

MS1

Combination Fire/Smoke Damper

Class I • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper



Construction	Standard
Frame Material	Galvanized steel
Frame Material Thickness	16Ga Galvanized steel
Frame Type	5½" X ¾" Galvanized steel Hat Channel
Blade Type	Single Thickness Blade
Blade Material Thickness	16 -GA Double skin (equivalent to 14-GA)
Axle materials	Plated Solid Steel stub
Axle Bearings	Oil impregnated bronze
Linkage	Plated steel angle & crank plates with stainless steel pivots; In-jamb type or on-blade type
Blade Seal	Silicone
Jamb Seal	Stainless steel
Closure Device	Electric heat responsive device
Closure Temperature	165° F (73°C)

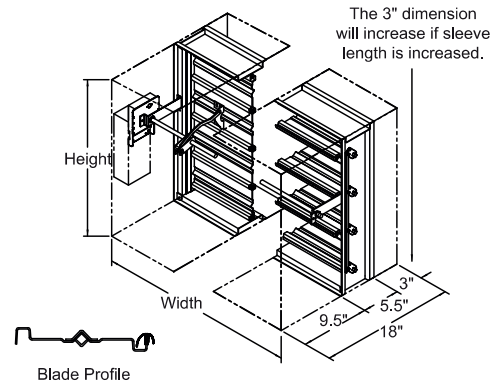
UNDERWRITERS LABORATORIES INC.
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS I
FILE # R27351

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:119
- New York City MEA Listing # 111-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.

Options

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (DPI) Switches
- Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
- Sensotherm Re-Openable Heat Response Device (EPOT) for Pneumatic Actuator
- Model SM-501 Flow-Rated Smoke Detector
- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
- Remote Test Boxes
- Copper Tubing (for Pneumatic Actuators)
- Transformers
- Tab-Lock Retaining Angles - 1 or 2 Sets
- Stainless Steel Bearings
- Stainless Steel Axles
- Security Bars
- Sleeves of Various Depths and Gauge Thickness (restriction apply)
- No Sleeves (restriction apply)
- Round or Oval Transitions
- Short-Width (<8") and/or Short-Height (<6") Transitions



Notes

- "A" width and "B" height are opening dimensions. Dampers are provided approximately "A" undersize.
- Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

		2000 fpm, 4 in.wg ** (10m/s , 1000 Pa)**					
Orientation	Hor & Ver	Horizontal			Vertical		
Panels	Min. Panel W x H	Max. Panel 250° / 350° W x H	Max. Assy 250° / 350° W x H	Max. Panel 250° W x H	Max. Panel 350° W x H	Max. Assy 250° W x H	Max. Assy 350° W x H
	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)
Rectangular	4"W x 4"H (102mm x 102mm) 8"W x 6"H frame (203mm x 152mm)	36"W x 48"H (914mm x 1219mm)	72"W x 48"H (1829mm x 1219mm)	36"W x 48"H (914mm x 1219mm)	36"W x 48"H (914mm x 1219mm)	144"W x 70"H (3658mm x 1778mm)	128"W x 62"H (3251mm x 1575mm)
Round	4"dia (102mm dia) 8"W x 6"H frame (203mm x 152mm)	34"dia (864mm)	46"dia (1168mm)	34"dia (864mm)	34"dia (864mm)	68"dia (1727mm)	60"dia (1524mm)
Oval	4"W x 4"H (102mm x 102mm) 8"W x 6"H frame (203mm x 152mm)	34"W x 46"H (864mm x 1168mm)	70"W x 46"H (1778mm x 1168mm)	34"W x 46"H (864mm x 1168mm)	34"W x 46"H (864mm x 1168mm)	106"W x 68"H (2692mm x 1727mm) 45 sq.ft	106"W x 60"H (2692mm x 1524mm)

* Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.

** For sizes smaller than 16" w x 8" h, airfoil blade will be supplied.

* WHEN A TRUE 6" High, width is limited to 16"; if ordered as 6" high and width is > 16", an 8" high damper with 2" short-height transition will be supplied.

*In the interest of product development, KMC reserves the right to make changes without notice.

Combination Fire/Smoke Damper

Class I • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq.ft. maximum @ 1 in.wg

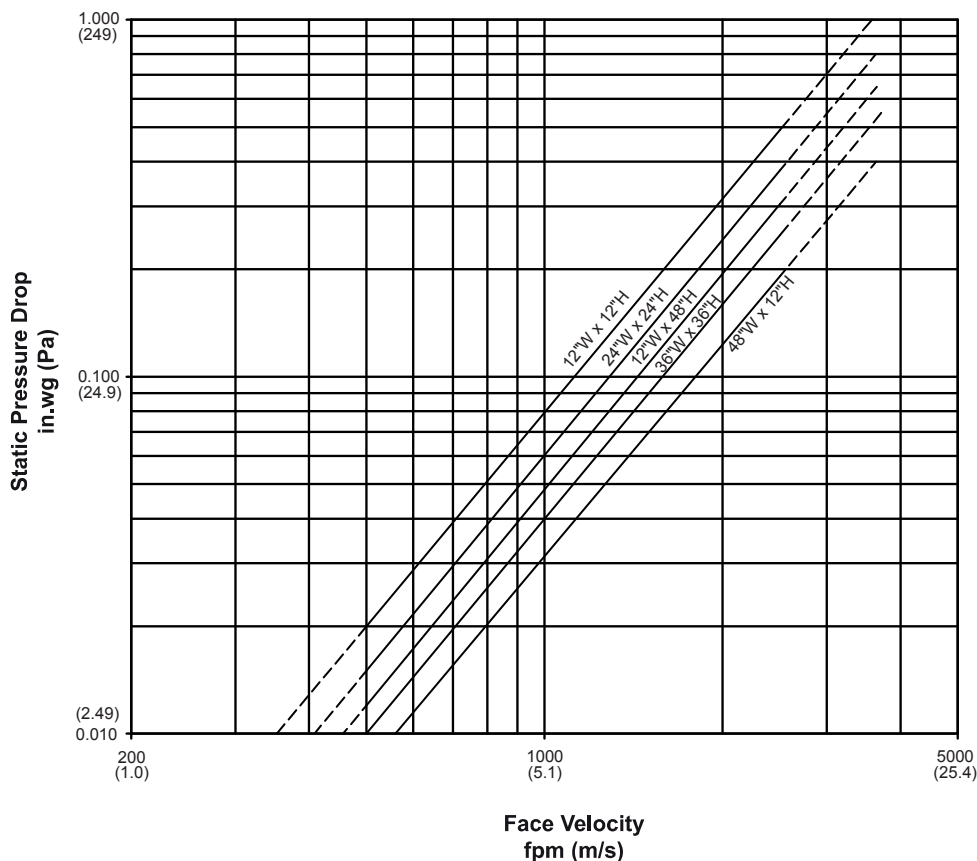
8 cfm per sq.ft. maximum @ 4 in.wg

Sound Ratings: The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion				
Damper Size	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	N/A

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested in accordance with AMCA Standard 500D.

MS2

Combination Fire/Smoke Damper

Class II • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper



Construction	Standard
Frame Material	Galvanized steel
Frame Material Thickness	16Ga Galvanized steel
Frame Type	5½" X ¼" Galvanized steel Hat Channel
Blade Type	Single Thickness Blade
Blade Material Thickness	16-GA Single Thickness Parallel action
Axle materials	Plated Solid Steel stub
Axle Bearings	Oil impregnated bronze
Linkage	Plated steel angle & crank plates with stainless steel pivots; In-jamb type or on-blade type
Blade Seal	Silicone
Jamb Seal	Stainless steel
Closure Device	Electric heat responsive device
Closure Temperature	165° F (73°C)

Options

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (IDPI) Switches
- Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
- Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
- Model SM-501 Flow-Rated Smoke Detector
- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
- Remote Test Boxes
- Copper Tubing (for Pneumatic Actuators) Transformers
- Tab-Lock Retaining Angles - 1 or 2 Sets Stainless Steel Bearings
- Stainless Steel Axles
- Security Bars
- Sleeves of Various Depths and Gauge Thickness (restriction apply)
- No Sleeves (restriction apply)
- Round or Oval Transitions
- Short-Width (<8") and/or Short-Height (<6") Transitions

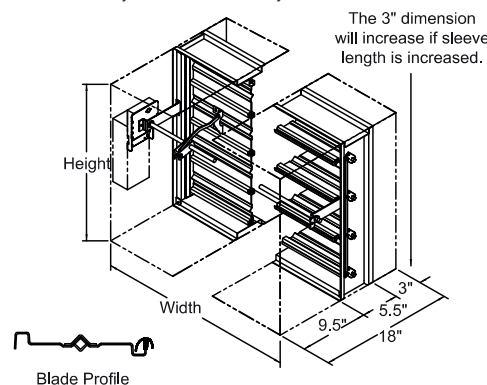
UNDERWRITERS LABORATORIES INC.

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1% HR
 LEAKAGE RESISTANCE CLASS II
FILE # R27351



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:119
- New York City MEA Listing # 111-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Notes

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

		2000 fpm, 4 in.wg ** (10m/s , 1000 Pa)**						3000 fpm, 6 in.wg ** (15m/s , 1000 Pa)**		
Orientation	Hor & Ver	Horizontal			Vertical			Hor & Ver	Horizontal	Vertical
Panels	Min. Panel W x H	Max. Panel 250° / 350° W x H	Max. Assy 250° / 350° W x H	Max. Panel 250° W x H	Max. Panel 350° W x H	Max. Assy 250° W x H	Max. Assy 350° W x H	Max. Panel 250° W x H	Max. Panel 250° W x H	Max. Panel 350° W x H
	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)
Rectangular	4"W x 4"H (102mm x 102mm) (8"W x 6"H frame) (203mm x 152mm)	36"W x 48"H (914mm x 1219mm)	72"W x 48"H (1829mm x 1219mm)	36"W x 48"H (914mm x 1219mm)	36"W x 48"H (914mm x 1219mm)	144"W x 70"H (3658mm x 1778mm)	128"W x 62"H (3251mm x 1575mm)	36"W x 36"H (914mm x 914mm)	72"W x 36"H (1829mm x 914mm)	108"W x 36"H (2743mm x 914mm)
Round	4"dia (102mm dia) (8"W x 6"H frame) (203mm x 152mm)	34"dia (864mm)	46"dia (1168mm)	34"dia (864mm)	34"dia (864mm)	68"dia (1727mm)	60"dia (1524mm)	34"dia (864mm)	34"dia (864mm)	34"dia (864mm)
Oval	4"W x 4"H (102mm x 102mm) (8"W x 6"H frame) (203mm x 152mm)	34"W x 46"H (864mm x 1168mm)	70"W x 46"H (1778mm x 1168mm)	34"W x 46"H (864mm x 1168mm)	34"W x 46"H (864mm x 1168mm)	106"W x 68"H (2692mm x 1727mm) 45 sq.ft.	106"W x 60"H (2692mm x 1524mm)	34"W x 34"H (864mm x 864mm)	70"W x 34"H (1778mm x 864mm)	106"W x 34"H (2692mm x 864mm)

* Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.

** For sizes smaller than 16" w x 8" h, airfoil blade will be supplied.

* WHEN A TRUE 6" High, width is limited to 16"; if ordered as 6" high and width is > 16", an 8" high damper with 2" short-height transition will be supplied.

*In the interest of product development, KMC reserves the right to make changes without notice.

Combination Fire/Smoke Damper

Class II • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

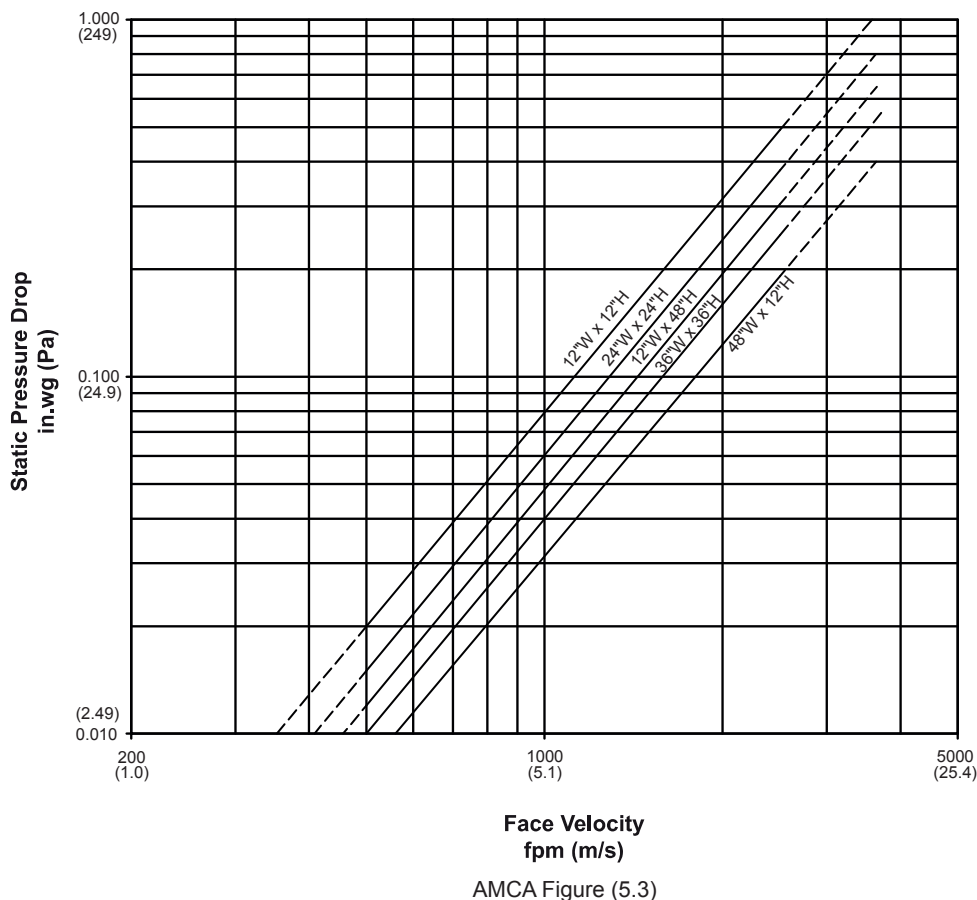
20 cfm per sq.ft. maximum @ 4 in.wg

Sound Ratings: The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion				
Damper Size	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	N/A

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested in accordance with AMCA Standard 500D.

MT1

Combination Fire/Smoke Damper

Class I • 3 Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper



Construction	Standard
Frame Material	Galvanized steel
Frame Material Thickness	16ga Galvanized steel
Frame Type	5½" X ¾" Galvanized steel Hat Channel
Blade Type	Single Thickness Blade
Blade Material Thickness	16-GA Single Thickness Parallel action
Axle materials	Plated Solid Steel stub
Axle Bearings	Oil impregnated bronze
Linkage	Plated steel angle & crank plates with stainless steel pivots; In-jamb type or on-blade type
Blade Seal	Silicone
Jamb Seal	Stainless steel
Closure Device	Electric heat responsive device
Closure Temperature	165° F (73°C)

Options

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (DPI) Switches
- Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
- Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
- Model SM-501 Flow-Rated Smoke Detector
- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
- Remote Test Boxes
- Copper Tubing (for Pneumatic Actuators)
- Transformers
- Tab-Lock Retaining Angles - 1 or 2 Sets
- Stainless Steel Bearings
- Stainless Steel Axles
- Security Bars
- Sleeves of Various Depths and Gauge Thickness (restriction apply)
- No Sleeves (restriction apply)
- Round or Oval Transitions
- Short-Width (<8") and/or Short-Height (<6") Transitions

UNDERWRITERS LABORATORIES INC.

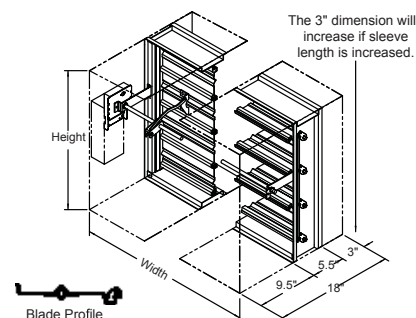
CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 3 HR
 LEAKAGE RESISTANCE CLASS I



FILE # R27351

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3230-1328:105
- New York City MEA Listing 112-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistance rating of 3 hours and longer.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.



Notes

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

		2000 fpm, 4 in.wg ** (10m/s , 1000 Pa)**				3000 fpm, 6 in.wg ** (15m/s , 1000 Pa)**		
Orientation	Hor & Ver	Horizontal		Vertical		Hor & Ver	Horizontal	Vertical
Panels	Min. Panel W x H	Max. Panel W x H	Max. Assy W x H	Max. Panel W x H	Max. Panel W x H	Max. Panel W x H	Max. Assy W x H	Max. Assy W x H
	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)
Rectangular	4"W x 4"H (102mm x 102mm) 8"W x 6"H frame (203mm x 152mm)	30"W x 48"H (762mm x 1219mm) 36"W x 30"H (914mm x 30mm)	60"W x 48"H (1524mm x 1219mm)	36"W x 48"H (914mm x 1219mm)	108"W x 48"H (2743mm x 1219mm)	36"W x 36"H (914mm x 914mm)	60"W x 36"H (1524mm x 914mm)	108"W x 36"H (2743mm x 914mm)
Round	4"dia (102mm dia) 8"W x 6"H frame (203mm x 152mm)	28"dia (711mm dia)	47"dia (1194mm dia)	34"dia (864mm)	46"dia (559mm)	34"dia (1168mm)	34"dia (864mm)	34"dia (864mm)
Oval	4"W x 4"H (102mm x 102mm) 16"W x 8"H frame (406mm x 203mm)	28"W x 46"H (711mm x 1168mm) 34"W x 28"H (864mm x 711mm)	58"W x 47"H (1473mm x 1194mm)	34"W x 46"H (864mm x 1168mm)	106"W x 46"H (2692mm x 1168mm)	34"W x 34"H (864mm x 864mm)	58"W x 34"H (1473mm x 864mm)	106"W x 34"H (2692mm x 864mm)

* Dampers Smaller than Minimum Frame Size require a transition - Refer SD- TRFS

** For sizes smaller than 16" w x 8" h, airfoil blade will be supplied

*In the interest of product development, KMC reserves the right to make changes without notice.

Combination Fire/Smoke Damper

Class I • 3 Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

10 cfm per sq.ft. maximum @ 1 in.wg

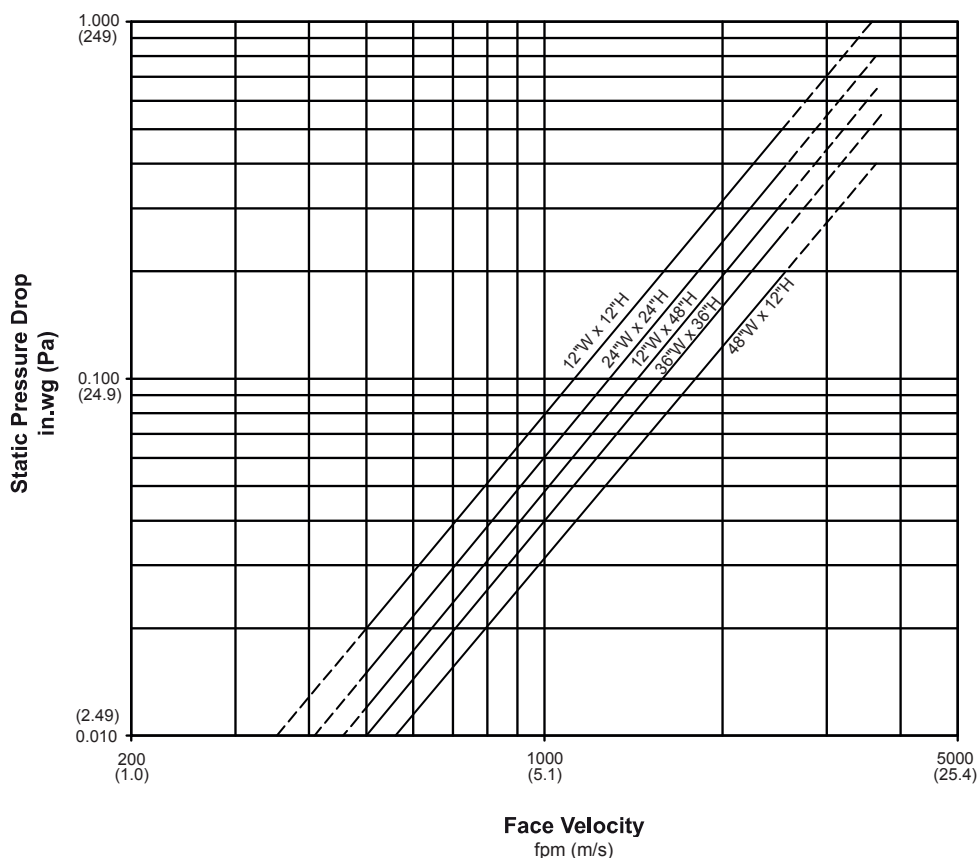
20 cfm per sq.ft. maximum @ 4 in.wg

Sound Ratings: The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion				
Damper Size	Velocity (fpm)			
	1000	2000	3000	400
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	N/A

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested in accordance with AMCA Standard 500D.

Combination Fire/Smoke Damper

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Construction	Standard
Frame Material	Galvanized steel
Frame Material Thickness	16ga Galvanized steel
Frame Type	5½" X ¾" Galvanized steel Hat Channel
Blade Type	Single Thickness Blade
Blade Material Thickness	16-GA Single Thickness Parallel action
Axle materials	Plated Solid Steel stub
Axle Bearings	Oil impregnated bronze
Linkage	Plated steel angle & crank plates with stainless steel pivots; In-jamb type or on-blade type
Blade Seal	Silicone
Jamb Seal	Stainless steel
Closure Device	Electric heat responsive device
Closure Temperature	165° F (73°C)

Options

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (DPI) Switches
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- Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
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- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
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- Tab-Lock Retaining Angles - 1 or 2 Sets
- Stainless Steel Bearings
- Stainless Steel Axles
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UNDERWRITERS LABORATORIES INC.

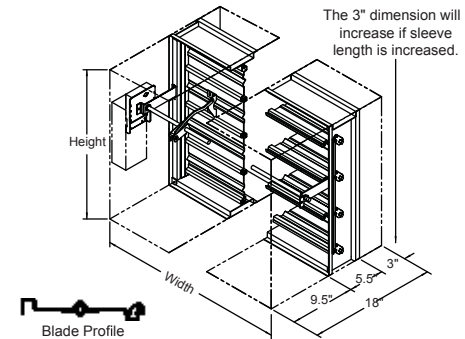
CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
FIRE RESISTANCE RATING 3 HR
LEAKAGE RESISTANCE CLASS II

FILE # R27351



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- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
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- New York City MEA Listing # 111-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detections system.



Notes

- "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
- Damper \geq 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

		2000 fpm, 4 in.wg ** (10m/s , 1000 Pa)**				3000 fpm, 4 in.wg ** (15m/s , 1000 Pa)**		
Orientation	Hor & Ver	Horizontal		Vertical		Hor & Ver	Horizontal	Vertical
Panels	Min. Panel W x H	Max. Panel W x H	Max. Assy W x H	Max. Panel W x H	Max. Panel W x H	Max. Panel W x H	Max. Assy W x H	Max. Assy W x H
	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)	Inches (mm)
Rectangular	4"W x 4"H (102mm x 102mm) 8"W x 6"H - frame (203mm x 152mm)	30"W x 48"H (762mm x 1219mm) 36"W x 30"H (914mm x 30mm)	60"W x 48"H (1524mm x 1219mm)	36"W x 48"H (914mm x 1219mm) 42"W x 36"H (1067mm x 914mm)	108"W x 48"H (2743mm x 1219mm)	36"W x 36"H (914mm x 914mm)	60"W x 36"H (1524mm x 914mm)	108"W x 36"H (2743mm x 914mm)
Round	4" dia (102mm dia) 8"W x 6"H - frame (203mm x 152mm)	28" dia (711mm dia)	47" dia (1194mm dia)	34" dia (864mm)	46" dia (1168mm dia)	34" dia (864mm)	34" dia (864mm)	34" dia (864mm)
Oval	4"W x 4"H (102mm x 102mm) 8"W x 6"H - frame (203mm x 152mm)	28"W x 46"H (711mm x 1168mm) 34"W x 28"H (864mm x 711mm)	58"W x 47"H (1473mm x 1194mm)	34"W x 46"H (864mm x 1168mm) 40"W x 34"H (1016mm x 864mm)	106"W x 46"H (2692mm x 1168mm)	34"W x 34"H (864mm x 864mm)	58"W x 34"H (1473mm x 864mm)	106"W x 34"H (2692mm x 864mm)

* Dampers Smaller than Minimum Frame Size require a transition - Refer SD- TRFS

** For sizes smaller than 16"w x 8"h, airfoil blade will be supplied

*In the interest of product development, KMC reserves the right to make changes without notice.



Combination Fire/Smoke Damper

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

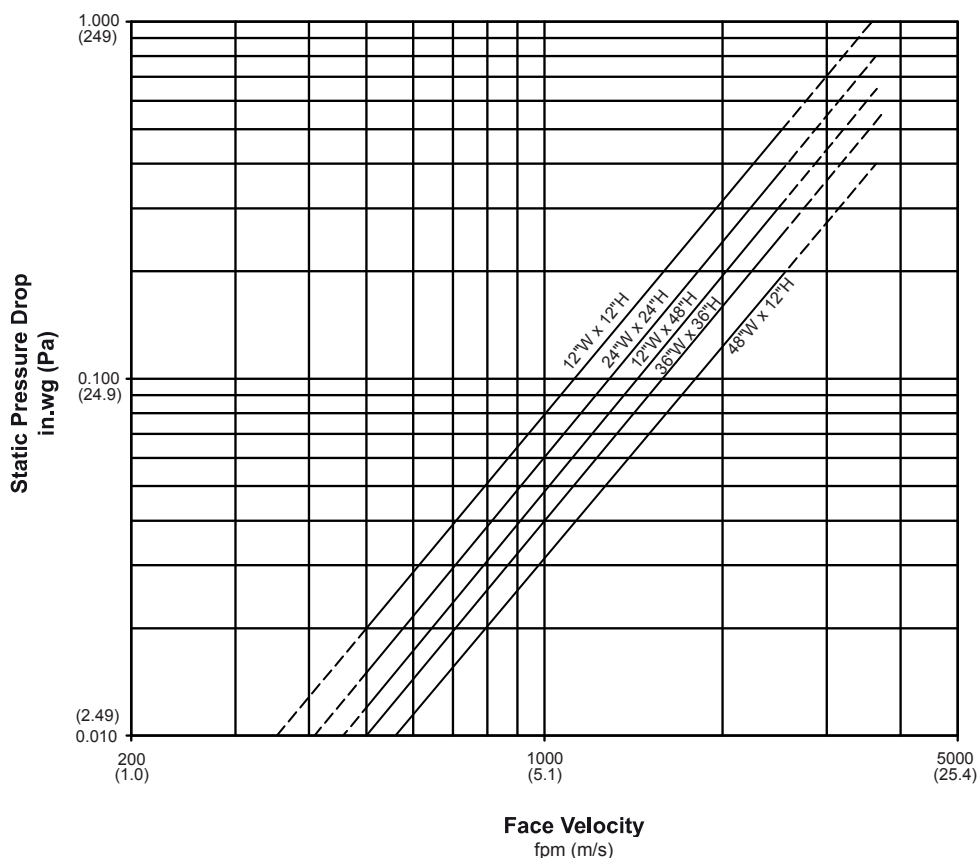
20 cfm per sq.ft. maximum @ 4 in.wg

Sound Ratings: The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion				
Damper Size	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	N/A

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested in accordance with AMCA Standard 500D.



INSTALLATION INSTRUCTION

Standard Installation

Fire/Smoke Damper Models: FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA, FS2C2, TG2C, MS2C, AS2C

Fire Damper Models: MD19, 15MD, 17MD, MD17, MD39, 30MD, 38MD, 37MD, MA19, 15MA, 17MA, MA17, MA39, 30MA, 38MA, 37MA

APPLICATION

These dynamically rated fire/smoke and fire dampers are intended to restrict the passage of flame. The dynamically rated fire/smoke dampers are also intended to restrict the passage of smoke. When the damper is intended to be used as a fire rated damper, the standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier. When the damper is to be used as a leakage rated damper only, the damper is to be installed within 24" of the smoke barrier and upstream of any duct outlets.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down and can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal position,

the damper must be mounted in a fire barrier constructed of masonry/concrete materials. See page 4 of 7 for approved location of actuator when mounted horizontally (floor mount)

The Models FS2C2, TG2C, MS2C, AS2C are approved and labeled for use in the following applications. For sizes not exceeding 24"W x 24"H the Models FS2C2, TG2C, MS2C, AS2C are approved and labeled for use as a vertically mounted or horizontally mounted, 1½ hour rated Fire/Smoke Damper. When used as a Fire/Smoke Damper, the installation instructions stated in this pamphlet apply. The Models FS2C2, TG2C, MS2C, AS2C are also approved and labeled for use as a horizontally mounted, 1 hour rated Corridor Damper. When used as a Corridor Damper, the installation instructions stated by II-FS2C shall apply.

PANEL SIZE LIMITATIONS							
MODEL	Actuation	Electric					
	Orientation	Horizontal			Vertical		
	Assembly	Max. Panel	Max. Assy 250°F	Max. Assy 350°F	Max. Panel	Max. Assy 250°F	Max. Assy 350°F
MODEL	FS, CG, MS, AS	36"W x 48"H	72"W x 48"H	72"W x 48"H	36"W x 48"H 48"W x 36"H	144"W x 70"H	128"W x 62"H
	FT, CH, MT, AT	30"W x 48"H 36"W x 30"H	60"W x 48"H	60"W x 48"H	36"W x 48"H 42"W x 36"H	126"W x 48"H	126"W x 48"H
	FA, CA, MA, UA	32"W x 48"H	96"W x 96"H	96"W x 96"H	32"W x 48"H	128"W x 96"H	128"W x 96"H
	TA, CT, LA	30"W x 48"H	60"W x 48"H	60"W x 48"H	30"W x 48"H	60"W x 48"H	60"W x 48"H
	FS2C, TG2C, MS2C, AS2C	24"W x 24"H	24"W x 24"H	n/a	24"W x 24"H	24"W x 24"H	N/A

MODEL	Actuation	Pneumatic					
	Orientation	Horizontal			Vertical		
	Assembly	Max. Panel	Max. Assy 250°F	Max. Assy 350°F	Max. Panel	Max. Assy 250°F	Max. Assy 350°F
MODEL	FS, CG, MS, AS	36"W x 48"H	72"W x 48"H	72"W x 48"H	36"W x 48"H	108"W x 48"H	108"W x 48"H
	FT, CH, MT, AT	30"W x 48"H 36"W x 30"H	60"W x 48"H	60"W x 48"H	36"W x 48"H 42"W x 36"H	126"W x 48"H	126"W x 48"H
	FA, CA, MA, UA	32"W x 48"H	96"W x 96"H	96"W x 96"H	32"W x 48"H	128"W x 96"H	128"W x 96"H
	TA, CT, LA	30"W x 48"H	60"W x 48"H	60"W x 48"H	30"W x 48"H	60"W x 48"H	60"W x 48"H

MODEL	Actuation	Non-Motorized					
	Orientation	Horizontal			Vertical		
	Assembly	Max. Panel	Max. Assy 250°F	Max. Assy 350°F	Max. Panel	Max. Assy 250°F	Max. Assy 350°F
MODEL	MD19, 15MD, 17MD, MD17	36"W x 48"H	72"W x 48"H	72"W x 48"H	36"W x 48"H	72"W x 60"H 126"W x 48"H	72"W x 60"H 126"W x 48"H
	MD39, 30MD, 38MD, 37MD	30"W x 48"H 36"W x 30"H	60"W x 48"H	60"W x 48"H	36"W x 48"H	126"W x 48"H	126"W x 48"H
	MA19, 15MA, 17MA, MA17	32"W x 48"H	64"W x 36"H 32"W x 72"H	64"W x 36"H 32"W x 72"H	32"W x 48"H	64"W x 36"H 32"W x 72"H	64"W x 36"H 32"W x 72"H
	MA39, 30MA, 38MA, 37MA	30"W x 48"H	60"W x 36"H	60"W x 36"H	30"W x 48"H	60"W x 36"H	60"W x 36"H

INSTALLATION INSTRUCTION

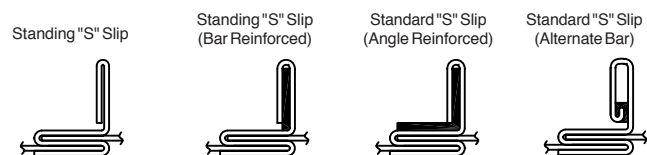
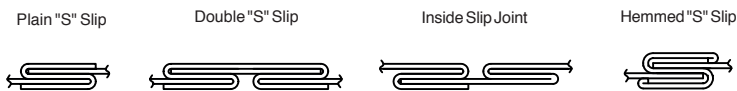
Installation

Proper installation and periodic performance testing are required to ensure that these dampers function as intended.

1. General: The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-80, NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.
2. Actuators: Dampers must be supplied with factory mounted actuators (except Models MD19, 15MD, 17MD, MD17, MD39, 30MD, 38MD, 37MD, MA19, 15MA, 17MA, MA17, MA39, 30MA, 38MA, 37MA) and are intended to close automatically when sensing heat or upon loss of electrical power or release of air pressure. When this damper is used as a leakage rated damper only, it shall be arranged to operate automatically and is to be controlled by a smoke detector. See additional instructions, which detail damper actuator sequence of operations. Multiple actuators in a mechanically linked section that are factory wired/plumbed together have only one heat response device and one supply connection point. The supply connection point must be at the «master» actuator package, which contains the heat response device. The heat response device must be wired/plumbed between the supply connection point and the master actuator and all slave actuators.
3. Multiple Panel / Multiple Section Assembly: Large damper assembly sizes may require multiple factory assembled modules that ship separately. Refer to page 5 for details.
4. Sleeves: Sleeves are required for the proper installation of fire rated dampers, but need not be factory supplied. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with 3/16» diameter steel rivets, 1/4» diameter steel bolts, #10 steel sheet metal screws, or 1/2» long welds. Fasteners shall be staggered on each side of the damper frame on 6» maximum centers and 3-1/2» maximum from each corner. For Class I Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on only one side.
5. Expansion Clearance: The opening in the wall for the fire rated

damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of 1/4» or 1/8» per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed 1/8» per foot of overall damper/sleeve width and height plus 2». Example: For a damper with exact outside dimensions of 36»W x 48»H, the gap at the top plus the gap at the bottom must be between 0.50» and 2.5». The gap at the left side plus the gap at the right side must be between 0.375» and 2.375». The damper can be located anywhere in the opening and need not be centered. The expansion clearance space is not to be filled.

6. Retaining Angle Attachment: Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1» overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. In metal frame construction, the angles can be mounted under or over the gypsum board. In wood frame construction, the angles must be mounted over the gypsum board. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with 3/16» diameter steel or stainless steel nuts and bolts or by tack welding with beads 1/2» ± 1/4» in length or with #10 steel or stainless steel sheet metal screws or 3/16» steel or stainless steel pop rivets. All connections shall be spaced on 6» maximum centers and 3» maximum from each corner (a minimum of 2 fasteners are required per side). For perimeter angle mounting on one side of the fire barrier only, reference Installation Instruction II-FSOS. Perimeter retaining angles shall be a minimum of 1-1/2» x 7/8» x 16-GA steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24». For dampers 24»W x 24»H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
7. Caulking: Caulk exposed to the airstream shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening. Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T



INSTALLATION INSTRUCTION

Installation

8. Duct Connections: All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36» wide or 24» high or 24» diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain “S” Slip, Double “S” Slip, Inside Slip, Hemmed “S” Slip, Standing “S” Slip, Standing “S” Slip (Bar Reinforced), Standing “S” Slip (Angle Reinforced), and Standing “S” Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides. The damper is normally supplied with a factory attached sleeve (see Note 4 when field supplied sleeve). The standard factory supplied sleeve is 20-GA galvanized steel (18-GA on dampers wider or higher than 84») and assumes that a breakaway type duct connection will be employed. The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

- Round duct diameter is no larger than 36”.
- Oval duct size is no larger than 71”W x 30”H.
- Duct gauges conform to the SMACNA or ASHRAE standard.
- An oval duct or round duct less than or equal to 24” is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24” is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection). Dampers with round/oval transitions that fall outside of these restrictions must use a 4” wide drawband connection as shown by the SMACNA Fire, Smoke Radiation Damper Instruction Guide. The collar hem on stainless steel dampers is not a breakaway connection.

9. Damper access: Access to the damper shall be provided and be large

enough to allow for inspection and maintenance. For small duct size, a removable duct may be necessary. The access is to be located on the jackshaft side of the damper.

10. Operation of dampers: After the damper is installed, it shall be cycled and inspected to insure proper operation.

Periodic Inspection and Performance Testing:

Although the required frequency of this periodic operation testing varies by local jurisdiction, most local requirements reference one of two national standards, either NFPA 80 or NFPA 105. NFPA 80 covers the requirements for fire dampers and NFPA 105 covers the requirements for smoke dampers. Both documents contain the following frequency requirements for periodic operation testing:

Each damper shall be tested and inspected one year after installation. The test and inspection frequency shall then be every 4 years, except in hospitals, where the frequency shall be every 6 years.

Performance Testing Depends On Site Requirements.

- A recommended procedure follows:
- Visually confirm that the damper is in the full open position.
- Ensure that all obstructions, including hands, are out of the path of the damper blades and then remove electric power or air pressure from the actuator to allow the actuator's spring return feature to close the damper.
- Visually confirm that the damper closed completely.
- Reapply electric power or air pressure to reopen the damper.
- Visually confirm that the damper is in the full-open position.

NOTE: If lubrication is applied, it shall be of a dry type.

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

One-Side Retaining Angles (II-FSOS)

Out-of-Wall Floor (II-FAGM)

Sleeve Extension (SI-SLVEXT)

Electric or Pneumatic Heat Response Devices (SD-EHRD or SD-PHRD)

Integral Dual Position Indication (SD-IDP)

Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)

Flow-Rated Smoke Detector (SM-501)

No-Flow Smoke Detector (2151)

Transitions (SD-TRFS)

Sleeves (SD-SLVFS)

September 2013

II-FS-13.09

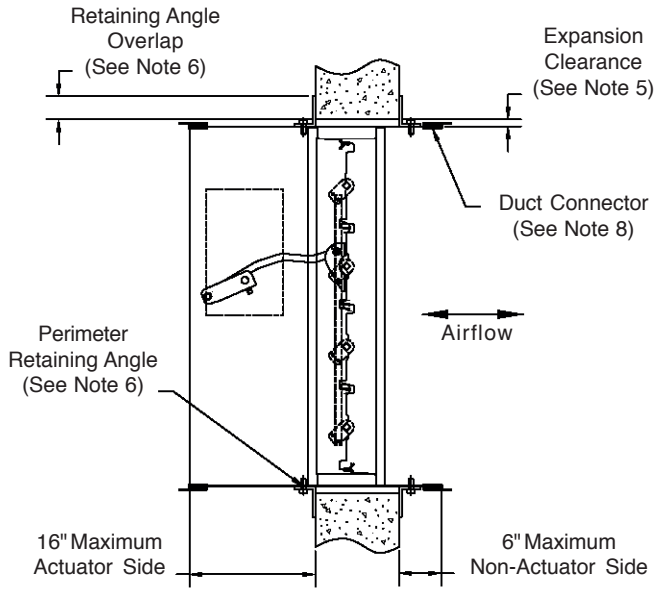
*In the interest of product development, KMC reserves the right to make changes without notice.

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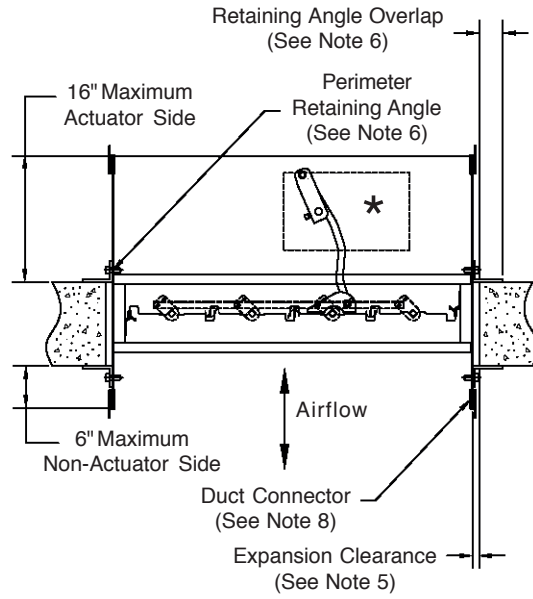
INSTALLATION INSTRUCTION

Standard Mounting Details

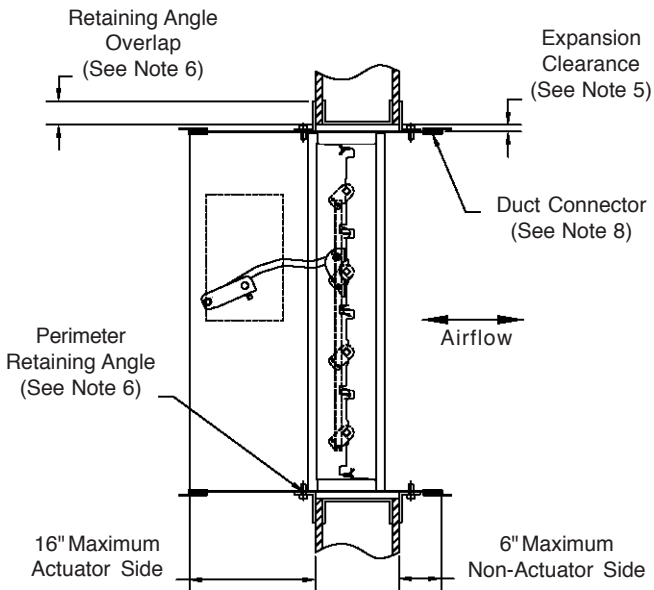
Vertical, 2-Side Retaining, Masonry



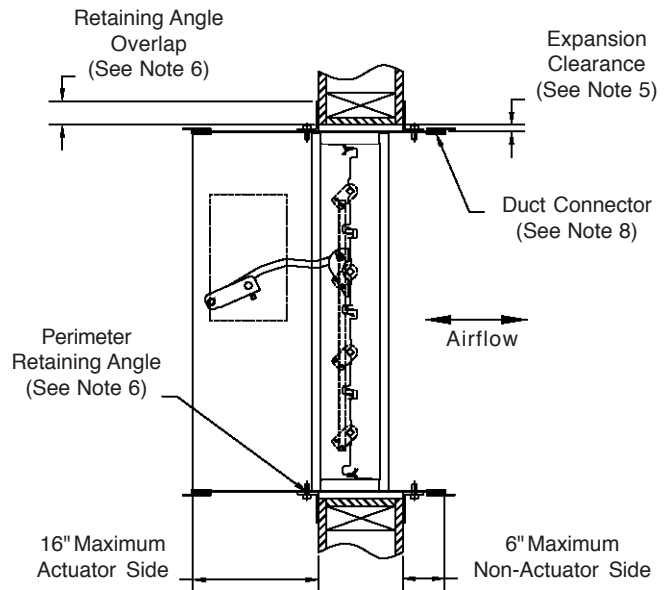
Horizontal, 2-Side Retaining, Masonry



Vertical, 2-Side Retaining, Metal Stud



Vertical, 2-Side Retaining, Wood Stud



* When floor mounted, the actuator is to be on the top side. Exception; the model FA, CA, MA and UA can have its actuator mounted below the floor as well for dampers no larger than 32" wide X 36" high.

INSTALLATION INSTRUCTION

Multiple Panel / Multiple Section Installation Details

Fire/Smoke Dampers (Models FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA)

1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are electrically/pneumatically, but not mechanically linked between top and bottom panels if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/ pneumatically linked.
3. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
4. Damper assembly sections that are not mechanically or electrically/ pneumatically linked each have their own heat response device and their own supply connection point, such that they operate independently. Multiple actuators within a linked section are factory wired/plumbed together.
5. Damper assembly sections that are mechanically and electrically/ pneumatically linked share a single heat response device and a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.
6. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame. Fasteners are by others.

Fire Dampers (MD19, 15MD, 17MD, MD17, MD39, 30MD, 38MD, 37MD, MA19, 15MA, 17MA, MA17, MA39, 30MA, 38MA, 37MA)

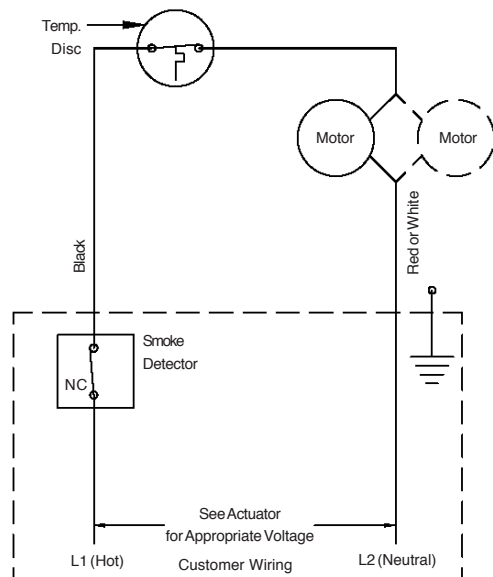
1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are not mechanically linked between top and bottom panels.
3. Multiple panel wide damper assemblies are not mechanically linked between panels.
4. Damper assembly sections that are not mechanically linked each have their own heat response device, such that they operate independently.
5. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

ELECTRIC WIRING SCHEMATICS

Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.
4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)



POSITION INDICATION SWITCH WIRING CHART

	CLOSED DAMPER INDICATION		OPEN DAMPER INDICATION	
	LOWER WITH COMMON	NORMALLY COLSED (LOWER)	UPPER LIMIT COMMON	NORMALLY COLSED (UPPER)
PK1200 -1201 PACKAGE	RED	BLUE	GRAY	ORANGE
BELIMO FSLF	51	52	S4	56
BELIMO FSNF	51	S2	S4	55
BELIMO FSAFB24-5R-S	51	S2	S4	S5
HONEYWELL AUXILIARY	WHITE / RED	WHITE / YELLOW	BLACK / RED	BLACK / YELLOW
HONEYWELL F SERIES	BLUE	BLUE	YELLOW	YELLOW

September 2013

II-FS-13.09

*In the interest of product development, KMC reserves the right to make changes without notice.

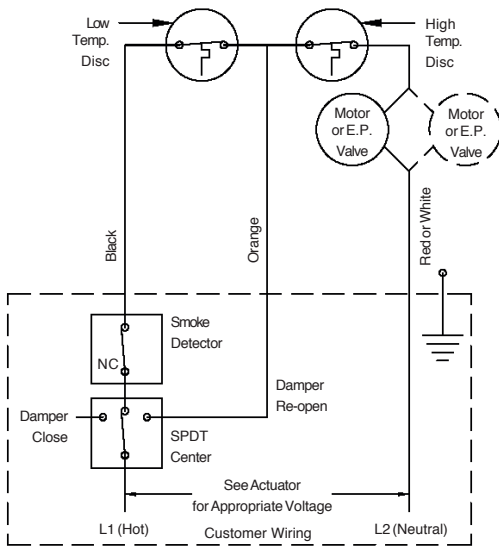
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Louvers  Dampers

Khalid Manufacturing Company

INSTALLATION INSTRUCTION ELECTRIC WIRING SCHEMATICS (CONT.)

Electric/Pneumatic Sensotherm (ESOT/PSOT) with included Integral Dual Position Indication (IDPI)



POSITION INDICATION SWITCH WIRING CHART				
	CLOSED DAMPER INDICATION		OPEN DAMPER INDICATION	
	LOWER WITH COMMON	NORMALLY CLOSED (LOWER)	UPPER LIMIT COMMON	NORMALLY CLOSED (UPPER)
PK1200 -1201 PACKAGE	RED	BLUE	GRAY	ORANGE
BELIMO FSLF	.51	S2	S4	SO
BELIMO FSNF	S1	S2	S4	S5
BELIMO FSAFB24-5R-S	S1	S2	S4	S5
HONEYWELL AUXILIARY	WHITE / RED	WHITE / YELLOW	BLACK / RED	BLACK / YELLOW
HONEYWELL F SERIES	BLUE	BLUE	YELLOW	YELLOW

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (MCS) (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

1. Place (MCS) switch in damper close position.
Result: The closed indicator light (if used) should be on and the damper blades closed.
2. Apply power.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

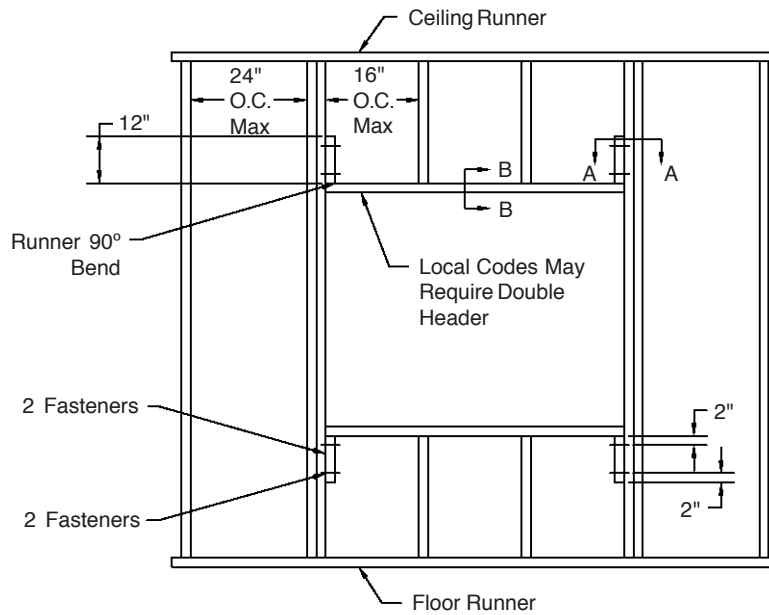
1. MCS closed position: Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. MCS re-open position: If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

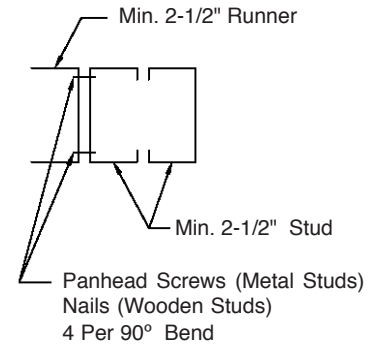


INSTALLATION INSTRUCTION

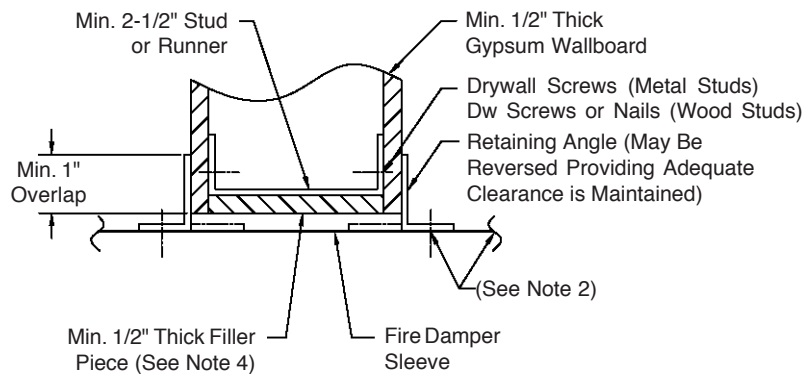
Framing Details (Metal Or Wood 1 Hour And 2 Hour Rated Barriers)



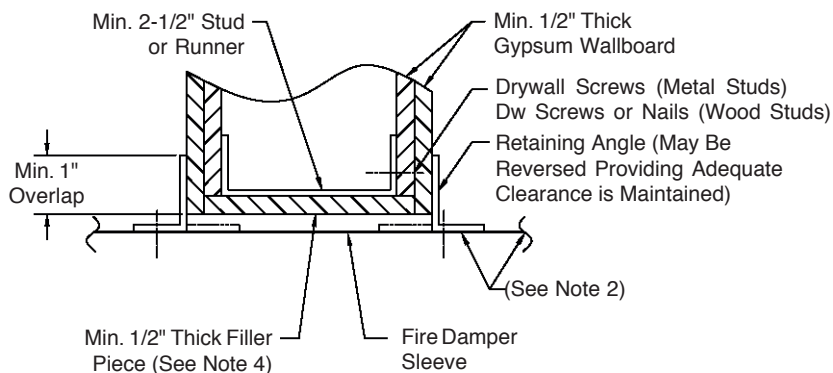
Section A-A



Section B-B (1 Hour Rated Fire Barrier)



Section B-B (2 Hour Rated Fire Barrier)



NOTES:

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown and required when opening width or length exceeds 36". Single jamb studding acceptable for openings 36"W x 36"H and smaller.

