PARAGON CONTROLS INCORPORATED

Technical Data Sheet

FAATS 1000
Fan Array Airflow Totalizing System

- Individual Monitoring of up to Forty Fans
- Monitor up to two Outside Air Intakes
- Seven Inch HMI Color Touchscreen Display
- Displays Each Fan's Airflow Rate & Total Airflow Rate for Each Array
- Simple Field Configuration Menus
- Fan Failure & Caution Alarms

FAATS-1000 FAN ARRAY AIRFLOW TOTALIZING SYSTEM

The **F**an **A**rray **A**irflow **T**otalizing **S**ystem (FAATS-1000) has been specifically designed to provide a cost effective means for accurate (±0.25%F.S.) airflow measurement of up to forty individual fans within a single fan array or forty combined fans in an air handling unit with both supply and return fan arrays. The FAATS-1000 utilizes either existing airflow sensors provided by the fan manufacturer or field installed airflow sensors as inputs to each fan's independent airflow transducer.

The individual airflow rate of each fan in an array is indicated on a seven-inch, full color, Human-Machine-Interface (HMI) touchscreen display as well as the summed (total) airflow rate of each array. Individual fan airflow rates and total airflow rates for each array are also available to the Building Management System (BMS) via BACnet®-MS/TP Master or Modbus® RTU Slave network communications.

Independent monitoring of each fan allows the FAATS-1000 to identify and alarm fan failures and airflow rate discrepancies between fans. All caution alarms and failure alarms are available to the BMS for facility operator notification.

The FAATS-1000's intuitive on-screen menus and custom "HELP" pages have been developed to facilitate field programming and setup changes that may be required.

The FAATS-1000 can be supplied in a modular configuration to build application specific solutions, reducing the length of pneumatic tubing runs. Alternatively, the FAATS-1000 can be consolidated into a single panel; consult factory for details. Optional features include monitoring of up to two outside air intakes, temperature compensation, and NEMA 4 enclosures.

Additional Features

- 24 VAC power
- Power switch and electronic self-resetting fuse
- ±0.25% F.S. transducer accuracy
- Excellent resolution utilizing a 16-bit A/D converter (65,536 steps)
- Two alarm relay outputs (SPDT)
- Field selectable analog outputs (0-5 VDC, 0-10 VDC, or 4-20 mA) scaled linear to the total measured airflow rate of each fan array
- BACnet®-MS/TP Master or Modbus® RTU Slave communication protocols
- Two levels of password protection
- Single point temperature and site elevation input for fixed air density correction; capable of receiving external temperature input for air density calculations for all arrays (optional)
- Field configurable for English or SI units
- NEMA 1 rated enclosure (standard)
- NEMA 4 rated enclosure (optional)

SPECIFICATIONS

Performance Specifications

Flow/Pressure Sensing Points	Up to 40 Fans and 2 Outside Air
Flow Summation	Up to 3 Unique Systems
Accuracy	+/- 0.25% F.S.[1]
Long Term Stability	0.125% F.S. Annually
Temperature Effects	Zero: 0.03% of Transducer Full Span per °F Span: 0.03% of Transducer Full Span per °F
Proof Pressure	300 in. H20
Burst Pressure	500 in. H20
Pressure Media	Non-corrosive, Non-ionic Dry Gases and Air
Alarms	Fan Caution Alarm Fan Failure Alarm
Display	7.0" Capacitive HMI Touchscreen

Note[1]: Accuracy includes typical linearity, hysteresis & repeatability.

Electrical Specifications

Power Requirements	20 - 28VAC/VDC
Circuit Protection	Polarity Protected Self-Resetting Fuse
Power Consumption	HMI, CPU and Sensor Module w/ 8 Sensors - 27 VA Each additional Sensor Module w/ 8 Sensors - 5.28 VA
Digital Outputs	(2) Isolated Digital Outputs Alarm Dry Contact Closure (Latching or Non-latching)
Digital Inputs	(4) Digital Inputs Group Run (Dry Contact) up to 4 Custom Fan Groups
Analog Outputs	(2) 16-Bit Analog Outputs Field Selectable 0-5V, 0-10V & 4-20mA (Max Load 700Ω)
Terminal Blocks	Pluggable Screw Type
Wiring	16 to 24 AWG

Environmental Specifications

Operating Temperature	32°F to 113°F (0°C to 45°C)
Temperature Compensated Range	41°F to 113°F (5°C to 45°C)
Storage Temperature	14°F to 140°F (-10°C to 60°C)
Operating Humidity	0 to 95% RH (non-condensing)

Physical Specifications

Pressure Connections	1/4" OD Barbed Brass Fittings
Enclosure Type Modular Configuration	
Remote HMI Display	NEMA 1 (Standard) IP-66, NEMA4X Rated (Optional)
Remote Sensor Module	Aluminum (Standard) IP-66, NEMA4X Rated (Optional)
Dimensions Modular Configuration	
Remote HMI Display (NEMA 1 & 4)	13.5" L x 12.0" W x 6.0" H
Remote Senor Module (Aluminum)	11.75" L x 5.00" W x 2.50" H
Remote Sensor Module (NEMA 4)	13.50" L x 6.50" W x 4.50" H
Mounting Modular Configuration	
All components	Top & bottom mounting tabs 1/4" OD Through Hole
Weight Modular Configuration	
Remote HMI Display	12lbs
Remote Senor Module (Aluminum)	2lbs
Remote Sensor Module (NEMA 4)	8lbs

Certification / Compliance

CE	LVD 2014/35/EU EMC 2014/30/EU RoHS 2011/65/EU
Conflict Minerals	DRC Conflict Free
BACnet	Application Specific Controller B-ASC

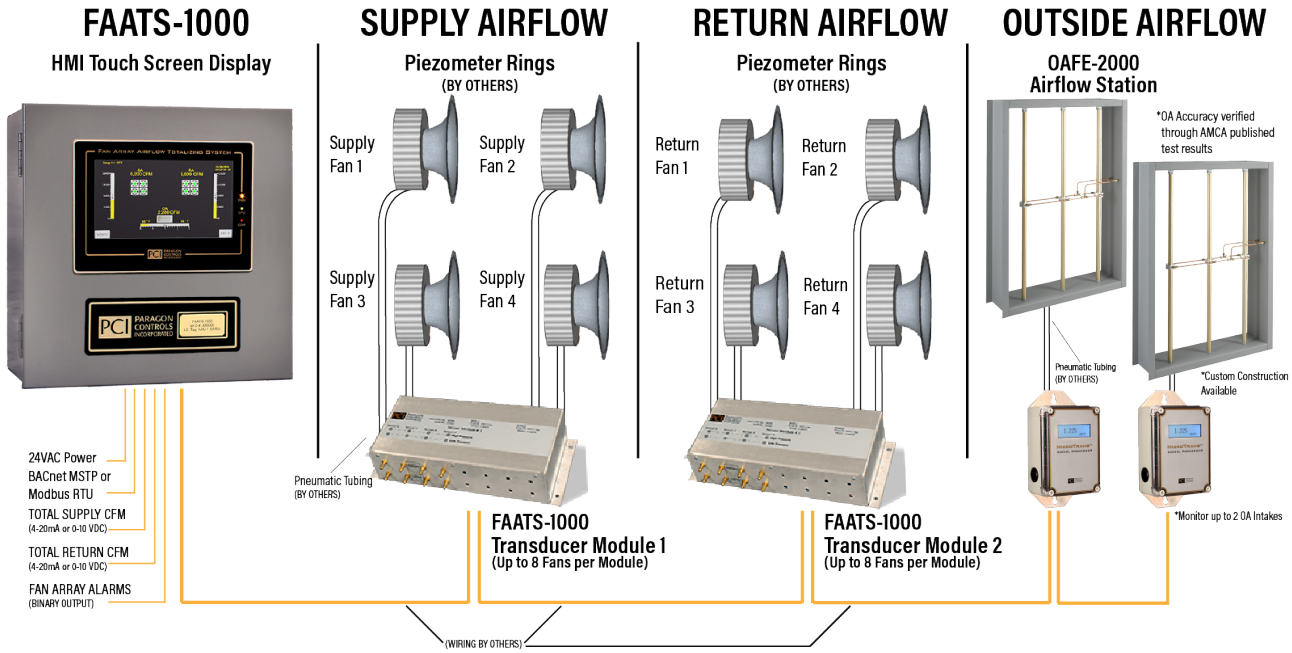
Communications

Hardware	EIA-485
Supported Protocols	Modbus RTU Slave, BACnet MS/TP
Modbus RTU data bits	8
Modbus RTU parity	None
Modbus stop bits	1
Max communication length	4000 ft. (EIA-485)

SYSTEM CONFIGURATIONS

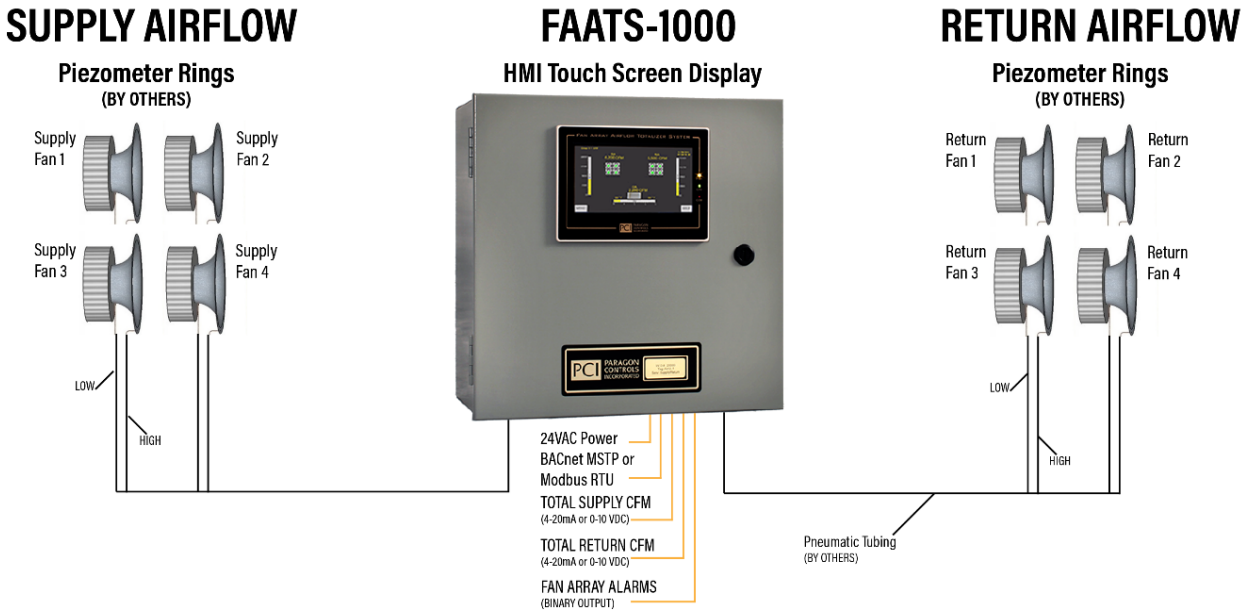
Modular Configuration

The modular configuration is standard construction and consists of a Remote HMI Display mounted in a NEMA 1 powder-coated steel enclosure and a Remote Sensor Module per fan array housed in an aluminum enclosure. NEMA 4 enclosures are optional for both the Remote HMI Display and Remote Sensor Module. Additional Sensor Modules are required for arrays with more than 8 fans each. The system diagram for the modular configuration is shown below including the optional outside air intake monitoring using Paragon's OAFE-2000 Outside Airflow Measurement System (see associated Technical Data Sheet for details).



Consolidated Configuration

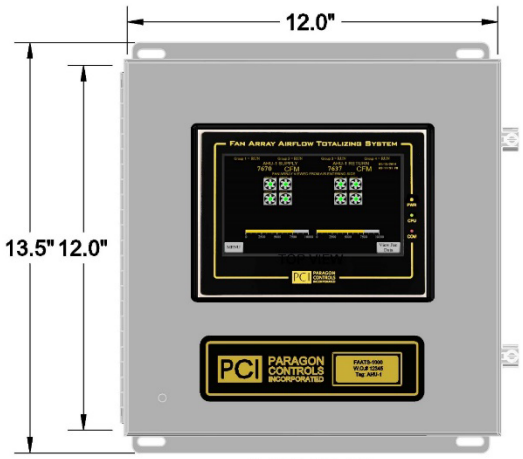
The consolidated configuration consists of a single NEMA 1 powder-coated steel panel with HMI Display and enclosed Sensor Module for measuring up to 8 fans per air handling or rooftop unit. NEMA 4 enclosure is optional. Larger panels with additional enclosed sensor modules are required for air handling or rooftop units with more than 8 fans. Consult factory for details for the consolidated configuration. The system diagram for the consolidated configuration is shown below.



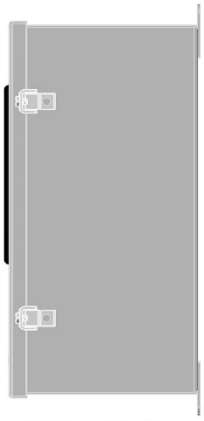
ENCLOSURE OPTIONS

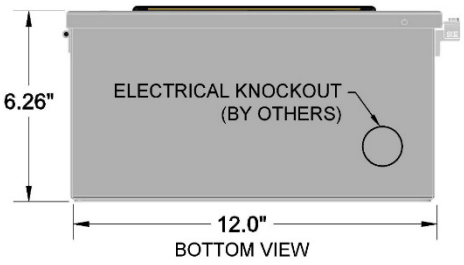
Modular Configuration

NEMA 1 Remote HMI Display - Indoor Installation (Standard) - NEMA 1enclosures are offered as standard construction for installations located Indoors or within a conditioned space, the HMI will be placed through the front door of a NEMA 1 rated enclosure. All wiring or conduit connections will be made in the field as required.



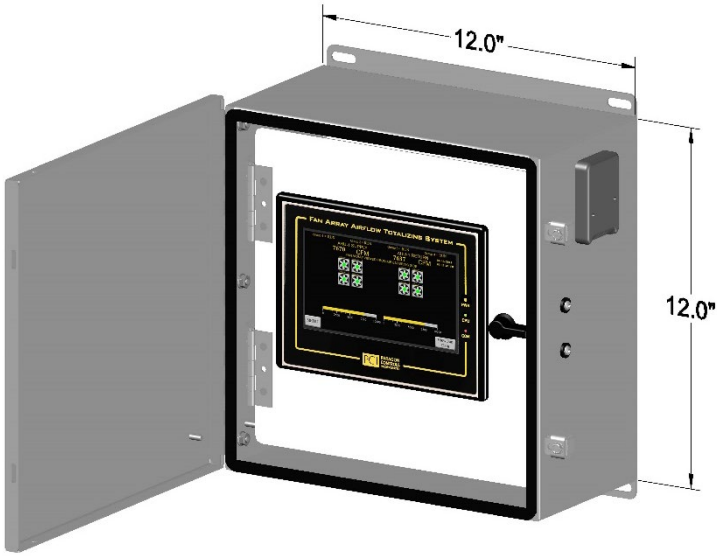
FRONT VIEW

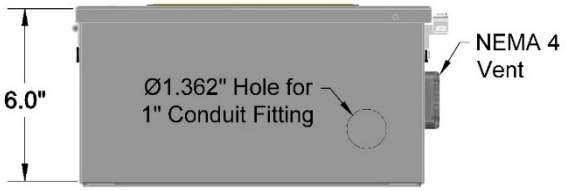

RIGHT SIDE VIEW



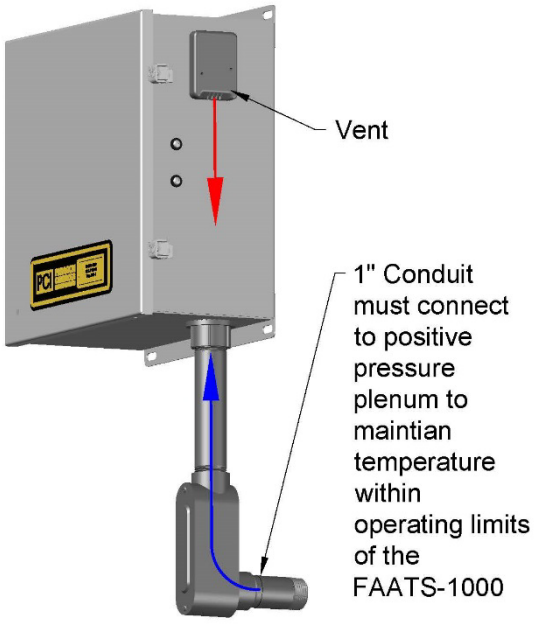
BOTTOM VIEW

NEMA 4 Remote HMI Display - Outdoor Installation (Optional) - For installations located outdoors or in areas exposed to temperature fluctuations outside the recommended "Operating Temperature limits", the HMI will be located within a NEMA 4 rated enclosure. It will be mounted to an internal backplate protecting it from UV light and moisture. The backplate will be hinged for ease of access behind the HMI. A NEMA 4 rated panel vent, and a 1.362" diameter hole drilled for 1" Conduit connection will be provided for ventilation and wiring purposes.



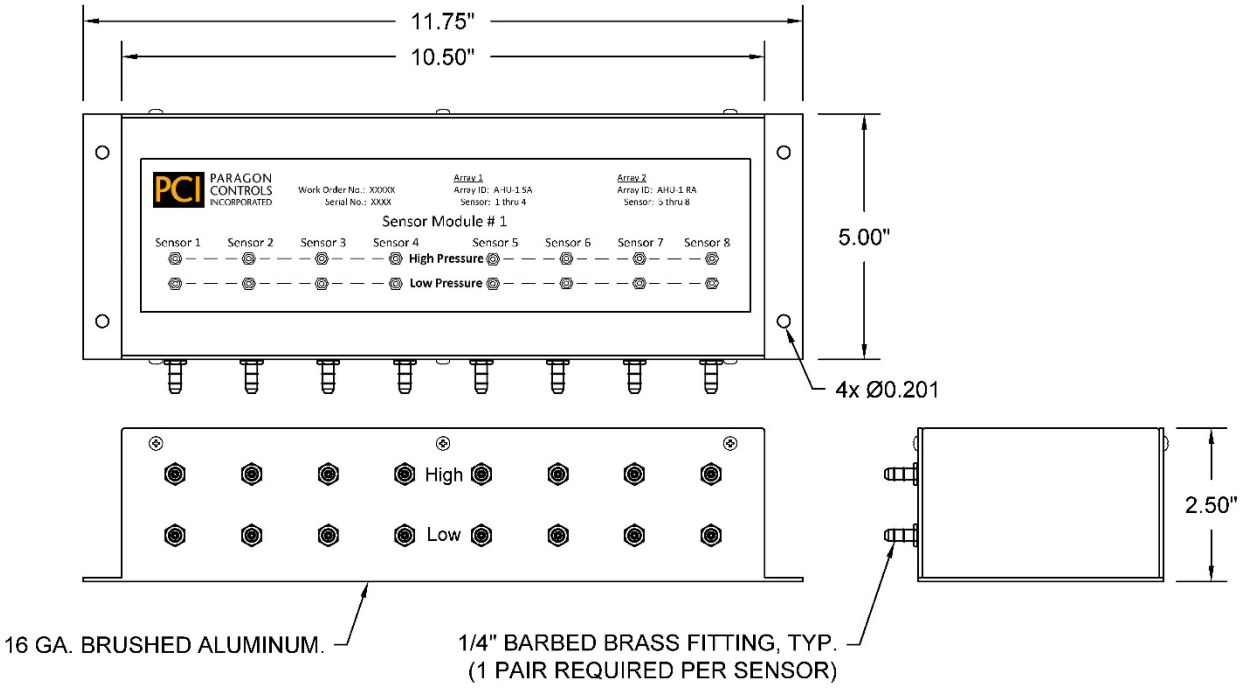


BOTTOM VIEW

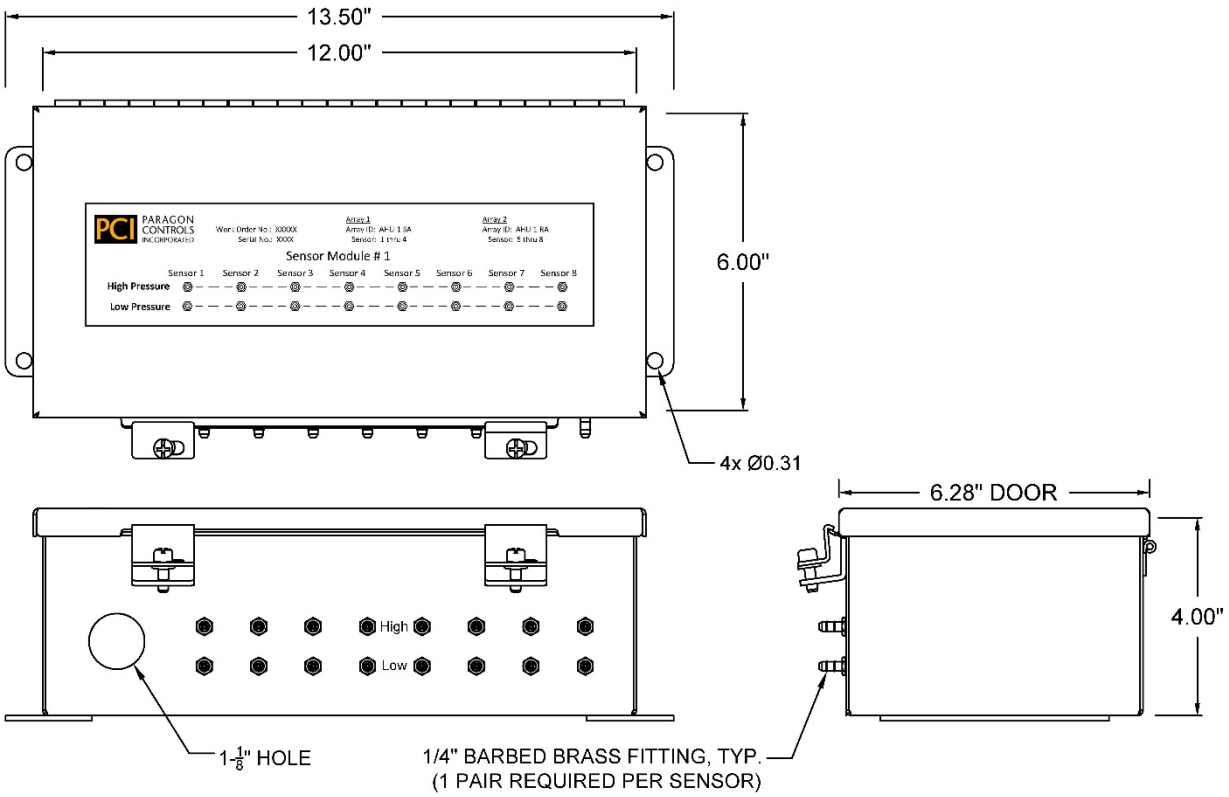


In outdoor applications it is required to field install a NEMA 4 rated 1" diameter conduit connection between the FAATS-1000 panel and a positively pressurized section of the AHU (typically the supply air plenum). This process allows for conditioned air to travel through the conduit connection into the FAATS-1000 enclosure and purge out the factory supplied vent.

Aluminum Remote Sensor Module (Standard) - Transducer Modules are typically located inside the air handler near the fan array they are serving.



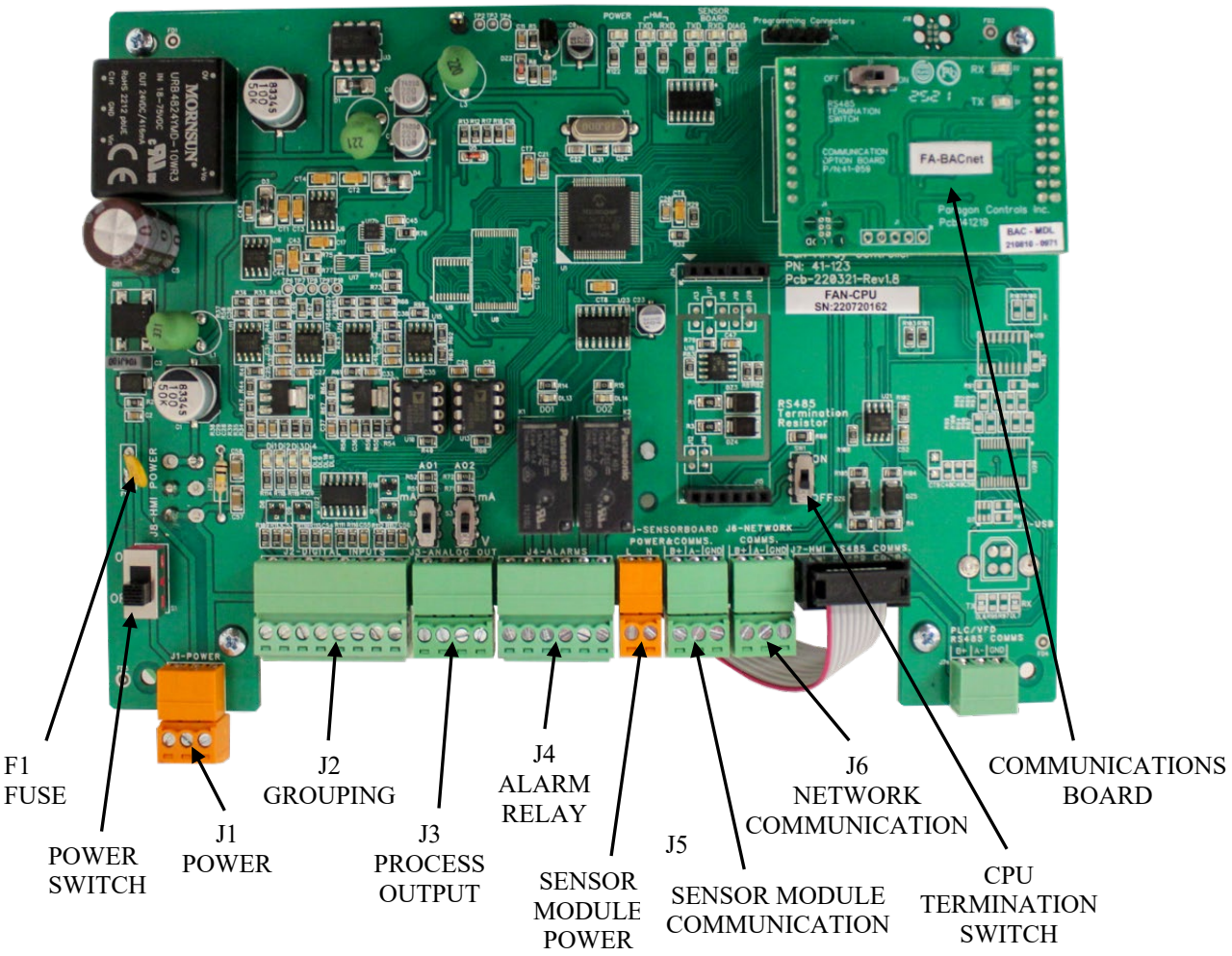
NEMA 4 Remote Sensor Module (Optional) - In applications where humidity, dust, or washdown requirements, are a concern, sensor modules can be supplied in a NEMA 4 enclosure and will include a 1 1/8" hole for ¾" conduit connections.



Consolidated Configuration

Consult Factory for details on dimensions for the Consolidated Configuration.

ELECTRICAL CONNECTION



MAIN CPU CONNECTION CODE

J1
1 2 3 — 20 - 28VAC; EARTH GROUND

J2
4 5 — GROUP 1 START (DRY CONTACT)
6 7 — GROUP 2 START (DRY CONTACT)
8 9 — GROUP 3 START (DRY CONTACT)
10 11 — GROUP 4 START (DRY CONTACT)

J3
12 — + ARRAY 1 PROCESS OUTPUT
13 — - ARRAY 1 PROCESS OUTPUT (COMMON)
14 — + ARRAY 2 PROCESS OUTPUT
15 — - ARRAY 2 PROCESS OUTPUT (COMMON)

J4
16 — COM
17 — NO
18 — NC
ARRAY 1 ALARM
19 — COM
20 — NO
21 — NC
ARRAY 2 ALARM

J5
L N — 24VAC OUT TO SENSOR MODULE
B+ A- — REMOTE SENSOR MODULE COMMUNICATIONS
G — CABLE SHIELD CONNECTION

J6
22 — + NETWORK COMMUNICATIONS
23 — - NETWORK COMMUNICATIONS
24 — EARTH GROUND

SENSOR MODULE CONNECTION CODE

J5
L N — 24VAC IN FROM CPU J5 TERMINAL
B+ A- — REMOTE SENSOR MODULE COMMUNICATIONS
G — CABLE SHIELD CONNECTION

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FAATS 1000
Fan Array Airflow Totalizing System

SPECIFICATION GUIDE

Multiple Fan (Fan Array) Applications:

1. When multiple fans (fan array) are serving a common system, the fan manufacturer shall provide airflow measurement pressure taps for each individual fan and shall provide the factory determined flow coefficient for the fans being furnished. A fan array airflow totalizing system which monitors the airflow capacity of each individual fan based on the differential pressure and flow coefficient shall be installed to provide a totalized airflow rate to the Building Management System (BMS) or local controller for control and monitoring purposes.
2. Basis of design shall be Paragon Controls Incorporated's Fan Array Airflow Totalizing System Model FAATS-1000 subject to compliance with the following stated requirements or an equal as approved by the Engineer.
3. Accuracy shall be 0.25% of full scale including non-linearity, hysteresis, deadband and non-repeatability for each fan in the array.
4. All airflow rate calculations shall be based on the fan manufacturers specified flow coefficient, jobsite elevation, and air temperature.
5. The airflow totalizing system shall utilize a 16-bit or greater analogue to digital converter for precise conversion of the differential pressure input from each fan and a 12 bit or greater digital to analogue converter providing high resolution output to the BMS control system.
6. Analog outputs to the BMS control system shall be linear to the measured total airflow rate of each fan array. Analog outputs shall be field selectable allowing for 4-20 mA, 0-5 VDC, and 0-10 VDC transmission signal to the BMS for control and monitoring purposes.
7. The fan array monitoring system shall utilize a human-machine-interface (HMI) panel for air volume indication and configuration of the fan array airflow totalizing system.
8. The HMI shall provide continuous on-screen indication of each individual fan's airflow rate and operational status and shall display the totalized airflow rates for each fan array numerically and graphically as a percent of total design flow. The graphic screen shall be configured to match the fan array layout (i.e. two rows by three columns for a total of six fans).
9. The fan array monitoring system shall provide individual fan diagnostics via the HMI panel. In this mode the display shall indicate the measured differential pressure being reported by each individual fan as well as transducer output.
10. Automatic zero and span calibration of each individual differential pressure transducer shall be performed via the HMI.
11. The fan array monitoring system shall provide individual fan failure alarming capability. The alarming function shall provide a warning alarm when an individual fan's airflow rate is either above or below the average for all fans by a programmable percentage value. A failed fan alarm shall be initiated when the airflow rate for an individual fan goes to zero. The fan (or fans) that are in an alarm state shall be shown on the HMI graphics screen in flashing yellow for warning and red for failed.
12. The fan array airflow totalizing systems shall provide network communication to the BMS for monitoring and control purposes via [BACnet®-MS/TP Master] [Modbus®RTU Slave] communication network. The network information shall provide individual fan information and remote configuration of programmable values.