



Model FBV-33

Vertical Face & Bypass Control Damper Low Leakage

Application and Design

The FBV-33 is a vertical style face and bypass low leakage damper with steel airfoil blades. This model is intended for application in medium to high pressure and velocity systems.

The FBV-33 is IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm per sq. ft. at 1 in. wg (55cmh/m²) or less.

Vertical style face and bypass control dampers are used in applications where face and bypass dampers are needed one over the top of the other. The units are connected causing one damper to open and the other damper to close.



Width and Height is based on outside dimension. **Actual sizing only.**

Construction	Standard	Optional
Frame Material	Galvanized steel	-
Frame Thickness	16 ga. (1.5mm)	12 ga. (2.7mm)*
Frame Type	5 in. x 1 in. Channel (127mm x 25mm)	-
Blade Material	Galvanized steel	-
Blade Thickness	14 ga. equivalent (2mm)	-
Blade Type	Airfoil	-
Blade Action	Parallel	Opposed
Bypass Location	Above Face	Below Face
Blade Seals	TPE	Silicone
Axle Bearings	Synthetic	316SS
Linkage Material	Plated steel	316SS
Axle Material	Plated steel	316SS
Jamb Seal	Stainless steel	-
Paint Finishes	None	Baked Enamel, Hi Pro Polyester, Industrial Epoxy

*When 12 ga. frame is selected and the damper height is less than 17 inches, low profile top and bottom frame members are utilized. These low profile frame members will be made from 16 ga. material.

Damper Ratings

Pressure: Up to 8 in. wg (2 kPa) - pressure differential
For pressures greater than 8 in wg, consult factory.

Velocity: Up to 4000 fpm (20.3 m/s)

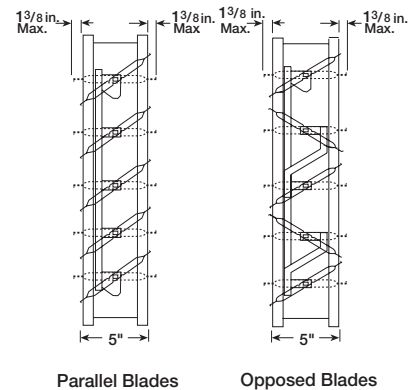
Leakage: Class 1A at 1 in. wg (.25 kPa)
Class 1 at 4-8 in. wg (1kPa - 2kPa)

Temperature: Up to 250°F (121°C) (Consult factory for higher temperatures)

Features & Options:

- Low profile head and sill are used on sizes less than 17 in. high (432mm).
- Electric actuators and manual operators available. Factory supplied actuators are sized for 1500 fpm (7 m/s) and a fully-closed differential pressure of 2 in. wg (.5kPa). Contact factory for actuator sizing and applications exceeding those levels.
- Clean wrap available.

Blade Operation



Size Limitations

W x H In. (mm)		Damper	
		Face	Bypass
Minimum Sizes*		8 x 6 (203 x 152)	8 x 6 (203 x 152)
Maximum Sizes	Single Section	60 x 74 (1524 x 1880)	60 x 74 (1524 x 1880)
	Multiple Section	120 x 74 (3048 x 1880)	120 x 74 (3048 x 1880)

*varies by actuator configuration

This pressure drop testing was conducted in accordance with AMCA Standard 500-D using the three configurations shown. All data has been corrected to represent standard air at a density of .075 lb/ft³ (1.2 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.

AMCA Test Figures

Figure 5.2 Illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

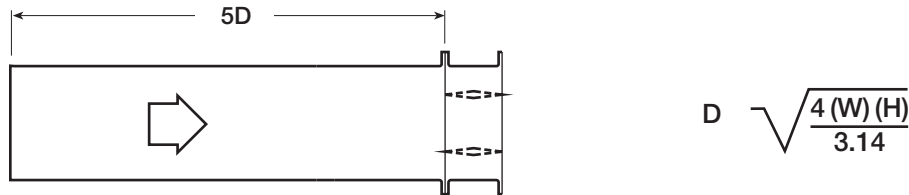


Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

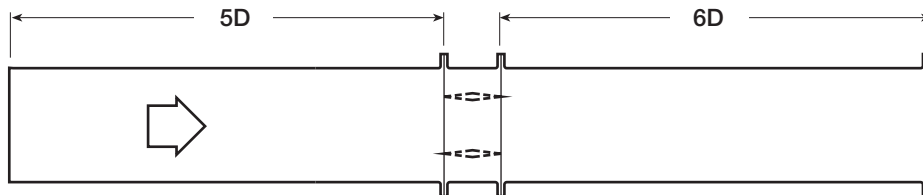
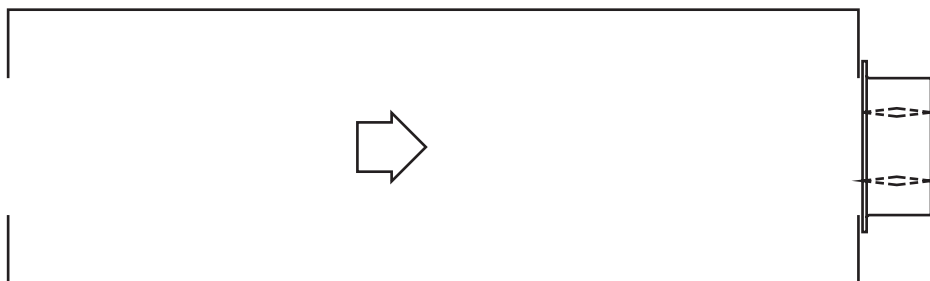
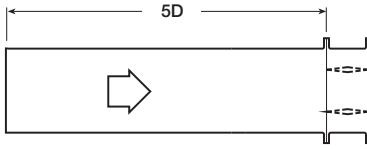


Figure 5.5 Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.



AMCA 5.2



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.05
1500	0.11
2000	0.19
2500	0.29
3000	0.41
3500	0.55
4000	0.72

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.06
2000	0.10
2500	0.16
3000	0.23
3500	0.30
4000	0.40

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.05
2000	0.09
2500	0.14
3000	0.19
3500	0.27
4000	0.35

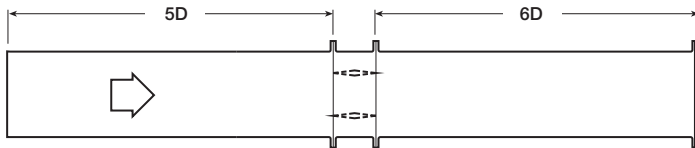
12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.04
1500	0.08
2000	0.15
2500	0.22
3000	0.32
3500	0.43
4000	0.56

48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.12
2500	0.18
3000	0.26
3500	0.36
4000	0.47

AMCA 5.3



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.08
2000	0.13
2500	0.20
3000	0.29
3500	0.40
4000	0.51

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.04
2000	0.07
2500	0.11
3000	0.16
3500	0.21
4000	0.28

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.02
1500	0.03
2000	0.06
2500	0.09
3000	0.13
3500	0.19
4000	0.25

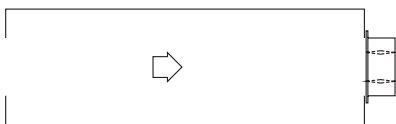
12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.07
2000	0.12
2500	0.18
3000	0.26
3500	0.36
4000	0.46

48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.01
1000	0.03
1500	0.06
2000	0.10
2500	0.16
3000	0.22
3500	0.30
4000	0.39

AMCA 5.5



12 in. x 12 in. (305mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.13
1500	0.30
2000	0.53
2500	0.82
3000	1.19
3500	1.62
4000	2.10

24 in. x 24 in. (610mm x 610mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.26
2000	0.47
2500	0.75
3000	1.04
3500	1.41
4000	1.90

36 in. x 36 in. (914mm x 914mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.02
1000	0.10
1500	0.22
2000	0.40
2500	0.62
3000	0.90
3500	1.23
4000	1.62

12 in. x 48 in. (305mm x 1219mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.27
2000	0.47
2500	0.75
3000	1.07
3500	1.45
4000	1.91

48 in. x 12 in. (1219mm x 305mm)

Velocity (fpm)	Pressure Drop (in. wg)
500	0.03
1000	0.12
1500	0.28
2000	0.49
2500	0.77
3000	1.12
3500	1.53
4000	2.01

Air leakage is based on operation between 32°F (0°C) and 120°F (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 are based on a torque of 5.0 in.lb./ft² (0.56 N·m) applied to close and seat the damper during the test.

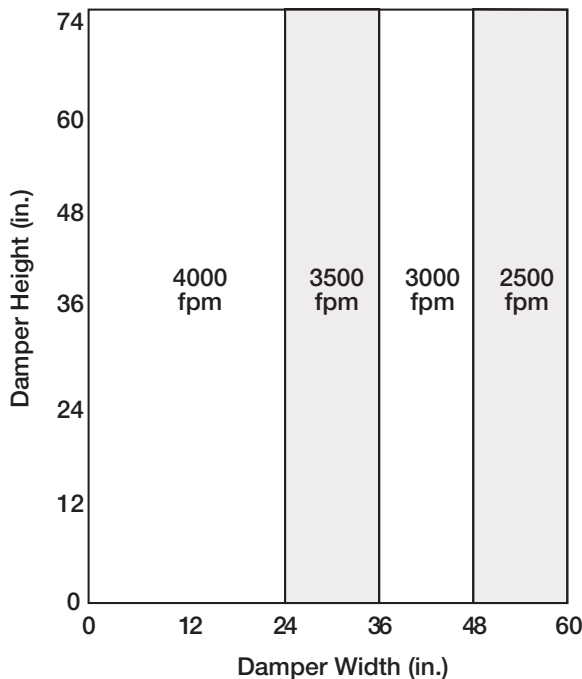
FBV-33	Leakage Class*		
	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	8 in. wg (2 kPa)
Maximum Damper Width 60 in. (1524mm)	1A	1	1

*Leakage Class Definitions

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

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

Velocity Limitations



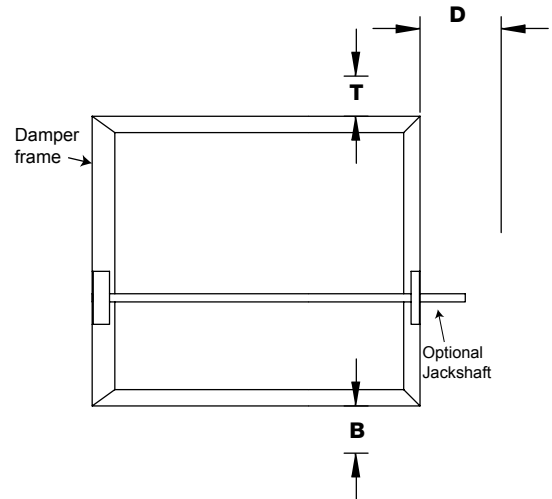
Temperature Limitations

Blade Seal	Temperature Range
TPE	-10°F to 180°F (-23°C to 82°C)
Silicone	-40°F to 250°F (-40°C to 121°C)

Application Data

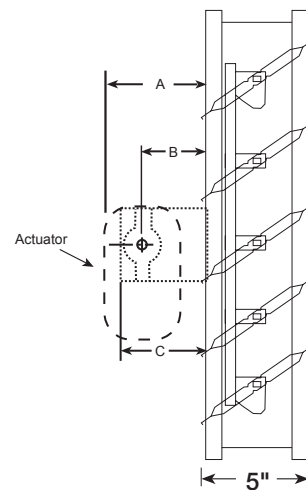
Space Envelopes

Dampers less than 18 in. (457mm) high may require actuator clearances above and/or below the damper frame. "B" and "T" dimensions are worst case clearance requirements for some dampers less than 18 in. (457mm) high. All damper sizes under 18 in. (457mm) high do not require these worst case clearances. If space availability above or below the damper is limited, each damper size should be individually evaluated.



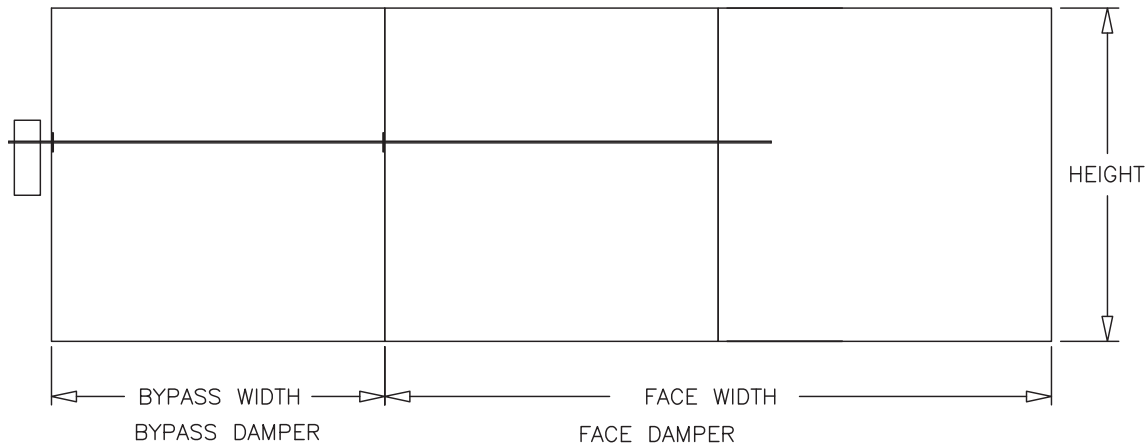
Actuator Type/Model	Height	T	B	D
	Inches (mm)	Inches (mm)		
AFBUP (-S) and FSNF Series, Belimo MSxx20 Series, Honeywell	≥6 to <10	0	12 ³ / ₄	6
	≥10 to <18	0	2	6
	≥18	0	0	10
FSLF, LF and TFB Series, Belimo	≥6 to <10	0	3 ¹ / ₂	6
	≥10	0	0	6
MSxx04 & MSxx09 Series, Honeywell	≥6 to <9	0	4 ³ / ₄	6
	≥9	0	0	6
MS75xx Series, Honeywell	≥6 to <10	0	12 ³ / ₄	6
	≥10 to <18	0	7	6
	≥18	0	0	6

This drawing depicts the worst case clearance requirements for an actuator with a jackshaft.



Multi-Section Assembly

Dampers larger than the maximum single section size will be made up of a multiple of equal size sections. The bypass damper can be mounted to the right or left of the face damper. This example depicts the face damper is two sections wide and the bypass damper is mounted to the left of the face, which is one section wide.



Specifications

Control dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules.

Dampers shall consist of: a 16 ga. (1.5mm) galvanized steel channel frame with 5 in. (127mm) depth; airfoil shaped, galvanized steel double skin construction blades (14 ga. [2mm] equivalent thickness); blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow in either direction

or pressure on either side of the damper; ½ in. (6mm) dia. plated steel axles turning in synthetic (acetal) sleeve bearings; TPE blade seals for 200°F (93°C) maximum temperature; flexible stainless steel jamb seals; and external (out of the airstream) blade-to-blade linkage.

Damper air performance shall be developed in accordance with the latest edition of AMCA Standard 500-D.

Basis of design is model FBV-33.