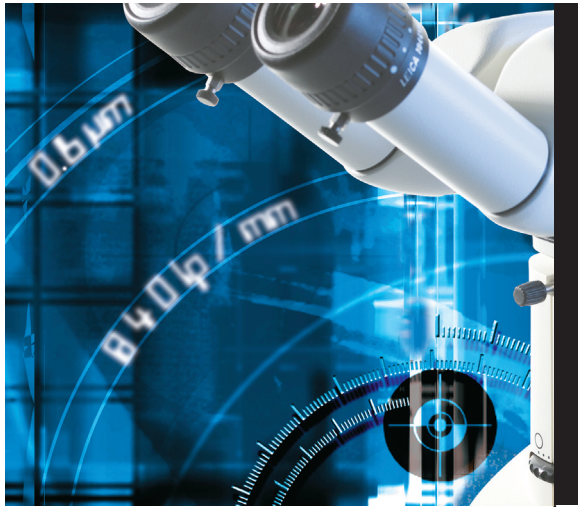




Leica MZ16 A

Description of commands

Leica
MICROSYSTEMS

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1 Summary of commands

Command code	Function
60 001	Function Unit Present
60 002	Get Version
60 010	MOVE UP
60 011	MOVE DOWN
60 012	MOVE STOP
60 014	MOVE TO CAL. POS.
60 020	SAVE Eyep. and Obj. -Parameter
60 021	SAVE Cal. Data
60 022	RESET / CLEAR Calibration
60 029	write factory default
60 030	MOVE ABSOLUTE MAGNIFICATION
60 031	MOVE RELATIVE MAGNIFICATION
60 032	GET MAGNIFICATION
60 038	GET MAX MAGNIFICATION
60 039	GET MIN MAGNIFICATION
60 040	SET EYEPIECE (1 to 1000)
60 041	GET EYEPIECE
60 042	SET OBJECTIVE (0.1 to 100.0)
60 043	GET OBJECTIVE
60 044	SET Video Objective
60 045	GET Video Objective
60 047	GET / REPORT actual POSITION in MOTOR INCREMENTS
60 048	MOVE ABSOLUTE in MOTOR INCREMENTS
60 049	MOVE RELATIVE in MOTOR INCREMENTS
60 050	SET CALIB. POSITION POSITION (Adjusted Pos.)
60 051	GET CALIB. MAGNIFICATION POSITION (Adjusted Pos.)
60 060	BEEP (#, ontime, offtime)



Command code	Function
60 092	SET BEEP ENABLE
60 093	REPORT BEEP ENABLE
60 094	TOGGLE BEEP ENABLE
60 095	SET COAX (present / NOT present)
60 096	GET COAX
72 250 x	ERROR error messages

2 Control concept

The device can be connected to any standard PC, Macintosh computer or terminal equipped with an RS232 port using the PC Interface Kit.

The manual control system is connected to the devices via an internal bus (CAN Bus). The manual control system is also capable of receiving commands and returning messages.

Device identifiers

The following identifiers are assigned to the following devices:

- 70 - MST31 motor focus
- 71 - MHS1 manual control system for MST31 motor focus
- 60 - MZ16A motorized zoom
- 61 - MHS2 manual control system for MZ16A motor focus

Commands corresponding to the device identifier are executed directly. Commands intended for other devices are forwarded via the internal bus.

3 Interface parameters and cables

3.1 Interface parameters	Baud rate:	fixed at 9600 baud
	Parity:	none
	Stop bit:	2
	Data bit:	8
	Protocol:	XON/XOFF (DC1 / DC3)

- 3.2 Cables** The cable assignments are designed to permit the device to be connected directly to the serial port of a PC. If the cable is too short, use a shielded null modem cable (9 conductors with a 1 to 1, 2 to 2 etc. pin assignment).

The total length of the cable must not exceed 5 meters, however.

4 Syntax

- 4.1 Device identifiers** The device identifier should be sent as the first parameter. The parameter should have a maximum of two value digits, however (range from 1 to 99):
70 - MST31 motor focus
71 - MHS1 manual control system for MST31 motor focus
60 - MZ16A motorized zoom
61 - MHS2 manual control system for MZ16A motor focus
The device identifier may contain leading zeros. The complete device identifier must NOT contain exactly five characters, however.
- 4.2 Command identifiers** The command identifier must be sent as the second parameter and must be in the range from 0 to 255, with a maximum of three value digits.
- 4.3 Parameters** Depending on the command, up to 3 parameters can be transferred.
- 4.4 Separating characters** Spaces and commas may be used as separating characters. Multiple separating characters may also be inserted, i.e. a parameter will not be omitted due to multiple separating characters.
- 4.5 Number format** Use only signed integers (long int, 32-bit max.); floating-point numbers (float) are not supported.
It is the responsibility of the user to prevent overflows.
- 4.6 Exception** The separating character can be omitted between the device command identifier and the first parameter.
In this case, however, ensure that exactly 2 characters are transmitted for the device identifier and 3 characters for the command identifier.
- Example:
MOVE absolute
7003012345<CR><LF>

4.7 Terminating characters The following are valid terminating characters:
<CR> (carriage return) or
<CR><LF> (carriage return,
line feed)

4.8 Leading zeros The parameters may contain leading zeros.

4.9 Operational signs The operational sign must be immediately before the parameter (without separating characters), the parameter itself may contain leading zeros, however.

4.10 Examples The following are valid command sequences:

MOVE absolute to position 12345:

7003012345<CR><LF>
70030 12345<CR>
70 030 12345<CR>
70 30 12345<CR>
0070 0030 0012345<CR>
70,30,12345<CR>
70,,,30,,,12345<CR>
70, 30, 12345<CR>

The following are not valid command sequences:

00070 30 12345<CR> (identifier contains 5 characters)
70 31 - 12345<CR> (separating character between "-" and
parameter)

If the first 5 characters form a unit, they will be evaluated as
device and command identifiers.

5 Control commands

5.1 FUNCTION UNIT PRESENT

Identification of the connected device

Command code: 60 001 <CR>

Parameter: none

Return: short device designation
"60 01 LEICA MZ16A"

Note:
The device designation is returned in plain text (ASCII).

Important:
Multiple devices connected via the internal bus will not be returned. Any additional devices must be interrogated separately using the appropriate identification, e.g. 70 001 or 71 001.

5.2 GET VERSION

Querying of the software version

Command code: 60 002 <CR>

Parameter: none

Return: version in plain text

Note:
Software version in plain text (ASCII), e.g.: "60 2 Ver. 1.41"

5.3 MOVE UP

Increase magnification (travel command)

Command code: 60 010 <CR>

Parameter: none

Return: none

Note:
The zoom will be increased until maximum magnification has been reached.

5.4 MOVE DOWN Decrease magnification (travel command)

Command code: 60 011 <CR>

Parameter: none

Return: none

Note:

The zoom will be decreased until minimum magnification has been reached (also see MOVE UP).

5.5 MOVE STOP Abort travel, stop zoom travel

Command code: 60 012

Parameter: none

Return: none

Note:

Stopping zoom travel (60 010, 60 011)

5.6 MOVE TO USER CALIBRATION POSITION If the system is calibrated, go to calibration position

Command code: 60 014

Parameter: none

Return: none

5.7 SAVE SETTED PARAMETER Saves the parameter to nonvolatile RAM

Command code: 60 020

Parameter: none

Return: none

Note:

The following parameters will be saved to nonvolatile RAM.

Eyepiece - (60 040)

Objective - (60 042)

Video objective - (60 044)

BEEP ON - (60 092)

The next time the device is switched on, the parameters will be read and applied.



Note:

The nonvolatile RAM has a useful life of 1,000,000 write cycles. Ensure that this command is not used too frequently in the control software! (loops)

**5.8 SAVE
CALIBRATION
PARAMETER**

Saves the calibration values to nonvolatile RAM

Command code: 60 021
Parameter: none
Return: none

Note:

The following parameters will be saved to nonvolatile RAM:
Calibration deviation, calibration position - (60 050)

The next time the device is switched on, the parameters will be read and applied.

Note:

The nonvolatile RAM has a useful life of 1,000,000 write cycles. Ensure that this command is not used too frequently in the control software! (loops)

**5.9 RESET
CALIBRATION**

Resetting the calibration deviation

Command code: 60 022
Parameter: none
Return: none

Note:

The calibration deviation is reset and immediately stored in the nonvolatile RAM.

**5.10 SET FACTORY
DEFAULT**

Resetting the user templates

Command code: 60 029
Parameter: none
Return: none

Note:

Reset the user templates to their basic settings:

Eyepiece: 10x
Objective: 1.0x
Coax : no
Beep: on
Video objective: 1.0x
Distance measurement: FOV
Calibration deleted

5.11 MOVE ABSOLUTE Go to absolute magnification (travel command)

Command code: 72 030
Parameter: range: 1 - 10,000,000
Return: none

Note:
The magnification unit is 0.001x.

Example:
Go to 7.25x magnification position

72 030 7250<CR>

5.12 MOVE RELATIVE Go relative to current magnification

Command code: 60 031
Parameter: relative magnification
Return: none

Note:
Increase or decrease magnification (depending on operational sign) relative to the current position. A positive operational sign will result in increased magnification, the magnification will be reduced if the operational sign is negative. The magnification unit is 0.001x.

Example:
Increase magnification by 10x from current magnification

Current magnification = 25
Command: 60 31 10000<CR>
Magnification after execution of command = 35 (25+10)

5.13 GET MAGNIFICATION Interrogation of current total magnification

Command code: 60 032
Parameter: none
Return: current absolute magnification

Note:
The return value is resolved as 0.001.

Example (for RS 232):
Current absolute magnification = 7.25x
host transmits: 60 032 <CR>
host receives: 60 032 7250<CR>



**5.14 GET / REPORT
UPPER LIMIT**

Interrogation of lower limit or lowest possible magnification

Command code: 60 038
Parameter: none
Return: magnification in 0.001

The limits are determined by the system and cannot be changed.

**5.15 GET / REPORT
LOWER LIMIT**

Interrogation of upper limit or lowest possible magnification

Command code: 60 039
Parameter: none
Return: magnification in 0.001x

The limits are determined by the system and cannot be changed.

5.16 SET EYEPIECE

Setting the magnification of the used eyepieces

Command code: 60 040
Parameter: magnification in 0.001x
Return: none

Note:

Setting the magnification of the used eyepieces The setting will be retained only as long as the device is switched on, unless the command (60 020) is explicitly invoked.

5.17 REPORT EYEPIECE

Interrogation of the set magnification of the eyepieces

Command code: 60 041
Parameter: none
Return: magnification in 0.001x

5.18 SET OBJECTIVE Setting the magnification of the used objective

Command code: 60 042
Parameter: magnification in 0.001x
Return: none

Example:
Used objective 0.8x magnification:
60 42 800<CR>

Note:
The setting will be retained only as long as the device is
switched on, unless the command (60 020) is explicitly invoked.

5.19 GET OBJECTIVE Interrogation of the set magnification of the objective

Command code: 60 043
Parameter: none
Return: magnification in 0.001x

Example:
Query: 60 043 <CR>

Reply for used objective with 0.8x magnification:
60 43 800<CR>

**5.20 SET VIDEO
OBJECTIVE** Setting the magnification of the used video objective

Command code: 60 044
Parameter: magnification in 0.001x
Return: none

Note: the information is stored only and has no influence on the
function.

Example:
Used objective 0.8x magnification:
60 44 800<CR>

Note:
The setting will be retained only as long as the device is
switched on, unless the command (60 020) is explicitly invoked.



5.21 GET VIDEO OBJECTIVE Interrogation of the set magnification of the objective

Command code: 60 045
Parameter: none
Return: magnification in 0.001x

5.22 GET / REPORT actual POSITION in MOTOR INCREMENTS Interrogation of current zoom position in motor increments

Command code: 60 047
Parameter: none
Return: motor position in motor increments

Note: The command corresponds to 60 32; the transfer parameter is in motor increments, however.

5.23 MOVE ABSOLUTE in MOTOR INCREMENTS Go to absolute magnification (travel command)

Command code: 60 048
Parameter: absolute position
Return: none

Note: The command corresponds to 60 30; the transfer parameter is in motor increments, however.

5.24 MOVE RELATIVE in MOTOR INCREMENTS Go to relative position (travel command)

Command code: 60 049
Parameter: relative position
Return: none

Note: The command corresponds to 60 31; the transfer parameter is in motor increments, however.

5.25 SET CALIBRATION Setting the calibration deviation and associated position

Command code: 60 050
First parameter: deviation
 Value range 120 to -120
 in motor steps
Second parameter: calibration position in motor steps
Return: none

Note:

The actual calibration can only be performed on the device.
If the value is read from the device, it can be set again.

CAUTION: The values are only temporary and can be stored
with command 60 21.

5.26 GET / REPORT CALIBRATION Interrogation of the calibration deviation

Command code: 60 051
Parameter: none
First return: deviation
 Value range 120 to -120
 in motor steps
Second return: calibration position in motor steps

Note:

Interrogation of the calibration deviation of the last
calibration performed on the device.

5.27 BEEP (ALARM) Enabling the buzzer

Command code: 60 060
Parameters: 3 (16 bit INT)
 1. Number of beeps
 2. On-time in ms (milliseconds)
 3. Pause between beeps
Return: none

Note:

The buzzer can be enabled. This command can be used to set
the number and duration of the beeps, as well as the duration of
the pause. The time units are milliseconds.

Value range

Number of beeps: 0 to 255

On and pause times: 0 to 65535

5.28 TEST Reserved command

Command code: 60 069
Parameter: various
Return: various



Note:
This command is intended solely for use in servicing by trained Leica technicians. This command can change the device's basic settings, which may render it unserviceable.

5.29 SET BEEP ENABLE Enabling/disabling the buzzer

Command code: 60 092
Parameter: 1 byte
0 ... deactivate
1 ... activate
Return: none

Note:
This command enables or disables the buzzer. The setting will be retained only as long as the device is switched on, unless the command (60 020) is explicitly invoked.

5.30 REPORT BEEP ENABLE Interrogation of BEEP ENABLE status

Command code: 60 093
Parameter: none
Return: 1 byte
0 ... disabled
1 ... enabled

5.31 TOGGLE BEEP ENABLE Changes beep status from ON to OFF or vice versa.

Command code: 60 094
Parameter: none
Return: none

Note:
The status ON or OFF is changed. The setting will be retained only as long as the device is switched on, unless the command (60 020) is explicitly invoked.

5.32 SET COAX Set Coax

Command code: 60 095
Parameter: 1 present
 0 not present
Return: none

Note:

A factor for the coaxial attachment (see manual) is taken into consideration when calculating the total magnification. The setting will be retained only as long as the device is switched on, unless the command (60 020) is explicitly invoked.

5.33 GET COAX Interrogation of coax presence

Command code: 60 096
Parameter: none
Return: 1 present
 0 not present

6 Error reports

Errors are returned with the device identifier, the command identifier 250 and the error code.

6.1 Error codes The following errors are recognized and returned:

Command code: 72 250 x
Parameter: error code

1 more than three parameters

2 unknown device identifier (0 or greater than 100)

3 unknown command

4 CAN bus error, the command could not be forwarded

5 Invalid value; the specified parameter is out of the permissible range



Notes

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