RLS Series

RLS-GD-15 Gloss Detection

- Insensitive to outside light due to clocked white light
- 2 receivers (15°, 60°) and reference
- Storing of up to 31 gloss degrees
- Tolerance adjustable for each gloss degree
- Working distance typ. 15 mm
- Parameterisable under Windows®, RS232 interface
- 5 switching outputs (npn-/pnp-able, 100 mA, short circuit proof)
- Switching state indication via 5 yellow LEDs
- Transmitter power adjustable or controllable (STAT or DYN)
- Averaging can be activated (over up to approx. 32000 values)
- Scratch-resistance glass covers of the optics
- Sturdy aluminum housing
- Calibration function (Wood's glass)
- Various evaluation algorithms (standardized or calibrated onto Wood's glass = 100%)
- Analog output (voltage 0...+10V and current 4...20mA, proportional to the gloss degree 0%...100% respectively zoomed up to the tenfold) via zoom function

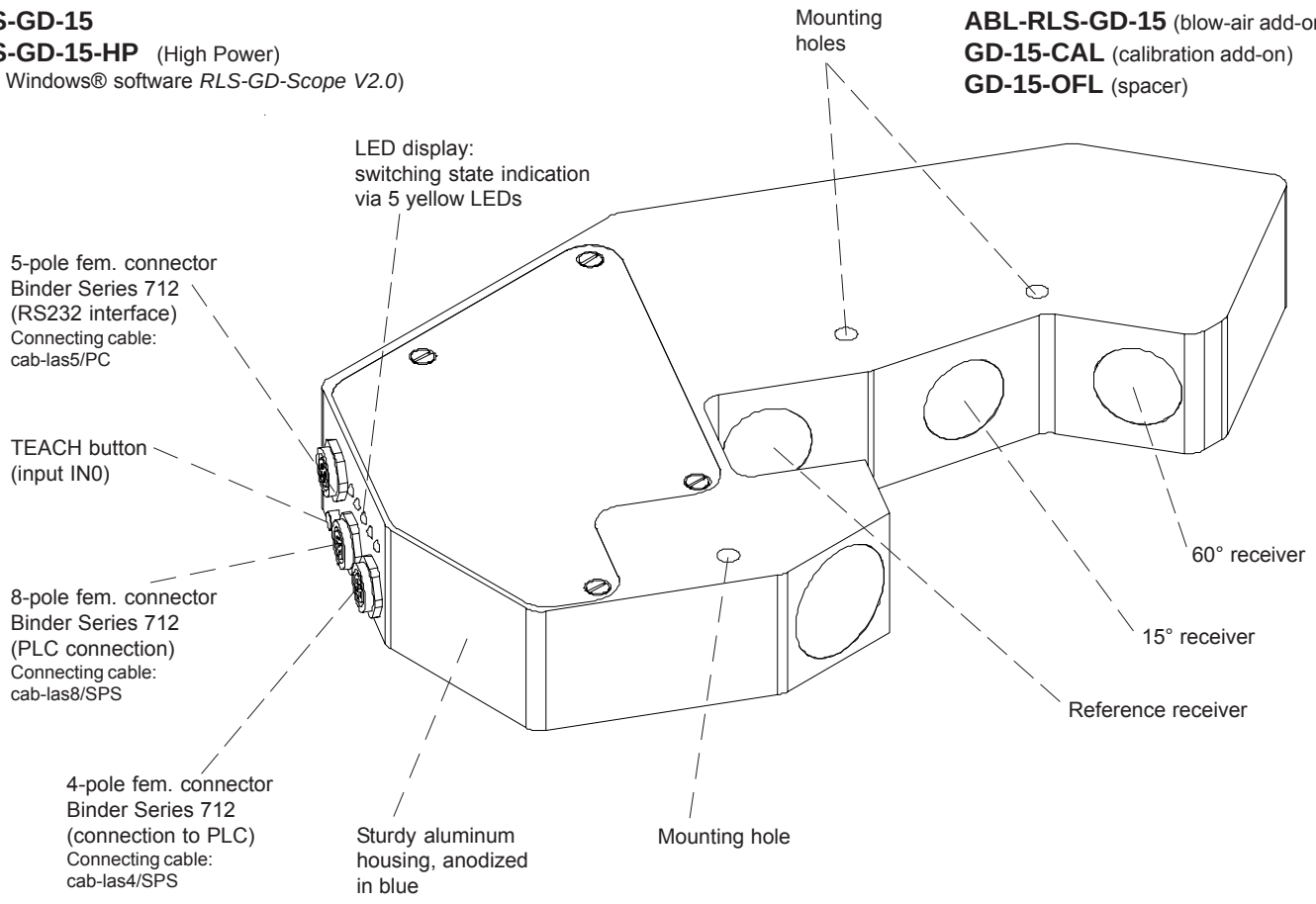
Design

Product name:

RLS-GD-15
RLS-GD-15-HP (High Power)
(incl. Windows® software *RLS-GD-Scope V2.0*)

Accessories: (cf. page 14-15)

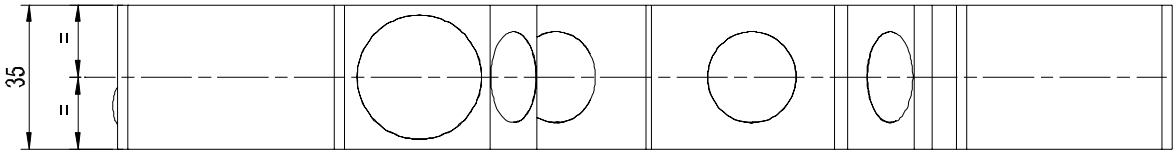
ABL-RLS-GD-15 (blow-air add-on)
GD-15-CAL (calibration add-on)
GD-15-OFL (spacer)

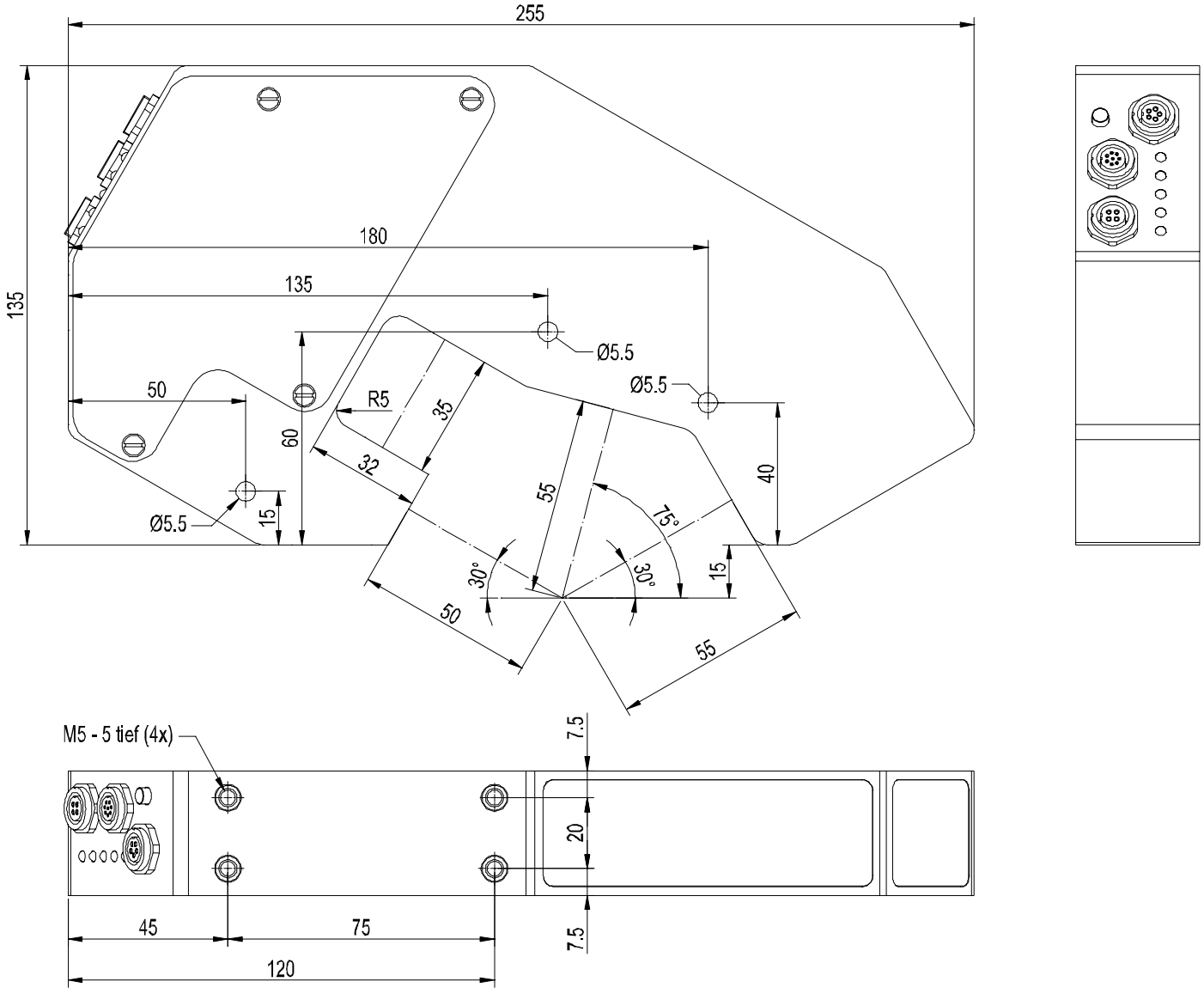


Technical Data

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)
Optcal 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... CE
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 (npn n.c.) / pnp dark-switching (pnp n.o.) Q: pnp bright-switching (pnp n.c.) / npn dark-switching (npn 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

Dimensions



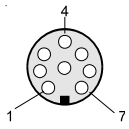


All dimensions in mm

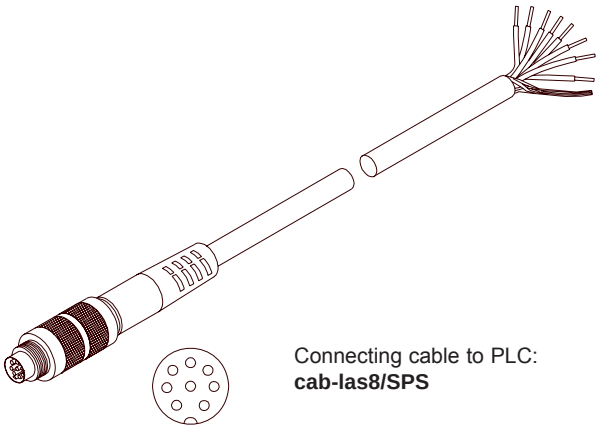
Connector Assignment

Connection of RLS-GD-15 to PLC:
8-pole fem. connector Binder 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+12 ... +30 VDC
3	green	IN0
4	yellow	OUT0
5	grey	OUT1
6	pink	OUT2
7	blue	OUT3
8	red	OUT4



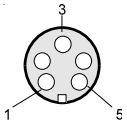
Connecting cable:
cab-las8/SPS (2m)



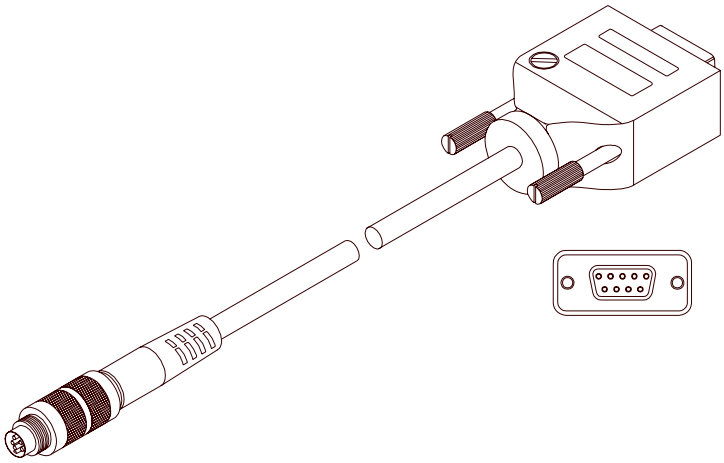
Connecting cable to PLC:
cab-las8/SPS

Connection of RLS-GD-15 to PC:
5-pole fem. connector Binder 712

Pin:	Assignment:
1	GND (0V)
2	TxD
3	RxD
4	not connected
5	not connected



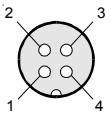
Connecting cable:
cab-las5/PC (2m)



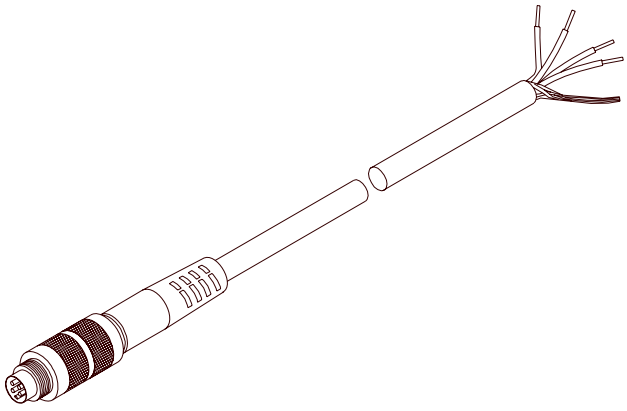
Connecting cable to PC (RS232 interface cable):
cab-las5/PC

Connection of RLS-GD-15 to PLC:
4-pole female connector Binder 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	not connected
3	black	Analog output/voltage (0...+10V)
4	blue	Analog output/current (4...20mA)



Connecting cable:
cab-las4/SPS (2m)



Connecting cable to PLC:
cab-las4/SPS

Measuring Principle

Measuring principle of the gloss detection sensor RLS-GD-15:

The RLS-GD-15 sensor can be "taught" up to 31 gloss degrees or normalized vector. Evaluation always is performed with 12 bits. With the help of a modulated white-light LED a white light spot (Ø 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 (arranged at an angle of 15°). The gloss degree is then determined from the 2 receiver signals (15°, 60°).
As an alternative calibration can be performed on black glass (under 60°, corresponds to 100%), and the 60° value serves as a percentage gloss value. For this purpose a reference line is applied during calibration to store a reference value which then serves as a comparison value during measurement.

Gloss detection either operates continuously or is started by an external SPC trigger signal.
The gloss degree respectively 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.

TEACH button:

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).

RS232 interface:

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 degree detection respectively 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.

Calibration:

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.

Temperature compensation:

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

Visualization

Visualization of the gloss degrees:

Under Windows® representation of the gloss degree on a PC in numeric form and in a gloss chart, and representation of the 15°/60° values in a time chart. In addition the current 15°/60° values are displayed as a bar chart.

The following evaluation algorithms can also be selected:

- Target lies within the tolerance window of a taught gloss grade.
- Determination of the taught gloss degree that is most similar to the target (minimum distance between target gloss degree and reference gloss degree in the gloss chart) (MINIMAL DIST)
- EXTERN TEACH: With this function field the gloss sensor can be taught by means of a LOW-signal at pin 3 (for instance via push button, or PLC).
  During this procedure the object to be taught has to be in the visibility range of the gloss sensor. The yellow LEDs indicate a successful teaching procedure.

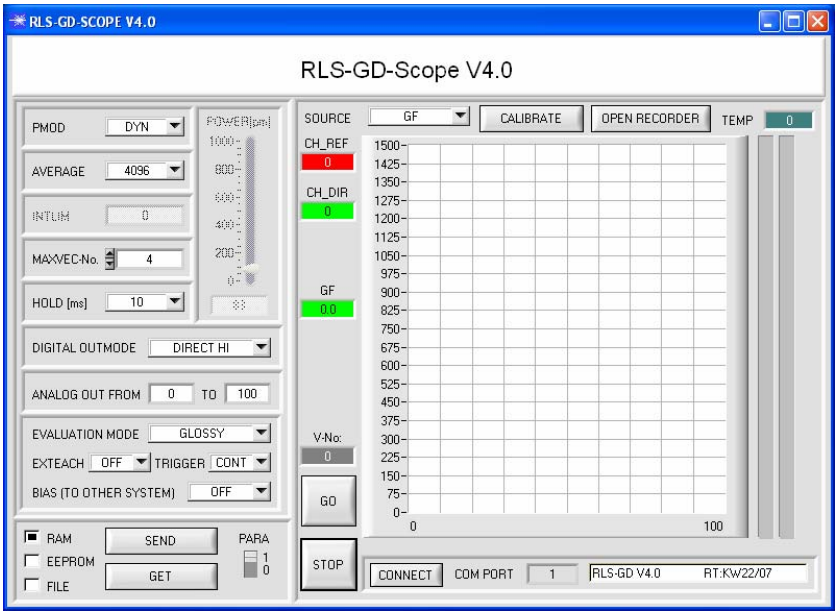
Parameterization

Parametrisation under Windows® with software RLS-GD-Scope:

The gloss sensor is parameterized under Windows® with the RLS-GD-Scope software.

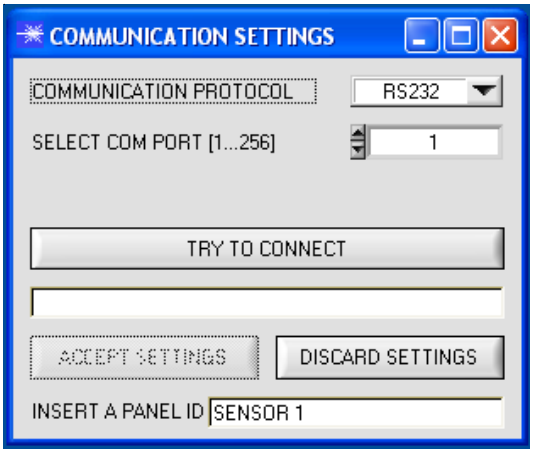
The RS232 interface is used for setting parameters such as:

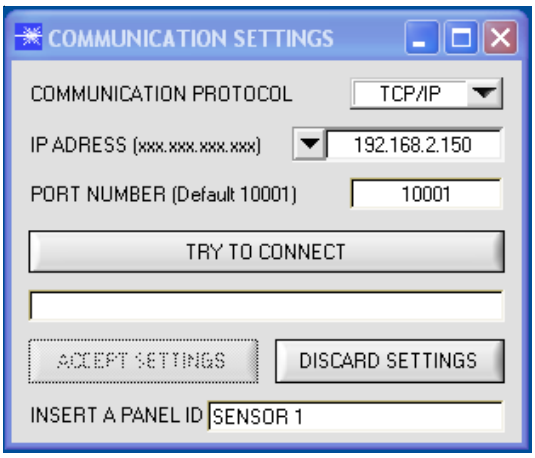
- Averaging over a maximum of 32768 values
- Number of surfaces to be checked
- Light power of the white-light LED
- Automatic light power control ON/OFF
- Pulse lengthening up to 100ms max.
- External or continuous trigger
- Minimum intensity required for gloss evaluation
- Calibration to 100% (black glass)
- normalized or percentage evaluation
- Zoom function



CONNECT:
Pressing the CONNECT button opens a window for selecting and configuring the interface. The currently set connection type is displayed beside the CONNECT button.

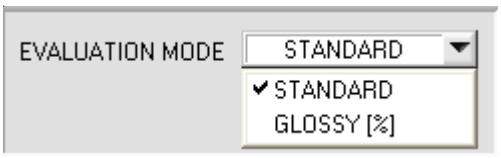
The COMMUNICATION PROTOCOL function field is used for selecting either an RS232 or a TCP/IP protocol.
If RS232 is selected, a port from 1 to 256 can be selected with SELECT COM PORT, depending on which port the sensor is connected to.
If the sensor should communicate through a local area network, an RS232 to Ethernet adaptor will be needed. This adapter makes it possible to establish a connection to the sensor with the TCP/IP protocol.
In order to establish a connection to the adaptor, its IP address must be entered in the IP ADRESS field. The DROP DOWN menu (down arrow) shows the last 10 IP addresses that were used. An address from this list can be directly selected by clicking on the respective item. The DROP DOWN list is saved and is thus always available when the software is closed.
The PORT NUMBER for the XPort-based network adaptors is 10001. This port number must not be changed.
When you press the TRY TO CONNECT button, the software tries to establish a connection with the set parameters. The communication status is shown in the display field. If the sensor answers with its FIRMWARE ID, the set connection type can be accepted by pressing ACCEPT SETTINGS.





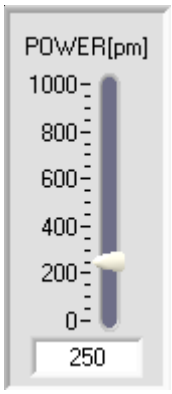
The software can be started several times, i.e. writing can be done simultaneously in parallel to several sensors, with every sensor having its own software window. In the INSERT A PANEL ID edit-box a software panel can be assigned to a certain sensor for identification. This ID is shown in the large gloss factor panel and in the recorder.

Parameterization



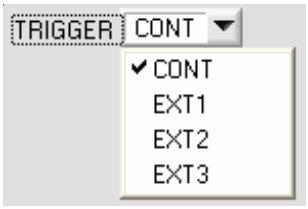
EVALUATION MODE:
The gloss sensor can be operated with two different evaluation modes.
STANDARD:
Only the channels CH_DIR (direct reflection) and CH_DIF (diffuse reflection) are used for evaluation. From the two values of CH_DIR and CH_DIF a NORM signal and an INTENSITY are calculated and evaluated (see 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!

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 gloss value detection (no trigger event required).
EXT1:
Evaluation is started through the external trigger input (IN0 pin3 green of cable cab-las8/SPS) or through clicking the TEACH button. 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.
EXT3:
As long as input IN0 is high (+24V), measured values are recorded in an internal buffer. When the input has dropped again, an average is formed from the number of the recorded measured values and is then output. Please note here that the first 10 percent and the last 10 percent of the recorded values are discarded.

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.

MAXVEC-No.:
This function field serves for setting the number of gloss degrees respectively 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.

Parameterisation

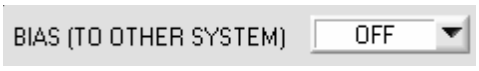
HOLD:
The RLS-GD-15 sensor operates with minimum scanning times in the magnitude of less than 150µs. This is why most of the PLCs that are connected to the digital outputs OUT0 … OUT4 have difficulties with the safe detection of the resulting short switching state changes. For the digital outputs of the RLS-GD-15 sensor pulse lengthening of up to 100 ms can be set by selecting the corresponding HOLD value.

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

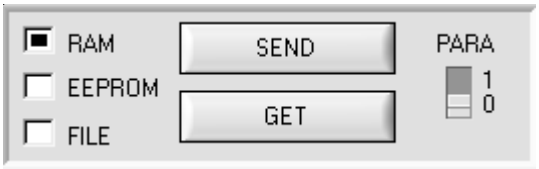
BINARY:
The maximum number of gloss degrees respectively normalized vectors to be taught is 31.
DIRECT HI or DIRECT LO:
In this mode the maximum number of gloss degrees respectively normalized vectors to be taught is 5.

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.

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 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.

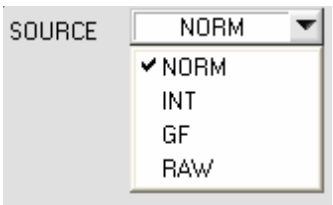


BIAS:
In evaluation mode GLOSSY, the gloss factor value can be influenced by means of BIAS. The sensors can be calibrated to other systems. This function is activated with BIAS = ON. For details see below under BUTTON CALIBRATE.



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.

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.



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.

Parameterisation

Evaluation mode STANDARD:

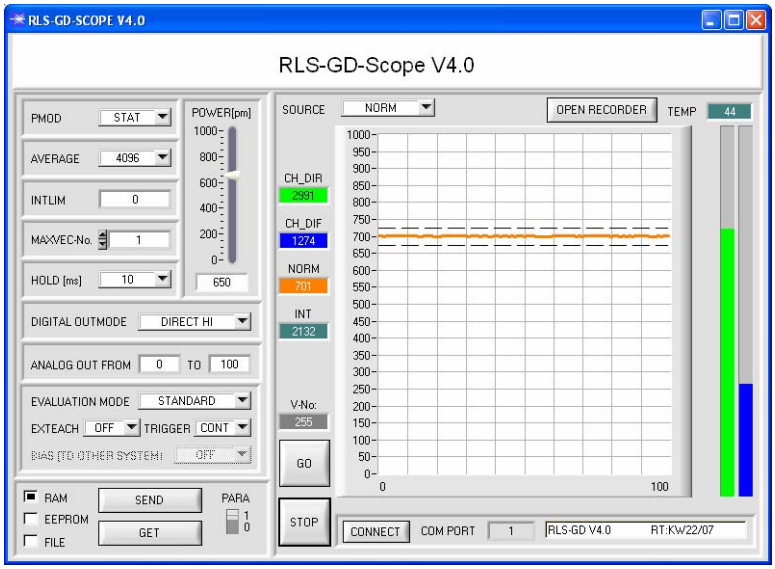
In EVALUATION MODE STANDARD only the two channels CH_DIR (direct reflection) and CH_DIF (diffuse reflection) are used for evaluation.

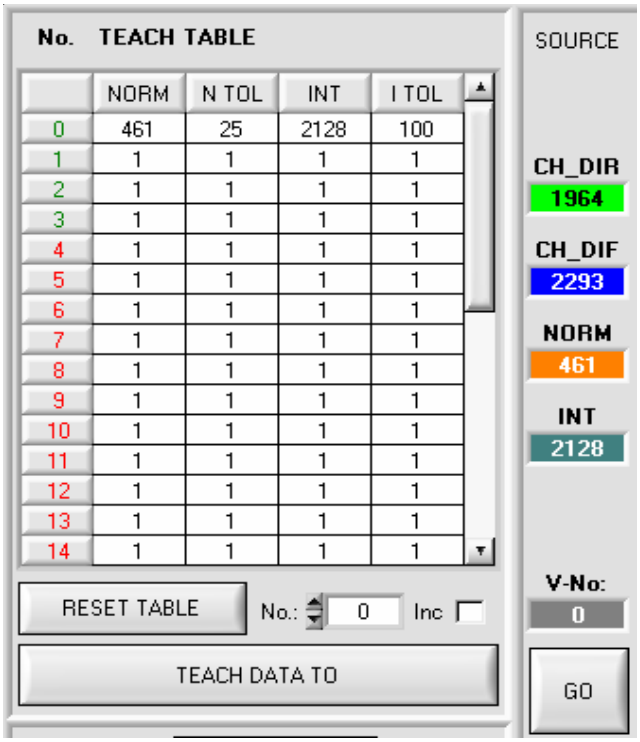
$$NORM = \frac{CH\_DIR}{CH\_DIR + CH\_DIF} * 1000$$

$$INT = \frac{CH\_DIR + CH\_DIF}{2}$$

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.

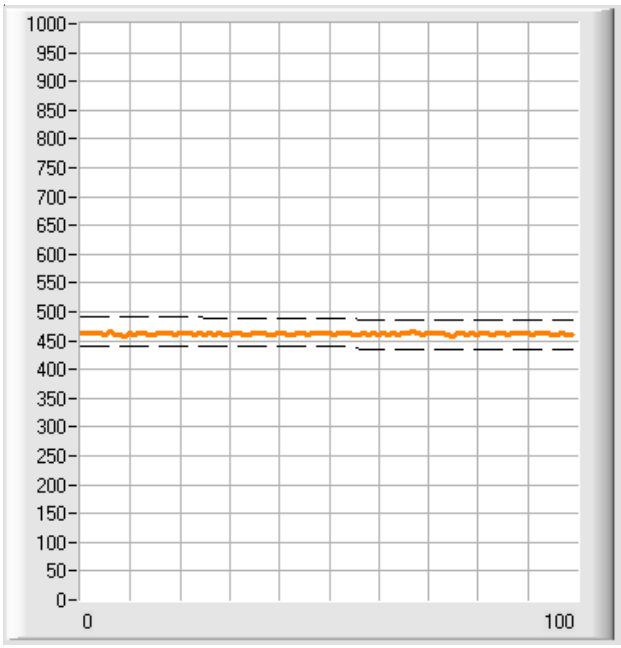




TEACH TABLE

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:.



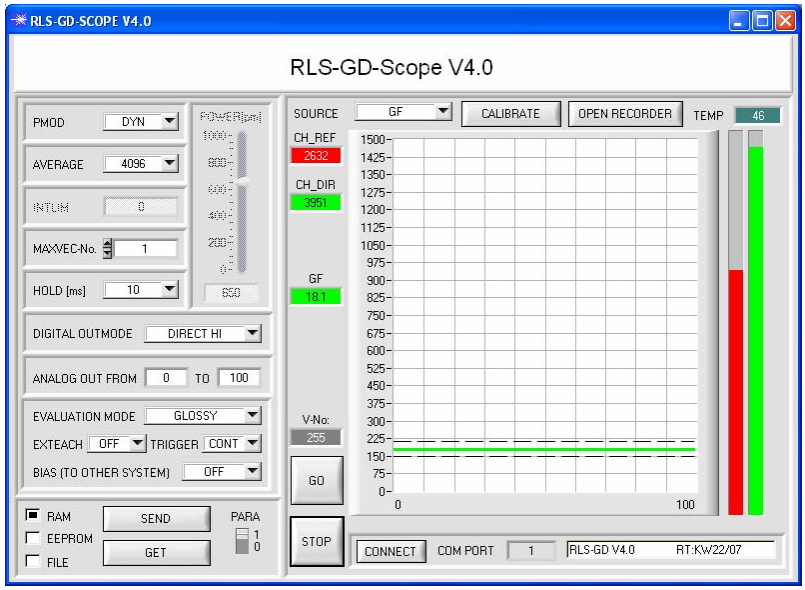
SOURCE is used for selecting which signal (NORM or INT) should be shown in the graphic display. In addition to the signal, the tolerance window that was selected under No.: is also displayed.

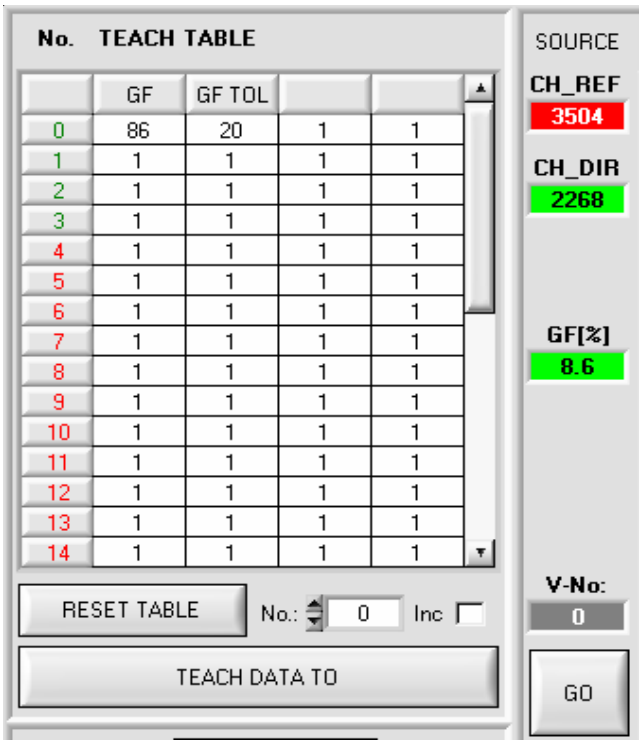
Parameterisation

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. 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.

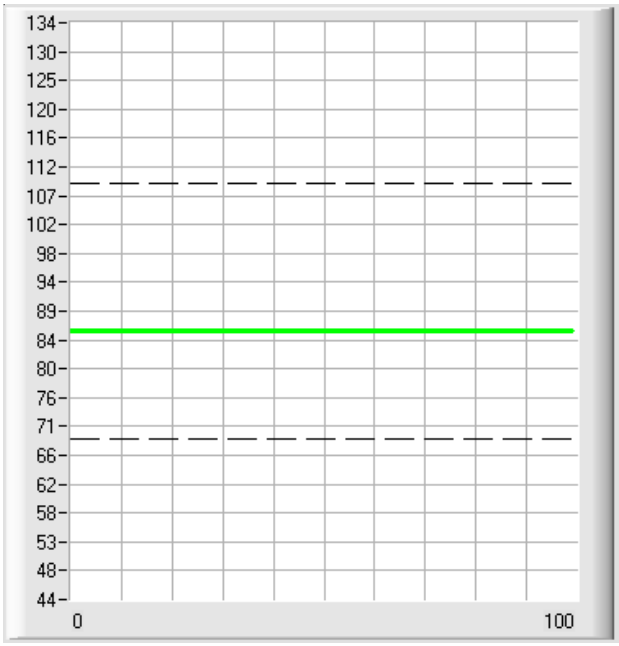
The sensor must be calibrated first before it can be operated in evaluation mode GLOSSY.
Sensor calibration should be performed from time to time, because dirt may accumulate on the optical unit.
A reference surface which by definition has a gloss factor of 100 is required for calibration.
The sensor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





TEACH TABLE

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.:



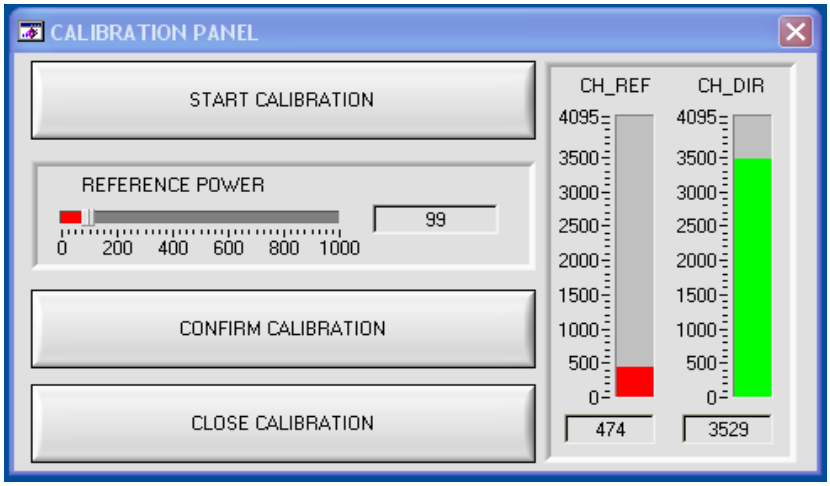
Under SOURCE the gloss factor can be selected for being displayed in the graphic display. In addition to the signal, the tolerance window that was selected under No.: is also displayed.

Calibration

Calibration:

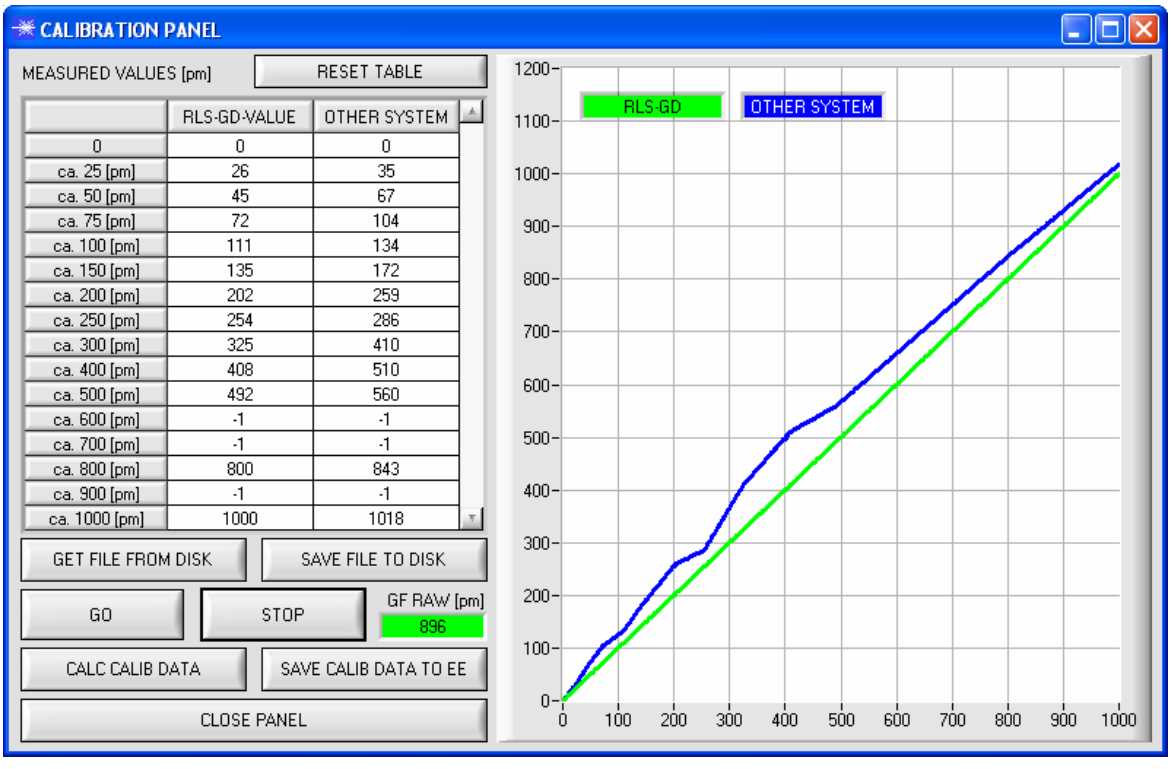
When you press START CALIBRATION, you will be asked to place the reference calibration surface with a gloss factor of 100% in front to the sensor.
Click on YES when you have placed the reference surface.
A suitable POWER will then be set at which channel CH_DIR is in the upper third of its dynamic range.
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.



CALIBRATE TO OTHER SYSTEM:
After successful calibration with a reference of 100, the sensor can be calibrated to another system. This is necessary, for example, if several systems of the same type should be exactly matched to each other, or the RLS-GD-15 should be matched to another system.
Calibration is activated with the parameter BIAS = ON.
For performing calibration to another system, press the CALIBRATE TO OTHER SYSTEM button.

The following panel will be displayed:



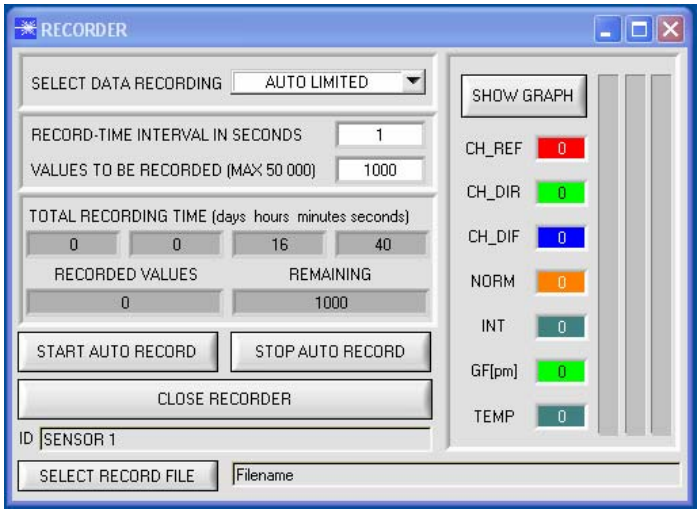
	RLS-GD-VALUE	OTHER SYSTEM
0	0	0
ca. 25 [pm]	26	35
ca. 50 [pm]	45	67
ca. 75 [pm]	72	104
ca. 100 [pm]	111	134
ca. 150 [pm]	135	172
ca. 200 [pm]	202	259
ca. 250 [pm]	254	286
ca. 300 [pm]	325	410
ca. 400 [pm]	408	510
ca. 500 [pm]	492	560
ca. 600 [pm]	-1	-1
ca. 700 [pm]	-1	-1
ca. 800 [pm]	800	843
ca. 900 [pm]	-1	-1
ca. 1000 [pm]	1000	1018

Data Recorder

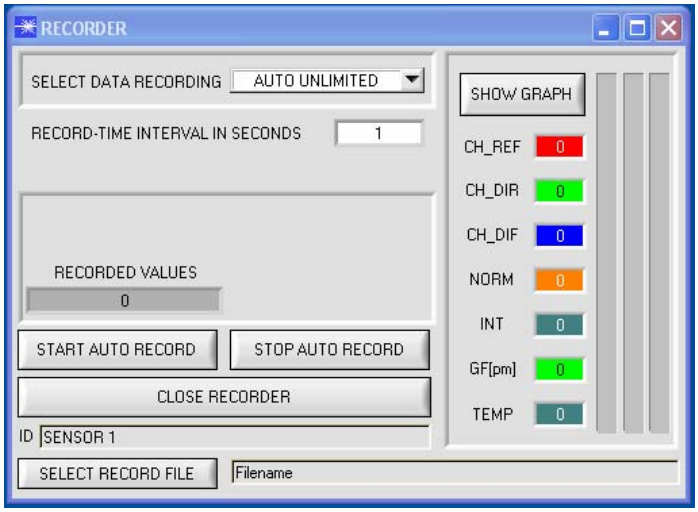
Function of the data recorder:

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.

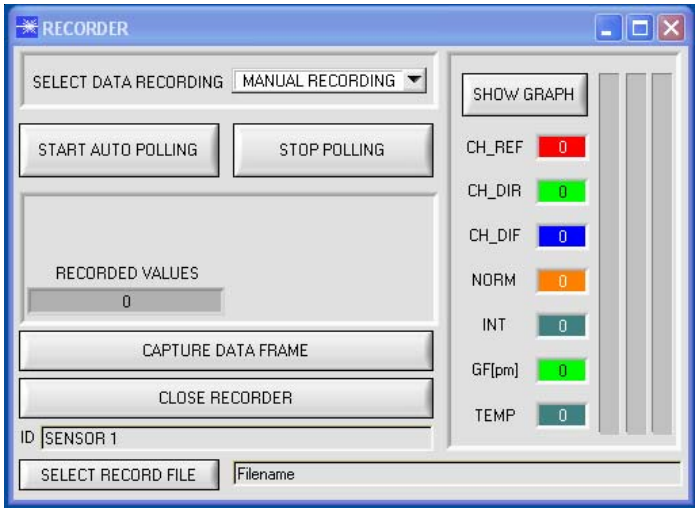
If you want to automatically record several data frames, please select AUTO LIMITED under SELECT DATA RECORDING.
Enter a time interval for recording (in this example: 5, i.e. a new value is called from the sensor every five seconds). Then enter the maximum number of values you wish to record in the second input field.



If you want to record an unlimited number of data, please select the AUTO UNLIMITED function under SELECT DATA RECORDING.
Select the desired recording interval and press START AUTO RECORD.



If you want to record data "manually", please select the MANUAL RECORDING function under SELECT DATA RECORDING.
You can start reading data from the sensor by pressing the START POLLING button. These data are visualised in the display window.
Pressing the CAPTURE DATA FRAME button saves a data frame in the file that was selected under SELECT RECORD FILE.
The RECORDED VALUES field shows the sum of the frames already recorded.

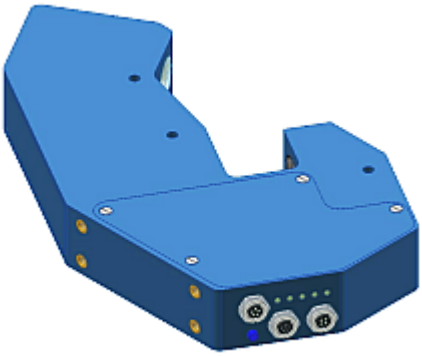


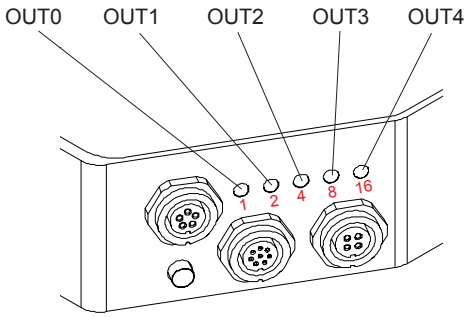
LED Display

LED display:

The gloss grade is visualized by means of 5 yellow LEDs at the housing of the gloss sensor. At the same time the gloss grade indicated at the LED display is output as 5-bit binary information at the digital outputs OUT0 ... OUT4 of the 8-pole PLC connector.

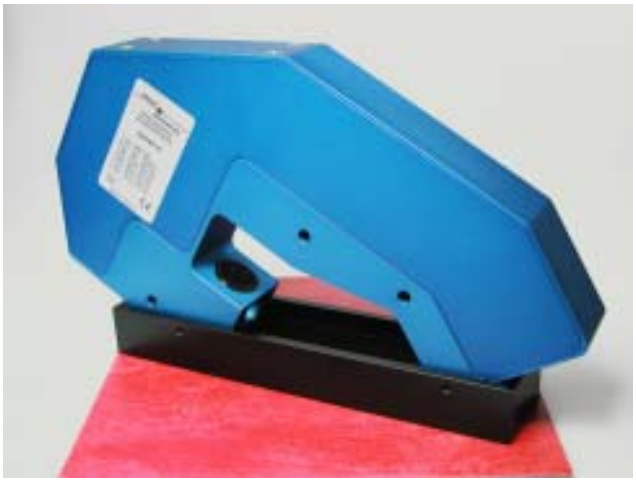
In the DIRECT mode the maximum number of gloss grades to be taught is 5. These 5 gloss grades can be directly output at the 5 digital outputs. The respective detected gloss grade is displayed by means of the 5 yellow LEDs at the gloss sensor housing.



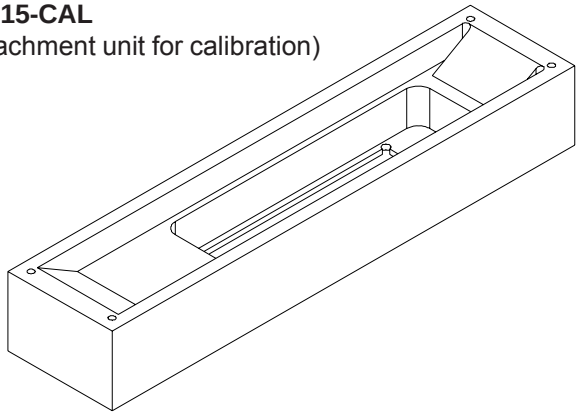


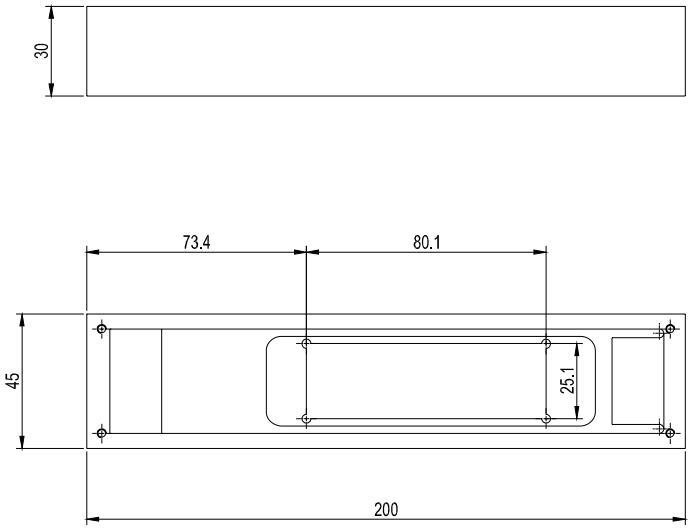
0	1	2
3	4	5
6	7	8
9	10	11
12	13	14
15	16	17
18	19	20
21	22	23
24	25	26
27	28	29
30	**„error“ respectively „not detected“**	

Accessories

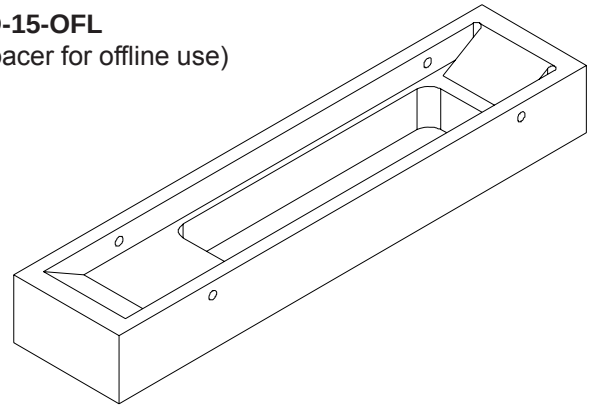


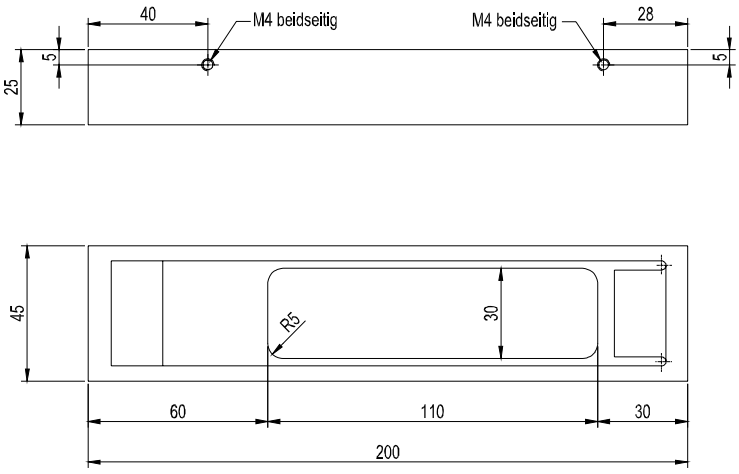
GD-15-CAL
(Attachment unit for calibration)





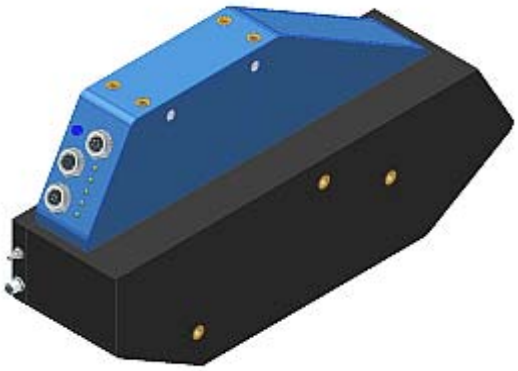
GD-15-OFL
(Spacer for offline use)

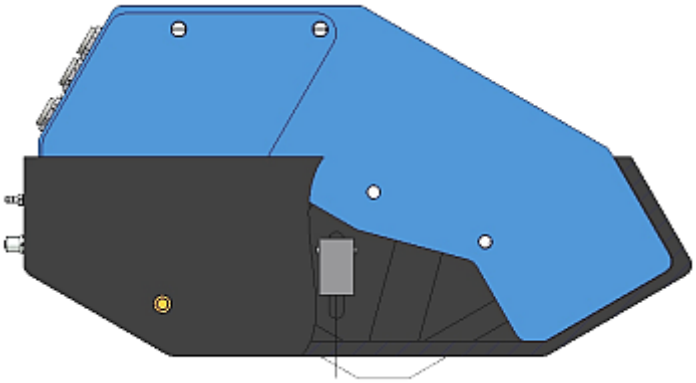




All dimensions in mm

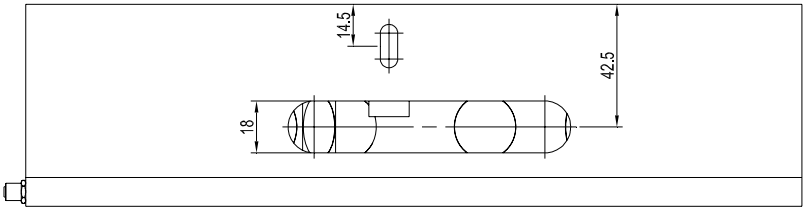
Accessories

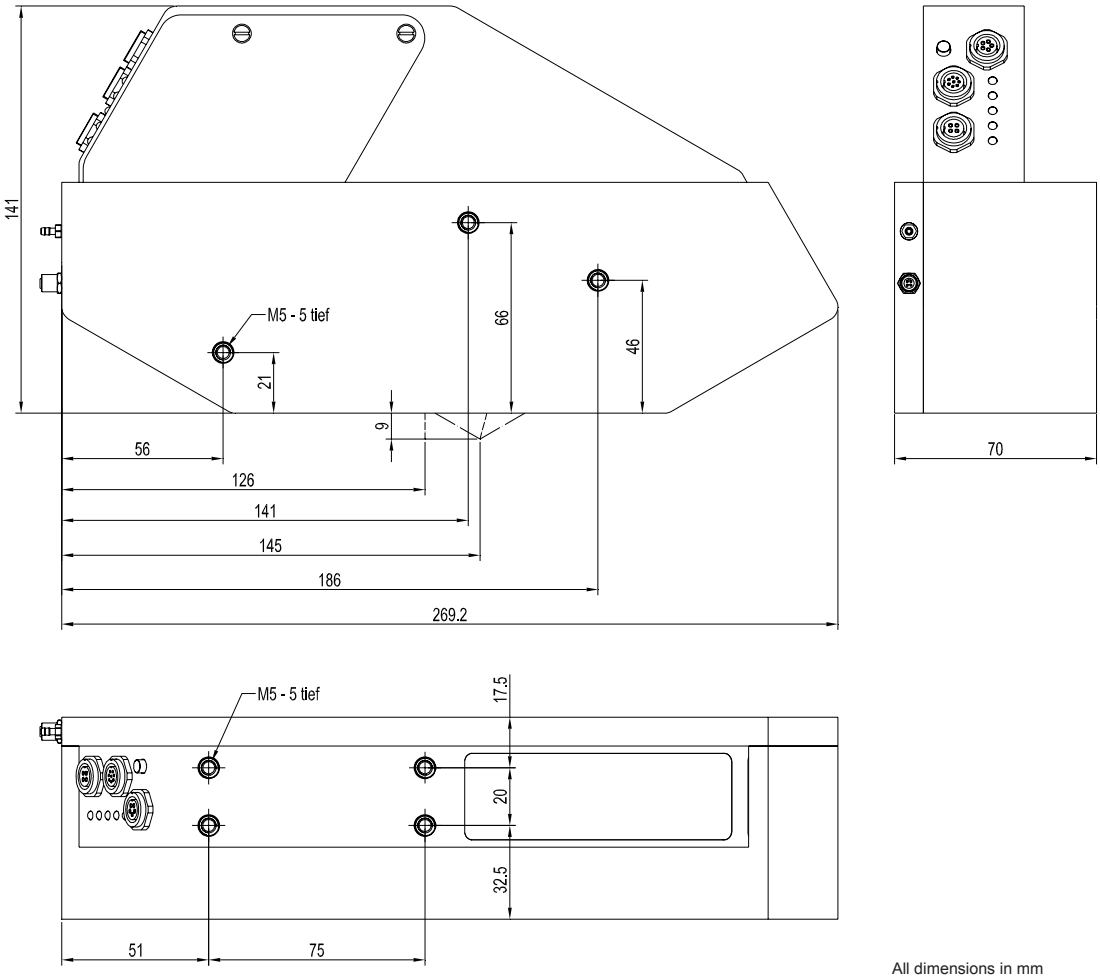




ABL-RLS-GD-15
(blow-air add-on)

ABL-RLS-GD-15-TRIG
(blow-air add-on including trigger sensor C-LAS-LT-35)





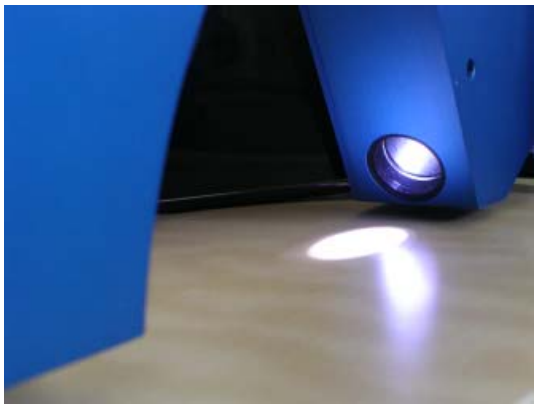
All dimensions in mm

Application Examples

Online measurement of the gloss degree

In the production of plastic sheets (design sheets, wall coverings, floor coverings, table coatings, foam sheets, and coated carrier materials for the furniture industry, automobile industry, fashion industry, or construction industry) and ceramic parts (ceramic tiles and plates for wall and floor) 100% quality inspection of the optically visible surface has become an ever more frequent requirement.

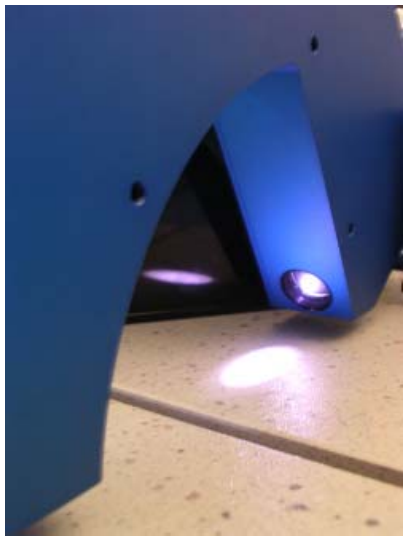
For this purpose the RLS-GD sensor features non-contacting detection of the gloss degree. The simultaneous measurement of the object from two different directions (direct reflection and diffuse reflection) allows intensity-independent evaluation. The sensor can be taught to a certain surface, and up to 31 tolerance windows can be applied around the taught value. Measurement output is performed digitally by way of five outputs.



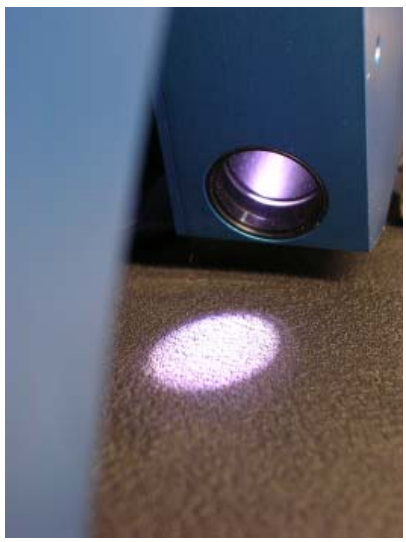
Gloss degree determination of sheets for the furniture industry

Monitoring of the gloss value of imitation leather

Gloss degree monitoring at plates of stone



Online gloss measurement at ceramic parts



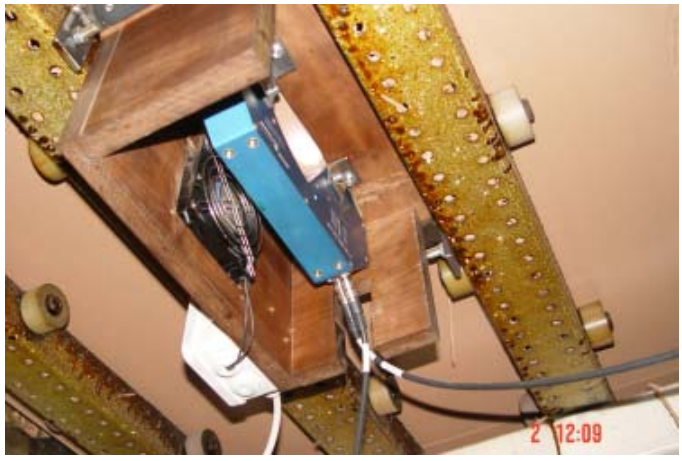
Examination of leather surfaces with respect to their gloss behavior

Application Examples

Checking the presence of sub-decor during laminate flooring production

It may happen in the production of laminate flooring that the sub-decor is not applied. Such missing sub-decor should be detected as early as possible in the production process, which is why surface checking should be performed directly after the laminating unit. Because of the great variety of different products and surface decors, image processing systems and color sensors turned out to be unsuitable for this application.
The RLS-GD-15 gloss sensor, however, can perfectly distinguish between sub-decor present / not present.
The application uses the analog output (4mA ... 20mA), which behaves proportionally to the gloss grade of the surface. A missing sub-decor leads to a sudden change of the analog signal, i.e. of the gloss grade. It is furthermore possible to perform teaching to the respective sub-decor, the gloss grade is then indicated in 31 stages (from good to bad) by way of switching outputs, and can thus easily be interrogated by a PLC. When a certain stage is exceeded, an alarm signal can be triggered or, in case of small deviations (trend), the operator can be informed in time.

Online gloss measurement at laminate flooring (monitoring of counteracting paper)



These sensors are used to check whether the resistant hard-paper layer is applied correctly. For this inspection use is made of the different gloss degrees of the hard-paper layer and the uncoated back side of the laminate flooring. This wood processing company presently is considering the use of the RLS-GD-15 for quality inspection of the decor, where a distinction should be made between decor and sub-decor.

Online gloss measurement during PVC-flooring production in transverse motion operation

In the production of plastic floor coverings the gloss degree decisively depends on the material temperature in the extruder. Environmental influences such as air humidity and ambient temperature also are of importance with respect to the gloss degree.”Until now, measurements were only performed at the start and end of production. With the RLS-GD-15 online measuring system the gloss degree can now be determined during the whole production process.”It is furthermore planned to use the analog signal (4...20mA, proportional to the gloss degree) for automatically controlling the temperature of the extruder and thus the gloss degree.

Application Examples

Gloss measurement in the paper industry

Since the gloss degree should be measured on both sides of the paper web, and the paper web should not bend during measurement, but should run flatly, the position for the RLS-GD-15 gloss sensors was chosen at two deflection rollers.
In order to also obtain information about the gloss degree characteristics in crosswise direction of the paper web, three gloss sensors are mounted on each side (close to the left edge - center - close to the right edge).
This means that there are six sensors for one system.