SD-1250 and SD-1600 Series Smoke Dampers

Product Bulletin

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Johnson Controls provides a leakage-rated damper for life safety smoke management systems that meets new UL leakage testing procedures and fits your size and application requirements:

- SD-1630 Class I leakage resistance galvanized steel one-piece airfoil blade
- SD-1620 Class II leakage resistance Triple-V blades
- SD-1250 Class I leakage resistance aluminum frame and aluminum airfoil shaped blades

Smoke Dampers are listed under the latest Underwriters Laboratories Inc.® (UL) Standard 555S, and carry the UL/cUL label. UL listing number is R11172.

All Smoke Dampers include actuators that have been tested and approved as a matched set (rated for 250°F or 350°F temperature degradation operation) according to the National Fire Protection Association (NFPA) Standards 80, 90A, 92A, 92B, and 101.

Figure 1: SD-1620 Smoke Damper

Table 1: Features and Benefits

Features	Benefits
3-Year Warranty on Materials and Workmanship	Provides the confidence of the manufacturer standing behind product.
Fast Track Shipping - as Quick as 5 Working Days after Order Entry	Provides faster response for projects, at a cost premium.
Modulating Actuators (SD-1630 Only)	Allows for use as volume control dampers.
Available Factory-Installed Blade Position Switch Kit with Direct Coupling	Provides feedback of blade position instead of actuator position.

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Application

The SD-1250 Series Smoke Dampers meet specifications requiring a Class I leakage-rating at 250°F. The SD-1600 Series Smoke Dampers meet specifications requiring a Class I or Class II leakage-rating at 250°F or 350°F. SD-1250 and SD-1600 Series smoke dampers are tested according to UL Standard 555S for dampers that are used in Heating, Ventilating, and Air Conditioning (HVAC) smoke systems.

SD-1250 and SD-1600 Series smoke dampers meet the requirements for the International Building Codes (IBC).

Each SD-1250 and SD-1600 Series smoke damper includes factory-installed actuator(s) per UL Testing. Smoke dampers up to maximum tested sizes are rated for either vertical or horizontal mounting.

Sample Specification

Smoke dampers meeting or exceeding the following specifications shall be furnished and installed at locations shown on plans or as described in schedules:

- Dampers shall meet the requirements of NFPA 80, 90A, 92A, 92B, and 101 and shall be either Class I or Class II Leakage-Rated Dampers for use in smoke control systems in accordance with the latest version of UL555S.
- As part of the UL qualification, smoke dampers shall have demonstrated a capacity to open and close under HVAC system operating conditions, with pressures up to 4 inches w.g. in the closed position and 2,000 fpm air velocity in the open position.
- In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 250°F or 350°F, depending on the actuator.
- Appropriate electric/pneumatic actuators (specifier selects one) shall be installed by the damper manufacturer at the time of damper fabrication.
- Damper and actuator shall be supplied as a single entity which meets all applicable UL555S qualifications for both dampers and actuators.
- Each damper shall be rated for leakage and airflow in either direction through the damper.
- Damper and actuator assembly shall be factory cycled to ensure operation.

Construction

Table 2: Materials

Frame	5 in. deep x 16-gauge galvanized steel or aluminum
Blades	SD-1620 – 16-gauge galvanized steel, Triple V SD-1630 – 14-gauge equivalent galvanized steel, one-piece airfoil SD-1250 – One-piece 6063T5 extruded aluminum, airfoil shape All blades are 6 in. nominal width and 8 in. maximum width.
Linkage	Concealed in the frame
Blade Pin	1/2 in. plated steel hex
Bearings	Stainless steel
Side Seal	Flexible metal compression, stainless steel
Blade Seal	Extruded silicone
Sleeve	20-gauge galvanized steel, 20 in. long (optional)
Side Plate	16-gauge galvanized steel

All leakage rated smoke damper systems are cycled prior to shipping. Actuators should be field-wired together so the smoke damper assembly operates as one assembly.

Labeling

All damper assemblies include an identification label, which provides the following information:

- damper model and size
- manufacturing date code (year/week)

Other labels include:

- UL/cUL classification of damper
- temperature rating
- top of damper
- maximum rated airflow and static pressure

Actuators

All actuators are factory mounted and cycled with the damper prior to shipment.

Note: Maximum size and area limitations are a function of past UL testing. Future testing may include additional actuators, or expand present limits.

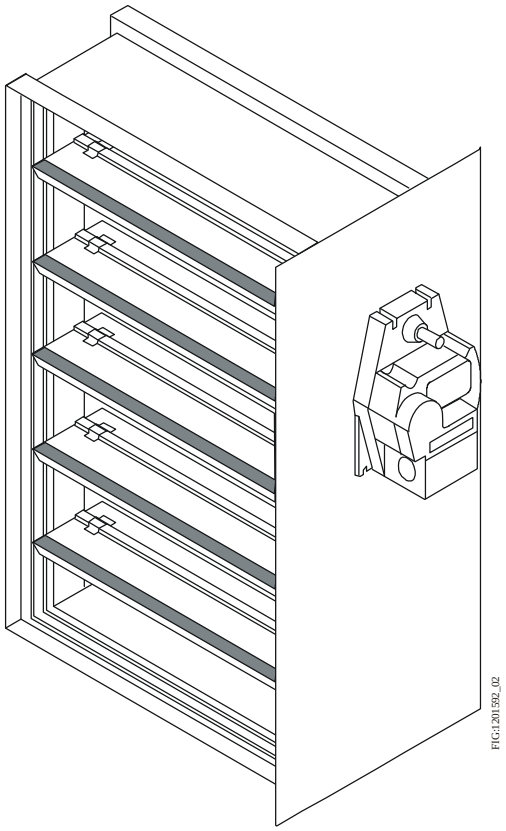

Figure 2: Smoke Damper System with Externally Mounted Electric Actuator

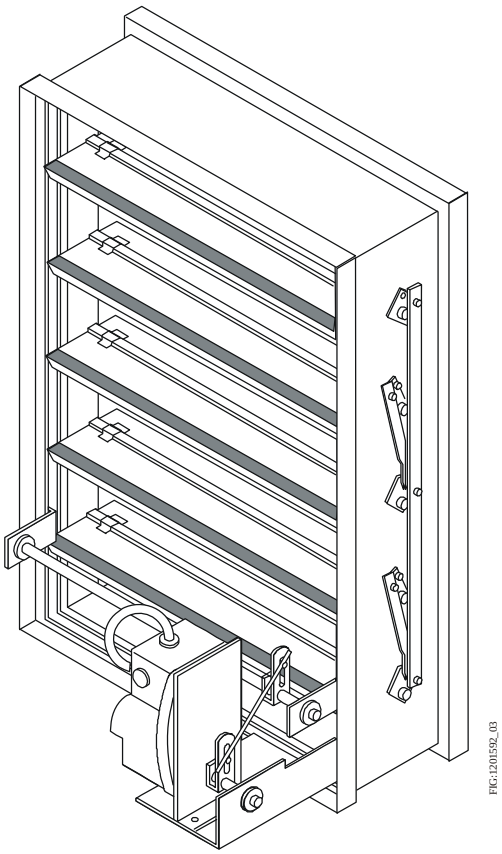

Figure 3: Smoke Damper System with Internally Mounted Electric Actuator

Electric

SD-1600 and SD-1250 Smoke Dampers are available with UL Listed/Canadian Standards Association (CSA) Certified electric actuators.

Actuators are pre-configured within the electronic selection tool to provide the most efficient operation based on UL testing for each model.

Maximum single section is 36 in. wide x 48 in. high (914 mm x 1,219 mm) for all SD models.

For more detailed information on the electric actuators, refer to the *Electric Smoke Damper Actuator (LIT-1201680)*.

Table 3: 2-Position Electric Actuator, 350°F, 4 in. Static Pressure, 2,000 FPM

Code Number	Description	Damper Assembly Size	Maximum Damper Area
MS4120	175 lb·in., 120 VAC	36 in. w x 48 in. h (914 mm x 1,219 mm)	12 sq ft (1.11 sq m)
MS8120	175 lb·in., 24 VAC	36 in. w x 48 in. h (914 mm x 1,219 mm)	12 sq ft (1.11 sq m)

Table 4: Modulating Electric Actuator, 250F, 4 in. Static Pressure, 2,000 FPM

Code Number	Description	Damper Assembly Size	Maximum Damper Area (for One Actuator)
FSAF24-SR	24 VAC	36 in. w x 48 in. h (914 mm x 1,219 mm)	12 sq ft (1.11 sq m)

Pneumatic

Smoke Dampers are available with UL Component Recognized pneumatic actuators.

Table 5: Pneumatic Actuator, 250°F, 4 in. Static Pressure, 2,000 FPM

Code Number	Description	PSI	Damper Assembly Size	Maximum Damper Area
331-2961	High force 250°F	25 PSI	36 in. w x 48 in. h (914 mm x 1,219 mm)	12 sq ft (1.11 sq m)
331-3060	High force 350°F	25 PSI	36 in. w x 72 in. h (914 mm x 1,829 mm) 48 in. w x 72 in. h (1,219 mm x 1,829 mm)	12 sq ft (1.11 sq m)
331-4827	Low force 350°F	25 PSI	24 in. w x 24 in. h (610 mm x 610 mm)	4 sq ft (0.38 sq m)

For more detailed information on the pneumatic actuators, refer to the *331 Series Pneumatic Damper Actuators Product Bulletin (LIT-12011619)*.

Dimensional Data

Smoke dampers are available in 1 in. increments. All Johnson Controls® smoke dampers dimensions are from the outside edges of the damper.

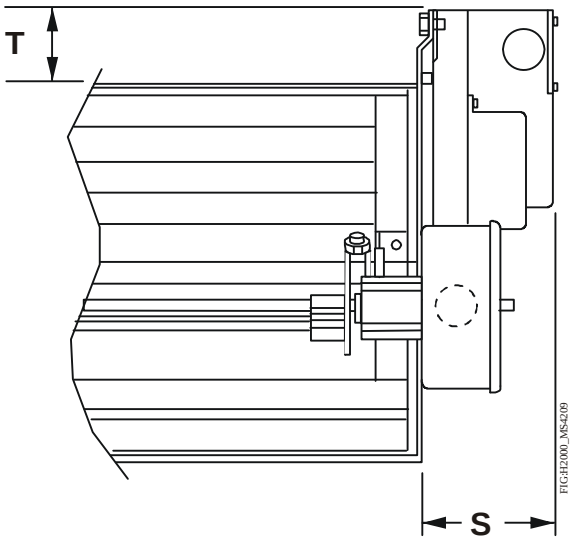

Figure 4: Mounting Dimensions with Electric Actuator

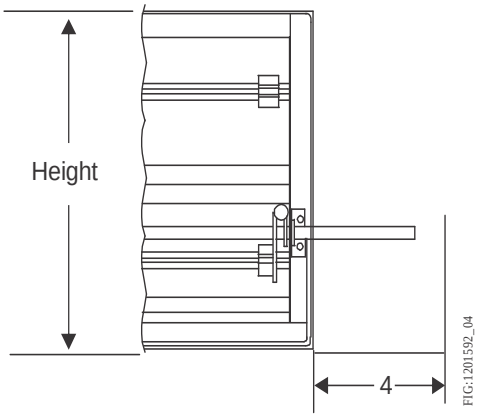

Figure 5: Mounting Dimensions with Electric Actuator - MS4120, MS8120

Table 6: Electric Actuator Dimensions

Actuators	Height	4	T
MS4120, MS8120	17 in. (432 mm)	4 in. (102 mm)	9 in. (229 mm)

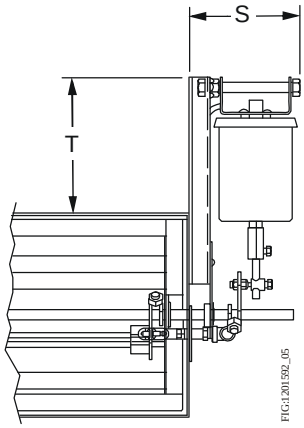

Figure 6: Mounting Dimensions with Pneumatic Actuator

Table 7: Pneumatic Actuator Dimensions

Actuators	S	T
331-4827	5 in. (127 mm)	9 in. (229 mm)
331-2961	8 in. (203 mm)	13 in. (330 mm)
331-2901P	10 in. (259 mm)	13 in. (330 mm)
331-3060	9 in. (229 mm)	16 in. (406 mm)

Maintenance

Test a ll smoke dampers at least twice a year in accordance with local fire safety codes. The owner or authorized representative must perform and document all tests, including cycling the damper at least three full strokes. Make documentation of all tests available for inspection by local authorities when requested.

Ordering Information

Use the following to select the product:

1. Determine required size and type of damper.
2. Select the features from Table 8 that match the operation and performance required.
3. Enter width and height of damper.
4. Enter options required.

Smoke Dampers include 16-gauge galvanized steel blades, stainless steel bearings, and stainless steel side seals.

Example: SOWSB-020x020 is an SD-1620 smoke damper that has 16-gauge blades, opposed blade operation, stainless steel bearings, high-temperature blade seals, and side seals. Its dimensions are 20 inches wide x 20 inches high, with a 250°F 24 VAC electric actuator.

Table 8: Smoke Damper Ordering Template[1]

	Ordering Code Number	S			S		-	w	w	w	x	h	h	h	
Application	S = Smoke														
Blade Operation	O = Opposed (greater than 12 inches) P = Parallel														
Blade Type	G = Class I Airfoil (SD-1630) W = Class II Triple-V (SD-1620) E = Class I Aluminum Frame and Blade (SD-1250)														
Bearing/Seal	S = Standard (stainless steel/silicone)														
Actuator Type	A = 120 VAC 250°F B = 24 VAC 250°F C = 120 VAC 350°F D = 24 VAC 350°F G = 24 VDC 250°F Modulating (class I Airfoil only)[2] O = Pneumatic 250°F (8-13# spring range) P = Pneumatic 350°F (8-13# spring range) Q = Pneumatic Modulating (class I Airfoil only) 250°F (8-13# spring range)[2]														
Width Dimensions	008 to 144, 1-inch increments														
Height Dimensions	006 to 096, 1-inch increments														
Factory-installed Options	See Table 10 for selection and combinations.														

1. Standard product includes the actuator mounted outside the air stream on a 12 in. wide side plate. Only certain damper and actuator combinations have been evaluated and found suitable for volume control use. As such, only use dampers marked **Also Suitable For Use As Volume Control Damper** for volume control applications.
2. These dampers are **Also Suitable For Use As Volume Control Damper** for volume control applications.

Panel Size

Maximum size and area limitations are determined by past UL testing. Future testing may include additional actuators or expand present limits. Actual damper size is 1/4 in. less than nominal. For example, a damper ordered 24 in. wide x 32 in. high is shipped 23-3/4 in. wide x 31-3/4 in. high.

Table 9: Panel Size Limits

Damper	Width x Height, in. (mm)
SD-1620	
Maximum, 1 Panel	36 (914) x 72 (1,829)
Multiple Panels	36 (914) x 48 (1,219)
SD-1630	
Maximum, 1 Panel	32 (813) x 72 (1,829)
Multiple Panels	32 (813) x 48 (1,219)
SD-1630 Modulating	
Maximum, 1 Panel	32 (813) x 48 (1,219)
SD-1250	
Maximum, 1 Panel	36 (914) x 48 (1,219)

Options

Table 10: Option List[1]

Code	Option Description
E	Exact size, no undercut
I	Factory Installed Blade Position Switch Kit[2]
L	20 gauge galvanized steel sleeve, 20 in. length
Q	Internal mount actuator[3]
V	Transition to round or oval duct[4]

1. Dampers have a maximum of two factory-installed options.
2. One kit provided per damper opening, not one kit per actuator or shipped section.
3. Minimum size for an electric actuator is 012 x 021 in. Minimum size for a pneumatic actuator is 018 x 024 in.
4. Minimum size is 006 x 004 in. Maximum size is 070 x 094 in.

Transitions

Smoke dampers have round or oval connections for low or medium pressure.

Round connections are a minimum of 4 in. (102 mm) in diameter. The rectangular size of the damper is 2 in. (51 mm) larger than the connection dimension ordered.

Smoke dampers supplied with oval connections are a minimum of 6 in. wide x 4 in. high (152 mm x 102 mm). The rectangular size of the damper is 2 in. (51 mm) larger than the width and height of the connection dimensions.

Note: The maximum dimension of the transition is 070 x 094 in.

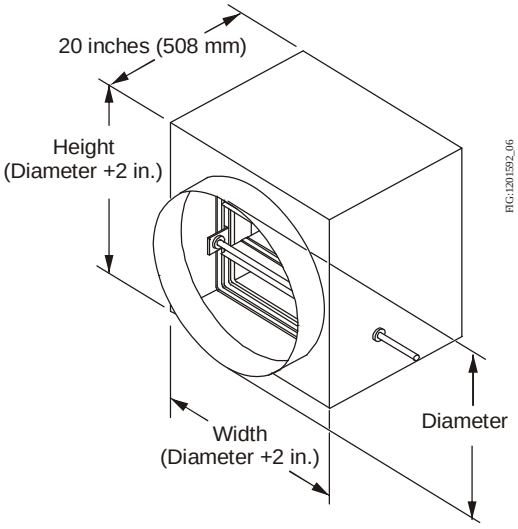

Figure 7: Transitions

Pressure Drop

To determine the pressure drop:

1. Select the damper free area factor based on the damper width and height from Table 11 and Table 12.
2. Solve this equation using the free area found in Step 1:

P = 2.75 {[(CFM ÷ Free Area) - Velocity] / 4005}^2

where

P = Pressure drop in inches w.g.

Velocity = Duct Velocity in feet per minute

CFM = Duct area (sq ft) x Velocity (fpm)

Table 11: Free Area (square feet) for Class I Dampers

Height, in.	Width, in.						
	8	12	16	20	24	28	30
8	0.17	0.29	0.42	0.54	0.67	0.79	0.86
10	0.24	0.42	0.60	0.78	0.97	1.15	1.24
12	0.29	0.51	0.72	0.94	1.15	1.37	1.47
14	0.32	0.55	0.79	1.03	1.26	1.50	1.62
16	0.39	0.68	0.98	1.27	1.56	1.85	2.00
18	0.44	0.77	1.09	1.42	1.74	2.07	2.23
20	0.51	0.90	1.28	1.66	2.04	2.42	2.61
24	0.64	1.11	1.58	2.05	2.52	3.00	3.23
28	0.78	1.37	1.95	2.53	3.12	3.70	3.99
32	0.91	1.58	2.25	2.93	3.60	4.27	4.61
36	1.03	1.79	2.55	3.32	4.08	4.85	5.23
40	1.18	2.05	2.93	3.80	4.68	5.55	5.99
44	1.30	2.26	3.23	4.19	5.16	6.12	6.61
48	1.42	2.47	3.53	4.59	5.64	6.70	7.22

Table 12: Free Area (square feet) for Class II Dampers

Height, in.	Width, in.							
	8	12	16	20	24	28	32	36
8	0.18	0.31	0.45	0.58	0.71	0.85	0.98	1.12
10	0.23	0.40	0.57	0.74	0.91	1.08	1.25	1.42
12	0.30	0.53	0.76	0.98	1.21	1.53	1.66	1.88
14	0.33	0.58	0.82	1.07	1.32	1.56	1.81	2.06
16	0.40	0.69	0.99	1.28	1.58	1.87	2.17	2.46
18	0.44	0.77	1.10	1.43	1.76	2.09	2.42	2.75
20	0.53	0.92	1.32	1.71	2.11	2.50	2.89	3.29
24	0.62	1.09	1.55	2.01	2.48	2.94	3.40	3.87
28	0.78	1.35	1.93	2.50	3.08	3.66	4.23	4.81
32	0.93	1.62	2.31	2.99	3.68	4.37	5.06	5.75
36	1.05	1.83	2.61	3.39	4.18	4.96	5.74	6.52
40	1.19	2.08	2.96	3.85	4.73	5.62	6.50	7.39
44	1.32	2.31	3.29	4.28	5.26	6.25	7.23	8.21
48	1.45	2.52	3.60	4.68	5.75	6.83	7.91	8.98

Repair Information

If the SD-1250 or SD-1600 Series Smoke Damper fails to operate within its specifications, replace the unit. For a replacement SD-1250 or SD-1650 damper, contact the nearest Johnson Controls® representative.

Technical Specifications

SD-1250 and SD-1600 Series Smoke Dampers[1] [2]

Maximum Dynamic Rating	4 in. w.c. static pressure at 2,000 fpm	
Ambient Operating Temperature	-40 to 200°F (-40 to 93°C)	
Electrical – Power Input	120 VAC ±10%, 60 Hz 24 VAC +20%, -10%, 50/60 Hz	
Electrical – Power Consumption	120 V - Running: 0.18 A, 23 W, Holding: 0.13 A, 9 W maximum 24 V - Running: 23 VA, Holding: 8 VA maximum	
Modulating Control Signal	0-10 VDC or 4-20 mA	
Timing	Drive open: 15 to 25 seconds typical Spring close: 15 seconds typical	
Maximum Short Duration Operating Temperature	250 or 350° F (121 or 177° C) based on actuator selected	
Pressure Drop (inches WG) - Fully Open	1,000 fpm	2,000 fpm
24 inches x 24 inches **36 inches x 48 inches**	0.03 0.02	0.11 0.10
Field Installed Accessories	None	
Field Replace Parts	SP100 position switch kit (DMPR-KC013 or DMPR-KC014) Actuators are field replaceable, refer to model number of actuator mounted on damper to order direct replacement.	
Approximate Weight	7 lb per square foot	

1. Dampers are tested at an AMCA Certified Laboratory using instrumentation and procedures in accordance with AMCA Standard No. 500-89, Test Methods for Louvers, Dampers, and Shutters.
2. All Johnson Controls Dampers are built to order, just in time, and cannot be returned due to customer ordering errors. All dampers are backed by a 3-year warranty, which covers defects in materials or workmanship when used in our defined applications. Refer to terms and conditions of sale for specifics.

For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

Building Efficiency
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