PART 2 PRODUCTS

1. SECTION INCLUDES
	1. Acceptable Manufacturers
		1. EBTRON, Inc.
		2. Pre-approved performance equal
	2. Products Included in this Section
		1. Fan Airflow Measurement Devices (AMD) with Temperature and Airflow Alarming Capability
2. ACCEPTABLE MANUFACTURERS
	1. EBTRON, Inc. model GTx108-F – JMB & Associates
		1. Basis of Design and Acceptable Manufacturers
			1. Airflow measurement devices shall use the principle of thermal dispersion and provide one self-heated bead-in-glass thermistor and one zero power bead-in-glass thermistor at each sensing node.
				1. Thermal dispersion devices that indirectly heat a thermistor are not acceptable.
			2. Substitution requests for acceptance less than 30 days prior to bid date or products submitted in non-conformance with the requirements of this specification will not be considered.
				1. For any product to be considered for substitution, a written document shall be submitted to the engineer detailing exceptions and compliance, section-by-section with supporting documentation, before an approval will be considered.
				2. Any product submitted as an equal shall be expected to comply with all performance capabilities and functional aspects of this specification.
				3. Submitting vendors will also be required to present a functioning demonstration sample for review in the specifying engineer’s office. Nonfunctioning samples will not be considered and submissions will be rejected.
			3. Excluded devices:
				1. Vortex shedding airflow measurement devices.
				2. Pitot tubes, pitot arrays, piezo-rings and other differential pressure measurement devices.
			4. The manufacturer's authorized representative shall review, approve placement and the operating airflow rates for each measurement location indicated on the plans.
			5. The AMD shall be mounted at the AHU manufacture’s location or at the jobsite
3. PRODUCTS INCLUDED IN THIS SECTION
	1. Airflow Measurement Devices (AMD) with Temperature and Airflow Alarming Capability
		1. General:
			1. Provide one AMD for each measurement location provided on the plans, schedules and/or control diagrams to determine the average airflow rate and temperature of each fan at each measurement location.
			2. Each AMD shall be provided with a microprocessor-based transmitter and one or more sensor probes.
				1. Devices that have electronic signal processing components on or in the sensor probe are not acceptable.
			3. Airflow measurement shall be field configurable to determine the average actual or standard mass airflow rate.
				1. Actual airflow rate calculations shall have the capability of being adjusted automatically by the transmitter for altitudes other than sea level.
			4. Temperature measurement shall be field configurable to determine the velocity weighted temperate or simple arithmetic average temperature.
			5. The system shall provide
		2. Sensor Probes:
			1. Each sensor probe shall consist of one sensor node mounted on a 304 stainless steel block with two adjustable zinc plated steel rods connected to 304 stainless steel pivoting mounting feet.
			2. Sensor node internal wiring connections shall be sealed and protected from the elements and suitable for direct exposure to water.
			3. Each sensor probe shall be provided with an integral, FEP jacket, plenum rated CMP/CL2P, UL/cUL Listed cable rated for exposures from -67°F to 392 °F (-55° C to 200° C) and continuous and direct UV exposure.
				1. Plenum rated PVC jacket cables are not acceptable.
			4. Each sensor probe cable shall be provided with a connector plug with gold plated pins for connection to the transmitter.
			5. Sensor node airflow and temperature calibration data shall be stored in a serial memory chip in the cable connecting plug and not require matching or adjustments to the transmitter.
			6. Each sensor node shall be provided with two bead-in-glass, hermetically sealed thermistors potted in a marine grade waterproof epoxy.
				1. Devices that use epoxy or glass encapsulated chip thermistors are not acceptable.
			7. Each thermistor shall be individually calibrated at a minimum of 3 temperatures to NIST traceable temperature standards.
			8. Each sensor node shall be individually calibrated to NIST traceable airflow standards at a minimum of 16 calibration points.
			9. The number of independent sensor nodes provided shall be as follows:
				1. SWSI and DWDI fans: 2 probes x 1 sensor node/per probe in each fan inlet
				2. Fan Arrays (less than or equal to 4 fans): [select one/delete one]

2 probes x 1 sensor node per probe in each fan inlet or

1 probe x 1 sensor node per probe in each fan inlet

* + - * 1. Fan Arrays (5-8 fans): 1 probe x 1 sensor node per probe in each fan inlet
		1. Transmitter
			1. A remotely located microprocessor-based transmitter shall be provided for each measurement location.
			2. The transmitter shall be comprised of a main circuit board and interchangeable interface card.
			3. All printed circuit board interconnects, edge fingers, and test points shall be gold plated.
			4. All printed circuit boards shall be electroless nickel immersion gold (ENIG) plated.
			5. All receptacle plug pins shall be gold plated.
			6. The transmitter shall be capable of determining the average airflow rate and temperature of each fan.
				1. Separate integration buffers shall be provided for display airflow output, airflow signal output (analog and network) and individual sensor output (IR-interface).
			7. The transmitter shall have startup firmware to facilitate setup of multiple fans and fan areas.
			8. The transmitter shall provide a high and/or low airflow alarm.
			9. The transmitter shall provide individual fan alarming on fan array configurations.
			10. The transmitter shall be capable of identifying an AMD malfunction via the system status alarm and ignore any sensor node that is in a fault condition.
			11. The transmitter shall be provided with a 16-character, alpha-numeric, LCD display.
				1. The total airflow rate, temperature, airflow alarm, individual fan alarm and system status alarm shall be visible on the display.
			12. The transmitter shall be provided with two field selectable (0-5/0-10 VDC or 4-20mA), scalable, isolated and over-current protected analog output signals and [select one or both of the following]
				1. one isolated RS-485 (field selectable BACnet MS/TP or Modbus RTU) network connection; or
				2. one isolated Ethernet (simultaneously supported BACnet Ethernet or BACnet IP, Modbus TCP and TCP/IP) network connection.
			13. Analog output signals shall provide the total airflow rate and be field configurable to output one of the following:
				1. temperature
				2. airflow alarm
				3. individual fan alarm; or
				4. system status alarm
			14. Network communications shall provide the total airflow rate and temperature, individual fan airflow rates, individual fan temperatures, airflow alarm, individual fan alarm, system status alarm, individual sensor node airflow rates and individual sensor node temperatures.
			15. Provide an infra-red I/O card mounted on the transmitter PCB for communication to a handheld retrieval device that can download individual sensor node airflow and temperature data in real time.
			16. The transmitter shall use a “watchdog” timer circuit to ensure continuous operation in the event of brown-out and/or power failure.
		2. Performance
			1. Each sensing node shall have an airflow accuracy of ±2% of reading over an operating range of 0 to 10,000 FPM (50.8 m/s).
				1. Accuracy shall include the combined uncertainty of the sensor nodes and transmitter.

Devices whose overall accuracy is based on individual accuracy specifications of the sensor probes and transmitter shall demonstrate compliance with this requirement over the entire operating range.

* + - 1. Each sensing node shall have a temperature accuracy of ±0.15° F (0.1° C) over an operating range of -20° F to 160° F. (-28.9° C to 71° C).
		1. Listings and Certifications
			1. The AMD shall be UL873 Listed as an assembly.
			2. The AMD shall be BTL Listed.

PART 3 EXECUTION

1. SECTION INCLUDES
	1. Installation
	2. Adjusting
2. INSTALLATION
	1. Install in accordance with manufacturer’s placement guidelines. A written report shall be submitted to the consulting mechanical engineer if any discrepancies are found.
3. ADJUSTING
	1. Field adjustment, when required shall be accomplished using transmitter firmware that calculates adjustment gain and offset coefficients based on one or two reference measurements.