AFG VAV DAMPER AIR VOLUME CONTROL

Combined FGG Flowgrid and ATG Damper
Airtight Damper construction to DIN 1946 T4
Compact Constant or Variable Volume control
Sturdy Actuator drive spindle 12mm Ø
Embedded quality seals in damper blades
Special moulded seals on each blade end
Brass bearings with 'O' ring seals on drive shaft
Standard Frame sizes 20mm and 30mm
Height in 100mm and width in 50mm increments
Works with all CMR actuators and controllers
CMR standard 24 month warranty
35 Years field application experience

*The AFG is an FGG Flowgrid with an ATG Damper*

The AFG Volume control Damper has been designed to control air volume in ventilation ducts. The AFG consists of a galvanized steel ATG Damper and a bolted on in FGG Fowgrid. The length is 410mm and has a 30mm flange duct connection to suit standard galvanized steel duct work. The galvanized steel damper blades are fitted across the internal frame area. Each end of the blade is firmly secured in brass bearings which have 'O' ring seals to the outside. A dust protection cap is fitted on the outside over the bearing and shaft. Heavy duty cast aluminium gears are fitted on the drive side of the damper and are located inside the frame. The drive shaft is standard 12mm Ø and an actuator bracket is fitted to suit the CMR actuators. The blades have embedded lip seals and side seals so that the DIN 1946 T4 airtight specification can be achieved.

The AFG DAMPER is a complete assembled construction and are manufactured in standard height increments of 100mm going up to a maximum height of 1200mm. The width of the DAMPER is manufactured in increments of 50mm up to 1200mm.

The AFG Damper has an end stop when it is closed and the seal shall be firmly pressed against the frame. At this point, the actuator needs just a little more torque to seal it. The actuator is factory commissioned to close and open over 90º but angle limit adjustments can be achieved via the actuator. At the entrance of the AFG is the CMR FGG flowgrid fitted which measures both the air flow impact and the static pressure which is the velocity pressure. This velocity pressure is then converted by the CMR P-Sensor into an air volume measurement. to provide total air volume measurement. Dual dampers i.e. a 100mm and a 500mm can be welded together. One DPC controller can drive two actuators and very low and high volumes can be measured and controlled. Turn down rates of 40:1 can be achieved with a dual AFG by carefully selecting the AFG sizes.

The dampers can be operated vertically or horizontally but is not recommended to have the controller and actuator hanging at the bottom of the AFG when installed on site.

AFG VAV is a combination of an ATG Damper and an FGG Flowgrid providing accurate air volume

Airflow

CMR Actuator

ATG Damper
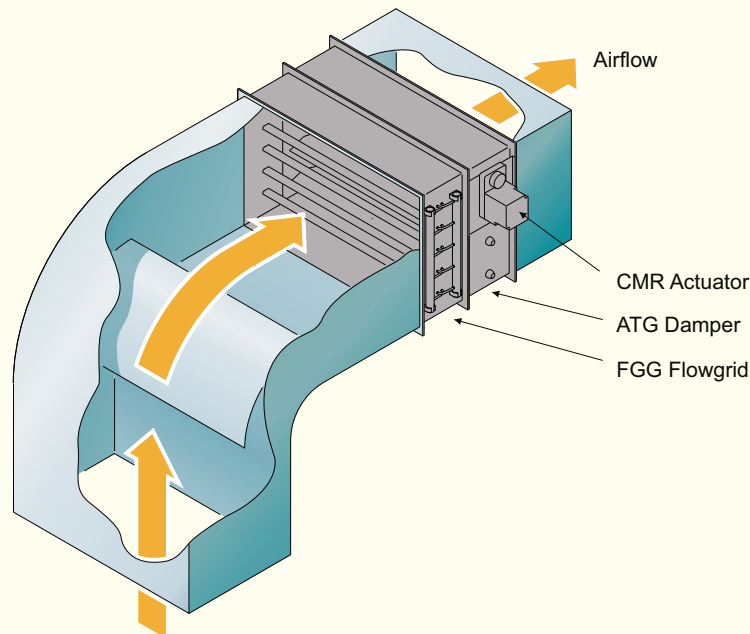
FGG Flowgrid

AFG FLOW CONTROLLER INSTALLATION

T-JUNCTION

The AFG Flow controller is best installed in a straight duct with a length before the Fowgrid. The AFG Flowgrid can be installed after a T-Section shown on the the right but a straight duct section is recommended after the 'T'. The FGG Flowgrid is always on the air entrance of the AFG.
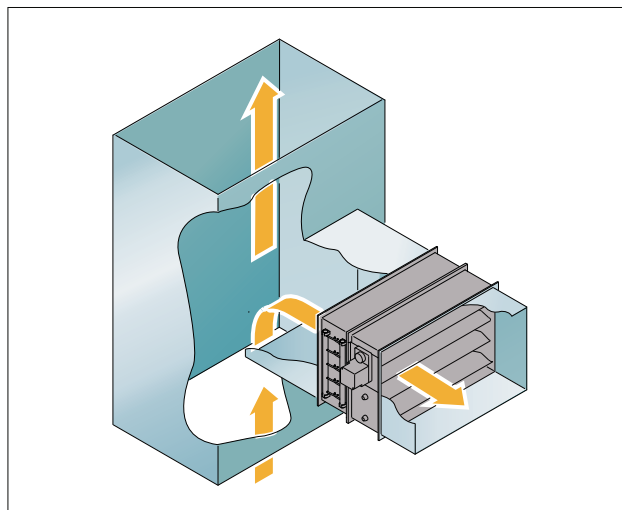
AFG Flow Controller after a T- duct section

ELBOW

The AFG Flowgrid can be installed after an elbow as shown on the right. Best is to have room for a straight duct before the Flowgrid.
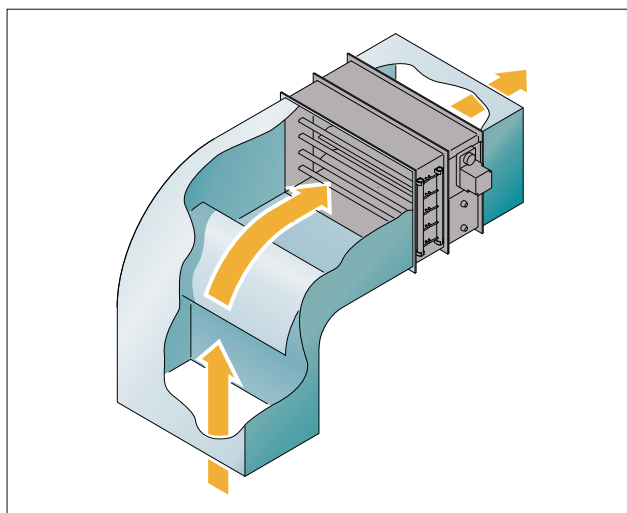
AFG FlowController after an elbow duct section

BRANCH

If the duct on the right cannot be fitted with an AFG Flow Controller then the bottom AFG Flowcontroller measures the total volume coming up and the top AFG Flowcontroller measures what is left over. The difference is the volume which passes through the duct on the right, which can be controlled by the two AFGs. It is best to allow for a straight duct length before the FGG Flowgrid.
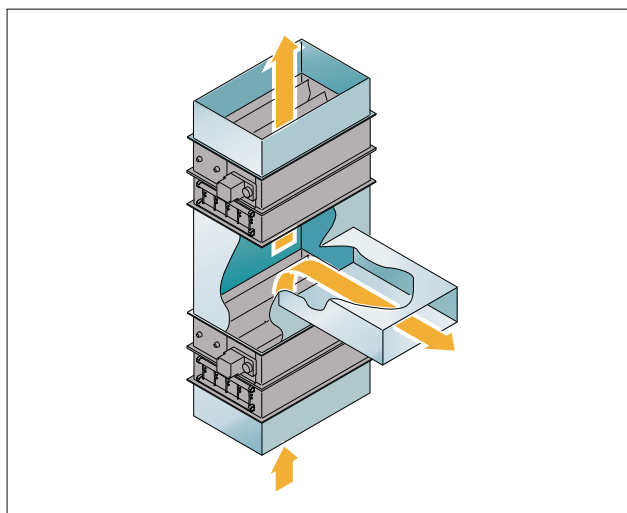
AFG Flow Controller before and after a T section

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®
CMR

AFG FLOWGRID   VELOCITY PRESSURES

P-Sensor

Manifold Tank

Manifold Tank

Oval Flowprobe in Flowgrid
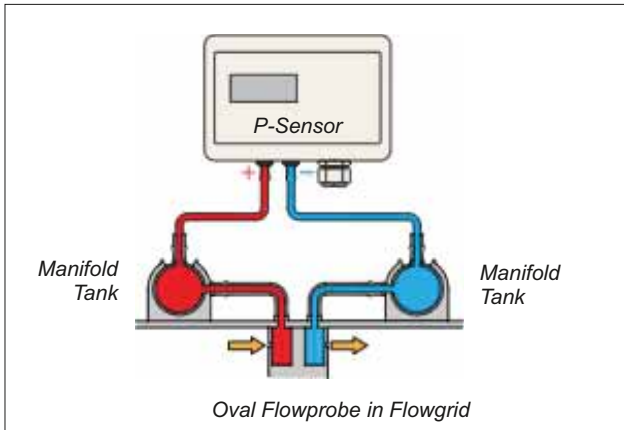
AFG Flowgrid and P-Sensor tube connections

The velocity pressure is measured by the Oval Flowprobe built into the AFG Flowgrid and the total impact pressure is measured on the positive (+red) and the static pressure is measured on the negative (- blue) manifold tanks The P-Sensor shall be connected to the corresponding tanks using CMR PVC red and blue tube.

When the P-Sensor is ordered with the AFG Flowgrid then it is pre-adjusted at the factory - i.e. duct width and height, density and AFG Flowgrid Magnification Factor (mf) and the range is in m^3/s, m^3/h or l/s..

It is ready for connection to the control or monitoring system.

If the P-Sensor was ordered separately and it was not factory adjusted then it is quite simple to adjust the parameters on site.

The P-Sensor has a keyboard and the duct height and width must be entered. The magnification factor of the AFG Flowgrid must be entered which is normally 1.650, if it is installed in a straight duct.

If the volume indicated on the P-Sensor display is deviating from the actual measurements, then the magnification factor can be adjusted to suit the installation abnormalities via the P-Sensor keyboard.

Adjust the fan to a constant volume – start with 50% of the minimum and maximum operating volume and take a pitot travers reading with a CAL150 or other instrument. Once the average volume has been established and it is not the same as displayed on the P-Sensor, then adjust the Magnification Factor (mf) until the same display is achieved. For higher accuracy try this at 25%, 75% and 100% volume set point The P-Sensor has also parameters to linearize the measurements for more critical applications.

Useful AFG Flowgrid scaling formula:

$$\text{velocity m/s} = \sqrt{\frac{2 \times (\Delta P \text{ in Pa / mag factor})}{1.2 \quad \text{Density}}}$$

Example:

2 x (100Pa across AFG / 1.650 mf) = 121.21 / 1.2 = 101.01
$\sqrt{}$ 101.01 = 10.05 m/s
10.05 m/s x (duct height 'h' x duct width 'w') = ... m^3/s * 3600 = m^3/h

Conversion Table - Velocity in m/s at standard density to Velocity Pressure in Pa

m/s	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.00	0.01	0.02	0.05	0.10	0.15	0.22	0.29	0.38	0.49
1	0.60	0.73	0.86	1.01	1.18	1.35	1.54	1.73	1.94	2.17
2	2.40	2.65	2.90	3.17	3.46	3.75	4.06	4.37	4.70	5.05
3	5.40	5.77	6.14	6.53	6.94	7.35	7.78	8.21	8.66	9.13
4	9.60	10.09	10.58	11.09	11.62	12.15	12.70	13.25	13.82	14.41
5	15.00	15.61	16.22	16.85	17.50	18.15	18.82	19.49	20.18	20.89
6	21.60	22.33	23.06	23.81	24.58	25.35	26.14	26.93	27.74	28.57
7	29.40	30.25	31.10	31.97	32.86	33.75	34.66	35.57	36.50	37.45
8	38.40	39.37	40.34	41.33	42.34	43.35	44.38	45.41	46.46	47.53
9	48.60	49.69	50.78	51.89	53.02	54.15	55.30	56.45	57.62	58.81
10	60.00	61.21	62.43	63.65	64.90	66.15	67.42	68.69	69.98	71.29
11	72.60	73.93	75.26	76.61	77.98	79.35	80.74	82.13	83.54	84.97
12	86.40	87.85	89.30	90.77	92.26	93.75	95.26	96.77	98.30	99.85
13	101.40	102.97	104.54	106.23	107.74	109.35	110.98	112.61	114.26	115.93
14	117.60	119.29	120.98	122.69	124.42	126.15	127.90	129.65	131.42	133.21
15	135.00	136.81	138.62	140.45	142.30	144.15	146.02	147.89	149.78	151.69
16	153.60	155.53	157.46	157.46	159.41	161.38	163.35	165.34	167.33	169.34
17	173.40	175.45	177.50	179.57	181.66	183.75	185.86	187.97	190.10	192.25
18	194.40	196.57	198.74	200.93	203.14	205.35	207.58	209.81	212.06	214.33
19	216.60	218.89	221.18	223.49	225.82	228.15	230.50	232.85	235.22	237.61
20	240.00	242.41	244.82	247.25	249.70	252.15	254.62	257.09	259.58	262.09
21	264.60	267.13	269.66	272.21	274.78	277.35	279.94	282.53	285.14	287.77
22	290.40	293.05	295.70	298.37	301.06	303.75	306.46	309.17	311.90	314.65
23	317.40	320.17	322.94	325.73	328.54	331.35	334.18	337.01	339.86	342.73
24	345.60	348.49	351.38	354.29	357.22	360.15	363.10	366.05	369.02	372.01
25	375.00	378.01	381.02	384.05	387.10	390.15	393.22	396.29	399.38	402.49

To get the range of the P-Sensor use the keyboard and display the range . This is the sensor range in m^3/s, m^3/h or l/s at 10V / 20mA. Enter this range into your control system. No further calculations are necessary. If you want to use the table above, use the range of the transmitter in Pa and divide it by the (mf) of the AFG. Look up the velocity above. i.e. 100Pa / 1.65 = 60.60 Pa.

Look up above ~ 60 Pa and read on side and top ~ 10 m/s then multiply with duct area in m^2 to get m^3/s and multiply 3600 to get m^3/h.

AFG VOLUME DAMPER   SPECIFICATIONS

Selection of Volume Control Damper

It is essential to determine the air volume during the design stage. Normally there is a minimum and a maximum volume which has to be controlled.

The duct area should be calculated so that the velocity is approximately 2.5m/s at the minimum volume and preferably 5m/s at the operating point if possible. If the velocity is more than 5m/s at the maximum volume then the noise level criteria needs to be considered.

The maximum velocity should not exceed 9m/s as the duct resistance shall increase and the overall energy consumption shall go up.

The AFG Damper has 100mm blades complete with seals and have a long diamond shape with an embedded drive arrangement. The reduced internal area of the damper and Flowgrid shall increase the velocity pressure momentarily but will have a regain of pressure after passing through the AFG. Therefore the overall pressure drop is be kept at a minimum.

The heavy duty cast aluminium drive gears are located internally, having seals to the side. The advantage is that the wheels are not on the outside which could cause a hazard during automatic operation.

Installation

The AFG Damper works in any position, but it is best if the blades and actuator are positioned horizontally. This way, the weight is reduced on the side seals and provide a long term maintenance free operation. It is also easier for the maintenance engineers to replace the actuator. Care must be taken during installation, that there is sufficient space for the engineers to adjust and replace the DPC controller and actuator . A 600mm space would be recommended.

Hysteresis

The AFG Dampers have a very low hysteresis due to the aluminium precision cast gears and therefore the damper can be moved very accurately to a control position.

Maintenance

The AFG Damper is maintenance free.

Materials

Frame	- Galvanised Sheet Metal
Blades	- Galvanised Sheet Metal
Drive Wheels	- Cast Aluminium
Drive Shaft	- Zinc Plated Steel
Bearing	- Brass with 'O' ring seal
Seals	- EPDM on request
Actuator Bracket	- Galvanised Sheet Metal
FGG Flowgrid	- Anodized Aluminium

Internal height   'h' from 100mm up to 1200mm in 100mm steps
Internal width   'w' from 100mm up to 1200mm in 50mm steps
External length 'd' 410mm
Standard Duct Frame 30mm with corner holes
Actuator Mounting Bracket with Actuator fitted optional.
The actuator selection depends on AFG size and torque.

Recomended min and max Velocities

Recommended minimum air velocity is	2.5 m/s
Recommended operating air velocity is	5 m/s
Maximum recommended air velocity is	9 m/s
Free Open Area	84 %

Humidity 10% to 90% non condensing.
Operating Temperature (dry condition)   -5 to 60°C

AFG Dimensions

Pressure Drop with Damper fully open

Sound Performance Level with open damper

Noise levels depend on duct pressure and damper position. They have to be estimated at the operating point.

AFG DAMPER ORDER SELECTION

HOW TO USE THE PART NUMBER SELECTOR

Call sales at CMR and provide the duct dimension such as height and width, the minimum and maximum air volume in l/s, m3/s or m3/h and how it is to be mounted in the duct.

You can however configure the part number yourself by using the table below. The selection table has been prepared to make ordering easy. Each column contains a number of different options which can be selected to configure a part number using the duct dimensions. Base the selection on 5 m/s velocity in the duct.

Example Part Number configuration
The code after the [=] sign is used to form the number

The example part number AFG-0300-0800-410-30 which is printed above the selection table can be used to try to configure a Part Number to be used in your new application. Please always use the '-' between each selection.

The sample shows it is a combined ATG Damper and FGG Flowgrid named AFG, having a base part Number of AFG - the height 'h' is 300m, the width 'w' is 800mm, the damper Length 'd' is 410mm and the Duct Flange is 30mm,

AFG	0300	0800	410	30
Damper	Height	Width	Length	Flange
Part No.	'h' mm	'w' mm	'd' mm	Size mm
Base = AFG	h = 0100	w = 0100	d = 410	Flange = 30
	h = 0200	w = 0150		
	h = 0300	w = 0200		
	h = 0400	w = 0250		
	h = 0500	w = 0300		
	h = 0600	w = 0350		
	h = 0700	w = 0400		
	h = 0800	w = 0450		
	h = 0900	w = 0500		
	h = 1000	w = 0550		
	h = 1100	w = 0600		
	h = 1200	w = 0650		
		w = 0700		
		w = 0750		
		w = 0800		
		w = 0850		
		w = 0900		
		w = 0950		
		w = 1000		
		w = 1050		
		w = 1100		
		w = 1150		
		w = 1200		

Damper Dimensions

HOW TO ORDER

EXAMPLE
A Galvanised AFG damper to control air volume is required
The duct height must be 600 mm
The duct width must be 950 mm
The duct is long enough to fit an AFG damper with a length of 410mm.
The damper can be mounted onto the duct with a 30mm Flange..

The part number for this AFG Damper is AFG-0600-0950-410-30

Now try to select your Damper for your installation

Call CMR for free assistance at any time.

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