



5-year warranty

## Technical data

|                           |                      |                          |
|---------------------------|----------------------|--------------------------|
| <b>Functional data</b>    | Mounting Position    | 90° to 180°              |
|                           |                      |                          |
| <b>Safety data</b>        | Ambient temperature  | -22...122°F [-30...50°C] |
|                           | Storage temperature  | -40...176°F [-40...80°C] |
| <b>Materials</b>          | Housing material     | galvanized steel         |
|                           | Stem                 | steel                    |
|                           | Frame, plate, base   | galvanized steel         |
|                           | Bearing              | GF Delrin                |
| <b>Suitable actuators</b> | Non-Spring           | AMB(X)                   |
|                           |                      | GMB(X)                   |
|                           |                      | NMB(X)                   |
|                           | Spring               | AF                       |
|                           |                      | EFB(X)                   |
|                           |                      | LF                       |
|                           |                      | NF                       |
|                           | Electronic fail-safe | NKQB(X)                  |

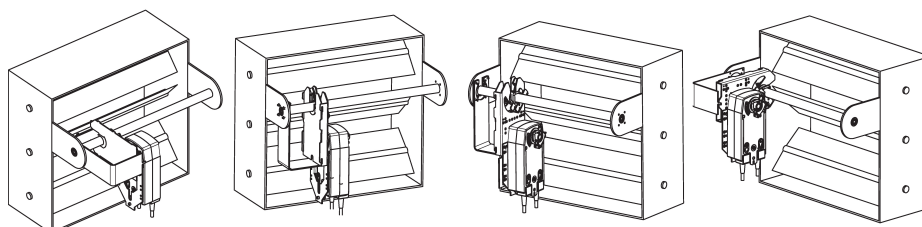
\* ZG-121 adapter must be used with EF. \*\* GM/GK not for use with 1/2" shafts. \*\*\* K6-1 clamp must be used with LF. For close-off pressure reference Select Pro or Retrofit Technical Documentation.

For close-off pressure reference Select Pro or retrofit technical documentation.

## Product features

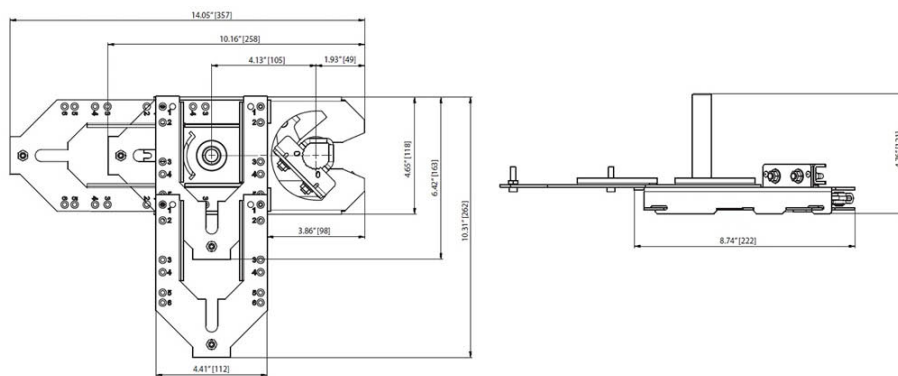
- Default/Configuration** The ZG-JSL linkage can also be configured by moving the anti-rotation plate 90° for space-saving applications. See mounting configurations below. The ZG-JSLA will have a factory mounted actuator on the linkage in the vertical position only.
- Application** The ZG-JSL jackshaft linkage is designed to easily attach to any part of a jackshaft and allow easy installation of select Belimo actuators. The unique open ended design and clamp insert allows the ZG-JSL to be used with any jackshaft from 1/2" to 3/4" in diameter. Removal of the insert will allow the linkage to attach to a maximum shaft diameter of 1.05". Changing the antirotation plate will allow various actuators to be mounted.
- Operation** The 3/4" diameter built-in steel shaft allows direct coupling to the Belimo series actuators in the chart below. There is a torque reduction when using the ZG-JSL linkage. Verify application requirements before use.

## Flow/Mounting details



## Dimensions

## Dimensional drawings





5-year warranty


**MFT**

## Technical data

|                        |                                     |                                                                                                                                                                     |
|------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electrical data</b> | Nominal voltage                     | AC/DC 24 V                                                                                                                                                          |
|                        | Nominal voltage frequency           | 50/60 Hz                                                                                                                                                            |
|                        | Power consumption in operation      | 2.5 W                                                                                                                                                               |
|                        | Power consumption in rest position  | 1 W                                                                                                                                                                 |
|                        | Transformer sizing                  | 5 VA (class 2 power source)                                                                                                                                         |
|                        | Auxiliary switch                    | 1 x SPDT, 3 A resistive (0.5 A inductive) @ AC 250 V, adjustable 0...95°                                                                                            |
|                        | Switching capacity auxiliary switch | 3 A resistive (0.5 A inductive) @ AC 250 V                                                                                                                          |
|                        | Electrical Connection               | (2) 18 GA appliance cables with 1/2" conduit connectors, 3 ft [1 m],                                                                                                |
|                        | Overload Protection                 | electronic throughout 0...95° rotation                                                                                                                              |
| <b>Functional data</b> | Electrical Protection               | actuators are double insulated                                                                                                                                      |
|                        | Torque motor                        | 35 in-lb [4 Nm]                                                                                                                                                     |
|                        | Options positioning signal          | variable (VDC, PWM, on/off, floating point)                                                                                                                         |
|                        | Position feedback U variable        | VDC variable                                                                                                                                                        |
|                        | Direction of motion motor           | selectable with switch 0/1                                                                                                                                          |
|                        | Direction of motion fail-safe       | reversible with cw/ccw mounting                                                                                                                                     |
|                        | Angle of rotation                   | Max. 95°, adjustable with mechanical stop                                                                                                                           |
|                        | Angle of rotation note              | adjustable with mechanical stop                                                                                                                                     |
|                        | Running Time (Motor)                | default 150 s, variable 75...300 s                                                                                                                                  |
|                        | Running time motor variable         | 75...300 s                                                                                                                                                          |
|                        | Running time fail-safe              | <25 s @ -4...122°F [-20...50°C], <60 s @ -22°F [-30°C]                                                                                                              |
|                        | Angle of rotation adaptation        | off (default)                                                                                                                                                       |
|                        | Override control                    | MIN (minimum position) = 0%<br>MID (intermediate position) = 50%<br>MAX (maximum position) = 100%                                                                   |
|                        | Noise level, motor                  | 30 dB(A)                                                                                                                                                            |
|                        | Noise level, fail-safe              | 62 dB(A)                                                                                                                                                            |
|                        | Shaft Diameter                      | 3/8...1/2" round, centers on 1/2"                                                                                                                                   |
|                        | Position indication                 | Mechanical                                                                                                                                                          |
| <b>Safety data</b>     | Degree of protection IEC/EN         | IP54                                                                                                                                                                |
|                        | Degree of protection NEMA/UL        | NEMA 2                                                                                                                                                              |
|                        | Enclosure                           | UL Enclosure Type 2                                                                                                                                                 |
|                        | Agency Listing                      | cULus acc. To UL 873 and CAN/CSA C22.2 No. 24-93; Listed to UL 2043 - suitable for use in air plenums per Section 300.22(c) of the NEC and Section 602.2 of the IMC |
|                        | Quality Standard                    | ISO 9001                                                                                                                                                            |

|                    |                     |                             |
|--------------------|---------------------|-----------------------------|
| <b>Safety data</b> | Ambient temperature | -22...122°F [-30...50°C]    |
|                    | Storage temperature | -40...176°F [-40...80°C]    |
|                    | Ambient humidity    | Max. 95% RH, non-condensing |
|                    | Servicing           | maintenance-free            |
| <b>Weight</b>      | Weight              | 3.3 lb [1.5 kg]             |
| <b>Materials</b>   | Housing material    | galvanized steel            |

## Product features

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default/Configuration</b> | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Application</b>           | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Operation</b>             | 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. |
| <b>Typical specification</b> | 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.                                                                                                                                                                                                                                                                         |
| <b>Factory settings</b>      | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Accessories

| Gateways | Description                | Type    |
|----------|----------------------------|---------|
|          | Gateway MP to BACnet MS/TP | UK24BAC |
|          | Gateway MP to LonWorks     | UK24LON |
|          | Gateway MP to Modbus RTU   | UK24MOD |

## Electrical accessories

## Description

## Type

|                                                                                             |          |
|---------------------------------------------------------------------------------------------|----------|
| DC Voltage Input Rescaling Module                                                           | IRM-100  |
| Auxiliary switch, mercury-free                                                              | P475     |
| Auxiliary switch, mercury-free                                                              | P475-1   |
| Convert Pulse Width Modulated Signal to a 2...10 V Signal for Belimo Proportional Actuators | PTA-250  |
| Positioner for wall mounting                                                                | SGA24    |
| Positioner for front-panel mounting                                                         | SGF24    |
| Cable conduit connector 1/2"                                                                | TF-CC US |
| Gateway MP to BACnet MS/TP                                                                  | UK24BAC  |
| Gateway MP to LonWorks                                                                      | UK24LON  |
| Gateway MP to Modbus RTU                                                                    | UK24MOD  |
| Resistor, 500 $\Omega$ , 1/4" wire resistor with 6" pigtail wires                           | ZG-R01   |
| Resistor kit, 50% voltage divider                                                           | ZG-R02   |
| Transformer, AC 120 V to AC 24 V, 40 VA                                                     | ZG-X40   |

## Mechanical accessories

## Description

## Type

|                                                                                                                                                                     |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Shaft extension 170 mm $\varnothing$ 10 mm for damper shaft $\varnothing$ 6...16 mm                                                                                 | AV6-20        |
| End stop indicator                                                                                                                                                  | IND-LF        |
| Shaft clamp for LF..                                                                                                                                                | K6 US         |
| Shaft clamp reversible, clamping range $\varnothing$ 16...20 mm                                                                                                     | K6-1          |
| Ball joint suitable for damper crank arm KH8 / KH10                                                                                                                 | KG10A         |
| Ball joint suitable for damper crank arm KH8                                                                                                                        | KG6           |
| Ball joint suitable for damper crank arm KH8                                                                                                                        | KG8           |
| Actuator arm, clamping range $\varnothing$ 8...16 mm, Slot width 8.2 mm                                                                                             | KH-LF         |
| V-bolt Kit for KH-LF.                                                                                                                                               | KH-LFV        |
| Damper crank arm Slot width 8.2 mm, for $\varnothing$ 1.05"                                                                                                         | KH12          |
| Damper crank arm Slot width 6.2 mm, clamping range $\varnothing$ 10...18 mm                                                                                         | KH6           |
| Damper crank arm Slot width 8.2 mm, clamping range $\varnothing$ 10...18 mm                                                                                         | KH8           |
| Anti-rotation bracket LF.                                                                                                                                           | LF-P          |
| Push rod for KG10A ball joint 36" L, 3/8" diameter                                                                                                                  | SH10          |
| Push rod for KG6 & KG8 ball joints (36" L, 5/16" diameter).                                                                                                         | SH8           |
| Wrench 0.32 in and 0.39 in [8 mm and 10 mm]                                                                                                                         | TOOL-06       |
| Angle of rotation limiter, with end stop                                                                                                                            | ZDB-LF        |
| Form fit adapter 8x8 mm                                                                                                                                             | ZF8-LF        |
| Mounting Bracket: ZS-260 Right Angle                                                                                                                                | ZG-109        |
| Linkage kit                                                                                                                                                         | ZG-110        |
| Mounting bracket for LF..                                                                                                                                           | ZG-112        |
| Damper clip for damper blade, 3.5" width.                                                                                                                           | ZG-DC1        |
| Damper clip for damper blade, 6" width.                                                                                                                             | ZG-DC2        |
| LF crankarm adaptor kit (includes ZG-112).                                                                                                                          | ZG-LF112      |
| LF crankarm adaptor kit (T bracket included).                                                                                                                       | ZG-LF2        |
| Shaft extension for 3/8" diameter shafts (4" L).                                                                                                                    | ZG-LMSA-1     |
| Shaft extension for 1/2" diameter shafts (5" L).                                                                                                                    | ZG-LMSA-1/2-5 |
| Weather shield 330x203x152 mm [13x8x6"] (LxBxH)                                                                                                                     | ZS-100        |
| Base plate, for ZS-100                                                                                                                                              | ZS-101        |
| Weather shield 406x213x102 mm [16x8-3/8x4"] (LxWxH)                                                                                                                 | ZS-150        |
| Explosion proof housing 406x254x164 mm [16x10x6.435"] (LxBxH), UL and CSA, Class I, Zone 1&2, Groups B, C, D, (NEMA 7), Class III, Hazardous (classified) Locations | ZS-260        |
| Weather shield 438x222x140 mm [17-1/4x8-3/4x5-1/2"] (LxBxH), NEMA 4X, with mounting brackets                                                                        | ZS-300        |
| Weather shield 438x222x140 mm [17-1/4x8-3/4x5-1/2"] (LxBxH), NEMA 4X, with mounting brackets                                                                        | ZS-300-5      |
| Shaft extension 1/2"                                                                                                                                                | ZS-300-C1     |
| Shaft extension 3/4"                                                                                                                                                | ZS-300-C2     |
| Shaft extension 1"                                                                                                                                                  | ZS-300-C3     |

| Service tools | Description                                                                                                                           | Type    |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------|---------|
|               | Belimo PC-Tool, Software for adjustments and diagnostics                                                                              | MFT-P   |
|               | Signal simulator, Power supply AC 120 V                                                                                               | PS-100  |
|               | Connection cable 16 ft [5 m], A: RJ11 6/4 ZTH EU, B: free wire end for connection to MP/PP terminal                                   | ZK2-GEN |
|               | Connection cable 10 ft [3 m], A: RJ11 6/4 ZTH EU, B: 3-pin Weidmüller and supply connection                                           | ZK4-GEN |
|               | Service Tool, with ZIP-USB function, for programmable and communicative Belimo actuators, VAV controller and HVAC performance devices | ZTH US  |

## Electrical installation

### 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.

Apply only AC line voltage or only UL-Class 2 voltage to the terminals of auxiliary switches. Mixed or combined operation of line voltage/safety extra low voltage is not allowed.

Actuators with appliance cables are numbered.

Provide overload protection and disconnect as required.

Actuators may also be powered by DC 24 V.

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

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

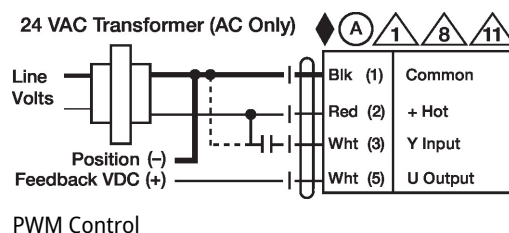
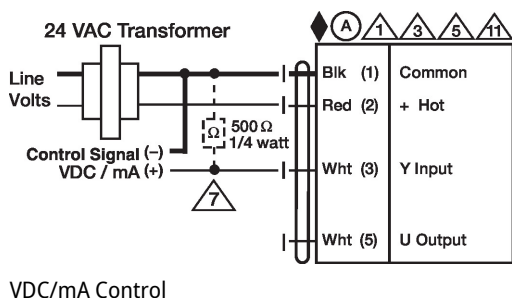
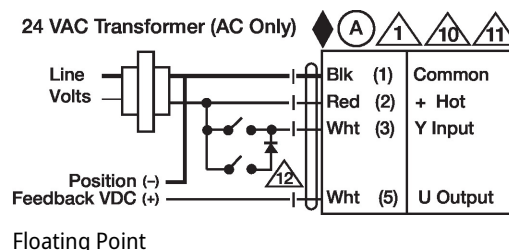
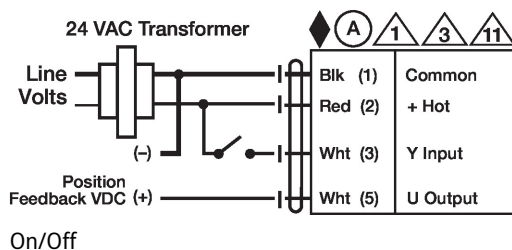
Control signal may be pulsed from either the Hot (Source) or Common (Sink) 24 V line.

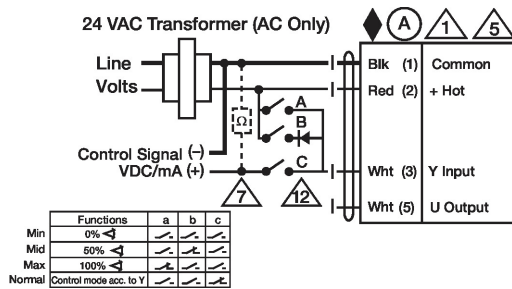
For triac sink the Common connection from the actuator must be connected to the Hot connection of the controller. Position feedback cannot be used with a triac sink controller; the actuator internal common reference is not compatible.

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

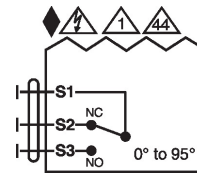
IN4004 or IN4007 diode. (IN4007 supplied, Belimo part number 40155).

One built-in auxiliary switch (1x SPDT), for end position indication, interlock control, fan startup, etc.





Override Control



Auxiliary Switches

## Dimensions

### Dimensional drawings

