

Communicative damper actuator for adjusting dampers in technical building installations

- Air damper size up to approx. 4 m<sup>2</sup>
- Nominal torque 20 Nm
- Nominal voltage AC/DC 24 V
- Integrated temperature controller
- Communication via LONWORKS® (FTT-10A)
- Conversion of sensor signals


**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	3.5 W
	Power consumption in rest position	1.4 W
	Power consumption for wire sizing	6 VA
	Connection supply / control	Cable 1 m, 6 x 0.75 mm <sup>2</sup>
<b>Data bus communication</b>	Certified	According to LONMARK® 3.3
	Processor	Neuron 3150
	Transceiver	FTT-10A
	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>	Torque motor	Min. 20 Nm
	Torque variable	25%, 50%, 75% reduced
	Position feedback U	DC 2...10 V
	Position feedback U note	Max. 0.5 mA
	Position feedback U variable	Start point DC 0.5...8 V End point DC 2.5...10 V
	Position accuracy	±5%
	Direction of motion motor	selectable with switch 0 / 1
	Direction of motion note	Y = 0 V: At switch position 0 (ccw rotation) / 1 (cw rotation)
	Direction of motion variable	electronically reversible
	Manual override	with push-button, can be locked
	Angle of rotation	Max. 95°
	Angle of rotation note	can be limited on both sides with adjustable mechanical end stops
	Running time motor	150 s / 90°
	Motor running time variable	86...346 s
	Adaption setting range	manual (automatic on first power-up)
	Adaption setting range variable	No action Adaption when switched on Adaption after pushing the gear disengagement button
	Override control, controllable via nviManOvr	MAX (maximum position) = 100% MIN (minimum position) = 0% ZS (intermediate position) = 50%
	Sound power level motor	45 dB(A)
	Spindle driver	Universal spindle clamp reversible 10...20 mm
	Position indication	Mechanically, pluggable
<b>Safety</b>	Protection class IEC/EN	III Safety Extra-Low Voltage (SELV)
	Protection class UL	UL Class 2 Supply

## Technical data

<b>Safety</b>	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2, UL Enclosure Type 2
	EMC	CE according to 2014/30/EU
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-14
	Certification UL	cULus according to UL 60730-1A, UL 60730-2-14 and CAN/CSA E60730-1:02
	Mode of operation	Type 1
	Rated impulse voltage supply / control	0.8 kV
	Control pollution degree	3
	Ambient temperature	-30...50°C
	Non-operating temperature	-40...80°C
	Ambient humidity	95% r.h., non-condensing
	Maintenance	Maintenance-free
	<b>Weight</b>	Weight

## Safety notes



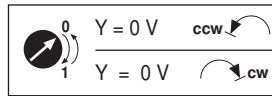
- The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Outdoor application: only possible in case that no (sea)water, snow, ice, insolation or aggressive gases interfere directly with the actuator and that is ensured that the ambient conditions remain at any time within the thresholds according to the data sheet.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- 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.
- Cables must not be removed from the device.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation site and the ventilation conditions must be observed.
- The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

## Product features

<b>Mode of operation</b>	The actuator is equipped with an integrated interface for LONWORKS®. The actuator can be directly connected to the LON network and controlled via the transceiver FTT-10A
<b>Converter for sensors</b>	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®.
<b>Integrated temperature controller</b>	The device has an integrated temperature controller (Thermostat Object LONMARK® #8060). Other control variants upon request. The temperature controller can be set using the LNS Plug-In from Belimo.
<b>Parameterisable actuators</b>	The factory settings cover the most common applications. Single parameters can be modified with the Belimo Service Tools MFT-P or ZTH EU.
<b>Simple direct mounting</b>	Simple direct mounting on the damper spindle with an universal spindle clamp, supplied with an anti-rotation device to prevent the actuator from rotating.
<b>Manual override</b>	Manual override with push-button possible (the gear is disengaged for as long as the button is pressed or remains locked).
<b>Adjustable angle of rotation</b>	Adjustable angle of rotation with mechanical end stops.
<b>High functional reliability</b>	The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

## Product features

**Home position** The first time the supply voltage is switched on, i.e. at the time of commissioning, the actuator carries out an adaption, which is when the operating range and position feedback adjust themselves to the mechanical setting range. The actuator then moves into the position defined by the positioning signal.



**Adaption and synchronisation** An adaption can be triggered manually by pressing the “Adaption” button or with the PC-Tool. Both mechanical end stops are detected during the adaption (entire setting range). Automatic synchronisation after pressing the gearbox disengagement button is configured. The synchronisation is in the home position (0%). The actuator then moves into the position defined by the positioning signal. A range of settings can be adapted using the PC-Tool (see MFT-P documentation)

## Accessories

	Description	Type
<b>Electrical accessories</b>	Auxiliary switch, add-on, 1 x SPDT	S1A
	Auxiliary switch, add-on, 2 x SPDT	S2A
	Feedback potentiometer 140 Ohm, add-on	P140A
	Feedback potentiometer 140 Ohm, add-on, grey	P140A GR
	Feedback potentiometer 200 Ohm, add-on	P200A
	Feedback potentiometer 500 Ohm, add-on	P500A
	Feedback potentiometer 500 Ohm, add-on, grey	P500A GR
	Feedback potentiometer 1 kOhm, add-on	P1000A
	Feedback potentiometer 1 kOhm, add-on, grey	P1000A GR
	Feedback potentiometer 2.8 kOhm, add-on	P2800A
	Feedback potentiometer 2.8 kOhm, add-on, grey	P2800A GR
	Feedback potentiometer 5 kOhm, add-on	P5000A
	Feedback potentiometer 5 kOhm, add-on, grey	P5000A GR
	Feedback potentiometer 10 kOhm, add-on	P10000A
	Feedback potentiometer 10 kOhm, add-on, grey	P10000A GR
	Connection cable 5 m, A+B: RJ12 6/6, To ZTH/ZIP-USB-MP	ZK1-GEN
	Connection cable 5 m, A: RJ11 6/4, B: Free wire end, To ZTH/ZIP-USB-MP	ZK2-GEN
<b>Mechanical accessories</b>	<b>Description</b>	<b>Type</b>
	Actuator arm, for standard spindle clamp (reversible) K-SA	AH-20
	Shaft extension 250 mm for CrNi (INOX)	AV12-25-I
	Shaft extension 250 mm, for damper spindles Ø 8...25 mm	AV8-25
	Angled ball joint with M8, suitable for damper crank arms KH8	KG8
	Straight ball joint with M8, suitable for damper crank arms KH8	KG10A
	Damper crank arm, for damper spindles	KH8
	Spindle clamp, one side for NM..A, SM..A	K-ENSA
	Spindle clamp, one side for SM..A	K-ENSA-I
	Spindle clamp, reversible for SM..A and NMQ..	K-SA
	Universal mounting bracket 180 mm	Z-ARS180
	Universal mounting bracket 230 mm	Z-ARS230
	Angle of rotation limiter, for K-NA	20334-00001
	Form fit insert 10x10 mm, for NM..A / SM..A	ZF10-NSA
	Form fit insert 12x12 mm, for NM..A / SM..A	ZF12-NSA
	Form fit insert 15x15 mm	ZF15-NSA
	Form fit insert 16x16 mm, for NM..A / SM..A	ZF16-NSA
	Mounting kit for linkage operation, SM..A for flat installation	ZG-SMA
	Position indication for LM..A, NM..A, SM..A, GM..A	Z-PI
	Base plate extension from SM..A to SM../AM../SMD24R	Z-SMA

Accessories

	Description	Type
Service Tools	Service tool for parametrisable and communicative Belimo actuators / VAV controller and HVAC performance devices	ZTH EU
	Belimo PC-Tool, software for adjustments and diagnostics	MFT-P
	Adapter to Service Tool ZTH	MFT-C

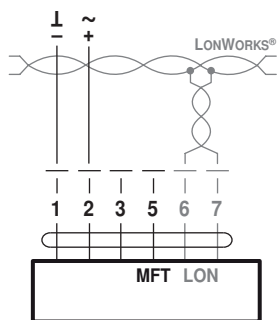
Electrical installation



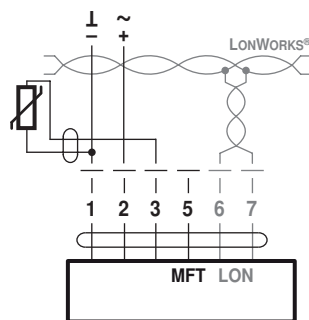
**Notes** • Connection via safety isolating transformer.

Wiring diagrams

Connection without sensor



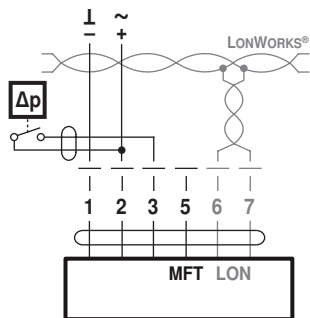
Connection with passive sensor, e.g. Pt1000, Ni1000, NTC



Ni1000	-28...+98 °C	850...1600 Ω <sup>2)</sup>
PT1000	-35...+155 °C	850...1600 Ω <sup>2)</sup>
NTC	-10...+160 °C <sup>1)</sup>	200 Ω...60 kΩ <sup>2)</sup>

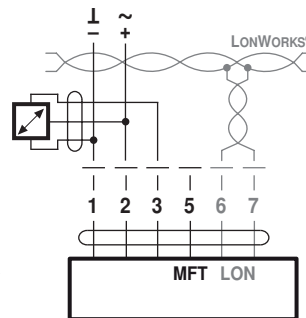
Sensor scaling:  
The sensors can be scaled with the sensor plug-in (sensor table).  
1) Depending on type  
2) Resolution 1 Ohm

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 24 V accurately.

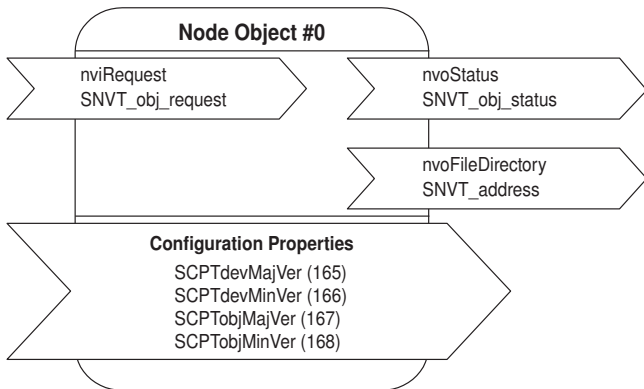
Connection with active sensor, e.g. 0...10 V @ 0...50 °C



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

**Functional Profile as per 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**

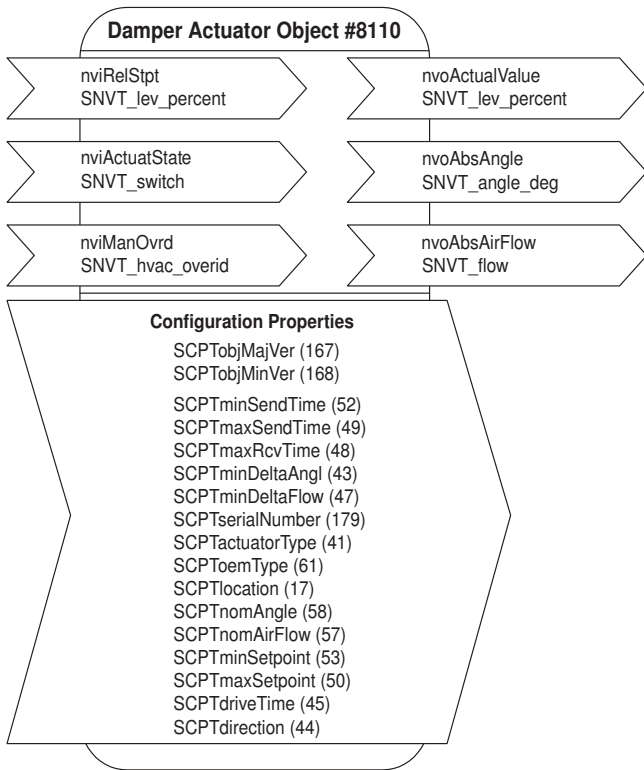
Input variable for requesting the status of a particular object in the node.

**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**

Via this input variable, the setpoint in % for the actuator is specified (0...100% = Min...Max). 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.

**nviManOvrd: SNVT\_hvac\_overid**

see table «Override control with SNVT nviManOvrd»

**nvoActualValue: SNVT\_lev\_percent**

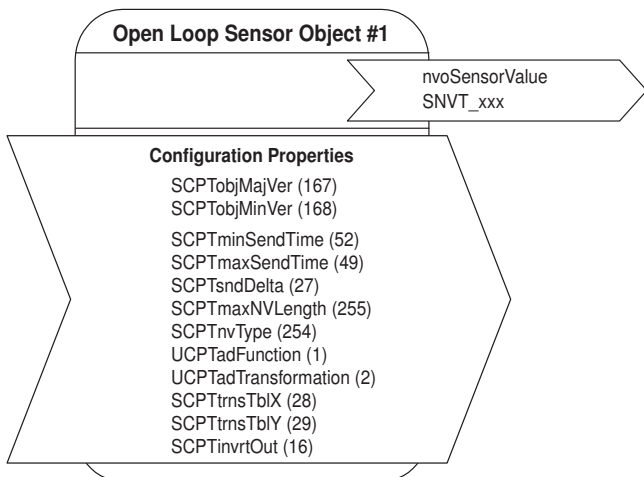
This output variable shows the current actual position of the actuator and can be used for control circuit feedback or for displaying positions.

**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.

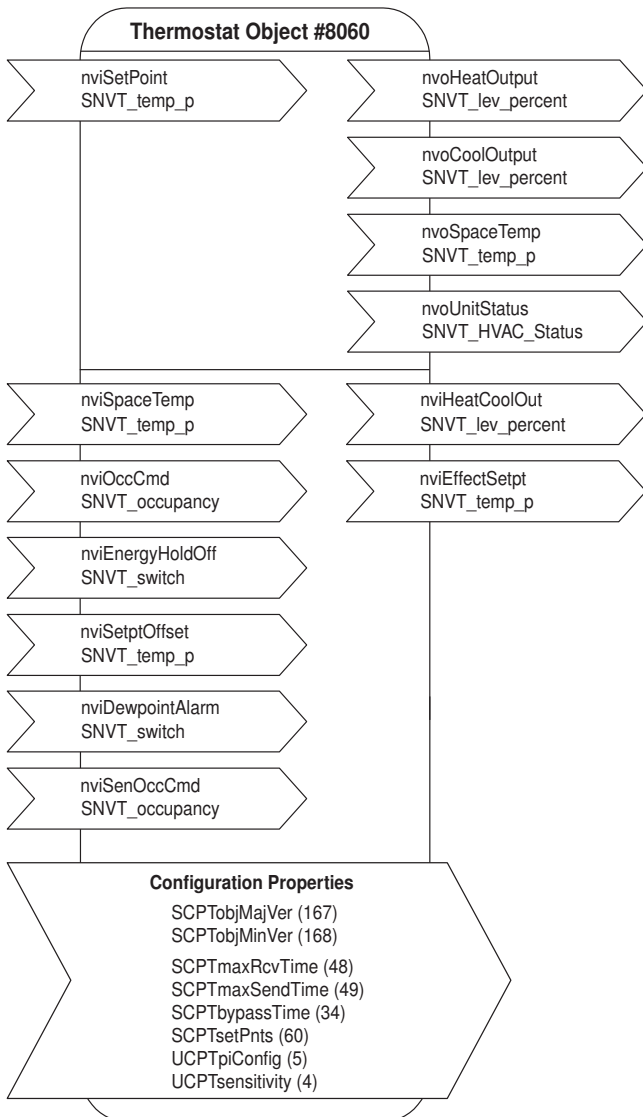
**nvoSensorValue: SNVT\_XXX**

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 as per 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 as per LONMARK®

Functions Inputs Occupancy

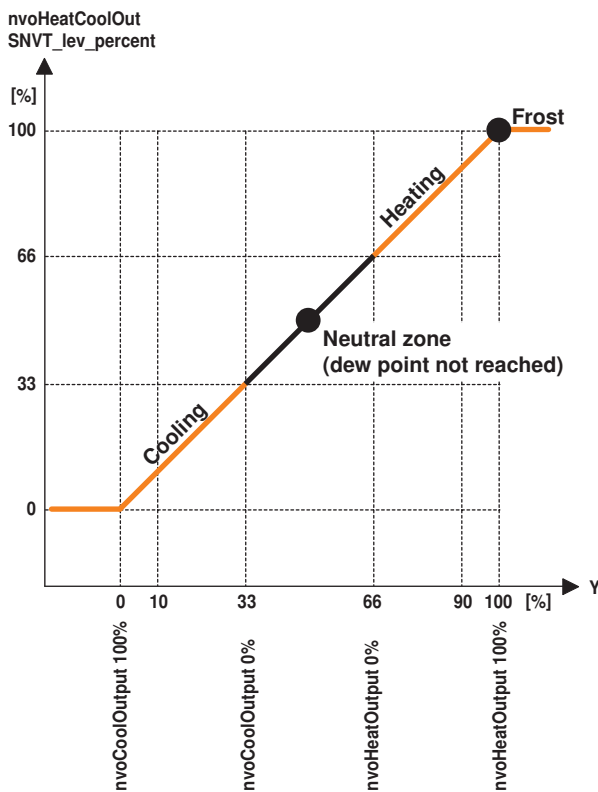
**Note**  
The function nviOccCmd has a higher priority than the function nviSenOccCmd.

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.



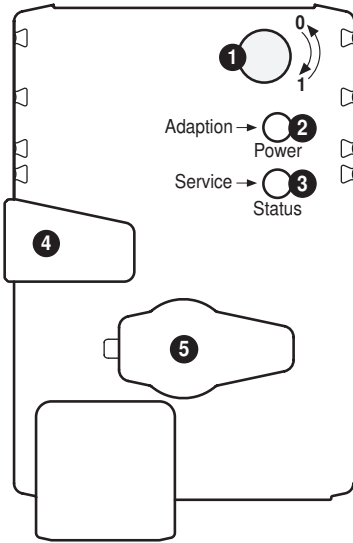
Override control with the SNVT nviManOvr

**Note**  
The basic setting is «HVO\_OFF». This value is loaded when the power supply is switched on.

**Note**  
More detailed information on the functional profiles can be found on the website of LONMARK®. (www.lonmark.org).

State	Value	Actuator
HVO_OFF	–	Override control inactive
HVO_POSITION	percent	Position in % (MIN...MAX)
HVO_FLOW_VALUE	flow	–
HVO_FLOW_PERCENT	percent	–
HVO_OPEN	–	Full open
HVO_CLOSE	–	Full closed
HVO_MINIMUM	–	Minimum position
HVO_MAXIMUM	–	Maximum position

Operating controls and indicators

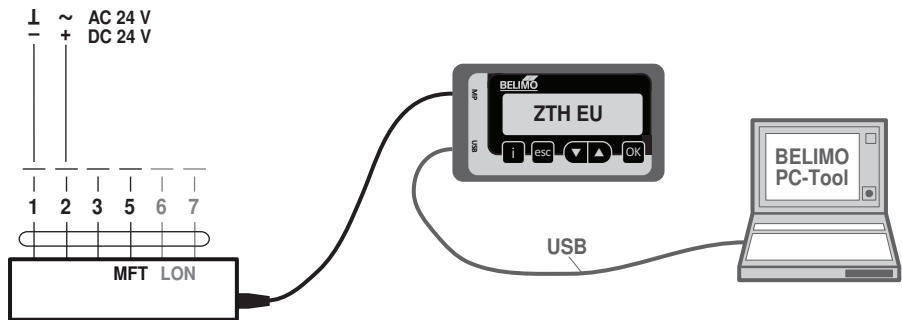


- 1 Direction of rotation switch**  
Switch over: Direction of rotation changes
- 2 Push-button and LED display green**  
Off: No power supply or malfunction  
On: In operation  
Press button: Triggers angle of rotation adaptation, followed by standard mode
- 3 Service button for commissioning at LONWORKS® and LED display yellow for LON status**  
Off: The actuator is linked to the LONWORKS® and ready for operation  
On: No application software is loaded in the actuator  
Flashing, interval 2 s: The actuator is ready for operation, but not linked to the LONWORKS® (unconfigured)  
Other flashing codes: There is a malfunction in the actuator  
Press button: Service Pin Message is sent to the LONWORKS®
- 4 Gear disengagement button**  
Press button: Gear disengages, motor stops, manual override possible  
Release button: Gear engages, synchronisation starts, followed by standard mode
- 5 Service plug**  
For connecting parameterisation and service tools

Service

Service Tools connection

The actuator can be parameterised by ZTH EU via the service socket. For an extended parameterisation the PC tool can be connected.



Dimensions [mm]

Spindle length

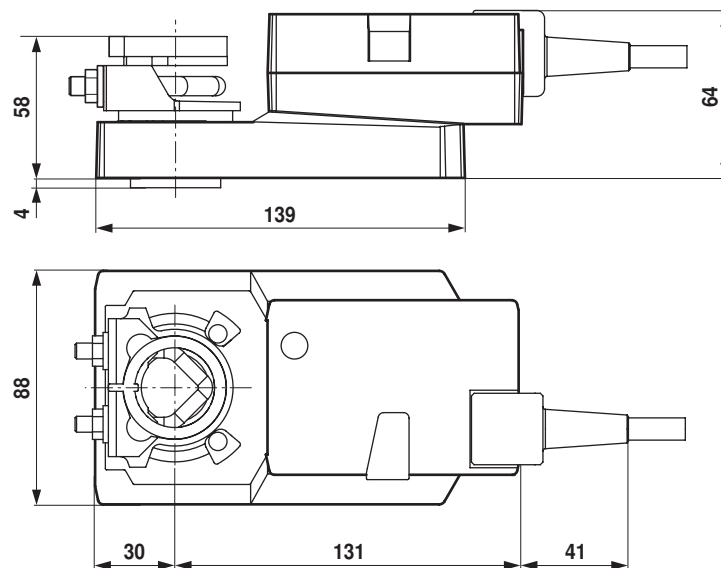
		Min. 48
		Min. 20

Clamping range

	10...20	≥10	≤20
<b>CrNi (INOX)</b>	12...20	≥10	≤20

With utilisation of a round spindle made of CrNi (INOX): Ø 12...20 mm

Dimensional drawings





**Further documentation**

- Applications with integrated temp. controller
- LON actuators with CO<sub>2</sub> control
- Actuator Plug-in description
- Sensor Plug-in description
- Controller Plug-in description
- Tool connections
- LonWorks® Glossary