Product information

ZTH EU Service tool for parametrisable and communicative actuators/VAV controllers/ HVAC performance devices from Belimo

Edition 2022-02/A

BELIMO

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Technical Data

Electrical data

Nominal voltage	AC 24 V, 50/60 Hz, DC 24 V (from actuator)
Nominal voltage range	AC 19.2...28.8 V/DC 21.6...28.8 V
Power consumption in operation	1 W
Connection	Connector socket for connection cable ZK1-GEN (3 m) with connector plug enclosed
Interface USB 2.0	USB connector plug type B, connection cable (1 m) with connector plug A to B enclosed
Optional cables	ZK2-GEN, ZK6-GEN

Interface

Communication	Point-to-point (PP), no bus mode possible (MP)

Operating modes

Parametrisation	Point-to-point (PP) Connection via service socket or terminals on the actuator.
MP level converter (ZIP function)	Connection in the control cabinet or via service socket at the actuator. For MP monitor operation, connection to MP-Bus

Operating

LCD display	2 x 16 characters, with backlight
Buttons	i / esc / ◥ / ◢ / OK

Safety

Protection class	III Protective extra low voltage (PELV)
EMC	CE according to 2014/30/EU
Operating temperature	–0...50°C, non-condensing
Storage temperature	–20...50°C, non-condensing

Dimensions/Weight

Dimensions	L x W x D: 95 x 55 x 25 mm
Weight	approx. 135 g

Safety notes

– The device is not allowed to be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
– Connection permitted only for Belimo devices with 24 V protective extra low voltage (PELV) and PP/MP interface.
– Changes to parameters, etc. may only be made after consultation with/information from the OEM, device or plant manufacturer. Important: Observe the operating and setting instructions.

Definitions

ZTH EU

The ZTH EU is distributed worldwide. Therefore, in the Europe region, the product name is defined as ZTH EU. In the product information, the ZTH EU is referred to as the ZTH.

Actuators

For the sake of simplicity, the word "actuator" is used in the product information as a collective term to refer to actuators, VAV controllers, fire damper actuators and HVAC performance devices.

Supported devices

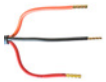
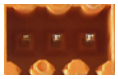
Damper product range	..-MF/..-MP/..-MPL/..-MFT(2)/..-MOD/..LON	
Valve product range	..-MF/..-MP/..-MPL/..-MFT(2)/..-MOD/..LON/..BAC	
Electronic pressure-independent Characterised control valve, 2-way EPIV	P6..W..-MP / EP0..R+MP	available since 2011
	P6..W..-KMP/EP0..R+KMP available since 2011	available since 2011
Fire damper actuator	BF-TopLine with BKN230-24MP	
VAV product range	VRD2 / VRD2-L	available 1992-2007
	VRD3	available since 2008
	VRP-M (VAV and STP applications)	available 2005-2020
	NMV-D2..	available 1992-2000
	LMV-D2M / NMV-D2M..	available 2000-2006
	LMV-D2-MP / NMV-D2-MP / SMV-D2-MP.., LHV-D2-MP..	available 2006-2011
	LMV-D2LON / NMV-D2LON	available 2006-2011
	LMV-D3-MP / NMV-D3-MP / SMV-D3-MP.., LHV-D3-MP..	available since 2011
	LMV-D3LON / NMV-D3LON	available since 2011
	LMV-D3-MOD / NMV-D3-MOD	available since 2012
	LMV-D3-KNX / NMV-D3-KNX, LHV-D3-KNX..	available since 2015
	CMV-..-MP	available since 2013
	VRU-D3-BAC / VRU-M1-BAC / VRU-M1R-BAC	available since 2020
HVAC performance devices	In accordance with system description (e.g. Belimo Energy Valve™, pressure-independent 6-way characterised control valve)	
sharedlogic	In accordance with system description	

Connection

Connection and supply

The ZTH EU is supplied via the actuator. The connection is made
– either directly at the service socket of the actuator
– or via PP/MP connection (U5), e.g. connection socket, control cabinet and room controller CR24.

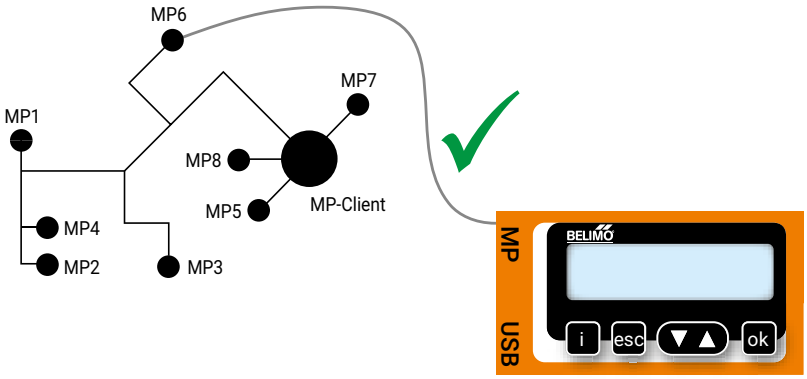
Connection type and connection cable

Connection		Suitable cable	MP level converters and devices
Service plug		ZK1-GEN	ZIP-USB-MP ZTH EU/ZTH-GEN
Connection socket		ZK2-GEN	ZIP-USB-MP ZTH EU/ZTH-GEN MP-Bus tester
Weidmüller connector plug		ZK4-GEN	ZIP-USB-MP ZTH EU/ZTH-GEN MP-Bus tester
RJ12 connector socket		ZK6-GEN	ZIP-USB-MP ZTH EU/ZTH-GEN MP-Bus tester

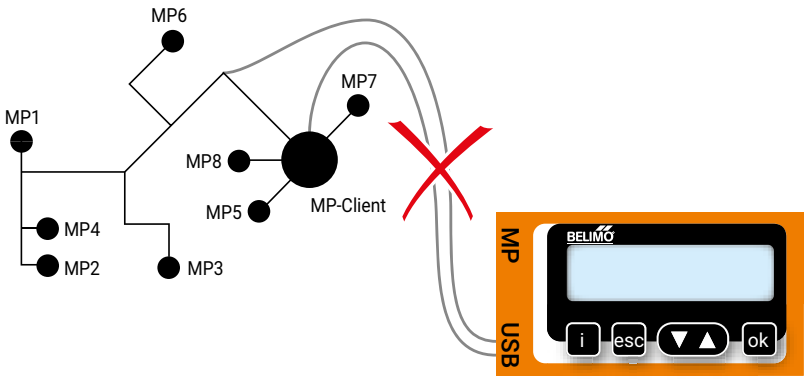
Connection Service Tool ZTH EU

Correct

Direct connection of the ZTH EU to the MP-Bus or MP client is not possible.



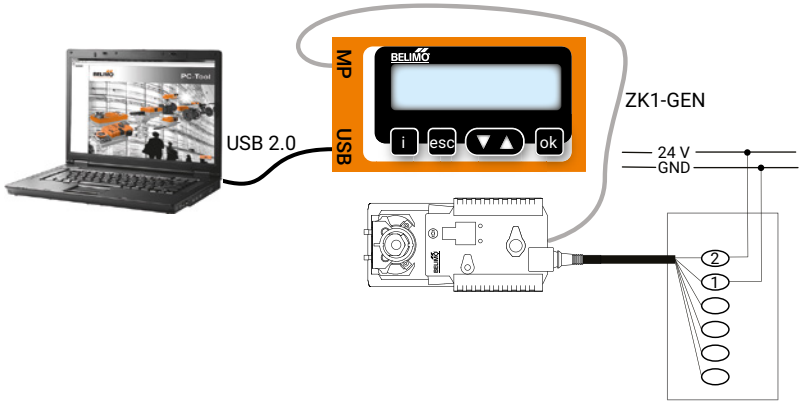
False



Solution: Use service socket on actuator or temporarily disconnect MP connection of MP device from MP-Bus. Connect the ZTH EU to the MP connection.

Connection ZIP function

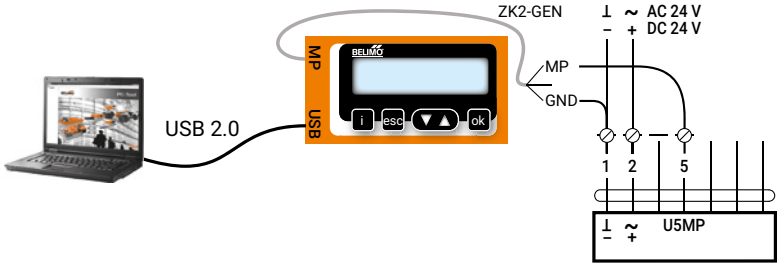
Connection via service socket – Local connection with cable ZK1-GEN



Note:
The USB driver required is automatically installed with PC-Tool version 3.9 or higher. For older PC-Tool versions, the USB driver can be downloaded from the Internet at www.belimo.com and installed retroactively.

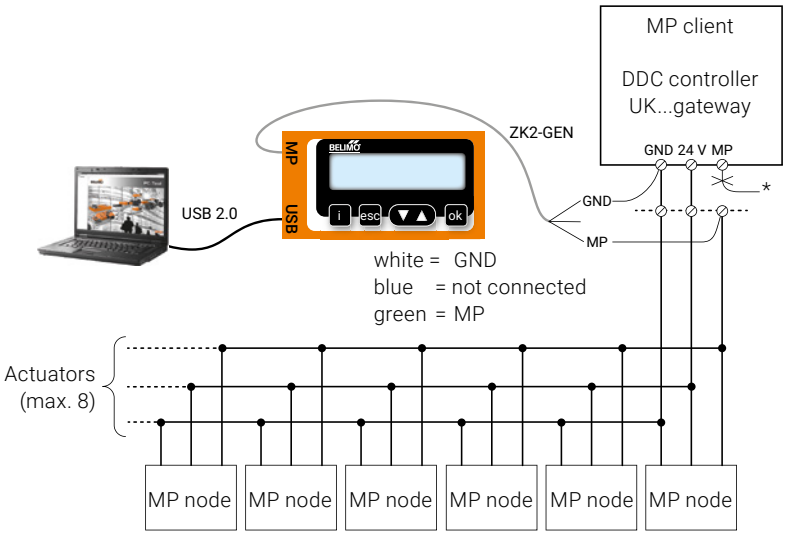
Connection via connection cable – Local connection with cable ZK2-GEN

Note:
The USB driver required is automatically installed with PC-Tool version 3.9 or higher. For older PC-Tool versions, the USB driver can be downloaded from the Internet at www.belimo.com and installed retroactively.



PC-Tool as MP client

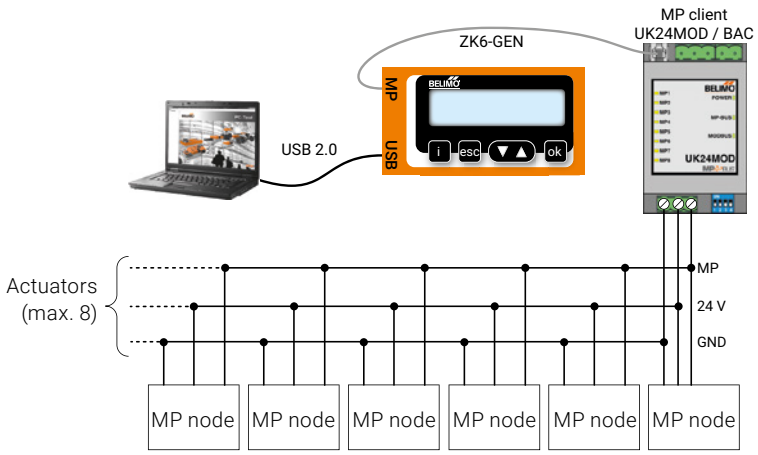
- Parametrisation of the actuators via MP-Bus
- Specification of setpoints for simulation of the actuators via MP-Bus
- Read in the sensors connected to the MP actuator.
- Adoption of graphic trends



Note:
* Interrupt the connection between ZTH EU and MP client before the accommodation of the ZIP function.

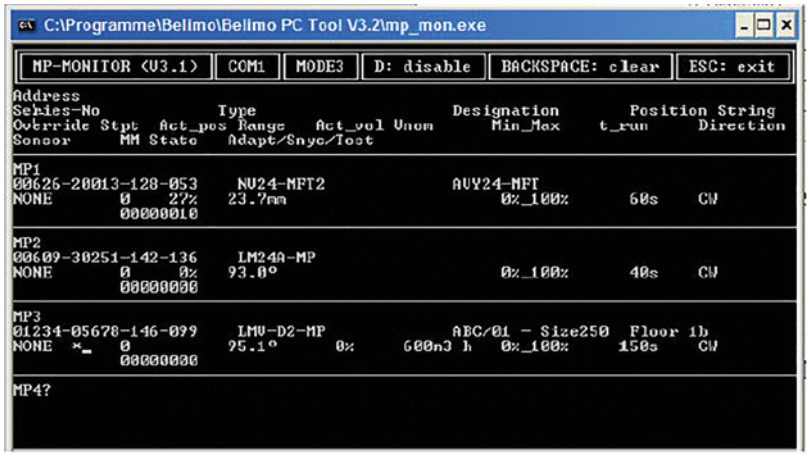
PC-Tool connection with ZK6-GEN, ZK4-GEN to Belimo gateways

- Use the ZK6-GEN cable for connection to UK24MOD and UK24BAC.
- Use the ZK4-GEN cable for connection to UK24EIB and UK24LON.

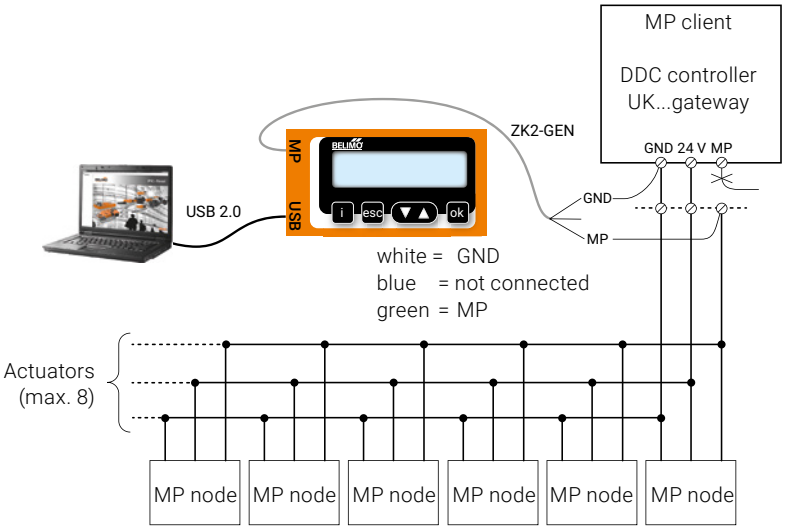


PC-Tool as monitor

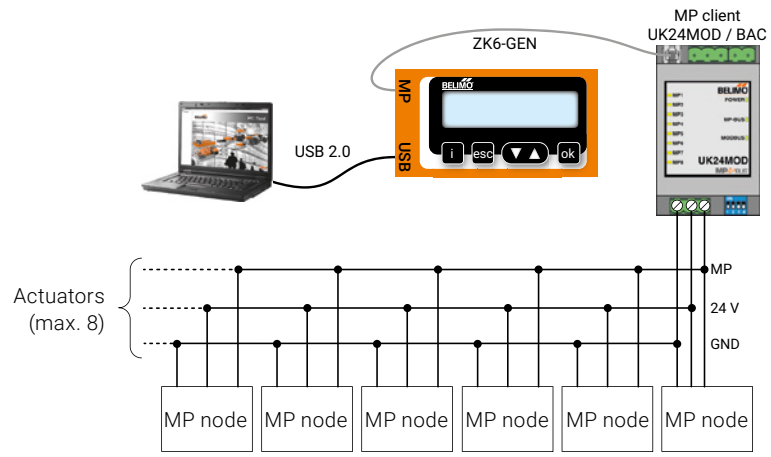
Check the MP communication with the MP Monitor Tool (module of PC-Tool V3.x).



PC-Tool with monitor function/ connection: ZK2-GEN to MP client



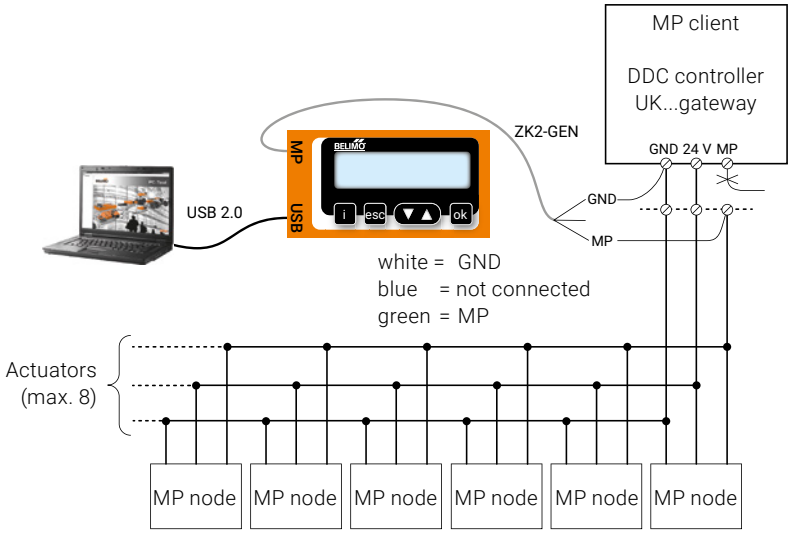
PC tool with monitor function/ connection: tool socket with ZK6-GEN, ZK4-GEN



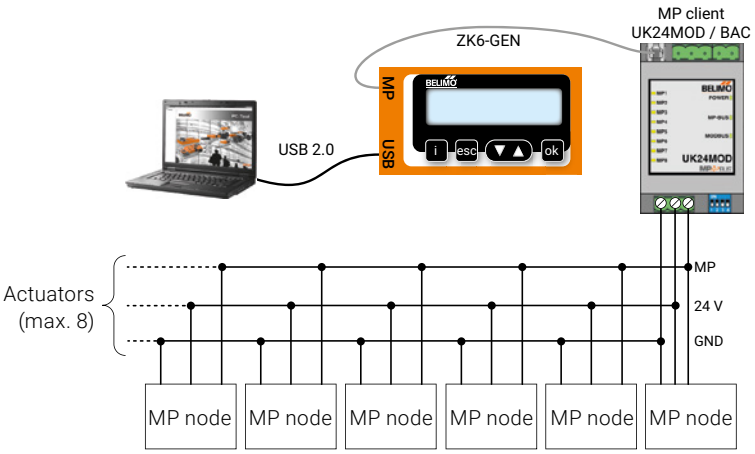
MP tester connection

MP-Bus direct ZTH connection

Check the MP communication with the MP Monitor Tool (module of PC-Tool V3.x).



ZTH connection to tool socket with ZK6-GEN, ZK4-GEN



Operating

When the ZTH EU is connected to the Belimo actuator, the operating device is started and the data of the connected device are read out. The available setting and operating options are displayed according to the device type. The available setting parameters are listed in the respective product documentation of the actuators.
For further information, please visit www.belimo.com.

Operating elements

LCD display:
– Backlight
– Display with 2 x 16 characters

▼ and ▲	Forward/backward, change value/status
OK	Confirm input, switch to submenu
esc	Cancel entry, exit submenu, discard change
i	Shows additional information (if available)

Button function:
– RJ12 connector socket
– USB connection socket for communication with PC

Language setting, units presentation

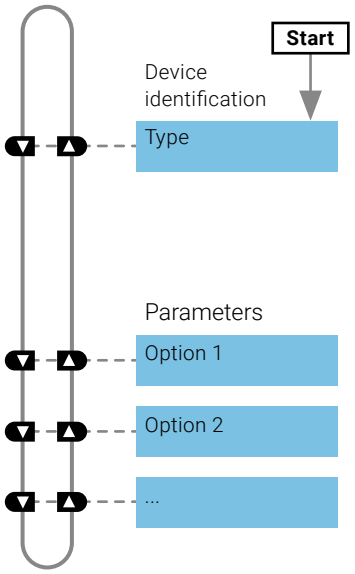
Language and units can be set in the configuration menu.

Operating

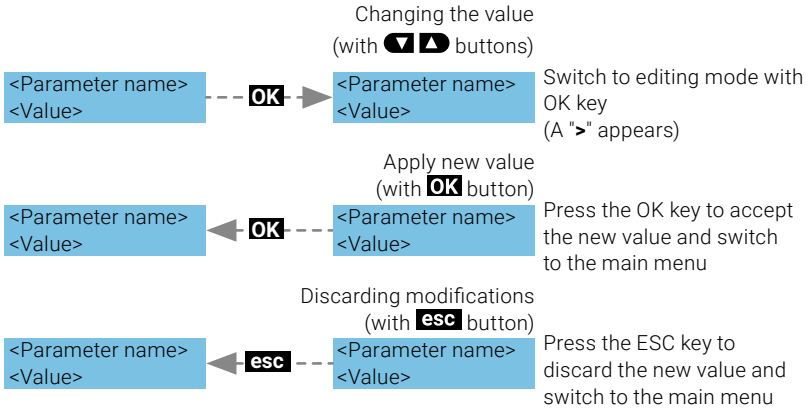
Operating is context-related. The user thus sees only the options available for the connected device. The corresponding configuration table is read from the actuator for this purpose. In addition to the parameter type, the table also contains the respective ranges (e.g. the minimum adjustable running time, the type, etc.). Non-relevant options are not displayed.

Menu structure, handling

The operating menu can be scrolled through from both sides using the ▼ ▲ keys.



Changing values



Starting/Finishing

The connection to the actuator is started by plugging in the RJ connector plug and terminated by unplugging it.

Device specifications/ Technical data

For a detailed description incl. setting parameters, please refer to the respective separate product information.
See www.belimo.com/Dokumentation.

Configuration

Starting the configuration

1. Press the (OK) button and at the same time plug in the connecting cable.
2. Configuration menu display appears.

Configuration menu

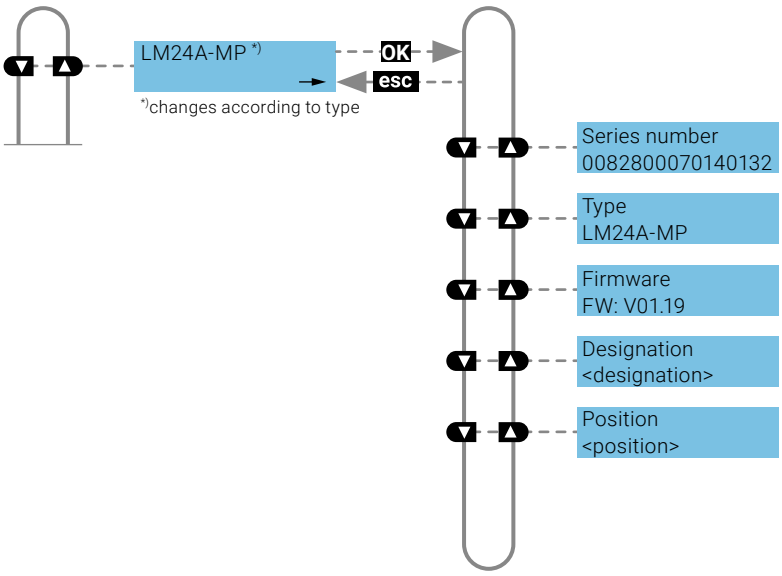
Option / Display	Parameters	Product range	Explanation
Deleting the cache	Yes/no		Function to delete data profiles of HVAC performance devices from the local cache
Background lighting	After 0...255 s off/ always active		Setting the duration of the backlight in seconds
Display of favourites	0…65535	VAV	
OEM number			USB connector plug type B, connection cable (1 m) with connector plug A to B enclosed
Advanced mode [1]	Yes/no	VAV Fire protection Modbus	Approved settings: – VAV: direction of rotation – VAV: set V'_{min}/V'_{max} to original values (call up OEM setting) – CMV: correction factor – BF-Top: adaptation – Modbus: basic address
Expert mode [1]	Yes/no	VAV Valves	Approved settings: – VAV: switching mode – VAV: V'_{mid}-parameter – VAV: altitude compensation
PICCV function	Yes/no	Valves	Belimo US: release PICCV Wizard function
Start RT monitor	RT monitor active		Real-time monitor function
Start MP tester	MP-Bus level/ Telegram counter		MP tester function
Measuring Power supply	Value V (AC) VHW (%)		
Pressure unit	Pa / in WC	VAV	
Unit volume (Water)	m^3/h/l/min/ gpm/l/s	Valves	
Unit volume (air)	m^3/h/l/s/cfm	VAV	
Exiting the configuration	esc		

[1] Activate these options only if required and with the necessary application knowledge. The adjustment of the corresponding parameters requires special expertise.

Basic functions

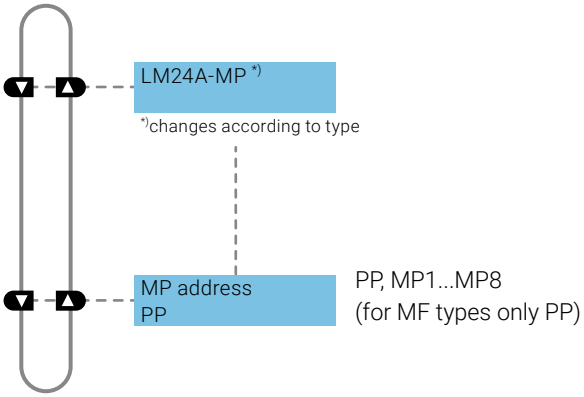
Device identification

The following menu tree shows the basic functions, which are identical for all devices.



MP address

The MP address (PP, MP1-MP8) can be set for MP-capable actuators.



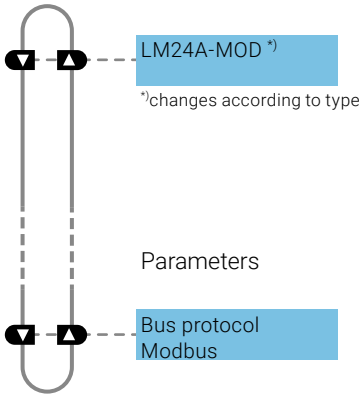
Modbus actuators

Modbus-specific communication settings of an actuator with integrated Modbus interface (..-MOD).

Functions for MOD actuators

Bus protocol

Specific communication settings of an actuator with integrated MP-Bus, Modbus RTU and BACnet MS/TP interface (..-MOD).
The specific communication protocols are displayed by selecting the corresponding bus protocol.

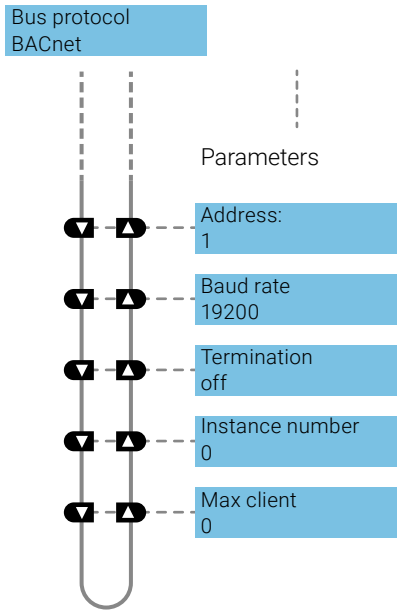


Possible settings with ▼▲ buttons in edit mode:
MP-Bus/Modbus/BACnet

Note:
After changing communication settings (Baud rate, address, parity, etc.), wait at least 5 seconds before selecting the next menu. This also applies when writing the setting before the ZTH EU is unplugged or the power supply is interrupted.

BACnet settings

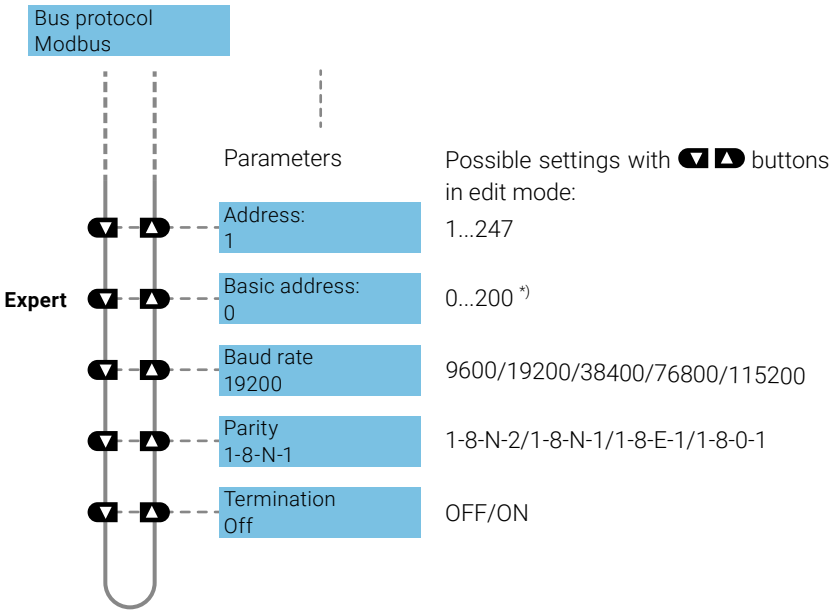
The following menu tree shows the setting/display options for the BACnet communication settings.



Possible settings with ▼▲ buttons in edit mode:
1...127
9600/19200/38400/76800/115200
OFF/ON
0...4194302
0...127

Modbus settings

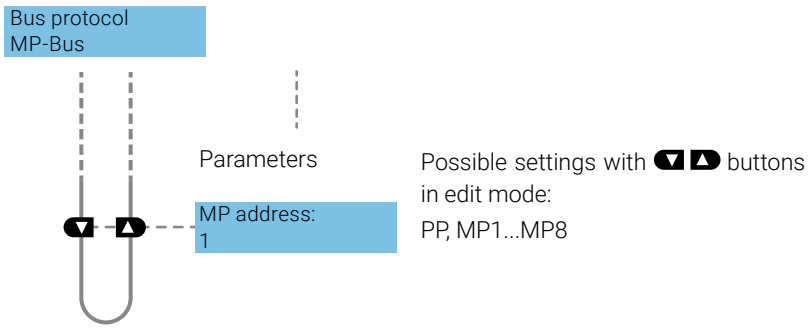
The following menu tree shows the setting/display options for the Modbus communication settings.



*)The setting of the base address is also taken into account for the BACnet MS/TP address.

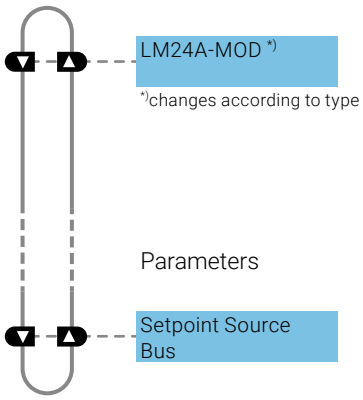
MP-Bus settings

The following menu tree shows the setting/display options for the MP-Bus communication settings.



Setpoint source (hybrid operation)

The "Setpoint source" setting allows the operating mode for controlling the devices to be selected.



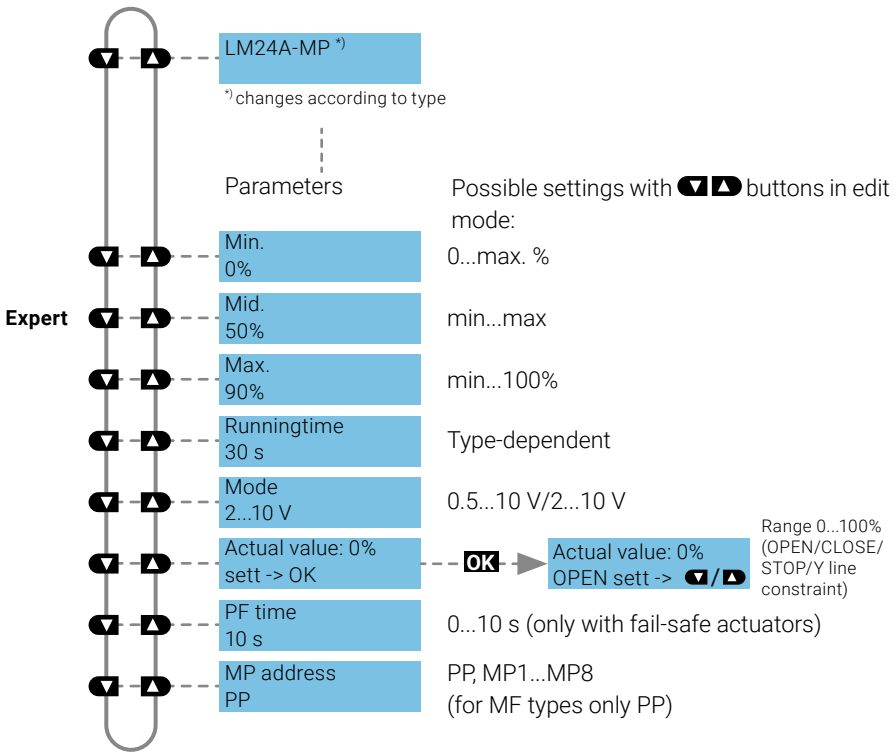
Bus selection:
Control is exclusively via selected bus protocol (Modbus or BACnet).
Analogue selection:
Control is via the analogue 0...10 V signal. It is still possible to read out and monitor the device via the selected bus protocol (Modbus or BACnet).

Functions for damper product range/rotary valve product range

Menu tree

The ZTH EU automatically detects the device family of the connected device. The menu and the adjustable options are displayed according to the connected device.

Setting/display options LM24A-MP

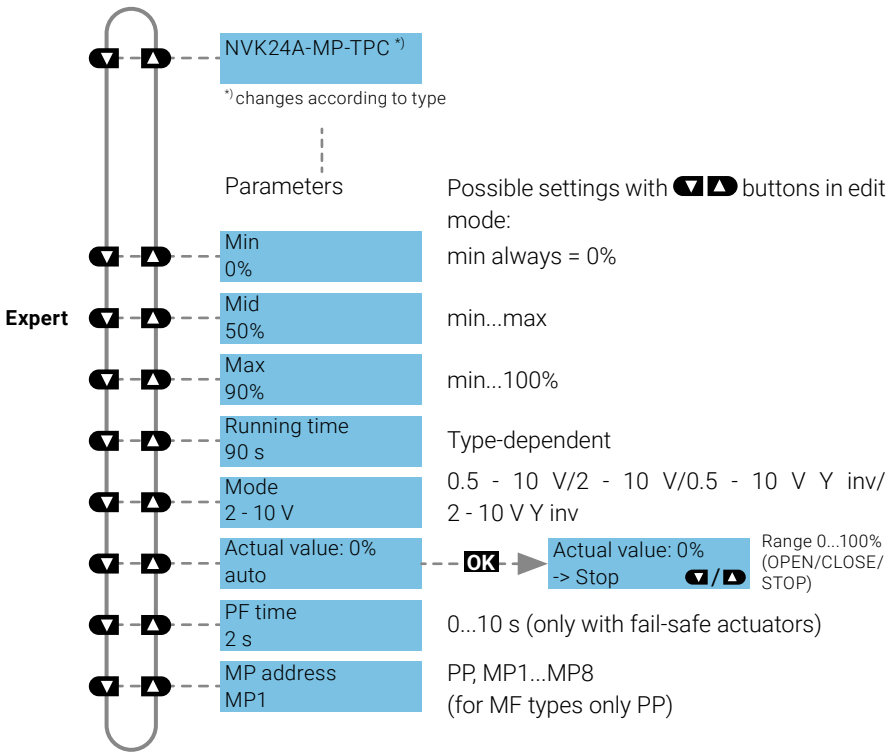


Functions for globe valve product range

Menu tree

The ZTH EU automatically detects the device family of the connected device. The menu and the adjustable options are displayed according to the connected device.

Setting/display options NVK24A-MP-TPC

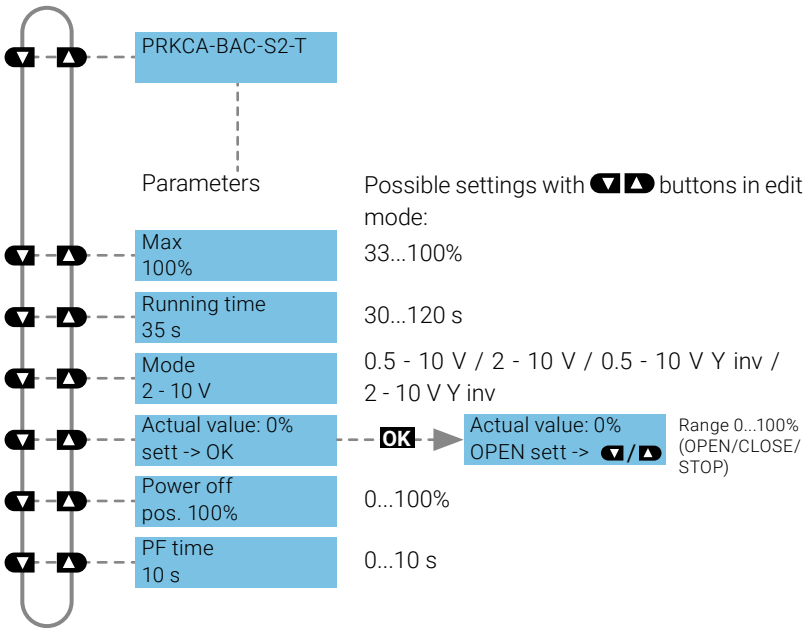


Functions for butterfly valve actuators

Menu tree

The following menu tree shows the adjustment/display options of a PRKCA-BAC-S2-T.

Setting/display options PRKCA-BAC-S2-T

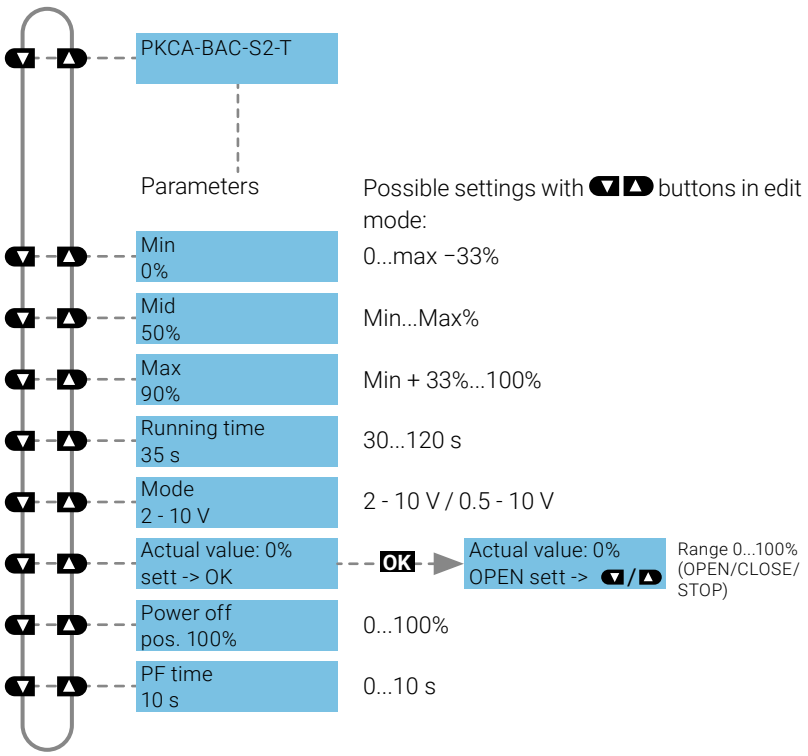


Functions for rotary actuators with high torque

Menu tree

The ZTH EU automatically detects the device family of the connected device. The menu and the adjustable options are displayed according to the connected device.

Setting/display options PKCA-BAC-S2-T

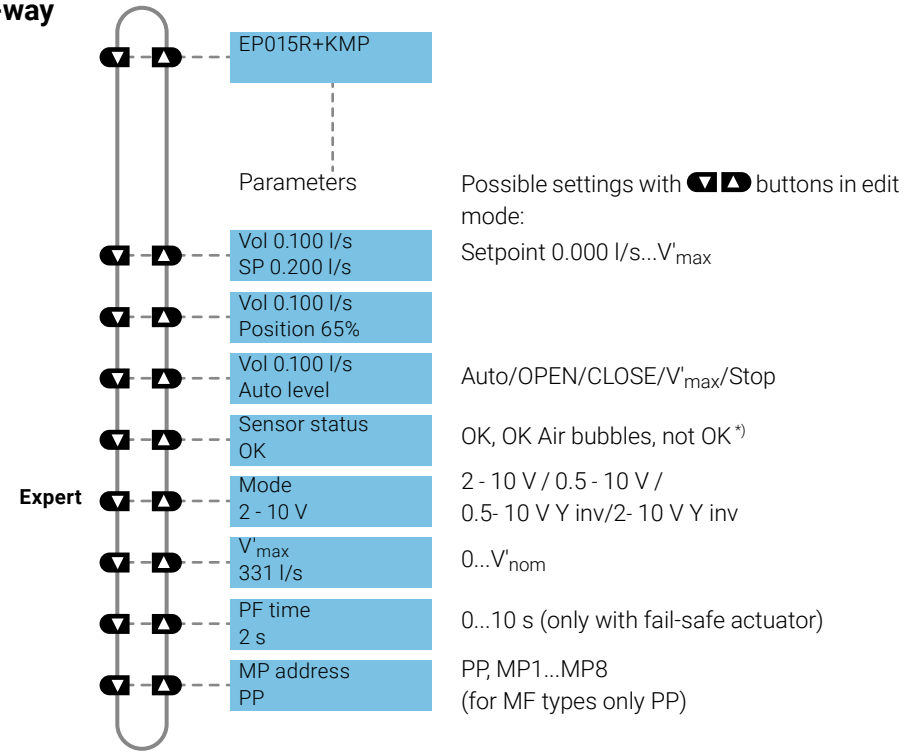


Functions for 2-way EPIV electronic pressure-independent characterised control valve

Menu tree

The following menu tree shows the adjustment/display options of an EP015R+KMP.

Setting/display options for 2-way EPIV electronic pressure-independent characterised control valve



*) O.K.:
O.K. Air bubbles:
not O.K.:
– Flow sensor works correctly
– Flow sensor is working correctly, air bubbles in the system
– Sensor malfunction

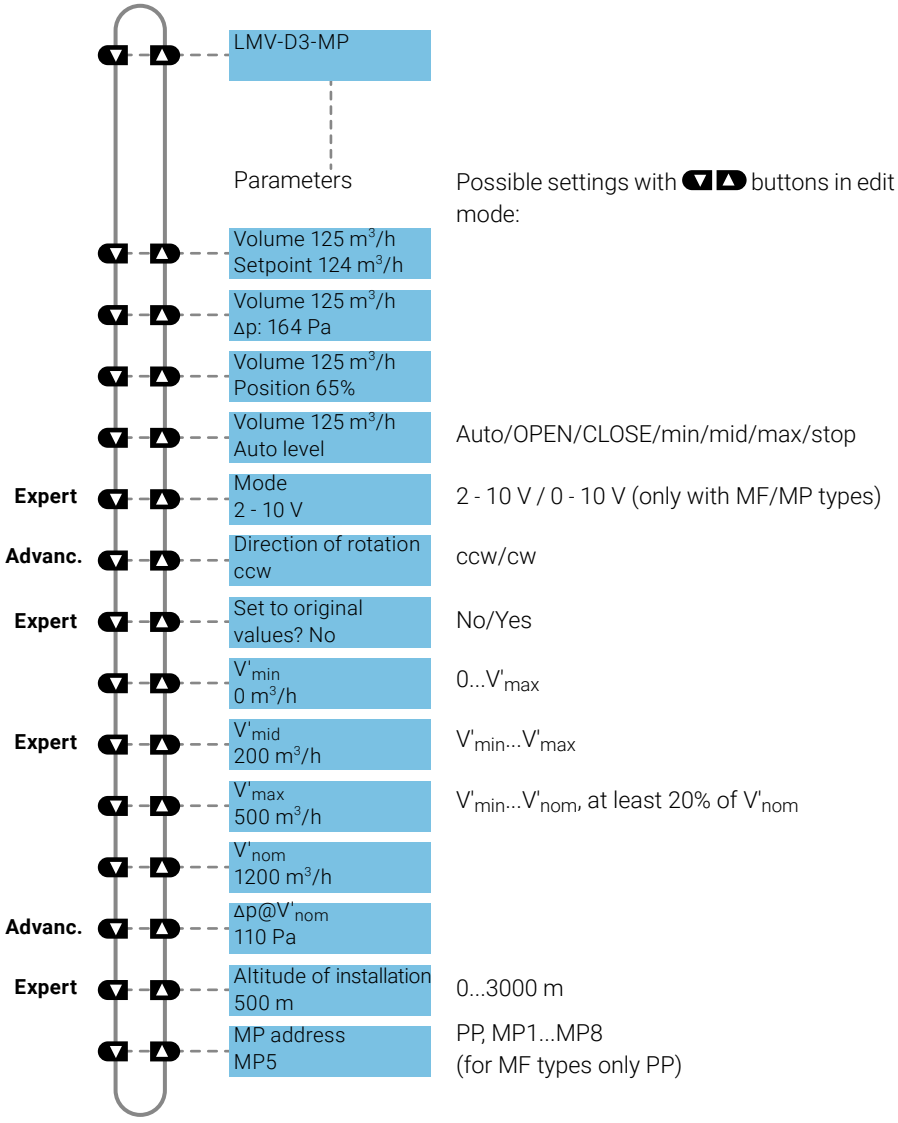
Functions for VAV product range

Menu tree

The following menu tree corresponds to the menu control of the new generation VAV-Compact D3:
L/N/SMV-D3-MP, LHV-D3-MP, L/NMV-D3LON, L/NMV-D3-MOD, LHV-D3-MOD [1], L/NMV-D3-KNX, LHV-D3-KNX.

[1] Modbus settings – see previous description, "Basic functions for Modbus actuators"
[2] Volume display in m^3/h at defined V'_{nom}. Volume display with undefined V'_{nom} in %.

Setting/display options, LMV-D3-MP



Deviations

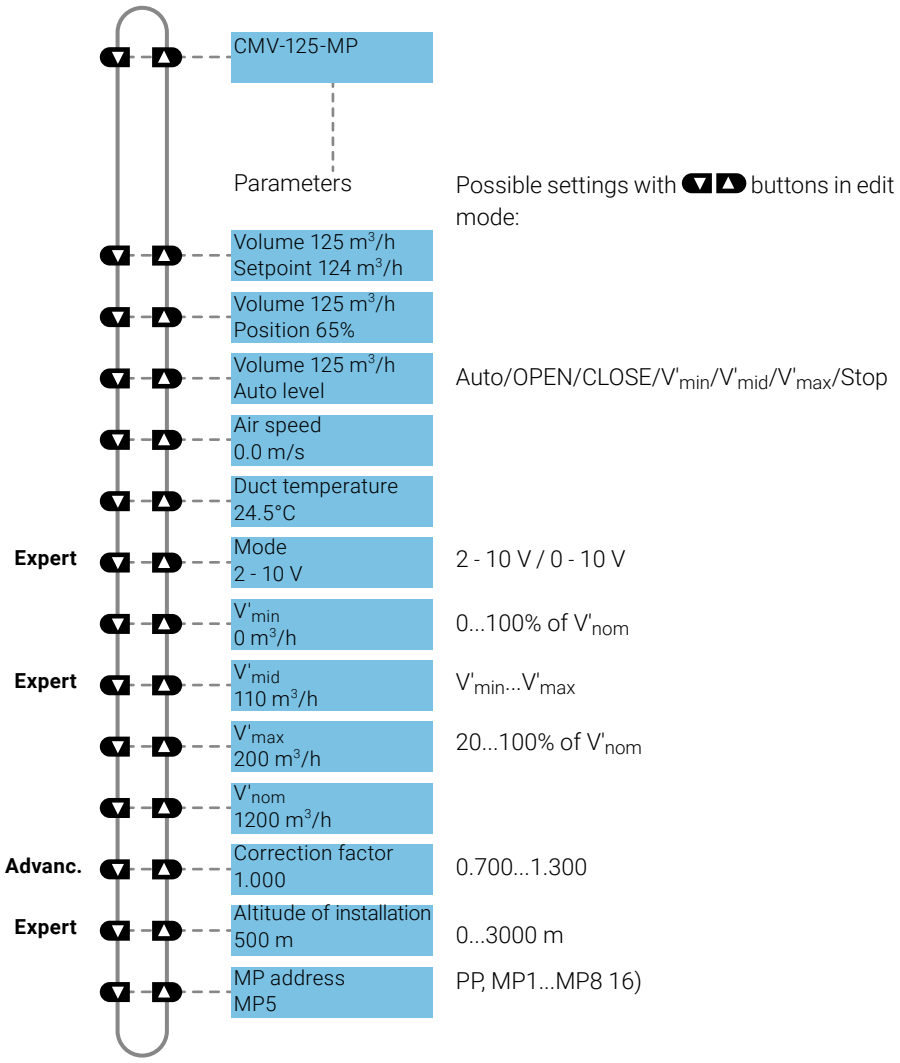
VRD2 (1992–2007)	Display of actual value/ setpoint in [% V'_{nom}] V'_{min} in [% V'_{max}], V'_{max} in [% V'_{nom}]	Read only	PP
VRD3 (as of 2008)	Display of actual value/ setpoint in [% V'_{nom}] V'_{min} in [% V'_{nom}], V'_{max} in [% V'_{nom}]	HW potentio-meter setting tool -> Read/write, otherwise -> Read only	PP
VRP-M VAV	up to V2.16 as of V3.0 V'_{min} in [% V'_{max}], V'_{max} in [% V'_{nom}] V'_{min} in [% V'_{nom}], V'_{max} in [% V'_{nom}]	VAV	PP / MP1…8
NMV-D2 (1992–2000) **NMV-D2M** (2000–2006)	Display of actual value/ setpoint in [% V'_{nom}], V'_{min} in [% V'_{max}], V'_{max} in [% V'_{nom}]		PP PP / MP1…8
Altitude compensation	The function is only available with VAV-Compact D3 as of firmware V2.06 (03/2013)		

Functions for CMV actuators

Menu tree

The following menu tree corresponds to the menu control of the CMV-..-MP VAV control system.

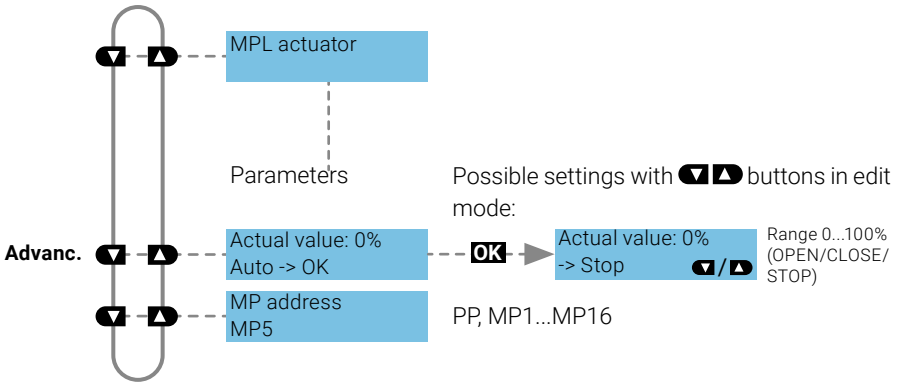
Setting/display options CMV-..-MP



Functions for MPL actuators

Menu tree

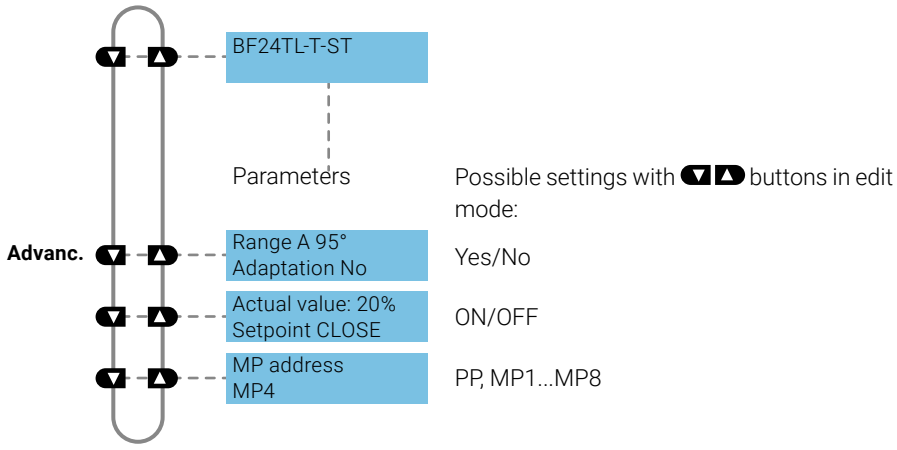
Setting/display options, MPL actuator



Functions for BF-TopLine fire damper actuator

Menu tree

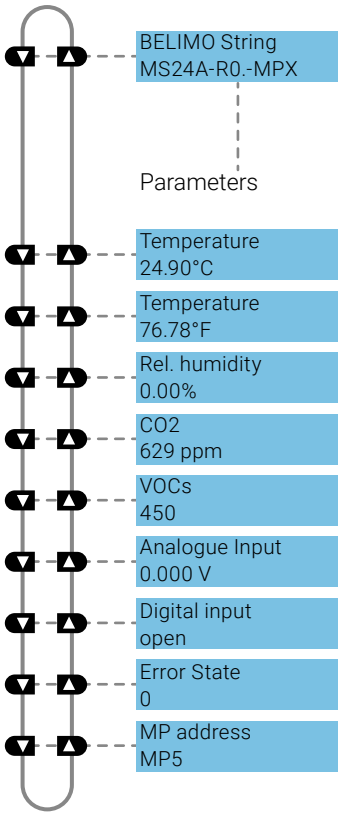
Setting/display options BF-TopLine actuator



Functions for room sensors MS24A-R0x-MPX

Menu tree

Setting/display options, room sensor MS24A-R08-MPX (T, rH, CO2, VOC)



Possible settings with ▼ ▲ buttons in edit mode:

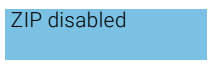
- Measured value 0.00...50.00°C
- Measured value 32.00...122.00°F
- Measured value 10.00...90.00%
- Measured value 0...2000 ppm
- Measured value 0...2000 (pseudo ppm)
- Measured value 0.000...10.000 V
- open/closed
- 1,2,4,8 see data pool value
- PP, MP1...MP8 (16)

ZIP functions

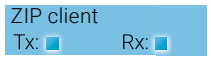
Note:
When the ZTH EU is connected to the PC, the display flashes a few times until the driver is installed on the PC.

In this configuration, the ZTH EU functions as a level converter between the USB interface of a PC and the MP device from Belimo. The correct driver will be automatically installed on the PC when the ZTH EU is plugged in. As soon as the USB interface is connected, the ZTH EU switches to ZIP mode.

ZIP disabled



ZIP client



Connection as MP client (e.g. PC-Tool). If there is bus communication, this is indicated by Tx and Rx flashing.

ZIP Monitor

Connection for monitor function with PC-Tool. If there is bus communication, this is indicated by Rx flashing.

Diagnostics function power supply

Checking the power supply

The ZTH EU allows the "AC 24 V" power supply (III protective extra-low voltage (PELV)) of the Belimo devices to be checked. Voltages >30 V are not permitted! Application: e.g. commissioning, troubleshooting in the event of a fault.

Measuring process

Equipment: ZTH EU, ZK2-GEN
Make the connection in the following order:
– Connect free wires of the ZK2-GEN to AC 24 V
– White to GND (connection 1 MP node)
– Blue on ~ (connection 2 MP nodes)
– Do not connect turquoise
Start:
Press the (OK) button on the ZTH EU and connect the RJ12 connector plug at the same time.
Select the "AC measurement" function with the arrow key (▼).
Finishing:
Disconnect RJ12 connector plug or exit "Configuration" function (ESC).

Note:
Do not connect RJ12 plug to ZTH EU until the time of starting!

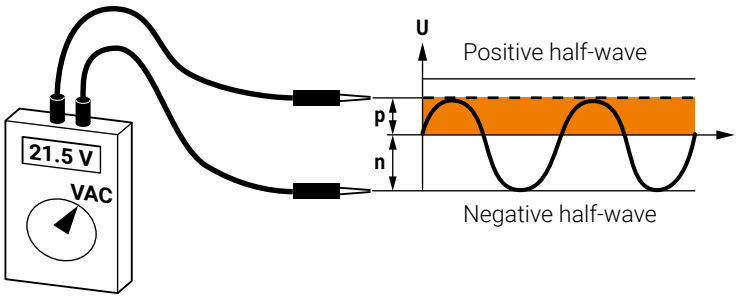
Display

Supply OK
AC 25 V, VHW: 85%

Quality:
Supply okay: VHW >80% and AC supply in the range 19.2 ... 28.8 V
Supply low: VHW <80% and AC supply <19.2 or >28.8 V
AC value:
Measured AC voltage (accuracy ±1.0 V provided that VHW >95%)

Explanation VHW

The unit VHW describes the ratio between positive and negative half-wave. The deviation between the positive and negative half-wave values must not be too large.
The following formula applies: Positive HW/negative HW x 100 should be >80%:



Possible problems
The following points influence the half-wave load:
– Transformer dimensioned too small in size
– Long signal cable length transformer to MP node

Diagnostics function MP tester/MP-Bus level

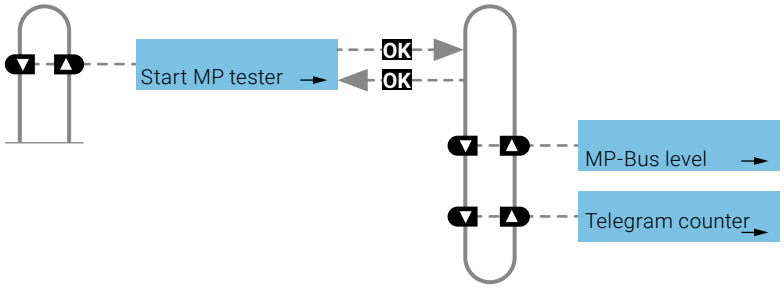
MP tester

The ZTH EU offers the following options with the MP tester function:
– Determines the MP-Bus level at the MP client and also at the MP server nodes
– Checking the MP-Bus communication on the basis of the counting of the telegrams

Selection

The MP tester function can be selected in the Configuration menu of the ZTH EU.

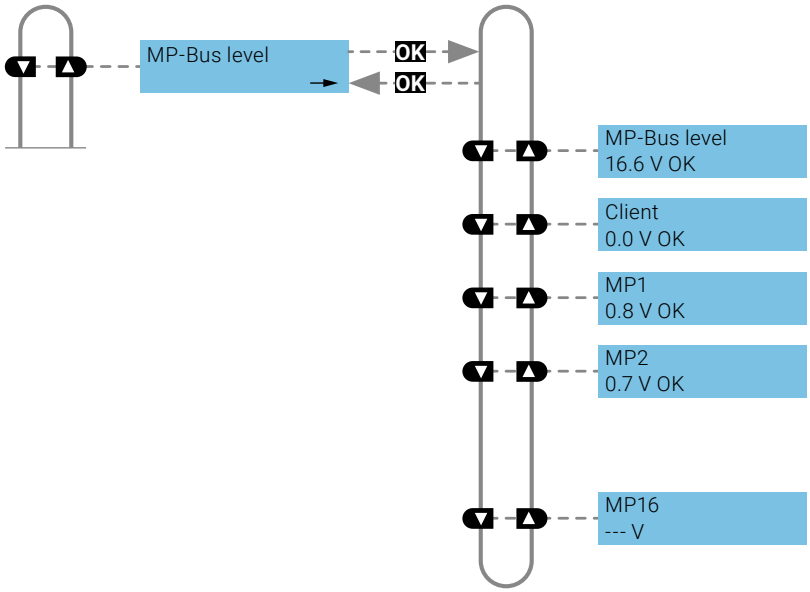
Configuration menu



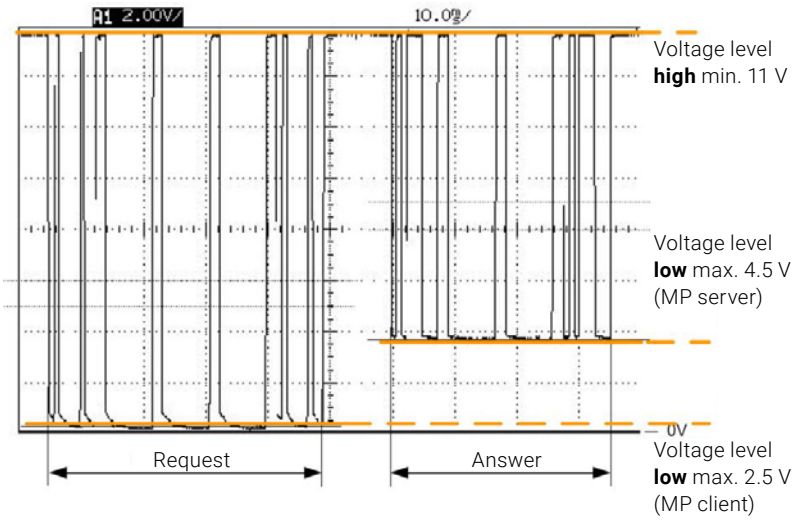
MP-Bus level

The MP signal levels from the MP client and the MP server nodes are measured against GND and compared with the limit values of the protocol specification.
The following values are checked:
– Signal level HIGH (identical for request and answer telegram)
– Signal level LOW for request telegram of the client
– Signal level LOW with answer telegram of the server (MP1 … MP16, PP)
The signal levels can be measured at any location. It is recommended to take measurements at different positions (e.g. control cabinet and bus end).

Menu tree MP-Bus level



Interpretation of the measurements



MP-Bus level	OK: not OK:	Signal level >11 V Signal level <11 V
MP client level	OK: not OK:	Signal level <2.5 V Signal level >2.5 V
MP server level	OK: not OK: ---V:	Signal level <4.5 V Signal level >4.5 V No MP server nodes detected and/or connected

Possible causes

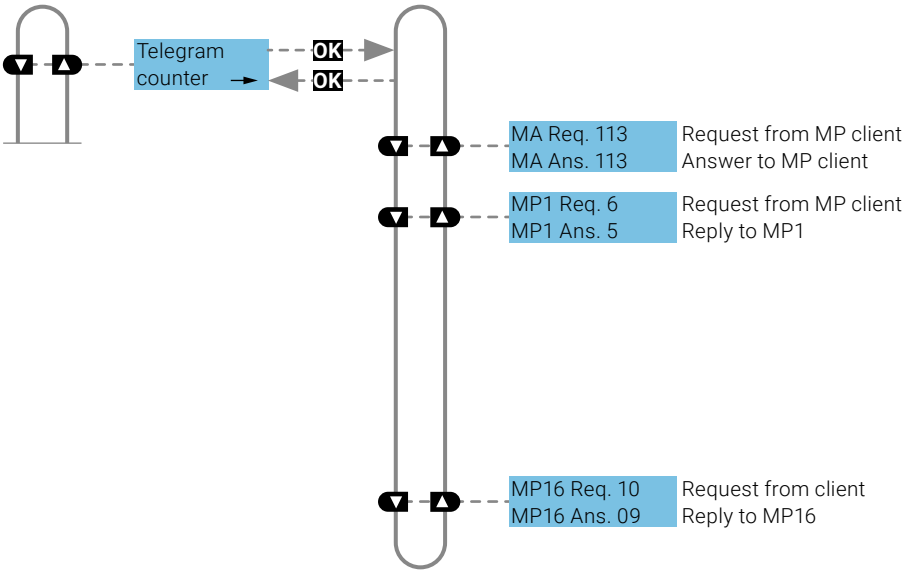
– Incorrect cable dimension
– Signal cable lengths too long
– Node does not answer (---V)

Diagnostics function MP tester/telegram counter

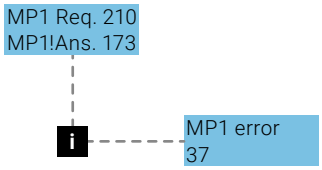
Telegram counter

The number of telegrams is recorded and the telegram correctness (checksum) is also checked. The number of telegrams per node varies and depends significantly on the function profile of the nodes. VAV controllers, for example, have a larger amount of information than damper/valve actuators, which is why more communication is usually done with this type of node.

The following menu tree shows the display options of the telegram counter function.



If it is determined that telegrams are being erroneously conveyed, then this will be indicated visually with a "!" as a mark of mistrust.
Erroneous telegrams are not counted as answers.



The number of erroneous telegrams of both the MP client and the MP server can be displayed using the "i" information button.

Function

The registered erroneous telegrams are identified separately for the nodes (MP1...MP16, PP and MA). The absolute number of errors must always be judged in relation to the total number of telegrams or the number of telegrams per node, respectively. Erroneous telegrams are ignored by the client/server nodes and the MP requests from the client are repeated if necessary, which is why low error rates (<5%) require no further clarification. In case of high error rates or proven communication difficulties, a detailed analysis with the MP monitor is required.

Possible causes

– A high error rate can indicate insufficient signal levels (see "MP-Bus level" function).
– The MP command set used is not compatible with the node.
– An actuator expected by the MP client is not connected or not addressed

MP1 Req. 210
MP1 Ans. 0

If no answer is received from an MP server node,
– … then no MP server node is connected at the address listed
– … or the MP server node cannot be reached at the address listed.

MP-Bus total failure

In the event of a total MP-Bus failure, no activity can be detected with the MP-Bus tester. Neither requests from the client nor answers from the server are registered. In the event of a total failure of MP-Bus communication, the following points must be checked:
– Disconnect the MP client from the bus and secure the client activity separately with the MP-Bus tester.
– Check the wiring of all of the nodes:
  – Is connection wire 1 (⏚) wired correctly to the bus?
  – Have the connection wires 1 (⏚) and 2 (⏦) not been switched?

Diagnostics function MP tester/RT monitor

RT monitor function

Belimo internal function for real-time analysis of MP networks.

Further checks

MP monitor

The MP monitor is installed with the Belimo PC-Tool and can be started either directly or via PC-Tool. Depending on the type of check, the MP monitor can be operated either in Applications mode or in Command mode. The use of the monitor has no influence on system function (passive participant).

Belimo PC-Tool

The installed MP client is temporarily replaced by a "standardised" MP client when the PC-Tool in scan mode.

MP client

In the case of the freely programmable MP client, the programming (application software) must be checked. In particular, the correct mapping of the MP addresses on the function modules is to be observed and the version of the components used (e.g. module library) is to be checked.

Installation

The installation is to be checked for wiring errors (e.g. 24 V and GND connections were switched) and loose terminal connections (loose contact). The possibility of EMC interference sources (antennas, frequency converters, …) in the range of the MP network must be taken into account at the same time.

MP-Bus design

It is possible to check the correct layout of the MP network using the MP cable length calculator on the Belimo homepage.

Firmware upgrade

The ZTH EU can be updated to the latest firmware version with the ZTH EU-Update. The required software and the instructions for the upgrade can be downloaded in the download section of the Belimo homepage www.belimo.com.

Compatibilities

Function and handling

The ZTH EU contains the complete functionality of all previous versions of the ZTH-GEN and the ZTH-VAV.

However, the hardware of the ZTH EU is not compatible with the hardware of the ZTH-GEN. The updates for the ZTH-GEN cannot be loaded onto the ZTH EU.

Note:
For current information on firmware upgrades, version overviews, documentation:
see www.belimo.com

In addition, the new ZTH EU supports the ZIP-USB function. This can be used for updates of the ZTH EU and also with the PC-Tool as level converter USB/MP.

ZEV

The ZEV service tool (1992 to 2007) is superseded by the ZTH EU.

ZTH-VAV

Is superseded by the ZTH EU.

ZTH-GEN V2.xx / V3.xx / V4.xx

Is superseded by the ZTH EU.

Version overview

V 2.09

Addition: BACnet settings for MOD actuators added
– Addition: Function setpoint source for MOD actuators added
– Supplement: VAV TypeList
– New devices: Support for PM../PK.. actuators added
– Error correction: Detection of PM.. actuators
– Error correction: Behaviour V'_{min} and V'_{max} when connecting NMV-D2
– Error correction: Improved write and save process of Modbus and BACnet parameters to the actuator

V 2.08

New devices: Support for PRKC.. actuators added
– Supplement: Control mode function for PR.. actuators
– Error correction: Display for PR.. actuators

V 2.06

Addition: VAV: Function "Set V'_{min}/V'_{max} to original values" also available in Expert Mode:
– Addition: "Fail-safe position" for PR.. actuators with SuperCap added
– New devices: Support for EP..R-R6+BAC actuators added
– New devices: support for PR.. actuators added

V 2.05

Display of small flows optimised (EPIV):
– Supplement: Unit l/s for valve actuators
– New function: MP tester with MP level measurement and telegram counter
– Error correction: Failure of LCD display with low ambient temperature
– Error correction: Override is not set with BF-Top actuator

V 2.03

Device identification for VRD2/NMV-D2 corrected

V 2.02

New devices: Support for PRKC.. actuators added
– Error correction: Display for PR.. actuators
– Supplement: Control mode function for PR.. actuators

V 2.01

Enabling the ZTH and ZIP function

All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Actuators, valves and sensors represent our core business.

Always focusing on customer added value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

- 5-year warranty
- On site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

EN – 2022-02/A – Subject to technical modifications

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