

# AFX24-SR - Damper Actuator

Modulating, Spring Return, 24 VAC/DC, for 2 to 10 VDC or 4 to 20 mA Control Signal



| Technical Data                    |   |
|-----------------------------------|---|
| Power Supply                      | 24 VAC, ±20%, 50/60 Hz, 24 VDC, -10% / +20%   |
| Power Consumption Running         | 5.5 W   |
| Power Consumption Holding         | 3 W   |
| Transformer Sizing                | 8.5 VA (class 2 power source)   |
| Shaft Diameter                    | 1/2" to 1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert                           |
| Electrical Connection             | 3ft [1m], 10ft [3m] or 16ft [5m] 18 GA appliance or plenum cables, with or without 1/2" conduit connector |
| Overload Protection               | electronic throughout 0° to 95° rotation  |
| Electrical Protection             | actuators are double insulated  |
| Operating Range Y                 | 2 to 10 VDC, 4 to 20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)   |
| Input Impedance                   | 100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA  |
| Feedback Output U                 | 2 to 10 VDC, 0.5 mA max   |
| Angle of Rotation                 | 95°, adjustable with mechanical end stop, 35° to 95°  |
| Torque motor                      | Min. 180 in-lbs [20 Nm]   |
| Direction of Rotation (Motor)     | reversible with built-in switch   |
| Direction of Rotation (Fail-Safe) | reversible with CW/CCW mounting   |
| Position Indication               | visual indicator, 0° to 95° (0° is full spring return position)   |
| Manual Override                   | 5 mm hex crank (3/16" Allen), supplied  |
| Running Time (Motor)              | 95 sec  |
| Running Time (Fail-Safe)          | <20 sec @ -4°F to 122°F [-20°C to 50°C], <60 sec @ -22°F [-30°C]  |
| Ambient Humidity                  | max. 95% RH non-condensing  |
| Ambient Temperature Range         | -22°F to 122°F [-30°C to 50°C]  |
| Storage Temperature Range         | -40°F to 176°F [-40°C to 80°C]  |
| Housing                           | NEMA 2, IP54, UL Enclosure Type 2   |
| 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                               |
| Noise Level (Motor)               | ≤40 dB (A)  |
| Noise Level (Fail-Safe)           | <62 dB (A)  |
| Servicing                         | maintenance free  |
| Quality Standard                  | ISO 9001  |
| Weight                            | 4.6 lb [2.1 kg]   |

†Rated Impulse Voltage 800V, Type of action 1.AA, Control Pollution Degree 3

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

## Application

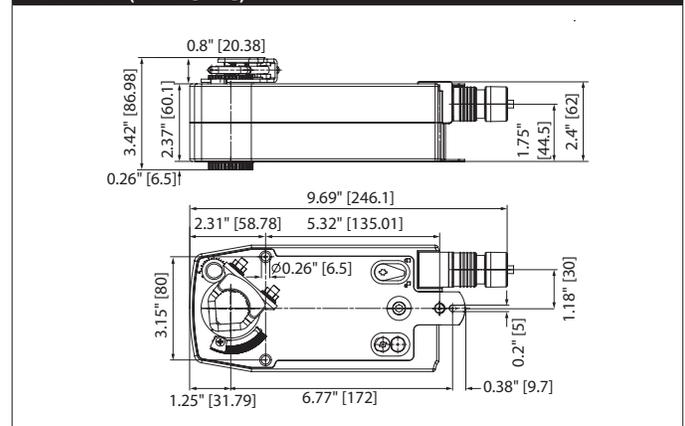
For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. The actuator operates 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. A 2 to 10 VDC feedback signal is provided for position indication. Not to be used for a master-slave application.

## Operation

The AF..24-SR series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator. The AF..24-SR series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The AF..24-SR 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 fail-safe position. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The AF..24-SR actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

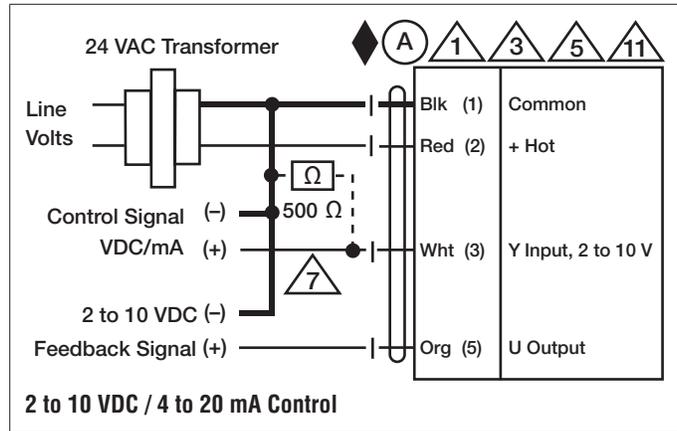
ATTENTION: AF..24-SR cannot be tandem mounted on the same damper or valve shaft. Only On/Off and MFT AF.. models can be used for tandem mount applications.

## Dimensions (Inches[mm])



Date created, 11/29/2017 - Subject to change. © Belimo Aircontrols (USA), Inc.

| Accessories |  |
|-------------|--|
| AF-P        | Anti-rotation bracket AF/NF.                                   |
| AV8-25      | 9.8" shaft extension for 5/16" to 1" diameter shafts.          |
| IND-AFB     | AFB(X)/NFB(X) position indicator.                              |
| K7-2        | Standard AFB(X)/NFB(X) clamp (1/2" to 1.05").                  |
| KG10A       | Ball joint for 3/8" diameter rod, zinc plated.                 |
| KG8         | Ball joint for 5/16" diameter rod, 90°, galvanized steel.      |
| KH10        | Univ. crankarm, slot 21/64" w, for 9/16" to 1" dia. shafts.    |
| KH12        | Univ. crankarm, slot 21/64" w, for 3/4" to 1" dia. shafts.     |
| KH8         | Univ. crankarm, slot 21/64" w, for 3/8" to 11/16" dia. shafts. |
| KH-AFB      | AFB(X)/NFB(X) crankarm (with 3/4" dia. shaft pass through).    |
| SH10        | Push rod for KG10A ball joint (36" L, 3/8" diameter).          |
| SH8         | Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).    |
| Z-AF        | Classic AF/NF to AFB(X)/NFB(X) retrofit mounting bracket.      |
| ZG-100      | Univ. right angle bracket (17" H x 11-1/8" W x 6" base).       |
| ZG-101      | Univ. right angle bracket (13" H x 11" W x 7-7/16" base).      |
| ZG-109      | Right angle bracket for ZS-260.                                |
| ZG-110      | Stand-off bracket for ZS-260.                                  |
| ZG-118      | AFB(X)/NFB(X) U bracket (5-7/8" H x 5-1/2" W x 2-19/32" D).    |
| ZG-120      | Jackshaft mounting bracket.                                    |
| ZG-AFB      | AFB(X)/NFB(X) crankarm adaptor kit.                            |
| ZG-AFB118   | AFB(X)/NFB(X) crankarm adaptor kit.                            |
| ZG-DC1      | Damper clip for damper blade, 3.5" width.                      |
| ZG-DC2      | Damper clip for damper blade, 6" width.                        |
| ZG-JSA-1    | 1" diameter jackshaft adaptor (11" L).                         |
| ZG-JSA-2    | 1-5/16" diameter jackshaft adaptor (12" L).                    |
| ZG-JSA-3    | 1.05" diameter jackshaft adaptor (12" L).                      |
| ZS-100      | Weather shield - galvaneal (13" L x 8" W x 6" D).              |
| ZS-101      | Base plate for ZS-100.   |
| ZS-150      | Weather shield - PC w/ foam seal (16" L x 8-3/8" W x 4" D).    |
| ZS-260      | Explosion proof housing.                                       |
| ZS-300      | NEMA 4X, 304 stainless steel enclosure.                        |
| ZS-300-5    | NEMA 4X, 316L stainless steel enclosure.                       |
| ADS-100     | Analog to digital switch for modulating actuators.             |
| IRM-100     | Input rescaling module for modulating actuators.               |
| PS-100      | Actuator power supply and control simulator.                   |
| PTA-250     | Pulse width modulation interface for modulating actuators.     |
| SGA24       | Positioner control for modulating actuators (surface mount).   |
| SGF24       | Positioner control for modulating actuators (flush mount).     |
| TF-CC US    | Cable conduit connector, 1/2".                                 |
| ZG-R01      | 4 to 20 mA adaptor, 500Ω, 1/4 W resistor w 6" pigtail wires.   |
| ZG-SGF      | Mounting plate for SGF.  |
| ZG-X40      | 120 to 24 VAC, 40 VA transformer.                              |



### Typical Specification

Spring return control 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. The actuator must provide modulating 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. The actuators must be designed so that they may be used for either clockwise or counter clockwise 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 with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Date created, 11/29/2017 - Subject to change. © Belimo Aircontrols (USA), Inc.

# AFX24-SR - Damper Actuator

Modulating, Spring Return, 24 VAC/DC, for 2 to 10 VDC or 4 to 20 mA Control Signal

## Wiring Diagrams



### **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.



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



Actuators with appliance cables are numbered.



Provide overload protection and disconnect as required.



Actuators may also be powered by 24 VDC.



Only connect common to negative (-) leg of control circuits.



A 500  $\Omega$  resistor (ZG-R01) converts the 4 to 20 mA control signal to 2 to 10 VDC.



Actuators may be connected in parallel if not mechanically linked. Power consumption and input impedance must be observed.