

RLS Series

▶ RLS-GD-60 Gloss Detection

- Insensitive to outside light due to clocked white light
- 3 receivers (20°, 60° and 80°)
- Storage of up to 31 gloss values
- Tolerance of each gloss value can be adjusted
- Working distance typ. 10 mm
- Parameterisable under Windows®, RS232 interface
- 5 switching outputs (npn/pnp, 100 mA, short-circuit proof)
- Switching state indication by means of a yellow LED (5x)
- Transmitting power can be adjusted (STAT or DYN)
- Averaging can be activated (up to over 32000 values)
- Scratch-resistant optics cover made of glass
- Sturdy aluminum housing
- RLS-GD-60-HP: High dynamic range due to 8 white light LED



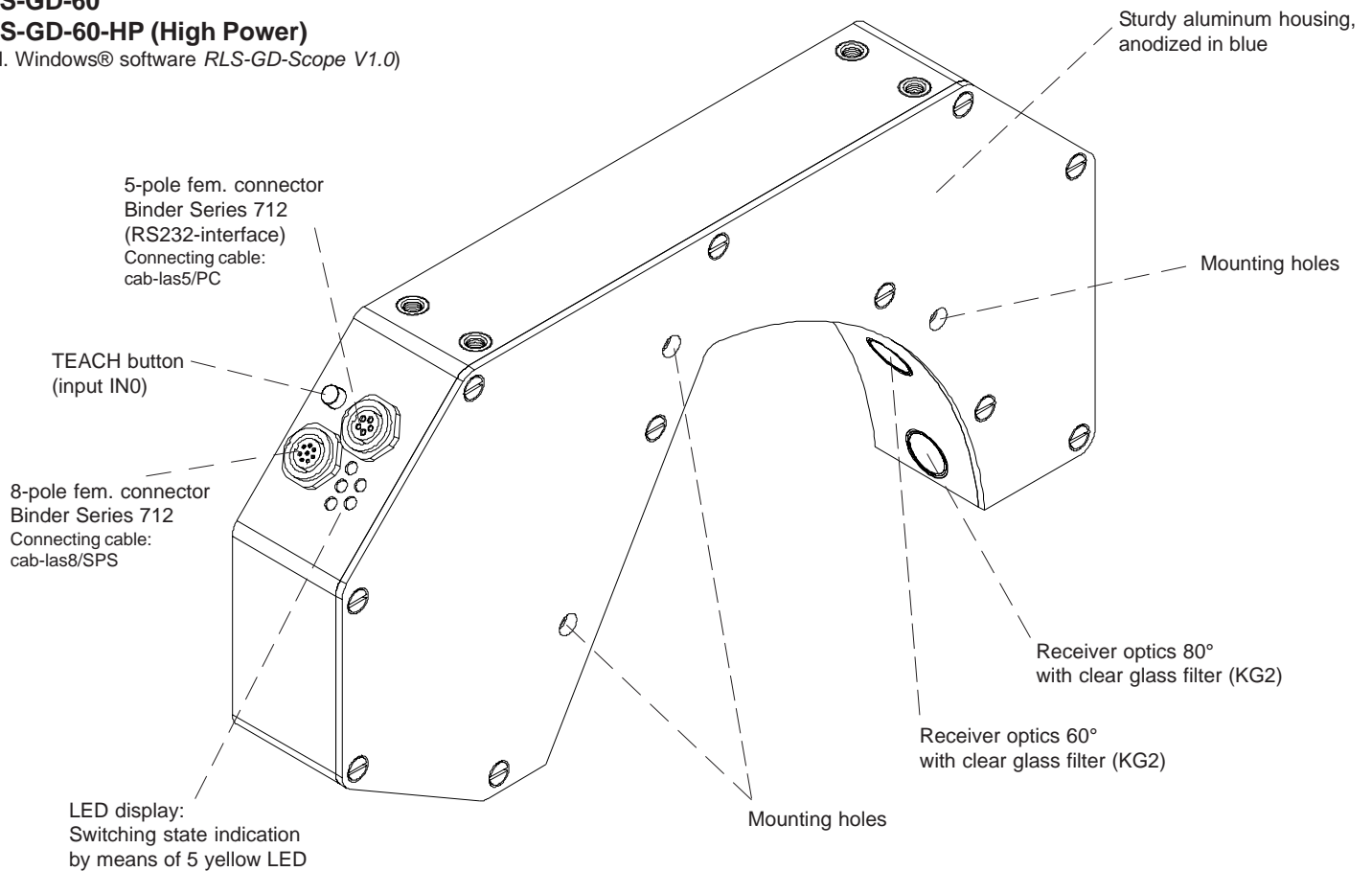
Design

Product name:

RLS-GD-60

RLS-GD-60-HP (High Power)

(incl. Windows® software *RLS-GD-Scope V1.0*)



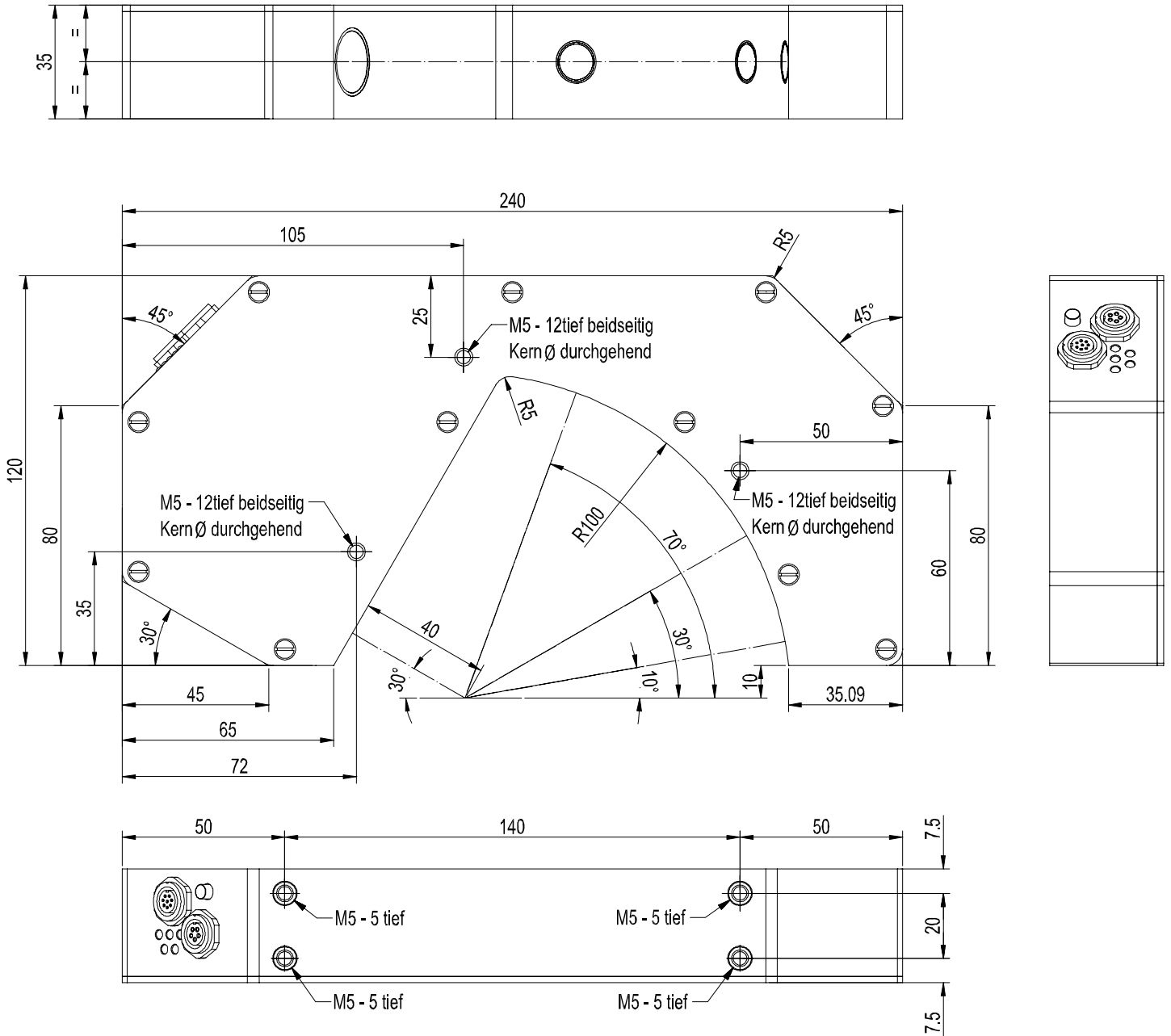


Technical Data

Model	RLS-GD-60	RLS-GD-60-HP
Light source	1x white-light LED, modulated, AC-operation	8x super-bright white-light LED, modulated, AC-operation
Light spot size	in 10 mm distance: typ. Ø 15 mm (beam divergency typ. 1°)	
Optical filter	Daylight filter (clear glass filter KG2)	
Voltage supply	+12VDC ... +30VDC, reversed polarity protected, overcurrent 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 PC: 5-pole female connector Binder Series 712	
Operating temperature	-20°C ... +55°C	
Storage temperature	-20°C ... +85°C	
Housing	Aluminum, anodized in blue	
Max. switching current	100 mA, short-circuit-proof	
Switching frequency	typ. 5 kHz (depends on averaging)	
Output DIGITAL (5x)	Output OUT0 ... OUT4: Qinv or Q, adjustable via PC: Qinv: npn n.c. / pnp n.o. Q: pnp n.c. / npn n.o.	
Sensitivity (switching threshold)	parameterisable under Windows® (adjustable: threshold / tolerance window)	
Pulse lengthening	0 ms ... 100 ms	
Working distance	typ. 10 mm ± 10%	
Luminous power	adjustable under Windows®	
Averaging	max. 32000 values (adjustable under Windows®)	
Switching state indication	by means of 5 yellow LED	

Dimensions

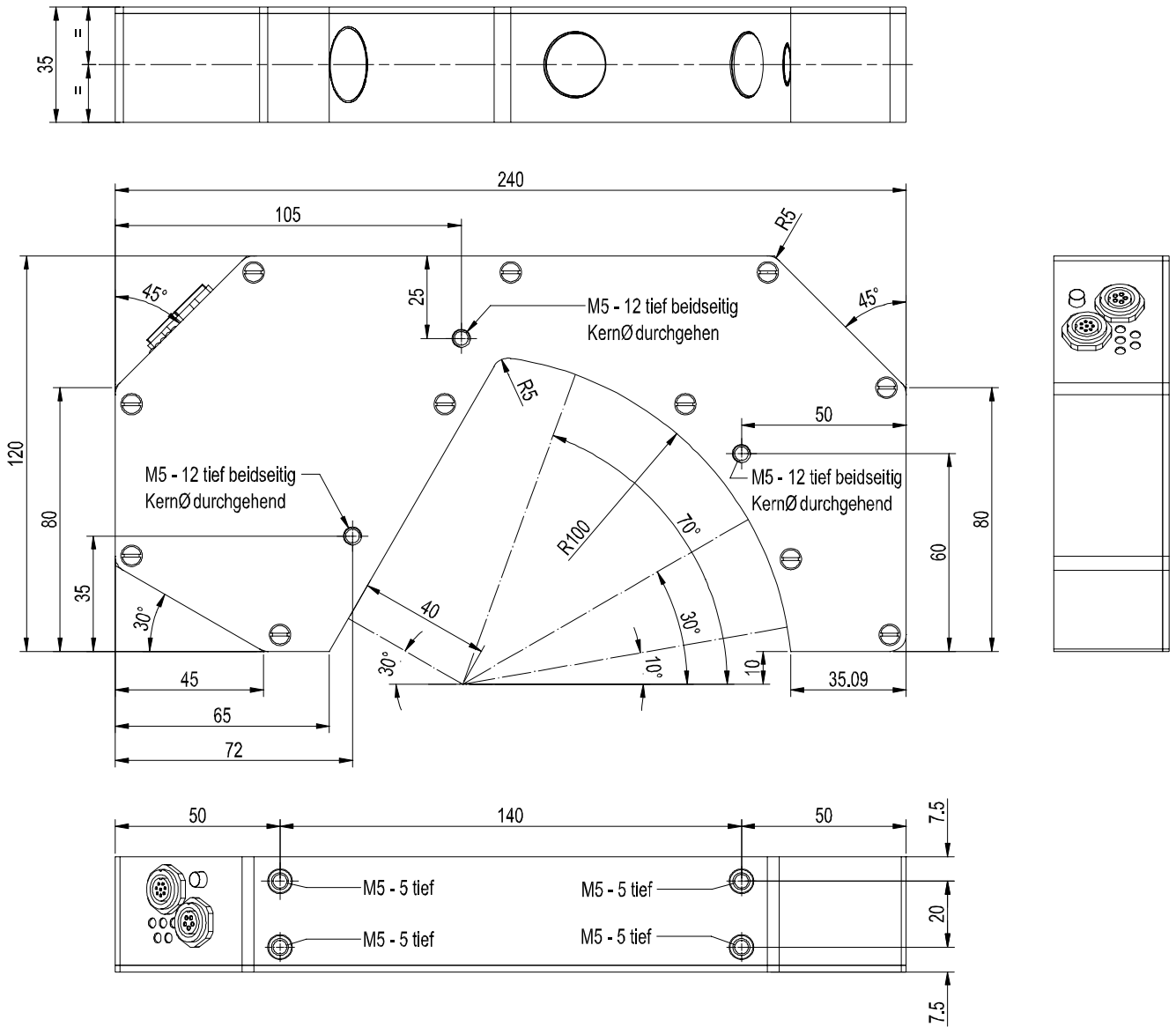
RLS-GD-60:



All dimensions in mm

Dimensions

RLS-GD-60-HP:



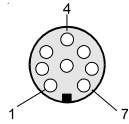
All dimensions in mm



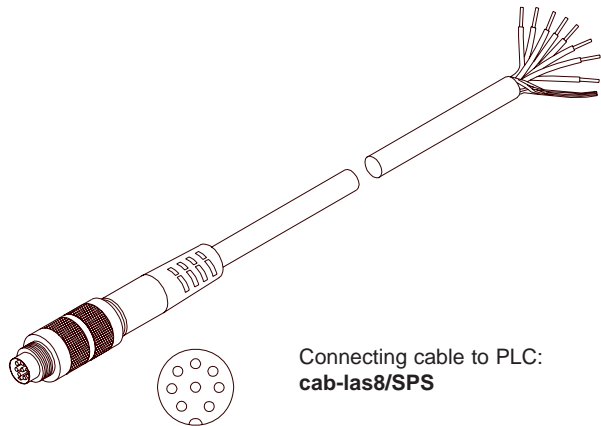
Connector Assignment

**Connection of RLS-GD-60 or RLS-GD-60-HP to PLC:
8-pole female connector Binder 712**

Pin:	Color:	Assignment:
1	wht	GND (0V)
2	brn	+12 ... +30 VDC
3	grn	IN0
4	yel	OUT0
5	gry	OUT1
6	pnk	OUT2
7	blu	OUT3
8	red	OUT4



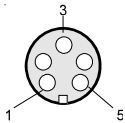
Connecting cable:
cab-las8/SPS (2m)



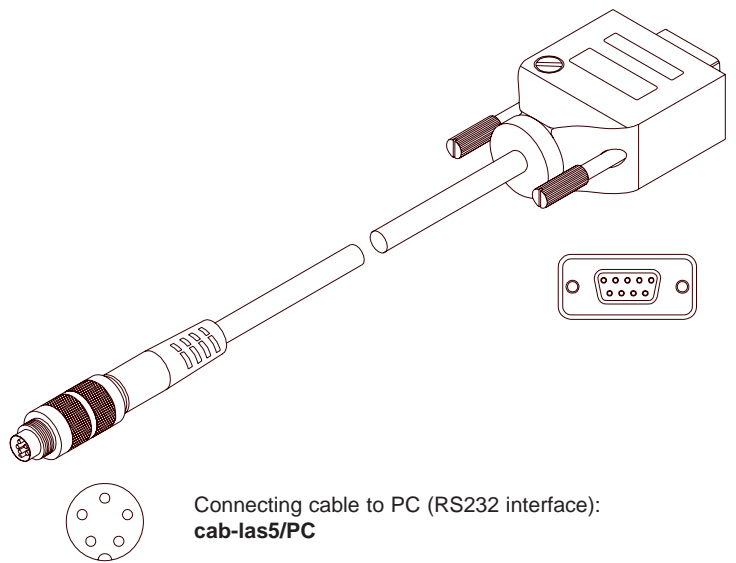
Connecting cable to PLC:
cab-las8/SPS

**Connection of RLS-GD-60 or RLS-GD-60-HP to PC:
5-pole female 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):
cab-las5/PC



Measuring Principle

Measuring principle:

With the help of a modulated white-light LED (or with the help of eight modulated super-bright white-light LED in case of RLS-GD-60-HP) 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 two additional optical units (at an angle of 20° and 80°).

The gloss grade is then determined from the 3 receiver signals (20° , 60° , 80°).



Parameterization

Parameterization 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



Visualization

Visualization of the gloss grade:

Under Windows® representation of the gloss grade on a PC in numeric form and in a gloss chart, and representation of the three receiver signals (20° , 60° , 80° values) in a time chart. In addition the current $20^\circ/60^\circ/80^\circ$ values are displayed as a bar chart.

The following evaluation algorithms can also be selected:

- Target lies within the gloss tolerance circle of a taught gloss grade and within an intensity window (FIRST HIT)
- Determination of the taught gloss grade that is most similar to the target (minimum distance between target gloss grade and reference gloss grade 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.

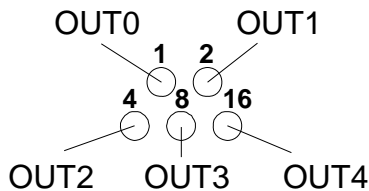
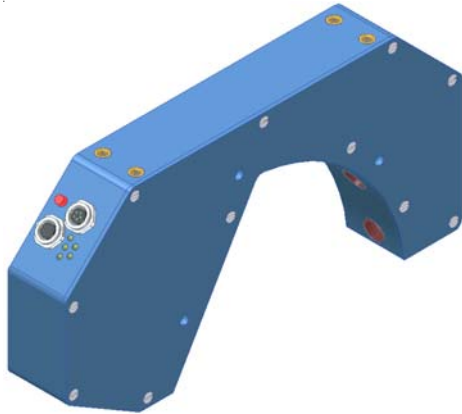


LED Display

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	31

„Error“
or
„not detected“

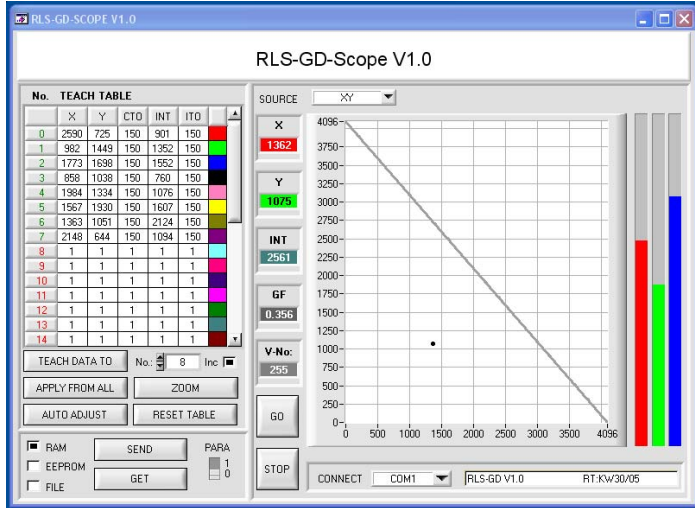


Parameterization

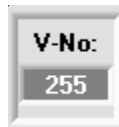
Windows® user interface:

The Windows® user interface facilitates the teach-in process at the gloss sensor and supports the operator in the task of adjustment and commissioning of the gloss sensor.

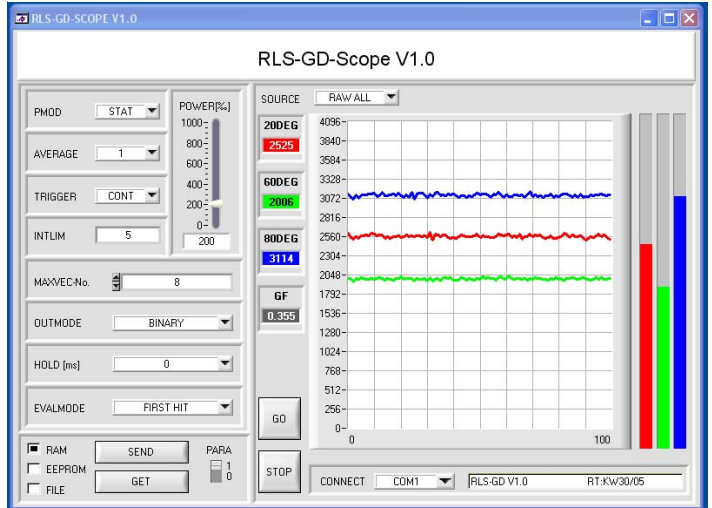
X,Y-chart:



The gloss value is displayed graphically by way of the X,Y gloss triangle and also in the numerical output fields. The current raw data (20°, 60°, 80°) from the gloss detector are visualized in a bar chart. If a gloss value is detected during measuring operation, the currently detected gloss value is displayed in a numeric output field:



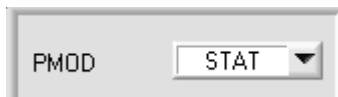
RGB-t-chart:



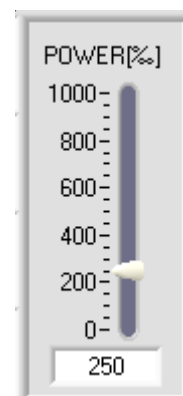
Display of the current raw data (20°, 60°, 80°) from the gloss sensor in „scroll mode“ (oscilloscope function). In addition the current raw data are visualized as a bar display. This facilitates the adjustment of the gloss sensor.

Parameter setting:

Among others the following parameters can be set:



PMOD:
In this function field the operating mode of automatic light power control at the transmitter unit (white-light LED) can be set.
STAT: The LED transmission power is constantly kept at the value set with the POWER slider.
DYN: The LED transmission power is dynamically controlled in accordance with the amount of radiation that is diffusely reflected from the object.



POWER:
With this slider the intensity of the white-light transmitter LED at the sensor can be adjusted.



AVERAGE:
Averaging (over 32768 scanning values max.). Here the number of scanning values over which the raw signal measured at the receiver is averaged can be set.



TRIGGER:
In this function field the trigger mode at the gloss sensor can be set.
EXT: Gloss detection is activated through the external trigger input (IN0).
CONT: Continuous gloss detection (no trigger event required).



INTLIM:
This edit box is used for setting a lower intensity limit. Color evaluation is stopped if the total intensity of the three receiver signals (20°, 60°, 80°) that is measured at the receiver unit falls below this limit.

Parameterization

MAXVEC-No.

HOLD [ms]

EVALMODE

No.	TEACH TABLE	X	Y	CTO	INT	ITO	
0		2590	725	150	901	150	Red
1		982	1449	150	1352	150	Green
2		1773	1698	150	1552	150	Blue
3		858	1038	150	760	150	Black
4		1984	1334	150	1076	150	Pink
5		1567	1930	150	1607	150	Yellow
6		1363	1051	150	2124	150	Olive
7		2148	644	150	1094	150	Purple
8		1	1	1	1	1	Cyan
9		1	1	1	1	1	Magenta
10		1	1	1	1	1	Dark Purple
11		1	1	1	1	1	Light Purple
12		1	1	1	1	1	Dark Green
13		1	1	1	1	1	Dark Blue
14		1	1	1	1	1	Dark Red

TEACH DATA TO No.: Inc

APPLY FROM ALL ZOOM

AUTO ADJUST RESET TABLE

MAXVEC-No.:

In this function field the number of gloss values to be checked can be set. With the gloss sensor a maximum of 31 gloss values can be checked.

HOLD:

In this edit box a pulse lengthening (100 ms max.) at the digital outputs of the gloss sensor can be set.

EVALMODE:

In this function field the evaluation mode at the gloss sensor can be set:

FIRST HIT: The current gloss value (X,Y) lies within the tolerance circle of a taught gloss grade.

MINIMAL DIST: The current gloss value (X,Y) is assigned to the teach-in gloss grade that lies next to this gloss value (X,Y) in the gloss triangle.

EXT TEACH: Teaching procedure is started by setting the input to 0V (for instance via PLC, or push button). The integrated yellow LED indicates the successful teaching procedure.

TEACH TABLE:

Input of parameters X, Y, CTO, INT, and ITO in the corresponding input fields, or automatically by clicking the **TEACH DATA TO** button.



X: X-value of the teach-in gloss grade, normalized 20° content

Y: Y-value of the teach-in gloss grade, normalized 60° content

CTO: Tolerance circle around the teach gloss grade that is defined as (X,Y) point

INT: Teach-in value for the total intensity

ITO: Intensity tolerance around the INT teach-in value

Each of the gloss ranges defined in the TEACH TABLE is represented as a tolerance circle around the teach-in gloss value (X,Y) after a click on the **APPLY FROM ALL** button.



The tolerance circle around the teach-in gloss value (X,Y) is specified by entering „CTO“.

"GLOSS TRIANGLE":

In the gloss triangle the currently detected gloss grade is represented by an X,Y value pair, with the X-value representing the normalized 20° content, and the Y-value representing the normalized 60° content of the teach-in gloss grade.

The 80° content on the gloss triangle is proportional to the distance of the X,Y value pair from the hypotenuse.

$$X = \frac{20^\circ}{20^\circ + 60^\circ + 80^\circ} * 4095$$

$$Y = \frac{60^\circ}{20^\circ + 60^\circ + 80^\circ} * 4095$$

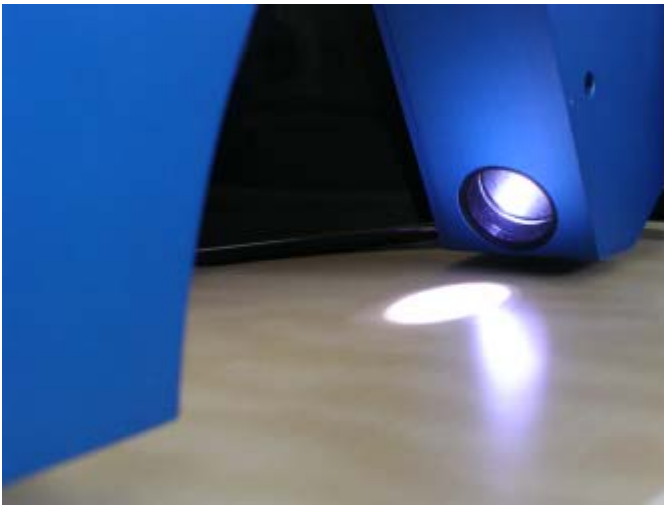


Application Examples

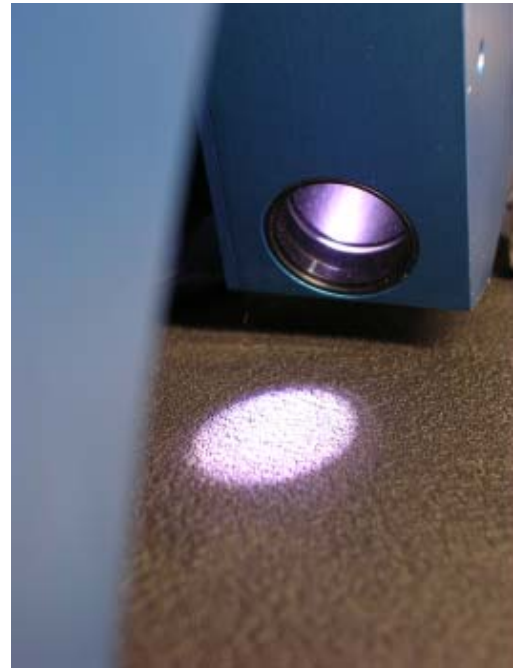
Online measurement of the gloss degree

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.

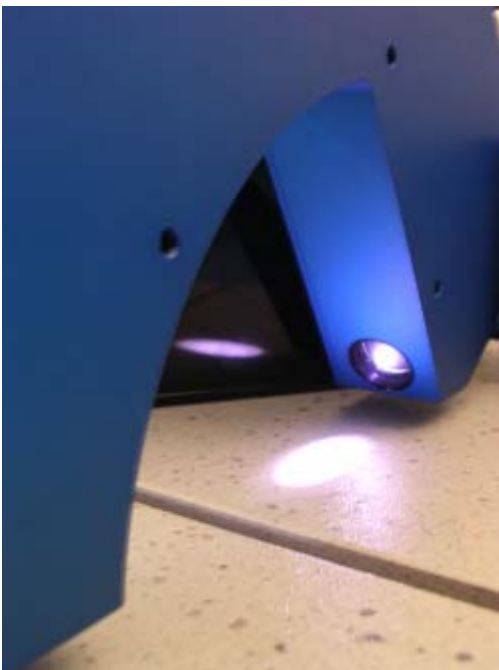
For this purpose the RLS-GD-60 sensor features non-contacting detection of the gloss degree. The simultaneous measurement of the object from two different directions (direct reflection and diffuse reflection) allows intensity-independent evaluation. The sensor can be taught to a certain surface, and 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



Examination of leather surfaces with respect to their gloss behavior



Online gloss measurement at ceramic parts



Monitoring of the gloss value of imitation leather



Application Examples

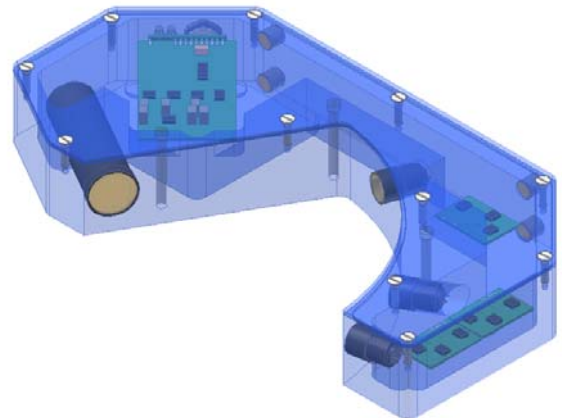
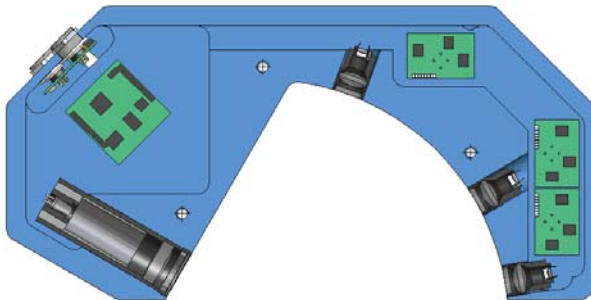


Gloss degree checking of laminate floor covering



Function Principle

RLS-GD-60:



RLS-GD-60-HP:

