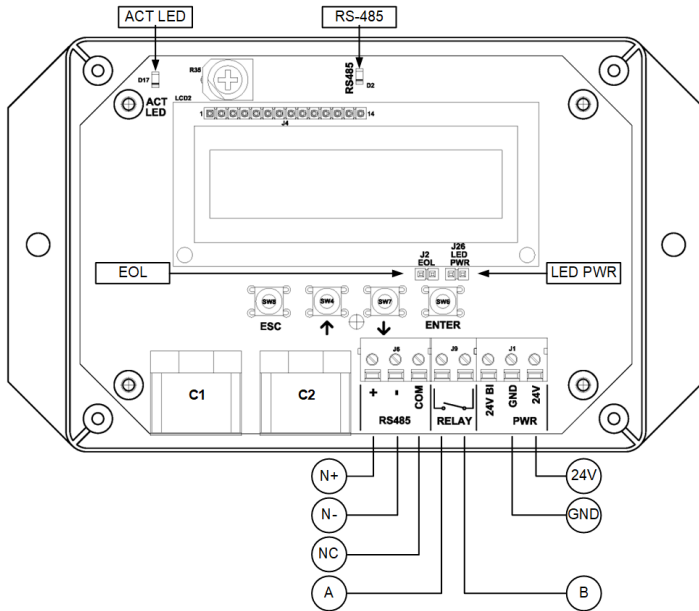
TRANSMITTER CONNECTIONS

Power	Analog Out (non-isolated)		Contact Closure		Connector
	A1	A2	A	B	
24V (hot)	A1	A2	OUT	IN	1 probe x2 sensors/probe Not Used
24V (neutral)	GND	GND	OUT	IN	
	Airflow +	Temperature or Alarm +	Signal Common		

Connect each analog output signal required to the host B.A.S. using shielded twisted-pair wire. Properly terminate the shield (typically at the B.A.S.).

- ⚠ If twisted pair wire and/or shielded cable is not used, extraneous electrical noise can be picked up between the transmitter and host control panel.
- i Transmitters are preconfigured for 2-10VDC. Consult the Startup Guide for the appropriate model to change the output to either 0-5 VDC, 0-10 VDC or 1-5 VDC.

EF-N2000-T - Wiring and Probe Connections



TRANSMITTER CONNECTIONS

Power		RS-485 (non-isolated)			Contact Closure		Connector
24V	GND	N+	N-	NC	A	B	C1 C2
24 VAC (hot)	24 VAC (neutral)	Network +	Network -	Network Common	OUT	IN	1 probe x 2 sensors/probe Not Used

Use a 3-conductor network cable meeting the corresponding BACnet or Modbus standards. Ensure that all three connections, N+, N- and NC are connected.

- i* Refer to the O&M Manual for information regarding network configuration, BACnet objects, and Modbus registers.
- i* Transmitters are preconfigured for BACnet MS/TP. Consult the Startup Guide for the appropriate model to change the output to Modbus RTU network protocol.
- !** If a 2-conductor network cable or other non-conforming cable is used, network speed, length and reliability may be compromised or network failure may occur.
- i* If the transmitter is the first or last device on the network run, place the shunt jumper across the EOL posts (J2).

STARTUP

Detailed startup guides are provided in the O&M Manual.

VERIFICATION, TROUBLESHOOTING, AND MAINTENANCE

Verification and troubleshooting is discussed in detail in the O&M manual.

EBTRON airflow monitoring devices are factory calibrated and should not require periodic maintenance or recalibration in most HVAC environments. If the sensor probes are installed in a location that is subject to excessive dust, lint, or other airborne debris accumulation, filtration at the source or access for cleaning should be provided. Please note that this issue is not specific to EBTRON or EBTRON technology. Consult EBTRON to discuss specific concerns or suggested remedies if airborne particulates are a concern.

APPLICATION REVIEW REQUESTS

EBTRON and/or your local representative will review the application and make recommendations on the proper use of this device prior to requesting a quotation or placing an order. Provide as much of the following information as possible to facilitate the review process:

- √ Service: SA, RA, OA, EA, Other (specify)
- √ Duct or opening size where the probes will be installed
- √ Minimum and maximum expected airflow rates
- √ Minimum and maximum expected airstream temperatures
- √ Immediate up and downstream disturbance and the distance between disturbances
- √ Mechanical drawings or sketches
- √ Sequence of operation
- √ Control schematic

QUOTATIONS AND ORDERING

Use the model code below to request a quote or place an order. Quotations and orders are provided by your local EBTRON representative.

