

Service tool for parameterisable and communicative actuators / VAV controllers and HVAC performance devices from Belimo.

- Connection via service socket on the device or MP/PP connection
- ZIP USB function



## Technical data

Electrical data	Nominal voltage	AC 24 V, 50/60 Hz, DC 24 V (from actuator)
	Operating range	AC 19.2...28.8 V / DC 21.6...28.8 V
	Power consumption    Operation	1 W
	Connection	Socket for connecting cable ZK1-GEN (3 m) supplied with connector
	Interface USB 2.0	USB socket type B, connecting cable (1 m) with socket A to B supplied
	Optional cables	ZK2-GEN, ZK6-GEN
Interface	Communication	Point to Point (PP), no bus mode possible (MP)
	Operating modes	Parameterisation
		Point to Point (PP) Connection using service socket or connecting terminals on the actuator
MP level converter (ZIP function)		Connection in control cabinet or via service socket on actuator
		For MP monitor operation, connection on MP-Bus
Operation	LCD display	2 x 16 characters, with background lighting
	Keys	i / esc / / / OK
Safety	Protection class	III Safety extra-low voltage
	EMC	CE according to 2004/108/EU
	Operating temperature	0...50 °C, non-condensing
	Non-operating 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 must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- **Only connection to Belimo devices with 24 V safety extra-low voltage and PP/MP interface permitted.**
- Changes to parameters etc. may only be performed following consultation with/specification from the OEM, device or mechanical/electrical contractor. Operating and adjustment regulations must be observed.

## Definitions

ZTH EU	The ZTH EU is sold worldwide. Therefore the product name for the European region is defined as ZTH EU. In the product information, the term ZTH is used to represent the ZTH EU.
Actuators	For simplicity in the product information, the terms actuators, VAV controllers, fire damper actuators and HVAC performance devices are summarised using the term actuators.

## Supported devices

Damper product range	..-MF / ..-MP / ..-MPL / ..-MFT(2) / ..-MOD / ..LON	
Valve product range	..-MF / ..-MP / ..-MPL / ..-MFT(2) / ..-MOD / ..LON	
EPIV - pressure-independent characterised control valve	P6..W..-MP / EP..R(..)+MP	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 since 2005
	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
HVAC performance devices sharedlogic	According to system description (e.g. Energy Valve)	
	According to system description	

## Connection

## Connection and supply

The ZTH EU is supplied via the actuator. The connection is set up

- either directly on the service socket of the actuator
- or via PP/MP connection (U5), e.g. connection socket, control cabinet and room controller CR24

## Type of connection and connection cable

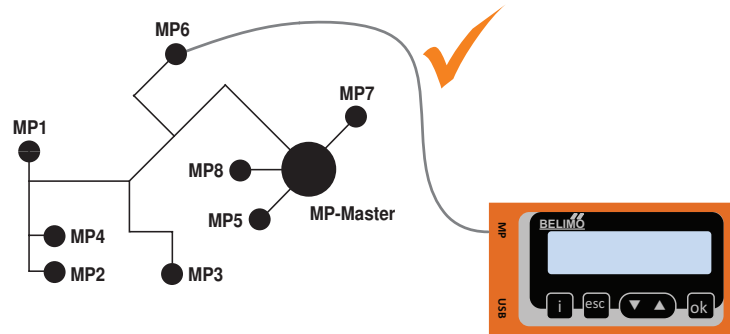
## Suitable cable

	ZK1-GEN
	ZK2-GEN
	ZK4-GEN
	ZK6-GEN

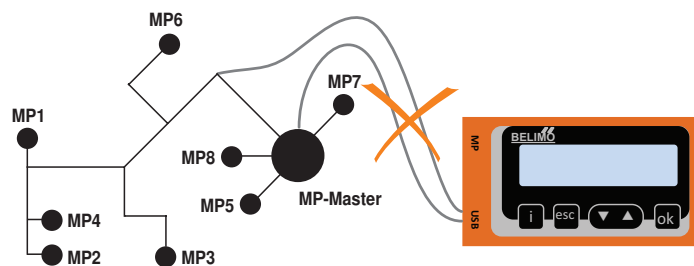
### Connection for ZTH adjustment and diagnostic device

Direct connection to the MP-Bus or MP master is not possible with the ZTH EU.

Right



Wrong



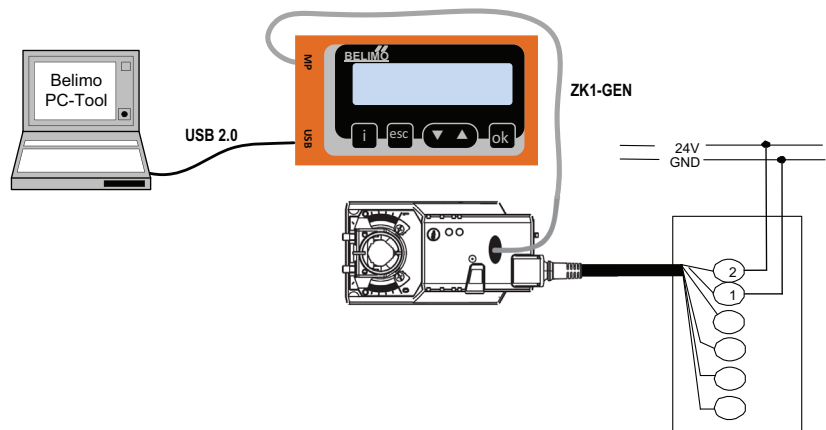
Solution: Use the service socket on the actuator or temporarily disconnect the MP connection of the MP device from the MP-Bus and connect the ZTH EU to the MP connection.

### ZIP function connection

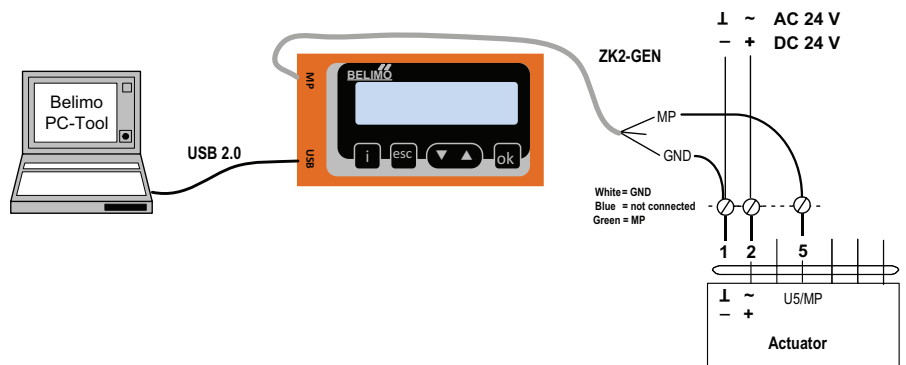
#### Note

The USB driver required will be automatically installed with PC-Tool version 3.9 or higher. For older versions of the PC-Tool, the driver can be downloaded from [www.belimo.eu](http://www.belimo.eu) and installed separately.

#### Connection via service socket - local connection with ZK1-GEN cable



#### Connection via connecting cable - local connection with ZK2-GEN cable



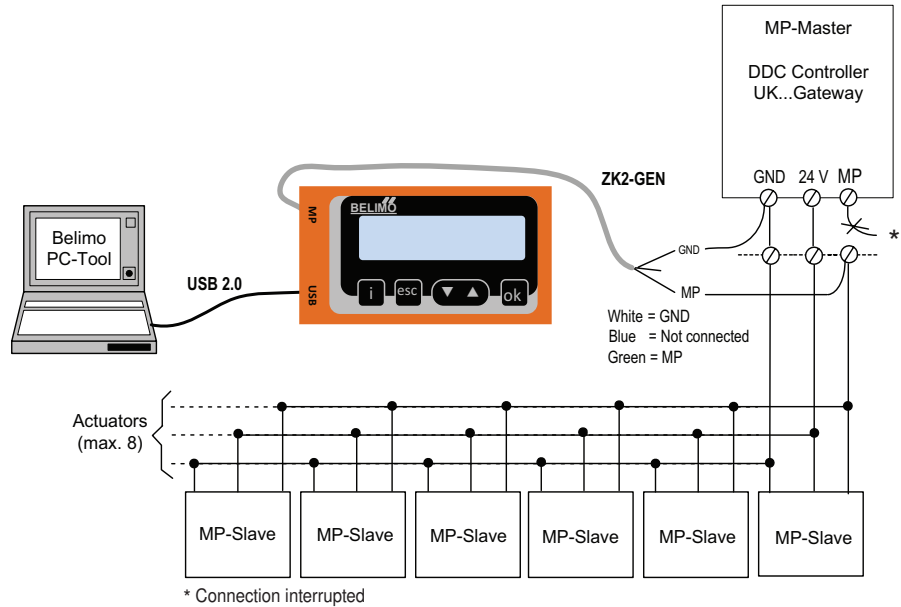
## ZIP function connection

**PC-Tool as MP master**

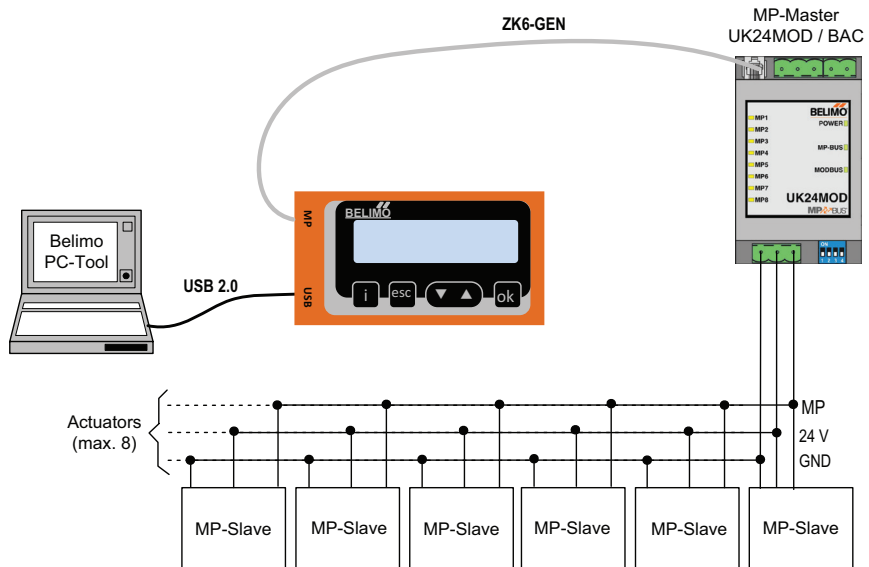
- Actuator parameterisation via MP-Bus
- Specification of setpoints for simulation of actuators via MP-Bus
- Reading in of sensors that are connected to the MP actuator
- Recording of graphic trends

**Note**

\* Interrupt connection between ZTH EU and MP master before using the ZIP function.

**PC-Tool connection with ZK6-GEN, ZK4-GEN on Belimo gateways**

- For connection to UK24MOD and UK24BAC, use the ZK6-GEN cable.
- For connection to UK24EIB and UK24LON, use the ZK4-GEN cable.



## Connection with ZIP function

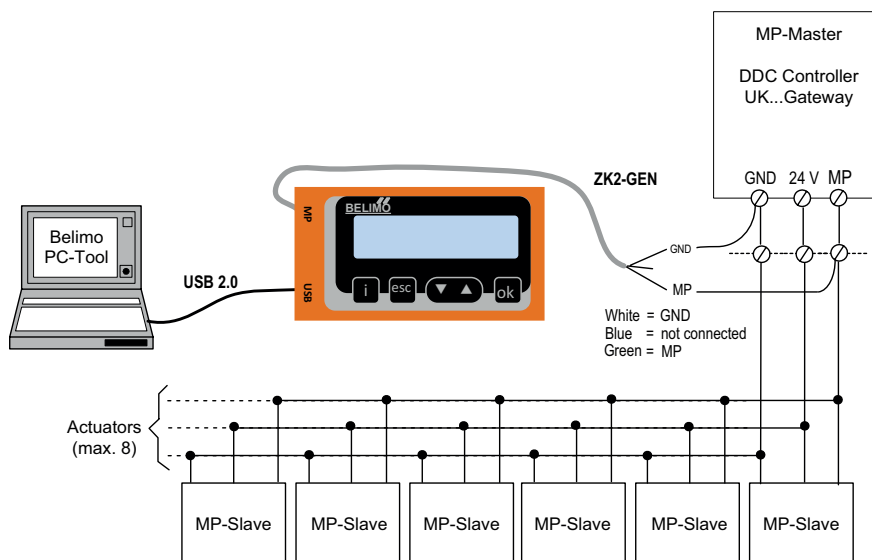
## PC-Tool as monitor

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

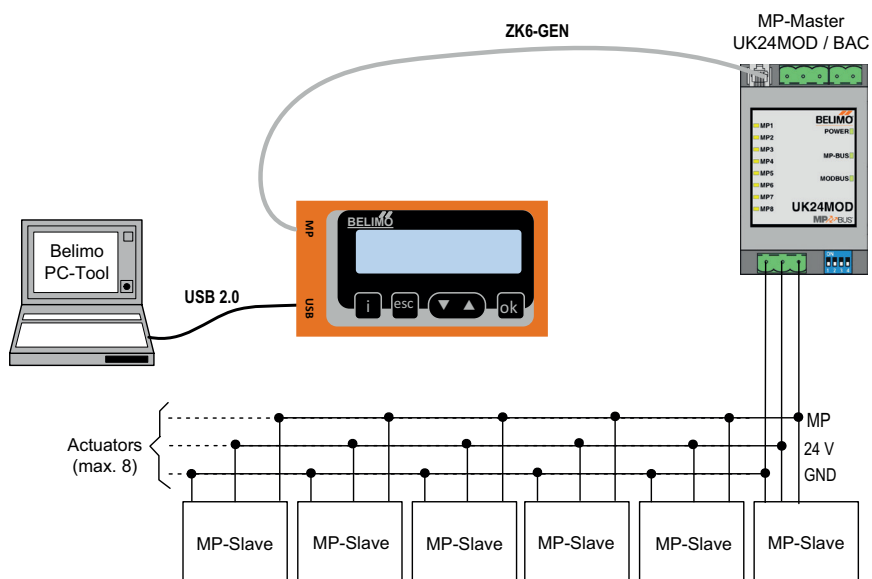
C:\Program Files\Belimo\Belimo PC Tool V3.2\mp\_mon.exe

MP-MONITOR <V3.1>											COM8	MODE3	D: disable	BACKSPACE: clear	ESC: exit	
Address											Type		Designation		Position	
Series-No		Override	Stpt	Act_pos	Range	Act_vol	Unom	Min_Max		t_run	String	Direction				
Sensor		MM	State	Adapt/Snyc/Test												
MP1																
00533-30012-142-128				LM24A-MP		1.0G		B³ro 2		40s		CW				
NONE		79*		79%		95.1°		0%_100%								
7.9U		00000000														
MP2																
00533-30009-142-128				LM24A-MP		LM24A-MP		Inlet damper		35s		CW				
NONE		79		79%		95.3°		0%_100%								
OFF		00000000														
MP3																
00543-10271-142-143																
CLOSE		0		0%		94.9°		0%_100%		35s		CW				
0.3U																

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

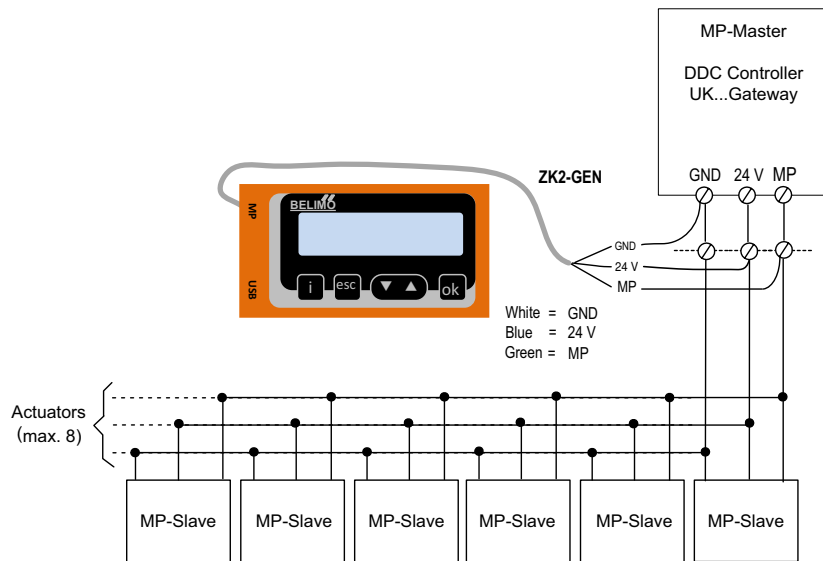


## PC-Tool with monitor function / connection: tool socket with ZK6-GEN, ZK4-GEN

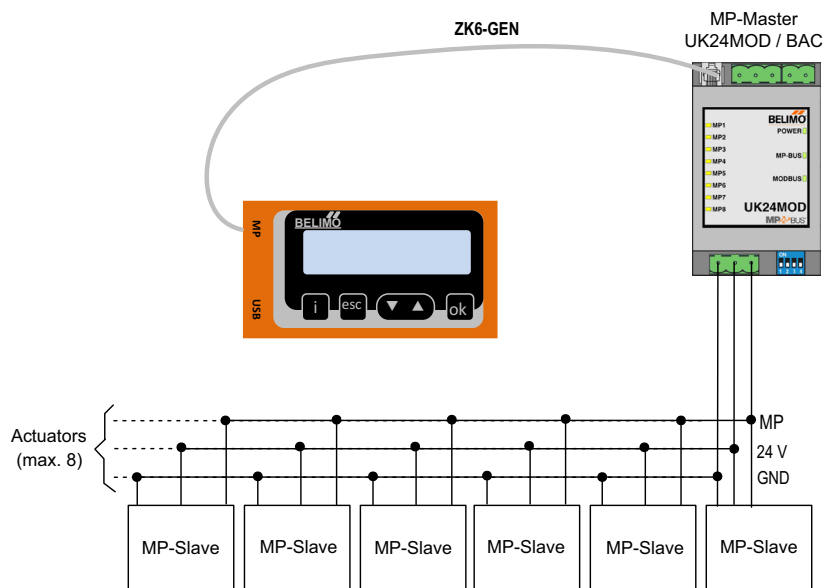


## MP tester connection

## MP-Bus direct ZTH connection



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



## Operation

When the ZTH EU is connected to the Belimo actuator, the operating device starts and data is read from the connected device. The available adjustment and operating options are displayed in accordance with the device type. The available setting parameters are listed in the product documentation for the actuators. See [www.belimo.eu](http://www.belimo.eu)

### Operating elements

#### LCD display

- Background lighting
- Display with 2 x 16 characters

#### Key function

- ▼ and ▲ Forward /backward  
Change value / status
- OK Confirm entry,  
go to submenu
- esc Abort entry,  
leave submenu,  
discard change
- i Shows additional information  
(if available)



- RJ12 connection socket
- USB connection socket for communication with PC

### Language setting, unit depiction

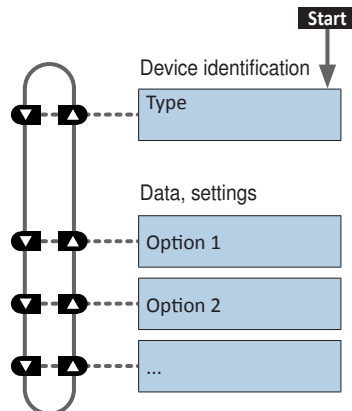
Language and units can be set in the Configuration menu.

### Operation

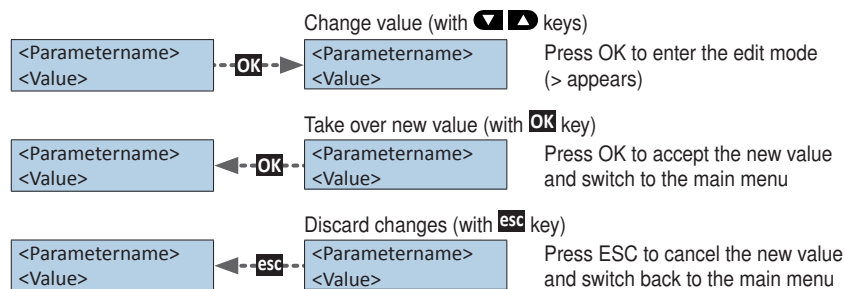
Operating is context-related, i.e. the user sees only the options available for the connected device. The corresponding Configuration table is read from the actuator for this purpose. In addition to the parameter type, this table also contains the corresponding divisions, e.g.: minimum running time which can be set, 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 / ending

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

### Device specifications/Technical data

For a more detailed description, including setting parameters, please refer to the respective separate product information. See [www.belimo.eu](http://www.belimo.eu) | Documentation.

## Configuration

- Starting configuration**
1. Press the key (OK) while simultaneously plugging in the connecting cable.
  2. Configuration menu display appears.

### Configuration menu

Option / Display	Setting	Product range	Explanation
Empty cache	Yes / No		Function to delete data profiles of HVAC performance devices from the local cache
Backlight	After 0.. 255 sec off / always active		Setting for duration of backlight in seconds
Show favourites	Disabled / after 1...65535 s	HVAC performance devices (Energy Valve)	Alternating display of the first 3 values after the set time
OEM number	0...65535	VAV	
Advanced Mode <sup>1)</sup>	Yes / No	VAV Fire protection Modbus	Enabled settings: – VAV: direction of rotation – VAV: set Vmin / Vmax to original values (call up OEM setting) – CMV: Correction factor – BF-Top: adaption – Modbus: basic address
Expert Mode <sup>1)</sup>	Yes / No	VAV Valves	Enabled settings: – VAV: switching mode – VAV: Vmid parameter – VAV: altitude compensation
PICCV function	Yes / No	Valves	Belimo US: Enable PICCV Wizard function
Start RT-Monitor	RTMonitor active		Realtime monitor function
Start MP tester	MP-Bus level / Frame counter		MP tester function
Power supply measurement	Value V (AC) VHW (%)		
Pressure unit	Pa / in WC	VAV	
Flow unit (water)	m3/h / l/min / gpm / l/s	Valves	
Flow unit (air)	m3/h / l/s / cfm	VAV	
Exit configuration	ESC		

<sup>1)</sup> Only activate this option as needed and with the respective know-how. Adjustment of the respective parameters requires special expertise.



## Functions for VAV product range

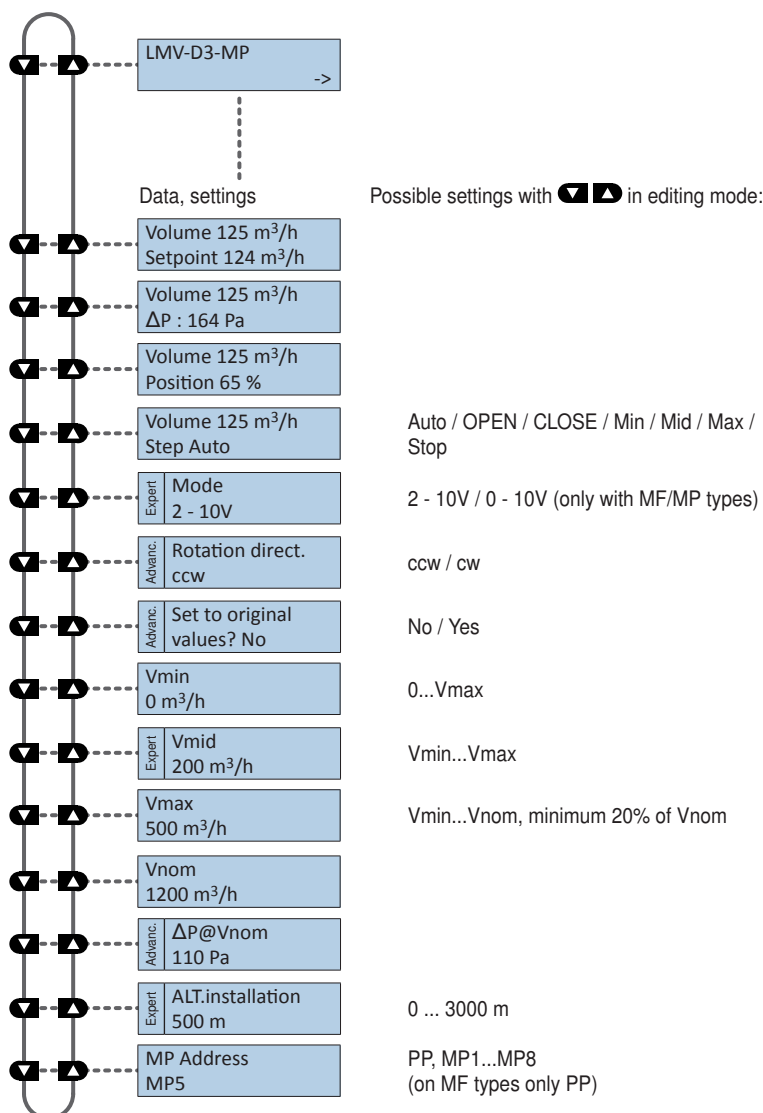
## Menu tree

The following menu tree corresponds to the new VAV-Compact D3 generation: L/N/SMV-D3-MP, LHV-D3-MP, L/NMV-D3LON, L/NMV-D3-MOD, LHV-D3-MOD <sup>1)</sup>, L/NMV-D3-KNX, LHV-D3-KNX.

1) For Modbus settings, see previous description of "Basic functions for Modbus actuators"

Adjustment/display options  
LMV-D3-MP.**Note: VAV-Universal actuators**

The V-actuators L/N/SM24A-V, L/NMQ24A-SRV-ST, which fit the VAV universal controllers VR..., have a tool connection but are nevertheless not tool-capable.



Deviations	VRD2 (1992-2007)	Display showing actual value/setpoint in [% Vnom] Vmin in [% Vmax], Vmax in [% Vnom]	Read only	PP
	VRD3 (as of 2008)	Display showing actual value/setpoint in [% Vnom] Vmin in [% Vnom], Vmax in [% Vnom]	HW potentiometer setting Tool → Read/write, otherwise → Read only	PP
	VRP-M VAV	Up to V2.16 As of V3.0 Vmin in [% Vmax], Vmax in [% Vnom] Vmin in [% Vnom], Vmax in [% Vnom]		PP / MP1...8
	NMV-D2 (1992 – 2000) NMV-D2M (2000 – 2006)	Display showing actual value/setpoint in [% Vnom], Vmin in [% Vmax], Vmax in [% Vnom]		PP PP / MP1...8
	Altitude compensation	This function requires VAV-Compact D3 with firmware V2.06 (03/2013) or higher		

## ZIP functions

### Note



If 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 works as a level converter between the USB port of a PC and the Belimo MP device. 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 disabled

### ZIP Master

ZIP Master  
Tx:  Rx: 

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

### ZIP Monitor

ZIP Monitor  
Tx:  Rx: 

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

## Diagnose function power supply

### Checking the power supply

The ZTH EU allows the "AC 24 V" power supply (III safety extra-low voltage) of the Belimo devices to be checked. Voltages >30V are not permitted!

Application: e.g. commissioning, troubleshooting in the event of a malfunction.

### Note

Connect RJ12 plug to ZTH EU only when starting!

### Measuring process

Equipment: ZTH EU, ZK2-GEN

Connect in the following order:

- Connect free wires of the ZK2-GEN to AC 24 V
  - White to GND (connection 1 MP node)
  - Blue to ~ (connection 2 MP node)
  - Turquoise do not connect

### Start:

Press the ZTH EU key (OK) while at the same time connecting the RJ12 plug  
Select "AC measurement" function with arrow key (▼)

### End:

Disconnect RJ12 plug or end "Configuration" function (ESC)

### Display

Supply okay  
AC 25V, VHW: 85%

Quality: Supply OK: VHW >80% and AC supply in the range 19.2 ... 28.8 V

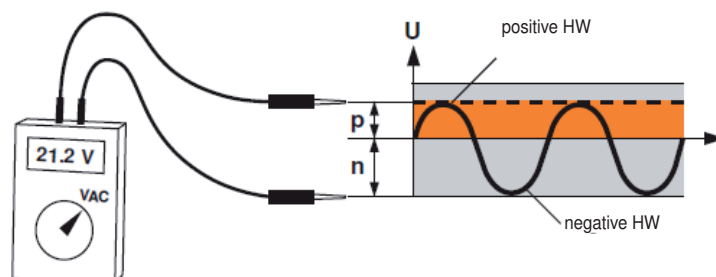
Supply low: VHW <80% and AC feed <19.2 or >28.8 V

AC value: measured AC voltage (accuracy  $\pm 1.0$  V provided that VHW >95%)

### Explanation of VHW

The VHW unit describes the relationship between the positive and negative half-wave.

The deviation between the positive and negative half-wave value must not be too great. The following formula applies: positive HW / negative HW x 100 should be >80%:



### Possible problems

The following factors influence the half-wave load:

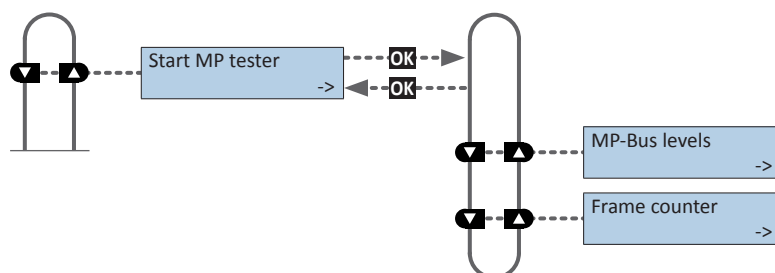
- Transformer dimensions too small
- Maximum signal cable length between transformer and MP node exceeded

**MP tester diagnostics function**

- MP tester** With the MP tester function, the ZTH EU offers the possibility of
- Determining the MP-Bus level on the MP master as well as on the MP slave nodes
  - Checking the MP-Bus communication based on the counting of telegrams

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

Configuration menu



## MP tester / MP-Bus level diagnostics function

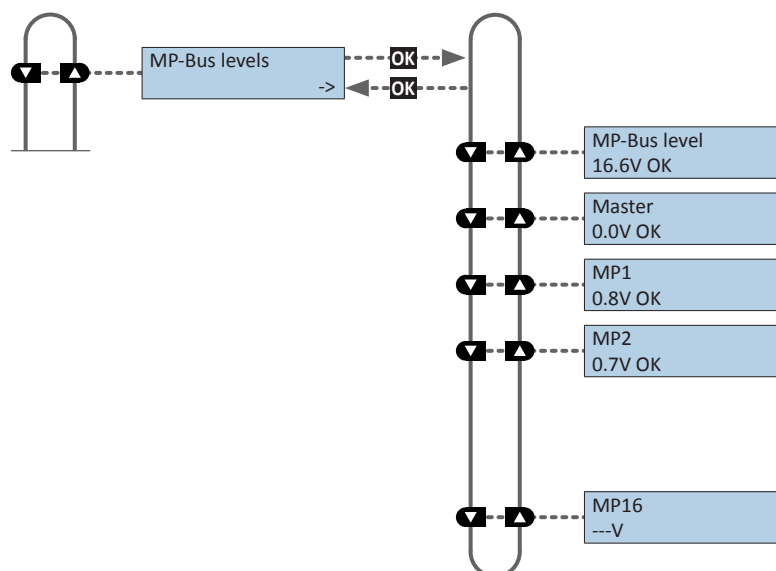
**MP-Bus levels** The MP signal levels from the MP master and the MP slave nodes are measured against GND and compared with the limit values of the protocol specification.

The following values are checked:

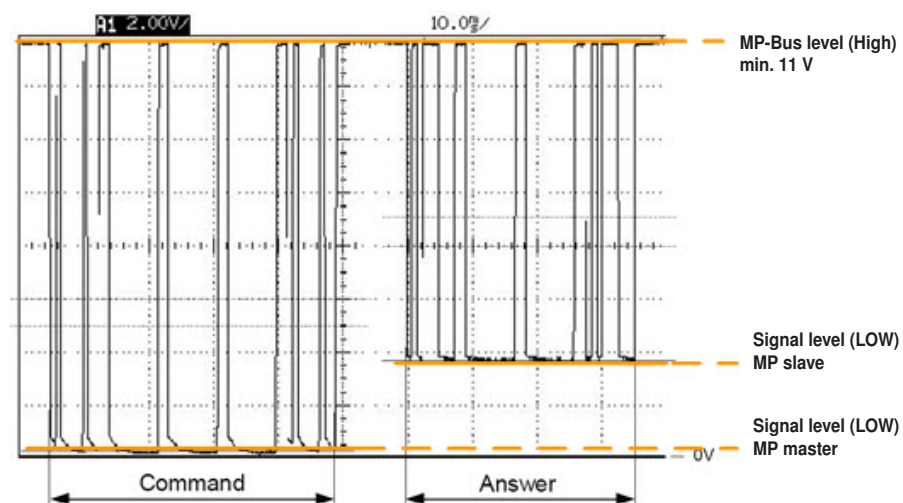
- Signal level HIGH (identical with command and answer telegram)
- Signal level LOW with command telegram from the master
- Signal level LOW with answer telegram of the slaves (MP1 ... MP16, PP)

The signal levels can be measured at any given place. It is recommended to carry out measurements at a variety of positions (e.g. control cabinet and bus end).

**Menu tree MP-Bus levels** The following menu tree shows the display possibilities of the various MP levels:



## Interpretation of the measurements



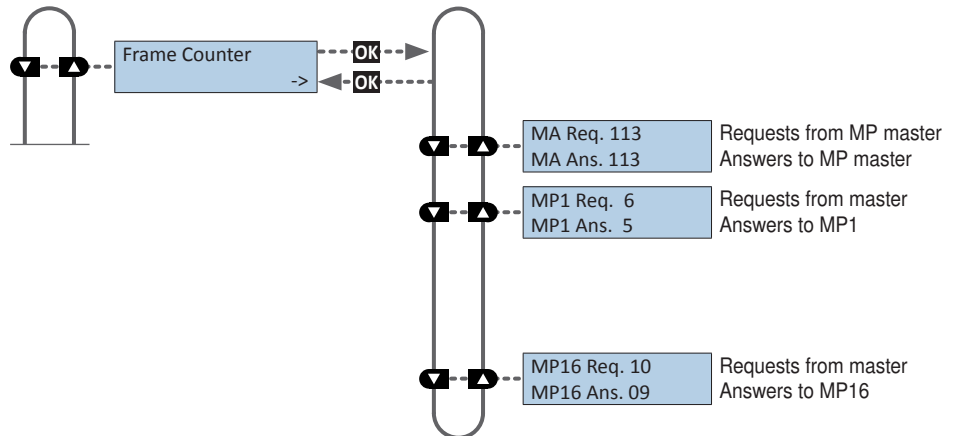
<b>MP-Bus levels</b>	OK:	Signal level >11 V
	not OK:	Signal level <11 V
<b>MP master levels</b>	OK:	Signal level <2.5 V
	not OK:	Signal level >2.5 V
<b>MP slave levels</b>	OK:	Signal level <4.5 V
	not OK:	Signal level >4.5 V
	---V:	No MP slave nodes detected and/or connected

- Possible causes**
- Incorrect cable dimension
  - Signal cable lengths too long
  - Node does not reply (---V)

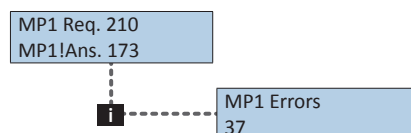
## MP tester / Frame counter diagnostics function

**Frame counter** The number of telegrams and also the correctness of telegrams (checksum) are checked. The number of telegrams per node varies and is largely dependent on the function profile of the node. VAV controllers, for example, provide a larger range of information than damper/valve actuators do, which is why usually more communication is carried out with this type of node.

The following menu tree shows the display possibilities of the frame counter function



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

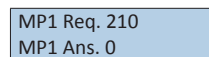


The number of erroneous telegrams of both the MP master and the MP slaves can be displayed using the "i" Information button.

**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 nodes (master/slaves) and the MP commands from the master are repeated if necessary, which is why low error rates (<5%) require no further clarification. It is only with high error rates or identified communications difficulties that a detail analysis should be carried out with the MP monitor.

**Possible causes**

- A high error rate could 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 master is not connected or not addressed.



If no answer is received from an MP slave node

- ...then no MP slave node is connected to the listed address
- ...or the MP slave node cannot be reached at the listed address

**MP-Bus total failure** In the event of a total MP-Bus failure, no activity can be detected with the MP-Bus tester. Neither queries from the master nor answers from the slaves will be registered. The following points are to be checked in the event of a total failure of MP-Bus communications:

- Disconnect MP master from the bus and secure the master activity separately with the MP-Bus tester
- The wiring at all nodes is to be checked:
  - Connection wire 1 (⊥ / -) is wired correctly to the bus
  - Connection wires 1 (⊥ / -) and 2 (~ / +) have not been interchanged

## MP tester / RT-Monitor diagnostics function

**RT-Monitor function** Internal Belimo function for enabling real-time analysis of MP networks.

## Additional checks

<b>MP Monitor</b>	The MP monitor is installed with the BELMO PC-Tool and can be started either directly or via the PC-Tool. Depending on the type of check, the MP monitor can be operated in either Application mode or Command mode. The utilisation of the monitor has no influence on the system function (passive participant).
<b>Belimo PC-Tool</b>	The installed MP master is temporarily replaced by a "standardised" MP master when the PC-Tool is in Scan mode.
<b>MP master</b>	The programming (Application program) is to be checked at the freely programmable MP masters. Particular attention is to be paid to the correct mapping of the MP addresses on the functional blocs and to the version of the components utilised (e.g. module library).
<b>Installation</b>	The installation is to be checked for wiring errors (e.g. 24 V and GND connections were interchanged) and loose terminal connections (loose contact). At the same time, attention is to be paid to possible EMC disturbance sources (antennas, frequency converters, ...) in the area of the MP network.
<b>MP-Bus design</b>	The possibility exists of checking the correct design 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 using the ZTH EU updater. The required software and the instructions for the upgrade can be downloaded from the download area of the Belimo website [www.belimo.eu](http://www.belimo.eu).

## Compatibilities

**Function and handling** The ZTH EU includes the complete functionality of all previous versions of the ZTH-GEN and ZTH-VAV.

**Note**

Latest information about firmware upgrades, version overviews, documentation:  
See [www.belimo.eu](http://www.belimo.eu)

The hardware of the ZTH EU is not however compatible with the hardware of the ZTH-GEN. The updates for the ZTH-GEN cannot be loaded to the ZTH EU.

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

**ZEV** The ZEV adjustment tool (1992 to 2007) is replaced by the ZTH EU.

**ZTH-VAV** Is replaced by the ZTH EU.

**ZTH-GEN V2.xx / V3.xx / V4.xx** Is replaced by the ZTH EU.

## Version overview

- |               |   |
|---------------|---|
| <b>V 2.05</b> | <ul style="list-style-type: none"> <li>• Display of small flows optimised (EPIV)</li> <li>• New function: MP Tester with MP level measurement and frame counter</li> <li>• Error correction: Failure of LCD display with low ambient temperature</li> <li>• Error correction: Override is not set with BF-Top actuator</li> </ul> |
| <b>V 2.03</b> | <ul style="list-style-type: none"> <li>• Device identification for VRD2 / NMV-D2 corrected</li> </ul>   |
| <b>V 2.02</b> | <ul style="list-style-type: none"> <li>• New menu "Sensor monitoring of air bubbles" for the EPIV</li> <li>• Error correction: impairment of the sensor measurement at Y3</li> <li>• Error correction: impairment of the analogue setpoint at Y3</li> </ul>   |
| <b>V 2.01</b> | <ul style="list-style-type: none"> <li>• Release of the ZTH and ZIP function</li> </ul>   |



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