

# FSNF24(-S) US, FSNF120(-S) US

On/Off, Spring Return, 350°F for Half Hour, 15 Seconds Cycle Time



Technical Data		FSNF24(-S) US, FSNF120(-S) US
Power supply		
	FSNF24(-S) US	24 VAC ± 20%, 50/60 Hz
	FSNF120(-S) US	120 VAC ± 10%, 50/60 Hz
Power consumption		
	running	27 VA, .23 A
	120 VAC holding	10 VA, .09 A
Transformer sizing		
	24 VAC	27 VA Class 2 power supply
Electrical connection		
	FSNF24(-S) US	3 ft, 18 ga, 2 color coded leads
	FSNF120(-S) US	3 ft, 18 ga, 3 color coded leads
	FSNF...-S US	3 ft, 18 ga, appliance cable
Overload protection		Electronic throughout 0 to 95° rotation grounded enclosure, 120V
Control		microprocessor
Angle of rotation		95°
Torque		70 in-lb [7.9 Nm] minimum from 32°F to 350°F [0°C to 177°C]
Direction of rotation		spring can be selected by CCW/CW mounting
Position indication		visual indicator, 0° to 95°
Running time		between 32°F and 350°F [0°C to 177°C]
	motor	<75 seconds constant, independent of load
	spring	<20 seconds nominal
Humidity		5 to 95% RH non-condensing
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
Housing material		zinc coated steel
Gears		steel, permanently lubricated
Agency listings		cULus listed to UL873 and CAN/CSA C22.2 No. 24
Servicing		Maintenance free
Quality standard		ISO 9001
Weight		
	FSNF24(-S) US	6.0 lbs (2.75 kg)
	FSNF120(-S) US	6.7 lbs (3.0 kg)
	FSNF...-S US	+0.5 lbs (+0.23 kg)

FSNF24-S US, FSNF120-S US	
Auxiliary Switch	2xSPST 7A resistive, 2.5A inductive at 120V or 250V, UL Approved, double-insulated, one switch at <10°, one adjustable from >30° to 90°

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

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

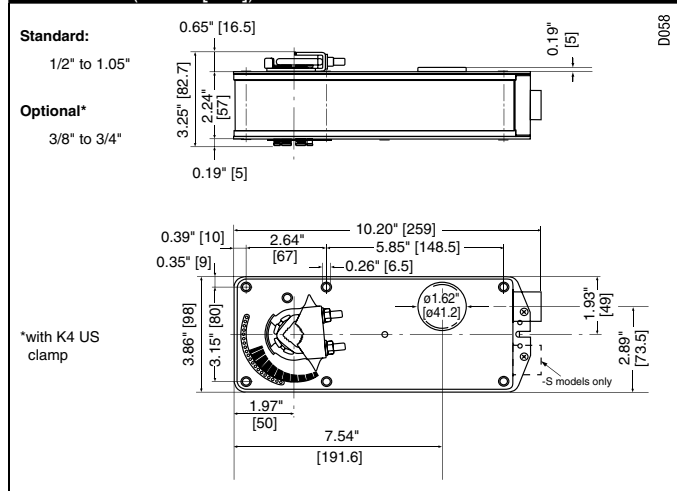
## SAFETY NOTES

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

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

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

## Dimensions (Inches [mm])



## Accessories

All AF/NF linkages and parts may be employed.

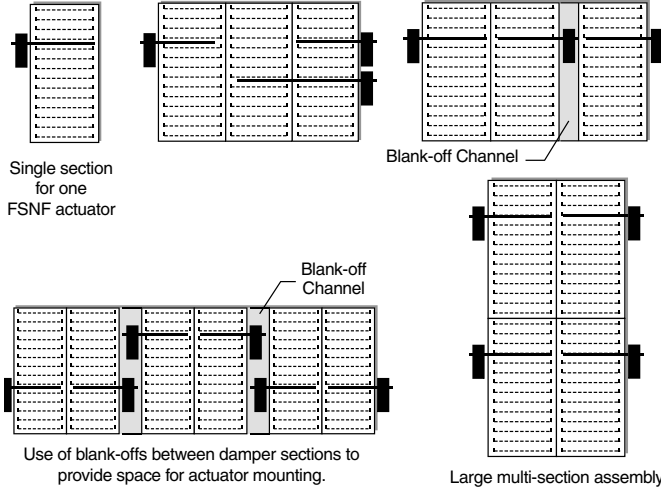
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### Typical Applications

#### Multi-section Damper Assemblies

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 FSNF will operate multi-section dampers using multiple actuators for multiple sections. Some of the methods used are shown below.

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.



### Typical Specification

#### Smoke Control and Combination Fire and Smoke Control Damper Actuators

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

Damper and actuator shall have UL555S Listing for 250°F (350°F) and shall comply with UBC if required by local codes.

Where proof of closure switches are required, blade switches, actuator auxiliary switches, or proximity switches are allowed.

### Replacement Applications

The number one "equal or better" requirement for use as a replacement for obsolete defective motors is the UL555S listing of the Belimo actuator with the damper for the application. The local authority having jurisdiction sets the requirements. In some cases a permit and inspection may be required.

Contact Belimo for a list of damper manufacturers with UL555S listing with Belimo FSAF, FSLF, & FSNF actuators.

#### CAUTION

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 many cases, replacing the actuator voids the UL555S listing of the damper.

### Wiring Diagrams

#### INSTALLATION NOTES

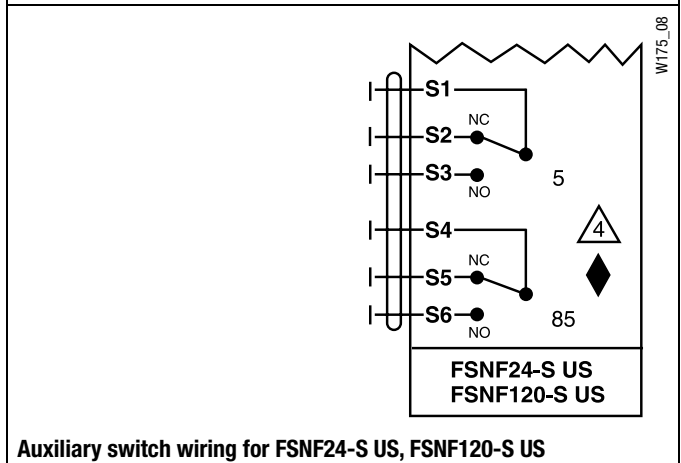
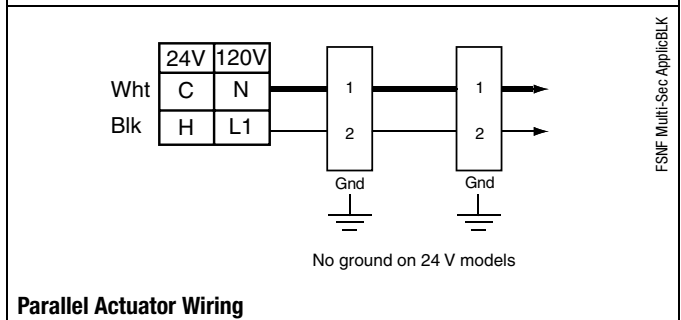
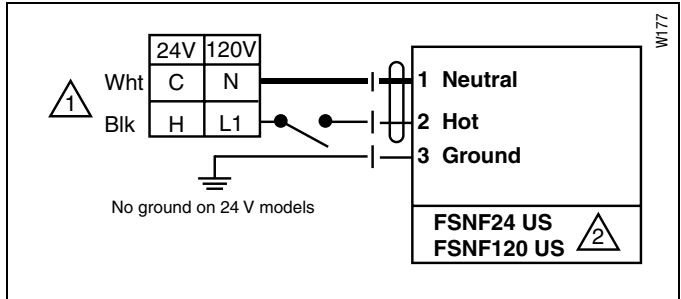
- 1 Provide overload protection and disconnect as required.
- 2 **CAUTION Equipment Damage!**  
Actuators may be connected in parallel.  
Power consumption and input impedance must be observed.
- 4 For end position indication, interlock control, fan startup, etc., FSNF24-S US and FSNF120-S US incorporate two built-in auxiliary switches: 2 x SPDT, 7A (2.5A inductive)@125/250 VAC, UL Approved, 5 and 85. Switch rating is for 250F 1/2 hour only.

#### APPLICATION NOTES

- ◆ Meets cULus or UL and CSA Standard requirements without the need of an electrical ground connection.

#### WARNING Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.



# FSNF230(-S) US

On/Off, Spring Return, 350°F [177°C] for Limited Time, Nominal 15 Seconds Operation



Technical Data		FSNF230(-S) US
Power supply	FSNF230(-S) US	230 VAC ± 10%, 50/60 Hz
Power consumption	running	18 W, 27 VA, .13 A
	230 VAC holding	6 W, 10 VA, .04 A
Transformer sizing	24 VAC	27 VA Class 2 power supply
Electrical connection	FSNF230(-S) US	3 ft [1m], 18 ga, 3 color coded leads
	FSNF...-S US	3 ft [1m], 18 ga, appliance cable
Overload protection		Electronic throughout 0 to 95° rotation auto-restart after temporary overload
Electrical protection		grounded enclosure, 230V
Control		microprocessor
Angle of rotation		95°
Torque		70 in-lb [7.9 Nm] minimum from 32°F to 350°F [0°C to 177°C]
Direction of rotation	spring	can be selected by CCW/CW mounting
Position indication		visual indicator, 0° to 95°
Running time	motor	between 32°F and 350°F [0°C to 177°C] approx. 15 sec at rated voltage and torque
	spring	approx. 15 sec
Humidity		5 to 95% RH non-condensing
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
Housing material		zinc coated steel
Gears		steel, permanently lubricated
Agency listings		cULus listed to UL873 and CAN/CSA C22.2 No. 24
Servicing		Maintenance free
Quality standard		ISO 9001
Weight	FSNF230(-S) US	6.7 lbs (3.0 kg)
	FSNF...-S US	+0.5 lbs (+.23 kg)
<b>FSNF230-S US</b>		
Auxiliary Switch		2 x SPDT 7A (2.5A inductive)@ 125/250VAC, UL Approved, 5° and 85°, double insulated

## Application

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

## Operation

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

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

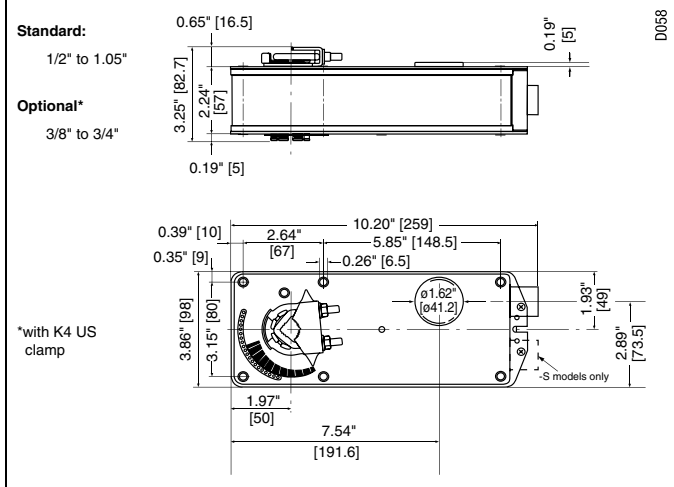
## SAFETY NOTES

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

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

## Dimensions (Inches [mm])



## Accessories

All AF/NF linkages and parts may be employed.

Order part 22965-00001 for square shafts.

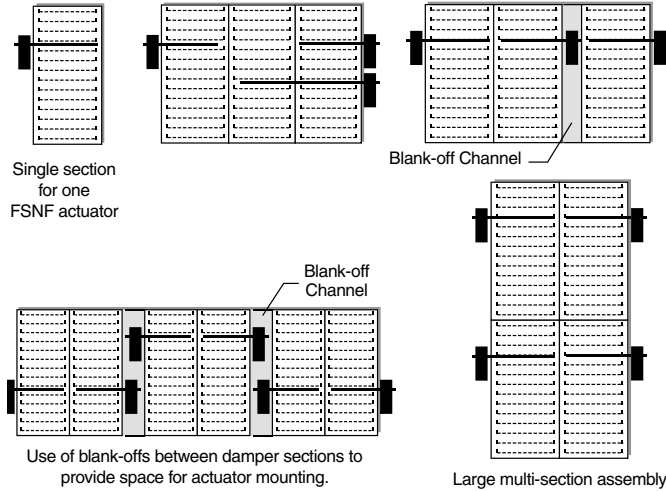
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## Typical Applications

### Multi-section Damper Assemblies

The typical US fire-smoke damper requires from 5-15 in-lb torque per square ft. [6-17 Nm per square meter] at 350°F [171°C] under dynamic load (2400 fpm [12m/s] velocity).

Some of the methods used for multi-section dampers with the FSNF actuators are shown below.



## Typical Specification

### Smoke Control and Combination Fire and Smoke Control Damper Actuators

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

Damper and actuator shall have UL555S Listing for 250°F (350°F) and shall comply with UBC if required by local codes.

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## Wiring Diagrams

### INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

### CAUTION Equipment Damage!

2 Actuators may be connected in parallel.

Power consumption and input impedance must be observed.

4 For end position indication, interlock control, fan startup, etc., FSNF230-S incorporates two built-in auxiliary switches: 2 x SPDT, 7A (2.5A inductive)@125/250 VAC, UL Approved, 5 and 85. Switch rating 250°F [121°C] 1/2 hour only.



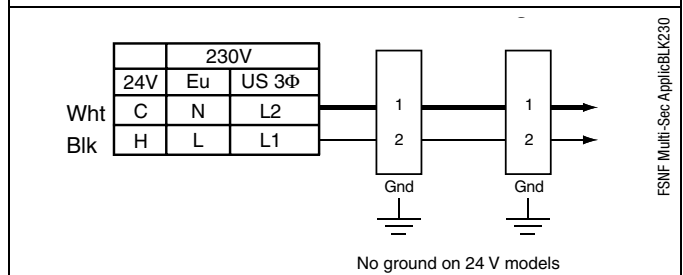
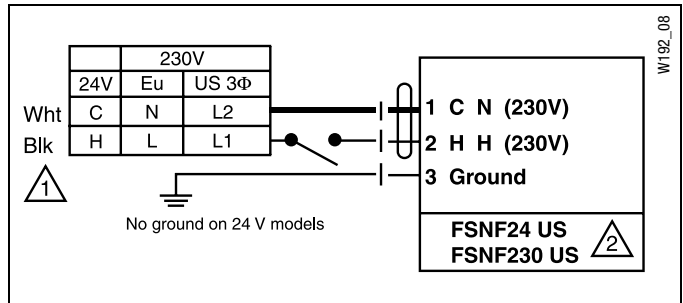
### APPLICATION NOTES

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### Parallel Actuator Wiring

