



EBTRON®
a measurable difference!

AIRFLOW AND TEMPERATURE MEASUREMENT

Now available with **relative humidity, enthalpy and / or dew point!**



For over thirty-five years, EBTRON has been the industry leader in airflow measurement with unsurpassed connectivity solutions for building automation systems. Our new Gold Series GTx116e-PC can be provided with an integral humidity sensor (/H option) for accurate humidity, enthalpy and/or dew point measurement.



- Directly measure actual or standard (mass) airflow, temperature and relative humidity.
- Velocity-weighted temperature results in more accurate humidity and enthalpy measurement.
- Improve enthalpy switchover control on air-side economizer-based systems.
- Time-tested thermal dispersion technology uses stable bead-in-glass thermistor probes for airflow and temperature measurement.
- Ruggedized capacitive polymer RH sensor is designed for long-life in harsh environments.
- Two line alpha-numeric back-lit LCD and easy to remove transmitter cover.



DEMAND CONTROL VENTILATION SOLUTIONS



OUTDOOR AIRFLOW
MEASURING DEVICES



CO₂ / AIRFLOW
OCCUPANCY COUNTERS



DOOR OCCUPANCY
COUNTERS



CO₂ SENSORS

A MEASURABLE DIFFERENCE FOR OVER 35 YEARS!



Contact your representative to attend one of our informative and rewarding educational seminars on airflow measurement and control!

Outdoor Air Delivery Monitoring
Demand Control Ventilation Systems
Fan & Fan Array Airflow Measurement
Building Pressure Solutions
Hospital & Medical Facility Airflow Measurement
Laboratory & Clean Room Pressurization

EBTRON®

AIRFLOW MEASUREMENT SOLUTIONS DATA AT THE TOUCH OF YOUR FINGER!



For over thirty-five years, EBTRON has been the industry leader in airflow measurement with unsurpassed connectivity solutions for your building automation system. Our Gold Series transmitters are now outfitted with Bluetooth® low energy technology for one touch monitoring on your cell phone or tablet!



- Ideal for commissioning and balancing agents
- Retrieve individual /average airflow rates and temperatures
- Download transmitter settings and diagnostic data

Download the free app to your Android® or Apple® device today and put the power of EBTRON in the palm of your hand.





CUSTOMER PROFILE

Fortune 500 Companies
K-12 Schools
Universities
Healthcare & Medical Facilities
Government Buildings
Laboratories & Clean Rooms
Data Centers
Museums, Galleries & Libraries
Airport & Cruise Terminals
Arenas
Courthouses

APPLICATIONS

AHU Outdoor Air Delivery Monitoring
DOAS Outdoor Air Delivery Monitoring
DCV Outdoor Airflow Limit Control
CO₂/Airflow Population Estimation
Differential Airflow Tracking
ERV/HRV Airflow Tracking
Laboratory & Hospital Pressurization
Air Change Performance Monitoring
Low Airflow VAV Terminal Measurement
Fault Detection Monitoring

BENEFITS

Comply with ASHRAE Standards
Demonstrate Code Compliance
Satisfy LEED Prerequisites and Credits
Provide Acceptable IAQ
Save Energy
Reduce Liability
Improve Building Performance

EBTRON[®]
a measurable difference!

THERMAL DISPERSION TECHNOLOGY

Thermal dispersion airflow measurement was pioneered by EBTRON in the early 1980's. Since then, the Company has continuously refined and improved its technology and products. Today, EBTRON manufactures the highest quality airflow meters available and is arguably the leader in airflow measurement technology.

Thermal dispersion relates the velocity of the air to the power and rise in temperature of a heated element in a moving air stream. EBTRON uses precision, bead-in-glass thermistor probes to measure the airflow rate and air temperature. Multiple sensing points are used to produce an average velocity for true volumetric or mass airflow. Each individual sensor node is calibrated to NIST traceable airflow standards at up to 16 points resulting in a sensor accuracy of 2% of reading.

THE LEADER IN AIRFLOW MEASUREMENT

EBTRON's engineering design team continuously tests and improves its products. Product testing is conducted in environmental chambers to evaluate performance under the environmental limits that the transmitter and sensor probe will encounter. Sensor node assemblies are tested by an independent laboratory to demonstrate survival in high-salt and atmospheric acid environments.

EBTRON maintains a computer-controlled manufacturing system with more than 30 automated calibration and quality checkpoints. Every sensor node is independently calibrated against NIST traceable standards in custom designed and automated calibration wind tunnels. Precision bead-in-glass thermistor probes manufactured to EBTRON specifications undergo a rigorous aging process to ensure long-term stability and high reliability under self-heat conditions. The ruggedized bead-in-glass design differentiates EBTRON from competitors that use less stable, "chip" type thermistors. High performance transmitters undergo electrical burn-in prior to calibration and use only the highest quality industrial grade components to provide for additional reliability.

The result is unparalleled performance and reliability that meets the demands of today's high-tech green buildings.

SPECIFY EBTRON ON YOUR NEXT PROJECT!

- ✓ Specify EBTRON thermal dispersion technology.
- ✓ Exclude differential pressure devices including pitot tubes, pitot arrays, piezo rings and devices that measure the pressure drop across a louver or obstruction.
- ✓ Require that each sensor node uses two bead-in-glass thermistors and exclude devices that use any type of chip thermistor.
- ✓ Demand that each sensor is individually calibrated to NIST traceable airflow and temperature standards.

Model Comparisons

Advantage IV / EB-Flow II

	GTX116e-PC	GTX116e-P+	HTX104-PE	HTX104-T	EF-x2000-T	EF-x1000-T	EF-x2000-U	GTX108e-F/An	GTX108e-F /SI & /DI	HTX104-F /SI & /DI	HTX104-B	EF-x2000-B
Thermal Dispersion Sensor Node Assembly	DUCT & PLENUM PROBES							FAN INLETS			BLEED	
Bead-in-glass Self-heated Thermistor	•	•	•	•	•	•	•	•	•	•	•	•
Bead-in-glass Temperature Sensor	•	•	•	•	•	•	•	•	•	•	•	•
Maximum Sensor Nodes per Transmitter	16	16	4	2	2	2	2	8	4	4	1	1
Maximum Probes per Transmitter	4	4	2	1	1	1	2	8	4	4	1	1
Maximum Sensors/Probe	8	8	4	2	2	2	1	1	1	1	1	1
Humidity Sensor Assembly (Requires /H Option)												
Ruggedized Capacitive Polymer Sensor	•											
Maximum Sensor Assemblies per Transmitter	1											
Mounting Options												
Duct & Plenum Probes												
Insertion, Internal and Standoff (Round, Rectangle, Oval)	•	•	•									
Insertion (Round)				•	•	•						
Insertion and Standoff (Universal Mounting)							•					
Fan Inlets (Adjustable)												
Fan Throat Mount (Traditional Brackets)									•	•		
Fan Face Mount (Traditional Brackets)								•	•	•		
Fan Face Mount (Cantilever Brackets)								•	•	•		
Fan Forward Mount (Traditional Brackets)								•	•	•		
Backdraft Damper Mount (Traditional Brackets)								•	•	•		
"Bleed" Airflow Sensors - 1/2" NPT Female Connections											•	•
Probe to Transmitter Connections												
FEP Plenum Rated Cable (10 ft. standard, up to 50 ft.)	•	•	•	•	•	N/A	•	•	•	•	•	•
Gold Plated Probe Plug/Connector Pins	•	•						•	•			
Airflow Measurement												
NIST Traceable Calibration Standard	•	•	•	•	•	•	•	•	•	•	•	•
Individual Sensor Node Accuracy (% of reading)	±2	±2	±2	±3	±3	±3	±3	±2	±2	±2	±2	±2
Installed Accuracy without Adjustment (% of reading) ¹	±3	±3	±3/10	±3	±3	±3	< ±15	< ±10	< ±10	< ±10	N/A	N/A
Adjusted Accuracy to Third Party Reference (% of reading)	±3	±3	±3	±3	±3	±3	±3	±3	±3	±3	N/A	N/A
Airflow Measurement Range (Min/Max FPM)	0/5000	0/5000	0/5000	0/3000	0/2000 ²	0/2000 ²	0/2000 ²	0/10000	0/10000	0/10000	±3000	±2000 ²
Temperature Measurement												
NIST Traceable Calibration Standard	•	•	•	•	•	•	•	•	•	•	•	•
Velocity Weighted Temperature	•	•	•	•	•	•	•	•	•	•	N/A	N/A
Sensor Node Accuracy (°F)	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15	±0.15

Model Comparisons

Advantage IV / EB-Flow II

	GTX116e-PC	GTX116e-P+	HTX104-PE	HTX104-T	EF-x2000-T	EF-x1000-T	EF-x2000-U	GTX108e-F/An	GTX108e-F /SI & /DI	HTX104-F /SI & /DI	HTX104-B	EF-x2000-B
Humidity Measurement (Requires /H Option)	DUCT & PLENUM PROBES							FAN INLETS		BLEED		
Accuracy @ 77°F (%RH, 20 to 80%RH<20 and >80%RH)	±2/3.5											
Temperature Coefficient (%/°F)	0.07											
Long Term Drift (%RH/year)	0.5											
Velocity Weighted RH and Enthalpy	•											
Dewpoint	•											
Alarm Capability												
High/Low Airflow Alarms	•	•	•	•	•	•	•	•	•	•	•	•
Fan Airflow Alarm								•				
System Status Alarm	•	•	•	•	•	•	•	•	•	•	•	•
Contact Closure Alarm Relay (Assignable)					•		•					•
Display												
16 Character x 2 Row Alpha-numeric LCD (backlit)	•	•						•	•			
16 Character x 1 Row Alpha-numeric LCD (non backlit)			•	•	•		•			•	•	•
Connectivity Options (Model code placeholder x=A, C, F, M, N, or U)												
Linear Analog Output Signals (AO1, AO2, AO3) ³	A,C,F,M,U	A,C,F,M,U	A	A	A	A	A ⁴	A,C,F,M,U	A,C,F,M,U	A	A	A
RS-485 BACnet/Modbus	C	C	N	N	N	N	N	C	C	N	N	N
Ethernet BACnet/Modbus	M	M						M	M			
Lonworks Free Topology	F	F						F	F			
USB "Thumb Drive" Datalogger	U	U						U	U			
Phone/Tablet Applications (Free Download for Android® and iOS systems®)												
EB-Link Reader w/Bluetooth® low energy Interface	•	•						•	•			
Operating Ranges												
Probe Temperature Range (Min/Max °F)	-20/160	-20/160	-20/160	-20/160	-20/160 ²	-20/120 ²	-20/160 ²	-20/160	-20/160	-20/160	-20/160	-20/160 ²
Transmitter Temperature Range (Min/Max °F)	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120	-20/120
Probe Humidity Range (% RH)	0/100	0/100	0/100	0/100	0/100	0/100	0/100	0/100	0/100	0/100	0/100	0/100
Transmitter Humidity Range (% RH)	5/95	5/95	5/95	5/95	5/95	5/95	5/95	5/95	5/95	5/95	5/95	5/95
Listings & Ratings												
UL/cUL	•	•	•	•	•	•	•	•	•	•	•	•
CE	•	•	⁵	⁵				•	•	⁵	⁵	
UKCA	•	•	⁶	⁶				•	•	⁶	⁶	
BTL Listed (BACnet devices only)	•	•	•	•				•	•	•	•	
FCC Part-15	•	•	•	•	•	•	•	•	•	•	•	•

Note 1 - When installed in accordance to published guidelines.

Note 2 - 0/3000 FPM when minimum temp is greater than 0 °F

Note 3 - AO1=Airflow - AO2=Temperature or Alarm - AO3 (required /H option)=RH, Enthalpy, or Dewpoint

Note 4 - For dual location configurations AO1=Airflow1 (AF1), Airflow1 - Airflow2, or Airflow2 - Airflow1; AO2=Airflow2 (AF2), Airflow1 - Airflow2, or Airflow2 - Airflow1

Note 5 - Non-UK European shipments only

Note 6 - UK shipments only

Airflow and Temperature Measurement Device with
Integral Relative Humidity Sensor (with /H option)

OVERVIEW



- Thermal Dispersion Airflow Technology
- Supports up to 16 Sensor Nodes
- NIST-traceable Calibration
- %-of-reading Airflow Accuracy
- Airflow and Status Alarms
- Velocity-weighted Temperature
- Output %RH, Enthalpy or Dew Point¹
- Three Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty

¹ Requires /H option

The GTx116e-PC is EBTRON’s top-of-the-line solution for accurate and repeatable measurement in ducts and plenums. Ruggedized RH sensor option (/H), onboard barometric pressure sensor and velocity-weighted temperature results in accurate relative humidity, enthalpy and dew point calculations. Ideal for supply, return and outdoor air intake applications on systems with an airside economizer. Bluetooth® low energy technology interface.²

² Order with the /NR option when RF devices are not permitted.

Typical Applications	Benefits	Product Highlights
<ul style="list-style-type: none"> ◆ Outdoor Air Delivery Monitoring and Control ◆ Differential Airflow Tracking for Building Pressurization Control ◆ Airside Economizer Enthalpy Switchover Detection ◆ Supply Air Humidity Monitoring and Control ◆ DOAS Dew Point Monitoring 	<ul style="list-style-type: none"> ◆ Comply with ASHRAE Standards and Building Codes ◆ Satisfy LEED Prerequisites and Credits ◆ Provide Acceptable IAQ ◆ Save Energy ◆ Reduce Liability ◆ Improve Economizer Performance 	<ul style="list-style-type: none"> ◆ Best Installed Accuracy ◆ Low Airflow Capability ◆ Volumetric or Mass Airflow Measurement ◆ Long-term Stability ◆ “Plug and Play” Operation ◆ Intuitive User Interface ◆ Waterproof Sensor Assembly ◆ FEP Plenum Rated Cables

GTx116e-PC_Overview_18e

General

Probe and Sensor Node Configurations (max.)

- 2 probes x 8 sensor nodes/probe
- 4 probes x 4 sensor nodes/probe

Installed Airflow Accuracy

- Ducts/Plenums:** ±3% of reading
- Non-ducted OA Intakes:** better than or equal to ±5% of reading

PC Sensor Density:

 Refer to the PC sensor density table.

Sensor Node Averaging Method

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

Listings & Compliance

- UL:** UL 60730-1; CAN/CSA-E60730-1-15
- CE:** Non-UK European shipments only
- UKCA:** UK shipments only
- BACnet International:** BTL Listed (GTC116e and GTM116e transmitters)
- FCC:** This device complies with Part 15 of the FCC rules
- RoHS:** This device is RoHS2 compliant

Environmental Limits

- Temperature:**
 - Probes:** -20 to 160 °F [-28.9 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:** ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)
- Calibrated Range:** 0 to 5,000 fpm [25.4 m/s]
- Calibration Points:** 16

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]

Optional Relative Humidity Sensor (/H Option)

Type: Ruggedized capacitive polymer RH sensor

Accuracy @ 77 °F [25 °C]

20 to 80 %RH: ±2% RH

0 to 20 and 80 to 100 %RH: ±3.5% RH

Temperature Coefficient: 0.07%/°F [0.13%/°C]

Long Term Drift: 0.5% RH/year

Calculated Measurements: Velocity weighted relative humidity, velocity-weighted enthalpy and dew point using measured RH, velocity-weighted temperature and on-board barometric pressure sensor.

Sensor Probe Assembly

Tube

Material: Gold anodized 6063 aluminum (316 stainless steel with /SS option)

Mounting Brackets

Material: 304 stainless steel

Mounting Options & Size Limits

- Insertion:** 6 to 191 in. [152.4 to 4851 mm]
- Stand-off:** 6 to 190 in. [152.4 to 4826 mm]
- Internal:** 10 to 194 in. [254.0 to 4928 mm]
- Note: The /H option is only available on probes >18 in. [457.2 mm]

Probe to Transmitter Cables

- Type:** FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 302 °F [-55 to 150 °C], UV tolerant
- Standard Lengths:** 10, 15, 20, 25, 30, 40 and 50 ft. [3.1, 4.6, 6.1, 7.6, 9.1, 12.2, and 15.2 m]
- Connecting Plug:** 13/16" [20.63 mm] nominal diameter with gold-plated connector pins

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @20V-A max.

Connector Receptacle Pins and PCB Connections: Gold-plated

receptacle pins, PCB interconnects, PCB edge fingers, and test points

User Interface: 2 line x16-character backlit LCD display and 4 button interface

B.A.S. Connectivity Options

All Transmitters: Three field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm, AO3=%RH, enthalpy or dew point when /H option is provided).

GTA116e Transmitter: No additional connectivity to B.A.S.

GTC116e Transmitter: One additional field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection - Individual sensor node airflow rates and temperatures are available via the network

GTM116e Transmitter: One additional isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection - Individual sensor node

airflow rates and temperatures are available via the network

GTF116e Transmitter: One additional isolated LonWorks Free Topology network connection

GTU116e Transmitter: One additional USB connection for thumb drive data-logging of sensor node airflow rates and temperatures; %RH, enthalpy and dew point when /H option is provided.

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

Analog Signal Indication: Yes, on AO2 assignment

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Analog Signal Indication: Yes, on AO2 assignment

EB-Link Bluetooth[®] low energy Interface for Android[®] and

iPhone[®]: Display real-time airflow, velocity-weighted temperature, humidity, enthalpy, dew point, individual sensor node airflow/temperature data, settings and diagnostics.¹

¹ Order with the /NR option when RF devices are not permitted.



Advantage IV

Gold Series

GTx116e-PC

Airflow Measurement with Temperature, Humidity & Alarm Capability (humidity requires /H option)

SENSOR DENSITY

PC SENSOR DENSITY TABLE (# Probes/# Sensor nodes per probe) - /H not available with /SS option																							
		Probe Length (inches)																					
		/H Not Available																					
		Insertion/Standoff Only																					
				Internal 1 sensor P*																			
		6	8	10	12	14	16	18	20	22	24	30	36	42	48	54	60	66	72	84	96	108	120
Round >		1/1	1/1	1/1	1/2	2/2	2/2	2/2	2/2	2/2	2/4	2/4	2/4	2/6	2/6	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
Flat Oval >	All flat ovals are custom. Contact EBTRON or your representative for information on flat ovals.																						
Square/Rectangle Adjacent Side Length (inches)	6	1/1	1/1	1/1	1/1	1/2	1/2	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/6	1/6	1/8	1/8
	8	1/1	1/1	1/1	1/2	1/2	1/2	1/2	1/3	1/3	1/3	1/4	1/4	1/6	1/6	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8
	10	1/1	1/1	1/1	1/2	1/2	1/3	1/4	1/3	1/3	1/3	1/4	1/5	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	12	1/1	1/1	1/1	1/2	1/2	1/3	1/4	1/3	1/3	1/3	1/4	1/5	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	14	2/1	2/1	2/1	2/2	2/2	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/4	2/4	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6
	16	2/1	2/1	2/1	2/2	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6
	18	2/1	2/1	3/1	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	2/4	1/8	1/8	2/6	2/6	2/6	2/6	2/8	2/8
	20	2/1	3/1	3/1	2/2	2/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	2/4	2/4	1/8	2/6	2/6	2/6	2/6	2/8	2/8	2/8
	22	2/1	3/1	3/1	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	2/4	2/4	2/6	2/6	2/6	2/6	2/8	2/8	2/8	2/8
	24	2/1	4/1	4/1	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	2/4	2/4	2/6	2/6	2/6	2/6	2/8	2/8	2/8	2/8
	30	4/1	4/1	4/1	3/2	3/2	3/2	3/2	3/3	3/3	3/3	2/4	2/4	2/6	2/6	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8
	36	4/1	4/1	4/1	3/2	3/2	3/2	4/2	4/2	4/2	3/3	2/4	2/5	2/6	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8
	42	4/1	4/1	4/1	3/2	4/2	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	2/7	2/8	4/4	2/8	2/8	2/8	2/8	2/8	2/8
	48	4/1	4/1	4/1	3/2	4/2	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	4/4	4/4	4/4	4/4	4/4	2/8	2/8	2/8	2/8
	54	4/1	4/1	4/1	4/2	4/2	4/2	4/2	4/2	4/3	4/3	3/4	3/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8	2/8	2/8	2/8
	60	4/1	4/1	4/1	4/2	4/2	4/2	4/2	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8	2/8	2/8
66	4/1	4/1	4/1	4/2	4/2	4/2	3/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8	2/8	
72	4/1	4/1	4/1	4/2	4/2	4/2	3/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8	
84	4/1	4/1	4/1	4/2	4/2	4/3	3/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
96	4/1	4/1	4/1	4/2	4/2	4/3	3/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
108	4/1	4/1	4/1	4/2	4/2	4/3	4/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
120	4/1	4/1	4/1	4/2	4/2	4/3	4/4	4/3	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	

GTx116e-PC_SensorDensity_11a

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Supports up to 16 Sensor Nodes
- NIST-traceable Calibration
- *%-of-reading* Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Combination Analog/Network Models
- Three Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty

The GTx116e-**P+** is EBTRON’s top-of-the-line solution for accurate and repeatable measurement in ducts and plenums. Ideal for outdoor air delivery monitoring and airflow tracking applications. Temperature and alarm capability plus unsurpassed product features and connectivity options make this the best choice for today’s high performance buildings. Bluetooth® low energy technology interface.¹

¹ Order with the /NR option when RF devices are not permitted.

Typical Applications

- ◆ Outdoor Air Delivery Monitoring
- ◆ Differential Airflow Tracking
- ◆ Hospital Pressurization
- ◆ Laboratory Pressurization
- ◆ Air Change Verification & Monitoring
- ◆ System Performance Monitoring

Benefits

- ◆ Comply with ASHRAE Standards
- ◆ Demonstrate Code Compliance
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Best Installed Accuracy
- ◆ Low Airflow Capability
- ◆ Volumetric or Mass Airflow Measurement
- ◆ Long-term Stability
- ◆ “Plug and Play” Operation
- ◆ Intuitive User Interface
- ◆ Waterproof Sensor Assembly
- ◆ FEP Plenum Rated Cables

GTx116e-P+_Overview_18d

General

Probe and Sensor Node Configurations (max.)

- 2 probes x 8 sensor nodes/probe
- 4 probes x 4 sensor nodes/probe

Installed Airflow Accuracy¹

- Ducts/Plenums:** ±3% of reading
- Non-ducted OA Intakes:** better than or equal to ±5% of reading

P+ Sensor Density:

 Refer to the P+ sensor density table.

Sensor Node Averaging Method

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

Listings & Compliance

- UL:** UL-873 and CSA C22.2 No. 24
- CE:** Non-UK European shipments only
- UKCA:** UK shipments only
- BACnet International:** BTL Listed (GTC116e and GTM116e transmitters)
- FCC:** This device complies with Part 15 of the FCC rules
- RoHS:** This device is RoHS2 compliant

Environmental Limits

- Temperature:**
 - Probes:** -20 to 160 °F [-28.9 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:** ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)
- Calibrated Range:** 0 to 5,000 fpm [25.4 m/s]
- Calibration Points:** 16

Temperature Measurement

- 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:** Gold anodized 6063 aluminum (316 stainless steel with /SS option)

Mounting Brackets

- Material:** 304 stainless steel

Mounting Options & Size Limits¹

- Insertion:** 6 to 191 in. [152.4 to 4851 mm]
- Stand-off:** 6 to 190 in. [152.4 to 4826 mm]
- Internal:** 8 to 194 in. [203.2 to 4928 mm]

Probe to Transmitter Cables

- Type:** FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 302 °F [-55 to 150 °C], UV tolerant
- Standard Lengths:** 10, 15, 20, 25, 30, 40 and 50 ft. [3.1, 4.6, 6.1, 7.6, 9.1, 12.2, and 15.2 m]
- Connecting Plug:** 13/16" [20.63 mm] nominal diameter with gold-plated connector pins

Transmitter

- Power Requirement:** 24 VAC (22.8 to 26.4 under load) @20V-A max.

- Connector Receptacle Pins and PCB Connections:** Gold-plated receptacle pins, PCB interconnects, PCB edge fingers, and test points

- User Interface:** 2 line x16-character backlit LCD display and 4 button interface

B.A.S. Connectivity Options

- All Transmitters:** Three field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm, AO3=Not Used).
- GTA116e Transmitter:** No additional connectivity to B.A.S.
- GTC116e Transmitter:** One additional field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection - Individual sensor node airflow rates and temperatures are available via the network
- GTM116e Transmitter:** One additional isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection - Individual sensor node airflow rates and temperatures are available via the network
- GTf116e Transmitter:** One additional isolated Lonworks Free Topology network connection
- GTU116e Transmitter:** One additional USB connection for thumb drive data-logging of sensor node airflow rates and temperatures

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
- Analog Signal Indication:** Yes, on AO2 assignment

System Status Alarm

- Type:** Sensor diagnostic system trouble indication
- Visual Indication:** Yes, LCD display
- Analog Signal Indication:** Yes, on AO2 assignment
- EB-Link Bluetooth[®] low energy Interface for Android[®] and iPhone[®]:** Display real-time airflow, velocity-weighted temperature, individual sensor node airflow/temperature data, settings and diagnostics.²

¹ Installed airflow accuracy allows for additional uncertainty that results from averaging a finite number of sensors in a contorted velocity profile created from up and downstream disturbances. The specified installed accuracy is based on the P+ sensor density rules for installations that meet or exceed EBTRON minimum placement requirements. P+ sensor density rules may not be available in certain duct sizes due to sensor placement limitations.

² Order with the /NR option when RF devices are not permitted.

Airflow Measurement with Temperature and Alarm Capability (/H not available with -P+)

SENSOR DENSITY

P+ SENSOR DENSITY TABLE (# Probes/# Sensor nodes per probe)																								
		Probe Length (inches)																						
		6	8	10	12	14	16	18	20	22	24	30	36	42	48	54	60	66	72	84	96	108	120	
Round >		<u>1/1</u>	1/1	1/1	<u>1/2</u>	2/2	2/2	2/2	2/4	2/4	2/4	2/4	2/4	2/6	2/8	2/8	2/8	2/8	4/4	4/4	4/4	4/4	4/4	
Flat Oval >	All flat ovals are custom. Contact EBTRON or your representative for information on flat ovals.																							
Square/Rectangle Adjacent Side Length (inches)	6	<u>1/1</u>	1/1	1/1	1/1	1/2	1/2	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/6	1/6	1/8	1/8	
	8	<u>1/1</u>	1/1	1/1	<u>1/2</u>	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	
	10	<u>1/1</u>	1/1	1/1	<u>1/2</u>	1/2	1/3	<u>1/4</u>	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	2/6
	12	<u>1/1</u>	1/1	1/1	<u>1/2</u>	<u>1/3</u>	1/3	<u>1/4</u>	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	2/6	2/6
	14	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/3	2/3	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6
	16	<u>2/1</u>	2/1	3/1	<u>2/2</u>	2/2	2/2	2/2	2/3	2/3	2/3	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/7
	18	<u>2/1</u>	2/1	3/1	<u>2/2</u>	2/2	2/2	2/3	2/3	2/3	2/3	1/6	1/8	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/6	2/7	2/8
	20	<u>2/1</u>	3/1	3/1	<u>2/2</u>	2/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/6	2/7	2/8	2/8
	22	<u>2/1</u>	3/1	3/1	<u>2/2</u>	3/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
	24	<u>2/1</u>	4/1	4/1	<u>2/2</u>	3/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	1/8	1/8	2/6	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
	30	<u>4/1</u>	4/1	4/1	<u>3/2</u>	3/2	3/2	3/2	2/4	2/4	2/4	2/4	2/4	2/6	2/6	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8
	36	<u>4/1</u>	4/1	4/1	<u>3/2</u>	3/2	3/2	4/2	4/2	4/2	4/2	2/4	2/4	2/6	2/6	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8
	42	<u>4/1</u>	4/1	4/1	<u>3/2</u>	4/2	4/2	4/2	4/2	4/2	4/2	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
	48	<u>4/1</u>	4/1	4/1	<u>3/2</u>	4/2	4/2	4/2	4/2	4/2	4/2	3/4	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
54	<u>4/1</u>	4/1	4/1	<u>4/2</u>	4/2	4/2	4/2	4/2	3/4	3/4	3/4	2/7	2/8	2/8	2/8	2/8	2/8	2/8	4/4	2/8	2/8	2/8	2/8	
60	<u>4/1</u>	4/1	4/1	<u>4/2</u>	4/2	4/2	4/2	3/4	3/4	3/4	4/4	4/4	2/8	2/8	2/8	4/4	4/4	4/4	4/4	4/4	4/4	2/8	2/8	
66	<u>4/1</u>	4/1	4/1	<u>4/2</u>	4/2	4/2	<u>3/4</u>	3/4	3/4	3/4	4/4	4/4	4/4	4/4	2/8	2/8	4/4	4/4	4/4	4/4	4/4	4/4	2/8	
72	<u>4/1</u>	4/1	4/1	<u>4/2</u>	4/2	4/2	<u>3/4</u>	3/4	3/4	3/4	4/4	4/4	4/4	4/4	2/8	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8	
84	<u>4/1</u>	4/1	4/1	<u>4/2</u>	<u>4/3</u>	4/3	<u>3/4</u>	3/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
96	<u>4/1</u>	4/1	4/1	<u>4/2</u>	<u>4/3</u>	4/3	<u>3/4</u>	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
108	<u>4/1</u>	4/1	4/1	<u>4/2</u>	<u>4/3</u>	4/3	<u>4/4</u>	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
120	<u>4/1</u>	4/1	4/1	<u>4/2</u>	<u>4/3</u>	4/3	<u>4/4</u>	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	

NOTE

- UNDERLINED items cannot be manufactured as internal mount due to manufacturing limitations.

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Supports up to 4 Sensor Nodes
- NIST-traceable Calibration
- %-of-reading Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Three Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty



The HTx104-**PE** is EBTRON’s most economical solution for larger systems when “out-of-the-box” installed accuracy is not required and field adjustment is acceptable. Perfect for LEED outdoor air delivery monitoring or other low sensor density airflow measurement applications.

Typical Applications

- ◆ LEED Outdoor Air Delivery Monitoring
- ◆ Small Duct Airflow Tracking
- ◆ Hospital Pressurization
- ◆ Laboratory Pressurization
- ◆ Air Change Verification & Monitoring
- ◆ System Performance Monitoring

Benefits

- ◆ Comply with ASHRAE Standards
- ◆ Demonstrate Code Compliance
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Accurate and Repeatable
- ◆ Low Airflow Capability
- ◆ Volumetric or Mass Airflow Measurement
- ◆ Long-term Stability
- ◆ “Plug and Play” Operation
- ◆ Intuitive User Interface
- ◆ Waterproof Sensor Assembly
- ◆ FEP Plenum Rated Cables



SPECIFICATIONS: HTx104-PE

General

Probe and Sensor Node Configurations (max.)

- 1 probes x 4 sensor nodes/probe
- 2 probes x 2 sensor nodes/probe

Installed Airflow Accuracy¹

- ≤ 2 sq.ft. [0.185 sq.m.]: ±3% of reading
- > 2 sq.ft. [0.185 sq.m.]: ±(3% to 10%), typical (increases with increasing duct size). May be improved by field adjustment using the Field Adjust Wizard (FAW) to a reliable reference.

PE Sensor Density: Refer to the PE sensor density table.

Sensor Node Averaging Method

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

Listings and Compliance

- UL:** UL-873 and CSA C22.2 No. 24
- CE:** Non-UK European shipments only
- UKCA:** UK shipments only
- BACnet International:** BTL Listed (HTN104 transmitter)
- FCC:** This device complies with Part 15 of the FCC rules
- RoHS:** This device is RoHS2 compliant

Environmental Limits

- Temperature:**
 - Probes:** -20 to 160 °F [-28.9 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:** ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)
- Calibrated Range:** 0 to 5,000 fpm [0 to 25.4 m/s]
- Calibration Points:** 16

Temperature Measurement

- 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:** Gold anodized 6063 aluminum (316 stainless steel with /SS option)

Mounting Brackets

- Material:** 304 stainless steel

Mounting Options & Standard Size Limits¹

- Insertion:** 6 to 191 in. [152.4 to 4851 mm]
- Stand-off:** 6 to 190 in. [152.4 to 4826 mm]
- Internal:** 8 to 194 in. [203.2 to 4928 mm]

Probe to Transmitter Cables

- Type:** FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 302 °F [-55 to 150 °C], UV tolerant
- Standard Lengths:** 10, 15, 20, 25, 30, 40 and 50 ft. [3.1, 4.6, 6.1, 7.6, 9.1, 12.2 and 15.2 m]
- Connecting Plug:** 0.60" [15.24 mm] circular DIN

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @11V-A

PCB Connections: Gold-plated PCB interconnects and test points

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

B.A.S. Connectivity Options

- HTA104 Transmitter:** Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm)

- HTN104 Transmitter:** One field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection- Individual sensor node airflow rates and temperatures are available via the network

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 (HTN104 only)

- Analog Signal Indication:** Yes, on AO2 assignment (HTA104 only)

System Status Alarm

- Type:** Sensor diagnostic system trouble indication

- Visual Indication:** Yes, LCD display

- Network Indication:** Yes (HTN104 only)

- Analog Signal Indication:** Yes, on AO2 assignment (HTA104 only)

¹ Installed airflow accuracy allows for additional uncertainty that results from averaging a finite number of sensors in a contorted velocity profile created from up and downstream disturbances. The specified installed accuracy is based on the PE sensor density rules for installations that meet or exceed EBTRON minimum placement requirements. PE sensor density rules may not be available for all duct sizes due to sensor placement limitations.

Airflow Measurement with Temperature and Alarm Capability

SENSOR DENSITY

PE SENSOR DENSITY TABLE (# Probes/# Sensor nodes per probe)																							
		Probe Length (inches)																					
		6	8	10	12	14	16	18	20	22	24	30	36	42	48	54	60	66	72	84	96	108	120
Round	➤	<u>1/1</u>	1/1	1/1	<u>1/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2
Flat Oval	➤	All flat ovals are custom. Contact EBTRON or your representative for information on flat ovals.																					
Square/Rectangle Adjacent Side Length (inches)	6	<u>1/1</u>	1/1	1/1	1/1	1/2	1/2	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	8	<u>1/1</u>	1/1	1/1	<u>1/2</u>	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	10	<u>1/1</u>	1/1	1/1	<u>1/2</u>	1/2	1/3	<u>1/4</u>	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	12	<u>1/1</u>	1/1	1/1	<u>1/2</u>	<u>1/3</u>	1/3	<u>1/4</u>	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	14	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	16	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	18	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	20	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	22	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	24	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	30	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	36	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	42	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4
	48	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4
54	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	1/4	
60	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	1/4	
66	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	1/4	
72	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
84	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
96	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
108	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
120	<u>2/1</u>	2/1	2/1	<u>2/2</u>	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	

NOTE:

- UNDERLINED items cannot be manufactured as internal mount due to manufacturing limitations.



Advantage IV

a measurable difference!

Hybrid Series

HTx104-T

OVERVIEW

Airflow Measurement with Temperature and Alarm Capability



- Thermal Dispersion Technology
- Cost Effective Single Probe
- NIST-traceable Calibration
- %-of-reading Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Duct Insertion Mounting
- Remote Transmitter with LCD Display
- 3-year Warranty



The HTx104-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. More output circuit protection than the EF-x2000-T with a true 4-20mA output option (HTA104-T) make this the best choice for all small duct measurement applications.

Typical Applications

- ◆ High Performance CV/VAV Terminal Box Measurement
- ◆ Small Duct Outdoor Air Delivery Monitoring
- ◆ Small Duct Airflow Tracking
- ◆ Hospital Pressurization
- ◆ Laboratory Pressurization

Benefits

- ◆ Improve Terminal Box Performance with Turndown
- ◆ Comply with ASHRAE Standards
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Accurate & Repeatable
- ◆ Low Airflow Capability
- ◆ Volumetric or Mass Airflow Measurement
- ◆ Long-term Stability
- ◆ “Plug-and-Play” Operation
- ◆ Intuitive User Interface
- ◆ Waterproof Sensor Assembly
- ◆ FEP Plenum Rated Cable

HTx104-T_Overview_r1a

General

Probe and Sensor Node Configurations (max.)

- 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:** UL-873 and CSA C22.2 No. 24
- CE:** Non-UK European shipments only
- UKCA:** UK shipments only
- BACnet International:** BTL Listed (HTN104 transmitter)
- FCC:** This device complies with Part 15 of the FCC rules
- RoHS:** This device is RoHS2 compliant

Environmental Limits

Temperature:

- Probes:** -20 to 160 °F [-28.9 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

- 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/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] circular DIN

Transmitter

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

PCB Connections: Gold-plated PCB interconnects and test points

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

B.A.S. Connectivity Options

HTA104 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm)

HTN104 Transmitter: One field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection- Individual sensor node airflow rates and temperatures are available via the network

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 (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

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.

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Cost Effective Single Probe
- NIST-traceable Calibration
- %-of-reading Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Dry Contact Relay
- Remote Transmitter with LCD Display
- 3-year Warranty

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.

Typical Applications

- ◆ High Performance CV/VAV Terminal Box Measurement
- ◆ Small Duct Outdoor Air Delivery Monitoring
- ◆ Small Duct Airflow Tracking
- ◆ Hospital Pressurization
- ◆ Laboratory Pressurization

Benefits

- ◆ Improve Terminal Box Performance with Turndown
- ◆ Comply with ASHRAE Standards
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Accurate & Repeatable
- ◆ Low Airflow Capability
- ◆ Volumetric or Mass Airflow Measurement
- ◆ Long-term Stability
- ◆ “Plug-and-Play” Operation
- ◆ Intuitive User Interface
- ◆ Waterproof Sensor Assembly
- ◆ FEP Plenum Rated Cable

EF-x2000-T_Overview_17b

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

- 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/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.



- Thermal Dispersion Technology
- Cost Effective Single Probe
- NIST-traceable Calibration
- *%-of-reading* Accuracy
- Velocity Pressure Output Option
- Temperature Output Models Available
- Analog and RS-485 Output Models
- Duct Insertion Mounting
- Integral Transmitter
- 3-year Warranty

The EF-x1000-T (ELF) is EBTRON’s economical measurement solution for round ducts between 4 and 16 inches in diameter. Ideal for most small duct airflow measurement and airflow tracking applications. Low flow performance, temperature capability and connectivity options make this a better choice than traditional differential pressure averaging arrays, rings and crosses.

Typical Applications

- ◆ High Performance CV/VAV Terminal Box Measurement
- ◆ Small Duct Outdoor Air Delivery Monitoring
- ◆ Small Duct Airflow Tracking
- ◆ Hospital Pressurization
- ◆ Laboratory Pressurization

Benefits

- ◆ Improve Terminal Box Performance with Turndown
- ◆ Comply with ASHRAE Standards
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Accurate & Repeatable
- ◆ Low Airflow Capability
- ◆ Long-term Stability
- ◆ Unsurpassed Quality
- ◆ Easy to Install
- ◆ Very Cost Effective High-performance Solution

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:** 873 and CSA C22.2 No. 24 (EF-A1000-T/ELF-F0x 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 120 °F [-28.9 to 48.9 °C]
- Probes 0 to 3,000 fpm** [0 to 15.24 m/s]:
0 to 120 °F [-17.8 to 48.9 °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

- Accuracy:** ±0.15°F [0.08 °C] to NIST-traceable temperature standards (includes transmitter uncertainty)
- Calibrated Range:** -20 to 120 °F [-28.9 to 48.9 °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, & 16 inch round [101.6, 127.0, 152.4, 177.8, 203.2, 228.6, 254.0, 304.8, 355.6 & 406.4 mm]

Integral Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @5V-A

User Interface: DIP switch

B.A.S. Connectivity Options

EF-A1000 Transmitter: One field selectable (0-10/2-10 VDC* or 0-5/1-5 VDC* - specify at time of order), scalable and protected analog output signal (AO1=airflow)

EF-A1001 Transmitter: Two field selectable (0-10/2-10 VDC* or 0-5/1-5 VDC* - specify at time of order), scalable and protected analog output signals (AO1=airflow, AO2 = temperature)

* The VDC output circuit of the EF-A1000 and EF-A1001 transmitters can drive the input circuit of devices designed to measure 4-wire current loops with a resistive load ≥250 ohms.

EF-N1000 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-N1000 transmitter for applications requiring isolated RS-485)

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LED on circuit board

Network Indication: Yes (EF-N1000 only)

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.

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Single or Dual Airflow Output
- NIST-traceable Calibration
- *%-of-reading* Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Two Universal Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty

The EF-x2000-U is a cost effective measurement solution for smaller rooftop packaged units, fan coils and classroom ventilators. Available with adjustable standoff or insertion mount universal probes. Dual airflow output capability makes it ideal for outdoor air and exhaust airflow measurement in RTUs with powered exhaust and in energy/heat recovery ventilators.

Typical Applications

- ◆ Smaller openings (≤ 8 sq ft [0.74 sq m]) for Outdoor Air Delivery Monitoring where 10% installed accuracy is acceptable
- ◆ ERV/HRV Outdoor Air & Exhaust Air Monitoring
- ◆ Classroom Unit Ventilator Outdoor Air Delivery Monitoring

Benefits

- ◆ Demonstrate Proper Outdoor Air Delivery
- ◆ Maintain Pressurization
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Universal Mounting
- ◆ Adjustable Brackets
- ◆ Low Airflow Capability
- ◆ Long-term Stability
- ◆ Unsurpassed Quality
- ◆ “Plug-and-Play” Operation
- ◆ Intuitive User Interface
- ◆ Waterproof Sensor Assembly
- ◆ FEP Plenum Rated Cables

General

Probe and Sensor Node Configurations

- 1 probe x 1 sensor node
- 2 probes x 1 sensor node/probe

Installed Airflow Accuracy¹

- ≤ 8 sq.ft. [0.74 sq.m.]: ±(3% to 15%), typical (increases with increasing opening size). May be improved by field adjustment using the Field Adjust Wizard (FAW) to a reliable reference.
- > 8 sq.ft. [0.74 sq.m.]: Not recommended.

Sensor Node Averaging Method

- Airflow:** Independent (arithmetic average on 2 sensor configurations installed at a single measurement location)
- Temperature:** Independent, velocity weighted average on 2 sensor configurations installed at a single measurement location

Listings and Compliance

- UL:** 60730-1, 60730-2-9; CAN E60730-1, E60730-2-9 (EF-A2000-U 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
- Sensor Potting Materials:** Waterproof marine epoxy

Sensing Node Internal Wiring

- Type:** Kynar® coated copper

Airflow Measurement

- Accuracy:** ±3% of reading (typical), 4% max. to NIST-traceable airflow standards (includes transmitter uncertainty)
- Calibrated Range:** 0 to 3,000 fpm [0 to 15.24 m/s]
- Calibration Points:** 7

Temperature Measurement

- Accuracy:** ±0.15 °F [0.08 °C] to NIST-traceable temperature standards (includes transmitter uncertainty)

Sensor Probe Assembly

Tube

- Material:** Mill finish 6063 aluminum

Mounting Brackets

- Material:** 304 stainless steel

Mounting Options & Overall Probe Length

- Insertion:** 6, 8 or 16 in. [152.4, 203.2 or 406.4 mm] (adjustable)
- Stand-off:** 6, 8 or 16 in. [152.4, 203.2 or 406.4 mm] (adjustable)

Probe to Transmitter Cables

- Type:** FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 302 °F [-55 to 150 °C], UV tolerant
- Standard Lengths:** 10, 25 and 50 ft. [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 or airflow 1, AO2=airflow 2, 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 for 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.

Fan Array Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Supports up to 8 Fans
- NIST-traceable Calibration
- %-of-reading Accuracy
- Individual Fan Airflow Alarms
- Temperature Output Capability
- Combination Analog/Network Models
- Four Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty

The GTx108e-F/An is EBTRON’s solution for accurate and repeatable airflow measurement in fan arrays. One to eight fans are supported. Airflow, temperature and/or airflow alarming are available on all models. Individual fan airflow rates and fan alarming are available with combination analog output/network models. Does not affect fan performance. Bluetooth® low energy technology interface.¹

¹ Order with the /NR option when RF devices are not permitted.

Typical Applications

- ◆ Fan Airflow Tracking
- ◆ Air Change Verification & Monitoring
- ◆ Individual Fan Performance Monitoring & Fault Detection

Benefits

- ◆ Monitor up to 8 Fans with a Single Transmitter
- ◆ Demonstrate Fan Performance and Operation
- ◆ Improve Fan Tracking of VAV Systems
- ◆ Comply with ASHRAE Standards
- ◆ Save Energy
- ◆ Reduce Fan Horsepower

Product Highlights

- ◆ Accurate and Repeatable
- ◆ Long-term Stability
- ◆ Streamline Design
- ◆ Individual Fan Airflow Monitoring & Alarming
- ◆ Adjustable Mounting Brackets
- ◆ “Plug and Play” Operation
- ◆ FEP Plenum Rated Cables

General

Probe and Sensor Node Configurations

Fan Arrays (less than or equal to 4 fans): 2 probes x 1 sensor node per probe or 1 probe x 1 sensor node per probe in each fan

Fan Arrays (greater than 4 fans): 1 probe x 1 sensor node per probe in each fan (8 probe maximum)

Installed Airflow Accuracy¹

±(3% to 10%) of reading, depending on fan type and installation. May be improved by field adjustment using the Field Adjust Wizard (FAW) to a reliable reference.

Sensor Node Averaging Method

Airflow: Independent, arithmetic average per fan

Temperature: Independent, velocity weighted average

Listings and Compliance

UL: UL-873 and CSA C22.2 No. 24

CE: Non-UK European shipments only

UKCA: UK shipments only

BACnet International: BTL Listed (GTC108e and GTM108e transmitters)

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature:

Probes: -20 to 160 °F [-28.9 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

Temperature sensor: Precision, hermetically sealed, bead-in-glass thermistor

Sensing Node Housing

Material: Glass-filled Polypropylene

Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)

Calibrated Range: 0 to 10,000 fpm [0. to 50.8 m/s]

Calibration Points: 16

Temperature Measurement

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

Mounting Rods

Material: Zinc plated steel

Mounting Brackets (Forward, Face, Flare)

Material: 304 stainless steel

Mounting Brackets (Cantilever)

Material: Zinc plated steel

Mounting Options & Size Limits

Forward: 6 to 64 inches [152.4 to 1625.6 mm] (diameter at inlet entrance)

Face: 11 to 77 inches [279.4 to 1955.8 mm] (diameter at inlet entrance)

Flare: 6 to 57 inches [152.4 to 1447.8 mm] (opening size at backdraft damper inlet)

Cantilever: 11 to 82 inches [279.4 to 2082.8 mm] (diameter at inlet entrance)

Probe to Transmitter Cables

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

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

Connecting Plug: 9/16" [14.29 mm] nominal diameter with gold-plated connector pins

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @16V-A

Connector Receptacle Pins and PCB Connections: Gold-plated receptacle pins, PCB interconnects, PCB edge fingers, and test points

User Interface: 2 line x16-character backlit LCD display and 4 button interface

B.A.S. Connectivity Options

All Transmitters: Three field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm, AO3=Not Used).

GTA108e Transmitter: No additional connectivity to B.A.S.

GTC108e Transmitter: One additional field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection - Individual sensor node airflow rates and temperatures are available via the network

GTM108e Transmitter: One additional isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection - Individual sensor node airflow rates and temperatures are available via the network

GTF108e Transmitter: One additional isolated Lonworks Free Topology network connection

GTU108e Transmitter: One additional USB connection for thumb drive data-logging of sensor node airflow rates and temperatures

GTU108e Transmitter: One additional USB connection for thumb drive data-logging of sensor node airflow rates and temperatures

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 (GTM108e and GTC108e only)

Analog Signal Indication: Yes, on AO2 assignment

Fan Alarm

Type: Minimum airflow, % deviation from median airflow, or % deviation from maximum airflow stored in memory

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 (GTM108e and GTC108e only)

Analog Signal Indication: Yes, on AO2 assignment

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes

Analog Signal Indication: Yes, on AO2 assignment

EB-Link Bluetooth® low energy Interface for Android® and iPhone®:

Download individual sensor node airflow/temperature data, settings and diagnostics.²

¹ Installed airflow accuracy is the actual system accuracy expected and includes sampling uncertainty of the sensor probes.

² Order with the /NR option when RF devices are not permitted.

SWSI & DWDI Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Designed for SWSI and DWDI Fans
- NIST-traceable Calibration
- %-of-reading Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Combination Analog/Network Models
- Five Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty

The GTx108e-F/SI and GTx108e-F/DI are EBTRON’s solution for accurate and repeatable airflow measurement in SWSI and DWDI fans. Airflow, temperature and/or airflow alarming are available on all models. Does not affect fan performance. Bluetooth® low energy technology interface.¹

¹ Order with the /NR option when RF devices are not permitted.

Typical Applications	Benefits	Product Highlights
<ul style="list-style-type: none"> ◆ Fan Airflow Tracking ◆ Air Change Verification & Monitoring ◆ Fan Performance Monitoring 	<ul style="list-style-type: none"> ◆ Demonstrate Fan Performance and Operation ◆ Improve Fan Tracking on VAV Systems ◆ Comply with ASHRAE Standards ◆ Save Energy ◆ Reduce Fan Horsepower 	<ul style="list-style-type: none"> ◆ Accurate and Repeatable ◆ Long-term Stability ◆ Streamline Design ◆ Adjustable Mounting Brackets ◆ “Plug and Play” Operation ◆ Intuitive User Interface ◆ FEP Plenum Rated Cables

GTx108e-F_SI_DI_Overview_r8e



SPECIFICATIONS: GTx108e-F (/SI & /DI)

General

Probe and Sensor Node Configurations

SWSI and DWDI fans: 2 probes x 1 sensor node/per probe in each fan inlet

Installed Airflow Accuracy¹

±(3% to 10%) of reading, depending on fan type and installation. May be improved by field adjustment using the Field Adjust Wizard (FAW) to a reliable reference.

Sensor Node Averaging Method

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

Listings and Compliance

UL: UL-873 and CSA C22.2 No. 24
CE: Non-UK European shipments only
UKCA: UK shipments only
BACnet International: BTL Listed (GTC108e and GTM108e transmitters)
FCC: This device complies with Part 15 of the FCC rules
RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature:
Probes: -20 to 160 °F [-28.9 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
Temperature sensor: Precision, hermetically sealed, bead-in-glass thermistor

Sensing Node Housing

Material: Glass-filled Polypropylene
Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)
Calibrated Range: 0 to 10,000 fpm [0 to 50.8 m/s]
Calibration Points: 16

Temperature Measurement

Accuracy: ±0.15°F 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

Mounting Rods

Material: Zinc plated steel

Mounting Brackets (Throat, Forward, Face, Flare)

Material: 304 stainless steel

Mounting Brackets (Cantilever)

Material: Zinc plated steel

Mounting Options & Size Limits

Throat: 6 to 66 inches [152.4 to 1676.4 mm] (throat diameter)

Forward: 6 to 64 inches [152.4 to 1625.6 mm] (diameter at inlet entrance)

Face: 11 to 77 inches [279.4 to 1955.8 mm] (diameter at inlet entrance)

Flare: 6 to 57 inches [152.4 to 1447.8 mm] (opening size at backdraft damper inlet)

Cantilever: 11 to 82 inches [279.4 to 2082.8 mm] (diameter at inlet entrance)

Probe to Transmitter Cables

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

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

Connecting Plug: 9/16" [14.29 mm] nominal diameter with gold-plated connector pins

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @16V-A

Connector Receptacle Pins and PCB Connections: Gold-plated receptacle pins, PCB interconnects, PCB edge fingers, and test points

User Interface: 2 line x16-character backlit LCD display and 4 button interface

B.A.S. Connectivity Options

All Transmitters: Three field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm, AO3=Not Used).

GTA108e Transmitter: No additional connectivity to B.A.S.

GTC108e Transmitter: One additional field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection - Individual sensor node airflow rates and temperatures are available via the network

GTM108e Transmitter: One additional isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection - Individual sensor node airflow rates and temperatures are available via the network

GTF108e Transmitter: One additional isolated Lonworks Free Topology network connection

GTU108e Transmitter: One additional USB connection for thumb drive data-logging of sensor node airflow rates and temperatures

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 (GTM108e and GTC108e only)

Analog Signal Indication: Yes, on AO2 assignment

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes

Analog Signal Indication: Yes, on AO2 assignment

EB-Link Bluetooth® low energy Interface for Android® and iPhone®:

Download individual sensor node airflow/temperature data, settings and diagnostics.²

¹ Installed airflow accuracy is the actual system accuracy expected and includes sampling uncertainty of the sensor probes.

² Order with the /NR option when RF devices are not permitted.

SWSI & DWDI Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Designed for SWSI and DWDI Fans
- NIST-traceable Calibration
- %-of-reading Accuracy
- Airflow and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Five Mounting Styles
- Remote Transmitter with LCD Display
- 3-year Warranty



The HTx104-F/SI and HTx104-F/DI are EBTRON’s most economical solution for accurate and repeatable airflow measurement in SWSI and DWDI fans. Airflow, temperature and/or airflow alarming are available on all models. Does not affect fan performance.

Typical Applications

- ◆ Fan Airflow Tracking
- ◆ Air Change Verification & Monitoring
- ◆ Fan Performance Monitoring

Benefits

- ◆ Demonstrate Fan Performance and Operation
- ◆ Improve Fan Tracking on VAV Systems
- ◆ Comply with ASHRAE Standards
- ◆ Save Energy
- ◆ Reduce Fan Horsepower

Product Highlights

- ◆ Accurate and Repeatable
- ◆ Long-term Stability
- ◆ Streamline Design
- ◆ Adjustable Mounting Brackets
- ◆ “Plug and Play” Operation
- ◆ Intuitive User Interface
- ◆ FEP Plenum Rated Cables



SPECIFICATIONS: HTx104-F (/SI & /DI)

General

Probe and Sensor Node Configurations

SWSI and DWDI fans: 2 probes x 1 sensor node/per probe in each fan inlet

Installed Airflow Accuracy¹

±(3% to 10%) of reading, depending on fan type and installation. May be improved by field adjustment using the Field Adjust Wizard (FAW) to a reliable reference.

Sensor Node Averaging Method

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

Listings and Compliance

UL: UL-873 and CSA C22.2 No. 24
CE: Non-UK European shipments only
UKCA: UK shipments only
BACnet International: BTL Listed (HTN104 transmitter)
FCC: This device complies with Part 15 of the FCC rules
RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature:
Probes: -20 to 160 °F [-28.9 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
Temperature sensor: Precision, hermetically sealed, bead-in-glass thermistor

Sensing Node Housing

Material: Glass-filled Polypropylene
Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)
Calibrated Range: 0 to 10,000 fpm [0 to 50.8 m/s]
Calibration Points: 16

Temperature Measurement

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

Mounting Rods

Material: Zinc plated steel

Mounting Brackets (Throat, Forward, Face, Flare)

Material: 304 stainless steel

Mounting Brackets (Cantilever)

Material: Zinc plated steel

Mounting Options & Size Limits

Throat: 6 to 66 inches [152.4 to 1676.4mm] (throat diameter)
Forward: 6 to 64 inches [152.4 to 1625.6 mm] (diameter at inlet entrance)
Face: 11 to 77 inches [279.4 to 1955.8] (diameter at inlet entrance)

Flare: 6 to 57 inches [152.4 to 1447.8 mm] (opening size at backdraft damper inlet)

Cantilever: 11 to 82 inches [279.4 to 2082.8 mm] (diameter at inlet entrance)

Probe to Transmitter Cables

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

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

Connecting Plug: 0.60" [15.24 mm] circular DIN

Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @11V-A

PCB Connections: Gold-plated PCB interconnects and test points

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

B.A.S. Connectivity Options

HTA104 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm)

HTN104 Transmitter: One field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection- Individual sensor node airflow rates and temperatures are available via the network

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 (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

¹ Installed airflow accuracy is the actual system accuracy expected and includes sampling uncertainty of the sensor probes.

Bleed Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Bi-directional Airflow Measurement
- Detect ΔP as low as 0.0002" H₂O
- Optional Mounting Kits Available
- Airflow (or ΔP) and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- 1/2" NPT Female Pipe Connections
- Remote Transmitter with LCD Display
- 3-year Warranty



The HTx104-B is a unique measurement device that can detect very small pressure differentials (as low as 0.0002" H₂O) between two adjacent spaces by sensing the airflow rate induced by the pressure gradient. The HTx104-B can be used to determine the airflow rate across fixed openings when a reference airflow rate is provided. More output circuit protection than the EF-x2000-B with a true 4-20mA output option (HTA104-B) make this the best choice for these applications.

Typical Applications	Benefits	Product Highlights
<ul style="list-style-type: none"> ◆ Ultra-low Pressure Detection ◆ Parking Garage Pressurization ◆ Construction Zone Contaminant Containment ◆ Stairwell Pressurization ◆ Relief and Exhaust Damper Control ◆ Airflow across a Louver or other Fixed Opening 	<ul style="list-style-type: none"> ◆ Maintain Pressure Relationships between Adjacent Spaces ◆ Satisfy LEED Prerequisites and Credits ◆ Provide Acceptable IAQ ◆ Save Energy ◆ Reduce Liability ◆ Improve Performance 	<ul style="list-style-type: none"> ◆ Uni- or Bi-directional Measurement ◆ Extremely Sensitive ◆ Airflow or Equivalent Pressure Output ◆ Long-term Stability ◆ Small Footprint ◆ Simple NPT Pipe Connections ◆ Optional Mounting Kits Available

General

Probe and Sensor Node Configurations

1 bi-directional, dual 1/2" NPT female bleed sensor housing

Installed Accuracy

Airflow through an opening or across and obstruction: Requires field measurement of a reference airflow of the specific installation. The Field Adjust Wizard (FAW) facilitates setup.

Equivalent pressure between two adjacent spaces: Requires field measurement of a reference pressure to correct the default flow coefficient of the specific installation. The Field Adjust Wizard (FAW) facilitates setup.

Listings and Compliance

UL: UL-873 and CSA C22.2 No. 24

CE: Non-UK European shipments only

UKCA: UK shipments only

BACnet International: BTL Listed (HTN104 transmitter)

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature:

Sensor: -20 to 160 °F [-28.9 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%

Bleed Sensor Assembly

Sensing Node Sensors

Self-heated sensor: Two precision, hermetically sealed, bead-in-glass thermistor probes

Temperature sensor: One precision, hermetically sealed, bead-in-glass thermistor probe

Sensing Node Housing

Material: Glass-filled Polypropylene

Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)

Calibrated Range: -3,000 to 3,000 fpm [-15.24 to 15.24 m/s]

Calibration Points: 9

Temperature Measurement

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

Probe to Transmitter Cables

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

Standard Lengths: 10, 25 and 50 ft. [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

PCB Connections: Gold-plated PCB interconnects and test points

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

B.A.S. Connectivity Options

HTA104 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow or equivalent ΔP, AO2=temperature or alarm)

HTN104 Transmitter: One field selectable (BACnet MS/TP or Modbus RTU) and isolated RS-485 network connection- Individual sensor node airflow rates and temperatures are available via the network

Airflow (or Pressure) Alarm

Type: Low and/or high user defined setpoint alarm

Tolerance: User defined % of setpoint

Delay: User defined

Reset Method: Manual or automatic

Visual Indication: Yes, LCD display

Network Indication: Yes (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes (HTN104 only)

Analog Signal Indication: Yes, on AO2 assignment (HTA104 only)

Bleed Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Bi-directional Airflow Measurement
- Detect ΔP as low as 0.0002" H₂O
- Airflow (or ΔP) and Status Alarm
- Temperature Output Capability
- Analog and RS-485 Output Models
- Dry Contact Relay
- 1/2" NPT Female Pipe Connections
- Remote Transmitter with LCD Display
- 3-year Warranty

The EF-x2000-B is a unique measurement device that can detect very small pressure differentials (as low as 0.0002" H₂O) between two adjacent spaces by sensing the airflow rate induced by the pressure gradient. The EF-x2000-B can be used to determine the airflow rate across fixed openings when a reference airflow rate is provided.

Typical Applications

- ◆ Ultra-low Pressure Detection
- ◆ Parking Garage Pressurization
- ◆ Construction Zone Contaminant Containment
- ◆ Stairwell Pressurization
- ◆ Relief and Exhaust Damper Control
- ◆ Airflow across a Louver or other Fixed Opening

Benefits

- ◆ Maintain Pressure Relationships between Adjacent Spaces
- ◆ Satisfy LEED Prerequisites and Credits
- ◆ Provide Acceptable IAQ
- ◆ Save Energy
- ◆ Reduce Liability
- ◆ Improve Performance

Product Highlights

- ◆ Uni- or Bi-directional Measurement
- ◆ Extremely Sensitive
- ◆ Airflow or Equivalent Pressure Output
- ◆ Long-term Stability
- ◆ Small Footprint
- ◆ Simple NPT Pipe Connections
- ◆ Optional Mounting Kits Available

General

Probe and Sensor Node Configuration

1 bi-directional, dual 1/2" NPT female bleed sensor housing

Installed Accuracy

Airflow through an opening or across and obstruction: Requires field measurement of a reference airflow of the specific installation. The Field Adjust Wizard (FAW) facilitates setup.

Equivalent pressure between two adjacent spaces: Requires field measurement of a reference pressure to correct the default flow coefficient of the specific installation. The Field Adjust Wizard (FAW) facilitates setup.

Listings and Compliance

UL: 60730-1, 60730-2-9; CAN E60730-1, E60730-2-9 (EF-A2000-B Only)

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature:

Sensor -2,000 to 2,000 fpm [-10.16 to 10.16 m/s];
-20 to 160 °F [-28.9 to 71.1 °C]

Sensor -3,000 to 3,000 fpm [-15.24 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%

Bleed Sensor Assembly

Sensing Node Sensors

Self-heated sensor: Two precision, hermetically sealed, bead-in-glass thermistor probes

Temperature sensor: One precision, hermetically sealed, bead-in-glass thermistor probe

Sensing Node Housing

Material: Glass-filled Polypropylene

Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: ±2% of reading to NIST-traceable airflow standards (includes transmitter uncertainty)

Calibrated Range: -3,000 to 3,000 fpm [-15.24 to 15.24 m/s]

Calibration Points: 9

Temperature Measurement

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

Probe to Transmitter Cables

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

Standard Lengths: 10, 25 and 50 ft. [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 or equivalent ΔP, 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 for 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 (or Pressure) Alarm

Type: Low and/or high user defined setpoint alarm

Tolerance: User defined setpoint value

Delay: User defined

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

Data Center Containment Rack Airflow/Pressure and Temperature Monitor

OVERVIEW



- Thermal Dispersion Technology
- Bi-directional Airflow Measurement
- Equivalent ΔP Output Capability
- Detect ΔP as low as 0.0002" H₂O
- Alarm Capability
- Temperature Measurement
- Ethernet Network Connection
- Server Rack Mounting
- LCD Display
- 3-year Warranty

The SERVAIRE-E100 rack mount bidirectional airflow measurement device can detect very small pressure differentials (as low as 0.0002" H₂O) across containment zones by measuring the airflow bled across a false server. Temperature measurement of the bleed airflow path is also provided.

Typical Applications

- ◆ Supply Air Fan Control
- ◆ Supply Air Deficiency Detection
- ◆ Supply Air Over-pressurization Detection
- ◆ Containment Aisle Short-circuit Airflow Detection

Benefits

- ◆ Reduce Fan Energy
- ◆ Improve Server Efficiency
- ◆ Reduce Server Failures

Product Highlights

- ◆ Simple Rack Mount Design
- ◆ Self-contained Sensing Unit
- ◆ Long-term Stability
- ◆ Simultaneous BACnet and Modbus Capability
- ◆ Supports up to 10 Simultaneous Connections
- ◆ Dual Redundant 110 VAC Power Supplies



SPECIFICATIONS: SERVAIRE-E100

General

Probe and Sensor Node Configuration

1 bi-directional bleed sensor in a single rack mount housing

Listings and Compliance

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature: -20 to 160 °F [-28.9 to 71.1 °C]

Humidity: (non-condensing) 5 to 95%

Bleed Sensor Assembly

Sensing Node Sensors

Self-heated sensor: Two precision, hermetically sealed, bead-in-glass thermistor probes

Temperature sensor: One precision, hermetically sealed, bead-in-glass thermistor probe

Sensing Node Housing

Material: Glass-filled Polypropylene

Sensor Potting Materials: Waterproof marine epoxy

Airflow Measurement

Accuracy: $\pm 2\%$ of reading to NIST traceable-standards airflow standards (includes transmitter uncertainty)

Calibrated Range: -2,000 to 2,000 fpm [-10.16 to 10.16 m/s]

Approximate Pressure Range: -0.5 to +0.5 in. H₂O [-124.54 to +124.54 Pa]

Calibration Points: 9

Temperature Measurement

Accuracy: $\pm 0.15^\circ\text{F}$ [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

Integral Transmitter

Power Requirement: 110 VAC @ 8V-A

Power Redundancy: Dual independent redundant power supplies

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

B.A.S. Connectivity

SERVAIRE-E100: One isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection - supports up to 10 simultaneous connections

Airflow (or Pressure) Alarm

Type: Low and/or high user defined setpoint alarm

Tolerance: User defined setpoint

Delay: User defined

Reset Method: Manual or automatic

Visual Indication: Yes, LCD display

Network Indication: Yes

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LCD display

Network Indication: Yes

Rack Mount Assembly

Standard 1U Rack Height Enclosure

1.75H x 19W x 12D in. [44.5 x 482.6 x 304.8 mm]

Wall-mounted RS-485 Combination Sensor with CO₂,
Temperature and Relative Humidity Capability

OVERVIEW



- Up to 3 Sensors in One Package
- Telaire NDIR CO₂ Sensor
- Planar Capacitive Polymer RH Sensor
- Integral Bandgap PTAT Temp. Sensor
- Accurate Measurement
- Reliable Design
- RS-485 BACnet/Modbus Connection
- BTL Listed
- Attractive Wall-mount Enclosure
- 1-year Warranty

The IAQSENS family of wall mounted devices simplifies wiring and installation by providing up to three sensors over a single RS-485 connection. The device is available as a stand-alone CO₂ sensor, dual output RH/Temperature sensor or a combination of all three.

Typical Applications

- ◆ Room CO₂, Relative Humidity and Temperature Monitoring
- ◆ CO₂ Demand Control Ventilation (DCV)
- ◆ CO₂/Airflow* Population Estimation DCV

* When an Airflow Monitoring Device is Provided

Benefits

- ◆ Reset Outdoor Airflow Rates
- ◆ Save Energy
- ◆ Satisfy LEED Requirements
- ◆ Combine with an Airflow Measuring Device for ASHRAE 62.1 and 90.1 Compliant DCV

Product Highlights

- ◆ Self-calibrating ABC Logic Circuitry for CO₂ Measurement
- ◆ Microprocessor-based
- ◆ Watchdog Circuit Protection
- ◆ Time-tested Network Firmware
- ◆ Simple DIP Switch Network Configuration

General

Sensor Configurations

CO₂ only - IAQ-N100-W

RH and Temperature only - IAQ-N200-W

CO₂, RH and Temperature - IAQ-N300-W

Listings and Compliance

BACnet International: BTL Listed

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits (Recommended)

Temperature: 32 to 122 °F [0 to 50 °C]

Humidity: 5 to 95%

Sensors

CO₂ Sensor

Technology: Telaire 6613 Non Dispersive Infrared (NDIR)

Range: 0 to 2,000 ppm

Accuracy:

400 to 1,250 ppm ±30 ppm or 3% of reading, whichever is greater

1,250 to 2,000 ppm ±30 ppm

Temperature Dependence: 0.36% FS/°F [0.2% FS/°C]

Stability: <2% of FS over life of sensor (15 year typical)

Calibration Interval: Not required

Response Time: <2 minutes for 90% step change typical

Temperature Sensor

Technology: Integral Bandgap PTAT

Range: 32 to 122 °F [0 to 50 °C]

Accuracy: ±1.08 °F [0.6 °C] @77 °F [25 °C]

Resolution: 0.36 °F [0.2 °C]

Relative Humidity Sensor

Technology: Planar Capacitive Polymer

Range: 0 to 100% RH

Accuracy:

±3% <20% RH

±2% 20% to 80% RH

±3% >80% RH

Resolution: 0.4% RH

Integral Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @1.5V-A

Printed Circuit Boards: Electroless nickel immersion gold (ENIG) plated

User Interface: DIP switch

B.A.S. Connectivity Options

IAQ-N100, IAQ-N200, IAQ-N300 Transmitters: One field selectable (BACnet MS/TP or Modbus RTU) and non-isolated RS-485 network connection (provide individual 24 VAC transformers at each IAQ-Ny00 for applications requiring isolated RS-485)

Supported Baud Rates: 9.6, 19.2, 38.4 and 76.8 kbaud

System Status Alarm

Type: Sensor diagnostic system trouble indication

Visual Indication: Yes, LED indication

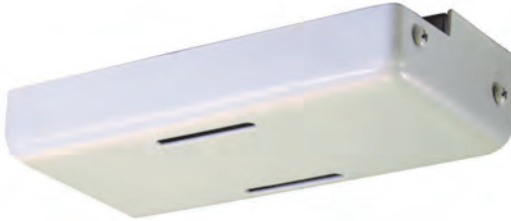
Network Indication: Yes

Enclosure

Dimensions: 4.56H x 3.25W x 1.09D in. [115.8 x 82.6 x 27.7 mm]

Thermal Imaging Occupancy Counter for Single Width Interior Doors

OVERVIEW



- Thermal Imaging Technology
- Bi-directional Counting
- Ideal for Single Entry Doors
- 5% or Better Typical Counting Accuracy
- RS-485 Network Connection
- Analog Output Connection
- Install Over Door Opening
- Door Jamb or Stand-off Mounting
- Operates on 24 VAC Power
- 3-year Warranty

The CENSus-C100 is a unique solution for reliable and cost effective occupancy counting. Ideal for Demand Control Ventilation (DCV) applications. Ideal for single entry interior doors or openings. Multiple counters can be installed on rooms with more than one entry.

Typical Applications

- ◆ Classrooms
- ◆ Lecture Halls
- ◆ Conference Rooms
- ◆ Waiting Rooms
- ◆ Libraries
- ◆ Retail Spaces
- ◆ Arenas or Exhibition Spaces with Channeled Entry Paths

Benefits

- ◆ Provide Only the Outdoor Air Required for the Actual Population
- ◆ Save Energy
- ◆ Reduce IAQ Liability
- ◆ Satisfy ASHRAE 62.1 DCV Requirements on Single and Multi-zone Spaces
- ◆ Satisfy DCV Requirements of ASHRAE 90.1

Product Highlights

- ◆ Easy to Install
- ◆ Real-time Counting
- ◆ Advanced Algorithm Reduces False Counts
- ◆ No Sensor/Receptor Alignment Required
- ◆ Compatible with BRG-N100 when no B.A.S. Network is Available



SPECIFICATIONS: CENSUS-C100

General

Counting Technology: Dual sensor differential thermal imaging

Accuracy: Typically better than $\pm 5\%$ of actual population or 3 people, whichever is greater, on openings less than or equal to 42 in. [1.07m]

Listings and Compliance

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature (recommended limits): 65 to 85 °F [18.3 to 29.4 °C]

Humidity: 5 to 95%

Sensor Assembly

Sensors: Two thermopile sensors

Mounting Options:

Standard: Install on overhead door jamb

Optional: Install above door opening with optional stand-off bracket

Maximum Recommended Mounting Height: 96 in. [2.43 m]

Integral Transmitter

Power Requirement: 24 VAC (22.8 to 26.4 under load) @1.5V-A

B.A.S. Connectivity Options

CENSUS-C100: One 0-10 VDC, scalable and protected analog output signal (AO1=occupancy count) and one field selectable (BACnet MS/TP or Modbus RTU) and non-isolated RS-485 network connection (provide individual 24 VAC transformers for each CENSUS-C100 device for applications requiring isolated RS-485)

Enclosure

Enclosure: White powder coated formed aluminum

RS-485 Network Bridge with Configurable Display and Alarm Capability

OVERVIEW



- Analog Input to RS-485 Bridge
- Make any Sensor a Network Sensor
- Accurate Voltage Measurement
- Scalable Signal Conversion
- Display Custom Units of Measure
- RS-485 BACnet/Modbus Connection
- Substitute BACnet AI for Analog Voltage
- Alarm Capability
- Dry Contact Relay
- 1-year Warranty

The BRG-N100 functions as an analog input to RS-485 network bridge. It supports both BACnet MS/TP and Modbus RTU. In addition, it can bind to a remote BACnet object (AO, AI or AV) to read BACnet devices without a dedicated B.A.S. network.

Typical Applications

- ◆ Analog Signal to RS-485 Network Bridge
- ◆ Remote Display for RS-485 or Analog Signal Device
- ◆ Low/High Setpoint Alarm

Benefits

- ◆ Convert any Analog Output Sensor to an RS-485 Network Sensor
- ◆ Display any BACnet MS/TP Device without a B.A.S. Network
- ◆ Satisfy Alarming Requirements of Codes and Standards

Product Highlights

- ◆ Stand-alone Bridge
- ◆ Fixed or % Tolerance Alarming
- ◆ Simple Pushbutton Interface
- ◆ No Additional Devices Required for Setup

General

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

Type: Analog Input (AI1)

Ranges:

Voltage: 0-10 VDC

Current: 4-20mA (from 4 wire source, no excitation voltage)

B.A.S. Connectivity Options

BRG-N100 Bridge: One field selectable (BACnet MS/TP or Modbus RTU) and non-isolated RS-485 network connection for the scaled network value of AI1, including units of measure - A remote BACnet network object (AO, AI or AV) may be substituted for the physical analog input (AI1) in applications that require an RS-485 BACnet device be read without a B.A.S. network. Note: this functionality is not available for Modbus devices. Provide individual 24 VAC transformers at each BRG-N100 bridge 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.

Analog Input (AI1) Alarm

Type: Low and/or high user defined setpoint alarm

Tolerance: User defined % of setpoint or fixed value setpoint

Delay: User defined

Reset Method: Manual or automatic

Visual Indication: Yes, LCD display and red indicating LED

Network Indication: Yes

Contact Closure Relay Assignment: Yes, R1

Listings and Compliance

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature: -20 to 120 °F [-28.9 to 48.9 °C]

Humidity: 5 to 95% (non-condensing)

Power Requirement: 24 VAC (22.8 to 26.4 under load) @2.5V-A

Dimensions: 3.57H x 6.00W x 1.58D in. [90.7 x 152.4 x 40.1 mm]

Analog Input Signal “Smart Relay” Threshold Alarm
with Local LED Indication

OVERVIEW



- Comparison Threshold Alarm
- LED Alarm Indication
- Dry Contact N.O. Relay
- Trigger with an Analog DC Signal
- Input Range 0-10 VDC or 4-20 mA
- Activation Trigger > 3 VDC or 6 mA
- Ideal for Advantage IV Products
- Convert AO Alarm to LED/Relay Alarm
- Simple Terminal Block Connections
- 1-year Warranty

The ALRT-100 accepts a binary analog output signal for applications requiring local or remote visual or contact closure alarming. The device provides a visual LED indication as well as a contact closure relay capable of passing up to 3 amps at 30VDC or 24 VAC.

Typical Applications

- ◆ Convert Analog Signal Alarms to Visual or Contact Closure Alarms
- ◆ Gold & Hybrid Transmitter Enhanced Alarming

Benefits

- ◆ Ideal for LEED Compliance when no B.A.S. is Provided
- ◆ Satisfy Fault Detection Requirements of Codes and Standards
- ◆ Detect HVAC System Failure

Product Highlights

- ◆ Fixed Threshold
- ◆ No Setup or Configuration Required
- ◆ Accepts VDC or mA DC Analog Signals
- ◆ Easy to Install
- ◆ Low Cost

General

Input

Type: Analog input (AI1)

Ranges:

Voltage: 0-10 VDC

Current: 4-20 mA (from 4 wire source, no excitation voltage)

Relay:

Type: Dry contact w/onboard jumper to drive a remote LED

(R1=Alarm)

Status: N.O.

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

Analog Input (AI1) Threshold Alarm

Type: Threshold alarm on AI1 > comparison threshold

Comparison Threshold:

Voltage: Fixed at 3 VDC

Current: Fixed at 6 mA

Delay: None

Reset Method: Automatic

Visual Indication: Yes, red LED

Contact Closure Relay Assignment: Yes, R1

Listings and Compliance

FCC: This device complies with Part 15 of the FCC rules

RoHS: This device is RoHS2 compliant

Environmental Limits

Temperature: -20 to 120 °F [-28.9 to 48.9 °C]

Humidity: 5 to 95% (non-condensing)

Power Requirement: 24 VAC (22.8 to 26.4 under load) @1.5V-A

Dimensions: 3.36H x 4.25W x 1.36D in. [85.2x108.0 x 34.5 mm]

AIRFLOW MEASUREMENT SOLUTIONS

SMART AIRFLOW MEASUREMENT SOLUTIONS



AIR-IQ2

- Designed specifically for outdoor air intakes.
- 35% narrower sleeve depth than original AIR-IQ.
- 1" radius flare improves measurement performance and minimizes pressure drop.
- Integral EBTRON GTx116e-PC or GTX116-P+ thermal dispersion airflow measurement device.
- Integral high-performance TAMCO damper.

FAN-IQ

- Ideal for fan arrays.
- Supports up to eight fans.
- Integral EBTRON GTx108e-F/An thermal dispersion airflow measurement device.
- Airflow measurement device does not affect fan performance.
- Individual fan airflow measurement with fan alarm capability.
- Integral high-performance TAMCO backdraft damper.

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