

# RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System

## Description

RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System averages velocity and temperature from fan inlet sensors in a duct or plenum, providing accurate, dependable airflow measurement from 0 to 10,000 fpm (0 to 50.8 mps) within  $\pm 2\%$  accuracy.

Each sensor circuit is connected to a router that stores the calibration data. The router's microprocessor calculates flow and temperature and sends this information digitally to the DMPR-RA003 Electronic Controller, which provides air velocity and temperature information on an LCD screen. The transmitter sends the output to a Building Automation System (BAS) through 4 to 20 mA or 2 to 10 VDC analog outputs (using a 500 ohm resistor) or a 1 to 5 VDC analog output (using a 250 ohm resistor).

The factory-assembled RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System includes fan inlet sensors, CAT5e shielded cables, router box, and a DMPR-RA003 Electronic Transmitter.

Refer to the *RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System Product Bulletin (LIT-12011620)* for product information.

## Features

- Aerodynamically Shaped, Surface Mount Fan Inlet Sensors
- Multiple-Pivot Hinge Design
- National Institute of Standards and Technology (NIST) Traceable Calibration at Each Sensing Point
- LCD Screen on DMPR-RA003 Electronic Controller
- CAT5e Cable with RJ-45 Connectors
- NIST Traceable Calibration

## Application

The RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System meets the requirements for minimum outside air according to several agency specifications:

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 62 and ASHRAE 90.1
- California Title 24
- International Mechanical Code (IMC)
- International Energy Conservation Code (IECC)

The RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System contributes to earning required Indoor Environmental Quality (EQ) and Energy and Atmosphere (EA) credits for U.S. Green Building Council® Leadership in Energy and Environmental Design (LEED) prerequisites for construction and operation.

## Sample Specifications

Furnish and install, at locations shown on plans or as in accordance with schedules, an electronic thermal dispersion type fan inlet Airflow and Temperature Measuring Station (AFTMS). AFTMS shall be surface mount type, with no exceptions.

Communications cable within the fan inlet sensor shall be soldered directly to the fan inlet sensor's Printed Circuit Board (PCB) to ensure absolute connectivity and long term accuracy.

Underwriters Laboratories, Inc.® (UL) Plenum-rated CAT5e communications cable with square terminal connectors, dust boot covers, and gold-plated contacts shall link sensors to the router and router to electronic controller.

Factory calibration of thermal dispersion sensors shall be at sixteen airflow rates between 0 and 10,000 FPM using NIST traceable calibration standards.

Sensor to router communication cable shall be 10 ft (6.1 m) maximum. Router to Electronic Controller communications cable shall be a minimum of 10 ft (6.1 m) in length. Total router to electronic controller communications cable shall be available up to a maximum length of 50 ft (15.25 m) for a single router or 100 ft (30.5 m) for two routers, when specified.

Complete assembly shall be constructed and calibrated in an ISO 9001 certified facility.

Devices creating fan performance degradation (resulting in additional energy consumption) caused from pressure drop associated with probes or mounting apparatus in the center of the fan inlet are prohibited.

Unit shall be capable of monitoring the airflow and temperature at each fan inlet location through two or four sensing circuits. Unit shall be capable of reporting through an electronic controller that communicates with the Building Automation System (BAS).

Sensor circuit casings shall be constructed of UL94 flame-rated, high-impact ABS and include a stainless steel thermistor cap that maintains the precise calibrated flow over the heated and ambient measurement points. Each sensor circuit shall consist of two ceramic base, glass encapsulated thermistors for measuring ambient temperature and velocity. Circuits shall be designed for operation in a wide range of environments, including high humidity and rapid thermal cycling.

Sensors shall terminate at a router containing a multiplexer circuit. Multiplexer shall include a microprocessor that collects data from each PCB and digitally communicates the average airflow and temperature of sensing point to the microprocessor-based electronic controller. Multiplexer board shall be completely encased in electrical potting material to prevent moisture damage.



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Electronic controller shall be capable of processing up to 4 independent sensing points per airflow measuring location and shall operate on a fused 24 VAC supply.

Electronic controller shall feature a 16 x 2 character alphanumeric LCD screen, digital offset/gain adjustment, continuous performing sensor/controller diagnostics, and a visual alarm to detect malfunctions.

LCD screen shall be field-adjustable to display either I-P or SI units. Electronic controller output shall be 4 to 20 mA.

All electronic components of the assembly shall be Restriction of Hazardous Substances (RoHS) Directive compliant and UL rated.

Dedicated transformers shall be used for each air measurement station. If additional devices are connected to the same transformer, transformers with sufficient capacity for the total load shall be used.

System design shall avoid wiring multiple low-voltage devices from a common transformer that results in lower-than-expected voltage at the device and higher-than-expected current draw when devices are connected a great distance from the power source.

## Selection Charts

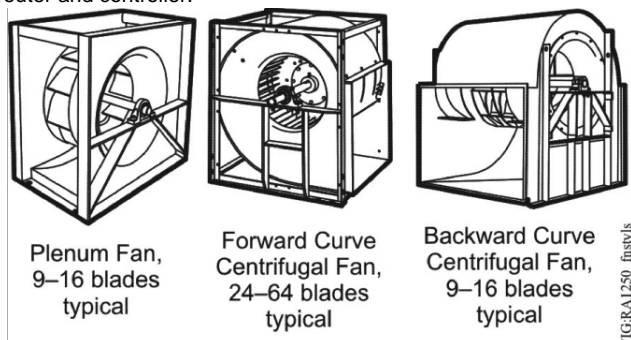
Use the following information to select the product:

1. Select the product code number required where **dd** is the diameter of duct (4 to 32 inches in 1-inch increments).
2. Enter option for desired cable length between router(s) and controller(s).

**Note:** Cable length between sensor and router is 10 ft (3 m) maximum length.

## RA-1250 Thermal Dispersion Fan Inlet Sensor Airflow Measuring System (Continued)

Example: RAF20NO is an RA-1250 Fan Inlet Thermal Dispersion Airflow Measuring System for use with forward-curved fans having a single inlet and a standard sensor density. This model has a controller, a router, two inlet sensors, and a 20 ft (6 m) CAT5e cable between the router and controller.



Fan Types

### Router-to-Controller Cable Length Options

Letter	Cable Length
O	20 ft (6 m)
P	30 ft (9 m)
Q	40 ft (12 m)
R	50 ft (15 m)

### RA-1250 Fan Inlet Thermal Dispersion Airflow Measuring System Ordering Information

Code Number <sup>1</sup>	Fan Type <sup>2</sup>	Inlet Type and Sensor Density <sup>3</sup>	Fan Inlet Thermal Dispersion Airflow Measuring System with
RAFddD	Forward Curve	Double Inlet - Standard Density	Controller, Router and 4 sensors
RAFddH		Single Inlet - High Density	2 Controllers, 2 Routers and 8 sensors
RAFddN		Double Inlet - High Density	Controller, Router and 2 sensors
RABddD	Backward Curve	Double Inlet - Standard Density	Controller, Router and 4 sensors with sensor brackets
RABddH		Single Inlet - High Density	2 Controllers, 2 Routers and 8 sensors with sensor brackets
RABddN		Double Inlet - High Density	Controller, Router and 2 sensors with sensor brackets
RAPddD	Plenum / Plug	Double Inlet - Standard Density	Controller, Router and 4 sensors with sensor brackets
RAPddH		Single Inlet - High Density	2 Controllers, 2 Routers and 8 sensors with sensor brackets
RAPddN		Double Inlet - High Density	Controller, Router and 2 sensors with sensor brackets

1. dd is the diameter of plenum (4 to 50 inches in 1-inch increments).

2. If you are not sure of fan type, select backward or plenum to get mounting brackets. The brackets work on all fan types.

3. Standard Density is 2 sensors per inlet. High Density is 4 sensors per inlet.

### Technical Specifications

RA-1250 Thermal Dispersion Probe Fan Inlet Sensor Airflow Measuring System	
Velocity Requirements	Minimum 0 fpm (0 mps) Maximum 10,000 fpm (50.8 mps)
Fan Degradation	Minimal
Sensor Accuracy	Airflow: $\pm 2\%$ of reading and $\pm 0.15\%$ repeatability Temperature: $\pm 0.10^\circ\text{F}$ 24 VAC internally fused power supply Velocity Output: 4 to 20 mA (Standard) or 2 to 10 VDC (requires 500-ohm resistor) Temperature Output: 4 to 20 mA (Standard) or 2 to 10 VDC (requires 500-ohm resistor) Fused outputs
Power Requirement	Dedicated 24 V, 20 VA with one router connected and 40 VA with two routers connected
Power Consumption	18 VA Maximum per router
Operating Conditions	-25 to 140°F (-32 to 60°C); 0-99% RH, noncondensing
Router Unit (One per Fan Location)	One microprocessor based multiplexer circuit Sensor/communications circuit Router circuits encapsulated in electronic potting compound
Approximate Weight	Controller: 2.9 lb (1.32 kg) Router: 1 lb (0.45 kg) Sensor: 0.5 lb (0.22 kg)