

AIRFLOW/TEMPERATURE MEASUREMENT DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Related Sections
- B. References
- C. Submittals
- D. Qualifications
- E. System Responsibility
- F. Warranty
- G. Delivery, Storage, and Handling

1.02 RELATED SECTIONS

- A. Section 15720 – Air Handling Units
- B. Section 15890 – Ductwork
- C. Section 15910 – Ductwork Accessories
- D. Section 15952 – Controls and Instrumentation
- E. Section 16180 – Equipment Wiring Systems

1.03 REFERENCES

- A. UL 873 – Temperature and Airflow Indicating Equipment

1.04 SUBMITTALS

- A. Submit product data sheets for airflow measuring devices indicating minimum placement requirements, sensor density, sensor distribution, and installed accuracy to the host control system.
 - 1. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
- B. Submit a schedule of airflow measuring devices indicating compliance with specified accuracy at minimum and maximum airflow rates.
- C. Submit installation, operation and maintenance documentation.

1.05 QUALIFICATIONS

- A. Manufacturer: The company manufacturing the products specified in this section shall have a minimum of ten years experience producing products of this type.

1.06 SYSTEM RESPONSIBILITY

- A. The contractor shall be responsible for any and all costs associated with any and all changes resulting from the use of a supplier other than the listed acceptable manufacturer.

1.07 WARRANTY

- A. Provide a manufacturer's parts warranty for 36 months from the date of unit shipment.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. All handling and storage procedures shall be per manufacturer's recommendations.
- B. Airflow measuring devices shall be kept clean and dry, protected from weather and construction traffic.

PART 2 PRODUCTS

2.01 SECTION INCLUDES

- A. Products Included in this Section
- B. Acceptable Manufacturers
- C. Airflow/Temperature Measurement Devices

2.02 PRODUCTS INCLUDED IN THIS SECTION

- A. Duct and plenum mounted airflow measurement devices
- B. Fan inlet mounted airflow measurement devices

2.03 ACCEPTABLE MANUFACTURERS

- A. EBTRON, Inc. Model GTx116-P and GTx116-F (basis of design)
 - 1. Alternatives requesting acceptance as "equals" less than 60 days prior to bid date or products submitted in non-conformance with the requirements of this specification will not be considered.

2. For any product to be considered for substitution a written section-by-section detailed exceptions/compliance document shall be submitted to the Engineer before any approval will be considered.

B. Kurz Instruments

1. Multi point sensing required
2. Follow sensor density requirements as listed in 2.04, D, 2, a.

C. Fluid Components, Inc.

1. Multi point sensing required
2. Follow sensor density requirements as listed in 2.04, D, 2, a.

2.04 AIRFLOW/TEMPERATURE MEASUREMENT DEVICES

A. Provide airflow/temperature measurement devices where indicated on the plans. Fan inlet measurement devices shall not be substituted for duct or plenum measurement devices indicated on the plans.

B. Each measurement device shall consist of one or more sensor probe assemblies and a single microprocessor-based transmitter. Each sensor probe assembly will contain one or more independently wired sensor housings. Multiple sensor housings shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding flow meters are not acceptable.

C. All Sensor Probe Assemblies

1. Each sensor housing shall be manufactured of a U.L. listed engineered thermoplastic.
2. Each sensor housing shall utilize two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Devices that use "chip" type thermistors are unacceptable. Devices that do not have 2 thermistors in each sensor housing are not acceptable.
3. Each sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range. Each sensor assembly shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
 - a.) Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
4. The operating temperature range for the sensor probe assembly shall be -20° F to 160° F. The operating humidity range for the sensor probe assembly shall be 0-99% RH (non-condensing).
5. Each temperature sensor shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15° F over the entire operating temperature range. Each temperature sensor shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
6. Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to a remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
7. Each sensor assembly shall not require matching to the transmitter in the field.
8. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.

D. Duct and Plenum Sensor Probe Assemblies

1. Sensor housings shall be mounted in an extruded, gold anodized, 6063 aluminum tube probe assembly.
2. The number of sensor housings provided for each location shall be as follows:

a.)	Area (sq.ft.)	Sensors
	<=1	2
	>1 to <4	4
	4 to <8	6
	8 to <12	8
	12 to <16	12
	>=12	16
3. Probe assembly mounting brackets shall be constructed of 304 stainless steel. Probe assemblies shall be mounted using one of the following options:
 - a.) Insertion mounted through the side or top of the duct
 - b.) Internally mounted inside the duct or plenum
 - c.) Standoff mounted inside the plenum

4. The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated on the plans.
- E. Fan Inlet Sensor Probe Assemblies
 1. In applications where flow stations with multiple probes and sensors are not feasible based on AHU design, Fan Inlet Sensors will be applied as follows.
 2. Sensor housings shall be mounted on 304 stainless steel blocks.
 3. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel plated steel.
 4. Mounting feet shall be constructed of 304 stainless steel.
 5. The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated on the plans.
- F. Transmitters
 1. The transmitter shall have an LCD display capable of displaying airflow and temperature. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.
 2. The transmitter shall be capable of displaying the individual airflow and temperature readings of each sensor on the LCD display.
 3. The transmitter shall operate on 24 VAC. The transmitter shall not require an isolated power source.
 4. The operating temperature range for the transmitter shall be -20° F to 120° F. The transmitter shall be protected from weather and water.
 5. Provide transmitter with direct integration to DDC system. Utilize temperature output from device for monitoring and controlling as specified.
 6. The transmitter shall also be capable, using interchangeable communication boards, of communicating with the host controls using one of the following interface options:
 - a. Linear analog output signal: Field selectable, fuse protected and isolated, 0-10VDC and 4-20mA (4-wire)
 - b. RS-485: Field selectable BACnet-MS/TP, ModBus-RTU and Johnson Controls N2 Bus
 - c. 10 Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, ModBus-TCP and TCP/IP
 - d. LonWorks Free Topology
- G. The measuring device shall be UL listed as an entire assembly.
- H. The manufacturer's authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the plans. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer's placement requirements.

PART 3 EXECUTION

3.01 SECTION INCLUDES

- A. Installation
- B. Adjusting

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions at the locations indicated on the plans. A written report shall be submitted to the consulting mechanical engineer if any discrepancies are found.

3.03 ADJUSTING

- A. Duct and plenum devices shall not be adjusted without approval from the consulting mechanical engineer.

PART 4 SEQUENCE OF OPERATIONS

4.01 UTILIZATION OF AIRFLOW MEASURING DEVICE TO MAINTAIN BUILDING PRESSURIZATION AND/OR AHU CONTROL

- A. Utilize feedback from airflow measuring device to maintain ventilation rates as listed.
- B. Modulate control dampers and/or variable frequency drives to insure ventilation rates as indicated