

AD-1272 Advanced Thermal Dispersion Probe Airflow Measuring System

Product Bulletin

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AD-1272 Advanced Thermal Dispersion Airflow and Temperature Measuring System is a highly accurate airflow and temperature measurement product for new installations or retrofit applications. The system supports air flow measurements up to 128 waterproof, flex sensors. The AD-1272 provides the most sensing points in the industry.

The AD-1272 Advanced Thermal Dispersion Airflow and Temperature Measuring System is capable of measuring a velocity range from 0 to 5,000 feet per minute and displays the average flow and temperature. It is intended for commercial airflow measurement in any outside, return, exhaust, or supply air application.

Each surface-mount thermistor pair provides a measurement for both velocity and temperature and is protected from the elements through conformal coating.

A number of sensing points on one or more probes establish a measurement array across the area of the duct or plenum to provide an averaged airflow and temperature output.

Figure 1: AD-1272 Thermal Dispersion Probe Airflow Measuring System



Probe-sensing elements are factory tested and calibrated, at 20 points, from 0 to 5,000 fpm.

Features and Benefits

- **BACnet® and analog output standard**—multiple methods to interface with building automation systems.
- **Cutting-edge technology**—has the lowest power consumption of any commercially available thermal dispersion device.
- **Display with surface membrane buttons**—provides tool-free setup and configuration.
- **Standard communication cabling**—does not require the use of proprietary cables.
- **Airfoil shaped anodized aluminum sensing probes**—lower pressure drop and greater resistance to oxidation.
- **Up to 128 sensing points**—provides accurate air flow measurements even in non-linear air flow.
- **Remote Display Options**—Wireless or remote displays with CFM and temperature read-outs on easy to use menus.

Application

The AD-1272 Thermal Dispersion Probe Airflow Measuring System can be used in most standard HVAC applications of measuring airflow including minimum outside air verification, volume matching application, supply air measurements, and return air measurements.

When used to control minimum outside air the AD-1272 Thermal Dispersion Probe Airflow Measuring System contributes to earning required Indoor Environmental Quality (IEQ) and Energy and Atmosphere (EA) credits for U.S. Green Building Council™ Leadership in Energy and Environmental Design (LEED) prerequisites for construction and operation.

Operation

Figure 2: Typical Sensing Point



The AD-1272 probe uses thermal dispersion technology to measure the airflow in the most demanding applications.

The mathematical relationship between heat transfer rate and airflow velocity makes it possible to accurately measure flow by measuring the energy required to maintain a heated thermistor at a reference temperature.

The airfoil shape of the probe, geometry of the sensor shroud, and placement of the sensors (quantity and location) are all based on results from computational fluid dynamics and extensive lab testing. This unique design provides a lower pressure drop and more accurate measurement of flow and temperature.

Outputs

The LCD screen is 16x2 alphanumeric character display showing actual velocity and temperature in either Imperial (I-P) or International System (SI) units.

The AD-1272 Thermal Dispersion Airflow and Temperature Measuring System provides two 4 to 20 analog mA outputs - one for airflow velocity and one for air temperature - and BACnet outputs to provide input to any Building Automation System.

The AD-1272 Thermal Dispersion Airflow and Temperature Measuring System provides a linear 4 to 20 mA output signal proportional to the airflow. The probe automatically adjusts the airflow calculation based on the current air temperature. The linear output signal for airflow is repeatable and not affected by temperature changes. The Analog Outputs are scalable to provide the best resolution for the operating range of the system.

Sample Specifications

AD-1272 Advanced Thermal Dispersion Airflow Measuring System is the basis of design.

Furnish and install advanced electronic thermal dispersion type airflow and temperature measuring station at locations shown on the plans. The system is capable of monitoring and reporting the airflow and temperature at each measuring location with up to 16 measuring probes containing 1 to 8 sensor points per probe. The system includes a primary transmitter as part of a probe assembly or the transmitter can be installed up to 500 ft from the sensor. The primary transmitter interfaces with the building automation system (BAS) interface using BACnet protocol or 4 to 20 mA analog outputs to report velocity and temperature measurements. Probes are constructed of an airfoil shaped anodized aluminum extrusion. Each moisture resistant flexible polyimide sensor circuit consists of thermistors for reading temperatures and calculating velocity. Primary transmitter user interface features tool-free touch setup through surface membrane switches on a hinged enclosure lid with dust tight, weather resistant construction. Thermal dispersion sensors will be factory calibrated at 20 points between 0 to 5,000 FPM (0 to 1,523 MPM) using NIST traceable calibration standards.

Complete assembly is in an ISO 9001 certified facility following strict ISO calibration test procedures. Acceptable manufacturers are members of AMCA (Air Movement & Control Association).

Communications are a Twisted Shielded Pair 24AWG low capacitance wire and power is a 18AWG. The Primary Transmitter is capable of processing up to 128 (16 probes, 8 sensors/probe each) independent sensing points and operates on a Class 2 24 VAC low-voltage supply. The transmitter features a 16 character x 2 line alphanumeric backlit LCD display, digital offset/gain adjustment, continuous performing sensor/transmitter diagnostics and a visual alarm to indicate malfunctions. The front panel display is field adjustable to display either I.P. or S.I. units. The primary transmitter is capable of providing flow, temperature readings and alarms through BACnet MS/TP communication to a BAS as well as providing field adjustable 4 to 20 mA outputs for flow and temperature values.

When installed in a duct in accordance with AMCA requirements, the accuracy of the airflow measuring system will be ± 3 of the reading. AFMS provides means for automated or manual field calibration when installed in less than ideal locations.

Communication between primary probes, remote transmitters, and ancillary probes will utilize daisy-chain, RS-485 communications wiring.

Johnson Controls provides a standard limit warranty for a period of 5 years (60 months) from the date of delivery to the delivery location.

Standard Materials and Construction

Probe is airfoil shaped 2 x 3/4 in. (51 x 19 mm) 6063T6 extruded aluminum (clear anodized, acid-etched finish).

Mounting brackets are 0.080 in. aluminum (mill finish).

Equal area or Log-Tchebycheff sensor distribution.

Thermistor flow hood is UL 94 flame-rated, high-impact Acrylonitrile Butadiene Styrene (ABS) plastic.

Sensor circuit (up to eight per probe assembly) is a water-resistant flex sensor circuit consisting of thermistors to measure temperature and calculate velocity.

Dimensions

See Table 1 for minimum and maximum duct sizes for use with the AD-1272 System.

Table 1: Duct Dimensions

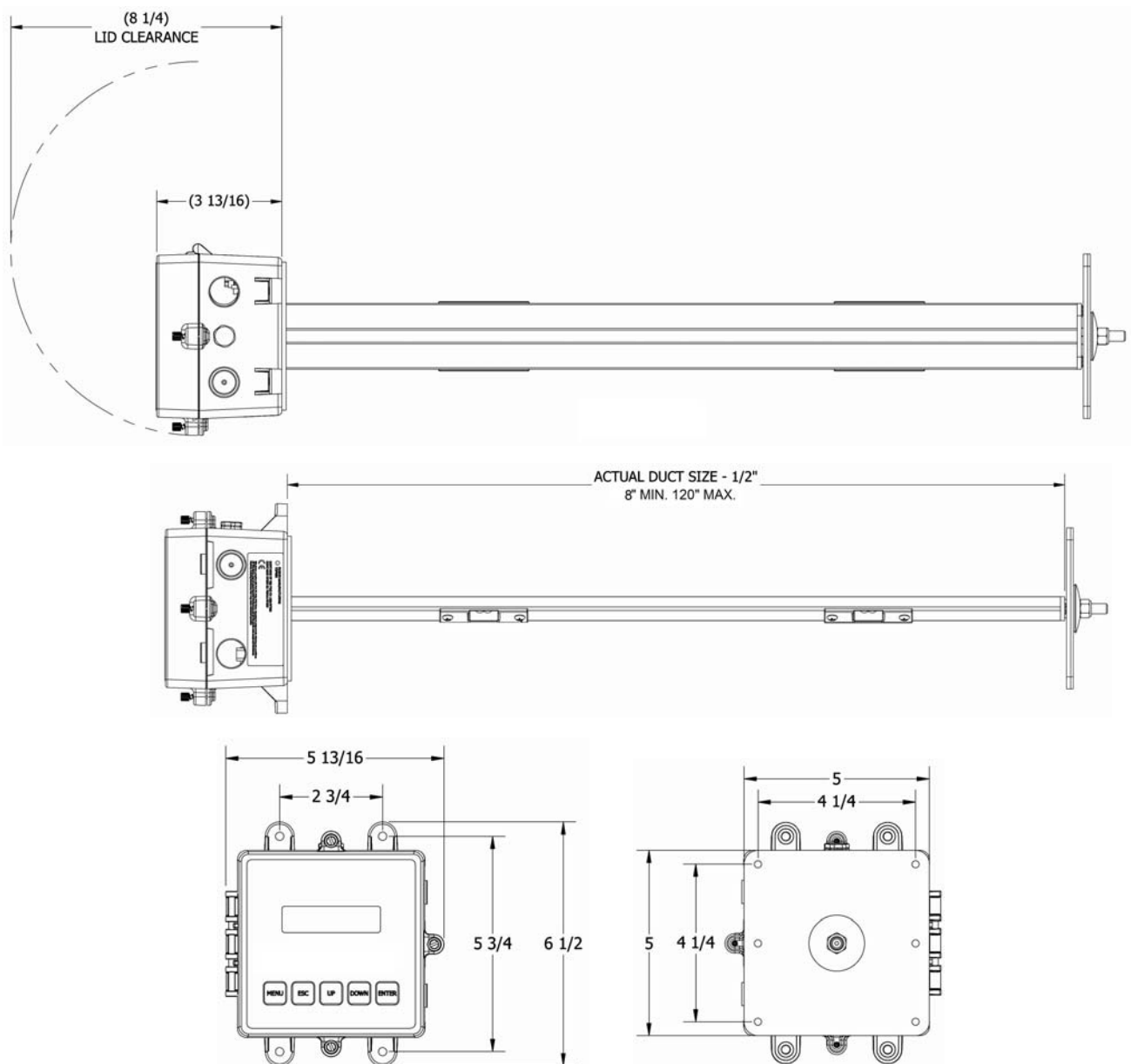
Size Limits	Width x Height, inches (mm) ¹
Minimum	8 x 8
Maximum	120 x 120

1. Actual size is 1/4-inch less than nominal.

Figure 3: AD-1272 System (Installed View)



Figure 4: Thermal Dispersion Probe Dimensions, in. (mm)



Rectangular Duct Mounting

Figure 5: Rectangular Duct Mounting - One and Two Probe Configurations

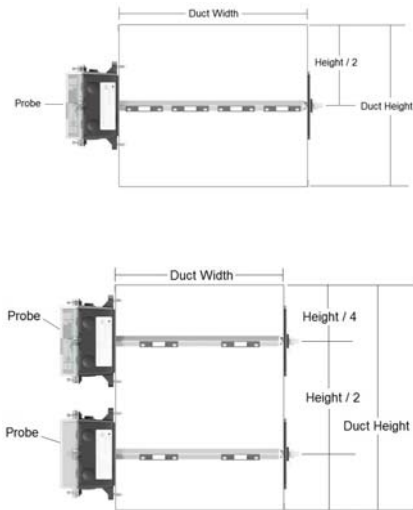


Figure 6: Rectangular Duct Mounting - Three and Four Probe Configurations

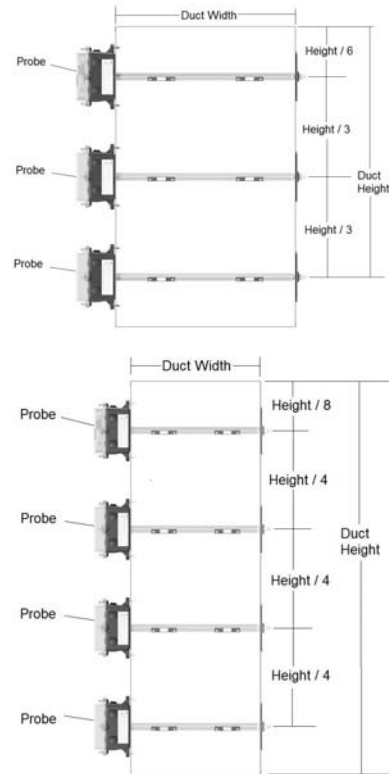


Table 2: Number of Probes/Sensors per Probe for Rectangular Duct Applications¹

Duct Height in. (mm)	Duct Width, in. (mm)																			
	8 (203)	12 (305)	14 (356)	16 (406)	18 (457)	20 (508)	22 (559)	24 (610)	30 (762)	36 (914)	42 (1,067)	48 (1,219)	54 (1,372)	60 (1,524)	66 (1,676)	72 (1,829)	84 (2,134)	96 (2,438)	108 (2,743)	120 (3,048)
8 (203)	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
12 (305)	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
14 (356)	1/2	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
16 (406)	2/2	2/2	2/2	2/2	2/2	2/3	2/3	2/3	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
18 (457)	2/2	2/2	2/2	2/2	2/2	2/3	2/3	2/2	2/2	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
20 (508)	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	1/8
22 (559)	2/2	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
24 (610)	2/2	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
30 (762)	3/2	3/2	3/2	3/2	3/2	2/4	2/4	2/4	2/4	2/4	2/6	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8
36 (914)	3/2	3/2	3/2	3/2	4/2	4/2	4/2	2/4	2/4	2/6	2/6	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8
42 (1,067)	3/2	3/2	4/2	4/2	4/2	4/2	4/2	4/2	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
48 (1,219)	3/2	3/2	4/2	4/2	4/2	4/2	4/2	4/2	3/4	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
54 (1,372)	4/2	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	2/7	2/8	2/8	2/8	2/8	2/8	4/4	2/8	2/8	2/8	2/8
60 (1,524)	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	4/4	4/4	2/8	2/8	2/8	4/4	4/4	4/4	4/4	2/8	2/8	2/8
66 (1,676)	4/2	4/2	4/2	4/2	4/3	3/4	3/4	3/4	4/4	4/4	4/4	2/8	2/8	4/4	4/4	4/4	4/4	4/4	2/8	2/8
72 (1,829)	4/2	4/2	4/2	4/2	4/3	3/4	3/4	3/4	4/4	4/4	4/4	2/8	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8
84 (2,134)	4/2	4/2	4/2	4/2	4/3	3/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
96 (2,438)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
108 (2,743)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
120 (3,048)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4

1. The minimum size is 8 x 8 inches (203 x 203 mm) for rectangular duct applications. Smaller sizes can be special ordered.

Round Duct Mounting

Figure 7: Round Duct Mounting - One or Two Probe Configurations

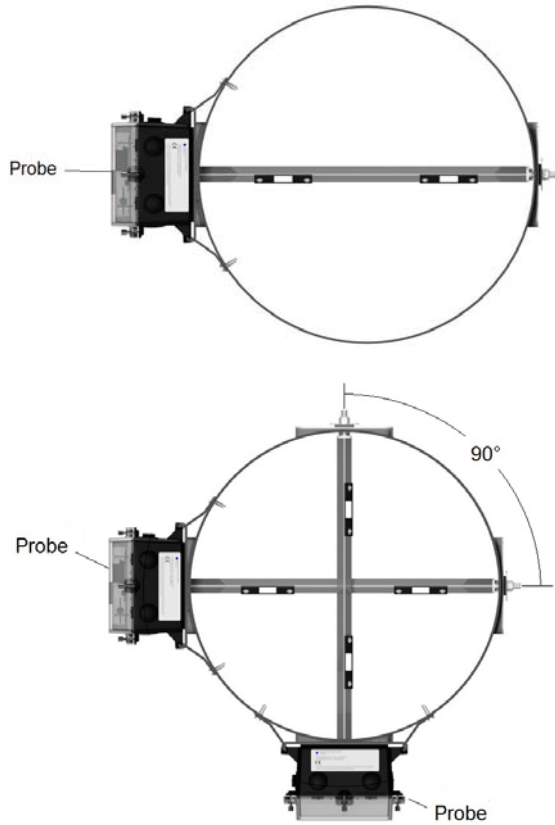


Figure 8: Round Duct Mounting - Three or Four Probe Configurations

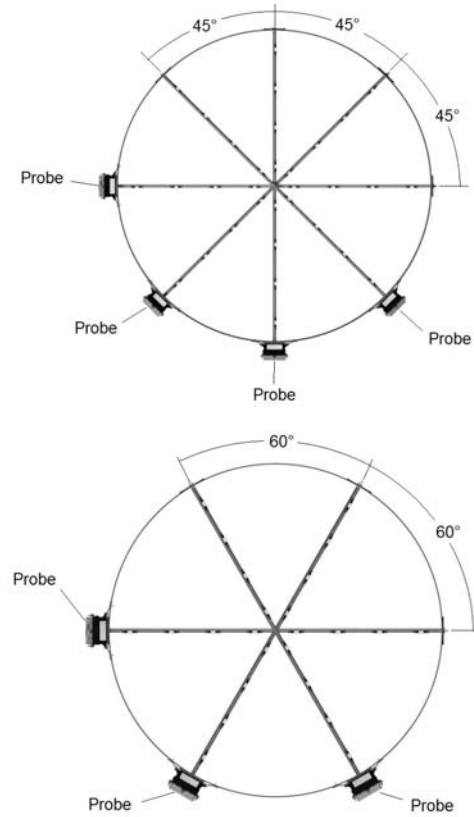


Table 3: Round Duct Applications - Number of Probes/Sensors per Probe

Duct Diameter, in. (mm)	No. of Probes/No. of Sensors per Probe
8 (203)	1/2
12 (305)	1/2
14 (356)	2/2
20 (508)	2/4
42 (1,067)	2/6
48 (1,219)	2/8
60 (1,524)	3/8
72 (1,829)	4/8
120 (3,048)	4/8

Oval Duct Mounting

Figure 9: Rectangular Duct Mounting - One and Two Probe Configurations

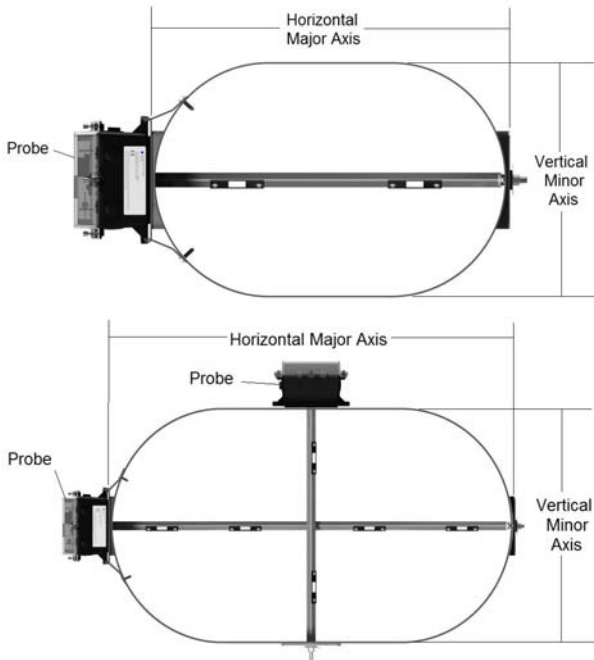


Figure 10: Rectangular Duct Mounting - Three Probe Configurations

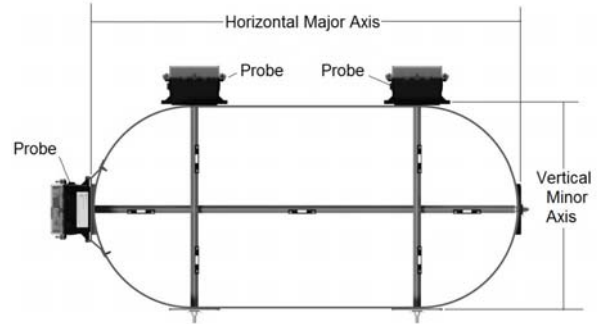


Table 4: Number of Probes/Sensors per Probe for Oval Duct Applications—12 to 22 in. (305 to 559 mm)

		Vertical Minor Axis, in. (mm)																	
		12 (305)			14 (356)			16 (406)			18 (457)			20 (508)			22 (559)		
Horizontal Major Axis, in. (mm)	14 ¹ (356)	H	1/1	16 ¹ (406)	H	1/2	18 ¹ (457)	H	1/2	21 ¹ (533)	H	1/3	25 ¹ (635)	H	1/2	28 ¹ (711)	H	1/2	
		V			V			V			V			V			V		
	15 ¹ (381)	H	1/2	25 ¹ (635)	H	1/3	22 ¹ (559)	H	1/3	29 ¹ (737)	H	1/4	34 ¹ (864)	H	1/4	31 ¹ (787)	H	1/4	
		V			V			V			V			V			V		
	28 ¹ (712)	H	1/3	34 ¹ (864)	H	1/4	32 ¹ (813)	H	1/4	37 ¹ (940)	H	1/5	42 ² (1,067)	H	1/3	44 ² (1,118)	H	1/3	
		V			V			V			V			V			V	2/2	
	40 ¹ (1,016)	H	1/4	45 ¹ (1,143)	H	1/5	41 ¹ (1,041)	H	1/5	46 ¹ (1,168)	H	1/6	51 ² (1,295)	H	1/4	53 ² (1,346)	H	1/4	
		V			V			V			V			V			V	2/2	
	53 ¹ (1,346)	H	1/5	55 ¹ (1,397)	H	1/6	51 ¹ (1,295)	H	1/6	53 ¹ (1,346)	H	1/7	64 ² (1,626)	H	1/5	60 ² (1,524)	H	1/5	
		V			V			V			V			V			V	2/2	
	65 ¹ (1,651)	H	1/6	67 ¹ (1,702)	H	1/7	60 ¹ (1,524)	H	1/7	62 ¹ (1,575)	H	1/8	70 ² (1,778)	H	1/6	66 ² (1,676)	H	1/6	
		V			V			V			V			V			V	2/2	
	75 ¹ (1,905)	H	1/6	74 ¹ (1,880)	H	1/7	69 ¹ (1,753)	H	1/8	71 ² (1,803)	H	1/5	80 ² (2,032)	H	1/6	72 ² (1,829)	H	1/7	
		V			V			V			V	2/2		V	2/2		V	2/2	
						79 ¹ (2,007)	H	1/8	78 ² (1,981)	H	1/6				79 ² (2,007)	H	1/8		
					V			V		2/2	V		2/2	V		2/2			
									81 ² (2,057)	H	1/6				85 ² (2,159)	H	1/5		
							V	2/2		V	2/2		V	2/4					

1. See Figure 9 for details.
2. See Figure 10 for details.

Use the following to select the product:

2. Select the product code number required.

1. Determine the required number of air measurement stations from system drawings. Field verify duct size and installation locations. See Rectangular Duct Mounting, Round Duct Mounting and Oval Duct Mounting for more information.

	Code Number/Character	Field														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Application	A = Air Measuring Station	A	N	S	S	A	-	W	W	W	X	h	h	h	-	-
Duct Type	N = Rectangular R = Round x ¹ = Oval (Ruskin01 required)															
Sensor Placement	S = Standard Equal Area Distribution T = Log-Tchebycheff Arrangement (Ruskin01 required))															
Mounting Options	S = Insertion Mount with Stainless Steel Mounting Hardware. T = Standoff Mount with Stainless Steel Mounting Hardware. A = Standoff Mount with Aluminum Hardware (Not available/valid with Round or Oval duct)															
User Interface Options (Pgs 2&3)	A = Primary Probe <u>with</u> Display, No Remote Display C = Remote Primary with Display (All Probes to be Ancillary Probes) R = Primary Probe <u>with</u> Display and Wired Remote Display S = Primary Probe <u>without</u> Display and Wired Remote Display W = Primary Probe <u>with</u> Display and Wired Remote Display Y = Primary Probe <u>without</u> Display and Wireless Remote Display N ² = Primary Probe <u>without</u> Display. User Interface not included. (See Note 2 below)															
Length Dimensions	8 to 120 in. (inch increments)															
Height Dimensions	8 to 120 in. (inch increments)															
Options (Up to 2)	G = Cord Grip (Qty 2) (dust tight, waterproof cord entry and exit for probe enclosure when installed) N = NEMA 4 Weather Resistant Enclosure T = 24 VAC 40 VA Transformer															

1. Option is only available through a Ruskin01 special quote at this time.
2. Option "N" does not include a user Interface. Field configuration and adjustments are not possible without a User Interface.

3. Enter width and height of duct, where:
www = width of duct (sets the length of the probe)
hhh = height of duct (sets the number of probes)

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

Enter options required (maximum 2).

Display Options

Table 5: Optional Display Configurations

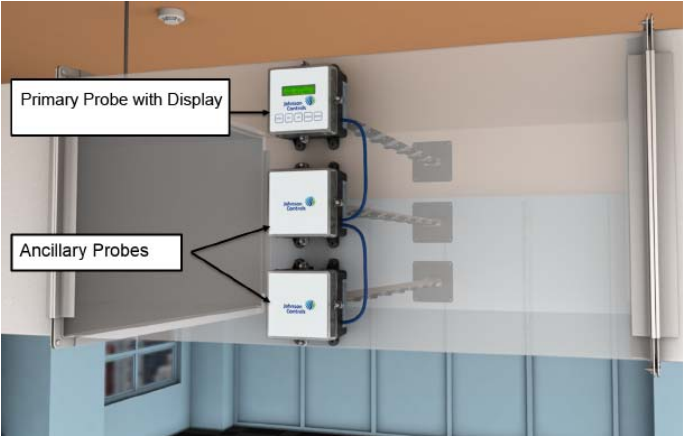
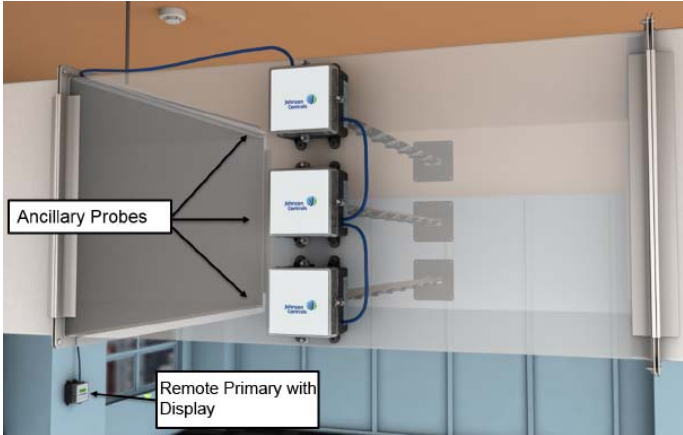
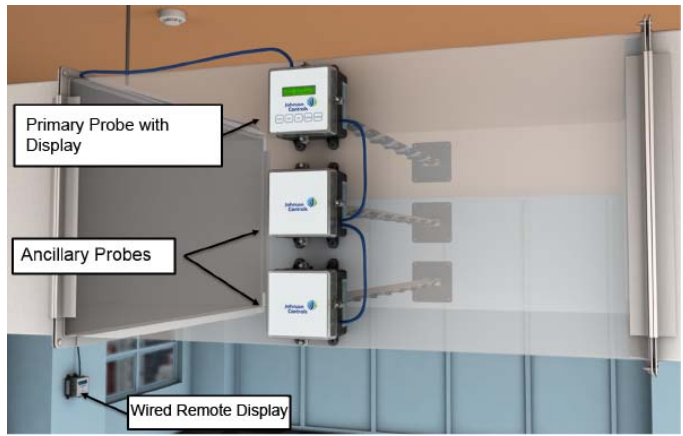
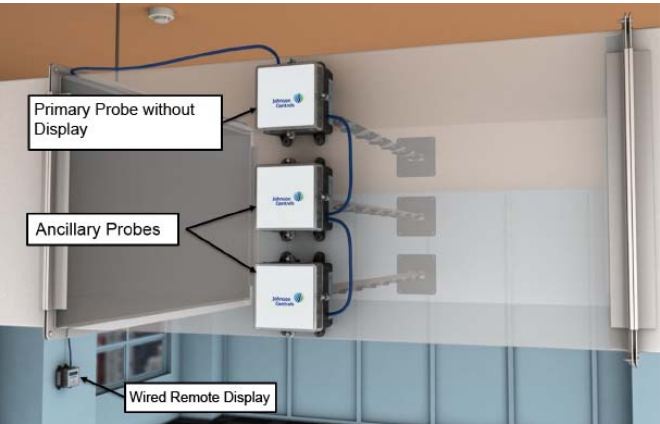
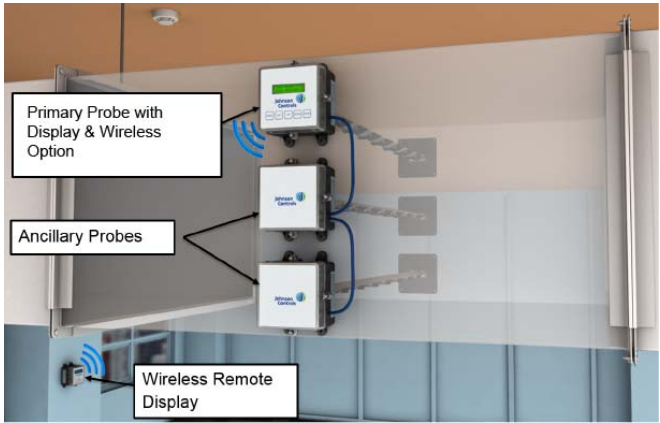
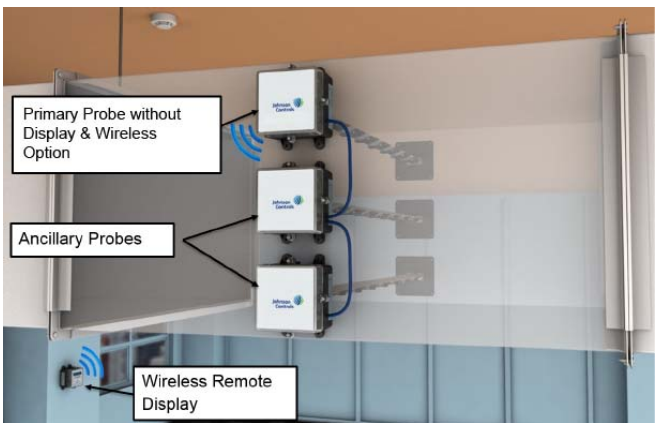
Options	Displays
<p>Primary Probe with Display, No Remote Display (Ordering Code A)</p>	 <p>This diagram shows three probe units mounted vertically on a wall. The top unit is labeled 'Primary Probe with Display' and features a small green display screen. The two units below it are labeled 'Ancillary Probes' and do not have displays. Blue cables connect the units to a wall-mounted terminal block.</p>
<p>Remote Primary with Display (All Probes to be Ancillary Probes) (Ordering Code C)</p>	 <p>This diagram shows three probe units mounted vertically on a wall. All three units are labeled 'Ancillary Probes' and do not have displays. A separate unit labeled 'Remote Primary with Display' is mounted on the wall to the left of the main probe stack. Blue cables connect the units to a wall-mounted terminal block.</p>
<p>Primary Probe with Display and Wired Remote Display (Ordering Code R)</p>	 <p>This diagram shows three probe units mounted vertically on a wall. The top unit is labeled 'Primary Probe with Display' and has a small green display. The two units below it are labeled 'Ancillary Probes' and do not have displays. A separate unit labeled 'Wired Remote Display' is mounted on the wall to the left of the main probe stack. Blue cables connect the units to a wall-mounted terminal block.</p>

Table 5: Optional Display Configurations

Options	Displays
<p>Primary Probe without Display and Wired Remote Display (Ordering Code S)</p>	 <p>The diagram shows a primary probe without a display and three ancillary probes mounted on a wall. They are connected via blue cables to a single wired remote display unit. Labels with arrows point to the 'Primary Probe without Display', 'Ancillary Probes', and 'Wired Remote Display'.</p>
<p>Primary Probe with Display and Wireless Remote Display (Ordering Code W)</p>	 <p>The diagram shows a primary probe with a display and three ancillary probes mounted on a wall. They are connected via wireless signals (indicated by blue curved arrows) to a single wireless remote display unit. Labels with arrows point to the 'Primary Probe with Display & Wireless Option', 'Ancillary Probes', and 'Wireless Remote Display'.</p>
<p>Primary Probe without Display and Wireless Remote Display (Ordering Code Y)</p>	 <p>The diagram shows a primary probe without a display and three ancillary probes mounted on a wall. They are connected via wireless signals (indicated by blue curved arrows) to a single wireless remote display unit. Labels with arrows point to the 'Primary Probe without Display & Wireless Option', 'Ancillary Probes', and 'Wireless Remote Display'.</p>

Maintenance

Johnson Controls AD-1272 Airflow Measuring Systems maintenance includes semi-annual verification of sensor readings and annual cleaning of the sensors. Reference the *AD-1272 Advanced Thermal Dispersion Probe Airflow Measuring System Installation Instructions (LIT-12012552)* for more information.

Wiring

When using a single transformer for multiple devices ensure the transformer is rated with sufficient capacity for the total connected loads.

Wiring multiple low-voltage devices from a common transformer can result 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.

Return Policy

All Johnson Controls AD-1272 Thermal Dispersion Probe Airflow Measuring Systems are built to order, just in time, and cannot be returned due to customer ordering errors. All AD-1272 System products are backed by a 5-year warranty which covers defects in materials or workmanship. Refer to terms and conditions of sale for specifics.

Replacement Parts

Table 6: Replacement Parts

Code Number	Description
DMPR-EAF-001	User Interface; Wired Remote Display
DMPR-EAF-003	One set of NEMA 4 hole plugs for pre-drilled holes in the enclosure (6 per set)
DMPR-EAF-004	Cord grip and locking nut (dust tight, waterproof cord entry and exit for probe enclosure when installed)
DMPR-EAF-005	One set of NEMA 1 nylon dust plugs for knockouts (6 per set)
DMPR-EAF-006	Replacement captive screw assembly for the lid
DMPR-EAF-007	Connect-Air W24182P-2306BL composite four-wire cable, 500 ft (152.4 m)

Technical Specifications

AD-1272 Thermal Dispersion Probe Airflow Measuring System

Probe Material	2 x 3/4 in. (51 x 19 mm) 6063T6 high-yield extruding aluminum with acid-etch, clear anodized finish
Communication Bus	RS-485, BACnet MS/TP 2-wire FC Bus between the primary transmitter and field controllers
Thermistor	Thermistor pair in flexible polyimide membrane sensor
Size Range	8 x 8 in. to 120 x 120 in. (20 x 20 cm to 305 x 305 cm)
Brackets	0.080 Stainless Steel
Sensor Accuracy	Airflow: $\pm 2\%$ of reading and $\pm 0.25\%$ repeatability
Repeatability	$\pm 0.25\%$
Measurement Units	Imperial (I.P.) or International System of Units (S.I.)
Sensor Distribution	Equal area
Calibrated Range	0 to 5,000 FPM (0 to 1,523 MPM)
Temperature Sensor Accuracy	$\pm 0.10^\circ\text{F}$ (0.06°C)
Sensor Temperature Range	-20 to 120°F (-29 to 49°C)
Probe Temperature Range	-20 to 120°F (-29 to 49°C) ¹
Humidity Range	0 to 99% RH, noncondensing
Maximum Number Sensors	128
Power Requirement	24 VAC, 15 VA
Power Consumption	<10 VA for 2 probes with 8 sensors per probe and LDC display on primary transmitter
Output Signals	4 to 20 mA standard, 2 to 10 VDC requires 500 ohm resistor across output terminals.
Display	16x2 character LCD (airflow, temperature, setup, and diagnostics) and Optional Remote Display
Velocity Requirements	Minimum: 0 FPM (0 MPM) Maximum: 5,000 FPM (1,524 MPM)
Approximate Shipping Weight	12 lb (5.4 kg) for AD-1272 Airflow Measuring System with two probes

- Standard LCDs can be difficult to read at low temperatures. If display operation at less than -5°F (-20°F) is expected, consider remote display options.

Measuring stations are tested at an AMCA Certified Laboratory using instrumentation and procedures in accordance with AMCA Standard No. 610, 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 shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Canadian Emissions Compliance

*This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*



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AD-1272 Advanced Thermal Dispersion Probe Airflow Measuring System Product Bulletin