Technical Data

Power Supply
24 VAC, ±20%, 50/60 Hz, 24 VDC, -10% / +20%

Power consumption in operation
3.5 W

Power consumption in rest position
2.5 W

Transformer sizing
6 VA (class 2 power source)

Shaft Diameter
1/2...1.05" round, centers on 1/2" and 3/4" with insert, 1.05" without insert

Electrical Connection
18 GA appliance cable, 3 ft [1 m], with 1/2" conduit connector

Overload Protection
electronic throughout 0...95° rotation

Electrical Protection
actuators are double insulated

Operating Range
DC 2...10 V, 4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor)

Input Impedance
100 kΩ for DC 2...10 V (0.1 mA), 500 Ω for 4...20 mA

Position Feedback
DC 2...10 V, Max. 0.5 mA

Angle of rotation
95°, adjustable with mechanical end stop, 35°...95°

Torque motor
90 in-lb [10 Nm]

Direction of rotation motor
reversible with built-in switch

Direction of motion fail-safe
reversible with cw/ccw mounting

Position indication
Mechanical

Manual override
5 mm hex crank (3/16" Allen), supplied

Running Time (Motor)
95 s

Running time fail-safe
<20 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]

Ambient humidity
max. 95% r.H., non-condensing

Ambient temperature
-22...122°F [-30...50°C]

Storage temperature
-40...176°F [-40...80°C]

Degree of Protection
IP54, NEMA 2, UL Enclosure Type 2

Housing material
Galvanized steel and plastic housing

Agency Listing
cULus acc. to UL60730-1A/-2-14, CAN/CSA 22.2 No. 60730-1.02, CE acc. to 2004/108/EC

Noise level, motor
40 dB(A)

Noise level, fail-safe
62 dB(A)

Maintenance
maintenance-free

Quality Standard
ISO 9001

Weight
4.9 lb [2.2 kg]

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

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 NFB24-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 NFB24-SR series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The NF..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 NF..24-SR actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Dimensions (Inches[mm])

Safety Notes

WARNING: For Belimo products sold in California: these products do or may contain chemicals which are known to the State of California to cause cancer and or birth defects or other reproductive harms. For more information see www.p65warnings.ca.gov.
Accessories

**AF-P**  Anti-rotation bracket AF/NF.

**AV8-25**  Shaft extension

**IND-AFB**  End stop indicator

**K7-2**  Shaft clamp reversible

**KG10A**  Ball joint

**KG8**  Ball joint

**KH10**  Damper crank arm

**KH8**  Damper crank arm

**KH-AFB**  Actuator arm

**SH10**  Push rod for KG10A ball joint (36” L, 3/8” diameter).

**SR8**  Push rod for KG6 & KG8 ball joints (36” L, 5/16” diameter).

**TOOL-06**  8 mm and 10 mm wrench.

**ZG-100**  Univ. right angle bracket 17”x11-1/8”x6” (HxWxbase).

**ZG-101**  Univ. right angle bracket 13x11x7-7/16” (HxWxbase).

**ZG-109**  Right angle bracket for ZS-260.

**ZG-110**  Stand-off bracket for ZS-260.

**ZG-118**  AFB(X)/NFB(X) U bracket 5-7/8x5-1/2x2-19/32” (HxWxD).

**ZG-120**  Jackshaft mounting bracket.

**ZG-199**  Mounting and linkage kit

**ZG-11811**  AFB(X)/NFB(X) crankarm adaptor kit.

**ZG-DC1**  Damper clip for damper blade, 3.5” width.

**ZG-DC2**  Damper clip for damper blade, 8” width.

**ZG-JSA-1**  1” diameter jackshaft adaptor (14” 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 13x8x6” (LxWxD).

**ZS-101**  Base plate for ZS-100.

**ZS-150**  Weather shield - PC w/ foam seal 16x8-3/8x4” (LxWxD).

**ZS-260**  Explosion proof housing.

**ZS-300**  NEMA 4X, 304 stainless steel enclosure.

**ZS-300-5**  NEMA 4X, 316L stainless steel enclosure.

**ZS-300-C1**  1/2” shaft adaptor, standard with ZS-300(-5).

**ZS-300-C2**  3/4” shaft adaptor for ZS-300(-5).

**ZS-300-C3**  1” shaft adaptor for ZS-300(-5).

**Z-SF**  Base plate extension

**ADS-100**  Analog to digital switch for modulating actuators.

**IRM-100**  Input rescaling module for modulating actuators.

**P475**  Shaft mount, non-Mercury aux. switch for 1/2” dia. shafts.

**P475-1**  Shaft mount, non-Mercury aux. switch for 1” dia. shafts.

**PS-100**  Actuator power supply and control simulator.

**PTA-250**  Pulse width modulation interface for modulating actuators.


**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-R02**  50% voltage divider kit (resistors 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.

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 Ω 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.