

AD-1251 Probe with Differential Pressure Transducer

Product Bulletin

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The AD-1251 Probe with Differential Pressure Transducer (DPT) is designed to provide accurate and economical flow monitoring at all times. The probe is a differential pressure air measuring device that is designed to measure flow in duct applications. The device is intended for retrofit projects. You may install the AD-1251 in a straight duct or one duct diameter upstream from an unvaned elbow, or five duct diameters downstream from an unvaned elbow. The probes are tested per Air Movement and Control Association (AMCA) 610.93 setup.

This probe measures and reports differential pressure, effectively monitoring airflow from 400 to 5,000 Feet Per Minute (fpm) (122 to 1,524 Meters per Minute [mpm]) within $\pm 5\%$ accuracy. When used with the Pressure Across Measuring System (PAMS) chart accompanying the probe (or in the product literature), precise airflow is easy to determine.

The probe can be used in either a horizontal or vertical application. When ordered with an air straightener, the probe is automatically positioned in a vertical application. The 9 in. (229 mm) deep probe with air straightener allows for installation in tight space requirements where dampers are already installed, or where dampers are also required.

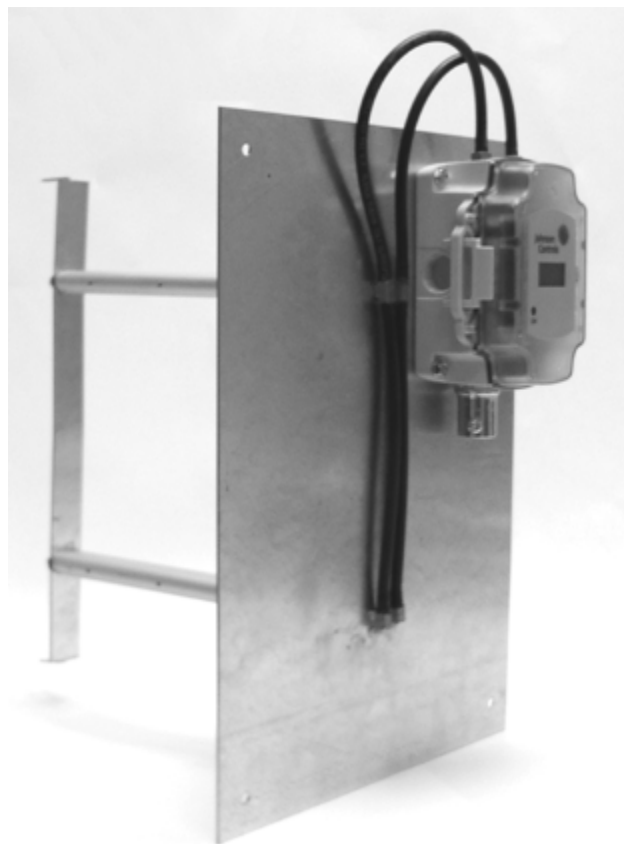


Figure 1: AD-1251 Probe with Differential Pressure Transducer

Table 1: Features and Benefits

Features	Benefits
Slip Fit Mounting	Provides easy installation.
Horizontal or Vertical Anodized Aluminum Sensing Probes	Allow for measurement of lower airflows.
Factory-Piped DPT with Display	Provides visual readout of flow and reduces installation time.

Application

Probes

The airflow measuring probes were developed to meet the market need for an air measuring station that is easily installed in an existing duct.

Each fully factory-assembled probe unit contains everything needed to install an air measuring station.

The standard 0 to 10 Volt transducer output signal is proportional to Cubic Feet per Minute (CFM) and may be routed to any Building Automation System (BAS) for continuous monitoring of the airflow.

All products are perfect for measuring airflow in existing ducts and install in minutes.

Each probe is factory-piped to the pressure transducer and ready for quick and easy installation. The slip-fit design installs in only three steps.

Probe with Air Straightener

- | The probe with air straightener option is factory-assembled. The unit comes standard with a honeycomb airflow straightener, pressure sensing station, and a high performance transducer. The probes are extruded aluminum with a clear anodized finish.
- | The probe with air straightener option offers precise airflow measurement with total and static pressure chambers piped to the pressure transducer.

The selectable transducer output signal is proportional to CFM and may be routed to any BAS for continuous monitoring of airflow.

This makes the unit suitable for many retrofit applications where a damper is already installed.

The probe with air straightener is only 9 inches (229 mm) deep in the direction of airflow, making it perfect for retrofit applications that do not have a lot of space available.

The probe also is available with or without mounting flange options to reduce installation time. The transducer requires a 24 VAC power supply and wiring to a BAS.

Operation

Strategically placed sensing blades within the air stream perform airflow measurements. Air tubing or piping connections provided connect the sensing probes to the DPT.

Using the velocity pressure provided from the sensing blades, the BAS calculates a CFM value. This value can then be compared to the design CFM setpoint as determined by the particular mode of operation of the Heating, Ventilating, and Air Conditioning (HVAC) system. In normal operation, this setpoint corresponds to the minimum outside air ventilation required by the system design to meet American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62.1.

Test data is based on multiple sizes and Air Movement and Control Association International, Inc. (AMCA) test setup configurations. Compare data to other manufacturers that claim lower accuracy, and you will find that their data is based on one size in the most favorable test configuration. Some manufacturers do not even test to AMCA standards. You can trust Johnson Controls, Inc. to have the most comprehensive test data in the industry, so you can use our products with confidence.

Differential Pressure Transducer (DPT)

Brass fittings are used to connect the high and low pressure chambers of the sensing probe to a high performance piezoresistive sensor with a 4.5 character Liquid Crystal Display (LCD) screen transducer through 1/4 in. (6 mm) Outside Diameter (O.D.) polyethylene tubing.

The DPT output signal is field-selectable and can be routed to a BAS for continuous monitoring of airflow. With simple DIP switch settings, you may choose the output signal (factory set at 0 to 10 Volts), which is proportional to airflow.

Housing is hinged 4 x 5 x 2-1/2 in. (102 x 127 x 64 mm) IP66 rated polycarbonate.

Sensor is micro-machined, single-crystal silicone, piezoresistive.

LCD screen is a 4.5 character display of actual differential pressure in inches of water column (in. W.C.).

Sample Specifications

Furnish and install, at locations shown on plans or as in accordance with schedules, an air measuring probe system piped to a high performance pressure transducer with digital readout.

Assembly shall be AMCA tested and capable of measuring a range from 300 to 5,000 fpm (122 to 1,524 mpm) for the Probe with Transducer and Air Straightener and from 400 to 5,000 fpm (122 to 1,524 mpm) for the Probe with Transducer.

The air measuring assembly shall measure to $\pm 3\%$ accuracy and consist of 6063T5 extruded aluminum sensing blade(s) with anodized finish, plenum-rated polyethylene pressure tubing, brass barbed fittings, mounting hardware and a glass-on-silicone capacitance sensor pressure transducer capable of measuring up to five field-selectable pressure ranges up to 2.5 in. W.C.

The transducer shall be accurate to $\pm 0.5\%$ of full scale on the 0.10 and 0.25 inch range and ± 0.25 on all other ranges. Stability shall be $\pm 2\%$ (of span selected) per year. Transducer shall be contained in a National Electrical Manufacturer's Association (NEMA) 4 (IP-65) enclosure. Transducer shall be factory mounted and piped to high and low pressure ports through fittings made of brass.

All sensor tubing shall terminate in solid brass barbed fittings.

Air measuring probe assemblies shall be, in all respects, equivalent to Johnson Controls® AD-1250 airflow Measuring System.

Air straightener shall be provided for sizes over 60 in. wide x 42 in. high (152 cm wide x 107 cm high).

Standard Materials and Construction

The probe is 20-gauge G60 galvanized steel.

The probe with air straightener includes a 9 in. (22.9 cm) long x 16-gauge G60 galvanized steel sleeve for slip-fit duct connection.

The air straightener is a 1/2 in. (13 mm) honeycomb cell x 3 in. (76 mm) 3000 Series aluminum alloy.

Step sensor extrusion is made of 6063T5 extruded aluminum with clear anodized finish.

Sensor probe fittings are 1/4 in. (6.5 mm) brass barbed fitting.

Pressure tubing is plenum-rated polyethylene.

Dimensions

See Figure 2 and Figure 3 for dimensional information on AD-1251 Probes with Air Straighteners. See Figure 4 and Table 2 for dimensional information on single or multiple probe applications. See Figure 5 for information on dimensional information for AD-1251 Probes (without an air straightener).

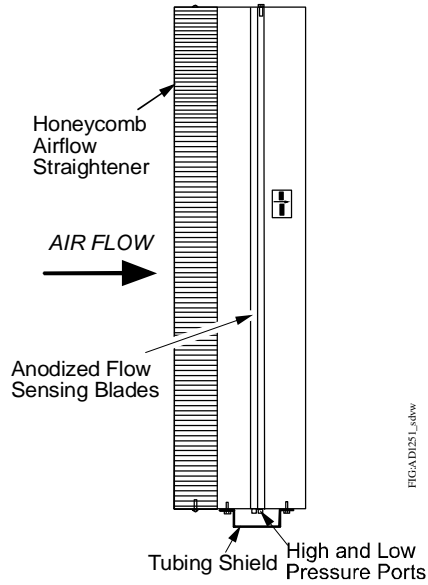


Figure 2: AD-1251 Probe with Air Straightener, Side View

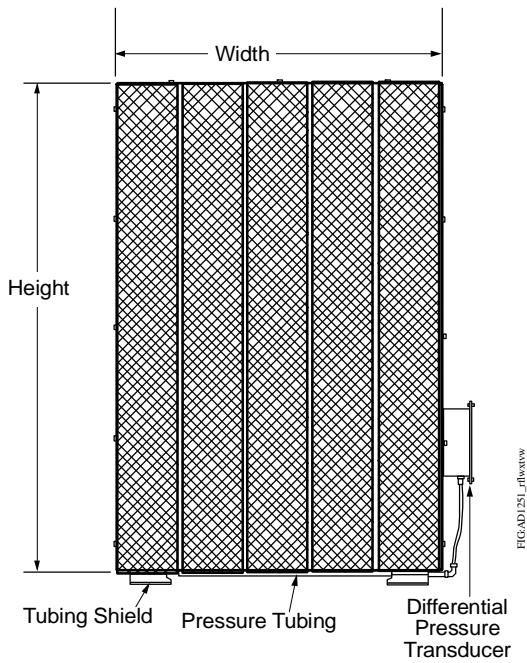


Figure 3: AD-1251 Probe with Air Straightener, Front View

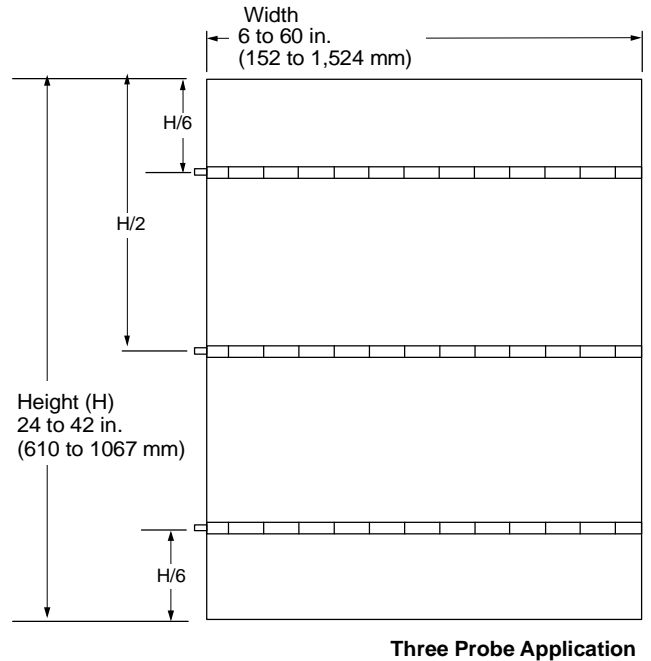
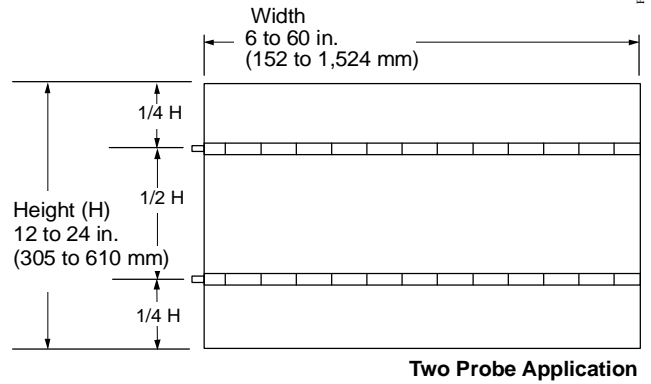
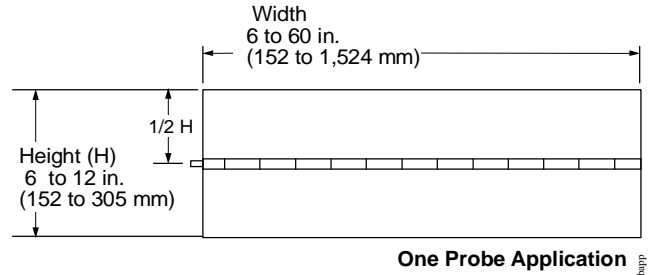


Figure 4: One, Two, and Three Probe Applications

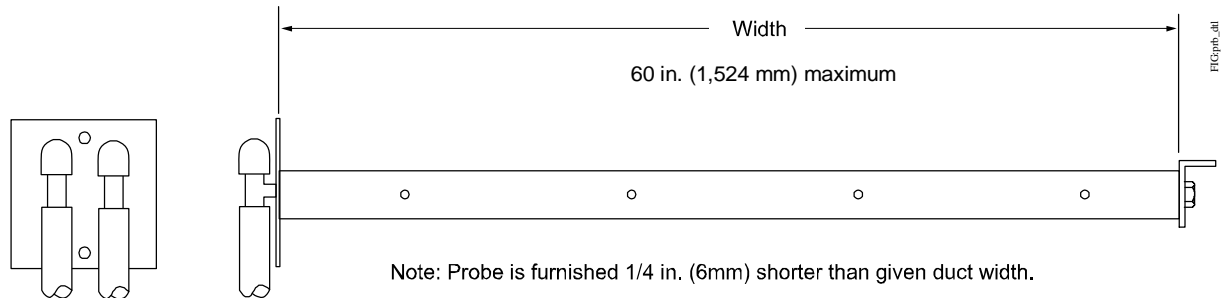


Figure 5: AD-1251 Probe Details

Table 2: Dimensions

Size Limits	Width x Height, in. (mm)
Minimum Single Probe	6 x 6 (152 x 152)
Maximum Three Probes	60 x 42 (1,524 x 1,069)
Maximum (with Air Straightener)	Unlimited

Note: Actual size is 1/4 in. less than nominal.

Wiring

The DMPR-RA001 Differential Pressure Transducer is part of the AD-1250 Airflow Measuring Station and the AD-1251 Probe.

Wire the DMPR-RA001 Transducer using the information in Figure 6 and Table 3.

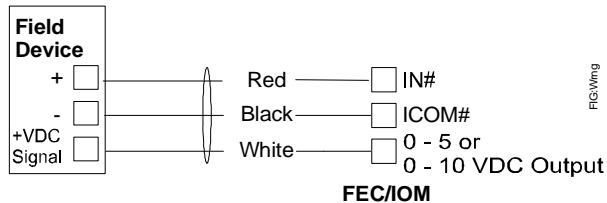


Figure 6: Voltage Input – Internal Source

Table 3: Wiring the DMPR-RA001 Differential Pressure Transducer

Wire Color	0–10 V	4–20 mA Loop, 7–45 VDC, 7–32 VAC
Red	24 V Power	+
Black	Common	-
White	Voltage Out	Not Used

Test Criteria

All performance data is based on three duct areas tested to AMCA 610-93, providing the most comprehensive testing in the industry.

Model

Method: Differential Pressure

Duct Sizes:

- 12 x 12 in. (304 x 304 mm)
- 24 x 24 in. (609 x 609 mm)
- 36 x 36 in. (914 x 914 mm)

Rated Duct Size: Rectangular duct with cross-sectional areas between 0.5 to 18 sq ft (0.05 to 1.7 sq m).

Test Set Up: Refer to Figures 1 and 2 of AMCA Standard 610-93.

Calculations

CFM = Free area Sqft x Ka x PAMS l/m

Where

FPM = Ka x PAMS l/m

Face Area sq ft = [Duct width (in.) x Duct Height (in.)] / 144

Table 4: Air Measurement Probe with Air Straightener

Size in. (mm)	Ka	l/m
12 x 12 (30 x 30)	2,645.5	0.495
24 x 24 (609 x 609)	2,986.5	0.4731
36 x 36 (914 x 914).	3,047.4	0.5222

Table 5: Air Measurement Probe with One, Two, or Three Probes

Application	Ka	l/m
1 Probe	3,493	0.551
2 Probes	2,850	0.5
3 Probes	2,940	0.4751

PAMS Chart

PAMS charts are provided for each unit shipped with the air straightener option. **This is a sample for information only.** Use this chart to verify that the BAS interface and airflow calculations are correct. Do not set 0 V = Minimum CFM and 10 V = Maximum CFM. Velocity pressure is an x root function where $x = l/m$.

Table 6: PAMS, CFM, and FPM Ratings

PAMS	CFM	FPM
0.005	1,077	215
0.01	1,524	320
0.02	2,155	453
0.03	2,639	554
0.04	3,047	640
0.05	3,407	716
0.06	3,732	784
0.07	4,031	847
0.08	4,310	905
0.09	4,571	960
0.10	4,818	1,012
0.11	5,054	1,061
0.12	5,278	1,109
0.13	5,494	1,154
0.14	5,701	1,197
0.15	5,901	1,239
0.20	6,814	1,431
0.30	8,346	1,753
0.40	9,637	2,024
0.50	10,774	2,263
0.60	11,802	2,479
0.70	12,748	2,677
0.80	13,628	2,862
0.90	15,455	3,036
1.0	15,237	3,200

Selection Information

Use the following to select the product:

1. Determine required size from drawings.
2. Select the part number required. See Table 7.

Table 7: Selection

Part Number	Description
ASENN-wwwxhhh	Airflow Measuring Probe with DMPR-RA001 Transducer
ASENN-wwwxhhhW	Airflow Measuring Probe with DMPR-RA001 Transducer and Air Straightener

3. Enter width and height of duct.

www = width of duct (in inches)

hhh = height of duct (in inches)

Note: Actual probe size is 1/4 in. (6 mm) less than nominal.

Example: ASENN-020x020W is an airflow measuring probe comprised of an aluminum air straightener, flow pickup station and DPT. Its dimensions are 20 in. (51 mm) wide x 20 in. (51 mm) high, and enclosed in a 9 in. (229 mm) long sleeve without flanges for a slip fit.

Repair Information

If the AD-1251 Probe with Differential Pressure Transducer fails to operate within its specifications, replace the unit. For a replacement AD-1251 Probe with Differential Pressure Transducer, contact the nearest Johnson Controls® representative.

All Johnson Controls AD-1251 Probes with Differential Pressure Transducers are built to order and cannot be returned due to ordering errors. All AD-1251 Probes with Differential Pressure Transducers are backed by a 3-year warranty, which covers defects in materials or workmanship. Refer to terms and conditions of sale for specifics.

Maintenance

The AD-1251 Probe with Differential Pressure Transducer has no components that require routine scheduled maintenance.

Technical Specifications

AD-1251 Probe with Differential Pressure Transducer¹

Velocity Requirements	Airflow Measuring Probe with DMPR-RA001 Transducer	Minimum 400 fpm (122 mpm) Maximum 5,000 fpm (1,524 mpm)
	Airflow Measuring Probe with DMPR-RA001 Transducer and Air Straightener	Minimum 300 fpm (91.44 mpm) Maximum 5,000 fpm (1,524 mpm)
Temperature Rating	Standard Operating Conditions: -22 to 140°F (-30 to 60°C) Actuator: -4 to 122°F (-20 to 50°C)	
Approximate Weight	Sensor with DPT and Side Plate: 8 lb (3.6 kg) for 60 in. (1,524 mm) long probe Sensor only: 1 lb (0.45 kg)	

1. Measuring stations are tested at an AMCA Certified Laboratory using instrumentation and procedures in accordance with AMCA Standard No. 610-93, Airflow Station Performance.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Building Efficiency

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