



COMBINATION FIRE/SMOKE DAMPER
 1 1/2 HOUR LABEL • LEAKAGE CLASS I OR II
MODELS: 1270 AND 1271 (TYPE A)



QUALIFICATIONS:

- **UL 555 & CAN/ULC-S112 CLASSIFIED DYNAMIC FIRE DAMPER**
1 1/2 hr. Label (File # R9492).
- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**
Leakage Class I or II at 250°F or 350°F elevated temperature.
- **California State Fire Marshal: Fire Damper Listing No. 3225-0935:106.**
- **City of New York Board of Standards and Appeals. Cal. No. 460-88-SA.**
- **Meets NFPA 80, 90A, 92A, 92B, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.**
- **Maximum velocity 2000 fpm @ 4" w.g.**

The 1270 Series dampers are ideal for applications where building codes require both a fire damper for the protection of ductwork penetrations in walls or floors that have a fire resistance rating of up to 2 hours and also require a leakage rated damper for operational smoke control in static or dynamic smoke management systems.

The 1270 Series has been especially designed and tested to offer a rugged cost effective damper well suited to the majority of commercial applications.

STANDARD SPECIFICATION:

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galvanized steel hat channel.
- Blades:** 6" (152) wide on 5 1/2" (140) centers. 16 ga. (1.6) galvanized steel vee groove or double-skin design.
- Linkage:** Concealed in frame. 12 ga. (2.7) plated steel.
- Bearings:** 1/2" (13) dia. self-lubricating oilite bronze.
- Axles:** 1/2" (13) dia. plated steel bolted to blades.
- Jackshaft:** 1/2" (13) dia. cadmium plated steel.
- Jamb Seals:** Stainless steel.
- Blade Seals:** Silicone on vee groove blade.
- Heat Responsive Device (Controlled Closure):**

ERL (Electric Resettable Link) is standard on dampers with electric actuators: 250°F (121°C) standard. 165°F (74°C), 212°F (100°C) and 350°F (176°C) available.

PRL (Pneumatic Replaceable Link) is standard on dampers with pneumatic actuators: 212°F (100°C) standard. 165°F (74°C) and 280°F (138°C) available.

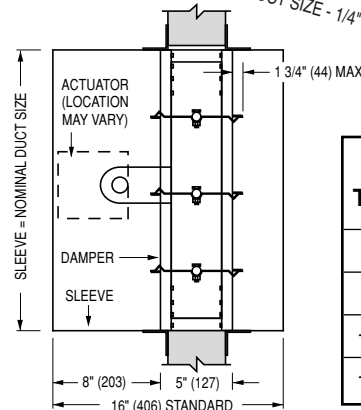
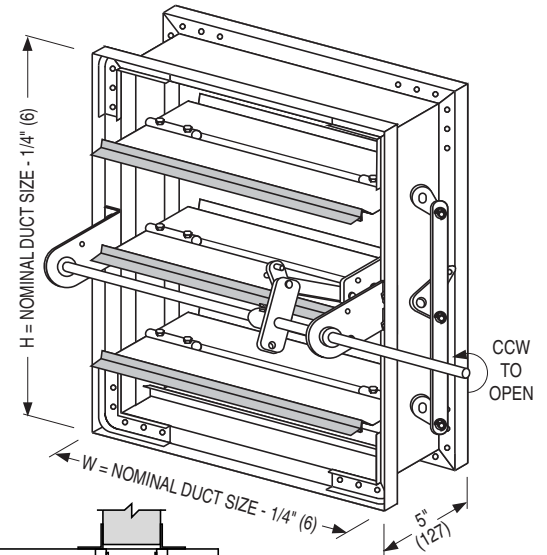
Minimum Size: Vertical or Horizontal mount: 8" x 8" (203 x 203).

- Maximum Size:** Single Section
 Vertical mount: 36" x 48" (914 x 1219).
 Horizontal mount: 30" x 40" (762 x 1016).
 Multiple Section Assembly
 Vertical mount: 72" x 48" (1829 x 1219) or
 36" x 96" (914 x 2438).
 Horizontal mount: 60" x 40" (1524 x 1016) or
 30" x 80" (762 x 2032).

Dampers with duct heights less than 8" (203) require a Type 'B' sleeve enclosure (Model 1272). Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1273).

BASE MODEL SELECTION:

- 1270** With side motor mounting plate
- 1271** Standard factory sleeve (caulked to UL requirements) 16" long x 20 ga. (406 x 1.0) (18 ga. for dampers over 84" [2134] in width).
- 1271** Non-standard sleeve. Specify _____ length _____ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).



Wall Thickness	Minimum Sleeve Length
4 (102)	16 (406)
8 (203)	20 (508)
12 (305)	24 (610)
16 (406)	28 (711)

LEAKAGE CLASS / ELEVATED TEMPERATURE:

- I II @ 250°F (Standard)
- I II @ 350°F (Optional)

ACTUATOR SELECTION:

- Electric** **Pneumatic** Specify model _____

ACTUATOR LOCATION :

- External** (std.) **Internal** (in the airstream)

ACTUATOR FAIL POSITION: Closed.

OPTIONS:

- BS** Stainless steel bearings
- MLS-300** Position indicator switch pack
- MLS-400** Electric Fire Sensor (Re-openable control system). Includes dual heat sensors (165°F and 250°F or 350°F) and position indicator switch pack.
- QS1** Quick-set retaining angle (one side)
- QS2** Quick-set retaining angles (two sides)
- TDF1** Flange (one end)
- TDF2** Flange (both ends)

For installation instructions, see IOM-1270INST.

Dimensions are in inches (mm).

SCHEDULE TYPE:				
PROJECT:				
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	4 - 28 - 11	1200	8 - 21 - 08	1270-1



COMBINATION FIRE/SMOKE DAMPER
 1 1/2 HOUR LABEL • LEAKAGE CLASS I OR II
MODEL: 1272
(TYPE B SLEEVE ENCLOSURE)



FOR DUCTS UNDER 8" (203) IN HEIGHT AND 8" (203) OR MORE IN WIDTH QUALIFICATIONS:

- **UL 555 & CAN/ULC-S112 CLASSIFIED DYNAMIC FIRE DAMPER** 1 1/2 hr. Label (File # R9492).
- **UL 555S CLASSIFIED SMOKE DAMPER** (File # R9492) Leakage Class I or II at 250°F or 350°F elevated temperature.
- **California State Fire Marshal: Fire Damper Listing No. 3225-0935:106.**
- **City of New York Board of Standards and Appeals. Cal. No. 460-88-SA.**
- **Meets NFPA 80, 90A, 92A, 92B, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.**
- **Maximum velocity 2000 fpm @ 4" w.g.**

The 1270 Series dampers are ideal for applications where building codes require both a fire damper for the protection of ductwork penetrations in walls or floors that have a fire resistance rating of up to 2 hours and also require a leakage rated damper for operational smoke control in static or dynamic smoke management systems.

The 1270 Series has been especially designed and tested to offer a rugged cost effective damper well suited to the majority of commercial applications.

STANDARD SPECIFICATION:

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galvanized steel hat channel.
- Blades:** 6" (152) wide on 5 1/2" (140) centers. 16 ga. (1.6) galvanized steel vee groove or double-skin design.
- Linkage:** Concealed in frame. 12 ga. (2.7) plated steel.
- Bearings:** 1/2" (13) dia. self-lubricating oilite bronze.
- Axles:** 1/2" (13) dia. plated steel bolted to blades.
- Jackshaft:** 1/2" (13) dia. cadmium plated steel.
- Jamb Seals:** Stainless steel.
- Blade Seals:** Silicone on vee groove blade.

Heat Responsive Device (Controlled Closure):

ERL (Electric Resettable Link) is standard on dampers with electric actuators: 250°F (121°C) standard. 165°F (74°C), 212°F (100°C) and 350°F (176°C) available.

PRL (Pneumatic Replaceable Link) is standard on dampers with pneumatic actuators: 212°F (100°C) standard. 165°F (74°C) and 280°F (138°C) available.

Min. Duct Size: 8" x 4" (203 x 102) (Overall damper H is 8" [203]).

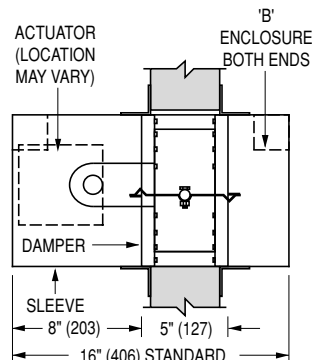
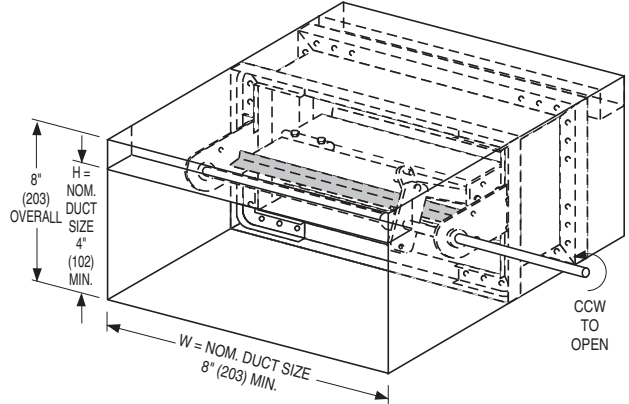
Max. Duct Size: Single Section
 Vertical mount: 36" x 7 1/2" (914 x 191).
 Horizontal mount: 30" x 7 1/2" (762 x 191).

Multiple Section Assembly
 Vertical mount: 72" x 7 1/2" (1829 x 191).
 Horizontal mount: 60" x 7 1/2" (1524 x 191).

Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1273).

SLEEVE/ENCLOSURE SELECTION:

- 1272** Standard factory sleeve (caulked to UL requirements) 16" long x 20 ga. (406 x 1.0) (18 ga. for dampers over 84" [2134] in width).
- 1272** Non-standard sleeve. Specify _____ length _____ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).



Wall Thickness	Minimum Sleeve Length
4 (102)	16 (406)
8 (203)	20 (508)
12 (305)	24 (610)
16 (406)	28 (711)

LEAKAGE CLASS / ELEVATED TEMPERATURE:

- I II @ 250°F (Standard)
- I II @ 350°F (Optional)

ACTUATOR SELECTION:

- Electric Pneumatic Specify model _____.

ACTUATOR LOCATION :

- External (std.) Internal (in the airstream)

ACTUATOR FAIL POSITION: Closed.

OPTIONS:

- BS** Stainless steel bearings
- MLS-300** Position indicator switch pack
- MLS-400** Electric Fire Sensor (Re-openable control system). Includes dual heat sensors (165°F and 250°F or 350°F) and position indicator switch pack.
- QS1** Quick-set retaining angle (one side)
- QS2** Quick-set retaining angles (two sides)

For installation instructions, see IOM-1270INST.

SCHEDULE TYPE:	Dimensions are in inches (mm).			
PROJECT:				
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	4 - 28 - 11	1200	8 - 21 - 08	1270-2



COMBINATION FIRE/SMOKE DAMPER
 1 1/2 HOUR LABEL • LEAKAGE CLASS I OR II
 ROUND DUCT CONNECTION
MODEL: 1273
(TYPE C SLEEVE ENCLOSURE)



QUALIFICATIONS:

- **UL 555 & CAN/ULC-S112 CLASSIFIED DYNAMIC FIRE DAMPER**
1 1/2 hr. Label (File # R9492).
- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**
Leakage Class I or II at 250°F or 350°F elevated temperature.
- **California State Fire Marshal: Fire Damper Listing No. 3225-0935:106.**
- **City of New York Board of Standards and Appeals. Cal. No. 460-88-SA.**
- **Meets NFPA 80, 90A, 92A, 92B, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.**
- **Maximum velocity 2000 fpm @ 4" w.g.**

The 1270 Series dampers are ideal for applications where building codes require both a fire damper for the protection of ductwork penetrations in walls or floors that have a fire resistance rating of up to 2 hours and also require a leakage rated damper for operational smoke control in static or dynamic smoke management systems.

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- Blades:** 6" (152) wide on 5 1/2" (140) centers. 16 ga. (1.6) galvanized steel vee groove or double-skin design.
- Linkage:** Concealed in frame. 12 ga. (2.7) plated steel.
- Bearings:** 1/2" (13) dia. self-lubricating oilite bronze.
- Axles:** 1/2" (13) dia. plated steel bolted to blades.
- Jackshaft:** 1/2" (13) dia. cadmium plated steel.
- Jamb Seals:** Stainless steel.
- Blade Seals:** Silicone on vee groove blade.

Heat Responsive Device (Controlled Closure):

ERL (Electric Resettable Link) is standard on dampers with electric actuators: 250°F (121°C) standard. 165°F (74°C), 212°F (100°C) and 350°F (176°C) available.

PRL (Pneumatic Replaceable Link) is standard on dampers with pneumatic actuators: 212°F (100°C) standard. 165°F (74°C) and 280°F (138°C) available.

Min. Duct Size: Vertical or Horizontal mount: 4" (102) diameter. (Overall damper size is 8" x 8" [203 x 203] min.).

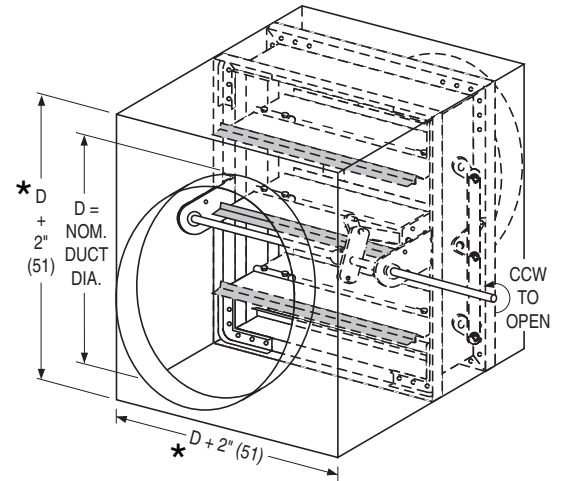
Max. Duct Size: Single Section
 Vertical mount: 34" (864) diameter.
 Horizontal mount: 28" (711) diameter.
 Multiple Section Assembly
 Vertical mount: 46" (1168) diameter.
 Horizontal mount: 38" (965) diameter.

SLEEVE/ENCLOSURE SELECTION:

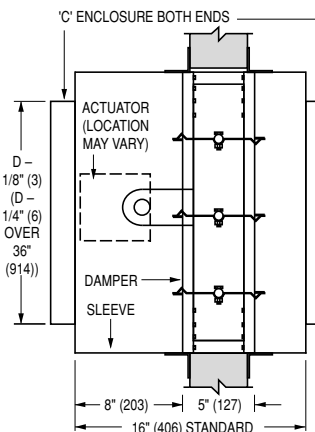
- 1273** Standard factory sleeve (caulked to UL requirements) 16" long x 20 ga. (406 x 1.0).
- 1273** Non-standard sleeve. Specify _____ length _____ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).

LEAKAGE CLASS / ELEVATED TEMPERATURE:

- I II @ 250°F (Standard)
- I II @ 350°F (Optional)



* or 8" (203) min.



Wall Thickness	Minimum Sleeve Length
4 (102)	16 (406)
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ACTUATOR SELECTION:

- Electric** **Pneumatic** Specify model _____.

ACTUATOR LOCATION :

- External (std.)** **Internal (in the airstream)**

ACTUATOR FAIL POSITION: Closed.

OPTIONS:

- BS** Stainless steel bearings
- MLS-300** Position indicator switch pack
- MLS-400** Electric Fire Sensor (Re-openable control system). Includes dual heat sensors (165°F and 250°F or 350°F) and position indicator switch pack.
- QS1** Quick-set retaining angle (one side)
- QS2** Quick-set retaining angles (two sides)

For installation instructions, see IOM-1270INST.

SCHEDULE TYPE:	Dimensions are in inches (mm).			
PROJECT:				
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	4 - 28 - 11	1200	8 - 21 - 08	1270-3



COMBINATION FIRE/SMOKE DAMPER
 1 1/2 HOUR LABEL • LEAKAGE CLASS I OR II
 RECTANGULAR OR OVAL DUCT CONNECTION
MODEL: 1273
 (TYPE C SLEEVE ENCLOSURE)



QUALIFICATIONS:

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PRL (Pneumatic Replaceable Link) is standard on dampers with pneumatic actuators: 212°F (100°C) standard. 165°F (74°C) and 280°F (138°C) available.

Min. Duct Size: Vertical or Horizontal mount: 4" x 4" (102 x 102). (Overall damper size is 8" x 8" [203 x 203] min.).

Max. Duct Size: Single Section
 Vertical mount: 34" x 46" (864 x 1168).
 Horizontal mount: 28" x 38" (711 x 965).
 Multiple Section Assembly
 Vertical mount: 70" x 46" (1176 x 1168) or 34" x 94" (864 x 2388).
 Horizontal mount: 58" x 38" (1473 x 965) or 28" x 78" (711 x 1981).

SLEEVE/ENCLOSURE SELECTION:

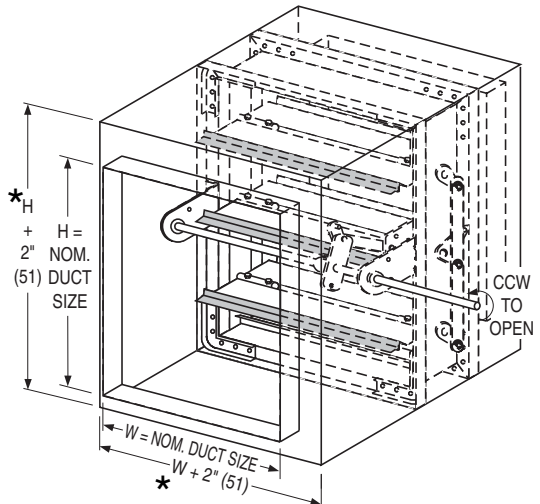
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LEAKAGE CLASS / ELEVATED TEMPERATURE:

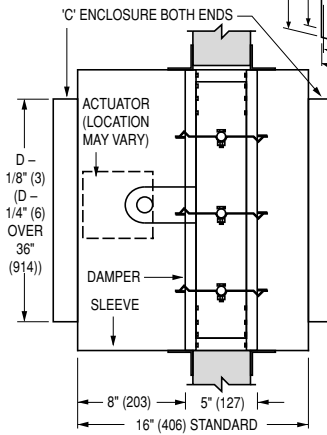
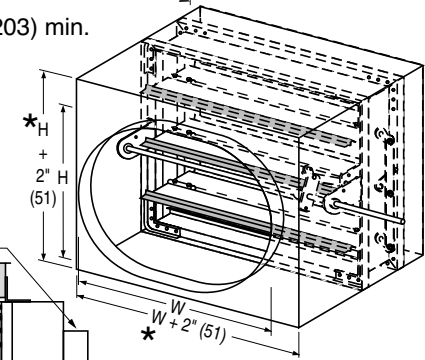
- I II @ 250°F (Standard)
- I II @ 350°F (Optional)

ACTUATOR SELECTION:

- Electric** **Pneumatic** Specify model _____ .



* or 8" (203) min.



Wall Thickness	Minimum Sleeve Length
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16 (406)	28 (711)

ACTUATOR LOCATION :

- External (std.)** **Internal (in the airstream)**

ACTUATOR FAIL POSITION: Closed.

OPTIONS:

- BS** Stainless steel bearings
- MLS-300** Position indicator switch pack
- MLS-400** Electric Fire Sensor (Re-openable control system). Includes dual heat sensors (165°F and 250°F or 350°F) and position indicator switch pack.
- QS1** Quick-set retaining angle (one side)
- QS2** Quick-set retaining angles (two sides)

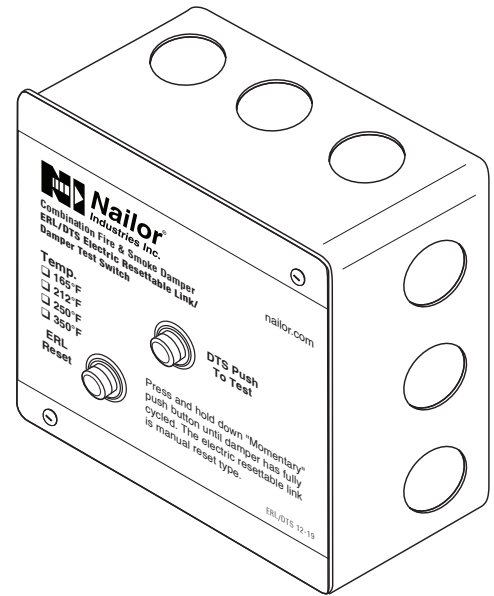
For installation instructions, see IOM-1270INST.

SCHEDULE TYPE:		Dimensions are in inches (mm).			
PROJECT:					
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.	
CONTRACTOR:	4 - 28 - 11	1200	8 - 21 - 08	1270-4	

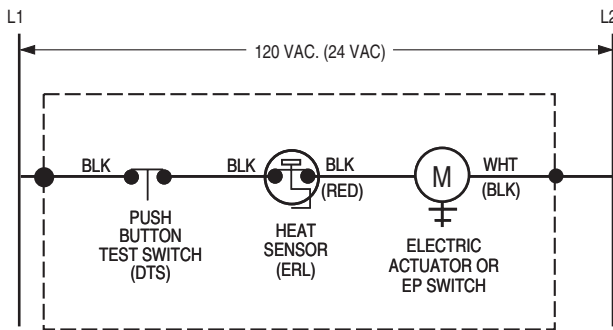
The DTS (Damper Test Switch) is an optional "momentary" push button test switch available on all Nailor smoke and combination fire/smoke dampers. The DTS provides the ability to "cycle test" the damper by pushing and holding down the button until the damper has cycled and closure has been visually verified, either by inspecting the damper through the access door or by confirmation at a remote control panel when equipped with the optional MLS-300 position indicator.

The DTS is mounted right on the damper and enables a single maintenance person to test and cycle the damper, eliminating the need for help from another person in the control room.

When a combination fire/smoke damper is ordered, the DTS is combined with the ERL (Electric Resettable Link), in a common enclosure.



WIRING DIAGRAMS:



MOUNTED ON DAMPER (FACTORY WIRING TERMINATES AT SPLICE POINTS INDICATED INSIDE 4" x 4" ELECTRICAL BOX)

Figure 1. DTS/ERL Damper Test Switch with Electric Resettable Link

Belimo Actuator Aux. Switch Wiring Connections

Model Series	Open (OP)	Closed (CL)
FSTF	Orange / Gray	Violet / Red
FSLF / FSAFA	Gray / Gray	Violet / Violet
FSNF / FSAFB	White S4 / S6	White S1 / S2

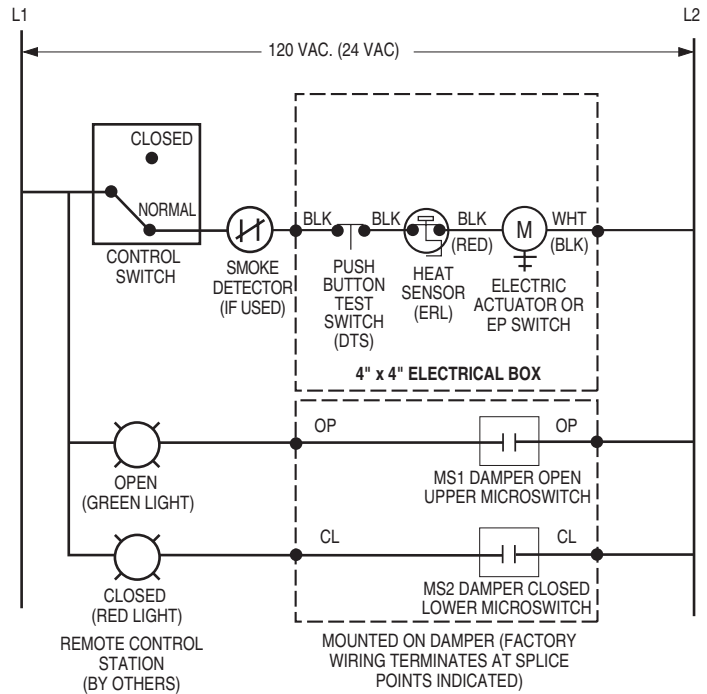


Figure 2. DTS/ERL with MLS-300 Belimo (actuator aux. switches) Position Indicator Package

SCHEDULE TYPE

PROJECT

ENGINEER

CONTRACTOR

DATE

B SERIES

SUPERSEDES

DRAWING NO.

9 - 3 - 20

FD-ACC

3 - 29 - 18

DTS

WIRING DIAGRAMS:

Honeywell Actuator Aux. Switch Wiring Connections

Model Series	Open (OP)	Closed (CL)
MSXX04	Yellow / Yellow	Blue / Blue
MSXX20	Yellow / Yellow	Blue / Blue

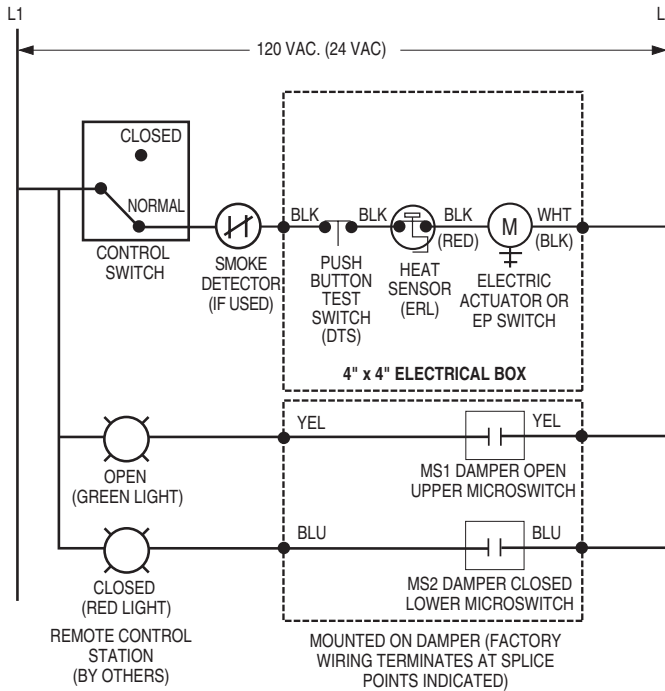


Figure 3. DTS/ERL with MLS-300 Nailor or Honeywell (actuator aux. switches) Position Indicator Package

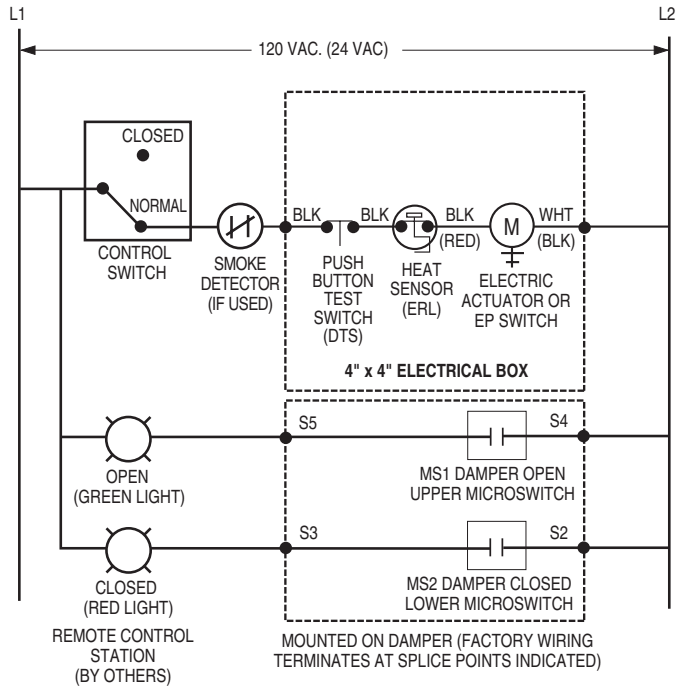
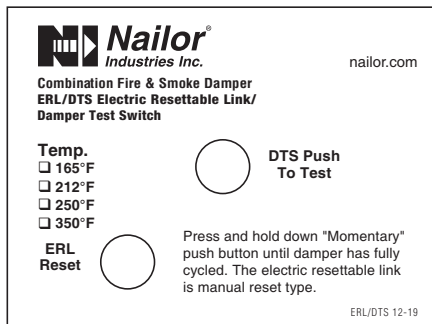
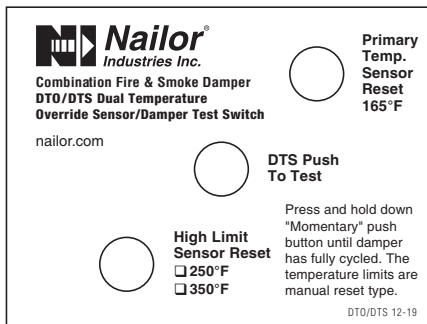


Figure 4. DTS/ERL with MLS-300 Siemens GJD Series (actuator auxiliary switches) Position Indicator Package

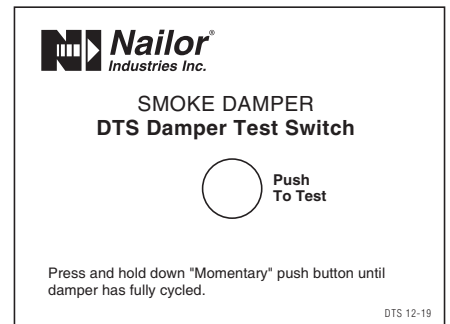
DTS LABEL VARIATIONS:



ERL/DTS Combination Fire/Smoke Damper



DTO/DTS Combination Fire/Smoke Damper



DTS Smoke Damper

SCHEDULE TYPE

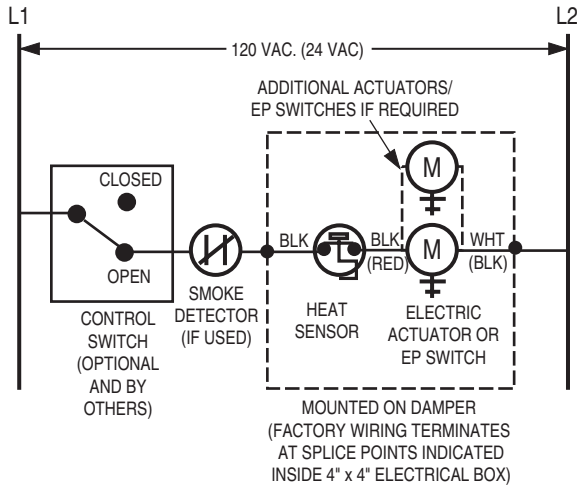
PROJECT

ENGINEER

CONTRACTOR



ELECTRIC RESETTABLE LINK FOR COMBINATION FIRE / SMOKE DAMPERS MODEL: ERL



APPLICATION AND OPERATION:

The ERL Electric Resettable Link (heat sensor) is standard on all Nailor combination fire/smoke dampers with an electric actuator. The ERL is a thermally responsive bimetal disc/thermostat that opens and closes electrical contacts at a specific calibrated temperature. The ERL is a UL Classified Heat Responsive Device. The standard ERL has a fixed temperature setting of 250°F (121°C) which is the UL listed elevated/degradation temperature of the damper/actuator assembly. A 350°F (177°C) elevated temperature classification and ERL is available as an option.

[A 165°F and 212°F (74°C and 100°C) ERL are also available. Local codes have specified 165°F (74°C) widely in the past.]

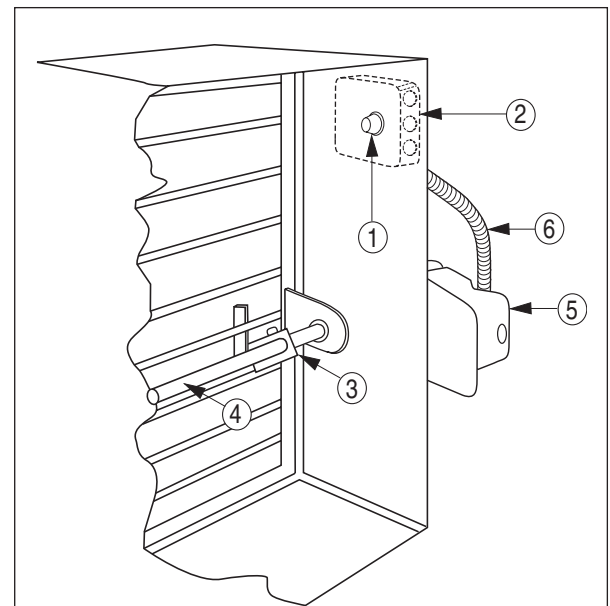
The ERL's function is to sense an abnormally high temperature, as caused by a fire and allow the damper to close in order to prevent the spread of fire and smoke. The sensor interrupts power to the actuator and the actuator's spring return mechanism causes the damper to close and lock.

In smoke control mode, when a signal is detected via a normally closed smoke detector connection, the damper will close and remain closed until the smoke signal ceases. The system will then reset when power is re-applied and the damper will open. The damper may be closed at anytime by placing a control switch (optional and by others) in the closed position.

The ERL in combination with all Nailor qualified electric or pneumatic actuators provides controlled closure and eliminates the instantaneous damper closure associated with traditional fusible links that can cause damage to the ductwork.

The ERL sensor is of the manual reset type and can be reset after the temperature has cooled down below the sensor set point. Exposure to actual fire conditions may render these devices unusable. In this case, it is recommended that a careful inspection of the damper, actuator and ERL be performed.

The ERL requires factory installation and wiring together with the associated actuator to meet UL requirements. If the damper is provided with a pneumatic actuator, an EP switch is required.



DESCRIPTION:

1. ERL 165, 212, 250, 350 Electric Resettable Link (heat sensor)
2. Electrical Junction Box (and EP Switch with Pneumatic Actuator)
3. Over-Center Knee Lock
4. Jackshaft
5. Actuator
6. Flexible Conduit

SCHEDULE TYPE

PROJECT

ENGINEER

CONTRACTOR

Dimensions are in inches (mm).

DATE

B SERIES

SUPERSEDES

DRAWING NO.

9 - 9 - 20

FD-ACC

9 - 23 - 02

ERL

**"QUICK-SET" RETAINING ANGLES BOTH SIMPLIFY AND SPEED INSTALLATION,
 SAVING BOTH TIME AND MONEY.**

BENEFITS:

- One piece angles are fastened together in the corners. Only two sets of angles to handle per damper (rather than four separate angles per side).
- Angles are shipped with damper - no sorting or matching.
- Provided with pre-drilled fastening holes on 2" (51) centers to ensure correct angle/sleeve attachment.
- Factory fabricated by Nailor to suit the individual fire damper.
- Reduced cost when compared to conventional retaining angles.
- Dampers can ship directly to the job site complete with all necessary installation sheet metal hardware (saves on double handling at contractor's shop).
- Help ensure a correct installation as per U.L. approved installation instructions.

The majority of installing contractors view fire damper installation as a costly time consuming and troublesome procedure. Eight conventional angles must be custom fabricated for each damper either in a sheet metal shop or at the job site and sized to suit each individual damper. Invariably, they are mislaid or lost and must be matched to each factory supplied damper.

The Nailor "Quick-Set" solution solves the majority of problems. They are pre-formed to fit and ship with the individual damper for ultimate convenience. "Quick-Set" angles are supplied with correctly spaced pre-drilled screw-holes to ensure a quick, easy and accurate installation for all integral sleeve Nailor fire and combination fire/smoke dampers - no measuring required.

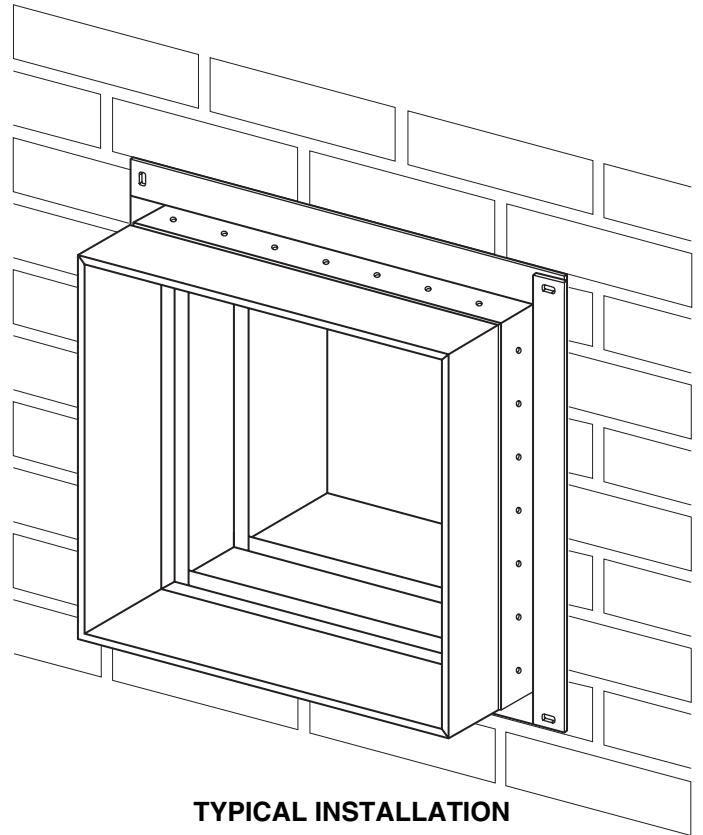
"Quick-Set" retaining angles provide the "complete" installation package. Simple, fast, convenient.

MODELS:

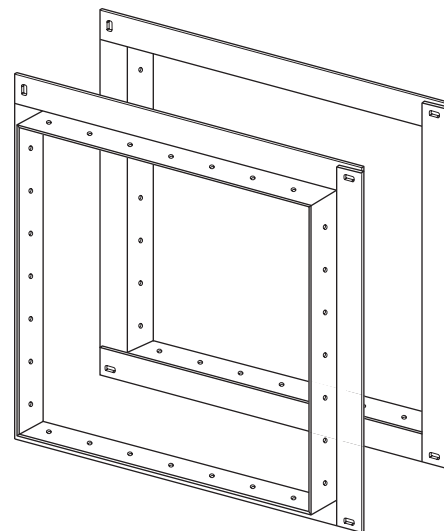
Nailor "Quick-Set" retaining angles are an accessory option for all dampers ordered with factory sleeves.

QS2: Two sides (pair). For standard installations where angles are installed on both sides of the fire partition.

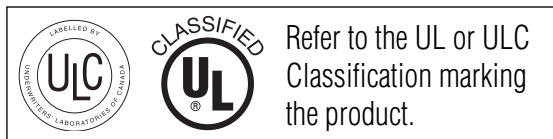
QS1: One side (single set). For use in single side retaining angle installations and with grille mount and "out of wall" damper models.



TYPICAL INSTALLATION



**TYPICAL PAIR OF PRE-ASSEMBLED
 QUICK-SET' RETAINING ANGLES**



SCHEDULE TYPE:	
PROJECT:	
ENGINEER:	
CONTRACTOR:	

Page 1 of 2
 Dimensions are in inches (mm).

DATE	B SERIES	SUPERSEDES	DRAWING NO.
2 - 26 - 09	FD-ACC	6 - 5 - 03	QSRA

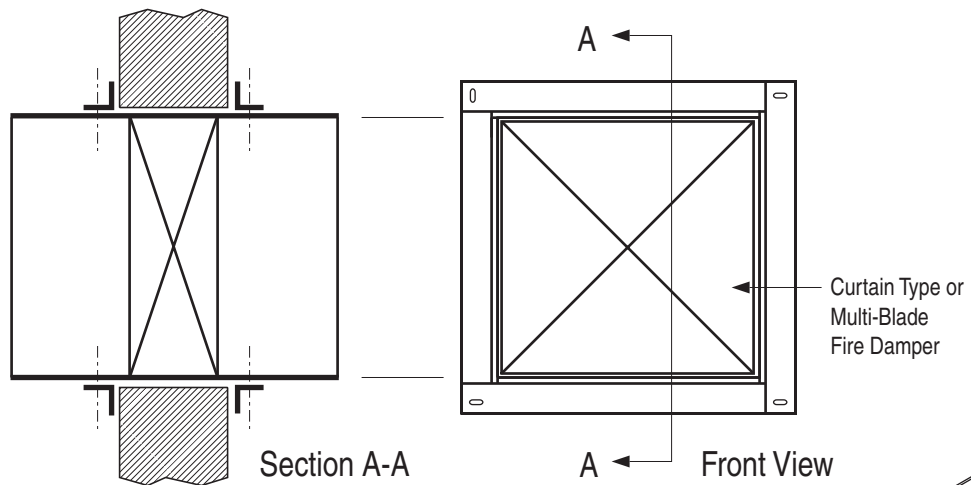


FIGURE 1. TYPICAL TWO SIDED INSTALLATION.

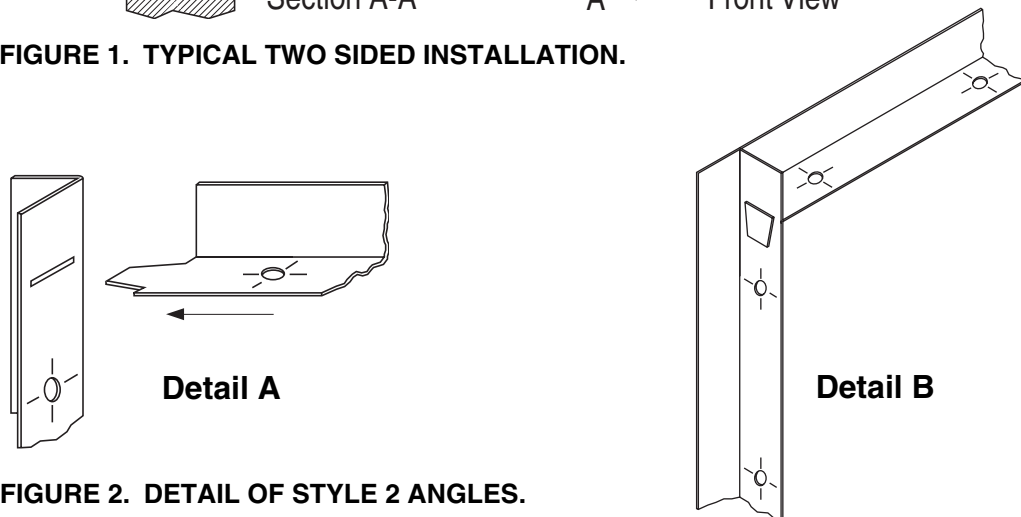


FIGURE 2. DETAIL OF STYLE 2 ANGLES.

APPLICATION:

The Nailor Quick-Set Retaining Angle System may be used in lieu of conventional retaining angles on all Nailor Fire and Combination Fire/Smoke Dampers.

Quick-Set angles are supplied in one of two styles, dependent upon fire resistance label, damper size and installation method.

Style 1: 1 1/2" x 1 1/2" x 20 ga. (38 x 38 x 1.0) Four sides are connected together with rivets in three corners.

Standard for the majority of applications with the following limitations:

- 1 1/2 hour label fire dampers.
- Maximum Size: 36" x 36" (914 x 914)
- Two sided installation only

Style 2: 1 1/2" x 1 1/2" x 16 ga. (38 x 38 x 1.6) Slot and tab design. The retaining angle assembly for each side has four angles, each with a tab end and a slot end (Detail A).

The tabs are to be inserted into the slots and knocked down either before or after fastening to the sleeve (Detail B).

- 1 1/2 or 3 hour label fire dampers
- Maximum Size: 90" x 48" (2286 x 1219) or 48" x 90" (1219 x 2286)
- Single side (1 1/2 hour only. Refer to Single Side Retaining Angles Supplementary Installation Instructions for size limitations) or two sided installation

Refer to the Following Installation Instructions:

Quick-Set Retaining Angles	FDQSRA
Curtain Type Fire Dampers (D)0100 & (D)0500	FDINST
Curtain Type Fire Dampers 0200 & 0500 Thinline	FDTINST
Multi-Blade Fire Dampers 1200 & 1250	MBFDINST
Combination Fire/Smoke Dampers 1220	1220INST
Combination Fire/Smoke Dampers 1270	1270INST
Single Side Retaining Angles	FDSSRAINST

SCHEDULE TYPE:		Page 2 of 2			
PROJECT:		Dimensions are in inches (mm).			
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.	
CONTRACTOR:	2 - 26 - 09	FD-ACC	5 - 5 - 03	QSRA	

Powers™ Controls No. 4 Pneumatic Damper Actuator

Product Description

The No. 4 Pneumatic Damper Actuator is a totally enclosed pneumatic piston type actuator designed to actuate dampers for ventilating systems, mixing box control, and other applications requiring a large, effective diaphragm area and long stroke. The No. 4 Hesitation Actuator is frequently used to operate the outdoor air damper on unit ventilators.

Product Numbers

See Table 1.

Prerequisites

- Ensure all kits are ordered and available for installation. Kits are listed with each mounting application.
- Have the damper manufacturer drill the mounting holes.
- Have the damper manufacturer weld the mounting lug to the damper frame in frame mounting installations.



WARNING:

Do not remove the jam nut (Figure 1). Spring is under heavy load. Repair by trained personnel only.

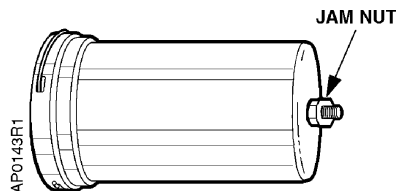


Figure 1. Actuator Jam Nut Location.

Required Tools

- Flat-blade screwdriver
- Adjustable crescent wrench
- Pliers

Warning/Caution Notations

WARNING		Personal injury/loss of life may occur if the user does not follow a procedure as specified.
CAUTION		Equipment damage, or loss of data may occur if the user does not follow a procedure as specified.

Installation

Extended Shaft Mounting-Pivot Actuator

Expected Installation Time: 28 minutes

Actuators: 331-3000, 331-3001, 331-3002, 331-2973, or 331-3004.

These assemblies are designed for 90° damper rotation.

NOTE: Clevis mounts in Crank Radius Hole No. 1 for 90° damper rotation.

1. Slip 3/4-inch (19 mm) diameter hole in the mounting plate over the damper shaft (Figure 2).

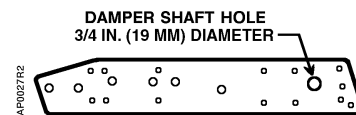


Figure 2. Actuator Mounting Plate.

2. Slip the crank over the 3/8 through 1/2-inch (10 through 13-mm) diameter damper shaft (Figure 3).

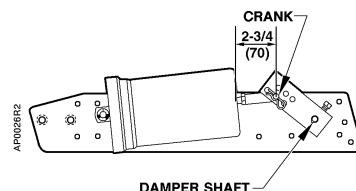


Figure 3. Extended Shaft Mounting.

3. Position the mounting plate and attach it to the duct with four screws.

Table 1. No. 4 Damper Actuator Product Numbers.

Description	Mounting Style	Product Numbers				
		Nominal Spring Range				
		3-7 psi (21-48 kPa)	3-13 psi (21-90 kPa)	5-10 psi (35-69 kPa)	8-13 psi (55-90 kPa)	2-3, 8-13 psi (14-21, 55-90 kPa) Hesitation Model
Actuator, mounting screws (non-pivot)	Front	331-2910	—	331-2917	331-2963	—
Actuator, bracket (non-pivot) 3-inch stroke for unit ventilator	Fixed	331-2911	—	331-2934	331-2966	331-2927
Actuator, bracket (non-pivot) 2-3/8 inch stroke for unit ventilator	Fixed	—	—	—	—	331-2974
Actuator, mounting plate, ball joint connector	Fixed	331-3015	331-3018	331-3016	331-3017	331-3019
Actuator, mounting plate, ball joint connector with positioning relay	Fixed	—	—	—	332-3017	—
Actuator, integral pivot	Pivot	331-2904 ¹	331-2905 ¹	331-2906 ¹	331-2961 ¹	331-2909 ¹
Actuator, integral pivot, clevis and clevis pin for use with frame mounting accessory	Pivot	331-2929	331-2930	331-2931	331-2968	—
Actuator, integral pivot with pivot post ²	Universal kit	331-3000	331-3001	331-3002	331-2973 ¹	331-3004
Actuator, integral pivot with pivot post, and positioning relay ²	Universal kit with positioning relay	—	—	—	332-2973	—

¹ UL Recognized Components for Fire/Smoke Applications.

² Mounted on plate for extended shaft with clevis and crank for 3/8-inch (10-mm), 7/16-inch (11-mm), or 1/2-inch (13-mm) diameter shaft. Parts for frame mounting (blade drive) are included with kit.

NOTE: When the actuator is ordered with universal mounting, the mounting plate, pivot post and hardware, clevis, damper crank, rocker arm, and all screws/nuts are included. Order other frame mounting accessories as required if not supplied by damper manufacturer.

Installation, Continued

Extended Shaft Mounting-Fixed Actuator

Expected Installation Time: 28 minutes

Actuator with mounting bracket: 331-2911, 331-2966, 331-2934, 331-2927, or 331-2974

Clevis: 331-801

Linkage Kit: 331-958

1. Determine the application from Table 2 and then select appropriate "X" and "Y" dimensions. Select a rigid section of the duct, if possible, and draw these lines on the duct.



CAUTION:

It is important to use the "X" and "Y" dimensions from Table 2 to position the actuator to ensure that the crank is approximately perpendicular to the actuator shaft at half its stroke (see Figure 4). This will prevent the linkage from scissoring or locking up.

Table 2. Fixed Mounted Assembly Dimensions.

Application	Dimensions in Inches (mm)		Crank Radius Hole
	X	Y	
4-inch (102 mm) Stroke – 90° Rotation	8-1/2 (216)	2 (51)	1
4-inch (102 mm) Stroke – 70° Rotation	8-1/2 (216)	3 (76)	2
3-inch (76 mm) Stroke – 90° Rotation	8 (203)	1-1/2 (38)	3
3-inch (76 mm) Stroke – 60° Rotation	8 (203)	2-1/2 (64)	4

NOTE: Crank Radius Holes No. 5 and 6 are used for No. 3 Pneumatic Damper Actuators only.

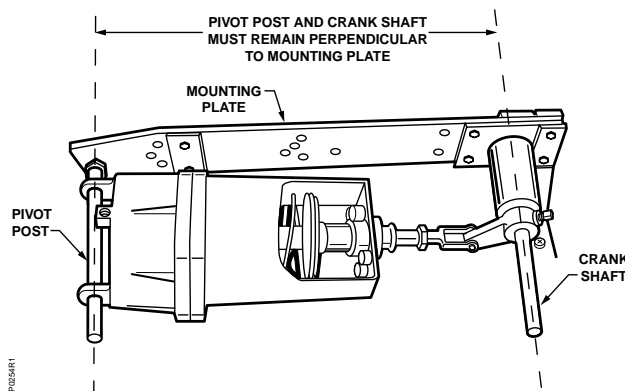


Figure 4. Perpendicular Mounting.

2. Place front of actuator on "X" dimension line so that the actuator shaft faces damper shaft. Place center line of actuator over "Y" dimension line (see Figure 5).
3. Thread Clevis 331-801 on to actuator shaft and tighten against locknut. Assemble Linkage Kit 331-958 to actuator assembly (see Figure 4). The linkage is assembled so that the damper shaft will rotate counterclockwise as actuator pressure increases. This is a typical normally closed damper installation.

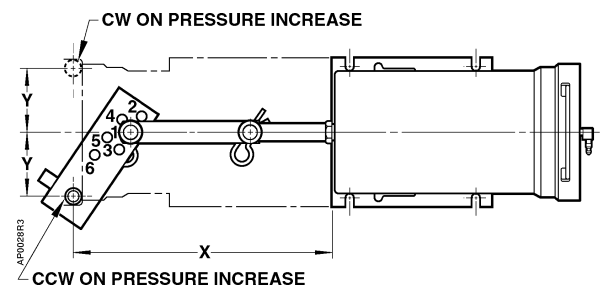


Figure 5. Fixed Mounted Actuator Assembly.

Frame Mounting

Expected Installation Time: 3 hours

Actuator: 331-3000, 331-3001, 331-3002, 331-2973, or 331-3004.

Mounting lug: 331-569

1. If the damper frame is aluminum, light gauge sheet metal, or an unusual shape, bolt a 3/16-inch (5 mm) thick, flat piece of steel to the frame where the mounting lug is to attach. The mounting lug can then be welded to it.
2. Weld the mounting lug parallel and 5/16-inch (8 mm) from the inside edge of the damper frame and perpendicular to it (Figure 6). Weld the lug along both sides. The lug should be as close as possible to the corner of the damper frame to minimize deflection. The damper manufacturer should weld the lug.
3. If the damper frame is aluminum, light gauge sheet metal, or an unusual shape, bolt a 3/16-inch (5-mm) thick, flat piece of steel to the frame. Then, weld the mounting lug to the piece of steel.

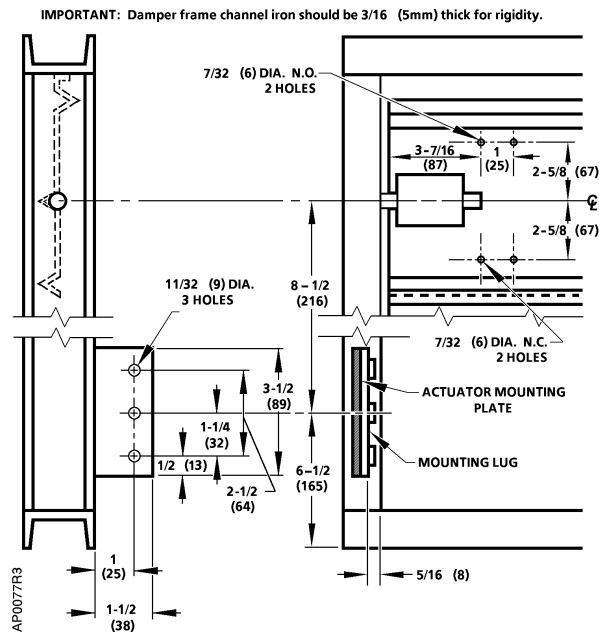


Figure 6. Frame Mounting Dimensions.
 Dimensions in Inches (Millimeters).

4. Attach rocker to blade in proper position for normally open or normally closed damper (Figure 6).
5. Attach mounting plate to mounting lug.
 - a. Normally closed damper: attach plate to lug (Figure 7). Place pivot post in Hole 3.

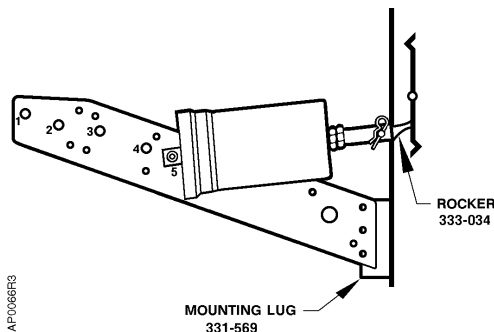


Figure 7. No. 4 Actuator Frame Mounting,
 Normally Closed Damper.

- b. Normally open damper: attach plate to lug (Figure 8). Place pivot post in Hole 6.

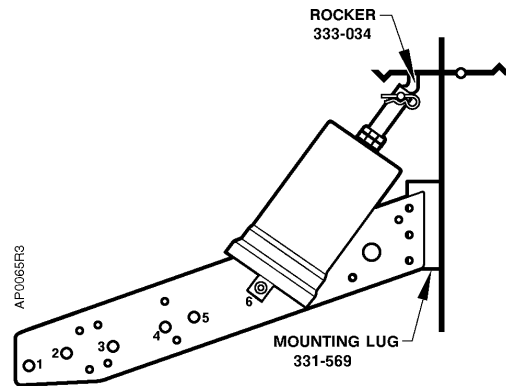


Figure 8. No. 4 Actuator Frame Mounting,
 Normally Open Damper.

6. Fasten clevis to rocker. Discard crank and other parts not used.
7. The actuator mounting plate has a tendency to pivot at the point where the lug is welded to the damper frame when the actuator strokes. It is recommended that some means be devised in the field to prevent this from happening. A threaded rod attached to the mounting plate and duct wall will normally work.

Hesitation Actuator Adjustment

Expected Installation Time: 15 minutes

1. To obtain an initial hesitation point, add air pressure to actuator until shaft travels the desired distance.
2. Turn locknuts on cycle adjustment rods until they contact lower housing and then lock together. Tighten cycle adjustment nuts evenly to ensure smooth operation.

The installation is now complete.

References

AP 331-2 Powers™ Controls No. 4 Pneumatic Damper Actuator Technical Instructions, (155-032P25)

TB 181, Maximum Thrust Ratings of Pneumatic Damper Actuators Technical Bulletin, (155-219P25)

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Powers® Controls No. 6 Damper Actuator

Product Description

The No. 6 Damper Pneumatic Actuator is a heavy duty, rolling diaphragm, spring return actuator designed to drive large dampers, centrifugal refrigeration inlet vanes, and other applications requiring a large, effective diaphragm area and long stroke.


Required Tools

- Flat-blade screwdriver
- Adjustable crescent wrench
- Pliers

Prerequisites

- Ensure all kits are ordered and available for installation. Kits are listed with each mounting application.
- Have the damper manufacturer drill mounting holes.
- Have the damper manufacturer weld mounting lug to damper frame for Frame Mounting—Type B installations.

Product Numbers

Description	Mounting Style	Product Numbers		
		Nominal Spring Range		
		3-8 psi (21-55 kPa)	3-13 psi (21-90 kPa)	8-13 psi (55-90 kPa)
Actuator, integral pivot	Pivot	331-2793	331-2794	331-3060 ¹
Actuator, integral pivot and forward travel stops	Pivot	—		331-2988
Actuator with clevis	Pivot ²	331-2857	331-2858	331-2856 ¹
Actuator with clevis and positioning relay	Pivot ²	—	—	332-2856
Actuator, integral pivot with pivot post ³	Extended Shaft	331-3012	331-3013	331-3011 ¹
Actuator, integral pivot with pivot post and positioning relay ³	Extended Shaft with Positioning Relay	—	—	332-3011

¹ UL Recognized Components for Fire/Smoke Applications.

² Also order frame mounting kit accessories.

³ Mounted on plate for extended shaft with clevis and crank for 3/8-inch (10-mm), 7/16-inch (11-mm), or 1/2-inch (13-mm) diameter shaft. Parts for frame mounting (blade drive) included with kit.

NOTE: When the actuator is ordered with universal mounting, the mounting plate, pivot post and hardware, clevis, damper crank, rocker arm, and all screws/nuts are included. Order other frame mounting accessories as required if not supplied by damper manufacturer.

Installation

Extended Shaft Mounting – Pivot Actuator

Expected installation time: 28 minutes

Actuators: 331-3012, 331-3013, 331-3011, or 332-3011. These assemblies are designed for 90° damper rotation.

NOTE: Clevis mounts in crank radius hole No. 1 for 90° damper rotation.

1. Slip 3/4-inch (19-mm) diameter hole in the mounting plate over the damper shaft (Figure 1).

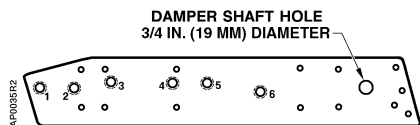


Figure 1. Actuator Mounting Plate.

2. Slip the crank over the 3/8-inch through 1/2-inch (10-millimeter through 13-millimeter) diameter damper shaft (Figure 2).

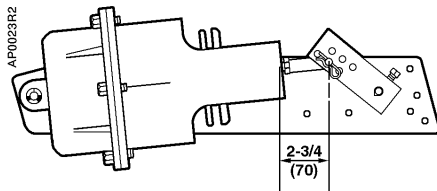


Figure 2. Extended Shaft Mounting.

3. Position the mounting plate and attach it to the duct with 4 screws.

Frame Mounting – Type A

Actuator and Clevis Assembly: 331-2857, 331-2858 or 331-2856.

Frame Mounting Kit: 751* for one-section damper, or 752* for two-section damper.

* Order from Arrow United Industries.

NOTE: Have manufacturer drill holes in damper frame and damper blade(s). Specific locations of holes are shown in the *AP 331-3 Powers™ Controls No. 6 Pneumatic Damper Actuator Technical Instructions*, (155-029P25).

One-Section Damper (Kit 751)

Expected installation time: Two hours

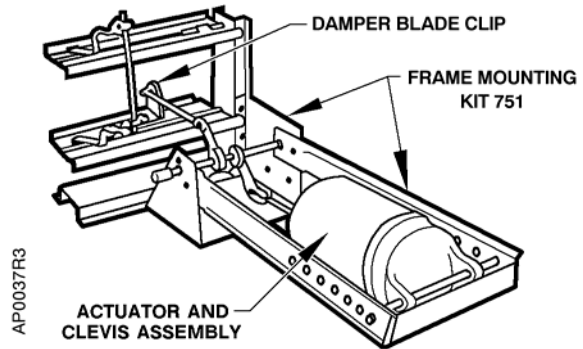


Figure 3. One-section Damper.

1. Attach damper mounting bracket to lower right-hand corner (or upper left-hand corner, if necessary) of damper section with six screws provided. For Arrow 1770 Dampers, add shim provided between brackets and bottom of frame.
2. Attach damper blade clip (included) to damper blade (Figure 4). Use the same clip location for both normally open and normally closed dampers. Put damper in its normal position, open or closed. Connect push rod to trunnion in blade clip and tighten setscrews. Connect other end of push rod to crank on drive shaft and tighten trunnion setscrew on push rod. Position crank so push rod is parallel to bracket, then tighten crank setscrews.

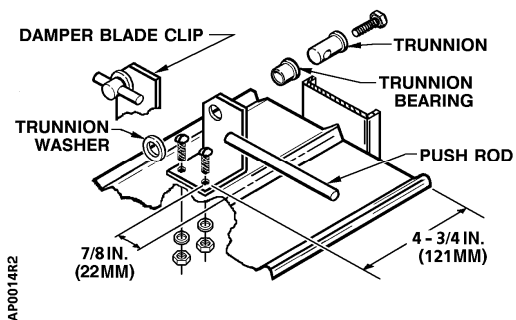


Figure 4. Damper Blade Clip.

3. Install actuator in actuator support bracket using pivot shaft and hitch pins. Pivot shaft should be in holes about 17-1/2 inches (445 mm) from drive shaft. The actuator support bracket can also mount in the vertical position for installations where space is limited.

4. Position crank drive by actuator as follows:
 - a. Normally open dampers: crank is above drive shaft.
 - b. Normally closed dampers: crank is below drive shaft.
5. Connect actuator clevis to crank. Place damper in its normal position, open or closed. Stroke actuator 1/4-inch (6-millimeter) with hand pump, and then tighten crank setscrews. This will ensure a tight damper closure.

The installation is now complete.

Two-Section Damper (Kit 752)

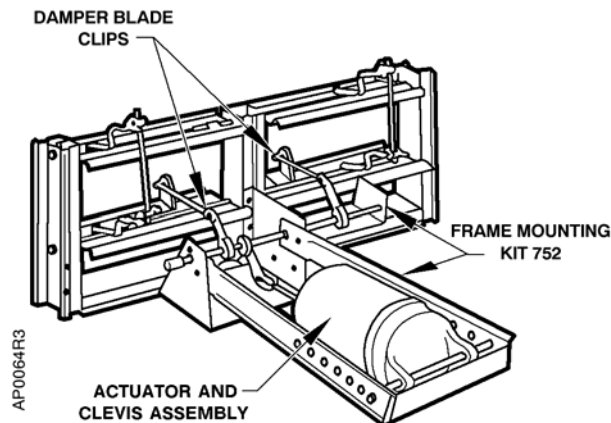


Figure 5. Two-section Damper.

Expected installation time: Two hours, 30 minutes

1. Follow the steps in *One-Section Damper*.
2. Attach Damper Blade Clip (included) to damper blade in second damper section. Repeat Step 2 in *One-Section Damper*. The push rod will connect to the extra crank on the drive shaft.

Frame Mounting – Type B

Expected installation time: Three hours

Actuator: 331-3012 (331-3013 or 331-3011)

Mounting lug: 331-569.

1. If damper frame is aluminum, light gauge sheet metal, or an unusual shape, bolt a 3/16-inch (5-millimeter) thick, flat piece of steel to the frame where the mounting lug is to attach. The mounting lug can then be welded to it.

2. Weld the mounting lug parallel and 5/16-inch (8-millimeter) from the inside edge of the damper frame and perpendicular to it (Figure 6). Weld the lug along both sides. The lug should be as close as possible to the corner of the damper frame to minimize deflection. The damper manufacturer should weld the lug.
3. If the damper frame is aluminum, light gauge sheet metal, or an unusual shape, bolt a 3/16-inch (5-millimeter) thick, flat piece of sheet metal to the frame. Then weld the mounting lug to it.
4. Attach rocker to blade in proper position for normally open or normally closed damper (Figure 6).

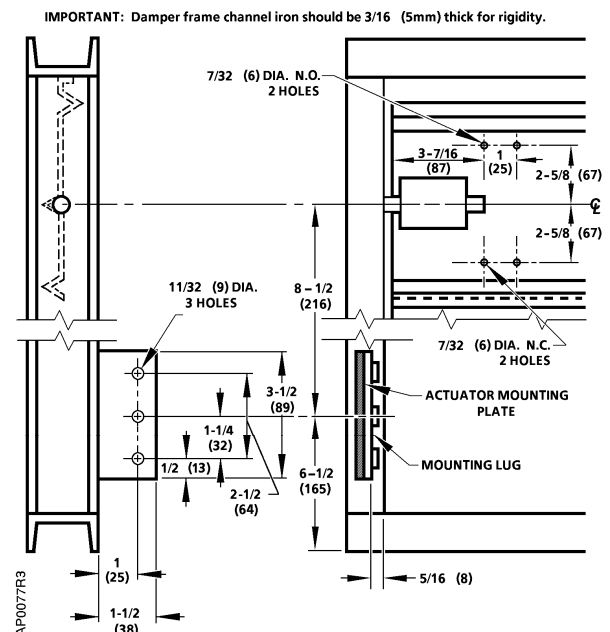


Figure 6. Frame Mounting-Type B Dimensions. Dimensions in Inches (Millimeters).

5. Attach mounting plate to mounting lug.
 - a. Normally closed damper: attach plate to lug (Figure 7). Place pivot post in Hole 3.
 - b. Normally open damper: attach plate to lug (Figure 8). Place pivot post in Hole 4.

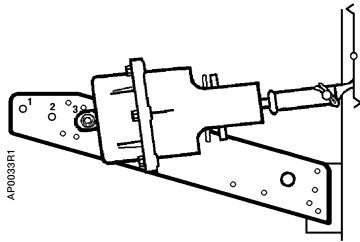


Figure 7. No. 6 Actuator Frame Mounting, Normally Closed Damper.

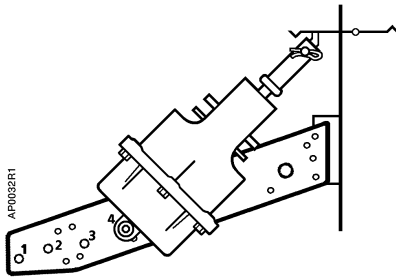


Figure 8. No. 6 Actuator Frame Mounting, Normally Open Damper.

6. Fasten clevis to rocker. Discard crank and other unused parts.
7. The actuator mounting plate has a tendency to pivot at the point where the lug is welded to the damper frame when the actuator strokes. It is recommended that some means be devised in the field to prevent this from happening. A threaded rod attached to the mounting plate and duct wall will normally work.

The installation is now complete.

Extended Shaft Remote Mounting (Figure 9)

Actuator: 331-2857, 331-2858, or 331-2856

Remote Mounting Kit: 331-618

1. Attach the mounting plate assembly to the mounting surface.
2. Attach the pivot post to the mounting plate assembly.
3. Slide the crank shaft into the bearing support.

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4. Attach the two cranks to the crank shaft.
5. Position the actuator on the mounting plate and attach the clevis to one crank on the crank shaft.
6. To the other crank, attach a ball joint and a 3/8-inch (10-millimeter) diameter push rod (not provided) cut to the proper length.
7. Attach the remaining crank to the damper shaft and use the remaining ball joint to fasten it to the push rod.

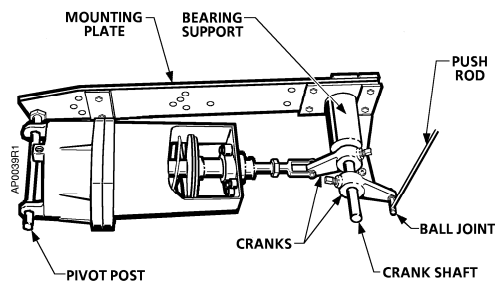


Figure 9. Extended Shaft Remote Mounting Assembly.

The installation is now complete.

References

AP 331-3, Powers™ Controls No. 6 Pneumatic Damper Actuator Technical Instructions, (155-029P25)

TB 181, Maximum Thrust Ratings of Pneumatic Damper Actuators Technical Bulletin, (155-219P25)

MS4120F; MS4620F; MS8120F; S2024-F; S20230-F Fast-Acting, Two-Position Actuators

PRODUCT DATA



FEATURES

- 175 lb-in. (20 Nm) minimum driving torque at 350°F (176°C).
- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Stainless steel internal spring.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24, 120, and 230 Vac applications.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Self-centering shaft adapter (SCSA), patent pending.
- Designed to operate reliably in smoke control systems requiring Underwriter's Laboratories Inc. UL555S ratings up to 350°F.

APPLICATION

The MS4120F, MS4620F, MS8120F, S2024-F, and S20230-F Fast-Acting, Two-Position Actuators are spring return direct coupled actuators (DCA) for on/off damper control. The actuator accepts an on/off signal from a single-pole, single-throw (spst) controller. Reversible mounting allows actuator to be used for either clockwise (cw) or counterclockwise (ccw) spring rotation.

Designed to operate reliably in smoke control systems requiring Underwriter's Laboratories Inc. UL555S ratings up to 350°F.

APPLICABLE LITERATURE

— Specification Data Sheet	63-2592
— Motor/Actuator Selection Guide for Damper Applications	63-8419
— Engineering Manual of Automatic Control (also called The Gray Manual)	77-1100
— Direct Coupled Actuator Quick Selection Guide	63-8553
— Damper Torque Calculator	63-8437

MS4120F, MS4620F, MS8120F

- High temperature Teflon® lead wires.
- Models available with integral high temperature (350°F) SPST position-indicating switches (7°, 85° stroke).

S2024-F, S20230-F

- Double-insulation rating.
- High-temperature, halogen-free, silicone-free leadwires.
- Models available with integral high temperature (350°F) SPDT position-indicating switches (7°, 85° stroke).



SPECIFICATIONS

Models: See Tables 1, 2, and 3.

Table 1. Models.

Model	Voltage in Vac	Internal Auxiliary Switches
MS4120F1006	120	None
MS4120F1204	120	2 SPST ^a
MS4620F1005	230	None
MS4620F1203	230	2 SPST ^a
MS8120F1002	24	None
MS8120F1200	24	2 SPST ^a
S2024-F (MS8120S1006)	24	None
S20230-F (MS4620S1009)	230	
S2024-F-SW2 (MS8120S1204)	24	2 SPDT ^a
S20230-F-SW2 (MS4620S1207)	230	

^a Internal switches are designed to pass UL555S requirements (at 350°F).

Dimensions: See Fig. 1.

Device Weight:

MS4120F, MS4620F, S20230-F: 7.5 lb (3.4 kg)
MS8120F, S2024-F: 6.25 lb (2.8 kg)

Stroke: 95° ± 3°, mechanically limited.

Electrical Ratings:

Power Input:

MS4120F: 120 Vac ±10%, 60 Hz.
MS4620F,S; S20230-F: 230 Vac ±10%, 50/60 Hz.
MS8120F,S; S2024-F: 24 Vac +20%, -10%, 50/60 Hz (Class 2).

Power Consumption:

MS4120F: Driving: 0.35A, 35W. Holding: 0.15A, 10W.
MS4620F,S; S20230-F:
Driving: 0.20A, 35W. Holding: 0.14A, 10W.
MS8120F,S; S2024-F: Driving: 45 VA. Holding: 10 VA.

Electrical Connections:

Lead Wires:

MS4120F, MS4620F, MS8120F: 1m Teflon wire.
MS4620S, MS8120S, S2024-F, S20230-F: 1m halogen-free, silicone-free wire.

Two integral 3/8 in. flexible conduit connections.

Timing (At Rated Torque and Voltage):

Drive Open: 15 seconds typical.
Spring Close: 15 seconds typical.

Auxiliary Switches:

Dry Contact
Ratings (maximum load): 250 Vac, 5A resistive.
Settings (fixed): 7° nominal stroke, 85° nominal stroke.

Torque Rating (at Rated Voltage):

Typical Holding (minimum at 350°F): 175 lb-in. (20 Nm).
Spring Return (minimum at 350°F): 175 lb-in. (20 Nm).
Stall Maximum (fully open at 75°F): 425 lb-in. (48.0 Nm).
350°F Minimum Driving: 175 lb-in. (20 Nm).

Design Life (at Rated Voltage): 30,000 full stroke cycles.

Minimum Damper Shaft Length:

1 in. (25 mm); 3-1/4 (83 mm) recommended.

Cycling Requirements:

Prolonged holding-period (1 year) testing of these actuators has been performed with no spring return failures. The actuator and the internal spring are designed to require no special cycling during long-term holding.

Honeywell recommends following all local, state and national codes for periodic testing of the entire smoke control system. Refer to National Fire Protection Association (NFPA) National Fire Codes®: NFPA90A, NFPA92A and NFPA92B for your application.

NFPA recommends periodic examination of each fire/smoke damper (semi-annually or annually) to ensure proper performance.

Mounting: Self-centering shaft adapter.

Round Damper Shafts: 0.5 to 1.06 in.

Square Damper Shafts: 1/2 to 3/4 in.

Actuator can be mounted with shaft in any position.

IMPORTANT

- Honeywell does not recommend using linkages with these actuators because side-loading of the output hub reduces actuator life.
- 3/4 in. or greater shaft diameter recommended.

Noise Rating at 1m (Maximum):

Driving or Spring Return: 70 dBA.

Holding: 20 dBA (no audible noise).

Vibration:

Not suitable for high vibration applications (Example installation environment: Truck Trailers or Railroad Cars)

Acceptable Vibration Levels 0.6g at 30 to 300 Hz.

Temperature Ratings:

Ambient: -40°F to 130°F (-40°C to 55°C).

Shipping and Storage: -40°F to 140°F (-40°C to 60°C).

IMPORTANT

The actuator is designed to meet UL555S standards at 350°F (176°C). The actuator must be tested with the damper to achieve this rating.

NOTE: The actuator is designed to operate for 30 minutes during a one-time excursion to 350°F (176°C).

Humidity Ratings: 5% to 95% RH noncondensing.

Environmental Protection Ratings:

NEMA2 and IP54 when mounted on a horizontal shaft and the base of the actuator below the shaft.

Accessories:

205649 Mounting Bracket (not supplied with actuator).

Approvals: See Table 4.

Controller Type:

MS4120F: Line voltage (120 Vac), 2-position, spst (Series 40).

MS4620F,S; S20230-F: Line voltage (230 Vac), 2-position, spst (Series 40).

MS8120F,S; S2024-F: Low voltage (24 Vac), 2-position, spst (Series 80).

Table 2. Actuator Selection (MS Series)

M	Electrical Motor
S	Fail Safe Function (Spring Return)
41	120 Vac 2-position Control; Reversible Mount Spring Return
46	230 Vac 2-position Control; Reversible Mount Spring Return
81	24 Vac 2-position Control; Reversible Mount Spring Return
20	175 lb-in. (20 Nm)
F	Fire and Smoke (US)
1	No Feedback
0	No Auxiliary Switches
2	Two Auxiliary Switches
XX	System Controlled Numbers

M S 41 20 F 1 2 XX

Table 3. Actuator Selection (S20 Series).

S	Fail Safe Function (Spring Return)
20	20 Nm (175 lb-in.)
24	24 Vac 2-position Control; Reversible Mount Spring Return
230	230 Vac 2-position Control; Reversible Mount Spring Return
F	Fire and Smoke Actuator
	No Auxiliary Switches
-SW2	Two Auxiliary Switches

S 20 24 - F -SW2

Table 4. Approvals.

	MS4120F	MS4620F, MS8120F	S20230-F	S2024F
UL/cUL	X	X		
UL873 Plenum Rating, File No. E4436; Guide No. XAPX. ^a	X	X		
CE		X	X	
C-TICK		X	X	X

^a Plenum applications require that conductors be enclosed in conduit (see Wiring section for conduit details).

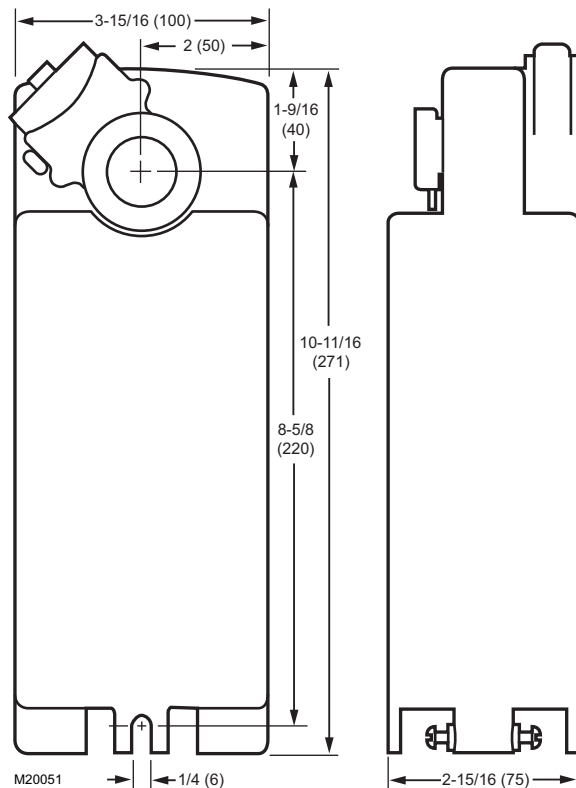


Fig. 1. Dimensional drawing of actuator in in. (mm).

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

WARNING

Electrical Power Hazard.
Line voltage can cause death or serious injury and short equipment circuitry.
Disconnect power supply before installation.



CAUTION

Electrical Shock or Equipment Damage Hazard.
Low voltage can shock individuals or short equipment circuitry.
Disconnect power supply before installation.

IMPORTANT

All wiring must agree with applicable codes, ordinances and regulations.

Location

The actuators are designed to open a damper by driving the damper shaft in either a clockwise  or counterclockwise  direction. The actuator housing has two slots on the bottom, either of which, with a 205649 Mounting Bracket, secures it flush to a damper box (see Fig. 2).

NOTE: When mounted correctly, these slots allow the actuator to *float* without rotating relative to the damper shaft.

CAUTION

Equipment Damage Hazard.
Tightly securing actuator to damper housing can damage actuator.
Mount actuator to allow it to float along its vertical axis.

Preparation

Before mounting the actuator onto the damper shaft, determine the:

- Damper/valve opening direction for correct spring return rotation. The actuator can be mounted to provide clockwise or counterclockwise spring return.
- Damper shaft size (see Specifications section).

Determine Appropriate Mounting Orientation

See Fig. 2 for mounting orientation.

NOTES:

- Actuators are shipped in the fully closed position.
- An arrow molded into the hub points to tick marks on the label to indicate the hub rotary position.
- See Fig. 3 for proper mounting to a square damper shaft.

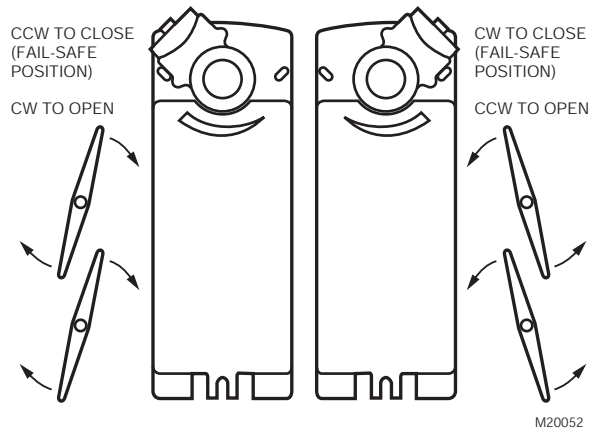


Fig. 2. Spring Return DCA mounting orientation.

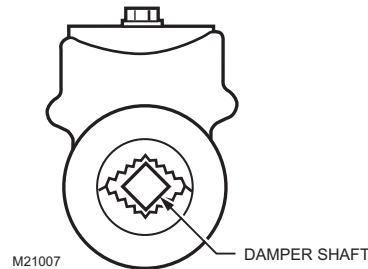


Fig. 3. Proper mounting to square damper shaft.

Measure Damper/Valve Shaft Length

If the shaft is less than three inches in length, the shaft coupling must be located between the damper/valve and actuator housing. If the shaft length is more than three inches, the shaft coupling may be located on either side of the actuator housing.

If the coupling must be moved from one side of the actuator to the reverse, follow these instructions (see Fig. 4):

1. Remove the retainer clip from the shaft coupling and set it aside for later use.
2. Remove shaft coupling from one side of the actuator.
3. Replace the shaft coupling on the opposite side of the actuator aligning it based on the stroke labelling.
4. Replace the retainer clip on the shaft coupling using the groove of the coupling.

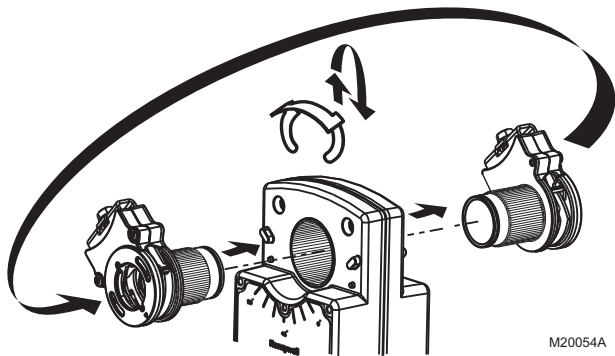


Fig. 4. Mounting shaft coupling to actuator opposite side.

Mounting

! CAUTION
Device Malfunction Hazard.
Improper shaft coupling tightening causes device malfunction.
 Tighten shaft coupling with proper torque to prevent damper shaft slippage.

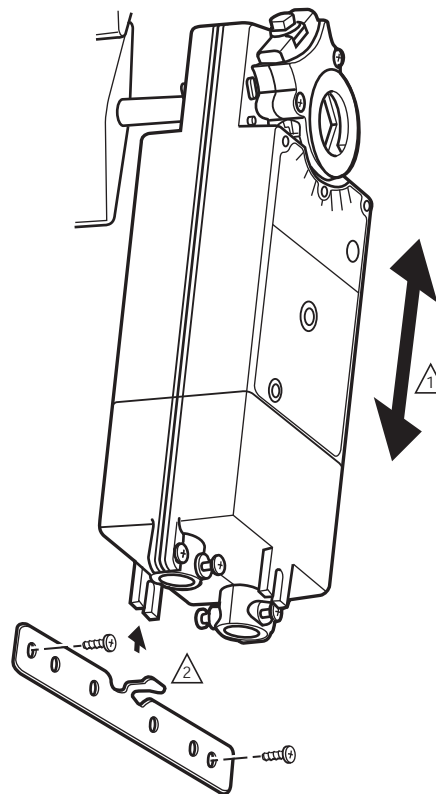
! CAUTION
Actuator Damage Hazard.
Using actuator as shaft bearing causes device damage.
 Use actuator only to supply rotational torque. Avoid any side loads to actuator output coupling bearings.

To mount actuator, proceed as follows:

1. Place actuator over damper shaft; and hold mounting bracket in place. See Fig. 5.
2. Mark screw holes on damper housing.
3. Remove actuator and mounting bracket.
4. Drill or center-punch holes for mounting screws (or use no.10 self-tapping sheet metal screws).

NOTE: If necessary, use a field-fabricated steel base plate secured with sheet metal screws.

5. Turn damper blades to desired normal (closed) position.
6. Place actuator and mounting bracket back into position and secure bracket to damper box with sheet metal screws.
7. Using 10 mm wrench, tighten shaft coupling securely onto damper shaft using minimum 120 lb-in., maximum 180 lb-in. torque.



- 1** ENSURE THAT MOUNTING ASSEMBLY PREVENTS ACTUATOR ROTATION AND ALLOWS ACTUATOR TO FLOAT ALONG INDICATED AXIS. WHEN TOO TIGHT, THE RESULTING BINDING CAN DAMAGE THE ACTUATOR OR REDUCE TORQUE OUTPUT.
- 2** ACCESSORY MOUNTING BRACKET IS NOT SUPPLIED WITH THE ACTUATOR.

M20055

Fig. 5. Mounting actuator to damper housing.

Manual Positioning

The actuator can be operated with no power present. Use this feature during installation or to move and lock the damper or valve shaft position when there is no power.

To operate the manual positioning:

1. If the power is on, turn it off.
2. Insert supplied hex wrench (key) as shown in Fig. 6.
3. Rotate key in the direction indicated on the cover.
4. Once the desired position is reached, hold the key to prevent the spring return from moving the actuator.

NOTE: No detente for fire and smoke actuators. If key is released, actuator will return to spring closed position.

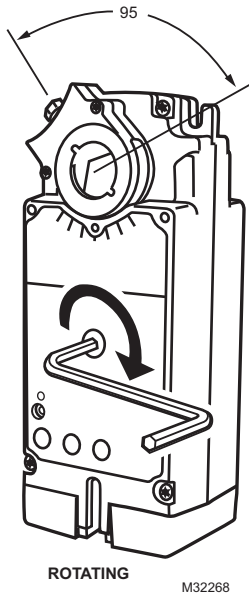


Fig. 6. Manual positioning.

WIRING

See Fig. 7 through 11 for typical wiring diagrams.

⚠ WARNING
Electrical Power Hazard.
 Line voltage can cause death or serious injury and short equipment circuitry.
 Disconnect power supply before installation.

⚠ CAUTION
Electrical Shock or Equipment Damage Hazard.
 Disconnect all power supplies before installation.
 Motors with auxiliary switches can have more than one disconnect.

IMPORTANT

1. All wiring must comply with local electrical codes, ordinances and regulations.
2. Voltage and frequency of transformer used with MS8120F,S and S2024-F must correspond with the characteristics of power supply and actuator.

NOTE: The conduit fittings are designed for use with 3/8 in. reduced-wall steel or aluminum flexible conduit.

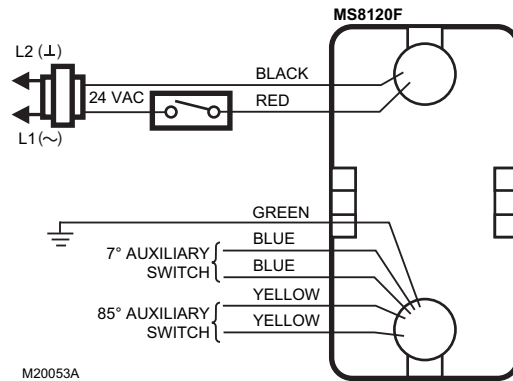


Fig. 7. Typical 24 Vac wiring (MS Series).

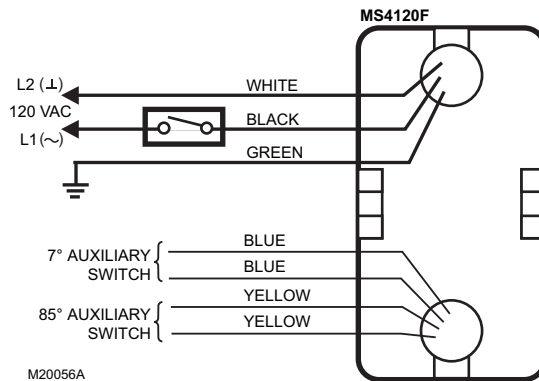


Fig. 8. Typical 120 Vac wiring (MS Series).

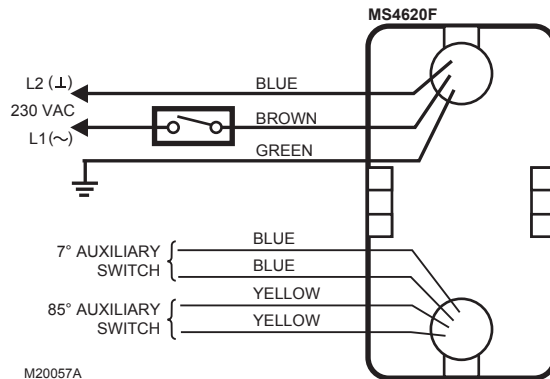


Fig. 9. Typical 230 Vac wiring (MS Series).

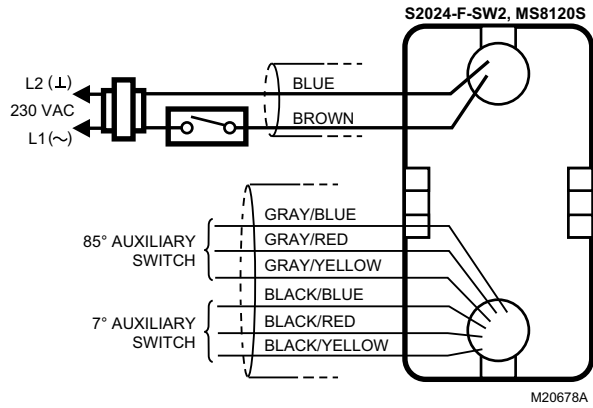


Fig. 10. Typical 24 Vac wiring (S20 Series).

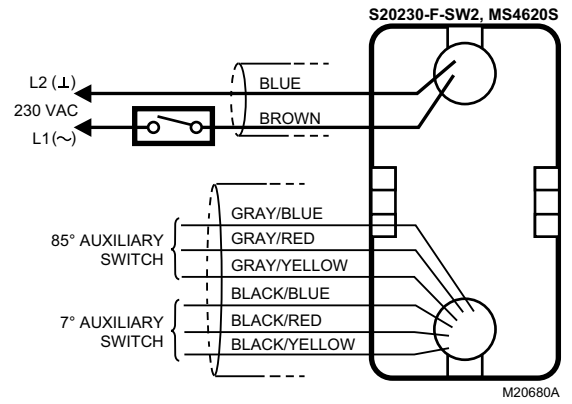


Fig. 11. Typical 230 Vac wiring (S20 Series).

OPERATION

The actuators are designed for use in Smoke Control Systems. If power fails, the actuator spring returns to the 0° position. The actuator mounts flush with the damper box. The actuator drives from 0° to 95° and spring returns back to 0°.

The actuators are operated by an spst two-position controller. When using an spst two-position controller, the actuator drives to the damper fully open position when controller contact makes and spring returns to the damper fully closed position when controller contact breaks. The actuator drops to holding power level on detection of stall, independent of hub position.

Cycling

The actuator and the internal spring are designed so that no special cycling during long-term holding is required. Honeywell recommends following all local, state, and national codes for periodic testing of the entire smoke control system. Refer to National Fire Protection Association (NFPA) National Fire Codes®: NFPA90A, NFPA92A, and NFPA92B for your application.

Auxiliary Switches

Some models include auxiliary switches (see Table 1).

SPST Switches (Table 5)

See Fig. 7 through 9 for SPST auxiliary switch wiring.

Table 5. SPST Auxiliary Switch Operation.

Switch	Wire Color	Makes	Breaks
		(degrees from fully closed position)	
7°	blue	less than 7	greater than 7
85°	yellow	greater than 85	less than 85

NOTE: Both sets of contacts are open when the actuator is between 7° and 85°.

SPDT Switches (Fig. 12)

See Fig. 10 through 12 for SPDT auxiliary switch wiring.



Fig. 12. SPDT auxiliary switch operation.

CHECKOUT

MS4120F (120 Vac model)

1. Check damper position.
2. Connect 120 Vac to the black and white leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not run, remove power for at least two seconds.
4. If the actuator spring returns, allow it to close entirely, then return to step 2.
5. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
6. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

MS4620F; S20230-F (230 Vac models)

1. Check damper position.
2. Connect 230 Vac to the blue and brown leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not run, remove power for at least two seconds.
4. If the actuator spring returns, allow it to close entirely, then return to step 2.
5. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
6. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

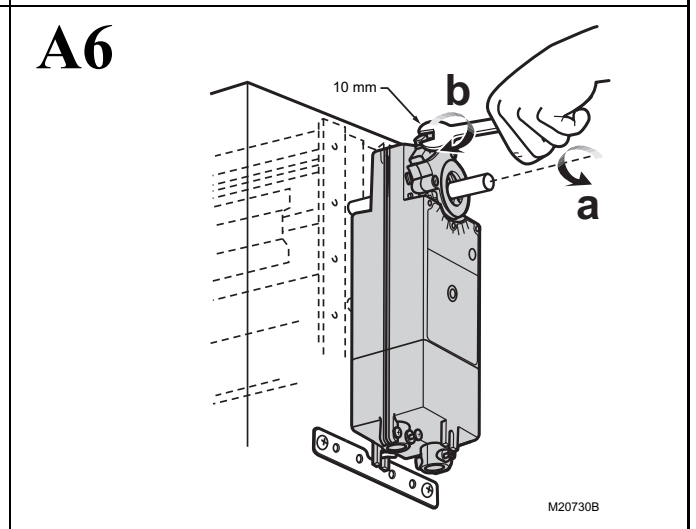
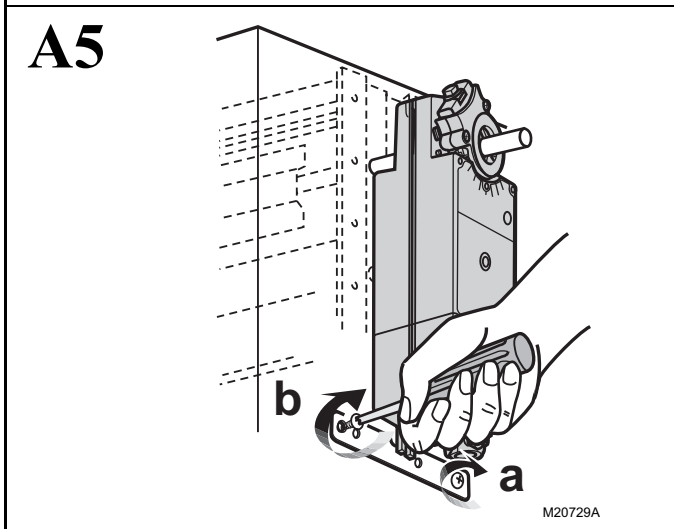
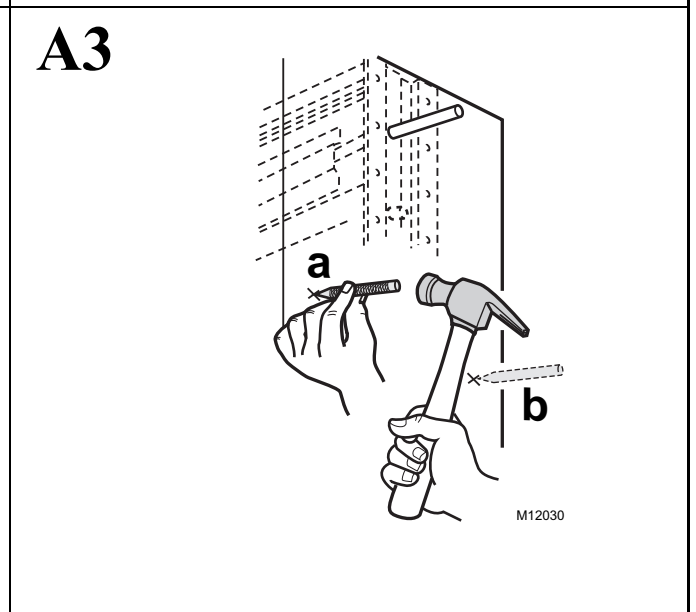
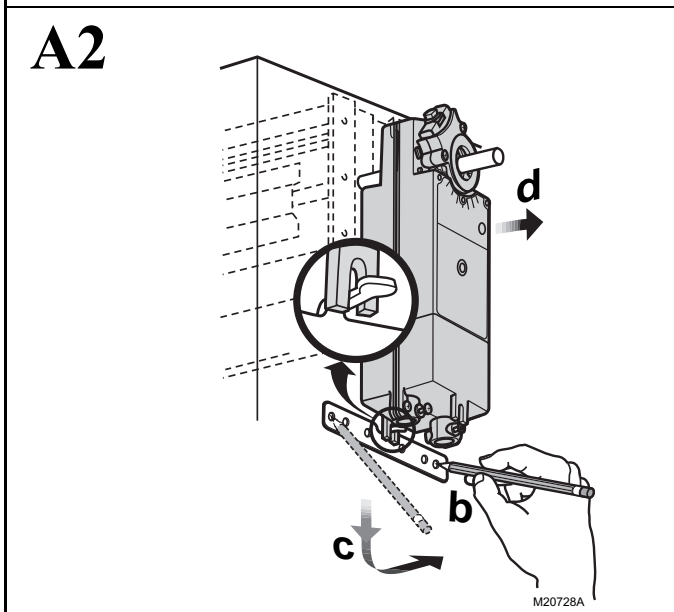
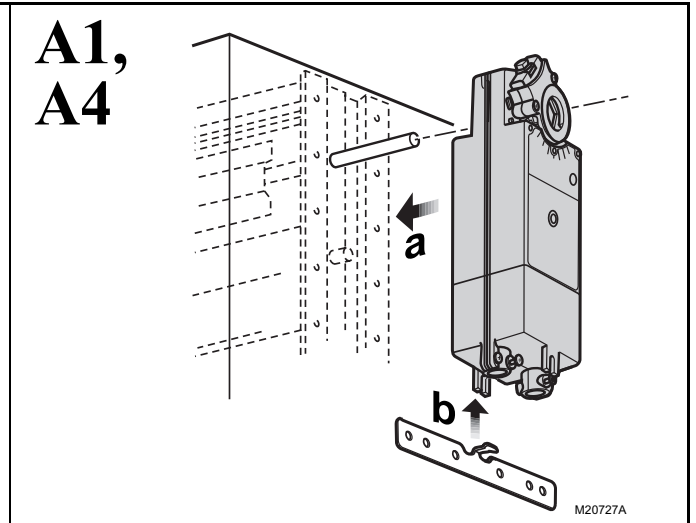
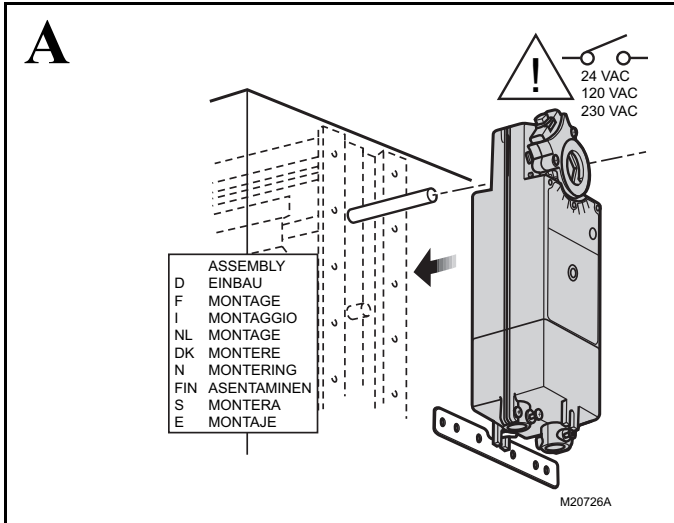
MS8120F; S2024-F (24 Vac models)

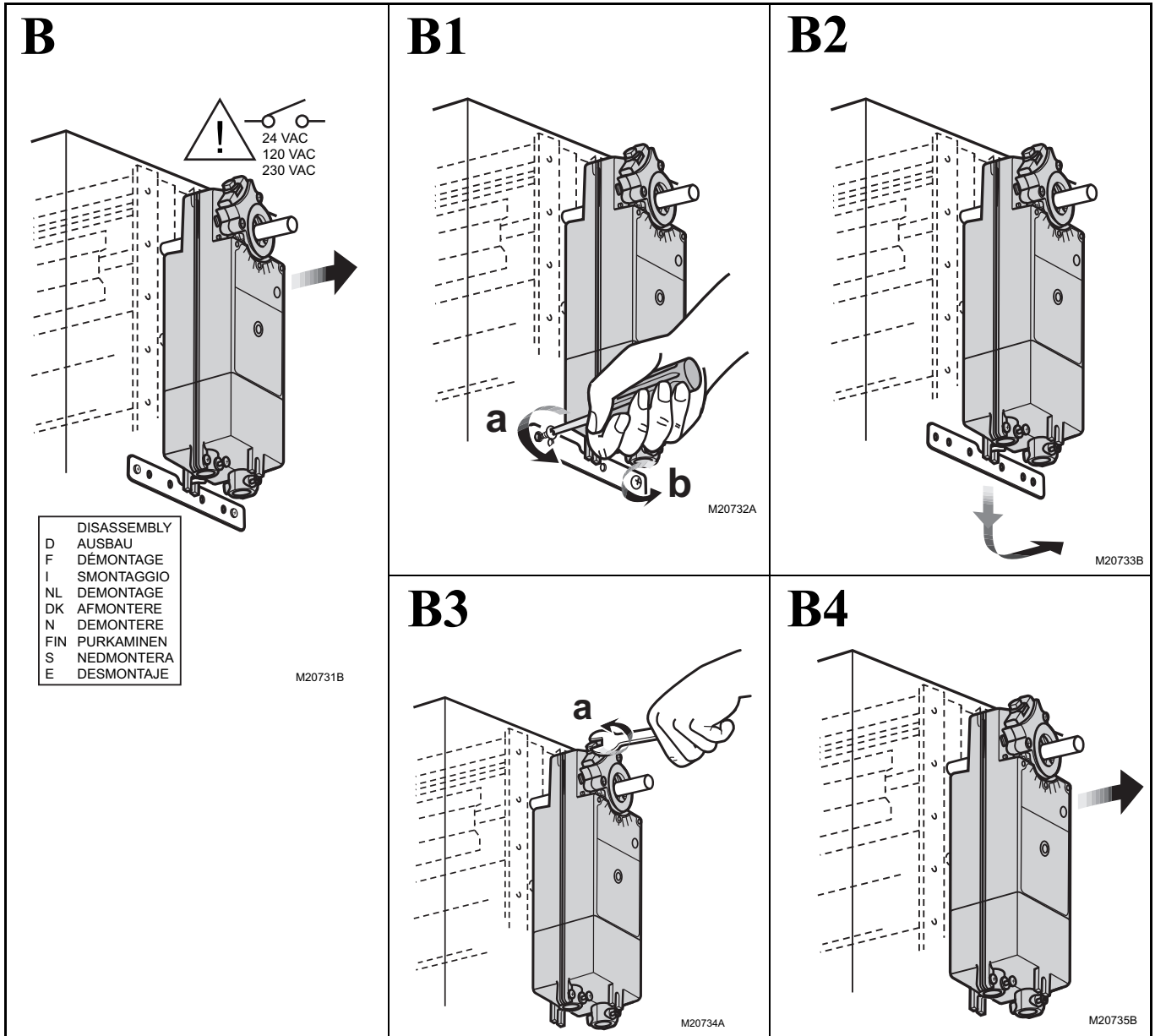
1. Check damper position.
2. Connect 24 Vac to the red and black leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not run, remove power for at least two seconds.
4. If the actuator spring returns, allow it to close entirely, then return to step 2.
5. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
6. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

D Montageanweisung
 F Instructions d'Installation
 I Istruzioni per l'Installazione

NL Installatievoorschrift
 DK Installasjonsinstruks
 N Installationsinstruktioner

SF Asennusohje
 S Installations Instruktioner
 E Instrucciones de montaje





MS4120F; MS4620F; MS8120F; S2024-F; S20230-F FAST-ACTING, TWO-POSITION ACTUATORS

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National Fire Codes® is a registered trademark of the National Fire Protection Association (NFPA).

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Honeywell

MS4104, MS4109, MS4604, MS4609, MS8104, MS8109 Fast-Acting, Two-Position Actuators FOR FIRE/SMOKE CONTROL APPLICATIONS

PRODUCT DATA



APPLICATION

The MS4104, MS4109, MS4604, MS4609, MS8104 and MS8109 Fast-Acting, Two-Position Actuators are spring return direct coupled actuators (DCA) for Fire and Smoke dampers (on/off control). The actuator accepts an on/off signal from a single-pole, single-throw (SPST) controller. Reversible mounting allows actuator to be used for either clockwise (cw) or counterclockwise (ccw) spring rotation.

FEATURES

- 30 lb-in. (3.4 N•m) or 80 lb-in. (9 N•m) minimum driving torque at 350°F (176°C).
- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24, 120, and 230 Vac.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Designed to operate reliably in smoke control systems requiring Underwriter's Laboratories Inc. UL555S ratings up to 350°F.
- Models available with SPST position-indicating switches (7°, 85° stroke).

Contents

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63-2740-05

SPECIFICATIONS

Models: See Table 1.

Table 1. Models.

Model	Voltage (Vac)	Internal Auxiliary Switches
MS4104F1010	120	None
MS4104F1210	120	2 SPST ^a
MS4109F1010	120	None
MS4109F1210	120	2 SPST ^a
MS4604F1010	230	None
MS4604F1210	230	2 SPST ^a
MS4609F1010	230	None
MS4609F1210	230	2 SPST ^a
MS8104F1010	24	None
MS8104F1210	24	2 SPST ^a
MS8109F1010	24	None
MS8109F1210	24	2 SPST ^a

^a Internal switches are designed to pass UL555S requirements (at 350°F for 30 minutes) and are intended for use as position indication.

Dimensions: See Fig. 1.

Minimum Damper Shaft Length: 2 in. (51 mm).

Device Weight: 5 lb (2.3 kg).

Stroke: 95° ± 3°, mechanically limited.

Electrical Ratings: See Table 2.

Electrical Connections:

Power Lead Wires:

MS410xF and MS460xF: 32 inches (0.8m), 18 AWG

MS810xF: 39 inches (1m), 18 AWG

Switch Lead Wires: 18 inches, 18 AWG, 2 color coded leads

Mounting: Round 1/2 inch shaft adapter with 1/4 inch set screws.

Threads: ¼-20 UNC-2A

Material: Alloy Steel hardened to HRC 45-53

Thread Lock: Nylon Patch

IMPORTANT

Honeywell does not recommend using linkages with these actuators because side-loading of the output hub reduces actuator life.

Temperature Ratings:

Ambient: 0°F to 130°F (-18°C to 55°C).

Shipping and Storage: -40°F to 140°F (-40°C to 60°C).

IMPORTANT

The actuator is designed to meet UL555S standards at 350°F (176°C). The actuator must be tested with the damper to achieve this rating.

Humidity Ratings: 5% to 95% RH noncondensing.

Noise Rating (Maximum):

Driving Open: 75 dBA at 1m.

Holding: 20 dBA at 1m (no audible noise).

Controller Type:

MS4104, MS4109: Line voltage (120 Vac), two-position, SPST (Series 40).

MS4604, MS4609: Line voltage (230 Vac), two-position, SPST (Series 40).

MS8104, MS8109: Low voltage (24 Vac), two-position, SPST (Series 80).

Table 2. MS4104, MS4109, MS4604, MS4609, MS8104 and MS8109 DCA Models.

Model	Power Consumption		Torque in lb-in. (N•m)	Voltage Input in Vac
	Running	Holding		
MS4104F	0.18A, 18W	0.11A, 9W	30 (3.4)	120 ±10%, 50/60 Hz
MS4109F	0.25A, 23W	0.13A, 7W	80 (9)	
MS4604F	0.13A, 18W	0.10A, 11W	30 (3.4)	230 ±10%, 50/60 Hz
MS4609F	0.13A, 23W	0.09A, 7W	80 (9)	
MS8104F	16 VA	8 VA	30 (3.4)	24Vac/dc +20%, -10%, 50/60 Hz
MS8109F	23 VA	7 VA	80 (9)	

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number. If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Environmental and Combustion Controls Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
1985 Douglas Drive North
Minneapolis, Minnesota 55422-4386
3. <http://customer.honeywell.com> or <http://customer.honeywell.ca>

International Sales and Service Offices in all principal cities of the world. Manufacturing in Belgium, Canada, China, Czech Republic, Germany, Hungary, Italy, Mexico, Netherlands, United Kingdom, and United States.

Torque Rating (at rated voltage):

Spring Return:

MS4104F, MS4604F, MS8104F: 30 lb-in. (3.4 N•m).
 MS4109F, MS4609F, MS8109: 80 lb-in. (9 N•m).

Stall Maximum:

MS4104F, MS4604F, MS8104F: 150 lb-in. (17 N•m).
 MS4109F, MS4609F, MS8109: 240 lb-in. (27 N•m).

350°F Driving:

MS4104F, MS4604F, MS8104F: 30 lb-in. (3.4 N•m).
 MS4109F, MS4609F, MS8109: 80 lb-in. (9 N•m).

Timing (At Rated Torque and Voltage):

Drive Open: 15 seconds typical.
 Spring Close: 15 seconds typical.

Cycling Requirements:

The actuator and the internal spring are designed to require no special cycling during long-term holding.

Honeywell recommends following all local, state and national codes for periodic testing of the entire smoke control system. Refer to National Fire Protection Association (NFPA) National Fire Codes®: NFPA90A, NFPA92A and NFPA92B for your application.

NFPA recommends periodic examination of each fire/smoke damper (semi-annually or annually) to ensure proper performance.

Design Life (at Rated Voltage): 30,000 full stroke cycles.

Approvals: See Table 3.

Environmental Protection Ratings: See Table 4.

Accessories:

205649 Mounting Bracket (not supplied with actuator).

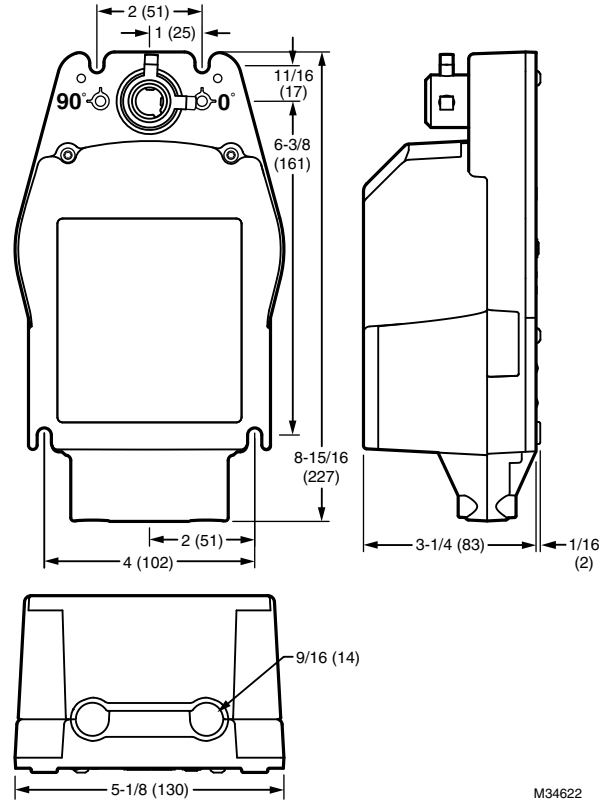


Fig. 1. MS4104, MS4109, MS4604, MS4609, MS8104 and MS8109 dimensional drawing in in. (mm).

Table 3. Approvals.

	MS4104F, MS4109F	MS4604F, MS4609F	MS8104F, MS8109F
UL/cUL	X	X	X
UL60730	X	X	X
CE	X	X	X
C-Tick	X	X	X

Table 4. Environmental Ratings.

All Devices	MS4104, MS4109, MS4604, MS4609, MS8104 and MS8109
NEMA1	IP40

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

IMPORTANT

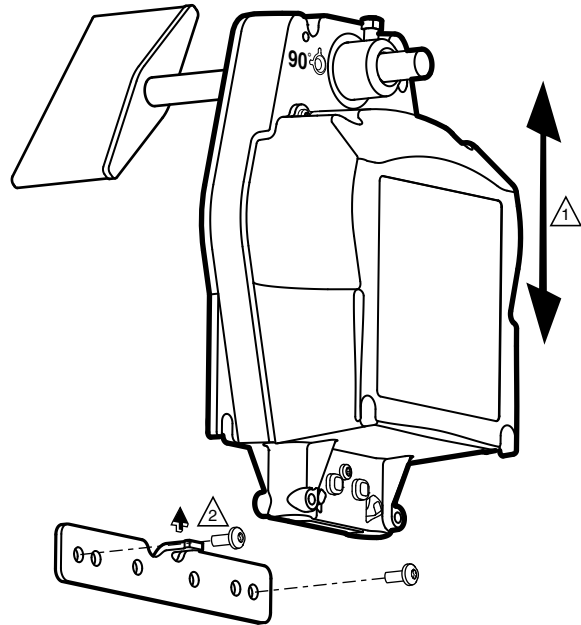
All wiring must agree with applicable codes, ordinances and regulations.

! WARNING

Electrical Power Hazard.
Line voltage can cause death or serious injury and short equipment circuitry.
 Disconnect power supply before installation.

! CAUTION

Electrical Shock or Equipment Damage Hazard.
Low voltage can shock individuals or short equipment circuitry.
 Disconnect power supply before installation.





! ENSURE THAT MOUNTING ASSEMBLY PREVENTS ACTUATOR ROTATION AND ALLOWS ACTUATOR TO FLOAT ALONG INDICATED AXIS. WHEN TOO TIGHT, THE RESULTING BINDING CAN DAMAGE THE ACTUATOR OR REDUCE TORQUE OUTPUT.

! ACCESSORY MOUNTING BRACKET IS NOT SUPPLIED WITH THE ACTUATOR.

M34623

Fig. 2. Mounting actuator to damper housing.

Location and Mounting

The actuators are designed to open a damper by driving the damper shaft in either clockwise  or counterclockwise  direction. The actuator housing has two slots on the bottom that, with a 205649 Mounting Bracket, secure it flush to a damper box (see Fig. 2). When mounted correctly, these slots allow the actuator to *float* without rotating relative to the damper shaft.

! CAUTION

Equipment Damage Hazard.
Tightly securing actuator to damper housing can damage actuator.
 Mount actuator to allow it to float along its vertical axis.

Preparation

Before mounting the actuator onto the damper shaft, determine the:

- Damper/valve opening direction for correct spring return rotation. The actuator can be mounted to provide clockwise or counterclockwise spring return.
- Damper shaft size (see Specifications section).

Installation



CAUTION

Device Malfunction Hazard.
Improper set screw tightening causes device malfunction.

Ensure damper blade is in the correct position and tighten set screws with proper torque to prevent damper shaft slippage.



CAUTION

Actuator Damage Hazard.
Using actuator as shaft bearing causes device damage.

Use actuator only to supply rotational torque. Avoid any side loads to actuator output coupling bearings.

To install actuator, proceed as follows:

1. Place actuator over damper shaft; and hold mounting bracket in place. See Fig. 2.
2. Mark screw holes on damper housing.
3. Remove actuator and mounting bracket.
4. Drill or center-punch holes for mounting screws (or use no.10 self-tapping sheet metal screws).
5. Turn damper blades to desired normal (closed) position.
6. Place actuator and mounting bracket back into position and secure bracket to damper box with sheet metal screws.
7. Tighten set screws securely into damper shaft using minimum 100 lb-in., maximum 130 lb-in. torque. Use 1/4 in. wrench (see Specifications for details) to tighten set screws.

Wiring

See Fig. 3 through 5 for typical wiring diagrams.



WARNING

Electrical Power Hazard.
Line voltage can cause death or serious injury and short equipment circuitry.

Disconnect power supply before installation.



CAUTION

Electrical Shock or Equipment Damage Hazard.
Low voltage can shock individuals or short equipment circuitry.

Disconnect power supply before installation.

IMPORTANT

1. All wiring must comply with local electrical codes, ordinances and regulations.
2. Voltage and frequency of transformer must correspond with the characteristics of power supply and actuator.
3. Use wires rated for at least 75°C (167°F).
4. The conduit fittings are designed for use with 3/8 in. reduced-wall steel or aluminum flexible conduit.

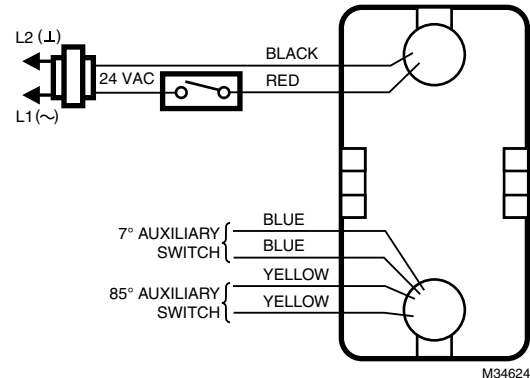


Fig. 3. Typical 24 Vac wiring.

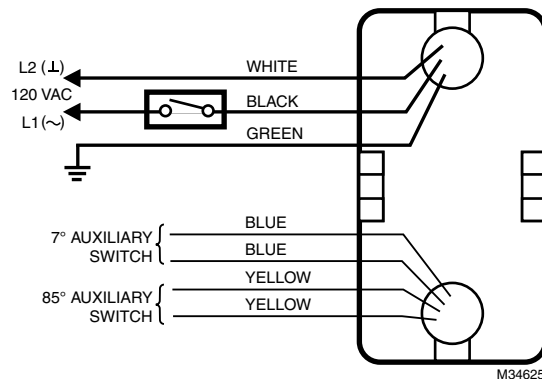


Fig. 4. Typical 120 Vac wiring.

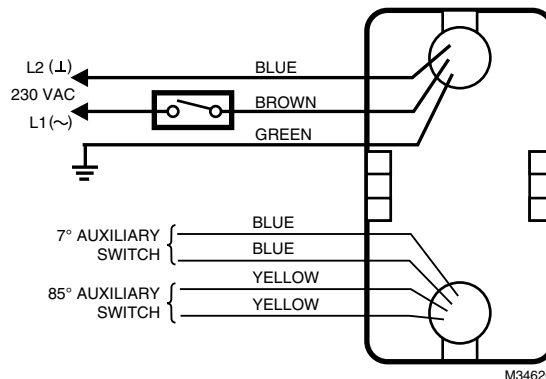


Fig. 5. Typical 230 Vac wiring.

OPERATION

The MS4104, MS4109, MS4604, MS4609, MS8104 and MS8109 DCA are designed for use in Smoke Control Systems. If power fails, the actuator spring returns to the 0° position. The actuator mounts flush with the damper box. The actuator drives from 0° to 95° and spring returns back to 0°.

The actuators are operated by an spst two-position controller. When using an spst two-position controller, the actuator drives to the damper fully open position when controller contact makes and spring returns to the damper fully closed position when controller contact breaks. The actuator drops to holding power level on detection of stall, independent of hub position.

Cycling

The actuator and the internal spring are designed so that no special cycling during long-term holding is required. Honeywell recommends following all local, state, and national codes for periodic testing of the entire smoke control system. Refer to National Fire Protection Association (NFPA) National Fire Codes®: NFPA90A, NFPA92A, and NFPA92B for your application.

NOTE: The actuator is designed to operate for 30 minutes during a one-time excursion to 350°F (176°C).

CHECKOUT

MS4104F, MS4109F (120 Vac model)

1. Check damper position.
2. Connect 120 Vac to the black and white leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
4. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

MS4604F, MS4609F (230 Vac model)

1. Check damper position.
2. Connect 230 Vac to the blue and brown leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
4. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

MS8104F, MS8109F (24 Vac model)

1. Check damper position.
2. Connect 24 Vac to the red and black leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not spring return, verify that the actuator is properly installed. See Installation section.
4. If the actuator is correctly installed but neither runs nor spring returns, replace the actuator.

National Fire Codes® is a registered trademark of the National Fire Protection Association (NFPA).

Automation and Control Solutions

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Honeywell



4-Wire Photoelectric Duct Smoke Detector

The InnovairFlex™ Series are the only duct smoke detectors flexible enough to fit configurations from square to rectangular and everything in between.

Features

- Photoelectric, integrated low-flow technology
- Air velocity rating from 100 ft/min to 4,000 ft/min (0.5 m/s to 20.32 m/sec)
- Versatile mounting options: square or rectangular configuration
- Plug-in sensor offers superb false alarm immunity and the latest sensor technology
- Broad ranges for operating temperature (–4°F to 158°F) and humidity (0% to 95% non-condensing)
- Patented sampling tube installs from front or back of the detector with no tools required
- Increased wiring space with a newly added 3/4-inch conduit knockout
- One easy-access Test/Reset button and improved LED status
- Patented interconnect feature for multi-fan shutdown
- New high contrast terminal designations
- Built-in short circuit protection from operator wiring errors
- Field selectable settings for configuring the detector
- Two DPDT Form-C relay contacts
- 24 VAC/DC or 120VAC
- Backward compatibility with existing Innovair products, including remote accessories

Agency Listings



Innovairflex™

The InnovairFlex D4120 4-wire photoelectric duct smoke detector features a pivoting housing that fits both square and rectangular footprints and mounts to round or rectangular ductwork. This unit senses smoke in the most challenging conditions, operating in airflow speeds of 100 to 4,000 feet per minute, temperatures of –4°F to 158°F, and a humidity range of 0 to 95 percent (non-condensing). A plug-in sensor head offers improved false alarm immunity and simple installation, testing, and maintenance. An improved cover design isolates the sensor head from the low-flow feature for simple maintenance.

The InnovairFlex housing provides ample wiring space, a 3/4-inch conduit knockout, and built-in short circuit protection to prevent damage to sensitive components during installation. High contrast terminal designations make wiring easy. With its 2:1 sensor-to-power capability, the power board of the D4120 may be used to monitor a second sensor, D4S, simultaneously (i.e., supply and return side). As many as 50 InnovairFlex detectors can be interconnected. When one unit senses smoke, all interconnected detectors will switch their relays; only the detector sensing smoke will go into alarm, thus pinpointing the fire source.

An easy-access Test/Reset button makes it possible to test the unit with the cover on. Three DIP switches can be used to configure field selectable settings: cover tamper delay, number of sensors to be controlled, and shut down on trouble option. Each power board has two LEDs that can be used to indicate the status of connected sensors, and a quick reference imprinted on the cover explains the LED status indications (Standby, Maintenance, Trouble, and Alarm). The InnovairFlex duct smoke detector can be customized to meet local codes and specifications without additional wiring. The new InnovairFlex product line is compatible with all previous Innovair models, including remote test accessories.

WARNING: Duct smoke detectors are **NOT** a substitute for open area smoke detectors; **NOT** a substitute for early warning detection; **NOT** a replacement for a building's regular fire detection system. Refer to NFPA 72 and 90A for additional information.

InnovairFlex™ Duct Smoke Detector Specifications

Architectural/Engineering Specifications

The air duct smoke detector shall be a System Sensor InnovairFlex™ D4120 Photoelectric Duct Smoke Detector. The detector housing shall be UL listed per UL 268A specifically for use in air handling systems. The flexible housing of the duct smoke detector fits multiple footprints from square to rectangular. The detector shall operate at air velocities of 100 feet per minute to 4000 feet per minute (0.5 to 20.32 meters/second). The unit shall be capable of controlling up to 50 air handling systems when interconnected with other detectors. The detector shall be capable of providing a trouble signal in the event that the front cover is removed. It shall be capable of local testing via magnetic switch, test button on the cover, or remote testing using the SSK451 Multi-Signaling Accessory or the RTS451KEY Remote Test Station. Terminal connections shall be of the strip and clamp method suitable for 12–18 AWG wiring.

Physical Specifications

Size: (Rectangular Dimensions)	14.38 in (37 cm) Length; 5 in (12.74 cm) Width; 2.5 in (6.36 cm) Depth
Size: (Square Dimensions)	7.75 in (19.7 cm) Length; 9 in (22.9 cm) Width; 2.5 in (6.35 cm) Depth
Weight:	2.5 lbs (1.14 kg)
Operating Temperature Range:	D4120 & D4S: -4° to 158°F (-20° to 70°C); D4P120: -40° to 158°F (-40° to 70°C)
Storage Temperature Range:	D4120 & D4S: -22° to 158°F (-30° to 70°C); D4P120: -40° to 158°F (-40° to 70°C)
Operating Humidity Range:	0% to 95% relative humidity non-condensing
Air Duct Velocity:	100 to 4000 ft/min (0.5 to 20.32 m/sec)

Electrical Ratings

Power supply voltage:	20–29 VDC	24 VAC 50–60 Hz	120 VAC 50–60 Hz
Input capacitance:	270 µF max.	270 µF max.	N/A
Reset voltage:	3.0 VDC min.	2.0 VAC min.	10 VAC min.
Reset time: (with RTS451)	.03 to 0.3 sec.	.03 to 0.3 sec.	.03 to 0.3 sec.
Reset time: (by power down)	0.6 sec. max.	0.6 sec. max.	0.6 sec. max.
Power up time:	35 sec. max.	35 sec. max.	35 sec. max.
Alarm response time:	15 sec.	15 sec.	15 sec.
Sensitivity Test:	See detector label	See detector label	See detector label

Current Requirements: (Using No Accessories)

Max. standby current:	21 mA @ 24VDC	65 mA RMS @ 24VAC 60Hz	20 mA RMS @ 120VAC 60Hz
Max. alarm current:	65 mA @ 24VDC	135 mA RMS @ 24VAC 60Hz	35 mA RMS @ 120VAC 60Hz

Contact Ratings

Alarm initiation contacts: (SPST)	2.0A @ 30 VDC (resistive)
Alarm auxiliary contacts: (DPDT)	10A @ 30 VDC (resistive); 10A @ 250 VAC (resistive); ½ HP @ 240 VAC ; ¼ HP @ 120 VAC
Note: Alarm auxiliary contacts shall not be connected to initiating circuits of control panels. Use the alarm initiation contact for this purpose.	
Supervisory contacts: (SPDT)	2.0A @ 30 VDC (resistive); 2.0A @ 125 VAC (resistive)

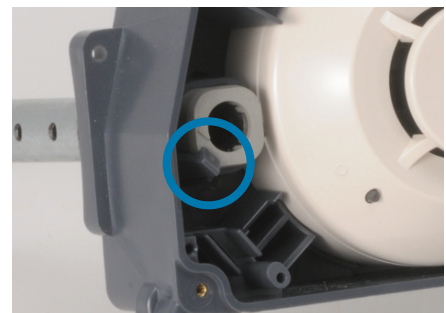
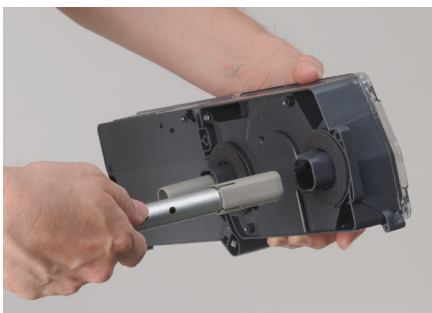
Accessory Current Loads at 24 VDC

Device	Standby	Trouble	Alarm
APA151/APA451	12.5 mA	n/a	30 mA Max.
MHR/MHW	0 mA	n/a	29 mA Max.
RA400Z	0 mA	n/a	12 mA Max.
RTS451/RTS451KEY	0 mA/12 mA	n/a	12 mA Max.
SSK451	8 mA Max.	16 mA Max.	40 mA Max.

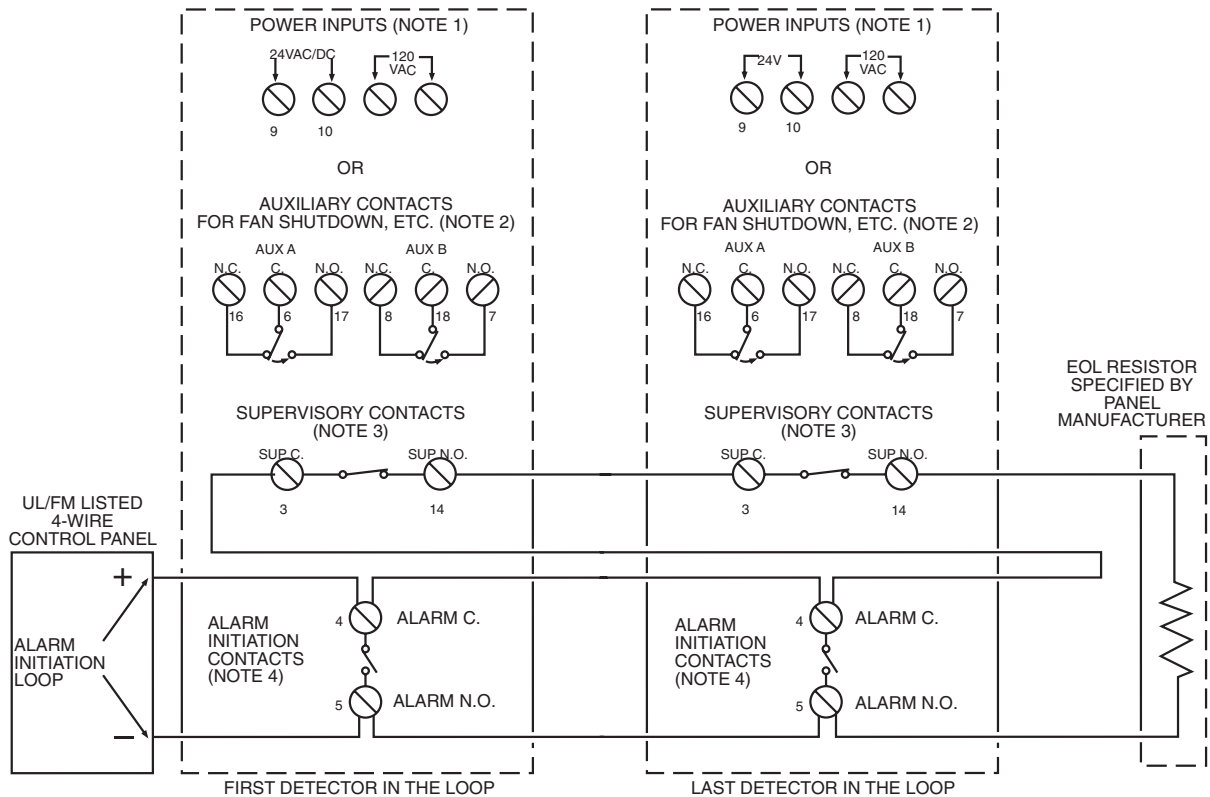
Note: Any combination of accessories may be used such that the given accessory loads are: 110 mA or less at the Aux output, and 50 mA or less at the Alarm output

Installing the InnovairFlex Sampling Tube

The InnovairFlex sampling tube may be installed from the front or back of the detector. The tube locks securely into place and can be removed by releasing the front or rear locking tab (front locking tab shown below right).



Wiring for 4-wire Duct Smoke Detector and Accessories



NOTE 1: 24V Power Inputs accept a non-polarized 24VDC or 24VAC 50-60Hz. 120VAC Power Inputs accept only 120VAC 50-60Hz. Connect power source to appropriate terminals of each detector. See specifications for additional power supply information.

NOTE 2: Auxiliary contacts shown in standby position. Contacts switch during alarm as indicated by arrows. Auxiliary contacts are not to be used for connection to the control panel. See specifications for contact ratings.

NOTE 3: Supervisory contacts shown in standby position. Open contacts indicate a trouble condition to the panel. See specifications for contact ratings.

NOTE 4: Alarm Initiation contacts shown in standby position. Closed contacts indicate an alarm condition to the panel. See specifications for contact ratings.

*Please refer to the corresponding installation manual for accessory wiring diagrams.

Important Notes on 2:1 Sensor-to-Power Capability

- 2:1 sensor-to-power capability is not available for all InnovairFlex models. The feature is only available on the D4120 4-wire conventional models.
- 2:1 sensor-to-power capability can be enabled using one D4120 and one D4S, or two D4S and one D4P120.

Important Interconnect Notes

- When using the interconnect feature, all interconnected units must be powered using the same independent supply.
 - Polarity must be maintained throughout the interconnect wiring. Connect the INT+ terminal on unit 1 to the INT+ terminal on unit 2 and so on. Similarly, connect the INT/AUX- terminal on unit 1 to the INT/AUX- terminal on unit 2 and so on.
 - Up to 50 D4120 units, 50 D4P120 units, or 50 units of combination may be interconnected.
 - Up to 10 DH100ACDC units may be interconnected. Please note that each of the 9 DH100ACDC units interconnected may be replaced by three D4P120 units. Therefore, when using the interconnect feature a single DH100ACDC can drive either 9 DH100ACDCs or 27 D4120 units.
- * NOTE: Alarm can be reset only at the initiating device and not at the devices interconnected.

Accessories

System Sensor provides system flexibility with a variety of accessories, including two remote test stations and several different means of visible and audible system annunciation. As with our duct smoke detectors, all duct smoke detector accessories are UL listed.



RTS451 UL S2522



RTS451KEY UL S2522



APA151 UL S4011



SSK451 UL S2522



RA400Z UL S2522



MHW UL S4011



MHR UL S4011



SSK451 with PS24LOW strobe and PS12/24 LENS lenses

Ordering Information

Part No.	Description		
D4120	4-wire photoelectric low-flow duct smoke detector		
Accessories			
D4S	4-wire photoelectric sensor component only	MHR	Mini Horn, Red
D4P120	4-wire photoelectric power board component only, 24 VAC/DC, 120 VAC	MHW	Mini Horn, White
2D51	4-wire conventional photoelectric sensor head	P48-21-00	End cap for metal sampling tubes
DST1	Metal sampling tube duct width up to 1ft (0.3m)	PS12/24LENESC	Ceiling-mount "SMOKE" lens
DST1.5	Metal sampling tube duct widths 1 ft to 2 ft (0.3 to 0.6 m)	PS12/24LENSW	Wall-mount "SMOKE" lens
DST3	Metal sampling tube duct widths 2 ft to 4 ft (0.6 to 1.2 m)	PS24LO	Mini-Alert add-on strobe (red)
DST5	Metal sampling tube duct widths 4 ft to 8 ft (1.2 to 2.4 m)	PS24LOW	Mini-Alert add-on strobe (white)
DST10	Metal sampling tube duct widths 8 ft to 12 ft (2.4 to 3.7 m)	RA400Z	Remote annunciator alarm LED
APA151	Remote annunciator with piezo alarm	RTS451	Remote test station
DH400 OE-1	Weatherproof enclosure	RTS451KEY	Remote test station with key lock
ETX	Metal exhaust tube duct width 1ft (0.3m)	SSK451	Multi-signaling accessory
M02-04-00	Test magnet		



3825 Ohio Avenue • St. Charles, IL 60174
Phone: 800-SENSOR2 • Fax: 630-377-6495

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A05-0419-000 • 8/08 • #1836



**FACTORY MOUNTED DUCT SMOKE DETECTOR
LOW FLOW (100 TO 4000 FPM AIR VELOCITY)
FOR USE WITH 1200 SERIES SMOKE AND COMBINATION
FIRE/SMOKE DAMPERS
MODEL: DSD-LF**

QUALIFICATIONS:

The following qualifications apply to the smoke detector only. There is no separate UL product category for factory-mounted detector/damper combination. Refer to individual damper specification drawing for damper qualifications. Consult the local authority having jurisdiction before installation to ensure local code compliance.

- **UL 268A Listed Smoke-automatic Detectors, Category UROX (File # S911).**
- **Meets the requirements of NFPA 72, 90A, 92 and 101.**
- **City of New York. MEA No. 29-01-E.**
- **California State Fire Marshal Listing No. 7272-1653:0207.**
- **Factory Mutual Approved.**

APPLICATION:

Nailor model DSD-LF duct smoke detector (low-flow) can be utilized with Nailor UL 555S Classified smoke or combination fire/smoke dampers to detect the presence of smoke within HVAC ductwork and close the damper to prevent the smoke from spreading. As most fatalities resulting from fires can be attributed to the effects of toxic smoke, detecting and controlling the smoke from spreading within the HVAC system is vital to preventing injury as well as limiting property damage, including damage to the HVAC system itself. Refer to NFPA Standards 72, 90A and 92 to determine when and where duct smoke detectors are required.

The DSD-NF detector can be factory installed to side of sleeve on Nailor Model Series 1210, 1260, 1280, 1220 and 1270.

A minimum airflow velocity of 100 fpm (0.5 m/s) is required for Model DSD-LF.

OPERATION:

Upon detection of smoke, the smoke detector causes the damper to close by cutting off power to the actuator. The actuator return spring forces the damper closed. The detector can be reset only by a momentary power interruption. The standard model DSD-LF detector and smoke damper combination is designed simply to close the damper upon detection of smoke. For applications requiring the detector to be wired into a firefighters' smoke-control station (FSCS), contact Nailor.

DSD-LF STANDARD SPECIFICATION:

Model: System Sensor D4120.

Sensor Type: Photoelectric.

Dimensions: (Rectangular) 14.38" (365) Length, 5" (127) Width, 2.5" (64) Depth.

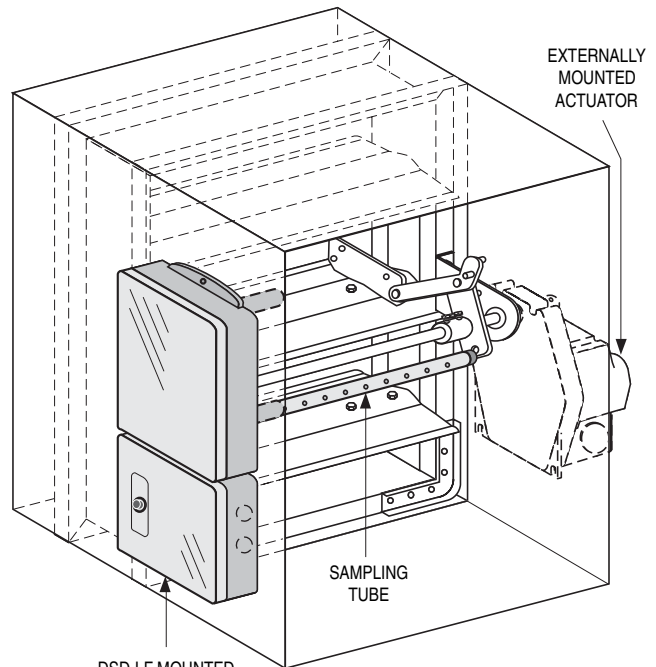
Weight: 2.5 lbs. (1.14 kg.).

Airflow Velocity Range: 100 to 4000 fpm (0.5 to 20.3 m/s).

Operating Temperature Range: -4°F to 158°F (-20°C to 70°C).

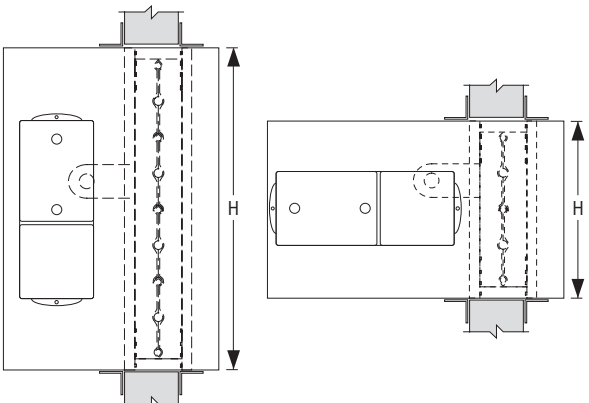
Operating Humidity Range: 0% to 95% Relative Humidity Non-Condensing.

Voltage: 24 VAC/DC or 120 VAC.



NOTES:

1. Smoke detector is factory mounted externally on left side of sleeve (opposite side of sleeve to the actuator) and will be mounted horizontally on dampers under 20" (508) in height and mounted vertically on dampers 20" (508) in height and over. See orientation details below.
2. Factory mounted smoke detectors will be factory wired to actuator(s) (or E.P. switch) and heat sensor(s), as applicable, into a 4" x 4" (102 x 102) common junction box in order to provide a single point wiring connection in the field.



Height ≥ 20" (508)

Height < 20" (508)

Dimensions are in inches (mm).

SCHEDULE TYPE:				
PROJECT:				
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	9 - 4 - 13	1200	NEW	DSD-LF



**FACTORY MOUNTED DUCT SMOKE DETECTOR
NO FLOW (0 TO 3000 FPM AIR VELOCITY)
FOR USE WITH 1200 SERIES SMOKE AND COMBINATION
FIRE/SMOKE DAMPERS
MODEL: DSD-NF**

QUALIFICATIONS:

The following qualifications apply to the smoke detector only. There is no separate UL product category for factory-mounted detector/damper combination. Refer to individual damper specification drawing for damper qualifications. Consult the local authority having jurisdiction before installation to ensure local code compliance.

- UL 268A Listed Smoke-automatic Detectors, Category UROX (File # S911).
- Meets the requirements of NFPA 72, 90A, 92 and 101.
- City of New York. MEA No. 205-94-E.
- California State Fire Marshal Listing No. 7272-1653:0122.
- Factory Mutual Approved.

APPLICATION:

Nailor model DSD-NF duct smoke detector (no-flow) can be utilized with Nailor UL 555S Classified smoke or combination fire/smoke dampers to detect the presence of smoke within HVAC ductwork, whether or not there is airflow and close the damper to prevent the smoke from spreading. As most fatalities resulting from fires can be attributed to the effects of toxic smoke, detecting and controlling the smoke from spreading within the HVAC system is vital to preventing injury as well as limiting property damage, including damage to the HVAC system itself. Refer to NFPA Standards 72, 90A and 92 to determine when and where duct smoke detectors are required.

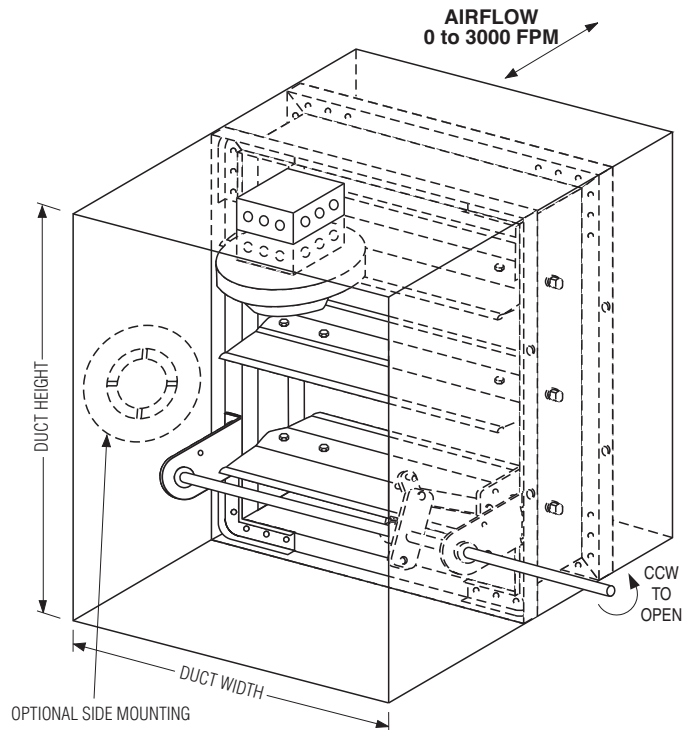
The DSD-NF detector features a low-profile design for optimum pressure drop and will operate with airflow in either direction. It can be factory installed to top of sleeve (side mounting optional) on Nailor Model Series 1210, 1260, 1280, 1220 and 1270.

OPERATION:

Upon detection of smoke, the smoke detector causes the damper to close by cutting off power to the actuator. The actuator return spring forces the damper closed. The detector can be reset only by a momentary power interruption. The standard model DSD-NF detector and smoke damper combination is designed simply to close the damper upon detection of smoke. For applications requiring the detector to be wired into a firefighters' smoke-control station (FSCS), contact Nailor.

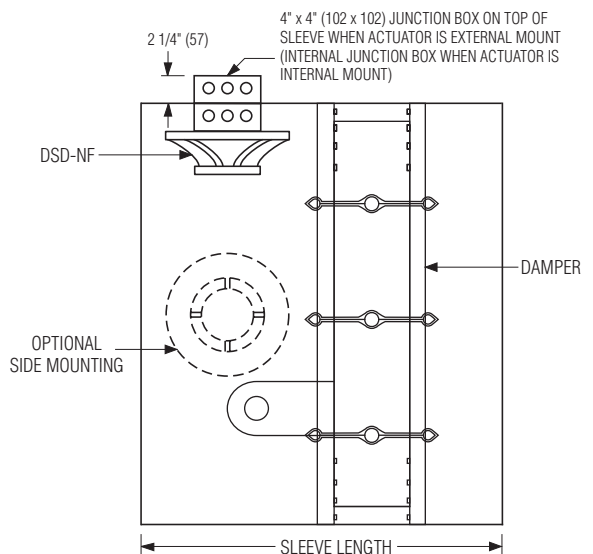
DSD-NF STANDARD SPECIFICATION:

- Model:** System Sensor 2151 Low-Profile.
- Sensor Type:** Photoelectric.
- Dimensions:** 6.1" (155) dia. flanged base.
- Weight:** 3.6 oz. (104 g.).
- Airflow Velocity Range:** 0 to 3000 fpm (0 to 15.24 m/s).
- Operating Temperature Range:** 32°F to 120°F (0°C to 49°C).
- Operating Humidity Range:** 10% to 93% Relative Humidity Non-Condensing.
- Voltage:** 120 VAC or 24 VAC/DC.
- Latching Arm:** Reset by momentary power interruption.
- Contact Nailor for minimum damper size and sleeve length for your specific application.**



NOTES:

1. Factory mounted smoke detectors will be factory wired to actuator(s) (or E.P. switch) and heat sensor(s), as applicable, into a 4" x 4" (102 x 102) common junction box in order to provide a single point wiring connection in the field.



Dimensions are in inches (mm).

SCHEDULE TYPE:
PROJECT:
ENGINEER:
CONTRACTOR:

DATE	B SERIES	SUPERSEDES	DRAWING NO.
9 - 4 - 13	1200	1 - 5 - 09	DSD-NF



DUAL TEMPERATURE OVERRIDE SENSOR
REOPENABLE CONTROL SYSTEM WITH HIGH LIMIT
FOR COMBINATION FIRE / SMOKE DAMPERS
MODEL: DTO FIRE SENSOR

The DTO Dual Temperature Override Sensor is a factory installed option on Nailor combination fire/smoke dampers, incorporating two electric heat sensors (with external manual reset buttons). A primary heat sensor (manual reset) automatically closes the damper upon sensing an elevated temperature of 165°F (74°C) at the damper. The sensor interrupts power to the actuator, and the actuator's spring return mechanism causes the damper to close. The damper may be closed at anytime by placing a control switch (by others) in the closed position.

The primary heat sensor and the smoke detector (if used) can be bypassed by an external electrical signal from a remote control station, allowing the damper to reopen as may be required in the operation of a smoke control system. The Fire Fighter's Smoke-Control Station must include a three position (double throw, center off) master switch for correct operation.

The damper remains operational until the the temperature at the damper reaches that of the high limit secondary heat sensor. This is the UL listed elevated/degradation temperature rating (operational limit) of the damper/actuator assembly. The standard high limit temperature is 250°F (121°C). A 350°F (177°C) elevated temperature classification is available as an option. When the temperature of the high limit heat sensor is exceeded, the damper closes and locks and remains closed thereafter, in conformance with UL 555 and NFPA 90A. The secondary sensor can be manually reset, using the external button, at the damper after temperatures have cooled down.

The DTO can be ordered with electric (120 or 24 Vac) or pneumatic actuators. Pneumatic actuators are supplied with a factory mounted EP (electric/pneumatic) switch.

The DTO Fire Sensor also incorporates a position indicator package. Two auxiliary switches indicate the open and closed damper position at a remote control station.

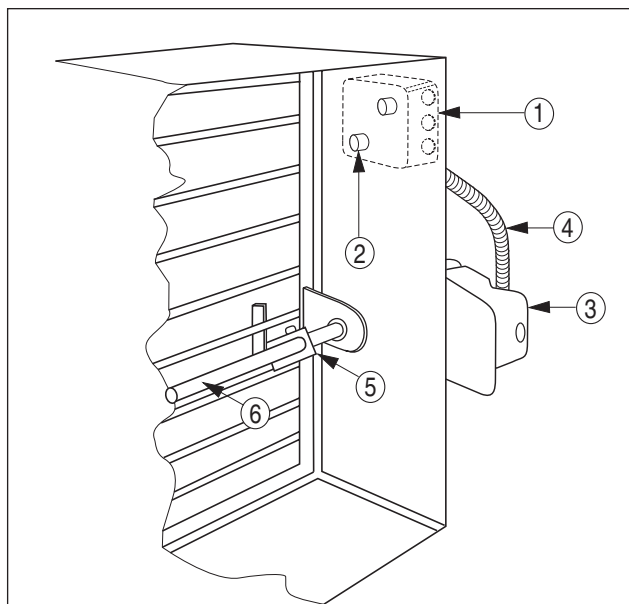
For installation and operation instructions, see dwg. IOM-DTO.

NOTE:

Nailor recommends the use of a single ERL Electric Resettable Link at the elevated/degradation temperature of the damper/actuator assembly on all combination fire/smoke dampers. 250°F Standard (350°F optional). Together with a position indicator package (MLS-300) where remote damper position status is required.

The re-openable system only provides a narrow temperature window of operation, increased cost and complexity of operation, since UL555 introduced the high limit closure requirement in 1995 in full compliance with the intent of NFPA 90A.

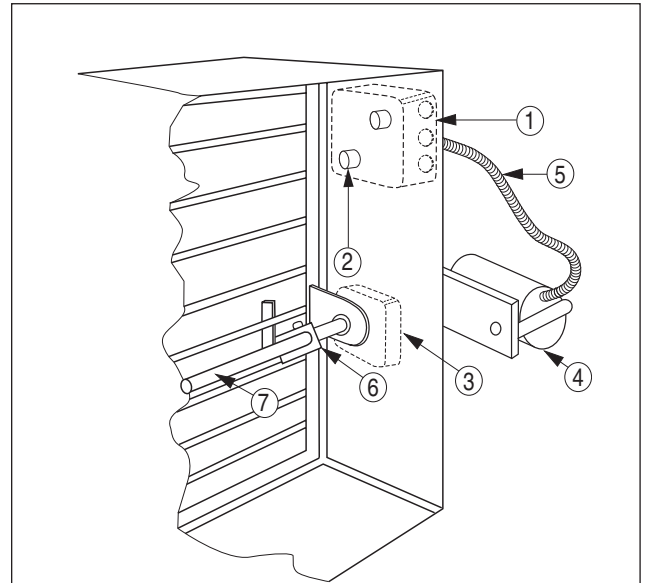
Previous building codes used to require 165°F (74°C) for all fire dampers. This is no longer the case for Smoke Management Systems.



With UL Listed Electric Actuator
Description:

1. Electrical Junction Box with 165°F (74°C) Primary Heat Sensor
2. High Limit Secondary Heat Sensor 250°F or 350°F (121°C or 177°C)
3. Electric Actuator with Auxiliary Position Indicator Switches
4. Flexible Conduit
5. Over-Center Knee Lock
6. Jackshaft

SCHEDULE TYPE:	Page 1 of 2			
PROJECT:	Dimensions are in inches (mm)			
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	9 - 8 - 20	FD-ACC	MLS-400/7-20-19	DTO



With UL Listed Pneumatic Actuator
Description:

1. Electrical Junction Box with 165°F (74°C) Primary Heat Sensor and EP Switch
2. High Limit Secondary Heat Sensor 250°F or 350°F (121°C or 177°C)
3. Position Indicator Package
4. Pneumatic Actuator
5. Silicone Tubing
6. Over-Center Knee Lock
7. Jackshaft

SCHEDULE TYPE:
PROJECT:
ENGINEER:
CONTRACTOR:

Page 2 of 2
Dimensions are in inches (mm)

DATE	B SERIES	SUPERSEDES	DRAWING NO.
9 - 8 - 20	FD-ACC	MLS-400/7-20-19	DTO

FSAF120A

On/Off, Spring Return Fail-Safe, 120 VAC



Technical Data	
Power Supply	120 VAC, ±10%, 50/60 Hz
Power consumption in operation	30 VA
Power consumption in rest position	7.5 W, 12 VA (50 Hz 20 VA), End stop 55 VA, 0.5 A slow blow fuse *
Shaft Diameter	1/2" to 1.05" round, centers on 3/4" with insert, 1.05" without insert
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 120V
Angle of rotation	95°
Torque motor	180 in-lb [20 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<25 sec
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC
Noise level, motor	inaudible holding, running <40 dB (A) spring <62 dB (A)
Noise Level (Fail-Safe)	inaudible holding, spring 73 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001, RoHS (EU-Directive 2011/65/EU)
Weight	6.84 lb [3.0 kg]

† UL File XAPX.E108966

Fire & Smoke, 180 in-lb at 350°F for 30 min., 25 sec. drive, 15 sec. spring

Application

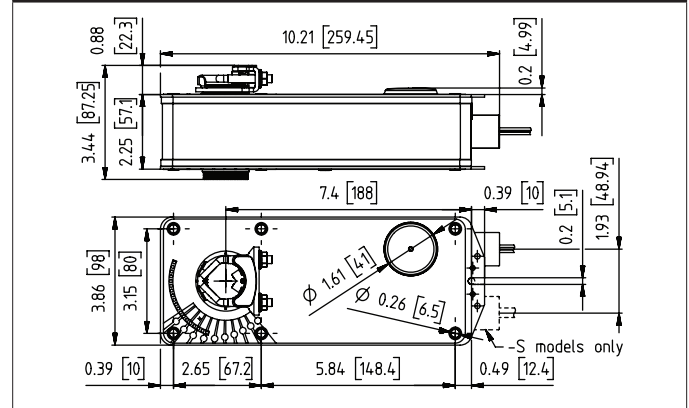
The FSAF_A actuators provide true spring return operation for reliable fail-safe application and positive close-off on UL555S dampers. The spring return system provides constant torque to the damper with and without power applied to the actuator. The FSAF_A series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°.

Operation

The FSAF_A series actuators are mounted to the damper axle shaft or jackshaft (1/2" to 1.05") via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Note on linkage kits. The correct leg kit for the FSAF_A series is the older ZG-AF US as the actuator has a classic AF frame. However, the spline is the new generation type and the crank arm required is the KH-AFB.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSAF_A actuators draw higher peak current when driving against any type of stop. After 10 seconds current drops to the lower holding level. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2 A slow blow should be used for 24 VAC. A 0.5 A slow blow should be used for 120 VAC. A 0.25 A slow blow should be used for 230 VAC and a 0.3 A slow blow for 208 VAC.

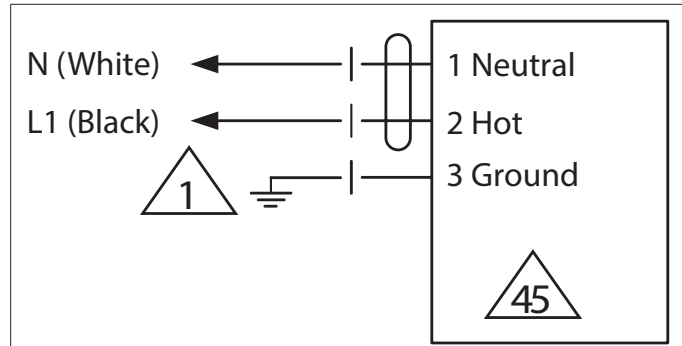
Accessories	
---AF-P	Anti-rotation bracket AF/NF.
---SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
---TOOL-06	8 mm and 10 mm wrench.
---ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
---ZG-101	Univ. right angle bracket (13" H x 11" W x 7-7/16" base).
---ZG-102	Dual actuator mounting bracket.
---ZG-AF US	Classic AF/NF crankarm adaptor kit.
---ZG-AFB118	AFB(X)/NFB(X) crankarm adaptor kit.
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---ZS-260	Explosion proof housing.
---ZS-300	NEMA 4X, 304 stainless steel enclosure.
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

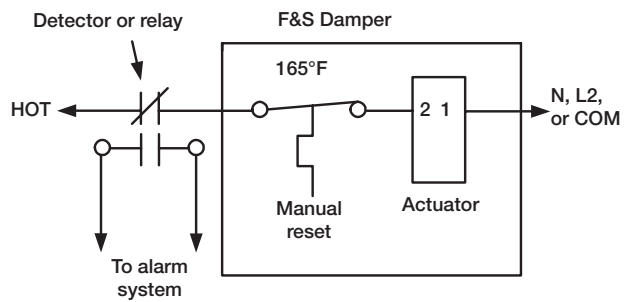
All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

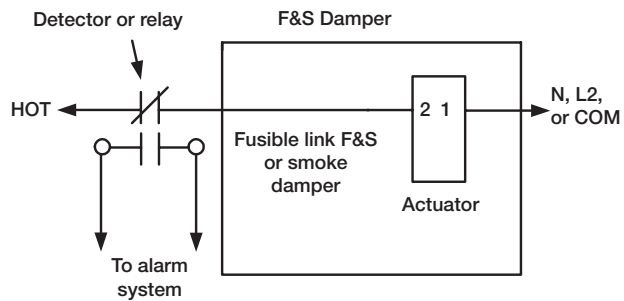
- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.



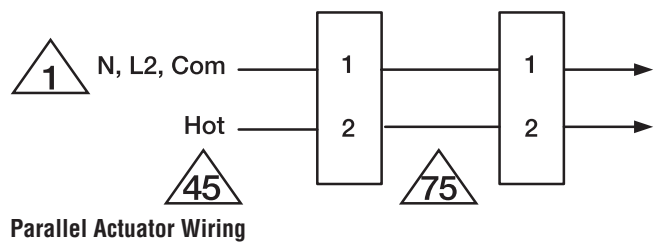
120 VAC



Typical containment damper control wiring



Typical smoke or fusible link damper wiring



Parallel Actuator Wiring

FSAF230A

On/Off, Spring Return Fail-Safe, 230 VAC



Technical Data	
Power Supply	230 VAC, ±10%, 50/60 Hz
Power consumption in operation	37 VA
Power consumption in rest position	10 W, 19 VA (60 Hz 12 VA), End stop 50 VA, 0.25 A slow blow fuse *
Shaft Diameter	1/2" to 1.05" round, centers on 3/4" with insert, 1.05" without insert
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 230V
Angle of rotation	95°
Torque motor	180 in-lb [20 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<25 sec
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC
Noise level, motor	inaudible holding, running 70 dB (A)
Noise Level (Fail-Safe)	inaudible holding, spring 73 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001, RoHS (EU-Directive 2011/65/EU)
Weight	6.84 lb [3.0 kg]

† UL File XAPX.E108966

Fire & Smoke, 180 in-lb at 350°F for 30 min., 25 sec. drive, 15 sec. spring

Application

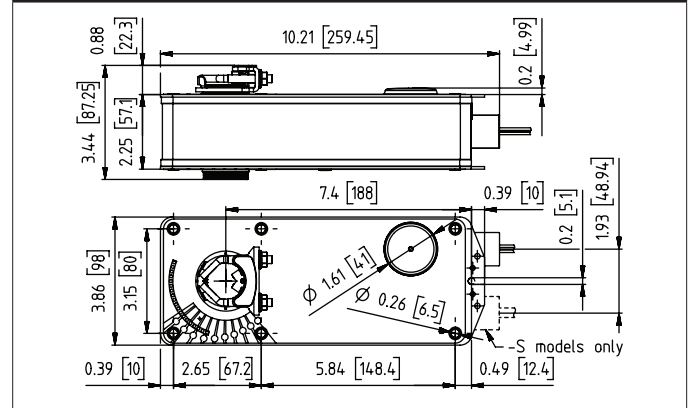
The FSAF_A actuators provide true spring return operation for reliable fail-safe application and positive close-off on UL555S dampers. The spring return system provides constant torque to the damper with and without power applied to the actuator. The FSAF_A series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°.

Operation

The FSAF_A series actuators are mounted to the damper axle shaft or jackshaft (1/2" to 1.05") via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Note on linkage kits. The correct leg kit for the FSAF_A series is the older ZG-AF US as the actuator has a classic AF frame. However, the spline is the new generation type and the crank arm required is the KH-AFB.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSAF_A actuators draw higher peak current when driving against any type of stop. After 10 seconds current drops to the lower holding level. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2 A slow blow should be used for 24 VAC. A 0.5 A slow blow should be used for 120 VAC. A 0.25 A slow blow should be used for 230 VAC and a 0.3 A slow blow for 208 VAC.

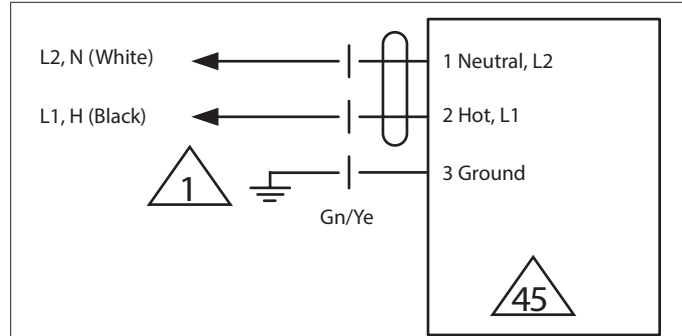
Accessories	
---AF-P	Anti-rotation bracket AF/NF.
---SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
---TOOL-06	8 mm and 10 mm wrench.
---ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
---ZG-101	Univ. right angle bracket (13" H x 11" W x 7-7/16" base).
---ZG-102	Dual actuator mounting bracket.
---ZG-AF US	Classic AF/NF crankarm adaptor kit.
---ZG-AFB118	AFB(X)/NFB(X) crankarm adaptor kit.
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---ZS-260	Explosion proof housing.
---ZS-300	NEMA 4X, 304 stainless steel enclosure.
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

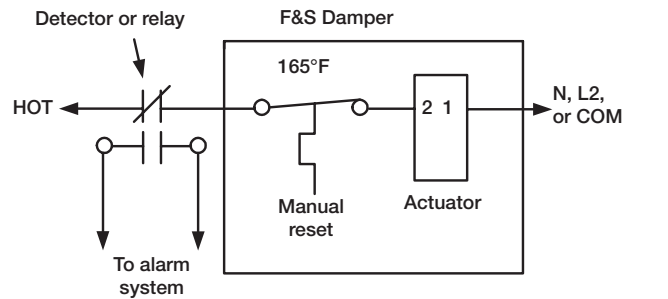
All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

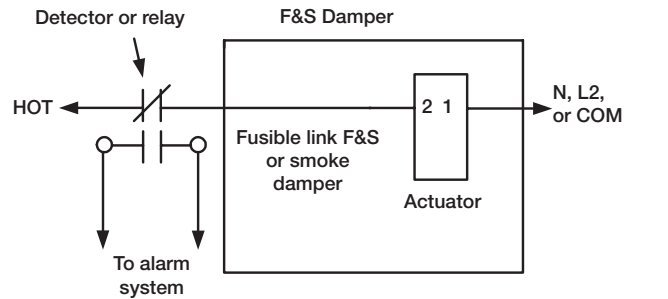
- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.



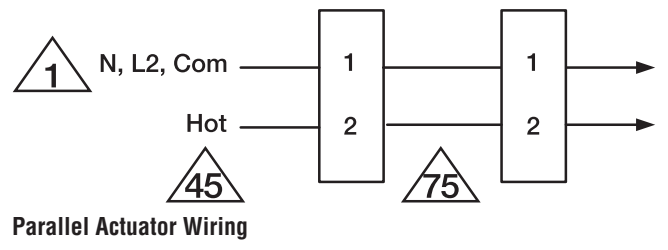
230 VAC



Typical containment damper control wiring



Typical smoke or fusible link damper wiring



Parallel Actuator Wiring

FSAF24A

On/Off, Spring Return, 24 VAC/DC



Technical Data

Power Supply	24 VAC, ±10%, 50/60 Hz, 24 VDC, -0% / +50%
Power consumption in operation	32 VA
Power consumption in rest position	5 W, 8.5 VA, End stop 50 VA, 2 A slow blow fuse *
Transformer sizing	40 VA (class 2 power source)
Shaft Diameter	1/2" to 1.05" round, centers on 3/4" with insert, 1.05" without insert
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	[20 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<25 sec
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL60730-1A:02; UL 60730-2-14:02 and CAN/CSA-E60730-1:02; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC
Noise level, motor	inaudible holding, running 70 dB (A)
Noise Level (Fail-Safe)	inaudible holding, spring 73 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001, RoHS (EU-Directive 2011/65/EU)
Weight	5.87 lb [2.5 kg]

† UL File XAPX.E108966

Fire & Smoke, 180 in-lb at 350°F for 30 min., 25 sec. drive, 15 sec. spring

Application

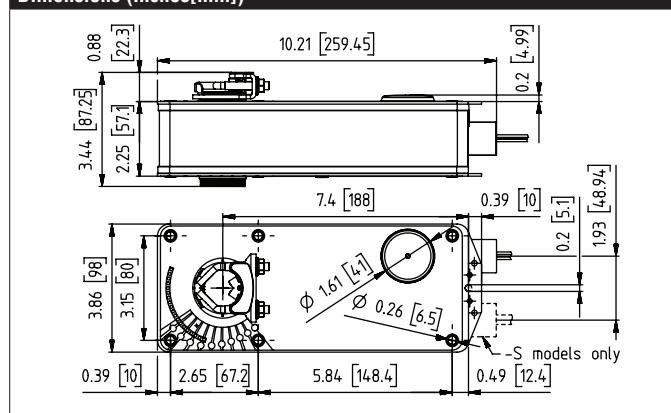
The FSAF_A actuators provide true spring return operation for reliable fail-safe application and positive close-off on UL555S dampers. The spring return system provides constant torque to the damper with and without power applied to the actuator. The FSAF_A series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°.

Operation

The FSAF_A series actuators are mounted to the damper axle shaft or jackshaft (1/2" to 1.05") via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Note on linkage kits. The correct leg kit for the FSAF_A series is the older ZG-AF US as the actuator has a classic AF frame. However, the spline is the new generation type and the crank arm required is the KH-AFB.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSAF_A actuators draw higher peak current when driving against any type of stop. After 10 seconds current drops to the lower holding level. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2 A slow blow should be used for 24 VAC. A 0.5 A slow blow should be used for 120 VAC. A 0.25 A slow blow should be used for 230 VAC and a 0.3 A slow blow for 208 VAC.

Transformers:

Note that while a 24 V 100 VA transformer would handle 3 actuators run current, a 4 A breaker or plug fuse is insufficient. A 6 A slow blow would be required.

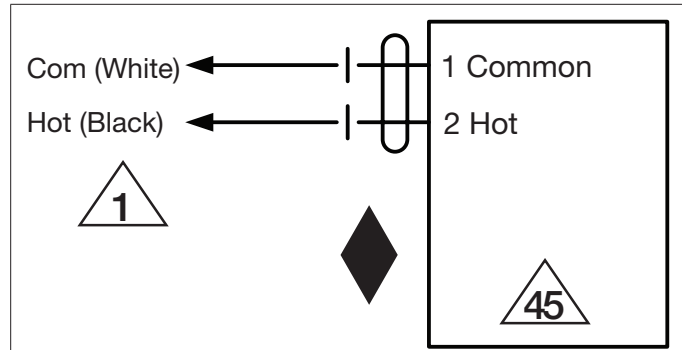
Accessories	
---AF-P	Anti-rotation bracket AF/NF.
---SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
---TOOL-06	8 mm and 10 mm wrench.
---ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
---ZG-101	Univ. right angle bracket (13" H x 11" W x 7-7/16" base).
---ZG-102	Dual actuator mounting bracket.
---ZG-AF US	Classic AF/NF crankarm adaptor kit.
---ZG-AFB118	AFB(X)/NFB(X) crankarm adaptor kit.
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---ZS-260	Explosion proof housing.
---ZS-300	NEMA 4X, 304 stainless steel enclosure.
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

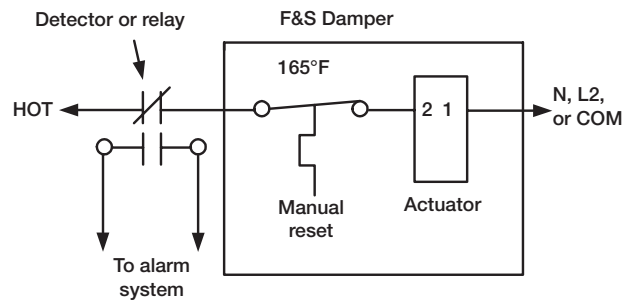
All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

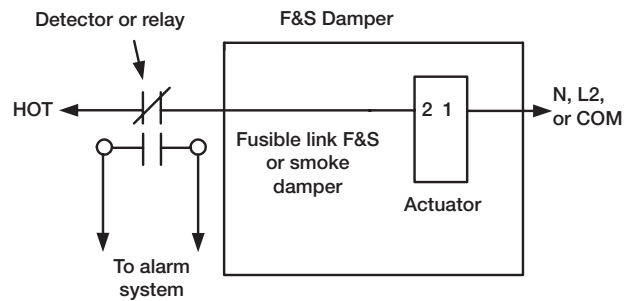
- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.
- Meets cULus requirements without the need of an electrical ground connection.



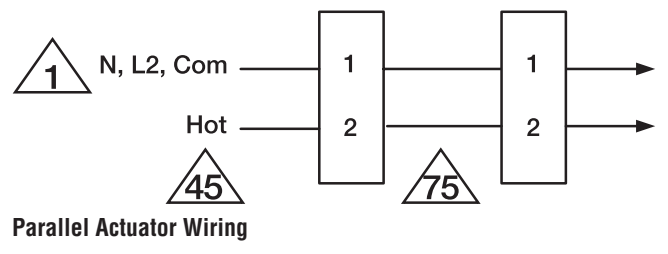
24 VAC/DC



Typical containment damper control wiring



Typical smoke or fusible link damper wiring



Parallel Actuator Wiring

FSLF120 US

On/Off, Spring Return, 350°F [177°C] for a half hour, 15 Seconds Cycle Time



Technical Data

Power Supply	120 VAC, ±10%, 50/60 Hz
Power consumption in operation	18 VA
Power consumption in rest position	4 W, 5.5 VA (50 Hz 8 VA), End stop 27 VA, 0.25 A slow blow fuse *
Shaft Diameter	3/8" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 120V
Angle of rotation	95°
Torque motor	30 in-lb [3.5 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<15 sec at rated voltage and torque 32...122°F [0...50°C]
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP30, NEMA 1
Housing material	zinc coated steel
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. NYC Department of Buildings MEA 197-07-M California State Fire Marshal Listing 3210-1593:102
Noise Level (Fail-Safe)	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	4.13 lb [1.8 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

The type FSLF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing. Square footage of damper operated will depend on make and model and the temperature required.

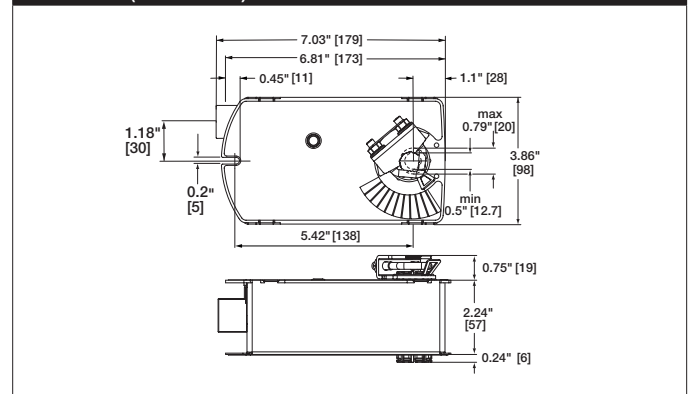
IMPORTANT 24VDC NOTE: The FSLF24 & -S models will not operate below 24VDC. A filtered and regulated power supply must be used.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require individual fusing of FSLF actuators.

The FSLF draws higher peak current when driving against its end stop or any other type of stop. Given the technology of fuses & breakers, this requires the value of fuse or breaker to be increased to avoid nuisance opening or tripping. A 1 amp slow blow should be used for 24VAC. A 0.25 amp slow blow should be used for 120VAC. A .125 amp slow blow should be used for 230V.

SAFETY NOTES

Wiring and installation must comply with all local electrical and mechanical codes.

The actuator contains no components which the user can replace or repair. Cables are not plenum rated and require flex conduit.

1/2" Threaded Connector: Screw a conduit fitting into the actuator's metal bushing. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

3/8" Flex Connector (-FC models): Mount the flexible conduit into the actuator's metal bushing by means of the provided screw with a torque of 1.2 Nm. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

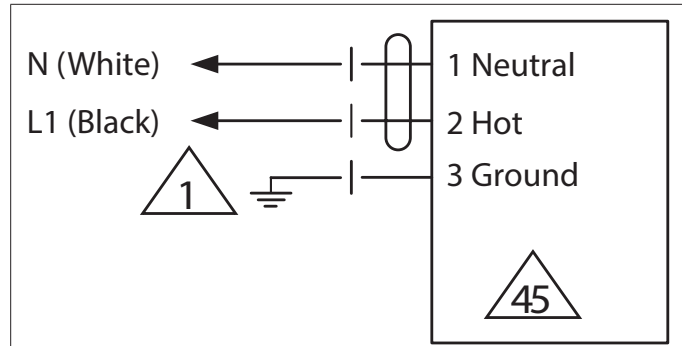
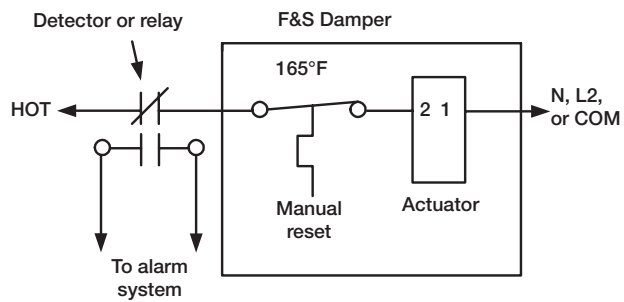
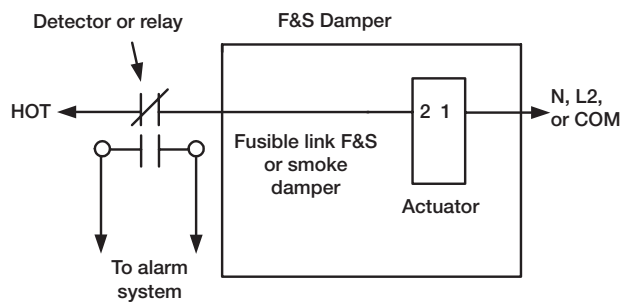
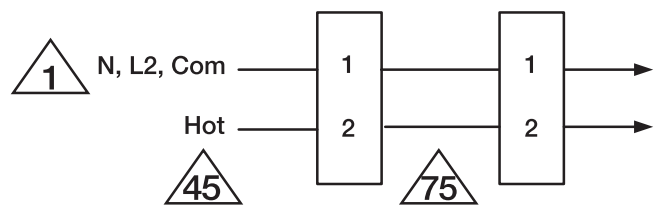
Accessories	
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
APPLICATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.


120 VAC

Typical containment damper control wiring

Typical smoke or fusible link damper wiring

Parallel Actuator Wiring

FSLF230 US

On/Off, Spring Return, 350°F [177°C] for a half hour, 15 Seconds Cycle Time



Technical Data

Power Supply	230 VAC, ±10%, 50/60 Hz
Power consumption in operation	17 VA
Power consumption in rest position	4 W, 8 VA (60 Hz 5.5 VA), End stop 27 VA, 0.125 A slow blow fuse *
Shaft Diameter	3/8" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA, 3 color coded leads
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 230V
Angle of rotation	95°
Torque motor	30 in-lb [3.5 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<15 sec at rated voltage and torque 32...122°F [0...50°C]
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP30, NEMA 1
Housing material	zinc coated steel
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. NYC Department of Buildings MEA 197-07-M California State Fire Marshal Listing 3210-1593:102
Noise Level (Fail-Safe)	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	4.12 lb [1.8 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

The type FSLF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing. Square footage of damper operated will depend on make and model and the temperature required.

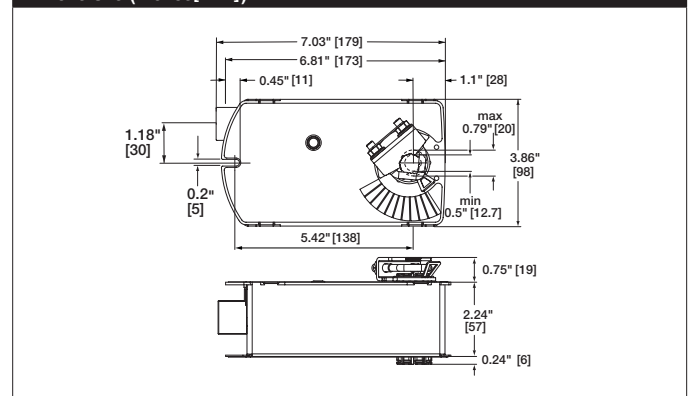
IMPORTANT 24VDC NOTE: The FSLF24 & -S models will not operate below 24VDC. A filtered and regulated power supply must be used.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require individual fusing of FSLF actuators.

The FSLF draws higher peak current when driving against its end stop or any other type of stop. Given the technology of fuses & breakers, this requires the value of fuse or breaker to be increased to avoid nuisance opening or tripping. A 1 amp slow blow should be used for 24VAC. A 0.25 amp slow blow should be used for 120VAC. A 1.25 amp slow blow should be used for 230V.

SAFETY NOTES

Wiring and installation must comply with all local electrical and mechanical codes.

The actuator contains no components which the user can replace or repair. Cables are not plenum rated and require flex conduit.

1/2" Threaded Connector: Screw a conduit fitting into the actuator's metal bushing. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

3/8" Flex Connector (-FC models): Mount the flexible conduit into the actuator's metal bushing by means of the provided screw with a torque of 1.2 Nm. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

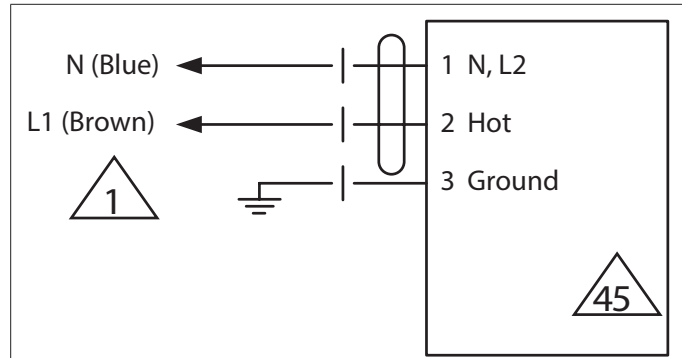
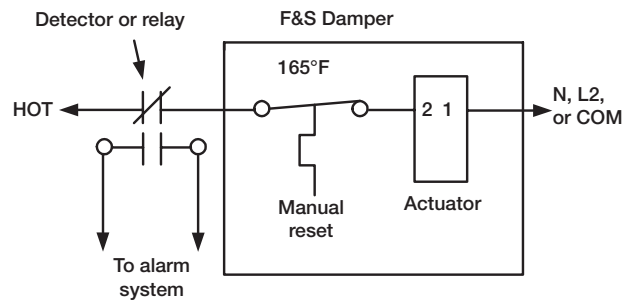
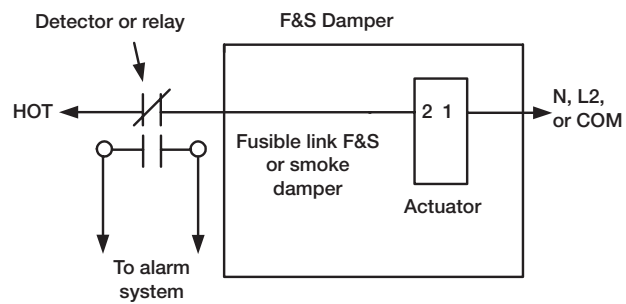
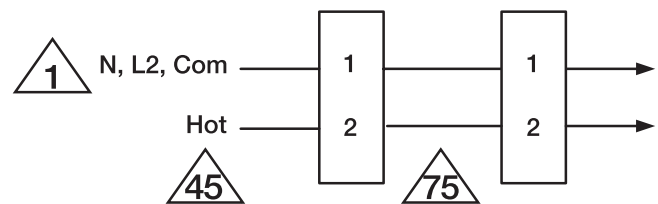
Accessories	
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
APPLICATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.


230 VAC

Typical containment damper control wiring

Typical smoke or fusible link damper wiring

Parallel Actuator Wiring

FSLF24 US

On/Off, Spring Return, 350°F [177°C] for a half hour, 15 Seconds Cycle Time



Technical Data

Power Supply	24 VAC, ±10%, 50/60 Hz, 24 VDC, -0% / +50%
Power consumption in operation	15 VA
Power consumption in rest position	2.5 W, 3.5 VA, End stop 25 VA, 1 A slow blow fuse *
Transformer sizing	24 VA (class 2 power source)
Shaft Diameter	3/8" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA, 2 color coded leads
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	30 in-lb [3.5 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<15 sec at rated voltage and torque 32...122°F [0...50°C]
Running time emergency control position	<15 sec
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP30, NEMA 1
Housing material	zinc coated steel
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. NYC Department of Buildings MEA 197-07-M California State Fire Marshal Listing 3210-1593:102
Noise Level (Fail-Safe)	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	3.46 lb [1.7 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

The type FSLF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing. Square footage of damper operated will depend on make and model and the temperature required.

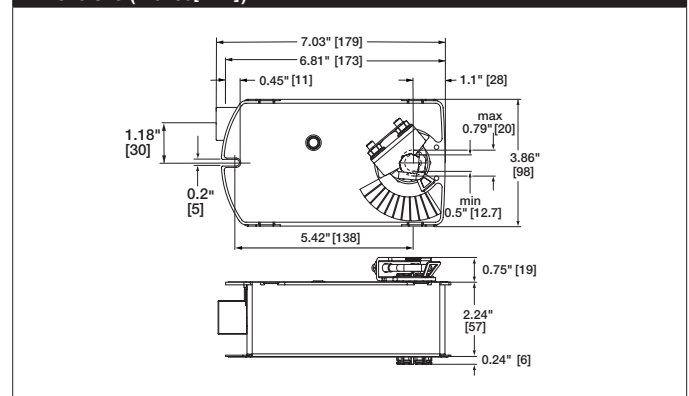
IMPORTANT 24VDC NOTE: The FSLF24 & -S models will not operate below 24VDC. A filtered and regulated power supply must be used.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require individual fusing of FSLF actuators.

The FSLF draws higher peak current when driving against its end stop or any other type of stop. Given the technology of fuses & breakers, this requires the value of fuse or breaker to be increased to avoid nuisance opening or tripping. A 1 amp slow blow should be used for 24VAC. A 0.25 amp slow blow should be used for 120VAC. A 1.25 amp slow blow should be used for 230V.

SAFETY NOTES

Wiring and installation must comply with all local electrical and mechanical codes.

The actuator contains no components which the user can replace or repair. Cables are not plenum rated and require flex conduit.

1/2" Threaded Connector: Screw a conduit fitting into the actuator's metal bushing. Jacket the actuator's input wiring with suitable flexible conduit.

Properly terminate the conduit in a suitable junction box.

3/8" Flex Connector (-FC models): Mount the flexible conduit into the actuator's metal bushing by means of the provided screw with a torque of 1.2 Nm. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

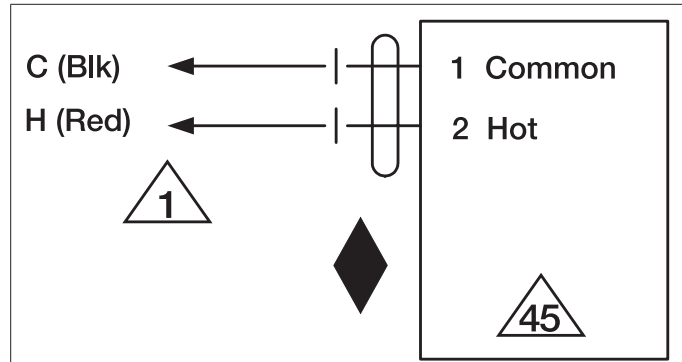
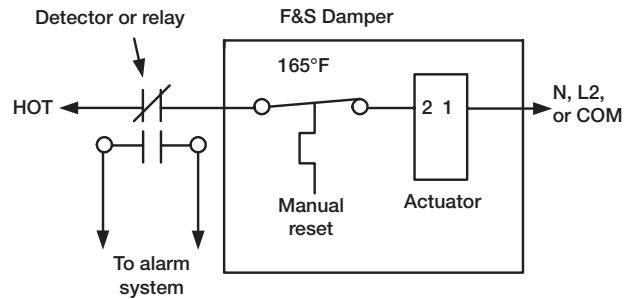
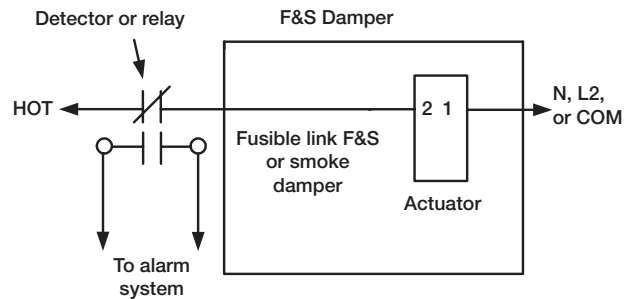
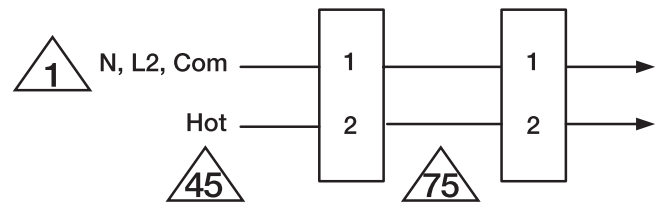
Accessories	
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.
---S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
APPLICATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.


24 VAC

Typical containment damper control wiring

Typical smoke or fusible link damper wiring

Parallel Actuator Wiring

FSNF120 US

On/Off, Spring Return, 350°F [177°C] for half hour, 120VAC, 15 Seconds Cycle Time



Technical Data	
Power Supply	120 VAC, ±10%, 50/60 Hz
Power consumption in operation	27 VA
Power consumption in rest position	6 W, 9 VA (50 Hz 15 VA), End stop 55 VA, 0.5 A slow blow fuse *
Shaft Diameter	1/2" to 1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert
Electrical Connection	18 GA, 3 ft [1 m], 3 color coded wires
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 120V
Angle of rotation	95°
Torque motor	70 in-lb [8 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with cw/ccw mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	15 sec between 32...350°F [0...177°C], <15 sec at rated voltage & torque
Running Time (Fail-Safe)	15 sec
Ambient humidity	5...95% r.H. non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL873 and CAN/CSA C22.2 No.24, UL 2043 Listed for air plenum installation per NEC 300.22 and IMC Section 602 NYC Department of Buildings MEA 197-07-M.California State Fire Marshal Listing 3210-1593:101.
Noise level, motor	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	6.58 lb [3.0 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

The type FSNF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing at 350°F. Square footage of damper operated will depend on make and model and the temperature required.

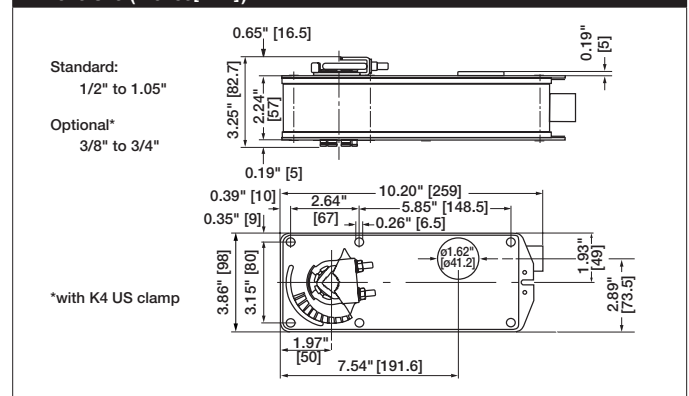
IMPORTANT 24VDC NOTE: The FSNF24 & -S models will not operate below 24VDC. A filtered and regulated power supply must be used.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft (3/8" to 1.05") is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSNF actuators draw higher peak current when driving against any type of stop. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2.5 amp slow blow should be used for 24VAC. A 0.5 amp slow blow should be used for 120 VAC. A 0.25 amp slow blow should be used for 230V and a 0.3 amp slow blow for 208 VAC. Transformers: Note that while a 24V 100VA transformer would handle 2 actuators, a 4 A breaker or plug fuse is insufficient. A 5 amp slow blow would be required. Belimo Fire & Smoke actuators have passed the AMCA 520 and UL 555S Long Term Holding test. No special cycling is required during prolonged periods when actuator is driven open and held there. Periodic testing of dampers and actuators per local codes and NFPA 80 and NFPA 105 are required.

The actuator contains no components which the user can replace or repair. A 1/2" threaded connector is standard. FSNFxx-FC models have a 3/8" Flex Connector. Other than the connector, these actuators are identical to the conduit connector version.

⚠ **WARNING:** For Belimo Products sold in California, these Products do or may contain chemicals which are known to the State of California to cause cancer and or birth defects or other reproductive harms. For more information see www.p65warnings.ca.gov.

Accessories

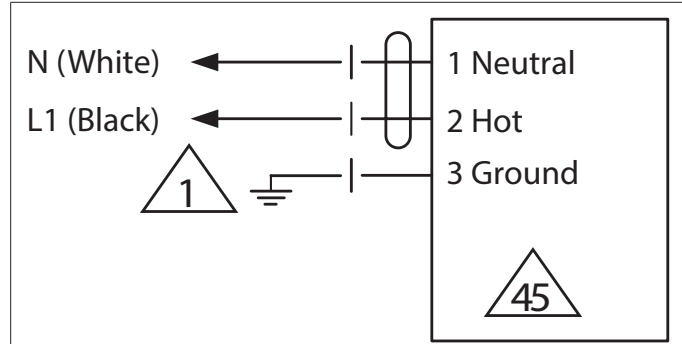
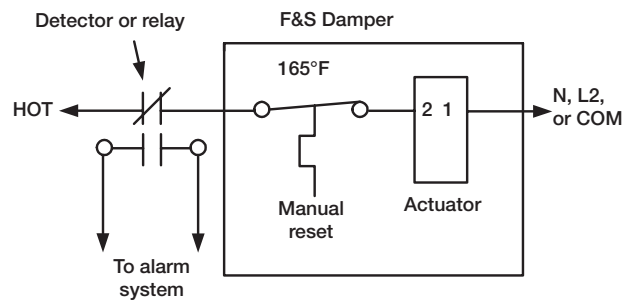
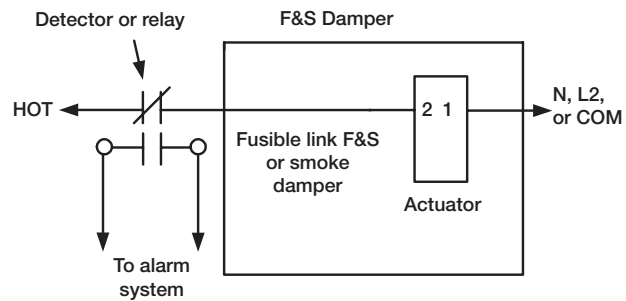
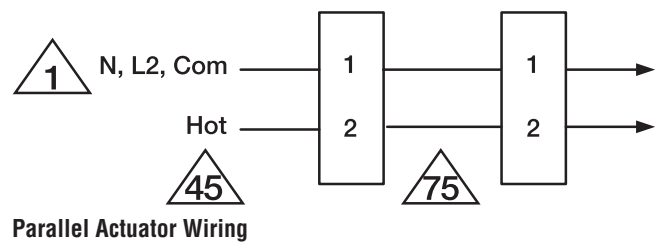
AF-P	Anti-rotation bracket AF/NF.
IND-AF2	End stop indicator
K4-1 US	Classic AF/NF jackshaft clamp (up to 1.05").
KH-AF-1 US	Classic AF/NF crankarm for Jackshaft to 1.05".
SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
ZDB-AF2 US	Angle of rotation limiter for Classic AF/NF.
ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
ZG-101	Univ. right angle bracket 13x11x7-7/16" (HxWxbase).
ZG-AF US	Classic AF/NF crankarm adaptor kit.
ZG-AF108	Classic AF/NF crankarm adaptor kit with ZG-108.
ZG-DC1	Damper clip for damper blade, 3.5" width.
ZG-DC2	Damper clip for damper blade, 6" width.
ZS-100	Weather shield - galvaneal 13x8x6" (LxWxD).
ZS-150	Weather shield - PC w/ foam seal 16x8-3/8x4" (LxWxD).
ZS-260	Explosion proof housing.
ZS-300	NEMA 4X, 304 stainless steel enclosure.
BAE165 US	165° F electric thermal sensor, SPST, normally closed.
S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
INSTALLATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.


120 VAC

Typical containment damper control wiring

Typical smoke or fusible link damper wiring

Parallel Actuator Wiring

FSNF230 US

On/Off, Spring Return, 350°F [177°C] for half hour, 230VAC, 15 Seconds Cycle Time



Technical Data	
Power Supply	230 VAC, ±10%, 50/60 Hz
Power consumption in operation	27 VA
Power consumption in rest position	5 W, 9 VA (60 Hz 6.5 VA), End stop 55 VA, 0.25 A slow blow fuse *
Shaft Diameter	1/2" to 1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert
Electrical Connection	18 GA, 3 ft [1 m], 3 color coded wires
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	grounded enclosure, 230V
Angle of rotation	95°
Torque motor	70 in-lb [8 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with cw/ccw mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	15 sec between 32...350°F [0...177°C], <15 sec at rated voltage & torque
Running Time (Fail-Safe)	15 sec
Ambient humidity	5...95% r.H. non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL873 and CAN/GSA C22.2 No.24, UL 2043 Listed for air plenum installation per NEC 300.22 and IMC Section 602 NYC Department of Buildings MEA 197-07-M.California State Fire Marshal Listing 3210-1593:101.
Noise level, motor	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	6.58 lb [3.0 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

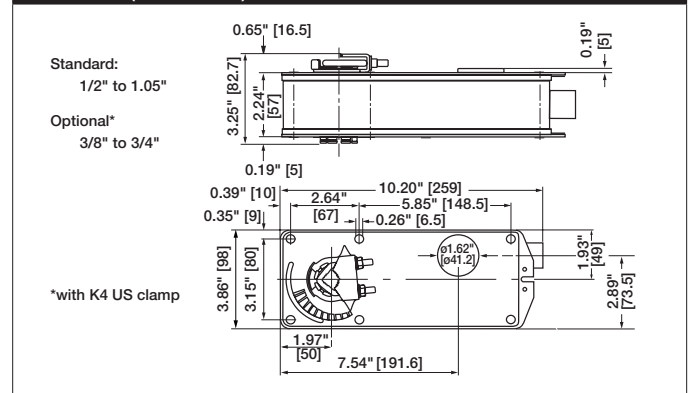
The type FSNF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing. Square footage of damper operated will depend on make and model and the temperature required.

Operation

Mounting of the actuator to the damper shaft or jackshaft (3/8" to 1.05") is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSNF actuators draw higher peak current when driving against any type of stop. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2.5 amp slow blow should be used for 24VAC. A 0.5 amp slow blow should be used for 120 VAC. A 0.25 amp slow blow should be used for 230V and a 0.3 amp slow blow for 208 VAC. Transformers: Note that while a 24V 100VA transformer would handle 2 actuators, a 4 A breaker or plug fuse is insufficient. A 5 amp slow blow would be required. Belimo Fire & Smoke actuators have passed the AMCA 520 and UL 555S Long Term Holding test. No special cycling is required during prolonged periods when actuator is driven open and held there. Periodic testing of dampers and actuators per local codes and NFPA 80 and NFPA 105 are required. The actuator contains no components which the user can replace or repair. A 1/2" threaded connector is standard. FSNFxx-FC models have a 3/8" Flex Connector. Other than the connector, these actuators are identical to the conduit connector version.

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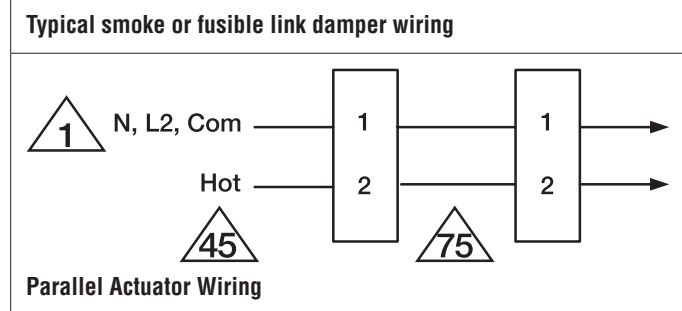
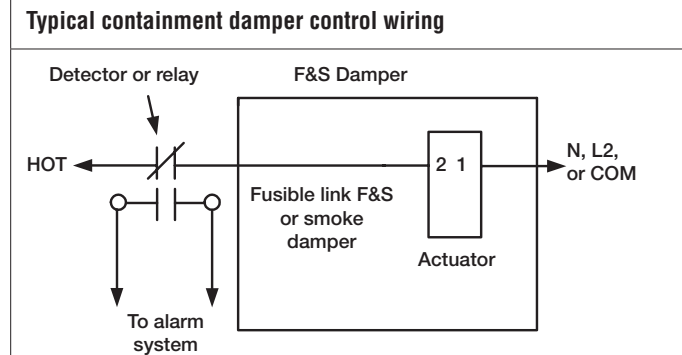
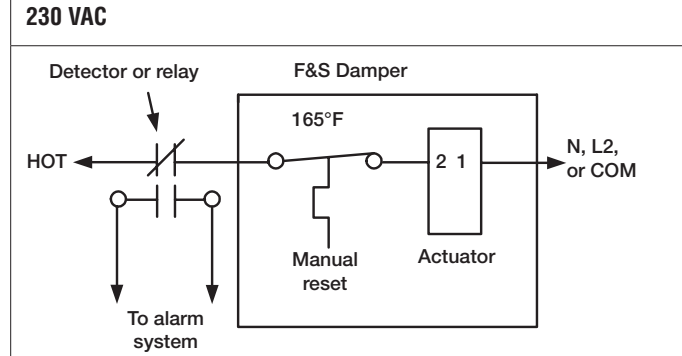
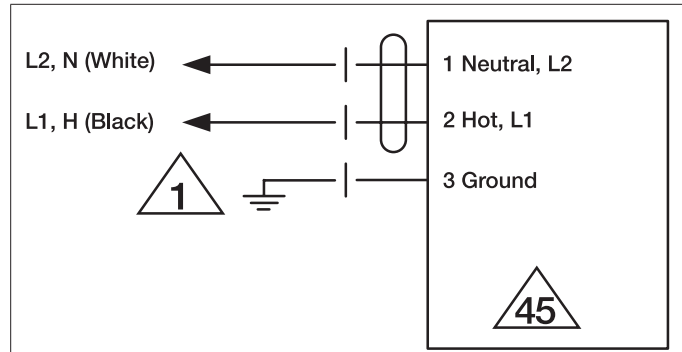
Accessories	
AF-P	Anti-rotation bracket AF/NF.
IND-AF2	End stop indicator
K4-1 US	Classic AF/NF jackshaft clamp (up to 1.05").
KH-AF-1 US	Classic AF/NF crankarm for Jackshaft to 1.05".
SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
ZDB-AF2 US	Angle of rotation limiter for Classic AF/NF.
ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
ZG-101	Univ. right angle bracket 13x11x7-7/16" (HxWxbase).
ZG-AF US	Classic AF/NF crankarm adaptor kit.
ZG-AF108	Classic AF/NF crankarm adaptor kit with ZG-108.
ZG-DC1	Damper clip for damper blade, 3.5" width.
ZG-DC2	Damper clip for damper blade, 6" width.
ZS-100	Weather shield - galvaneal 13x8x6" (LxWxD).
ZS-150	Weather shield - PC w/ foam seal 16x8-3/8x4" (LxWxD).
ZS-260	Explosion proof housing.
ZS-300	NEMA 4X, 304 stainless steel enclosure.
BAE165 US	165° F electric thermal sensor, SPST, normally closed.
S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
INSTALLATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.



FSNF24 US

On/Off, Spring Return, 350°F [177°C] for a half hour, 15 Seconds Cycle Time



Technical Data	
Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, 0% / +50%
Power consumption in operation	27 VA
Power consumption in rest position	3 W, 6.5 VA, End stop 55 VA, 2.5 A slow blow fuse *
Transformer sizing	40 VA (class 2 power source)
Shaft Diameter	1/2" to 1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert
Electrical Connection	18 GA, 3 ft [1 m], 2 color coded wires
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	70 in-lb [8 Nm] from 32...350°F [0...177°C]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with cw/ccw mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running Time (Motor)	15 sec between 32...350°F [0...177°C], <15 sec at rated voltage & torque
Running Time (Fail-Safe)	15 sec
Ambient humidity	5...95% r.H. non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP40, NEMA 1
Housing material	zinc coated steel
Gears	steel, permanently lubricated
Agency Listing	cULus listed to UL873 and CAN/CSA C22.2 No.24, UL 2043 Listed for air plenum installation per NEC 300.22 and IMC Section 602 NYC Department of Buildings MEA 197-07-M.California State Fire Marshal Listing 3210-1593:101.
Noise level, motor	45 dB (A) motor, 62 dB (A) spring, inaudible holding
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	5.71 lb [2.8 kg]

† UL File XAPX.E108966

Fire & Smoke damper actuator

Application

The type FSNF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper and will meet requirements of UBC for 15 second opening and closing at 350°F. Square footage of damper operated will depend on make and model and the temperature required.

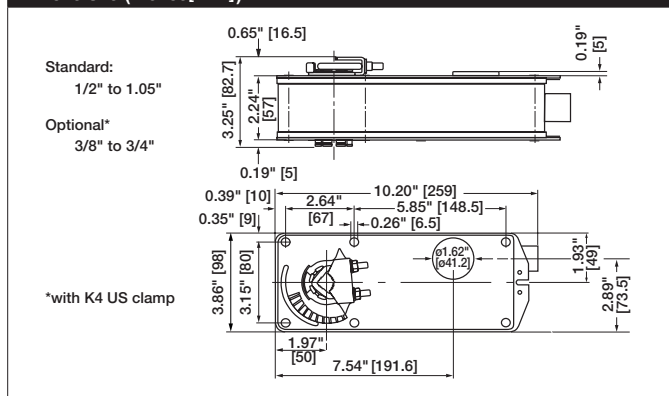
IMPORTANT 24VDC NOTE: The FSNF24 & -S models will not operate below 24VDC. A filtered and regulated power supply must be used.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft (3/8" to 1.05") is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer.

The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

* Neither UL nor Belimo require local over-current protection. The FSNF actuators draw higher peak current when driving against any type of stop. If used, this requires the value of a local fuse or breaker to be increased to avoid nuisance opening or tripping. A 2.5 amp slow blow should be used for 24VAC. A 0.5 amp slow blow should be used for 120 VAC. A 0.25 amp slow blow should be used for 230V and a 0.3 amp slow blow for 208 VAC. Transformers: Note that while a 24V 100VA transformer would handle 2 actuators, a 4 A breaker or plug fuse is insufficient. A 5 amp slow blow would be required. Belimo Fire & Smoke actuators have passed the AMCA 520 and UL 555S Long Term Holding test. No special cycling is required during prolonged periods when actuator is driven open and held there. Periodic testing of dampers and actuators per local codes and NFPA 80 and NFPA 105 are required.

The actuator contains no components which the user can replace or repair. A 1/2" threaded connector is standard. FSNFxx-FC models have a 3/8" Flex Connector. Other than the connector, these actuators are identical to the conduit connector version.

⚠ **WARNING:** For Belimo Products sold in California, these Products do or may contain chemicals which are known to the State of California to cause cancer and or birth defects or other reproductive harms. For more information see www.p65warnings.ca.gov.

Accessories

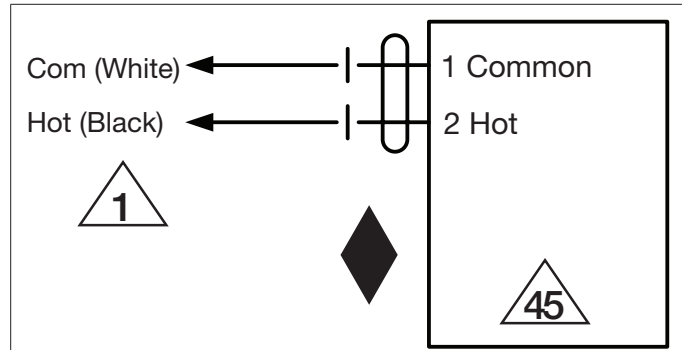
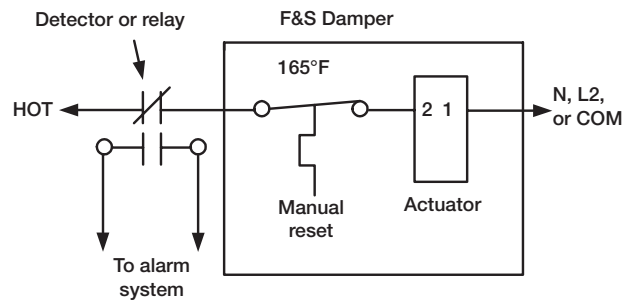
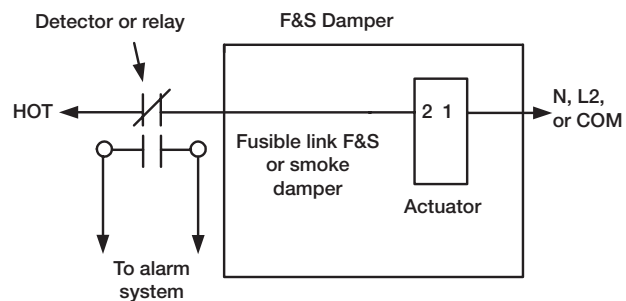
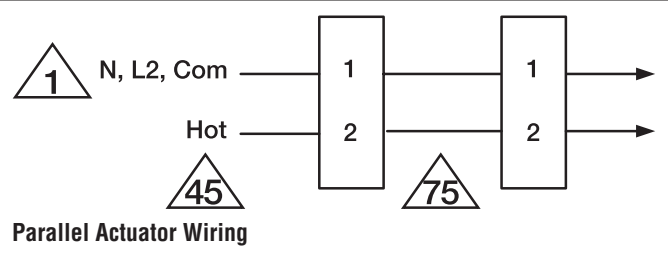
AF-P	Anti-rotation bracket AF/NF.
IND-AF2	End stop indicator
K4-1 US	Classic AF/NF jackshaft clamp (up to 1.05").
KH-AF-1 US	Classic AF/NF crankarm for Jackshaft to 1.05".
SH8	Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).
ZDB-AF2 US	Angle of rotation limiter for Classic AF/NF.
ZG-100	Univ. right angle bracket 17"x11-1/8"x6" (HxWxbase).
ZG-101	Univ. right angle bracket 13x11x7-7/16" (HxWxbase).
ZG-AF US	Classic AF/NF crankarm adaptor kit.
ZG-AF108	Classic AF/NF crankarm adaptor kit with ZG-108.
ZG-DC1	Damper clip for damper blade, 3.5" width.
ZG-DC2	Damper clip for damper blade, 6" width.
ZS-100	Weather shield - galvaneal 13x8x6" (LxWxD).
ZS-150	Weather shield - PC w/ foam seal 16x8-3/8x4" (LxWxD).
ZS-260	Explosion proof housing.
ZS-300	NEMA 4X, 304 stainless steel enclosure.
BAE165 US	165° F electric thermal sensor, SPST, normally closed.
S2A-F US	Auxiliary switch, 2x SPDT, 3A (0.5A inductive) @250 VAC max.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F (350°F). Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams
INSTALLATION NOTES

- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.
- Meets cULus requirements without the need of an electrical ground connection.


24 VAC/DC

Typical containment damper control wiring

Typical smoke or fusible link damper wiring

Parallel Actuator Wiring

FSTF120 US

On/Off, Spring Return Fail-Safe, 120 VAC



Technical Data	
Power Supply	120 VAC, ±10%, 50/60 Hz
Power consumption in operation	2 W, 3.5 VA
Power consumption in rest position	1.5 W, 2.5 VA
Shaft Diameter	1/4" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	18 in-lb [2 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<75 sec @ 250°F [121°C]
Running time emergency control position	<25 sec @ 32...122°F [0...50°C]
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP42, NEMA 2, UL Enclosure Type 2
Housing material	UL94-5VA
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. California State Fire Marshal Listing 3210-1593:104
Noise level, motor	<45 dB (A)
Noise Level (Fail-Safe)	<62 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	1.59 lb [0.60 kg]

Part no.	Clamp side spring return
FSTF120 US	CW
FSTF120.1 US	CW (bulk pack)
FSTF120.1 CCW	CCW (bulk pack)
FSTF120-S US CW	CW
FSTF120-S.1 US	CW (bulk pack)
FSTF120-S.1 CCW	CCW (bulk pack)
FSTF24-S.1 US	CW (bulk pack)

† UL File XAPX.E108966

Torque 18 in-lb, 250°F for 30 min, for fire and smoke dampers

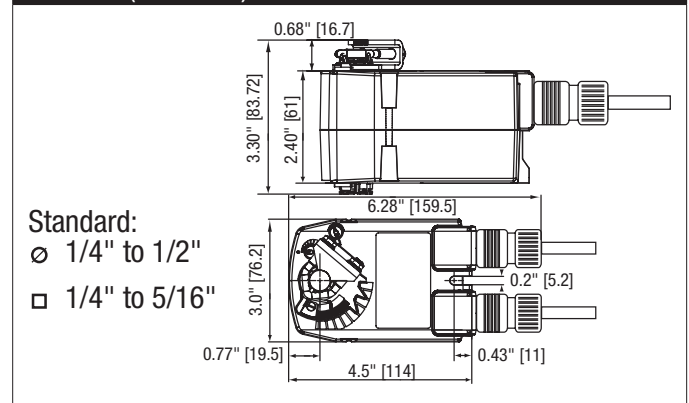
Application

The type FSTF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper. Square footage of damper operated will depend on make and model per damper manufacturer UL testing.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) typically closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

Screw a conduit fitting into the actuator's bushing. Jacket the actuator's input and output wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

Retrofit Safety Note

Use of the FSTF for replacement of other makes of actuators is limited in damper area. The FSLF is preferred for direct coupled applications. The FSTF may be applied for linkage applications on dampers 1.5 sq.ft. and smaller at velocities under 2000 fpm.

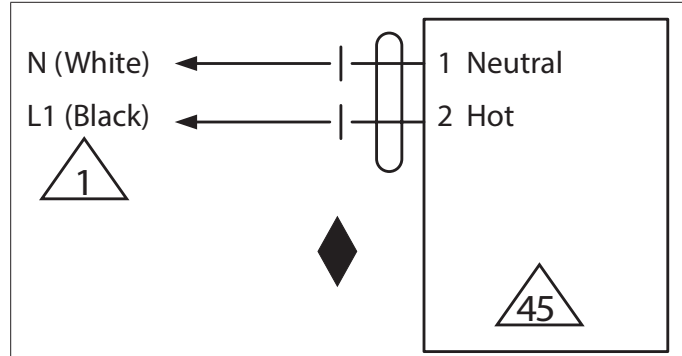
Accessories	
---KH-TF US	TFB(X) crankarm with 5/16" slot.
---KH-TF-1 US	TFB(X) crankarm with 1/4" slot.
KH-TF-1.1 US	TFB(X) crankarm for Shafts with 1/4" slot.
---TF-P	Anti-rotation bracket TF/NKQ/AM/NM/LM.
---TOOL-06	8 mm and 10 mm wrench.
---ZG-TF2	TFB(X) crankarm adaptor kit (T bracket included).
---ZG-TF112	TFB(X) crankarm adaptor kit (includes ZG-113).
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.

Typical Specification

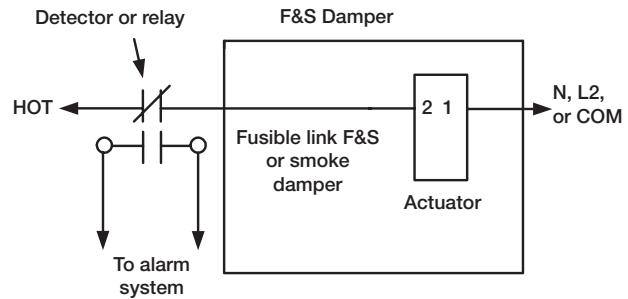
All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

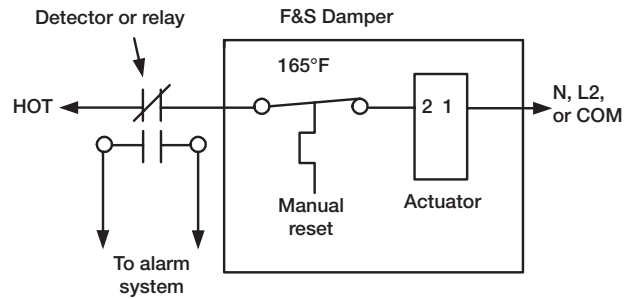
- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.
- Meets cULus requirements without the need of an electrical ground connection.



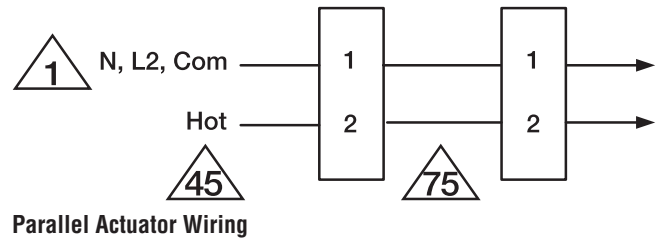
120 VAC



Typical smoke or fusible link damper wiring



Typical containment damper control wiring



FSTF230 US

On/Off, Spring Return Fail-Safe, 230 VAC



Technical Data	
Power Supply	230 VAC, ±10%, 50/60 Hz
Power consumption in operation	5 W
Power consumption in rest position	4.5 VA
Shaft Diameter	1/4" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	18 in-lb [2 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<75 sec @ 250°F [121°C]
Running time emergency control position	<25 sec @ 32...122°F [0...50°C]
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP42, NEMA 2, UL Enclosure Type 2
Housing material	UL94-5VA
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. California State Fire Marshal Listing 3210-1593:104
Noise level, motor	<45 dB (A)
Noise Level (Fail-Safe)	<62 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	1.6 lb [0.60 kg]

Part no.	Clamp side spring return
FSTF120 US	CW
FSTF120.1 US	CW (bulk pack)
FSTF120.1 CCW	CCW (bulk pack)
FSTF120-S US CW	CW
FSTF120-S.1 US	CW (bulk pack)
FSTF120-S.1 CCW	CCW (bulk pack)
FSTF24-S.1 US	CW (bulk pack)

† UL File XAPX.E108966

Torque 18 in-lb, 250°F for 30 min, for fire and smoke dampers

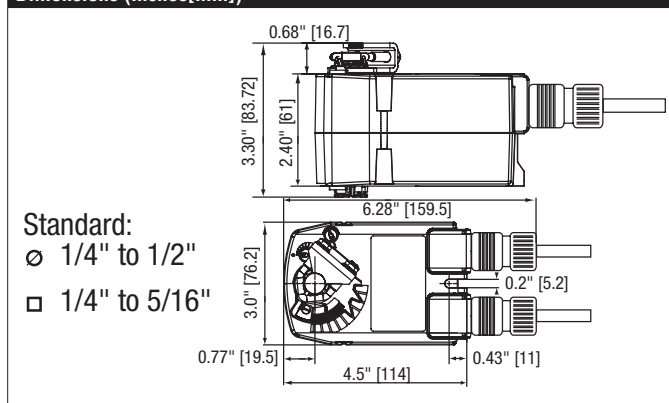
Application

The type FSTF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper. Square footage of damper operated will depend on make and model per damper manufacturer UL testing.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) typically closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

Screw a conduit fitting into the actuator's bushing. Jacket the actuator's input and output wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

Retrofit Safety Note

Use of the FSTF for replacement of other makes of actuators is limited in damper area. The FSLF is preferred for direct coupled applications. The FSTF may be applied for linkage applications on dampers 1.5 sq.ft. and smaller at velocities under 2000 fpm.

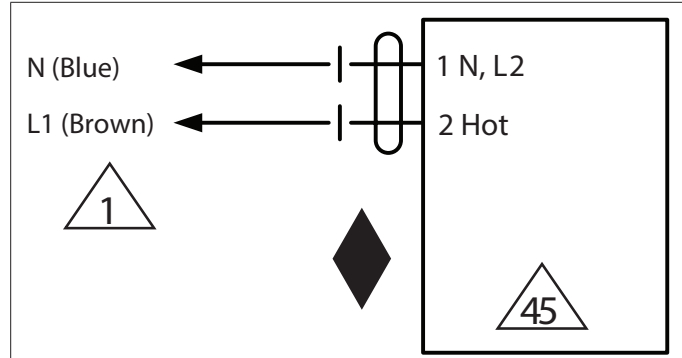
Accessories	
---KH-TF US	TFB(X) crankarm with 5/16" slot.
---KH-TF-1 US	TFB(X) crankarm with 1/4" slot.
KH-TF-1.1 US	TFB(X) crankarm for Shafts with 1/4" slot.
---TF-P	Anti-rotation bracket TF/NKQ/AM/NM/LM.
---TOOL-06	8 mm and 10 mm wrench.
---ZG-TF2	TFB(X) crankarm adaptor kit (T bracket included).
---ZG-TF112	TFB(X) crankarm adaptor kit (includes ZG-113).
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.

Typical Specification

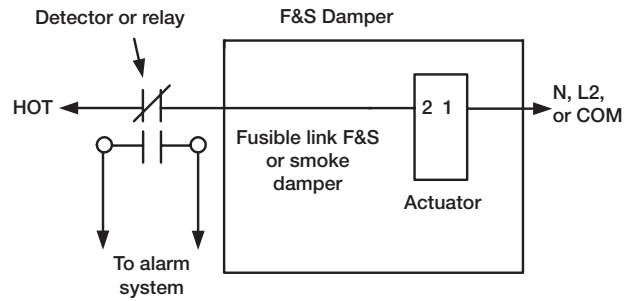
All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

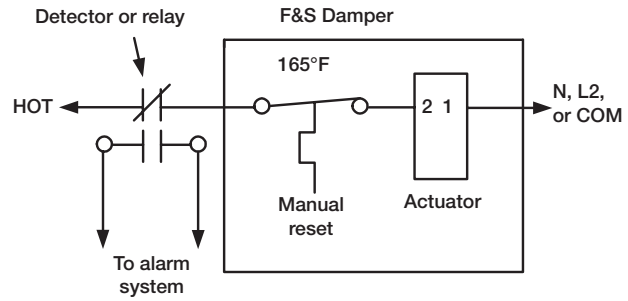
- Provide overload protection and disconnect as required.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.
- Meets cULus requirements without the need of an electrical ground connection.



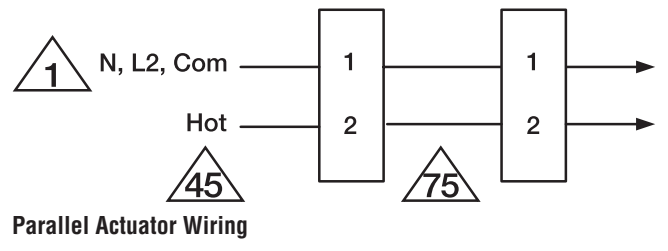
230 VAC



Typical smoke or fusible link damper wiring



Typical containment damper control wiring



FSTF24 US

On/Off, Spring Return, Fail-Safe, 24VAC/DC



Technical Data	
Power Supply	24 VAC, ±20%, 50/60 Hz, 24 VDC, -10% / +20%
Power consumption in operation	2 W, 3 VA
Power consumption in rest position	1.5 W, 2 VA
Transformer sizing	5 VA (class 2 power source)
Shaft Diameter	1/4" to 1/2" round, centers on 1/2"
Electrical Connection	3 ft [1 m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	95°
Torque motor	18 in-lb [2 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Running time motor	<75 sec @ 250°F [121°C]
Running time emergency control position	<25 sec @ 32...122°F [0...50°C]
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	32...122°F [0...50°C]
Non-operating temperature	-40...176°F [-40...80°C]
Degree of Protection	IP42, NEMA 2, UL Enclosure Type 2
Housing material	UL94-5VA
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, Listed to UL 2043 - suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC. California State Fire Marshal Listing 3210-1593:104
Noise level, motor	<45 dB (A)
Noise Level (Fail-Safe)	<62 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	1.61 lb [0.60 kg]

Part no.	Clamp side spring return
FSTF120 US	CW
FSTF120.1 US	CW (bulk pack)
FSTF120.1 CCW	CCW (bulk pack)
FSTF120-S US CW	CW
FSTF120-S.1 US	CW (bulk pack)
FSTF120-S.1 CCW	CCW (bulk pack)
FSTF24-S.1 US	CW (bulk pack)

† UL File XAPX.E108966

Torque 18 in-lb, 250°F for 30 min, for fire and smoke dampers

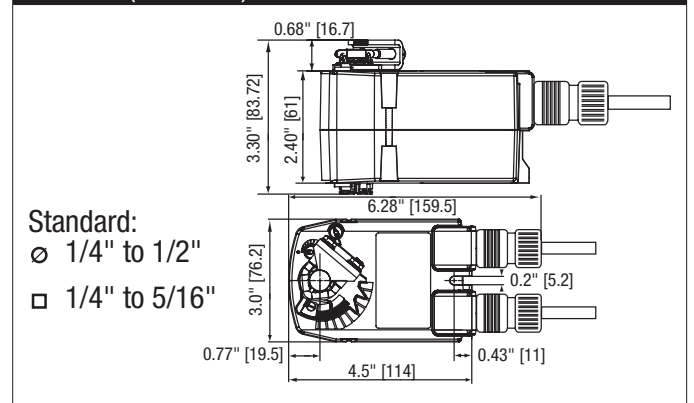
Application

The type FSTF spring-return actuator is intended for the operation of smoke and combination fire and smoke dampers in ventilation and air-conditioning systems. The actuator will meet requirements of UL555 and UL555S when tested as an assembly with the damper. Square footage of damper operated will depend on make and model per damper manufacturer UL testing.

Operation

Mounting of the actuator to the damper axle shaft or jackshaft is via a cold-weld clamp. Teeth in the clamp and V-bolt dig into the metal of both solid and hollow shafts maintaining a perfect connection. The specially designed clamp will not crush hollow shafts. The bottom end of the actuator is held by an anti-rotation strap or by a stud provided by the damper manufacturer. The actuator is mounted in its fail safe position with the damper blade(s) typically closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Dimensions (Inches[mm])



Safety Notes

Screw a conduit fitting into the actuator's bushing. Jacket the actuator's input and output wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

Retrofit Safety Note

Use of the FSTF for replacement of other makes of actuators is limited in damper area. The FSLF is preferred for direct coupled applications. The FSTF may be applied for linkage applications on dampers 1.5 sq.ft. and smaller at velocities under 2000 fpm.

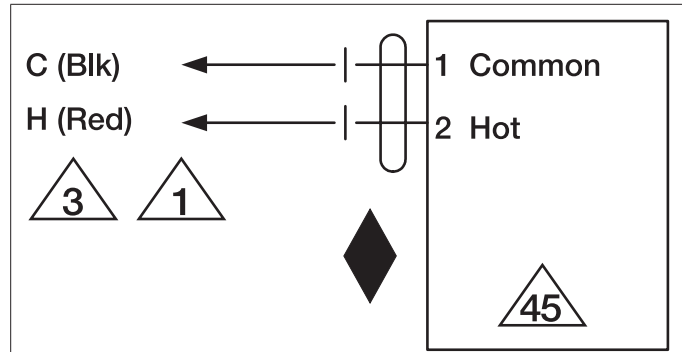
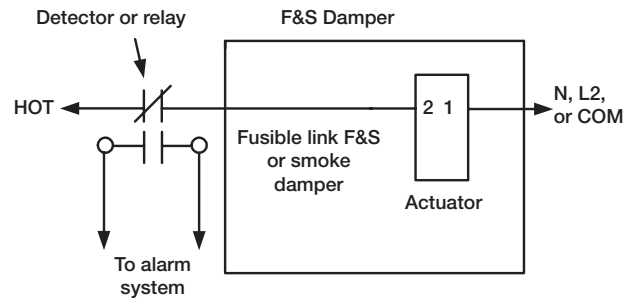
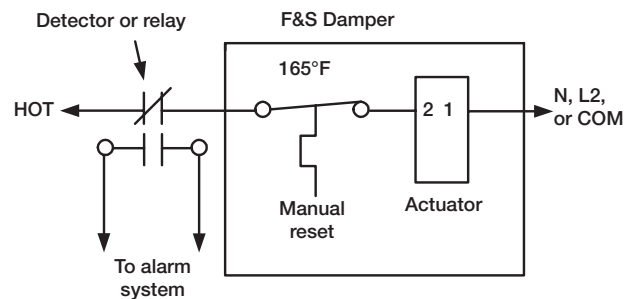
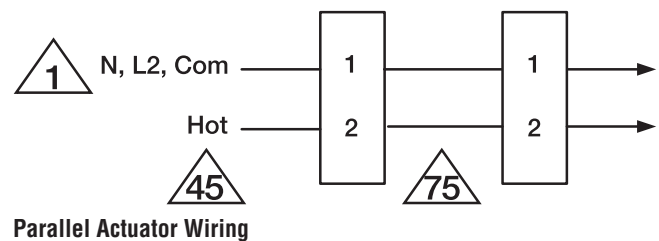
Accessories	
---KH-TF US	TFB(X) crankarm with 5/16" slot.
---KH-TF-1 US	TFB(X) crankarm with 1/4" slot.
KH-TF-1.1 US	TFB(X) crankarm for Shafts with 1/4" slot.
---TF-P	Anti-rotation bracket TF/NKQ/AM/NM/LM.
---TOOL-06	8 mm and 10 mm wrench.
---ZG-TF2	TFB(X) crankarm adaptor kit (T bracket included).
---ZG-TF112	TFB(X) crankarm adaptor kit (includes ZG-113).
---ZS-100	Weather shield - galvaneal (13" L x 8" W x 6" D).
---ZS-150	Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).
---BAE165 US	165° F electric thermal sensor, SPST, normally closed.

Typical Specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSTF, FSLF, FSNF, or FSAF actuators. All substitutions must be approved before submission of bid. Damper and actuator shall have UL 555S Listing for 250°F &/or 350°F. Actuator shall have been tested to UL 2043 per requirements of IMC 602.2 and NEC 300.22 (c). Where position indication is required -S models with auxiliary switches or damper blade switches will be provided per code requirements.

Wiring Diagrams

- Provide overload protection and disconnect as required.
- Actuators may also be powered by 24 VDC.
- Actuators may be powered in parallel. Power consumption must be observed.
- Ground present on some models.
- Meets cULus requirements without the need of an electrical ground connection.


24 VAC/DC

Typical smoke or fusible link damper wiring

Typical containment damper control wiring

Parallel Actuator Wiring



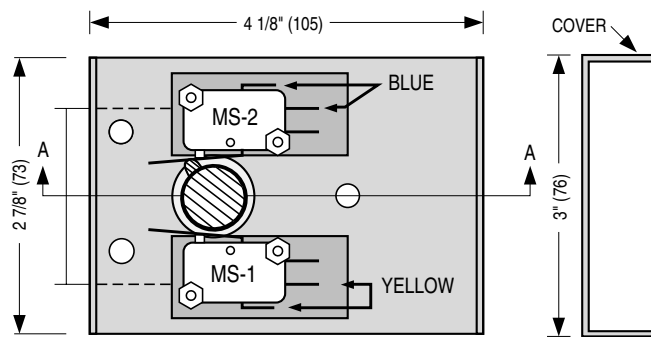
POSITION INDICATOR PACKAGE

FOR COMBINATION FIRE / SMOKE, SMOKE AND CONTROL DAMPERS

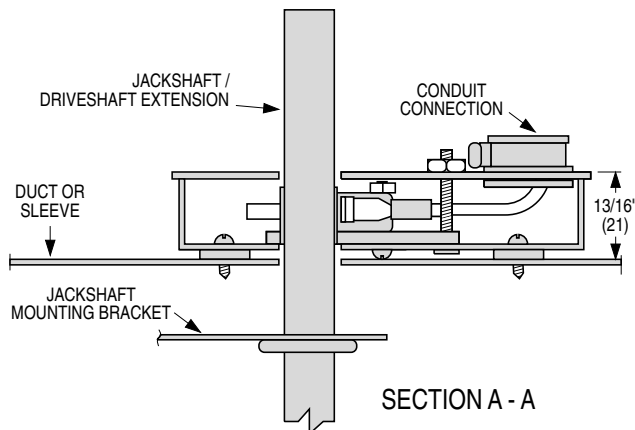
MODEL: MLS-300. For use with GGD221/121 (electric) and 331-2961 / 3060 (pneumatic) actuators

APPLICATION:

- The MLS-300 Position Indicator Package operates as a function of the damper blade position and provides the ability to remotely indicate damper blade position.
- The MLS-300 incorporates two SPDT switches and provides a positive open or closed signal when used in conjunction with remote indicator lights. MLS-300's are used in active smoke control management systems to positively indicate the status of all combination fire/smoke and smoke dampers in the building.
- The MLS-300 is available only as a factory installed option on combination fire/smoke and smoke dampers.
- The MLS-300 may also be used to provide a stop/start circuit for remote fans or to signal alarms.



EXTERNAL RIGHT HAND MOUNTING: FRONT VIEW (LESS COVER)



Position Indicator Microswitch Data:

Switch Type: Single Pole double throw (2)
 15 Amps, 1/3 HP, 125, 250 Vac or 24 Vdc.
 1/2 Amp, 125 Vdc. 1/4 Amp, 250 Vdc.

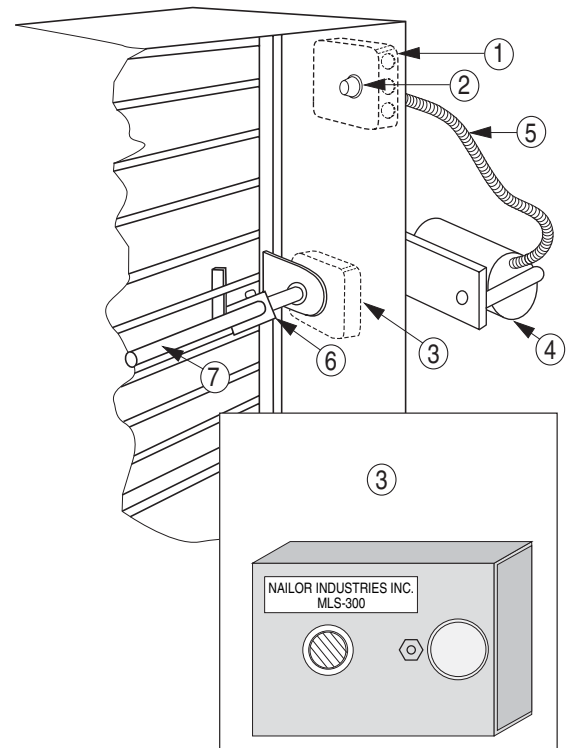
Standard Mounting:

MS1 is damper open signal.

MS2 is damper closed signal.

Non-Standard Mounting:

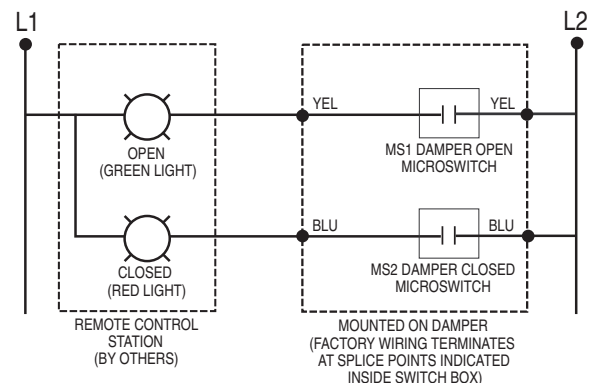
Important: Installer must double check continuity of MS1 and MS2 before wiring to determine which switch signals the damper's open or closed position.



Typical Combination Fire / Smoke Damper Installation With UL Listed Actuator

Description:

1. Electrical Junction Box (and EP switch with pneumatic actuator[s])
2. ERL 165, 212, 250, 350°F Electric Resettable Link (Heat Sensor)
3. Position indicator package
4. Actuator (pneumatic illustrated).
5. Silicone Tubing or Flexible Conduit
6. Over-Center Knee Lock
7. Jackshaft



Dimensions are in inches (mm).

SCHEDULE TYPE:				
PROJECT:				
ENGINEER:		DATE	B SERIES	SUPERSEDES
CONTRACTOR:		7 - 20 - 07	FD - ACC	12 - 4 - 02
				DRAWING NO.
				MLS-300-2



POSITION INDICATOR PACKAGE

FOR COMBINATION FIRE/SMOKE AND SMOKE DAMPERS
FOR USE WITH BELIMO AND HONEYWELL ACTUATORS

MODEL: MLS-300

APPLICATION:

When ordered with the MLS-300 Position Indicator Switch Pack, Nailor combination fire/smoke and smoke dampers that utilize factory installed Belimo or Honeywell fire/smoke actuators will be supplied as standard with an actuator that has an integral internal mounted switch pack. The auxiliary switches provide an on/off signal at two points in the actuator stroke and this signal can be routed to a Fire Fighter’s Smoke Control Station for remote open/closed damper position status in Smoke Control Management Applications. Alternatively, they may be field wired to a local accessible damper control panel (Nailor DCP16). Both provide a means to cycle test the damper as part of a scheduled building maintenance program.

ELECTRICAL SWITCH RATINGS:

Honeywell:

Models MS4104F1210, MS4109F1210, MS4604F1210, MS4609F1210:

Ratings (maximum load): 120 VAC/24 VDC, 3A resistive
Settings (fixed): 7° nominal stroke, 85° nominal stroke

Model MS8104F1210, MS8109F1210:

Ratings (maximum load): 24 VAC/DC, 3A resistive
Settings (fixed): 7° nominal stroke, 85° nominal stroke

Model MS4120F1204, MS4620F1203, MS8120F1200:

Ratings (maximum load): 250 VAC, 5A resistive
Settings (fixed): 7° nominal stroke, 85° nominal stroke

Belimo:

Model FSTF120-S, FSTF24-S, FSTF230-S:

2 x SPST 3A resistive, 0.5A inductive @ 120 VAC,
Settings (fixed): One switch at 10°, one switch at 80°

Models FSLF24-S, FSLF120-S, FSLF230-S:

2 x SPST 3A resistive, 0.5A inductive @ 120/250 VAC,
1mA @ 5 VDC,
Settings (fixed): One switch at 10°, one switch at 85°

Models FSNF24-S, FSNF120-S, FSNF230-S:

2 x SPDT 7A resistive, 2.5A inductive @ 120/250 VAC,
Settings (fixed): One switch at 10°, one at 85°

Model FSAFA24-S, FSAFA120-S, FSAF230A-S:

2 x SPST 6A resistive, 2.5A inductive @ 120/250 VAC,
Settings (fixed): One switch fixed at 10°, one at 85°

Model FSAFB24-SR-S:

2 x SPST 3A resistive, 0.5A inductive @ 120/250 VAC,
Settings: One switch set at + 10°, one adjustable from 10° to 90°



Fig. 1 - Typical Honeywell Fire/Smoke Actuator with auxiliary switches (MLS-300)



Fig. 2 - Typical Belimo Fire/Smoke Actuator with auxiliary switches (MLS-300)

Refer to manufacturer’s submittal and installation and operating manual for complete details and wiring diagrams.

SCHEDULE TYPE:				
PROJECT:				
ENGINEER:	DATE	B SERIES	SUPERSEDES	DRAWING NO.
CONTRACTOR:	12 - 29 - 17	FD - ACC	4 - 28 - 14	MLS-300-3

Application and Operation

The Nailor PRL Pneumatic Replaceable Link is a UL Classified heat responsive device used in conjunction with Nailor combination fire/smoke dampers.

The PRL is supplied as standard on all combination fire/smoke dampers ordered with a pneumatic actuator. An alternative to the PRL would be the Nailor ERL (Electric Resettable Link) with an EP (Electric/Pneumatic) Switch.

The PRL is a factory mounted pneumatic release valve/replaceable fusible link assembly. The PRL's function is to sense an abnormally high temperature, as caused by a fire, and allow the damper to close in order to prevent the spread of fire and smoke.

Fire Control Mode: The PRL activates when fire temperatures in excess of 165, 212 or 280°F (74, 100 or 138°C) are detected. When the fusible link melts, air from the pneumatic actuator(s) is exhausted and the actuator spring return mechanism causes the damper to close and lock.

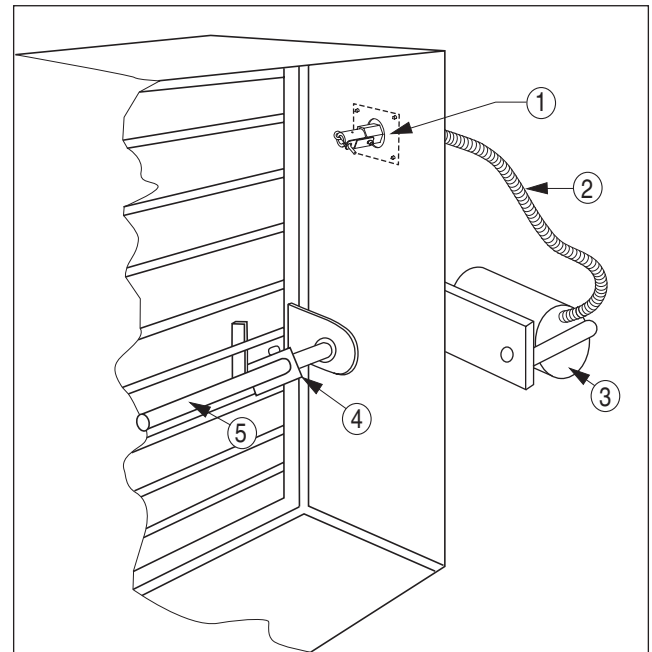
Smoke Control Mode: When a signal is detected via a normally closed smoke detector connection, during system testing or if power failure occurs, the damper will close and remain closed. When the smoke signal ceases (smoke detector reset), the test is completed or power is restored, the damper will automatically reset to the open position.

An EP (Electric/Pneumatic) Switch, by others, must be present in the system.

All pneumatic actuators are factory mounted with a fail close (Normally Closed) damper connection.

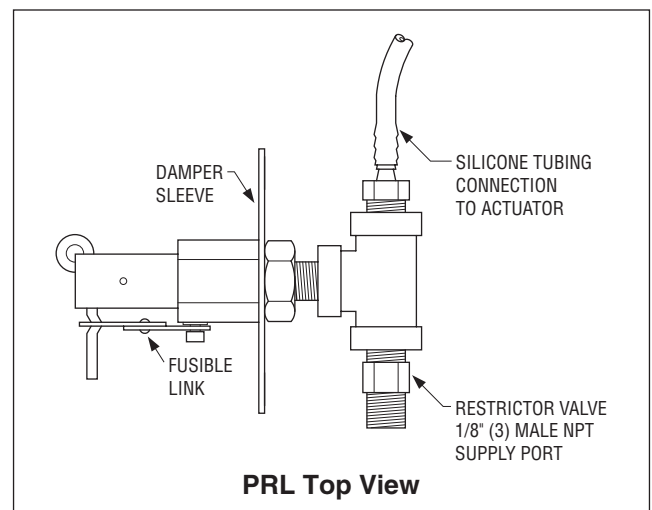
Notes:

1. The PRL must be installed at the factory and cannot be added in the field, in accordance with UL requirements.
2. A single PRL may be used to control up to a maximum of four pneumatic actuators.
3. Pneumatic actuators are to be field piped per local codes.



Typical Combination Fire/Smoke Damper Detail with UL Listed Pneumatic Actuator Description:

1. PRL 165, 212 or 280°F Pneumatic Replaceable Link
2. Silicone Tubing
3. Pneumatic Actuator
4. Over-center Knee Lock
5. Jackshaft



SCHEDULE TYPE				
PROJECT				
ENGINEER				
CONTRACTOR				
Dimensions are in inches (mm).				
DATE	B SERIES	SUPERSEDES	DRAWING NO.	
9 - 9 - 08	FD-ACC	4 - 15 - 03	PRL	

OpenAir™ GJD Series Electronic Damper Actuators for UL Listed Fire/Smoke and Smoke Control Dampers 2-Position, 30-second Run Time, 15-second Spring Return Time

Product Number	Operating Voltage			3-ft Plenum Cable	EFL Capability	Two Fixed Auxiliary Switches
	24 Vac ± 20%, 24 Vdc + 20%, - 10%	120 Vac ± 10%	230 Vac ± 10%			
GJD121.1U	•			•	•	
GJD126.1U	•			•	•	•
GJD221.1U		•		•	•	
GJD226.1U		•		•	•	•
GJD321.1U			•	•	•	
GJD326.1U			•	•	•	•

Technical Data

Torque:	20 lb-in (2 Nm) (minimum)
Stall Torque:	35 lb-in (4 Nm) (minimum)
Run time for 90°:	30 seconds (nominal)
Spring Return:	15 seconds (maximum)
Nominal angle of rotation:	95°
Operating voltage:	24 Vac ±20%/ 24Vdc+20%-10% 120 Vac ±10%/ 230 Vac ±10%
Power Consumption:	Running Holding
GJD12x.1U, GJD22x.1U:	~10VA/5.0 W ~5VA/3.0 W
GJD32x.1U:	~12VA/5.0 W ~7VA/3.0 W
Damper shaft size:	1/2-inch (13 mm) round
Damper shaft length, minimum:	1.4-inch (36 mm) min. length
Agency listings:	UL60730 cUL CSA 60730 CE conformity for Residential, Commercial, and Industrial environments. Australian RCM conformity
Ambient temperature, operating:	0°F to 130°F (-18°C to 55°C), 250°F (121°C) one time per UL555S
Ambient temperature, storage/transport:	-40°F to 158°F (-40°C to 70°C)
Ambient humidity (non-condensing):	Maximum 95% rh non-condensing
Plenum-rated cable:	400°F (200°C)
Enclosure:	NEMA 1/IP40
Housing material:	Plenum-rated plastic
Pre-cabled connection:	18 AWG, 3 ft 3 x 3/8-in flexible conduit connector
Dimensions (Approximate):	5.61" H x 2.83" W x 2.48" D (142.6 mm H x 72 mm W x 63 mm D)
Weight:	1.32 lbs. (0.60 kg)
Country of Origin	USA

Description

The OpenAir direct-coupled, 2-position, spring return electronic damper actuators are UL listed for smoke control dampers or for combination fire/smoke rated dampers. Actuators are designed to operate reliably in smoke control systems requiring Underwriter's Laboratories, Inc. UL555/555S rating when tested as an assembly with the damper and will meet requirements of UBC for 30-second opening and 15-second closing at 250°F (121°C).



Features

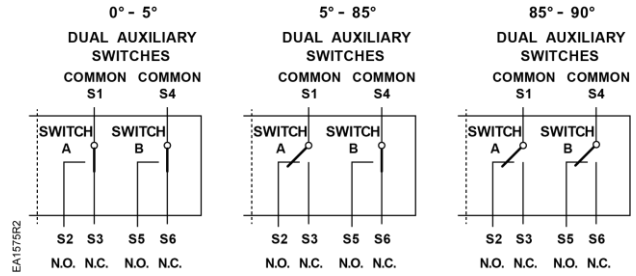
- Optional built-in auxiliary switches with fixed switch points at 5° and 85° rotation.
- Built-in Electronic Fusible Link (EFL) capability with three temperature ratings; 165°F, 212°F, and 250°F
- Reversible, fail-safe spring return
- Plenum-rated
- Pre-cabled
- 30-second operation at rated torque, temperature, and voltage
- Fixed Dual End Switches
 - 24 Vdc, 24 Vac to 250 Vac
 - 6A resistive
 - 2FLA/12 LRA
 - SPST
 - Fixed 5° and 85°

Accessories

Electronic Fuse Link (24 Vac)	
ASK791.165	165°F (74°C)
ASK791.212	212°F (100°F)
ASK791.250	250°F (121°C)

Maintenance

The National Fire Protection Association NFPA 92A Standard for Recommended Practice for Smoke-Control System and UL 864 Standard for Control Units and Accessories for Fire Alarm Systems, require weekly self-test for **dedicated** smoke control equipment used in a smoke control system. The National Fire Protection Association NFPA 72 Standard for National Fire Alarm Codes states that all life safety systems are to be functionally checked at least annually. The GJD actuator is designed such that no special cycling during long-term holding is required. The GJD actuator complies with the AMCA Standard 520 testing revision.



Electronic Fusible Link

Wiring Diagrams

NOTE: Actuators may be connected in parallel. Power consumption must be observed.

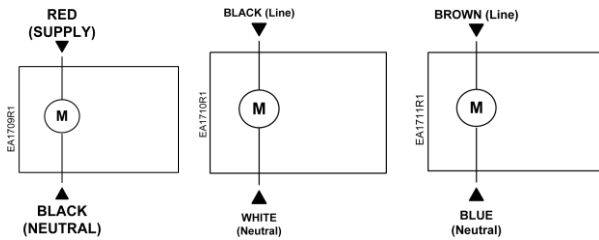


Figure 1.
 24 Vac/dc.

Figure 2
 120 Vac.

Figure 3.
 230 Vac.

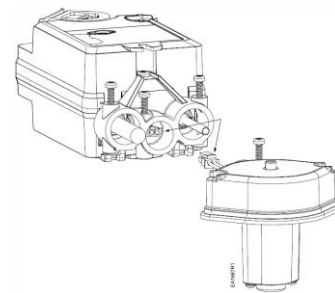


Figure 4. GJD Actuator and EFL.

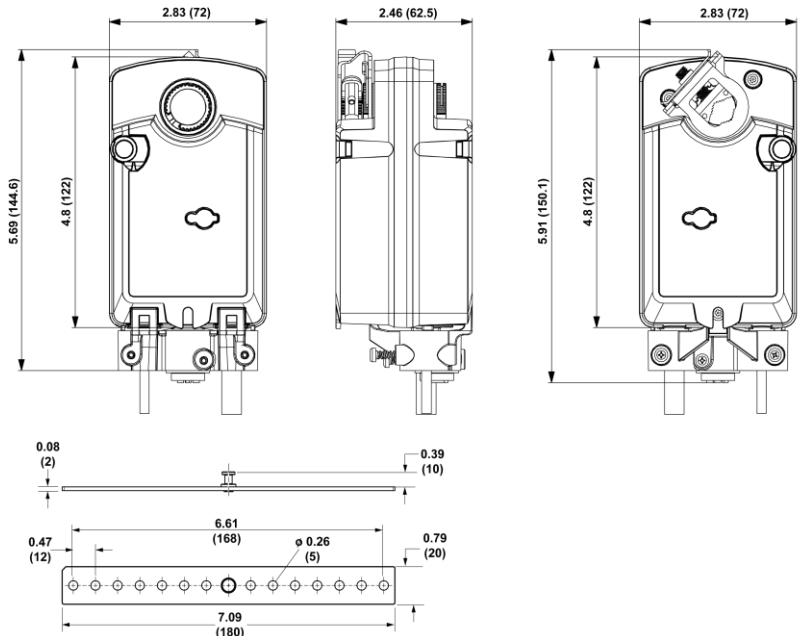


Figure 5. GJD Series Damper Actuator and Mounting Bracket Dimensions in Inches (Millimeters).

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. OpenAir is a trademark of Siemens Schweiz AG. Teflon is a trademark of Dupont. Other product or company names mentioned herein may be the trademarks of their respective owners. © 2019 Siemens Industry, Inc.



2151 Duct Smoke Detector for Special Applications

The System Sensor 2151 low-profile photoelectric smoke detector with a B114LP or B114LPBT base is listed to Underwriters Laboratories 268A specifically for use in no-flow/low-flow air-handling systems.



Features for 2151/B114LP/B114LPBT

- Low-profile smoke detector design
- Low standby current
- Two LEDs blink in standby
- Detector head plugs easily into base
- Field sensitivity metering of detector to meet the requirements of NFPA 72 with the use of SENS-RDR
- Designed for mounting on a standard electrical box
- Removable cover and insect screen for field cleaning
- Accepts 24 or 120V supply voltage

The 2151 can be used as a pendant mount detector in no-flow/low-flow air-handling systems (0-3,000 FPM). The pendant/plenum mounted **2151** is to be installed into a **B114LP or B114LPBT** base. This is the perfect combination for installation in ducts where the air velocity is below 500fpm or for duct sizes as small as 8" in diameter.

Pendant mounted in a standard electrical box within the duct, the twist-in/twist-out head allows easy removal from the base for quick cleaning and maintenance. The 2151 heads can be combined with the System Sensor B114LP 120VAC base or the B114LPBT 24VAC/DC base.

Agency Listings



2151 Photoelectric Detector Specifications

Architectural/Engineering Specifications

The air duct smoke detector shall be a System Sensor model 2151 Series Smoke detector listed to UL 268A specifically for use in air handling systems when used in conjunction with the B114LP or B114LPBT base. The detector shall operate at air velocities up to 3,000 feet per minute. It shall be capable of local testing using a magnet test on the 2151 sensor head.

Physical Specifications

Size	1.66" (4.22cm) H
Weight	3.6 oz (104 g)
Operating Temperature Range	32°F to 120°F (0°C to 49°C)
Operating Humidity Range	10 to 93% relative humidity non-condensing

B114LP/B114LPBT Plug-In Detector Base

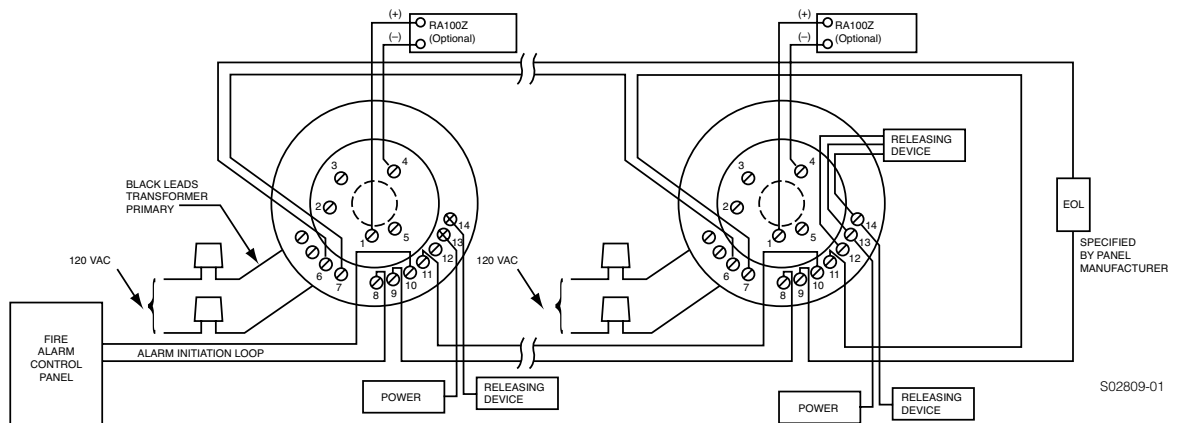
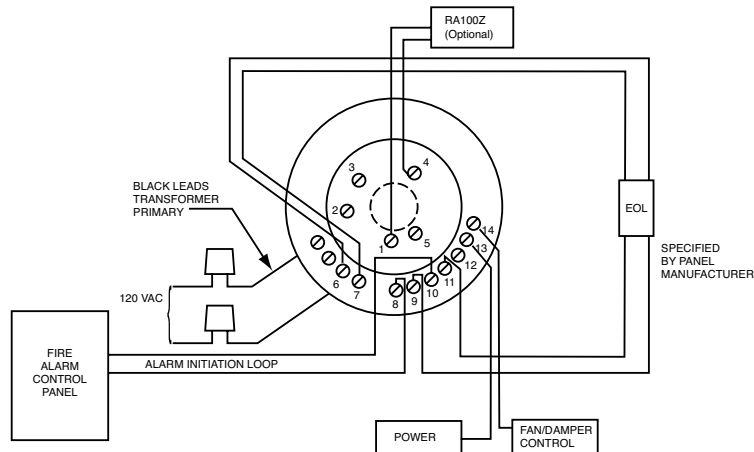
Physical Specifications

Diameter	6.1 inches (155mm)
Mounting	4-inch (102 mm) square box with or without plaster ring; Minimum Depth - 1.5 inches (38 mm) 4-inch Octagon Box; Minimum Depth - 1.5 inches (38 mm)
Operating Temperature Range	Refer to applicable sensor Operating Temperature Range using the Base/Sensor Cross Reference Chart at systemsensor.com

B114LP Typical Wiring Diagrams

B114LP Base Terminals

- | No. | Function |
|-----|--------------------------|
| 1 | Remote Annunciator (+) |
| 2 | Not Used |
| 3 | Not Used |
| 4 | Remote Annunciator (-) |
| 5 | Not used |
| 6 | N.O. } Supervisory Relay |
| 7 | N.O. } Form A Contacts |
| 8 | N.O. } Alarm Relay |
| 9 | N.O. } Form A |
| 10 | C. } Initiation |
| 11 | C. } Contacts |
| 12 | N.O. } Alarm Relay |
| 13 | N.C. } Form C |
| 14 | C. } Auxiliary Contacts |

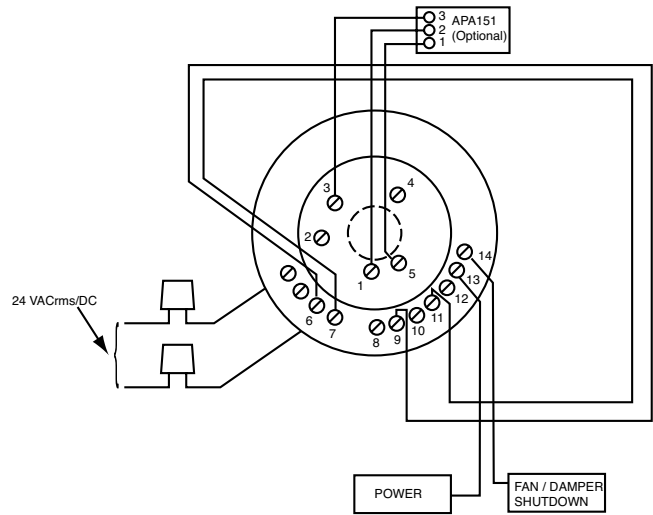


B114LPBT Typical Wiring Diagrams

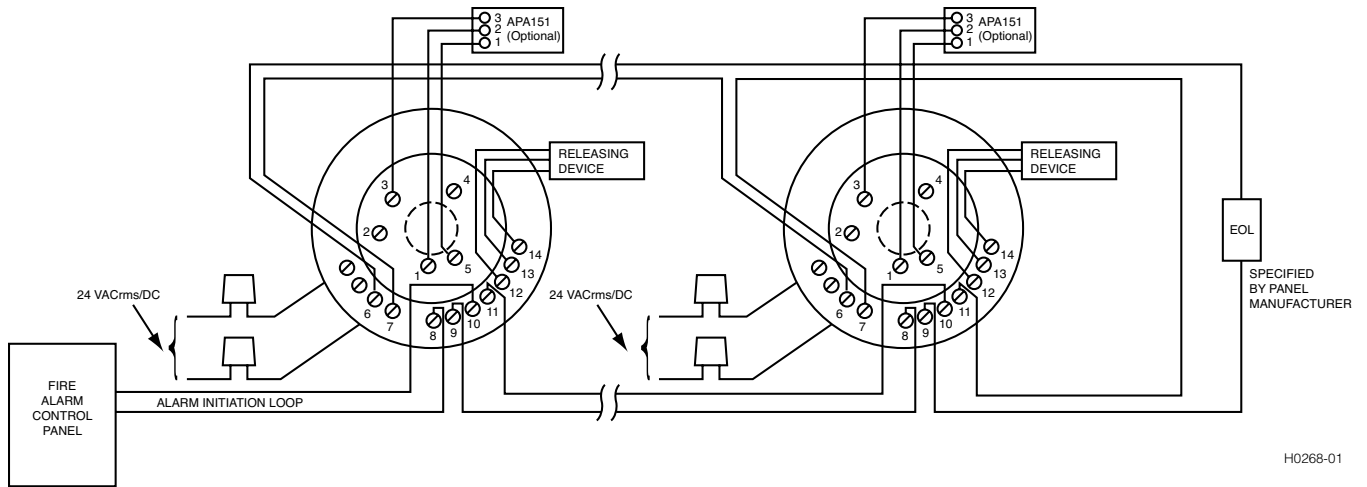
B114LPBT Base Terminals

No. Function

- 1 Remote Annunciator (+)
- 2 Test Coil (+)
- 3 Not Used
- 4 Remote Annunciator (-)
- 5 RTC (-)
- 6 C. } Supervisory Relay
- 7 N.O. } Form A Contacts
- 8 N.O. } Alarm Relay
- 9 N.O. } Form A
- 10 C. } Initiation
- 11 C. } Contacts
- 12 N.O. } Alarm Relay
- 13 N.C. } Form C
- 14 C. } Auxiliary Contacts



H0269-01



H0268-01

Ordering Information

Part No.	Description
2151	Low-profile photoelectric plug-in detector (order the base listed below)
B114LP	120 VAC detector base
B114LPBT	24VAC/DC detector base



3825 Ohio Avenue • St. Charles, IL 60174
Phone: 800-SENSOR2 • Fax: 630-377-6495
www.systemsensor.com

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for current product information, including the latest version of this data sheet.
HVDS00700 • 1/12

OpenAir™ GJD Series Electronic Damper Actuator Designed for UL Listed Fire/Smoke and Smoke Control Dampers

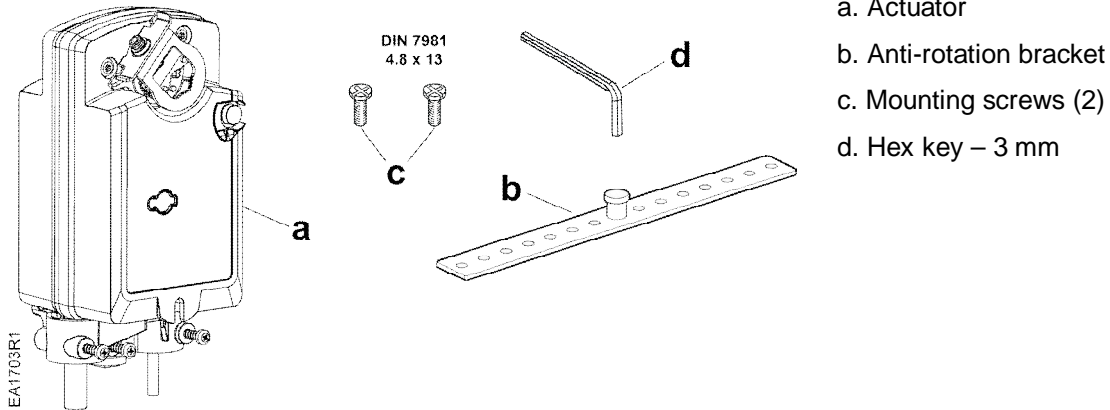


Figure 1. GJD Actuator Parts.

Product Description

Step-by-step description for direct-coupled mounting of the OpenAir GJD fast-acting two-position rotary electronic damper actuator. Actuator is intended for control of approved fire and smoke leakage-rated HVAC dampers.

Product Numbers

GJD121.1U
 GJD126.1U
 GJD221.1U
 GJD226.1U
 GJD321.1U
 GJD326.1U

Required Tools

- 3 mm hex wrench (provided)
- No. 2 Phillips screwdriver
- Marker or pencil
- Small, needle-nose pliers (for EFL installation)

Prerequisites



WARNING:
 Do not open the actuator housing.

CAUTION:
 Continuous use at voltages above the recommended tolerances may damage the actuator.

Warning/Caution Notations

WARNING:		Personal injury or loss of life may occur if you do not follow a procedure as specified.
CAUTION:		Equipment damage or loss of data may occur if you do not follow a procedure as specified.

Installation

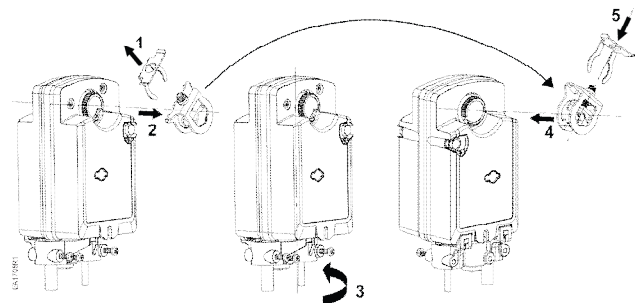


Figure 2. Actuator Mounting Orientation.

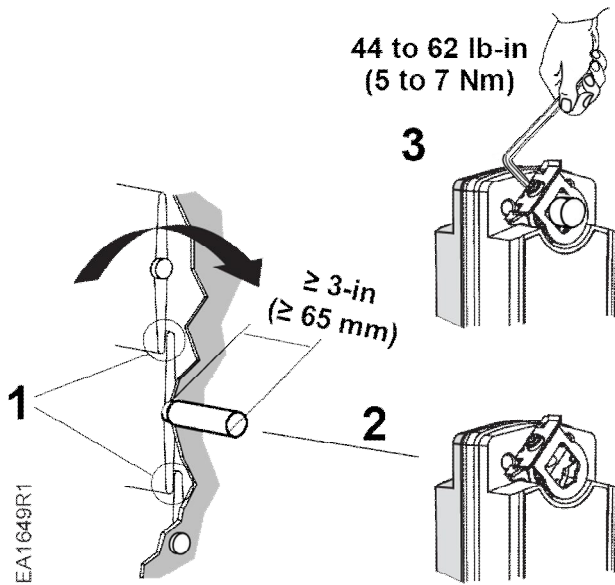


Figure 3. Shaft Length and Proper Shaft Adapter Location.

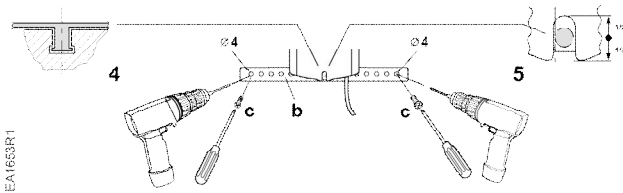


Figure 4. Anti-Rotation Bracket.

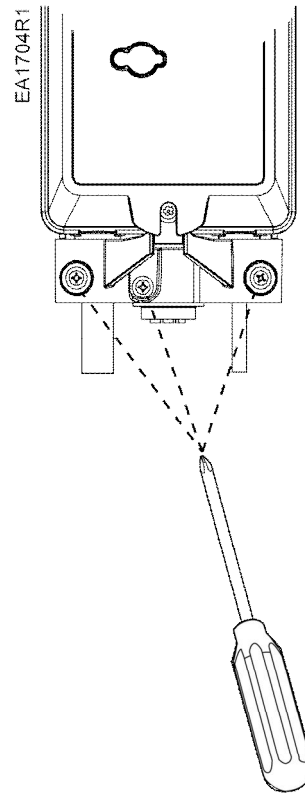
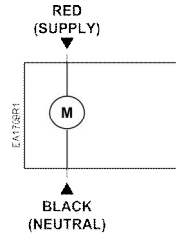


Figure 5. If using flexible conduit, insert the conduit into the proper opening and then tighten the conduit screws using a No. 2 Phillips Screwdriver.

Wiring Diagrams

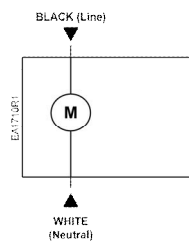
NOTE: All wiring must conform to NEC and local codes and regulations.

24 Vac/dc



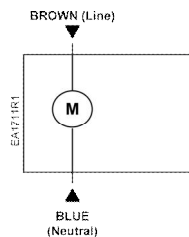
Function	Color
Supply	Red
Neutral	Black

120 Vac



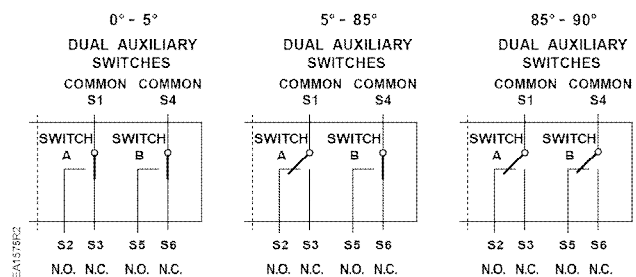
Function	Color
Line	Black
Neutral	White

230 Vac



Function	Color
Line	Brown
Neutral	Blue

Auxiliary Switches



Actuator Position	Switch A Common S1 Connected to	Switch B Common S4 Connected to
0° to 5°	S3	S6
5° to 85°	S2	S6
85° to 90°	S2	S5



CAUTION:

Mixed switch operation to the switching outputs of both dual end switches (5° and 85°) is not permitted.

Either AC line voltage from the same phase must be applied to all six outputs of the fixed dual end switches, or UL-Class 2 voltage must be applied to all six outputs.

Wiring, Continued

Electronic Fusible Link (EFL)

All GJD Electronic Damper Actuators are EFL-capable. EFLs are purchased separately. See Table 1.

Table 1. Electronic Fusible Link Product Numbers.

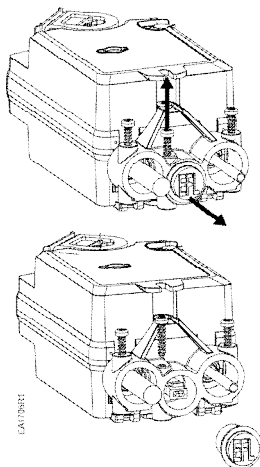
Part Number	Operation
ASK791.165	165°F (74°C)
ASK791.212	212°F (100°C)
ASK791.250	250°F (121°C)

NOTE:

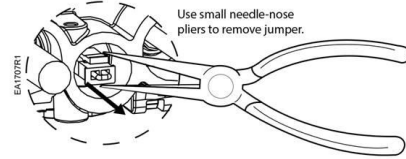
All EFLs are low voltage and do not need to be wired in conduit.

To install an EFL, do the following:

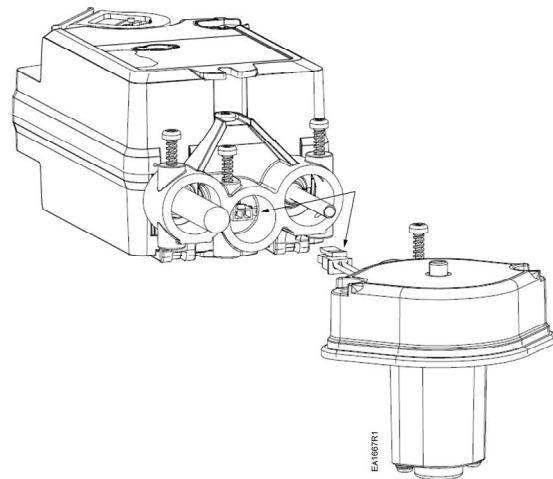
1. Remove and discard the plug marked **EFL**.



2. Using a small, needle-nose pliers or flat-blade screwdriver, remove the jumper.



3. Insert the quick connect from the EFL.



NOTE:

If you are not using an EFL, do not modify the actuator.

Maintenance



CAUTION:

The GJD actuator does not require any periodic cycling to function properly as an integral part of an active smoke control damper system. **The National Fire Alarm Code NFPA 72 states that all life safety systems are to be functionally checked at least annually.** Check the smoke control damper/actuator every time you functionally check your smoke detectors, emergency lights, and/or power generators for operation.

Dimensions

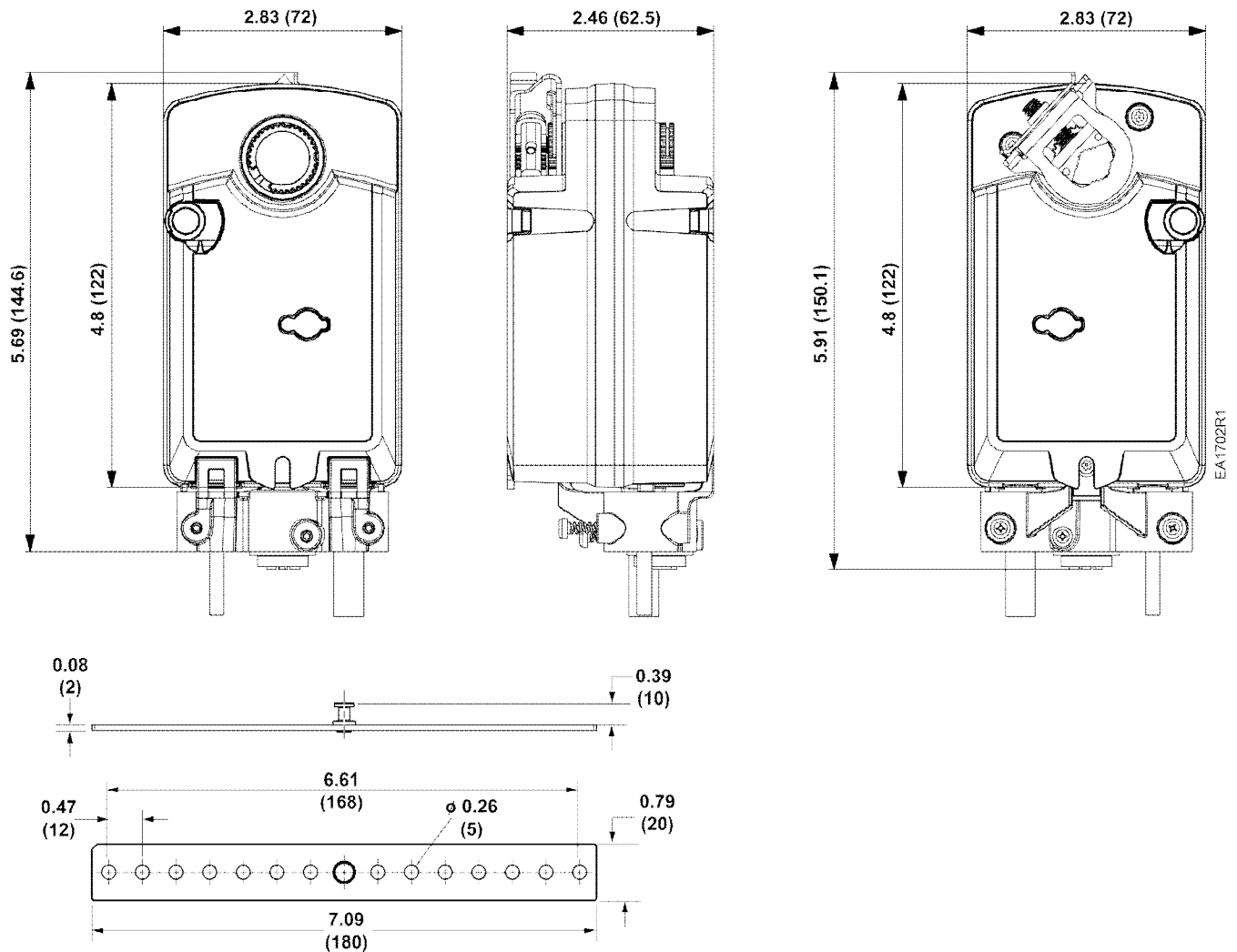


Figure 6. Dimensions of GJD OpenAir Actuator in Inches (mm).

References

Technical Instructions
 OpenAir Electric Damper Actuator Designed
 for UL Listed Fire/Smoke and Smoke Control
 Dampers

A6V11275901

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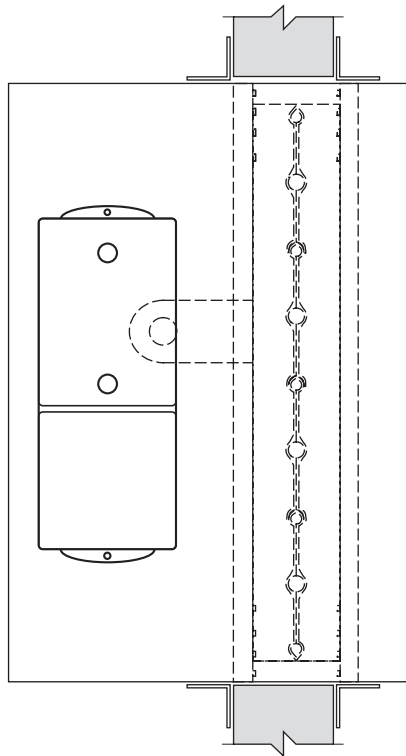


Figure 1: Mounting orientation of smoke detector on dampers with a height greater than or equal to 20" (508).

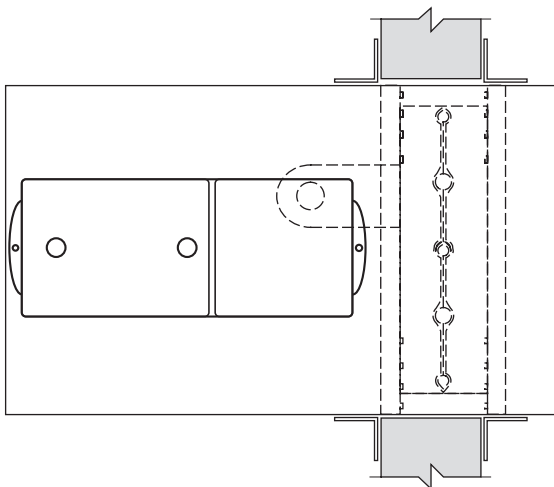


Figure 2: Mounting orientation of smoke detector on dampers with a height less than 20" (508).

UL CLASSIFIED (see complete marking on product)
***UL CLASSIFIED to Canadian safety standards**
(see complete marking on product)*
Standard 555 (Listing R9492)
Standard 555S (Listing R9492)

Smoke detector requires 100 fpm minimum air velocity in duct. For damper activation requirements when system velocity is less than 100 fpm, the local authority having jurisdiction should be consulted.

Refer to smoke detector manufacturer and Nailor's installation instruction supplement for dampers with factory mounted smoke detectors.

Label 1: Label applied to dampers with factory mounted smoke detectors.

NOTES:

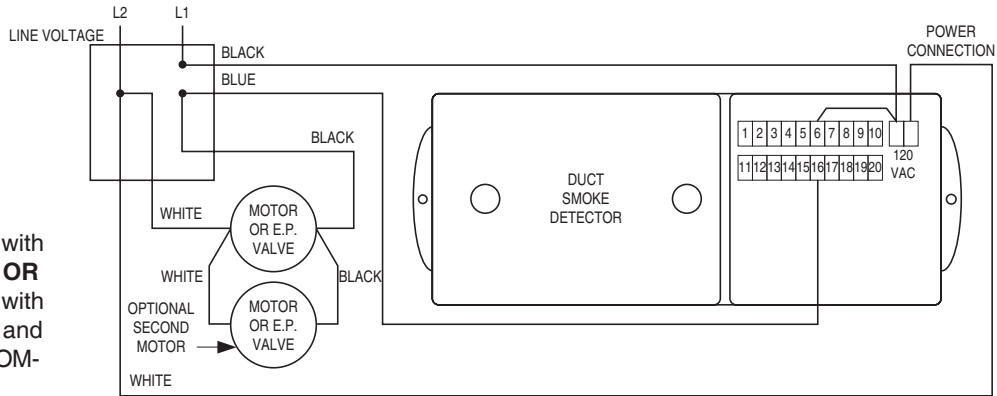
1. Minimum airflow rating for the smoke detector is 100 fpm. Maximum is 4000 fpm.
2. For further information, refer to System Sensor Model D4120 Installation and Maintenance Instructions.
3. Since the smoke detector is not rated for use at velocities below 100 fpm, local code may require an alternate means of damper closure such as zone detection or automated damper closure when the system fan is shut down.
 The local authority having jurisdiction should be consulted prior to the installation of the damper and smoke detector.
4. Correct orientation of holes on detector sampling tube is facing airstream.
5. See following pages for wiring diagrams.
6. Perform all maintenance and field tests recommended or required in System Sensor Model D4120 Installation and Maintenance Instructions.

WARNING: Duct smoke detectors have specific limitations. DUCT DETECTORS ARE:
NOT a substitute for an open area smoke detector,
NOT a substitute for early warning detection, and
NOT a replacement for a building's regular fire detection system.

Refer to NFPA 72 and 90A for additional duct smoke detector application information.

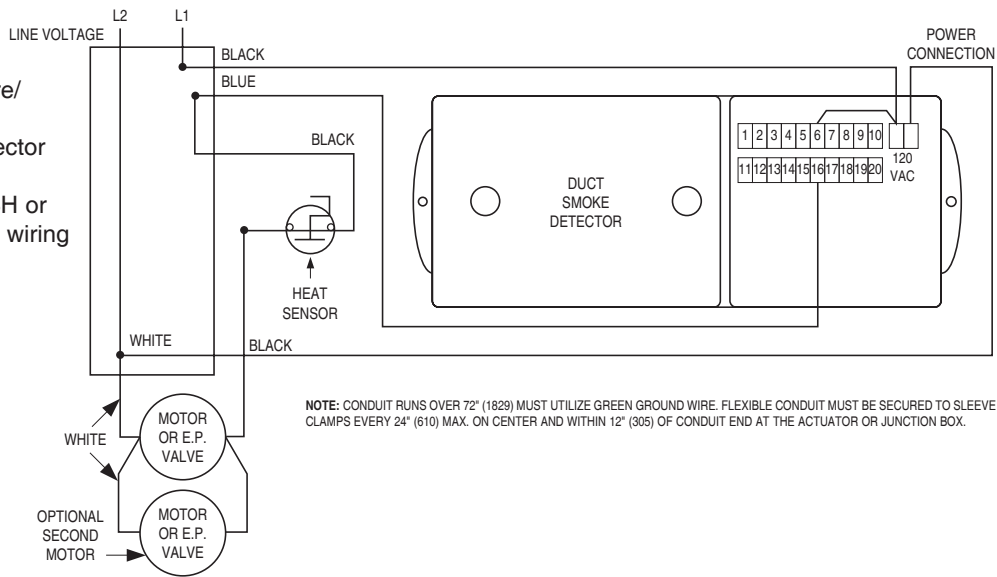
120 VAC DSD-LF WIRING SCHEMATICS

Figure 3: Smoke damper with smoke detector **OR** Smoke damper with smoke detector and MLS-300 (see IOM-MLS3H or IOM-MLS3N for wiring detail).



NOTE: CONDUIT RUNS OVER 72" (1829) MUST UTILIZE GREEN GROUND WIRE. FLEXIBLE CONDUIT MUST BE SECURED TO SLEEVE WITH CLAMPS EVERY 24" (610) MAX. ON CENTER AND WITHIN 12" (305) OF CONDUIT END AT THE ACTUATOR OR JUNCTION BOX.

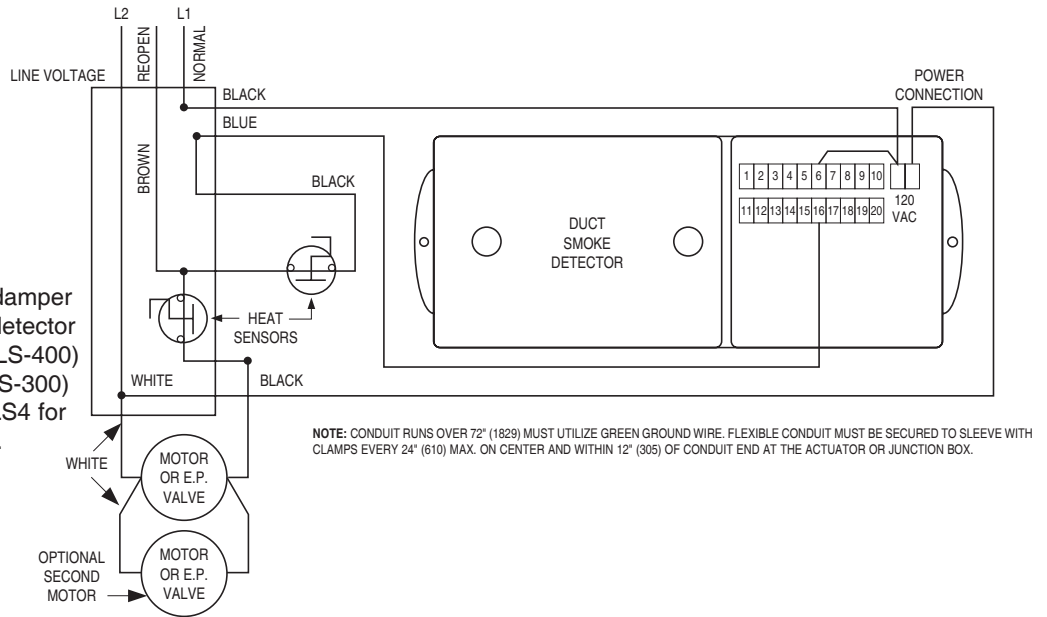
Figure 4: Combination Fire/Smoke damper with smoke detector and MLS-300 (see IOM-MLS3H or IOM-MLS3N for wiring detail).



NOTE: CONDUIT RUNS OVER 72" (1829) MUST UTILIZE GREEN GROUND WIRE. FLEXIBLE CONDUIT MUST BE SECURED TO SLEEVE WITH CLAMPS EVERY 24" (610) MAX. ON CENTER AND WITHIN 12" (305) OF CONDUIT END AT THE ACTUATOR OR JUNCTION BOX.

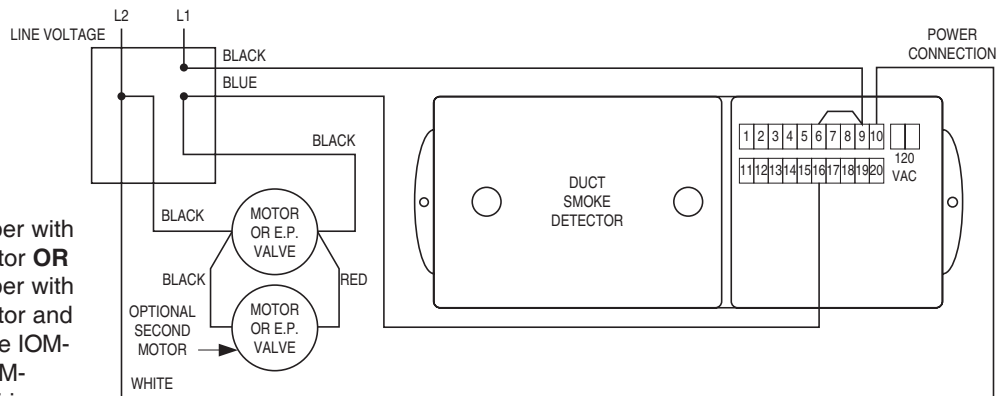
120 VAC DSD-LF WIRING SCHEMATICS (continued)

Figure 5: Combination Fire/Smoke damper with smoke detector and DTO (MLS-400) (includes MLS-300) (see IOM-MLS4 for wiring detail).



24 VAC DSD-LF WIRING SCHEMATICS

Figure 6: Smoke damper with smoke detector **OR** Smoke damper with smoke detector and MLS-300 (see IOM-MLS3H or IOM-MLS3N for wiring detail).



24 VAC DSD-LF WIRING SCHEMATICS (continued)

Figure 7: Combination Fire/Smoke damper with smoke detector and MLS-300 (see IOM-MLS3H or IOM-MLS3N for wiring detail).

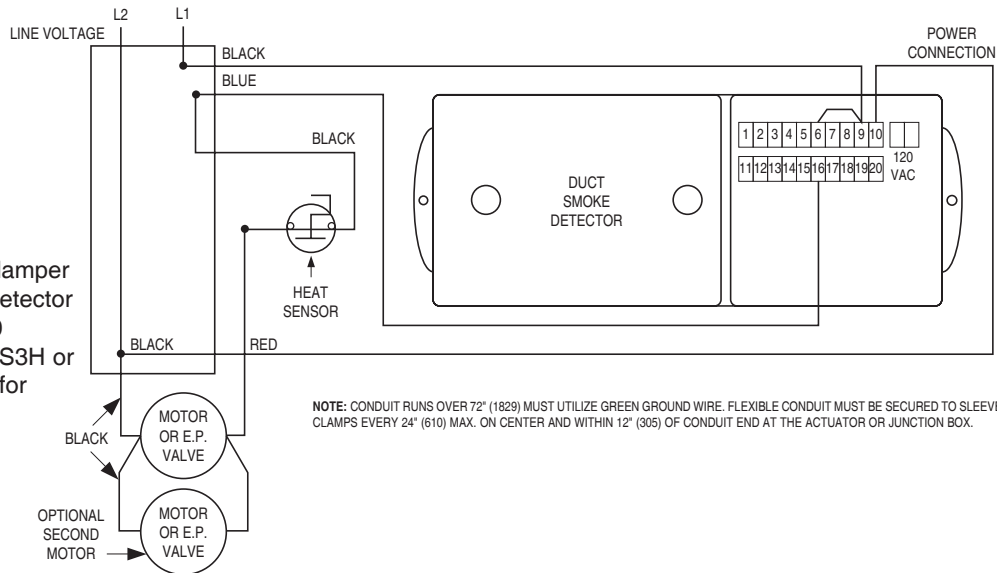
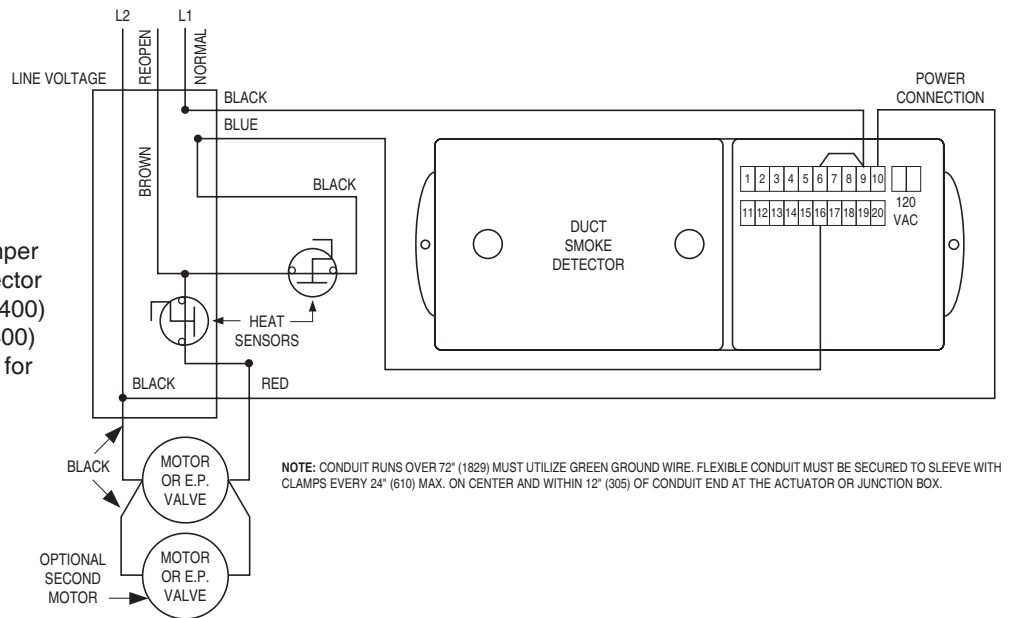


Figure 8: Combination Fire/Smoke damper with smoke detector and DTO (MLS-400) (includes MLS-300) (see IOM-MLS4 for wiring detail).



Application and Operation

Nailor model DSD-NF duct smoke detector (no-flow) can be utilized with Nailor UL555S Classified smoke or combination fire/smoke dampers to detect the presence of smoke within HVAC ductwork, whether or not there is airflow, and close the damper to prevent the smoke from spreading. As most fatalities resulting from fires can be attributed to the effects of toxic smoke, detecting and controlling the smoke from spreading within the HVAC system is vital to preventing injury as well as limiting property damage, including damage to the HVAC system itself. Refer to NFPA Standards 72, 90A and 92A to determine when and where duct smoke detectors are required.

The DSD-NF detector features a low-profile design for optimum pressure drop and will operate with airflow in either direction. It can be factory installed to top of sleeve (side mounting optional) on Nailor Model Series 1210, 1260, 1280, 1220 and 1270.

Upon detection of smoke, the smoke detector causes the damper to close by cutting off power to the actuator. The actuator return spring forces the damper closed. The detector can be reset only by a momentary power interruption. The standard model DSD-NF detector and smoke damper combination is designed simply to close the damper upon detection of smoke. For applications requiring the detector to be wired into a fire fighters' smoke-control station (FSCS), contact Nailor.

DSD-NF STANDARD SPECIFICATION:

Model: System Sensor 2151 Low-Profile.

Sensor Type: Photoelectronic.

Dimensions: 6" (155) dia. flanged base.

Weight: 3.6 oz. (104 g).

Airflow Velocity Range: 0 to 3000 fpm (0 to 15.24 m/s).

Operating Temperature Range: 32°F to 120°F (0°C to 49°C).

Humidity Range: 10% to 93% Relative Humidity non-condensing.

Sensitivity: 3% ± .7%/ft

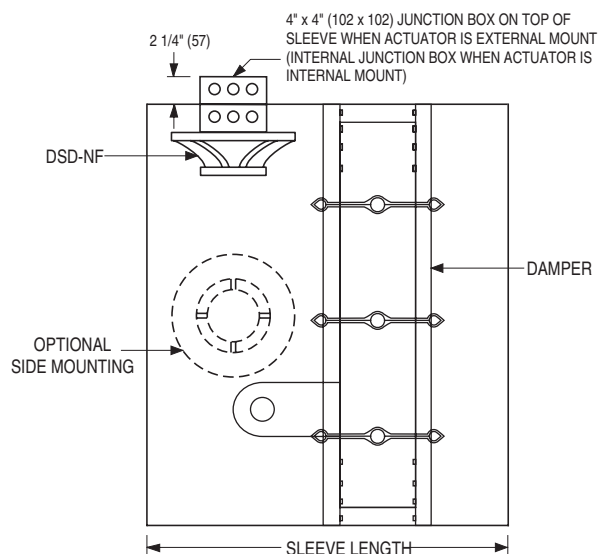
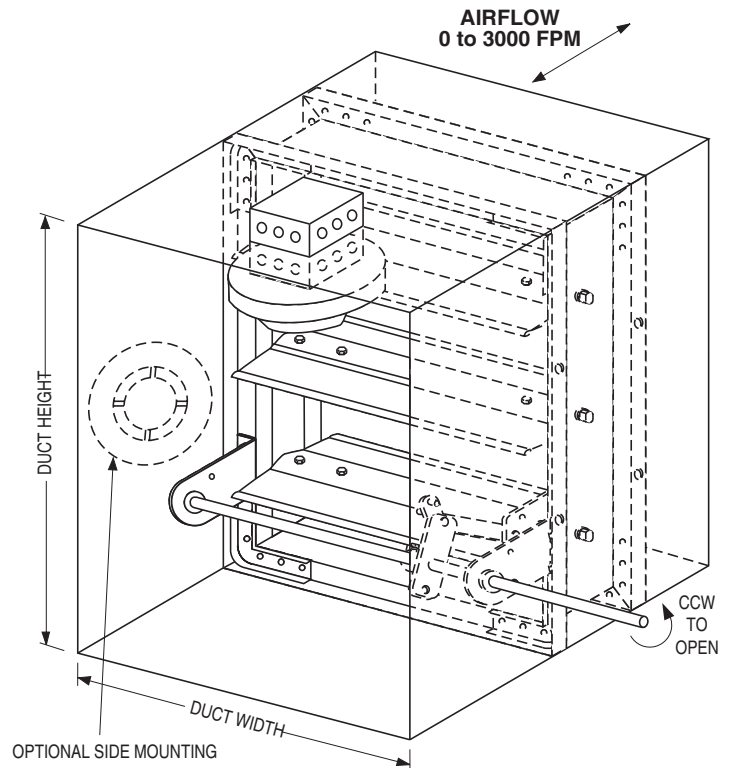
Voltage: 120 VAC, 24 VAC

Latching Alarm: Reset by momentary power interruption.

Contact Nailor for minimum damper size and sleeve length for your specific application.

Refer to Smoke Detector Installation Instructions and Nailor Smoke Detector Supplement for Dampers with Factory Mounted Duct Smoke Detectors.

Label 1: Label applied to dampers with factory mounted smoke detectors.



120 VAC DSD-NF WIRING SCHEMATICS

Figure 1: Smoke damper with smoke detector.

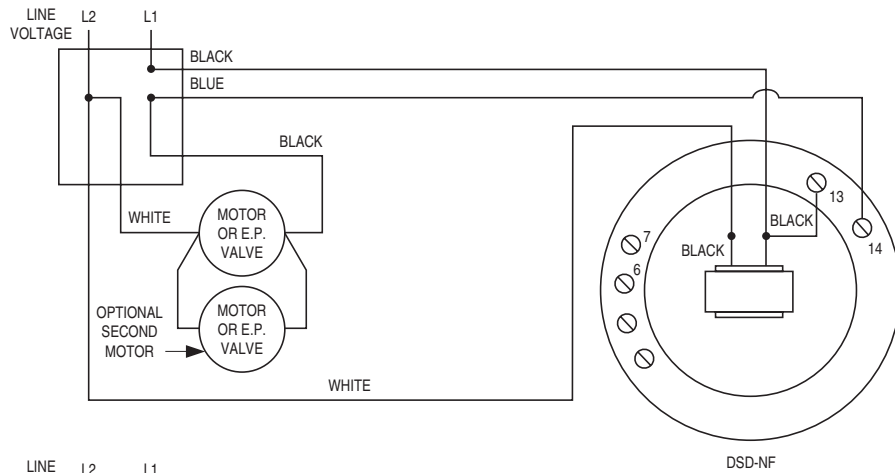


Figure 2: Combination Fire/Smoke damper with smoke detector.

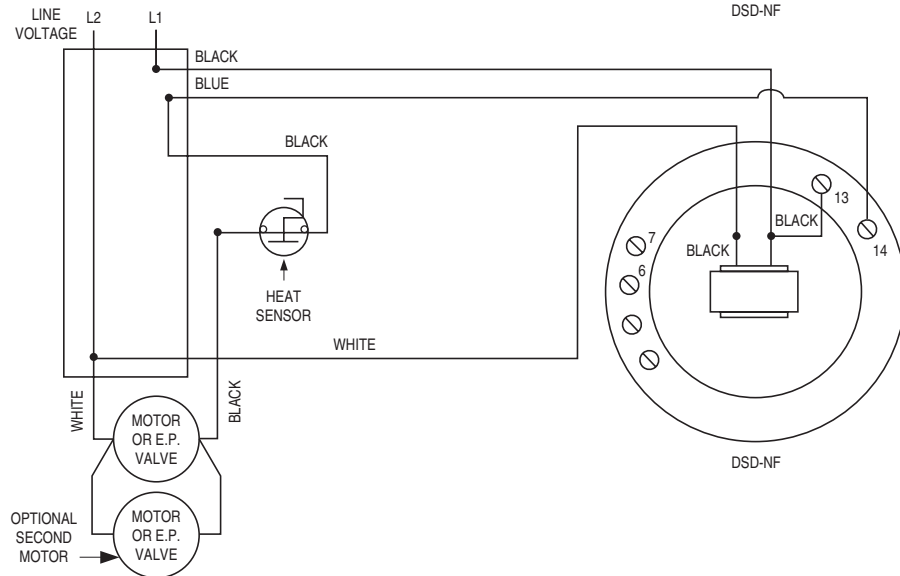
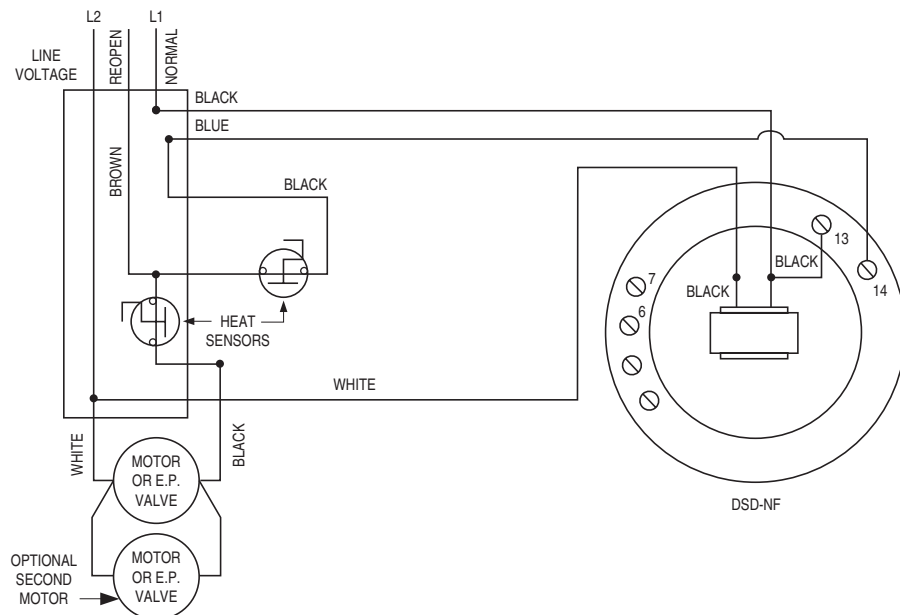


Figure 3: Combination Fire/Smoke damper with smoke detector and DTO (MLS-400) (includes MLS-300) (see IOM-MLS4 and IOM-MLS3H or IOM-MLS3N for wiring details).



24 VAC DSD-NF WIRING SCHEMATICS

Figure 4: Smoke damper with smoke detector.

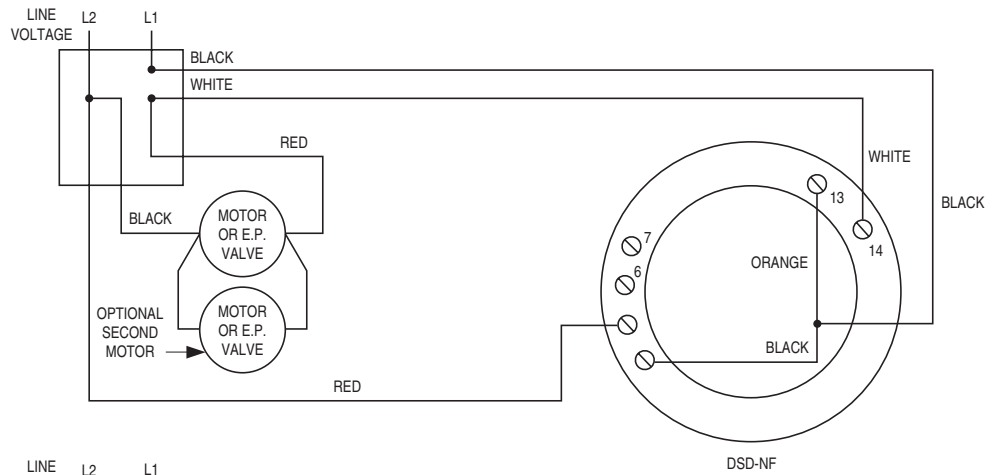


Figure 5: Combination Fire/Smoke damper with smoke detector.

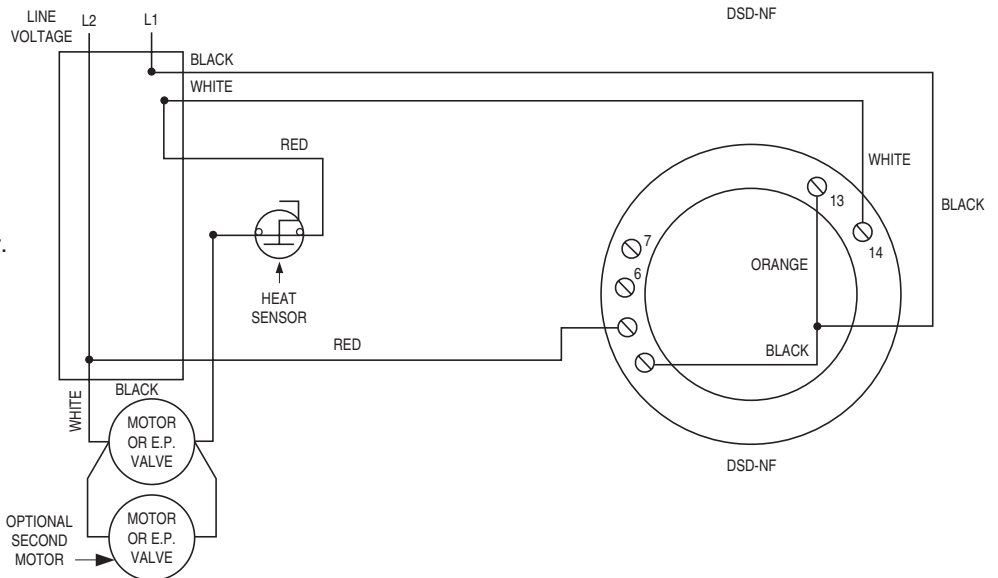
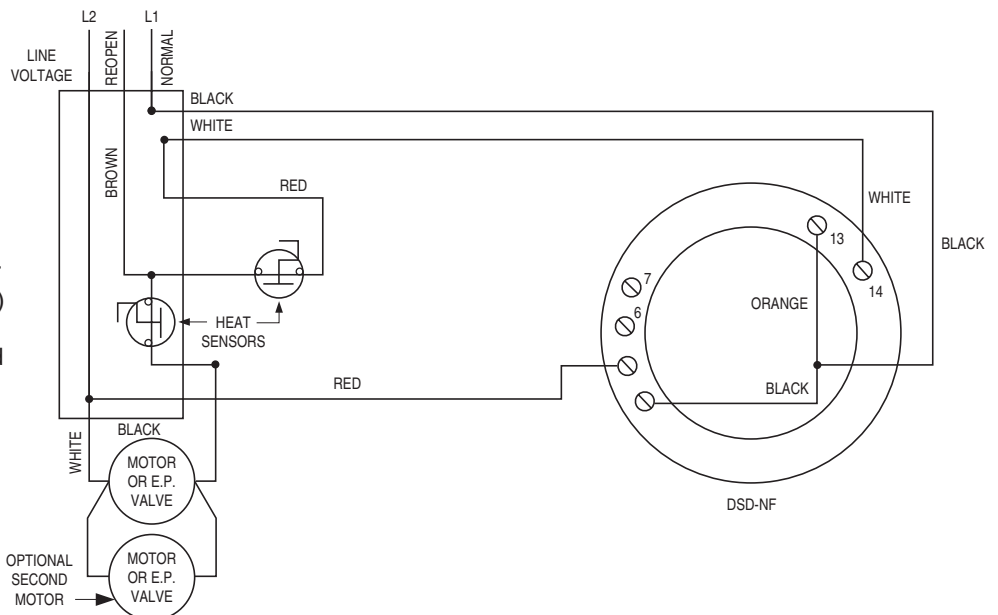


Figure 6: Combination Fire/Smoke damper with smoke detector and DTO (MLS-400) (includes MLS-300) (see IOM-MLS4 and IOM-MLS3H or IOM-MLS3N for wiring details).



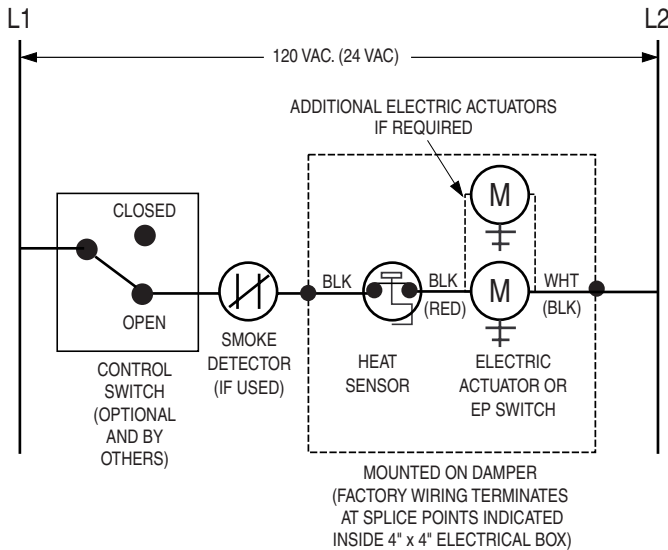


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Application and Operation

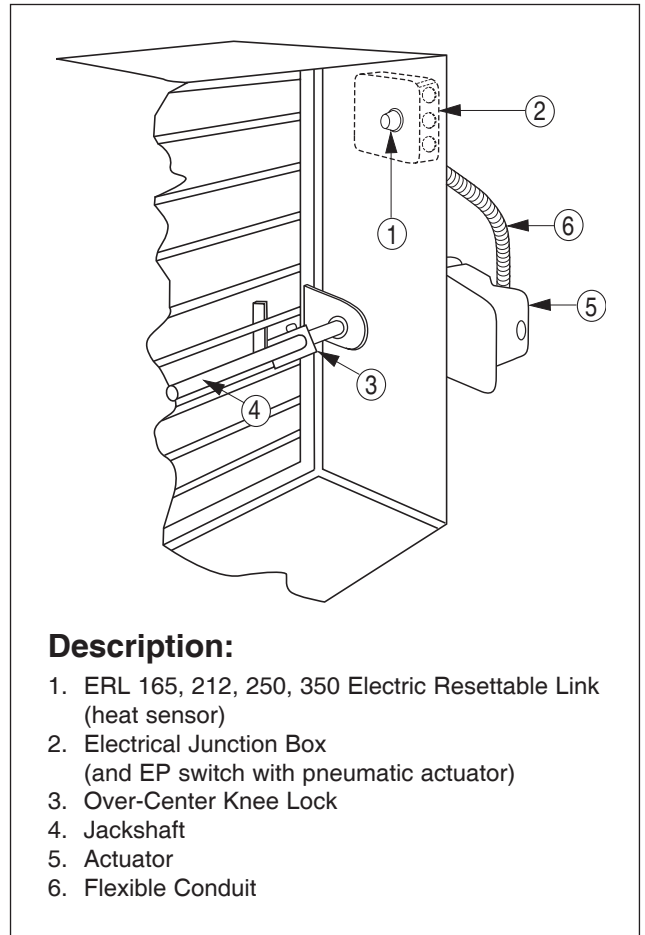
The ERL Electric Resettable Link (heat sensor) replaces the traditional hi-torque spring / fusible link fire closure mechanism on all Nailor combination fire / smoke dampers. The ERL is a thermally responsive bimetal disc / thermostat that opens and closes electrical contacts at a specific calibrated temperature. The ERL is a UL Classified Heat Responsive Device.

The standard ERL on all Nailor, combination fire / smoke dampers has a fixed temperature setting of 250°F (121°C) which is the UL listed elevated / degradation temperature of the damper / actuator assembly. A 350°F (177°C) elevated temperature classification and ERL is available as an option.

[A 165 and 212°F (74 and 100°C) ERL are also available. Local codes have specified 165°F (74°C) widely in the past.]

The ERL performs the same function as the fusible link it supercedes, that is to sense an abnormally high temperature, as caused by a fire and allow the damper to close in order to prevent the spread of fire and smoke. The sensor interrupts power to the actuator and the actuator's spring return mechanism causes the damper to close and lock.

In smoke control mode, when a signal is detected via a normally closed smoke detector connection, the damper will close and remain closed until the smoke signal ceases. The system will then reset when power is re-applied and the damper will open. The damper may be closed at anytime by placing a control switch (optional and by others) in the closed position.



Description:

1. ERL 165, 212, 250, 350 Electric Resettable Link (heat sensor)
2. Electrical Junction Box (and EP switch with pneumatic actuator)
3. Over-Center Knee Lock
4. Jackshaft
5. Actuator
6. Flexible Conduit

The ERL in combination with all Nailor qualified electric or pneumatic actuators provides controlled closure and eliminates the instantaneous damper closure associated with traditional fusible links that can cause damage to the ductwork.

The ERL sensor is of the manual reset type and can be reset after the temperature has cooled down below the sensor set point. This feature is a tremendous advantage where periodic system testing involves application of heat to the sensor to verify correct damper operation. Exposure to actual fire conditions may render these devices unusable. In this case, it is recommended that a careful inspection of the damper, actuator and ERL be performed.

The ERL requires factory installation and wiring together with the associated actuator to meet UL requirements. If the damper is provided with a pneumatic actuator, an EP switch is required.



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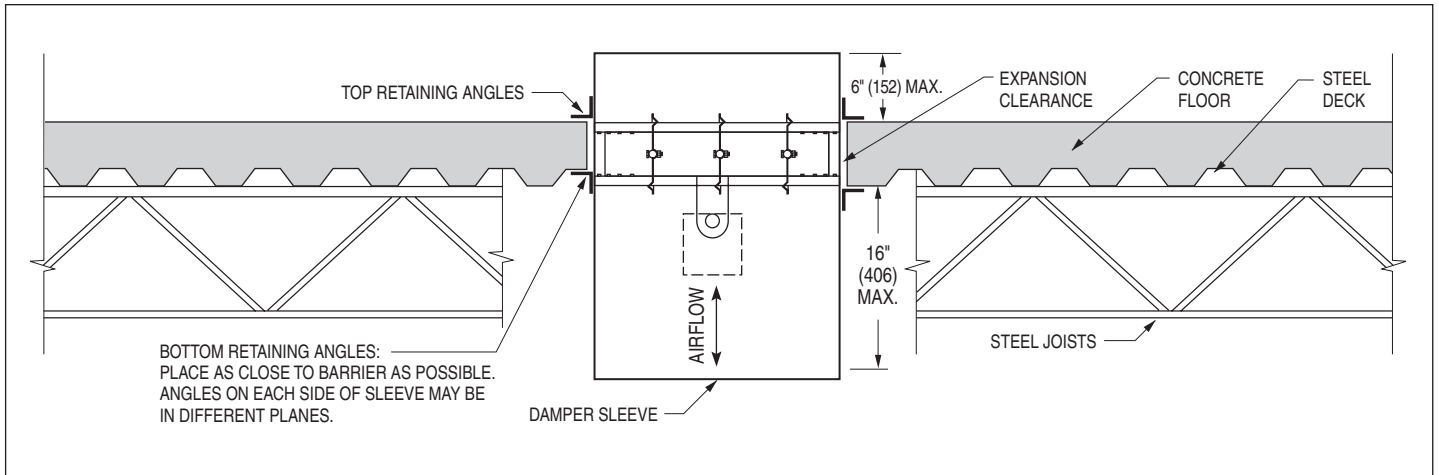


Fig. 1. Floor Opening Detail.

APPLICATION:

Horizontal installation of fire and combination fire/smoke dampers in concrete floors utilizing a steel deck may not allow the bottom angles to be placed against the steel deck on an even plane. This installation details how to properly install the required angles next to the steel deck.

NOTES:

1. Retaining angles are required on top and bottom sides of the damper as detailed in the damper installation instructions for the specific model. Angles may be reversed so that one leg of the angle points into the floor opening provided the required clearance is maintained between angle leg fasteners and the floor opening.

Important: When positioning damper in floor and attaching retaining angles to sleeve, ensure fasteners clear and do not penetrate damper frame. Failure to do so may prevent correct damper operation or closure due to fouling of linkage or damper blades.

2. Installation of the bottom angle against the uneven steel deck shall be done so the angles on each side of the sleeve are as close to the barrier as possible. The angles may be in different planes relative to each other (see Figures 1 and 2).
3. When viewed from the end of the sleeve, the angles must overlap each other in the corners to prevent "see through".

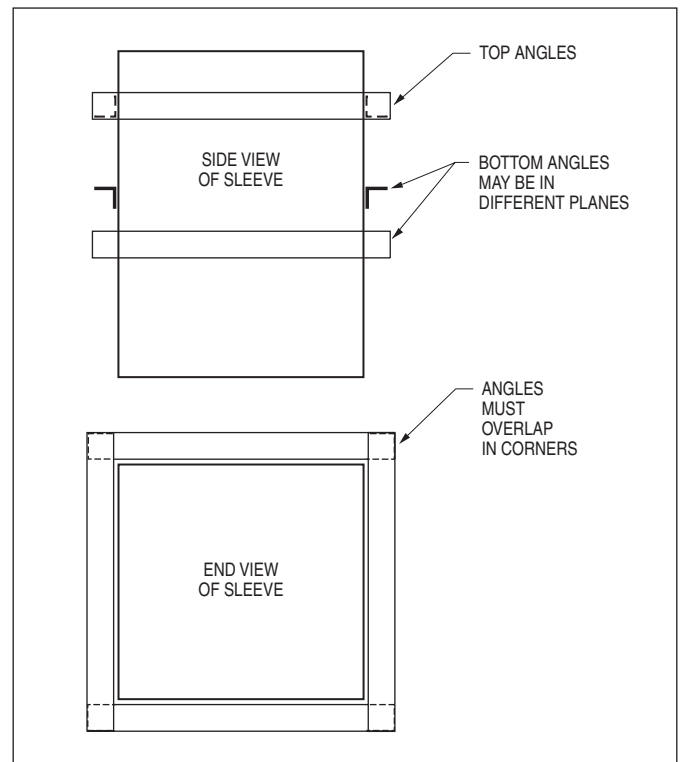


Fig. 2. Retaining Angle Detail

Refer to the Following Installation Instructions:

Curtain Type Fire Dampers (D)0100 & (D)0500	FDINST
Curtain Type Fire Dampers 0200 & 0500 Thinline	FDTINST
Multi-Blade Fire Dampers 1200 & 1250	MBFDINST
Combination Fire/Smoke Dampers 1220	1220INST
Combination Fire/Smoke Dampers 1270	1270INST



Dimensions are in inches (mm).



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APPLICATION:

This vertical fire damper installation is for metal stud framing in UL resistant cavity shaftwall designs (1 and 2 hr.) including Nos. U438, U469 and U497. It differs from conventional fire damper installations in that it requires retaining angles on one side of the wall only, which are fastened to the wall as well as the damper for opening sizes up to 48" W x 36" H (1219 x 914). Larger openings require retaining angles on both sides.

GENERAL INSTALLATION:

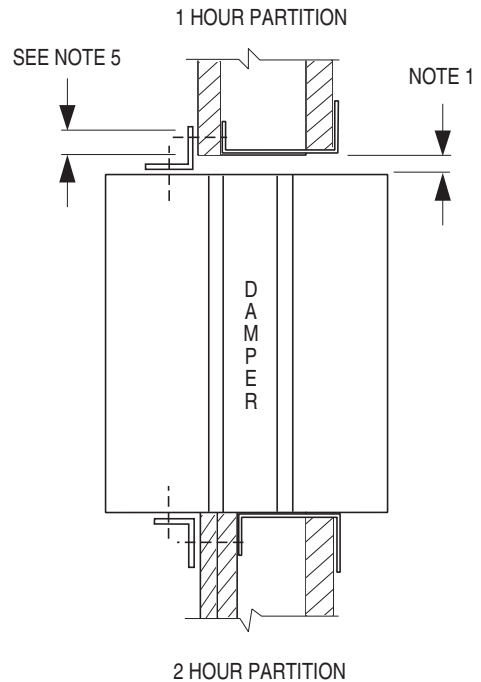
1. **Expansion Clearance:** Opening in wall shall be a minimum 1/8" (3) per linear foot larger than overall size of damper and sleeve assembly in either dimension. Maximum opening not to exceed 1/8" (3) per foot plus two inches. Opening shall not be less than 1/4" (6) larger for any size damper and sleeve assembly.
2. **Damper Sleeve:** Sleeve gauge shall be at least equal to the gauge of the duct as defined by the appropriate SMACNA duct construction standard and described in NFPA 90A when one or more of the following duct-sleeve connections are used (TDC/TDF breakaway, ductmate breakaway, plain "S" slip, hemmed "S" slip, standing "S" slip, reinforced standing "S" slip, inside slip joint, and double "S" slip.)

In addition, the following connections are acceptable:

- A. On rectangular duct, a standing S slip connection, with two #10 sheet metal screws on each side and bottom of the joint and with duct sealant* applied to each connection, may be used.
- B. On rectangular duct, a standing S slip connection on top and bottom joints and flat drive connections on side joints with duct sealant* applied to each connection, may be used for dampers 48" x 20" (1219 x 508) and smaller. Plain S and hemmed S slip connections can also be used in lieu of the standing S connections described above.
- C. A round duct may be attached to the round adapter which is part of the damper sleeve in the following manner:
 - (a) Duct diameters 22" (559) and smaller must use three #10 sheet metal screws equally spaced around the circumference and with duct sealant* applied to the connection.
 - (b) Duct diameters over 22" (559) up to and including 36" (914) may use five #10 sheet metal screws equally spaced around the circumference and with duct sealant* applied to the connection.
 - (c) Duct diameters larger than 36" (914) wide or diameter may use eight #10 sheet metal screws equally spaced around the circumference.

*The duct sealant must be PA2084T Duct Sealant Adhesive as manufactured by Precision or water based DP1010 by Design Polymetrics.

3. If any other duct-sleeve connections are used, sleeve shall be minimum of 16 gauge (1.6) for dampers up to 36" w x 24"h (914 x 610) and 14 gauge (1.9) if damper width exceeds 36" (914) or height exceeds 24" (610).
4. **Damper/Sleeve Attachment:** Damper shall be secured to sleeve with 1/4" (6) long welds, 3/16" (5) steel rivets, 1/4" (6) bolts and nuts, #8 sheet metal screws, or 3/16" (5) buttonlocks on both sides at 6" (152) on center and 2" (51) maximum from the corner of the damper on all four sides. For field assembled sleeves, the inner dimensions of the sleeve shall be equal to the outer dimensions of the damper.



5. Retaining Angles:

- A. Shall be a minimum of 1 1/2" x 1 1/2" x 16 gauge (38 x 38 x 1.61) and fastened with #10 bolts or screws, 1/2" (13) long welds, or 3/16" (5) rivets to sleeve at a maximum spacing of 8" (152) O.C. and not more than 2" (51) from each end with a minimum of two connections on each side, top and bottom (See Illustration).

Nailor 'Quick-Set' Retaining Angles can be used in lieu of conventional mounting angles. Retaining angles must overlap the structural opening by 1" (25) minimum.

- B. Retaining angles screw to wall with #10 screws. Use a minimum of two fasteners per side, top and bottom 12" (305) O.C. maximum.

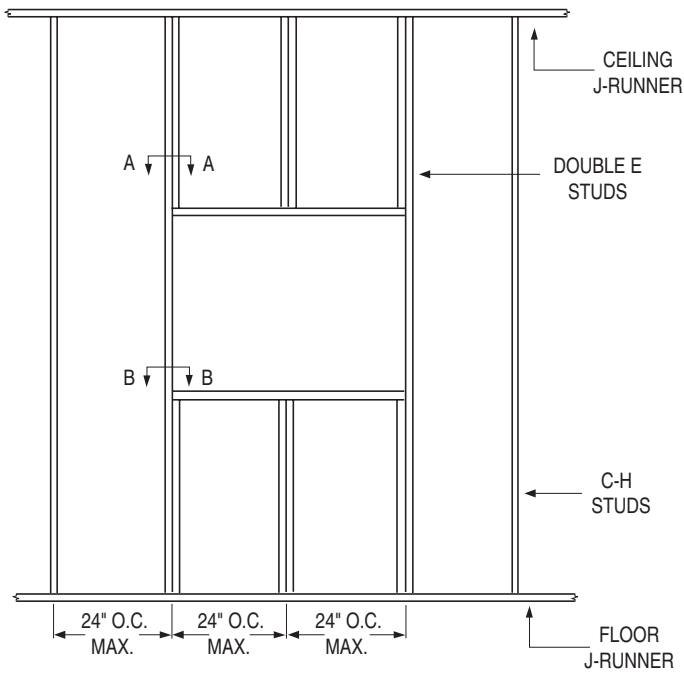
6. See framing detail on next page for opening preparation. Refer to the appropriate installation supplements for the following requirements:

Ductmate Breakaway Connection	Doc. FDDMINST
Flange System Breakaway Connections	Doc. FDTDCFINST
'Quick-Set' Retaining Angles.	Doc. FDQSRRA

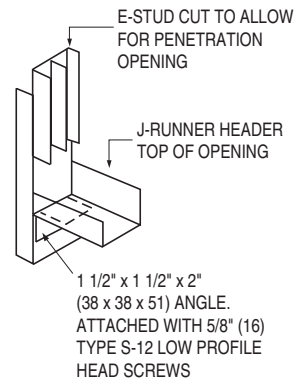
7. Refer to Underwriters Laboratories Inc. Fire Resistance Directory Vol. II for details on UL Design No. U438, U469 and U497.



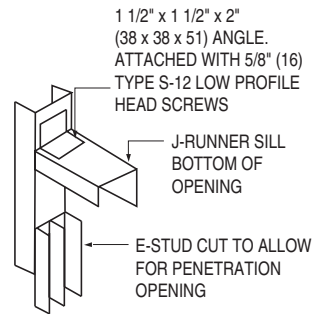
**FRAMING DETAIL FOR ASSEMBLIES
(U438 AND U469)**



NOTE:
 U438 shaftwall construction may alternatively utilize E shaped steel studs.

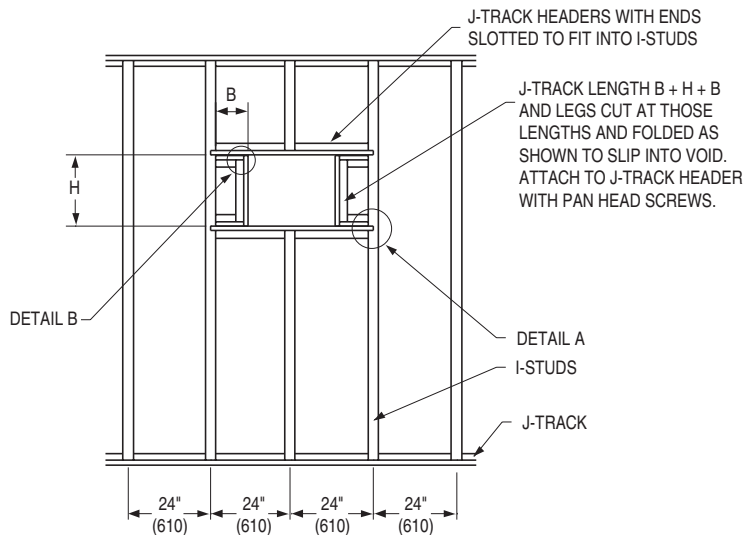


SECTION A-A

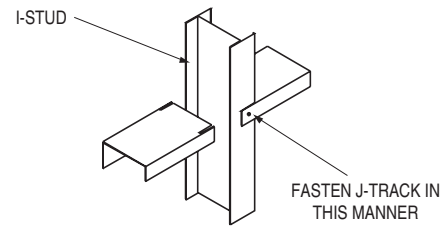


SECTION B-B

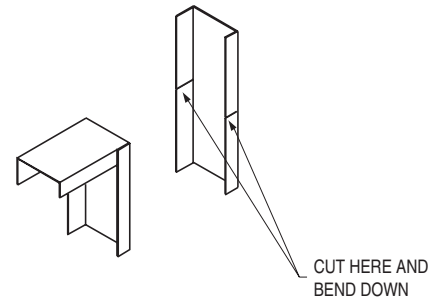
**FRAMING DETAIL FOR
ASSEMBLIES (U497)**



NOTE:
 Shaftwall construction may alternatively utilize C-H or C-T shaped steel studs.



DETAIL A



DETAIL B

Dimensions are in inches (mm).



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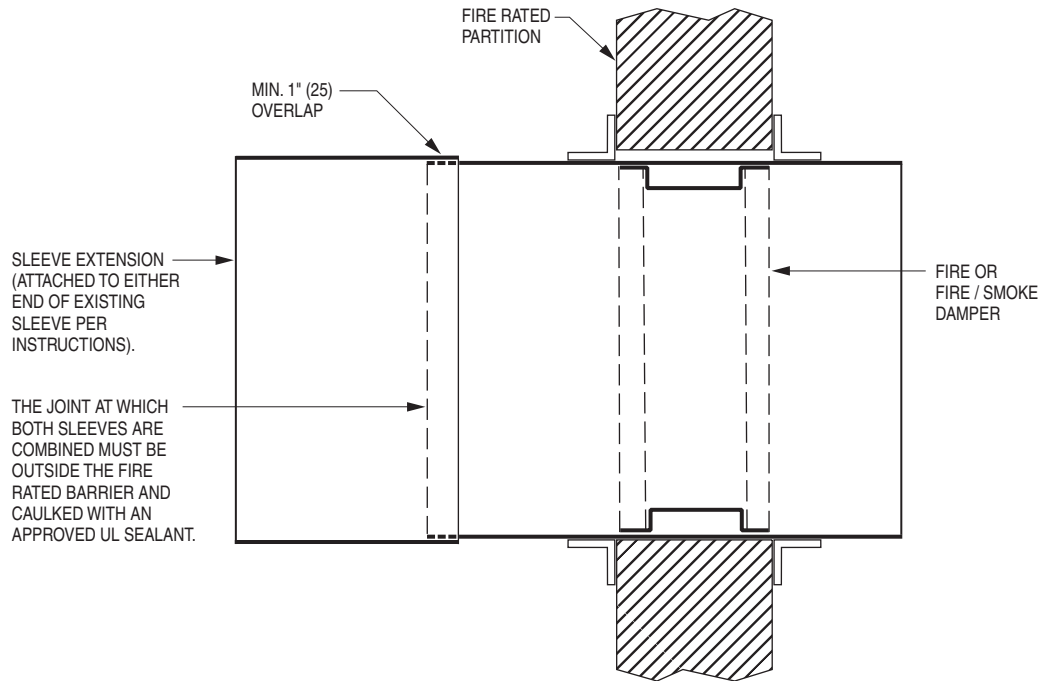


Figure 1. Sleeve Extension Detail

APPLICATION:

Factory installed sleeves may sometimes need to be extended in the field when of insufficient length for ductwork connection relative to the depth of the fire partition. This supplement installation instruction provides details for attachment of the sleeve extension. Consult Authority Having Jurisdiction for approval.

NOTES (Refer to Figure 1):

1. Sleeve extension must be same material and gauge as factory sleeve.
2. The inside dimensions of the sleeve extension must be the same dimensions as the outside dimensions of the factory sleeve.
3. Sleeve extension must overlap the factory sleeve a minimum of 1" (25).
4. All four sides of the sleeve extension must be attached to the factory sleeve. Attachments must be spaced a maximum of 6" (152) on center and a maximum of 2" (51) from corners. A minimum of 2 attachments per side (8 per damper) are required. Attach the sleeve extension using 1/2" (13) long tack or spot welds, #10 sheet metal screws, 1/4" (6.35) dia. bolts and nuts or 3/16" (5) steel pop rivets.
5. Products with a smoke leakage rating require that the joint between the two sleeves be sealed with a continuous 1/8" (3) bead of GE RTV108 or Dow Corning RTV732 silicone sealant.

6. Sleeve extensions can be made to either end of the factory sleeve. However, the sleeve cannot extend beyond the fire partition more than 6" (152) on either side or 16" (406) on one side if equipped with an actuator or integral access door.
7. The joint created by the factory sleeve and sleeve extension cannot be in the plane of the partition.

Refer to the Following Installation Instructions:

Curtain Type Fire Dampers (D)0100 & (D)0500	FDINST
Curtain Type Fire Dampers 0200 & 0500 Thinline	FDTINST
Multi-Blade Fire Dampers 1200 & 1250	MBFDINST
Combination Fire/Smoke Dampers 1220	1220INST
Combination Fire/Smoke Dampers 1270	1270INST



Dimensions are in inches (mm).



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Nailor[®] FIRE DAMPER INSTALLATION SUPPLEMENT Industries Inc. FLANGED TYPE ALTERNATE BREAKAWAY CONNECTIONS

These instructions provide details for an alternate breakaway connection between a fire damper or combination fire smoke damper sleeve and an adjoining duct. This alternate connection is classified with U.L. under the certification of the damper. These instructions apply to a connection using a manufactured add-on flange system by Ductmate, Ward, or Nexus and a TDC or TDF roll-formed flange system. These connections allow for both the use of the same flange type or the combining of mixed flange types. The following instructions depict the use of metal or plastic cleats and bolted or non-bolted corners:



1. Install the manufactured flange system onto the damper sleeve or duct per the manufacturer's instructions.
2. To seal the two flange systems together, Neoprene or Butyl gasketing may be applied between the mating surfaces.
3. Align the two flange systems together. An optional 3/8" (9) bolt may be used in the corners to help with the alignment. These bolts do not have to be removed.
4. Install the cleat or #10 tek screw approximately equally spaced, per the following schedule:
 - Width or height less than 24" (610); use one cleat or screw per side
 - Width or height 24" (610) to less than 36" (914); use 2 cleats or screws per side
 - Width or height 36" (914) to less than 54" (1372); use 3 cleats or screws per side
 - Width or height 54" (1372) to less than 72" (1829); use 4 cleats or screws per side
 - Width or height 72" (1829) or greater; use 5 cleats or screws per side

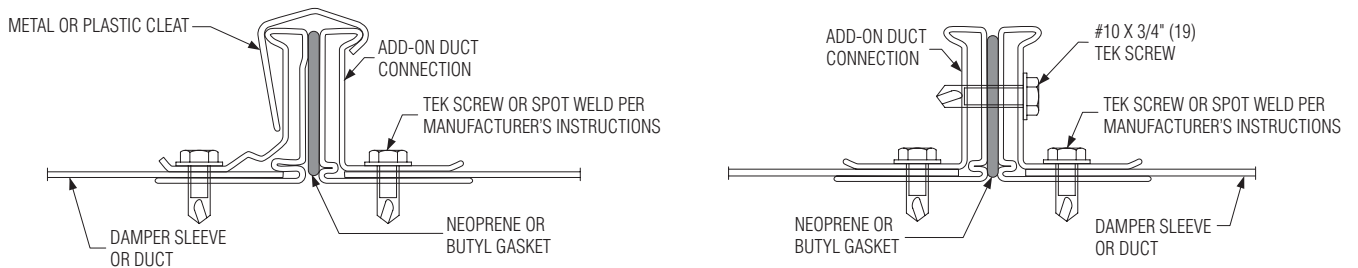


FIGURE 1. ADD-ON/ADD-ON

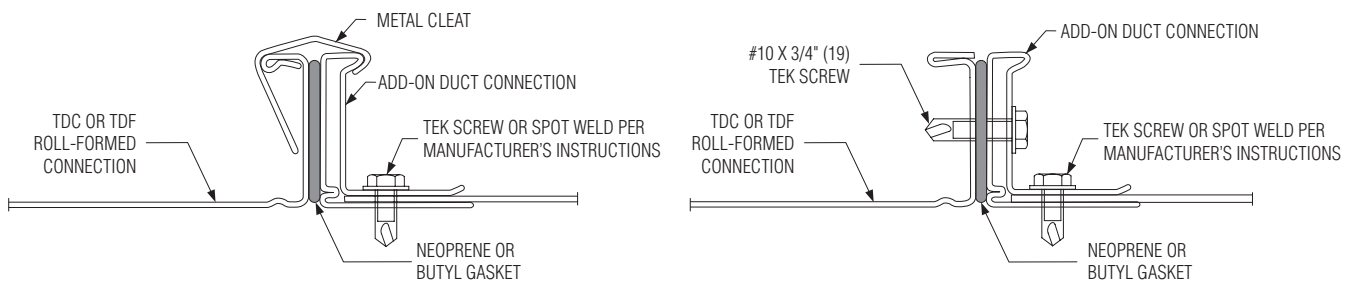


FIGURE 2. ROLL-FORMED/ADD-ON

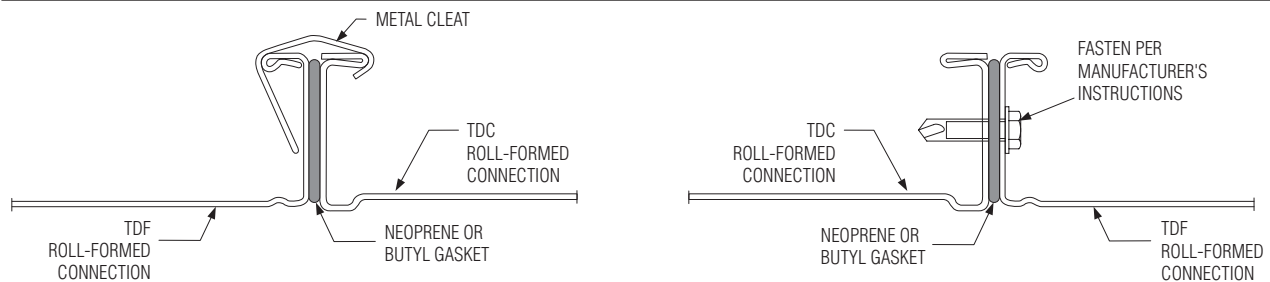


FIGURE 3. ROLL-FORMED/ROLL-FORMED

Dimensions are in inches (mm).



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**"QUICK-SET" RETAINING ANGLES BOTH SIMPLIFY AND SPEED INSTALLATION,
 SAVING BOTH TIME AND MONEY.**

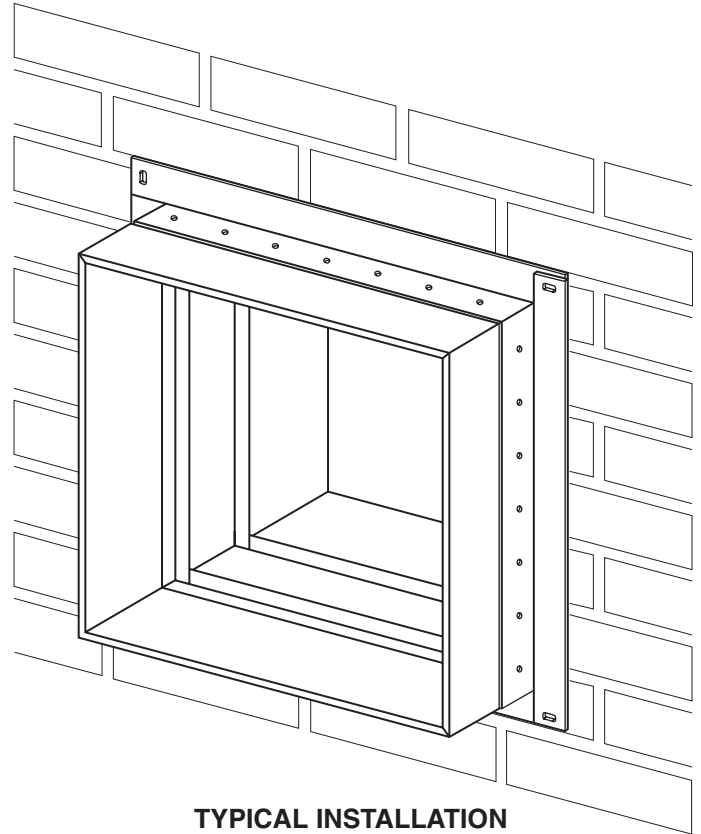
BENEFITS:

- One piece angles are fastened together in the corners. Only two sets of angles to handle per damper (rather than four separate angles per side).
- Angles are shipped with damper - no sorting or matching.
- Provided with pre-drilled fastening holes on 2" (51) centers to ensure correct angle/sleeve attachment.
- Factory fabricated by Nailor to suit the individual fire damper.
- Reduced cost when compared to conventional retaining angles.
- Dampers can ship directly to the job site complete with all necessary installation sheet metal hardware (saves on double handling at contractor's shop).
- Help ensure a correct installation as per U.L. approved installation instructions.

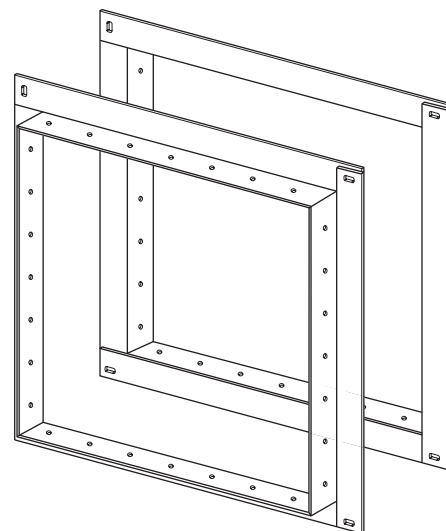
The majority of installing contractors view fire damper installation as a costly time consuming and troublesome procedure. Eight conventional angles must be custom fabricated for each damper either in a sheet metal shop or at the job site and sized to suit each individual damper. Invariably, they are mislaid or lost and must be matched to each factory supplied damper.

The Nailor "Quick-Set" solution solves the majority of problems. They are pre-formed to fit and ship with the individual damper for ultimate convenience. "Quick-Set" angles are supplied with correctly spaced pre-drilled screw-holes to ensure a quick, easy and accurate installation for all integral sleeve Nailor fire and combination fire/smoke dampers - no measuring required.

"Quick-Set" retaining angles provide the "complete" installation package. Simple, fast, convenient.



TYPICAL INSTALLATION



**TYPICAL PAIR OF PRE-ASSEMBLED
 'QUICK-SET' RETAINING ANGLES**



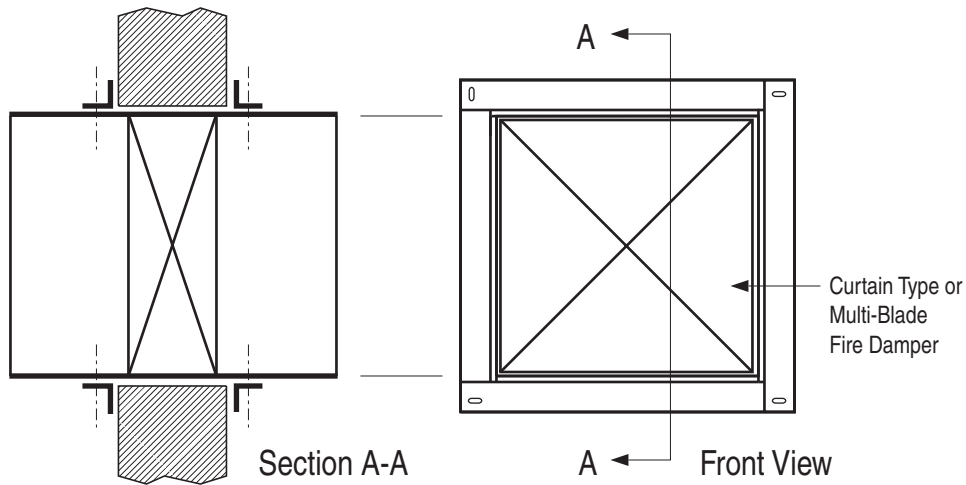


FIGURE 1. TYPICAL TWO SIDED INSTALLATION.

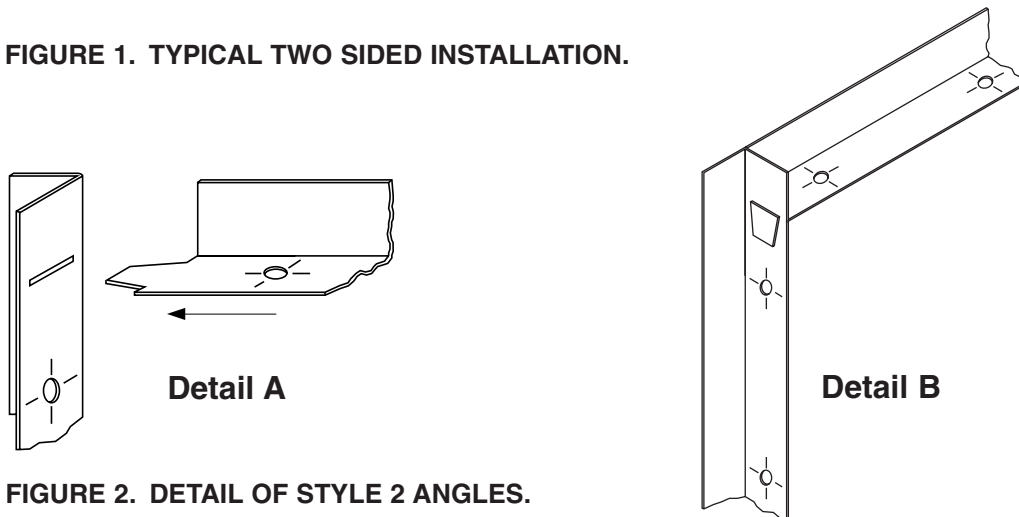


FIGURE 2. DETAIL OF STYLE 2 ANGLES.

APPLICATION:

The Nailor Quick-Set Retaining Angle System may be used in lieu of conventional retaining angles on all Nailor Fire and Combination Fire / Smoke Dampers.

Quick-Set angles are supplied in one of two styles, dependent upon fire resistance label, damper size and installation method.

Style 1: 1 1/2" x 1 1/2" x 20 ga. (38 x 38 x 1.0) Four sides are connected together with rivets in three corners.

Standard for the majority of applications with the following limitations:

- 1 1/2 hour label fire dampers
- Maximum Size: 36" x 36" (914 x 914)
- Two sided installation only

Style 2: 1 1/2" x 1 1/2" x 16 ga. (38 x 38 x 1.6) Slot and tab design. The retaining angle assembly for each side has four angles, each with a tab end and a slot end (Detail A). The tabs are to be inserted into the slots and knocked down either before or after fastening to the sleeve (Detail B).

- 1 1/2 or 3 hour label fire dampers
- Maximum Size: 90" x 48" (2286 x 1219) or 48" x 90" (1219 x 2286)
- Single side (1 1/2 hour only. Refer to Single Side Retaining Angles Supplementary Installation Instructions for size limitations) or two sided installation

Refer to the Following Installation Instructions:

Curtain Type Fire Dampers (D)0100 & (D)0500	FDINST
Curtain Type Fire Dampers 0200 & 0500 Thinline	FDTINST
Multi-Blade Fire Dampers 1200 & 1250	MBFDINST
Combination Fire/Smoke Dampers 1220	1220INST
Combination Fire/Smoke Dampers 1270	1270INST
Single Side Retaining Angles	FDSSRAINST



Dimensions are in inches (mm).

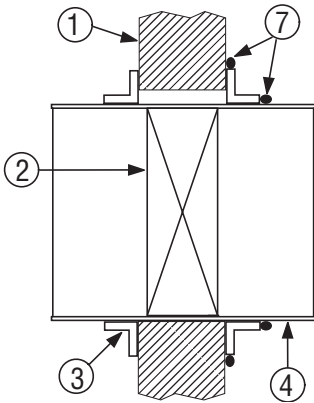


Figure 1. Damper ducted both sides.

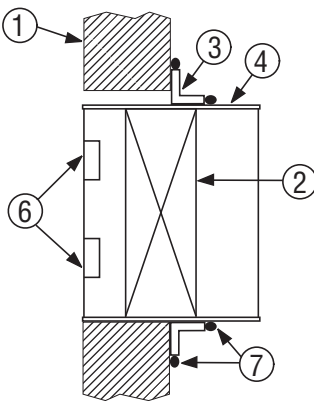


Figure 2. Damper sleeve with tabs for grille mounting

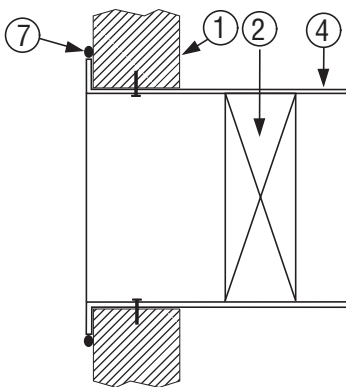


Figure 3. Out of Wall damper with flanged sleeve for grille mounting

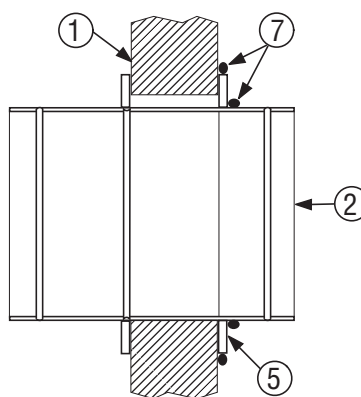


Figure 4. Round damper

APPLICATION:

Application of sealant between the retaining angles, retaining plates, or sleeve retaining flange and the fire rated wall or floor as applicable to the damper installation is not required by UL as a standard procedure. However, if an airtight seal is required by specification or local building code, sealant shall be applied as shown.

METHOD

Follow the sealant manufacturers' directions; remove dirt, grease, and moisture from the surfaces to be sealed. Apply a continuous bead of Dow Corning RTV732, Hilti Corporation FS-One, Nuco Inc. Self-Seal GG-200, Johns Manville Firetemp C1 or GE RTV108 sealant. Location of sealant should be as shown in Figures 1 through 4 and may be applied on one or both sides of the fire separation, as applicable to the model specific installation.

IMPORTANT:

Do not apply sealant within the required expansion gap between the damper and the fire rated wall or floor.

Press the surface of the sealant in place to dispel any air. Allow sealant to set and become tack-free before operating the damper.

Refer to the appropriate damper installation instructions for details on damper installation.

ITEMS

1. Fire Rated Wall or Floor
2. Damper
3. Retaining Angles
4. Sleeve
5. Retaining Plate
6. Mounting Tabs
7. Sealant (refer to text for specific sealant)

Dimensions are in inches (mm).



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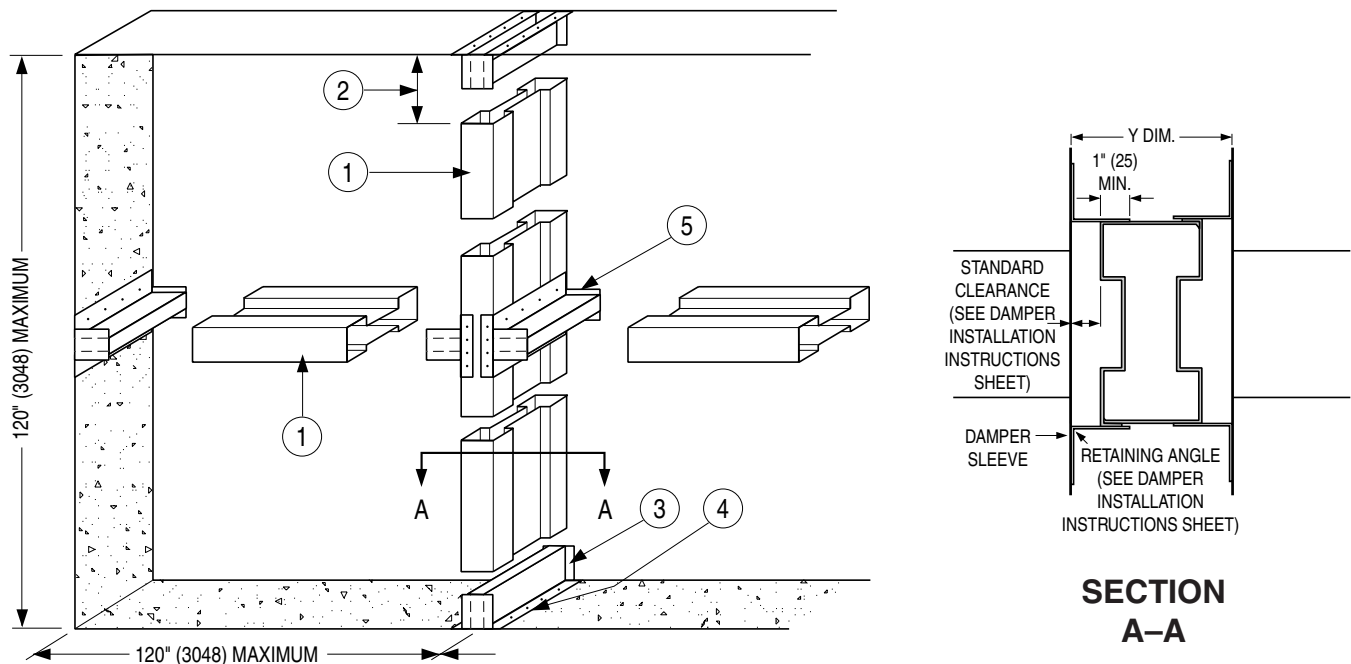
APPLICATION:

Fire dampers are UL/ULC Classified for their maximum size or maximum assembly size. Generic steel mullions can be used in static HVAC systems to separate vertically mounted 1 1/2 hour labeled galvanized steel fire dampers in vertical wall openings larger than maximum UL/ULC permitted multiple damper assembly size. Fire dampers must not exceed a maximum 120" (3048) height by unlimited width using vertical mullions every 120" (3048) max. Mullions are not intended to be part of the ductwork. (i.e. exposed to airflow).

Whenever the duct size exceeds the maximum damper width or height, the opening must be divided into two or more separate openings with a mullion installed between the damper sections. The mullion consists of a vertical and/or horizontal mullion and mullion caps. One cap for each end of the mullion.

The steel mullion is intended for use only in concrete block or poured walls with 7" (178) minimum and 12" (305) maximum thickness. Hollow concrete block walls are to be suitably filled with minimum 3500 psi concrete for proper securing of mullions.

Important Note: Steel mullions are for use in static systems only. UL/ULC does not acknowledge their use with dynamic fire dampers.



FABRICATION AND GENERAL INSTALLATION:

1. Fabricate mullions of 16 ga. (1.6) galvanized steel as shown in **Figure 1**. Two mullion pieces are joined with 3/16" (5) diameter steel pop rivets or 3/4" (19) long welds located 6" (152) maximum from each end and 12" (305) O.C. maximum.
2. The mullion should permit clearance between the mullion and top cap. Required clearance is 1/8" (3) per foot of wall opening height. Minimum permitted clearance is 1/4" (6). Maximum permitted clearance is 1 1/4" (32) (e.g. for an 8 ft. (2438) high opening the permitted clearance is 1/8" (3) x 8 = 1" (25) +).
3. Fabricate two caps for each mullion of 12 ga. (2.8) galvanized steel as shown in **Figure 2** for vertical and horizontal mullions. (Caps must permit mullion to overlap each cap by minimum 3" (76)). Cap height is calculated by adding 3" (76) to permitted mullion expansion clearance which is 1/8" (3) per foot of wall opening height. Insert mullion caps into mullion ends allowing mullion to float between the caps. Do not fasten mullion to caps in any way. Locate within opening to provide correct expansion clearance for dampers.
4. Drill holes in caps and concrete for anchoring steel mullion caps with 1/4" (6) – 20 x 5/16" (8) steel screws and 3/8" (10) diameter x 1" (25) concrete expansion anchors. The eight holes to secure the cap (**Figure 3**) are equally spaced, $X \div 8$ from both ends and 1/2" (13) inwards of each side.
5. Set horizontal mullion caps at vertical mullions as shown (**Figure 4**). If steel lintels are present, four 1" (25) welds (two per mullion cap leg) may be used to anchor each mullion cap.

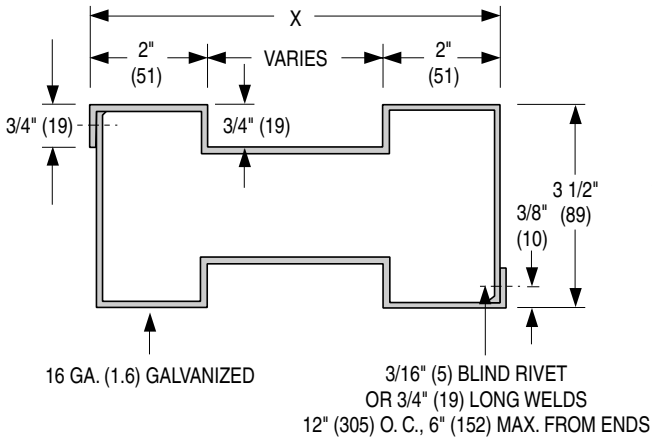


FIGURE 1
MULLION CROSS-SECTION

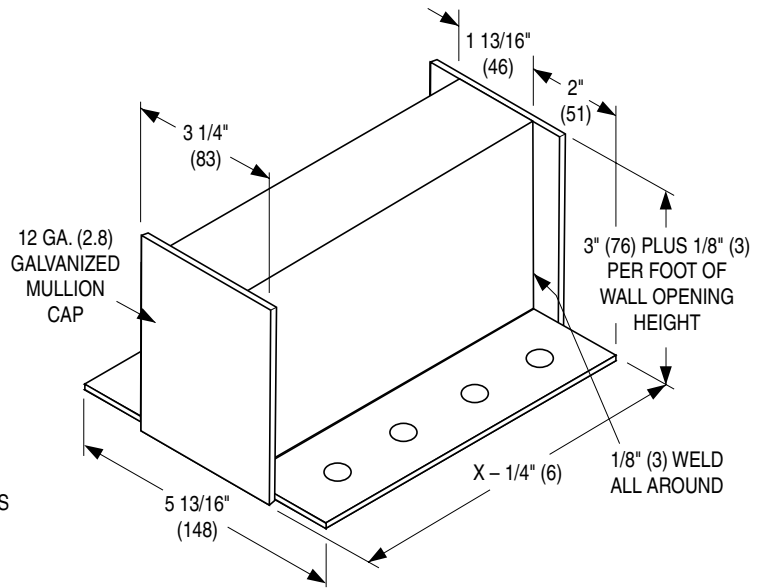


FIGURE 2

X = WALL THICKNESS

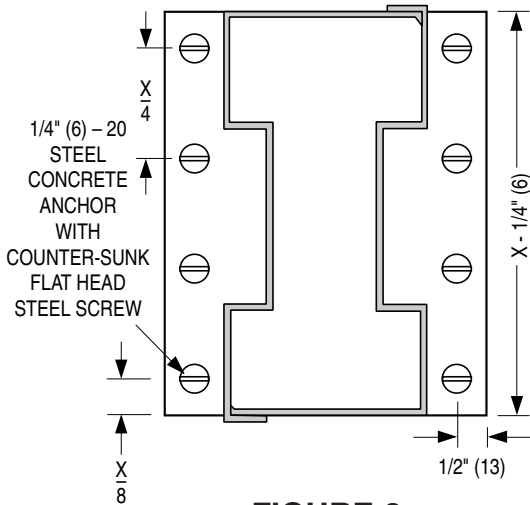


FIGURE 3

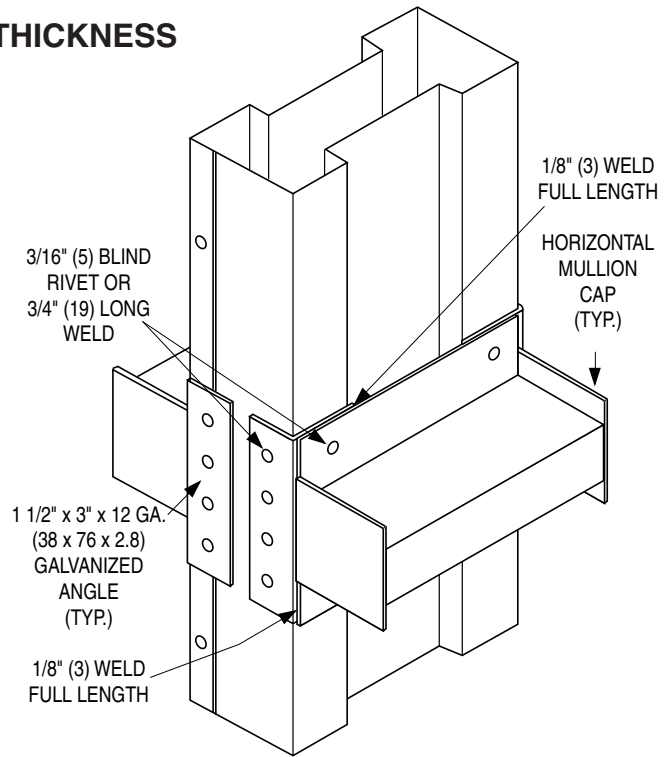


FIGURE 4



Refer to the UL or ULC Classification Marking on the Product

These instructions comply with Underwriters Laboratories Safety Standard 555.

Dimensions are in inches (mm).

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Detail 1A
Angle over
drywall.

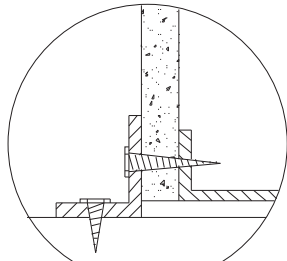
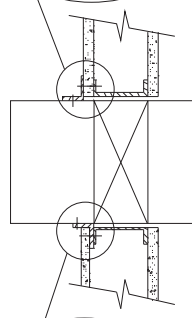


Figure 1
Metal Stud



Detail 1B
Angle under
drywall.

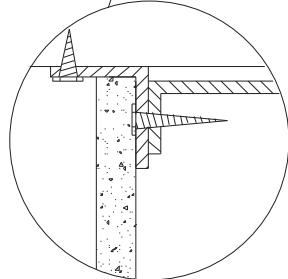


Figure 2
Wood Stud

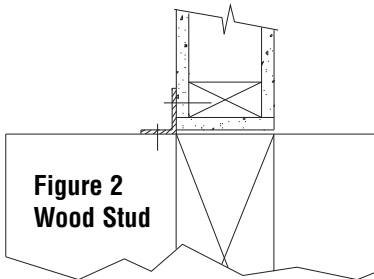
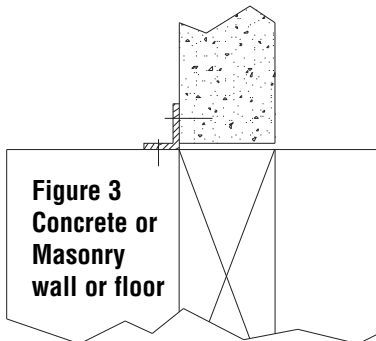


Figure 3
Concrete or
Masonry
wall or floor



NOTES:

1. For the maximum sizes listed below, all Nailor 1 1/2 hour labeled curtain, multi-blade and combination fire/smoke dampers may be installed using single-side retaining angles in lieu of the conventional two-sided retaining angle method. Retaining angles may be field fabricated or factory supplied and may be installed in metal/wood stud or masonry walls and concrete floors.
2. Install dampers in accordance with the appropriate damper installation instruction sheet in conjunction with this supplement. Replace conventional two-sided retaining angles with single-sided retaining angles as appropriate. Retaining angles may be installed on either side for vertical partition installations, but must be installed on the top side for a floor installation. Retaining angles must be attached to both the sleeve and the wall or floor.
3. Retaining angles required on all four sides unless installed on top of a concrete floor slab (See Note 6).
4. Single-sided retaining angles shall be a minimum of 1 1/2" x 1 1/2" x 16 ga. (38 x 38 x 1.61) steel for metal stud, masonry walls or concrete floors. For wood stud partitions, retaining angles shall be a minimum of 2" x 1 1/2" x 16 ga. (51 x 38 x 1.61) steel. For metal stud partitions only, the single-side retaining angle may be directly attached to the metal stud prior to the installation of the drywall. See Detail 1B.
5. Attach the 1 1/2" (38) leg of the retaining angles to the damper sleeve using 1/2" (13) long welds, 1/4" (6) diameter bolts and nuts, 3/16" (5) diameter steel rivets or #8 sheet metal screws, 6" (152) o.c.. Secure the retaining angles to the structural members of a vertical drywall wall using drywall screws. In the case of wood stud construction (see Figure 2), the screws should be a minimum of 2 1/2" (64) long, with minimum 1 1/4" (32) penetration into framing. In the case of masonry walls or concrete floors (see Figure 3), use 1/4" (6) masonry anchors 1 1/2" (38) minimum length, with minimum 1 1/4" (32) penetration into wall or floor. All fasteners to be on a maximum of 12" (305) o.c. with a minimum of two fasteners per side, top, and bottom.
6. In the case where the damper sits directly on a concrete floor slab, the bottom retaining angle is not required if the damper sleeve is fastened directly to the slab using 1/4" (6) masonry anchors 1 1/2" (38) minimum length, with minimum 1 1/4" (32) penetration into the floor. All fasteners to be on a maximum of 12" (305) o.c. with a minimum of 2 fasteners (See Figure 4).

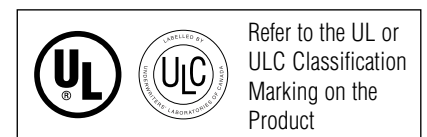
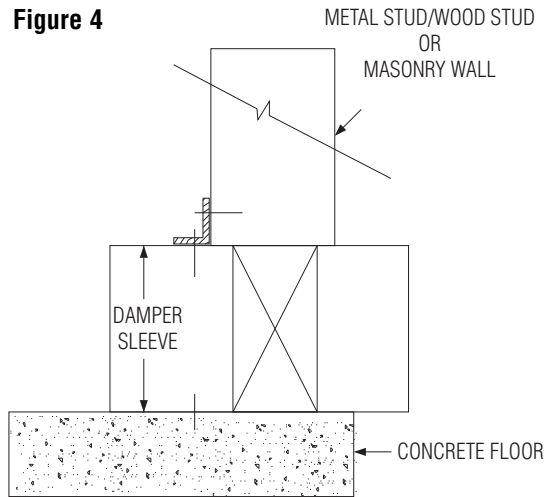


Figure 4



7. No firestop caulking is required on this product.

Underwriters' Laboratories file # R9492.

Also conforms to NFPA 90A and NFPA 92.

Maximum sizes: 96" W x 36" H (2438 x 914) or
36" W x 96" H (914 x 2438).

NOTES:

1. These details are based upon tests conducted by the Gypsum Association. Consult the local authority having jurisdiction for other acceptable framing methods.
2. Frame wall openings as shown in Figure 1 or 2.
3. Gypsum panels must be screwed to all stud and runner flanges, 12" (305) max. o.c. surrounding opening.
4. All fasteners to be per UL/ULC Classified wall design.
5. UL/ULC wood stud designs require gypsum wallboard filler pieces to be installed around entire opening, screwed 12" (305) o.c. to web of runners and studs, covering all wood stud surfaces.
 In UL metal stud designs, exposed steel surfaces need not be covered with gypsum wallboard. ULC metal stud construction however may still require filler pieces, check with the local authorities.
6. Refer to standard installation instructions sheet for additional details.

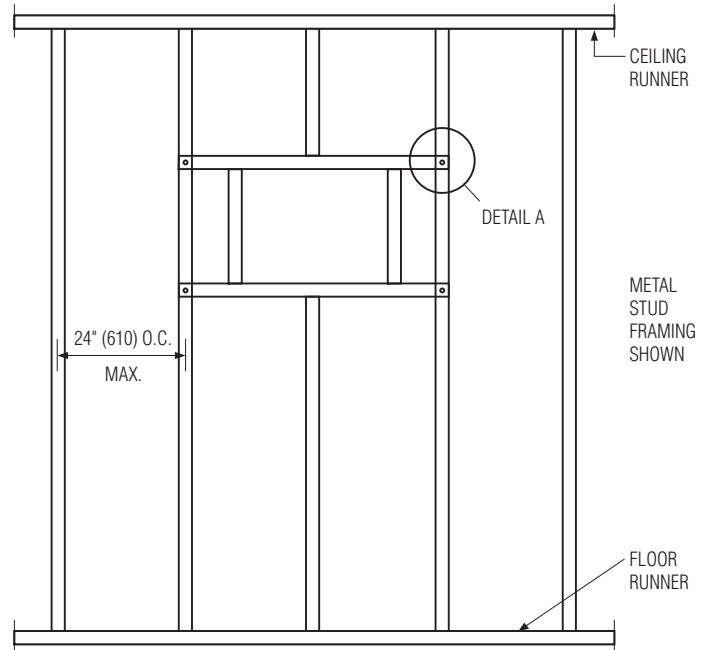


FIGURE 1. SINGLE VERTICAL STUD OPENING PREPARATION DETAILS.
 DAMPERS UP TO 36" x 36" (914 x 914).

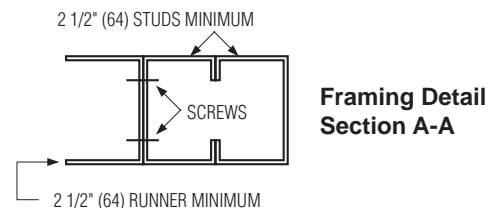
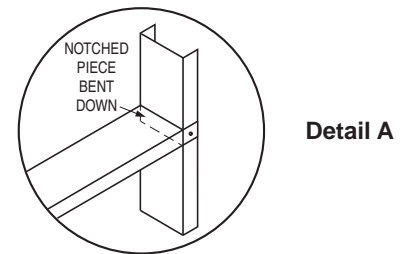
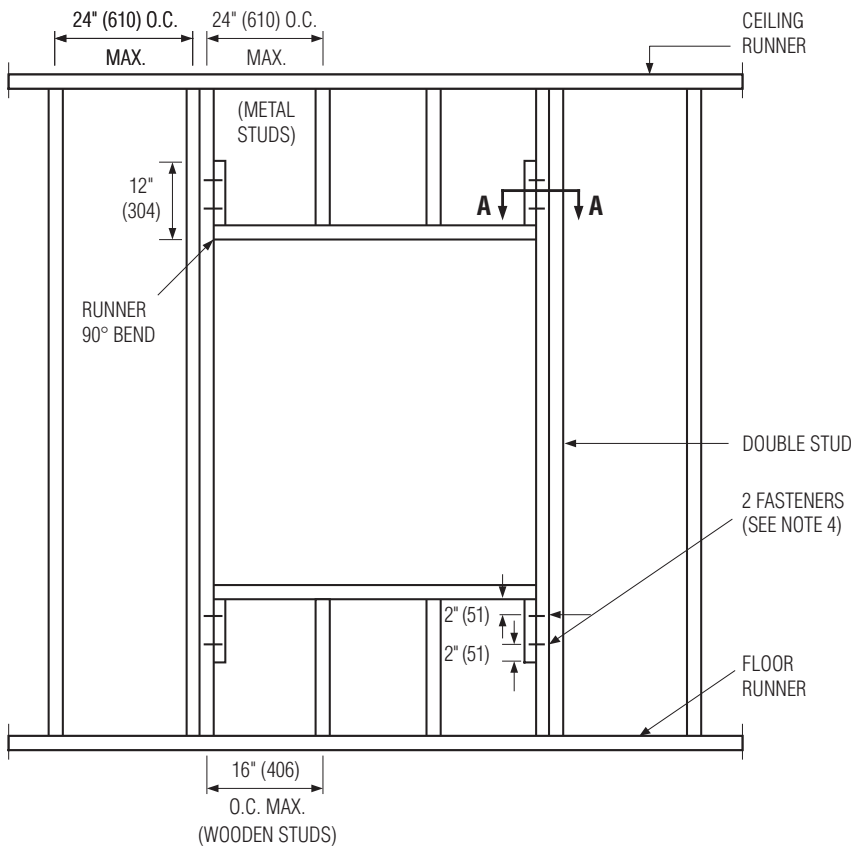
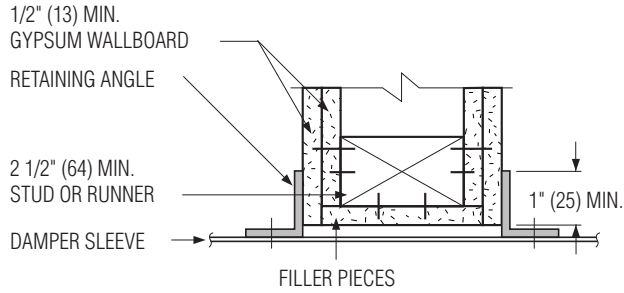


FIGURE 2. DOUBLE VERTICAL STUD OPENING PREPARATION DETAILS.
 DAMPERS OVER 36" x 36" (914 x 914).

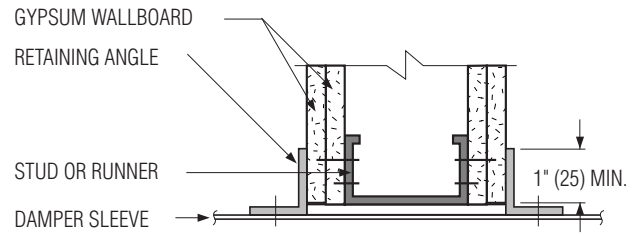
TYPICAL STUD WALL DETAILS (See Notes on Page 1)

WOOD STUD DETAIL

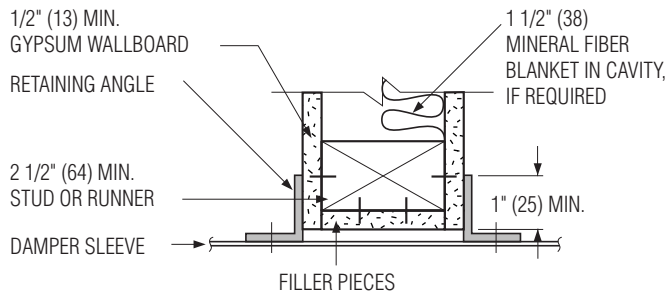


2 Hour Partition Rating

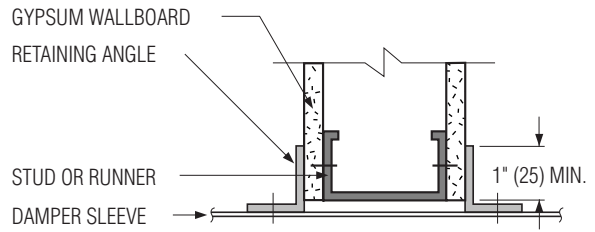
METAL STUD DETAIL (UL DESIGN)



2 Hour Partition Rating



1 Hour Partition Rating



1 Hour Partition Rating

Dimensions are in inches (mm).

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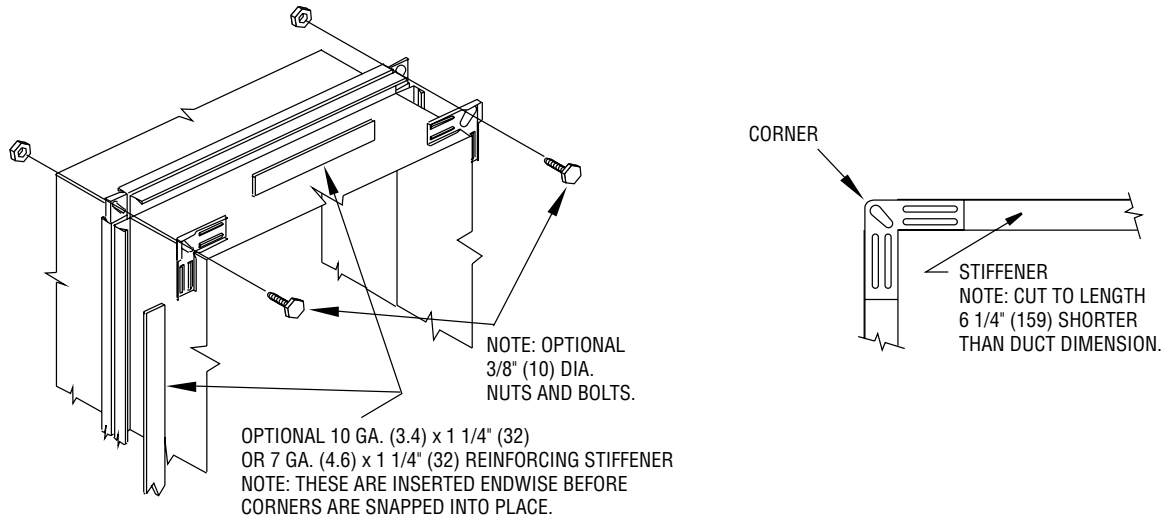


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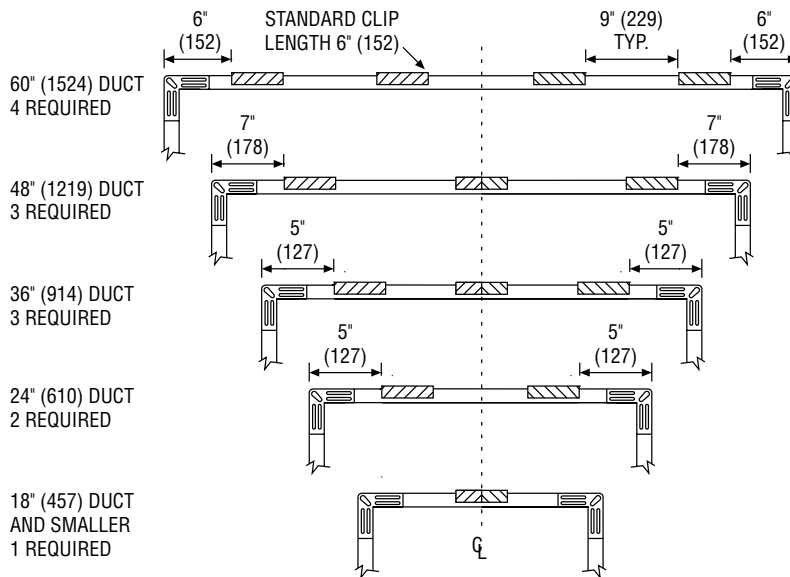
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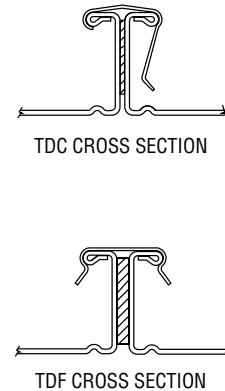
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RECOMMENDED CLIP SPACING



CLEAT DETAILS



Damper Type	Max. Size W x H		No. Cleats Per Side
	(inches)	(mm)	
Curtain	18 x 18	457 x 457	1
	24 x 24	610 x 610	2
	48 x 48	1219 x 1219	3
	60 x 60	1524 x 1524	4
Multi-Blade	18 x 18	457 x 457	1
	24 x 24	610 x 610	2
	36 x 48	914 x 1219	3

APPLICATION:

TDC (by Lockformer) and TDF (by Engle) are approved as breakaway connections for joining the fire damper sleeve and the duct. The slip joints shown in standard installation instructions for curtain type fire dampers, multi-blade fire dampers and combination fire/smoke dampers may be replaced by one of these systems.

INSTALLATION:

TDC and TDF roll-formed 4-bolt flanged connections assembled per the manufacturers instructions using gaskets, metal cleats 6" (152) long with spacing as shown and four 3/8" (9.5) metal nuts and bolts. See also the TDC or TDF addendum to the SMACNA Duct Construction Standards.



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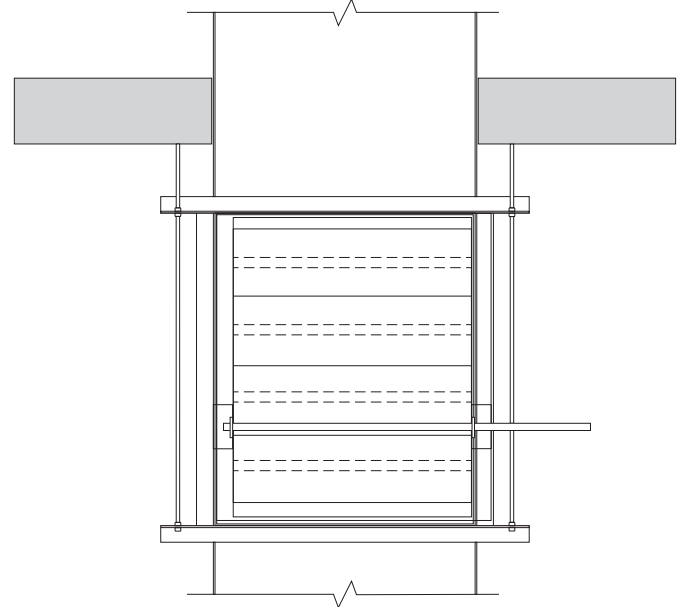
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These instructions are for installing vertical mount fire and combination fire smoke dampers in a fire resistant ventilation duct (UL Ventilation duct Assembly HNLN.V-5).



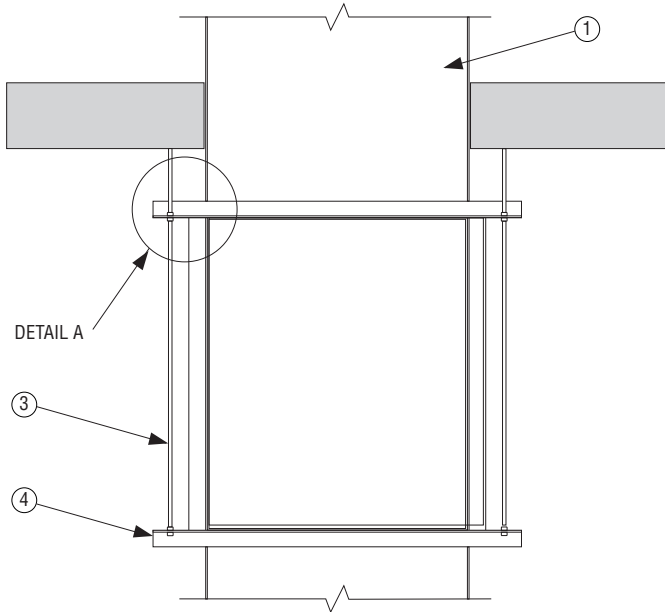
NOTES:

1. The damper sleeve must slip inside the fire resistant duct spool. Damper sleeve assembly will be 1/4" (6), 1/2" (13) maximum, smaller than duct spool size.
2. Damper is to be supplied with factory mounted sleeve. Sleeve gauge will be minimum of 16 ga. (1.5) for dampers up to 36" wide x 24" high (914 x 610) and 14 ga. (2) for dampers exceeding 36" wide x 24" high (914 x 610).
3. Mounting angles need to be the following sizes:
 - 1 1/2" x 1 1/2" x 1/4" up to 24" (38 x 38 x 6 up to 610)
 - 2" x 2" x 1/4" over 24" up to 32" (51 x 51 x 6 over 610 up to 813)
 - 2 1/2" x 2 1/2" x 1/4" over 32" up to 40" (64 x 64 x 6 over 813 up to 1016)
 - 3" x 3" x 1/4" above 40" (76 x 76 x 6 above 1016)
4. Mounting angle fasteners:
 - #10 bolts or screws
 - 3/16" (4.7) steel rivets
 - 1/2" (13) long welds
5. Mounting Angle Fasteners Spacing:
 - Mounting angles to dampers, space fasteners on 6" (152) on center.
 - Mounting angle to spool flange, space fasteners on 12" (305) on center.
 - Minimum 2 fasteners per side
6. Hanger rods:
 - 3/8" (10) threaded rod anchored to the floor above and attached to the mounting angles through hole in the angles and secured with hex nut and washer (items 5 & 6). Anchor to masonry per assembly No. V-5.
7. Duct to Damper Sleeve Connection:
 - See the fire damper or the combination fire smoke installation instructions for breakaway, flanged, or non-breakaway connections.

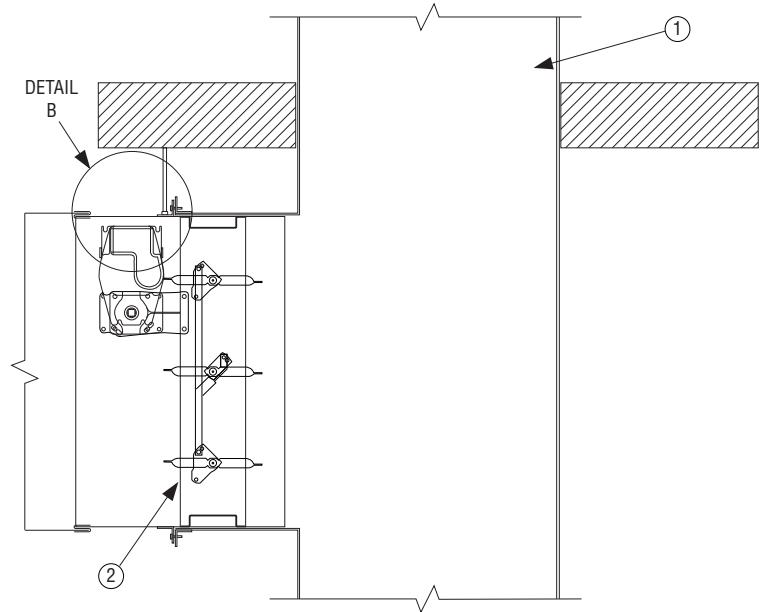


END VIEW

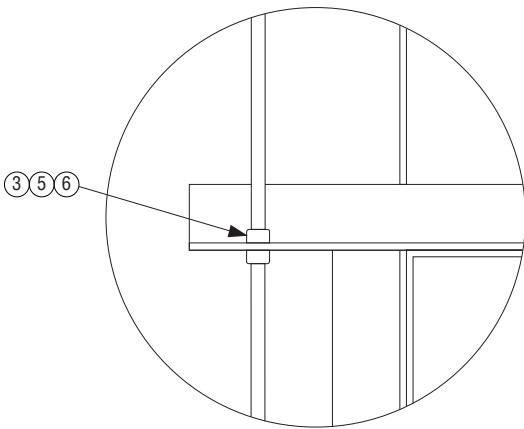
Item	Description
1	Fire Resistant Ventilation Duct (UL HNLN Assembly No. V-5)
2	Fire Damper or Combination Fire/Smoke Damper
3	Hanger rods in accordance with assembly No. V-5
4	Mounting angles (see instruction #3)
5	3/8" (10) hex nuts
6	3/8" (10) flat washer
7	Mounting angle fasteners (see instruction #4)



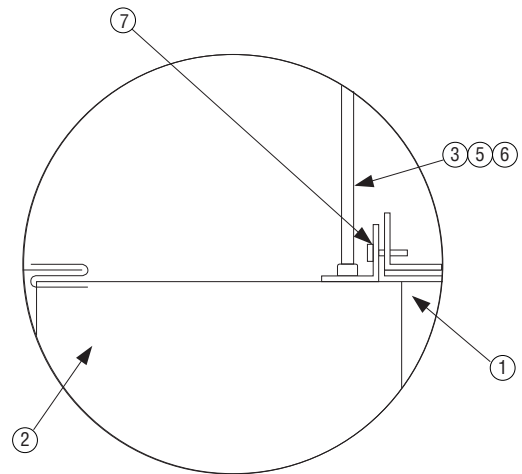
END VIEW



SIDE VIEW



DETAIL A



DETAIL B

Dimensions are in inches (mm).

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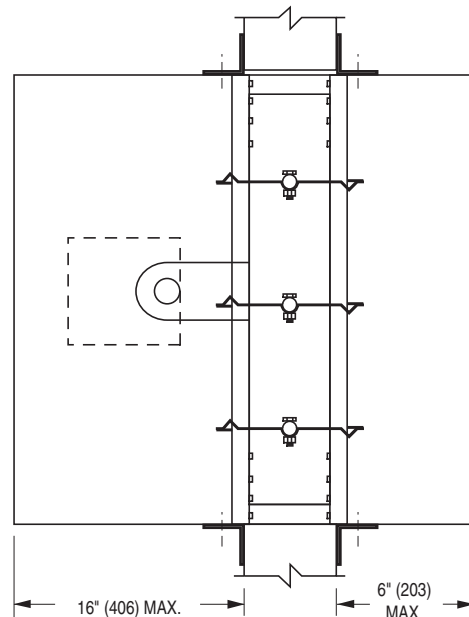
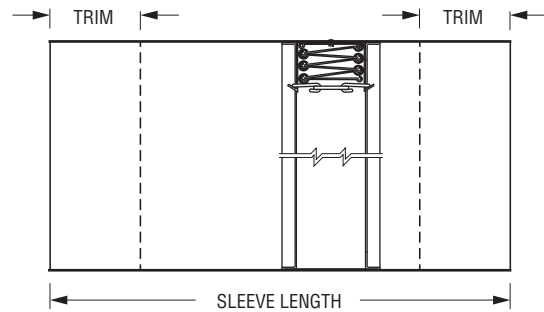
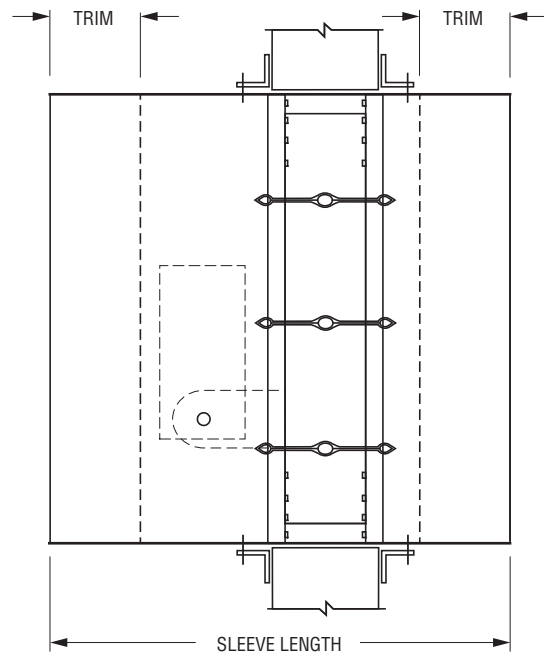
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Trimming of factory-supplied sleeves may be necessary to accommodate field conditions or applications. Other damper components such as actuators and fuse links should not be altered.

NOTES:

- 1. Sleeve Length on Non-actuator side:** 6" (152) maximum sleeve length beyond fire-rated barrier on non-actuator side.
- 2. Sleeve Length on Actuator side:** 16" (406) maximum sleeve length beyond fire-rated barrier on actuator side.



Dimensions are in inches (mm).



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APPLICATION

The MLS-300 Position Indicator Package contains two independent 360° rotary switch cams for use in conjunction with certain Honeywell electric actuators. It provides an on / off signal at two adjustable points in the actuator stroke. This signal can be routed to a Fire Fighters' Smoke-Control Station for remote damper position status in Smoke Control Management Applications. The MLS-300 is usually factory mounted for Fire / Smoke and Smoke Damper applications, but can be field installed.

ELECTRICAL SWITCH RATINGS:

Switching

Single-pole, double-throw (SPDT) micro switches.

Switching Differential

Three angular degrees maximum.

Electrical Switch Ratings (at 240 Vac):

At or below 240 Vac:

Resistive Load: 8A

Inductive Load: 2A

At 125 Vdc: 0.5A

At 250 Vdc: 0.25A

Pilot Duty: 4A, 125 Vac.

Cable

Double insulated, -40°F to 130°F (-40°C to 54°C).

Conduit (not included)

3/8" flexible.

Operating Temperature

-40°F to 350°F (-40°C to 177°C). UL555/555S

Rating and Approvals:

Base Model: Honeywell 32003532-005

UL Recognized file No. E4436.

UL94-5V Plenum rating

Cable: UL Style 1180 rated 300V, 200 C, 18 gauge.

NEMA2



CAUTION

Electrical shock or Equipment Damage Hazard.

Can shock individuals or short equipment circuitry.

Discount power supply before installation and always keep device assembled.



CAUTION

Actuator Damage Hazard.

Turning motor output hub by hand or wrench can damage internal gears.

Forcibly turning the motor shaft damages the gear train.

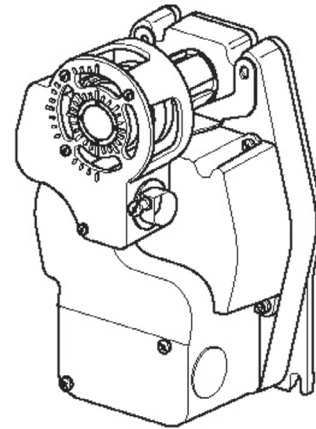


Figure 1. Honeywell ML4X02/8X02, ML4115/8115 or MS4X09/8X09 electric actuators with MLS-300 (Honeywell) position indicator package.

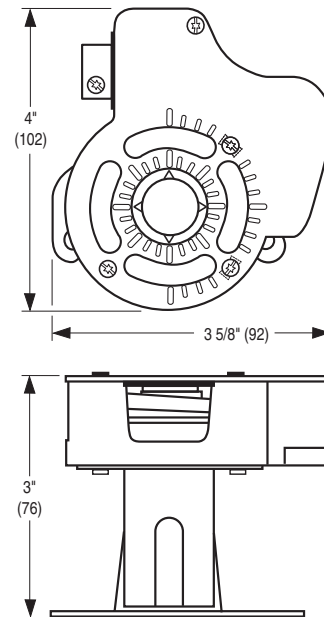


Figure 2. Dimensional detail

Factory Installation

When factory installed the switch is factory set for full open and full closed positions.

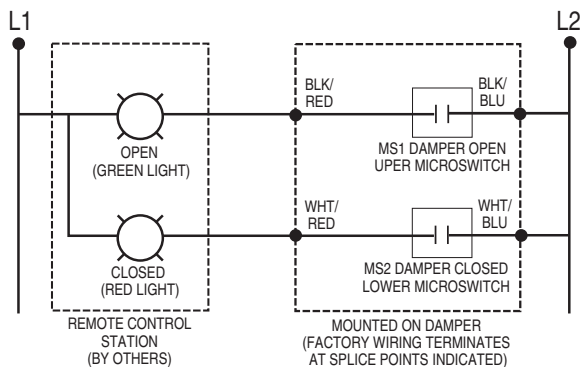


Figure 3. Wiring schematic

Standard Mounting:

MS1 is damper open signal.

MS2 is damper closed signal.

Non-Standard Mounting:

Important: Installer must double check continuity of MS1 and MS2 before wiring to determine which switch signals the damper's open or closed position.

Field Installation

Prior to installation first...

1. Read instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings and description given in specification to make sure product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

Procedure:

1. Determine desired switching action (if switch is to energize during clockwise ↻ or counterclockwise ↺ rotation).

Note: With switch cam as shown in Figure 4, the normally closed contact opens during counterclockwise rotation and the normally open switch closes.

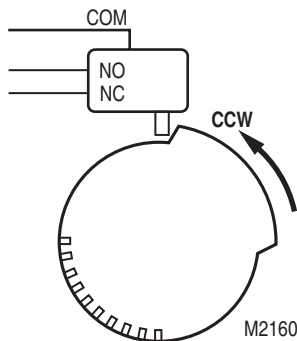


Figure 4. Switching configuration (top view) for counterclockwise rotation.

Conversely, with the switch cam as shown in Figure 5, the normally closed contact opens during clockwise rotation and the normally open switch closes.

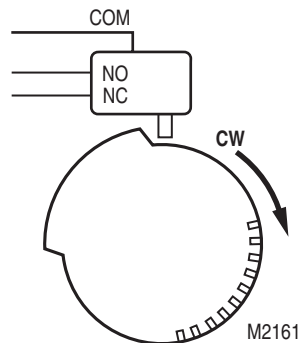


Figure 5. Switching configuration (top view) for clockwise rotation.

Note: Switches can be set prior to installation on the actuator if angular switch positions are known.

2. Align the switch hub with the setscrews on the actuator. See Figure 1.
3. Mount the switch on the actuator and tighten the two screws.
4. Determine switch position settings based on the angular indications molded into the housing.
5. Move each cam inside switch assembly to the appropriate position. Remember the direction of travel of the cam for switching purposes (see Figure 4 and 5). Monitor the switch closure with an ohmmeter for a continuity check. See Table 1.

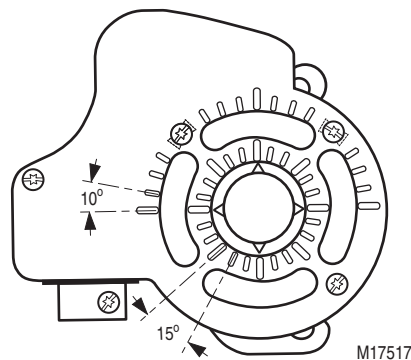


Figure 6. Angular indications of switch

Switch	Normally Open	Normally Closed
Activated	Zero ohm	Infinite ohms
Not Activated	Infinite ohms	Zero ohm

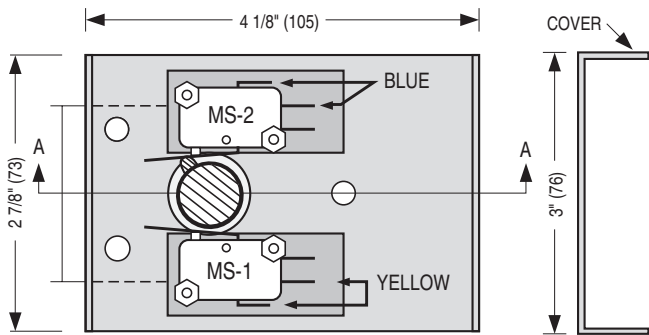
Table 1. Proper continuity measurements.

Connection	Upper Switch	Lower Switch
Common	Black / Red	White / Red
Normally Closed	Black / Yellow	White / Yellow
Normally Open	Black / Blue	White / Blue

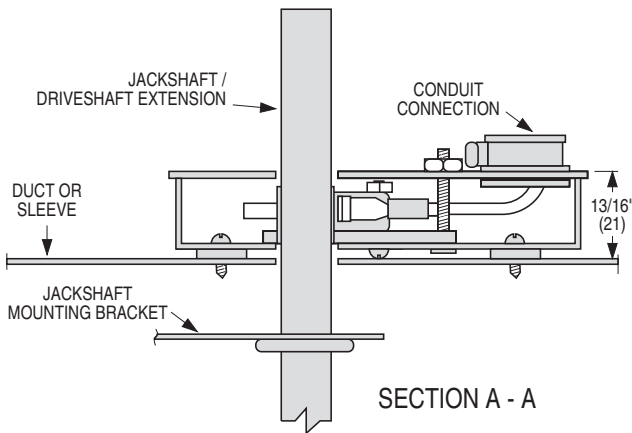
Table 2. Position Indicator Switch Wiring Connections.

APPLICATION:

- The MLS-300 Position Indicator Package operates as a function of the damper blade position and provides the ability to remotely indicate damper blade position.
- The MLS-300 incorporates two SPDT switches and provides a positive open or closed signal when used in conjunction with remote indicator lights. MLS-300's are used in active smoke control management systems to positively indicate the status of all combination fire/smoke and smoke dampers in the building.
- The MLS-300 is available only as a factory installed option on combination fire / smoke and smoke dampers.



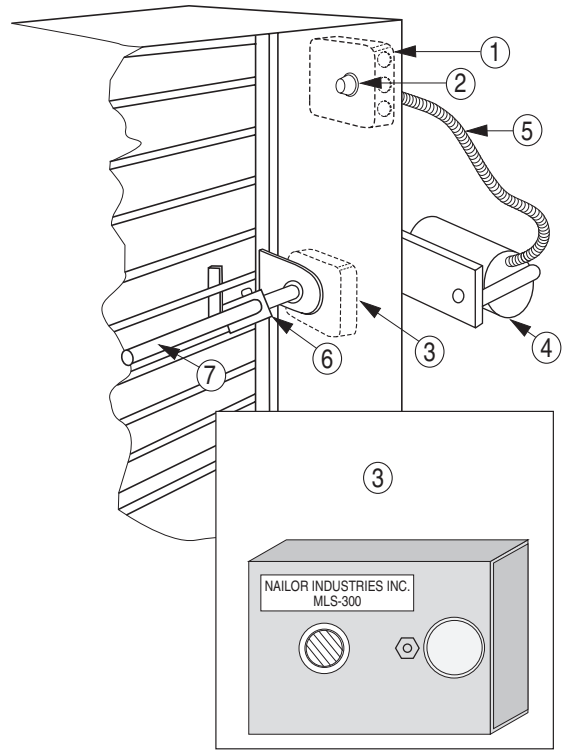
EXTERNAL RIGHT HAND MOUNTING: FRONT VIEW (LESS COVER)



SECTION A - A

Position Indicator Microswitch Data:

Switch Type: Single Pole double throw (2)
 15 Amps, 1/3 HP, 125, 250 Vac or 24 Vdc.
 1/2 Amp, 125 Vdc. 1/4 Amp, 250 Vdc.



Typical Combination Fire / Smoke Damper Installation With UL Listed Actuator

Description:

1. Electrical Junction Box. [and EP switch with pneumatic actuator(s)]
2. ERL 165, 212, 250, 350 Electric Resettable Link (Heat Sensor)
3. MLS-300 Position indicator package
4. Actuator (pneumatic illustrated).
5. Silicone Tubing or Flexible Conduit
6. Over-Center Knee Lock
7. Jackshaft

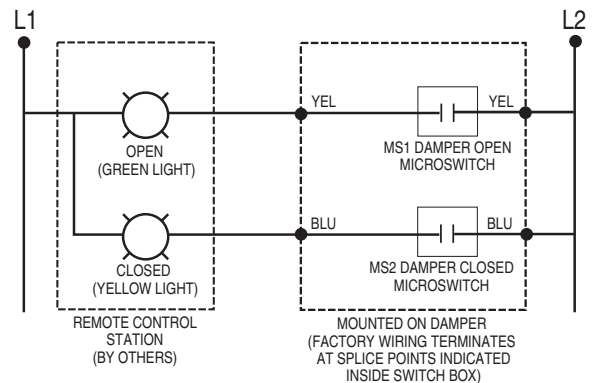


Figure 1. MLS-300 Wiring Schematic.

Electrical Connections:

1. Remove cover of junction box. There are four or six coded color wires. Four wires are the MLS-300 position indicator package. If six wires are present, the additional two are the field connection for either an electric actuator or an EP switch for a pneumatic actuator.

MS1 is damper open signal.

MS2 is damper closed signal.

Important: Installer must double check continuity of **MS1** and **MS2** before wiring to confirm which switch signals the damper's open or closed position.

2. Connect external wiring and electrical power supply (120 or 24 Vac) in accordance with N.E.C. and any applicable local codes.
3. Replace junction box cover and check operation.

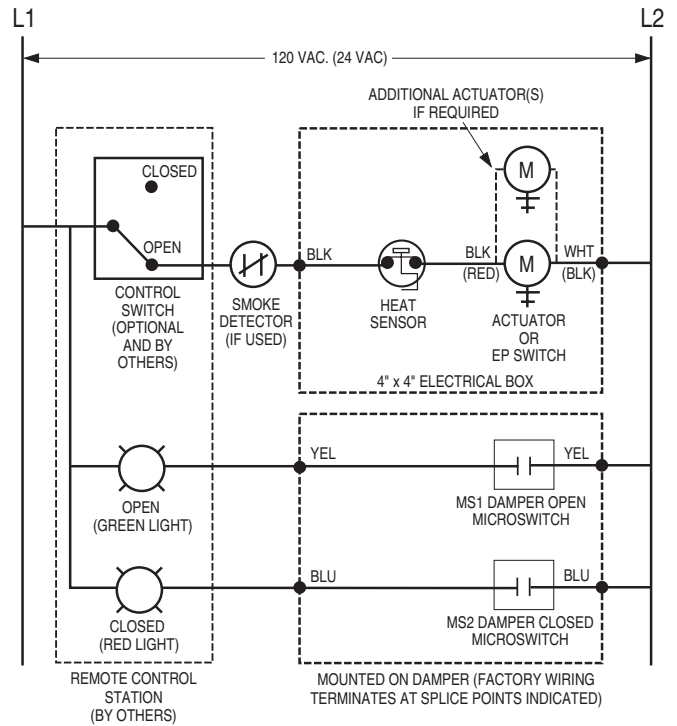


Figure 2. Combination Fire/Smoke Damper Wiring Schematic.

Dimensions are in inches (mm).

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Application and Operation

The Nailor PRL Pneumatic Replaceable Link is a UL Classified heat responsive device used in conjunction with Nailor combination fire/smoke dampers.

The PRL is supplied as standard on all combination fire/smoke dampers ordered with a pneumatic actuator. An alternative to the PRL would be the Nailor ERL (Electric Resettable Link) with an EP (Electric/Pneumatic) Switch.

The PRL is a factory mounted pneumatic release valve/replaceable fusible link assembly. The PRL's function is to sense an abnormally high temperature, as caused by a fire, and allow the damper to close in order to prevent the spread of fire and smoke.

Fire Control Mode: The PRL activates when fire temperatures in excess of 165, 212 or 280°F (74, 100 or 138°C) are detected. When the fusible link melts, air from the pneumatic actuator(s) is exhausted and the actuator spring return mechanism causes the damper to close and lock.

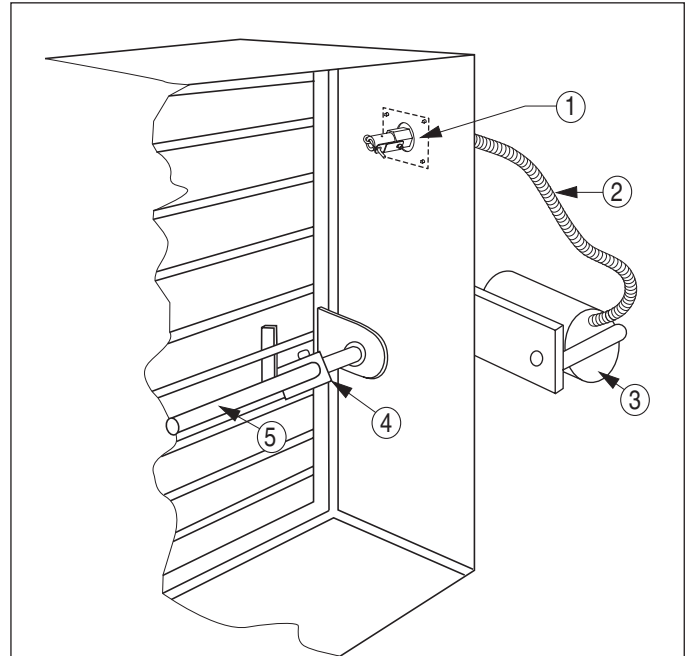
Smoke Control Mode: When a signal is detected via a normally closed smoke detector connection, during system testing or if power failure occurs, the damper will close and remain closed. When the smoke signal ceases (smoke detector reset), the test is completed or power is restored, the damper will automatically reset to the open position.

An EP (Electric/Pneumatic) Switch, by others, must be present in the system.

All pneumatic actuators are factory mounted with a fail close (Normally Closed) damper connection.

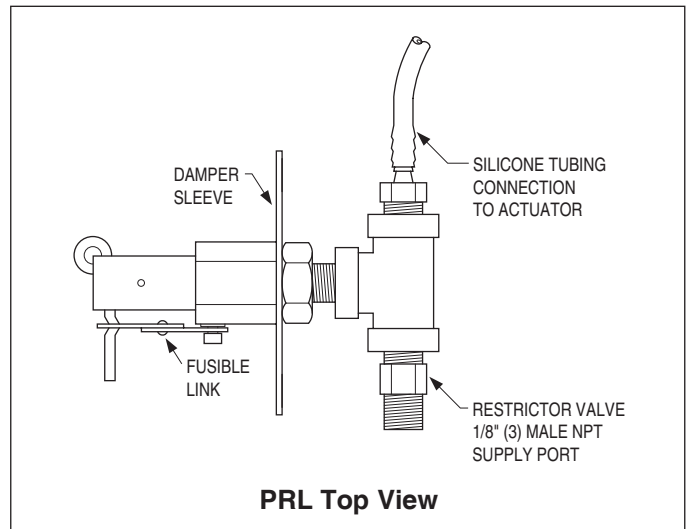
Notes:

1. The PRL must be installed at the factory and cannot be added in the field, in accordance with UL requirements.
2. A singel PRL may be use to control up to a maximum of four pneumatic actuators.
3. Pneumatic actuators are to be field piped per local codes.



Typical Combination Fire/Smoke Damper Detail with UL Listed Pneumatic Actuator Description:

1. PRL 165, 212 or 280°F Pneumatic Replaceable Link
2. Silicone Tubing
3. Pneumatic Actuator
4. Over-center Knee Lock
5. Jackshaft





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NOTES:

1. These instructions meet the requirements of UL 555 and apply to 1-1/2 hour rated combination fire smoke dampers and fire dampers mounted in masonry, block, or metal stud walls. This installation method may also be utilized in wood stud walls in applications where the angle on the bottom side of the damper is omitted. Specific requirements in these instructions are mandatory.

The installation shall comply with the requirements of NFPA 90A (Standard for the Installation of Air Conditioning and Ventilating Systems) and UL File R9492.

Maximum Damper Size

Dampers up to the following sizes may utilize this installation method:

Installations omitting the retaining angle from the top of the damper

- 36" wide x 48" high (914 x 1219)

Installation omitting the retaining angle from the bottom of the damper

- 96" wide x 36" high (2438 x 914)
- 36" wide x 96" high (914 x 2438)

2. Expansion Clearance Requirements

On the side of the damper without a retaining angle there shall be no expansion clearance between the damper sleeve and wall opening.

On the three sides of the damper that do have a retaining angles there are no minimum clearance requirements between the wall opening and the damper sleeve. However, to facilitate installation, clearances between the wall opening and the damper sleeve are recommended.

3. Retaining Angle Requirements

Installations utilizing this method only require retaining angles on one side of the wall.

When using the installation method described in this supplement retaining angles are only required on three of the four sides of the damper.

4. Requirements For Side Without Retaining Angle

A) In the case where the damper sits directly on a concrete floor slab, the bottom retaining angle is not required if the damper sleeve is fastened directly to the slab using 1/4" (6) masonry anchors 1 1/2" (38) minimum length, with minimum 1 1/4" (32) penetration into the floor. All fasteners to be on a maximum of 12" (305) o.c. with a minimum of 2 fasteners.

B) When the retaining angle is omitted from the top of the damper the following requirements apply:

- The damper shall be shimmed tight up against the top of the wall opening.
- On the top side of the damper sleeve fasteners shall be run up through the sleeve into the steel stud or block wall. For steel stud walls fasteners shall be #10 x 1 1/2" (38) sheet metal screws. See **Figure 2**. For masonry or block walls fasteners shall be 1/4" x 1 1/2" (6 x 38) self-tapping concrete screws.
- Fasteners shall be no more than 2" (51) from the corners and then a maximum of every 3" (76) on center.

5. Requirements For Sides With Retaining Angles

Retaining angles for dampers must be a minimum of 20 ga. (1.0). The leg of the retaining angle on the damper sleeve shall be a minimum of 1 1/4" (32). It is acceptable for the retaining angles to be installed either such that the leg on the sleeve goes away from the wall or in towards the wall. The leg of the retaining angle on the wall shall be long enough to cover the annular space and overlap the wall by at least 1" (25).

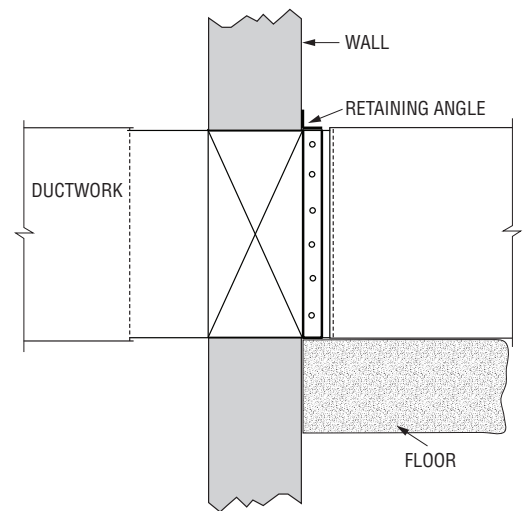


Figure 1: Retaining angle omitted from bottom side of the damper

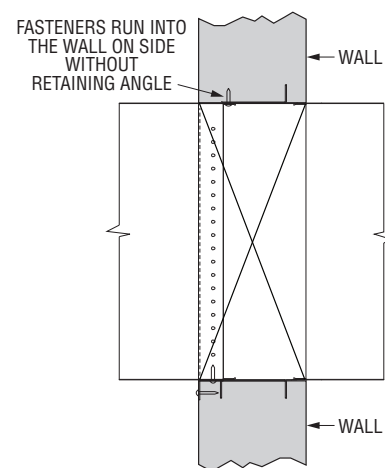


Figure 2: Fastening of damper on the side without retaining angles

Dimensions are in inches (mm).

Retaining angles must be attached to both the sleeve and the partition.

- Attachment to the sleeve shall be made with: tack or spot welds, #10 (3/4" [19] max.) sheet metal screws, or 1/4 in (6) nuts and bolts.
- Attachments to the partition shall be made using one of the following methods:
 - Drywall screws of a length such that the screw engages the steel stud/track by 1/2" (13) (steel framing). On metal stud partitions the retaining angle may be attached directly to the metal stud prior to the installation of the drywall.
 - Drywall screws of a length such that the screw engages the wood stud by 1 3/4" (45) (wood framing).
 - Steel anchors or 1/4" (6) self-tapping concrete screws of a length such that the screw penetrates the masonry or block 1 1/4" (32).
- The following applies to the attachment of the retaining angles to both the sleeve and the partition:
 - There shall be a minimum of two attachments per side
 - There shall be an attachment no more than 2" (51) from each corner and then a maximum of every 6" (152) on center.

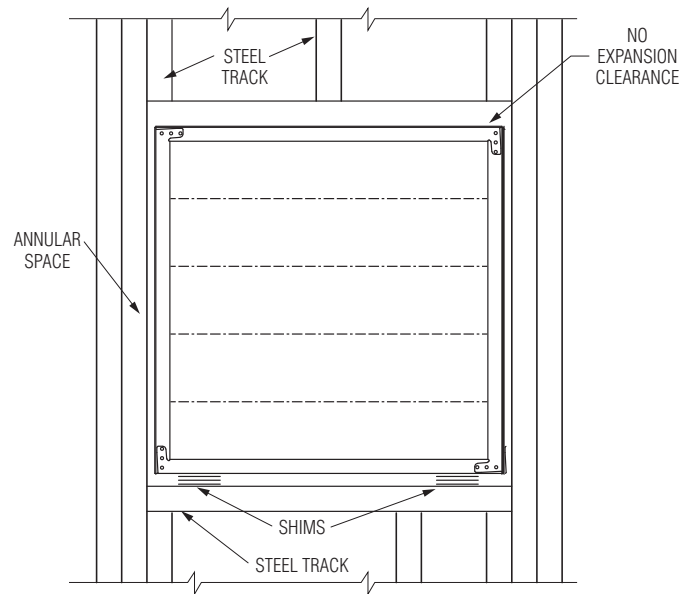


Figure 3: Steel shims left in place where center frame members meet on multiple section wide dampers when the retaining angle is omitted from the top of the damper sleeve.