Operating Manual

Software ODC1202-Tool Version 2.5

(PC software for Microsoft® Windows® Vista, XP, 2000, NT® 4.0, Me, 98)

for laser line sensors in the ODC1202 Series

Transmitter ODC1202-…   Receiver ODC1202-…

Contents

1   Installation of the ODC1202-Tool software

The following hardware requirements are necessary for a successful installation of the ODC1202-Tool software:

- 100 MHZ Pentium-compatible processor or better
- CD-ROM or DVD-ROM drive
- Approx. 8 MB free hard disc space
- SVGA graphic card with at least 800x600 pixels resolution and 256 colours or better
- Windows 98, Windows NT4.0, Windows 2000, Windows XP or Windows Vista operating system
- Free serial RS232 port or USB port with USB-RS232 adapter on the PC

Please install the ODC1202-Tool software as described in the following:

1. Insert the installation CD-ROM in the CD-ROM drive. In our example, we assume that this is the drive "D".

2. Start Windows Explorer and change to the directory D:\Install in the directory tree of the CD-ROM drive.
The actual installation is started by double clicking on the SETUP.EXE icon.

Alternatively, the software installation can be performed by clicking on **START, Run** and then inputting "D:\Install\setup.exe" and then clicking the **OK** button.
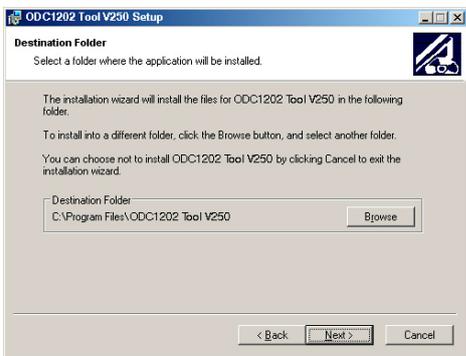
The installation program then displays a dialogue box about the ODC1202-Tool installation.
Some general information about the installation is shown in this dialogue box.

Click on the Next> button if you would like to start the installation
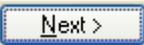
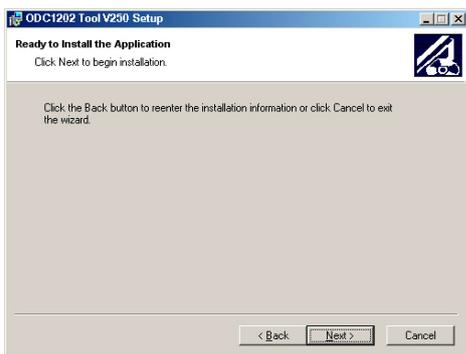or click on the Cancel button to abort the installation of the ODC1202-Tool software
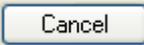
3. If the Next button has been pressed, another dialogue window for selecting the directory in which the application should be installed (Destination Folder) is displayed.
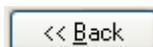
Accept the proposed destination by clicking on Next> or change the path information according to your requirements by clicking on the Browse button.
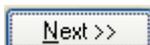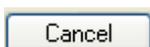
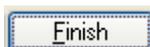|		
4.	ODC1202 Tool V250 Setup Ready to Install the Application Click Next to begin installation. Click the Back button to reenter the installation information or click Cancel to exit the wizard. < Back Next > Cancel	Another ODC1202-Tool Setup dialogue window is displayed on the screen. **<< Back** Click on the Back button to change the installation path again. **Next >>** Click on Next>> to start the installation or **Cancel** Click on Cancel to end the installation.
5.	ODC1202 Tool V250 Setup ODC1202 Tool V250 has been successfully installed. Click the Finish button to exit this installation. < Back Finish Cancel	A dialogue box informing you of the successful installation is displayed at the end. A new ODC1202-Tool program group has been created under Start, All Programs. **Finish** Click on Finish to exit the installation.
	ODC1202-Tool-V11 ▶ ODC1202-Tool-V11	The ODC1202-Tool software is started by clicking on the corresponding icon with the mouse in the new program group created under: Start >All Programs > ODC1202-ToolV2.5

Uninstalling the ODC1202-Tool *software:*

Software	The uninstall is performed using the Windows Add or Remove Programs tool. The Add or Remove Programs tool is found under Start/Control Panel

2 Operation of the ODC1202-Tool software

The ODC1202-Tool software is used for the configuration of the control electronics for the actuation of the ODC1202 line sensors. The measured values provided by the sensor can be visualised using the PC software. The software can thus be used, among other things, for adjustment purposes and for specifying suitable tolerances for the control of the target.

The data exchange between the PC user interface and the sensor system is performed via a standard RS232 interface. The sensor is connected to the PC using the SCD1202 serial interface cable for this purpose. After completion of the configuration, the specified values can be stored permanently in an EEPROM of the ODC1202 control electronics. The sensor system continues to operate with this in "STANDALONE" mode without PC.

The following Windows® user interface is displayed after invoking the ODC1202-Tool software:
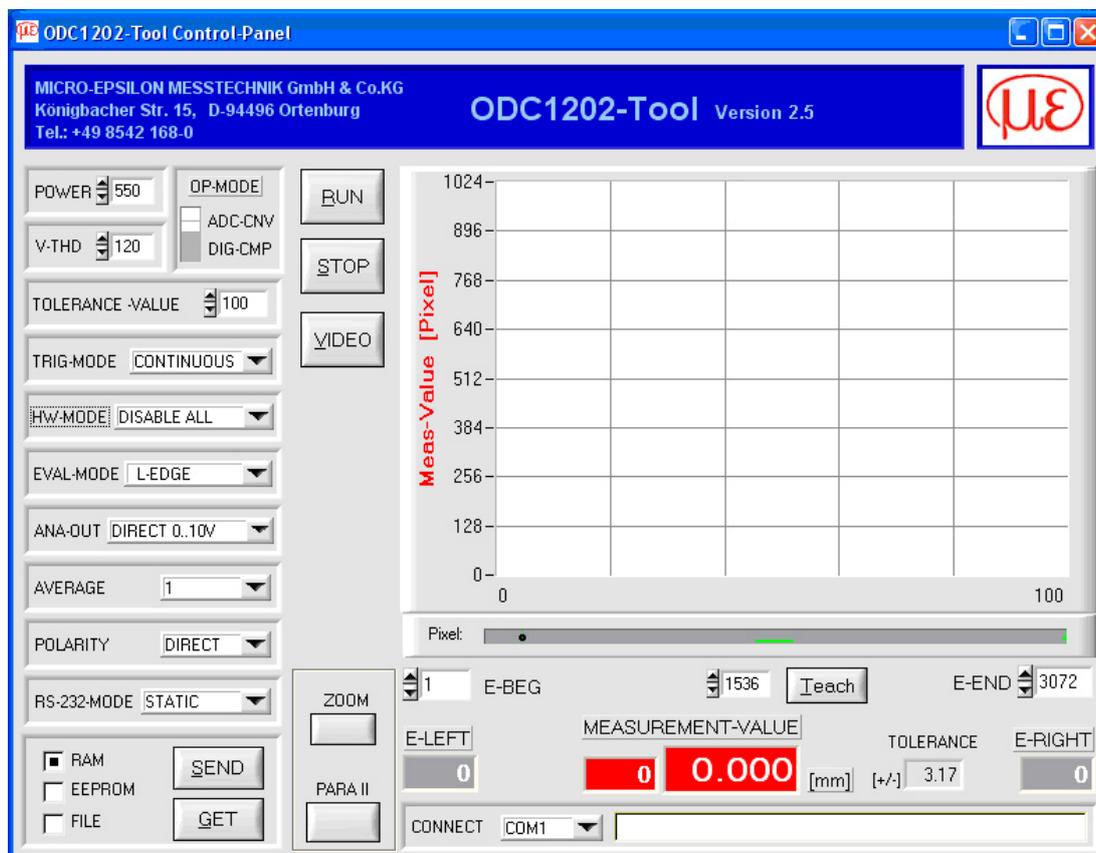
Many functions are available using the ODC1202-Tool CONTROL PANEL:
- Visualisation of the measured data in numeric and graphical output fields.
- Adjustment of the laser power for the laser transmitter.
- Adjustment of the polarity of the digital switching outputs OUT0, OUT1 and OUT2.
- Selection of a suitable evaluation mode.
- Specification of target value and tolerance band value.
- Storage of the parameters in the RAM, EEPROM memories on the control electronics or in a configuration file on the hard disc of the PC.

The individual control elements of the ODC1202-Tool software are explained in the following.

2.1 Control elements of the ODC1202-Tool software

Attention

SEND

Changes made in the function fields described below are not made active at the hardware of the ODC1202 sensor until after clicking the SEND button.

POWER 500

POWER:
The laser power at the laser transmitter of the line sensor can be adjusted in this function field by using the arrow buttons or by inputting a numeric value in the corresponding input field.

V-THD 128

V-THD (Video Threshold):
A threshold can be specified in this function field by making a numeric input using which the measured values can be derived from the intensity curve (video signal) of the CCD array. The intersection points between the intensity profile (red curve) and the adjustable video threshold (green horizontal line) are calculated and stored for this.

The x-value of the respective intersection point is assigned to a pixel on the CCD array. The measured value can be calculated from this information and the known distances of the pixels on the CCD array. The intersection points between intensity profile and video threshold obtained in this way are designated as Edges in the following.

TOLERANCE -VALUE 100

TOLERANCE-VALUE:
A tolerance default value for the tolerance window can be specified in pixels in this input field by entering a numeric value or by clicking on the arrow buttons. The tolerance window is symmetrical with the target value (TEACH-VALUE).
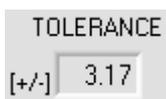
TOLERANCE
[+/-] 3.17

The tolerance value currently set at the sensor is shown in mm in a numeric display field underneath the graphical display area. If the TOLERANCE potentiometer on the sensor case is activated, the value set on the potentiometer is displayed for the tolerance.

TRIG-MODE CONTINUOUS
✔ CONTINUOUS
EXT. IN0 L/H
EXT. IN0 HIGH
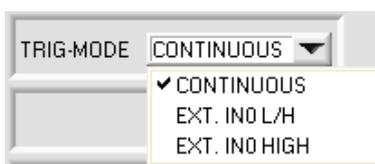
TRIGGER-MODE:
CONTINUOUS:
Continuous evaluation of the current measured values.

EXT. IN0 L/H:
External flank-controlled (LOW/HIGH) triggering of the measured value evaluation via the digital input IN0/Pin3/green on the 8-pin PLC connection socket.

EXT. IN0 HIGH:
External triggering of the measured value evaluation via a HIGH level (+Ub) at the digital input IN0/Pin3/green.
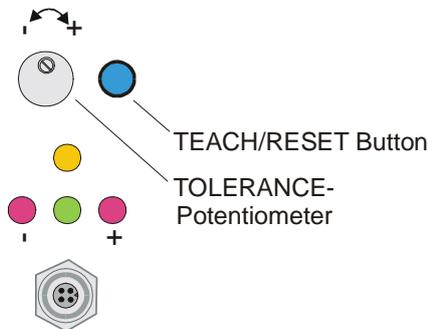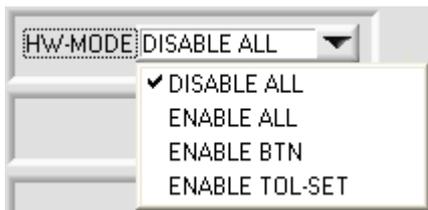
HW-MODE (Hardware Mode):

The TOLERANCE potentiometer and the TEACH/RESET button on the sensor case of the ODC1202 Sensors can be activated (ENABLE) or deactivated (DISABLE) by clicking in the drop-down menu.
The TOLERANCE potentiometer allows the specification of a tolerance window around the set value. If the function field is set to ENABLE ALL or ENABLE-TOL-SET, no numeric value inputs can be made in the TOLERANCE-VALUE input field from the PC software interface.

DISABLE ALL
Both the hardware TEACH/RESET button as well as the TOLERANCE potentiometer on the case are deactivated.

ENABLE ALL:
The TOLERANCE potentiometer on the case is activated
(turning clockwise increases the tolerance band width).
The TEACH/RESET button on the case is activated.
short button press (t<0.5 s): RESET.
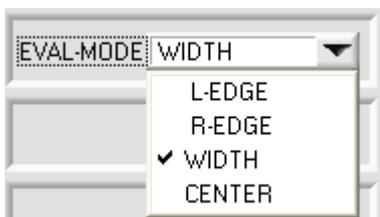long button press (t>1.5 s): TEACH.

ENABLE BTN:
Only the TEACH/RESET button on the case is activated.

ENABLE TOL-SET:
Only the TOLERANCE potentiometer on the case is activated.

EVAL-MODE:

The evaluation mode on the ODC1202 sensor can be set using this drop-down menu. Depending on which evaluation mode is currently set, the edges obtained from the video signal (intensity profile) of the CCD array are evaluated differently.

L-EDGE:
The first edge (left-edge) from the intensity profile of the CCD array is used as measured value.
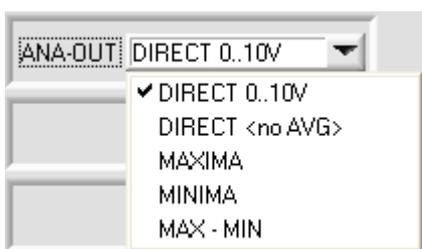
R-EDGE:
The second edge (right-edge) from the intensity profile of the CCD array is used as measured value.

WIDTH:
The difference between the second edge and the first edge is used as measured value: WIDTH = R-EDGE - L-EDGE

CENTRE:
The average value of the first edge and the second edge is used as measured value: CENTRE = (L-EDGE+R-EDGE)/2

ANA-MODE (Analogue-Output-Mode):

After clicking this function element, a drop-down menu is displayed for selecting the output mode of the analogue voltage at the ODC1202 sensor (Pin8/red of the 8-pin PLC/POWER socket).
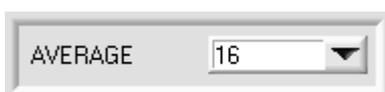
AVERAGE:

An average value can be set at the ODC1202 sensor in this function field by clicking in the input field with the mouse or by clicking the arrow button.

POLARITY:

The output polarity can be set at the ODC1202 sensor in this function field by clicking in the input field with the mouse or by clicking the arrow button. The ODC1202 sensor has 3 digital outputs (OUT0, OUT1 and OUT2) using which error states can be transmitted to the PLC.

DIRECT:

In the case of an error, the respective digital output is +Ub (+15 V DC ... +30 V DC) ($\rightarrow$ red LED lit).

INVERSE:

In the case of an error, the respective digital output is the reference potential (GND, 0 V), ($\rightarrow$ red LED lit).
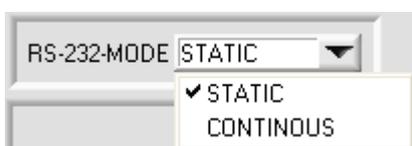
RS-232-MODE:

This function field is used for setting the operating mode of the RS232 interface on the ODC1202 sensor.

STATIC:

The RS232 interface of the ODC sensor sends back a single data frame on request of the PC/PLC (cf RS232 interface protocol).

CONTINUOUS:

If the operating mode is set to continuous, the microcontroller of the ODC1202 sensor sends measured data via the RS232 interface continuously. The time interval between the cyclical data transmissions can be adjusted using a HyperTerminal command. This mode is used for the data transfer to the Windows HyperTerminal program (cf data exchange with HyperTerminal),

Attention

If the RS232 mode is set to CONTINUOUS and the ODC1202-Tool software is used simultaneously, errors occur in the data exchange.
Remedy: Deactivate the automatic measured data transmission by selecting STATIC and activating this with the SEND button.

E-BEG:
Numeric input field for specifying the start of the evaluation. The CCD array is evaluated starting with the pixel entered here (Evaluation-Begin) (default value = 1).

E-END:
Numeric input field for specifying the end of the evaluation. The CCD array is evaluated up to and including this pixel. Pixels to the right of the pixel value specified here will not be evaluated.

TEACH-Edge:
The current edge information is applied in the RAM memory of the ODC1202 sensor as teaching value after clicking the TEACH button. Depending on the evaluation mode set (E-MODE), the left edge, the right edge or the WIDTH or the centre position (CENTRE) is taken over as the teaching value in the RAM memory of the ODC1202 sensor.

Reset/Teach Taster
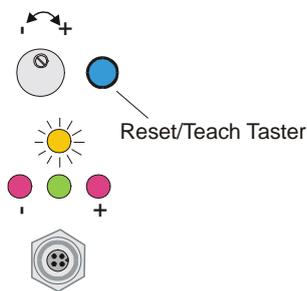
The yellow LED on the case of the ODC1202 sensor flashes briefly three times after carrying out the teaching process.

The teaching process can also be initiated using the TEACH/RESET button (pressing for t>1.5 s) on the case or by a HIGH pulse (t>1.5 s) at the digital input IN1/yellow/Pin4.
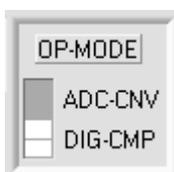
The current teaching value (set value) can also be set by making an entry in the numeric input field. The teaching value set in this way is not activated at the ODC1202 sensor until after clicking the SEND button.

The new learned set value can be read via the serial interface by clicking the GET button.

The new teaching value is then shown in the TEACH display field.

OP-MODE (operation-mode):
This function field can provide two different setting options depending on the CCD array used in the ODC1202 sensor:

(I): binary switch for setting the operating mode at the CCD array.

ADC-CNV: analogue/digital conversion of the video pixel information (8-bit)
DIG-CMP: information retrieval using a digital comparator on the
          preamplifier assembly of the CCD array. Benefit: higher sampling rate.
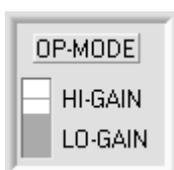
(II): binary switch for setting the gain at the CCD array.

PARAMETER TRANSFER:

This group of function buttons is used for the parameter transfer between the PC and the ODC1202 control electronics via the serial RS232 interface.

SEND:

The parameters currently set on the user interface are transmitted to the ODC1202 control electronics after clicking the SEND button.

The destination of the data transmission depends on the selected radio button (RAM, EEPROM or FILE).

GET:

After clicking the GET button, the adjustment parameters are transmitted from the ODV1202 control electronics to the PC and updated on the user interface. The source of the data transfer is determined by the set radio button:

RAM:

The currently set parameters are written to the volatile RAM memory of the ODC1202 control electronics or they are read from there and transmitted to the PC.

Note: The parameters set in RAM are lost if the ODC1202 control electronics are disconnected from the power supply.

EEPROM:

The currently set parameters are written to the non-volatile EEPROM memory of the ODC1202 control electronics or they are read from there and transmitted to the PC. Parameters stored in the EEPROM are also not lost after disconnection of the power supply.

If parameters are read from the EEPROM of the ODC1202 control electronics, these must be written to the RAM of the ODC1202 control electronics by selecting the RAM button and then pressing the SEND button. The ODC1202 control electronics then continues to operate with the specified RAM parameters.

FILE:

If the FILE radio button is selected, pressing the SEND/GET button causes a new file dialogue to be opened on the user interface. The current parameters can be written to a freely selectable file on the hard disc of the PC or read from there.
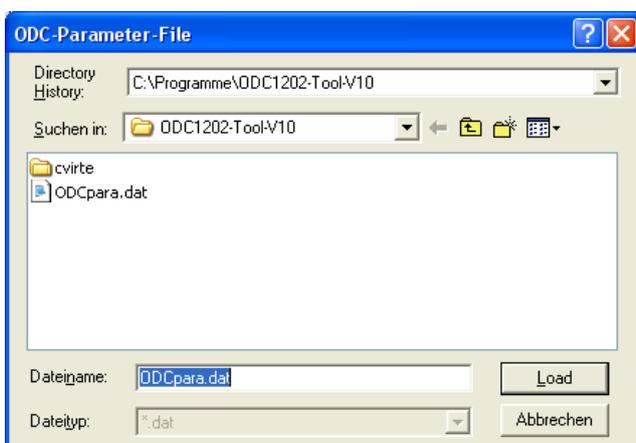
FILE dialogue window:

The standard output file for the parameter values has the file name "ODCpara.dat".
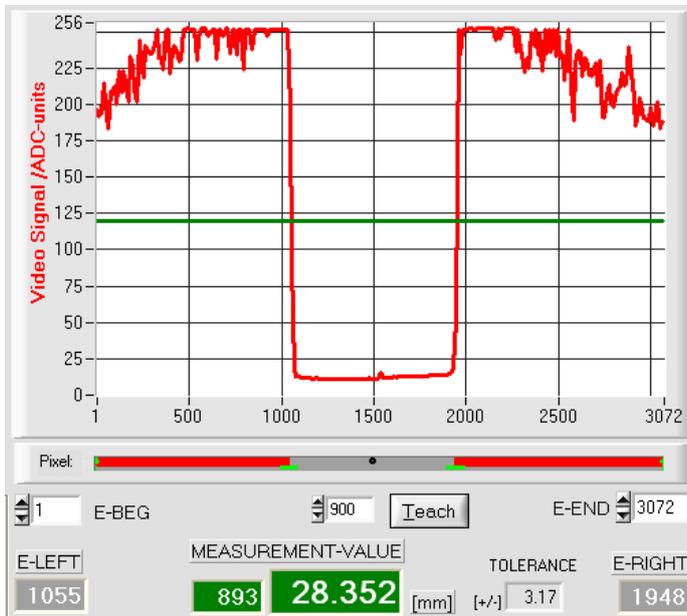
The output file can be opened with, e.g. the standard Windows text editor program "NOTEPAD".

2.2   Numeric and graphical display elements

VIDEO button:
After clicking the VIDEO button, the intensity profile measured at the CCD receiver is transferred to the PC and displayed as a red curve in the graphical display window.

The analogue signals of the individual pixels are shown on the Y-axis. The analogue values (video signals) of the CCD array are converted with 8-bit resolution using an A/D converter. The value range of 0 – 255 for the Y-axis is produced for this reason.

The currently set video threshold (V-THD) is displayed in the graph as a green horizontal line. The edge values (pixels) are derived from the intersection points of the intensity profile (red curve) with the video threshold (green line).

The individual pixels of the CCD array are displayed virtually on the X-axis
(e.g.: pixels: 1 ... 3027).

Due to the limited data transfer rate of the serial interface (19200 baud/s), the graphical display window can only be updated every second.

There is another display element underneath the graphical display window which shows the currently shadowed areas and the illuminated areas of the CCD array. The currently detected edge position is also shown in this display element by using a black, circular cursor. A green, horizontal bar shows the size of the currently set tolerance band around the teaching value.

E-LEFT:
Numeric display field for the output of the current left edge position.

E-RIGHT:
Numeric display field for the output of the current right edge position.

M-VALUE:
Numeric display field for the output of the current measured value (dependent on the set evaluation mode).
The numeric display field on the left shows the current measured value in pixels while the display field on the right shows the measured value converted to millimetres.

RUN button:
The current measured data are transmitted from the ODC1202 sensor to the PC after clicking the RUN button.

Clicking the RUN button displays the current measured value in the graphical display window in "rolling mode". The measured values here run from right to left through the graphical display window as the red curve.

The division of the Y-axis corresponds to the pixels present on the CCD array or the virtual number of subpixels per array. The current measured value (M-VALUE = 1594) is shown on the right end of the graph for the X-value 100.

The current target value (TEACH value) is displayed as a dashed horizontal line.
The current tolerance window is also shown using two green symmetrical lines around the target value.

The length of the data frame in the "RUN mode" is limited to 18 words (36 bytes). This means the numeric and graphical display elements can be updated more quickly.

Therefore, the data transfer via the serial RS232 interface does not require as much time as compared with the "DATA mode" (the intensity information for each pixel must be transferred in the DATA mode).

2.3   Serial RS232 data transfer

RS232 COMMUNICATION:

-        -   Standard RS232 serial interface without hardware handshake.
-        -   3-wire connection: GND, TXD, RXD.
-        -   Speed: 19200 baud, 8 data bits, no parity bit, 1 stop bit in binary mode, MSB first.

⚠️ **Attention**

The stable function of the RS232 interface (status message after program start) is a basic requirement for the successful parameter exchange between the PC and the ODC1202 control electronics. Due to the low data transfer rate of the serial interface (19200 bit/s), only slow changes of the analogue values can be traced on the graphic display of the PC. In order to guarantee the maximum switching frequency of the ODC1202 control electronics, the data exchange must be stopped in the normal monitoring process (click STOP button).

CONNECT:

During the start of the software, it is attempted to make a connection via the standard COM1 port to the ODC1202 control electronics. If the connection was established successfully, the current firmware version is displayed on the status line.
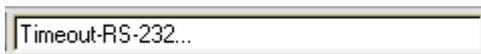
The serial connection between the PC and the ODC1202 control electronics could not be established or the connection has been interrupted.

In this case, it should first be checked whether the ODC1202 control electronics are connected to the power supply and whether the serial interface cable between the PC and the control electronics is connected properly.

If the assigned number of the serial port on the PC is not known, the ports COM1 to COM16 can be selected using the CONNECT drop-down list.

If the status message is "Invalid port number", the selected port, e.g. COM2, is not available on your PC.

If the status message is "Cannot open port", the selected port (e.g. COM2) is possibly already being used by another device.

2.4   ODC 1202-Tool software as aid for sensor adjustment

VIDEO:
The fine adjustment between the ODC transmitter and the receiver can be followed on the graphical display window after clicking on the VIDEO button. The display window can only be updated every second due to the limited data transfer rate of the RS232 interface.

STOP:
Clicking on the STOP button with the mouse ends the data transfer between the ODC1202 control electronics and the PC.


Optimum adjustment:
The intensity profile is displayed as a red curve in the graphical display window. The number values 1 – 1024 on the X-axis represent the individual pixels of the CCD array. The analogue values of the CCD array are converted with 10-bit resolution using an A/D converter. The value range of 0 – 1023 for the Y-axis is produced for this reason.
As can be seen from the graph on the left, the CCD pixels 1 to 1024 are evenly illuminated by the transmitted beam.
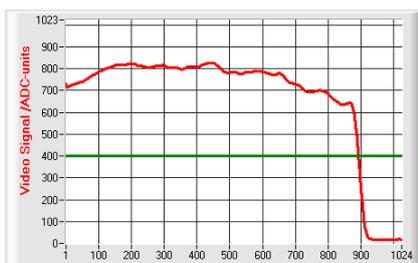

Misalignment - right:
The transmitted beam no longer sufficiently illuminates the pixels at the right-hand end of the CCD array. The alignment of the laser transmitter or the CCD receiver must be adjusted so that the pixels at the right-hand end are illuminated again.
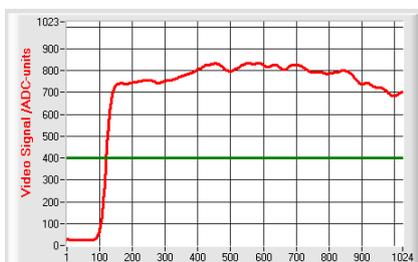
Misalignment - left:
The transmitted beam no longer sufficiently illuminates the pixels at the left-hand end of the CCD array. The alignment of the laser transmitter or the CCD receiver must be adjusted so that the pixels at the left-hand end are illuminated again.

2.5 ODC 1202-Tool software as aid for transmission power adjustment
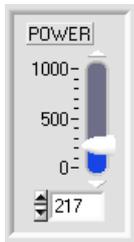
POWER:
The laser power at the laser transmitter of the ODC1202 sensor can be adjusted using the slider or by inputting a numeric value in the corresponding input field.

⚠️ **Attention**

The laser power at the transmitter of the ODC1202 sensor is not updated until after clicking the SEND button.

SEND

VIDEO:
After clicking the VIDEO button, the current intensity profile of the ODC1202 sensor is transferred to the PC and displayed in the graphical display window. When the VIDEO function is active, the laser power at the sensor can be changed (press SEND button) and the effect on the intensity profile can be observed.
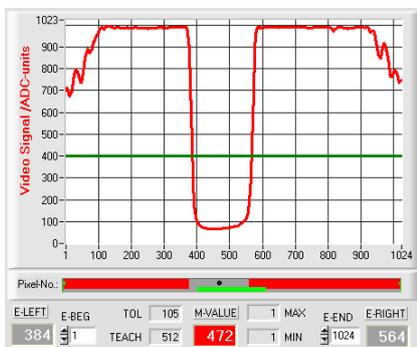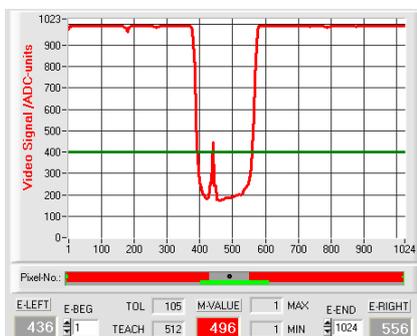
Optimum adjustment:
The intensity profile is displayed as a red curve in the graphical display window. The intensity curve over the complete CCD array is above the video threshold (green line).

The intensity profile is for low ADC values (offset < 120) in the shadowed area.

No sporadic "spikes" occur in the intensity curve in the shadowed areas.

Transmission power too high:
The transmitted beam overcontrols individual pixels of the CCD array. Short "spikes" occur sporadically in the shadowed areas.

If the "spikes" intersect the green, horizontal video threshold, faulty measurements occur!

Remedy:
Reduce laser power gradually until the "spikes" no longer occur in the shadow area.
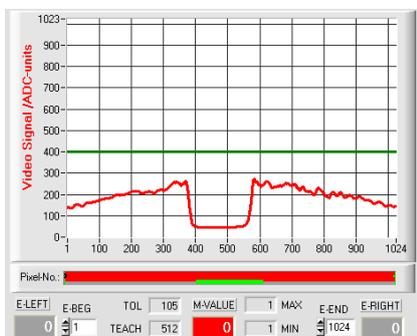
Transmission power too low:
The intensity profile of the CCD array is completely below the video threshold (green horizontal line).
The ODC1202 sensor does not detect any edges (light/dark transitions, i.e. intersection points between red curve and video threshold) from the beam pattern.

Remedy:
Increase laser power gradually and simultaneously follow intensity profile until the red curve (intensity profile) from Pixel 1 to Pixel 1024 is above the video threshold.
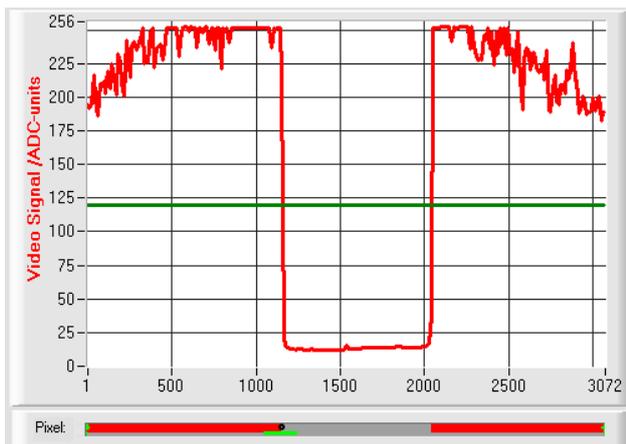
3   Evaluation operating modes

3.1   LEFT-EDGE

L-EDGE:
The <u>first</u> detected edge in the intensity profile of the CCD array is evaluated.

The transition between illuminated and shadowed areas in the intensity profile of the CCD array is used as criteria for detection of the edges.

The pixel of the CCD array where the light/dark transition occurs can be determined from the intersection point between the video threshold (green horizontal line) and the intensity profile (red curve).

In the graph on the left, the first light/dark transition is detected at the pixel No. 1155. The measured value can be converted to [mm] using the known pixel spacing (here 31.75 µm).
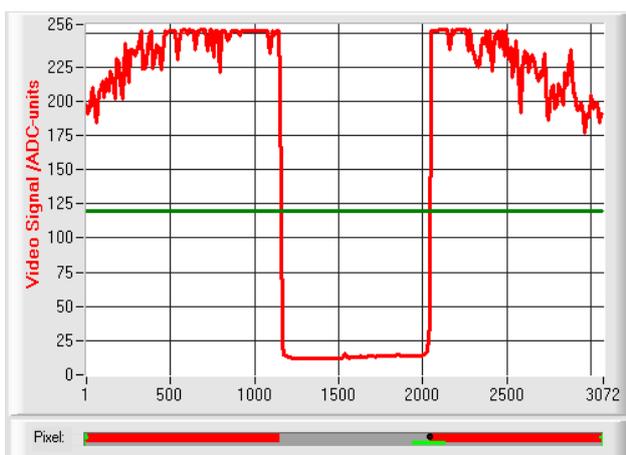
The current measured value M-VALUE = E-LEFT is output in the numeric display element.

E-LEFT 1155   MEASUREMENT-VALUE 1155 36.671 [mm]   TOLERANCE [+/-] 3.17   E-RIGHT 2047

3.2   RIGHT-EDGE

R-EDGE:
The <u>second</u> detected edge in the intensity profile of the CCD array is evaluated.

The pixel of the CCD array where the second light/dark transition occurs can be determined from the intersection point between the video threshold (green horizontal line) and the intensity profile (red curve).

In the graph on the left, the second light/dark transition is detected at the pixel No. 2047.

The black, point-shaped cursor underneath the graphic display marks the current right edge (R-EDGE) of the shadowed area. The measured value can be converted to [mm] using the known pixel spacing (here 31.75 µm).
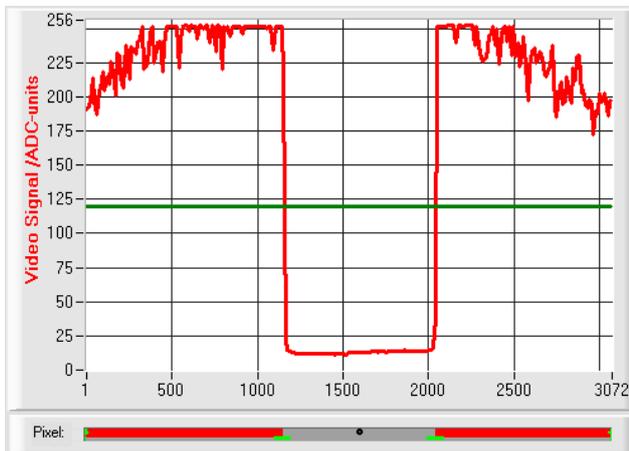
The current measured value M-VALUE = E-RIGHT is output in the numeric display element.

E-LEFT 1155   MEASUREMENT-VALUE 2047 64.992 [mm]   TOLERANCE [+/-] 3.17   E-RIGHT 2047

3.3 WIDTH

WIDTH:

The difference between the second edge and the first edge in the intensity profile of the CCD array is evaluated.

Two pixels where a light/dark transition occurs can be determined from the two intersection points between the video threshold (green horizontal line) and the intensity profile (red curve).

In the graph on the left, the first light/dark transition is detected at the pixel No. 1155 and the second light/dark transition at pixel No. 2047.

The difference between these produces the width of the target (WIDTH = 892).
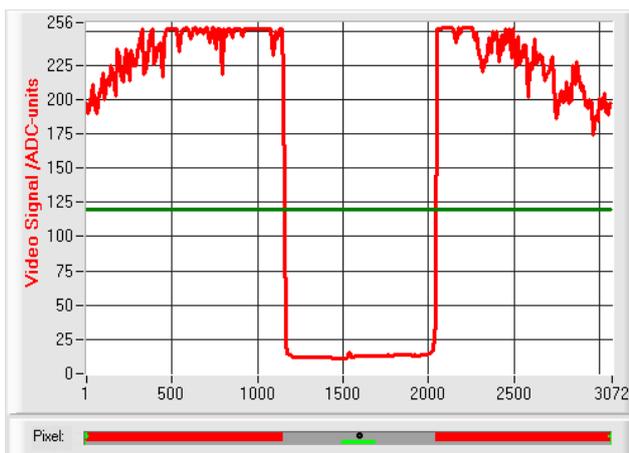
$$WIDTH = E\_RIGHT - E\_LEFT$$

The current measured value M-VALUE = WIDTH is output in the numeric display element.

3.4 CENTRE

CENTRE:

The average value of the first edge and the second edge is used as measured value: CENTRE = (R-EDGE+L-EDGE)/2

Two pixels where the light/dark transition occurs can be determined from the two intersection points between the video threshold (green horizontal line) and the intensity profile (red curve). In the graph on the left, the second light/dark transition is detected at the pixel No. 2047 and the first light/dark transition at pixel No. 1155.

The average of these produces (CENTRE = 1601)

$$CENTER = \frac{(E\_RIGHT + E\_LEFT)}{2}$$

The current measured value M-VALUE = CENTRE is output in the numeric display element.

4   Two point calibration

The CCD Settings & Calibration popup window is displayed after clicking this button. The popup window can be moved anywhere on the user interface of the PC and minimised. Clicking on the PARA II button again closes the popup window. A two point calibration on the sensor can be performed using the CCD Settings & Calibration window. Information concerning the CCD array used in the sensor is displayed in the top part of the window (number of pixels, distance from pixel centre to pixel centre, working area and resolution of the CCD array). In the example on the left, the pixel distance is 31.75 µm and the working area is 74.9 mm (1180 pixel * 31.75 µm * 2 subpixels = 74.9 mm).
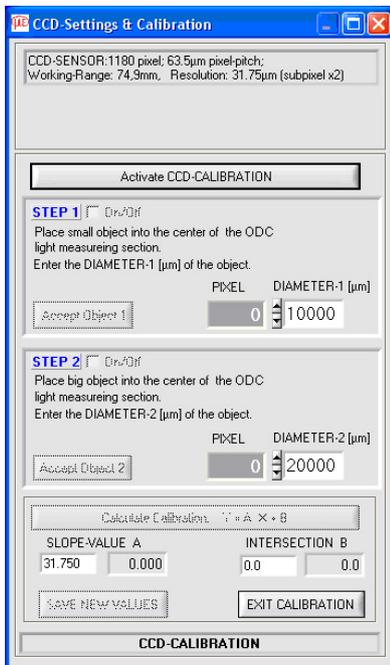
The two point calibration is used in the evaluation mode EVALMODE = WIDTH to output and display an accurate as possible width measured value in the micrometer on the sensor.


The problem for the width measurement is that the measured value for the width information is calculated differently depending on the specified video threshold and on the specified transmission power. This is caused by the constantly increasing analogue curve (slope) of the video signal in the transition area between object shadowing and direct incidence of the laser light on the pixels of the CCD array. The object width is calculated indirectly using the two intersection points of the video signal profile (red curve) with the green horizontal video threshold.
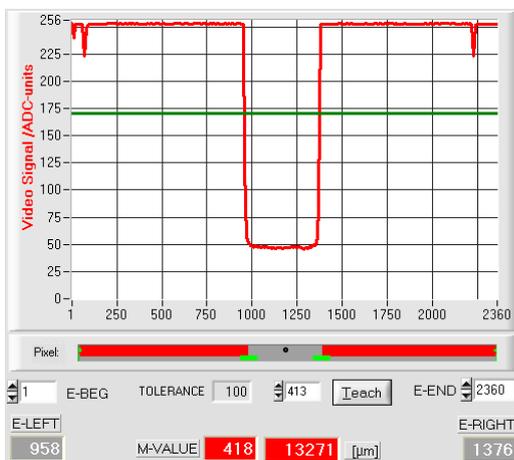
Video threshold high; object appears wider in the "cast shadow zone". Measured value = 418 pixels. The measured value in µm is produced from this by multiplication of the pixel number with the respective pixel distance (pixel pitch).

M-VALUE = 418 pixel x 31.75 µm = 13271 µm
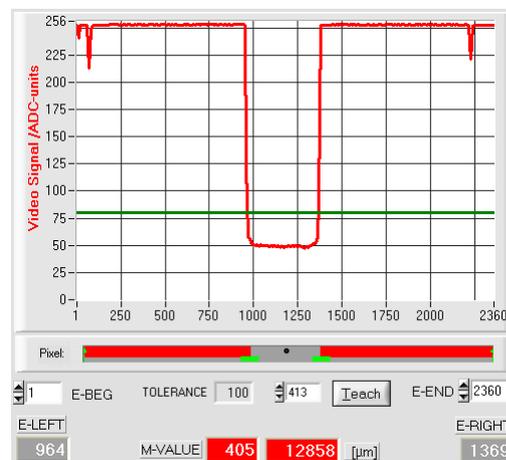
Video threshold low; object appears somewhat narrower in the "cast shadow zone". Measured value = 405 pixels. The measured value in µm is produced from this by multiplication of the pixel number with the respective pixel distance (pixel pitch).
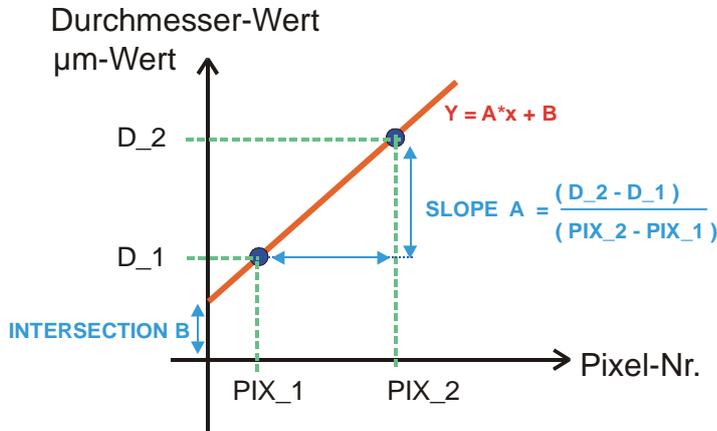
M-VALUE = 405 pixel x 31.75 µm = 12858 µm

In order to compensate for this problem, a two point calibration with fixed transmission power (POWER) and fixed video threshold (V-THD) can be performed.

Activate CCD-CALIBRATION

Activate CCD-CALIBRATIONI

The two point calibration for the width measurement can be started by clicking the Activate CCD CALIBRATION button.

Durchmesser-Wert µm-Wert

$Y = A*x + B$

$$\text{SLOPE A} = \frac{(D\_2 - D\_1)}{(PIX\_2 - PIX\_1)}$$

INTERSECTION B

PIX_1   PIX_2

Pixel-Nr.

Starting with two known objects (dimensions in µm known) of different width, a regression line through two points is calculated for the two point calibration.

The important parameters of the regression line are its slope (SLOPE-VALUE A) and if necessary the Y-axis intersection B.

The slope A shows how many micrometres change occur per pixel change. The Y-axis intersection B (INTERSECTION VALUE B) shows the zero point offset (Offset).

STEP 1 ☑ On/Off
Place small object into the center of the ODC light measureing section.
Enter the DIAMETER-1 [µm] of the object.
PIXEL   DIAMETER-1 [µm]
Accept Object 1   411   13000

STEP 1:

After activation of the ON/OFF checkmark, it is expected that the object with the smaller diameter will be placed in the centre of the working area. The smaller measuring object should cover, e.g. 20-40% of the maximum working area.
The known diameter value in micrometres must be input here in the numeric input field.

Accept Object 1

The first pair of values (DIAMETER-1, PIXEL_1) is saved by clicking the Accept Object 1 button.

STEP 2 ☑ On/Off
Place big object into the center of the ODC light measureing section.
Enter the DIAMETER-2 [µm] of the object.
PIXEL   DIAMETER-2 [µm]
Accept Object 2   1206   38060

STEP 2:

After activation of the ON/OFF checkmark, it is expected that the object with the larger diameter will be placed in the centre of the working area. The larger measuring object should cover, e.g. 60-80 % of the maximum working area.
The known diameter value in micrometres must be input here in the numeric input field.

Accept Object 1

The second pair of values (DIAMETER-2, PIXEL_2) is saved by clicking the Accept Object 2 button.

RUN

Pixel:

The actions of the RUN button are automatically performed on the user interface when the calibration is started. The central placement of the measuring objects in the working area of the sensor can be controlled in the graphical display area underneath the large "Roll Graph". The position of the measuring object can be recognised from the position of the area with the grey background (shadow area). The pixels which are struck by the laser beam are displayed as the area marked in red.

Calculate Calibration: Y = A* X + B

After clicking the Calculate Calibration button, the slope and the Y-axis intersection are recalculated from both known point pairs of the measuring objects.

The new calculated values for the slope (SLOPE-VALUE A) and the offset (INTERSECTION B) are shown in the display fields with grey backgrounds.
The previously specified values are displayed in the numeric input fields with white backgrounds.

SAVE NEW VALUES
If the new calculated values are reasonable, they can be saved in the RAM memory of the control electronics in the sensor by clicking the SAVE NEW VALUES button.
If the last calibration performed should be discarded, this can be done by clicking the EXIT CALIBRATION button.

Attention

The last calculated calibration values are not applied in the NONVOLATILE EEPROM memory of the control electronics until after selecting the EEPROM selection button and clicking the SEND button afterwards.

EXIT CALIBRATION
Discard the calibration values.

Manual input of the calibration data:

The calibration data can also be changed manually in the control electronics of the sensor.

After opening the PARA II popup window, the number values in the corresponding numeric input fields can be changed manually at any time without having to perform the calibration procedure.

The new entered calibration values must be activated on the control electronics by clicking the SEND button.
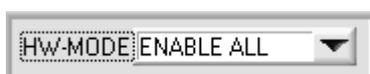
5 Appendix

5.1 How the tolerance potentiometer works

There is a potentiometer on the case of the ODC1202 sensor for adjustment of the tolerance band width.
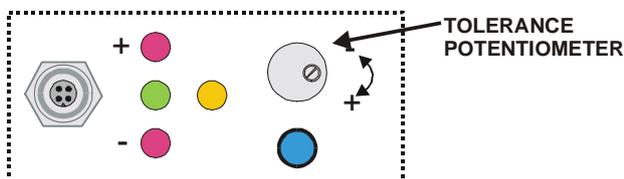

TOLERANCE potentiometer:
The tolerance band width is increased by turning the potentiometer clockwise.
Turning anticlockwise reduces the tolerance band width.

The potentiometer must be activated (switch setting on ENABLE ALL or ENABLE TOL SET) for the adjustment of the tolerance band width at the ODC1202 sensor.

5.2 DIGITAL INPUT IN0 (Pin3/green), External Trigger

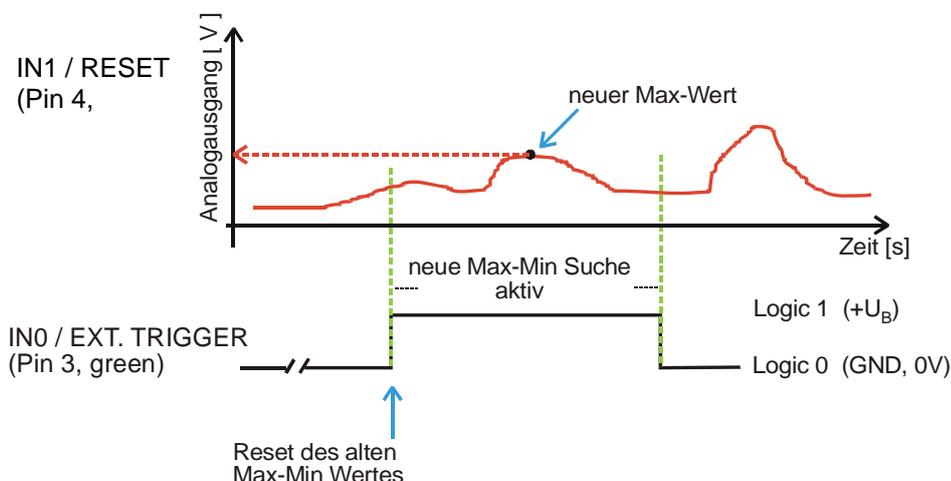The external triggering on the hardware is initiated by applying a HIGH level to the digital input IN0.
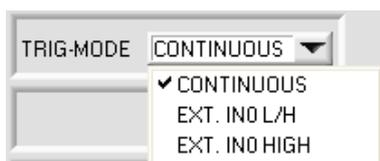
The triggered mode is only possible in the two trigger operating modes "EXT. IN0 L/H" and "EXT. IN0 HIGH".

Depending on the analogue output mode set, the analogue and digital outputs are only updated if the trigger condition is fulfilled.
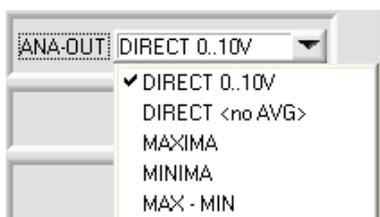
The control electronics resets the MAX/MIN value with the new LOW/HIGH flank at IN0. During the HIGH level at IN0 (time window), the MAX-MIN search is active in accordance with the trailing pointer principle. The respective current MAX/MIN value in this time window is output at the analogue output Pin 8/red. If the HIGH level at IN0 is removed, the MAX/MIN value detected during the time window remains at the analogue output. The analogue value is not reset until the next LOW/HIGH flank of the following time window.

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