

Communication-capable globe valve actuator with emergency control function for 2-way and 3-way globe valves

- Actuating force 2000 N
- Nominal voltage AC/DC 24 V
- Control modulating
- Nominal stroke 32 mm
- Communication via LONWORKS® (FTT-10A)
- Conversion of sensor signals
- Integrated temperature controller
- Design life SuperCaps 15 years


**Technical data**

<b>Electrical data</b>	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption in operation	5 W
	Power consumption at rest	2 W
	Power consumption for wire sizing	9.5 VA
	Connection supply / control	Cable 1 m, 6 x 0.75 mm <sup>2</sup>
<b>Data for LONWORKS®</b>	Certified	According to LONMARK® 3.3
	Processor	Neuron 3150
	Transceiver	FTT-10A, compatible with LPT-10
	Functional Profile as per LONMARK®	Damper actuator object #8110 Open Loop Sensor Object #1 Thermostat Object #8060
	LNS plug-in for actuator / sensor / controller	Can be run with any LNS-based integration tool (min. for LNS 3.x)
	Service button and status LED	According to LONMARK® guidelines
	Conductors, cables	Signal cable lengths, cable specifications and topology of the LONWORKS® network in accordance with the ECHELON® guidelines
<b>Functional data</b>	Actuating force	2000 N
	Position feedback U	DC 2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	Start point DC 0.5 ... 8V End point DC 2.5 ... 10V
	Setting emergency setting position	Actuator spindle 0...100%, adjustable (POP rotary knob)
	Bridging time (PF) variable	1...10 s
	Position accuracy	5% absolute
	Manual override	Gear disengagement with push-button
	Nominal stroke	32 mm
	Actuating time	150 s / 32 mm
	Variable actuating time	35...150 s / 32 mm
	Actuating time emergency control function	35 s / 32 mm
	Override control, controllable via nviManOvrd	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position) = 50%
	Override control, controllable via nviManOvrd, modifiable	ZS = MIN...MAX
	Sound power level motor max.	60 dB(A)
	Sound power level motor note	55 dB (A) @ 90 s running time
	Sound power level emergency setting position max.	60 dB(A)
Position indication	Mechanical 5 ... 32 mm stroke	
<b>Safety</b>	Protection class IEC/EN	III Safety extra-low voltage
	Degree of protection IEC/EN	IP54
	EMC	CE according to 2004/108/EC
	Certification IEC/EN	Certified to: IEC/EN 60730-1 and IEC/EN 60730-2-14

## Technical data

<b>Safety</b>	Principle of operation	Type 1.AA
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	0...50 °C
	Non-operating temperature	-40...80 °C
	Ambient humidity	95% r.h., non-condensing
	Maintenance	Maintenance-free
<b>Weight</b>	Weight approx.	4.460 kg

## Safety notes



- This actuator has been designed for application in stationary heating, ventilation and air-conditioning systems and is not allowed to be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.
- The switch for changing the direction of motion/the closing point may be adjusted only by authorised personnel. The direction of stroke is critical, particularly in connection with frost protection circuits.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

## Product features

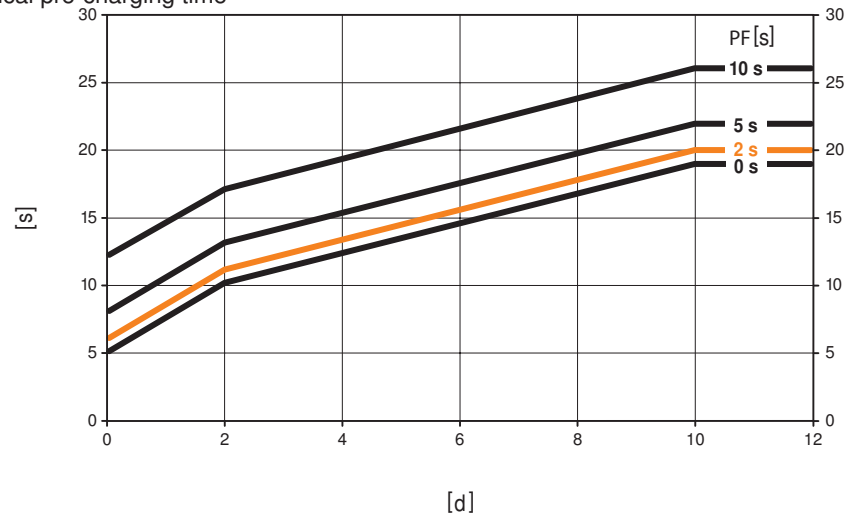
**Principle of operation** The actuator is equipped with an integrated interface for LONWORKS®. The actuator can be integrated and connected directly with LONWORKS® via transceiver FTT-10A. Interrupting the supply voltage causes the valve to be moved to the selected emergency setting position (POP) by means of stored electrical energy.

**Pre-charging time (start up)** The capacitor actuators require a pre-charging time. This time is used for charging the capacitors up to a usable voltage level. This ensures that, in the event of an electricity interruption, the actuator can move at any time from its current position into the preset emergency setting position (POP).  
The duration of the pre-charging time depends mainly on the following factors:

- Duration of the voltage interruption
- PF delay time (bridging time)

Product features

Typical pre-charging time



PF [s]	[d]				
	0	1	2	7	≥10
0	5	8	10	15	19
2	6	9	11	16	20
5	8	11	13	18	22
10	12	15	17	22	26
	[s]				

[d] = Electricity interruption in days  
[s] = Pre-charging time in seconds  
PF[s] = Bridging time

Calculation example: In the event of an electricity interruption of 3 days and a set bridging time (PF) of 5 s, the actuator requires a pre-charging time of 14 s (see graphic) after the voltage has been reconnected.

**Delivery condition (capacitors)**

The actuator is completely discharged after delivery from the factory, which is why the actuator requires approximately 20 s pre-charging time before initial commissioning in order to bring the capacitors up to the required voltage level.

**Converter for sensors**

Connection option for a sensor (passive or active sensor or switching contact). In this way, the analogue sensor signal can be easily digitised and passed along to LONWORKS®.

**Integrated temperature controller**

The actuator has an integrated temperature controller (Thermostat Object LONMARK® #8060). This makes it easy to implement individual room control solutions.

**Adjustable-parameter actuators**

The factory settings cover the most common applications. Individual parameters can be altered with the BELIMO service tool MFT-P or with the service tool ZTH-GEN.

**Direct mounting**

Simple direct mounting on the globe valve by means of form-fit hollow clamping jaws. The actuator can be rotated by 360° on the valve neck.

**Manual override**

Manual override with push-button possible - temporary. The gear is disengaged and the actuator decoupled for as long as the button is pressed / latched. The stroke can be adjusted by using a hexagon socket screw key (5 mm), which is inserted into the top of the actuator. The stroke spindle extends when the key is rotated clockwise.

**High functional reliability**

The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

**Combination valve/actuator**

Refer to the valve documentation for suitable valves, their permitted medium temperatures and closing pressures.

**Position indication**

The stroke is indicated mechanically on the bracket with tabs. The stroke range adjusts itself automatically during operation.

**Home position**

Setting ex-works: Actuator spindle is retracted. When valve-actuator combinations are shipped, the direction of motion is set in accordance with the closing point of the valve.

**Direction of stroke switch**

When actuated, the direction of stroke switch changes the running direction in normal operation. The direction of stroke switch has no influence on the emergency setting position (POP) which has been set

**Product features**

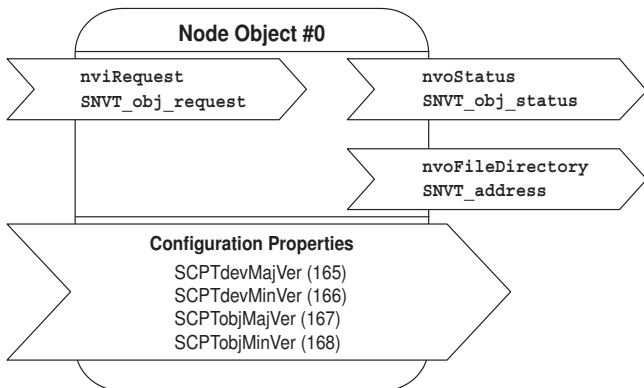
- Adaption of stroke range**    The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out a stroke adaption, which is when the operating range and position feedback adjust themselves to the mechanical stroke.  
Manual triggering of the adaption can be carried out by pressing the "Adaption" button or with the PC-Tool.
- Rotary knob emergency setting position**    The "Emergency setting position" rotary knob can be used to adjust the desired emergency setting position (POP) from 0% to 100% in 10% increments.  
The rotary knob is in reference to the adapted or programmed height of stroke.  
In the event of an electricity interruption, the actuator will move into the selected emergency setting position, taking into account the bridging time (PF) of 2 s which was set ex-works.  
Settings: The rotary knob must be set to the "Tool" position for retroactive settings of the emergency setting position with the BELIMO service tool MFT-P. Once the rotary knob is set back to the range 0 ... 100%, the manually set value will have positioning authority
- Bridging time (PF)**    Electricity interruptions can be bridged up to a maximum of 10 s.  
In the event of an electricity interruption, the actuator will remain stationary in accordance with the set bridging time. If the electricity interruption is greater than the set bridging time, then the actuator will move into the selected emergency setting position (POP).  
The bridging time set ex-works is 2 s. This can be modified at the site of operations with the use of the BELIMO service tool MFT-P.  
Settings: The rotary knob must not be set to the "Tool" position!  
Only the values need to be entered for retroactive adjustments of the bridging time with the BELIMO service tool MFT-P.

**Accessories**

	Description	Type
<b>Service tools</b>	Manual parameterizing device, for MF/MP/Modbus/LonWorks actuators and VAV-Control	ZTH-GEN
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P

**Functional profile according to LONMARK®**

The LON-capable actuator is certified by LONMARK®. The following actuator functions are made available via the LONWORKS® network as standardised network variables in accordance with LONMARK®: the Node Object #0, the Damper Actuator Object #8110, the Open Loop Sensor Object #1 and the Thermostat Object #8060.



**Node Object #0**

The node object contains the object status and object request functions.

**nviRequest: SNVT\_obj\_request**

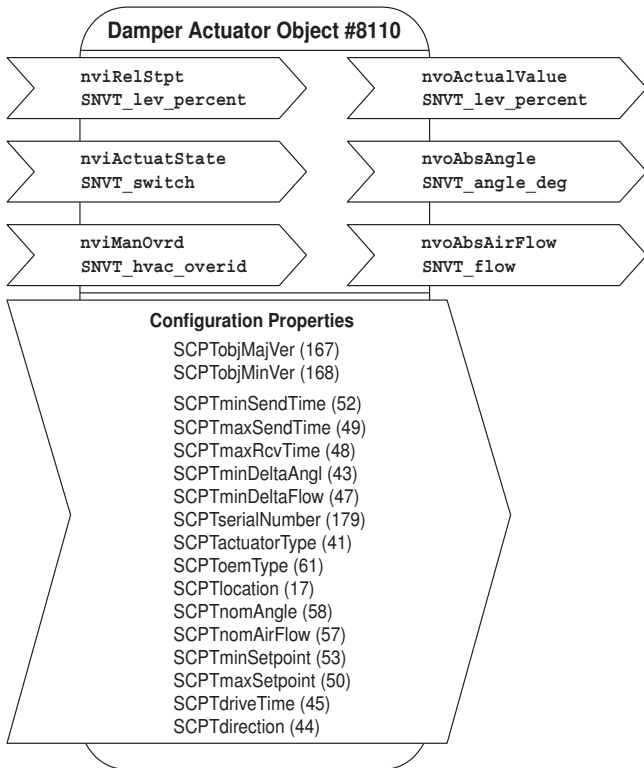
Input variable for requesting the status of a particular object in the node.

**nvoStatus: SNVT\_obj\_status**

Output variable that outputs the current status of a particular object in the node.

**nvoFileDirectory: SNVT\_address**

Output variable that shows information in the address range of the Neuron chip.



**Damper Actuator Object #8110**

The actuator object is used to display the functions of the actuator on the page of the LONWORKS® network.

**nviRelStpt: SNVT\_lev\_percent**

The nominal position is assigned to the actuator via this input variable. This variable is normally linked to the output variable of an HVAC controller.

**nviActuateState: SNVT\_switch**

A preset position is assigned to the actuator via this input variable. Note on priority: The variable which was most recently active, either nviActuatorState or nviRelStpt, has priority.

**nviManOvrdr: SNVT\_hvac\_overid**

This input variable can be used to manually override the actuator into a particular position.

**nvoActualValue: SNVT\_lev\_percent**

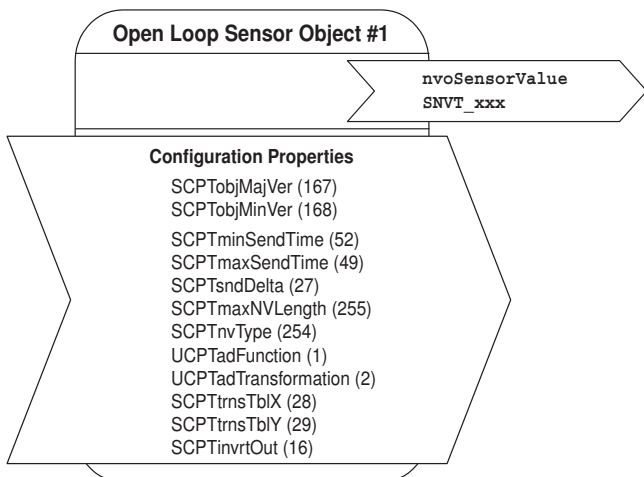
This output variable shows the current actual position of the actuator and can be used for control circuit feedback or for displaying positions.

**nvoAbsAngle: SNVT\_angle\_deg**

This output variable shows the current angle of rotation / stroke of the actuator and can be used to display the position or for service purposes.

**nvoAbsAirFlow: SNVT\_flow**

This output variable is inactive with this actuator and shows a constant value of 65535 (this variable is only active in conjunction with LON-capable VAV controllers).



**Open Loop Sensor Object #1**

One sensor can be connected to the actuator.

A passive resistance sensor (e.g. Ni1000), an active sensor (output 0 ... 32 V) or a switch (On/Off) can be connected. In the case of the open loop sensor object, the measured sensor values are transferred to the LONWORKS® network.

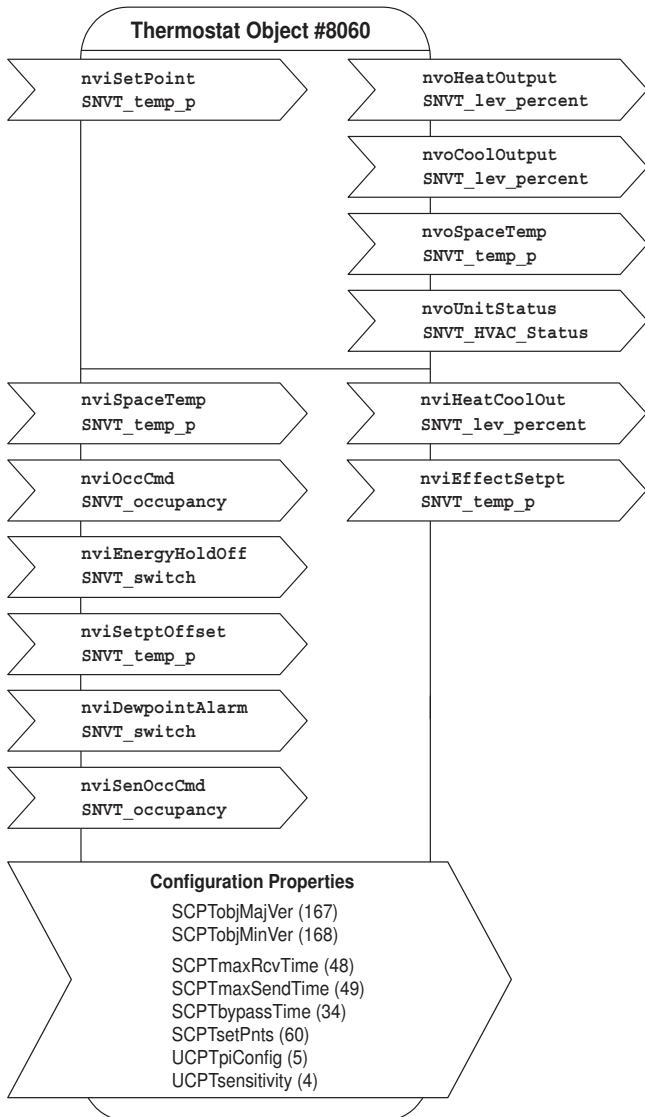
**nvoSensorValue: SNVT\_XXX**

This output variable shows the current sensor value. Depending on the connected sensor, the output variable can be configured via the sensor plug-in and specifically adapted to the system.

The SNVT .. can be configured as:		
SNVT_temp_p	SNVT_lev_percent	SNVT_lux
SNVT_temp	SNVT_abs_humid	SNVT_press_p
SNVT_switch	SNVT_enthalpy	SNVT_smo_obscur
SNVT_flow	SNVT_ppm	SNVT_power
SNVT_flow_p	SNVT_rpm	SNVT_elec_kwh

**Functional profile according to LONMARK®**

Individual room control solutions can be implemented with the thermostat object LONMARK® #8060. An LNS plug-in is available for configuring the controller parameters.



**Thermostat Object #8060**

**nviSetPoint: SNVT\_temp\_p**

Setpoint specification for the controller from the higher-level system or the room control unit. If this variable is not linked, then the local setpoints of the controller object apply (can be adjusted via plug-in). The setpoint specification from the higher-level system influences the setting on the controller as follows:

*Example: Comfort setpoint for heating = 21 °C and Comfort setpoint for cooling = 23 °C. The median point between heating and cooling is thus 22 °C. Now, if the external setpoint (nviSetPoint) is 23 °C, then the heating setpoint will shift to 22 °C and the cooling set point to 24 °C. The setpoints for Pre-Comfort heating and cooling will also be shifted accordingly.*

**nviSpaceTemp: SNVT\_temp\_p**

Room temperature from external room sensor. It is imperative that this variable be linked; typically, it is linked with the variable of the sensor object.

**nviOccCmd: SNVT\_occupancy**

Occupancy specification from the command centre (for the function, see the table entitled «Functions Inputs Occupancy» next page).

**nviEnergyHoldOff: SNVT\_switch**

In the case of active EnergyHoldOff, the controller will be set to the Building Protection setpoints.

**nviSetPtOffset: SNVT\_temp\_p**

Shifting of the room control unit. If the nviSetPoint is linked, then this input has an influence on the variable value of nviSetPoint, i.e. it corrects it. Otherwise, the Comfort and Pre-Comfort setpoints for heating and cooling will be adjusted directly by the amount of the shift (compare example with nviSetPoint).

**nviDewpointAlarm: SNVT\_switch**

In the case of active DewpointAlarm, the controller will be set to the Building Protection setpoints. The cooling sequence is deactivated.

**nviSenOccCmd: SNVT\_occupancy**

Occupancy specification from the local occupancy switch (for the function, see the table entitled «Functions Inputs Occupancy» next page).

**nvoHeatOutput: SNVT\_lev\_percent**

Control signal for heating.

**nvoCoolOutput: SNVT\_lev\_percent**

Control signal for cooling.

**nvoSpaceTemp: SNVT\_temp\_p**

Displays the room temperature of the nviSpaceTemp. If nviSpaceTemp is not linked, then the variable will display the value 0x7FFF.

**nvoUnitStatus: SNVT\_HVAC\_Status**

Displays the operating mode of the controller (in accordance with Functional Profile #8060).

**nvoHeatCoolOut: SNVT\_lev\_percent**

Depicts the heating and cooling sequence for controlling the 6-way characterised control valves (see illustration, next page).

This outlet runs parallel to the nvoCoolOutput or the nvoHeatOutput, respectively.

Cooling = 33 ... 0%

Valve closed 33 ... 66%

Heating = 66 ... 100%

**nvoEffectSetpt: SNVT\_temp\_p**

Shows the actual setpoint of the controller.

**Note**

A restart is necessary after accessing network variables for the purpose of rewriting them or after deleting links in order to initialise the variables.

Functional profile according to LONMARK®

Functions Inputs Occupancy

**Note**

The function nviOccCmd has a higher priority than the function nviSenOccCmd.

Occupancy specification from nviOccCmd command centre	Occupancy switch nviSenOccCmd	Room operating status	Comfort extension
OC_OCCUPIED	OC_OCCUPIED	Comfort	
	OC_UNOCCUPIED	Comfort	
	OC_NUL (default)	Comfort	
OC_STANDBY	OC_OCCUPIED	Bypass	Occupied time is extended by the amount of the bypass time (comfort time) (can be adjusted in the plug-in)
	OC_UNOCCUPIED	Pre-Comfort	
	OC_NUL (default)	Pre-Comfort	
OC_UNOCCUPIED	OC_OCCUPIED	Building Protection	
	OC_UNOCCUPIED	Building Protection	
	OC_NUL (default)	Building Protection	
OC_NUL (default)	OC_OCCUPIED	Comfort	
	OC_UNOCCUPIED	Pre-Comfort	
	OC_NUL (default)	Comfort	

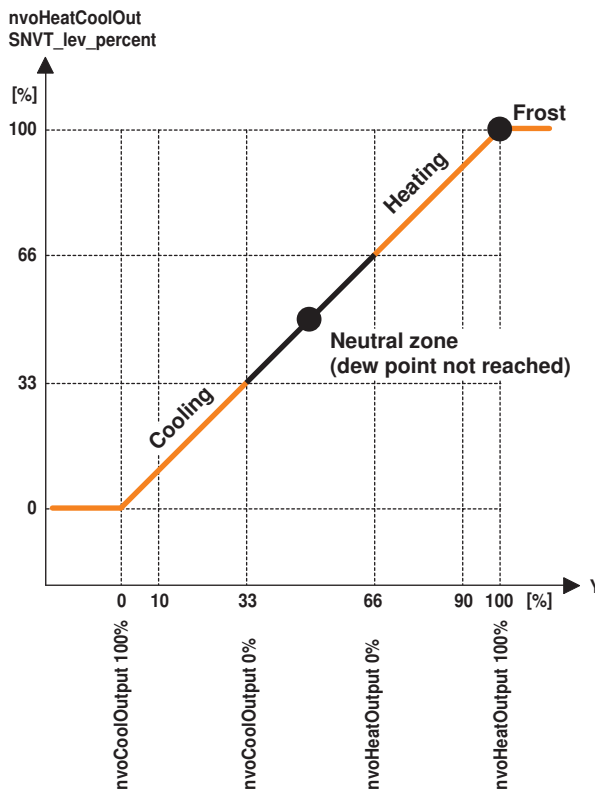
Funktion nvoHeatCoolOut

**Typical application**

Heating / cooling with Belimo 6-way characterised control valve.

**Note chilled ceiling application**

In the case of active DewPointAlarm (nviDewPointAlarm), the controller will be set to the Building Protection setpoints. The cooling sequence is deactivated.



**Notes**

More detailed information on the functional profiles can be found on the website of LONMARK®. ([www.lonmark.org](http://www.lonmark.org)).

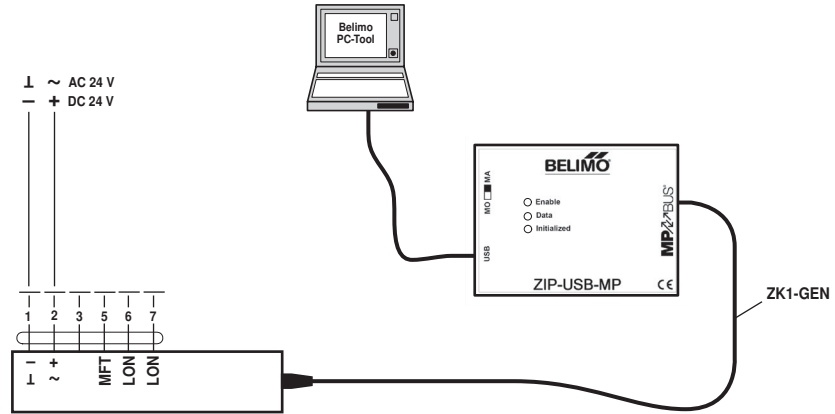
**Parameterisation**

**Connection of the MFT parameterising devices, e.g. Belimo PC-Tool MFT-P**

- The actuator can be parameterised as follows:
- Electronic angle of rotation limiting / stroke limiting
  - Torque reduction / stroke reduction
  - Operation mode
  - Running time
  - Function test or adaption can be triggered
  - Position feedback (measuring voltage U)

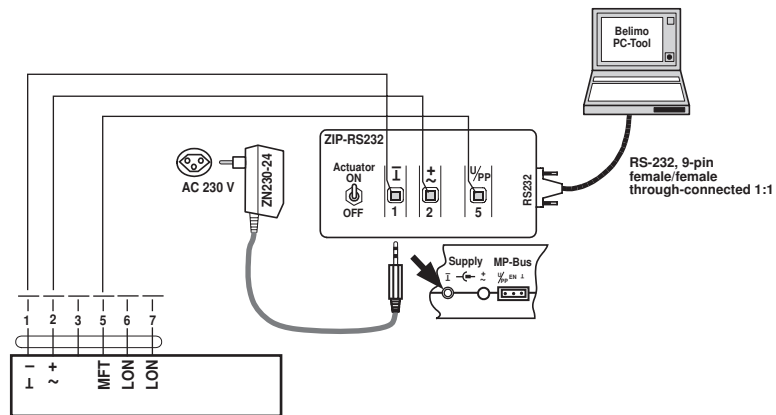
**Parameterisation of the connected actuator**

- Notes**
- The actuator can be triggered with the PC-Tool under „PP“.
  - The USB cable is included in the ZIP-USB-MP scope of delivery.
  - The connection cable ZK1-GEN has to be ordered separately.



**Parameterisation of the actuator, Standalone, without AC/DC 24V supply**

- Notes**
- The actuator can be triggered with the PC-Tool under „PP“.
  - The RS-232 cable is included in the ZIP232 scope of delivery.
  - The power supply unit ZN230-24 has to be ordered separately.





Electrical installation

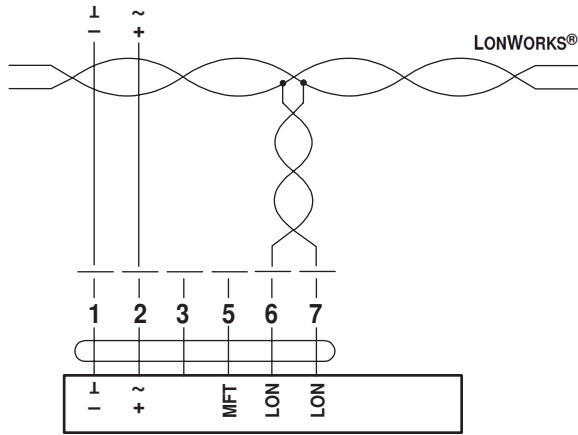


Notes

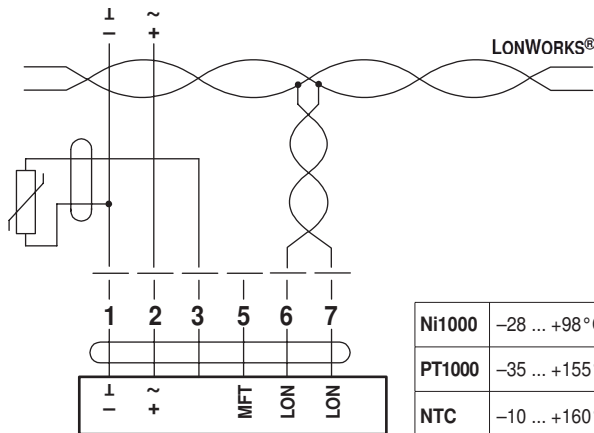
- Connection via safety isolating transformer.
- Direction of stroke switch factory setting: Actuator spindle retracted.

Wiring diagrams

Connection without sensor

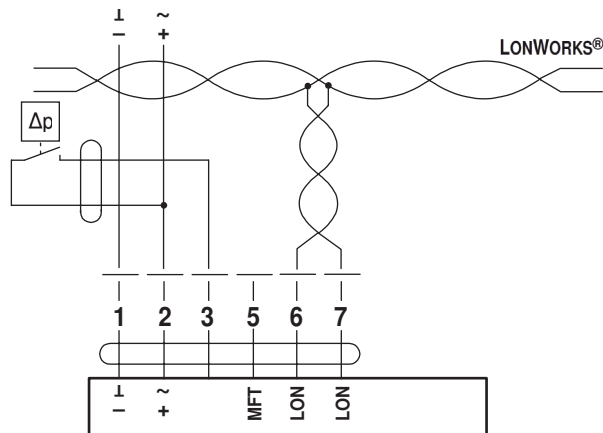


Connection with passive sensor, e.g. Pt1000, Ni1000, NTC



Sensor scaling:  
The sensors can be scaled with the sensor plug-in (sensor table).  
1) Depending on the type  
2) Resolution 1 Ohm

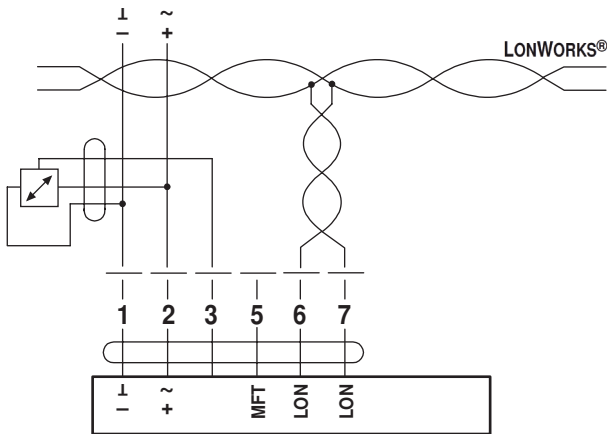
Connection with switching contact, e.g. Δp-monitor



Switching contact requirements:  
The switching contact must be able to switch a current of 16 mA at 24V accurately.

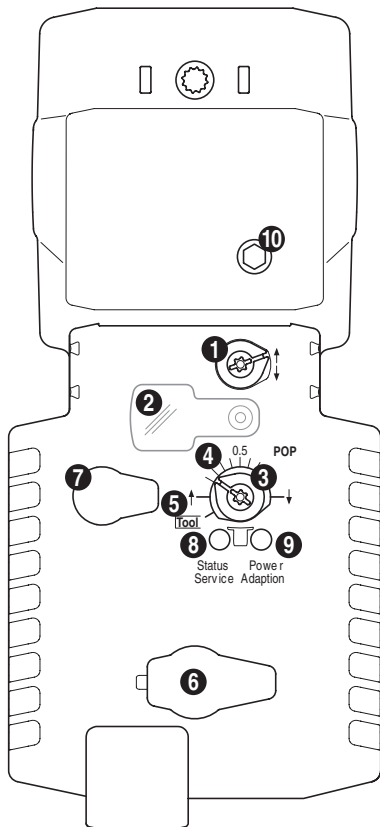
**Electrical installation**

Connection with active sensor, e.g. 0 ... 10V @ 0 ... 50°C



Possible voltage range:  
0 ... 32V (Resolution 30 mV)  
Sensor scaling: The sensors can  
be scaled with the sensor plug-in  
(sensor table)

**Indicators and operating elements**



**(1) Direction of stroke switch**

Switching: Direction of stroke changes

**(2) Cover, POP button**

**(3) POP button**

**(4) Scale for manual adjustment**

**(5) Position for adjustment with tool**

**(6) Service plug**

For connecting the parameterisation and service tools

**(7) Gear disengagement button, temporary**

Press button: Gear disengages, motor stops, manual override possible

Release button: Gear engages, standard mode

**(8) Service button for commissioning with LONWORKS®**

Press button: Service Pin Message is sent on LONWORKS® network

**(9) Push-button**

Press button: Switches on stroke adaption, followed by standard mode

**(10) Manual override**

Clockwise: Actuator spindle extends

Counterclockwise: Actuator spindle retracts

**LED displays (8, yellow) and (9, green)**

yellow: Off; green: Illuminated; The actuator is linked to the LONWORKS® network and ready for operation

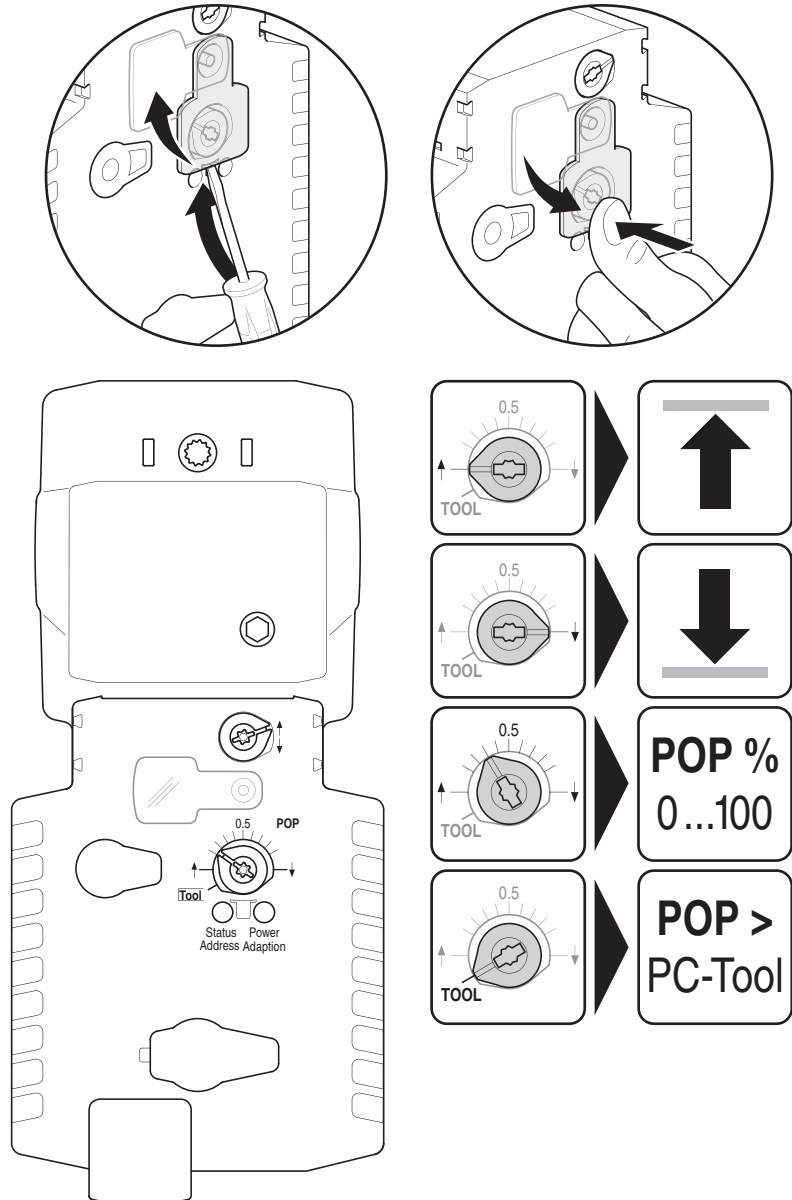
yellow: Illuminated; green: Illuminated; No application software is loaded in the actuator  
yellow: Blinking (flashing interval 2 s); green: Illuminated; The actuator is ready for operation, but not linked to the LONWORKS® network (unconfigured)

yellow: Off; green: Blinking; POP functions active

yellow: Illuminated; green: Off; Pre-charging time SuperCap / Fault SuperCap / Wiring error in supply

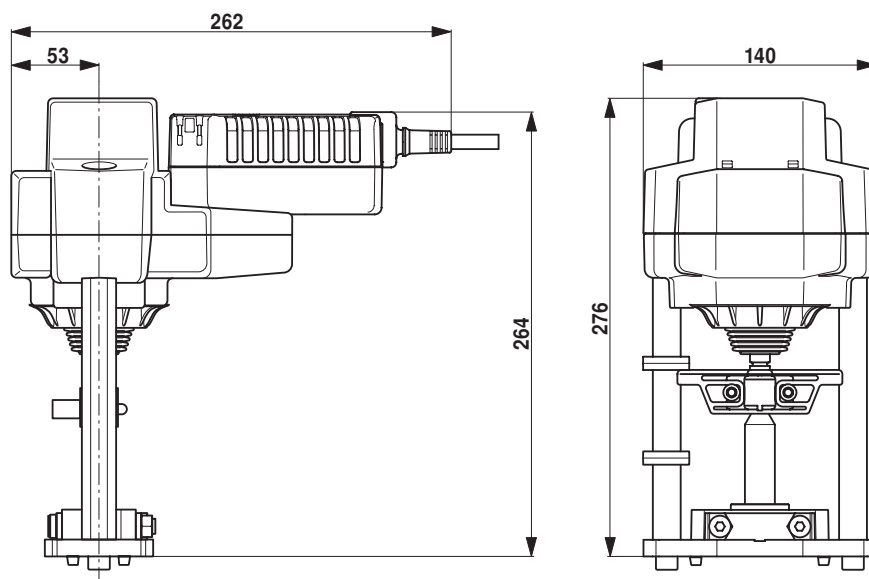
yellow: Off; green: Off; Not in operation

Indicators and operating elements



## Dimensions [mm]

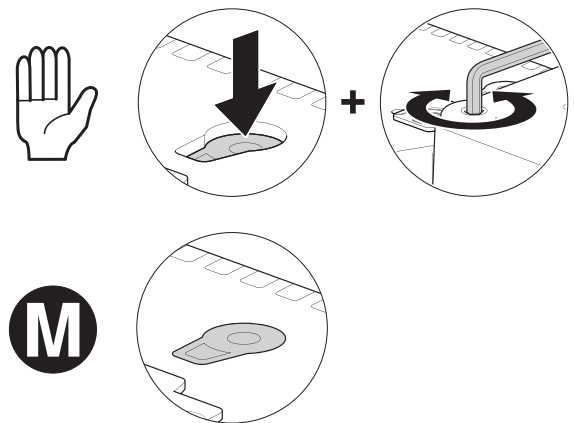
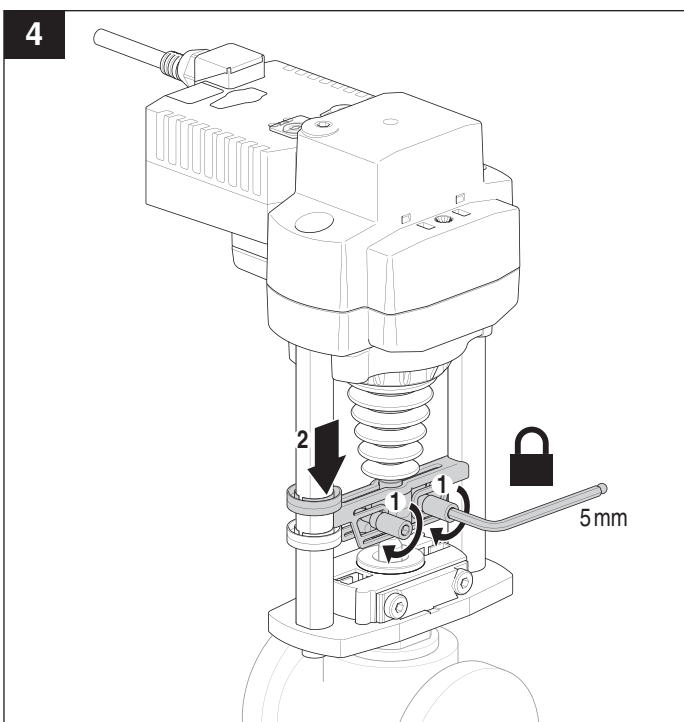
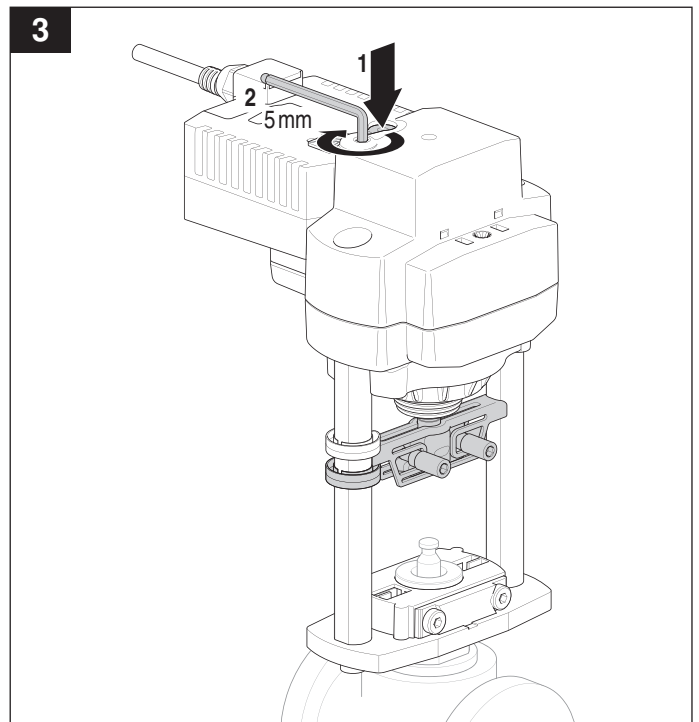
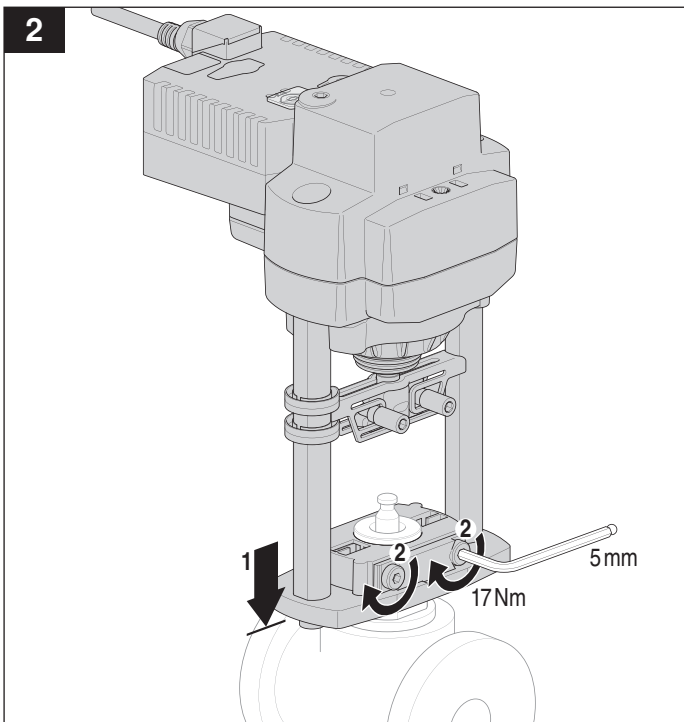
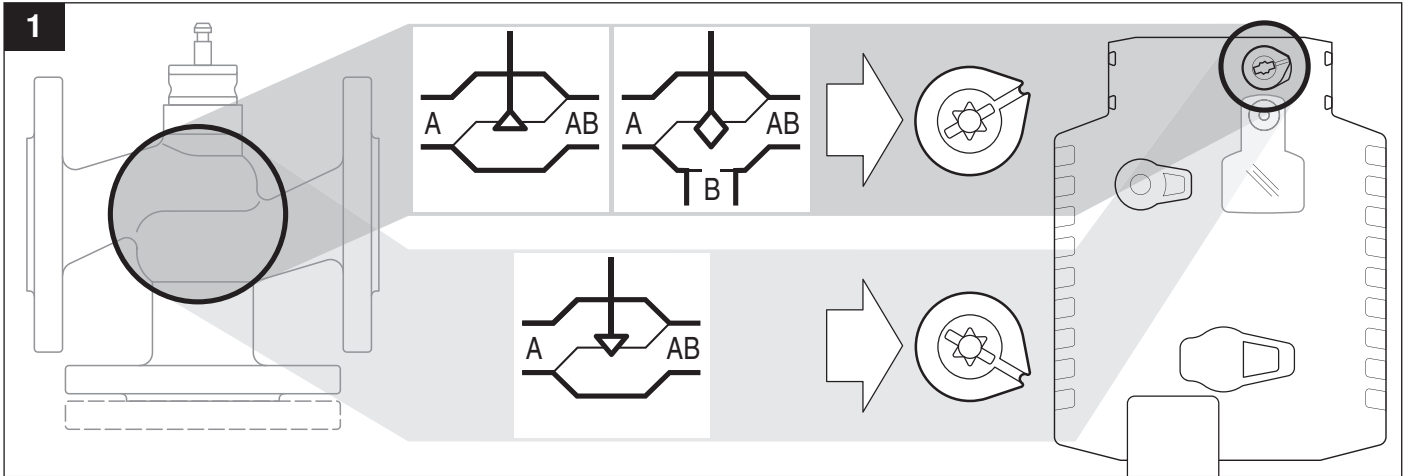
## Dimensional drawings

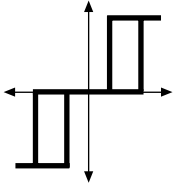


## Further documentation

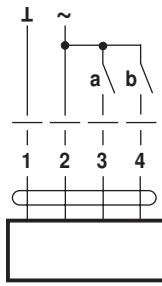
- Data sheets for globe valves
- Installation instructions for actuators and/or globe valves, respectively
- Notes for project planning, 2-way and 3-way globe valves
- Overview Valve-actuator combinations
- Description Belimo Plug-Ins

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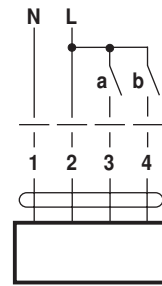


AC 24 V



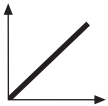
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AC 230 V

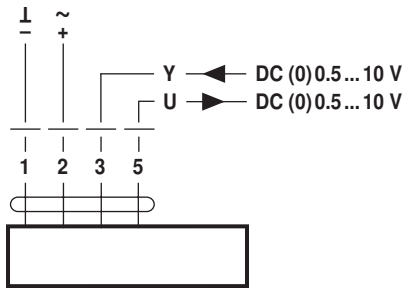


AVK230A-3

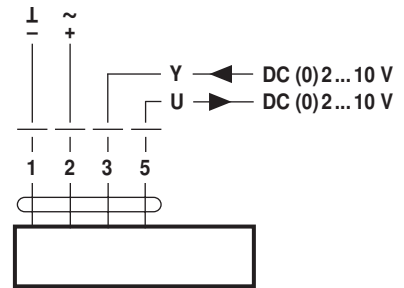
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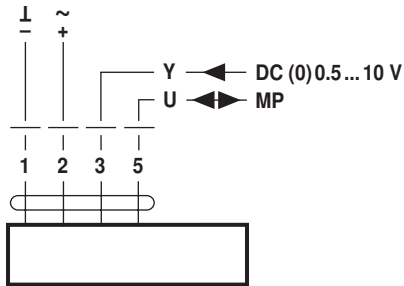
AC 24 V / DC 24 V



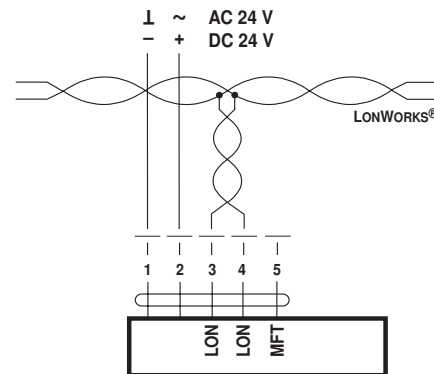
AVK(C)24A-SZ AVK(C)24A-MF



AVK(C)24A-SR



AVK(C)24A-MP



AVK24ALON