

“Bleed” Airflow Measurement Systems

System Features

- Bidirectional or Unidirectional dynamic pressure and airflow measurement.
- Measure between spaces for ultra low “dynamic” pressure control.
- Measure across intake louvers or fixed dampers to determine outside air flow rates.
- Measure across relief dampers to create an “electronic” gravity damper.
- Advanced Thermal Dispersion (TD) airflow measurement technology.
- Sensor and transmitter diagnostics with intelligent sensor detection system.
- Stable, hermetically sealed “bead in glass” thermistor sensors.
- Exclusive “plug and play” SMART sensor design.
- Microprocessor based digital circuitry with FLASH memory.
- Fully temperature compensated.
- Provides direct signal(s) to all B.A.S.



Application

Thermal dispersion technology can accurately measure airflow rates to determine bleed airflow or differential dynamic pressure across an obstruction or fixed orifice.

The **GTx116-B** is ideal for measuring very small dynamic pressure between two spaces or between interior and exterior walls for space pressure control. (Dynamic pressure is determined by measuring the bleed airflow rate, neglecting frictional losses in the sensor).

The device is also well suited for the measurement of outside airflow rates. Outside airflow rates can be determined by measuring the “bleed” airflow developed across an intake louver or fixed damper using a field or laboratory-generated correction factor related to the intake louver flow coefficient.

Control of exhaust flow rates in supply/return fan systems can also be accomplished by measuring and maintaining positive dynamic pressure across a relief air damper. The application essentially creates an electronic “gravity” damper.

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

Selection

The **GTx116-B** has been developed with most “traditional” options included standard. Each transmitter serves a single location and can be configured to measure differential dynamic pressure or “bleed” airflow and direction. The transmitter requires 24 VAC and provides the host controls with linear output signals for dynamic pressure and “bleed” airflow (**consult the GTx116 Transmitter Installation & Configuration Guide for RS-485, Ethernet and LonWorks options**).

Each transmitter is fully independent of the sensor. “Smart” sensor technology imbeds the calibration data of sensor in the cable assembly. The **GTA116** transmitter is provided with field selectable, isolated 4-20 mA and 0-10 VDC analog output signals for dynamic pressure and “bleed” airflow. Output scales can be configured easily in the field (see product specifications for factory default settings).



Thermal Dispersion Airflow Measurement

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Connection to the **GTx116-B** sensor housing is provided by a 1/2 inch NPT connection. Several mounting kits are available for specific applications (see **Sensor Housing Installation**). The model **GTx116-B** has a typical installed accuracy $\pm 2\%$ of reading for airflow ($\pm 4\%$ of reading for dynamic pressure) when installed in accordance with **EBTRON** installation guides.

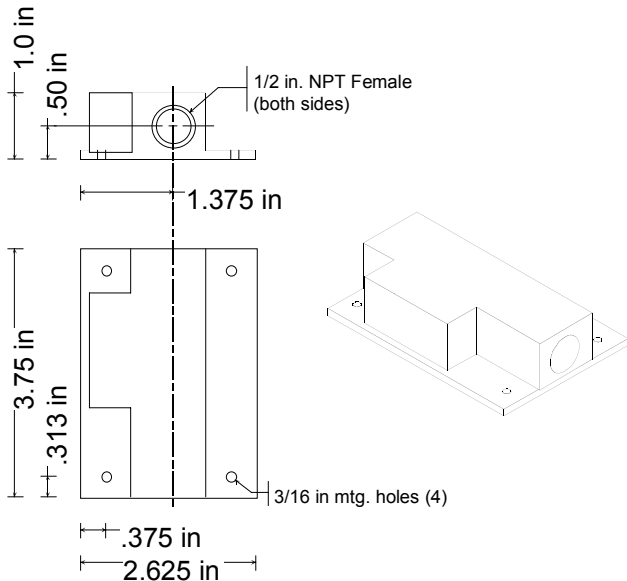
Sensor Housing Installation

Sensors are designed to be mounted across fixed obstructions which induce a differential airflow rate between the spaces. All sensor housings have a standard 10 foot plenum rated cable (optionally up to 50 feet) for connection to the remotely located transmitter (required). The sensor housing is connected to the transmitter with a simple, positive locking, circular plastic connector. The connector is 7/8" O.D. The sensor housing should be installed with the airflow arrow pointing towards the direction of airflow for "bleed" airflow applications or the low pressure side for dynamic pressure applications. Fasten in place with suitable hardware.

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

- Between spaces:** Install between two spaces to determine differential pressure. Provide a rain shield or mount the sensor housing vertically with at least 6 inches of vertical drop between the sensor housing and the exterior opening for applications exposed to exterior surfaces.
- Across intake louvers, hoods or dampers:** Install across an intake louver, hood or damper to measure outside airflow rates. The opening must be fixed and not have a filter between the inlet and outlet of the sensor. Provide a rain shield or mount the sensor housing vertically with at least 6 inches of vertical drop between the sensor housing and the exterior opening. Mount the sensor housing where it will not be exposed to direct rain or snow.
- Across relief dampers:** Install across a relief damper to create a precision electronic "gravity" damper.

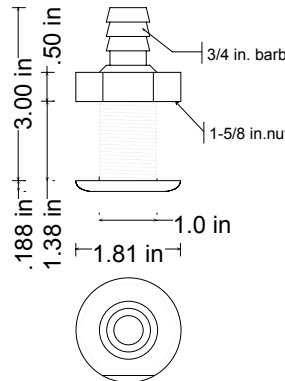
Sensor Head Dimensions



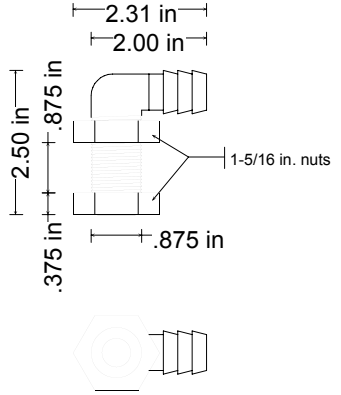
3/4" Tube Fitting Dimensions

Note: Fittings are provided with optional kits below

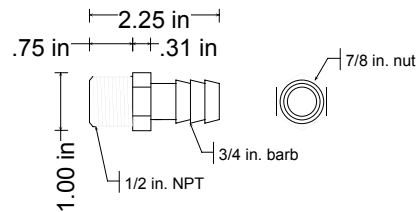
Straight Fitting



Right Angle Fitting

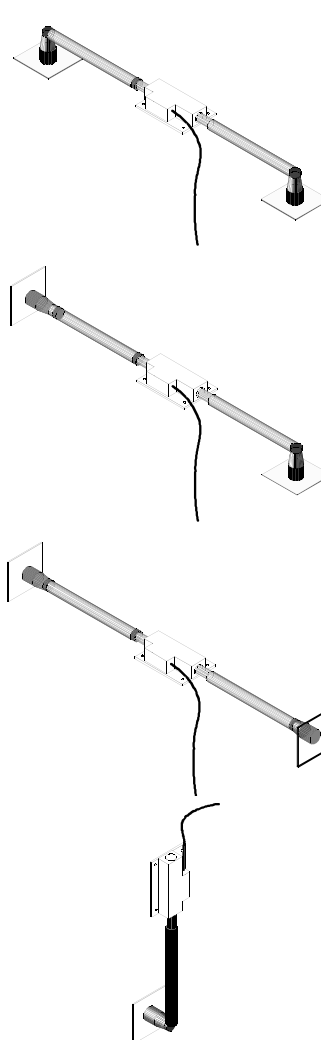


NPT to 3/4" Tube Sensor Housing Adapter



Mounting Kits (optional)

Kits are provided with 3' of Reinforced Vinyl Tubing



/R: (dual right angle)

- Across Dampers.
- Across Ceilings.

/SR: (straight/right angle)

- Between walls and ceilings
- Across dampers or louvers.
(provide a rain shield, by others, if straight fitting is on an exterior wall).

/S: (dual straight)

- Between walls (provide a rain shield, by others, if fitting is on an exterior wall).

/L: (single right angle)

- Between walls and ceilings
- Across dampers or louvers.
(provide at least 6" of vertical tube to prevent rain penetration).

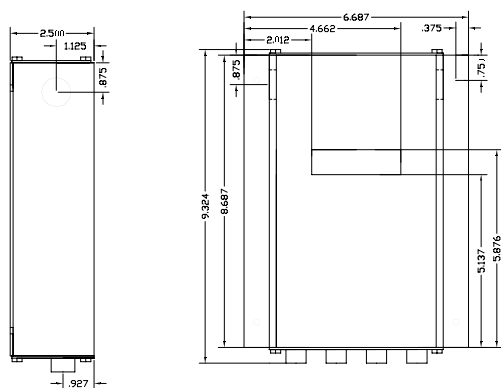
Transmitter Installation

The **GTX116-B** transmitter aluminum chassis has been designed for use in a protected environment between -20° F and 120° F where it will not be exposed to rain or snow.

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



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



Electrical Connections

After mounting the sensor probes and transmitter, connect the sensor(s) cable plugs to the circular receptacles located at the bottom of the **GTX116-B** transmitter enclosure. Sensors are “plug and play” and do not have to be connected to a specific receptacle on the transmitter. All **GTX116-B** transmitter enclosures have 4 receptacles. Plug the sensor(s) into any open receptacle for proper operation.



Do not drill into the transmitter chassis since metal shavings could damage the electronics.



Provide a “drip loop” at the transmitter if there will be the potential for water runoff or condensation along the sensor probe cable(s).

To wire the output signal and power, slide the cover plate up and out of the extruded chassis. Make sure that the power switch is in the “OFF” position. The **GTA116** wiring schematic is shown above. **Wiring and setup for network transmitters can be found in the the GTX116 Transmitter Installation & Configuration Guide for RS-485, Ethernet and LonWorks options.** Signal wires for airflow and temperature should be connected to the small, three position output terminal labeled “OUTPUT” on the upper left hand side of the main circuit board.



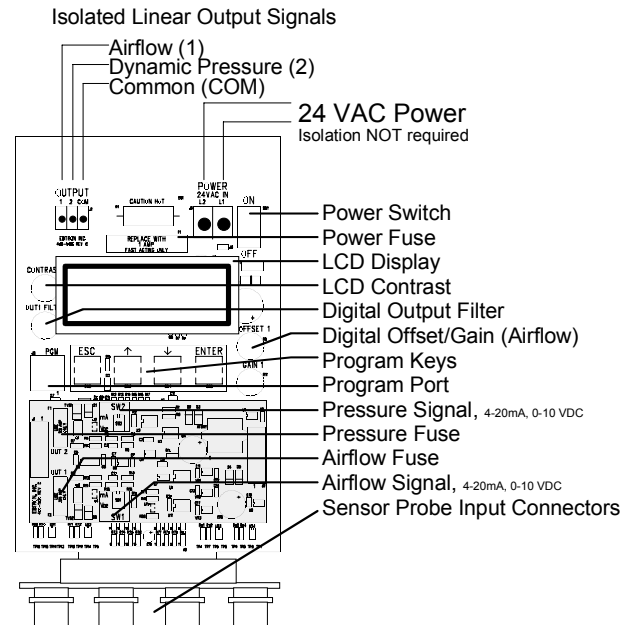
When configured for a 4-20 mA output, the GTA116-B is “4-wire” device. The host controls should not provide an excitation voltage to the output of the GTA116-B.

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



Multiple GTX116-B transmitters wired on a single transformer must be wired “in-phase”.

GTA116-B Transmitter Wiring and Circuit Board Functions



Start-up

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



Check the physical installation, power connections, and signal wiring prior to turning the power switch to the “ON” position.

The transmitter is factory shipped with the analog output signals set to the 4-20mA default. If a 0-10 VDC output is desired, simply move the corresponding switch (SW1 for airflow, SW2 for dynamic pressure) to the 0-10 VDC position prior to power-up. The factory default scaling for velocity is 0 to 3,000 FPM. To convert to CFM for outside air intakes, simply multiply the full scale velocity output by a correction factor that is generally equal to the free area of the opening or louver. The dynamic pressure output default scaling is -0.5 to +0.5 in.wg. The LCD display default is to FPM.

Move the power switch to the “ON” position. The transmitter executes a complete self-check each time the power is turned on. Check that scaling in the host control system returns an output that matches the output of the **GTX116**.

The **GTX116** is designed to operate on “power-up”. No field configuration is required. If factory default settings require a change in the field, consult the **GTX116 Transmitter Installation and Program Guide** or contact **EBTRON** Customer Service, toll free, at 800-232-8766.

Maintenance

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

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

Standard Limited Warranty

If the **GTx116-B** fails within 36 Months from Shipment, **EBTRON** will repair/replace the device free of charge as described in the

company's warranty contained in **EBTRON's Terms and Conditions of Sale**. Defective equipment shall be shipped back to **EBTRON**, freight pre-paid, for analysis.

Model GTx116-**B** Technical Specifications

System Performance

GTx116-B Installed Accuracy (typ. \pm of reading):

Airflow: 2%

Dynamic Pressure: 4%

Repeatability (\pm of reading): 0.25%

Measurement Units: I.P. or S.I. ((consult separate S.I. unit supplement for settings and factory defaults))

Sensor Probe Specifications

Sensor Assembly Model: GB1

Construction: Glass-filled Polypropylene

Sensor Assembly: Three hermetically sealed "bead-in-glass" thermistors in an engineered thermoplastic housing

Pipe Connections to Sensor Head: 1/2 inch NPT

Cable Assembly:

Type: Plenum Rated

Length: 10' std. (50' opt.)

Connection to Transmitter: 7/8" Positive lock w/gold plated contacts

Number of Air Velocity Calibration Points (each dir.): 16

Number of Temperature Calibration Points: 3

Sensor Probe Performance

Sensor Accuracy (\pm of reading):

Airflow: 2%

Dynamic Pressure: 4%

Calibrated Range:

Airflow: \pm 0-3,000 FPM

Bidirectional Dynamic Pressure: \pm 0.5 in.wg.

Sensor Temperature Range: -20° F to 160° F

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

Transmitter Specifications

Transmitter Model: GTx116

Maximum Number of GB1 Sensors per Location: 4

Microprocessor: Powered by Motorola® Digital DNA™

A/D Converter: 12 bit

Sensor Independent Electronics: Yes

Power Requirement: 24 VAC (22.5 to 29 VAC), 10 VA max.

(fused and protected on transmitter, isolation not required)

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

Output Signal Adjustments: Field adjustable output offset/gain (airflow and dynamic pressure)

Output Signal Filtering: Field adjustable digital output filter (airflow and dynamic pressure)

Display: 16 character LCD display with field selectable output
Airflow or Dynamic Pressure:

FPM, CFM w/area input, in.wg.

Display Digits (auto-ranging with units of measure):

Airflow: 0.00 to 999.99, 1000.0 to 9999.9, 10000 to 999999

Dynamic Pressure: -99.9999 to 99.9999

Analog Output Configuration (GTA116 Transmitter)

Analog Output Protection: Fused and protected ISOLATED analog outputs

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

Output Signal: Bidirectional (\pm Full Scale) or Unidirectional (0 to Full Scale)

Airflow Analog Output Scaling: Field selectable from 100 to 15,000 FPM, 100 FPM increments

Factory Default: 3,000 FPM

Dynamic Pressure Analog Output Scaling: Field selectable from 0.005 to 0.5 in.wg, 0.005 increments

Factory Default: 0.5 in.wg.

Analog Output Resolution (full scale output): 0.025%

Network Output Configurations

GTN116 Transmitter: 9600 baud RS485 Serial, JCI N2-Bus, ModBus-RTU

GTE116 Transmitter: Ethernet 10 BaseT, TCP/IP, ModBus-TCP

GTL116 Transmitter: LonWorks Free Topology

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

Warranty

Standard Warranty: 36 Months from shipment

Underlined items indicate *Factory Default* settings.



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Applies to GTN116-P only.