

FSAF24-BAL (-S) US

Balancing Fire and Smoke Actuator, Three Position Damper Actuator, Spring Return Closed, 24V, for UL555(S) Fire and Smoke Dampers. A maximum position potentiometer is built-in. 100% open override.

Application

For three position control of UL555S rated dampers in HVAC. Actuator sizing should be done in accordance with the damper manufacturer's tests. In the absence of other information, use 10 in-lb of torque per square foot of area for opposed blade and 14 in-lb for parallel blade fire and smoke dampers at 1000 fpm air velocity.

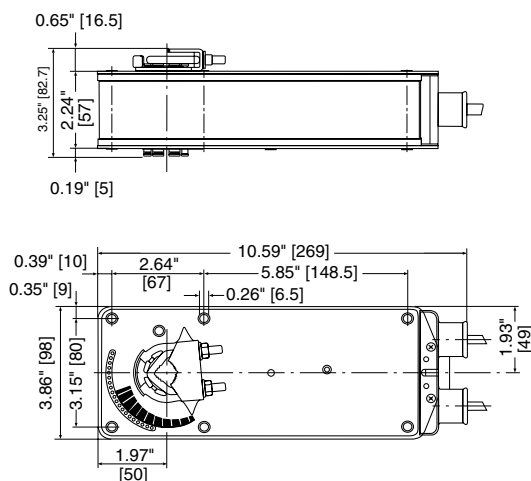
The FSAF24-BAL is specifically designed to balance the air flow in ducts and simultaneously provide control of fire and smoke dampers. 0V = spring closed. 24V on wire 2, not 3 = drive to the potentiometer position (balanced flow). 24V on wire 3, regardless of the status of wire 2 = drive full open (smoke control extraction or pressurization). See Application drawings below.

Operation

The FSAF24-BAL actuator provides spring return operation. There is no reversing switch. Mount in spring return closed position. The torque is asymmetrical giving 180 in-lb drive and 133 in-lb spring. A manual override winder and locking mechanism is provided. If the manual winder is used when the actuator is powered, the actuator will release, drive closed, and then go back to the potentiometer position. The actuator may not be mechanically paralleled or "piggybacked." Each damper section should be controlled by a separate actuator.

The FSAF24-BAL uses a DC motor which is controlled by a microchip. The actuator may be stalled anywhere during its rotation without damage. If power is removed, the damper will spring closed. Interlocks must be provided as necessary for life safety functions and to shut down fan if required.

Dimensions (All numbers in brackets are metric.)



Technical Data

FSAF24-BAL US

Power supply	24 VAC \pm 20% 50/60 Hz 24 VDC \pm 10%
Power consumption	running: AC 9.5 VA 6.5 W DC 6 W holding: AC 5 VA 3 W DC 3 W
Transformer sizing	10 VA (Class 2 power source 24V only)
Electrical connection	3 ft, 18 ga, $\frac{1}{2}$ " conduit connectors
Overload protection	electronic throughout 0 to 95° rotation
Control signal	24 VAC/DC 3-position
Angle of rotation	20° to 95°, pot adjustable
Torque	133 in-lb [15 Nm]
Direction of rotation	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	motor: <75 seconds @ 250°F [121°C] spring return: <20 seconds
Humidity	5 to 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 type 1 / IP40 (with flex conduit)
Housing material	zinc coated metal
Agency listings	cULus to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level	running: <45 dB(A), spring: <62 dB(A)
Holding	inaudible
Servicing	maintenance free
Quality standard	ISO 9001, 5 year Belimo warranty
Weight	5.3 lbs (2.4kg) 5.7 lbs (2.6kg) for -S model
Auxiliary switch	2 x SPDT, 7A resistive, 2.5A inductive at 120/250 VAC, UL listed, double-insulated, one switch is fixed at 10°, one is adjustable 30° to 90°

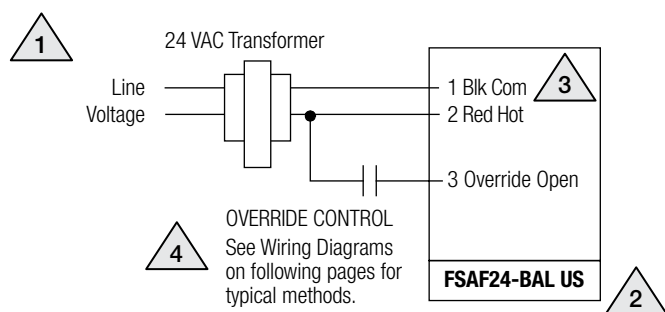
Accessories (AF series accessories may be employed)

IND-AF2	Damper position indicator
K4-1 US	Universal clamp for up to 1.05" dia. jackshafts
KH-AF	Crankarm for up to ¾" 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-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 FSAF24-BAL (-S) actuators, only use accessories listed on this page.

Wiring Diagrams



- 1** Provide overload protection and disconnect as required.
- 2** Actuators may be connected in parallel. Power consumption must be observed.
- 3** Actuator may also be powered by 24 VDC
- 4** Only connect Hot, Wire 2 to Wire 3 override control

Safety Note

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



FSAF24-BAL (-S) US Typical Specification

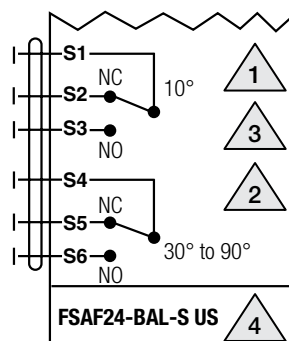
Where indicated on drawings, combination fire and smoke and balancing dampers shall be controlled by Belimo FSAF24-BAL or equal actuators. The actuators must be designed so that they may be used for either clockwise or counter clockwise failsafe operation. Actuator shall open damper in <75 seconds per UL555S and shall spring closed in under 20 seconds. Actuators shall have a 5-year warranty and be manufactured under ISO9001 International Quality Control Standards.

Actuator shall have an adjustable Maximum Opening Potentiometer which shall be used by the TAB contractor to adjust flow to that portion of the system fed by the damper.

The actuator shall spring closed if either the smoke detector or alarm system removes power from it. Actuator shall spring closed if the primary temperature thermdisc opens due to high ambient of >165°F or as otherwise indicated on drawings.

The actuator shall drive full open if either the smoke control system 100% open override or Fire Fighters Smoke Control Station override is activated. Damper shall spring closed again if the thermdisc of a combination fire and smoke damper opens due to high temperature (typically 250°F).

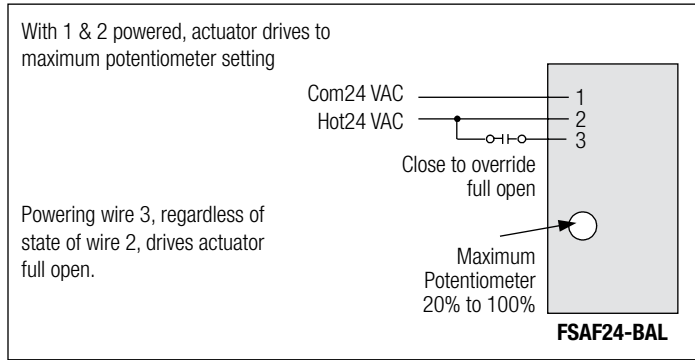
Auxiliary switch wiring for FSAF24-BAL-S US



- 1** For end position indication, interlock control, fan start-up, etc., FSAF24-BAL-S incorporates two built-in auxiliary switches: 2 x SPDT, 7A resistive, 2.5A inductive 120/250 VAC, UL listed, one switch is fixed at 10°, one is adjustable 30° to 90°.
- 2** Meets UL requirements without the need of an electrical ground connection. Actuator may also be powered by 24 VDC
- 3** Double insulated.
- 4** Actuators may be connected in parallel. Power consumption must be observed.

Wiring 1

Wiring 1 shows the basic operation of the FSAF24-BAL.



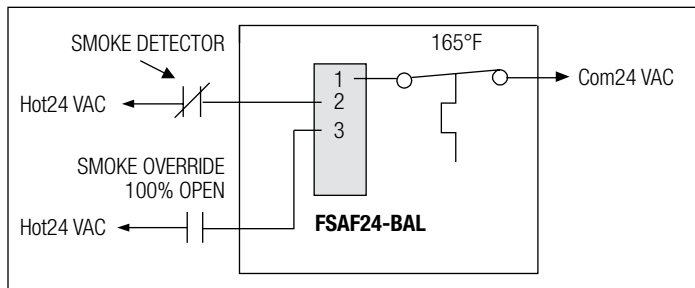
Sequence of Operation for Wiring 1

If 1 & 2 are powered and 3 is not powered, actuator goes to Maximum Potentiometer position. This is typically the balanced flow position.

If 1 & 3 are powered, regardless of the state of wire 2, the actuator goes 100% open. This is a purge mode.

Wiring 2

Wiring 2 shows one way to apply the FSAF24-BAL with a single thermdisc.



Sequence of Operation for Wiring 2

If 1 & 2 are powered, then actuator drives open to position as set by potentiometer.

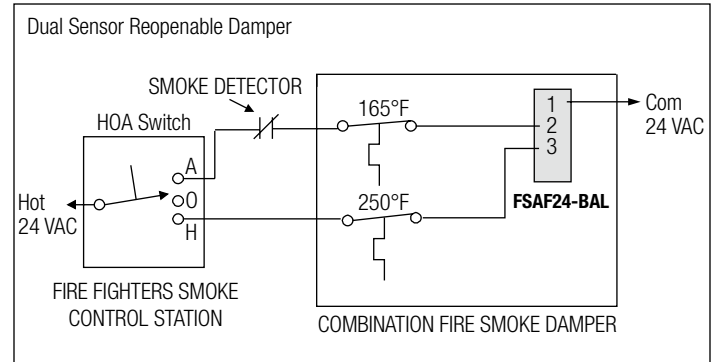
If smoke detector or other contact in wire 2 opens, then actuator springs damper full closed.

If 1 & 3 are powered, regardless of state of wire 2, actuator drives damper open 100%.

If 165°F thermdisc opens, actuator springs closed. Manual reset required.

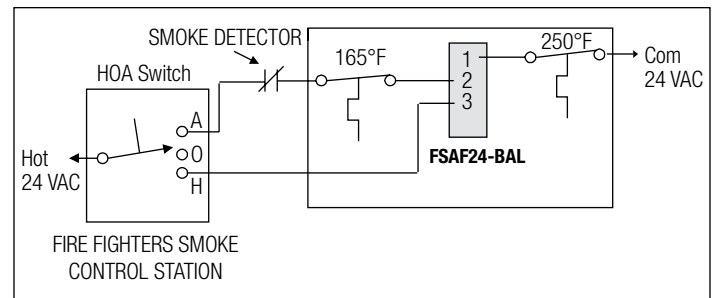
Wiring 3

Wiring 3 shows one method of wiring a Reopenable Damper using the Fire Fighters override switch and two thermdiscs.



Wiring 4

Wiring 4 shows an alternate wiring method to that shown in Wiring 3.



Sequence of Operation for Wiring 3 and Wiring 4

If HOA switch is in Auto position, smoke detector or other series contact is closed and temperature is <165°F at thermdisc sensor, then actuator wire 2 is powered and damper is driven open to adjustable position as set by Maximum Potentiometer. If smoke detector or other contact in wire 2 opens or if the manual reset 165°F sensor opens, then actuator springs damper closed.

If Hand-Off-Auto switch at FSCS is moved to Off, power to wire 2 is removed and actuator springs damper closed.

If HOA switch is moved to the Hand position, power bypasses wire 2 and goes to wire 3. This reopens the damper for smoke evacuation or pressurization control to the 100% open position.

If the 250°F thermdisc opens, the actuator springs closed and cannot be overridden. Manual reset of each thermdisc is required.



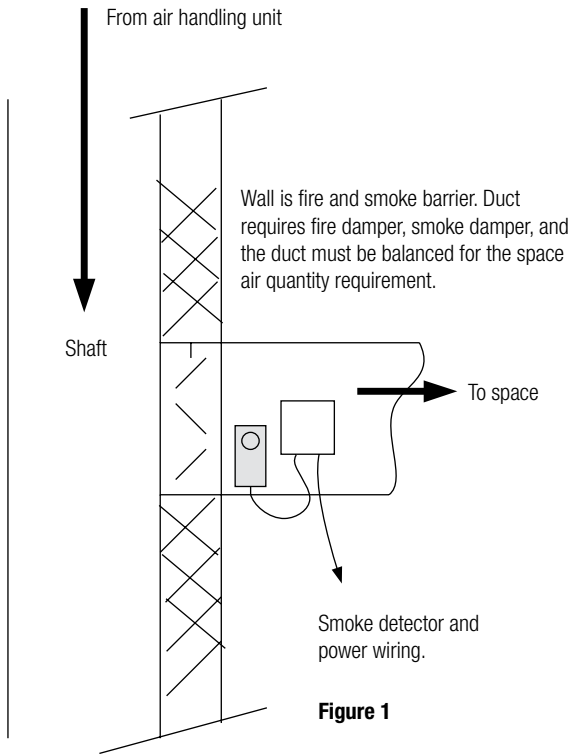
WARNING: For UL555S Listed dampers and actuators, follow damper manufacturer recommended field wiring diagrams. Do not bypass high temperature limits.

FSAF24-BAL (-S) US Balancing Fire and Smoke Actuator

Typical Applications

Most shafts carrying conditioned air from air handling equipment rooms to multiple stories are installed in fire and smoke barriers. In addition, the air to the floor must be balanced.

The FSAF24-BAL actuator allows one damper and actuator to do the job that once required three dampers – a fire damper, a smoke damper, and a balancing damper. See Figure 1.



Wiring 3 and 4 show actuated damper wiring for Engineered Smoke Control Systems. Where a smoke control damper is required in the wall and a balancing damper is required for volume-temperature control, the FSAF24-BAL provides a superior technical and economic solution.

See Figure 2. Other applications exist which are not covered here.

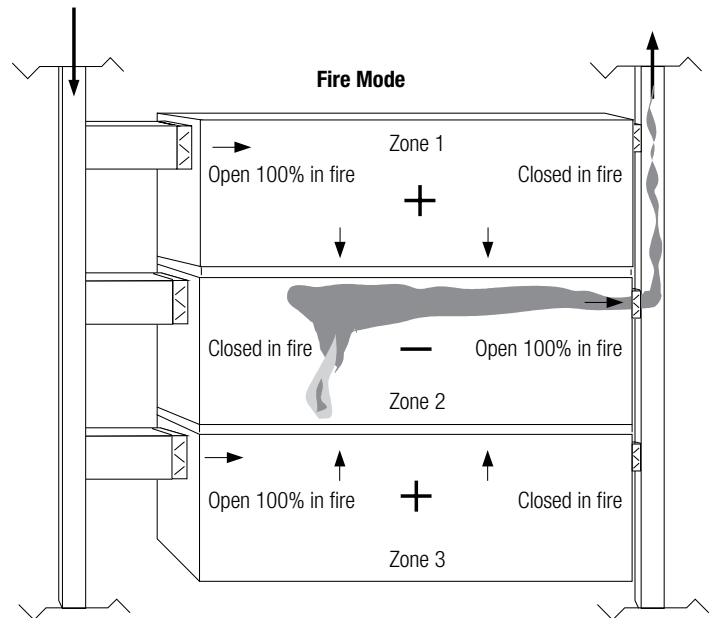


Figure 2
Non-dedicated smoke control system

The two most common applications are dampers installed to contain smoke and those installed in full engineered smoke control systems. Wiring 2 on the preceding page shows the damper installed with a smoke detector for containment. Figure 1 shows this application.

The supply dampers are fire, smoke, and balancing. Three dampers in one.

Normally, the damper is balanced for the design supply air quantity. If a fire occurs, the smoke zone supply damper closes and the adjacent zone supply dampers open 100%.

The return dampers are not typically balanced and are normal fire and smoke combination dampers.

In normal operating conditions, the BALANCING actuator is set to open by the Maximum Potentiometer on the cover of the actuator. This is the balancing position. It can be set as low as 20% open.

If the sensor detects ambient above 165°F (or as specified), the actuator springs closed.

If wired for smoke barrier protection or purge control, wire 3 may be powered to open the damper actuator 100% to maximize the amount of air to pressurize a space or remove smoke.

