

Adjustment and diagnostic tool as MP-Bus Tester.

- Connection in control cabinet
- MP/PP connection



**Brief description**

**Application** The adjustment tool ZTH-.. enables efficient diagnostics and adjustment settings of actuators and air volume controllers. A MP-Bus Tester is integrated as an auxiliary function which checks the following items:

- Power supply on MP-Bus
- Determination of active nodes (slaves)
- Determination of non-activated nodes (slaves)
- Determination of non-responding nodes (slaves)
- Evaluation of data communications (number of telegrams and error rate)
- Determination of the MP signal level (High/Low)

**Note**

The MP-Bus Tester is not suitable for the testing of the wiring by the installing electrician.

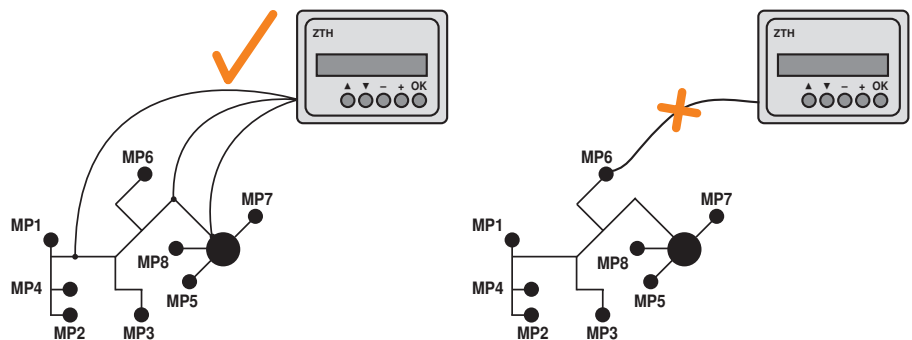
The ZTH-.. as MP-Bus Tester is utilised as a monitor (passive) during ongoing bus mode, i.e. the MP master must communicate simultaneously with the MP slaves. As an alternative, the BELIMO PC-Tool can be utilised in scan mode as MP master.

**Connection and supply**

The connection is made in the control cabinet or at any random location on the MP-Bus. The local service socket of an actuator cannot be used!

**Limitation**

Connection to the local service socket of an actuator is not possible.



**Instruction for use** The Operating Instruction describes the «MP-Bus-Tester» auxiliary function of the adjustment tool ZTH-.. and is a supplementary documentation for the ZTH-...

**Auxiliary information** For a more detailed description and the «Technical Data» of the ZTH-..., we draw attention to the separate Product Documentation under [www.belimo.eu](http://www.belimo.eu) | Documentation | Bus and System Integration.

For additional information concerning MP-Bus technology, MP products and available accessories, see [www.belimo.eu](http://www.belimo.eu) | Documentation | Bus and System Integration.

**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.
- Suitable only for connection to Belimo MP-Bus with 24V extra low voltage.

Electrical installation

Connection	Connection to	Cable type and order designation	
Terminals	ZK2-GEN		white - 1 ⊙ GND blue - 2 ⊙ ~/+ 3 ⊙ turquoise - 5 ⊙ PP
Tool plugs for: • ZN230-24MP • BKN230-24MP • UK24LON • UK24EIB	ZK4-GEN		ZK4-GEN 1 ⊙ GND 2 ⊙ ~/+ 3 ⊙ blue 5 ⊙ PP

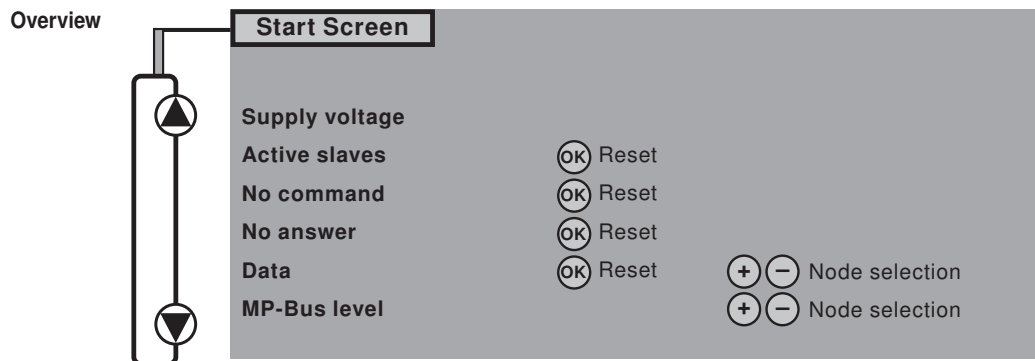
Configuration menu

In the Configuration menu, language selection is made and the «MP-Bus Tester» function is started.

Starting Configuration menu	
Action	Hold down the (OK) key and connect the MP-Bus at the same time, i.e. plug the cable into the ZTH-...
Reaction	«Configuration menu» display appears
continue with	Press key (▼) until menu entry «Start MP-Tester» appears
afterwards	Press (OK) button

In the Configuration menu one can then make the language selection (German/English). The remaining menu items are not relevant for the «MP-Bus-Tester» function.

Operating menu

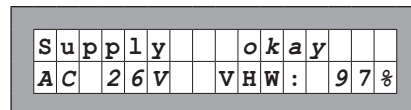


The current results are deleted with the OK key and the respective testing sequence is restarted. Each node can be tested individually in the «Data» and «MP-Bus level» testing steps with the + and – keys.

**Display** The display of the individual testing steps always involves an evaluation of *Okay* or *Error*, which is why a comparison with the specified limits can be dispensed with.

**Note**

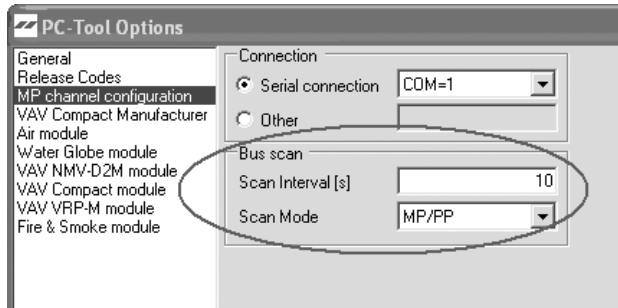
The elements in italics in the following display examples represent measurement results.



Test steps

**Precondition** The MP master must communicate actively with all of the connected slaves, i.e. the slaves must receive MP commands (requests) periodically from the master, in order to have complete inspection of the MP trunk.  
 If the MP master is not present, then the BELIMO PC-Tool can be utilised in scan mode. A scanning interval of ≤15 seconds is recommended for meaningful diagnostics.

Setting the scan interval on the PC-Tool



**Note**

The MP-Bus Tester is not suitable for the testing of the wiring by the installing electrician.

It is recommended that the MP-Bus Tester be clamped to the MP cable at the control cabinet in the first step. If necessary, the inspection can be repeated at various positions on the MP cable.

**1st Test step Power supply on MP-Bus**

This test step measures the voltage supply on the MP-Bus, which can be either AC or DC. This test cannot be performed with the 2-wire version of the MP-Bus (GND, MP), because here only the local supply (e.g. BKN230-24MP or UK24LON) is measured.

**Example:** MP-Bus with AC supply, ratio between positive and negative half-wave (VHW) is 97%

S	u	p	p	l	y			o	k	a	y			
A	C	2	6	V				V	H	W	:	9	7	%

Accuracy: ±1.0V insofar as VHW >95%

**Example:** MP-Bus with DC supply

S	u	p	p	l	y			o	k	a	y		
D	C	2	4	V									

Accuracy: ±0.5V

Possible sources of problems:

- Transformer/power supply unit designed too small
- Incorrect cable dimension
- Long signal conductor lengths
- Bad terminal connections

**2nd Test step Determination of active nodes (slaves)**

The test determines which nodes communicate with the MP master. Slaves which receive no query from the master or which do not answer these are not listed.

**Example:** Nodes with addresses MP1, MP2, MP3 and MP8 communicate with MP master

A	c	t	i	v	e	s	l	a	v	e	s		
1	2	3	.	.	.	.	8	.					

Legend	
1 ... 8, P	Node active
.	Node inactive (no query and/or no answer)

Possible sources of problems:

Test steps 3. & 4. must be carried out before a statement concerning the non-active nodes is possible.

Test steps

(continued)

**3rd Test step Determination of non-activated nodes (slaves)**

This test step determines which nodes are receiving no queries from the master. The test involves a time monitoring of the command. A change in the display with a particular node thus indicates rare queries on the part of the MP master, which need not necessarily be a problem. (Example: MP master periodically checks MP addresses which are not used in order to detect configuration changes.)

**Example:** Node with addresses MP7, MP8 and PP receive no Queries/Commands from the MP master

N	o	c	o	m	m	a	n	d											
.	.	.	.	.	.	7	8	P											

Legend	
1 ... 8, P	Node without query from MP master
.	Node receives query

- Possible sources of problems:
- Node is not configured in the master
  - MP master deactivated

**4th Test step Determination of non-responding nodes (slaves)**

This test detects the nodes which do not answer the queries of the MP master. The test involves a time monitoring. If neither a point nor a numeral is displayed for an MP address, then the node was not queried by the MP master within the time limit.

**Example:** Nodes with addresses MP4 ... MP8 do not respond, address PP is not queried

N	o	a	n	s	w	e	r												
.	.	.	4	5	6	7	8												

Legend	
1 ... 8, P	Node does not answer MP master commands
.	Node answers query
Blank	Node has received no query for 20 seconds

- Possible sources of problems:
- Node is incorrectly configured in the master
  - Node is either not addressed or incorrectly addressed
  - Node is not connected
  - There is no supply to the node

**5th Test step Evaluation of the data communication**

This test step evaluates the data communications at the telegram stage. Both the number of telegrams and the correctness of telegrams (checksum, time overrun) are checked. The number of telegrams per node varies and is largely dependent on the function profile of the node. VAV controllers, for example, exhibit a larger range of information than do damper/valve actuators, which is why more communication usually is carried out with this type of node.

**Example:** Main view with number of correct telegrams, 13 telegrams for or from MP3 contain errors

D	a	t	a			O	k	:	1	0	3	7	8						
E	r	r	o	r	:	M	P	3	=					1	3				

The registered erroneous telegrams are identified separately for the nodes (MP1...MP8, 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 deep 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.

The + and - keys can be used to check the number of telegrams per node (master/slaves). The telegrams are subdivided into queries and answers.

Test steps

(continued)

**Example:** Number of telegrams (queries and answers) of the master

>	M	A	<	R	e	q	:		6	7	8	
		A	n	s	w	e	r	s	:	5	9	8

**Example:** Node with address MP2 responds to no queries (Answers = 0)

>	M	P	:	2	<	R	e	q	:		7	8
		A	n	s	w	e	r	s	:		0	

Possible sources of problems:

- A high error rate could indicate insufficient signal levels (see Test step 6).
- The MP command set used is not compatible with the node.
- An actuator expected by the MP master is not connected or not addressed (see Test step 4).

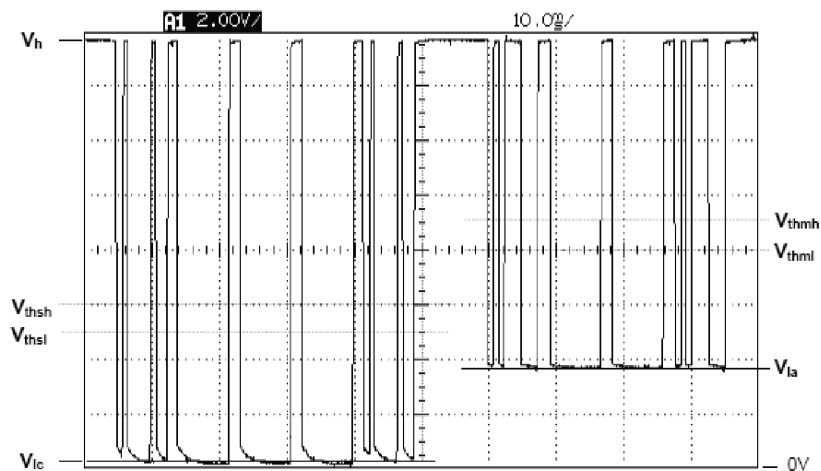
**6th Test step Determination of the MP signal level (High/Low)**

In the case of this test step, the level of the MP signal (U5) is 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 slave (MP1 ... MP8, 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).

**Example:** Command and Answer telegram



Legend	
$V_h$	Signal level HIGH
$V_{lc}$	Signal level LOW Command
$V_{la}$	Signal level LOW Answer

The HIGH signal level is shown and evaluated in the Main view. The HIGH level falls off with the number of connected MP slaves and is not permitted to be too low.

M	P	-	B	u	s	l	e	v	e	l		
1	4	.	5	V		O	k	a	y			

The LOW levels of the master and the slave can be checked with the + and - key. The LOW levels are not allowed to be too high.

## Test steps

(continued)

**Example:** Signal level LOW Command (at master)

>	M	A	<			O	k	a	y		
S	i	g	n	a	l	:		0	.	0	V

**Example:** Signal level LOW Answer (at MP1)

>	M	P	:	1	<			O	k	a	y
S	i	g	n	a	l	:		3	.	3	V

**Example:** Signal level LOW Answer (at MP2), node does not answer

>	M	P	:	2	<			E	r	r	o	r
S	i	g	n	a	l	:		1	4	.	4	V

Possible sources of problems:

- Incorrect cable dimension
- Long signal conductor lengths
- Node does not answer, i.e. displayed LOW level corresponds to HIGH level

## 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 ( $\perp$  /  $-$ ) is wired correctly to the bus
  - Connection wires 1 ( $\perp$  /  $-$ ) and 2 ( $\sim$  /  $+$ ) have not been switched

## Additional checks

The following checks are also useful as supplements and/or alternatives for the diagnostics and functional testing of the MP-Bus and the connected actuators:

**MP Monitor**

The MP monitor is installed with the BELIMO 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 node).

**BELIMO PC-Tool**

The installed MP master is temporarily replaced by a «standardised» MP master when the PC-Tool is in Scan mode.

**MP master**

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 modules and to the version of the components utilised (e.g. module library).

**Installation**

The installation is to be checked for wiring errors and loose terminal connections (loose contact). At the same time, attention is to be paid to possible EMC disruption sources (antennas, frequency converters, ...) in the area of the MP network.