



**Linear actuators for 2-way and 3-way globe valves DN 15...80**  
**Modulating actuator (AC/DC 24 V)**  
**with emergency control function**  
**Control DC 0...10 V**

### Applications

Operation of globe valves.

### Mode of operation

Modulating control is effected by means of a standard 0...10 V control signal. When the actuator is deenergized, the actuator spindle of the NVF.. type retracts and that of the NVF..E type extends.

### Product features

Simple attachment to the neck of the valve by means of a clamping strap. Semiautomatic coupling of the valve stem to the actuator spindle. The actuator can be rotated through 360° on the neck of the valve.

### Functional reliability

The actuator is short-circuit-proof and protected against polarity reversal. The stroke is adapted automatically and is also overload-proof.

### Manual operation

Inserting a 5 mm hexagonal key and turning it clockwise causes the actuator spindle to extend from the actuator housing (pushing). Together with the action of the valve, this causes the flow of water to increase. The actuator spindle retains its position until the power supply is energized (the controller takes first priority).

### Position indication

The stroke of the valve is indicated mechanically on the bracket; the maximum stroke adjusts itself automatically. There is a twin-color LED status indicator under the cover of the housing.

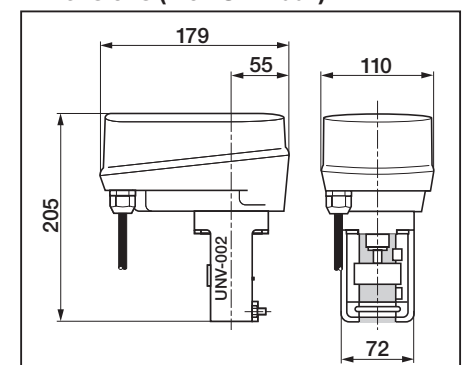
### Safety note

The linear actuator contains no components which can be replaced or repaired by the user.

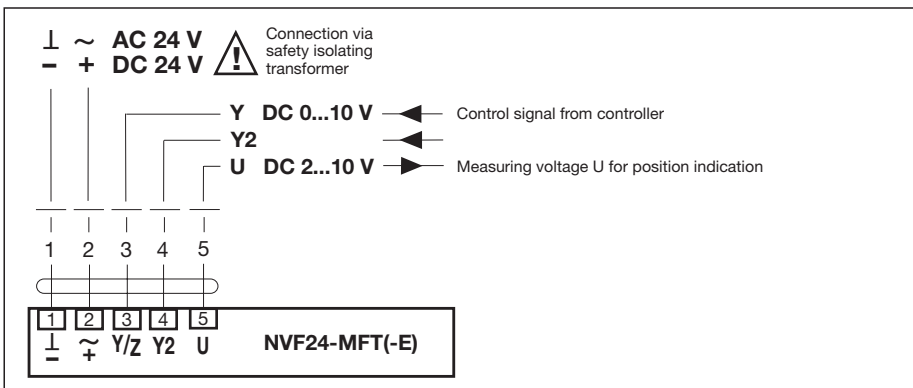
### Note on delivery

The UNV-002 bracket is included in the scope of delivery, providing the valve and the actuator are ordered together.

### Dimensions (incl. UNV-002)

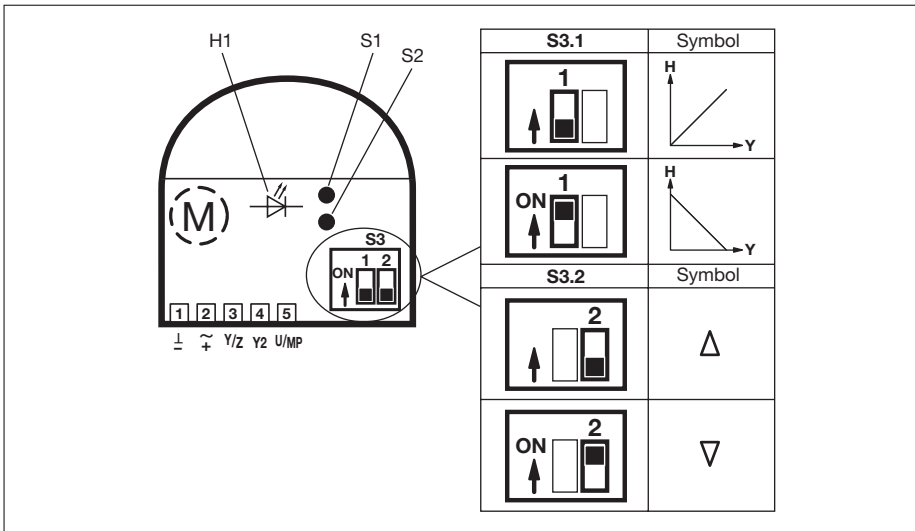


### Wiring diagram



| Technical data             | NVF24-MFT  | NVF24-MFT-E |
|----------------------------|--|-------------|
| Emergency control function | Pulling  | Pushing     |
| 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            | 10 VA  |             |
| Power consumption          | 5.5 W  |             |
| Connecting cable           | 1 m, 5 x 0.75 mm <sup>2</sup>                                    |             |
| Control                    | DC 0...10 V @ 100 kΩ   |             |
| Operating range            | DC 2...10 V for 0...100 % stroke                                 |             |
| Position feedback          | DC 2...10 V @ 0.5 mA   |             |
| Uni-rotation               | ±5 %   |             |
| Nominal stroke             | 20 mm  |             |
| Actuating force            | 800 N  |             |
| Manual operation           | Hexagonal key, self-resetting                                    |             |
| Running time               | 150 s  |             |
| Emergency actuating time   | < 1.5 s/mm   |             |
| Sound power level          | Max. 35 dB (A) or max. 50 dB (A) in emergency operation (spring) |             |
| Position indication        | Mechanical 10...20 mm stroke                                     |             |
| Protection class           | III (safety extra-low voltage)                                   |             |
| Degree of protection       | IP54   |             |
| Ambient temperature range  | 0°...+ 50° C   |             |
| Non-operating temperature  | -40°...+ 80° C   |             |
| Humidity test              | To EN 60730-1  |             |
| EMC                        | CE according to 89/336/EEC                                       |             |
| Software class A           | To EN 60730-1  |             |
| Mode of operation          | Type 1 to EN 60730-1   |             |
| Maintenance                | Maintenance-free   |             |
| Weight                     | 1.8 kg incl. UNV-002 bracket (without valve)                     |             |

## Arrangement of the operating controls on the NV../AV.. multifunctional



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

By setting slide switch S3 or pressing pushbuttons S1 and S2, it is possible to configure the actuator very simply on site to suit actual requirements if changes are necessary from the factory settings.

## Functional description

| Function            | Description  | Switch     | Symbol | Bold type in the table means standard factory setting (valve-specific). |
|---------------------|--|------------|--------|---|
| Test                | The valve effects full stroke with maximum running time and checks the adapted stroke to determine whether the two end-points (H = 0% and H = 100%) are reached.   | Press S1   |        |   |
| Init (adaptation)   | The possible stroke effected (between the two mechanical end stops of the valve) is detected as 100% stroke and stored in the microprocessor. The control signal and the running time are then matched to this 100% stroke.                      | Press S2   |        |   |
| Dir. of stroke      | Direction of stroke relative to the control signal   | S3.1       | Symbol | Consequence   |
| <b>Direct</b>       | <b>0% control signal corresponds to 0% position feedback. (The actuator spindle is extended or retracted according to the selected closing point.)</b>   | <b>OFF</b> |        |   |
| Inverted            | 0% control signal corresponds to 100% position feedback. (The actuator spindle is extended or retracted according to the selected closing point.)  | ON         |        |   |
| Valve closing point | Closing point with actuator spindle extended or retracted. The valve control path has zero flow.   | S3.2       | Symbol | Consequence   |
| <b>Up</b>           | <b>The actuator spindle is retracted into the actuator and the valve stem is extended from the fitting. The position feedback indicates 0% if the stroke direction is "direct". Default setting for H4..B-, H5..B-, H6..N- and H7..N valves.</b> | <b>OFF</b> |        |   |
| <b>Down</b>         | <b>The actuator spindle is extended from the actuator and the valve stem is retracted into the fitting. The position feedback indicates 0% if the stroke direction is "direct". Default setting for H6..S valves.</b>                            | <b>ON</b>  |        |   |

Only authorized and trained persons are allowed to change the settings of slide switch S3 and pushbutton S2.

1) The electrical closing point is either identical to the deenergized position of the actuator spindle or the opposite of this position, depending on the selected emergency control function type (NVF24-MFT-T or NVF24-MFT-E-T). The actuator type is selected according to the valve design and the required NO (valve open when deenergized) or NC (valve closed when deenergized) function.

## LED indicator H1

|  |   |
|--|---|
| Green steady light                     | Actuator working properly   |
| Green flashing light                   | Test run or adaptation with synchronization in progress   |
| Red steady light                       | Fault <sup>1)</sup>   |
| Red flashing light                     | After power interruption (> 2 s). The valve is automatically synchronized at the selected closing point the next time it closes. The LED indicator changes from a red flashing light to a green steady light. |
| Alternating red / green flashing light | Addressing via the control system and operation of the adaptation pushbutton S2 in progress   |

The actuator is maintenance-free. The twin-color LED indicator shows the actual actuator status.

It also allows simple commissioning if the factory settings need to be changed.

<sup>1)</sup> Possible causes: Actuator installed incorrectly; valve stem blocked; no valve installed. The adaptation must be repeated by pressing pushbutton S2 after all the above causes have been checked and rectified.

**Wiring diagrams of NV../AV.. multifunctional**

**Modulating (optional with feedback)**

| Symbols             |                     | "Direct" signal | "Inverted" signal | Closing point "up" | Closing point "down" | Control signal min. (e.g. Y = 2 V) | Control signal max. (e.g. Y = 10 V) | Meas. signal min. (e.g. U = 2 V) | Meas. signal max. (e.g. U = 10 V) | Actuator spindle moves |            |
|---------------------|---------------------|-----------------|-------------------|--------------------|----------------------|------------------------------------|-------------------------------------|----------------------------------|-----------------------------------|------------------------|------------|
| Direction of stroke | Valve closing point |                 |                   |                    |                      |                                    |                                     |                                  |                                   | S3.1                   | S3.2       |
| H                   | Δ                   | OFF             |                   | OFF                |                      | x                                  |                                     | x                                |                                   | RETRACTING             | EXTENDING  |
|                     | ∇                   | OFF             |                   |                    | ON                   | x                                  |                                     | x                                |                                   | EXTENDING              | RETRACTING |
| H                   | Δ                   |                 | ON <sup>1)</sup>  | OFF                |                      | x                                  |                                     |                                  | x                                 | RETRACTING             | EXTENDING  |
|                     | ∇                   |                 | ON <sup>1)</sup>  |                    | ON                   |                                    | x                                   |                                  |                                   | RETRACTING             | EXTENDING  |

1) If the controller generates a negative signal (< 0.15 V), slide switch S3.1 must not be set to "ON" if the operating range of the actuator is set to 2...10 V (exception: start point in the parameterized operating range = 0.5 V).

The control signal can be inverted by adjusting slide switch S3.1 to the "ON" position, and the valve closes as the control signal increases. This is a simple way of matching the sequences in the actuator. The closing point is down with fewer than 20% of the valves that are used and slide switch S3.2 must be set to the "ON" position. The position feedback U5 is likewise matched to the closing point.

**MFT actuator parameterized with 3-point control (optional with feedback)**

| Symbols                    |                     | "Direct" signal | "Inverted" signal | Closing point "up" | Closing point "down" | Relay contact a (Y1) | Relay contact b (Y2) | Meas. signal min. (e.g. U = 2 V) | Meas. signal max. (e.g. U = 10 V) | Actuator spindle moves |           |
|----------------------------|---------------------|-----------------|-------------------|--------------------|----------------------|----------------------|----------------------|----------------------------------|-----------------------------------|------------------------|-----------|
| "3-point" stroke direction | Valve closing point |                 |                   |                    |                      |                      |                      |                                  |                                   | S3.1                   | S3.2      |
| H                          | Δ                   | OFF             |                   | OFF                |                      | 1                    | 0                    | m                                |                                   | RETRACTING             | EXTENDING |
|                            | ∇                   | OFF             |                   |                    | ON                   | 0                    | 1                    | m                                |                                   | RETRACTING             | EXTENDING |
| H                          | Δ                   |                 | ON                | OFF                |                      | 1                    | 0                    | m                                |                                   | RETRACTING             | EXTENDING |
|                            | ∇                   |                 | ON                |                    | ON                   | 0                    | 1                    | m                                |                                   | RETRACTING             | EXTENDING |

\*) Measuring signal U<sub>5</sub> according to position  
m: If relay contact a or b is in switch position 1 for longer than the running time (150 s)

The NV..-MFT.. linear actuator with MFT can also be used for 3-point control. The actuator must, however, be parameterized for 3-point control and provided with a 4-wire connection. **Note:** Only works with a nominal voltage of **AC 24 V!**

**Override control 100% (optional with feedback)**

| Symbols                     |                     | "Direct" signal | "Inverted" signal | Closing point "up" | Closing point "down" | Relay contact c | Relay contact d | Meas. signal min. (e.g. U = 2 V) | Meas. signal max. (e.g. U = 10 V) | Actuator spindle moves |           |
|-----------------------------|---------------------|-----------------|-------------------|--------------------|----------------------|-----------------|-----------------|----------------------------------|-----------------------------------|------------------------|-----------|
| "Override" stroke direction | Valve closing point |                 |                   |                    |                      |                 |                 |                                  |                                   | S3.1                   | S3.2      |
| H                           | Δ                   | OFF             | ON                | OFF                |                      | 1               | 0               | 0                                | x                                 | RETRACTING             | EXTENDING |
|                             | ∇                   | OFF             |                   |                    | ON                   | 1               | 0               | x                                |                                   | RETRACTING             | EXTENDING |

A typical use for "100%" override control is in a frost protection circuit. Whether or not the frost thermostat has to interrupt the signal conductor to the controller "d" depends on the make of controller being used (not necessary if the signal output at the controller is short-circuit-proof and protected against polarity reversal).

## Wiring diagram of NVF24-MFT, NVF24-MFT-E

**Emergency control function (optional with feedback U<sub>5</sub>)**

Connection via safety isolating transformer  
 Y (DC 0...10 V) from controller  
 U<sub>5</sub> (DC 2...10 V)

| Symbols                     |                     | Actuator spindle moves |                   |                    |                      |                 |                                 |                                  |                        |                  |
|-----------------------------|---------------------|------------------------|-------------------|--------------------|----------------------|-----------------|---------------------------------|----------------------------------|------------------------|------------------|
| "Override" stroke direction | Valve closing point | "Direct" signal        | "Inverted" signal | Closing point "up" | Closing point "down" | Relay contact s | Meas. signal min. (eg. U = 2 V) | Meas. signal max. (eg. U = 10 V) | Actuator spindle moves |                  |
|                             |                     | S3.1                   | S3.2              |                    |                      |                 |                                 |                                  | NVF24-MFT(2)-T         | NVF24-MFT(2)-E-T |
|                             | 1)                  | 1)                     | 1)                | 0                  | k                    | k               |                                 |                                  | RETRACTING             |                  |
|                             | 1)                  | 1)                     | 1)                | 0                  | k                    | k               |                                 |                                  |                        | EXTENDING        |

1) The position of the slide switch has no influence on the emergency control direction  
 k) No measuring voltages can be determined in the deenergized state

|   |   |     |    |   |  |
|---|---|-----|----|---|--|
| 1 | 2 | 3   | 4  | 5 | <b>NVF24-MFT</b><br><b>NVF24-MFT-E</b> |
| ⊥ | ~ | Y/Z | Y2 | U |  |

The actuator spindle moves to the end stop if the power supply is interrupted. In the case of the NVF24-MFT(2)-T type, the actuator spindle retracts into the actuator housing (pulling). In the case of the NVF24-MFT(2)-E type, the actuator spindle extends from the actuator housing (pushing). The valve has either an NO (open when deenergized) or NC (closed when deenergized) function depending on its design (closing point up or down).

## Influence of the actuator spindle on different valves (closing point selection)

| Valve | Valve closing point | Closing point setting of linear actuator | Actuator spindle moves |         |
|-------|---------------------|--|------------------------|---------|
|       |                     |  | retracts               | extends |
|       | Up                  | Δ  |                        |         |
|       | Down                | ∇  |                        |         |
|       | Up                  | Δ  |                        |         |