

Manual

Software RLS-GD-Scope V2.0

(PC software for Microsoft® Windows® XP, 2000, NT® 4.0, Me, 98, 95)

for RLS-GD-15 gloss detection sensors

This manual describes the installation of the PC software for the RLS-GD-15 gloss detection sensor. As a support for commissioning of the gloss sensor this manual explains the functional elements of the Windows® user interface.

The RLS-GD-15 sensor can be "taught" up to 31 gloss degrees or normalized vectors. Evaluation always is performed with 12 bits. With the help of a modulated white-light LED a white light spot (\varnothing approx. 15 mm) is projected onto the surface to be inspected by way of an optical transmitter unit at an angle of 60° to the vertical plane.

Part of the light directly reflected by the object to be measured is directed onto a photodiode by means of an optical receiver unit (optical receiver unit also arranged at an angle of 60° to the vertical plane). Furthermore, diffuse reflection is determined by way of one additional optical unit.

Gloss detection either operates continuously or is started by an external SPC trigger signal. The gloss degree or the detected normalized vector is output at the 5 digital outputs OUT0 to OUT4, or it can be sent analog either to the voltage output 0 ... +10V or to the current output 4 ... 20mA. At the same time the detected gloss degree is visualised by means of 5 LEDs at the housing of the RLS-GD-15.

With the TEACH button at the sensor housing the sensor can be taught the currently detected gloss degree or the normalized vector. For this purpose the corresponding evaluation mode must be set with the software. The TEACH button is connected in parallel to the input IN0 (green wire of cable cab-las8/SPS).

Through the RS232 interface parameters and measured values can be exchanged between the PC and the RLS-GD-15 sensor. All the parameters for gloss grade detection and normalized vector detection can be stored in the non-volatile EEPROM of the RLS-GD-15 sensor. When parameterization is finished the gloss sensor continues to operate with the current parameters in "stand alone" mode without a PC.

In order to perform gloss degree detection the sensor must be calibrated. For this purpose a black glass inlay is required which by definition has a gloss degree of 100%. Calibration is then performed with the help of the PC software.

The sensor is factory-temperature-compensated. It is stable over a temperature range from 10 degrees to 60 degrees centigrade. The current temperature inside the housing is visualised by the PC user interface.

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1 Operation of the RLS-GD-Scope software

Hardware requirements for successful installation of the RLS-GD-Scope software:

- IBM PC AT or compatible
- VGA graphics
- Microsoft® Windows® XP, Me, 2000, 98, NT® 4.0 or 95
- Serial RS232 interface at the PC
- Microsoft-compatible mouse
- Cable for the RS232 interface
- CD-ROM drive
- Approx. 5 MByte of free hard disk space

The RLS-GD-Scope software can only be installed under Windows. Windows must therefore be started first, if it is not yet running.

Please install the software as described below:

1. The software can be installed directly from the installation CD-ROM. To install the software, start the SETUP program in the INSTALL folder of the CD-ROM.
2. The installation program displays a dialog and suggests to install the software in the C:\FILENAME directory on the hard disk. You may accept this suggestion with **OK** or **[ENTER]**, or you may change the path as desired. Installation is then performed automatically.
3. During the installation process a new program group for the software is created in the Windows Program Manager. In the program group an icon for starting the software is created automatically. When installation is successfully completed the installation program displays "Setup OK".
4. After successful installation the software can be started with a left mouse button double-click on the icon.

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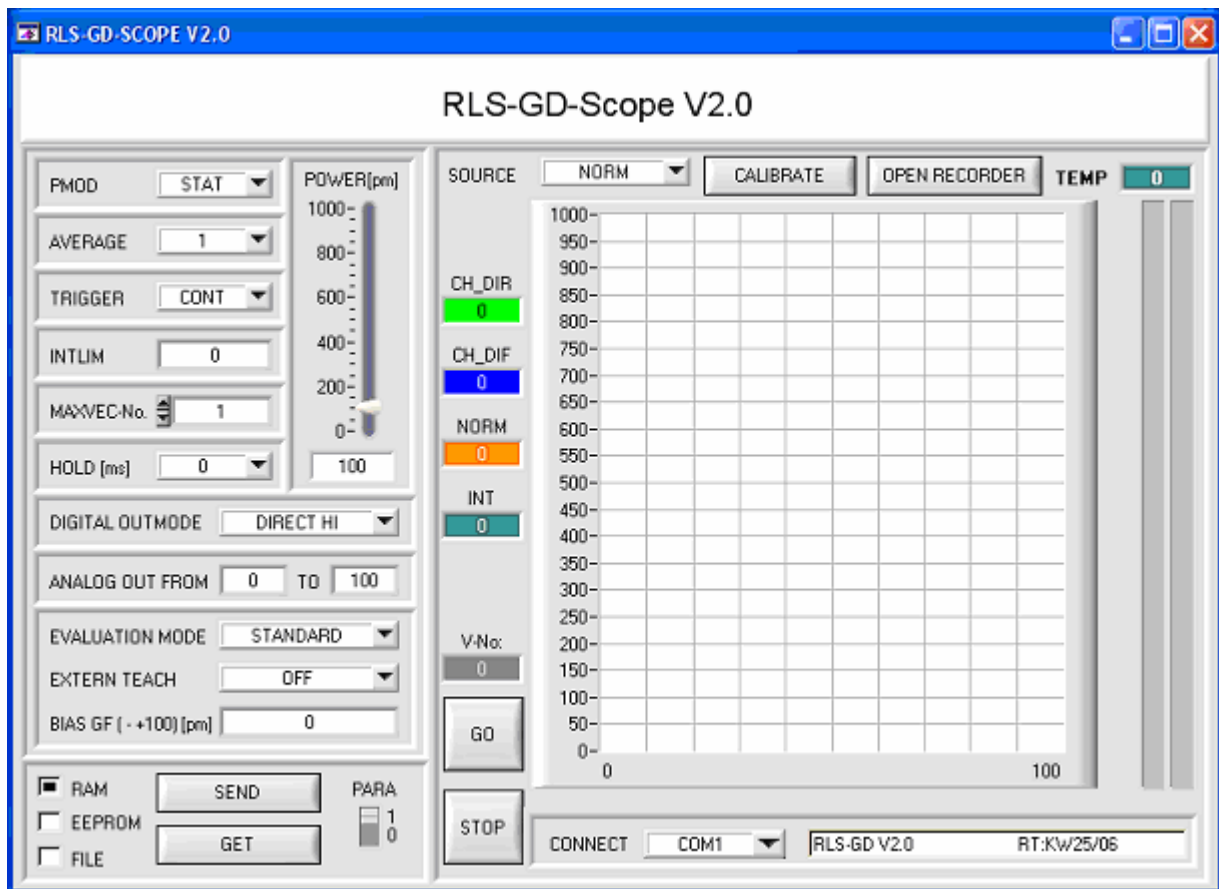
2 Operation of the RLS-GD-Scope software

2.1 Functions of the individual control elements

Please read this chapter first before you start to adjust and parameterise the RLS-GD-15 sensor.

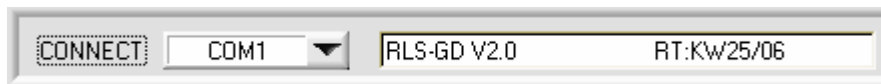
Pressing the right mouse button on an individual element will call up a short help text.

When the RLS-GD-Scope software is started, the following window appears on the Windows interface:



2.1.1 Explanation of general function groups and display elements


The RLS-GD-Scope software starts with the standard configuration COM1 and the respective communication status.



The system provides the following status messages:

Init COM-PORT	The PC tries to establish a connection with the sensor through the respective selected interface.
RLS-GD V2.0 RT:KW25/06	The connection between PC and sensor could be established successfully.
TIMEOUT:	<p>A connection between sensor and PC could not be established, or the connection is faulty.</p> <p>In this case it should first be checked whether the sensor is supplied with voltage, and whether the RS232 interface cable is correctly connected.</p> <p>If the interface assignment at the PC is not known, a selection can be made from COM1, COM2, ... COM9 by clicking on the [↓] selection field in the CONNECT group.</p>
Invalid port number:	The selected interface is not available at the PC.

Please note:	The stable function of the RS232 interface („RLS-GD V2.0 RT:KW25/06 “ status message after program start) is a basic prerequisite for measured value transfer from the PC to the RLS-GD-15 sensor.
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	<p>Due to the limited data transfer rate through the serial RS232 interface (19200 bit/s) only slow changes of the raw signals at the sensor front end can be observed in the graphic output window of the PC.</p>
<p>ATTENTION !</p>	<p>For maintaining maximum switching frequency at the sensor data communication with the PC must be stopped (press the STOP button).</p>

ATTENTION!

A change of the transmitter power only becomes effective at the RLS-GD-15 sensor after actuation of the SEND button in the MEM function field!



The gloss sensor can be operated with two different evaluation modes.

STANDARD:

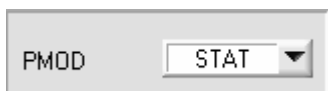
Only the channels CH_DIR (direct reflection) and CH_DIF (diffuse reflection) are used for evaluation.

From the two values of CH_DIR and CH_DIF a NORM signal and an INTENSITY are calculated and evaluated (see below).

GLOSSY[%]:

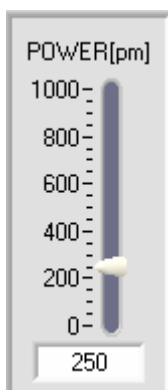
The channels CH_REF (reference channel) and CH_DIR are used for evaluation. Before this evaluation mode can be used, however, the sensor must be calibrated (see below).

After successful calibration the sensor determines the gloss degree of the respective surface and outputs this in digital and analog form.



PMOD:

In this function field the operating mode of automatic power correction at the transmitter unit can be set.



STAT:

The LED transmitter power is constantly kept at the value set with the POWER slider.

DYN:

The LED transmitter power is dynamically controlled in accordance with the amount of radiation that is diffusely reflected from the object. By using the intensities measured at the receivers the automatic control circuit attempts to adjust the transmitter power in such a way that the dynamic range is not exceeded (recommended operation mode).

POWER:

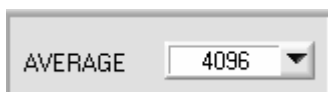
In this function field the intensity of the transmitter LED can be adjusted by using the slider or by entering a value in the edit box. A value of 1000% means full intensity at the transmitter LED, a value of 0 stands for the lowest transmitter

intensity adjustment!

INFO:

In EVALUATION MODE STANDARD the sensor can be operated with static or dynamic transmitter power. When dynamic transmitter power is used, the POWER slider is inactive, because the sensor automatically regulates the LED power.

In EVALUATION MODE GLOSSY [%] the function fields PMOD and POWER have no effect, because in this evaluation mode the sensor always regulates the transmitter power dynamically.



AVERAGE:

This function field is used for adjusting the number of scanning values (measurement values) over which the raw signals measured at the receivers are averaged. A higher AVERAGE default value reduces noise of the raw

signals at the receiver unit and there will be a decrease of the maximal available switching frequency of the RLS-GD-15 sensor.

TRIGGER:

This function field serves for setting the trigger mode at the RLS-GD-15 sensor.

CONT:

Continuous color detection (no trigger event required).

EXT1:

Evaluation is started through the external trigger input (IN0 pin3 green of cable cab-las8/SPS). A trigger event is recognized as long as +24V is present at the IN0 input (HIGH-active).

After the trigger input goes to LOW again, the state (V-No.:) that was last detected will be held at the outputs.

EXT2:

Same behaviour as in EXT1 mode, with the difference that an error state (V-No.: = 255) will be output after the trigger input goes to LOW again.

INTLIM:

This edit box is used for setting an intensity limit. Color evaluation is stopped, if the current intensity INT arriving at the receiver unit falls below this limit, and ERROR STATE (V-No.: =255) is output.

INFO:

The INTLIM functionality only is available in EVALUATION MODE STANDARD.

This function field has no effect when the EVALUATION MODE GLOSSY [%] is used.

MAXVEC-No.:

This function field serves for setting the number of gloss degrees or normalized vectors to be checked.

In the BINARY modus the maximum number of gloss degrees to be checked is 31. In the DIRECT HI or DIRECT

LO modus the maximum number of gloss degrees to be checked is 5 (No. 0,1,2,3,4). The numerical value set here determines the currently possible scanning rate of the sensor. The less the gloss degrees to be checked, the faster the operation of the RLS-GD-15 sensor.

The numerical value set here refers to the number of rows (starting with row 0) in the → TEACH TABLE.

HOLD:

The RLS-GD-15 sensor operates with minimum scanning times in the magnitude of less than 150µs. This is why most of the PLCs that are connected to the digital outputs OUT0 ... OUT4 have difficulties with the safe detection of the

resulting short switching state changes. For the digital outputs of the RLS-GD-15 sensor pulse lengthening of up to 100 ms can be set by selecting the corresponding HOLD value.

DIGITAL OUTMODE DIRECT HI

DIGITAL OUTMODE:

This group of buttons offers the method of how to control the 5 digital outputs.

BINARY:

If in this row-by-row comparison the current gloss grades or normalized vectors correspond with the teach-in parameters entered in the TEACH TABLE, this gloss degree or normalized vector in the TEACH TABLE is displayed as a vector number (V-No.) and is sent to the digital outputs (OUT0 ... OUT4) as a **bit pattern**. The maximum number of gloss degrees or normalized vectors to be taught is 31.

DIRECT:

In this mode the maximum number of gloss degrees or normalized vectors to be taught is 5.

If in this row-by-row comparison the current parameters correspond with the teach-in parameters entered in the TEACH TABLE, this gloss degree or normalized vector in the TEACH TABLE is displayed as a vector number (V-No.) and is sent **direct** to the digital outputs (OUT0 ... OUT4).

DIRECT HI:

If **DIRECT HI** is activated and if a line vector (V-no.: 0...4) is detected in the TEACH TABLE, the special digital output (OUT0 ... OUT4) is set to HI. If no line vector was detected, the digital outputs are in LO status (no LED is lighting).

DIRECT LO:

If **DIRECT LO** is activated and if a line vector (V-no.: 0...4) is detected in the TEACH TABLE, the special digital output (OUT0 ... OUT4) is set to LO, while the other ones are set to HI. If no line vector was detected, the digital outputs are in HI status (all LEDs are lighting).

ANALOG OUT FROM 0 TO 100 %

ANALOG OUT FROM:

These function groups are used for selecting the output mode of the analog outputs.

The gloss sensor has a current output from 4mA to 20mA and a voltage output from 0 to 10V.

The sensor internally calculates the gloss factor in per mille (0-1000). On the graphic user interface it is also indicated in per mille (0-1000), it is only shown in percent (0 to 100) in the corresponding display.

The calculated NORM may have values between 0 and 1000.

Depending on the EVALUATION MODE, either the gloss degree or the norm value is output in analog form.

The above function field is used to tell the sensor which range in percent of the total measuring range should be output (zoom function).

Example 1: ANALOG OUT FROM 0 TO 100 %:

Gloss factor in percent	Gloss factor in per mille	Voltage output	Current output
25	250	2.5 V	8mA
75	750	7.5V	16mA

Example 2: ANALOG OUT FROM 0 TO 50 %:

Gloss factor in percent	Gloss factor in per mille	Voltage output	Current output
25	250	5 V	12mA
75	750	10V (out of range)	20mA (out of range)

Example 3: ANALOG OUT FROM 50 TO 100 %:

Gloss factor in percent	Gloss factor in per mille	Voltage output	Current output
25	250	0 V (out of range)	4mA (out of range)
75	750	5V	12mA

EXTERN TEACH

EXTERN TEACH:

When EXTERN TEACH is activated, the currently present gloss degree or normalized vector (depending on EVALMODE) can be written to the TEACH TABLE by way

EVALMODE) can be written to the TEACH TABLE by way of the external IN0 input or the TEACH button. The currently present line vector is automatically taken over, starting with line 0, in as many lines as is set in MAXVEC-No..

The advantage is that the user does not have to start the parameterisation software for this purpose.

Please note that when this evaluation mode is selected, the tolerances must at the beginning be stored once to the EEPROM.

Furthermore, the MAXVEC-No. also must be set first, and must also be stored in the EEPROM.

EVALUATION MODE = STANDARD

No.	TEACH TABLE				
	NORM	N TOL	INT	I TOL	
0	1	25	1	20	
1	1	50	1	40	
2	1	100	1	80	
3	1	200	1	100	
4	1	1	1	1	

EVALUATION MODE = GLOSSY [%]

No.	TEACH TABLE				
	GF	GF TOL			
0	1	5	1	1	
1	1	10	1	1	
2	1	15	1	1	
3	1	20	1	1	
4	1	1	1	1	

ATTENTION!

When the EXTERN TEACH mode is activated, external triggering with EXT1 and EXT2 is not possible, because the sensor only has one input.

The TRIGGER function field will no longer be active.

BIAS GF (- +100) [pm]

BIAS:

By entering a BIAS value, the gloss factor value can be additively influenced in evaluation mode GLOSSY. BIAS has

a value range of -100 to +100. Values are entered in per mille.

This means, if you have a GF value of 7.0 with BIAS=0, and you enter BIAS=10, the resulting GF value will be 8.0, and if you enter BIAS=-10, the resulting GF value will be 6.0.

☒ RAM PARA ☐ 1
☐ EEPROM ☐ 0
☐ FILE

RAM, EEPROM, FILE :

This group of buttons controls parameter exchange between PC and sensor through the serial RS232 interface.

PARA:

With this switch the display of the TEACH TABLE at the PC screen can be switched on and off.

1: Display of function fields for entering and selecting general monitoring parameters.

0: Display of the TEACH TABLE for entering the individual parameters for the teach-in vectors.



SEND:

When the SEND button is clicked (or shortcut key button F9 is pressed), all the currently set parameters are transferred between PC and sensor. The target of the respective parameter transfer is determined by the selected button (RAM, EEPROM, or FILE).



GET:

The currently set values can be interrogated from the sensor by clicking on the GET button (or with shortcut key button F10). The source of data exchange is determined by the selected button (RAM, EEPROM, or FILE).

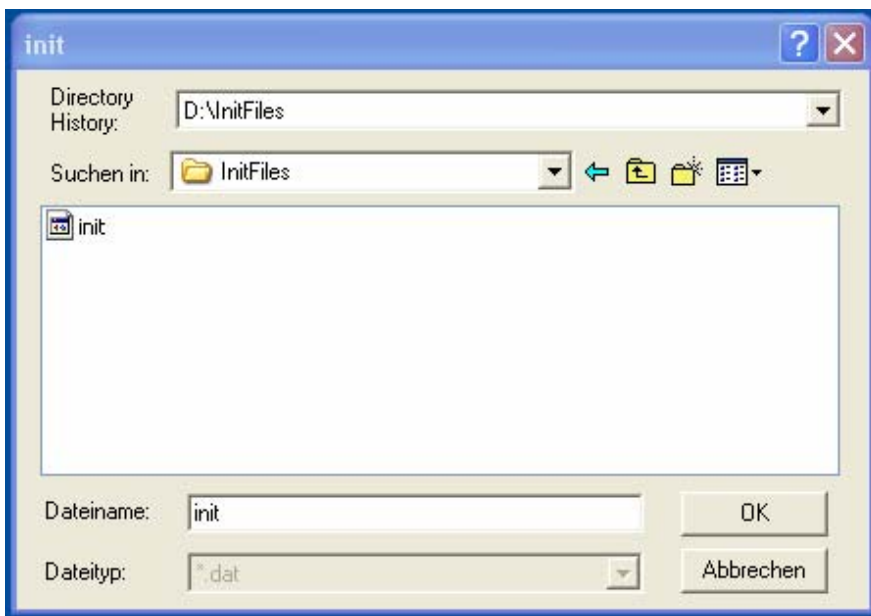
RAM: The current parameters are written into the RAM memory of the sensor, or they are read from the RAM, **i.e. these parameters are lost when the voltage at the sensor is switched off.**

EEPROM: The current parameters are written into the non-volatile memory of the EEPROM in the sensor, or they are read from the EEPROM, **i.e. the parameters in the internal EEPROM are stored when the voltage at the sensor is switched off.**

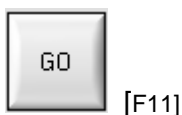
FILE: A click on this button opens an info field with the file name of the current parameter file.

PLEASE NOTE:

The current parameters are only stored in the current output file, or retrieved from the current output file, when the SEND or GET button is activated with a mouse click.



If another output file should be accessed, the file button must first be activated with the mouse pointer. Another dialog field then opens, in which an existing output file can be selected, or in which a file name for a new output file can be entered.



GO:

A click on this button (or pressing shortcut key button F11) starts data transfer from the RLS-GD-15 sensor to the PC through the serial RS232 interface.

The currently measured data are shown in the corresponding display elements on the PC user interface.



STOP:

A click on this button (or pressing shortcut key button F12) stops data transfer from the RLS-GD-15 sensor to the PC through the serial RS232 interface.

TEACH DATA TO

TEACH DATA TO:

A click on this button starts an automatic teach-in process. The current measured values are defined as teach-in values. The teach-in values are assigned to the teach-in color selected in the **No.:** function field.

No.: Inc ☐

No.:

The line into which the current teach vector should be stored is selected with No.:

Inc:

When Inc is activated, and the TEACH DATA TO button is pressed, the No.: input field is automatically incremented (increased) by 1, i.e. the next line in the TEACH TABLE is selected.

RESET TABLE

RESET TABLE:

A click on this button resets the TEACH TABLE (RESET value = 1).

CH_REF

3099

CH_DIR

1931

CH_DIF

2065

These displays indicate the data that are currently measured at the receiver.

CH_REF = Reference channel

CH_DIR = Direct reflection

CH_DIF := Diffuse reflection

On the right side of the graph the data are additionally visualised in the form of bars.

NORM

483

INT

1972

The NORM and INT displays show the norm and intensity values that are calculated from the measurement data.

GF[%]

10.3

This display shows the calculated gloss factor.

The gloss factor is shown in percent.

A double-click on this display calls up a large display, which can be closed again by clicking on it with the right mouse button.

TEMP 39

This display shows the current temperature that is measured in the sensor housing.

V-No:

255

V-No.:

This numerical value output field displays the currently detected vector number in accordance with the entry in the TEACH TABLE. The currently detected vector number is sent to the digital outputs OUT0 ... OUT4 as a corresponding bit pattern.

Please note:

The above-mentioned 5 output fields are only updated when data transfer between PC and RLS-GD-15 sensor is active (GO button pressed).

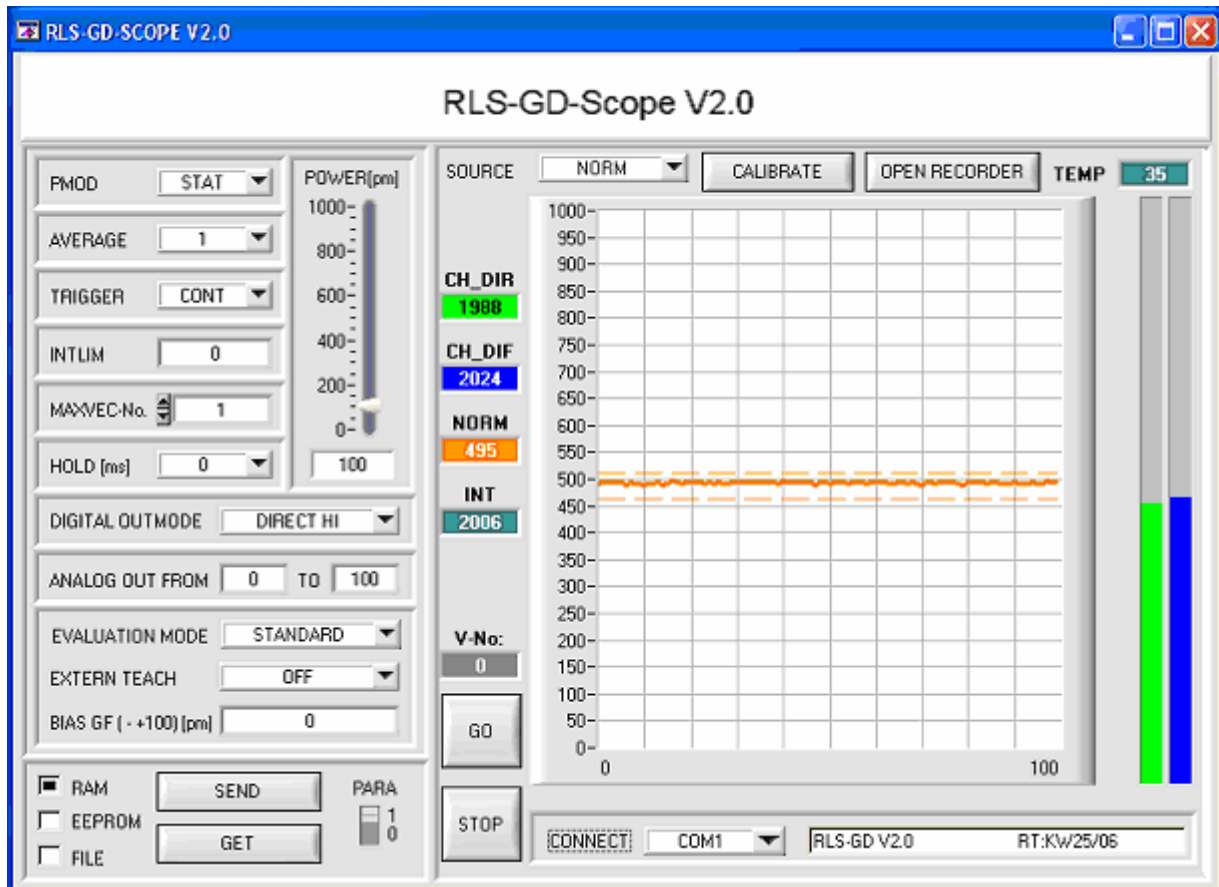


SOURCE:

A click on the arrow button opens a selection field for the selection of a display mode in the graphic display window.

NORM	The current NORM is displayed in the graph (range of values 0 – 1000).
INT	The current intensity is displayed in the graph (range of values 0 – 4096).
GF	The current gloss factor is displayed in per mille (range of values 0 – 1000).
RAW	The current raw signals are displayed.

2.1.2 EVALUATION MODE STANDARD



In EVALUATION MODE STANDARD only the two channels CH_DIR (direct reflection) and CH_DIF (diffuse reflection) are used for evaluation. From the channels CH_DIR and CH_DIF a NORM signal and an intensity are formed according to the formulas below:

$$NORM = \frac{CH_DIR}{CH_DIR + CH_DIF} * 1000 \qquad INT = \frac{CH_DIR + CH_DIF}{2}$$

The current values for CH_DIR, CH_DIF, NORM and INT are shown in displays on the PC user interface. CH_DIR and CH_DIF in addition are visualised in the form of bars at the right side of the graph. SOURCE is used to select the signal that should be visualised in the graph.

For teaching, the PARA switch must be set to 0.

When PARA has been switched over, the setting parameters will disappear and the TEACH TABLE will be displayed.

The sensor can be taught a total of 31 TEACH vectors.

No. TEACH TABLE

	NORM	N TOL	INT	I TOL
0	461	25	2128	100
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1
14	1	1	1	1

RESET TABLE No.: 0 Inc ☐

TEACH DATA TO

SOURCE

CH_DIR 1964

CH_DIF 2293

NORM 461

INT 2128

V-No: 0

GO

When the GO button is pressed, the NORM and INT data that are currently calculated in the sensor are shown on the PC user interface.

When the TEACH DATA TO button is pressed, the data for NORM and INT are written to the line in the TEACH TABLE that is selected under No.:

N TOL is used for setting a plus/minus tolerance for the taught NORM signal. The value of 25 can be changed by the user. For this purpose the corresponding cell in the TEACH TABLE must be selected either with a double-click or with function key F2.

The higher the value of N TOL, the more insensitive the sensor will be.

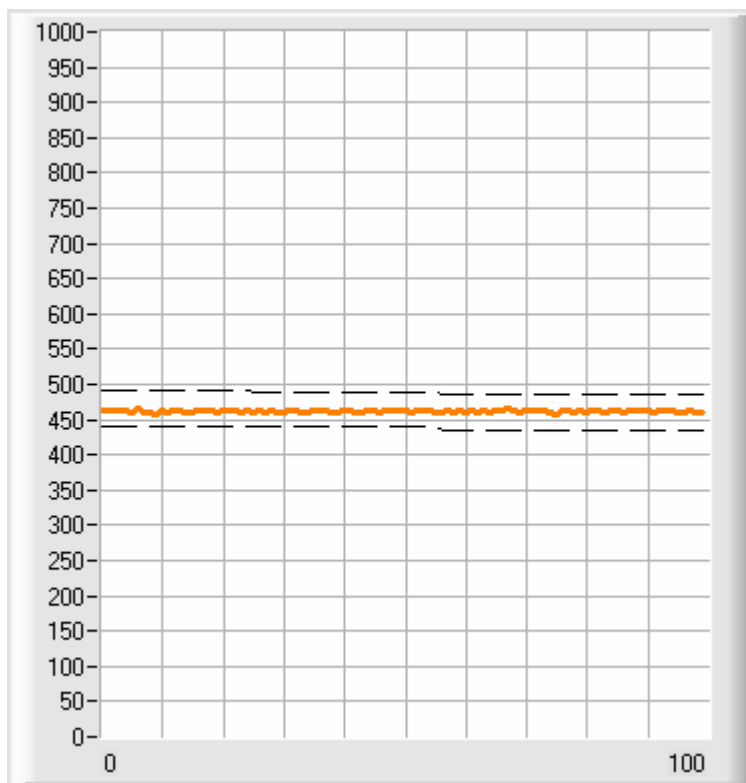
I TOL is used for setting a plus/minus tolerance for the taught intensity.

Once a vector has been taught, the information is transferred to the sensor by pressing the SEND button.

When the SEND button is pressed, the sensor stops data polling.

In order to check whether the sensor has adopted the teach vector, the GO button must be pressed again.

The currently detected line is displayed under V-No.:



SOURCE is used for selecting which signal (NORM or INT) should be shown in the graphic display. In addition to the signal, the tolerance window that was selected under No.: is also displayed.

Please note!

The value range for the NORM signal is 0 to 1000.

The value range for the INT signal is 0-4096.

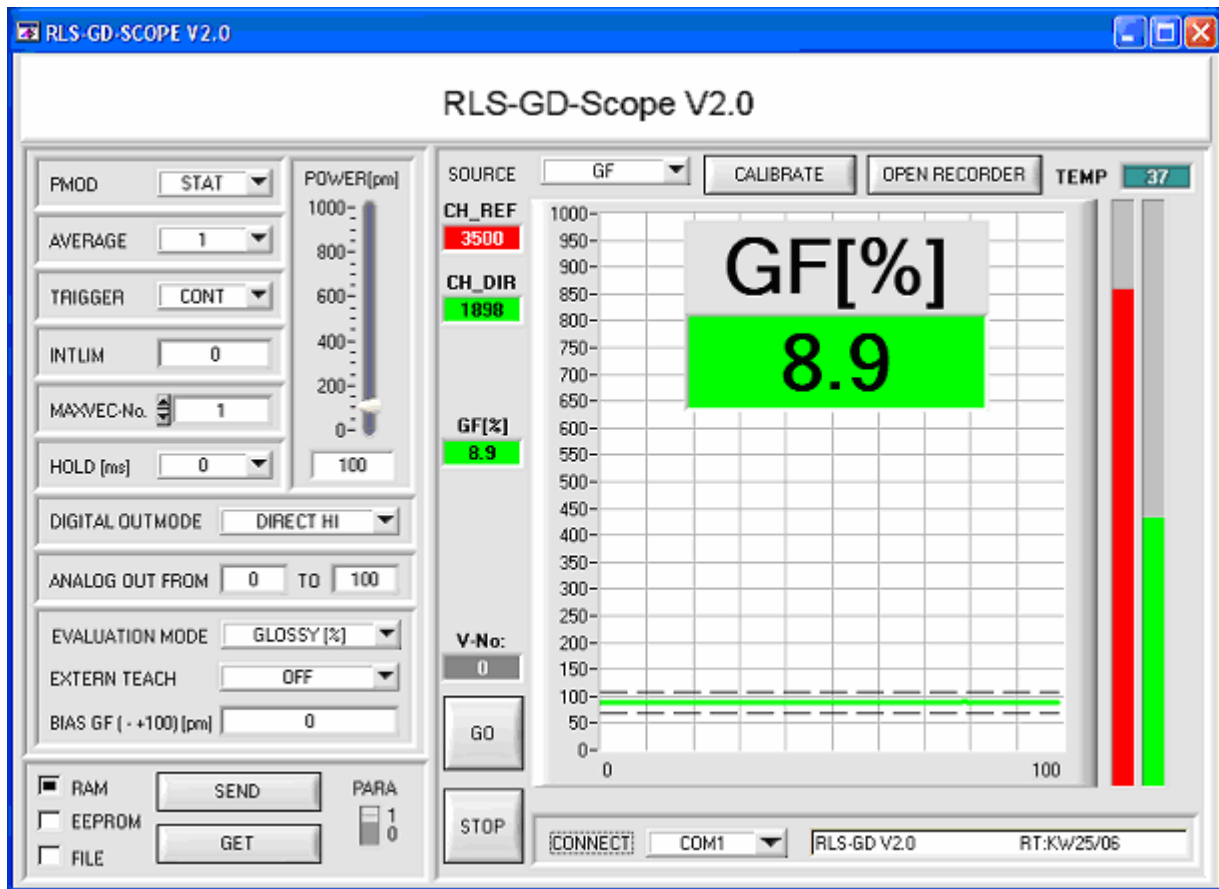
When PMOD = DYN is selected, the sensor tries to regulate the white-light LED such that a certain intensity arrives at the sensor.

It does therefore not make any sense to evaluate the intensity here, because the intensity is pre-set.

It rather makes sense here to evaluate the intensity with which the white-light LED is controlled.

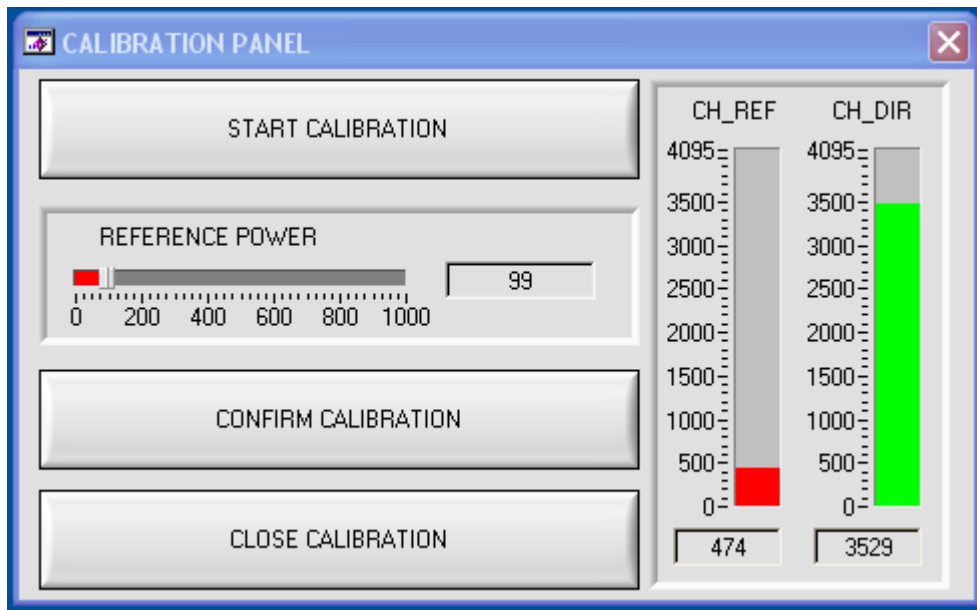
I.e. in PMOD = DYN the displayed INT is the intensity of the white-light LED, and the value range for INT in this case is 0 - 1000.

2.1.3 EVALUATION MODE GLOSSY [%]



In EVALUATION MODE GLOSSY only the two channels CH_REF (reference channel) and CH_DIR (direct reflection) are used for evaluation. The gloss factor is calculated from the channels CH_REF and CH_DIR, and is shown in per mille in the graphic display (0 to 1000) and in percent in the numerical display. A double-click on the numerical display GF[%] opens a large numerical display which can be closed again by clicking on it with the right mouse button. Double-clicking on the Y-axis in the graph starts automatic scaling. This automatic scaling is switched off again with a single mouse-click on the Y-axis.

The sensor must be calibrated first before it can be operated in evaluation mode GLOSSY. Sensor calibration should be performed from time to time, because dirt may accumulate on the optical unit. A reference surface which by definition has a gloss factor of 100% is required for calibration. The sensor must be placed in the holder with the reference surface. The calibration mode can then be started by pressing CALIBRATE.



When you press START CALIBRATION, you will be asked to place the reference calibration surface with a gloss factor of 100% in front to the sensor.

Click on YES when you have placed the reference surface.

A suitable POWER will then be set at which channel CH_DIR is in the upper third of its dynamic range.

If a suitable POWER value could be found, the software informs you that calibration is now possible.

Press CONFIRM CALIBRATION to finish the calibration process, and exit the calibration window by pressing CLOSE CALIBRATION.

The resulting values of CH_REF and CH_DIR are kept and, upon successful calibration, are stored in the EEPROM of the sensor, i.e. it is NOT necessary to perform calibration every time the sensor is restarted.

Please note!

If there should be an error message during calibration, this may have the following causes: The reference surfaces do not have the correct distance to the sensor, or the reference surfaces are dirty. It may also be that the optical unit of the sensor is dirty, or that the PC connection is interrupted.



No.	GF	GF TOL		
0	86	20	1	1
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1
14	1	1	1	1

RESET TABLE No.: 0 Inc ☐

TEACH DATA TO

SOURCE

CH_REF 3504

CH_DIR 2268

GF[%] 8.6

V-No: 0

GO

When the GO button is pressed, the value of the gloss factor that is currently calculated in the sensor is shown on the PC user interface.

When the TEACH DATA TO button is pressed, the gloss factor is written to the line in the TEACH TABLE that is selected under No.:

The sensor can be taught a maximum of 31 gloss factors.

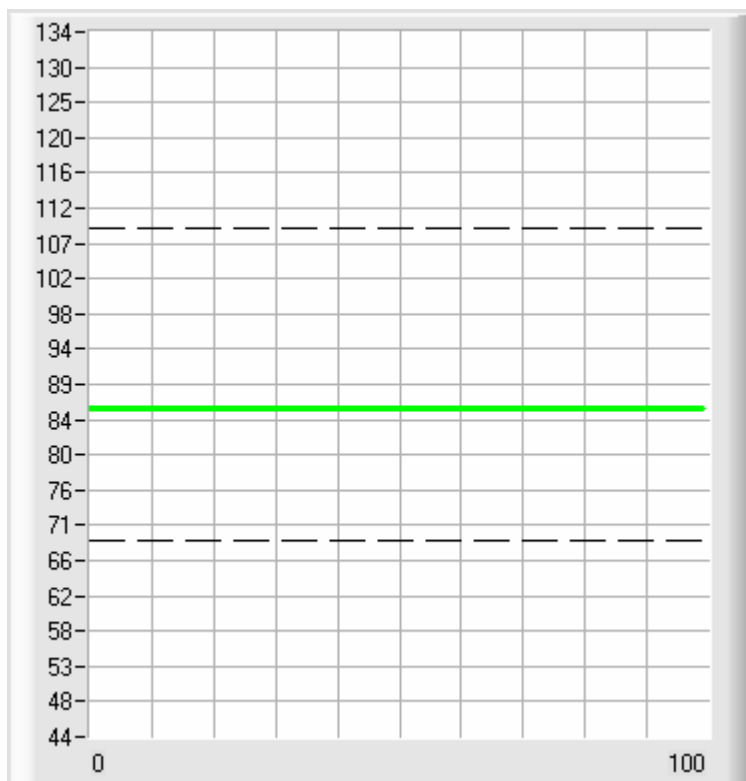
GF TOL is used for setting a plus/minus tolerance for the taught gloss factor. The value of 20 can be changed by the user. For this purpose the corresponding cell in the TEACH TABLE must be selected either with a double-click or with function key F2. The higher the value of GF TOL, the more insensitive the sensor will be.

Once a gloss factor has been taught, the information is transferred to the sensor by pressing the SEND button.

When the SEND button is pressed, the sensor stops data polling.

In order to check whether the sensor has adopted the teach vector, the GO button must be pressed again.

The currently detected line is displayed under V-No.:



Under SOURCE the gloss factor can be selected for being displayed in the graphic display. In addition to the signal, the tolerance window that was selected under No.: is also displayed.

Please note!

The value range for the gloss factor is 0 to 1000.

Double-clicking on the Y-axis in the graph starts automatic scaling. This automatic scaling is switched off again with a single mouse-click on the Y-axis.

2.1.4 Function of the data recorder (OPEN RECORDER)

The RLS-GD-Scope software features a data recorder that makes it possible to save a certain number of data frames. The recorded file is saved to the hard disk of your PC and can then be evaluated with a spreadsheet program.

The created file has eight columns and as many rows as data frames were recorded. A row is structured as follows: Date and time, CH_REF, CH_DIR, CH_DIF, NORM, INT, GF[pm], TEMP.

Attention! When the file is opened with EXCEL, date and time must be divided into two columns.

The following steps describe how data frames are recorded with the recorder:

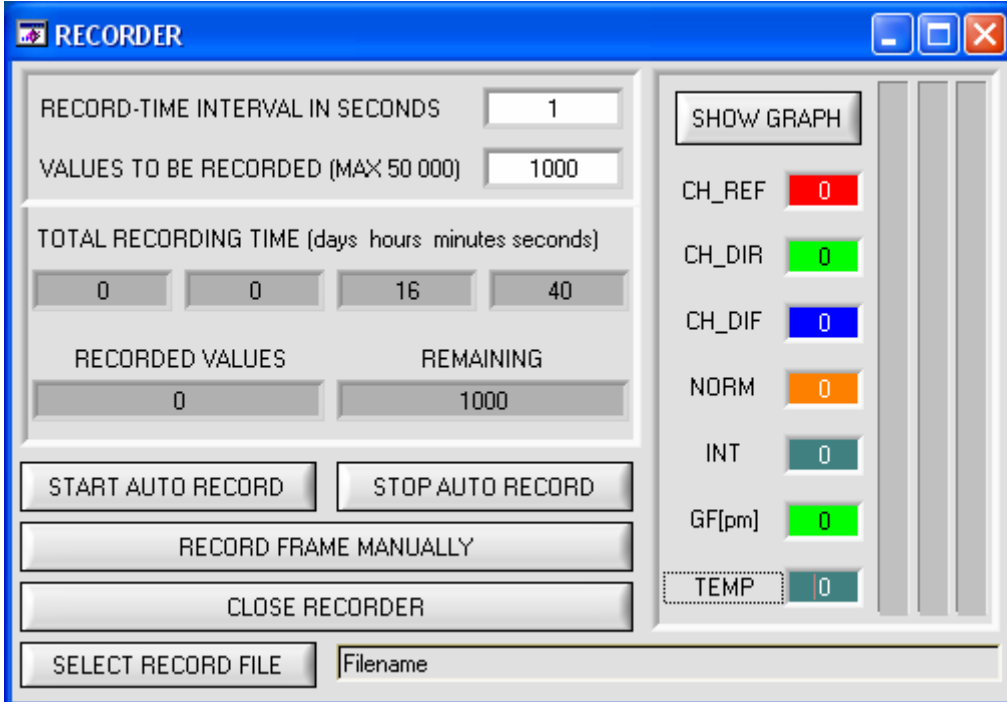
Please note! The recording function depends on the selected EVALUATION MODE. In various EVALUATION MODES certain data are not needed and are therefore set to a value of 0, i.e. the value 0 will be recorded for these data.

When TRIGGER=EXT1 or EXT2 is chosen, only those data will be transferred that were calculated during triggering.

Step 1:

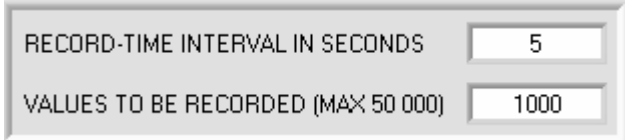
Press the OPEN RECORDER button. The following window will be displayed:

OPEN RECORDER



Step 2:

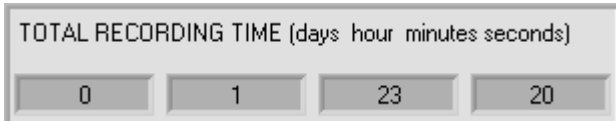
Enter a time interval for recording (in this example: 5, i.e. a new value is called from the sensor every 5 seconds). Then enter the maximum number of values you wish to record in the second input field.



Please note:

Recording can also be stopped earlier, the data recorded so far will not be lost.

These fields indicate how long recording will take (in days, hours, minutes, and seconds) if all data are recorded.



Step 3:

Press the SELECT RECORD FILE button and select a file to which the data should be saved when recording is finished.

If you select an already existing file name, you will be asked whether you want to overwrite the existing file or not.

SELECT RECORD FILE

d:\Filename\record.dat

Step 4:

Pressing the START AUTO RECORD button starts automatic data recording.

START AUTO RECORD

Pressing the RECORD FRAME MANUALLY button on the one hand allows you to include a value manually, on the other hand this function allows direct manual data recording, i.e. the START AUTO RECORD button does not have to be pressed, the data frames will be added to the file that is selected under SELECT RECORD FILE.

RECORD FRAME MANUALLY

Please note:

When the START AUTO RECORD button is pressed, the file that is selected under SELECT RECORD FILE will be deleted. With RECORD FRAME MANUALLY the file will be created, if it does not already exist. If the file already exists, the data will be added to the existing file.

If you press YES, the recorder starts to record data. The button will become red to indicate that evaluation is active.

The respective data frames are shown in the display windows.

In the two display fields RECORDED VALUES and REMAINING you can check how many data frames have been recorded, and how many frames remain to be recorded.

Please note:

During recording the two input fields RECORD-TIME INTERVAL and VALUES TO BE RECORDED are inactive.

SHOW GRAPH

CH_REF 0

CH_DIR 0

CH_DIF 0

NORM 0

INT 0

GF[pm] 0

TEMP 0

RECORDED VALUES

REMAINING

6

994

Step 5:

When all the data frames set under VALUES TO BE RECORDED have been recorded, or when the STOP AUTO RECORD button is pressed, a pop-up window will appear which confirms that the file is stored.

STOP AUTO RECORD

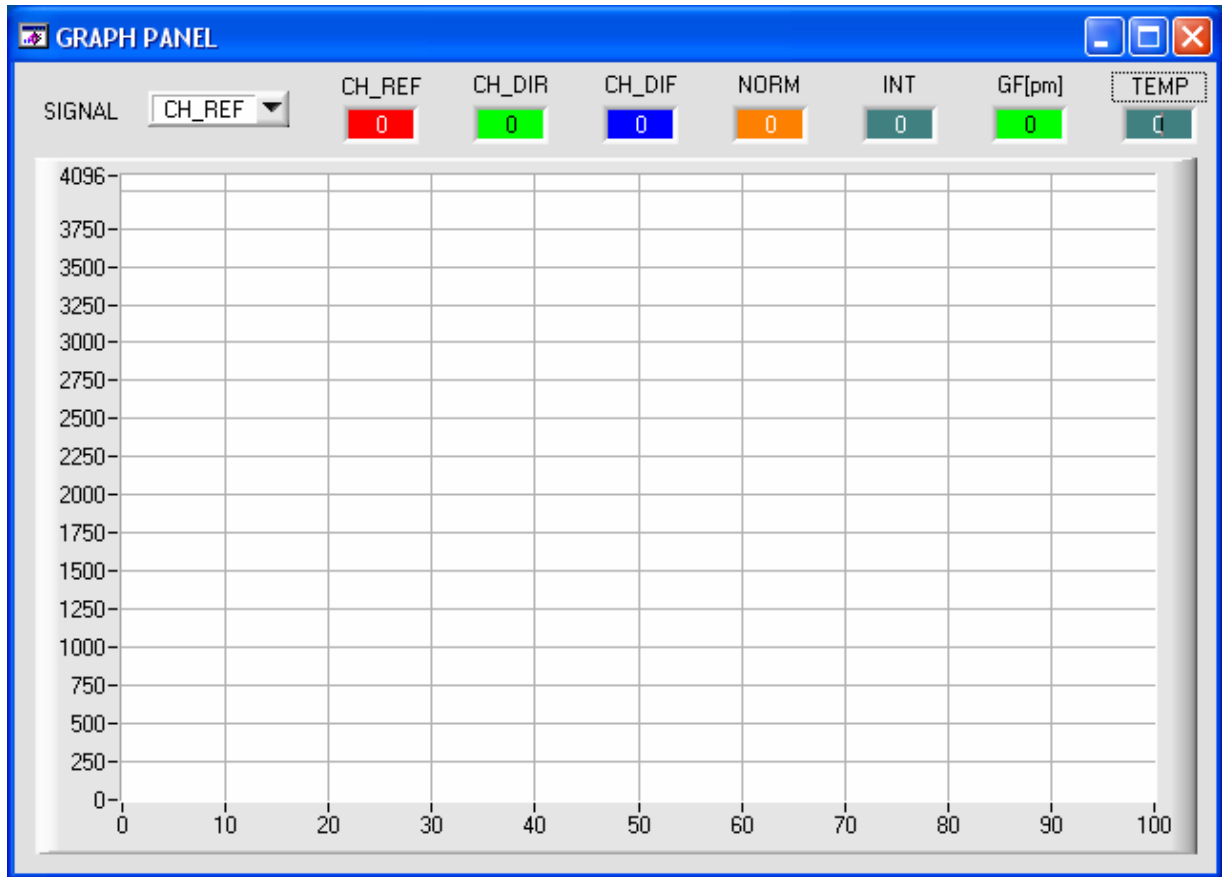
Step 6:

Press the CLOSE RECORDER button to close the recorder and return to the main program.

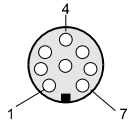
CLOSE RECORDER

SHOW GRAPH

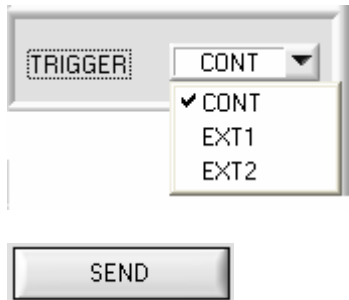
When the SHOW GRAPH button is pressed, a panel will be displayed that allows the user to monitor the different signals. The individual signals can be activated from the SIGNAL drop-down menu.



2.1.5 External triggering of the RLS-GD-15 sensor



External triggering is performed through pin no. 3 (grn) at the 8-pole socket of the RLS-GD-15/PLC connection.

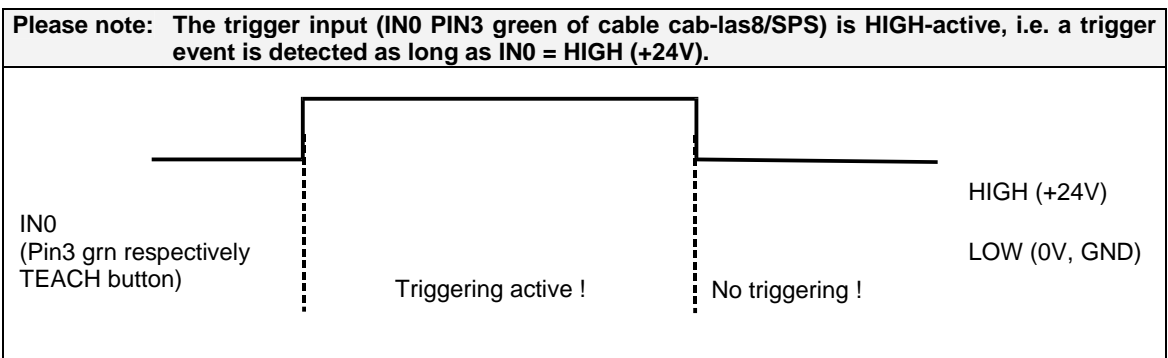


EXTERN:

First the external trigger mode must be set at the sensor. For this purpose option EXT1 or EXT2 must be selected in the TRIGGER selection field.

PLEASE NOTE:

The new setting is only activated at the RLS-GD-15 sensor after a click on the **SEND** button!



2.1.6 Function of the LED display

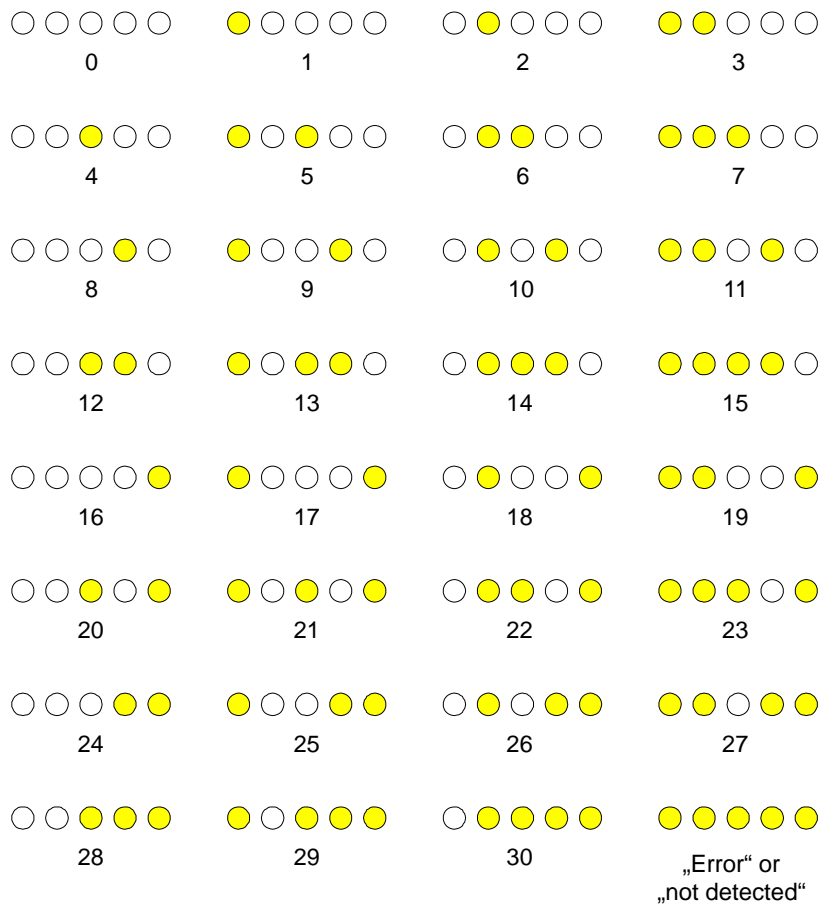
LED display:



BINARY

The line vector is visualised by way of 5 yellow LEDs at the housing of the RLS-GD-15 sensor. At the same time in the binary modes (OUT BINARY) the line vector indicated on the LED display is output as 5-bit binary information at the digital outputs OUT0 to OUT4 of the 8-pin RLS-GD-15/PLC socket.

The RLS-GD-15 sensor is able to process a maximum of 31 line vectors (0 ... 30) in accordance with the corresponding lines in the TEACH TABLE. An "error" or a "not detected" is displayed by the lighting of all LED (OUT0 ... OUT4) digital outputs are set to HIGH-level).

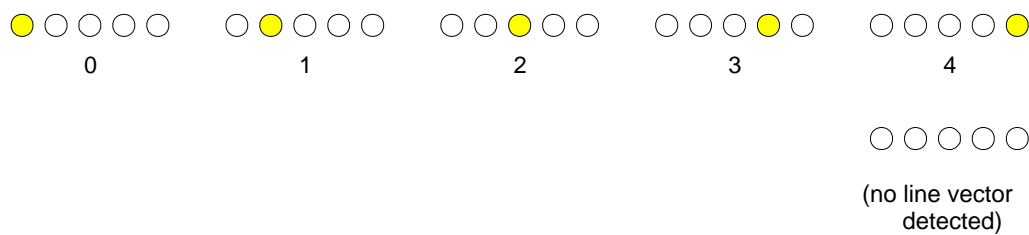


DIRECT

In the DIRECT mode (OUT DIRECT HI or OUT DIRECT LO) the maximum numbers of line vectors to be taught is 5 (no. 0, 1, 2, 3,4).

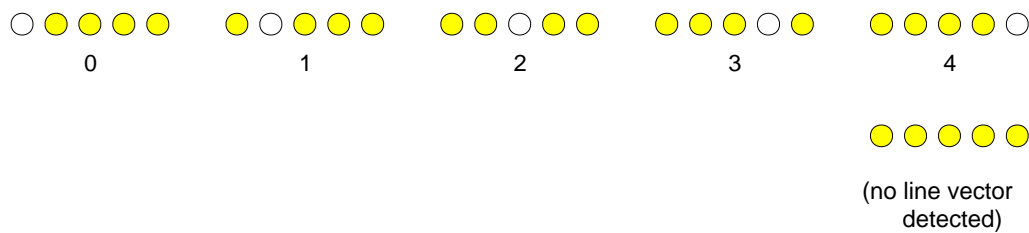
DIRECT HI:

If DIRECT HI is activated, the specially digital output is set to HI while the other 4 are set to LO.
 If no line vector was detected, all digital outputs are set to LOW (no LED is lighting).



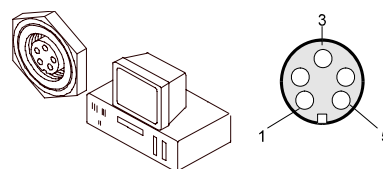
DIRECT LO:

If DIRECT LO is activated, the specially digital output is set to LO, while the other 4 are set to HI.
 If no line vector was detected, all digital outputs are set to HIGH (all LED are lighting).

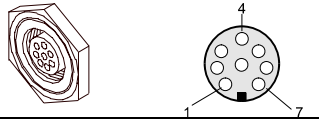


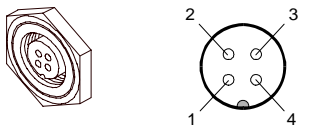
3 Connector assignment

Connection of RLS-GD-15 to PC:


5-pole female connector (type Binder 712) RLS-GD-15/PC-RS232			
Pin No.:		Assignment:	
1		0V (GND)	
2		TxD	
3		RxD	
4		Not connected	
5		Not connected	

Connection of RLS-GD-15 to PLC:

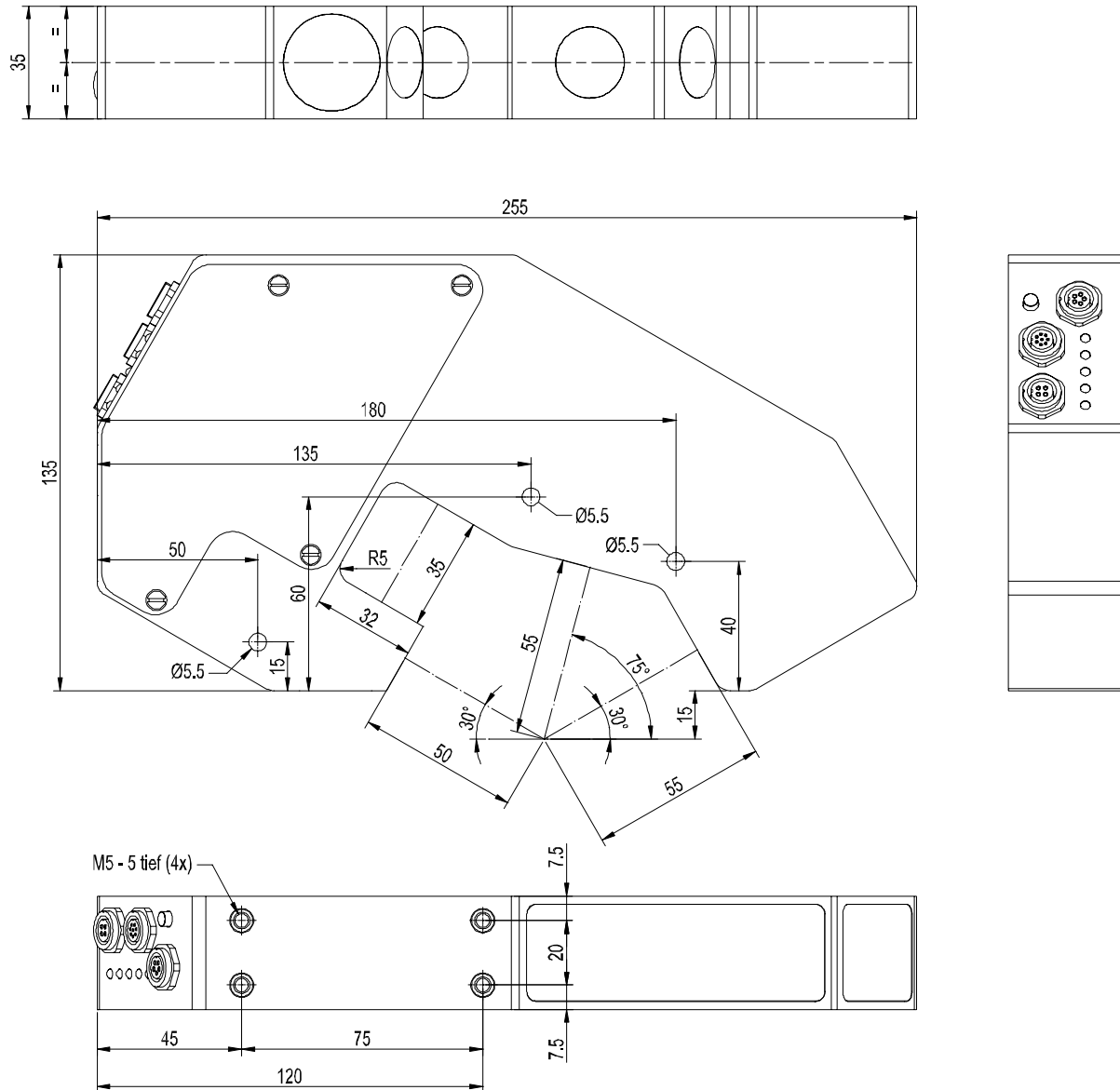
8-pole female connector (type Binder 712) RLS-GD-15/PLC			
Pin No.:	Color:	Assignment:	
1	white	0V (GND)	
2	brown	+12VDC .. +30VDC	
3	green	IN0	
4	yellow	OUT0 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub – 10%)	
5	grey	OUT1 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub – 10%)	
6	pink	OUT2 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub – 10%)	
7	blue	OUT3 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub – 10%)	
8	red	OUT4 (Digital 0: Type 0 ... 1V, Digital 1: Type +Ub – 10%)	

4-pole female connector (type Binder 712) RLS-GD-15/PLC			
Pin No.:	Color:	Assignment:	
1	white	0V (GND)	
2	brown	Not connected	
3	black	Analog voltage output (0 ... +10V)	
4	blue	Analog current output (4 ... 20mA)	

4 Technical data of the RLS-GD-15 sensor

Model	RLS-GD-15 or RLS-GD-15-HP
Light source	1x white light LED, AC-operation (100 kHz) or 8x white light LED (in case of LS-GD-15-HP)
Light spot size	in a distance of 15 mm: typ. 16 mm x 35 mm (elliptical)
Optical filters	day light filter (KG2), UV block filter
Voltage supply	+12VDC ... +30VDC, protected against polarity reversal, overload protected
Pulsating light operation	100 kHz
Ambient light	up to 5000 Lux
Enclosure rating	IP54
Current consumption	typ. 110 mA
Interface	RS232, parameterisable under Windows®
EMC test acc. to	IEC - 801... 
Type of connector	connection to PLC: 8-pole female connector Binder Series 712 connection to PLC: 4-pole female connector Binder Series 712 connection to PC: 5-pole female connector Binder Series 712
Operating temperature range	-20°C ... +55°C
Storage temperature range	-20°C ... +85°C
Housing material	aluminum, anodized in blue
Max. switching current	100 mA, short-circuit proof
Switching frequency	max. 5 kHz (depends on averaging)
Output DIGITAL (5x)	OUT0 ... OUT4: Qinv or Q, (adjustable via PC): Qinv: npn bright-switching (nnp n.c.) / pnp dark-switching (pnp n.o.) Q: pnp bright-switching (pnp n.c.) / npn dark-switching (nnp n.o.)
Output ANALOG (2x)	1x voltage output (0...+10V) 1x current output (4...20mA)
Input IN0	via teach push button at the housing
Sensitivity (switching threshold)	parameterisable under Windows® (selection: threshold or tolerance window)
Pulse lengthening	0 ms ... 100 ms
Working distance	typ. 15 mm ± 10%
Transmitted light power	adjustable under Windows®
Averaging	over 32000 values (adjustable under Windows®)
Switching state indication	by means of 5 yellow LEDs

5 Dimensions of the RLS-GD-15 sensor



All dimensions in mm

6 RS232 communication protocol

RS232 communication protocol PC ↔ RLS-GD-15 Sensor (RLS-GD-Scope V2.0)

- Standard RS232 serial interface without hardware-handshake

- 3-wire: GND, TX0, RX0

- Speed: 19200 baud, 8 data-bits, no parity-bit, 1 stop-bit in binary mode, us (unsigned), MSB (most significant byte) first.

The control device (PC or PLC) has to send a data frame of 18 words to the RLS-GD-15 hardware. All bytes must be transmitted in binary format (us, MSB). The meaning of the parameters is described in the software manual RLS-GD-Scope.

Info: 1 word = 2 bytes

Method:

The RLS-GD-15 hardware is permanently reading (polling) the incoming byte at the RS232 connection. If the incoming word = 0x0055 (synch-word), then the 2. word (order-word) is read in, after this, 16 words (parameters) will be read.

After reading in the completely data frame, the RLS-GD-15 hardware executes the order which is coded at the 2. word (order-word).

Format of the data frame:

Word No.	Format	Meaning:	Comment:
1	Word	sync-word = 0x0055	hex-code 0x0055, binary: 0000 0000 0101 0101, synchronisation word
2	Word	ORDER NUMBER	order word
3	Word	POWER	LED intensity (0 ... 1000) Attention intensity in thousandth!
4	Word	PMOD	LED mode STAT, DYN (0, 1)
5	Word	AVERAGE	Signal averaging 1,2,4,8,16,32,64,128,256,512,1024,2048,4096,8192,16384 or 32768
6	Word	EVALUATION MODE	Evaluation mode STANDARD or GLOSSY[%] coded to (0,1)
7	Word	HOLD[ms]	Hold time 0,1,2,3,5,10,50 or 100ms coded to (0,1,2,3,5,10,50 or 100)
8	Word	INTLIM	Lower intensity limit (0 ... 4095)
9	Word	MAXVEC-No.	Number of the vectors (1,2,3,...,31)
10	Word	DIGITAL OUTMODE	Function of the digital output (0=direct/HI, 1=binary, 2=direct/LO)
11	Word	TRIGGER	Trigger mode CONT, EXT1 or EXT2 (0,1,2)
12	Word	EXTER TEACH	Extern Teach OFF or ON coded to (0,1)
13	Word	ANAOUT BEGIN	Analog Output Range begin
14	Word	ANAOUT END	Analog Output Range end
15	Word	BIAS	BIAS [-100...100] coded to (990....1010)
16-18	Word	Free	Must be sent as dummy (e.g. 3x value 0)

Value	ORDER NUMBER	(parameter byte no. 2)
0	nop	no operation
1	Save parameter from PC into RAM	volatile: 18 words PC⇒RLS-GD-15
2	Save one selectable row of TEACH TABLE into RAM	volatile: 18 words PC⇒RLS-GD-15
3	Send parameter from RAM to PC	171 words binary RLS-GD-15 ⇒ PC
4	Send parameter from EEPROM to RAM + to PC	171 words binary RLS-GD-15 ⇒ PC
5	Send data from RAM to PC (CH_REF,CH_DIR,CH_DIF,NORM,INT,GF,V-No., Temp, 8 Dummies)	16 words binary RLS-GD-15 ⇒ PC
6	Save parameter from RAM to EEPROM	18 words PC⇒RLS-GD-15
7	Send connection OK to PC	48 words binary RLS-GD-15 ⇒ PC
20	Send line ok = 0x0055, 0x0014, 0x00AA to PC	3 words binary RLS-GD-15 ⇒ PC