



Model VCD-23V

Low Leakage 3V control damper

Application and Design

The VCD-23V series is a vertical blade low leakage control damper intended for application in low to medium pressure and velocity systems.

This model is IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² at 1 in. wg (55 cmh/m² at .25 kPa) or less.

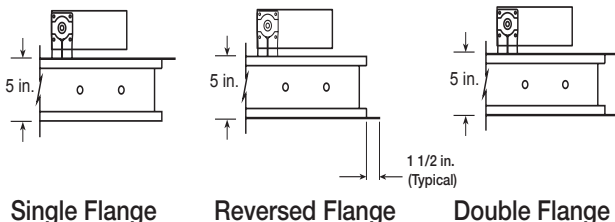


*W&H dimension furnished approximately 1/4 in. (6mm) undersize.

| Construction | Standard | Optional |
|-----------------|--|--|
| Frame Material | Galvanized steel | 304SS |
| Frame Thickness | 16 ga. (1.5mm) | 12 ga (2.7mm)* |
| Frame Type | 5 in. x 1 in. (127mm x 25mm) hat channel | Single flange, reversed flange or double flange |
| Blade Action | Opposed | Parallel |
| Blade Material | Galvanized steel | 304SS |
| Blade Type | 3V | - |
| Linkage | Plated steel out of airstream, concealed in jamb | 316SS |
| Axle Bearings | Synthetic with thrush washers | 316SS with thrush washers |
| Axle Material | Plated steel | 316SS |
| Blade Seals | TPE | Silicone |
| Jamb Seals | Stainless Steel | - |
| Paint Finishes | Mill Finish | Baked Enamel, Hi Pro Polyester, Industrial Epoxy |

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

Flange Options



Damper Ratings

Pressure: Up to 5.0 in. wg (1.2 kPa) - pressure differential.

Velocity: Up to 3000 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: -40°F to 250°F (-40°C to 121°C). Consult factory for higher temperatures.

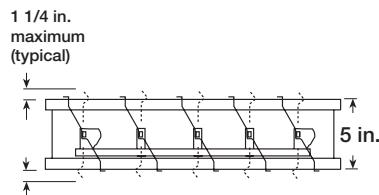
Features and Options:

- Blade seals - pressure activated to produce tighter sealing.
- Electric actuators and manual operators available. Factory supplied actuators are sized for 1500 fpm (7 m/s) and fully-closed differential pressure of 2 in. wg (.5 kPa). Contact factory for actuator sizing on applications exceeding those limits. Actuators (when supplied) are mounted on the top or bottom.
- Low profile jambs are used on sizes less than 17 in. (432mm) wide.

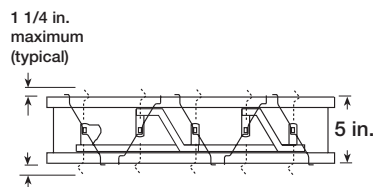
Size Limitations

| W x H | Minimum Size | Maximum Size | |
|--------|--------------|----------------|---------------|
| | | Single Section | Multi-Section |
| Inches | 6 x 6 | 74 x 48 | 148 x 96 |
| mm | 152 x 152 | 1880 x 1219 | 3759 x 2438 |

Blade Operation



Parallel Blades



Opposed Blades

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 0.075 lb/ft^3 (1.201 kg/m^3).

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.

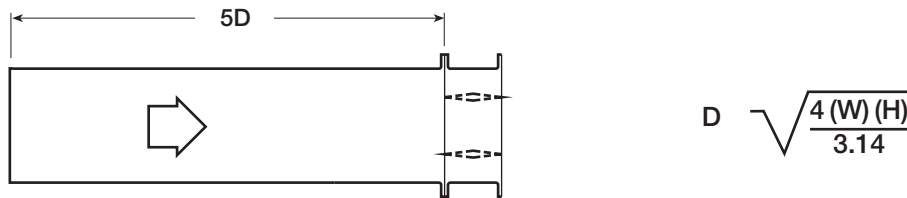


Figure 5.3 Illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

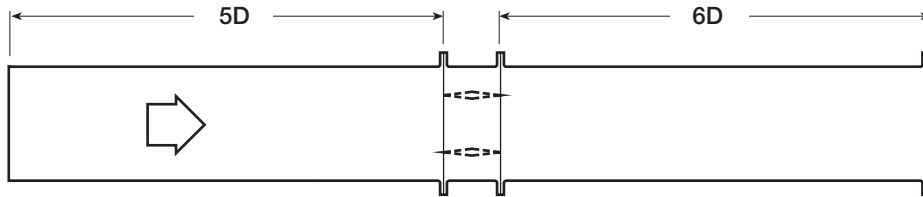
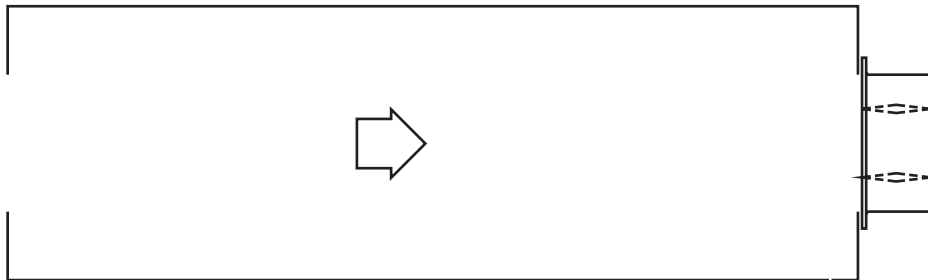
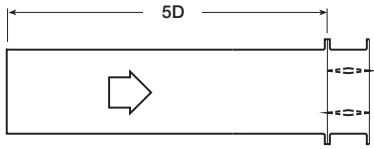


Figure 5.5 Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.



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 |

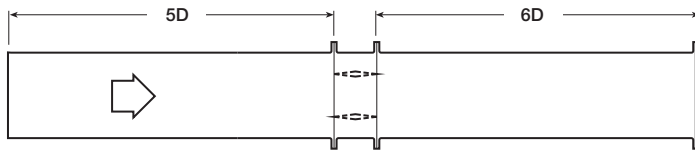
48 in. x 12 in. (1219mm x 305mm)

| 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 |

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 | 0.47 |

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 |

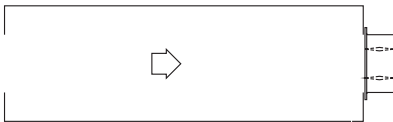
48 in. x 12 in. (1219mm x 305mm)

| 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 | 0.46 |

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

| 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 | 0.03 |
| 1000 | 0.12 |
| 1500 | 0.28 |
| 2000 | 0.50 |
| 2500 | 0.78 |
| 3000 | 1.12 |
| 3500 | 1.53 |
| 4000 | 2.00 |

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

| 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 |

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

| 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

VCD-23V

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.

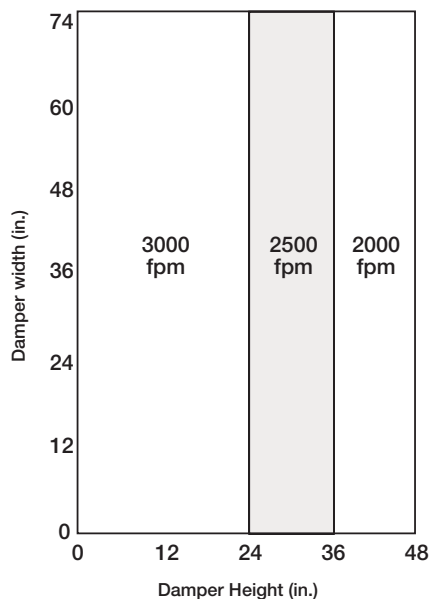
| VCD-23V | Leakage Class* | | |
|-----------------------|------------------------|---------------------|-----------------------|
| Maximum Damper Height | 1 in. wg (0.25 kPa) | 4 in. wg (1 kPa) | 5 in. wg (1.2 kPa) |
| 48 in. (1219mm) | 1A | 1 | 1 |

*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 and Temperature Limitations

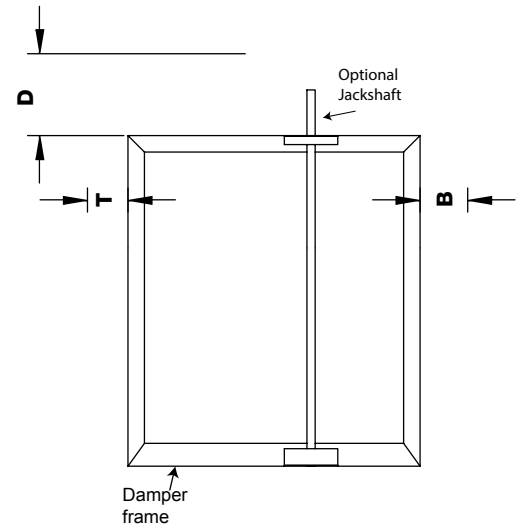


Temperature Limitations

| 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) |
| No Seal | -40°F to 250°F (-40°C to 121°C) |

Space Envelopes

On dampers less than 18 in. (457mm) high, actuators may also require 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.



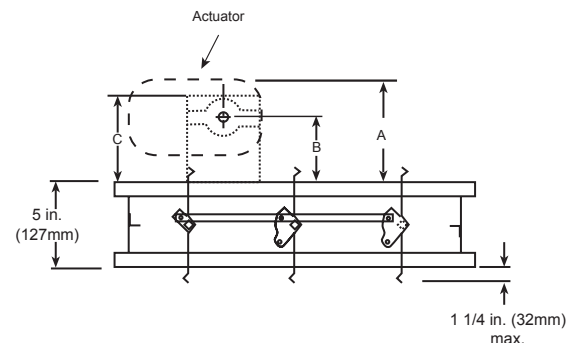
| Actuator Type/Model | Width | T | B | D |
|---|-------------|---|-------|----|
| | Inches (mm) | | | |
| AFBUP (-S) and FSNF Series, Belimo MSxx20 Series, Honeywell | ≥6 to <10 | 0 | 12.75 | 6 |
| | ≥10 to <18 | 0 | 2 | 6 |
| | ≥18 | 0 | 0 | 10 |
| FSLF, LF and TFB Series, Belimo | ≥6 to <10 | 0 | 3.5 | 6 |
| | ≥10 | 0 | 0 | 6 |
| MSxx04 & MSxx09 Series, Honeywell | ≥6 to <9 | 0 | 4.75 | 6 |
| | ≥9 | 0 | 0 | 6 |
| MS75xx Series, Honeywell | ≥6 to <10 | 0 | 12.75 | 6 |
| | ≥10 to <18 | 0 | 7 | 6 |
| | ≥18 | 0 | 0 | 6 |

| Internal mount only Actuator model | A | B | C |
|---------------------------------------|--------------------|-------------------|----------------------|
| All except - EFB & EFCX Series | 7 ¾ in (197 mm) | 3 ¾ in (95 mm) | 5 ⅝ in (136.5 mm) |
| EFB & EFCX Series | 8 ½ in (216 mm) | 6 in (152mm) | 8 ½ in (216 mm) |

Mounting

- External - includes extension pin (standoff bracket optional)
- External kit - actuator and all mounting hardware
- Internal - blade lever

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

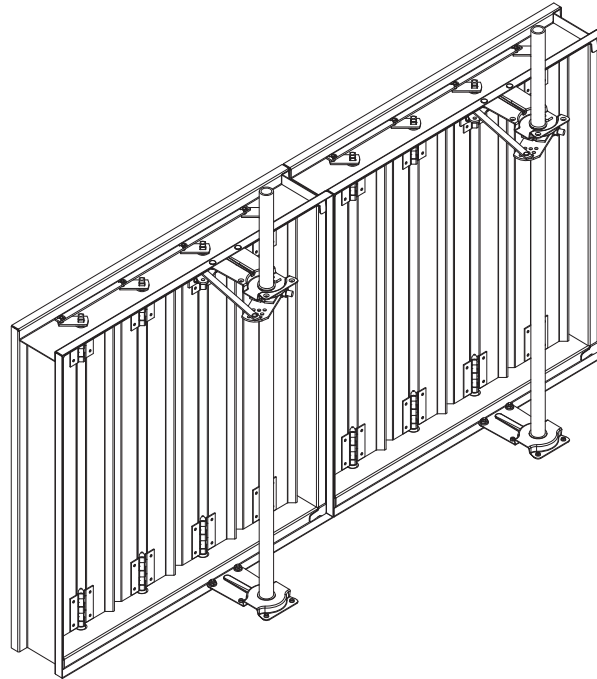


Multi-Section Assembly

Dampers larger than the maximum single section size, will be made up of a multiple of equal size sections. Multiple section dampers can be jackshafted together so that all sections operate together as shown below.

NOTE: Dampers larger than 74 in. x 48 in. (1880mm x 1219mm) are not intended to be structurally self supporting. Additional horizontal bracing is recommended to support the weight of the damper and vertical bracing should be installed as required to hold against system pressure.

Refer to IOM document 483509 for structural support requirements on multi-section assemblies.



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 for 180°F (82°C) maximum temperature. Linkage shall be blade-to-blade concealed in jamb (out of the 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. (3mm) 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 manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 5 in. wg, (1.2 kPa) velocities to 3000 fpm (15.2 m/s) and temperatures to 250°F (121° C).

Damper manufacturer's printed performance data showing standard air leakage less than 6 cfm/ft² at 4 in. wg (110 cmh/m² at 1 kPa) shall be submitted for approval.

Basis of design is model VCD-23V.