

NFX24-MFT - Damper Actuator

Modulating, Spring Return, 24 V, Multi-Function Technology®



Technical Data

| | |
|-----------------------------------|--|
| Power Supply | 24 VAC±20%, 50/60Hz, 24 VDC+20%/-10% |
| Power Consumption Running | 6.5 W |
| Power Consumption Holding | 3 W |
| Transformer Sizing | 9 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 | 3 ft [1m], 10 ft [3m] or 16 ft [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 (default), variable (VDC, PWM, floating point, on/off) |
| Input Impedance | 100 k Ω for 2 to 10 VDC (0.1 mA), 500 Ω for 4 to 20 mA, 1500 Ω for PWM, floating point and On/Off |
| Feedback Output U | 2 to 10 VDC, 0.5 mA max, VDC variable |
| Angle of Rotation | 95° (adjustable with mechanical end stop, 35° to 95°) |
| Torque (US unit) | 90 in-lbs [10 Nm] minimum |
| 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) | 150 sec (default), variable (40 to 150 sec) |
| Running Time (Fail-Safe) | <20 sec @ -4°F to 122°F [-20°C to 50°C], < 60 sec @ -22°F [-30°C] |
| Angle of Rotation Adaption | Off (default) |
| Override Control | min. position = 0% , mid. Position = 50% , max. position = 100% (Default) |
| 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) @ 150 sec, run time dependent |
| Noise Level (Fail-Safe) | <62 dB (A) |
| Servicing | maintenance free |
| Quality Standard | ISO 9001 |
| Weight | 4.15 lbs [1.9 kg] |

*Variable when configured with MFT options.

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

Torque min. 90 in-lb, Control 2 to 10 VDC (DEFAULT), Feedback 2 to 10 VDC (DEFAULT)

Application

For fail-safe, modulating control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. A feedback signal is provided for position indication.

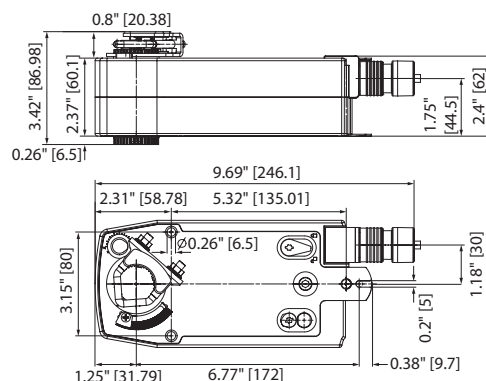
Default/Configuration

Default parameters for 2 to 10 VDC applications of the NF.-MFT actuator are assigned during manufacturing. If required, custom versions of the actuator can be ordered. The parameters are variable and can be changed by three means: Factory pre-set or custom configuration, set by the customer using PC-Tool software or the handheld ZTH US.

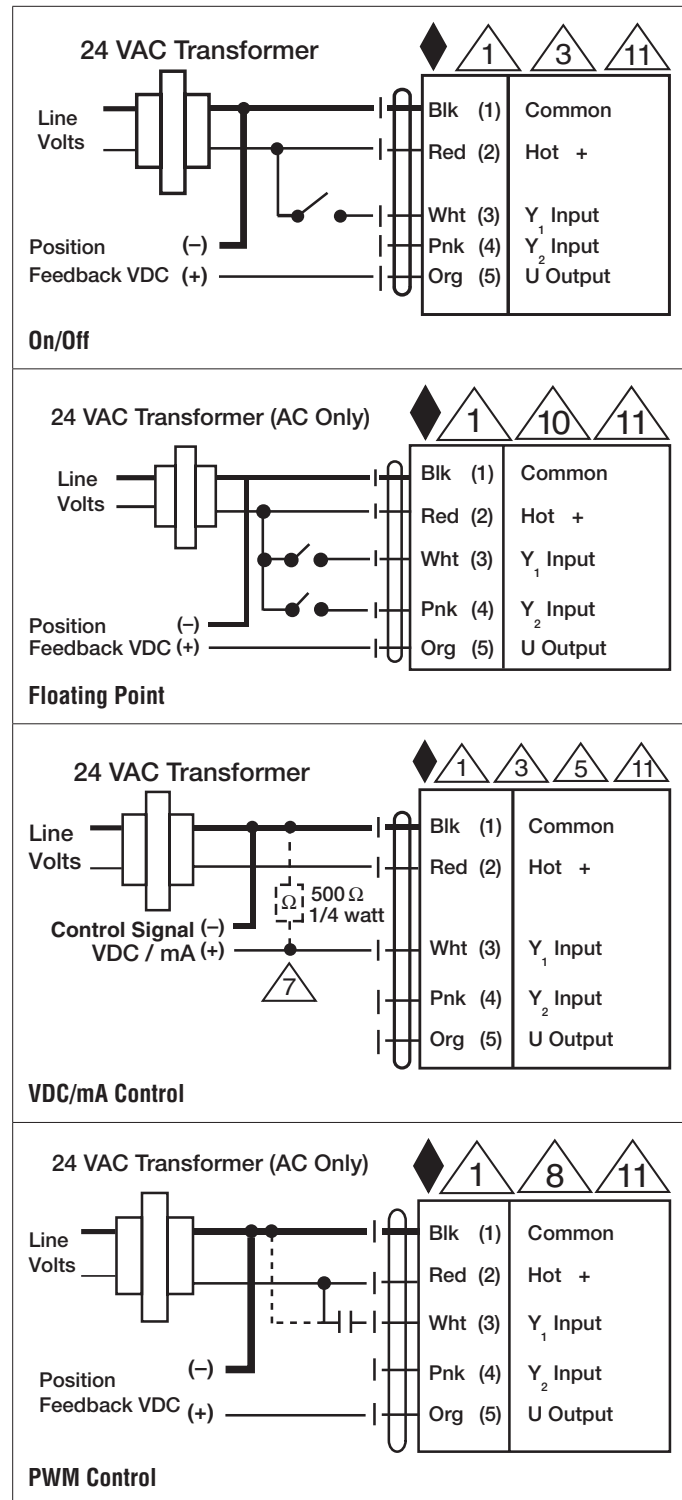
Operation

The NF.24-MFT 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 or valve mechanical stop 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 actuators'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 NF.24-MFT 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 minimum specified torque to the application during a power interruption. The NF.24-MFT actuator is shipped at +5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Dimensions (Inches[mm])



| 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). |
| TOOL-06 | 8 mm and 10 mm wrench. |
| 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). |
| ZG-JSL | Jackshaft linkage for 1/2" to 1.05" shafts |
| ZS-100 | Weather shield - galvanneal (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. |
| 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 | 20 piece Z-AF kit. |
| ADS-100 | Analog to digital switch for modulating actuators. |
| IRM-100 | Input rescaling module for modulating actuators. |
| MFT-P | Belimo MFT configuration software (hardware not included). |
| 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". |
| UK24BAC | BACnet gateway module for up to 8 MFT actuators. |
| UK24LON | LON gateway module for up to 8 MFT actuators. |
| UK24MOD | MODbus gateway module for up to 8 MFT actuators. |
| ZG-R01 | 4 to 20 mA adaptor, 500Ω, 1/4 W resistor w 6" pigtail wires. |
| ZG-R02 | 50% voltage divider kit (resistors with wires). |
| ZG-SGF | Mounting plate for SGF. |
| ZG-X40 | 120 to 24 VAC, 40 VA transformer. |
| ZK2-GEN | Cable for ZTH US to actuators w/o diagnostics socket. |
| ZTH US | Handheld programming tool w/ ZK1-GEN, ZK2-GEN, ZK6-GEN. |



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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 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.



Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 VAC line.



For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.



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



IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

