



Technical Data		FSAFB24-SR(-SC), FSAFB24-SR-S(-SC)
Power supply		24 VAC $\pm$ 20%, 50/60 Hz 24 VDC +20% / -10%
Power consumption	running	6 W, 8.5 VA
	holding	3 W, 5 VA
Transformer sizing		10 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable, 1/2" conduit connector
		<b>-S models:</b> two 3 ft, 18 gauge appliance cables with 1/2" conduit connectors <b>-SC models:</b> 8 in, 18 gauge appliance cable, with 1/2" conduit connectors
Overload protection		electronic throughout 0 to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 20mA
Input impedance		100 k $\Omega$ for 2 to 10 VDC (draws 0.1 mA)
		500 $\Omega$ for 4 to 20 mA
Feedback output U		2 to 10 VDC (max. 0.5 mA)
Torque		180 in-lb [10 Nm] minimum
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in switch
Mechanical angle of rotation		95° (adjustable with mechanical end stop, 35° to 95°)
Running time	spring	< 20 seconds @ -4°F to 122°F [-20°C to 50°C]; < 60 seconds @ -22°F [-30°C]
	motor	<75 seconds at 250°F, <75 seconds at 70°F
Override control		Short 3 to Hot (2) to override 100% open
Position indication		visual indicator, 0° to 95° (0° is full spring return position)
Manual override		5 mm hex crank (3/16" Allen), supplied
Humidity		max. 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		Nema 2, IP54, Enclosure Type2
Housing material		zinc coated metal and plastic casing
Agency listings†		cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC & 2006/95/EC
Noise level		≤40dB(A) motor @ 70 seconds, run time dependent ≤62dB(A) spring return inaudible holding
Servicing		maintenance free
Quality standard		ISO 9001
Weight		4.6 lbs (2.1 kg); 4.9 lbs (2.25 kg) with switches
† Rated Impulse Voltage 800V, Type of action 1.AA (1.AA.B for -S version), Control Pollution Degree 3.		
<b>FSAFB24-SR-S(-SC)</b>		
Auxiliary switches		2 x SPDT 3A resistive (0.5A inductive) @ 120 or 250 VAC, UL approved one set at +10°, one adjustable 10° to 90°

## FSAFB24-SR(-SC), FSAFB24-SR-S(-SC)

Fire & Smoke, Fail-Safe, Spring Return, Proportional 2-10 VDC Actuators

**Torque min. 180 in-lb**  
**Control 2 to 10 VDC**  
**Feedback 2 to 10 VDC**

### Application

For proportional control of fire and smoke combination and smoke dampers in UL555S applications. In new installations, codes require damper manufacturer mounting per UL555S.

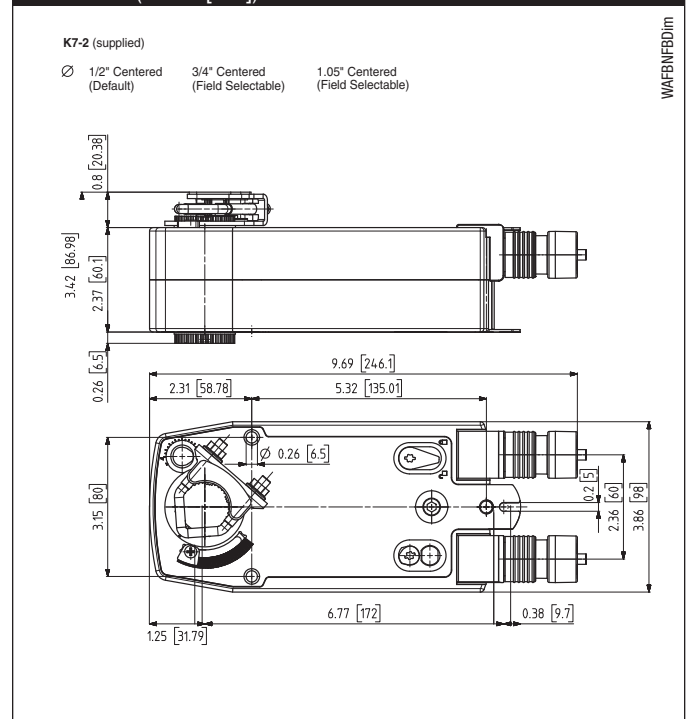
### Operation

The FSAFB24-SR(-SC), FSAFB24-SR-S (-SC), actuator provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The actuator will synchronize the 0° mechanical stop or the physical damper and use this point for its zero position during normal control operations. A unique manual override allows the setting of any actuator position within its 95° of rotation with no power applied. This mechanism can be released physically by the use of a crank supplied with the actuator. When power is applied the manual override is released and the actuator drives toward the fail-safe position.

The actuator uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact position. The ASIC monitors and controls the brushless DC motor's rotation and provides a Digital Rotation Sensing (DRS) function to prevent damage to the actuator in a stall condition. The position feedback signal is generated without the need for mechanical feedback potentiometers using DRS. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The actuator cannot burn out from being stalled before full rotation is achieved.

The FSAFB24-SR (-SC), FSAFB24-SR-S (-SC), is mounted directly to control shafts up to 1.05" diameter by means of its universal clamp and anti-rotation bracket. A crank arm and several mounting brackets are available for damper applications where the actuator cannot be direct coupled to the damper shaft. The spring return system provides the specified torque to the application during a power interruption. The FSAFB24-SR (-SC), FSAFB24-SR-S (-SC), actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

### Dimensions (Inches [mm])



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## Accessories

AV 8-25	Shaft extension
IND-AFB	Damper position indicator
KH-AFB	Crank arm
K7-2	Universal clamp for up to 1.05" dia jackshafts
TF-CC US	Conduit fitting
Tool-06	8mm and 10 mm wrench
ZG-100	Universal mounting bracket
ZG-101	Universal mounting bracket
ZG-118	Mounting bracket for Barber Colman® MA 3./4..., Honeywell® Mod III or IV or Johnson® Series 100 replacement or new crank arm type installations
ZG-AFB	Crank arm adaptor kit
ZG-AFB118	Crank arm adaptor kit
ZS-100	Weather shield (metal)
ZS-150	Weather shield (polycarbonate)
ZS-260	Explosion-proof housing
ZS-300	NEMA 4X housing

**NOTE:** When using FSAFB24-SR and FSAFB24-SR-S actuators, only use accessories listed on this page. For actuator wiring information and diagrams, refer to Belimo Wiring Guide.

## Typical Specification

Proportional fire and smoke spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. A manual override shall be provided for positioning the damper open before power is available on a new construction project. The actuator must provide proportional damper control in response to a 2 to 10 VDC or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Control wiring shall conform to Belimo Americas wiring schematics. The actuators shall be a flip-over design so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be constant, and independent of torque. A 2 to 10 VDC feedback signal shall be provided for position feedback. Actuators shall be cULus listed, have a 5 year warranty and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

## Wiring Diagrams

### INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 **CAUTION Equipment Damage!**  
Actuators may be connected in parallel if not mechanically mounted to the same shaft. Power consumption and input impedance must be observed.

3 Actuator may also be powered by 24 VDC.

### APPLICATION NOTES

Meets UL requirements without the need of an electrical ground connection.

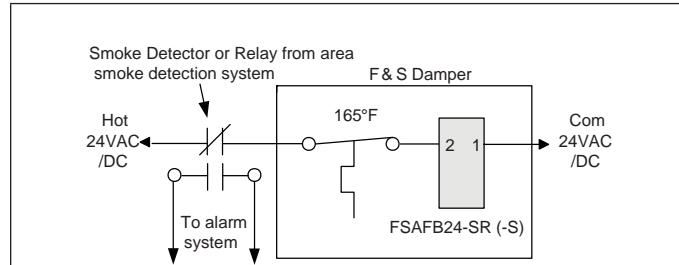
The ZG-R01 500 Ω resistor may be used.

### 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.

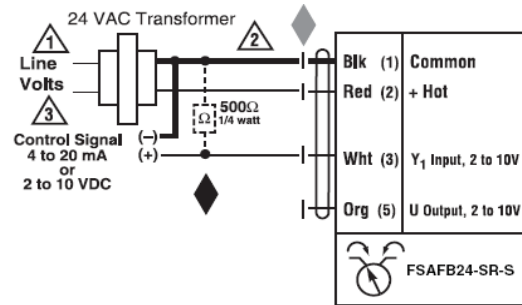
### Safety Note:

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.

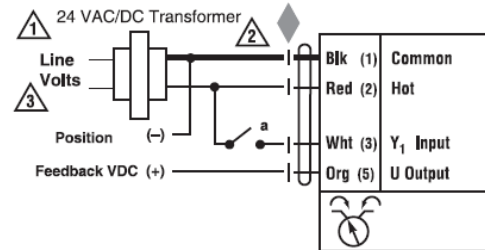


In all drawings below there exist the smoke &/or high temperature manual reset limits. Do not bypass. Regardless of any control wiring, the safeties must have final control.

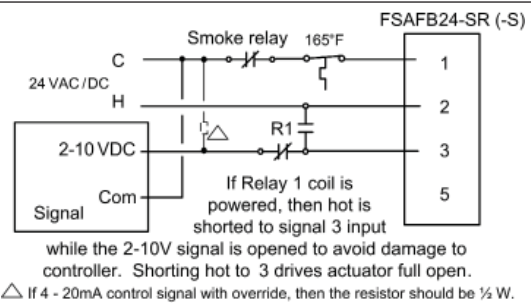
## Smoke detection and Primary Sensor



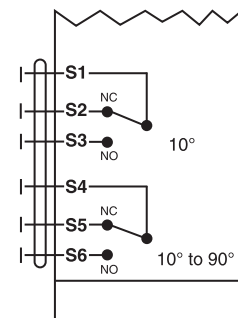
## VDC/4-20 mA



## On/Off Control



## Override Open



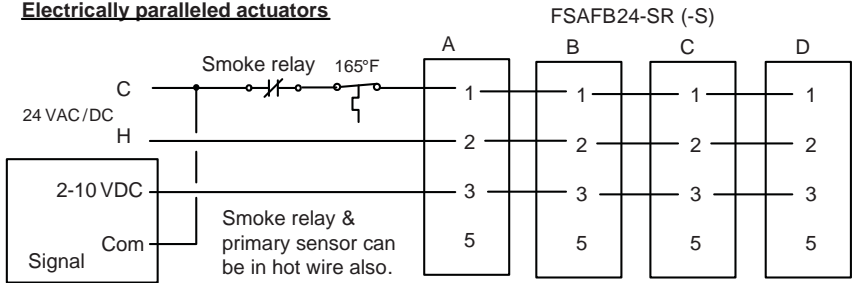
## Auxiliary Switches for FSAFB24-SR-S(-SC)

**Applications**

For mounting instructions visit:  
[https://www.belimo.us/bellib/Damper\\_Actuators/AFB\\_NFB\\_Installation.pdf](https://www.belimo.us/bellib/Damper_Actuators/AFB_NFB_Installation.pdf)

**Parallel Wiring**

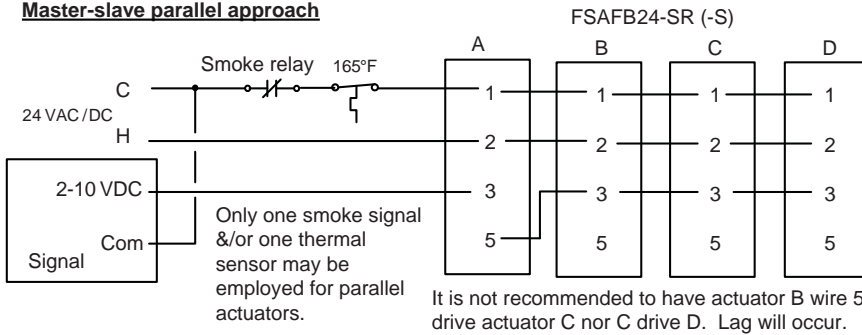
**Electrically paralleled actuators**



Only one smoke signal &/or one thermal sensor may be employed for parallel actuators.

Any wire 5 FBK could be used to indicate position or to drive other actuators.

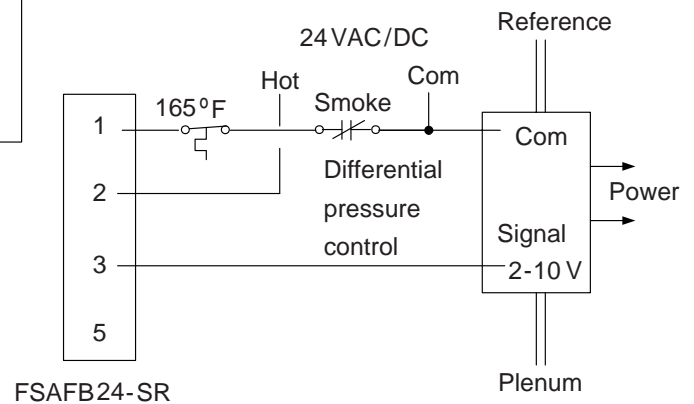
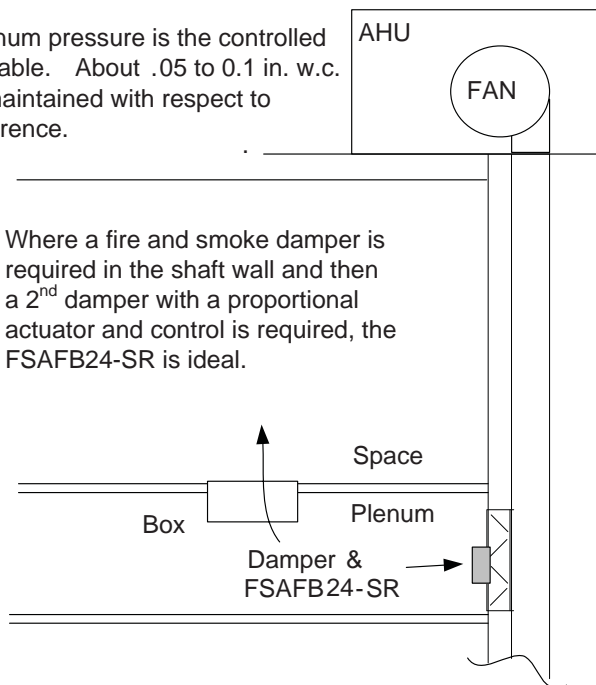
**Master-slave parallel approach**



**Underfloor Air Conditioning**

Plenum pressure is the controlled variable. About .05 to 0.1 in. w.c. is maintained with respect to reference.

Where a fire and smoke damper is required in the shaft wall and then a 2<sup>nd</sup> damper with a proportional actuator and control is required, the FSAFB24-SR is ideal.



Typically, a duct smoke detector or an area smoke detection system controls the damper – “Smoke” relay contacts above. No auxiliary switches are needed if the damper is not considered part of an engineered smoke control system.

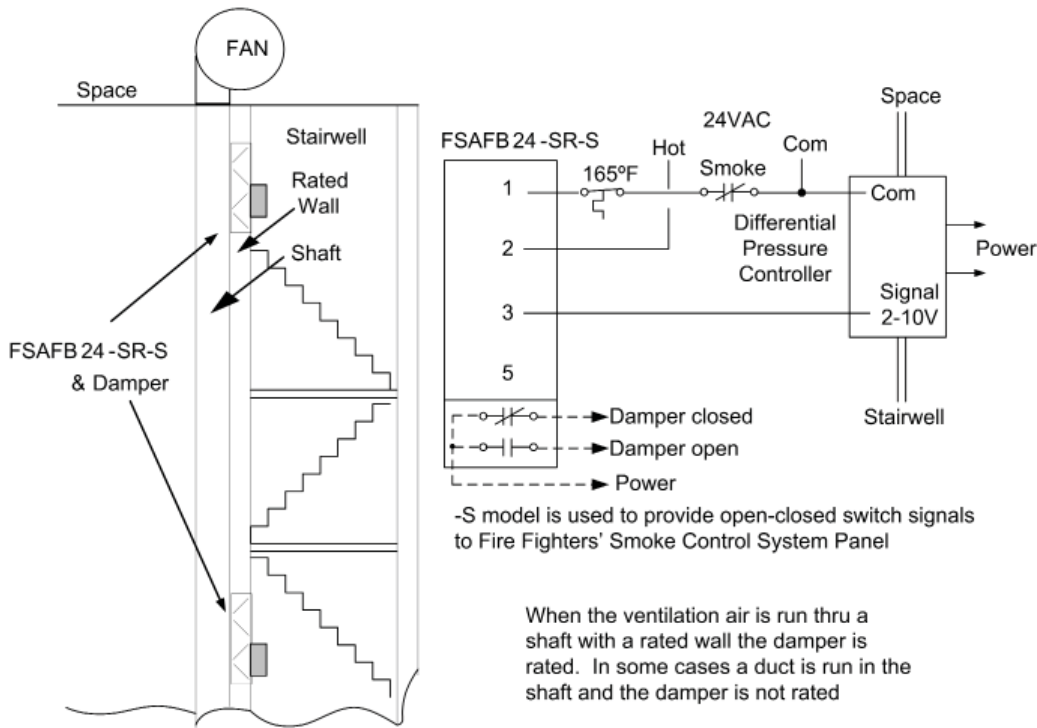
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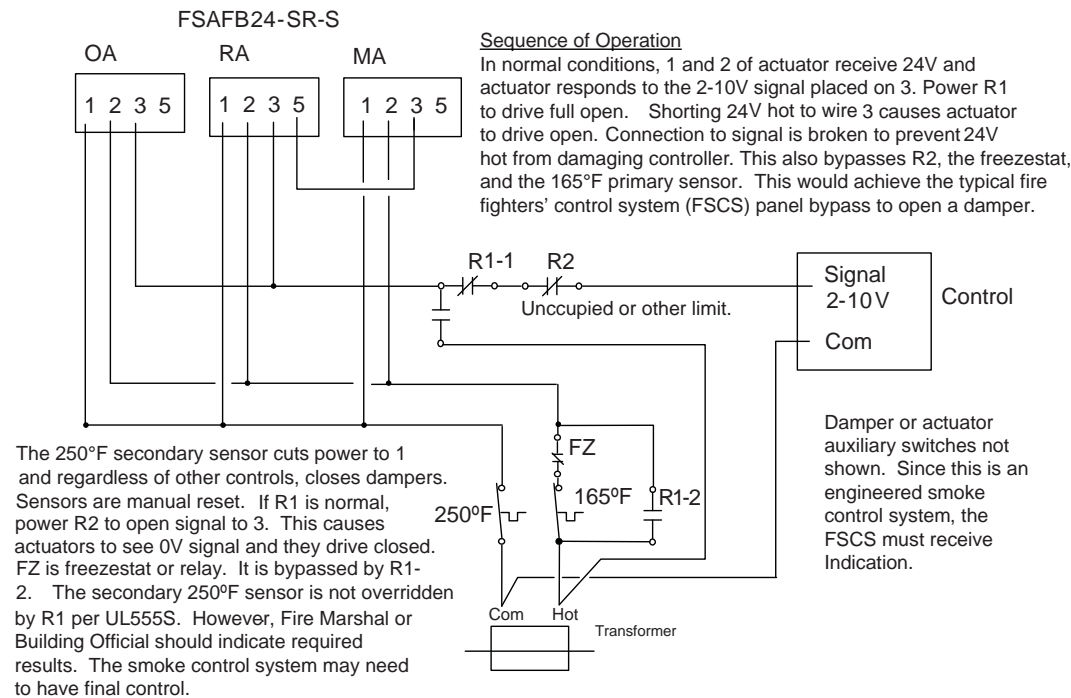


## Stairwell Pressurization



## Economizer with reopenable dampers

(Typical for many proportional applications.)



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