

Belimo is the worldwide leader in fire and smoke actuation

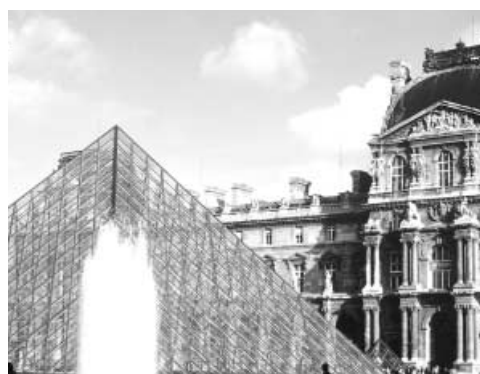
Belimo first produced actuators for the European fire and smoke damper market in 1978. Belimo has consistently offered new technology since entering the market. Since 1978 Belimo's market share has grown as actuator variations were released to meet various worldwide requirements. The FSLF and FSAF are the latest models to be introduced for the United States and regions of the world requiring UL 555 and UL 555S listing.

Belimo is the dominant fire and smoke actuator manufacturer in Europe today with 80% market share and is growing in the rest of the world.

Radio Shack, Corporate Headquarters, Fort Worth Texas



"Kärntner-Ringhof", Vienna



The Louvre, Paris

FS Series - at a glance

		FSAF24 US (p. 112)	FSAF24-S US (p. 112)	FSAF120 US (p. 112)	FSAF120-S US (p. 112)	FSNF24 US (p. 114)	FSNF24-S US (p. 114)	FSNF120 US (p. 114)	FSNF120-S US (p. 114)	FSNF230 US*	FSNF230-S US*	FSLF24 US (p. 116)	FSLF24-S US (p. 116)	FSLF120 US (p. 116)	FSLF120-S US (p. 116)
Torque:	133 in-lb	●	●	●	●										
	70 in-lb					●	●	●	●	●	●				
	30 in-lb											●	●	●	●
Power supply :	24 VAC	●	●			●	●					●	●		
	120 VAC			●	●			●	●					●	●
	230 VAC									●	●				
Control signal:	on-off	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Running time motor:					●	●	●	●	●	●	●	●	●	●
spring:	<75 sec	●	●	●	●										
	<15 sec					●	●	●	●	●	●	●	●	●	●
	<20 sec	●	●	●	●										
Built-in auxiliary switch		●		●		●		●		●		●		●	
Manual override		●	●	●	●										

*FSNF230 (-S) data sheets are available at www.belimo.com

A CLOSER LOOK...



- True mechanical spring return – the most reliable failsafe.
- Reverse mount for clockwise or counterclockwise fail-safe.
- Check damper position easily with clear position indicator.
- Overload-proof throughout rotation.
- Easy mechanical stop to adjust angle of rotation (add ZDB-AF2 accessory/FSAF and FSNF only).
- Built-in auxiliary switch is easy to use, offers feedback or signal for additional device. (-S models)
- Manual override crank speeds installation. (only on FSAF models)
- The same 100% steel toothed cold-weld clamp that Belimo uses on all actuators is used on the FS Series. No slipping on damper shafts will occur.
- Tested at high torque load for a minimum of 20,000 cycles per UL555(S).
- Reliable DC motor–low current draw.
- Permanently lubricated gears.
- FSNF and FSLF actuators meet Uniform Building Code (UBC) requirements.
- Belimo actuator is silent when holding at end position.



FS Series

The Belimo Difference

- **Customer Commitment.**
Extensive product range. Application assistance.
Same-day shipments. Free technical support. Five year warranty.
- **Low Installation and Life-Cycle Cost.**
Easy installation. Accuracy and repeatability.
Low power consumption. No maintenance.
- **Long Service Life.**
Components tested before assembly. Every product tested before shipment.
30+ years direct coupled actuator design.



FSAF120 (-S) US, FSAF24 (-S) US

Fire and smoke actuator, 133 in-lb, [15 Nm], spring return, meets 250°F [121°C] for half hour, 75 second



Technical Data	FSAF120 (-S) US	FSAF24 (-S) US
Power supply	120 VAC ± 10% 50/60 Hz	24 VAC ± 20% 24 VDC -10% +20%
Power consumption	50/60Hz:	
Running:	9.5W 11VA .1A	7.5W 10VA .4A
Holding:	3.5W 6VA .05A	2W 4VA .15A
Transformer sizing	10 VA (Class 2 power source 24V only)	
Electrical connection		
Motor	3 ft, 18 ga, 2 color coded leads	
Auxiliary switches	3 ft, 18 ga, 4 leads appliance cable 1/2" conduit connectors	
Overload protection	Electronic throughout 0 to 95° rotation	
Angle of rotation	Mechanically limited to 95°	
Torque	133 in-lb [15 Nm] constant	
Direction of rotation	Spring return reversible with CW/CCW mounting.	
Position indication	Visual indicator, 0° to 95° (0° is spring return position)	
Manual override	3mm hex crank (shipped w/actuator)	
Running time	<75 sec. constant, independent of load, Spring return <20 seconds nominal	
Humidity	5 to 95% RH non-condensing	
Ambient temperature		
- Normal duty	-22°F to +122°F [-30°C to +50°C]	
- Safety duty	3 on/off cycles after 30 minutes at ambient temperature of 250°F [121°C]	
Storage temperature	-40°F to +176°F [-40°C to +80°C]	
Housing	NEMA type 1 / IP40	
Housing material	Zinc coated metal	
Gears	Permanently lubricated	
Agency listings	cULus listed to UL873 and CAN/CSAC22.2 No.24	
Noise level	Maximum run 45 dB (A); spring 62dB	
Servicing	Maintenance free	
Quality standard	ISO 9001, 5 year Belimo warranty	
Weight	FSAF120-S US 6.1/6.6 lbs (2.8/3 kg)	FSAF24-S US 5.7/6.2 lbs (2.6/2.8 kg)
Auxiliary Switch	2xSPST 7A resistive, 2.5A inductive at 120V or 250V, UL listed, double-insulated, one switch at 10°, one adjustable from 30° to 90°	

Torque min. 133 in-lb, for control of air dampers

Application

For two position control of UL555S rated dampers in HVAC. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft or jack-shaft 3/8" to 1.05" in diameter by means of its universal clamp. A crankarm and mounting brackets are available if the actuator cannot be direct coupled to the jackshaft or damper shaft.

Square footage of damper operated will depend on make and model of damper. Typically 12 sq.ft. minimum up to 24 sq.ft maximum will be operated for UL555S applications.

Operation

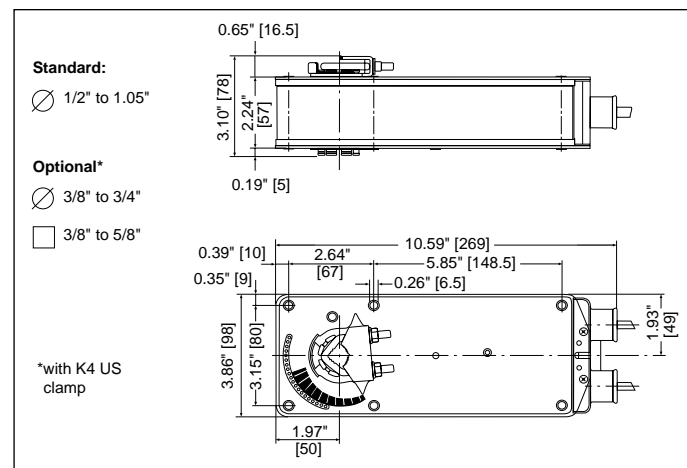
The FSAF series actuators provide true spring return operation for reliable fail-safe application and positive close-off on UL555S dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator.

The FSAF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°. The FSAF has a manual positioning mechanism which allows the setting of any damper position within its 95° of rotation.

The actuator is shipped in the zero fail-safe position to provide automatic compression against damper gaskets for tight shut-off. When power is applied, the manual mechanism is released and the actuator drives toward the open position where it stops rotating.

The manual override can also be released physically by the use of a crank supplied with the actuator.

Dimensions (All numbers in brackets are metric.)



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-01	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 FSAFxx (-S) US actuators, only use accessories listed on this page.

FSAF120 (-S) or FSAF24 (-S) Typical Specification

Large combination fire and smoke dampers are to be operated by Belimo FSAF series actuators. Manufacturer shall provide 5 year warranty.

Actuators shall draw no more than 11VA at 120V or 24V.

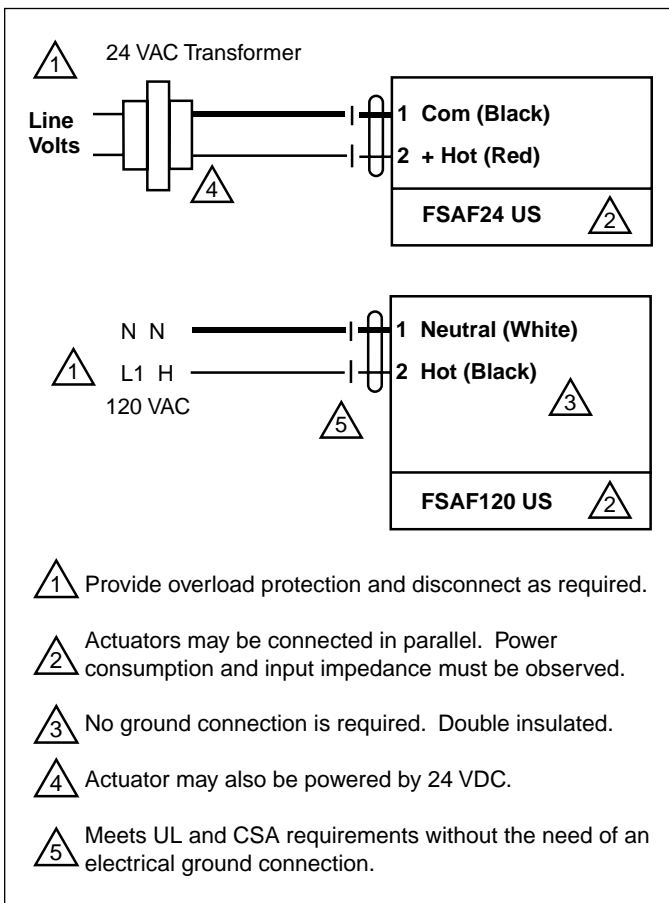
Where auxiliary switches are required for signaling, starting fans, or position indication, -S model actuators, damper blade, or proximity switches shall be provided.

Smaller dampers shall employ Belimo FSLF or FSNF actuators per damper manufacturer recommendations.

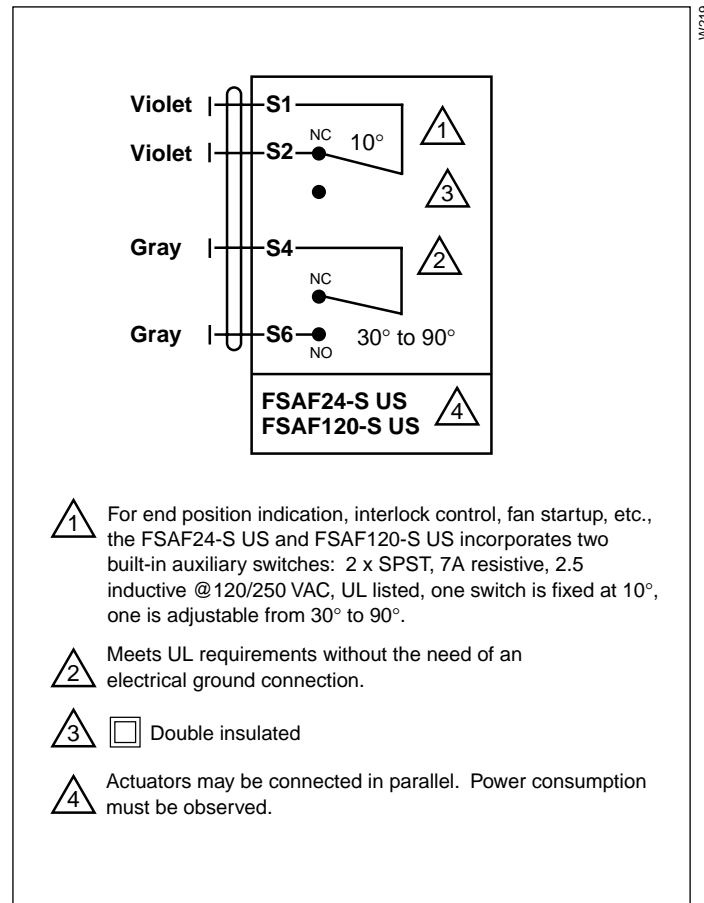
Safety Note

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

Wiring diagrams



W220



W219



Technical Data	FSAF230 (-S) US	FSAF24 (-S) US
Power supply	230 VAC \pm 14% 50/60 Hz	24 VAC \pm 20% 24 VDC -10% +20%
Power consumption	50/60Hz:	
Running:	11W 12VA .07A	7.5W 10VA .4A
Holding:	3.5W 6VA .03A	2W 4VA .15A
Transformer sizing	10 VA (Class 2 power source 24V only)	
Electrical connection		
Motor	3 ft, 18 ga, 2 color coded leads	
Auxiliary switches	3 ft, 18 ga, 4 leads appliance cable 1/2" conduit connectors	
Overload protection	Electronic throughout 0 to 95° rotation	
Angle of rotation	Mechanically limited to 95°	
Torque	133 in-lb [15 Nm] constant	
Direction of rotation	Spring return reversible with CW/CCW mounting.	
Position indication	Visual indicator, 0° to 95° (0° is spring return position)	
Manual override	3mm hex crank (shipped w/actuator)	
Running time	<75 sec. constant, independent of load, Spring return <20 seconds nominal	
Humidity	5 to 95% RH non-condensing	
Ambient temperature		
- Normal duty	-22°F to +122°F [-30°C to +50°C]	
- Safety duty	3 on/off cycles after 30 minutes at ambient temperature of 250°F [121°C]	
Storage temperature	-40°F to +176°F [-40°C to +80°C]	
Housing	NEMA type 1 / IP40 with flexible conduit	
Housing material	Zinc coated metal	
Gears	Permanently lubricated	
Agency listings	cULus listed to UL873 and CAN/CSA C22.2 No.24	
Noise level	Maximum run 45 dB (A); spring 62dB	
Servicing	Maintenance free	
Quality standard	ISO 9001, 5 year Belimo warranty	
Weight	FSAF230-S US 6.9 lbs (3.1 kg)	FSAF24-S US 6.0 lbs (2.7 kg)
Auxiliary Switch	2xSPST 7A resistive, 2.5A inductive at 120V or 250V, UL listed, double-insulated, one switch at <10°, one adjustable from >30° to 90°	

Torque min. 133 in-lb, for control of air dampers

Application

For two position control of UL555S rated dampers in HVAC. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

The actuator is mounted directly to a damper shaft or jack-shaft 3/8" to 1.05" in diameter by means of its universal clamp. A crankarm and mounting brackets are available if the actuator cannot be direct coupled to the jackshaft or damper shaft.

Square footage of damper operated will depend on make and model of damper. Typically 12 sq.ft. minimum up to 24 sq.ft. maximum will be operated for UL555S applications.

Operation

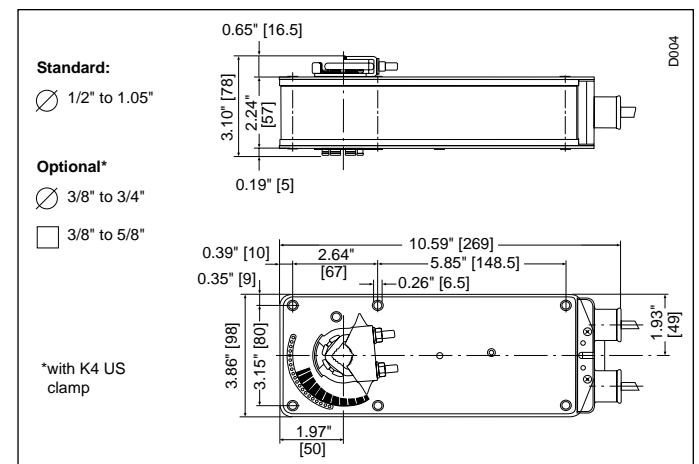
The FSAF series actuators provide true spring return operation for reliable fail-safe application and positive close-off on UL555S dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator.

The FSAF series provides 95° of rotation and is provided with a graduated position indicator showing 0 to 95°. The FSAF has a manual positioning mechanism which allows the setting of any damper position within its 95° of rotation.

The actuator is shipped in the zero fail-safe position to provide automatic compression against damper gaskets for tight shut-off. When power is applied, the manual mechanism is released and the actuator drives toward the open position where it stops rotating.

The manual override can also be released physically by the use of a crank supplied with the actuator.

Dimensions (All numbers in brackets are metric.)



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
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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 FSAFxx (-S) US actuators, only use accessories listed on this page.

FSAF230 (-S) or FSAF24 (-S) Typical Specification

Large combination fire and smoke dampers are to be operated by Belimo FSAF series actuators. Manufacturer shall provide 5 year warranty.

Actuators shall draw no more than 12VA at 230V or 10 VA at 24V.

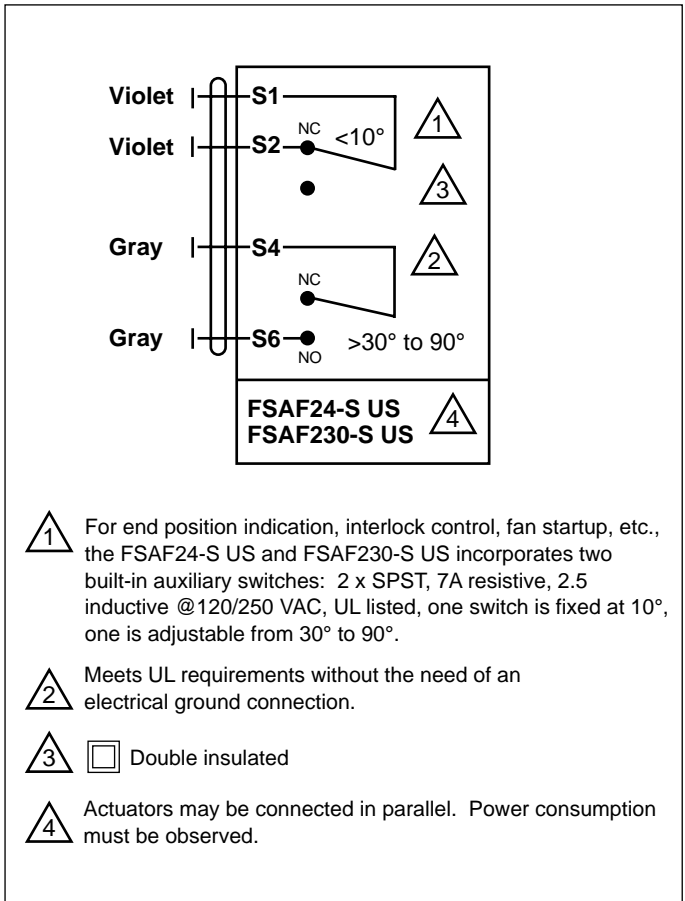
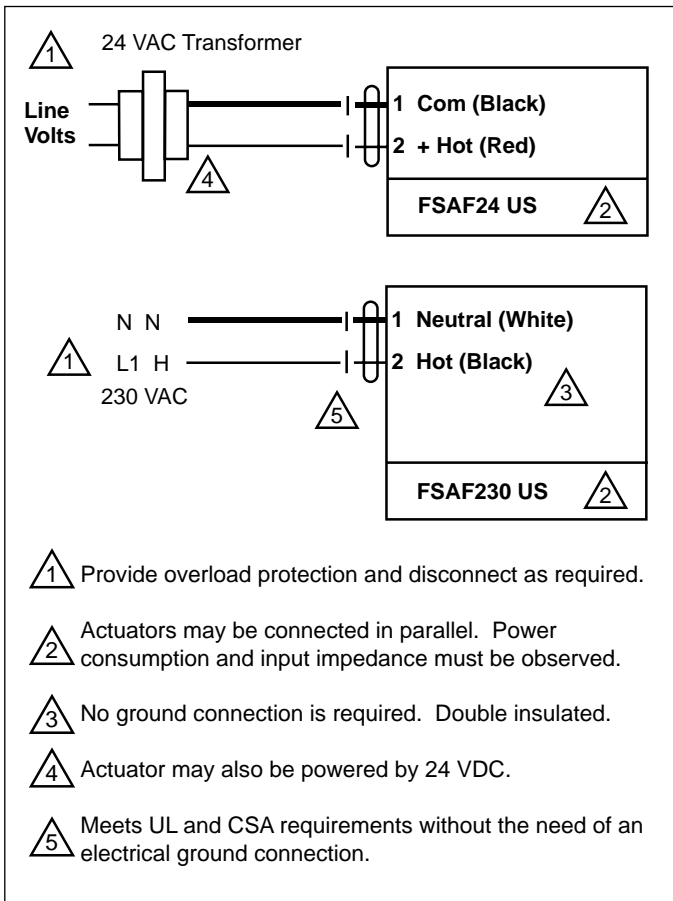
Where auxiliary switches are required for signaling, starting fans, or position indication, -S model actuators, damper blade, or proximity switches shall be provided.

Smaller dampers shall employ Belimo FSLF or FSNF actuators per damper manufacturer recommendations.

Safety Note

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

Wiring diagrams



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



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: 27 VA, Holding: 10 VA,	.23A .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 (-S models)	
Overload protection	Electronic throughout 0 to 95° rotation Grounded enclosure, 120V	
Electrical protection	Double insulated aux switches	
Control	Microprocessor	
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	cULus listed to UL873 and CAN/CSA C22.2 No. 24	
Servicing	Maintenance free	
Quality standard	ISO 9001	
Weight 24,120, (-S) [kg]	6 lbs [2.75], 6.7 lbs [3.0], (+.5 lbs [+0.23])	

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 note:

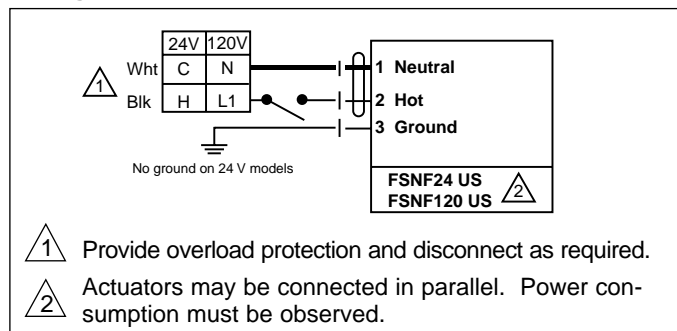
The actuator contains no components which the user can replace or repair.



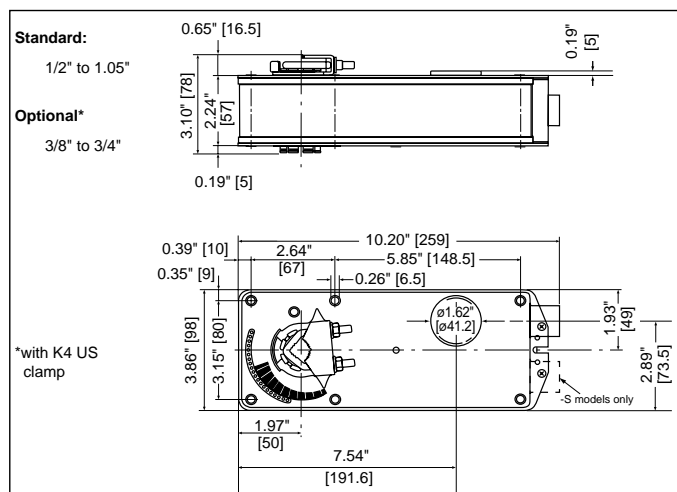
Accessories

All AF/NF linkages and parts may be employed.

Wiring



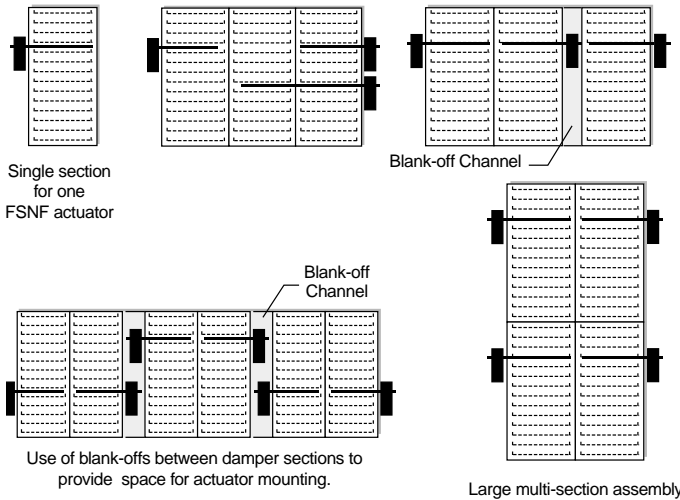
Dimensions (All ratings in brackets are millimeters.)



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 FSNF will operate multi-section

dampers using multiple actuators for multiple sections. Some of the methods used are shown left.



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:

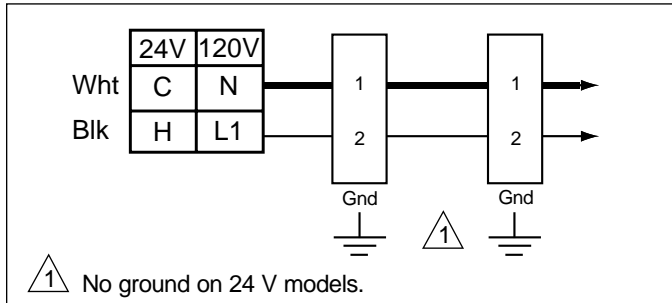
1/2" Threaded Connector

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.

Parallel actuator wiring



Typical specification

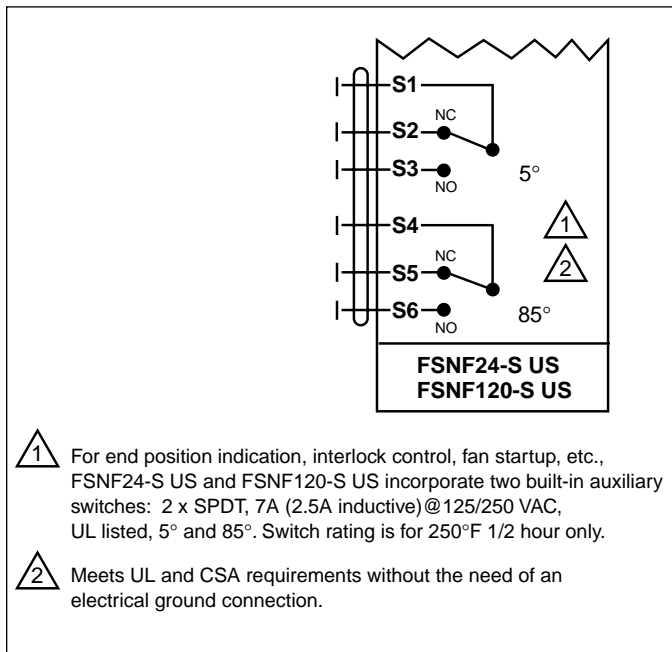
Smoke Control and Combination Fire and Smoke Control Damper Actuators

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.

Auxiliary switch wiring for FSNF24-S US, FSNF120-S US



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 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.

Fire and smoke spring return actuators FSNF230 (-S) US, FSNF24 (-S) US

70 in-lb [7.9 Nm], spring return, 350°F [177°C] for limited time, nominal 15 sec. operation



Technical Data	FSNF230(-S)	FSNF24(-S)
Power supply	230 VAC \pm 10% 50/60 Hz	24 VAC \pm 20% 50/60 Hz
Power consumption 230 VAC	running: 18 W, .13A holding: 6 W, .04A	27 VA 10 VA
Transformer sizing 24 VAC	27 VA Class 2 power supply	
Electrical connection	3 ft [1m], 18 ga, 3 color coded leads (230V) 3 ft [1m], 18 ga, 2 color coded leads (24V) Aux switch: 3 ft [1m], 18 ga, appliance cable	
Overload protection	Electronic throughout 0 to 95° rotation Auto-restart after temporary overload	
Electrical protection	Grounded enclosure 230 V Double insulated aux switches	
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 return 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: apx. 15 sec at rated voltage and torque spring: apx. 15 sec	
Auxiliary switches (FSNF24-S/230-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 1, 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 24,230, (-S) [kg]	6 lbs [2.75], 6.7 lbs [3.0], (+.5 lbs [+23])	

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 note:

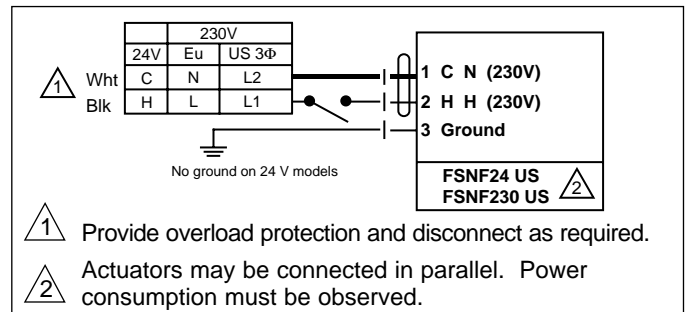
The actuator contains no components which the user can replace or repair.



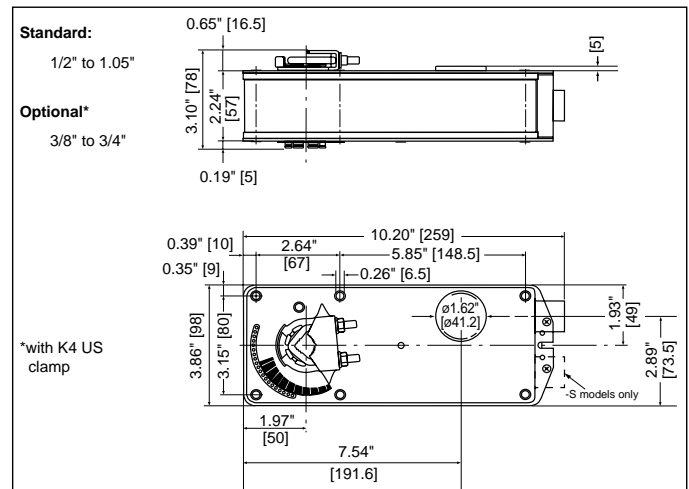
Accessories

All AF/NF linkages may be applied.
Order part 22965-00001 for square shafts.

Wiring

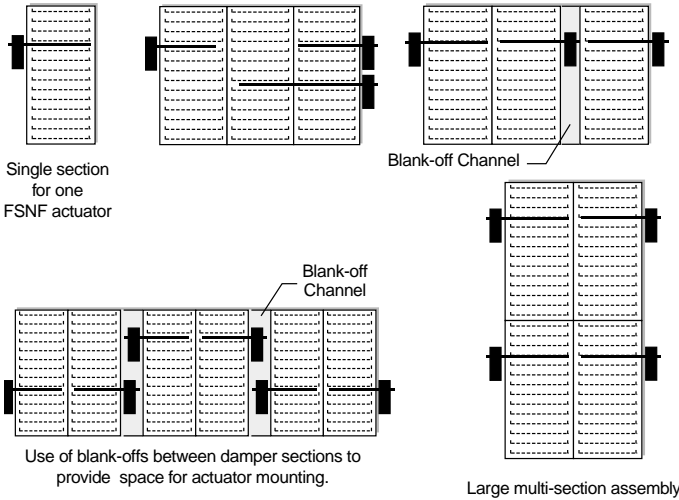


Dimensions (All ratings in brackets are millimeters)



Multi-section damper assemblies – typical applications

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 to the left.

Safety note:

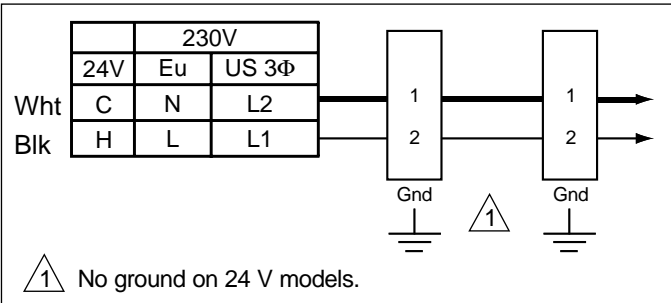
1/2" Threaded Connector

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.

Parallel actuator wiring



Typical specification

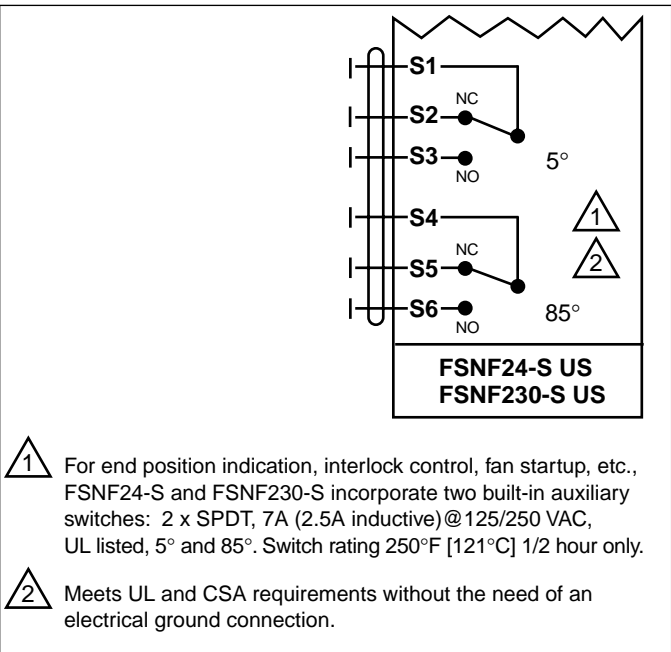
Smoke Control and Combination Fire and Smoke Control Damper Actuators

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.

Auxiliary switch wiring for FSNF24-S US, FSNF230-S US



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 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.

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 24 VAC	Safety note: Connect via safety isolating transformer, Class 2 supply.	
Electrical connection	18 ga, 3 color coded leads (120 V) 3 ft 18 ga, 2 color coded leads (24 V) 3 ft 3 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 Auxiliary switches	Double insulated <input type="checkbox"/>	
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 at ambient	
Control	Microprocessor	
Auxiliary switches FSLF120-S US/24-S US	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°	
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	
Shaft	3/8"-1/2" rnd (7/16" sq) 1/2"-3/4" rnd w/K6-1	
Gears	Permanently lubricated	
Agency listings	cULus listed acc. to UL 60730-1, CE	
Servicing	Maintenance free	
Quality standard	ISO 9001	
Weight 24, 120, (-S) [kg]	3.4 lbs [1.7], 4 lb [1.8], +.3 lb [+14]	

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.

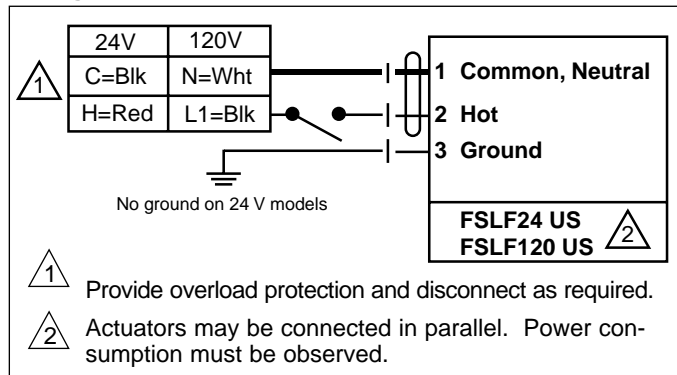
The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Safety note:

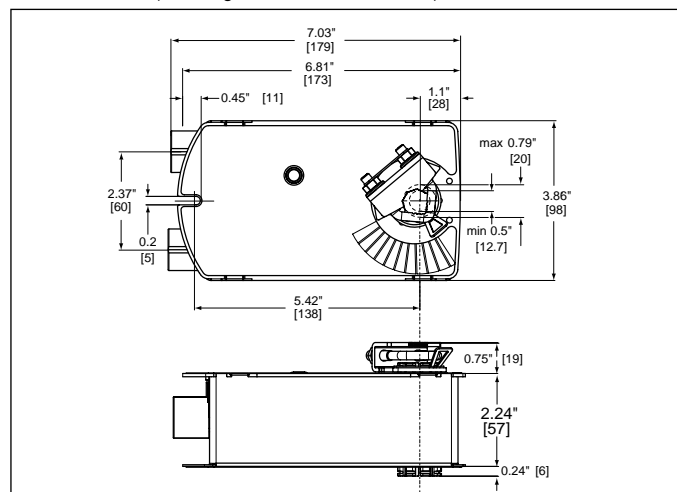
The actuator contains no components which the user can replace or repair.



Wiring



Dimensions (All ratings in brackets are metric.)



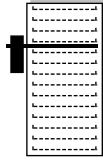
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120618 - Subject to change. © Belimo Aircontrols (USA), Inc.

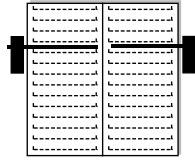
Fire and smoke actuator, 30 in-lb, [3.5 Nm], spring return, 350°F [177°C] for half hour, 15 sec. operation.

Multi-section damper assemblies – typical applications

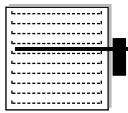
The typical fire and smoke damper requires from 5-15 in-lb of torque per square foot at 250°F - 350°F under dynamic load



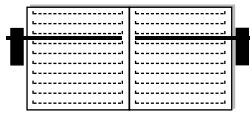
Single section for one FSLF actuator



Two section for two FSLF actuators



Maximum area one actuator



Maximum area for two actuators

(2000 fpm velocity). The FSLF is a single section damper actuator. For the multi section dampers, use the FSNF series.

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:

1/2" Threaded Connector

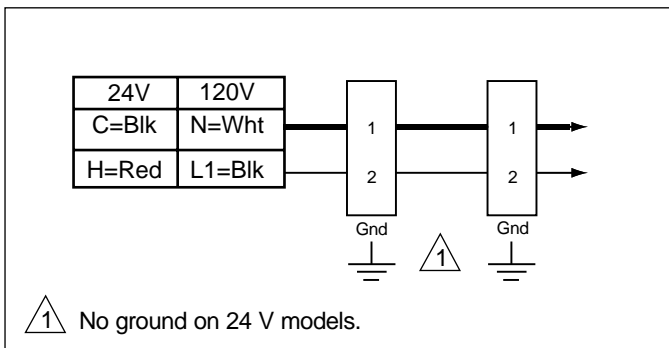
Screw a conduit fitting into the actuator's metal bushing. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

3/8" Flex Connector (-FC models)

Mount the flexible conduit into the actuator's metal bushing by means of the provided screw with a torque of 1.2 Nm. Jacket the actuator's input wiring with suitable flexible conduit. Properly terminate the conduit in a suitable junction box.

FS Series

Parallel actuator wiring



Typical specification

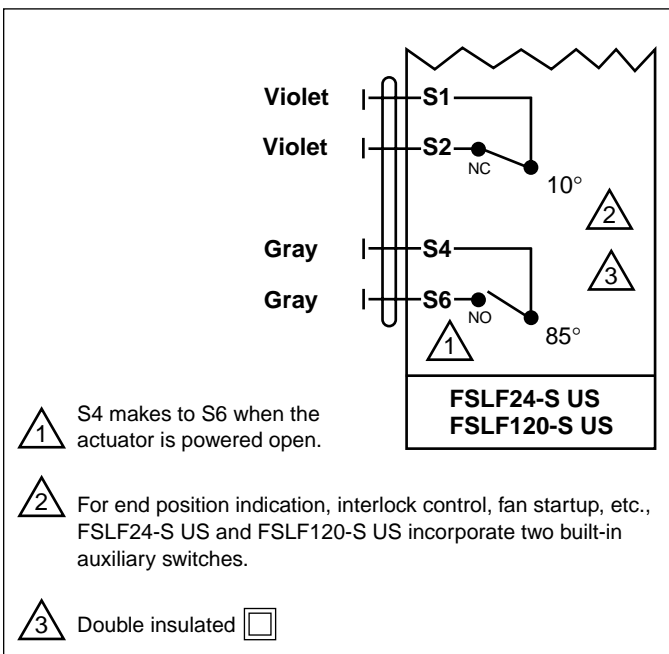
Smoke Control and Combination Fire and Smoke Control Damper Actuators

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.

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



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.

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

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.

Fire and smoke spring return actuators FSLF230 (-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	FSLF230(-S) US	FSLF24(-S) US
Nominal voltage	230 VAC 50/60 Hz	24 VAC 50/60 Hz
Nominal voltage range	207 - 253 VAC	21.6 - 26.4 VAC
Power consumption	Running: 24 VAC: 50/60 Hz: 5.0 VA 230 VAC, 60 Hz: 17 VA 230 VAC, 50 Hz: 17 VA Holding: 24 VAC, 50/60 Hz: 3.5 VA 230 VAC, 60 Hz: 6 VA 230 VAC, 50 Hz: 8 VA	
Transformer sizing	Safety note: 5 VA 24 VAC Connect via safety isolating transformer, Class 2 supply.	
Electrical connection	3 ft, 18 ga, 3 color coded leads (230 V) 3 ft, 18 ga, 2 color coded leads (24 V) 3 ft, 18 ga, appliance cable (Aux switches)	
Overload protection	Electronic throughout 0 to 95° rotation Auto-restart after temporary overload	
Electrical protection motor	FSLF230 US grounded enclosure	
Electrical protection	Double insulated Auxiliary Switches <input type="checkbox"/>	
Control	Microprocessor	
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 FSLF230-S US/24-S US	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°	
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. IP10	
Type of action	Type 1.B Software class A	
Shaft	3/8"-1/2" rnd (7/16" sq) 1/2"-3/4" rnd w/K6-1	
Gears	Permanently lubricated	
Agency listings	cULus listed to UL 60730-1 and CAN/CSA 22.2 No 4.	
Servicing	Maintenance free	
Quality standard	ISO 9001	
Weight 24, 120, (-S) [kg]	3.4 lb [1.55 kg], 4 lb [1.8], (+.3 lb [+14])	

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.

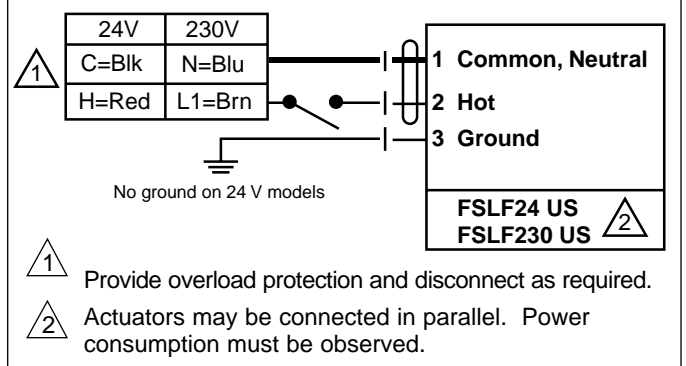
The actuator is mounted in its fail safe position with the damper blade(s) closed. Upon applying power, the actuator drives the damper to the open position. The internal spring is tensioned at the same time. If the power supply is interrupted, the spring moves the damper back to its fail-safe position.

Safety note:

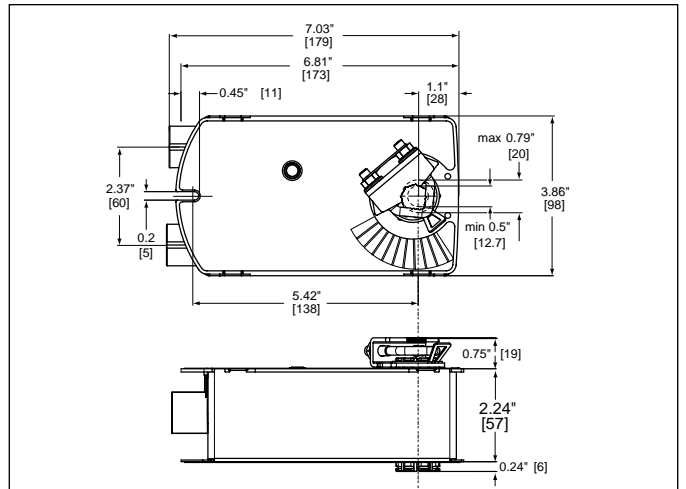
The actuator contains no components which the user can replace or repair.



Wiring

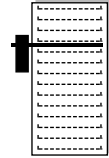


Dimensions (All ratings in brackets are metric.)

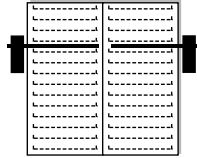


Multi-section damper assemblies – typical applications

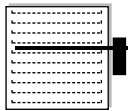
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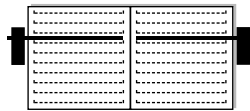
Single section for one FSLF actuator



Two section for two FSLF actuators



Maximum area one actuator



Maximum area for two actuators

(2000 fpm velocity). The FSLF is a single section damper actuator. For the multi section dampers, use the FSNF series.

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:

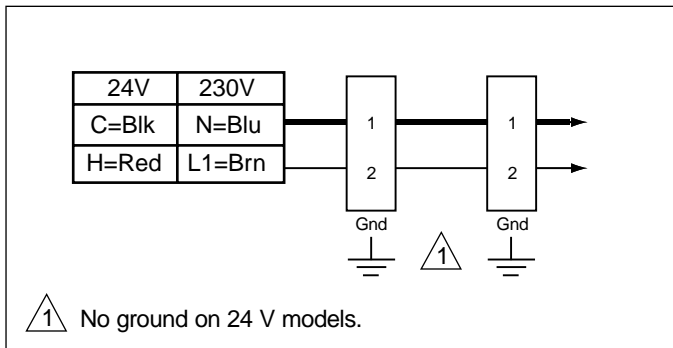
1/2" Threaded Connector

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

3/8" Flex Connector (-FC models)

Mount the flexible conduit into the actuators 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.

Parallel actuator wiring



Typical specification

Smoke Control and Combination Fire and Smoke Control Damper Actuator

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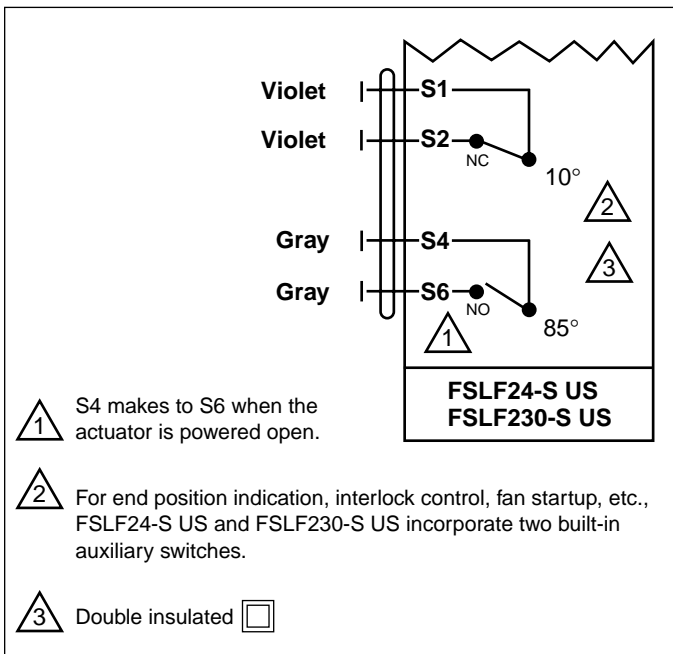
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Replacement applications

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.

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

Auxiliary switch wiring for FSLF24-S US, FSLF230-S US



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