LM Series Direct Coupled Actuator

Small Yet Powerful

- Minimum 35 in-lb torque in a compact package. For damper areas up to 8 sq-ft*.

Areas of Application

VAV Units and Small Zone Dampers

LM Series - at a glance

<table>
<thead>
<tr>
<th>Model</th>
<th>Torque</th>
<th>Power Supply</th>
<th>Brushless DC Motor</th>
<th>Control Signal</th>
<th>Feedback Signal</th>
<th>10kΩ Feedback Potentiometer</th>
<th>5kΩ Feedback Potentiometer</th>
<th>Run Time, 95 sec</th>
<th>Run Time, 80 to 110 sec</th>
<th>Left/Right Rotation Switch</th>
<th>Angle of Rotation Limiting (Mechanical)</th>
<th>Angle of Rotation Limiting (Electronic)</th>
<th>Plenum Rated Cable, 18 GA</th>
<th>Screw Terminal Strip</th>
<th>Manual Override Push-button</th>
<th>Built-in Auxiliary Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM24-3 US</td>
<td>35 in-lb</td>
<td>24 VAC/DC</td>
<td>Yes</td>
<td>On/Off</td>
<td>2 to 10 VDC</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<td>2 to 10 VDC</td>
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<td>On/Off</td>
<td>2 to 10 VDC</td>
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<td>Yes</td>
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<td>2 to 10 VDC</td>
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<td>2 to 10 VDC</td>
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<td>LM24-10P US</td>
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<td>24 VAC/DC</td>
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<td>2 to 10 VDC</td>
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<td>LM24-5P0-T US</td>
<td>35 in-lb</td>
<td>24 VAC/DC</td>
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<td>On/Off</td>
<td>2 to 10 VDC</td>
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<td>LM24-SR T-2.0 US</td>
<td>35 in-lb</td>
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<td>2 to 10 VDC</td>
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<td>2 to 10 VDC</td>
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<td>LMC24-SR US</td>
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<td>On/Off</td>
<td>2 to 10 VDC</td>
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<tr>
<td>LMC24-SR T US</td>
<td>35 in-lb</td>
<td>24 VAC/DC</td>
<td>Yes</td>
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<td>2 to 10 VDC</td>
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<tr>
<td>LMC24-SR T-2.0 US</td>
<td>35 in-lb</td>
<td>24 VAC/DC</td>
<td>Yes</td>
<td>On/Off</td>
<td>2 to 10 VDC</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
</tr>
</tbody>
</table>

* 4 in-lb/ft² damper torque loading. Parallel blade. No edge seals.
A CLOSER LOOK...

- Brushless DC Motor for added accuracy and controllability.

- Cut labor costs with simple direct coupling.

- Check damper position from a distance with clear position indication.

- Don’t worry about actuator burn-out. Belimo is overload-proof throughout rotation.

- Enjoy added flexibility with easy mechanical stops to adjust angle of rotation. (LM24-SR-2.0 US has electronic rotation limiting.)

- Consistent running time independent of load.

- Easily accessible manual override push-button helps you pre-tension damper blades.

- Need to change control direction? Do it easily with a simple switch.

- 3 ft. plenum rated cable eases installation (external terminal strip also available)

Bulk Packaging Offers Big Value for Large Jobs, Stocking Orders.

The Belimo Difference

- Customer Commitment.

- Low Installation and Life-Cycle Cost.
  Easy installation. Accuracy and repeatability. Low power consumption. No maintenance.

- Long Service Life.
  Components tested before assembly. Every product tested before shipment. 20+ years direct coupled actuator design.
**Application**

For on-off and floating point control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer’s specifications. The actuator mounts directly to the damper operating shaft with a universal V-bolt clamp assembly.

**Operation**

The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The angle of rotation is mechanically limited to 95°. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover. The position of the actuator is indicated by a visual pointer. The anti-rotation strap supplied with the actuator will prevent lateral movement.

The LM24-3 US and LM24-3-T US actuators use a Brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator’s rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition.

**Accessories**

- 11533 T-type anti-rotation bracket
- 22065 L-type anti-rotation bracket (included)
- ZG-LMSA Shaft adaptor for short shafts
- Tool-02 8 mm wrench

**Technical Data**

<table>
<thead>
<tr>
<th>LM24-3 (-T) US</th>
<th>on-off/ floating point control, non-spring return, direct coupled, 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Data</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>2 W</td>
</tr>
<tr>
<td><strong>Transformer sizing</strong></td>
<td>3 VA (Class 2 power source)</td>
</tr>
<tr>
<td><strong>Electrical connection</strong></td>
<td>3 ft, 18 GA, UL CL2P plenum cable</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>On-off/Floating point</td>
</tr>
<tr>
<td><strong>Overload protection</strong></td>
<td>Electronic throughout 0 to 95° rotation</td>
</tr>
<tr>
<td><strong>Input impedance</strong></td>
<td>3900Ω</td>
</tr>
<tr>
<td><strong>Angle of rotation</strong></td>
<td>max 95°, adjust. with mechanical stops</td>
</tr>
<tr>
<td><strong>Torque</strong></td>
<td>min 35 in-lb [4 Nm], Independent of load</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td>reversible w/switch CW/CCW (not on “-T” models)</td>
</tr>
<tr>
<td><strong>Position indication</strong></td>
<td>clip-on indicator (not on “-T” models)</td>
</tr>
<tr>
<td><strong>Running time</strong></td>
<td>95 seconds</td>
</tr>
<tr>
<td><strong>Manual override</strong></td>
<td>external push button</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>5 to 95% RH, non-condensing</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>-22°F to +122°F [-30°C to +50°C]</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40°F to +176°F [-40°C to +80°C]</td>
</tr>
<tr>
<td><strong>Housing type</strong></td>
<td>NEMA type 2 (-T models NEMA 1)</td>
</tr>
<tr>
<td><strong>Housing material rating</strong></td>
<td>UL94-5V</td>
</tr>
<tr>
<td><strong>Noise level</strong></td>
<td>less than 35 dB (A)</td>
</tr>
<tr>
<td><strong>Servicing</strong></td>
<td>maintenance free</td>
</tr>
<tr>
<td><strong>Agency listings</strong></td>
<td>UL873 listed, CSA 22.2 No. 24 certified, CE</td>
</tr>
<tr>
<td><strong>Quality standard</strong></td>
<td>ISO 9001</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>1.2 lbs [0.55 kg]</td>
</tr>
</tbody>
</table>

**LM24-3-T.1 US**

- **Electrical connection**: Screw terminal (for 26 to 14 GA wire)
- **Housing**: NEMA type 1
- **Direction of rotation**: Reverse wires terminals 2 and 3

*Standard cable length is 3 ft [1m]. Optional cable lengths of 6 ft [200m] or 10 ft [300m] are available at additional list price.

**Dimensions**

- 1/4" to 5/8" [8 to 16]
- 1/4" to 7/16" [6 to 11]
On-off/ floating point control, non-spring return, direct coupled, 24 V

### On-off control

- **24 VAC Transformer**
- **Line Volts**
  - a open
  - a closed
- **Common**
- **Blk (1)**
- **Red (2)**
- **Wht (3)**

The indication of direction is valid for switch position R.

### Floating point or on-off control

- **24 VAC Transformer**
- **Line Volts**
- **Common**
- **Blk (1)**
- **Red (2)**
- **Wht (3)**

The indication of direction is valid for switch position CW.

### Floating point or on-off control of LM24-3-T US

- **24 VAC Transformer**
- **Line Volts**
- **Common**
- **Blk (1)**
- **Red (2)**
- **Wht (3)**

### Notes

- Provide overload protection and disconnect as required.
- Actuators may also be powered by 24 VDC.
- Actuators are provided with color coded wires. Wire numbers are provided for reference.
- The LM24-3-T US actuators are provided with a numbered screw terminal strip instead of cable.
- Switch wires 2 and 3 to change rotation direction of LM24-3-T US (does not have CW/CCW external switch).

### T-Type bracket

These are included in the single-actuator packages and are available at no extra cost in the bulk packages upon request.

**Part # 11533 (UOM: 1)**

### L-Type anti-rotation bracket.

Included with each bulk packaged actuator.

**Part #: 22065 (UOM: 1)**

12502-00002
(includes 22065: UOM: 16)
shipped with bulk pack option.

### Bulk packaging

<table>
<thead>
<tr>
<th>Bulk Pack No.</th>
<th>Actuator Type</th>
<th>Quantity/Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM24-3.1 US</td>
<td>LM24-3 US</td>
<td>32</td>
</tr>
<tr>
<td>LM24-3-T.1 US</td>
<td>LM24-3-T US</td>
<td>48</td>
</tr>
</tbody>
</table>

To have better control of job site inventory and reduce the environmental impact of unnecessary packing material.

### LM24... on-off/floating - Typical Specification:

Control damper actuators shall be electronic direct coupled type which require no crank arm and linkage. Actuators shall be UL and CSA listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall have Brushless DC motor technology. Actuators shall have reversing switch and manual override on the cover, and be protected from overload at all angles of rotation. If required, actuator will be provided with screw terminal strip for electrical connections (LM24-3-T US). Actuators shall be as manufactured by Belimo.
LM24-SR (-T) -2.0 US
Proportional control, non-spring return, direct coupled, 24 V, for 2 to 10 VDC and 4 to 20 mA control signal

Application
For proportional modulation of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. The actuator mounts directly to the damper operating shaft with a universal V-bolt clamp assembly. The actuator operates in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA input signal from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master slave applications. (Not available on "-T" versions)

The LM24-SR-2.0 US provides an electronic angle of rotation adjustment to limit the actuators rotation 20% to 100% while still using the full input signal and feedback control range. (Not available on LM24-SR-T-2.0 US)

Operation
The anti-rotation strap supplied with the actuator will prevent lateral movement of the actuator. The damper actuator is not provided with and does not require any limit switches, but is protected electronically against overload. The angle of rotation is mechanically limited to 95°. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged by pressing a button on the actuator cover. The position of the actuator is indicated by a visual pointer.

The LM24-SR-2.0 US and LM24-SR-T-2.0 US actuators use a Brushless DC motor, which is controlled by an Application Specific Integrated Circuit (ASIC). The ASIC monitors and controls the actuator's rotation and provides a digital rotation sensing (DRS) function to prevent damage to the actuator in a stall condition.

Accessories
11533 T-type anti-rotation bracket
22065 L-type anti-rotation bracket (included)
ZG-LMSA Shaft adaptor for short shafts
Tool-02 8 mm wrench
ZG-R01 500 Ω resistor for 4 to 20 mA

Dimensions (All numbers in brackets are metric.)

Technical Data LM24-SR-2.0 US
Power supply 24 VAC ± 20%  50/60 Hz
24 VDC ± 10%
Power consumption 2 W
Transformer sizing 4 VA (Class 2 power source)
Electrical connection* LM24-SR-2.0 US:  3 ft, 18 GA, UL CL2P plenum cable
Overload protection Electronic throughout 0 to 95° rotation
Operating range Y 2 to 10 VDC, 4 to 20 mA
Input impedance 100 kΩ (0.1 mA), 500Ω
Feedback output 'U' 2 to 10 VDC (max. 0.7 mA ) (not available on LM24-SR-T-2.0 US
Angle of rotation max 95°, electronically adjustable 20 to 100% on LM24-SR-2.0 US
Torque min 35 in-lb, Independent of load
Direction of rotation reversible with switch CW/CCW
CW = with an increase in voltage
CCW = with an increase in voltage
Position indication clip-on indicator (not on "-T" models)
Running time 95 seconds
Manual override external push button
Humidity 5 to 95% RH, non-condensing
Ambient temperature -22°F to +122°F [-30°C to +50°C]
Storage temperature -40°F to +176°F [-40°C to +80°C]
Housing type NEMA type 2 (-T models Nema type1)
Housing material rating UL 94-5V
Noise level less than 35 dB (A)
Servicing maintenance free
Agency listings UL 873 listed, CSA 22.2 No. 24 certified, CE
Quality standard ISO 9001
Weight 1.2 lbs [0.55 kg]

LM24-SR-T-2.0.1 US
Electrical connection Screw terminals (for 26 to 14 GA wire)
Angle of rotation max 95°, adjust. with mechanical stops
Housing NEMA type 1
Feedback No feedback with the LM24-SR-T-2.0 US

*Standard cable length is 3 ft [1m]. Optional cable lengths of 6 ft [200m] or 10 ft [300m] are available at additional list price.

Torque min. 35 in-lb, for control of damper surfaces up to 8 sq ft.
**LM24-SR (-T) -2.0 US**

Proportional control, non-spring return, direct coupled, 24 V, for 2 to 10 VDC and 4 to 20 mA control signal

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**2 to 10 VDC control of LM24-SR-2.0 US**

- **Blek (1) Common**
- **Red (2) + Hot**
- **Wht (3) Y 2 to 10V Input**
- **Grn (5) U 2 to 10V Output**

**Line Volts**
- **500 Ω**

**2 to 10 VDC and 4 to 20 mA control of LM24-SR-T-2.0 US**

- **1 Common**
- **2 + Hot**
- **3 Y 2 to 10V Input**

**4 to 20 mA control of LM24-SR-2.0 US with 2 to 10 VDC feedback output**

**Notes**

- Provide overload protection and disconnect as required.
- Actuators are provided with color coded wires. Wire numbers are provided for reference.
- The LM24-SR-T-2.0 US is provided a screw terminal instead of cable.
- The LM24-SR-T-2.0 US does not have feedback.
- Connect actuator common (Wire 1) to Negative (-) leg of control circuits only.
- Actuators may also be powered by 24 VDC.
- A 500Ω resistor (ZG-R01) must be added for 4 to 20 mA control.


<table>
<thead>
<tr>
<th>Bulk Pack No.</th>
<th>Actuator Type</th>
<th>Quantity/Pack</th>
</tr>
</thead>
</table>

To have better control of job site inventory and reduce the environmental impact of unnecessary packing material.

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**T-Type bracket**

These are included in the single-actuator packages and are available at no extra cost in the bulk packages upon request.

Part # 11533 (UOM:1)

**L-Type anti-rotation bracket.**

Included with each bulk packaged actuator.

Part #: 22065 (UOM:1)

12502-00002 (includes 22065: UOM:16) shipped with bulk pack option.

**LM24-SR (-T) 2.0 US - Typical Specification:**

Control damper actuators shall be electronic direct coupled type which require no crank arm and linkage. Actuators shall be UL and CSA listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall have Brushless DC motor. Actuators shall have reversing switch and gear disengagement button on the cover, and be electronically protected from overload at all angles of rotation. Actuators shall respond to 2 to 10VDC output relative to position regardless of the amount of damper rotation. A 2 to 10 VDC feedback signal shall be provided for position indication or master-slave applications. Actuators shall be as manufactured by Belimo. An electronic angle of rotation adjustment shall be provided to reduce the actuators rotation from 100 to 20% while still using the full input signal and feedback control range. (LM24-SR US) If required, actuator will be provided with screw terminal strip for electrical connections (LM24-SR-T US).
**Application**
For on-off control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer’s specifications. The actuator mounts directly to the damper operating shaft with a universal V-bolt clamp assembly.

**Operation**
The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The angle of rotation is mechanically limited to 95°. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover. The position of the actuator is indicated by a visual pointer. The anti-rotation strap supplied with the actuator will prevent lateral movement.

**Accessories**
- LM-P T-type anti-rotation bracket
- ZG-LMSA Shaft adaptor for short shafts
- Tool-02 8 mm wrench

**Technical Data**

| LM24… on-off/ floating point | Power supply | 24 VAC ± 20% 50/60 Hz | 24 VDC ± 10% |
| Control | On-off |
| Overload protection | Electronic throughout 0 to 95° rotation |
| Angle of rotation | max 95°, adjust. with mechanical stops |
| Torque | min 35 in-lb [4 Nm] |
| Direction of rotation | reversible w/switch L/R (not on "-T" models) |
| Position indication | clip-on indicator (not on "-T" models) |
| Running time | 80 to 110 sec. for 0 to 35 in-lb |
| Manual override | external push button |

**LM24-S US**
- Control: On-off
- Auxiliary switch: Adj. 0° to 95°, SPDT 6 A (2.5A) @ 24 VAC

**LM24-10P US**
- Control: On-off/Floating point
- Feedback: 5 kΩ, 1W potentiometer

**LM24-5P0-T.1 US** (bulk pack only)
- Control: On-off/Floating point
- Feedback: 5 kΩ, 1W potentiometer
- Housing: NEMA type 1
- Direction of rotation: Reverse wires terminals 2 and 3

**LM24-T.1 US** (bulk pack only)
- Control: On-off
- Electrical connection: Screw terminal (for 26 to 14 GA wire)
- Housing: NEMA type 1
- Direction of rotation: Reverse wires terminals 2 and 3

*Standard cable length is 3 ft [1m]. Optional cable lengths of 6 ft [200m] or 10 ft [300m] are available at additional list price.

**Dimensions**
(All numbers in brackets are metric.)

![Dimensions Diagram]
**LM24 (-T) US**

**On-off control, non-spring return, direct coupled, 24 V**

**Notes**

1. Provide overload protection and disconnect as required.
2. Actuators may also be powered by 24 VDC.
3. Actuators are provided with color coded wires. Wire numbers are provided for reference.
4. For position indication, the LM24-10P US is provided with a 10 kΩ feedback potentiometer and the LM24-5P0-T US is provided with a 5 kΩ feedback potentiometer.
5. The LM24-T US and LM24-5P0-T US are provided with a numbered screw terminal strip instead of cable.
6. Switch wires 2 and 3 to change rotation direction of LM24-T US and LM24-5P0-T US (does not have L/R external switch).
7. Value based on resistance between (P1) and (P2). Indicates direction of rotation of actuator.

**L-Type anti-rotation bracket.** Included with each actuator.

**Part #: 22065**

**Bulk packaging LM24 on-off/floating**

<table>
<thead>
<tr>
<th>Bulk Pack No.</th>
<th>Actuator Type</th>
<th>Quantity/Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM24.1 US</td>
<td>LM24 US</td>
<td>32</td>
</tr>
<tr>
<td>LM24-T.1 US</td>
<td>LM24-T US</td>
<td>48</td>
</tr>
<tr>
<td>LM24-5P0-T.1 US</td>
<td>LM24-5P0-T US</td>
<td>48</td>
</tr>
</tbody>
</table>

**Auxiliary switch wiring for LM24-S US**

**Floating point or on-off control**

**Feedback potentiometer wiring for LM24-10P US and LM24-5P0-T US**
Application
For on-off control of dampers in HVAC systems (LMC24 US). For proportional modulation of dampers in HVAC systems (LMC24-SR-T US). Actuator sizing should be done in accordance with the damper manufacturer’s specifications. The actuator mounts directly to the damper operating shaft with a universal V-bolt clamp assembly.

The LMC24-SR-T US actuator operates in response to a 2 to 10 VDC or, with the addition of a 500 Ω resistor, a 4 to 20 mA input signal from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master slave applications. The LMC24-SR US provides an electronic angle of rotation adjustment (not available in the LMC24-SR-T US) to limit the actuators rotation 20% to 100% while still using the full input signal and feedback control range.

Operation
The actuator is not provided with and does not require any limit switches, but is electronically protected against overload. The angle of rotation is mechanically limited to 95°. When reaching the damper or actuator end position, the actuator automatically stops. The gears can be manually disengaged with a button on the actuator cover. The position of the actuator is indicated by a visual pointer. The anti-rotation strap supplied with the actuator will prevent lateral movement.

Accessories
LM-P T-type anti-rotation bracket
IRM-100 Input scaling module (For LMC24-SR-T US only)
ZG-LSMA Shaft adaptor for short shafts
PTA-250 Pulse width modulating interface
(SGA24 Min. and/or manual positioner in NEMA 4 housing
(SGF24 Min. and/or manual positioner for flush panel mount
Tool-02 8 mm wrench
ZAD24 Digital position indication (For LMC24-SR-T US only)
ZG-R01 500 Ω resistor for 4 to 20 mA
(For LMC24-SR-T US only)

Dimensions (All numbers in brackets are metric.)

Torque min. 18 in-lb, for control of damper surfaces up to 4.5 sq ft.

LMC24 US (on-off)
LMC24-SR US (proportional)
LMC24-SR-T US (proportional)

Note: Actuators do not have Brushless DC Motor
Notes

1. Provide overload protection and disconnect as required.
2. Actuators may also be powered by 24 VDC.
3. Actuators are provided with color coded wires. Wire numbers are provided for reference.
4. Connect actuator common (Wire 1) to Negative (–) leg of control circuits only.
5. A 500Ω resistor (ZG-R01) must be added for 4 to 20 mA control.
6. LMC24-SR-T US does not have a cable. Numbers shown are terminal numbers.

LMC24... - Typical Specification:
Control damper actuators shall be electronic direct coupled type which require no crank arm and linkage. Actuators shall be UL and CSA listed, have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall have reversing switch and manual override on the cover, and be protected from overload at all angles of rotation. Actuator shall have a nominal running time of 30 seconds for 95° rotation. Proportional actuators shall respond to 2 to 10VDC output relative to position regardless of the amount of damper rotation. A 2 to 10 VDC feedback signal shall be provided for position indication or master-slave applications. An electronic angle of rotation adjustment (LMC24-SR US only) shall be provided to reduce the actuators rotation from 100 to 20% while still using the full input signal and feedback control range. Actuators shall be as manufactured by Belimo.

L-Type anti-rotation bracket. Included with each actuator.

Part #: 22065
Preliminary steps

1. Belimo actuators should be mounted indoors in dry, relatively clean environment free from corrosive fumes. If the actuator is to be mounted outdoors, a protective enclosure must be used to shield the actuator. (See Belimo Mechanical Accessories Doc. 5.2)
2. For new construction work, order dampers with extended shafts. Instruct the installing contractor to allow space for mounting and service of the Belimo actuator on the shaft.
3. The LM Series actuator requires a minimum shaft length of 1.5". Use the ZG-LMSA for short shaft installations on 1/2" diameter shafts.

Dimensions (All numbers in brackets are metric.)

1. Turn damper blade to its fully closed position.
2. With manual override button depressed, rotate actuator clamp to about 1/16" - 1/8" between actuator stop and clamp, depending on damper seal design. Slide actuator over shaft and finger-tighten nuts.
3. Slide anti-rotation bracket up under actuator engaging center cut-out on actuator back. Secure bracket with self-tapping screws. Tighten the two nuts on the universal clamp with 8 mm wrench, 3-5 ft-lb torque. (On dampers with edge seals, actuator will compress damper blades when reaching end position for air-tight damper.)
4. Adjust end stops, if required.
WARNING The wiring technician must be trained and experienced with electronic circuits. Disconnect power supply before attempting any wiring connections or changes. Make all connections in accordance with wiring diagrams and follow all applicable local and national codes. Provide disconnect and overload protection as required. Use copper, twisted pair, conductors only.

Always read the controller manufacturer’s installation literature carefully before making any connections. Follow all instructions in this literature. If you have any questions, contact the controller manufacturer and/or Belimo.

Transformer(s)
The LM Series actuators require a 24 VAC class 2 transformer and draw a maximum of 4 VA. The actuator enclosure cannot be opened in the field, there are no parts or components to be replaced or repaired.

- EMC directive: 89/336/EEC
- Software class A: Mode of operation type 1
- Low voltage directive: 73/23/EEC

CAUTION: It is good practice to power electronic or digital controllers from a separate power transformer than that used for actuators or other end devices. The power supply design in our actuators and other end devices use half wave rectification. Some controllers use full wave rectification. When these two different types of power supplies are connected to the same power transformer and the DC commons are connected together, a short circuit is created across one of the diodes in the full wave power supply, damaging the controller. Only use a single power transformer to power the controller and actuator if you know the controller power supply uses half wave rectification.

Multiple actuators, one transformer
Multiple actuators may be powered from one transformer provided the following rules are followed:
1. The TOTAL current draw of the actuators (VA rating) is less than or equal to the rating of the transformer.
2. Polarity on the secondary of the transformer is strictly followed. This means that all No. 1 wires from all actuators are connected to the common leg on the transformer and all No 2 wires from all actuators are connected to the hot leg. Mixing wire No. 1 & 2 on one leg of the transformer will result in erratic operation or failure of the actuator and or controls.

Multiple actuators, multiple transformers
Multiple actuators positioned by the same control signal may be powered from multiple transformers provided the following rules are followed:
1. The transformers are properly sized.
2. All No. 1 wires from all actuators are tied together and tied to the negative leg of the control signal. See wiring diagram.

Wire length for LM Series actuators
Keep power wire runs below the limits listed in the Fig. 1. If more than one actuator is powered from the same wire run, divide the allowable wire length by the number of actuators to determine the maximum run to any single actuator.

Maximum wire length:

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Max. Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 Ga</td>
<td>1225 Ft.</td>
</tr>
<tr>
<td>18 Ga</td>
<td>725 Ft.</td>
</tr>
<tr>
<td>20 Ga</td>
<td>400 Ft.</td>
</tr>
<tr>
<td>22 Ga</td>
<td>200 Ft.</td>
</tr>
</tbody>
</table>

Fig. 1

Example for LM... US: 3 actuators, 18 Ga wire
725 Ft ÷ 3 Actuators = 241.6 Ft. Maximum wire run.

Wire Type and Wire Installation Tips
For most installations, 18 or 16 Ga. cable works well with the LM24 type actuators. Use code approved wire nuts, terminal strips or solderless connectors where wires are joined. It is good practice to run control wires unspliced from the actuator to the controller. If splices are unavoidable, make sure the splice can be reached for possible maintenance. Tape and/or wire tie the splice to reduce the possibility of the splice being inadvertently pulled apart.

LM Series Actuators with Terminal Strip
LM...-T actuators feature an external screw terminal strip on the top of the actuator housing (instead of cable). Connections are numbered and a wiring schematic is shown next to the terminal strip. The terminals are designed for 26 to 14 GA wire.

Overload protection
All Belimo actuators are electronically protected against overload. In the LM series an electronic circuit maintains the current at a level which will not damage the motor while providing adequate holding torque.

Manual Override
A button on the actuator cover disengages the gear train so the damper shaft can be moved manually. Release the button and the gear train is re-engaged.

Use the manual override to test the installation without power. For tight shut-off the damper should close with 5° of actuator stroke left.
Installation Instructions

Feature Operation

Direction of Rotation Switch (All LM except LM24-3-T US)

LM actuators have a reversing switch on the cover labeled “CW-CCW”. Switch position indicates start point. For the LM24-SR (-T) 2.0 US, with the switch in position “CW”, the actuator rotates clockwise with an increase in voltage or current. With the switch in position “CCW”, the actuator rotates counterclockwise with an increase in voltage or current.

The LM24-3-T US does not have a switch. They rotate clockwise when power is applied to wire #3, and counterclockwise when power is applied to wire #2.

During checkout, the switch position can be temporarily reversed and the actuator will reverse its direction. This allows the technician a fast and easy way to check the actuator operation without having to switch wires or change settings on the thermostat. When the check-out is complete, make sure the switch is placed back to its original position.


The adjustable stops are needed when there is no damper stop or if you want the damper to halt rotating before it reaches its stops. The LM actuator can be indefinitely stalled in any position without harm.

1. Loosen the two end stops with a No. 2 Phillips head screwdriver being careful not to unscrew the captive nut under the slot.
2. Move the stops (in 2.5° steps) to the desired position and re-tighten the screws.

Electronic Angle of Rotation Limiting (LM24-SR-2.0 US)

With the LM24-SR-2.0 US proportional actuator, you can adjust the angle of rotation (95°) anywhere between 20% and 100% using an external adjustment. A potentiometer limits rotation while allowing the full control input and feedback range (2 to 10 VDC), providing higher control resolution within the limited angle of rotation.

Adjust angle-of-rotation in steps of 2.5°
LM24-SR (-T) 2.0 US  Electrical check-out procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>Expected Response</th>
<th>Gives Expected Response</th>
<th>Does Not Give Expected Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control signal is applied to actuator.</td>
<td>Actuator will move to its “Control Signal” position.</td>
<td>Actuator operates properly Step 8</td>
<td>No response at all Step 2 Operation is reversed Step 3 Does not drive toward “Control Signal Position” Step 4</td>
</tr>
<tr>
<td>2</td>
<td>Check power wiring. Correct any problems. See Note 1.</td>
<td>Power supply rating should be ≥ the total power requirement of the actuator(s). Minimum voltage of 19.2 VAC or 21.6 VDC.</td>
<td>Power wiring corrected, actuator begins to drive Step 1</td>
<td>Power wiring correct ed, actuator still does not drive Step 4</td>
</tr>
<tr>
<td>3</td>
<td>Turn reversing switch to the correct position.</td>
<td>Actuator will move to its “Control Signal” position.</td>
<td>Actuator operates properly. Step 8</td>
<td>Does not drive toward “Control Signal Position” Step 4</td>
</tr>
<tr>
<td>4</td>
<td>Make sure the control signal positive (+) is connected to Wire No 3 and control signal negative (-) is connected to wire No. 1. Most control problems are caused by reversing these two wires. Verify that the reversing switch is all the way CCW or CW.</td>
<td>Drives to “Control Signal” position</td>
<td>Actuator operates properly. Step 8</td>
<td>Step 5</td>
</tr>
<tr>
<td>5</td>
<td>Check input signal with a digital volt meter (DVM). Make sure the input is within the range of the actuator. For LM24SR (-T) US this is 0 to 10 VDC or 0 to 20 mA. Note: The input signal must be above the 2 VDC or 4 mA to have the actuator move.</td>
<td>Input voltage or current should be ±1% of what controller’s adjustment or programming indicate.</td>
<td>Controller output (actuator input) is correct. Input Polarity Correct. Step 6</td>
<td>Reprogram, adjust repair or replace controller as needed. Step 1</td>
</tr>
<tr>
<td>6</td>
<td>Use the manual override button to move the damper by hand from fully closed to fully open.</td>
<td>Damper will go from fully closed to fully open.</td>
<td>Damper moves properly Step 7</td>
<td>Find cause of damper jam and repair. Step 1</td>
</tr>
<tr>
<td>7</td>
<td>Check damper torque requirement.</td>
<td>Torque requirement is ≤ actuator’s minimum torque.</td>
<td>Defective Actuator. Replace Actuator - See Note 2</td>
<td>Recalculate actuator requirement and correct installation.</td>
</tr>
<tr>
<td>8</td>
<td>Actuator works properly. Test controller by following controller manufacturer’s instructions.</td>
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<td></td>
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</table>

**Note 1** Check that the transformer(s) are sized properly.
- If a common transformer is used, make sure that polarity is observed on the secondary. This means connect all No. 1 wires to one leg of the transformer and all No. 2 wires to the other leg of the transformer.
- If multiple transformers are used with one control signal, make sure all No. 1 wires are tied together and tied to control signal negative (-).
- Controllers and actuators must have separate 24 VAC/VDC power sources.

**Note 2** If failure occurs within 5 years from original installation date, notify Belimo and give details of the application.