



AMS-60 AIRFLOW MONITORING DEVICE

APPLICATION GUIDE

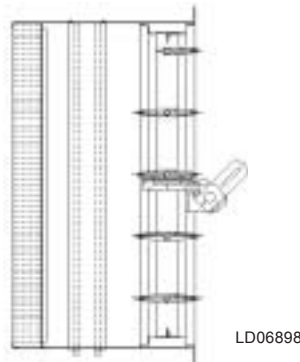
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Form 102.20-AG1 (303)

FOR USE IN SOLUTION AIR HANDLING UNITS

GENERAL

The YORK AMS-60 is an airflow monitoring device which combines the functions of control damper and airflow measurement station into one assembly. It is ideally suited for factory installation in Solution air handling units. **The YORK AMS-60 is tested to AMCA Standard 611-95 and qualifies to bear the AMCA Ratings Seal for Airflow Measurement Performance.**



DAMPER OPERATION

The AMS-60 airflow monitoring damper design incorporates a low leakage control damper with stationary, vertical air monitoring blades and air straightening section into one assembly. The control damper utilized for modulating airflow is the ultra-low leak Ruskin CD-60 with its standard blade and jamb seals used for low leakage. Strategically placed stationary and vertical airflow sensing blades measure the airstream velocity pressure. Air tubing/piping connections are provided to connect the sensing blades to an optional factory-mounted transducer. The transducer converts the velocity pressure from the sensing blades to an electrical output signal for the Building Automation System (BAS). The output signal corresponds directly to flow through the damper. The BAS compares this signal to the design CFM setpoint as determined by the particular mode of operation of the HVAC system. In normal

operation, this setpoint corresponds to the minimum outside air ventilation required by the system design to meet ASHRAE Standard 62. Based on the difference between the actual CFM reading and the desired setpoint, the BAS would send a signal to the optional, factory-mounted control damper Actuator to position the damper blades as necessary to ensure that the actual outside airflow meets the desired level.

NO FILTRATION REQUIRED

No filtration is required upstream of the AMS-60 damper, as normal amounts of moisture, dirt and dust do not affect the performance of the airflow station. Dirt and debris will not enter the stationary sensing elements since flow does not occur through them.

NO CALIBRATION REQUIRED

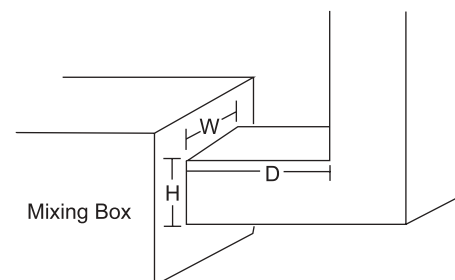
The AMS-60 airflow monitoring damper is factory calibrated. Calibration is not required at the jobsite. The optional factory-mounted transducer includes fully temperature compensated NIST traceable accuracy and calibration. Three field selectable pressure ranges eliminate the need for field re-calibration.

DUCTWORK INLET REQUIREMENTS

When connecting the ductwork to a mixing box with an AMS-60 damper, a minimum of one (1) equivalent duct diameter of straight duct is required before entering the AMS-60 damper.

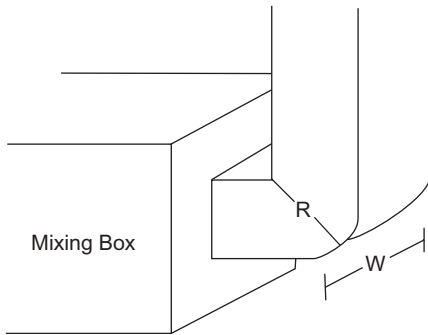
1 equivalent duct diameter = d

$$d = \sqrt{(4 \times W \times H) / \pi}$$



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If one equivalent duct diameter cannot be achieved during installation, the rectangular elbow may be substituted with a radius elbow. The outside radius must have a R/W ratio of 0.75 or more.



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DAMPER LINKAGE ARRANGEMENTS

The AMS-60 mixing box will ship with independent return air and outside air damper actuators if selected in the MB or FM segments.

LOUVER/DAMPER COMBINATION

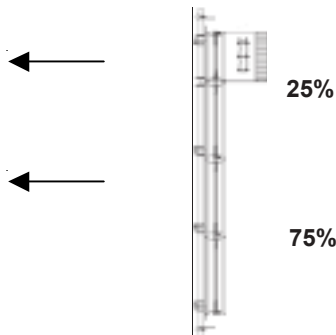
Outdoor Solution economizer and mixing box sections will utilize an integral rain resistant, airflow sensing louver/damper combination with operation and set-up similar to the AMS-60. The indoor and outdoor Solution designs have the same possible damper configurations.

DAMPER CONFIGURATIONS

There are 3 possible damper configurations, 25% Sensing option (Min./Max.), 25%/75% Sensing option, and 100% Sensing option.

- **25% Sensing Option (Min./Max.)**

The 25% Sensing (Min./Max.) option arrangement is a



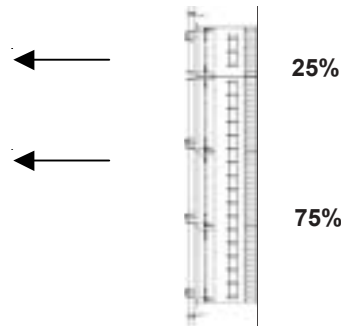
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25% Sensing Option

dual damper design and used for measuring the minimum outside air requirement. In this arrangement, the 25% damper would be for monitoring airflow through the first 25% down to 3.75% nominal flow and the 75% damper would have a separate actuator and used for economizer control only.

This option would be the best low cost option for areas in which economizer cycles are not often seen, such as the southeast, and are required to constantly operate in at the minimum outside air position.

- **25/75% Sensing Option**



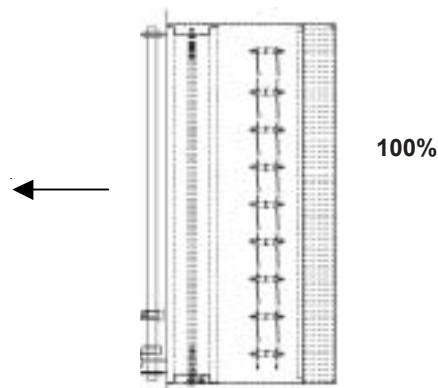
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25/75% Sensing Option

The 25/75% Sensing option arrangement is similar to the 25% Sensing (Min./Max.) option, but allows you to measure airflow throughout the economizer cycle also. In this arrangement, the 25% damper would be for monitoring nominal airflow through the first 25% down to 3.75% and the 75% damper would be for monitoring the remaining 75%.

- **100% Sensing Option**

The 100% sensing arrangement is a single damper design used to measure airflow throughout the full range of the outside air damper down to 15% of nominal airflow.



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100% Sensing Option

The 100% sensing option is the lowest cost option, but should not be utilized when minimum airflow to be sensed falls below 15% nominal flow. The 25% Sensing (Min./Max.) and 100% Sensing option arrangements will be the most prevalent.

The 100% Sensing arrangement with the outside and return air dampers tied to a common actuator, will usually be the most common configuration and cost-effective solution. However, areas in which economizer cycles are not often seen and operate primarily in minimum outside air position, the 25% Sensing option should be the preferred option for lowest airflow monitoring and a cost-effective solution.

In each of the available configurations, the minimum airflow across the sensing portion of the airflow monitoring station is 300 fpm for the Indoor Solution and 345 FPM for the Outdoor Solution.

Factory-mounted Control Option

The AMS-60 airflow monitoring station may be ordered with or without Factory-mounted End Devices. The Optional End Devices must be selected through the YorkWorks program and consist of the following:

- Modulating, Spring Return Actuator(s)
- Low Pressure Transducer(s)

YorkWorks will provide all wiring schematics.

JUMPER SELECTIONS

The AMS60 factory provided transducers technically provides six (6) jumper selections which allow you to select the appropriate range for your application. However, only three (3) are applicable to the AMS60 function. The jumper selections are as follows: 0-1", 0-.5", and 0-.25". These are field adjustable. To determine the correct jumper setting for your application, refer to the equation and examples on page 4 for Indoor Solution units and page 5 for Outdoor Solution Units.

INPUT POWER

A 24VAC power supply can be wired into the supply voltage terminals on the Factory-mounted Actuator and Transducer.

CFM Input Signal to Damper Actuator

2-10VDC (BELIMO)
0-10 VDC (YORK)

CFM Output Signal from Transducer

0-10VDC

SEQUENCE OF OPERATION

A 0-10 VDC or 2-10VDC control signal is sent to the AMS 60 damper actuator from the Building Automation System (BAS). The BAS maintains the required cfm by modulating the actuator on the control damper. The BAS receives a 0-10 VDC signal back from the transducer, confirming the cfm supplied. Upon loss of power, the AMS-60 actuator returns to a closed position.

END DEVICES REQUIREMENTS*

It is necessary for an independent contractor to provide controls capable of sending 0-10 VDC or a 2-10VDC signal to the actuator and receiving a 0-10VDC signal back from the transducer. A 24VAC power source must be provided.

* This paragraph only applies if the actuator and transducer are YORK supplied. Any controls provided by "others" are the contractor's responsibility.

AHU AIRFLOW STATION SPECIFICATIONS

Furnish and install, at locations indicated on plans and/or schedules, an air monitoring station integral with outside air control damper, stationary airflow sensing device, and air straightening section. The integral air monitoring station shall incorporate pressure sensing ports built into the sensing device and shall control the minimum amount of outside air as recommended by ASHRAE 62-2001. The airflow monitoring station must be tested in accordance with AMCA Standard 611-95 in an AMCA registered laboratory. The airflow monitoring station must bear the AMCA Certified Ratings Seal for Airflow Measurement Performance. If airflow station is internally mounted inside air handling unit and incorporates a control damper, the control damper must comply with leakage rates of damper specification.

If ASHRAE 90.1 is referenced, also include:

If airflow station is internally mounted inside air handling unit and incorporates a control damper, the control damper must comply with leakage rates per ASHRAE 90.1-1999. All damper leakage rates must be provided in submittal data on a CFM/sq ft at 1" w.g. basis.

AMS60 (Indoor Solution)

Use the following equation to determine the correct jumper setting for your application:

$$CFM=(AREA*Ka)*Pams^{(1/m)}, \text{ where } Ka = 3213$$

$Pams = \text{Range of transmitter, and } (1/m) = 0.54.$

TABLE 1 – BAD APPLICATION

Unit Name	Unit Size	Fan Design Flow (CFM)	AMS Sensing (%)	AMS O.A. Setpoint (CFM)	AMS60 Sensing Damper Dimensions 100% Sensing		AMS Sensing Area (Sq. Ft.)
					"A" Dim. (In.)	"B" Dim. (In.)	
AHU-01	AP-580	21370	100	7000	90	32.75	20.5

RANGE: 0.0 TO +0.25	
Minimum	Maximum
0	0.25

Comments: The range of the measuring device - whether a transducer, magnehelic, or manometer - must have a range no greater than 0.25" w.c. in order to measure the setpoint of 7000 cfm. Suggestion: if possible to gain the resolution to accurately read the cfm, sensor range should be 0.025" w.c. Minimum sensing in FPM for an AMS60 is 300 fpm; due to the size of the air measuring station, the FPM limitation is very close. To increase the "sensing" instruments/transducer, the size of the AMS60 would have be reduced. Hence, the 25% Min/Max sensing option would be a much better choice for this application.

Volts	Pams	CFM	FPM
0	0.00	0.00	0.00
1	0.03	8972.01	438.33
2	0.05	13045.05	637.32
3	0.08	16238.10	793.31
4	0.10	18967.15	926.64
5	0.13	21396.04	1045.30
6	0.15	23609.75	1153.45
7	0.18	25659.17	1253.58
8	0.20	27577.71	1347.31
9	0.23	29388.72	1435.78
10	0.25	31109.26	1519.84

TABLE 2 – GOOD APPLICATION

Unit Name	Unit Size	Fan Design Flow (CFM)	AMS Sensing (%)	AMS O.A. Setpoint (CFM)	AMS60 Sensing Damper Dimensions 25% Sensing		AMS Sensing Area (Sq. Ft.)
					"A" Dim. (In.)	"B" Dim. (In.)	
AHU-01	AP-580	21370	25	7000	22.5	32.75	5.1

RANGE: 0.0 TO +0.25	
MIN	MAX
0	0.25

Comments: Comparing the two tables, the 25% Min/Max sensing option would provide more control. Note that the FPM remains the same for both options, while the CFM range is expanded for more accurate readings. If the 100% sensing option were to be selected, the controller would be forced to recognize a signal between 1 and 2 volts. The dampers would fluctuate constantly, working to find the setpoint.

VOLTS	Pams	CFM	FPM
0	0.00	0.0	0.00
1	0.03	2243.0	438.33
2	0.05	3261.3	637.32
3	0.08	4059.5	793.31
4	0.10	4741.8	926.64
5	0.13	5349.0	1045.30
6	0.15	5902.4	1153.45
7	0.18	6414.8	1253.58
8	0.20	6894.4	1347.31
9	0.23	7347.2	1435.78
10	0.25	7777.3	1519.84

NOTES:

- CFM corrected to 70°F and 1,000 ft. elevation. For other elevations add 2% per 1,000 ft. increase and 1% per 10°F increase in temperature.
- The following information is required for **each** AMS 60 damper ordered:
 - Minimum Outside Air (OSA) CFM (minimum CFM at which damper will operate).
 - Maximum Outside Air CFM (maximum CFM at which damper will operate).
 - CFM setpoint (In normal operation, this setpoint corresponds to the minimum OSA ventilation rate).

Recommended operating range is 300-2,000 FPM.

Operation outside these parameters is not recommended.

AIRFLOW MONITORING STATION WITH LOUVERS/HOODS (Outdoor Solution)

Use the following equation to determine the correct jumper setting for your application:

$$CFM=(AREA * K_a) * P_{ams}^{(1/m)}, \text{ where } K_a = 3833$$

P_{ams} = Range of transmitter, and $(1/m) = 0.52$.

TABLE 3 – BAD APPLICATION

Unit Name	Unit Size	Fan Design Flow (CFM)	AMS Sensing (%)	AMS O.A. Setpoint (CFM)	AMS60 Sensing Damper Dimensions 100% Sensing		AMS Sensing Area (Sq. Ft.)
					"A" Dim. (In.)	"B" Dim. (In.)	
AHU-01	CP-400	21370	100	7000	90	32.75	20.5

RANGE: 0.0 TO +0.25	
MIN	MAX
0	0.25

Comments: The range of the measuring device - whether a transducer, magnehelic, or manometer - must have a range no greater than 0.25" w.c. in order to measure the setpoint of 7000 cfm. Suggestion: if possible to gain the resolution to accurately read the cfm, sensor range should be 0.025" w.c. Minimum sensing in FPM for an AMS60 is 345 fpm; due to the size of the air measuring station, the FPM limitation is very close. To increase the "sensing" instruments/transducer, the size of the AMS60 would have been reduced. Hence, the 25% Min/Max sensing option would be a much better choice for this application.

VOLTS	Pams	CFM	FPM
0	0.00	0.00	0.00
1	0.03	11522.82	562.95
2	0.05	16523.21	807.24
3	0.08	20401.50	996.71
4	0.10	23693.55	1157.55
5	0.13	26608.68	1299.97
6	0.15	29254.83	1429.24
7	0.18	31696.40	1548.53
8	0.20	33975.49	1659.87
9	0.23	36121.44	1764.71
10	0.25	38155.66	1864.09

TABLE 4 – GOOD APPLICATION

Unit Name	Unit Size	Fan Design Flow (CFM)	AMS Sensing (%)	AMS O.A. Setpoint (CFM)	AMS60 Sensing Damper Dimensions 25% Sensing		AMS Sensing Area (Sq. Ft.)
					"A" Dim. (In.)	"B" Dim. (In.)	
AHU-01	CP-400	21370	25	7000	22.5	32.75	5.1

RANGE: 0.0 TO +0.25	
MIN	MAX
0	0.25

Comments: Comparing the two tables, the 25% Min/Max sensing option would provide more control. Note that the FPM remains the same for both options, while the CFM range is expanded for more accurate readings. If the 100% sensing option were to be selected, the controller would be forced to recognize a signal between 1 and 2 volts. The dampers would fluctuate constantly, working to find the setpoint.

VOLTS	Pams	CFM	FPM
0	0.00	0.0	0.00
1	0.03	2880.7	564.84
2	0.05	4130.8	809.96
3	0.08	5100.4	1000.07
4	0.10	5923.4	1161.45
5	0.13	6652.2	1304.35
6	0.15	7313.7	1434.06
7	0.18	7924.1	1553.75
8	0.20	8493.9	1665.47
9	0.23	9030.4	1770.66
10	0.25	9538.9	1870.38

NOTES:

- CFM corrected to 70°F and 1,000 ft. elevation. For other elevations add 2% per 1,000 ft. increase and 1% per 10°F increase in temperature.
- The following information is required for **each** AMS 60 damper ordered:
 - Minimum Outside Air (OSA) CFM (minimum CFM at which damper will operate).
 - Maximum Outside Air CFM (maximum CFM at which damper will operate).
 - CFM setpoint (In normal operation, this setpoint corresponds to the minimum OSA ventilation rate).

Recommended operating range is 345-2,000 FPM.

Operation outside these parameters is not recommended.

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