

Application and Design

The FBV-23 is a vertical style face and bypass low leakage damper with 3V blades. This model is intended for application in low to medium pressure and velocity systems.

The FBV-23 is IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² at 1 in. wg (55cmh/m²).

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.**

Damper Ratings

Pressure: Up to 5 in. wg (1.2 kPa) - pressure differential

Velocity: Up to 3,000 fpm (15.2 m/s)

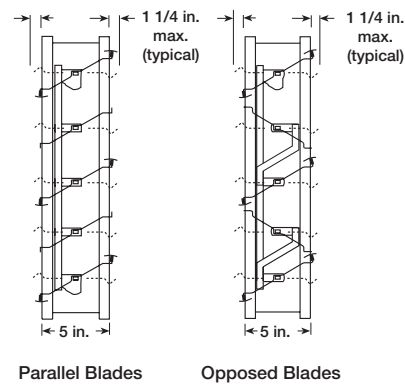
Leakage: Class 1A at 1 in. wg (.25 kPa)
Class 1 at up to 5 in. wg (1.2 kPa)

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



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	16 ga. (1.5mm)	-
Blade Type	3V	-
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

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	48 x 74 (1219 x 1880)	48 x 74 (1219 x 1880)
	Multiple Section	96 x 74 (2438 x 1880)	96 x 74 (2438 x 1880)

*varies by actuator configuration

*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.

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(1.201 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.

AMCA Test Figures

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 5.2 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 5.5 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.

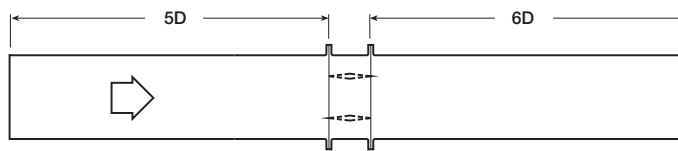
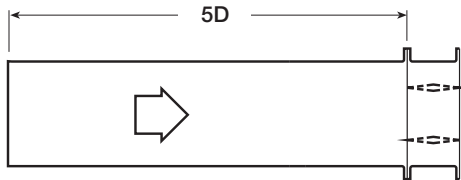


Figure 5.3



$$D = \sqrt{\frac{4(W)(H)}{3.14}}$$

Figure 5.2

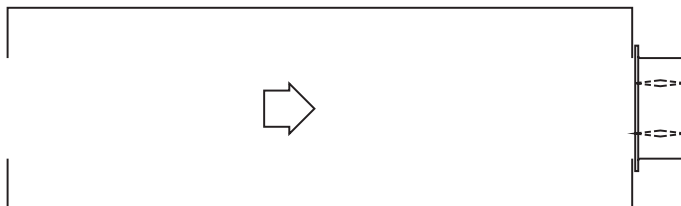
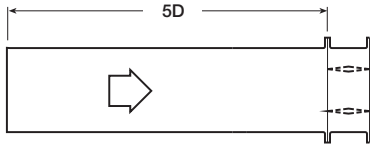


Figure 5.5

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

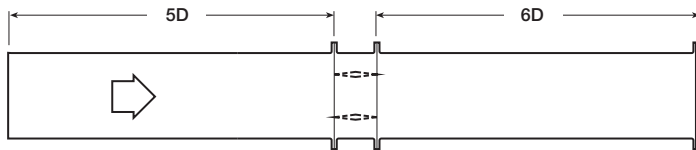
12 in. x 48 in. (305mm x 1219mm)

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

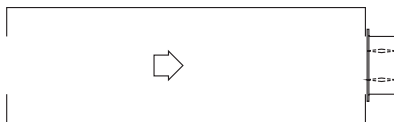
12 in. x 48 in. (305mm x 1219mm)

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

Leakage Data

FBV-23

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.

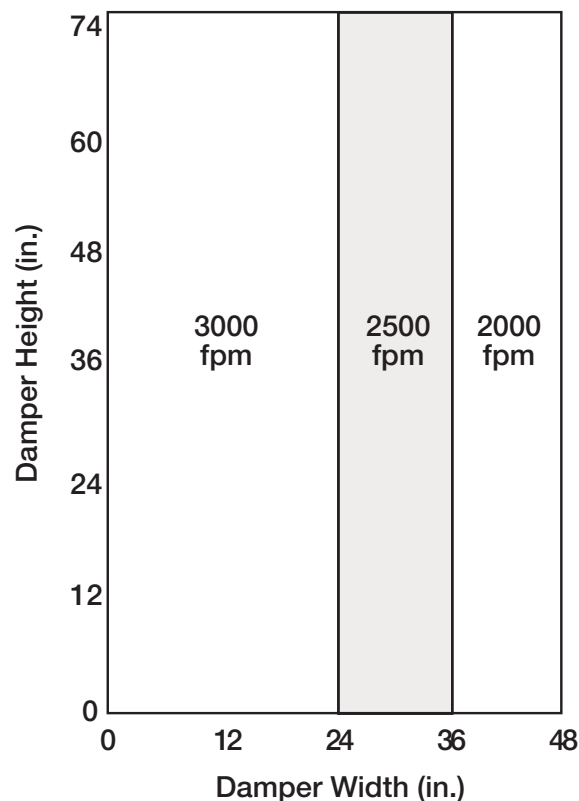
FBV-23	Leakage Class*		
	1 in. wg (0.25 kPa)	4 in. wg (1 kPa)	5 in. wg (1.2 kPa)
Maximum Damper Width			
48 in. (1219mm)	1A	1	1

*Leakage Class Definitions

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

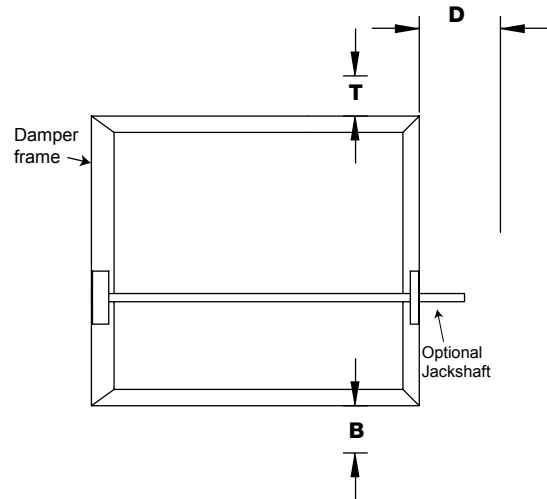
- Leakage Class 1A - 3 cfm/ft² at 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
 - 4 cfm/ft² at 1 in. wg
 - 8 cfm/ft² at 4 in. wg
 - 11 cfm/ft² at 8 in. wg
 - 12.6 cfm/ft² at 10 in. wg

Velocity Limitations



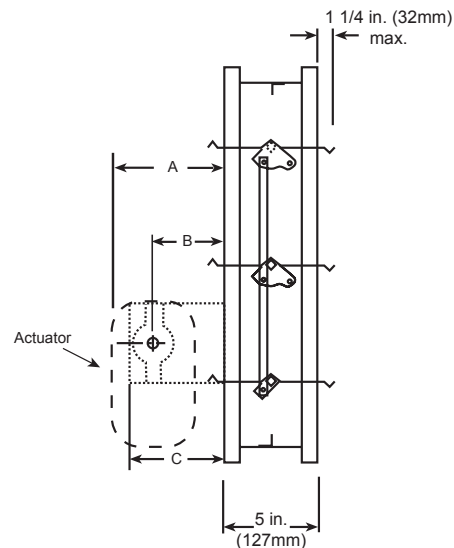
Space Envelopes

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.



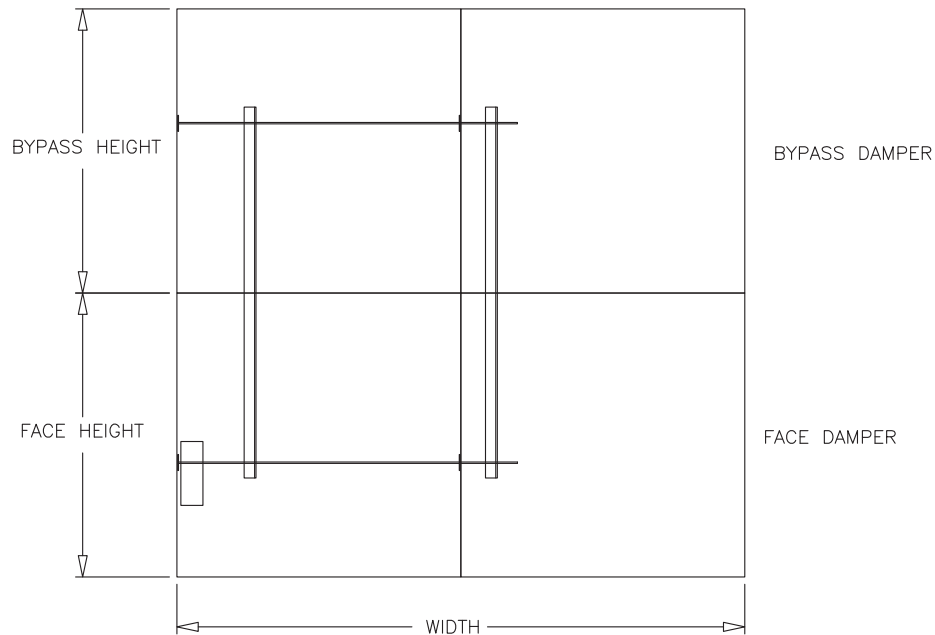
Actuator Type/Model	Height	T	B	D
	Inches (mm)			
AFBUP (-S) and FSNF Series, Belimo MSxx20 Series, Honeywell;	≥6 to <10	0	12¾ (324)	6
	≥10 to <18	0	2 (51)	6
	≥18	0	0	10
FSLF, LF and TFB Series, Belimo	≥6 to <10	0	3½ (89)	6
	≥10	0	0	6
MSxx04 & MSxx09 Series, Honeywell	≥6 to <9	0	4¾	6
	≥9	0	0	6
MS75xx Series, Honeywell	≥6 to <10	0	12¾ (324)	6
	≥10 to <18	0	7 (178)	6
	≥18	0	0	6

This drawing depicts the worst case 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 face damper is on the bottom and the bypass damper is on top.



Specifications

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

Damper blades shall be 16 ga. (1.5mm) galvanized steel 3V type with three longitudinal grooves for reinforcement. Blades shall be completely symmetrical relative to their axle pivot point, presenting identical resistance to airflow and operation in either direction through the damper (blades that are non-symmetrical relative to their axle pivot point or utilize blade stops larger than 1/2 in. (13mm) are unacceptable. Blade seals shall be TPE. Linkage shall be blade-to-blade concealed in jamb (out of airstream) to protect linkage and reduce pressure drop and noise.

Damper frame shall be 16 ga. (1.5mm) galvanized steel formed into a structural hat channel shape with reinforced corners to meet 11 ga. (3.1mm) criteria. Bearings shall be corrosion resistant, permanently lubricated, synthetic (acetal) sleeve type rotating in extruded holes in the damper frame for maximum service. Axles shall be square and positively locked into the damper blade. Jamb seals shall be flexible stainless steel compression type to prevent leakage between blade end and damper frame. Damper air performance data shall be developed in accordance with the latest edition of AMCA Standard 500-D.

Basis of design is model FBV-23.