# NV24-MFT-T, NVG24-MFT2, NV24-MFT2
# Direct-coupled actuators for globe valves

**BELIMO**



**Linear actuators for globe valves of 8...20 mm lift**

**Modulating actuator (AC / DC 24 V)**

**Control signal DC 0...10 V**

### Applications
The NV24-MFT-T, NVG24-MFT2 and NV24-MFT2 actuators are intended for motorizing globe valves by exerting an operating force on the valve stem in either a retracting or an extending direction.

### Mode of operation
Modulating control is effected by means of a standard signal of DC 0...10 V.
The control signal is produced by the microprocessor and acts on the brushless motor. When the actuator is powered up for the first time the stroke is acquired automatically and stored in the micro-processor. The control signal and the running time are then adapted to suit that value of stroke. If no correct adaption is performed at that time (e.g. because there is no valve mounted) another adaption will be performed the next time the actuator is powered up. When the actuator is lifting and it reaches the seat for either VALVE OPEN or VALVE CLOSED the supply of current to the actuator is reduced. The actuator has an anti-blocking feature which, should dirt on the valve seat prevent it from closing properly, causes the actuator to move several times in the open and close directions over 1 to 5% stroke.

### High-speed version
With the Type NV24-MFT2 actuator the running time can be reduced to 35 s or 17 s for 10 mm stroke.

### Functional reability
The actuator is short-circuit-proof and protected against polarity reversal. The stroke is adapted automatically.

### Manual operation
Inserting a 5 mm hexagonal key and turning it clockwise causes the spindle of the actuator to emerge from the housing (an extending action). The spindle will remain in that position until the power supply is applied (the controller has first priority).

### Position indication
The stroke is indicated mechanically on the UNV-... mounting bracket and the maximum stroke adjusts itself automatically. There is a two-colour LED status indicator under the cover of the housing.
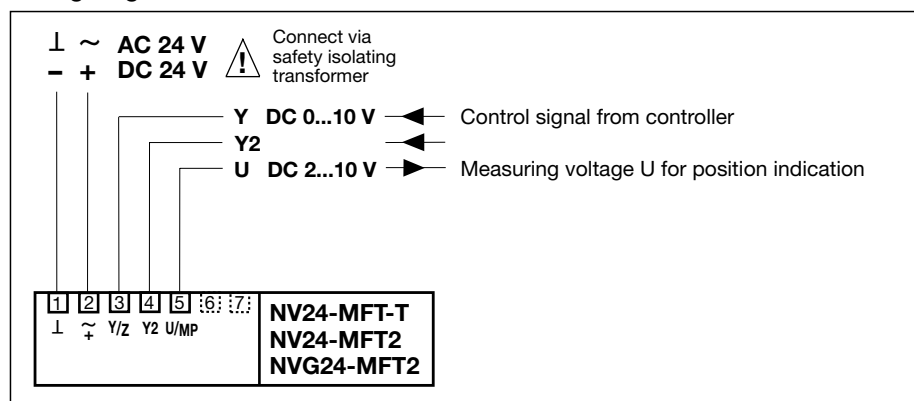
### Safety note
The linear actuator contains no components which the user can replace or repair.

### Dimensions
The dimensions depend on the type of UNV-... mounting bracket used; see from Page 22.

## Wiring diagram



| Technical data | | NV24-MFT-T | NV24-MFT2 | NVG24-MFT2 |
|---|---|---|---|---|
| Nominal voltage | | AC 24 V, 50/60 Hz, DC 24 V | | |
| Nominal voltage range | | AC 19.2...28.8 V DC 21.6...28.8 V | | |
| For wire sizing | | 5 VA | | |
| Power consumption | | 3 W | | |
| Connecting | cable: | | 1 m, 5 x 0.75 mm² | 1 m, 5 x 0.75 mm² |
| | terminals: | 2 x 1.5 mm² or 1 x 2.5 mm² | | |
| Control | | DC 0...10 V @ 100 kΩ | | |
| Operating range | | DC 2...10 V for 0...100% stroke | | |
| Position checkback | | 2...10 V @ 0.5 mA | | |
| Uni-rotation | | ±5% | | |
| Nominal stroke | | 20 mm | | |
| Actuating force | | 1000 N [1] / (800 N) [2] | | 1600 N |
| Manual operation | | hexagonal key, self resetting [3] | | |
| Running time | | 150 s | | |
| Sound power level | | max. 35 dB (A) | | |
| Position indication | | mechanical 8...20 mm stroke (mounting bracket) | | |
| Protection class | | ⬛ (safety extra-low voltage) | | |
| Degree of protection | | IP54 | | |
| Ambient temp. range Non-operating temp. | | 0°...+50°C −40°...+80°C | | |
| Humidity test | | to EN 60730-1 | | |
| EMC | | CE according to 89/336/EEC, 92/31/EEC, 93/68/EEC | | |
| Software | | Class A to EN 60730-1 | | |
| Mode of operation | | Type 1 to EN 60730-1 | | |
| Maintenance | | maintenance-free | | |
| Weight | | 1.7 kg (without mounting bracket UNV) | | |

[1] Electrical closing force
[2] Blocking force
[3] Permanent manual operation to order

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## Arrangement of the operating controls
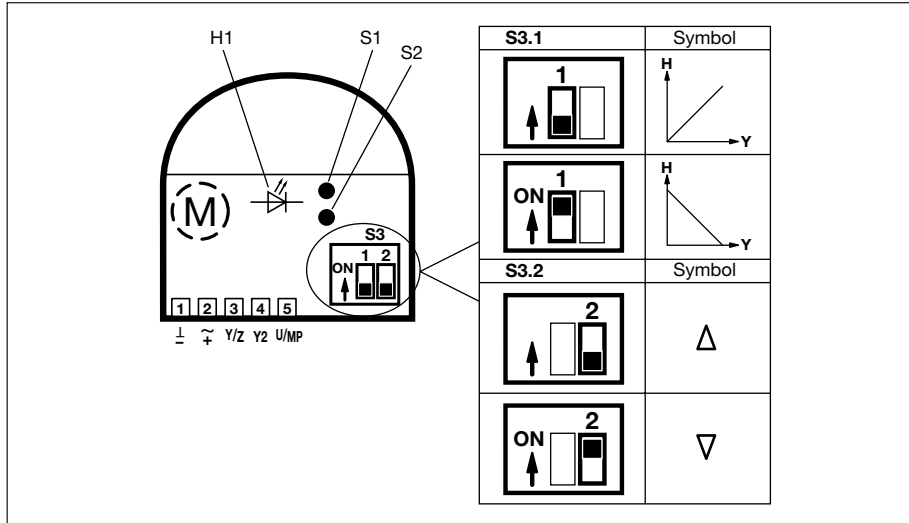


Under the cover of the actuator are the terminals for connecting the lead, the control devices S1, S2 and S3 and the LED indicator H1.

By setting the slide switch S3 appropriately or by pressing push-buttons S1 and S2 it is possible to configure the actuator very simply on-site to suit actual requirements when changes from the factory settings are needed.

**LED indicator H1
see details on Page 20**

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### Functional description S

| Function | Description | Switch | Symbol | Effect |
|---|---|---|---|---|
| Test | The valve covers the full stroke in maximum running time and verifies the adapted stroke to ensure that both end-points are reached (H = 0% and H = 100%). | S1 press | | |
| Adaptation | The effected stroke (between the two mechanical end-stops of the valve) is acquired as 100% stroke and stored in the micro-processor. The control signal and running time are then matched to this 100% stroke. | S2 press | | |
| Direction of stroke | The direction of travel in response to the control signal | S3.1 | Symbol | Effect |
| **direct** | **0% control signal corresponds to 0% position checkback. (The actuating spindle is then retracted or extended depending on the choice of closing point).** | **OFF** | | |
| inverted | 0% control signal corresponds to 100% position checkback. (The actuating spindle is then retracted or extended depending on the choice of closing point). | ON | | |
| Closing point valve | The closing point is when the actuating spindle is either retracted or extended. There is no flow through the valve control path. | S3.2 | Symbol | Effect |
| **up** | **The actuating spindle is retracted into the actuator and the valve stem is extended from the valve body. The position checkback shows 0% for direct travel.** | **OFF** | △ | |
| down | The actuating spindle is extended from the actuator and the valve stem is retracted into the valve body. The position checkback shows 0% for direct travel. (This setting is not necessary with Belimo Type H4.., H5.., H6.. and H7.. globe valves.) | ON | ▽ | |

**Bold type** in the table means standard factory setting.

Only properly authorised and trained persons may change the settings of slide switch S3 and push-button S2.

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### MFT

| Parameter | Standard | Variable |
|---|---|---|
| Control signal | **DC 0...10 V** | 3-point, Open/Closed |
| Operating range | **DC 2...10 V** | Start point DC 0.5...30 V<br>End point DC 2.5...32 V |
| Position checkback $U_5$ | **DC 2...10 V** | Start point 0.5...8 V<br>End point 1.5...10 V<br>Parameterizable for fault alarm |
| Running time | **150 s** | (35) 75...300 s [1]<br>(17) 35...300 s [2] |
| Actuating force | **100%** | 25...100% |

[1] with NV24-MFT-T, NVG24-MFT2    [2] with NV24-MFT2

**M**ulti-**F**unction **T**echnology allows optimum matching of parameters to the different needs of an installation. The parameters are either entered as standard values at the factory or altered subsequently using an MFT-H adjuster.

**Bold type** in the table means standard factory setting.

# Wiring diagrams NV..

## Wiring diagram NV24-3-T, NV230-3-T

**3-point**



| Symbols | | | | | | Control signal min. (e.g. Y = 2 V) | Control signal max. (e.g. Y = 10 V) | Actuator spindle moves ccw NV | cw NV |
|---|---|---|---|---|---|---|---|---|---|
| Actuating time | Closing point Valve | Signal «direct» | Signal «inverted» | Closing point «up» | Closing point «down» | | | | |
| | | S1.1 | | S1.2 | | 0 | 0 | stationary | stationary |
| 7.5 s/mm → | Δ | OFF | | OFF | | 1 | 0 | | OUT |
| | | | | | | 0 | 1 | IN | |
| | ∇ | OFF | | | ON | 1 | 0 | IN | |
| | | | | | | 0 | 1 | | OUT |
| 4.5 s/mm →→ | Δ | | ON | OFF | | 1 | 0 | IN | |
| | | | | | | 0 | 1 | | OUT |
| | ∇ | | ON | | ON | 1 | 0 | | OUT |
| | | | | | | 0 | 1 | IN | |

In the case of the classic 3-point actuator (NV..-3-T) the actuating time can be reduced from 7.5 s/mm to 4.5 s/mm by moving the slide switch 1.1 to the «ON» position. With less than 20% of the valves used the closing point is in the down position so the slide switch S1.2 can be set to the «ON» position.

## Wiring diagram NV24-MFT(2)-T, NVF24-MFT(2)(-E)-T, NVG24-MFT2

**Modulating**



| Symbols | | | | | | Control signal min. (e.g. Y = 2 V) | Control signal max. (e.g. Y = 10 V) | Measur. signal min. (e.g. U = 2 V) | Measur. signal max. (e.g. U = 10 V) | Actuator spindle moves ccw NV | cw NV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Actuating time | Closing point Valve | Signal «direct» | Signal «inverted» | Closing point «up» | Closing point «down» | | | | | | |
| | | S3.1 | | S3.2 | | | | | | | |
| | Δ | OFF | | OFF | | x | | x | | IN | |
| | | | | | | | x | | x | | OUT |
| | ∇ | OFF | | | ON | x | | x | | | OUT |
| | | | | | | | x | | x | IN | |
| | Δ | ON [1] | | OFF | | x | | | x | | OUT |
| | | | | | | | x | x | | IN | |
| | ∇ | ON [1] | | | ON | x | | x | | IN | |
| | | | | | | | x | x | | | OUT |

[1] If the controller produces a negative signal (<0.15 V) the slide switch S3.1 may not be set to the «ON» position if the parameters for the working range of the actuator have been assigned to 2...10 V (except when the start point in the parameterized working range is 0.5 V).

Setting the slide switch S3.1 to the «ON» position inverts the control signal so that the valve closes as the control signal is increased. This is a simple way of matching the sequences in the actuator. With less than 20% of the valves used the closing point is in the down position so the slide switch S3.2 must be set to the «ON» position. The position checkback signal U5 is also matched to the closing point.

## Wiring diagram NV24-MFT(2)-T, NVF24-MFT(2)(-E)-T, NVG24-MFT2

**3-point parameterized MFT actuator**



| Symbols | | | | | | Control contact a (Y/Z) | Control contact b (Y2) | Measur. signal min. (e.g. U = 2 V) | Measur. signal max. (e.g. U = 10 V) | Actuator spindle moves ccw NV | cw NV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction of stroke «3-point» | Closing point Valve | Signal «direct» | Signal «inverted» | Closing point «up» | Closing point «down» | | | | | | |
| | | S3.1 | | S3.2 | | 0 | 0 | *) | *) | stationary | stationary |
| | Δ | OFF | | OFF | | 1 | 0 | | m | | OUT |
| | | | | | | 0 | 1 | m | | IN | |
| | ∇ | OFF | | | ON | 1 | 0 | | m | IN | |
| | | | | | | 0 | 1 | m | | | OUT |
| | Δ | | ON | OFF | | 1 | 0 | m | | IN | |
| | | | | | | 0 | 1 | | m | | OUT |
| | ∇ | | ON | | ON | 1 | 0 | | m | | OUT |
| | | | | | | 0 | 1 | m | | IN | |

*) Measuring signal U5 according to position
m: When control contact a or b is in position 1 for longer than the running time (150 s)

The MFT linear actuator NV..-MFT.. can also be used as a 3-point control device. However, in this case the actuator must be assigned parameters for 3-point control and be provided with a 4-wire connection. **Note:** It will only function with an **AC 24 V** power supply!