

LF24-MFT US - Damper Actuator

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



Technical Data

| | |
|---|---|
| Power Supply | 24 VAC, ±20%, 50/60 Hz, 24 VDC, ±10% |
| Power consumption in operation | 2.5 W |
| Power consumption in rest position | 1 W |
| Transformer sizing | 5 VA (class 2 power source) |
| Shaft Diameter | 3/8" to 1/2" round, centers on 1/2" |
| Electrical Connection | 18 GA appliance cable, 3 ft [1 m], with 1/2" conduit connector |
| Overload Protection | electronic throughout 0° to 95° rotation |
| Electrical Protection | actuators are double insulated |
| Operating Range | DC 2...10 V (default), 4...20 mA w/ ZG-R01 (500 Ω, 1/4 W resistor), variable (VDC, PWM, on/off, floating point) |
| Operating range Y variable | Start point DC 0.5...30 V End point DC 2.5...32 V |
| Input Impedance | 100 kΩ for DC 2...10 V (0.1 mA), 500 Ω for 4...20 mA, 1500 Ω for PWM, On/Off and Floating point |
| Position Feedback | DC 2...10 V, Max. 0.5 mA, VDC variable |
| Angle of rotation | Max. 95°, adjustable with mechanical stop |
| Torque motor | 35 in-lb [4 Nm] |
| direction of rotation motor | reversible with built-in switch |
| direction of rotation spring-return | reversible with CW/CCW mounting |
| Position indication | visual indicator, 0° to 95° (0° is full spring return position) |
| Running Time (Motor) | default 150 sec, variable 75...300 sec |
| Running Time (Fail-Safe) | <25 sec @ -4...122°F [-20...50°C], <60 sec @ -22°F [-30°C] |
| Angle Of Rotation Adaption override control | off (default) min. position = 0% , mid. Position = 50% , max. position = 100% (Default) |
| Ambient humidity | 5...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 |
| Housing material | zinc coated steel |
| Agency Listing | cULus acc. To UL 873 and CAN/CSA C22.2 No. 24-93 |
| Noise level, motor | <30 dB (A) |
| Noise Level (Fail-Safe) | <62 dB (A) |
| Maintenance | maintenance free |
| Quality Standard | ISO 9001 |
| Weight | 3.26 lb [1.48 kg] |

*Variable when configured with MFT options.

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

Torque min. 35 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.

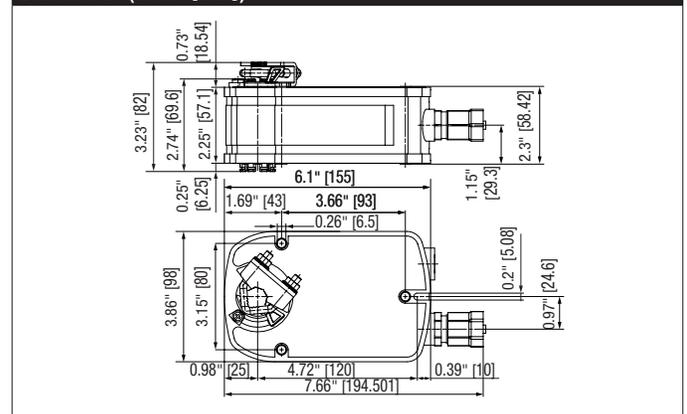
Default/Configuration

Default parameters for 2 to 10 VDC applications of the LF.-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 LF24-MFT US 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 damper or valves mechanical stop and use this point for its zero position during normal control operations. 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 LF24-MFT US is mounted directly to control shafts up to 3/4" diameter (K6-1 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 LF24-MFT US actuator is shipped in the zero position, compression against seats or gaskets for tight shut-off is accomplished manually.

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.

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| Accessories | |
|---------------|---|
| AV6-20 | Shaft extension |
| K6 US | Standard LF clamp (3/8" to 1/2"). |
| K6-1 | Spindle clamp reversible |
| KG10A | Ball joint |
| KG8 | Ball joint |
| KH8 | Damper crank arm |
| KH-LF | Actuator arm |
| KH-LFV | V-bolt Kit for KH-LF. |
| LF-P | Anti-rotation bracket LF. |
| 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. |
| ZDB-LF | Angle of rotation limiter |
| ZF8-LF | Form fit adapter |
| ZG-109 | Right angle bracket for ZS-260. |
| ZG-110 | Stand-off bracket for ZS-260. |
| ZG-112 | LF right angle bracket 4-1/2x5-1/2x2-1/2" (HxWxD). |
| ZG-DC1 | Damper clip for damper blade, 3.5" width. |
| ZG-DC2 | Damper clip for damper blade, 6" width. |
| ZG-LF112 | LF crankarm adaptor kit (includes ZG-112). |
| ZG-LF2 | LF crankarm adaptor kit (T bracket included). |
| ZG-LMSA-1 | Shaft extension for 3/8" diameter shafts (4" L). |
| ZG-LMSA-1/2-5 | Shaft extension for 1/2" diameter shafts (5" L). |
| ZS-100 | Weather shield - galvanneal 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). |
| ADS-100 | Analog to digital switch for modulating actuators. |
| IRM-100 | Input rescaling module for modulating actuators. |
| MFT-P | Belimo PC-Tool |
| 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. |
| SGA24 | Positioners suitable for use with the modulating damper actuators LM..A-SR, NM..A-SR, SM..A-SR and GM..A-SR |
| SGF24 | Positioners suitable for use with the modulating damper actuators LM..A-SR, NM..A-SR, SM..A-SR and GM..A-SR |
| UK24BAC | Gateway MP to BACnet MS/TP |
| UK24LON | Gateway MP to LonWorks |
| UK24MOD | Gateway MP to Modbus RTU |
| 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 | Connection cable |
| ZTH US | Handheld programming tool w/ ZK1-GEN, ZK2-GEN, ZK6-GEN. |

24 VAC Transformer

Line Volts

Blk (1) Common

Red (2) + Hot

Wht (3) Y Input

Wht (5) U Output

Position Feedback VDC (+)

On/Off

24 VAC Transformer (AC Only)

Line Volts

Blk (1) Common

Red (2) + Hot

Wht (3) Y Input

Wht (5) U Output

Position (-) Feedback VDC (+)

Floating Point

24 VAC Transformer

Line Volts

Blk (1) Common

Red (2) + Hot

Wht (3) Y Input

Wht (5) U Output

Control Signal (-) VDC / mA (+)

VDC/mA Control

24 VAC Transformer (AC Only)

Line Volts

Blk (1) Common

Red (2) + Hot

Wht (3) Y Input

Wht (5) U Output

Position (-) Feedback VDC (+)

PWM Control

24 VAC Transformer (AC Only)

Line Volts

Blk (1) Common

Red (2) + Hot

Wht (3) Y Input

Wht (5) U Output

Control Signal (-) VDC/mA (+)

Override Control

| Functions | a | b | c |
|-----------|------------------------|---|---|
| Min | 0% ← | ↘ | ↘ |
| Mid | 50% ← | ↘ | ↘ |
| Max | 100% ← | ↘ | ↘ |
| Normal | Control mode acc. to Y | ↘ | ↘ |

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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 shaft up to a 3/4" diameter and center on a 1/2" shaft (default). Actuator shall deliver a minimum output torque of 35 in-lbs. 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.

 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).