

Application

The SD-142 smoke damper employs triple-V blades for point-of-origin control of smoke in static and dynamic smoke management systems. The SD-142 is qualified to 2,000 ft/min (10.2 m/s) and 4 in.wg. (1.0 kPa) and may be installed in, or adjacent to vertical walls or partitions, or horizontally in, or adjacent to floors or assemblies.

Standard Construction

Frame: 5" x 1" (127 x 25) galvanized steel hat channel with interlocking corner gusset. Equivalent to 13 gauge (2.4) channel frame. Low profile head and sill are used on sizes less than 13" (330) high.

Blades: 6" x 16 gauge (152 x 1.6) galvanized steel — triple-V.

Side-Plate: 12" x 20 gauge (305 x 1.0) galvanized steel.

Axles: 1/2" (13) diameter plated steel hex.

Linkage: Concealed in frame.

Bearings: Stainless steel oilite, sleeve-type.

Seals: Silicone blade edge seals and flexible metal jamb seals.

Actuator: 120 VAC, power-open, spring-close, external mount.

Minimum Size: **8 X 8**

Maximum Size: Single section: 36" x 48" (914 x 1219)
 Multiple Section: 144" x 96" (3658 x 2438) or
 288" x 48" (7315 x 1219)

Options

- Alternate actuator:
 - Internal mount (actuator in air-stream).
 - 24 VAC 230 VAC Pneumatic Modulating
- PI-50 — Dual position indicator switch package. ← **On Actuator**
- Factory installed sleeve:
 - Gauge: 20 (1.0) 18 (1.3) 16 (1.6)
 - 14 (2.0) 10 (3.5)
 - Length: 12" (305) 16" (406) 24" (610) Other _____
- Transitions (sleeve required): Flanged
 - Round Oval
- Duct connections: 1" (25) S-clip 1 1/2" (38) S-clip
- DM25 DM35
- Duct smoke detector factory mounted and wired (sleeve required):
 - DH-100 (100-3,000 fpm [2.0-15.2 m/s])
 - 2151 (0-3,000 fpm [0-15.2 m/s])
- Duct access door factory mounted in common sleeve.
- Remote control stations:
 - RCP-1 (single) RCP-1K (single, key controlled)
 - RCP-10 (10 station) RCP-20 (20 station)
- Type-304 stainless steel construction.

Ratings

UL 555S Leakage Class: 2 [20 cfm/sq.ft. @ 4 in.wg.]
 [(0.10 m³/s/m² @ 1.0 kPa)]

Maximum Dynamic Closure Velocity: 2,000 fpm (10.2 m/s)

Maximum UL555S Rated Pressure: 4 in.wg. (1.0 kPa)

Maximum Temperature: 350°F (177°C)

Listings

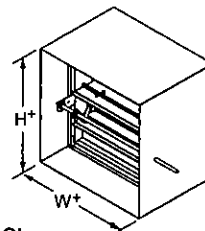
UL 555S Listing: R11767

CSFM Listing: 3230-0368:111

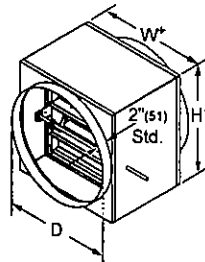
New York City MEA Listing: 295-98-E

Meets NFPA Standards: 90A, 92A, 92B and 101

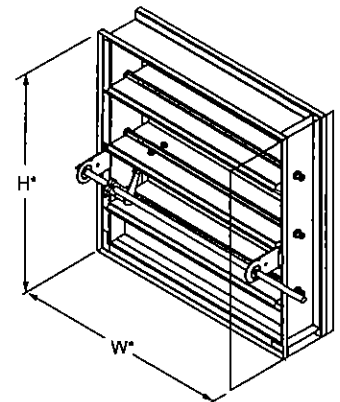
Meets Building Code Standards: IBC, NBC, NFPA, SBC and UBC



Sleeve (optional)

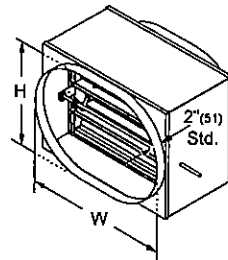


Sleeve Type R (optional)
 Round duct transitions are standard with D=W=H. (available with D<W and H)



Model SD-142 (standard)

*Damper dimensions furnished approximately 1/4" (6) undersize.



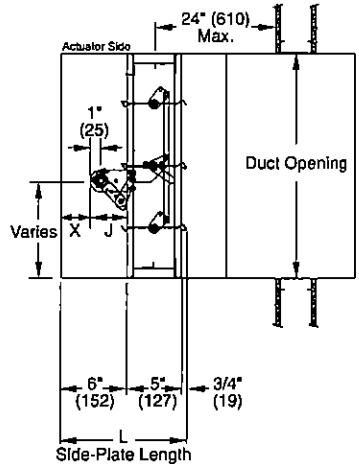
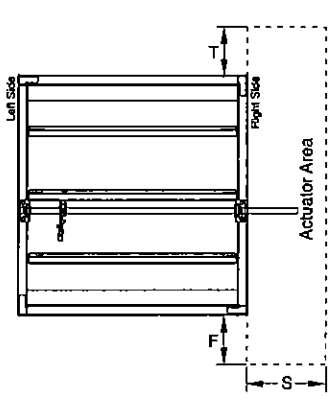
Sleeve Type O (optional)
 Oval duct transitions are standard with W and H equal to damper width and height dimensions. (available with W and H smaller than damper width and height)

*Damper dimensions furnished approximately 1/4" (6) undersize. (sleeve thickness not included)

Actuator and Sleeve Dimensional Data

The drawings and corresponding table illustrate the position of the damper when mounted in a factory sleeve and the relative space required for a given actuator. The standard mounting locations provide enough space for installation of retaining angles and duct connections.

Damper Height	Actuator Model						
	FSLF120 FSLF24	FSNF120 FSNF24	GGD221 GGD121	ML4115 ML8115	331-4826	331-2998	
F	6"-7" 8"-9" 10"-11" 12"-13" 14" 15"-16" 17" 18" and 23" 19"-20" and 25" 21"-22" and 24" 26"-27" >27"	5" 4" 1" 0" 0" 0" 0" 0" 0" 0" 0" 0"	7" 4" 3" 2" 1" 0" 0" 0" 0" 0" 0" 0"	9" 8" 6" 5" 4" 3" 3" 0" 0" 0" 0" 0"	5" 4" 1" 0" 0" 0" 0" 0" 0" 0" 0" 0"	9" 8" 5" 4" 3" 3" 0" 0" 0" 0" 0" 0"	13" 12" 9" 8" 7" 9" 3" 2" 1" 0" 0" 0"
T	6" and 10" 7" and 11"-12" 8", 13"-14" and 21" 9", 15"-17" and 20" 18"-19" 22"-23" and >24" 24"	3" 2" 1" 0" 0" 0" 0"	3" 2" 1" 0" 0" 0" 0"	3" 2" 1" 0" 0" 0" 0"	3" 2" 1" 0" 0" 0" 0"	3" 2" 1" 0" 0" 0" 0"	3" 1" 0" 0" 1" 1" 0"
S	All	4-1/2"	4-1/2"	4-1/2"	4-1/2"	5"	7-1/4"
X	<8" ≥8"	4" 2-5/8"	4" 2-5/8"	4" 2-5/8"	4" 2-5/8"	4" 2-5/8"	4" 2-5/8"
J	<8" ≥8"	2" 3-3/8"	2" 3-3/8"	2" 3-3/8"	2" 3-3/8"	2" 3-3/8"	2" 3-3/8"

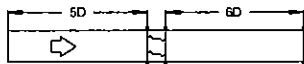
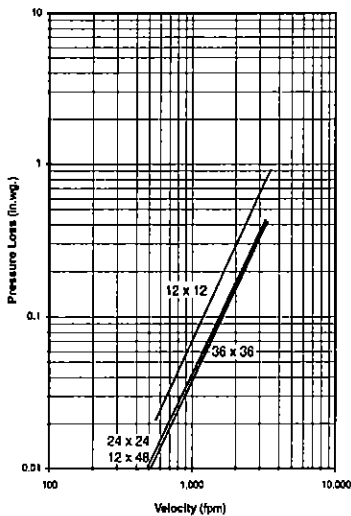


- NOTE:**
- Standard side-plate length "L" = 12" (305).
 - Damper may be rotated 180° to position actuator area on the left side.
 - The entire damper frame is not required to be installed within the wall, partition or floor. However, the closed plane of the damper blades must be within 24" (610) of the wall, partition or floor.
 - Dimensions for ML4115/ML8115 apply to MS4209/MS8209.
 - For dimensions on actuators not shown above, contact factory.

Airflow Performance Data

Pressure Loss vs. Velocity

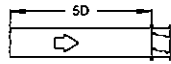
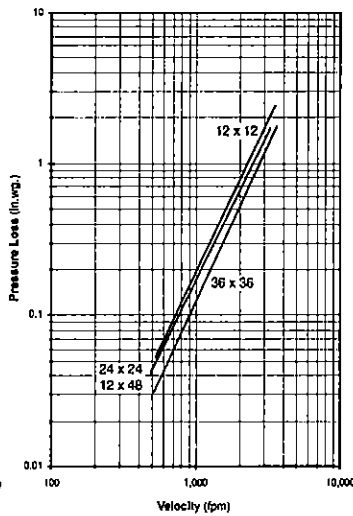
Figure 5.3 — Ducted Inlet and Outlet



Ducted Inlet and Outlet

AMCA Figure 5.3 illustrates a fully ducted damper. This configuration represents the lowest pressure drop of the three test configurations because entrance and exit losses are minimized by straight duct runs upstream and downstream of the damper.

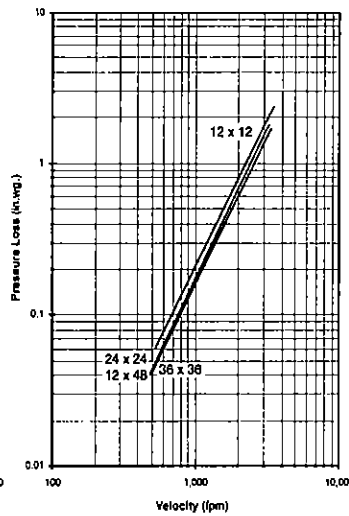
Figure 5.2 — Ducted Inlet



Ducted Inlet

AMCA Figure 5.2 illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5 because entrance losses are minimized by a straight duct run upstream of the damper.

Figure 5.5 Plenum Mount



Plenum Mount

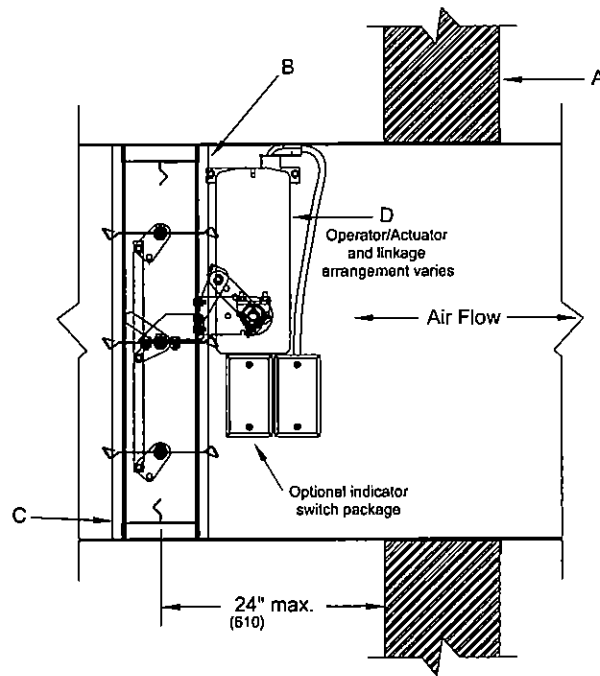
AMCA Figure 5.5 illustrates a plenum mounted damper. This configuration has the highest pressure drop because of extremely high entrance and exit losses due to the sudden changes of area in the system.

Pressure drop testing was performed in accordance with AMCA Standard 500-D using the three configurations shown. All data has been corrected to represent air density of 0.075 lb/ft. Actual pressure drop in any ducted HVAC system is a combination of many elements. This information, along with analysis of other system influences, should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

Information is subject to change without notice or obligation.

NOTE: Dimensions in parentheses () are millimeters.

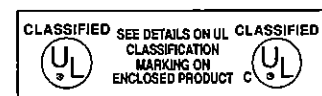
The following installation details apply to models **SD-141**, **SD-142**, **SD-143** and **SD-151**



**Damper Installed at Smoke Partition
Vertical Mount Shown (Horizontal Mount Similar)**

Illustrations show triple-V bladed (140 type), steel airfoil blade (150 type) similar.

- A. Leakage rated dampers can be installed vertically or horizontally, in accordance with NFPA-90A. Except as restricted by local building codes, the damper shall be installed no more than 24" (610) from the smoke partition. Install damper squarely and free from racking. Do not compress or stretch the damper frame.
- B. When joining multiple sections or fastening the damper to the duct, the damper shall be fastened with $\frac{7}{16}$ " (4.8) diameter steel rivets, Quick-Lock Joints, welds, No. 10 (M5) bolts or sheet metal screws at 12" (305) o.c. maximum. A minimum of two connections per side, top and bottom.
- C. A continuous bead of Dow-Corning 999A, Dow-Corning 700 or 732, Fiberfax, or GE RTV 108 OR SCS 1201 RTV silicone rubber sealant shall be applied between the damper and the sleeve. Sealant is only required on one side of the damper.
- D. Leakage rated dampers and qualified operators are tested together by Underwriters Laboratories and are factory installed to qualify for standard damper/operator warranties. Damper operator / actuator must be tested prior to system start-up to ensure proper operation. Prior to applying power to the operator / actuator the power must be verified.

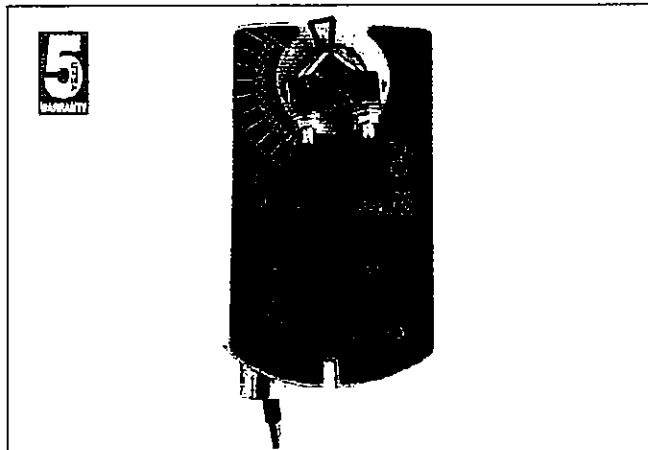


Underwriters Laboratories file #R11767
City of New York listing # MEA 295-98-E
The product is also listed by CSFM file # 3230-0368:111 and conforms to NFPA 90A and NFPA 92A.

FSLF120 (-S) US, FSLF24 (-S) US



Fire and smoke actuator, 30 In-lb, [3.5 Nm], spring return, 350°F [177°C] for half hour, 15 sec. operation.



Technical Data	FSLF120(-S) US	FSLF24(-S) US
Nominal voltage	120 VAC 50/60 Hz	24 VAC 50/60 Hz
Nominal voltage range	108 - 132 VAC	21.6 - 26.4 VAC
Power consumption	Running: 24 VAC, 50/60 Hz: 5.0 VA 120 VAC, 60 Hz: 18 VA (120 VAC, 50 Hz: 20 VA) Holding: 24 VAC, 50/60 Hz: 3.5 VA 120 VAC, 60 Hz: 6.5 VA (120 VAC, 50 Hz: 12 VA)	
Transformer sizing	Safety note: Connect via safety isolating transformer, Class 2 supply.	
Electrical connection	2 ft, 18 ga, 3 color coded leads (120 V) 2 ft, 18 ga, 2 color coded leads (24 V) 2 ft, 18 ga, appliance cable (Aux switches)	
Overload protection	Electronic throughout 0 to 95° rotation Auto-restart after temporary overload	
Electrical protection motor	FSLF120 US grounded enclosure	
Electrical protection	Double insulated <input type="checkbox"/>	
Auxiliary switches		
Angle of rotation	95°	
Torque	30 in-lb [3.5 Nm] minimum from 32°F to 350°F [0°C to 177°C]	
Direction of rotation	Spring return can be selected by CCW/CW mounting	
Position indication	Visual indicator, 0° to 95°	
Running time	Motor: < 15 sec at rated voltage and torque, 32°F to +122°F [0°C to +50°C] Spring: < 15 sec	
Auxiliary switches	2 x SPST 0.5 A inductive @ 120/250 V, 1 mA @ 5 VDC, 3 A resistive @ 120/250 V, UL listed, 10° and 85°	
FSLF120-S US/24-S US		
Humidity	5 to 95% RH noncondensing	
Ambient temperature		
- Normal operation	32°F to +122°F [0°C to +50°C]	
- Safety operation	3 On/Off cycles after 30 minutes at ambient temperature of 350°F [177°C]	
Storage temperature	-40°F to +176°F [-40°C to +80°C]	
Housing	NEMA type 1, zinc coated steel	
Type of action	Type 1.B	
Software class	A	
Gears	Permanently lubricated	
Agency listings	cULus listed acc. to UL 60730-1	
Servicing	Maintenance free	
Quality standard	ISO 9001	
Weight	3.7 lbs [1.7 kg]	

Application:

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

Square footage of damper operated will depend on make and model and the temperature required.

Operation

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

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

Replacement applications

When actuators fail on existing dampers, the local authority having jurisdiction sets the code requirements for replacement actuators. The local inspector or fire marshal should be consulted. In some jurisdictions, a product meeting current codes may be required.

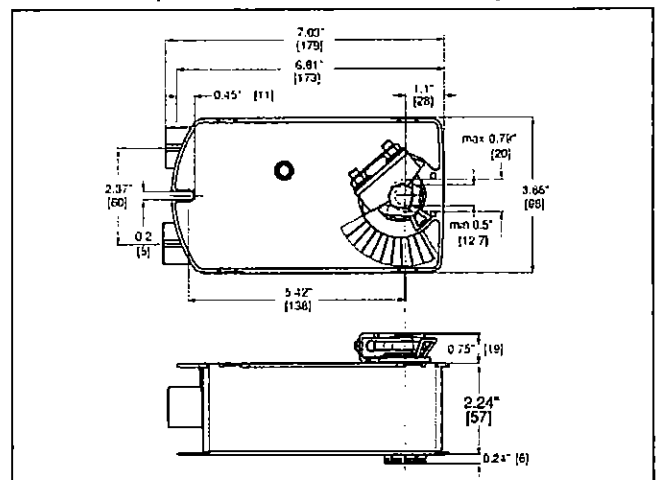
The FSLF will meet or exceed requirements.

Caution must be used when replacing failed motors with new Belimo actuators. Many old motors did not have internal springs and depended on external springs on the side of the damper or wrapped around the damper shaft to close the damper.

In some cases, the damper must be replaced because the damper would have to undergo major modifications to replace an actuator.

Most codes require that "equal or better" actuators be used to replace defectives.

Dimensions [All numbers in brackets are in millimeters.]



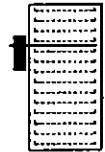


FSLF120 (-S) US, FSLF24 (-S) US

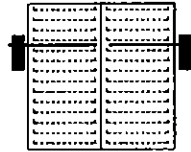
Fire and smoke actuator, 30 in-lb, [3.5 Nm], spring return, 350°F [177°C] for half hour, 15 sec. operation.

Multi-section damper assemblies – typical applications

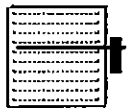
The typical fire and smoke damper requires from 5-15 in-lb of torque per square foot at 250°F - 350°F under dynamic load (2400 fpm velocity). The FSLF is a single section damper actuator. For the multi section dampers, use the FSNF series.



Single section for one FSLF actuator



Two section for two FSLF actuators



Maximum area one actuator



Maximum area for two actuators

This is a direct coupled actuator. If linkages are needed use the FSNF series. Square shaft adaptors are available: 22153-00002, 22153-00003, 22513-00004 for the 8mm, 10mm, and 12mm, form fit respectively.

Safety note:

The actuator contains no components which the user can replace or repair.

FSLF120 or FSLF24(-S) Typical specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSLF US or FSNF US actuators. No substitutions allowed.

Damper and actuator shall have UL555S Listing for 250°F (350°F) and shall drive open in 15 seconds and spring closed in 15 seconds as required by UBC.

Where auxiliary switches are required for signaling, starting fans, or position indication, -S model actuators, damper blade, or proximity switches shall be provided.

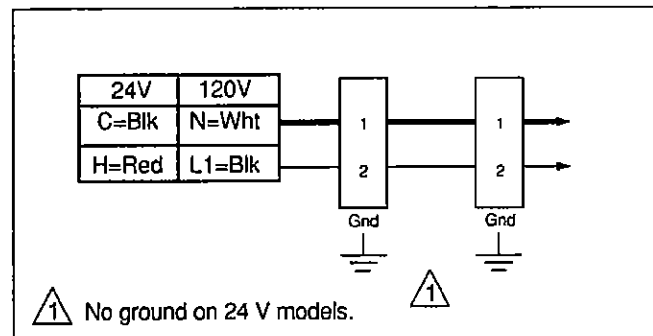
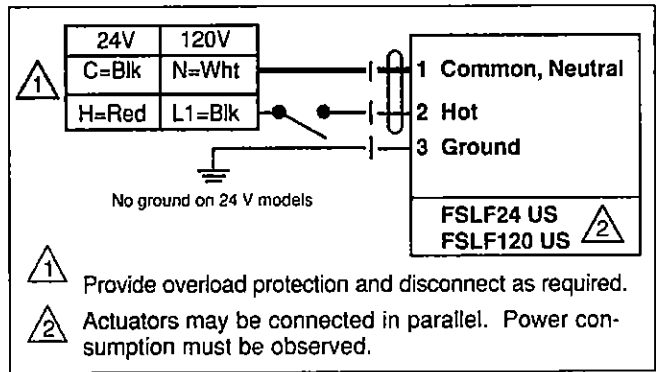
Safety note:

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

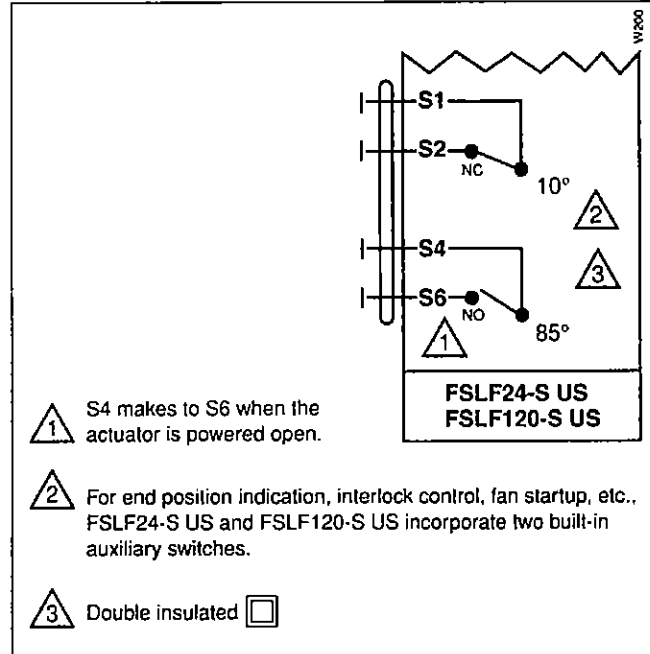
Indication switch



Wiring



Parallel actuator wiring

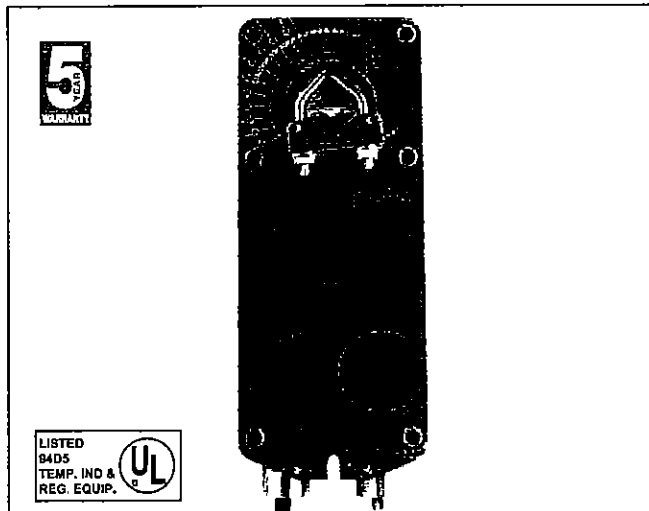


Auxiliary switch wiring for FSLF24-S US, FSLF120-S US

FSNF120 (-S), FSNF24 (-S)



Fire and smoke actuator, 70 in-lb, spring return, 350°F for half hour, 15 sec. cycle time



Technical Data	FSNF120(-S)	FSNF24(-S)
Power supply	120 VAC ± 10% 50/60 Hz	24 VAC ± 20% 50/60 Hz
Power consumption 120 VAC	running: 18 W, .23A holding: 6 W, .09A	
Transformer sizing 24 VAC	27 VA Class 2 power supply	
Electrical connection	3 ft, 18 ga, 3 color coded leads (120V) 3 ft, 18 ga, 2 color coded leads (24V) 3 ft, 18 ga, appliance cable (Aux switches)	
Overload protection	Electronic throughout 0 to 95° rotation Auto-restart after temporary overload	
Electrical protection	Grounded enclosure 120 V Double insulated aux switches	
Angle of rotation	95°	
Torque	70 in-lb [7.9 Nm] minimum from 32°F to 350°F	
Direction of rotation	spring return can be selected by CCW/CW mounting	
Position indication	visual indicator, 0° to 95°	
Running time	between 32°F and 350°F motor: < 15 sec at rated voltage and torque spring: < 15 sec	
Auxiliary switches (FSNF24-S/120-S)	2 x SPDT 7A (2.5A inductive)@ 125/250VAC, UL listed, 5° and 85°	
Humidity	5 to 95% RH noncondensing	
Ambient temperature	32°F to +122°F [0°C to +50°C]	
Storage temperature	-40°F to +176°F [-40°C to +80°C]	
Housing	NEMA type 1, zinc coated steel	
Gears	Steel, permanently lubricated	
Agency listings	UL listed to UL873 and CAN/CSA C22.2 No. 24, New York BEC, CSFM	
Servicing	maintenance free	
Quality standard	ISO 9001	
Weight	6 lbs (2.75 kg.)	

Application:

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

Square footage of damper operated will depend on make and model and the temperature required.

Operation

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

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

Accessories

All AF/NF linkages may be applied.

Replacement applications

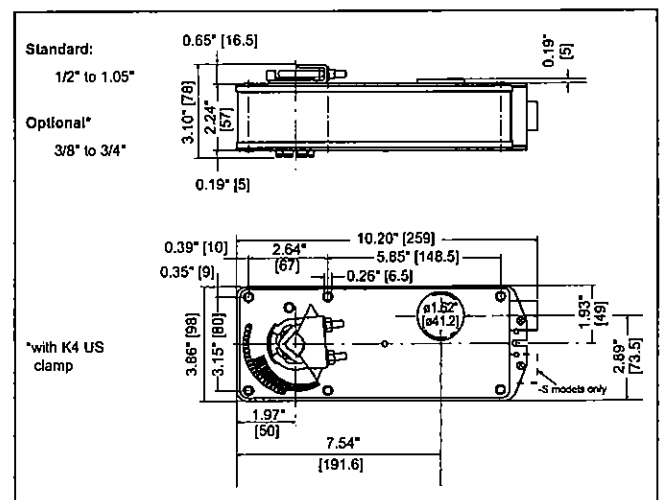
When actuators fail on existing dampers, the local authority having jurisdiction sets the code requirements for replacement actuators. The local inspector or fire marshal should be consulted. In some jurisdictions, a product meeting current codes may be required. The FSNF will meet or exceed requirements.

Caution must be used when replacing failed motors with new Belimo actuators. Many old motors did not have internal springs and depended on external springs on the side of the damper or wrapped around the damper shaft to close the damper.

In some cases, the damper must be replaced because the damper would have to undergo major modifications to replace an actuator.

In all cases, replacing the actuator voids the UL555 listing of the damper and actuator.

Dimensions [All numbers in brackets are in millimeters.]



Fire and smoke actuator, 70 in-lb, spring return, 350°F for half hour, 15 sec. cycle time

Accessories

AF series accessories may be employed:

- IND-AF2 Damper position indicator
- K4 US Universal clamp for 3/8" to 3/4" shafts
- K4-1 US Universal clamp for up to 1.05" dia. jackshafts
- K4-H Universal clamp for hexshafts 3/8" to 5/8"
- KH-AF Crankarm for up to 3/4" round shaft (Series 2)
- KH-AF-1 Crankarm for up to 1.05" jackshaft (Series 2)
- KH-AFV V-bolt kit for KH-AF and KH-AF-1
- Tool-06 8mm and 10 mm wrench
- ZDB-AF2 Angle of rotation limiter
- ZG-100 Universal mounting bracket
- ZG-101 Universal mounting bracket
- ZG-102 Multiple actuator mounting bracket
- ZG-103 Universal mounting bracket
- ZG-104 Universal mounting bracket
- ZG-106 Mounting bracket for Honeywell® Mod IV replacement or new crankarm type installations
- ZG-107 Mounting bracket for Honeywell® Mod III or Johnson® Series 100 replacement or new crankarm type installations
- ZG-108 Mounting bracket for Barber Colman® MA 3./4..., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crankarm type installations
- ZG-AF Crankarm adaptor kit for AF/NF
- ZG-AF108 Crankarm adaptor kit for AF/NF
- ZS-100 Weather shield (metal)

- ZS-150 Weather shield (polycarbonate)
- ZS-300 NEMA 4X housing
- 22965-00001 12mm form fit square shaft adaptor

For an overview of how to apply the accessories, see Belimo Mechanical Accessories and refer to the Belimo Mounting Methods Guide.

Note: When using FSNF (-S) US actuators, only use accessories listed on this page.

FSNF Typical specification

All smoke and combination fire and smoke dampers shall be provided with Belimo FSNF US actuators. No substitutions allowed.

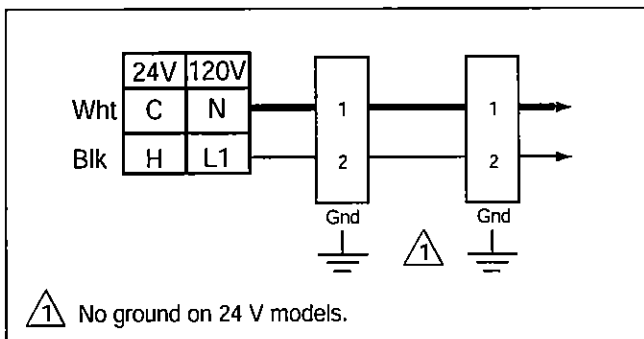
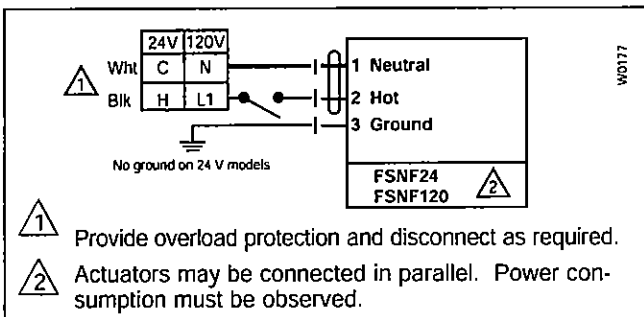
Damper and actuator shall have UL555S Listing for 350°F (250°F) and shall drive open in 15 seconds and spring closed in 15 seconds at elevated temperature.

Where auxiliary switches are required for signaling, starting fans, or position indication, -S model actuators, damper blade, or proximity switches shall be provided.

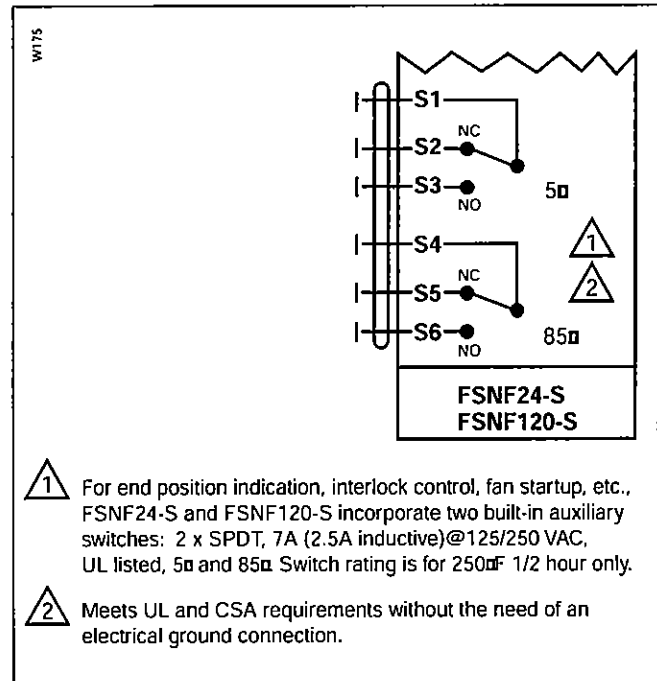
Indication switch



Wiring



Parallel actuator wiring



Auxiliary switch wiring for FSNF24-S, FSNF120-S