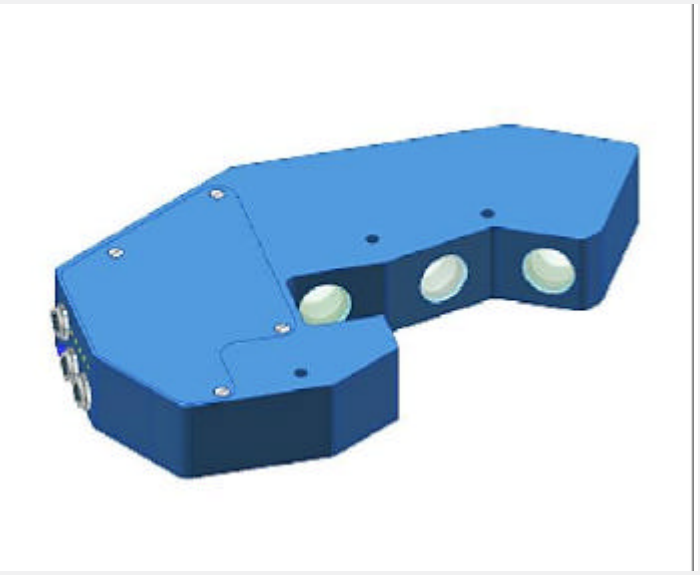
RLS Series

RLS-GD-15/60° 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
- Settable under Windows®, RS232 interface
- 5 switching outputs (npn-/pnp, 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

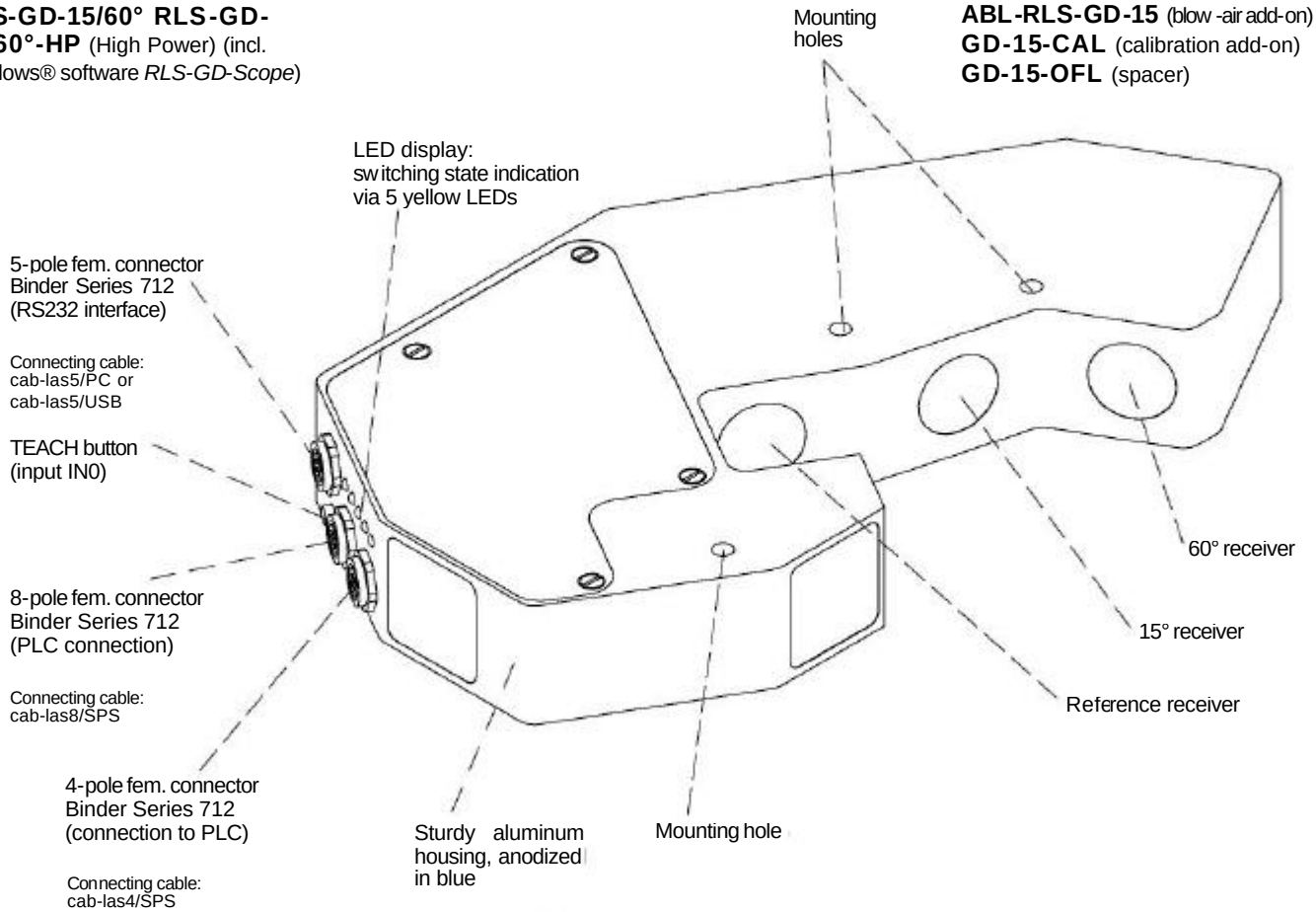
Design

Product name:

RLS-GD-15/60° RLS-GD-15/60°-HP (High Power) (incl. Windows® software *RLS-GD-Scope*)

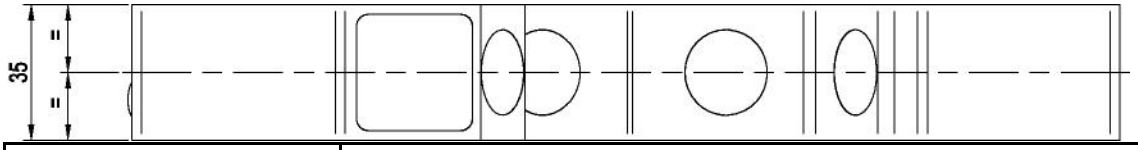
Accessories: (cf. page 14-15)

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



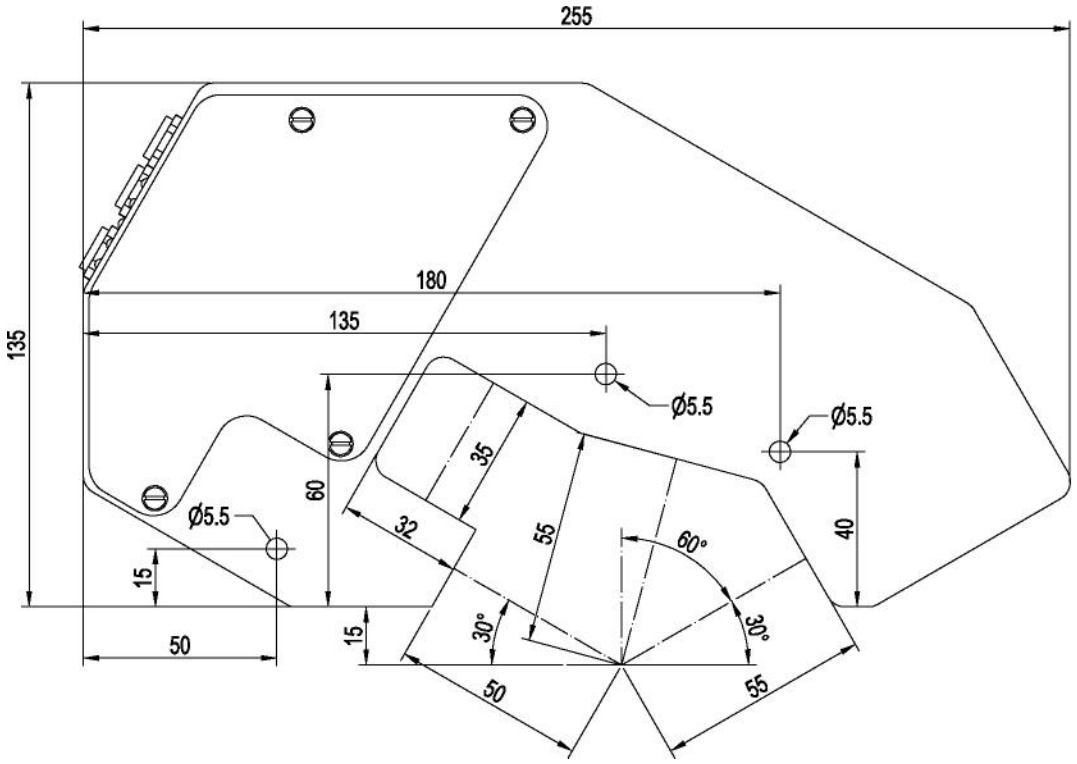
Technical Data

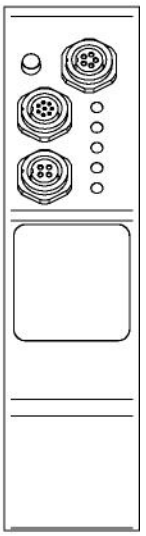
Model	RLS-GD-15/60°	or	RLS-GD-15/60°-HP

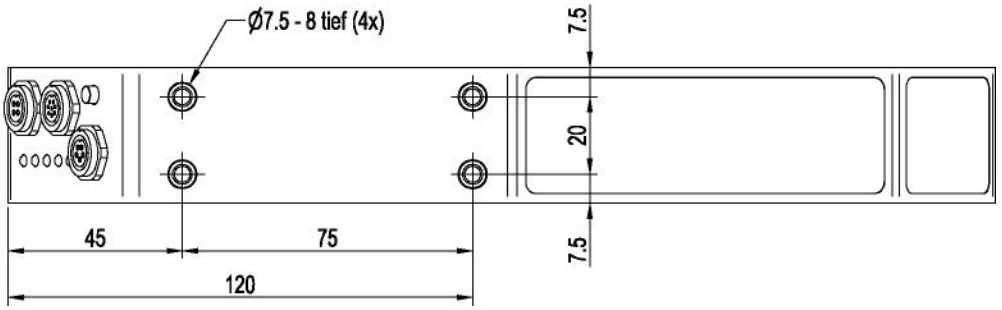


Light source	1x white light LED, AC-operation (100 kHz) or 8x white light LED (in case of LS-GD-15/60°-HP)
Light spot size	in a distance of 15 mm: typ. 16 mm x 35 mm (elliptical)
Optical filters	day light filter (KG2), UV block filter
Voltage supply	+24V DC (± 10 %), protected against polarity reversal, overload protected
Pulsating light operation	100 kHz
Ambient light	up to 5000 Lux
Enclosure rating	IP 54
Current consumption	typ. 110 mA
Interface	RS 232, settable under Windows®
EMC test acc. to	DIN EN 60947-5-2
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
Housing dimensions	LxWxH approx. 255 mm x 135 mm x 35 mm
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 ... 20 mA)
Input IN 0	via teach push button at the housing
Sensitivity (switching threshold)	parameterisable under Windows® (selection: threshold or tolerance window)
Pulse lengthening	0 ms ... 1000 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 LED s

Dimensions







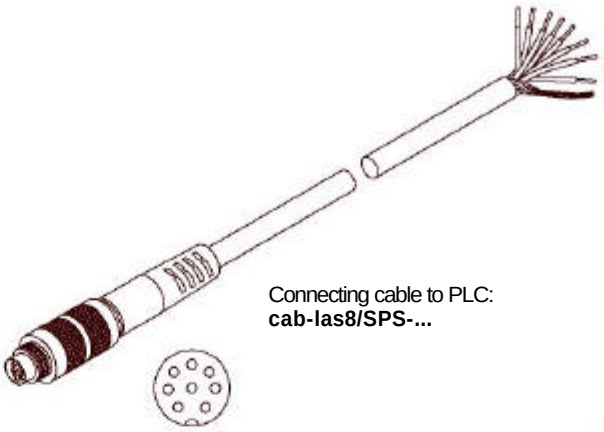
All dimensions in mm

Connector Assignment

Connection to PLC:
8-pole fem. connector Binder Series 712

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

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

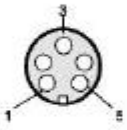


Connecting cable to PLC:
cab-las8/SPS-...

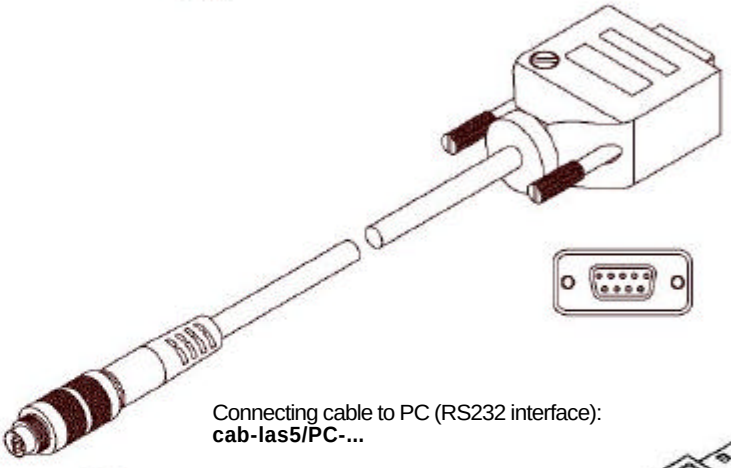
Connection to PC:
5-pole fem. connector Binder Series 712

Connection via SUB-D female connector at the PC

Pin:	Assignment:
1	GND (0V)
2	TxD
3	RxD
4	+24VDC (+Ub, OUT)
5	not connected



Connecting cable:
cab-las5/PC-*(length)* cab-las5/PC-w-*(length)* (angle type 90°) (Standard length 2 m)

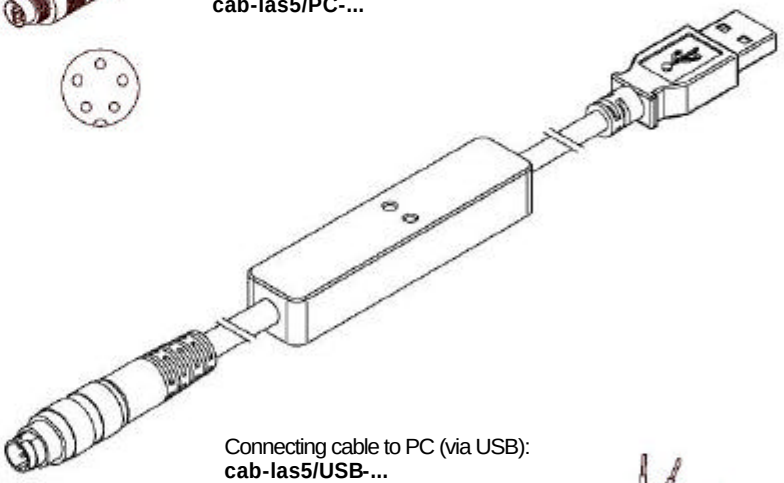


Connecting cable to PC (RS232 interface):
cab-las5/PC-...

alternatively:
Connection via USB interface

Pin: Assignment:

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

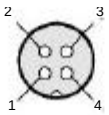


Connecting cable:
cab-las5/USB-0,5m
cab-las5/USB-1m
cab-las5/USB-2m
(incl. driver software)

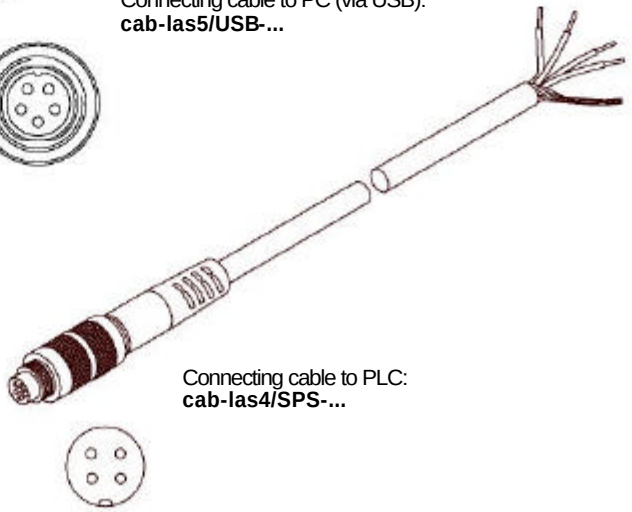
Connecting cable to PC (via USB):
cab-las5/USB-...

Connection to PLC:
4-pole fem. connector Binder Series 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-*(length)*
(Standard length 2m)



Connecting cable to PLC:
cab-las4/SPS-...

General Information

Different standard measuring angles for RLS-GD Series available:

RLS-GD 5/85° measures with an angle of 85° :	for low-gloss surfaces (standard for the automotive, paint varnish, plastics as well as Manufacturing industry)
RLS-GD 12/75° measures with an angle of 75° :	for low-gloss surfaces (standard for the paper industry)
RLS-GD 15/60° measures with an angle of 60° :	for medium gloss surfaces = „handyman“ (standard for the production of furniture, floor covering, tiles, decors)
RLS-GD 20/20° measures with an angle of 20° :	for high-gloss surfaces (standard for the production of glass, foils, films, and metal sheets)

Measuring Principle

Measuring principle of the gloss detection sensor RLS-GD-15/60° (or RLS-GD-15/60°-HP):

The RLS-GD-15/60° 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. 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%). 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 shown by means of 5 LEDs at the housing of the RLS-GD-15/60°.

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).

Evaluation algorithm 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 indicates successful teaching procedure.

RS232 interface:
Through the RS232 interface parameters and measured values can be exchanged between the PC and the RLS-GD-15/60° sensor. All the parameters for gloss degree detection respectively normalized vector detection can be stored in the non-volatile EEPROM of the RLS-GD-15/60° 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 shown 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.

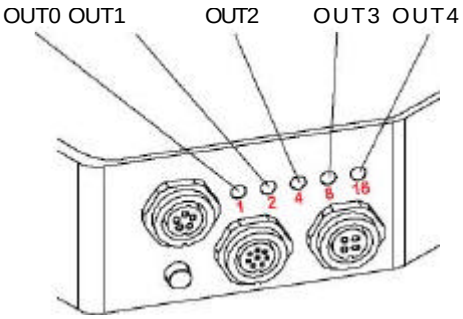
The following evaluation algorithms can also be selected:

- Target lies within the tolerance window of a taught gloss grade.
- 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.

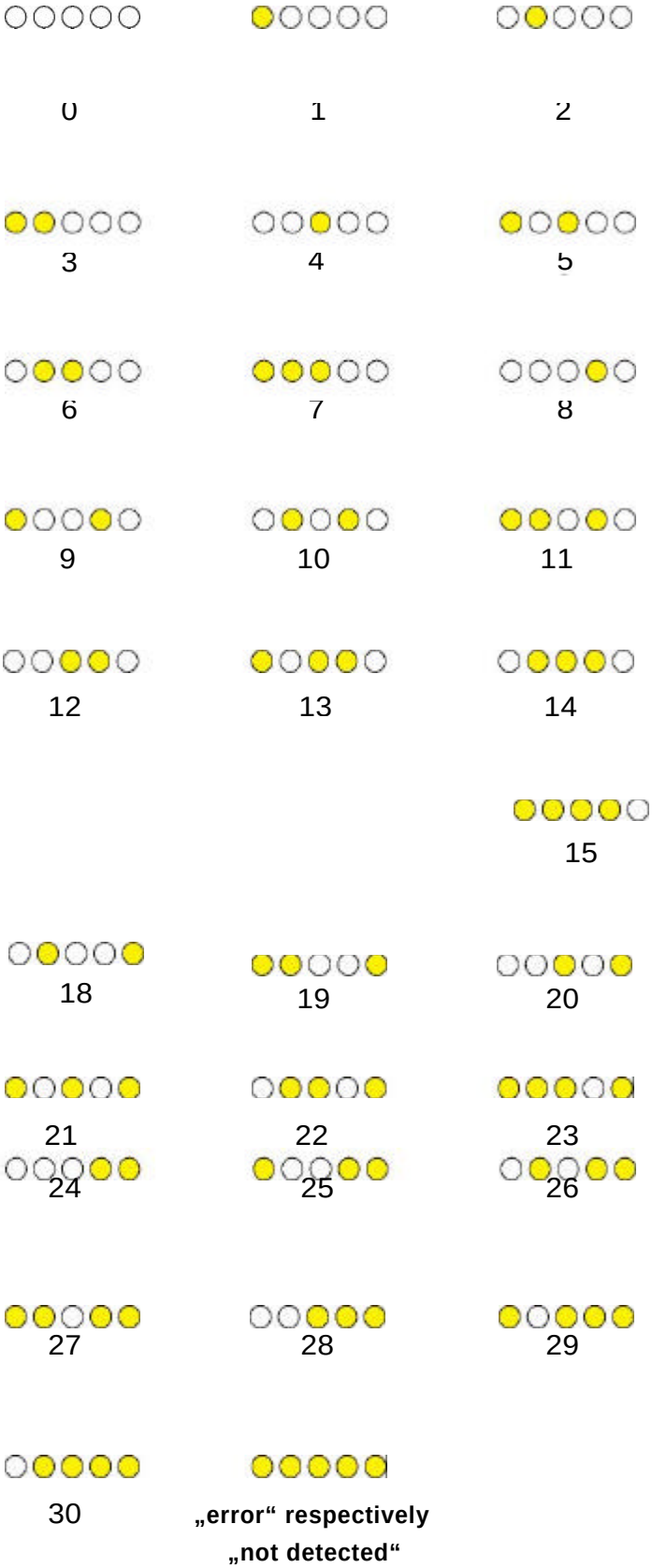
LED display:

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.



LED Display

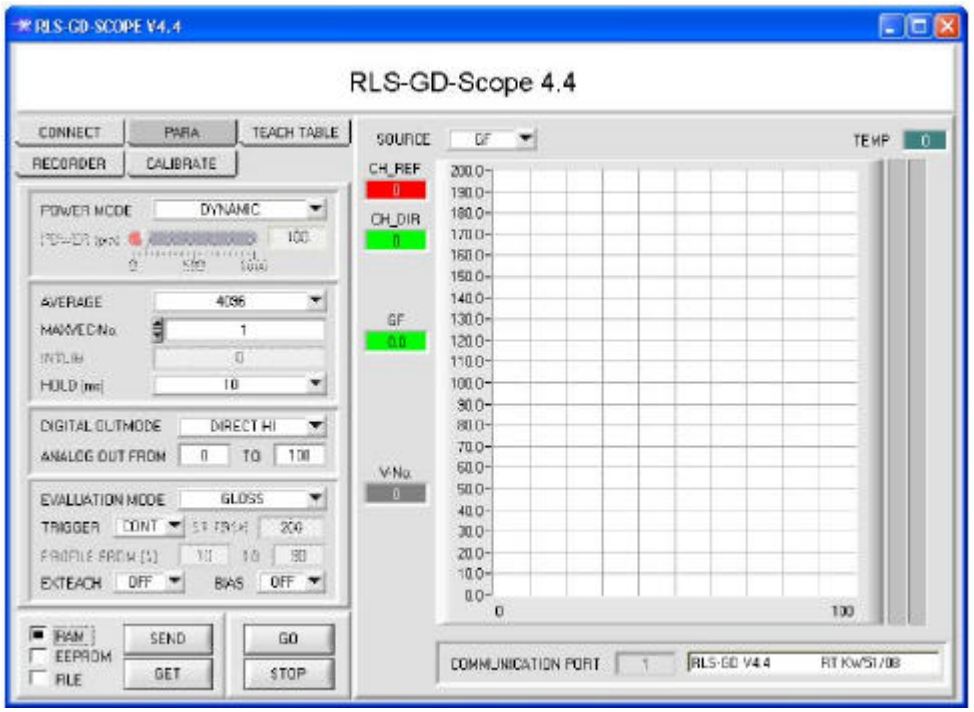


„error“ respectively „not detected“

Settings

Windows® user interface:

The color sensor is parameterized under Windows® with the RLS-GD-Scope software. The Windows® user interface facilitates the teach-in process at the color sensor and supports the operator in the task of adjustment and commissioning of the color sensor.



The RS232 interface (PARA) is used for setting parameters such as:

- MAXVEC-No.:
  Number of gloss degrees (normalized vectors) to be checked
- POWER-MODE:
  Light power of the white-light LED
- AVERAGE:
  Averaging over a maximum of 32768 values
- TRIGGER:
  Continuous or external or self trigger
- OUTMODE:
  Triggering of the digital outputs
- INTLIM:
  Minimum intensity required for gloss evaluation
- HOLD:
  Pulse lengthening up to 100ms max.

Under Windows® representation of the color value on a PC in numeric form and in a color chart, and representation of RGB values in a time chart.
In addition the current RGB values are displayed as a bar chart.

Explanation of general function groups and display elements:

Tab CONNECT:

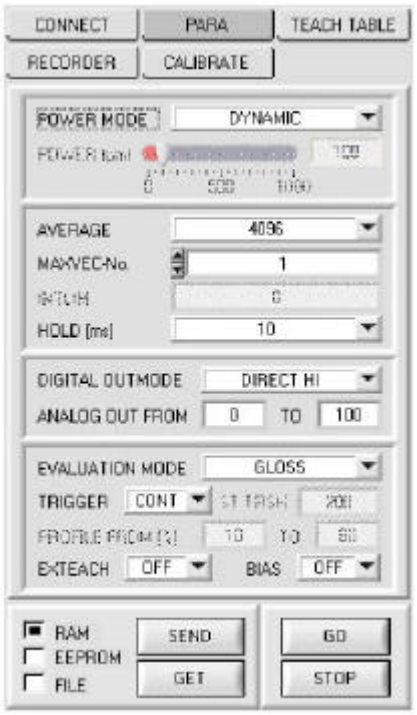
Pressing the CONNECT tab opens a window for selecting and configuring the interface.

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 an adaptor is used, the COMPORT number can be determined by way of the hardware manager in the system control panel.

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. The network adaptors that are available from us are based on the Lantronix XPort module. For setting these adapters (assigning of an IP address, setting of the Baud rate of 19200) please download the 'Device Installer' software that is provided free of charge by Lantronix at http:// www.lantronix.com/. Device Installer is based on Microsoft's '.NET' framework. Detailed operating instructions for the 'Device Installer' software also are available from Lantronix.

Parameterization



Tab PARA:

Pressing the PARA tab opens a window for setting the sensor parameters.
SEND [F9]:
When the SEND button is clicked (or with shortcut key F9), 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 [F10]:

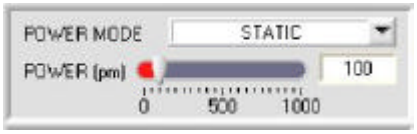
The currently set values can be interrogated from the sensor by clicking on the GET button (or with shortcut key F10). The source of data exchange is determined by the selected button (RAM, EEPROM, or FILE).
RAM:

After a click on the SEND button the current parameters are written into the RAM memory of the sensor, or they are read from the RAM by clicking on the GET button, i.e. these parameters are lost when the voltage at the sensor is switched off.
EEPROM:
After a click on the SEND button the current parameters are written into the non-volatile memory of the EEPROM in the sensor, or they are read from the EEPROM by clicking on the GET button, i.e. the parameters in the internal EEPROM are stored when the voltage at the sensor is switched off.

FILE:
After pressing SEND, the current parameters can be written to a selectable file on the hard disk. With GET parameters can be read from such a file. When the SEND or GET button is pressed, a dialog box opens for selecting the desired file.

GO [F11]:
A click on this button (or pressing shortcut key F11) starts data transfer from the sensor to the PC through the serial RS232 interface.

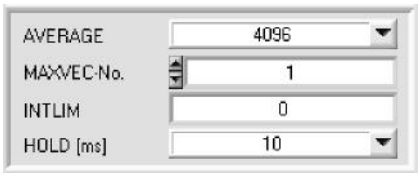
SOURCE is used to select which signals should be shown in the displays and graphs.
STOP [F12]:
A click on this button (or pressing shortcut key F12) stops data transfer from the sensor to the PC through the serial RS232 interface.



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

The LED transmitter power is constantly kept at the value set with the POWER slider. This operation mode is the recommended if EVALUATION MODE = NORM_INT is selected.
DYNAMIC:
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. This operation mode is the recommended if EVALUATION MODE = GLOSS is selected.
POWER [pm]:

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! With dynamic transmitter power the POWER slider is not active, because the sensor automatically regulates the LED power.



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 sensor.

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

INTLIM:

This edit box is used for setting an intensity limit. Gloss evaluation is stopped, if the current intensity INT=(CH_L+CH_C_+CH_R)/3 arriving at the receiver unit falls below this limit, and ERROR STATE (V-No.: =255) is output.

HOLD:
The 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 sensor pulse lengthening of up to 100 ms can be set by selecting the corresponding HOLD value.

Parameterization

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

ANALOG FROM OUT:
These function groups are used for selecting the output mode of the analog outputs.
The gloss sensor features a 4 to 20mA current output and a 0 to 10V voltage output.
Depending on the model the gloss sensor can measure a gloss factor of up to 2000 GU (Gloss Units).

The calculated NORM can have values between 0 and 1000.
Depending on the EVALUATION MODE, either the gloss factor or the norm value will be output in analog form. The above function field is used to inform the sensor about the sector of the total measuring range that should be output (zoom function).

EVALUATION MODE:
The gloss sensor can be operated with two different evaluation modes.
NORM_INT:
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.

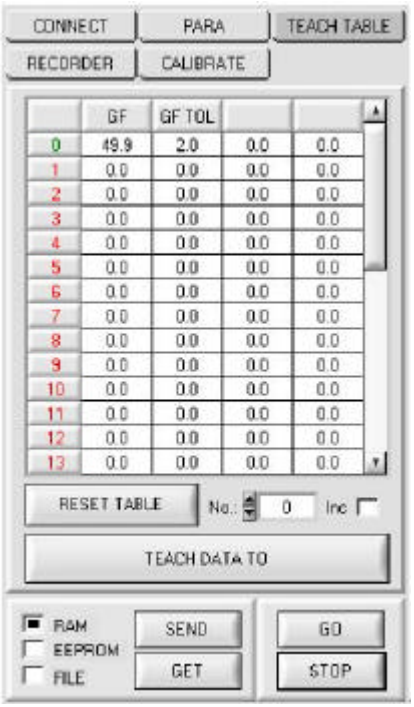
GLOSS:
The channels CH_REF (reference channel) and CH_DIR (direct channel) are used for evaluation. Before this evaluation mode can be used, however, the sensor must be calibrated. After successful calibration the sensor determines the gloss factor of the respective surface and outputs this in digital and analog form.

EXTERN TEACH:
When EXTERN TEACH is activated, the currently present gloss factor 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 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.

EXTERN TEACH:
In evaluation mode GLOSS, 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.

TRIGGER:
This function field serves for setting the trigger mode at the RLS-GD sensor.
CONT: Continuous gloss value detection (no trigger event required).
SELF: As long as the CH_DIR channel is higher than ST TRSH (Self Trigger Threshold), measurement values are recorded in an internal buffer. Once CH_DIR is lower than ST TRSH again, a mean value is determined from the number of recorded measurement values, and this mean value is then output. Otherwise this mode exactly Corresponds with the functionality of EXT3, the only difference is the type of triggering. SELF means internal self-triggering, and EXT3 means external triggering through the physical IN0 input.
EXT1: Evaluation is started through the external trigger input (IN0 pin3 green of cable cab-las8/SPS) or through clicking the TEACH button at the sensor housing. A trigger event is recognized as long as +24V is present at the IN0 input (HIGH active).
While IN0 is high (+24V), the detected states (vectors) are output, too.
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.
EXT4:
The transmission LED is active and evaluation is running as long as input IN0 is high (+24V) or as long as the button at the housing is pressed. When IN0 drops again or the button is released, the last recognised state remains present and the transmission LED goes off.
This trigger mode was introduced to reduce the strain on the transmission LED. If the transmission LED is a UV LED it is recommended to operate with this mode.

Parameterization



Tab TEACH TABLE:

TEACH TABLE opens a view where vectors can be taught to the TEACH TABLE.

After a left mouse button double click (or with shortcut key F2) on the respective field the default values can be changed by entering numerical values with the PC keyboard.
The TEACH TABLE is organized in rows, i.e. the individual parameters for the teach-in vectors are arranged side by side in the respective row.

The sensor is able to check up to 31 teach-in vectors. The number of the respective teach-in vectors is given in the left column of the table.
Only the green rows are used for evaluation in the sensor. The number of rows to be inspected is set with MAXVEC-No. .

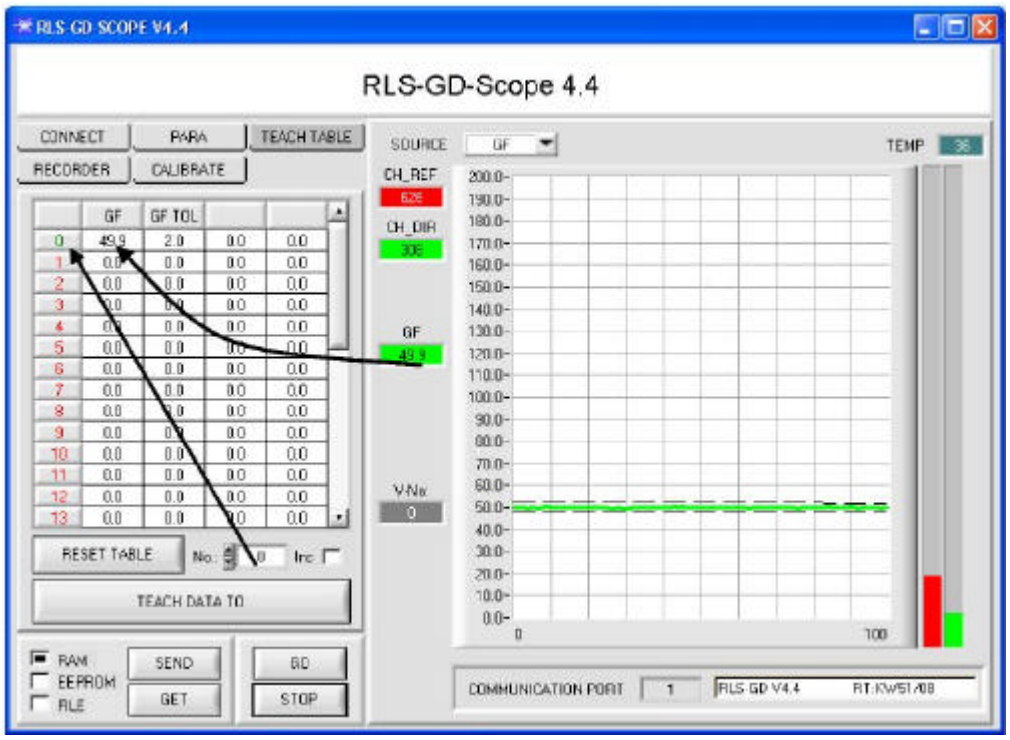
When TEACH DATA TO is pressed, the currently displayed gloss factor GF is transferred to the row in the TEACH TABLE that is selected under No.:

In addition, a tolerance (GF TO) is set. If necessary, the tolerances, as well as the teach value, can be changed as described above.
No.: also is used to select which INT or M tolerance window is shown in the respective graphs for the intensity or for M.

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 row in the TEACH TABLE is selected

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

Pressing the GO button starts data transfer from the sensor to the PC. The respective CH-REF, CH_DIR components are indicated by the bars beside the graph.
The calculated gloss factor GF is visualised in the display.



CH_REF, CH_DIR, CH_DIF:

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 shown in the form of bars.

NORM, INT:

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

GF:

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.

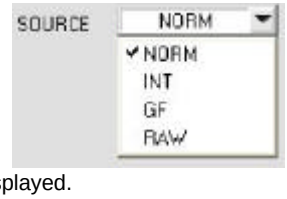
V-No:

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. If value 255 is displayed, no value has been detected that corresponds to the values taught to the Teach Table.

A double-click on this display calls up a large display.

TEMP:

This display shows the current temperature that is measured in the sensor housing.
(!!! not in °C)

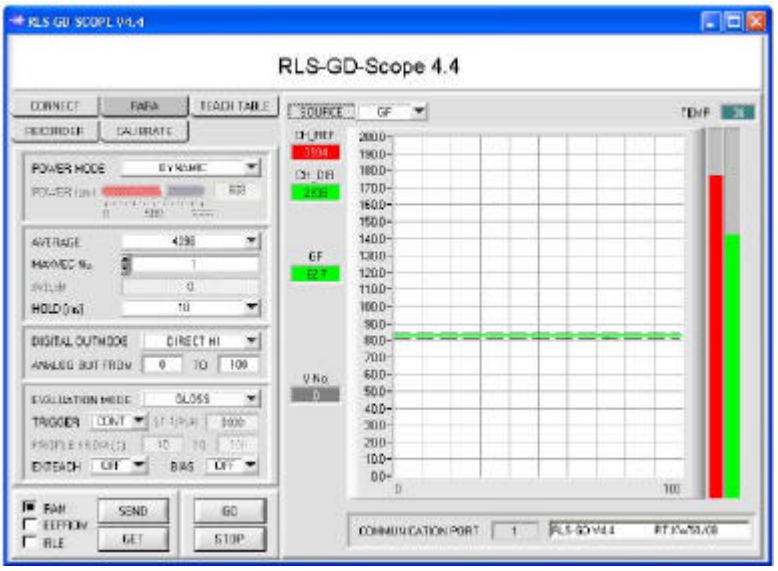


SOURCE:

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 (range of values 0 ... 2000).
RAW The current raw signals are displayed.

Parameterization

Evaluation mode GLOSS:

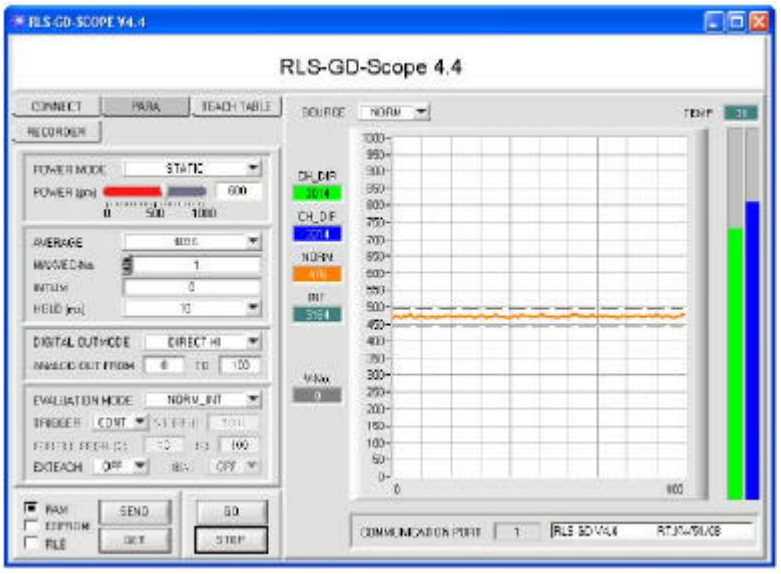


In EVALUATION MODE GLOSS the sensor operates as a measuring device that measures the gloss factor of a certain surface and displays this gloss factor. For this purpose it uses the CH_REF and CH_DIR channels, from which the gloss factor of a surface is determined. Up to 31 gloss factors can be taught to a TEACH TABLE. A tolerance GF TOL can be set for every gloss factor. The gloss factor and its respective tolerance are referred to as a VECTOR below. Each vector corresponds with a row. When a taught vector (gloss factor) is recognised again, the row number of the vector is sent to 5 digital outputs (OUT0 ... OUT4). In addition the value of the gloss factor in analog form is sent to a 0 - 10V voltage output and to a 4 ... 20mA current output.

In evaluation mode GLOSS the sensor, just like any other measuring device, must be calibrated from time to time. An RLS-GD-CAL calibration unit is available for this purpose. For calibrating the sensor, please follow the instructions under Tab CALIBRATE in the RLS-GD-Scope V4.4 manual.

Prior to the use of the software aids (graphic display of sensor signals) the sensor must be manually adjusted to the respective target or background as accurately as possible. The reference distance of the sensor to the target is defined in the data sheet of the respective sensor.
Please make sure that the sensor is properly connected and supplied with power.

Evaluation mode NORM INT:



In EVALUATION MODE NORM_INT the sensor operates as a control system. A NORM and an INT (intensity) are calculated from the CH_DIR and CH-DIF channels. These two values are characteristic for a certain surface. For both the NORM and INT value a respective N TOL and I TOL tolerance can be set. The information comprising NORM, N TOL, INT and ITOL again is referred to as a VECTOR below. A total of 31 vectors can be taught in the TEACH TABLE. When in a row-by-row comparison a vector is recognised again, this vector is sent to the digital outputs. In addition the value of NORM in analog form is sent to the voltage and current output.

Prior to the use of the software aids (graphic display of sensor signals) the sensor must be manually adjusted to the respective target or background as accurately as possible. The reference distance of the sensor to the target is defined in the data sheet of the respective sensor.

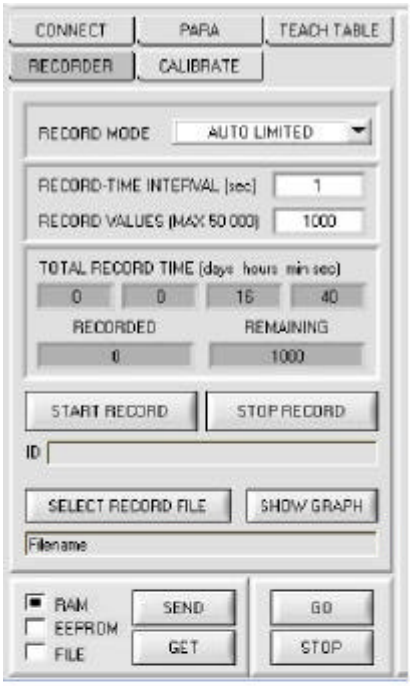
Please make sure that the sensor is properly connected and supplied with power.

From the data of CH_DIR and CH_DIF, NORM and INT are calculated acc. to the following formulas:

$$NORM = \frac{CH\text{-}DIR}{CH\text{-}DIR = CH - DIF} + 1000$$

$$INT = \frac{CH\text{-}DIR + CH - DIF}{2}$$

Parameterization

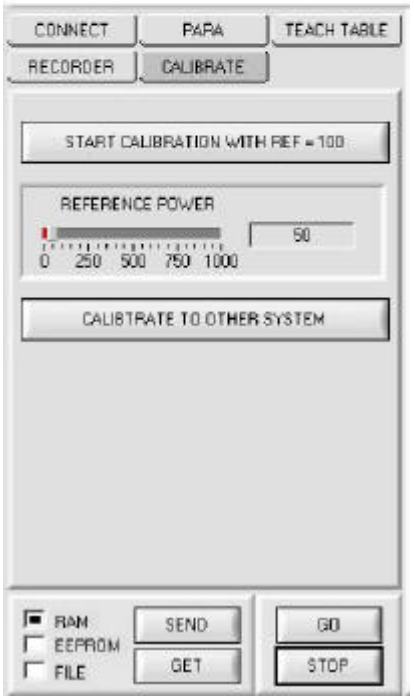


Tab RECORDER:

The RLS-GD-Scope software features a data recorder that allows the saving of CH_REF, CHD_DIR, CH_DIF, NORM, INT, GF, PP, V-No. and TEMP. The recorded file is saved to the hard disk of the PC and can then be evaluated with a spreadsheet program.

The file that is created has eleven columns and as many rows as data frames were recorded.
A row is structured as follows: Date and time, CH_REF, CHD_DIR, CH_DIF, NORM, INT, GF, PP, V-No., TEMP.

The following steps describe how data frames are recorded with the recorder:
Please note:
Recording depends on the EVALUATION MODE that is chosen. Several EVALUATION MODES do not need certain data, therefore these data will be set to 0, i.e. for these data the value 0 will be recorded.



Tab CALIBRATE:

As any other measuring equipment the sensors of the RLS-GD series must be calibrated from time to time. With the RLS-GD-CAL unit and the software you can perform calibration yo

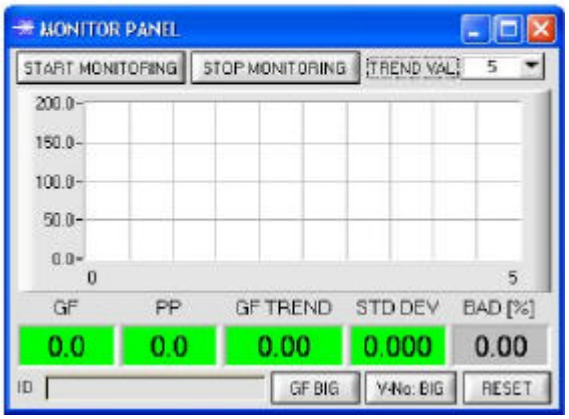
When you press START CALIBRATION with REF=100, you will be asked to place the sensor into the reference calibration surface RLS-GD-CAL with a gloss factor.
Click on YES when you have placed the reference surface.
A suitable POWER will then be set at which channel CH_DIR or CH_REF is in the upper third of its dynamic range.
If a suitable POWER value could be found, the software informs you that calibration is now possible and that the corresponding calibration factors have been stored in the sensor's EEPROM memory.

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.

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 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.
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.



Tab MONITOR:

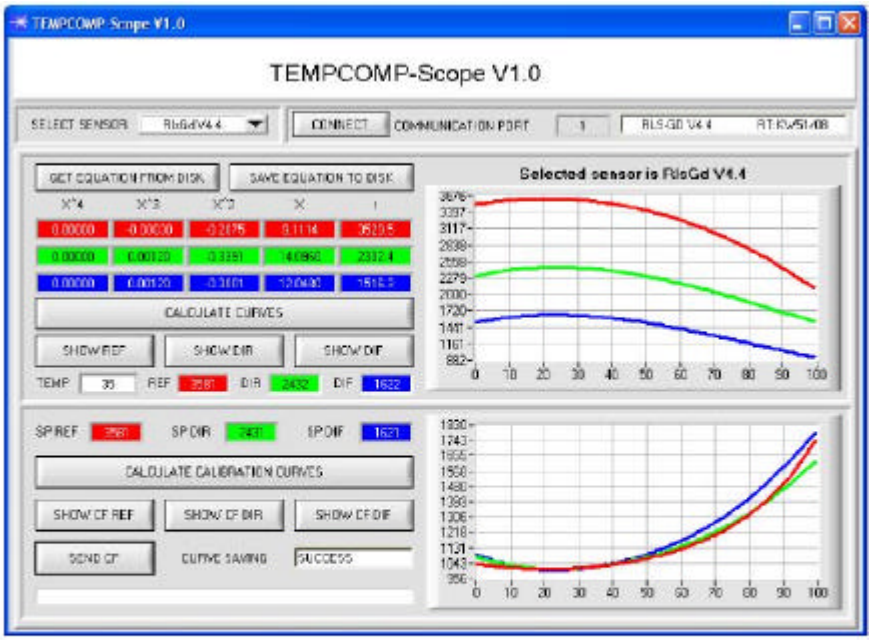
The monitoring function is only available if EVALUATION MODE = GLOSS is selected and if TRIGGER = SELF, EXT1, EXT2, EXT3, or EXT4. By clicking the MONITOR button the following panel is opened:

START MONITORING starts gloss factor monitoring. After every trigger event the sensor automatically sends the current gloss factor to the PC. This gloss factor is visualised in the GF display and in the graph. Under TREND VAL you can set how many of the last data frames are shown in the graphic display. The GF TREND display shows the gloss factor mean value that is calculated from the values that are displayed in the graph. When TRIGGER = SELF or EXT3 is selected, the PP value of the current profile is also transferred and shown in the PP display window. The displayed value STD DEV visualizes the standard deviation from average GF TREND.

The background of the GF, PP, GF TREND display windows may either be red or green.
GF is green, if GF ± GF TL of vector 0 was recognized in the TEACH TABLE.
PP is green, if PP is smaller than the value taught in row 0 of the TEACH TABLE (only if TRIGGER=SELF or EXT3).
GF TREND is green, if the gloss factor mean value corresponds with vector 0 in the TEACH TABLE.
The BAD[%] display shows the percentage of values recorded in the graph that do not correspond with the teach vector in row 0.

A left double-click on the display GF or a click on the button GF BIG opens a large window that displays the gloss factor.
A click on the button V-No: BIG opens a large window that displays the recognized vector.
A click on the button RESET sets all values to 0.

Operation of the TEMPCOMP-Scope software:

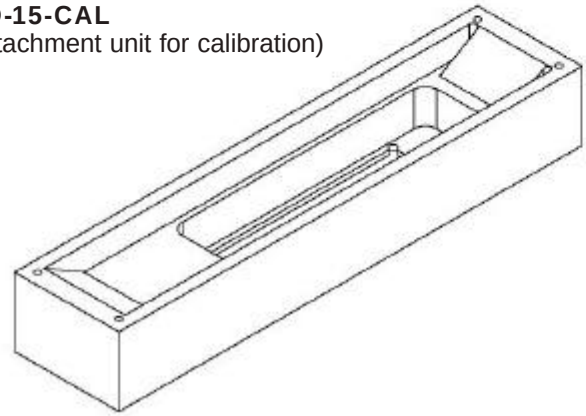


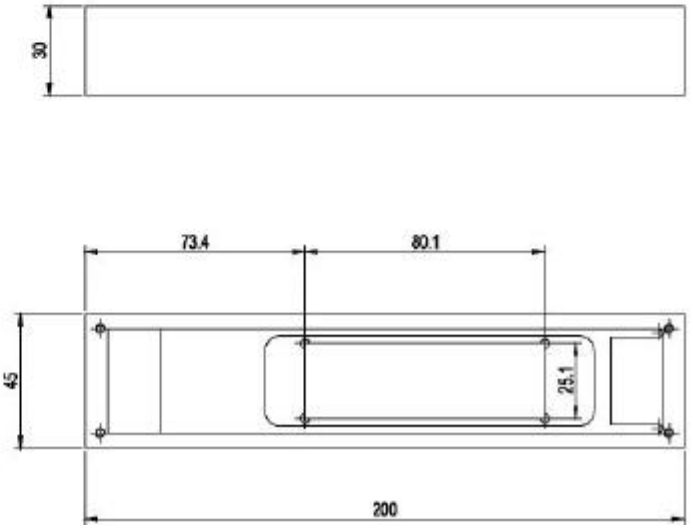
If a firmware update should go wrong and the temperature characteristics that are stored in the EEPROM should be lost, these characteristics must be created anew. For this purpose you will need a file with the corresponding data. This file can be obtained from your supplier.

To perform temperature compensation please start the corresponding TEMPCOMP-Scope software that is included on the supplied CD. Please make sure that you have a functioning sensor connection. It may be necessary to select the connection with CONNECT. Set the correct sensor under SELECT SENSOR, if this is not done automatically.

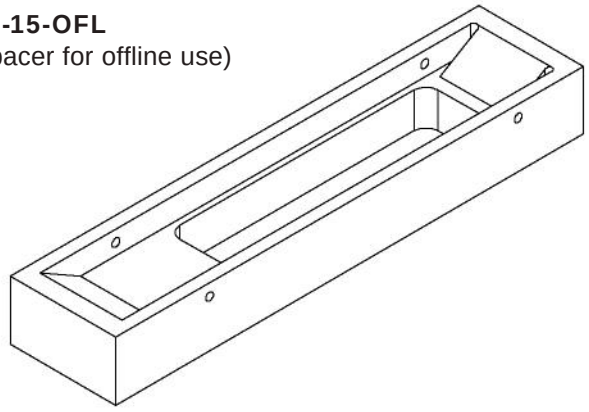
Accessories

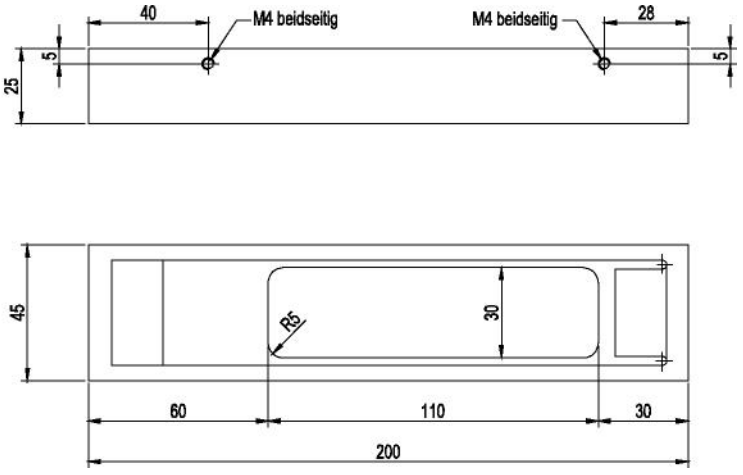
GD-15-CAL
(Attachment unit for calibration)





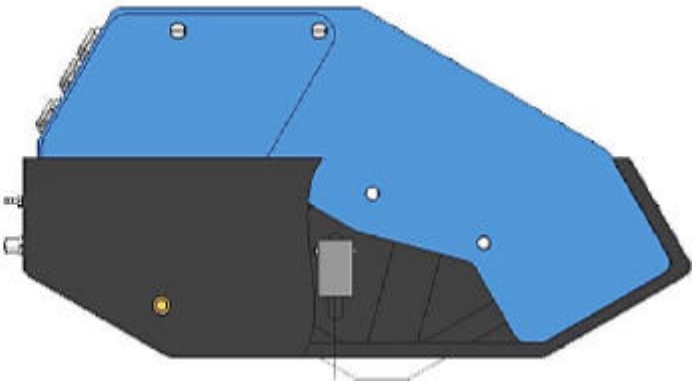
GD-15-OFL
(Spacer for offline use)





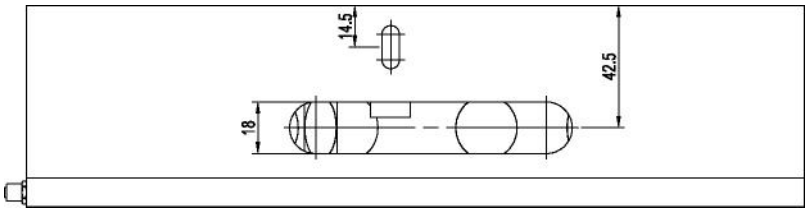
All dimensions in mm

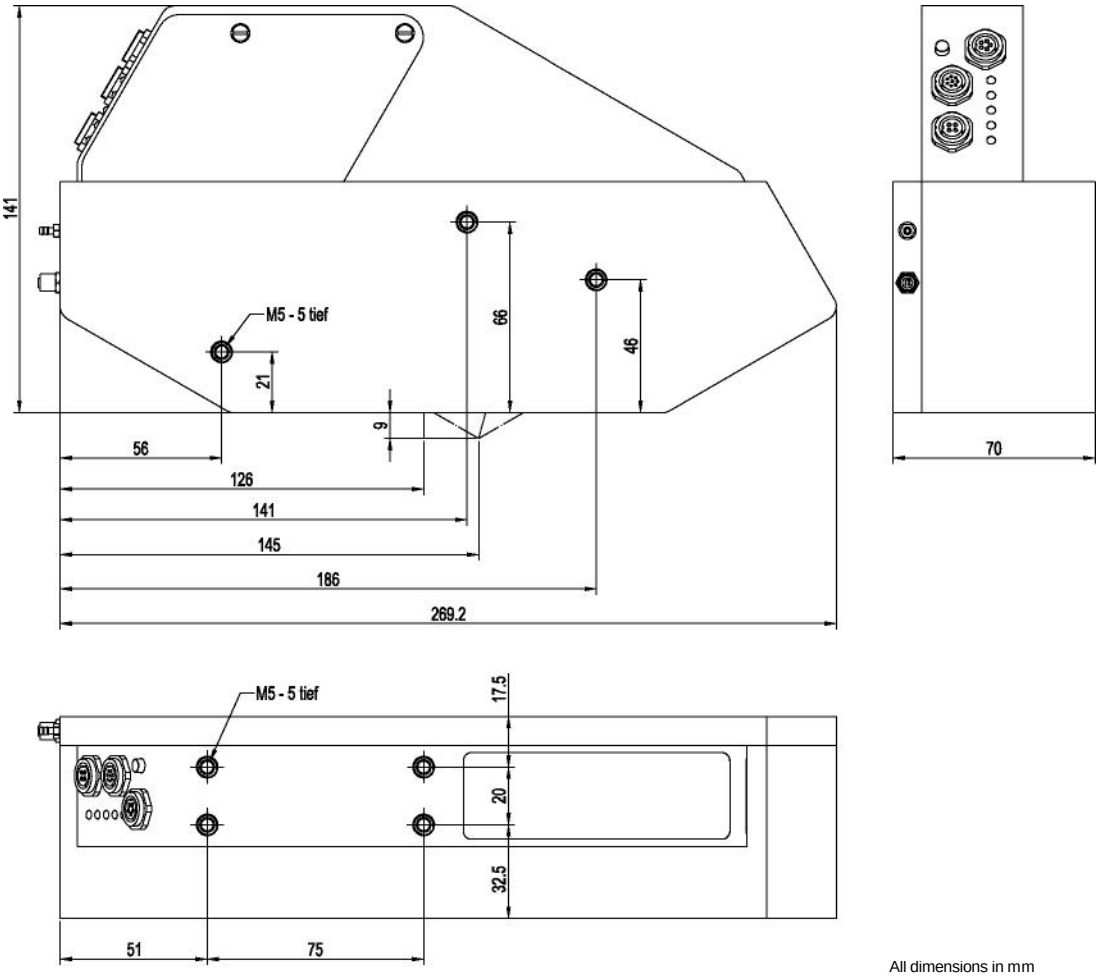
Accessories



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

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





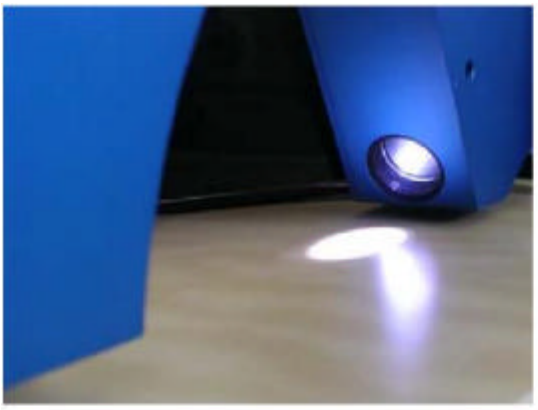
All dimensions in mm

Application Examples

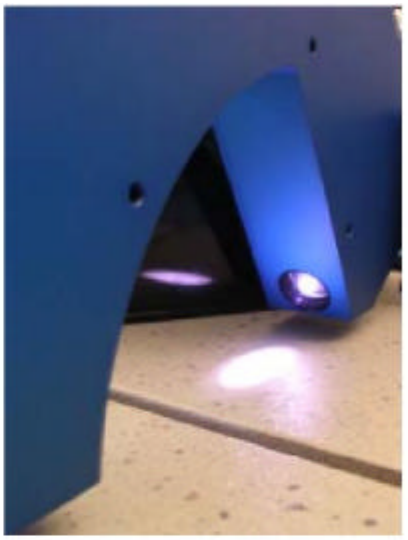
Online measurement of the gloss degree

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.



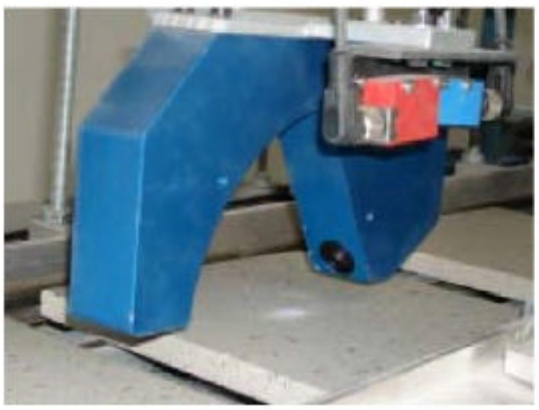
Gloss degree determination of sheets for the furniture industry



Online gloss measurement at ceramic parts

Monitoring of the gloss value of imitation leather

Examination of leather surfaces with respect to their gloss behavior



Gloss degree monitoring at plates of stone

Application Examples

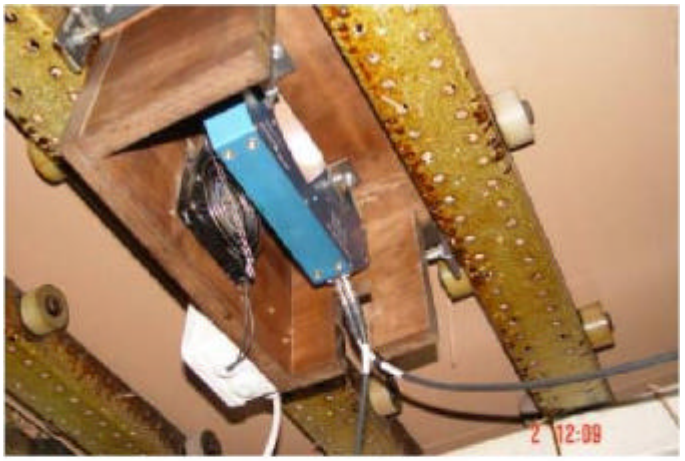
Checking the presence of sub-decor during laminate flooring production

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-15/60° 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 inter-rogated 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-15/60° 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-15/60° 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.

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-15/60° 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.