



Precise Measurement Solutions for Today's Green Buildings

Condensed
Catalog

EBTRON[®]
a measurable difference!

Advantage III EB-Flow SERVAIRE CENSus IAQSENS BRIDGE ALERT

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- High Sensor Density
- 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 GTx116-**P+** is EBTRON's top-of-the-line measurement 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.

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

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/Plenum: $\pm 3\%$ of reading
- Non-ducted OA Intakes: better than or equal to $\pm 5\%$ of reading

P+ Sensor Density Rules

Area (sq.ft.) [sq.m]	Sensor Nodes	Area (sq.ft.) [sq.m]	Sensor Nodes
≤ 0.5 [0.046]	1	$> 4 \text{ \& } \leq 8$ [0.743]	8
$> 0.5 \text{ \& } \leq 1$ [0.092]	2	$> 8 \text{ \& } \leq 12$ [1.11]	12
$> 1 \text{ \& } \leq 2$ [0.185]	4	$> 12 \text{ \& } \leq 14$ [1.30]	14
$> 2 \text{ \& } \leq 4$ [0.371]	6	> 14 [1.30]	16

Sensor Node Averaging Method

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

Listings

- UL:** UL 873 Listed
- CE:** European shipments only
- BACnet International:** BTL Listed (GTC116 and GTM116 transmitters)

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:** $\pm 2\%$ 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:** $\pm 0.15^\circ\text{F}$ [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

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 Limits²

- Insertion and Stand-off:** 6 to 120 in. [152.4 to 3048 mm]
- Internal:** 8 to 120 in. [203.2 to 3048 mm]

Probe to Transmitter Cables

- Type:** FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °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

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

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

B.A.S. Connectivity Options

- GTC116 Transmitter:** Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus 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

- GTM116 Transmitter:** Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus one 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

- GTL116 Transmitter:** One isolated Lonworks Free Topology network connection

- GTD116 Transmitter:** One USB connection for thumb drive data-logging of sensor node airflow rates and temperatures over specified time intervals

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 (GTC116 and GTM116 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 (GTC116 and GTM116 only)
- Analog Signal Indication:** Yes, on AO2 assignment

- EB-Link Infra-red Interface (with /EL option):** Provides individual airflow and temperature data to an EB-Link Reader

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.

² Custom probes are available up to 192 inches. Sensing nodes/probe limitations apply on sizes greater than 120 inches to ensure structural stability of the probe tube and may not meet P+ sensor density rules. Contact factory for more information.

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Economical Sensor Density
- 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

General

Probe and Sensor Node Configurations (max.)

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

Installed Airflow Accuracy¹

- Ducts/Plenum ≤ 2 sq.ft. [0.18 sq.m]: $\pm 3\%$ of reading
- All other applications and sizes: Unspecified

PE Sensor Density Rules (typical)

Area (sq.ft.) [sq.m]	Sensor Nodes
≤ 0.5 [0.046]	1
$> 0.5 \text{ \& } \leq 1$ [0.092]	2
> 1 [0.092]	4

Sensor Node Averaging Method

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

Listings

- UL: UL 873 Listed
- CE: European shipments only
- BACnet International: BTL Listed (HTN104 transmitter)

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: $\pm 2\%$ 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 Limits²

- Insertion, and Stand-off: 6 to 120 in. [152.4 to 3048 mm]
- Internal: 8 to 120 in. [203.2 to 3048 mm]

Probe to Transmitter Cables

- Type: FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °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 is the actual system accuracy expected and includes sampling uncertainty of the sensor probes when installation meets or exceeds placement guidelines.

² Custom probes are available up to 192 inches. Contact factory for more information.

Airflow Measurement with Temperature and Alarm Capability

OVERVIEW



- Thermal Dispersion Technology
- Cost Effective Single Probe
- Volumetric Airflow 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 top-of-the-line measurement solution for round ducts between 4 and 16 inches in diameter. Ideal for most small duct airflow measurement and volumetric airflow tracking applications. More features than the EF-x1000-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

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

Typically better than $\pm 3\%$ of reading

Sensor Node Averaging Method

Airflow: Independent arithmetic average

Temperature: Independent, velocity weighted or arithmetic average

Listings

UL: 60730-1; UL 60730-2-9 (HVAC Controls)

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: $\pm 3\%$ of reading to 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: $\pm 0.15^\circ\text{F}$ [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

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 392 °F [-55 to 200 °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
- Volumetric Airflow 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 volumetric airflow tracking applications. Low flow performance, temperature capability and connectivity options makes 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

Typically better than $\pm 3\%$ of reading

Sensor Node Averaging Method

Airflow: Independent arithmetic average

Temperature: Independent velocity weighted average

Listings

UL (EF-A1000-T): 60730-1; UL 60730-2-9 (HVAC Controls)

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%

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 transmitter 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)

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: $\pm 3\%$ of reading to 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: $\pm 0.15^\circ\text{F}$ [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]

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 RTU (≤ 12.5 tons)
Outdoor Air Delivery
Monitoring & Powered
Exhaust Tracking
- ◆ 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

Typically better than $\pm 10\%$ of reading

Sensor Node Averaging Method

Airflow: Independent (arithmetic average on 2 sensor configurations installed at a single measurement location)

Temperature: Independent (velocity weighted or arithmetic average on 2 sensor configurations installed at a single measurement location)

Listings

UL: 60730-1; UL 60730-2-9 (HVAC Controls)

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: High-performance encapsulated chip thermistor with parylene coating

Sensing Node Housing

Material: Glass-filled Polypropylene

Sensor Potting Materials: Waterproof marine epoxy

Sensing Node Internal Wiring

Type: Kynar® coated copper

Airflow Measurement

Accuracy: $\pm 3\%$ 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: $\pm 0.36^\circ\text{F}$ [0.2 °C]

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 392 °F [-55 to 200 °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
- Face, Forward and Flare Mounting
- Remote Transmitter with LCD Display
- 3-year Warranty

The GTx108-**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 of sensitive plenum fans.

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)

Sensor Node Averaging Method

Airflow: Independent, arithmetic average per fan

Temperature: Independent, velocity weighted or arithmetic average

Listings

UL: UL 873 Listed

BACnet International: BTL Listed (GTC108 and GTM108 transmitters)

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

Material: 304 stainless steel

Mounting Options & Size Limits

Forward: 6 to 64 inches [152.4 to 1676.4 mm] (diameter at inlet entrance)

Face: 11 to 77 inches [152.4 to 1625.6 mm] (diameter at inlet entrance)

Flare: 6 to 57 inches [279.4 to 1955.8 mm] (opening size at backdraft damper inlet)

Probe to Transmitter Cables

Type: FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °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: 16-character LCD display and 4 button interface

B.A.S. Connectivity Options

GTC108 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus 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 - Individual fan airflow rates are available via the network

GTM108 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus one 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 - Individual fan airflow rates are available via the network

GTL108 Transmitter: One isolated Lonworks Free Topology network connection - Individual fan airflow rates and temperatures are NOT available via the network on multiple fan systems

GTD108 Transmitter: One USB connection for thumb drive data-logging of sensor airflow and temperature over specified time intervals

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 (GTM108 and GTC108 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 (GTM108 and GTC108 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 Infra-red Interface (with /EL option): Provides individual airflow and temperature data to an EB-Link Reader

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
- Throat, Face, and Forward Mounting
- Remote Transmitter with LCD Display
- 3-year Warranty

The GTx108-F/SI and GTx108-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 SWSI or DWDI 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

General

Probe and Sensor Node Configurations

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

Sensor Node Averaging Method

Airflow: Independent, arithmetic average

Temperature: Independent, velocity weighted or arithmetic average

Listings

UL: UL 873 Listed

BACnet International: BTL Listed (GTC108 and GTM108 transmitters)

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

Material: 304 stainless 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)

Probe to Transmitter Cables

Type: FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °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: 16-character LCD display and 4 button interface

B.A.S. Connectivity Options

GTC108 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus 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

GTM108 Transmitter: Two field selectable (0-5/0-10 VDC or 4-20mA), scalable and isolated analog output signals (AO1=airflow, AO2=temperature or alarm) plus one 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

GTL108 Transmitter: One isolated Lonworks Free Topology network connection

GTD108 Transmitter: One USB connection for thumb drive data-logging of sensor airflow and temperature over specified time intervals

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 (GTM108 and GTC108 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 Infra-red Interface (with /EL option): Provides individual airflow and temperature data to an *EB-Link Reader*

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
- Throat, Face, and Forward Mounting
- 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 SWSI or DWDI 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

General

Probe and Sensor Node Configurations

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

Sensor Node Averaging Method

Airflow: Independent, arithmetic average

Temperature: Independent, velocity weighted or arithmetic average

Listings

UL: UL 873 Listed

CE: European shipments only

BACnet International: BTL Listed (HTN104 transmitter)

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

Material: 304 stainless 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)

Probe to Transmitter Cables

Type: FEP jacket, plenum rated CMP/CL2P, UL/cUL listed, -67 to 392 °F [-55 to 200 °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)

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 does not measure pressure directly but can be used to determine the approximate pressure differential when the proper flow coefficient for the installation is determined.

Typical Applications

- ◆ Ultra-low Differential Pressure Detection
- ◆ Parking Garage Pressurization
- ◆ Construction Zone Contaminant Containment
- ◆ Stairwell Pressurization
- ◆ Relief and Exhaust Damper Control

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

Listings

UL: 60730-1; UL 60730-2-9 (HVAC Controls)

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 392 °F [-55 to 200 °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

General

Probe and Sensor Node Configuration

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

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: ±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: ±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

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]

Thermal Imaging Occupancy Counter for Single Width Interior Doors

OVERVIEW



- Thermal Imaging Technology
- Bi-directional Counting
- Designed for 42" or Less Openings
- 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. Designed for single width 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

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 Opening Size: 42 in. [1.07 m]

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 steel

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

BACnet International: BTL Listed

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% or 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 isolated RS-485 network connection

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]

RS-485 Network Bridge with Configurable Display and Alarm Capability



- 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

Environmental Limits

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

Humidity: 5 to 95%

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 III (A3) 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

Environmental Limits

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

Humidity: 5 to 95%

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]

