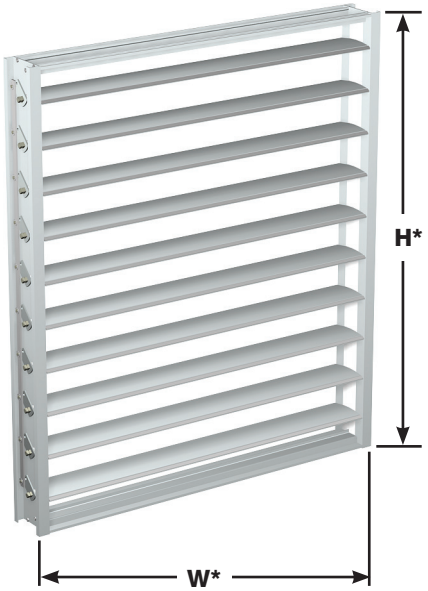
# *KVCD-40*
# *Extruded Airfoil Blade Control Damper*
# *Narrowline Frame Construction*

## Application and Design

The KVCD-40 is a low leakage high performance control damper with extruded aluminum airfoil blades. Blades are completely contained within the frame allowing the damper to be directly mounted to a louver, filter frame or similar application with no blade interference. Smooth profile extruded aluminum airfoil blades insure the lowest resistance to airflow in HVAC systems with velocities to 6000 fpm (30.5 m/s) and pressures to 6 in. wg. (1.5 kPa). KVCD-40 is IECC (International Energy Conservation Code) compliant with a leakage rating of 3 cfm/ft² @ 1 in. wg (55 cmh/m² @ .25 kPa) or less.




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

## Ratings (See page 4 for specific limitations)

**Pressure:** 3.0 - 6.0 in. wg (0.75 -1.5 kPa) pressure differential
**Velocity:** 3000 to 6000 fpm (15.2 - 30.5 m/s)
**Leakage:** Class 1A @ 1 in. wg (.25 kPa) For more leakage ratings, see page 4
**Temperature:** 180°F to 250°F (82°C to 121°C). Consult Kele for higher temperatures.

| Construction | Standard | Optional |
|---|---|---|
| Frame Material | Aluminum | – |
| Frame Material Thickness | .125 in. (3.2mm) minimum wall thickness | – |
| Frame Type | 4 in. x 1 in. (102mm x 25mm) hat channel | Single flange Reversed flange |
| Blade Action | Opposed | Parallel |
| Blade Material | Extruded Aluminum | – |
| Blade Type | Airfoil | – |
| Linkage | Plated steel out of airstream, concealed in jamb | 304SS |
| Axle Bearings | Synthetic (acetal) sleeve | Bronze or 304SS |
| Axle Material | Plated steel | 304SS |
| Blade Seals | TPE | Silicone |
| Jamb Seals | 304SS | – |
| Paint Finishes | Mill Finish | Baked Enamel, Epoxy, Hi Pro Polyester, Industrial Epoxy, Kynar/ Hylar (70% Kynar) |

## Size Limitations

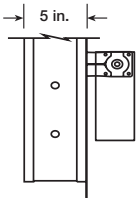
| W x H | Minimum Size | Maximum Size | |
|---|---|---|---|
| | | Single Section | Multiple Section |
| Inches | 6 x 6 | 60 x 74 | Unlimited |
| mm | 152 x 152 | 1524 x 1880 | Unlimited |

## Features and Options

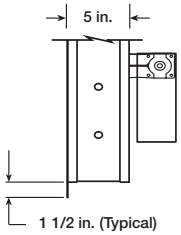
- Frames are constructed with reinforced corners. Low profile head and sill are used on sizes less than 17 in. high (432mm).
- Airfoil (streamlined) blade shape for reduced turbulence and lower pressure drop at velocities to 6000 fpm (1.5 kPa).
- Blade seals - pressure activated to produce tighter sealing.
- Open Close Indicator (OCI)

## Flange Options

Shown with optional internally mounted actuator.

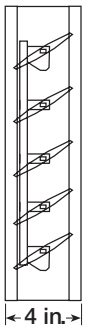



Single Flange

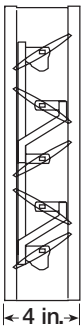



Single Reversed Flange

## Blade Operation




Parallel Blades




Opposed Blades

## Mounting

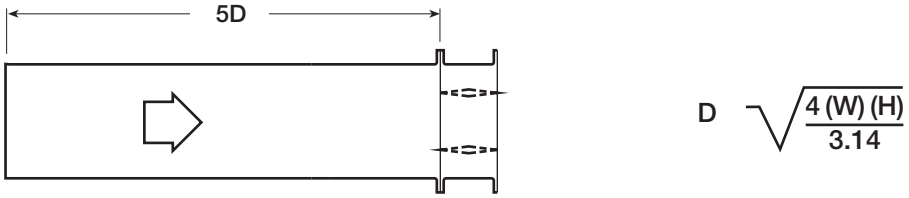
- External – includes extension pin (standoff bracket optional)
- External kit – actuator and all mounting hardware
- Internal – blade lever

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/ft$^3$ (1.2 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.




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

**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.

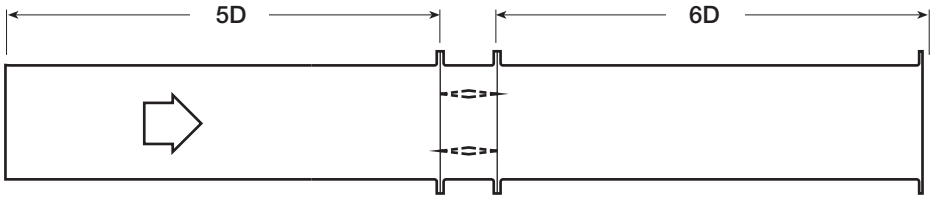
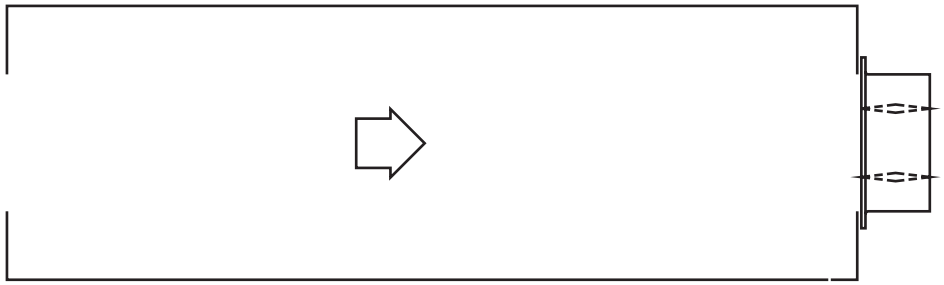
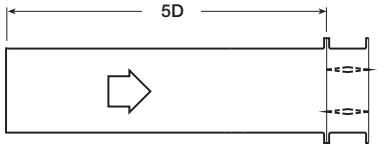



**Figure 5.5** Illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.



## AMCA 5.2




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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.08 |
| 1000 | 0.31 |
| 1500 | 0.69 |
| 2000 | 1.19 |
| 2500 | 1.84 |
| 3000 | 2.67 |
| 3500 | 3.59 |
| 4000 | 4.64 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.01 |
| 1000 | 0.05 |
| 1500 | 0.11 |
| 2000 | 0.19 |
| 2500 | 0.30 |
| 3000 | 0.43 |
| 3500 | 0.58 |
| 4000 | 0.76 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.01 |
| 1000 | 0.04 |
| 1500 | 0.09 |
| 2000 | 0.16 |
| 2500 | 0.24 |
| 3000 | 0.35 |
| 3500 | 0.48 |
| 4000 | 0.62 |

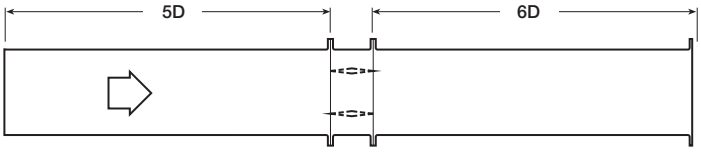
12 in. x 48 in. (305mm x 1219mm)

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.01 |
| 1000 | 0.05 |
| 1500 | 0.11 |
| 2000 | 0.20 |
| 2500 | 0.30 |
| 3000 | 0.43 |
| 3500 | 0.59 |
| 4000 | 0.77 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.06 |
| 1000 | 0.23 |
| 1500 | 0.52 |
| 2000 | 0.91 |
| 2500 | 1.43 |
| 3000 | 2.05 |
| 3500 | 2.82 |
| 4000 | 3.69 |

## AMCA 5.3




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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.05 |
| 1000 | 0.20 |
| 1500 | 0.45 |
| 2000 | 0.76 |
| 2500 | 1.19 |
| 3000 | 1.70 |
| 3500 | 2.29 |
| 4000 | 2.97 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.01 |
| 1000 | 0.02 |
| 1500 | 0.05 |
| 2000 | 0.10 |
| 2500 | 0.15 |
| 3000 | 0.22 |
| 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 | 0.04 |
| 2000 | 0.07 |
| 2500 | 0.10 |
| 3000 | 0.15 |
| 3500 | 0.20 |
| 4000 | 0.27 |

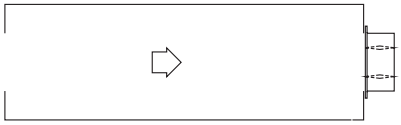
12 in. x 48 in. (305mm x 1219mm)

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.01 |
| 1000 | 0.03 |
| 1500 | 0.07 |
| 2000 | 0.12 |
| 2500 | 0.19 |
| 3000 | 0.26 |
| 3500 | 0.36 |
| 4000 | 0.46 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.03 |
| 1000 | 0.13 |
| 1500 | 0.29 |
| 2000 | 0.51 |
| 2500 | 0.81 |
| 3000 | 1.16 |
| 3500 | 1.59 |
| 4000 | 2.09 |

## AMCA 5.5



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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.1 |
| 1000 | 0.40 |
| 1500 | 0.88 |
| 2000 | 1.54 |
| 2500 | 2.41 |
| 3000 | 3.45 |
| 3500 | 4.75 |
| 4000 | 6.09 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.03 |
| 1000 | 0.12 |
| 1500 | 0.29 |
| 2000 | 0.52 |
| 2500 | 0.80 |
| 3000 | 1.14 |
| 3500 | 1.60 |
| 4000 | 2.14 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.03 |
| 1000 | 0.11 |
| 1500 | 0.26 |
| 2000 | 0.46 |
| 2500 | 0.72 |
| 3000 | 1.04 |
| 3500 | 1.43 |
| 4000 | 1.87 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.03 |
| 1000 | 0.12 |
| 1500 | 0.27 |
| 2000 | 0.49 |
| 2500 | 0.76 |
| 3000 | 1.11 |
| 3500 | 1.53 |
| 4000 | 2.00 |

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

| Velocity (fpm) | Pressure Drop (in. wg) |
|---|---|
| 500 | 0.08 |
| 1000 | 0.29 |
| 1500 | 0.63 |
| 2000 | 1.12 |
| 2500 | 1.76 |
| 3000 | 2.52 |
| 3500 | 3.40 |
| 4000 | 4.52 |

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.

| KVCD-40 | Leakage Class* | | | | | |
|---|---|---|---|---|---|---|
| Maximum Damper Width | 1 in. wg (0.25 kPa) | 2 in. wg (0.5 kPa) | 3 in. wg (0.75 in. wg) | 4 in. wg (1 kPa) | 5 in. wg (1.25 kPa) | 6 in. wg (1.5 kPa) |
| 36 in. (914mm) | 1A | 1 | 1 | 1 | 1 | 1 |
| 48 in. (1219mm) | 1A | 1 | 1 | 1 | 2 | N/A |
| 60 in. (1524mm) | 1A | 2 | 2 | N/A | N/A | N/A |

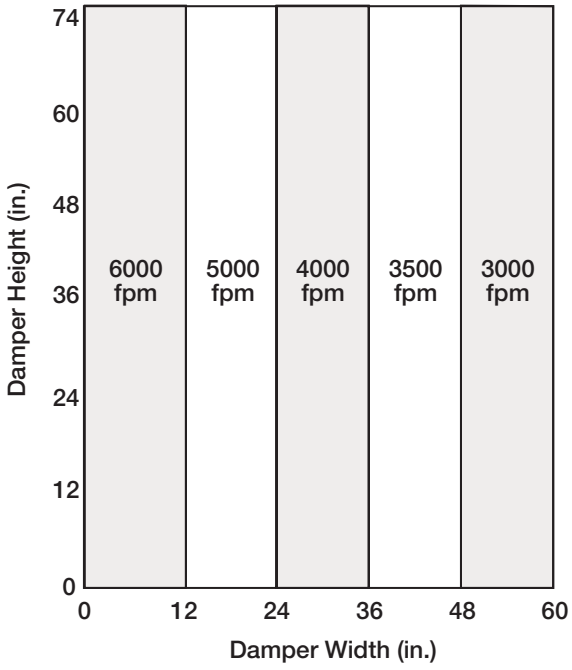
## Leakage Class Definitions*

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

- Leakage Class 1A - 3 cfm/ft$^2$ @ 1 in. wg (class 1A is only defined at 1 in. wg)
- Leakage Class 1
  - 4 cfm/ft$^2$ @ 1 in. wg
  - 8 cfm/ft$^2$ @ 4 in. wg
  - 11 cfm/ft$^2$ @ 8 in. wg
  - 12.6 cfm/ft$^2$ @ 10 in. wg

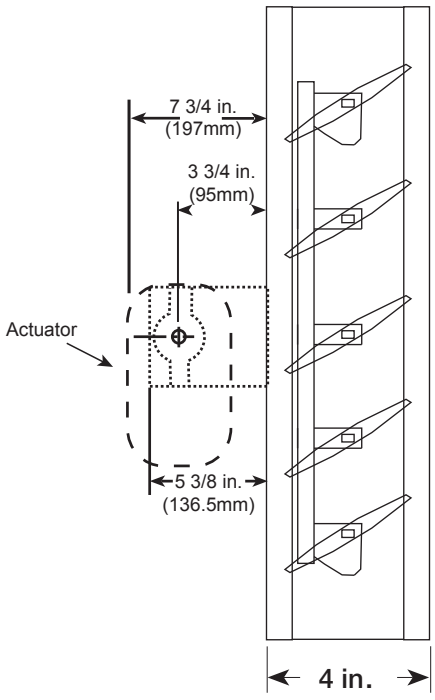
# Limitations

## Velocity Limitations



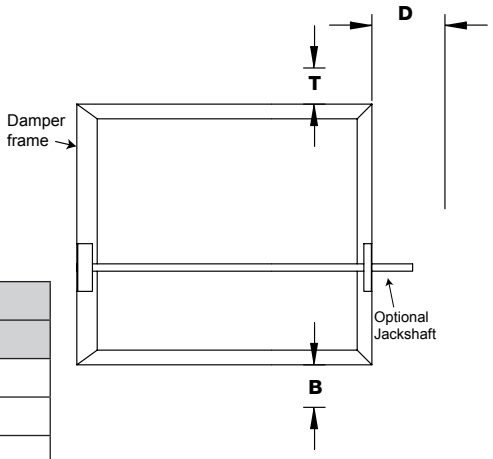

## Mounting

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



## 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 | Height Inches | T | B | D |
|---|---|---|---|---|
| | | Inches | | |
| AFBUP (-S) and FSNF Series, Belimo MSxx20 Series, Honeywell 33x-2976 Series, Siemens | ≥6 to <10 | 0 | 12.75 | 6 |
| | ≥10 to <18 | 0 | 2 | 6 |
| | ≥18 | 0 | 0 | 6 |
| FSLF, LF and TFB Series, Belimo | ≥6 to <10 | 0 | 3.5 | 6 |
| | ≥10 | 0 | 0 | 6 |
| MSxx04 and 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 |
| 33x-4551 Series, Siemens | ≥6 to <10 | 0 | 7.5 | 6 |
| | ≥10 to <17 | 0 | 1.5 | 6 |
| | ≥17 | 0 | 0 | 6 |
| 331-2856, Siemens | ≤12 | – | – | – |
| | >12 to <18 | 0 | 2.5 | 9 |
| | ≥18 | 0 | 0 | 9 |

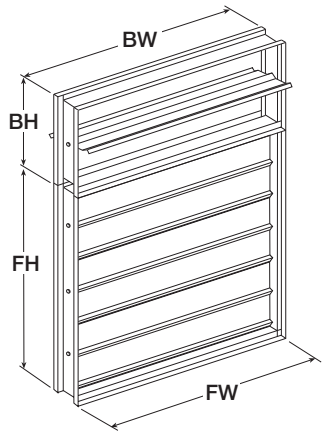
## Multi-Section Assembly

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.

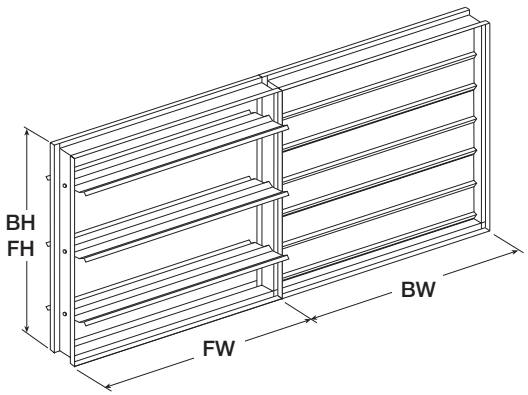
NOTE: Dampers larger than 60 in. x 74 in. (1524mm x 1880mm) are not intended to be structurally self supporting. Additional horizontal bracing is recommended to support the weight of the damper and vertical bracing should be installed as required to hold against system pressure.

## Face and Bypass Configurations

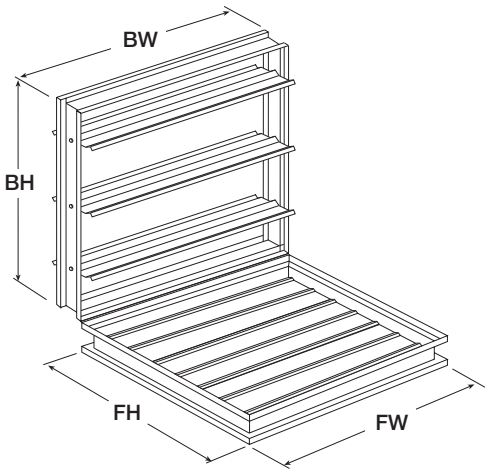
KVCD-40 series control dampers can be assembled for face and bypass configurations. Face and bypass dampers are available in vertical, horizontal and right angle arrangements as shown below.




KFBV




KFBH




KFBR

# *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: heavy gauge aluminum frame (0.125 in. [3.2mm] thick) with 4 in. (101mm) depth formed into a structural hat channel shape with reinforced corners; airfoil shaped, extruded aluminum blades (0.063 in. [1.6mm] thick) with metal blade to blade overlap (seal to seal only contact is not acceptable); 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); 1/2 in. (13mm) dia. plated steel axles turning in synthetic (acetal) sleeve bearings; TPE blade seals; flexible stainless steel jamb seals; and external (out of the airstream) blade-to-blade linkage. 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 6 in. wg (1.5 kPa), velocities to 6000 fpm (30.5m/s) and temperatures up to 250°F (121ºC).

Damper manufacturer's printed performance data showing standard air leakage less than 3 cfm/ft2 @ 1 in. wg (55 cmh/m2 @ 0.25 kPa) in either direction through the damper shall be submitted for approval. Damper testing and ratings shall be developed in accordance with the latest edition of AMCA Standard 500-D.

Basis of design is Kele model KVCD-40.

3300 BROTHER BLVD | MEMPHIS, TN 38133 | 888.397.KELE (5353) | www.kele.com

© 2014 Kele, Inc. All Rights Reserved. The Kele name and logo are registered trademarks of Kele, Inc.