Interface Description

MAVO-USB Interface

1.1/02.18

1 Introduction

This document describes the remote operation of the MAVO-USB product range (Mavolux, Mavomonitor, Mavo Spot2), the Program-Controlled device functions and parameters.

1.1 Treiberinstallation

To install the USB-Drivers connect the meter to the PC with the included USB cable. If the PC is connected to the Internet, Windows detects the device and installs the drivers automatically.

In rare cases, Windows might not find the drivers online. In this case, the drivers have to be downloaded and installed manually.
Download the D2XX drivers directly from FTDI Chip: http://www.ftdichip.com/Drivers/D2XX.htm

You'll find a current driver for your operating system in the table on this website (also available as an executable setup file in the "Comments" column for easier installation with installation instructions).

1.2 Interface Information

After successful installation of the drivers windows detects two new devices in the Device-Manager:

- USB Serial Port (COMxx)
- USB Serial Converter

Nearly all device functions and settings can be remote controlled with software via the interface. The respective device settings and confirmation messages are triggered by means of character strings (command frames) which are transmitted in ASCII code.

The UART Settings for the MAVO-USB-Devices are:

- 9600 Bit per Second
- 1 Start bit
- 7 Data bits
- 2 Stop bits
- Even parity
- now Flow control

2   Quick Check

After finishing all steps from point 1, a Quick Check can be performed. You need a Terminal-Program to do so. We recommend HTerm from der-Hammer.info. You can also use a different Terminal-Program that supports sending of several ASCII-Characters in one package.

Make all necessary settings in the Terminal-Program (red Circle). The commands are sent as ASCII and are terminated with "line feed" or "carriage return - line feed" (yellow circle)

If you send „*IDN?" to the device, the device should answer as shown in the screenshot (green circle).
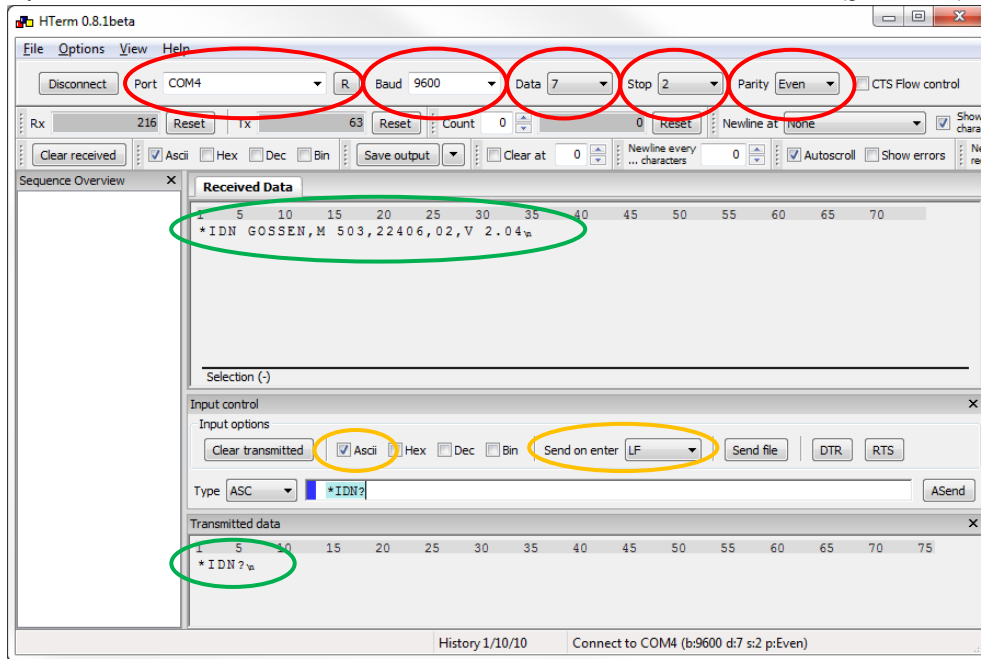
3   Command information

3.1   Command Layout

The commands are named according to the English designations for the corresponding functions.

For example, the command:

   DISPLAY ON

Switches the LDC on.

- Each command consists of a header, and one or more parameters as required
- Headers and parameters can be entered either as upper case or lower case letters, or as a combination of both
- At least one blank must be entered between the header and the parameter
- If several parameters are included they are separated by commas (,), and a blank can be entered before and after each parameter as well

3.2   Abbreviations for Commands

The portions of the commands printed in upper case letters in the command descriptions must be included, but the portions printed in lower case letters can be omitted.

The header may also include additional text (identified in the command descriptions by means of brackets: [...]), which can be inserted in order to assure better legibility and has no influence on the respective command

For example, the following variants of the command [[MEAsure:]PHOt]?

   MEASURE:PHOTO?
   pho?
   ?

have the same effect, i.e. they trigger measurement in the momentary measuring range:

3.3   Text Parameters

Text parameters generally begin with a letter[1].
A specific selection of texts exists for all commands which include text parameters, and these can be used for each respective parameter.

Example:

Command:	DISP	txt
Range:	txt	= OFF, ON

In the example above, DISP is the header, and OFF, ON are the group of allowable text parameters

3.4   Numeric Parameters

- Numeric parameters can currently be entered as whole numbers only. The response is a whole number with or without exponent
- The exponent may occupy up to two places
- A blank can be entered to the left and to the right of the exponent symbol
- Leading plus signs are omitted
- Up to 10 characters are permissible for numeric parameters
- Parameters are separated with commas
- Blanks can be entered to the left and to the right of parameters

Examples of permissible numeric parameters:

      1234   12340E-1

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[1] In compliance with the SCPI convention (Standard Commands for Programmable Instruments), special system commands are identified with a leading asterisk (*). However, the complete SCPI command set has not been implemented..

3.5   Query Commands

- Query commands are used to query device settings or to request measured values
- Query commands are identified with a question mark "?" at the end
- The question mark is part of the header, i.e. no spaces may be entered to the left of the question mark

Example:
> SENSE:PHOTO:RANGE?
> ran?

The two variants shown above are valid commands for querying the momentary measuring range

> RANGE ?

The above entry is responded to with an error message.

3.6   Commands with an Asterisk "*"

Special system commands are written with a leading asterisk "*".

3.7   Conventions, Restrictions

- Terminating device messages:
  The individual command string (or frame) must end with a line feed "LF" (0Ahex). The response from the device also ends with LF
- Number of parameters:
  The number of parameters is limited to 2
- Length of the command string:
  The length of the command string to the measuring instrument (including LF) is limited to 32 ASCII characters. The length of the response is not subject to this restriction
- Stringing commands together:
  So-called compound commands (command strings separated with semicolons) are not supported
- The response always consists of upper case letters:
  Portions of the command which are written in lower case letters are converted to upper case letters in the echo string

4   Commands for Device Settings and Querying Measured Values

4.1   *RST – Reset Device Settings

Function   Resets all configurable parameters to their default values, the device is restarted, stored values are not deleted!

Programming
          Command   *RST
          Parameter   none

          Response   *RST ACK2

Default configuration:
          Auto-ranging   On
          Display U/M   Unchanged, same as before reset
          Keyboard   Enabled
          Display   On
          Memory   Unchanged
          Sampling rate   Standard (0,5 measurements per second)
          Timer   Unchanged
          Calibration data Refresh from E²prom memory

4.2   *IDN? – Device Identification Query

Function   Device identifies itself with manufacturer's designation, type designation, serial number, hardware revision level and firmware version

Programming
          Command   *IDN?
          Parameter   none

          Response   *IDN manufacturer, type, serial number, hardware revision level, software version

Example:
                            → *IDN?
                            ← *IDN GOSSEN,M 502, 20387,01,V 1.00

4.3   VERSION? – Command Interpreter Version Query

<u>Function</u>   Queries the version number of the utilized command interpreter. This interface description makes reference to version V 1.00 (2004)

<u>Programming</u>
      Command   [SYStem:]VERsion?
      Parameter   none

      Response   [SYStem:]VER Version (year)

<u>Example</u>:
          → VER?
          ← VER V1.00 (2004)

4.4   BEEPER – Actuation of the Signal Generator [2]

<u>Function</u>   Generates an acoustic signal of specified duration

<u>Programming</u>
      Command   [SYStem:]BEEPer num
      Parameter   numeriic
      Range   1 .. 10 seconds
      Response   1

<u>Example</u>:
          → BEEP 2
          ← BEEP ON

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[2] Only applies to devices equipped with a signal generator.

4.5   KEYBOARD – Enable/Disable the Keyboard

Function   The keyboard can be disabled with the KEYBOARD command in order to avoid inadvertent interference during remote operation

Programming
          Command   [SYStem:]KEYboard b
          Parameter   boolean
          Range   {0, 1, ON, OFF}
          Response   ON

Example:

          → KEY OFF
          ← KEY OFF   (Keyboard is disabled)

4.6   TIME? – Read Out System Time

Function   Reads out system time. The system clock is started at the point in time of calibration, and is advanced second by second during operation (operating hours counter). When the device is switched off, current system time is saved to E²prom memory, and is reloaded at start-up

Programming
          Command   [SYStem:]TIMe?
          Parameter   none

          Response   HHHH:MM:SS

4.7   DISPLAY – Switch Display On/Off

<u>Function</u>   Switches the device display (LCD) on and off

<u>Programming</u>
          Command   [SYStem:]DISplay b
          Parameter   boolean
          Range   {0, 1, ON, OFF}
          Response   ON

<u>Example</u>:
                             → DISP OFF
                             ← DISP OFF   (Display darkened)

4.8   UNIT – Select Display Unit of Measure

<u>Function</u>   Sets the display unit of measure, for the device display, as well as for remote control functions

<u>Programming</u>
          Command   UNIt:PHOtometric txt
          Parameter   text
          Range   {LX,FC,CD_M2,FL}
          Response   LX

<u>Example</u>:
                             → uni:phot lx
                             ← UNI:PHOT LX

4.9   PHOT? – Execute Measurement

Function   Queries the momentary measured value in the preselected measuring range, as well as the selected display unit of measure

Programming
     Command   [[MEAsure:]PHOtometric]?
     Parameter   none

     Response   [[MEAsure:]PHOtometric] num
     Parameter   0 E-03 .. 1999 E03
     Format   nnnnn E-xy uu

                nnnnn   Up to 5 characters, leading zeros are suppressed
                uu   Selected display unit of measure

Example:
                → ?
                ← 1234E-01 LX

4.10   RANGE – Set Measuring Range

Function   Selects the utilized measuring range

Programming
     Command   [[MEAsure:]PHOtometric:]RANge num
     Parameter   numeric
     Range $Range_{min} \leq num \leq Range_{max}$

     Response   [[MEAsure:]PHOtometric:]RANge num

Example:
                → RAN 4
                ← RAN 4

4.11   RANGE? – Query Measuring Range

<u>Function</u>   Queries the momentary measuring range

<u>Programming</u>
        Command   [[MEAsure:]PHOtometric:]RANge?
        Parameter   none

        Response   [[MEAsure:]PHOtometric:]RANge num

<u>Example</u>:
              → RAN?
              ← RAN 3

4.12   RANGE:AUTO – Switch Automatic Measuring Range Selection On/Off

<u>Function</u>   Activates / Deactivates the use of the automatic measuring range selection

<u>Programming</u>
        Command   [[MEAsure:]PHOtometric:]RANge:AUTo b
        Parameter   boolean
        Range   {0, 1, ON, OFF}
        Default value   ON

<u>Example</u>:
              → RAN:AUTO OFF
              ← RAN:AUTO OFF

4.13   RANGE:AUTO? – Query Status of Automatic Range Selection

<u>Function</u>   Queries auto-ranging status

<u>Programming</u>
      Command   [[MEAsure:]PHOtometric:]RANge:AUTo?
      Parameter   none
      Range   {0, 1, ON, OFF}
      Default value   ON

<u>Example</u>:

        → RAN:AUTO?
        ← RAN:AUTO OFF

4.14   ECHO – Suppression

<u>Function</u>   Suppresses command echo in the response

<u>Programming</u>
      Command   [SYStem:]ECHo b
      Parameter   boolean
      Range   {0, 1, ON, OFF}
      Default value   ON

<u>Example</u>:

        → measure:photo?
        ← MEASURE:PHOTO? 123E00 LX
        → echo off
        ← ECHO OFF

        → measure:photo?
        ← 123E00 LX

4.15   BACKLIGHT – BACKLIGHT – Display Illumination [3]

Function   Switches display illumination on and off

Programming
          Command   [SYStem:]DISplay:BACklight b
          Parameter   boolean
          Range   {0, 1, ON, OFF}
          Default value   ON

Example:

                         → disp:backl on
                         ← DISP:BACKL ON

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[3] Only for devices that have a display backlight.

5   Measured Value Memory Commands

5.1   MEMORY:CLEAR – Measured Value Memory Deletion

Function   Clears measured value memory

Programming
      Command   MEMory:CLEar
      Parameter   none

      Response   MEMory:CLEar xx,yy
      Parameter   xx   Number of empty memory locations
                         yy   Entire memory

5.2   MEMORY:FREE? – Query Available Memory Capacity

Function   Queries the number of empty memory locations

Programming
      Command   MEMory:FREe?
      Parameter   none

      Response   MEMory:FREer xx,yy
      Parameter   xx   Number of empty memory locations
                         yy   Entire memory

Example:

              → mem:free?
              ← MEM:FREE 10,100

5.3   MEMORY:DATA? – Read Out Measured Value Memory

<u>Function</u>   Reads out the entire measured value memory (block read). Only occupied memory locations are read out

<u>Programming</u>
          Command   MEMory:DATa?
          Parameter   none

          Response   MEMory:DATa mm: nnnnn E-xy uu; ..... ;
          Parameter   mm   Memory location number
                            nnnnn   Measured value
                            -xy   Exponent
                            uu   Display unit of measure of the stored value

6   Error Messages

Code	Name	Description
001	UART_ERR_OVE	Overrun error: A new character was read in before the current character was picked up.
002	UART_ERR_FE	Transmission error: stop bit not detected
003	UART_ERR_PE	Transmission error: parity error
004	UART_ERR_BUFFOFL	Receive buffer overrun
008	UART_ERR_TIMEOUT	Timeout, no frame end detected
017	ADC_ERR_PHASE ADW	Phase sequence not adhered to
018	ADC_ERR_OFL	Timeout during deintegration (= overflow)
019	ADC_ERR_OVR	Measuring range exceeded (= overrange)
021	EEP_ERR_WRITE EEPROM	Write error
022	EEP_ERR_LOCKED	Impermissible access to calibration data memory
101	SCPI_ERR__CMD_NOT_FOUND	Error in header, command not supported
102	SCPI_ERR__WRONG_PARA_COUNT	Wrong number of parameters
103	SCPI_ERR__WRONG_PARA_TYPE	Unexpected parameter type
104	SCPI_ERR__WRONG_PARA_UNITS	Incorrect unit of measure for parameter
105	SCPI_ERR__UNMATCHED_QUERY	Query command not implemented
106	SCPI_ERR__UNMATCHED_BRACKET	Bracket error: The number of opening and closing brackets is not identical.
107	SCPI_ERR__INVALID_VALUE_LIST	Setting value outside of permissible range
108	SCPI_ERR__INVALID_NUM_SUFFIX	Incorrect index value
201	SCPI_ERR__DEVICE_UNKNOWN	Hardware is not supported by this firmware version
202	SCPI_ERR__WRONG_SENSOR	The connected sensor is not suitable for the requested measurement.
203	SCPI_ERR__RANGE_OVR Measuring	Range exceeded
204	SCPI_ERR__WRONG_PASSWORD	Incorrect password