

## Operating Instructions M-Box / L-Box / C-Box

### The Command String of V8.00

A command string is a character sequence which is to be sent to the interface box so that the box carries out actions such as reading in instruments.

The command string always consists of seven command parameters with a length of one to three digits. These seven parameters are transferred without separator and make a character sequence of 13 ASCII digits. The sequence is concluded with a carriage return.

**CAUTION:** The command string must not be concluded with LINE FEED as the BOBE boxes interpret this as cancel sign, interrupt the measurement and display the message E,1110.

Parameters:	1	2	3	4	5	6	7	Termination sign
Designation:	Data direction	Channel	String window	End channel	Foot switch	Company number	Measurement series	
Command string:	1	31	1	01	1	001	001	Carriage return

#### 1. Parameter: Data direction

Length	1 ASCII char.	
Options	0	not used
	1	Input with time-out: if the instrument addressed does not respond within a certain time, an error message is displayed and the measurement series is interrupted.
	2	Input without time-out: the box waits until the instrument responds or until it receives a termination signal from the host interface
	3	as Option 1, in addition to the measured value string, the channel number of the instrument addressed is transferred. If a measurement series is cancelled, no error message is displayed.
	4	as Option 3, without time-out
	5	not used
	6	Input of a multi-channel measurement. The multi-channel measurement allows the readout of various measuring channels with the aid of a command string. For this purpose, the measuring channel where the multi-channel measurement starts is entered via parameter 2 and the measuring channel where the measurement ends via Parameter 4. A multi-channel measurement displays the channel number after the measured value string.
Remark		Multi-channel measurements are only possible with instruments which are addressed via an identical company number (see Parameter 6).

#### 2. Parameter: Instrument channel

Length	2 ASCII char.	
Options	00	Identification and software reset. The interface box is reset to its starting condition.
	01	Instrument at Channel 1 is read in and processed.
	.	
	.	
	31	Instrument at Channel 31 is read in and processed.
Remark:		For data direction option 6 (1 <sup>st</sup> parameter), the instrument channel indicates the channel where the multi-channel measurement starts. For instrument channel 00, parameters 1, 4, 5 or 6 (except for company number 000, which is superordinated and puts Parameter 2 out of force) and 7 are ignored.

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### 3 Parameter: Beginning of string window

Length	1 ASCII char.	
	0	is ignored
Remark:	This parameter only serves for test purposes.	

### 4. Parameter: End channel

Length	2 ASCII char.	
Options	01	Only instrument at channel 1 is read in
	.	
	.	
	31	All instruments from the first channel (Parameter 2) to Channel 31 are read in.
Remark:	This parameter is only evaluated for data direction option 6.	

### 5. Parameter: Foot switch

Length	1 ASCII char.	
Options	0	The measured value is transmitted right after sending the command string.
	1	The measured value or the series is only processed and transmitted after operating the foot switch.
	2	One measured value of a series is processed and transmitted on operating the foot switch.
	3	as Option 2, the series (Parameter 7) is set to 000 (corresponds to endless measurement)
	4	as Option 0, on operating the foot switch, the following measured value is marked by „T“ instead of „M“ in the measured value string. The series is continued. Foot switch operations before sending the command string are not deleted.
	5	as Option 5, but the series is terminated.
	6	as Option 2, foot switch operations before sending the command string are not deleted.
	7	as Option 0, the following measured value is marked with „T“.
	8	as Option 2, the following measured value is marked with „T“.
Remark:	In the case of foot switch operations 1, 2, 3, 6, and 8, the box waits for a foot switch operation. The waiting position can be interrupted by sending one single ASCII character. The box responds by indicating error message E,1101. A new command string can be sent immediately, but it is to be ensured that the time between the first two digits is not greater than 10ms, as otherwise the first digit is interpreted as single termination signal.	

### 6. Parameter: Company number

Length	3 ASCII char.	
Options:	000	Identification
	001	Measured data of a Mitutoyo Digimatic instrument are expected.
	.	
	.	
	999	Date of manufacture
Remark:	Parameters 1, 2, 4, 5 and 7 are ignored in case of company number 000.	

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### 7. Parameter measurement series

Length	3 ASCII characters	
Options	000	Endless measurement
	001	Single measurement
	.	
	.	
	999	999 measurements
Remark:	A measurement series can be interrupted by sending a single ASCII character. All ASCII characters except for CARRIAGE RETURN and CONTROL-C are allowed. The termination is confirmed by error message 'E,1110: 'New Input '.	

## Data Format

### The Host Interface

The BOBE Box can be operated on any computer interface according to RS232C specification. The following interface parameters apply:

Transmission rate:     **9600 Baud**  
 Start bits:             **1**  
 Data bits:             **8**  
 Stop bits:             **1**  
 Parity:                **none**

### Measured Data Strings

The measured data string consists of:

Measured value identification	Character ,M' or ,T' Number ,1'
Measured value, consisting of	Plus/minus 8 digits before the comma Decimal point 6 digits after the comma
Unit	
Instrument address (option)	
Termination sequence	Carriage return Line feed

Measured value identification, measured value, unit and instrument address are separated by commas, respectively!

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Example 1:

An individual measured value from a Mitutoyo Digimatic instrument on Channel 1 is to be read in without foot switch operation.

Command string: 1011110001001 {CR}

Measured value string: M1, +12345678.123456,mm\_{CR} {LF}

Example 2:

An individual measured value of a Mitutoyo Digimatic instrument on Channel 2 is to be read in without foot switch operation.

Command string: 3021110001001 {CR}

Measured value string: M1, +12345678.123456,in\_{CR} {LF}

### Identification

If the company number 000 is entered in the command string, the box responds with its identification string.

Example:

Command string: 1011110000001 {CR}

Identification string: A, BOBE, M-Box16 V8.00 {CR} {LF}

### Identification with Software Reset

If the channel number 00 is indicated in the command string, the box responds with its identification string and is reset to the starting condition.

Example:

Command string: 1011110000001 {CR}

Identification string: A, BOBE, M-Box16 V8.00 {CR} {LF}

### Error messages

If errors occur, the box displays an error message. In contrast to the AI 488 interface system, no error text is given after the error number. An exact tracking of the error, however, is possible according to the error number.

Example: E, 1101 {CR} {LF}

The error number has always 4 digits, leading zeros are not suppressed.

E,0xxx	Format error	Error numbers under 1000 indicate a format error. The data format of the instrument addressed does not correspond to the specification which is expected under the company number indicated with xxx.
E,1101	Incorrect input	The command string entered does not correspond to the definition in length or parameter setting
E,1103	Not assigned	The interface box cannot process instruments with this company number.
E,1104	Instrument missing	The instrument called up in the command string is not connected or not on.
E,1110	New input	A measurement has been interrupted (this is no error message in the actual sense, but a confirming message).

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### Further Command String Examples

Some examples of command strings and their influences on measured value transmission are listed below. All examples can be tested on a PC with the aid of a terminal program (e.g. Windows terminal), only the company number needs to be adjusted to the instrument connected.

1. The Mitutoyo Digimatic instrument (company number 001) on channel # 1 is to be read in without waiting for foot switch operation:

Command string: 1011110001001 {CR}

Measured value string: M1,+12345678.123456, mm\_{CR} {LF}

2. The Sylvac OptorRS232 instrument (company number 179) on channel # 4 is to be read in 365 times, each individual measured value is to be triggered by foot switch operation. The series can be interrupted by sending a character.

Command string: 1041112179365 {CR}

Measured value string: M1,+12345678.123456, mm\_{CR}{LF}  
(365 times)

Termination sign: [e.g.]: A

Termination message: E,1110{CR}{LF}

3. The Tesa DigitCal caliper with OptoRS232 interface (company number 109) on channel # 7 is to be read in as endless series, the series is to be triggered by operating the foot switch, the measured value is to be transmitted with instrument channel and on interrupting the series, no termination message is to be displayed.

Command string: 3071111209000 {CR}

Measured value string: M1,+12345678.123456,mm\_,\_1{CR}{LF}  
(continued until terminated)

Termination sign: (e.g.): A

Termination message: (no termination message)

4. Instrument # 1 and instrument #2 are to be read in together without waiting for foot switch operation. The channel number of the instrument is to be transmitted.

Command string: 6011020001001 {CR}

Measured value string: M1,+12345678.123456,mm\_,\_1{CR}{LF}  
M1,+12345678.123456,mm\_,\_2{CR}{LF}

5. If an instrument does not respond within the standard reaction time (maximum approx. 2 seconds), the interface generates an error message E,1104. With some instruments (e.g. scales), however, the response time may be much longer.

In order to process such instruments, the above error generation can be switched off via the data direction option in the command string in BOBE boxes from Version 3.00 onwards. The Box waits until the instrument responds or until it receives a termination signal via the host interface.

A Sartorius-MC1 scale on Channel # 6 serves as example:

A Sartorius scale (company number 067) on channel # 6 is to be read in without the interface interrupting the read-in process, if the scale does not respond after approx. 2 seconds.

Command string: 2061110067001 {CR}

Measured value string: M1,+12345678.123456,kg\_{CR}{LF}