**ELECTRA-flo Master Specification**

Rev A

DOC-0006028

1. Product:

	1. Subject to compliance with requirements for pressure and flow meters in heating, ventilation, and air conditioning systems. American Made, Buy America Act FAR 52.225.1, ASHRAE 62.1, field serviceable.
	2. The basis of the design is the ELECTRA-flo series. Manufacturers approved to bid must adhere to requirements listed below.
2. Description:

Each probe array shall consist of one or more multi-point measuring probes and a single microprocessor-based transmitter. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.

1. Application Range:

The contractor shall be responsible for selecting the appropriate application not limited to ducted airflow, fan inlet, and fan discharge. Reduced straight run applications require the usage of an airflow station with an air straightener.

1. Probe Technology:

The sensors are to be hermetically sealed to provide protection from the environment, post-filter debris, and allow the sensor to be cleaned without damage. Each stand-alone sensing point shall use an ambient temperature thermistor and an externally heated thermistor to determine the point velocity and temperature. Automatic equal area averaging of the individual point measurements shall be performed in the transmitter. Each multi-point probe shall be assembled using heavy wall anodized aluminum tubing, aluminum mounting plates, aerodynamically optimized molded sensing apertures to ensure accurate measurement in angular airflow conditions, and a neoprene mounting gasket. The individual probes are to be daisy chained together, and the probe array shall be connected to the transmitter using a single cable of up to 100' in length, included with the transmitter.

1. Transmitter Technology:

The transmitter shall be housed in a NEMA 1 enclosure (optional NEMA 4X enclosure or NEMA 4X enclosure with heater and insulation for outside environment installs), with an integral color graphic display and four button keypad for use during the configuration and field characterization process. The display shall be configurable to indicate three (3) measured process variables (volume, velocity, temperature) during normal operation. The transmitter shall be able to identify the use of operation via Custom ID, this field is settable over BACnet or through the Service Menu to describe the transmitter location in the building. The transmitter shall incorporate elevation to be entered to perform airflow density compensation. The Transmitter shall provide BACnet MS/TP, MODBUS RTU, and four (4) field configurable analog outputs designed to interface with the building automation system (BAS). The ability to perform configuration changes and field characterization shall be accomplished via the user interface/display, the need for additional utility software shall not be required.

1. Transmitter Construction:
	1. Electronic enclosure shall be constructed of aluminum for rust protection against outdoor mounting. NEMA 4X enclosures shall be selected when a superior level of protection from corrosion and extreme environment is needed.
		1. Ambient Conditions Transmitter: The operating temperature range of the transmitter shall be from -20º to 140ºF. The transmitter shall be located where it will be sheltered from water or weather.
		2. Process Connections: The transmitter shall be provided with an interconnect cable for remote mounting up to 100’ away. A single run shall only be required to connect to the transmitter for up to 32 sensors
		3. Max Sensors: Each transmitter shall be capable of averaging as many as thirty-two (32) sensors
		4. Dual Systems: Each transmitter shall be cable of measuring up to two independent system and also add or subtract each system together.
		5. Password Protection: All transmitter configuration, scaling, and diagnostic functions shall be performed by means of a password protected, cover mounted membrane keypad.
		6. Display: The transmitter will have a high visibility backlit LCD for display of either the averaged or individual sensor airflow and temperature measurements, in user selectable units of measure.
		7. Keypad: Menu driven interface via four push buttons
		8. Field Characterization: The transmitter shall allow user to input actual conditions to provide field characterization
		9. Preconfigured: The transmitter shall be factory configured to output duct air volume for plug and play operation.
2. Applications:

	1. Duct mounting-Probe Array
		1. Each probe array shall consist of one or more multi-point measuring probes and a single microprocessor based transmitter. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.
		2. The probe array shall be connected to the transmitter using a single cable, of up to 100' in length, included with the transmitter.
		3. Each airflow sensor shall have an operating range of 5,000 FPM, with a NIST traceable accuracy of ±2% of reading for velocity measurement and 0.1ºF for temperature measurement.
		4. When installed per the manufacturer’s minimum installation requirements, the transmitter with accompanying station or probe array shall measure with an accuracy of ±3% of actual flow.
		5. The number of sensors for each rectangular probe array shall be:

|  |  |
| --- | --- |
| Station Area  | Sensor Density  |
| 1 to < 15 Sq. Ft.  | 1.50 Sq. Ft. Per Sensor  |
| 15 to < 30 Sq. Ft.  | 1.67 Sq. Ft. Per Sensor  |
| 30 to < 60 Sq. Ft.  | 2.10 Sq. Ft. Per Sensor  |
| 60 to 100 Sq. Ft.  | 3.13 Sq. Ft. Per Sensor  |

1. The preferred model code of such array is the E-flo/S5
	1. Duct mounting- Airflow Station w/ Air straightener
	2. Each station shall consist of one or more multi-point measuring probes and a single microprocessor-based transmitter. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.
	3. The station shall be connected to the transmitter using a single cable, of up to 100’ in length, included with the transmitter.
	4. Each airflow sensor shall have an operating range of 5,000 FPM, with a NIST traceable accuracy of ±2% of reading for velocity measurement and 0.1ºF for temperature measurement.
	5. The number of sensors for each rectangular probe array shall be:

|  |  |
| --- | --- |
| Station Area  | Sensor Density  |
| 1 to < 15 Sq. Ft.  | 1.50 Sq. Ft. Per Sensor  |
| 15 to < 30 Sq. Ft.  | 1.67 Sq. Ft. Per Sensor  |
| 30 to < 60 Sq. Ft.  | 2.10 Sq. Ft. Per Sensor  |
| 60 to 100 Sq. Ft.  | 3.13 Sq. Ft. Per Sensor  |

* 1. The stations shall have a 14 ga. [18 ga. for circular units] galvanized steel, 8” deep, welded casing with 90º formed flanges.
	2. Each station will have ½” hex, 3” deep aluminum honeycomb air straightener positioned upstream of the measuring probes to reduce straight run requirements.
	3. When installed per the manufacturer’s minimum installation requirements, the transmitter with accompanying station or probe array shall measure with an accuracy of ±2-3% of actual flow.
	4. The preferred model code of such array is the E-flo/CM
	5. Fan Inlet
1. For a single inlet fan, each probe array shall consist of one pair of single point measuring probes and a single microprocessor-based transmitter. For a double inlet fan, each probe array shall consist of two pairs of single point measuring probes and a single microprocessor-based transmitter. The transmitter shall be supplied by the same manufacturer as the probe array(s).
2. Probe arrays shall be connected to the transmitter using cable of up to 100' in length, included with the transmitter.
3. Each airflow sensor shall have an operating range of 0-10,000 FPM, with a NIST traceable accuracy of ±2% of reading for velocity measurement and 0.1ºF for temperature measurement. Individual sensors shall be fully field serviceable without need for field calibration, not requiring that the probe be returned to the Factory for repair and/or calibration.
4. When installed per the manufacturer’s minimum installation requirements, the transmitter with probe array shall measure with an accuracy of ±3-10% of actual airflow as installed or within ±2-3% of actual flow with field calibration.
5. The preferred model code of such array is the E-flo/FI
6. Input Power:

Input power to each transmitter shall be 20-28 VAC, 16-90 VA or 20-28 VDC, 16-50 W.

1. Analog Outputs:

The transmitter outputs shall be dual analog (4-20mA, 0-5VDC or 0-10VDC) for airflow and temperature and RS485, BACnet MS/TP or MODBUS RTU.

1. Calibration:

Each transmitter will go through a NIST traceable calibration bench to verify the accuracy of the analog outputs.

1. Certifications:

	1. FCC PART 15 Subpart B (per ANSI C63.4: 2014) for a Class A Device
	2. UL 60730, BACnet Standard ISO 16484-5
2. Warranty:

Each system shall be covered by a one year no-fault warranty and three year manufacturing warranty.

1. Installation:

Airflow measurement probes, stations and transmitters shall be installed per the manufacturer’s recommendations.

1. Model Code:

Preferred Model code for project \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is ELECTRA-flo-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_