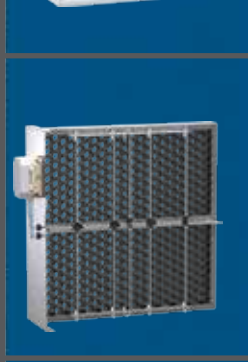
Air Measuring Damper Products

Models AMS, AMD and AMD-TD

- Pressure Differential
- Thermal Dispersion



GREENHECK

Building Value in Air.

June
2015

Airflow Measuring Technologies

Greenheck airflow measuring products are available with either differential pressure based technology or thermal dispersion technology.

Pressure Pick-Up Tubes

How do differential pressure based airflow measuring products work?

Differential pressure based airflow measuring products use an array of air pressure pick-ups to compare the total pressure going through the airflow station with the static pressure in the station. The design of the pressure pick-up assembly amplifies the difference between these two pressures. The resulting differential pressure is an amplified "velocity pressure", which is proportional to the velocity going through the flow station.

Airflow volume is then calculated using the formula:

$$Q = Area * K * P^m$$

Q	=	airflow (cfm)
Area	=	the face area of the damper
K	=	a damper specific flow coefficient that is provided with the unit
P	=	amplified velocity pressure measured by the supplied pressure transducer
m	=	a damper specific exponent that is provided with the unit

Transducer

How do thermal dispersion products work?

Thermal dispersion technology utilizes an array of thermal dispersion nodes positioned across the face of a duct or opening. Each node contains a pair of precision matched thermistors. One thermistor measures the ambient air temperature and the other is heated to a preset temperature differential above ambient. The air velocity is measured at each node by using the known relationship between heat transfer and air velocity and by measuring the power consumption necessary to maintain the fixed temperature difference between the thermistors. The Vari-Green® transmitter then averages the velocities at each node to determine the overall airflow volume going through our AMD-TD (Air Measuring Damper - Thermal Dispersion) damper model.

The probes utilized on our AMD-TD series maximize the accuracy of the airflow measurement system. Other thermal dispersion probes utilize nodes with sharp edges around the opening that can create turbulence resulting in airflow measurement inaccuracy. The nodes in the AMD-TD thermal dispersion probes utilize a highly engineered injection molded aperture that straightens the airflow as it passes over the thermistors to produce an accurate measurement.

Thermal Dispersion Probe

When should I use thermal dispersion AMD-TD versus a traditional differential pressure based AMD?

For most applications either technology can be used. When specifications don't call out a specific technology, the differential pressure-based AMD's (Air Measuring - Pressure Differential) will be the most cost-effective solution. However, thermal dispersion airflow stations are better suited for applications where airflows below 300 fpm are consistently being measured.

Vari-Green® Transmitter

Pressure Differential Products

AMS - Airflow Measuring Station

The AMS is an accurate airflow measuring station furnished with a properly sized pressure transducer that outputs a 0-10 VDC signal proportional to pressure. The pressure signal from the transducer can then be converted to CFM using the flow formula supplied with the unit.

A field-supplied or factory-supplied controller (see controls section) can position a damper's actuator to deliver a target CFM setpoint. An output from the controller can also communicate the measured airflow rate to a building management system, which can use that signal to regulate a fan's VFD or signal an under-ventilation alarm.

AMS

AMD - Airflow Measuring Dampers

The AMD series combines the functionality of an accurate airflow measuring station and a low leakage control damper into one compact assembly that both measures and controls airflow volume to a target setpoint. Available with 3V, steel airfoil or extruded airfoil blades, these models come standard with a modulating actuator and a properly sized pressure transducer that outputs a signal proportional to pressure. The pressure signal from the transducer can then be converted to CFM using the flow formula supplied with the unit.

A field-supplied or factory-supplied controller (see controls section) can position the damper's actuator to deliver a target CFM setpoint. An output from the controller can also communicate the measured airflow rate to a building management system, which can use that signal to regulate a fan's VFD or signal an under-ventilation alarm.

AMD-23

AMD-33-TD

Thermal Dispersion Products

AMD - TD Airflow Measuring Dampers

The AMD-TD series combines the functionality of a highly accurate thermal dispersion airflow station and a low leakage control damper to control airflow volumes to a target setpoint. Available with 3V, steel airfoil or extruded airfoil blades, these models come standard with Vari-Green Thermal Dispersion Probes factory-installed in the damper sleeve, a modulating actuator and a Vari-Green airflow measurement transmitter that outputs a signal proportional to the airflow going through the unit. The transmitter and actuator are factory-wired to a terminal block for easy single-point wiring.

A field-supplied or factory-supplied controller (see controls section) can position the damper's actuator to deliver a target CFM setpoint. An output from the controller can also communicate the measured airflow rate to a building management system, which can use that signal to regulate a fan's VFD or signal an under-ventilation alarm.

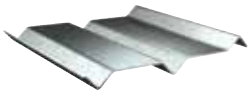
AMD-42V-TD

Features

Blade Styles

3V blades are fabricated from a single thickness of galvanized steel incorporating three longitudinal V-type grooves running the full length of the blade to increase strength.

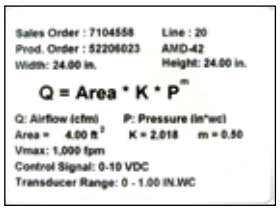
Airfoil blades are constructed of double-skin galvanized steel or extruded aluminum. This blade design results in lower resistance to airflow and increased strength for use in pressure systems.



3V Blade
AMD-23
AMD-23-TD

Fabricated Airfoil
AMD-33
AMD-33-TD

Extruded Airfoil
AMD-42
AMD-42V
AMD-42-TD
AMD-42V-TD



AMS/AMD Label

Easily Program Field-Supplied Controllers

Field supplied controllers can easily be programmed to work with any of Greenheck's airflow measuring products. The formula for converting pressure to CFM is shown on the "AMS/AMD Label" affixed to the side of every AMS and AMD series unit. On AMD-TD units, the analog output of the transmitter is directly proportional to airflow.

✓ = Standard O = Optional		AMS	AMD-23	AMD-33 AMD-42	AMD-42V	AMD-23-TD	AMD-33-TD AMD-42-TD	AMD-42V-TD
Velocity Range ft/min (m/s)	Minimum	300 (1.5)	300 (1.5)	300 (1.5)	300 (1.5)	100 (0.5)	100 (0.5)	100 (0.5)
	Maximum	2000 (10.2)	2000 (10.2)	3000 (10.2)	2000 (10.2)	2000 (10.2)	3000 (10.2)	3000 (10.2)
Accuracy		5%	5%	5%	5%	2-3%	2-3%	2-3%
Temperature Range °F (°C)	Minimum	-20° (-29°)	-20° (-29°)	-20° (-29°)	-20° (-29°)	-20° (-29°)	-20° (-29°)	-20° (-29°)
	Maximum	180° (82°)	180° (82°)	180° (82°)	180° (82°)	140° (60°)	140° (60°)	140° (60°)
Ambient Temperature Readout						✓	✓	✓
Factory-Supplied Transducer		✓	✓	✓	✓			
Factory-Supplied Transmitter						✓	✓	✓
Factory-Supplied Controller		O	O	O	O	O	O	O
Airflow Straightener		✓	✓	✓	✓	O	O	O
Blade Operation		-	Parallel	Parallel	Parallel	Parallel	Parallel	Parallel
Blade Orientation		-	Horizontal	Horizontal	Vertical	Horizontal	Horizontal	Vertical
Minimum Unit Depth inches (mm)		8 (203)	12 (305)	12 (305)	12 (305)	16 (406)	16 (406)	16 (406)
Minimum Size inches (mm)		6 x 8 (152 x 203)	6 x 6 (152 x 152)					
Maximum Size inches (mm)		60 x 48 (1524 x 1219)	144 x 148 (3658 x 3759)	144 x 148 (3658 x 3759)	74 x 48 (1880 x 1219)	120 x 120 (3048 x 3048)	120 x 120 (3048 x 3048)	74 x 60 (1880 x 1524)
Quick Build Program Available		✓	✓	✓	✓			

Controls

Factory-Supplied Controls

By adding a factory supplied controller, AMD and AMD-TD series airflow measuring dampers become a turn-key solution for measuring and controlling the flow of air. A factory-supplied controller can also be added to an AMS airflow measuring station to convert the signal from the pressure transducer to CFM. The CFM signal can then be used to control a field-supplied damper, regulate a fan's VFD, or signal an under-ventilation alarm. Greenheck offers two control solutions to meet your system needs. Go to **www.greenheck.com** for complete instructions on these two controllers.

Vari-Green Constant Volume Controller

Greenheck's Vari-Green Constant Volume Controller is a highly configurable analog-based controller. The controller can accept a CFM setpoint either remotely by way of an analog input or locally by using touch sensitive buttons on its cover. The controller then regulates the position of the AMD's actuator to deliver the requested CFM. An analog output on the controller also supplies a signal that is proportional to the real-time CFM.

The Vari-Green Constant Volume Controller features a two line backlit LCD display to show the user the current CFM setpoint, the real-time CFM, the current pressure reading, and the AMD's actuator position.

VAFB24-BAC GTD Actuator with Built-In BACnet™ MS/TP Controller

Greenheck's industry exclusive VAFB24-BAC GTD actuator integrates a fully functional BACnet MS/TP controller right inside of it. Simply set the desired CFM over the BACnet MS/TP network and the actuator will regulate the damper to the necessary position. The actuator will then communicate the real-time CFM back to the BAS.

Damper Leakage

Damper leakage (with blades fully closed) meet Class 1A and Class 1 requirements at appropriate pressures.

Test Information

Air leakage is based on operation between 32°F and 120°F (0° to 49°C).
Tested for leakage in accordance with ANSI/AMCA Standard 500-D, Figure 5.5.
Tested for air performance in accordance with ANSI/AMCA Standard 500-D, Figures 5.2, 5.3 and 5.5.

Torque

Data is based on a torque of 5.0 in-lb/ft² (0.56 N·m) applied to close and seat the damper during the test.

AMD-23	Leakage Class*	
Maximum Damper Width	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)
48 in. (1219mm)	1A	1

Torque

Data is based on a torque of 7.0 in-lb/ft² (0.79 N·m) applied to close and seat the damper during the test.

AMD-33	Leakage Class*		
Maximum Damper Width	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	8 in. wg (2 kPa)
60 in. 1524mm)	1A	1	1

***Leakage Class Definitions**

The *maximum* allowable leakage is defined by AMCA as the following:

- Leakage Class 1A - 3 cfm/ft² @ 1 in. wg (Class 1A is only defined at 1 in. wg)
- Leakage Class 1 - 4 cfm/ft² @ 1 in. wg
  - 8 cfm/ft² @ 4 in. wg
  - 11 cfm/ft² @ 8 in. wg
  - 12.6 cfm/ft² @ 10 in. wg

Maximum Leakage cfm/sq. ft. (cmh/sq.m)		
Model	Pressure	
	@ 1 in. wg (.25 kPa)	@ 4 in. wg (1 kPa)
AMD-42, AMD-42V, AMD-23-TD, AMD-33-TD, AMD-42-TD, AMD-42V-TD	3 (55)	6 (110)

Pressure Drop

Pressure drop testing was conducted in accordance with AMCA Standard 500-D. All data has been corrected to represent standard air at a density of .075 lb/ft³ (1.201 kg/m³).

Actual pressure drop found in any HVAC system is a combination of many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

AMD-23 and AMD-23-TD

Dimension inches	12 x 12			24 x 24			36 x 36			12 x 48			48 x 12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (ft/min)	Pressure Drop in. wg														
500	.05	.04	.07	.03	.03	.05	.03	.03	.05	.04	.03	.06	.03	.03	.05
1000	.15	.12	.25	.10	.09	.20	.09	.07	.17	.11	.10	.20	.11	.09	.20
1500	.31	.24	.54	.21	.17	.41	.18	.14	.36	.23	.20	.43	.22	.19	.42
2000	.52	.40	.92	.36	.28	.71	.31	.23	.62	.39	.34	.74	.38	.33	.72
2500	.80	.60	1.41	.54	.43	1.10	.46	.35	.96	.58	.51	1.13	.57	.50	1.11
3000	1.12	.84	2.02	.76	.60	1.54	.64	.48	1.36	.81	.72	1.59	.79	.71	1.56
3500	1.51	1.12	2.73	1.01	.80	2.09	.86	.64	1.84	1.10	.97	2.14	1.06	.96	2.12
4000	1.92	1.44	3.53	1.32	1.03	2.76	1.12	.82	2.40	1.43	1.26	2.78	1.38	1.24	2.77

Damper Pressure Drop

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AMD-33 and AMD-33-TD

Dimension inches	12 x 12			24 x 24			36 x 36			12 x 48			48 x 12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (ft/min)	Pressure Drop in. wg														
500	.04	.04	.07	.03	.03	.05	.03	.03	.05	.03	.03	.06	.04	.03	.05
1000	.13	.12	.24	.09	.09	.19	.08	.07	.16	.10	.10	.19	.10	.09	.19
1500	.27	.24	.50	.19	.17	.38	.16	.14	.34	.21	.20	.41	.21	.19	.41
2000	.44	.40	.86	.31	.28	.65	.26	.23	.57	.36	.34	.71	.36	.33	.71
2500	.66	.60	1.33	.47	.43	1.00	.39	.35	.88	.54	.51	1.09	.55	.50	1.10
3000	.93	.84	1.89	.65	.60	1.43	.53	.48	1.24	.76	.72	1.54	.77	.71	1.55
3500	1.25	1.12	2.57	.88	.80	1.9	.71	.64	1.67	1.02	.97	2.08	1.03	.96	2.10
4000	1.59	1.44	3.30	1.14	1.03	2.52	.91	.82	2.19	1.33	1.26	2.70	1.34	1.24	2.75

AMD-42 and AMD-42-TD

Dimension inches	12 x 12			24 x 24			36 x 36			12 x 48			48 x 12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (ft/min)	Pressure Drop in. wg														
500	.05	.03	.07	.01	.01	.04	.01	.01	.02	.01	.01	.03	.03	.02	.05
1000	.18	.12	.28	.05	.03	.17	.04	.02	.12	.01	.04	.18	.11	.06	.19
1500	.43	.28	.62	.12	.06	.37	.09	.05	.28	.14	.09	.40	.25	.14	.44
2000	.76	.49	1.11	.22	.11	.66	.17	.08	.50	.25	.16	.72	.44	.25	.78
2500	1.19	.77	1.73	.34	.17	1.04	.26	.13	.78	.39	.25	1.12	.69	.39	1.21
3000	1.71	1.11	2.50	.49	.24	1.50	.38	.19	1.13	.57	.36	1.62	1.00	.57	1.75
3500	2.33	1.51	3.41	.66	.33	2.04	.51	.26	1.53	.77	.49	2.21	1.36	.77	2.38
4000	3.04	1.98	4.45	.87	.43	2.66	.67	.34	2.01	1.01	.64	2.88	1.78	1.01	3.11

AMD-42V and AMD-42V-TD

Dimension inches	12 x 12			24 x 24			36 x 36			12 x 48			48 x 12		
AMCA figure	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5	5.2	5.3	5.5
Velocity (ft/min)	Pressure Drop in. wg														
500	.05	.03	.07	.01	.01	.04	.01	.01	.02	.03	.02	.05	.01	.01	.03
1000	.18	.12	.28	.05	.03	.17	.04	.02	.12	.11	.06	.19	.01	.04	.18
1500	.43	.28	.62	.12	.06	.37	.09	.05	.28	.25	.14	.44	.14	.09	.40
2000	.76	.49	1.11	.22	.11	.66	.17	.08	.50	.44	.25	.78	.25	.16	.72
2500	1.19	.77	1.73	.34	.17	1.04	.26	.13	.78	.69	.39	1.21	.39	.25	1.12
3000	1.71	1.11	2.5	.49	.24	1.5	.38	.19	1.13	1.00	.57	1.75	.57	.36	1.62
3500	2.33	1.51	3.41	.66	.33	2.04	.51	.26	1.53	1.36	.77	2.38	.77	.49	2.21
4000	3.04	1.98	4.45	.87	.43	2.66	.67	.34	2.01	1.78	1.01	3.11	1.04	.64	2.88

Greenheck Fan Corporation certifies that the model AMD-23 and 33 shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Programs. The AMCA Certified Ratings Seal applies to Air Leakage and Air Performance ratings.

Features/Options

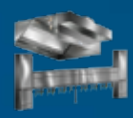
QR Codes

QR (Quick Response) codes have been added to the labels on commercial control and air measuring dampers.

When you scan the QR code with your smartphone, it will link to www.greenheck.com based on the model.

Clean Wrap

In the Indoor Air Quality section of the Green Building and LEED Core Concepts Guide 2009, you need to protect air quality during construction and prevent dust and particulate buildup. Greenheck offers Clean Wrap to help meet this requirement. Clean Wrap is a thin film that adheres to the ends of the damper sleeve to prevent dust, dirt and debris from entering the damper at the construction site.



Enjoy Greenheck's extraordinary service, before, during and after the sale.

Greenheck offers added value to our wide selection of top performing, energy-efficient products by providing several unique Greenheck service programs.

- Our **Quick Delivery** Program ensures shipment of our in-stock products within 24 hours of placing your order. Our **Quick Build** made-to-order products can be produced in 1-3-5-10-15 or 25-day production cycles, depending upon their complexity.
- Greenheck's free **Computer Aided Product Selection** program (CAPS), rated by many as the best in the industry, helps you conveniently and efficiently select the right products for the challenge at hand.
- Greenheck has been **Green** for a long time! Our energy-saving products and ongoing corporate commitment to sustainability can help you qualify for LEED credits.
- Our **3D service** allows you to download at no charge lightweight, easy-to-use AutoDesk™ Revit™ 3D drawings for many of our ventilation products.

Find out more about these special Greenheck services at **greenheck.com**

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

Prepared to Support Green Building Efforts

GREENHECK
Building Value in Air.

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