RA-2000 Airflow Measuring System

Product Bulletin

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Since 1905, Johnson Controls has provided the highest quality control dampers and controls that fit your application and size requirements.

Johnson Controls presents the RA-2000 Airflow Measuring System with a one-piece ABS plastic flow sensing cross with a 16 in. (406 mm) diameter or less, and a two-piece anodized aluminum extrusion sensing tube with an 18 in. (457 mm) diameter and larger.

Figure 1: RA-2000 Airflow Measuring System

Table 1: Features and Benefits

Features	Benefits
Formed Shroud	Inserts easily into round ductwork.
One-Piece Construction	Increases rigidity and strength.
Optional Factory-Installed Actuator	Reduces installation and commissioning time.
Airfoil Shaped Flow Sensing Blades 18 in. (457 mm) Diameter and Larger or ABS Plastic Flow Cross on All Other Units	Limit pressure drop through the damper.

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Application

The RA-2000 Airflow Measuring System is designed to meet industry requirements for a round air measuring system with low leakage and easy installation to spiral ductwork.

The design of the RA-2000 system incorporates a low leakage control damper with a neoprene seal placed between two round blades. The airfoil sensing tubes sample the air pressure across the full diameter of the duct.

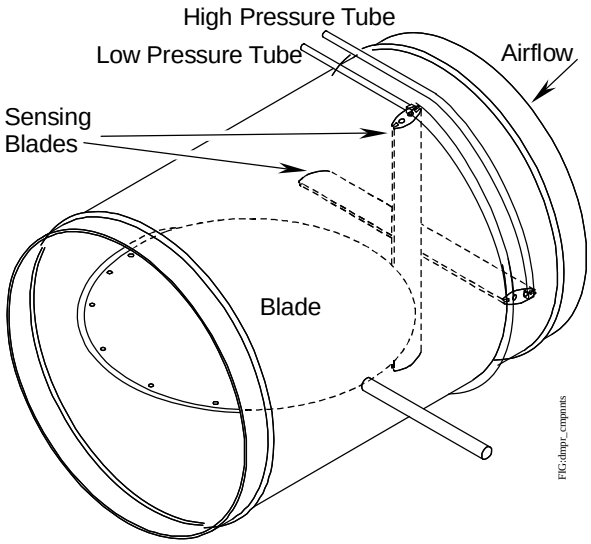

Figure 2: Damper Components

The air tubing connects to the DMPR-RA001 Differential Pressure Transducer, which is shipped loose. The RA-2000 system is designed for airflows between 400 and 4,000 Feet Per Minute (FPM) (122 and 1,219 Meters Per Minute [MPM]).

Based on the difference between the actual Cubic Feet per Minutes (CFM) reading and the desired setpoint, the control damper actuator positions the damper blades as necessary to ensure that the actual outside airflow meets the desired level.

Sample Specifications

- Furnish and install Johnson Controls® RA-2000 Airflow Measuring System, which combines the functions of outside air control damper, and flow monitoring sensing blades in one assembly.
- Frames are to be constructed of 20-gauge galvanized steel with rolled stiffener beads and stainless steel bearings.
- Blades are to be butterfly type constructed of galvanized steel with blade edge seals.
- Airflow sensing blades shall be one-piece ABS plastic on units 6 in. (152 mm) through 16 in. (406 mm) in diameter. Anodized extruded aluminum airfoil shaped sensing blades are used on units 18 in. (457 mm) through 24 in. (609 mm) in diameter and incorporate built-in measuring ports.
- Performance shall be designed to control outdoor air in compliance with ASHRAE Standard 62 guidelines. The damper must be rated to operate over a temperature range of -22 to 140°F (-30 to 60°C) standard.
- Sizing shall be determined by the designer in accordance with accepted industry practices to ensure proper system performance.

Standard Materials and Construction

- Frame is constructed of 20-gauge galvanized steel.
- Blades are constructed of two layers of galvanized steel, which are 14-gauge equivalent thickness.
- Sensing blades are constructed of one-piece ABS plastic on units 6 in. (152 mm) through 16 in. (406 mm) in diameter. Anodized extruded aluminum airfoil shaped sensing blades are used on units 18 in. (457 mm) through 24 in. (609 mm) in diameter.
- Axles are 1/2-in. (13 mm) plated steel, extended 6 in. (152 mm) from damper outer diameter.
- Bearings are made of stainless steel.
- Blade seals are neoprene placed between two sides of blade; the seal fully encompasses the blade edge.

Dimensions

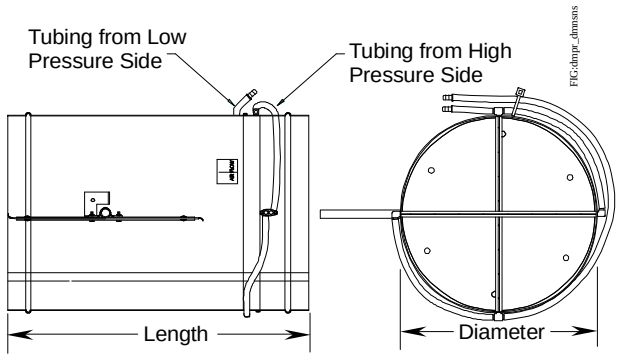

Figure 3: Damper Dimensions

Table 2: Damper Dimensions[1]

Diameter, in. (mm)	Length, in. (mm)
6 to 10 (152 to 254)	17 (432)
12 to 20 (305 to 508)	27 (686)
Over 20 (508)	31 (787)

1. Actual size is 1/8-inch (3 mm) less than nominal opening diameter.

Ordering Information

Use the following to select the product:

1. Determine the required size from the customer's drawings.
2. Select the damper size for your application using the damper dimensions from Table 2.
3. Select the required part number, using Table 3.

Table 3: Available Models

Part Number	Description
RAGddx	RA-2000 Airflow Measuring System

4. Enter the diameter of the damper.

   dd = diameter (in inches), where
   06 to 10 inches (1-inch increments)
   10 to 24 inches (2-inch increments)

   Note: Actual diameter is 1/8 in. (3 mm) less than nominal.

5. Enter the required options.

   x = option required, where:

   N = No Actuator, includes DMPR-RA001 DPT

   W = With M9208-GGA-3 Actuator, up to 12 in. (305 mm) in diameter, and M9220-GGA-1 Actuator, 14 in. (356 mm) in diameter and larger.

   Note: Option N includes a mounting bracket for a field-installed actuator.

Example: RAG09WNNC is a round airflow measuring system with a galvanized air damper that has integral seals, stainless steel bearings, cross flow sensors, factory installed modulating spring return actuator, no control signal (Field 7), and Normally Closed (N.C.) operation (Fields 8 and 9). The system dimensions are 9 in. (228 mm) in diameter by 17 in. (432 mm) in length.

Repair Information

If the RA-2000 Airflow Measuring System fails to operate within its specifications, replace the unit. For a replacement RA-2000 Airflow Measuring System, contact the nearest Johnson Controls representative.

All RA-2000 Airflow Measuring Systems are built to order and cannot be returned due to ordering errors. All airflow measuring stations are backed by a 3-year warranty, which covers defects in materials or workmanship. Refer to the terms and conditions of sale for specifics.

Maintenance

The RA-2000 Airflow Measuring Systems have no components that require routine scheduled maintenance.

During normal maintenance, damper blades should be wiped clean if necessary and opened and closed to verify complete rotation and sealing.

Technical Specifications

RA-2000 Airflow Measuring Systems[1]

Leakage - Fully Closed	0.15 scfm maximum per inch of blade circumference at 4-inch w.g.				
Operating Torque	8-inch diameter at 2-inch w.g. 16-inch diameter at 2-inch w.g. 24-inch diameter at 2-inch w.g.		52 lb·in. 84 lb·in. 116 lb·in.		
Pressure Drop (in. w.g.) - Fully Open		1,000 cfm	2,000 cfm	3,000 cfm	4,000 cfm
	12 inches 24 inches	0.017 0.005	0.06 0.010	0.15 0.010	0.25 0.010
Velocity and Pressure	400 to 4,000 fpm				
Temperature Rating	Standard Operating Conditions: -40 to 200°F (-40 to 93°C) Actuator: -4 to 122°F (-20 to 50°C)				
Approximate Weight	Damper: 5 pounds/square foot (2.7 kg/sq ft) Actuator: 2.9 pounds (1.6 kg) per actuator				

1. Measuring stations are tested at an Air Movement and Control Association International (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.

Refer to the M9208-xxx-x Series Electric Spring Return Actuators Product Bulletin (LIT-12011480) and M9220-xxx-3 Electric Spring Return Actuators Product Bulletin (LIT-12011057) for necessary information on operating and performance specifications for the actuator.

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