



# SMOKE DAMPER

HIGH PERFORMANCE • AIRFOIL BLADE  
 LOW LEAKAGE • LOW PRESSURE DROP  
**MODELS: 1280 AND 1281 (TYPE A)**



### QUALIFICATIONS:

- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**  
Leakage Class I or II at 250°F or 350°F elevated temperature.
- Meets NFPA 90A, 92, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.
- City of New York. MEA # 366-03-M.
- California State Fire Marshal: Fire Damper Listing No. 03230-0935:0107.
- Maximum velocity: 2000 fpm @ 4" w.g. (10 m/s @ 1 kPa).

Model Series 1280 Dampers are Nailor's premium choice for applications where building codes require a leakage rated smoke damper as part of a static smoke control or dynamic smoke management system. The 1280 Series features a smoothly contoured extruded aluminum airfoil blade and compression type seals that have been especially designed to offer the lowest leakage class available. Together with out of airstream linkage, the design provides an ultra-low pressure drop and minimizes unwanted turbulence and noise generation. Qualified for vertical or horizontal installation with airflow in either direction.

### STANDARD CONSTRUCTION:

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galv. steel hat channel.
- Blades:** Airfoil type 6063-T5 extruded aluminum on 5 1/2" (140) centers. Parallel action.
- 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 double bolted to blades.
- Jackshaft:** 1/2" (13) dia. plated steel.
- Jamb Seals:** Cambered stainless steel.
- Blade Seals:** Silicone.

### Sizes (Duct W x H):

| Velocity/<br>Pressure<br>Rating | Elevated<br>Temp.<br>°F | Minimum                |                           | Maximum   |                     |
|---------------------------------|-------------------------|------------------------|---------------------------|---|---------------------|
|                                 |                         | Single Section         | Single Section            | Multiple Section  |                     |
|                                 |                         | Vertical/Horizontal    | Vertical/Horizontal       | Vertical/Horizontal   | Vertical/Horizontal |
| 24                              | 250/350                 | 8" x 8"<br>(203 x 203) | 36" x 48"<br>(914 x 1219) | 144" x 96" (3658 x 2438),<br>288" x 48" (7315 x 1219) or<br>72" x 144" (1829 x 3658). |                     |

**Notes:** Dampers with duct heights less than 8" (203) require a Type 'B' sleeve enclosure (Model 1282). Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1283).

### BASE MODEL SELECTION:

- 1280** With actuator side mounting plate
- 1281** Standard factory sleeve (caulked to UL req.) 16" long x 20 ga. (406 x 1.0) (18 ga. for dampers over 84" [2134] in width).
- 1281** 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)

### DYNAMIC VELOCITY/PRESSURE RATING:

- 24** 2000 fpm @ 4" w.g. (Standard)

### ACTUATOR SELECTION:

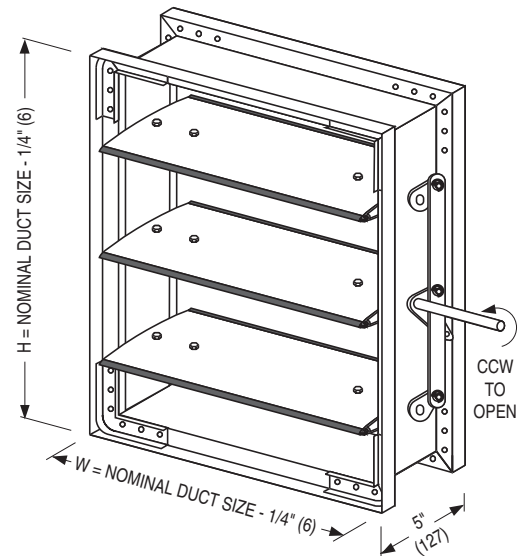
- Electric**  **Pneumatic** Specify model \_\_\_\_\_ .

### SCHEDULE TYPE:

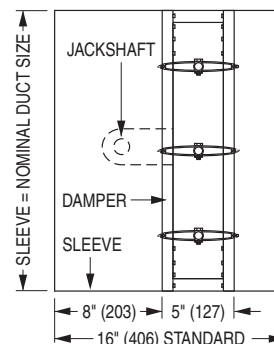
PROJECT:

ENGINEER:

CONTRACTOR:



**MODEL 1280**  
(Side Mounting Plate/Sleeve not shown)



**MODEL 1281:  
TYPE A SLEEVE**

| Wall Thickness | Minimum Sleeve Length |
|----------------|-----------------------|
| 4 (102)        | 16 (406)              |
| 8 (203)        | 20 (508)              |
| 12 (305)       | 24 (610)              |
| 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 package
- DSDL** Low Flow Smoke Detector
- DSDN** No Flow Smoke Detector
- TDF1** Flange (one end)
- TDF2** Flange (both ends)
- Special features** \_\_\_\_\_ .

For installation instructions, see IOM-SDINST.  
 Dimensions are in inches (mm).

| DATE        | B SERIES | SUPERSEDES | DRAWING NO. |
|-------------|----------|------------|-------------|
| 4 - 28 - 14 | 1280     | 1 - 1 - 12 | 1280-1      |



## SMOKE DAMPER

HIGH PERFORMANCE • AIRFOIL BLADE  
 LOW LEAKAGE • LOW PRESSURE DROP  
**MODEL: 1280 WITH EAF OPTION**



### QUALIFICATIONS:

- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**  
Leakage Class I or II at 250°F or 350°F elevated temperature.
- Meets NFPA 90A, 92, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.
- City of New York. MEA # 366-03-M.
- California State Fire Marshal: Fire Damper Listing No. 03230-0935:0107.
- Maximum velocity: 2000 fpm @ 4" w.g. (10 m/s @ 1 kPa).

Model Series 1280 Dampers are Nailor's premium choice for applications where building codes require a leakage rated (smoke) damper as part of a static smoke control or dynamic smoke management system.

The 1280 Series features a smoothly contoured extruded aluminum airfoil blade and compression type seals that have been especially designed to offer the lowest leakage class available. Together with out of airstream linkage, the design provides an ultra-low pressure drop and minimizes unwanted turbulence and noise generation. Qualified for vertical or horizontal installation with airflow in either direction. Option EAF provides a heavy duty extruded aluminum hat channel frame with hat mounting flanges.

### STANDARD CONSTRUCTION (WITH OPTION EAF):

- Frame:** Extruded aluminum frame.  
5" x 7/8" x 1/8" (127 x 22 x 3.2) 6063-T5 extruded aluminum.
- Blades:** Airfoil type 6063-T5 extruded aluminum on 5 1/2" (140) centers. Parallel action.
- 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 double bolted to blades.
- Jackshaft:** 1/2" (13) dia. plated steel.
- Jamb Seals:** Cambered stainless steel.
- Blade Seals:** Silicone.

### Sizes (Duct W x H):

| Velocity/<br>Pressure<br>Rating | Elevated<br>Temp.<br>°F | Minimum                |                           | Maximum   |                     |
|---------------------------------|-------------------------|------------------------|---------------------------|---|---------------------|
|                                 |                         | Single Section         | Single Section            | Multiple Section  |                     |
|                                 |                         | Vertical/Horizontal    | Vertical/Horizontal       | Vertical/Horizontal   | Vertical/Horizontal |
| 24                              | 250/350                 | 8" x 8"<br>(203 x 203) | 36" x 48"<br>(914 x 1219) | 144" x 96" (3658 x 2438),<br>288" x 48" (7315 x 1219) or<br>72" x 144" (1829 x 3658). |                     |

### BASE MODEL SELECTION:

- 1280 w/ EAF OPTION With actuator side mounting plate.

### LEAKAGE CLASS / ELEVATED TEMPERATURE:

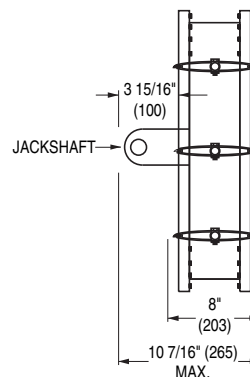
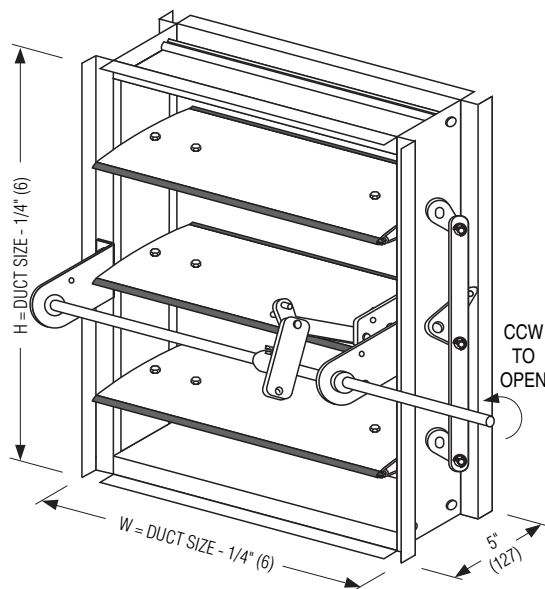
- I     II    @ 250°F (Standard)  
 I     II    @ 350°F (Optional)

### DYNAMIC VELOCITY/PRESSURE RATING:

- 24 2000 fpm @ 4" w.g. (Standard)

### 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 package
- Special features \_\_\_\_\_ .

### SCHEDULE TYPE:

### PROJECT:

### ENGINEER:

### CONTRACTOR:

For installation instructions, see IOM-SDINST.  
 Dimensions are in inches (mm).

| DATE        | B SERIES | SUPERSEDES | DRAWING NO. |
|-------------|----------|------------|-------------|
| 4 - 28 - 14 | 1280     | 1 - 1 - 12 | 1280-1A     |



**SMOKE DAMPER**  
 HIGH PERFORMANCE • AIRFOIL BLADE  
 LOW LEAKAGE • LOW PRESSURE DROP  
**MODEL: 1282 (TYPE B SLEEVE ENCLOSURE)**



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

**QUALIFICATIONS:**

- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**  
Leakage Class I or II at 250°F or 350°F elevated temperature.
- **Meets NFPA 90A, 92, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.**
- **City of New York. MEA # 366-03-M.**
- **California State Fire Marshal: Fire Damper Listing No. 03230-0935:0107.**
- **Maximum velocity: 2000 fpm @ 4" w.g. (10 m/s @ 1 kPa).**

Model Series 1280 dampers are Nailor's premium choice for applications where building codes require a leakage rated (smoke) damper as part of a static smoke control or dynamic smoke management system.

The 1280 Series features a smoothly contoured extruded aluminum airfoil blade and compression type seals that have been especially designed to offer the lowest leakage class available. Together with out of airstream linkage, the design provides an ultra-low pressure drop and minimizes unwanted turbulence and noise generation. Qualified for vertical or horizontal installation with airflow in either direction.

**STANDARD CONSTRUCTION:**

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galv. steel hat channel.  
**Blades:** Airfoil type 6063-T5 extruded aluminum on 5 1/2" (140) centers. Parallel action.  
**Linkage:** Concealed in frame. 12 ga. (2.7) plated steel.  
**Bearings:** 1/2" (13) dia. self-lubricating oilite bronze.  
**Axes:** 1/2" (13) dia. plated steel double bolted to blades.  
**Jackshaft:** 1/2" (13) dia. plated steel.  
**Jamb Seals:** Cambered stainless steel.  
**Blade Seals:** Silicone.

**Sizes (Duct W x H):**

| Velocity/<br>Pressure<br>Rating | Elevated<br>Temp.<br>°F | Maximum   |                          |                            |
|---------------------------------|-------------------------|---|--------------------------|----------------------------|
|                                 |                         | Minimum   | Single Section           | Multiple Section           |
|                                 |                         | Single Section  | Vertical/Horizontal      | Vertical/Horizontal        |
| 24                              | 250/350                 | 8" x 4" (203 x 102)<br>Overall damper height is 8" (203). | 36" x 7 1/2" (914 x 191) | 288" x 7 1/2" (7315 x 191) |

**Notes:** Duct heights less than 8" (203) require a Type 'B' sleeve enclosure (Model 1282). Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1283).

**BASE MODEL SELECTION:**

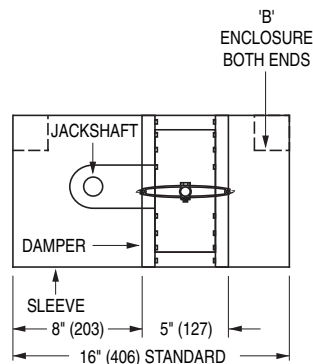
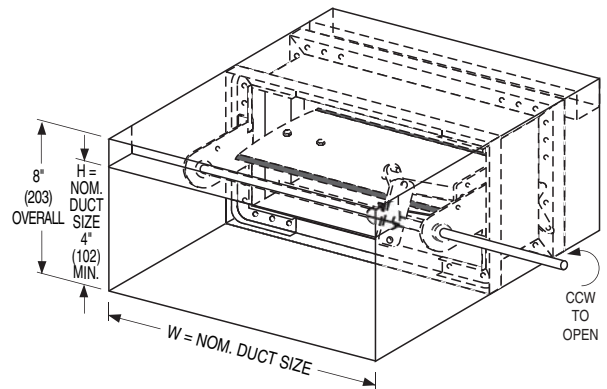
- 1282** Standard factory sleeve (caulked to UL req.) 16" long x 20 ga. (406 x 1.0).
- 1282** Non-standard sleeve. Specify \_\_\_\_\_ length \_\_\_\_\_ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).

**LEAKAGE CLASS / ELEVATED TEMPERATURE:**

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

**DYNAMIC VELOCITY/PRESSURE RATING:**

- 24** 2000 fpm @ 4" w.g. (Standard)



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

**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 package
- Special features** \_\_\_\_\_

**SCHEDULE TYPE:**

**PROJECT:**

**ENGINEER:**

**CONTRACTOR:**

For installation instructions, see IOM-SDINST.  
 Dimensions are in inches (mm).

| DATE        | B SERIES | SUPERSEDES | DRAWING NO. |
|-------------|----------|------------|-------------|
| 4 - 28 - 14 | 1280     | 1 - 1 - 12 | 1280-2      |



**SMOKE DAMPER**  
**HIGH PERFORMANCE • AIRFOIL BLADE**  
**ROUND DUCT CONNECTION**  
**MODEL: 1283 (TYPE C SLEEVE ENCLOSURE)**



**QUALIFICATIONS:**

- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**  
Leakage Class I or II at 250°F or 350°F elevated temperature.
- **Meets NFPA 90A, 92, 101 and 105 as well as IBC and NBC (Canada)**  
Building Code requirements.
- **City of New York. MEA # 366-03-M.**
- **California State Fire Marshal: Fire Damper Listing No. 03230-0935:0107.**
- **Maximum velocity: 2000 fpm @ 4" w.g. (10 m/s @ 1 kPa).**

Model Series 1280 dampers are Nailor's premium choice for applications where building codes require a leakage rated (smoke) damper as part of a static smoke control or dynamic smoke management system.

The 1280 Series features a smoothly contoured extruded aluminum airfoil blade and compression type seals that have been especially designed to offer the lowest leakage class available. Together with out of airstream linkage, the design provides an ultra-low pressure drop and minimizes unwanted turbulence and noise generation. Qualified for vertical or horizontal installation with airflow in either direction.

**STANDARD CONSTRUCTION:**

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galv. steel hat channel.  
**Blades:** Airfoil type 6063-T5 extruded aluminum on 5 1/2" (140) centers. Parallel action.  
**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 double bolted to blades.  
**Jackshaft:** 1/2" (13) dia. plated steel.  
**Jamb Seals:** Cambered stainless steel.  
**Blade Seals:** Silicone.

**Round Duct Connection Sizes (Duct Dia.):**

| Velocity/<br>Pressure<br>Rating | Elevated<br>Temp.<br>°F | Minimum   |                     |                     | Maximum             |                     |  |
|---------------------------------|-------------------------|---|---------------------|---------------------|---------------------|---------------------|--|
|                                 |                         | Single Section  |                     | Single Section      | Multiple Section    |                     |  |
|                                 |                         | Vertical/Horizontal   | Vertical/Horizontal | Vertical/Horizontal | Vertical/Horizontal | Vertical/Horizontal |  |
| 24                              | 250/350                 | 4" (102) dia.<br>Overall damper size<br>is 8" x 8" (203 x 203) min. |                     | 34"<br>(864) dia.   | 94"<br>(2388) dia.  |                     |  |

**Notes:** Duct heights less than 8" (203) require a Type 'B' sleeve enclosure (Model 1282). Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1283).

**BASE MODEL SELECTION:**

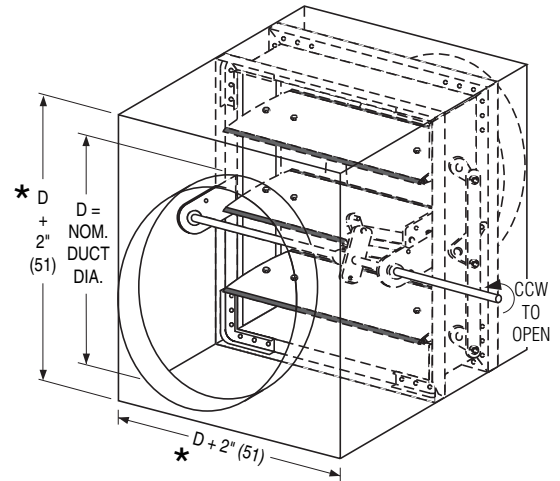
- 1283** Standard factory sleeve (caulked to UL req.) 16" long x 20 ga. (406 x 1.0).
- 1283** Non-standard sleeve. Specify \_\_\_\_\_ length \_\_\_\_\_ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).

**LEAKAGE CLASS / ELEVATED TEMPERATURE:**

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

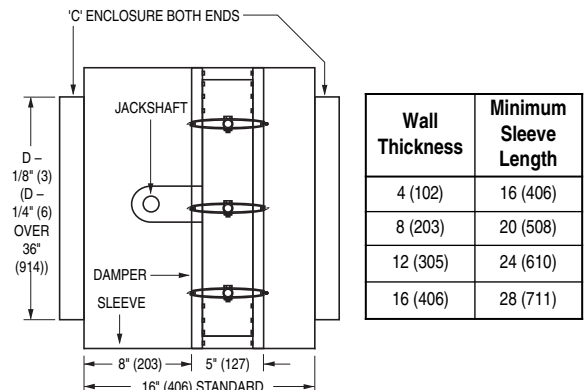
**DYNAMIC VELOCITY/PRESSURE RATING:**

- 24** 2000 fpm @ 4" w.g. (Standard)



\* or 8" (203) min.

STYLE CR : FOR ROUND DUCT



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

**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 package
- DSDL**    Low Flow Smoke Detector
- DSDN**    No Flow Smoke Detector
- Special features** \_\_\_\_\_ .

**SCHEDULE TYPE:**

**PROJECT:**

**ENGINEER:**

**CONTRACTOR:**

For installation instructions, see IOM-SDINST.  
 Dimensions are in inches (mm).

| DATE        | B SERIES | SUPERSEDES | DRAWING NO. |
|-------------|----------|------------|-------------|
| 4 - 28 - 14 | 1280     | 1 - 1 - 12 | 1280-3      |



**SMOKE DAMPER**  
 HIGH PERFORMANCE • AIRFOIL BLADE  
 SQUARE, RECTANGULAR OR OVAL  
 DUCT CONNECTION  
**MODEL: 1283 (TYPE C SLEEVE ENCLOSURE)**



**QUALIFICATIONS:**

- **UL 555S CLASSIFIED SMOKE DAMPER (File # R9492)**  
Leakage Class I or II at 250°F or 350°F elevated temperature.
- **Meets NFPA 90A, 92, 101 and 105 as well as IBC and NBC (Canada) Building Code requirements.**
- **City of New York. MEA # 366-03-M.**
- **California State Fire Marshal: Fire Damper Listing No. 03230-0935:0107.**
- **Maximum velocity: 2000 fpm @ 4" w.g. (10 m/s @ 1 kPa).**

Model Series 1280 dampers are Nailor's premium choice for applications where building codes require a leakage rated (smoke) damper as part of a static smoke control or dynamic smoke management system.

The 1280 Series features a smoothly contoured extruded aluminum airfoil blade and compression type seals that have been especially designed to offer the lowest leakage class available. Together with out of airstream linkage, the design provides an ultra-low pressure drop and minimizes unwanted turbulence and noise generation. Qualified for vertical or horizontal installation with airflow in either direction.

**STANDARD CONSTRUCTION:**

- Frame:** 5" x 7/8" x 16 ga. (127 x 22 x 1.6) galv. steel hat channel.
- Blades:** Airfoil type 6063-T5 extruded aluminum on 5 1/2" (140) centers. Parallel action.
- Linkage:** Concealed in frame. 12 ga. (2.7) plated steel.
- Bearings:** 1/2" (13) dia. self-lubricating oilite bronze.
- Axes:** 1/2" (13) dia. plated steel double bolted to blades.
- Jackshaft:** 1/2" (13) dia. plated steel.
- Jamb Seals:** Cambered stainless steel.
- Blade Seals:** Silicone.

**Square, Rectangular or Oval Duct Connection Sizes (Duct W x H):**

| Velocity/<br>Pressure<br>Rating | Elevated<br>Temp.<br>°F | Minimum  |                           | Maximum   |                     |
|---------------------------------|-------------------------|--|---------------------------|---|---------------------|
|                                 |                         | Single Section   | Single Section            | Multiple Section  |                     |
|                                 |                         | Vertical/Horizontal  | Vertical/Horiz.           | Vertical/Horizontal   | Vertical/Horizontal |
| 24                              | 250/350                 | 4" x 4" (102 x 102).<br>Overall damper size<br>is 8" x 8" (203 x 203) min. | 34" x 46"<br>(864 x 1168) | 142" x 94" (3607 x 2388),<br>286" x 46" (7264 x 1168) or<br>70" x 142" (1778 x 3607). |                     |

**Notes:** Duct heights less than 8" (203) require a Type 'B' sleeve enclosure (Model 1282). Duct sizes less than 8" (203) in width require a Type 'C' enclosure (Model 1283).

**BASE MODEL SELECTION:**

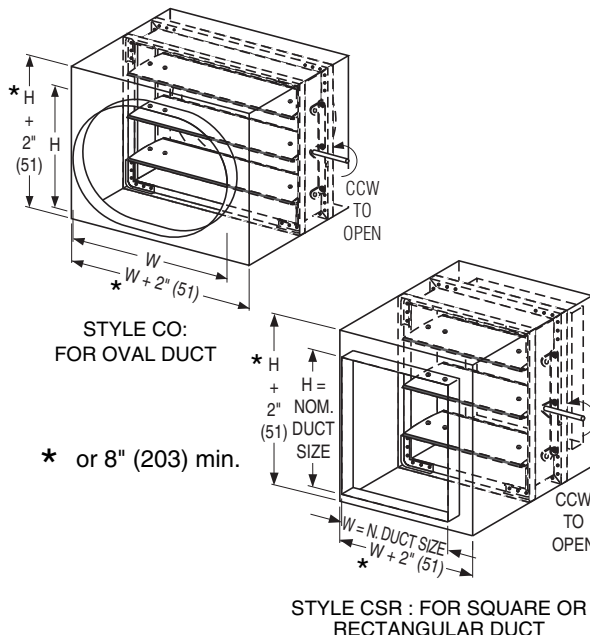
- 1283** Std. factory sleeve (caulked to UL requirements) 16" long x 20 ga. (406 x 1.0) (18 ga. for dampers over 84" [2134] in width).
- 1283** Non-standard sleeve. Specify \_\_\_\_\_ length \_\_\_\_\_ ga. Available up to 36" (914) dependent upon wall thickness and 10 through 20 ga. (3.5 through 1.0).

**LEAKAGE CLASS / ELEVATED TEMPERATURE:**

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

**DYNAMIC VELOCITY/PRESSURE RATING:**

- 24** 2000 fpm @ 4" w.g. (Standard)



**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 package
- DSDL** Low Flow Smoke Detector
- DSDN** No Flow Smoke Detector
- Special features** \_\_\_\_\_

For installation instructions, see IOM-SDINST.  
 Dimensions are in inches (mm).

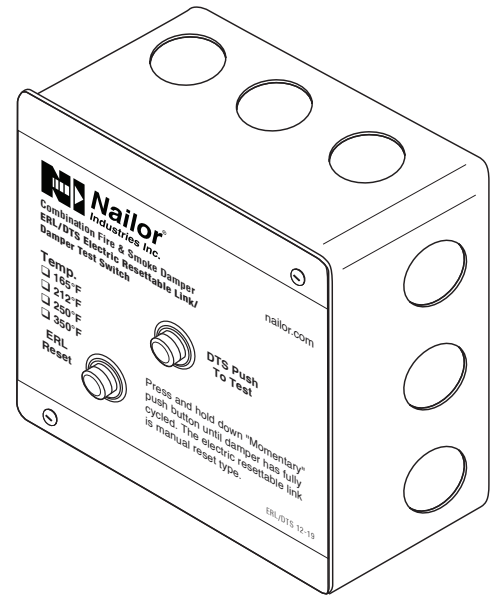
|                       |             |                 |                   |                    |
|-----------------------|-------------|-----------------|-------------------|--------------------|
| <b>SCHEDULE TYPE:</b> |             |                 |                   |                    |
| <b>PROJECT:</b>       |             |                 |                   |                    |
| <b>ENGINEER:</b>      | <b>DATE</b> | <b>B SERIES</b> | <b>SUPERSEDES</b> | <b>DRAWING NO.</b> |
| <b>CONTRACTOR:</b>    | 4 - 28 - 14 | 1280            | 1 - 1 - 12        | 1280-4             |



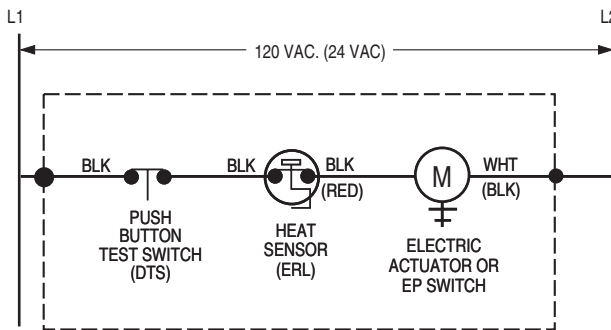
The DTS (Damper Test Switch) is an optional "momentary" push button test switch available on all Nailor smoke and combination fire/smoke dampers. The DTS provides the ability to "cycle test" the damper by pushing and holding down the button until the damper has cycled and closure has been visually verified, 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:

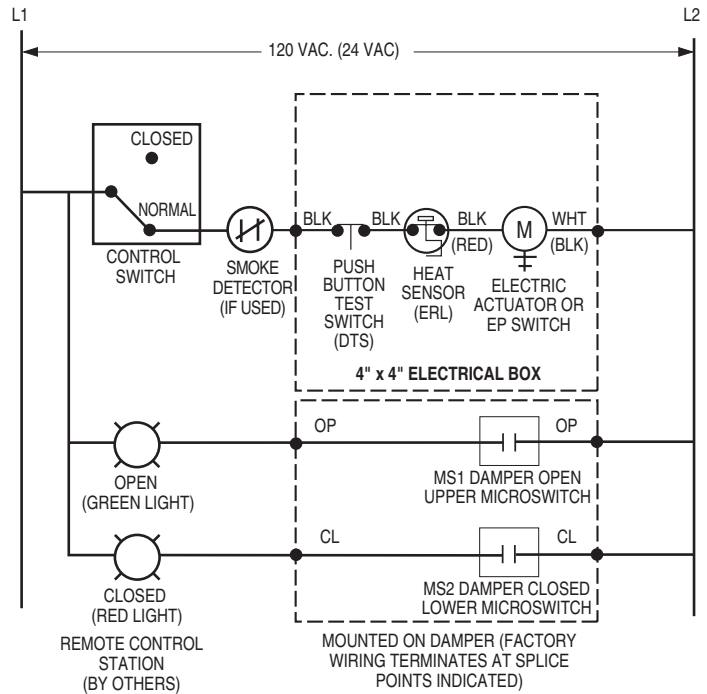


MOUNTED ON DAMPER (FACTORY WIRING TERMINATES AT SPLICE POINTS INDICATED INSIDE 4" x 4" ELECTRICAL BOX)

**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 |

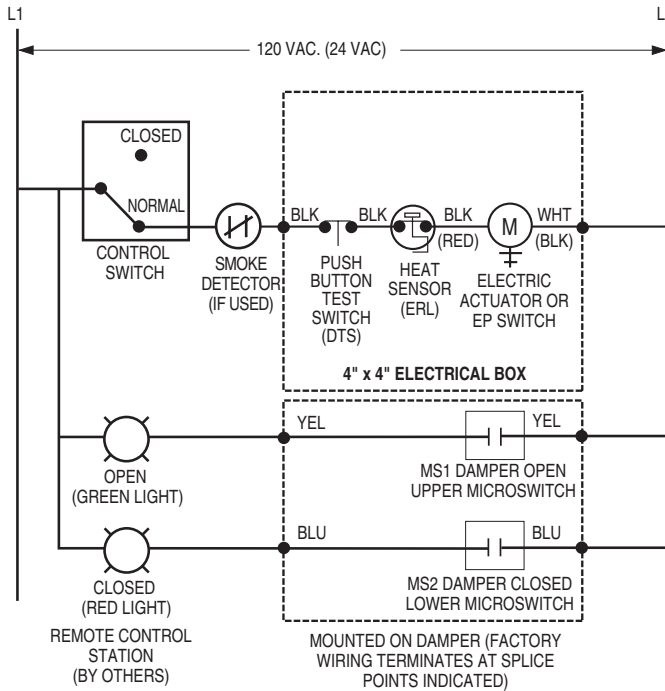


Figure 3. DTS/ERL with MLS-300 Nailor or Honeywell (actuator aux. switches) Position Indicator Package

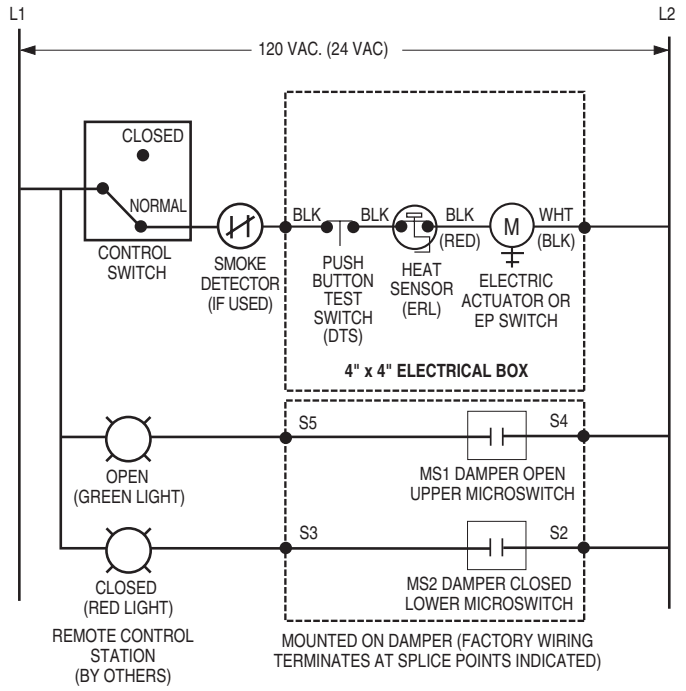
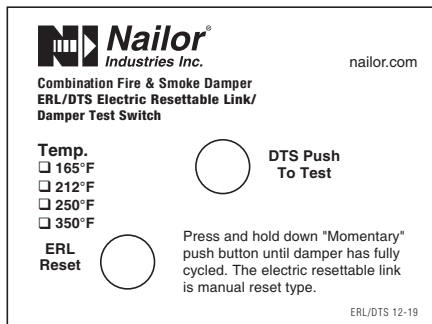
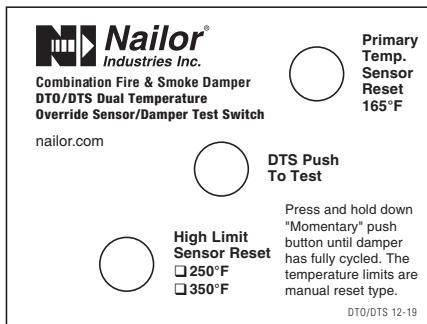


Figure 4. DTS/ERL with MLS-300 Siemens GJD Series (actuator auxiliary switches) Position Indicator Package

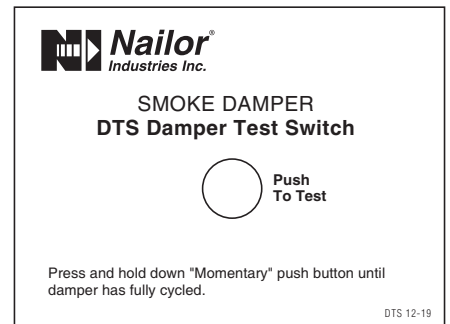
## DTS LABEL VARIATIONS:



ERL/DTS Combination Fire/Smoke Damper



DTO/DTS Combination Fire/Smoke Damper



DTS Smoke Damper

SCHEDULE TYPE

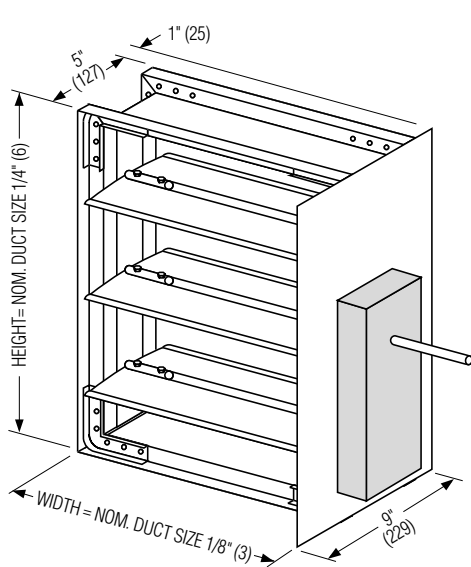
PROJECT

ENGINEER

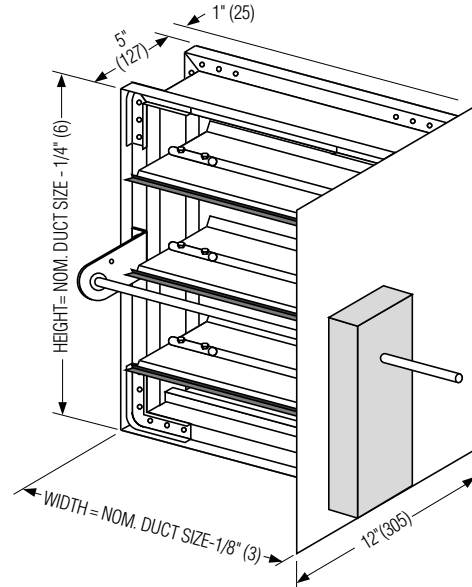
CONTRACTOR



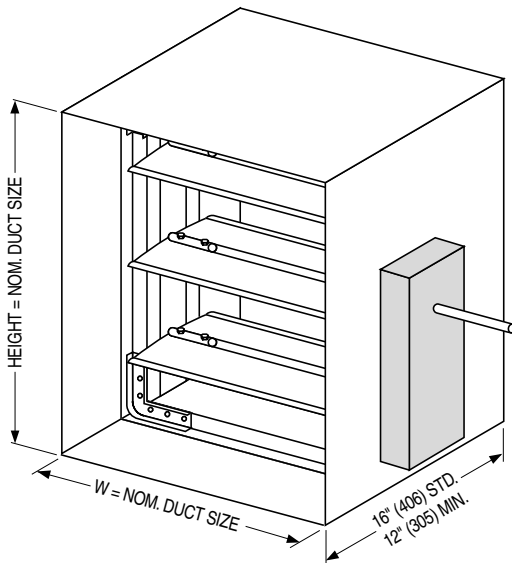
**SMP SIDE ACTUATOR MOUNTING PLATE  
AND TYPE 'A' SLEEVE DETAIL  
SMOKE DAMPERS  
MODEL SERIES: 1210, 1260 AND 1280**



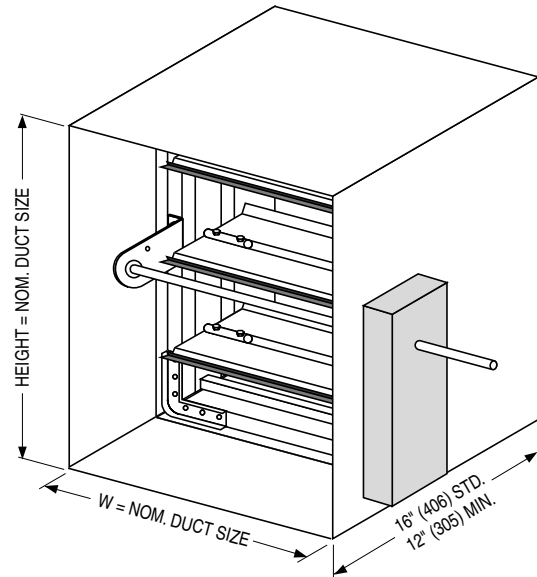
**SMP SIDE ACTUATOR MOUNTING PLATE  
DIRECT DRIVE MODELS**



**SMP SIDE ACTUATOR MOUNTING PLATE  
JACKSHAFT DRIVE MODELS**



**TYPE 'A' SLEEVE  
DIRECT DRIVE MODELS**



**TYPE 'A' SLEEVE  
JACKSHAFT DRIVE MODELS**

**NOTE:**

Smoke Dampers shall be installed in accordance with NFPA 90A, latest edition and Nailor installation instructions – see IOM-SDINST. Dampers must be installed within 24" (610) of the smoke barrier to conform with installation requirements.

|                       |  |
|-----------------------|--|
| <b>SCHEDULE TYPE:</b> |  |
| <b>PROJECT:</b>       |  |
| <b>ENGINEER:</b>      |  |
| <b>CONTRACTOR:</b>    |  |

Dimensions are in inches (mm).

| DATE        | B SERIES | SUPERSEDES    | DRAWING NO. |
|-------------|----------|---------------|-------------|
| 11 - 4 - 13 | 1200     | 9-00R/1200-11 | SMP-SL-1    |



## 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.

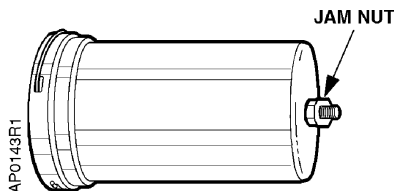


Figure 1. Actuator Jam Nut Location.

### Required Tools

- Flat-blade screwdriver
- Adjustable crescent wrench
- Pliers

### Warning/Caution Notations

|                |  |   |
|----------------|--|---|
| <b>WARNING</b> |  | Personal injury/loss of life may occur if the user does not follow a procedure as specified.      |
| <b>CAUTION</b> |  | 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).

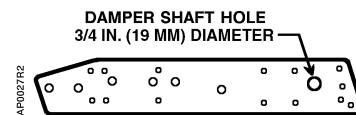


Figure 2. Actuator Mounting Plate.

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

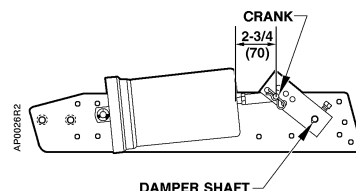


Figure 3. Extended Shaft Mounting.

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<br>(21-48 kPa) | 3-13 psi<br>(21-90 kPa) | 5-10 psi<br>(35-69 kPa) | 8-13 psi<br>(55-90 kPa) | 2-3, 8-13 psi<br>(14-21, 55-90 kPa)<br>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 <sup>1</sup>  | 331-2905 <sup>1</sup>   | 331-2906 <sup>1</sup>   | 331-2961 <sup>1</sup>   | 331-2909 <sup>1</sup>                                   |
| 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 <sup>2</sup>                                 | Universal kit                        | 331-3000               | 331-3001                | 331-3002                | 331-2973 <sup>1</sup>   | 331-3004  |
| Actuator, integral pivot with pivot post, and positioning relay <sup>2</sup>          | Universal kit with positioning relay | —                      | —                       | —                       | 332-2973                | —   |

<sup>1</sup> UL Recognized Components for Fire/Smoke Applications.

<sup>2</sup> 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.



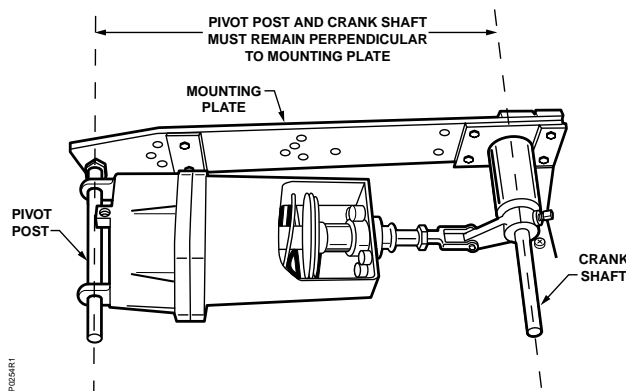
**CAUTION:**

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.**

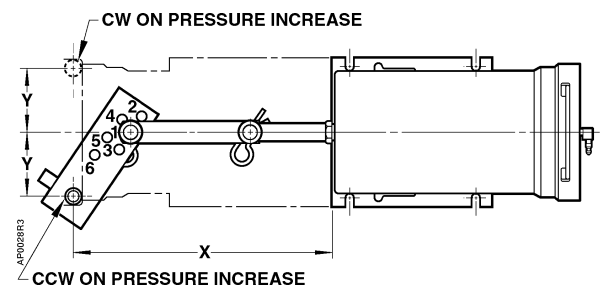
| Application                              | Dimensions in Inches (mm) |               | Crank Radius Hole |
|--|---------------------------|---------------|-------------------|
|  | X                         | Y             |                   |
| 4-inch (102 mm)<br>Stroke – 90° Rotation | 8-1/2<br>(216)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

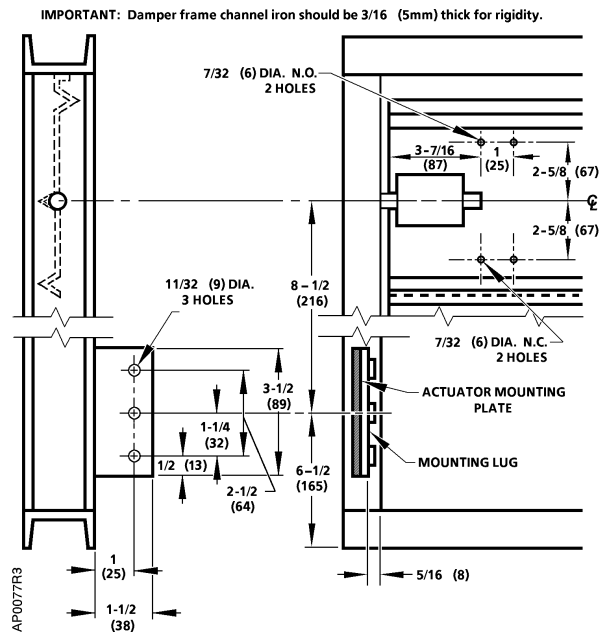
### Frame Mounting

**Expected Installation Time:** 3 hours

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

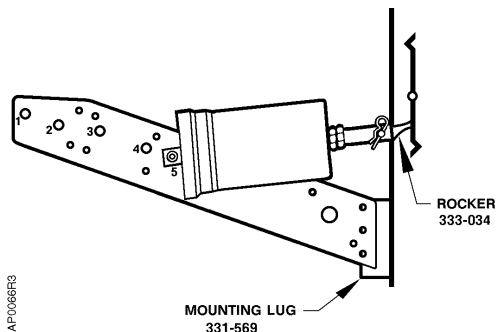
Mounting lug: 331-569

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.



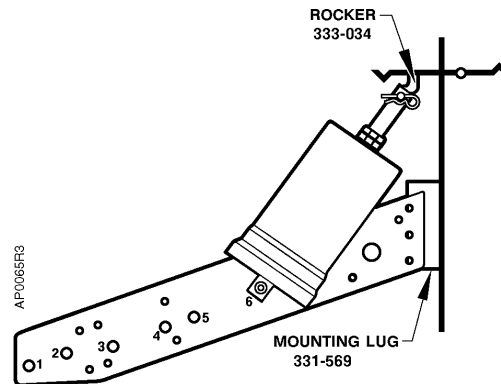
**Figure 6. Frame Mounting Dimensions.  
 Dimensions in Inches (Millimeters).**

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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# 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 <sup>a</sup>         |
| MS4620F1005                | 230            | None                        |
| MS4620F1203                | 230            | 2 SPST <sup>a</sup>         |
| MS8120F1002                | 24             | None                        |
| MS8120F1200                | 24             | 2 SPST <sup>a</sup>         |
| S2024-F (MS8120S1006)      | 24             | None                        |
| S20230-F (MS4620S1009)     | 230            |                             |
| S2024-F-SW2 (MS8120S1204)  | 24             | 2 SPDT <sup>a</sup>         |
| S20230-F-SW2 (MS4620S1207) | 230            |                             |

<sup>a</sup> 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)**

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

**M S 41 20 F 1 2 XX**

**Table 3. Actuator Selection (S20 Series).**

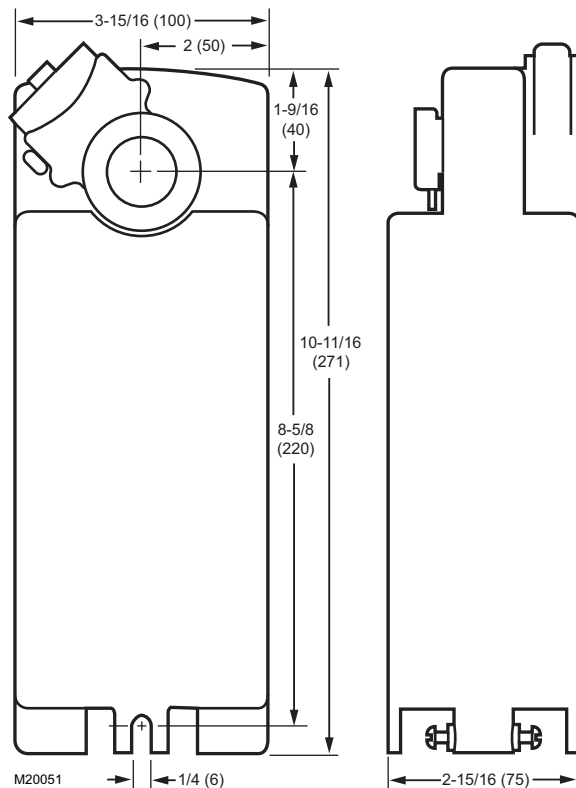
|             |  |
|-------------|--|
| <b>S</b>    | Fail Safe Function (Spring Return)                         |
| <b>20</b>   | 20 Nm (175 lb-in.)   |
| <b>24</b>   | 24 Vac 2-position Control; Reversible Mount Spring Return  |
| <b>230</b>  | 230 Vac 2-position Control; Reversible Mount Spring Return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

**S 20 24 - F -SW2**

**Table 4. Approvals.**

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

<sup>a</sup> 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.

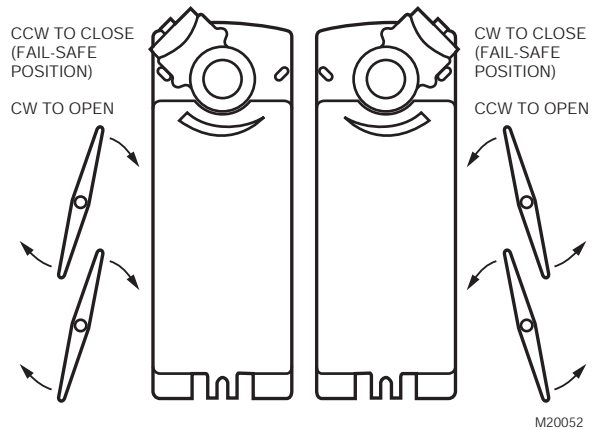


Fig. 2. Spring Return DCA mounting orientation.

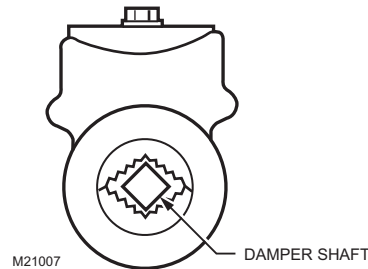


Fig. 3. Proper mounting to square damper shaft.

### 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.

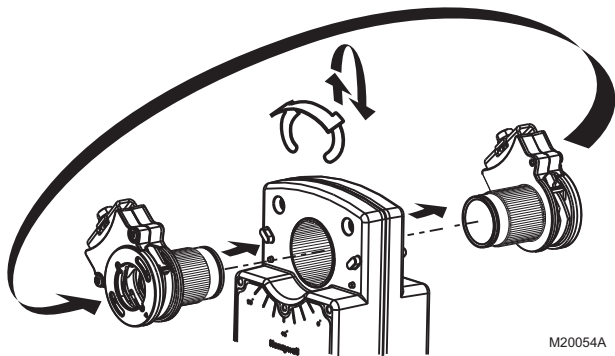


Fig. 4. Mounting shaft coupling to actuator opposite side.

## Mounting

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

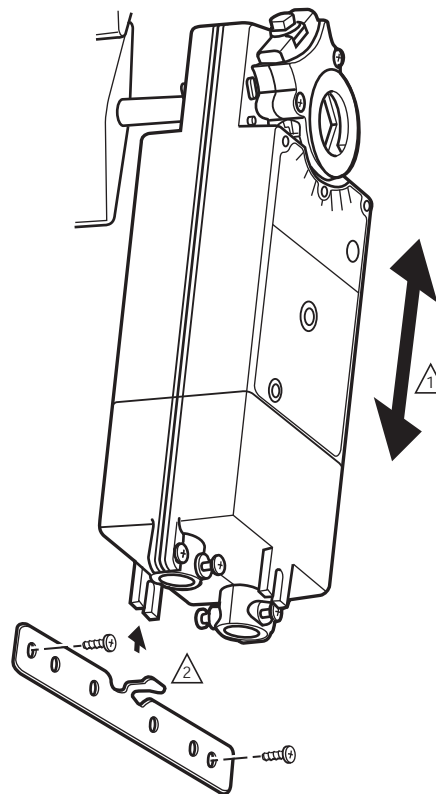
**CAUTION**  
**Actuator Damage Hazard.**  
**Using actuator as shaft bearing causes device damage.**  
 Use actuator only to supply rotational torque. Avoid any side loads to actuator output coupling bearings.

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.

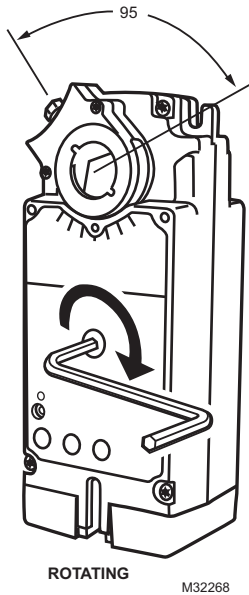


Fig. 6. Manual positioning.

## 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.

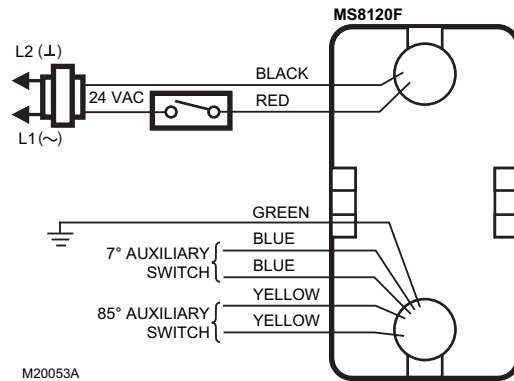


Fig. 7. Typical 24 Vac wiring (MS Series).

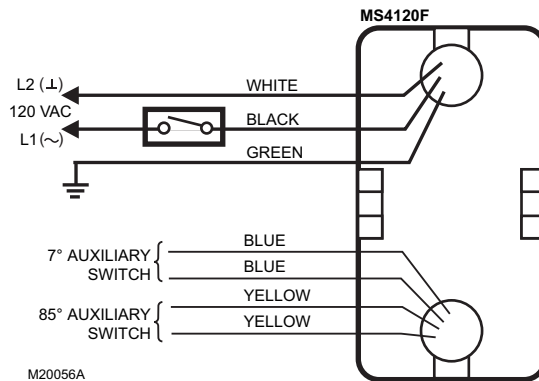


Fig. 8. Typical 120 Vac wiring (MS Series).

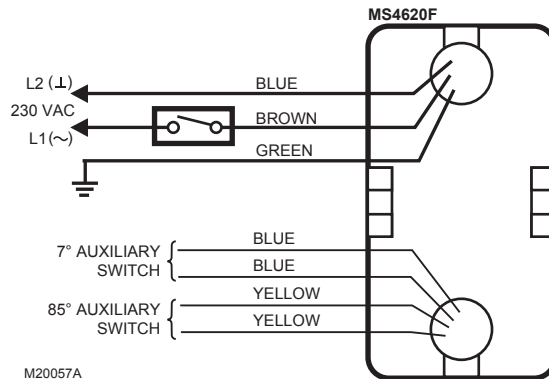
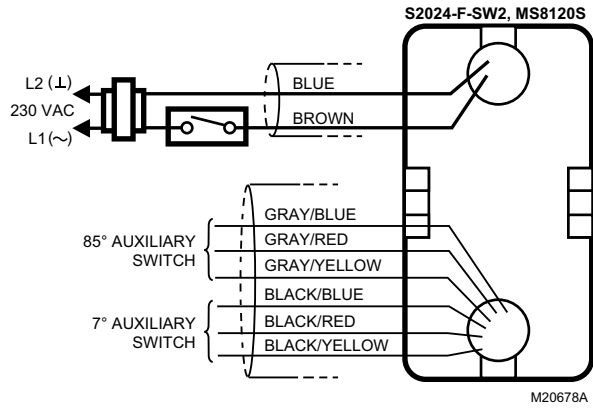
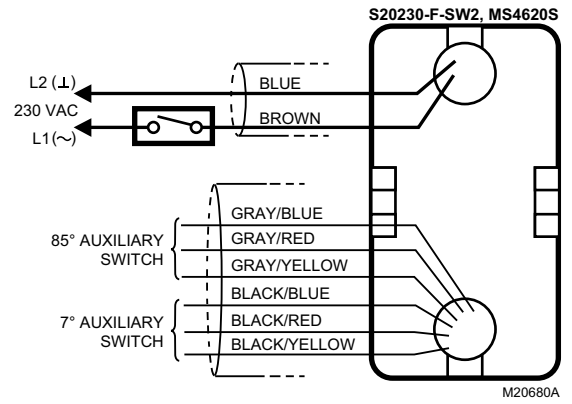


Fig. 9. Typical 230 Vac wiring (MS Series).



**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.

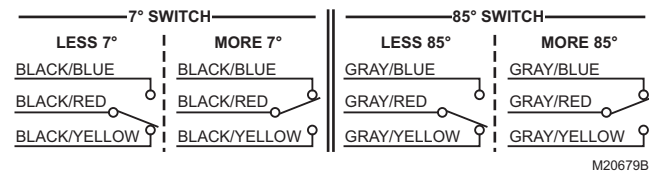


Fig. 12. SPDT auxiliary switch operation.

## 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)

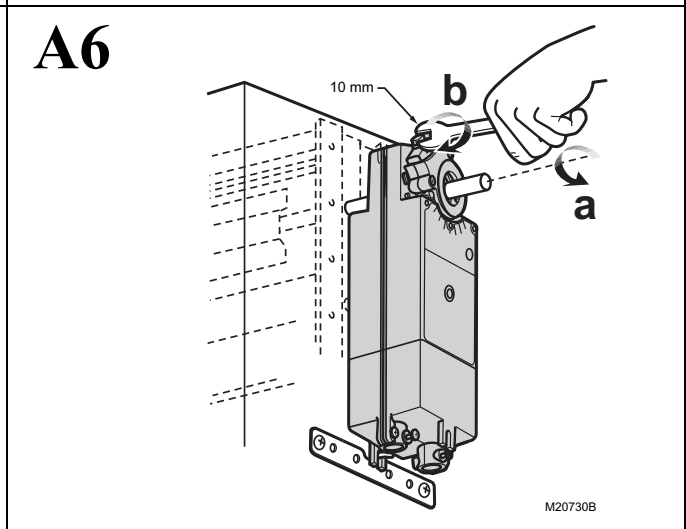
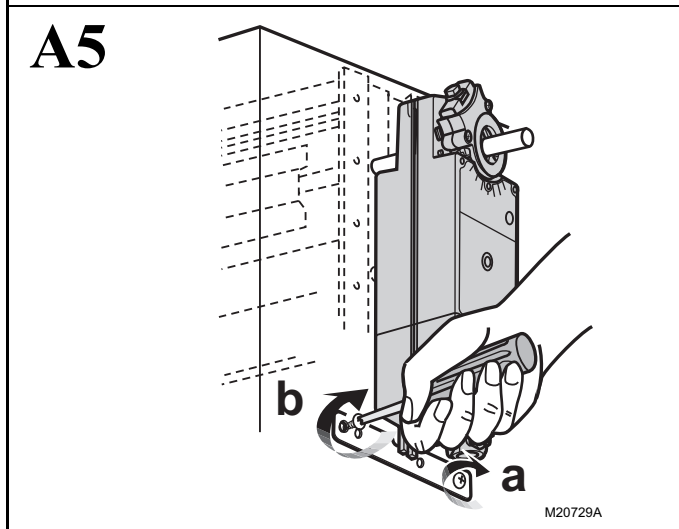
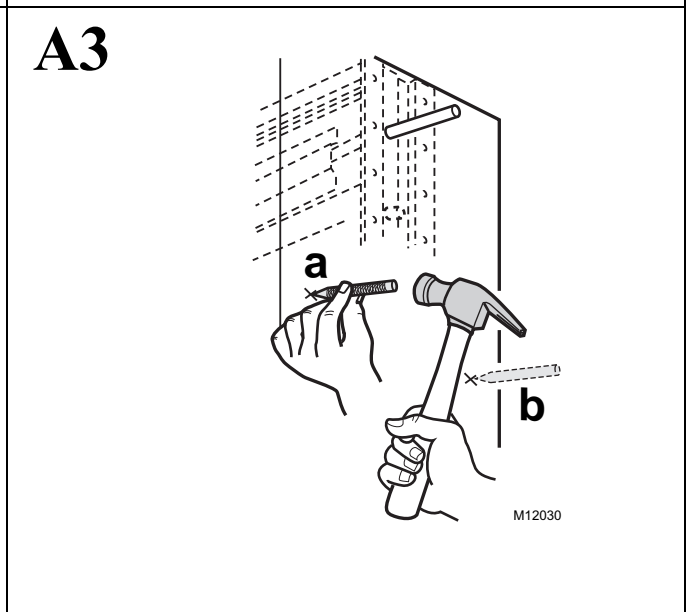
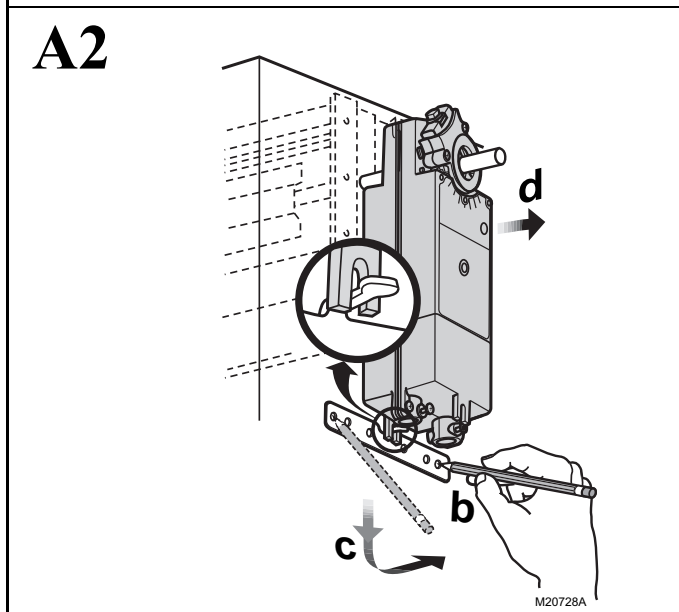
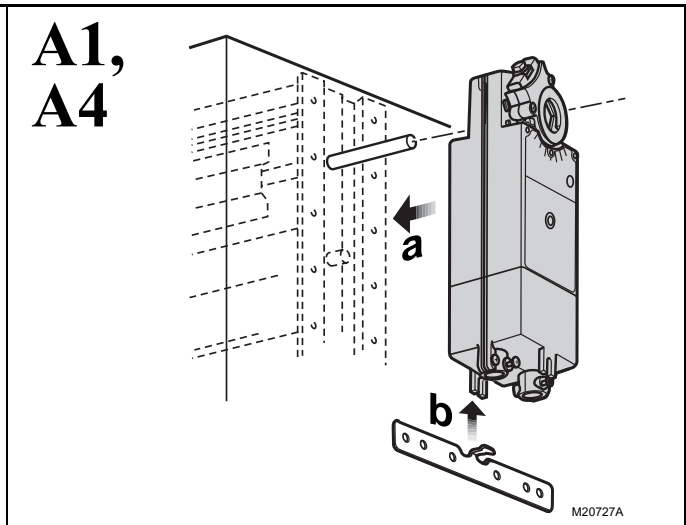
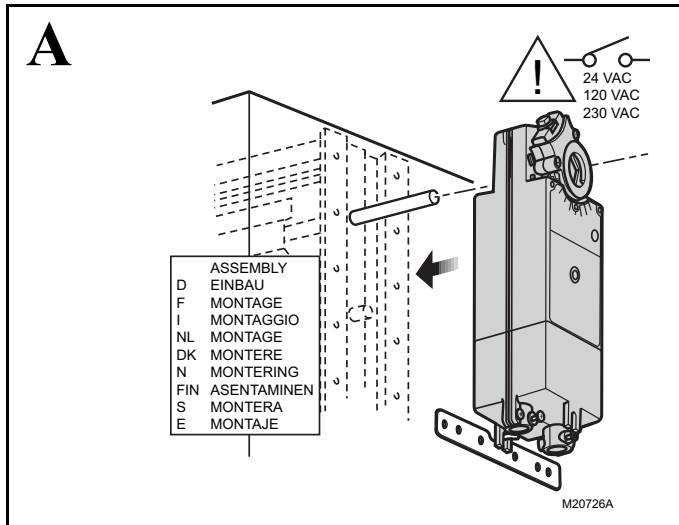
1. Check damper position.
2. Connect 24 Vac to the red and black leadwires to drive the damper to the open position. The actuator should drive the damper.
3. If the actuator does not run, remove power for at least two seconds.
4. If the actuator spring returns, allow it to close entirely, then return 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.

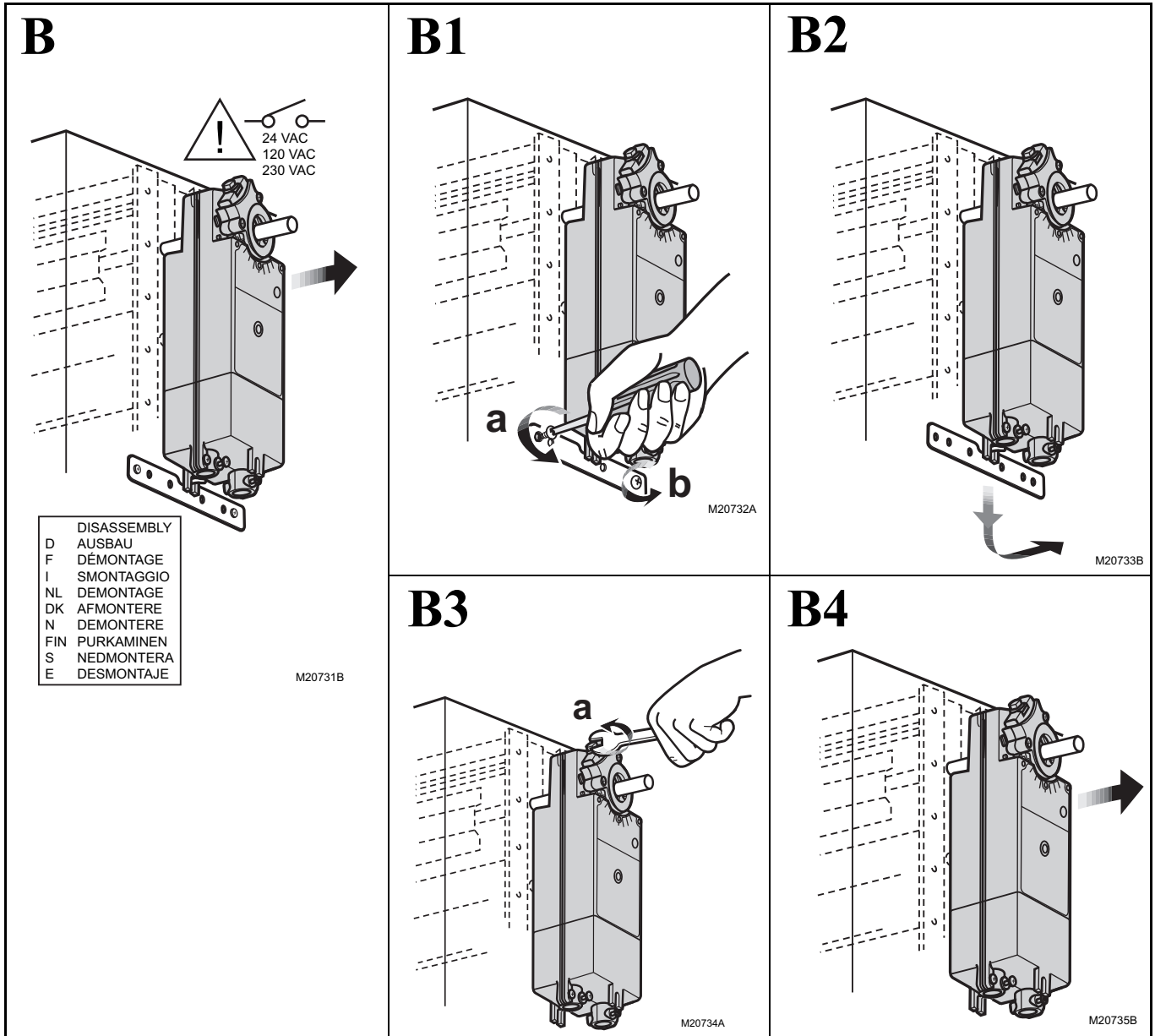


D Montageanweisung  
 F Instructions d'Installation  
 I Istruzioni per l'Installazione

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).*

## **Automation and Control Solutions**

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# **Honeywell**

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

### PRODUCT DATA



### FEATURES

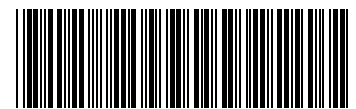
- 30 lb-in. (3.4 N•m) or 80 lb-in. (9 N•m) minimum driving torque at 350°F (176°C).
- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling 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).

### 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.

### 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 <sup>a</sup>         |
| MS4109F1010 | 120           | None                        |
| MS4109F1210 | 120           | 2 SPST <sup>a</sup>         |
| MS4604F1010 | 230           | None                        |
| MS4604F1210 | 230           | 2 SPST <sup>a</sup>         |
| MS4609F1010 | 230           | None                        |
| MS4609F1210 | 230           | 2 SPST <sup>a</sup>         |
| MS8104F1010 | 24            | None                        |
| MS8104F1210 | 24            | 2 SPST <sup>a</sup>         |
| MS8109F1010 | 24            | None                        |
| MS8109F1210 | 24            | 2 SPST <sup>a</sup>         |

<sup>a</sup> 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%,<br>50/60 Hz            |
| MS4109F | 0.25A, 23W        | 0.13A, 7W  | 80 (9)                 |                                  |
| MS4604F | 0.13A, 18W        | 0.10A, 11W | 30 (3.4)               | 230 ±10%,<br>50/60 Hz            |
| MS4609F | 0.13A, 23W        | 0.09A, 7W  | 80 (9)                 |                                  |
| MS8104F | 16 VA             | 8 VA       | 30 (3.4)               | 24Vac/dc +20%,<br>-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.

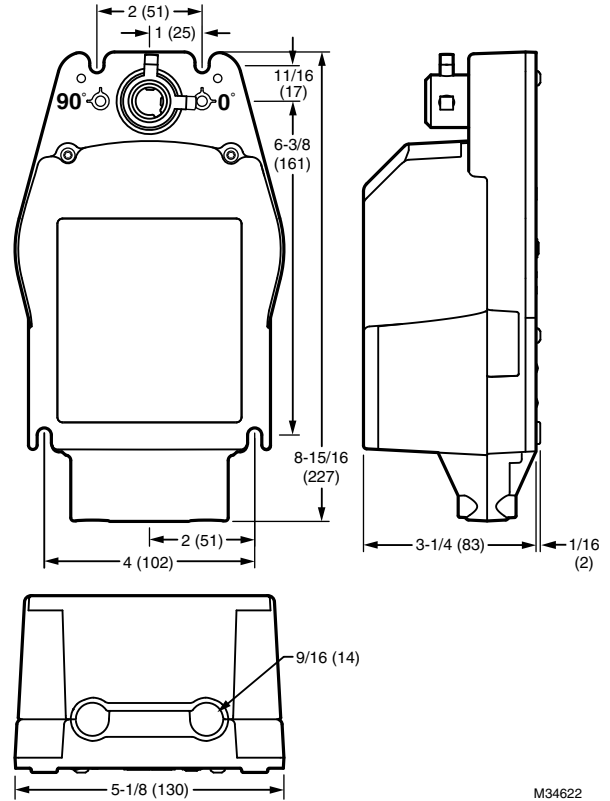
**Design Life (at Rated Voltage):** 30,000 full stroke cycles.

**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,<br>MS4109F | MS4604F,<br>MS4609F | MS8104F,<br>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,<br>MS4609, MS8104 and<br>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**

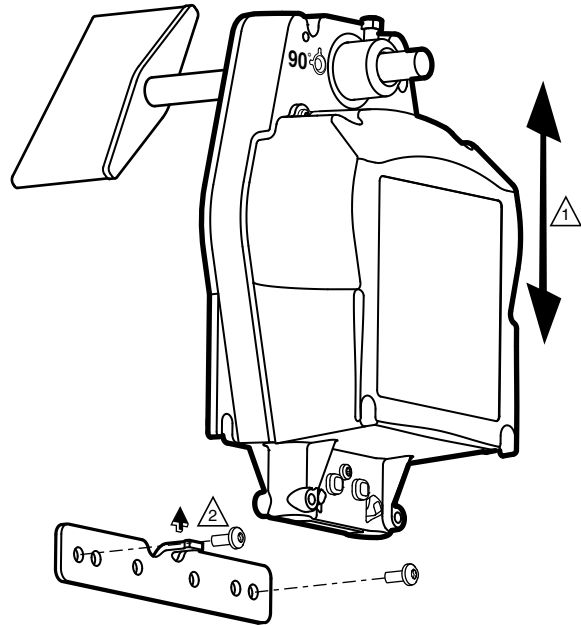
*All wiring must agree with applicable codes, ordinances and regulations.*

### **! 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.





**! 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.

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.

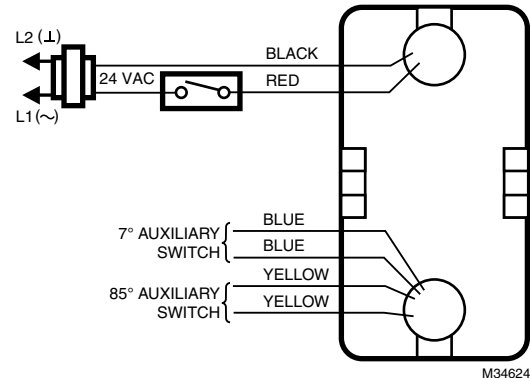


Fig. 3. Typical 24 Vac wiring.

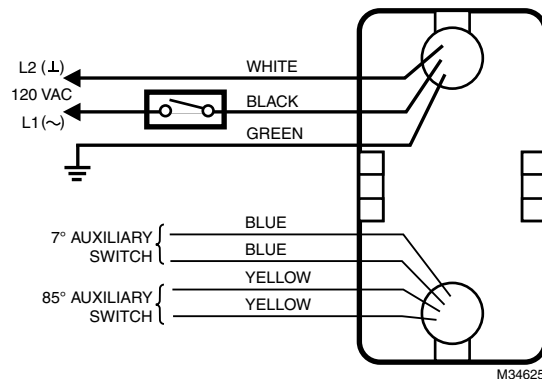


Fig. 4. Typical 120 Vac wiring.

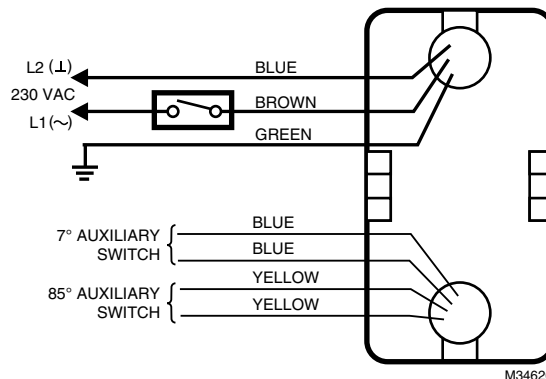


Fig. 5. Typical 230 Vac wiring.

## 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**

Honeywell International Inc.

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Golden Valley, MN 55422

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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

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

## Electrical Ratings

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

## Current Requirements: (Using No Accessories)

|                              |               |                         |                         |
|------------------------------|---------------|-------------------------|-------------------------|
| <b>Max. standby current:</b> | 21 mA @ 24VDC | 65 mA RMS @ 24VAC 60Hz  | 20 mA RMS @ 120VAC 60Hz |
| <b>Max. alarm current:</b>   | 65 mA @ 24VDC | 135 mA RMS @ 24VAC 60Hz | 35 mA RMS @ 120VAC 60Hz |

## Contact Ratings

|  |  |
|--|--|
| <b>Alarm initiation contacts: (SPST)</b>   | 2.0A @ 30 VDC (resistive)  |
| <b>Alarm auxiliary contacts: (DPDT)</b>  | 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. |  |
| <b>Supervisory contacts: (SPDT)</b>  | 2.0A @ 30 VDC (resistive); 2.0A @ 125 VAC (resistive)                                |

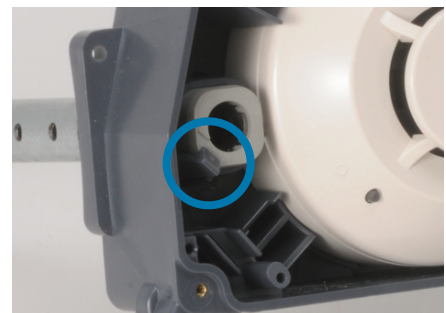
## Accessory Current Loads at 24 VDC

| 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

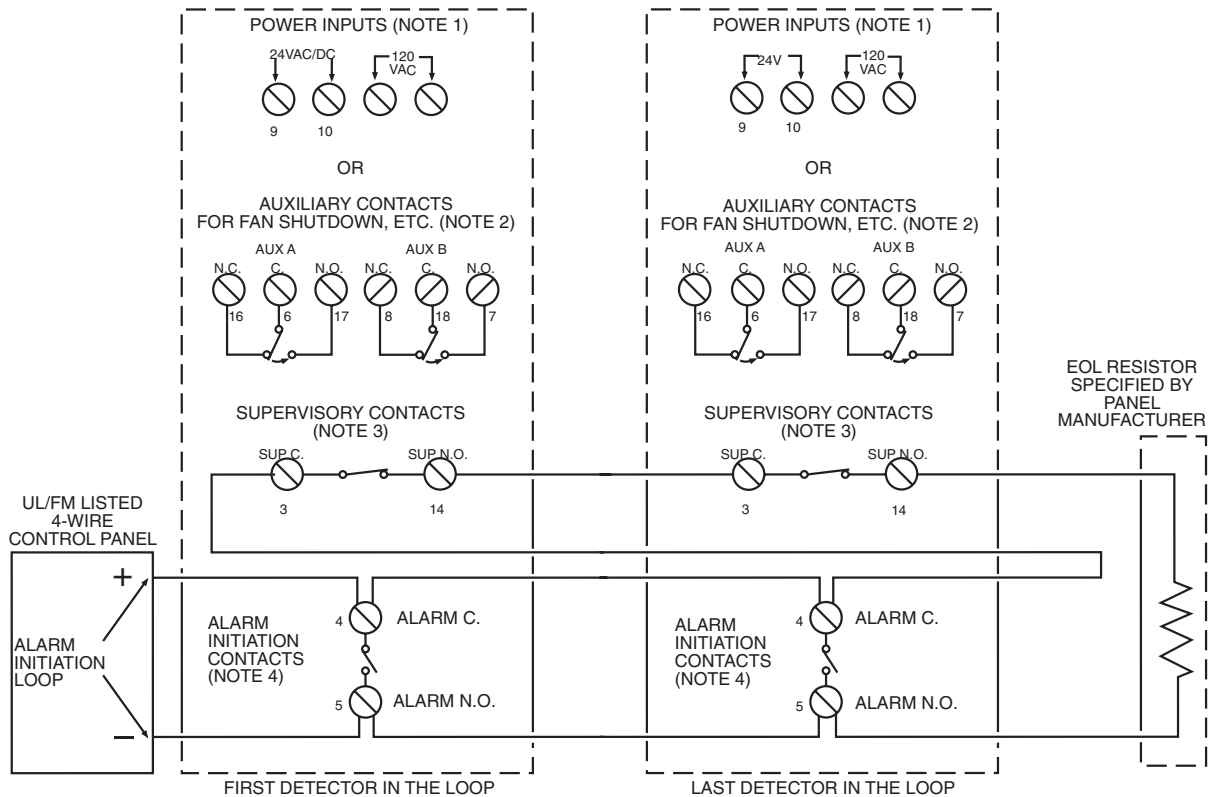
## Installing the InnovairFlex Sampling Tube

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                   |               |                                   |
| <b>Accessories</b> |   |               |                                   |
| 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   |               |                                   |



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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.

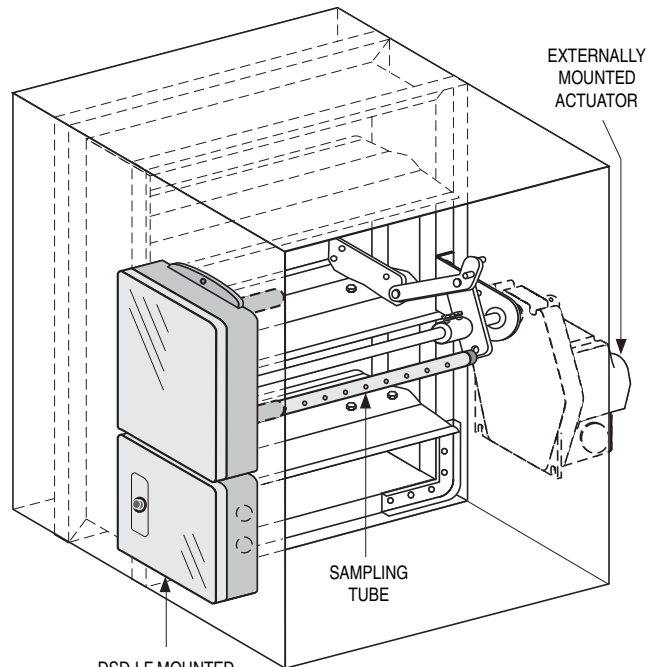
**Weight:** 2.5 lbs. (1.14 kg.).

**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).

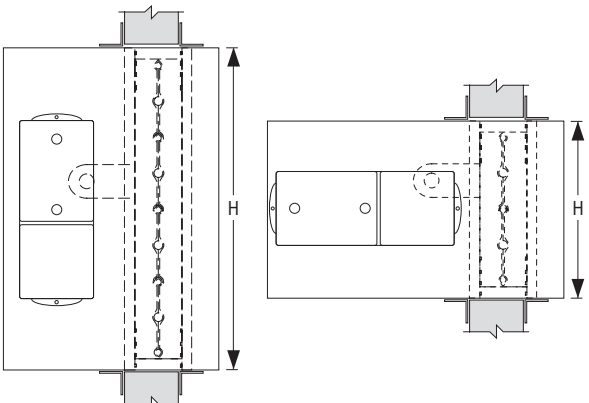
**Operating Humidity Range:** 0% to 95% Relative Humidity Non-Condensing.

**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).

|                       |             |                 |                   |                    |
|-----------------------|-------------|-----------------|-------------------|--------------------|
| <b>SCHEDULE TYPE:</b> |             |                 |                   |                    |
| <b>PROJECT:</b>       |             |                 |                   |                    |
| <b>ENGINEER:</b>      | <b>DATE</b> | <b>B SERIES</b> | <b>SUPERSEDES</b> | <b>DRAWING NO.</b> |
| <b>CONTRACTOR:</b>    | 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.

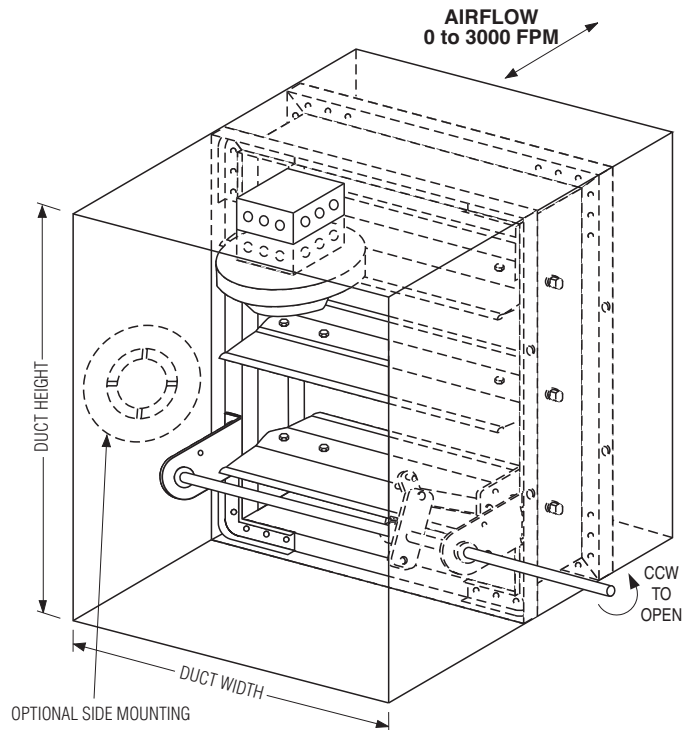
The DSD-NF detector features a low-profile design for optimum pressure drop and will operate with airflow in either direction. It can be factory installed to top of sleeve (side mounting optional) on Nailor Model Series 1210, 1260, 1280, 1220 and 1270.

**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.

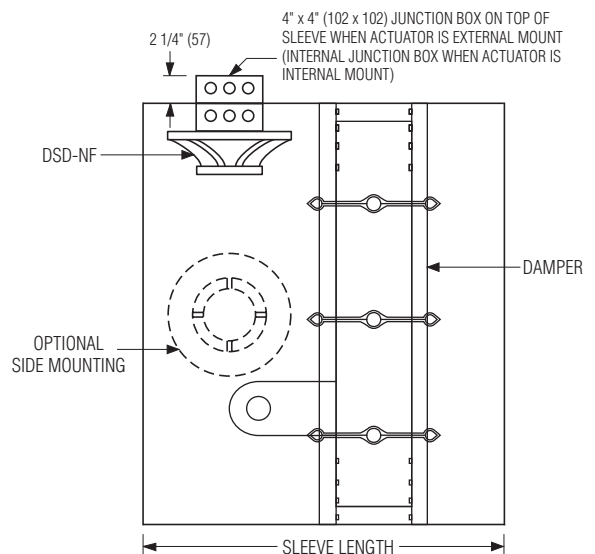
**DSD-NF STANDARD SPECIFICATION:**

- 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).

|                       |                 |                   |                    |  |
|-----------------------|-----------------|-------------------|--------------------|--|
| <b>SCHEDULE TYPE:</b> |                 |                   |                    |  |
| <b>PROJECT:</b>       |                 |                   |                    |  |
| <b>ENGINEER:</b>      |                 |                   |                    |  |
| <b>CONTRACTOR:</b>    |                 |                   |                    |  |
| <b>DATE</b>           | <b>B SERIES</b> | <b>SUPERSEDES</b> | <b>DRAWING NO.</b> |  |
| 9 - 4 - 13            | 1200            | 1 - 5 - 09        | DSD-NF             |  |



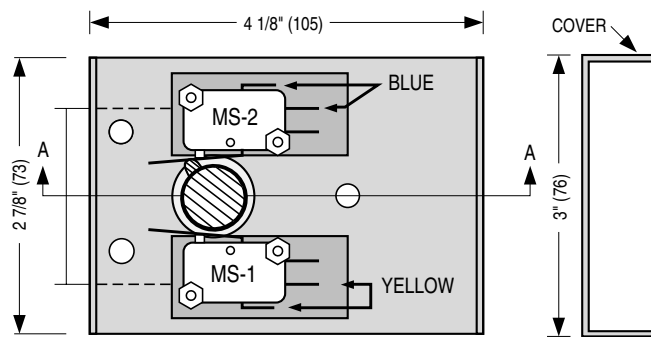
## POSITION INDICATOR PACKAGE

FOR COMBINATION FIRE / SMOKE, SMOKE AND CONTROL DAMPERS

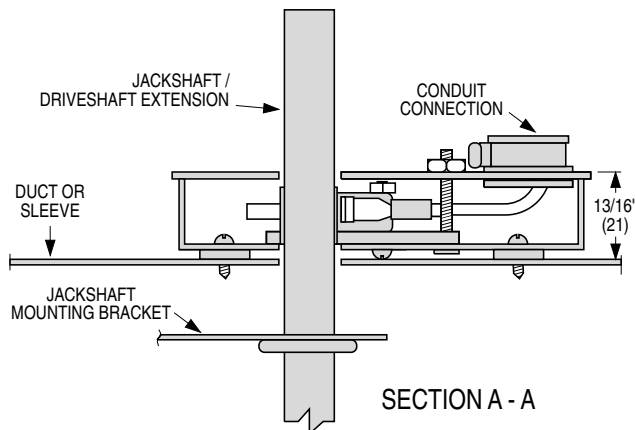
MODEL: MLS-300. For use with GGD221/121 (electric) and 331-2961 / 3060 (pneumatic) actuators

### 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:

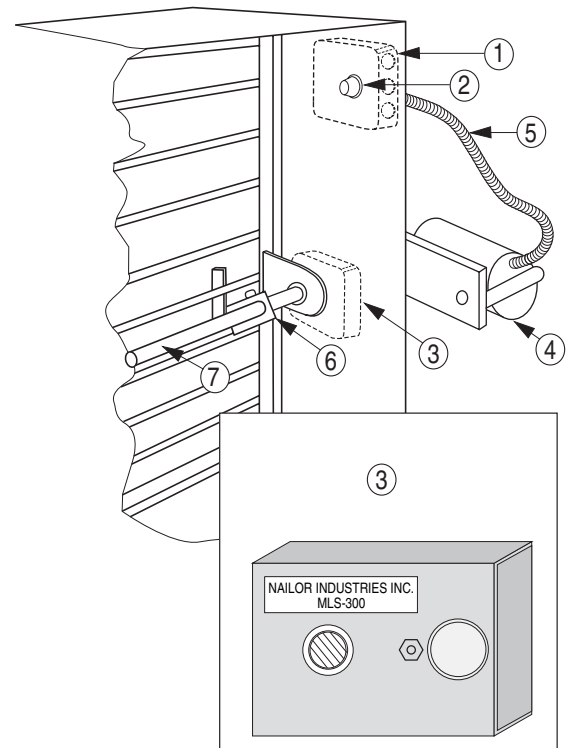
Switch Type: Single Pole double throw (2)  
 15 Amps, 1/3 HP, 125, 250 Vac or 24 Vdc.  
 1/2 Amp, 125 Vdc. 1/4 Amp, 250 Vdc.

### Standard Mounting:

**MS1** is damper open signal.  
**MS2** is damper closed signal.

### Non-Standard Mounting:

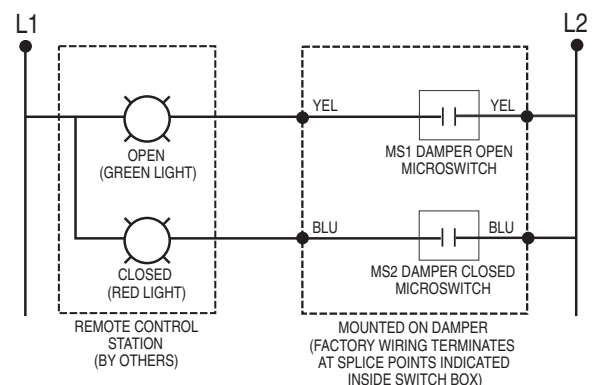
**Important:** Installer must double check continuity of MS1 and MS2 before wiring to determine which switch signals the damper's open or closed position.



### 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).

|                       |             |                 |                   |                    |
|-----------------------|-------------|-----------------|-------------------|--------------------|
| <b>SCHEDULE TYPE:</b> |             |                 |                   |                    |
| <b>PROJECT:</b>       |             |                 |                   |                    |
| <b>ENGINEER:</b>      | <b>DATE</b> | <b>B SERIES</b> | <b>SUPERSEDES</b> | <b>DRAWING NO.</b> |
| <b>CONTRACTOR:</b>    | 7 - 20 - 07 | FD - ACC        | 12 - 4 - 02       | 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.

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