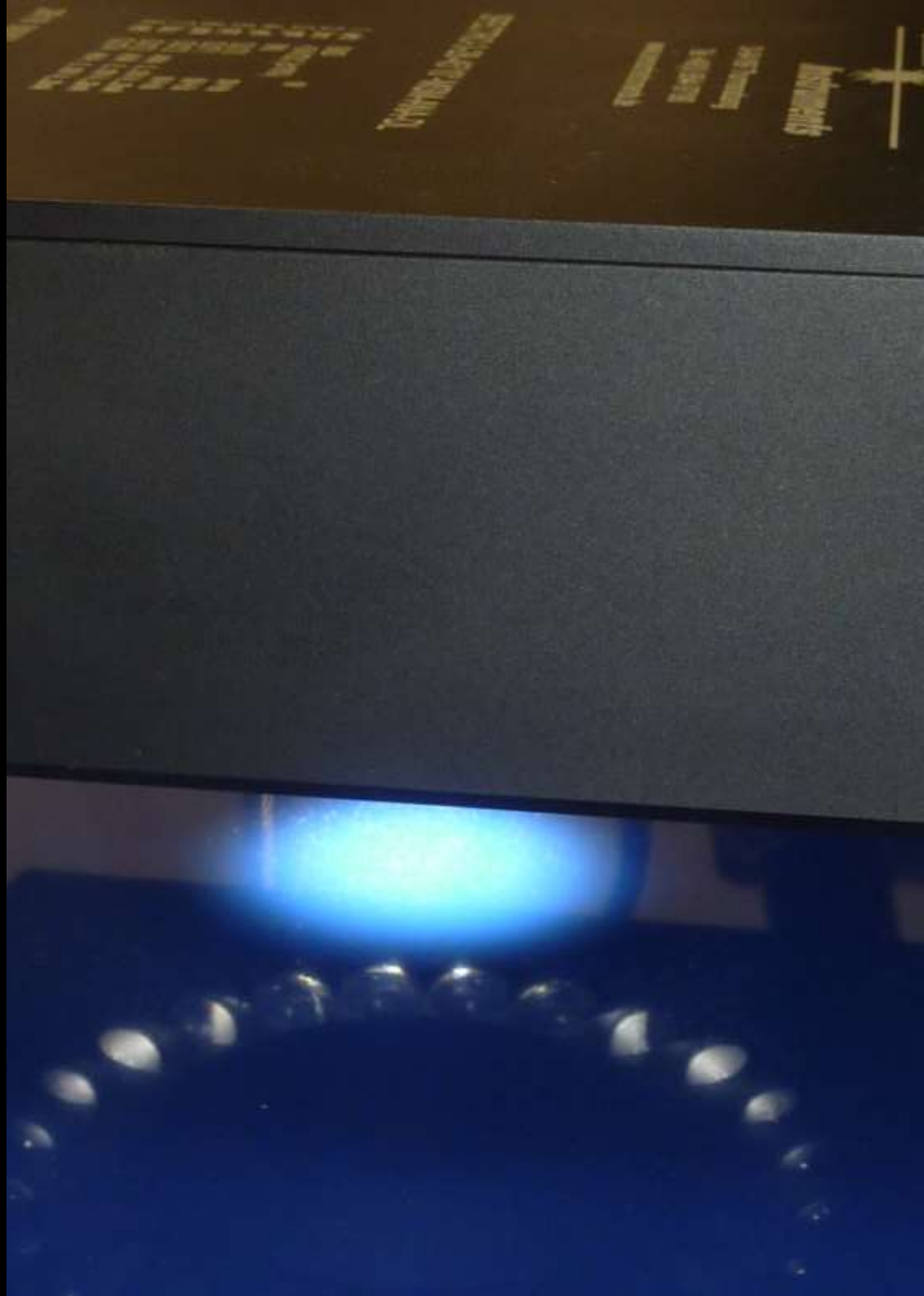
Precision Surface Inspection – Fast, Non-Contact, Reliable

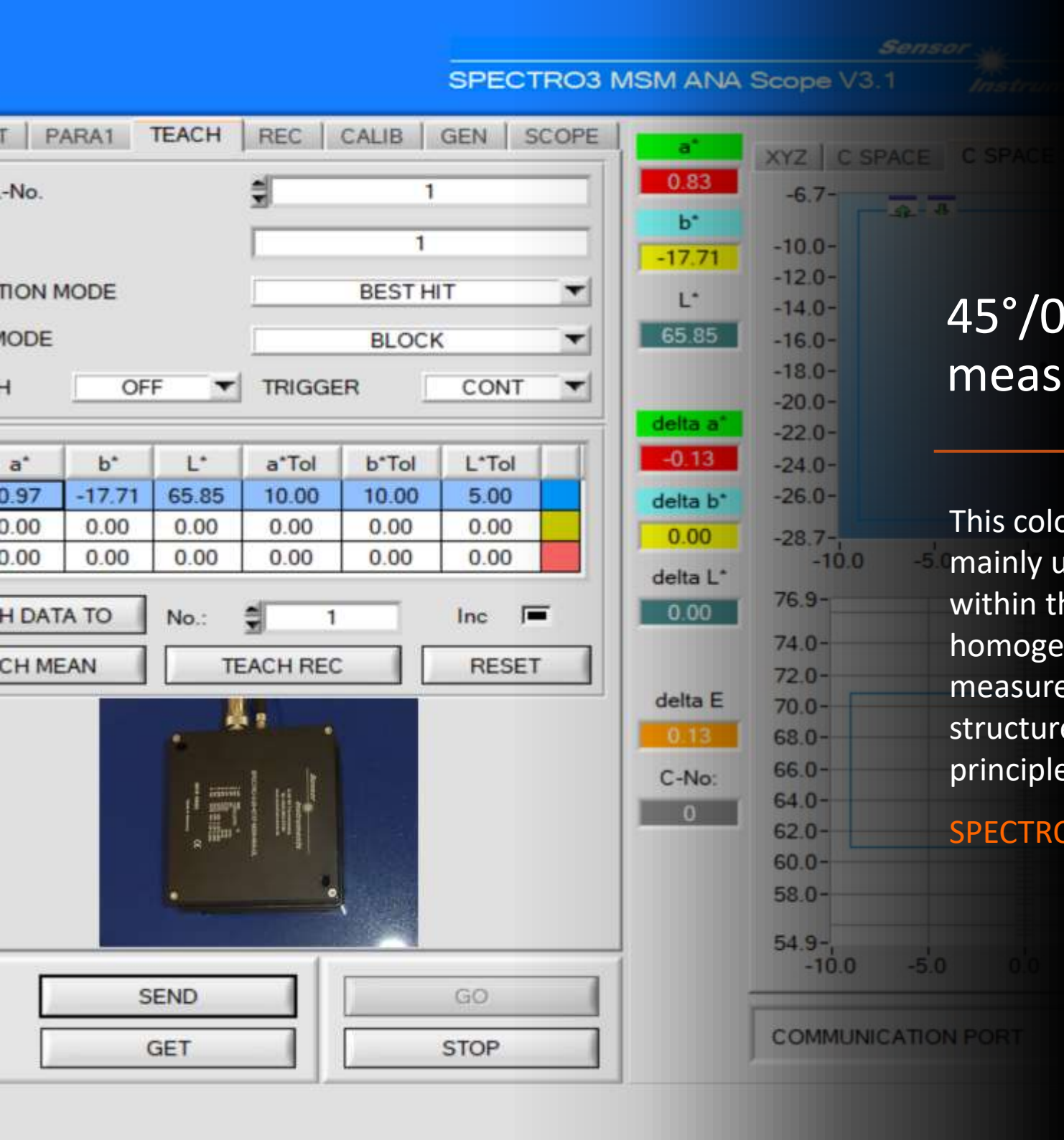
Color Measurement | Gloss Measurement | Haze Control |
Fluorescent Measurement | Phosphorescent Measurement

Sensor Instruments
Let's make sensors more individual

Inline measurement of the color of a surface using the 45°/0° method

To make the actual color more apparent, the direct reflection must be suppressed as much as possible. On the detector side, mainly diffusely reflected transmitter light is incident. Gloss effects are avoided as far as possible on the receiver side.
This significantly reduces the difference between glossy and matt surfaces.





45°/0° color measurement method

This color measurement method is mainly used for flat surfaces (flat within the measuring spot). Moreover, homogeneous surfaces should be measured. For the measurement of structured surfaces, this measuring principle is less suitable.

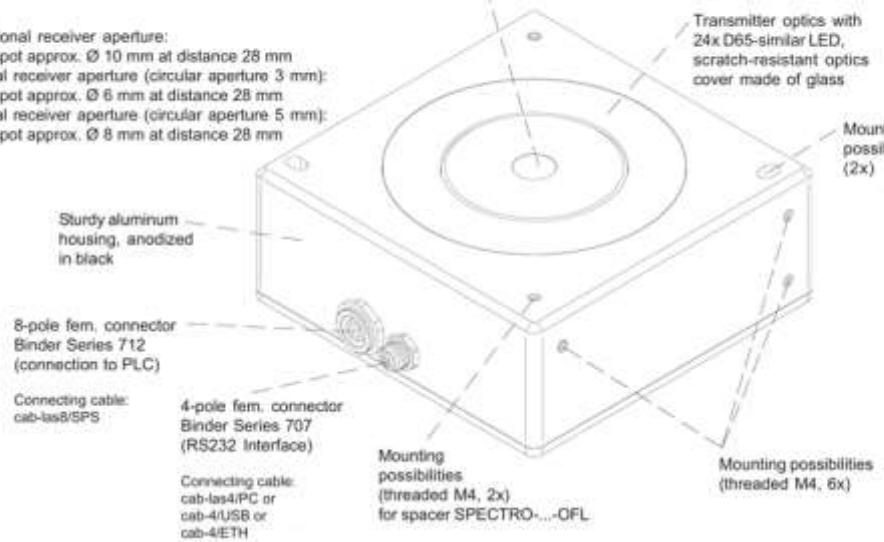
SPECTRO-3-28-45°/0°-MSM-ANA-DL

SPECTRO-3-28-45°/0°-MSM-ANA-DL

- Color measurement (color, contrast, and gray scale detection)
- Color measurement acc. to 45°/0° method
- Object distance: typ. 28 mm +/- 2 mm
- Different receiver apertures available
- D65 - similar lightning source (LEDs)
- Ambient light suppression (in AC - operation)
- Scan frequency max. 90 kHz (in DC - operation)
- Switching frequency typ. 60 kHz
- 3 analog outputs (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital outputs (0 V / +24 V)
- RS232 interface (USB, Ethernet or Profinet adapter available)

SPECTRO-3-28-45°/0°-MSM-ANA-DL
SPECTRO-3-28-45°/0°-MSM-ANA-DL-d3
SPECTRO-3-28-45°/0°-MSM-ANA-DL-d5
(incl. Windows® software SPECTRO3-MSM-ANA-Scope)

DL = without additional receiver aperture:
Size of light spot approx. Ø 10 mm at distance 28 mm
DL-d3 = with additional receiver aperture (circular aperture 3 mm):
Size of light spot approx. Ø 6 mm at distance 28 mm
DL-d5 = with additional receiver aperture (circular aperture 5 mm):
Size of light spot approx. Ø 8 mm at distance 28 mm



Accessories:

SPECTRO-3-28-45°/0°-OFL
SPECTRO-3-28-45°/0°-OFL-D30
(Spacer)

Connection to PLC:

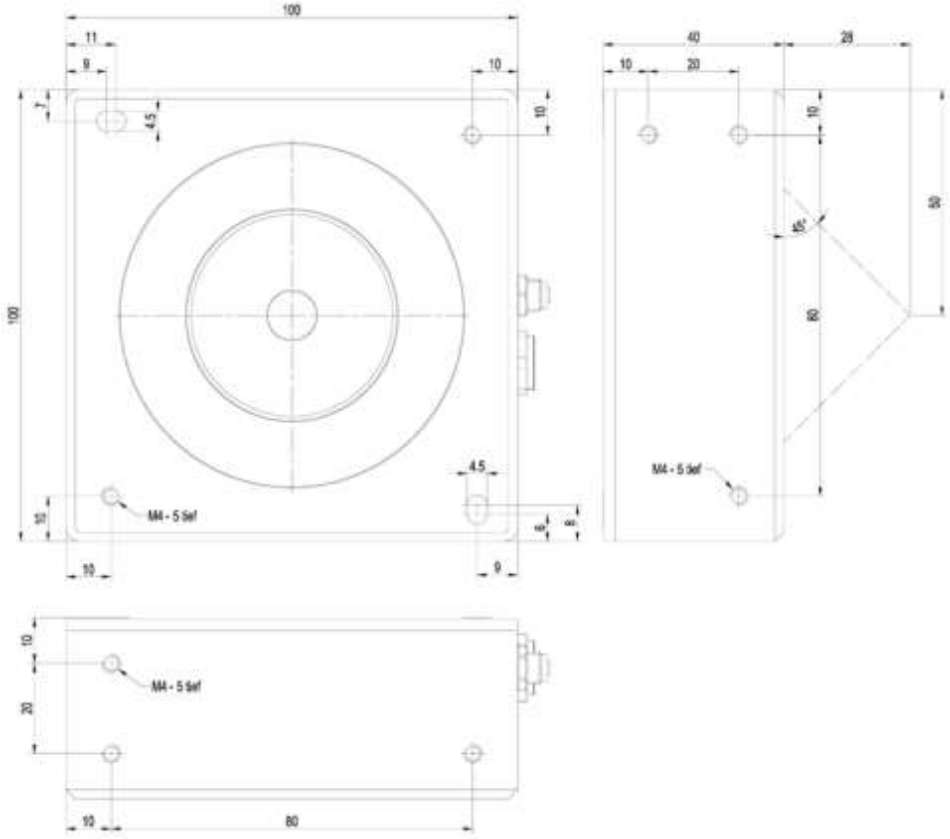
8-pole fem. connector Binder series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT2 X, x, a*, u*, u' or C* (Analog: 0 ... +10V or 4 ... 20mA)
7	blue	OUT3 Y, y, b*, v*, v' or h* (Analog: 0 ... +10V or 4 ... 20mA)
8	red	OUT4 Z, Y or L* (Analog: 0 ... +10V or 4 ... 20mA)

Connection to PC:

4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD



SPECTRO-3-28-45°/0°-MSM-DIG-DL

- Color measurement (color, contrast, and gray scale detection)
- Color measurement acc. to 45°/0° method
- Object distance: typ. 28 mm +/- 2 mm
- Different receiver apertures available
- D65 - similar lightning source (LEDs)
- Ambient light suppression (in AC - operation)
- Scan frequency max. 90 kHz (in DC - operation)
- Switching frequency typ. 60 kHz
- 5 digital outputs (0 V / +24 V)
- RS232 interface (USB, Ethernet or Profinet adapter available)

Connection to PLC:

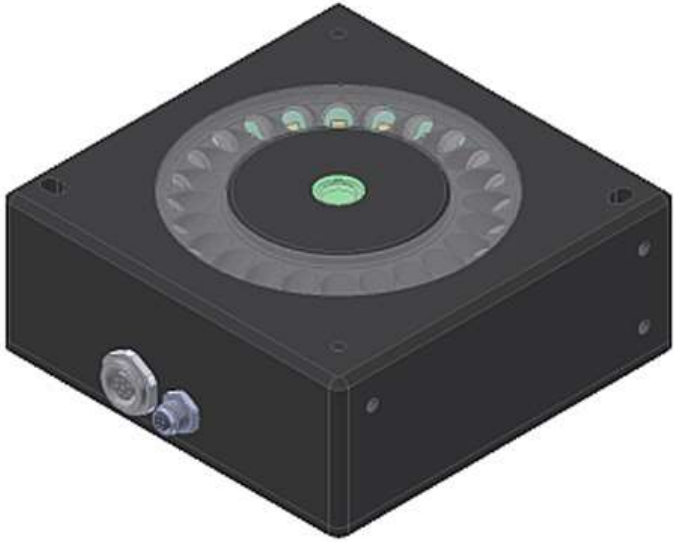
8-pole fem. connector Binder Series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0
4	yellow	OUT0 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
5	grey	OUT1 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
6	pink	OUT2 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
7	blue	OUT3 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
8	red	OUT4 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)

Connection to PC:

4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD



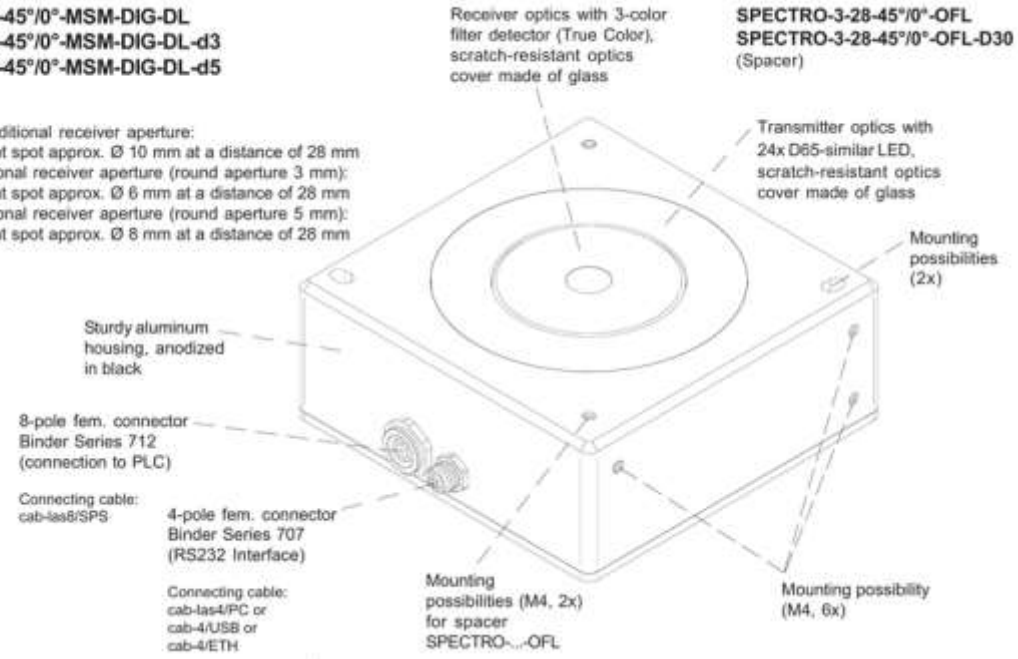
Product name:

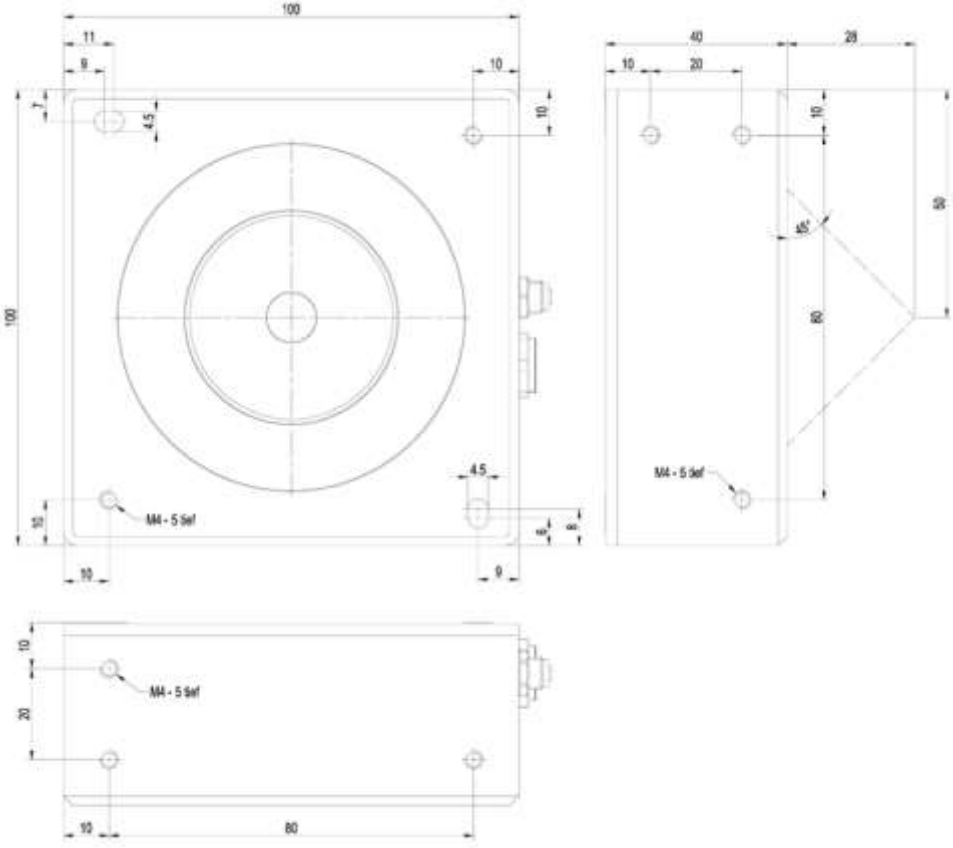
SPECTRO-3-28-45°/0°-MSM-DIG-DL
SPECTRO-3-28-45°/0°-MSM-DIG-DL-d3
SPECTRO-3-28-45°/0°-MSM-DIG-DL-d5

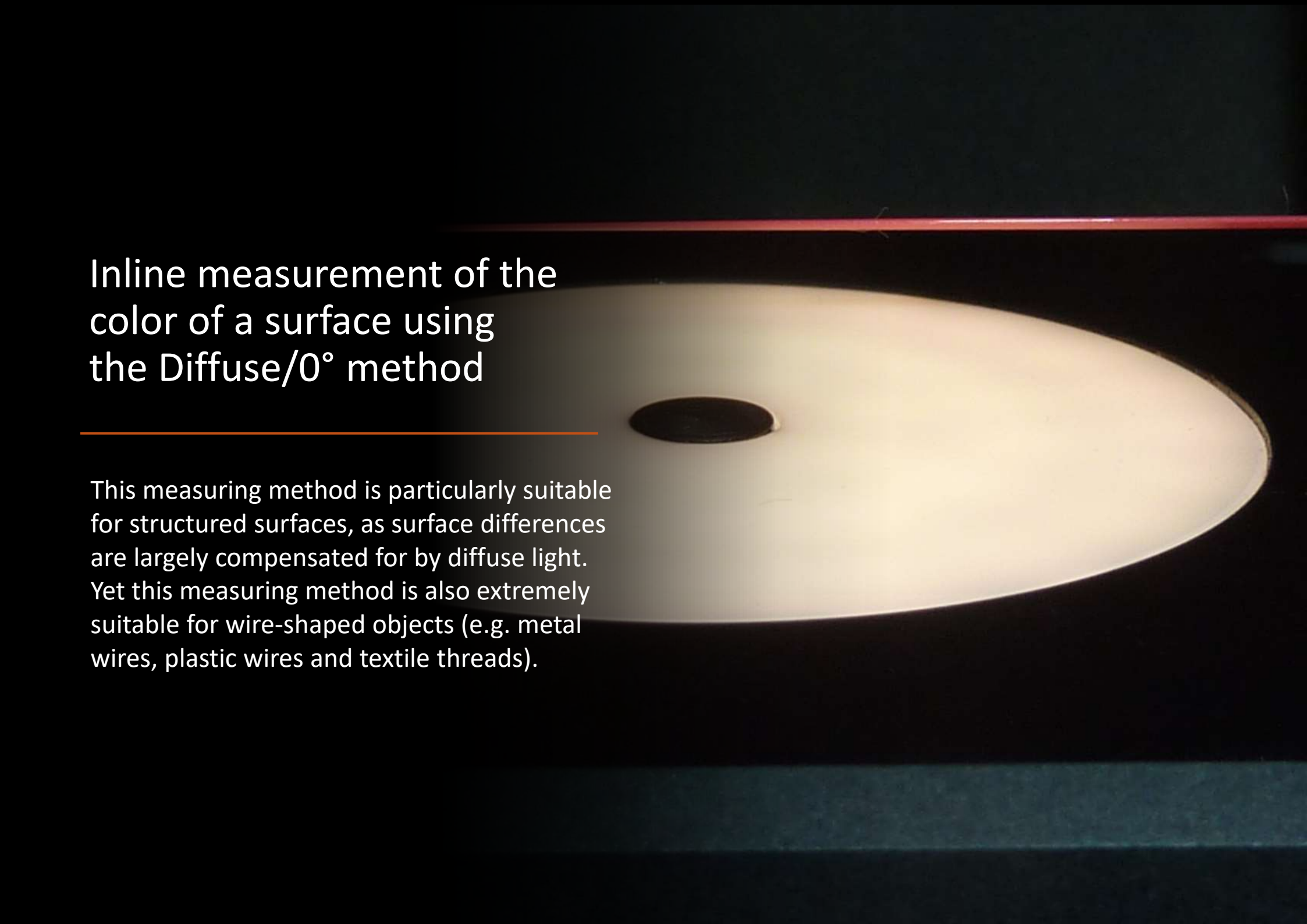
DL = without additional receiver aperture:
Size of light spot approx. Ø 10 mm at a distance of 28 mm
DL-d3 = with additional receiver aperture (round aperture 3 mm):
Size of light spot approx. Ø 6 mm at a distance of 28 mm
DL-d5 = with additional receiver aperture (round aperture 5 mm):
Size of light spot approx. Ø 8 mm at a distance of 28 mm

Accessories:

SPECTRO-3-28-45°/0°-OFL
SPECTRO-3-28-45°/0°-OFL-D30
(Spacer)

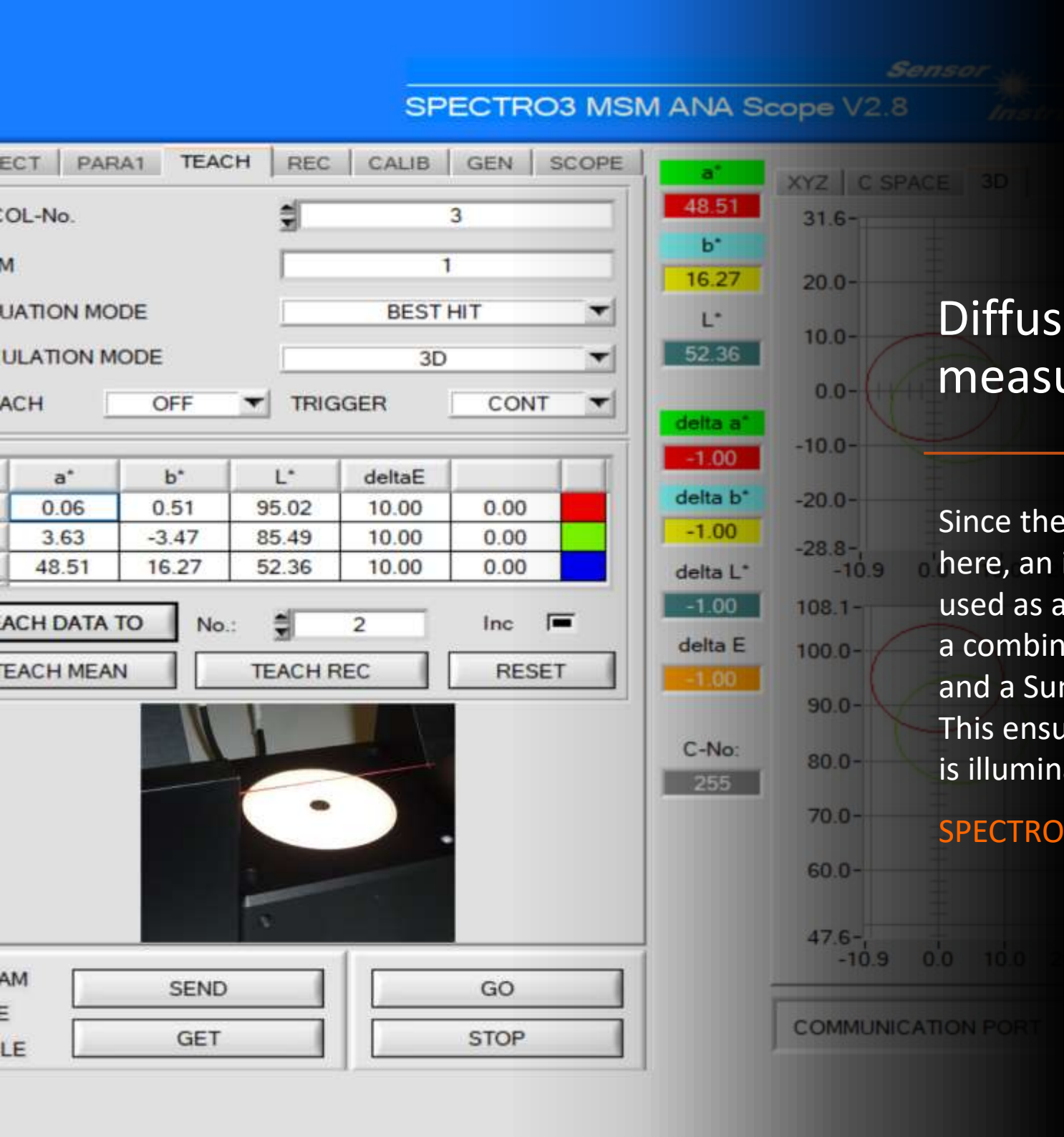






Inline measurement of the color of a surface using the Diffuse/0° method

This measuring method is particularly suitable for structured surfaces, as surface differences are largely compensated for by diffuse light. Yet this measuring method is also extremely suitable for wire-shaped objects (e.g. metal wires, plastic wires and textile threads).



Diffuse/0° measurement method

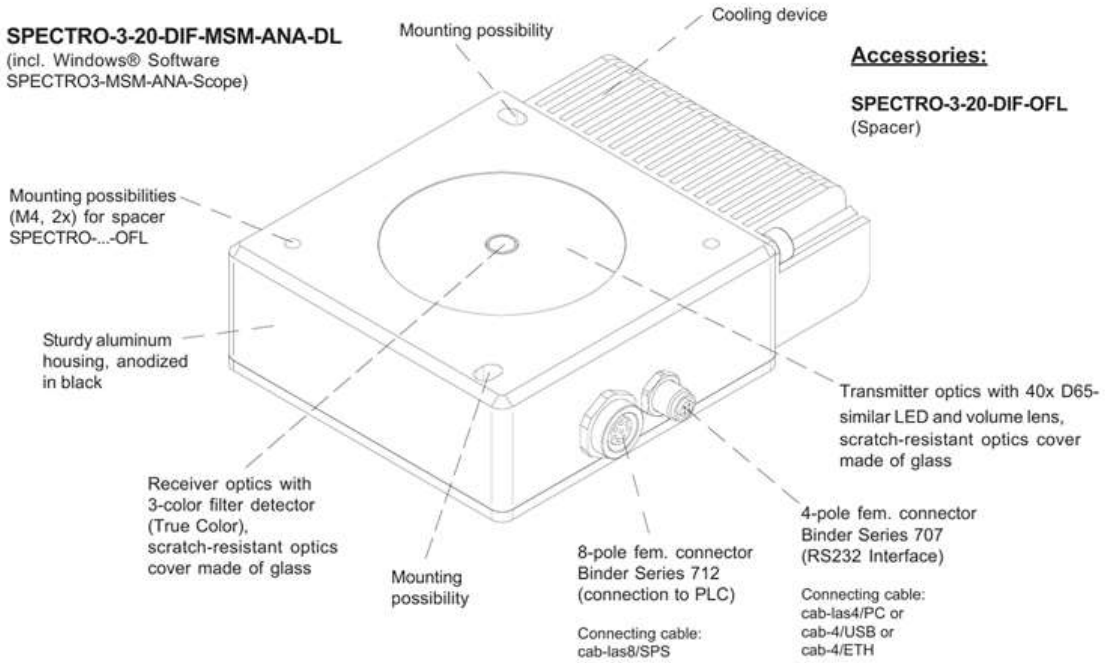
Since the measurement is done inline here, an integrating sphere cannot be used as a diffuse light source. Instead, a combination of volumetric diffusers and a Sunlight-LED cluster is used. This ensures that the entire half-space is illuminated almost homogeneously.

SPECTRO-3-20-DIF-MSM-ANA-DL

SPECTRO-3-20-DIF-MSM-ANA-DL

- Color measurement (color, contrast, and gray scale detection)
- Reduction of gloss effect due to diffuse Illumination
- Surface-structure compensation through diffuse Lightning
- 3 analog outputs (0V ... +10V, 4 mA ... 20 mA)
- 2 digital outputs (0V/+24V)
- D65 - similar diffuse lightning source
- RS232 interface (USB, Ethernet, Profinet adapter available)
- Object distance: 20 mm +/- 1mm
- Scan frequency: max. 90 kHz
- Switching frequency: typ. 60 kHz
- Parameterizeable via Windows software, scope function

SPECTRO-3-20-DIF-MSM-ANA-DL
(incl. Windows® Software
SPECTRO3-MSM-ANA-Scope)



Accessories:

SPECTRO-3-20-DIF-OFL
(Spacer)

Connection to PLC:

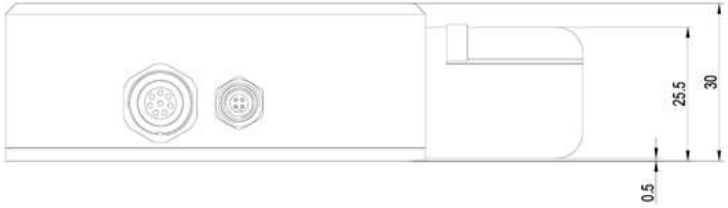
8-pole fem. connector Binder series 712

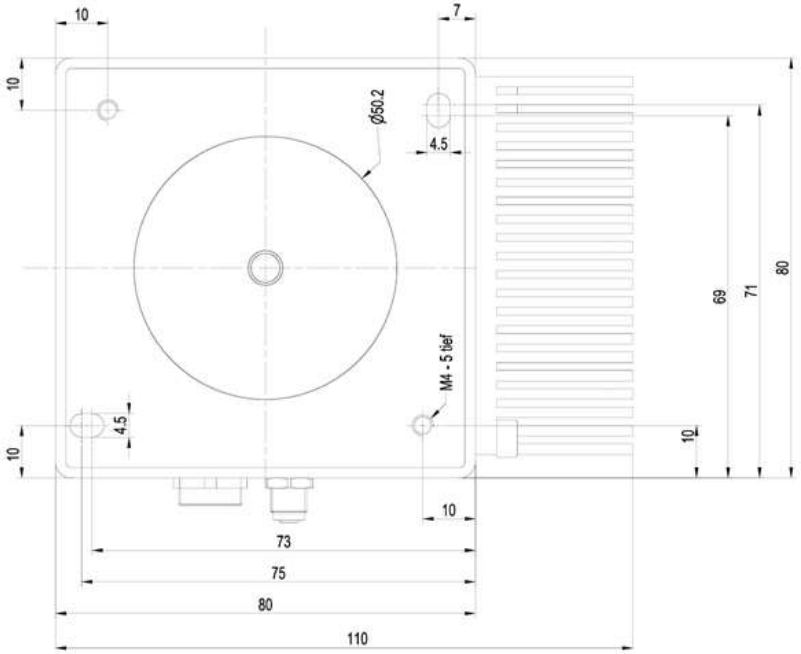
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT2 X, x, a*, u*, u' or C* (Analog: 0 ... +10V or 4 ... 20mA)
7	blue	OUT3 Y, y, b*, v*, v' or h* (Analog: 0 ... +10V or 4 ... 20mA)
8	red	OUT4 Z, Y or L* (Analog: 0 ... +10V or 4 ... 20mA)

Connection to PC:

4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD





SPECTRO-3-20-DIF-MSM-DIG-DL

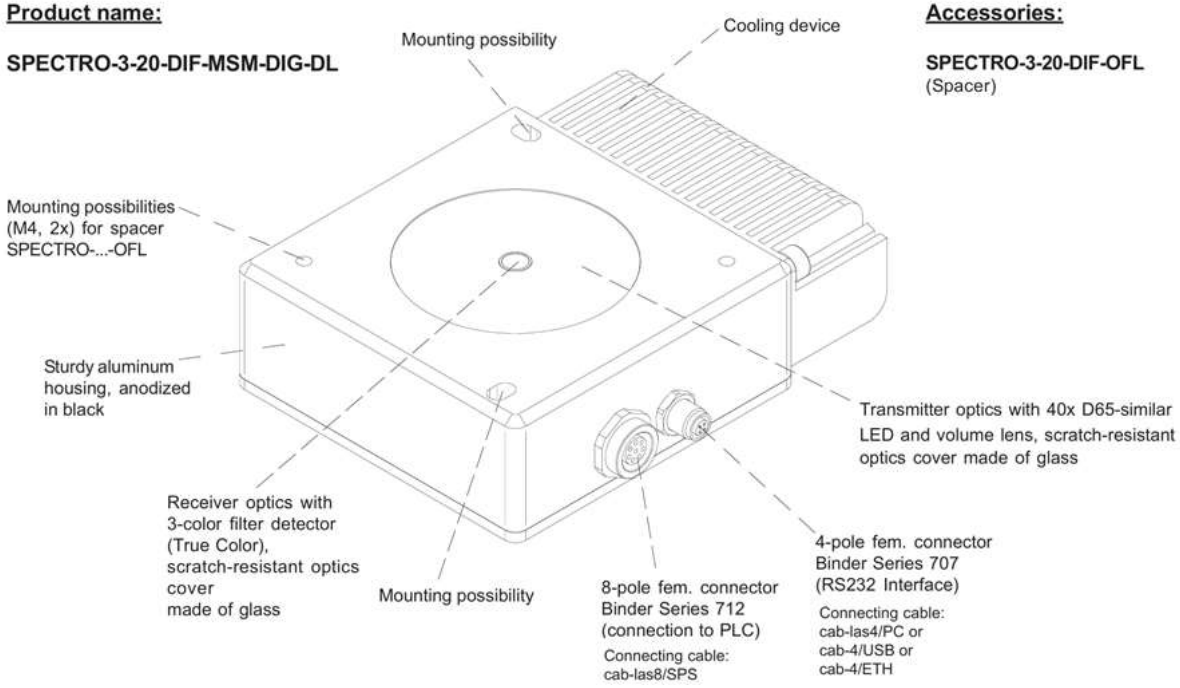
- Color measurement (color, contrast, and gray scale detection)
- Reduction of gloss effect due to diffuse Illumination
- Surface-structure compensation through diffuse Lightning
- 5 digital outputs (0V/+24V)
- D65 - similar diffuse lightning source
- RS232 interface (USB, Ethernet, Profinet adapter available)
- Object distance: 20 mm +/- 1mm
- Scan frequency: max. 90 kHz
- Switching frequency: typ. 60 kHz
- Parameterizeable via Windows software, scope function

Product name:

SPECTRO-3-20-DIF-MSM-DIG-DL

Accessories:

SPECTRO-3-20-DIF-OFL
(Spacer)



Connection to PLC:

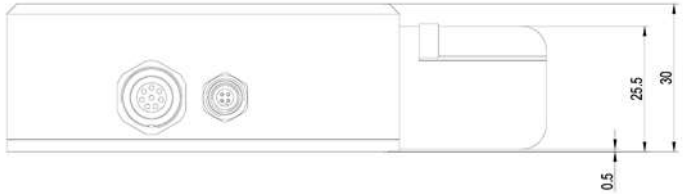
8-pole fem. connector Binder Series 712

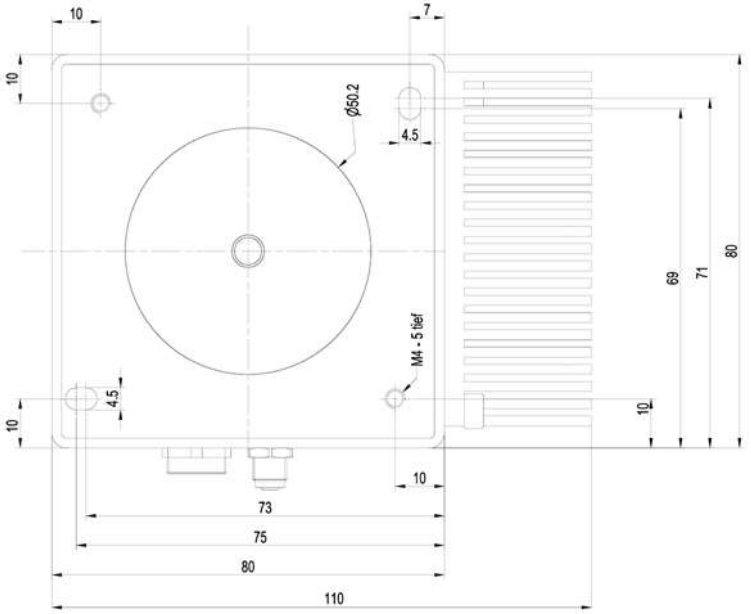
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0
4	yellow	OUT0 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
5	grey	OUT1 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
6	pink	OUT2 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
7	blue	OUT3 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)
8	red	OUT4 (Digital 0: typ. 0...1V, Digital 1: typ. +Ub - 10%)

Connection to PC:

4-pole fem. connector Binder Series 707

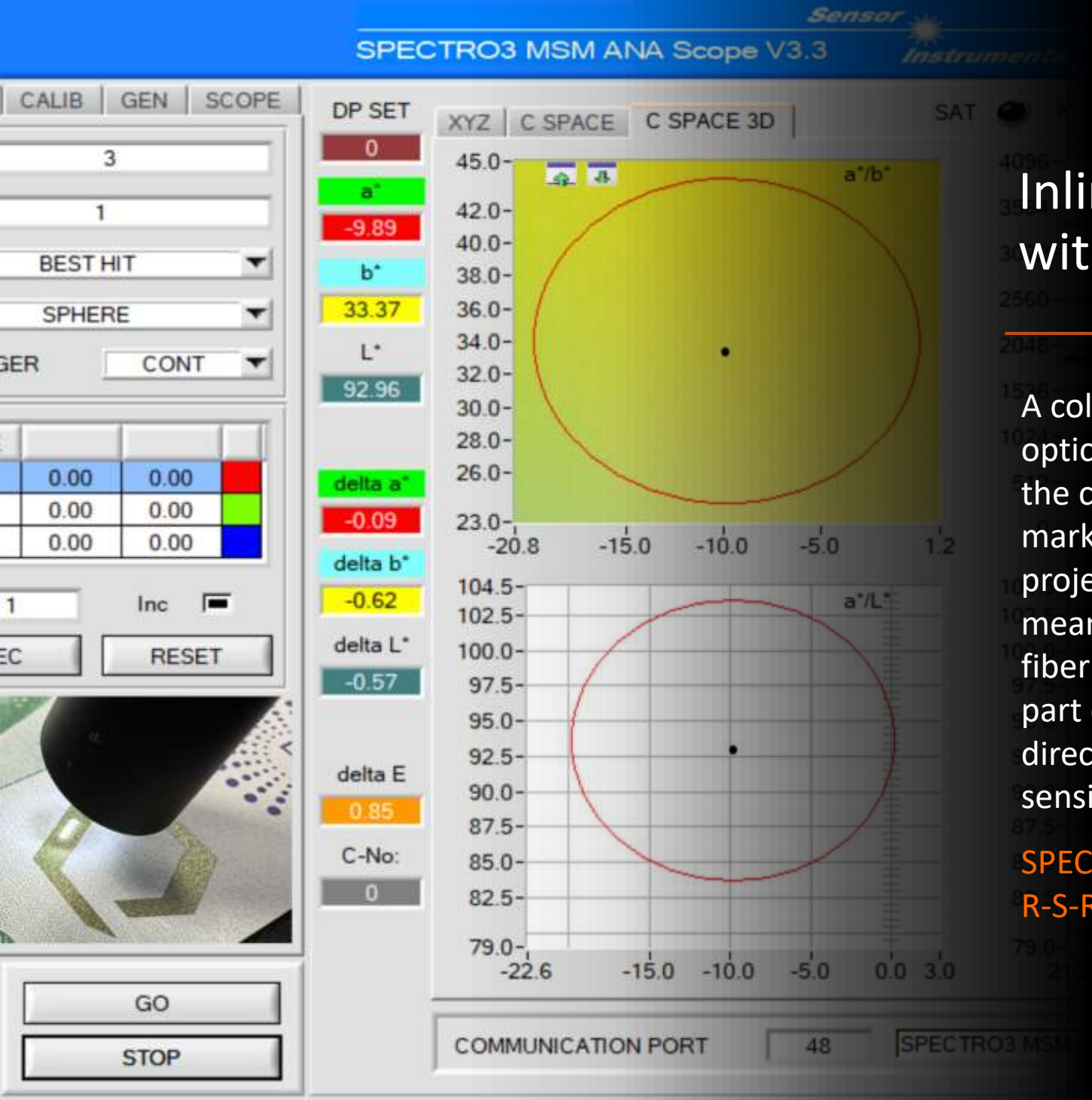
Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD





Spot inline color measurement

Fiber optic frontends are suitable for inline color measurement of small surface sections. Depending on the application, either a combination of transmitter and receiver fiber optics in a V-shaped arrangement or a reflected light fiber optics in which the transmitter and receiver branches are equally present can be selected. Corresponding cross-section converters enable both circular and rectangular light spots.



Inline color measurement with optical fibers

A color sensor system with a fiber optics interface is used to measure the color of pearlescent effect color marks, for example. The light is projected onto the color marks by means of a reflectied light optical fiber with attachment optics and a part of the diffuse reflected light is directed backwards to the color-sensitive detector element.

SPECTRO-3-FIO-MSM-ANA-DL + R-S-R2.1-(6x1)-1200-67° + KL-8-R2.1

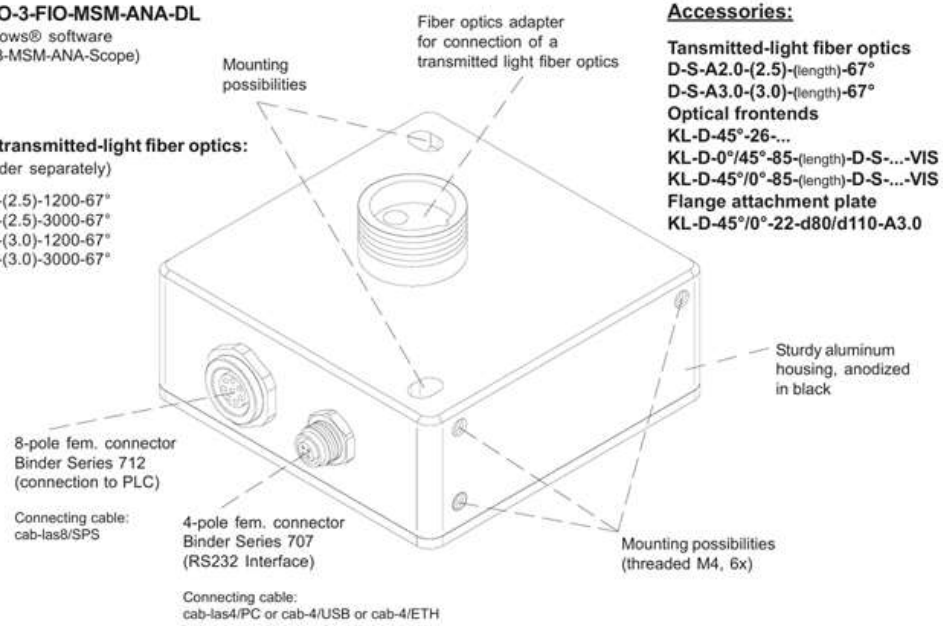
SPECTRO-3-FIO-MSM-ANA-DL
R-S-R2.1-(6x1)-1200-67°
KL-8-R2.1

- Color measurement (color, contrast, and gray scale detection)
- Various optical fibers and optical frontends available
- Object distance: typ. 10 mm ... 500 mm
- D65-similar lightning source (LED)
- Scan frequency max. 90 kHz (in DC - operation)
- Switching frequency typ. 60 kHz
- 3 analog outputs (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital outputs (0 V / +24 V)
- RS232 interface (USB, Ethernet, or Profinet adapter available)

SPECTRO-3-FIO-MSM-ANA-DL
(incl. Windows® software
SPECTRO3-MSM-ANA-Scope)

Suitable transmitted-light fiber optics:
(please order separately)

D-S-A2.0-(2.5)-1200-67°
D-S-A2.0-(2.5)-3000-67°
D-S-A3.0-(3.0)-1200-67°
D-S-A3.0-(3.0)-3000-67°

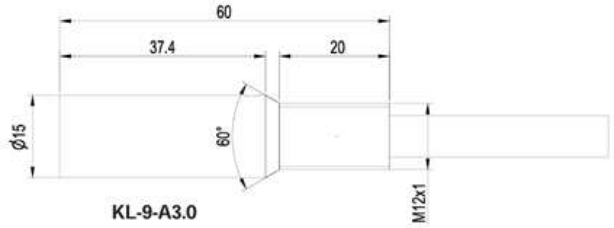


Accessories:

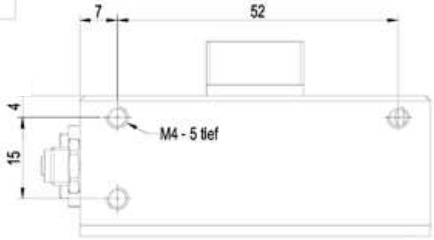
Tansmitted-light fiber optics
D-S-A2.0-(2.5)-(length)-67°
D-S-A3.0-(3.0)-(length)-67°
Optical frontends
KL-D-45°-26-...
KL-D-0°/45°-85-(length)-D-S-...-VIS
KL-D-45°/0°-85-(length)-D-S-...-VIS
Flange attachment plate
KL-D-45°/0°-22-d80/d110-A3.0

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

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT2 X, x, a*, u*, u' or C* (Analog: 0 ... +10V or 4 ... 20mA)
7	blue	OUT3 Y, y, b*, v*, v' or h* (Analog: 0 ... +10V or 4 ... 20mA)
8	red	OUT4 Z, Y or L* (Analog: 0 ... +10V or 4 ... 20mA)

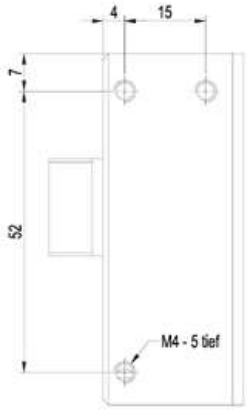


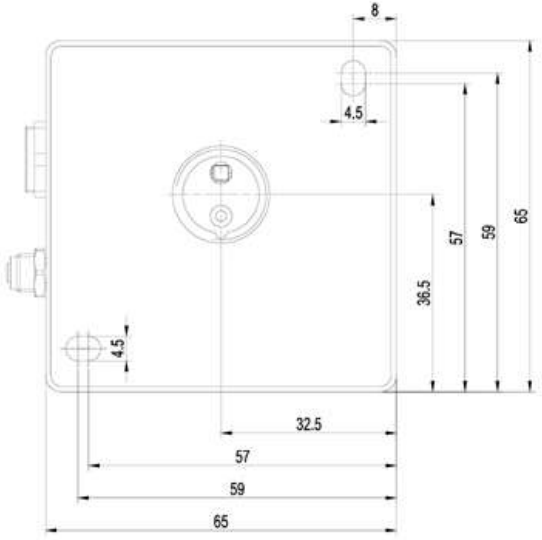
KL-9-A3.0

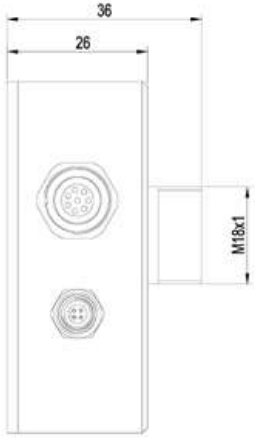


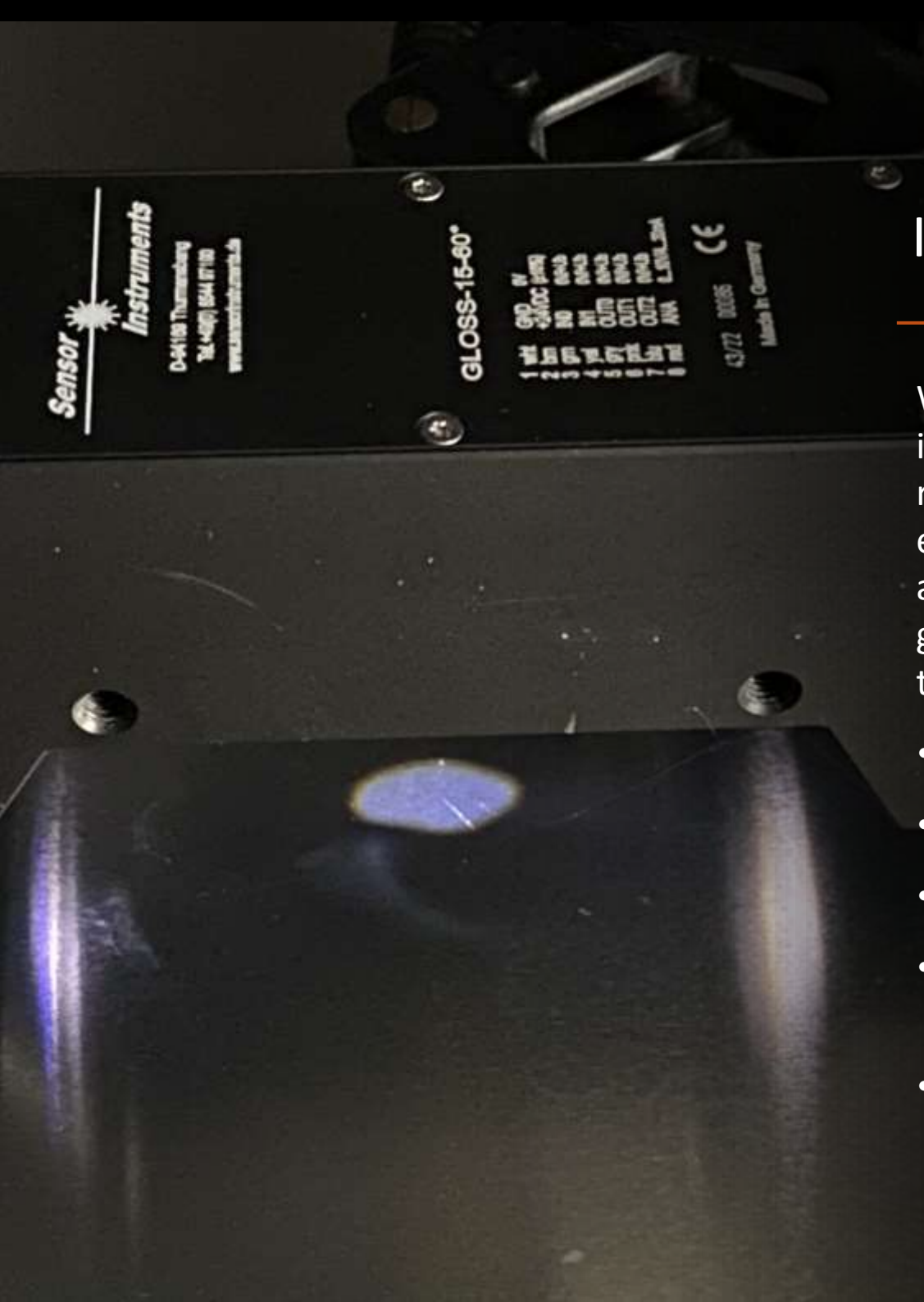
Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD







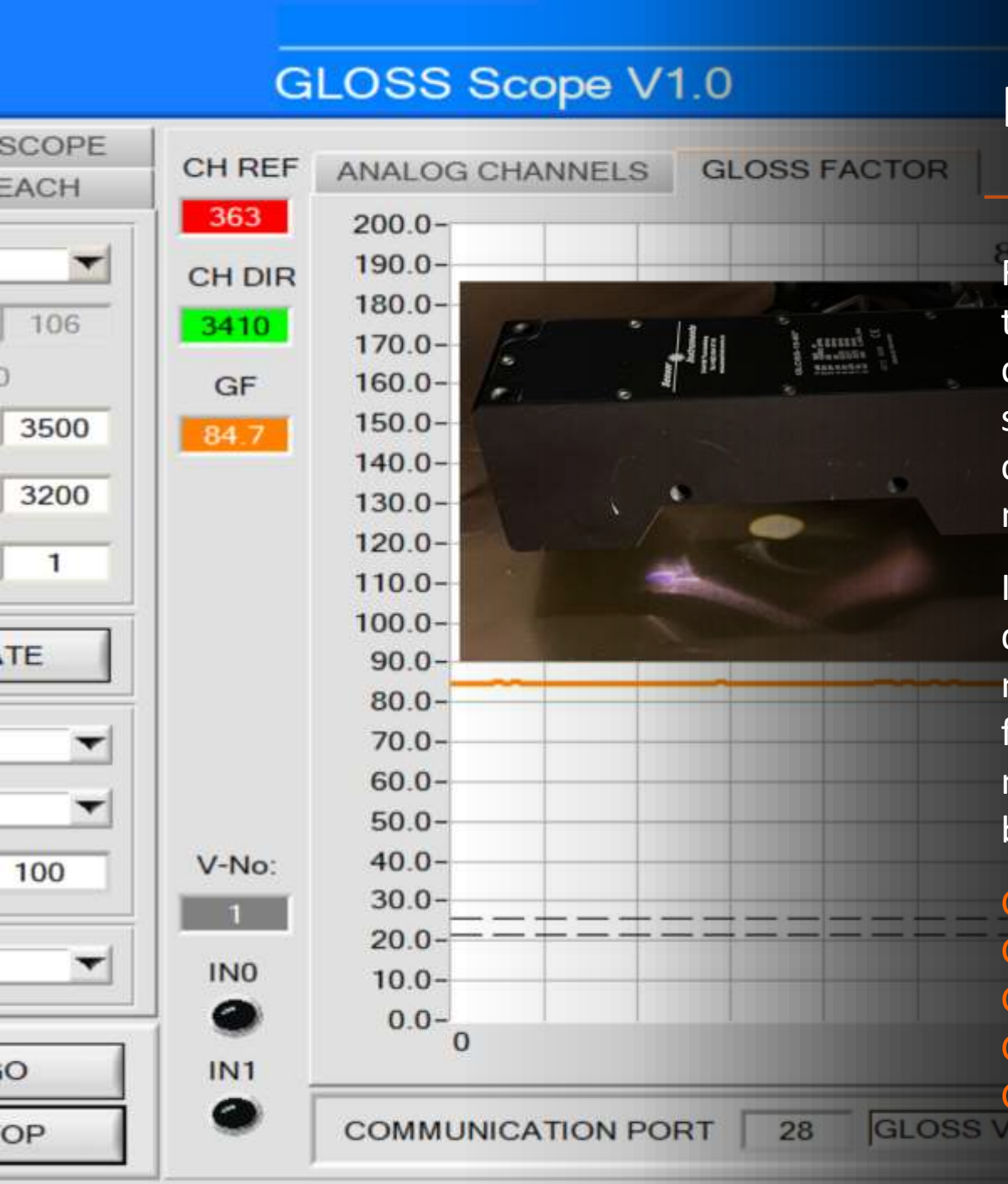


Inline gloss measurement

When assessing the quality of a surface, gloss is used in addition to color. Gloss is the direct reflection on the object surface. It is important to ensure that the surface within the light spot is flat and homogeneous. Depending on the degree of gloss, measurements are taken at different angles to the normal:

- 20° (high-gloss surface)
- 60° (glossy to matt surface)
- 85° (matt surface with low gloss)
- 45° (matt to glossy paper surface, TAPPI standard)
- 75° (matt paper surface, TAPPI standard)

Inline gloss measurement



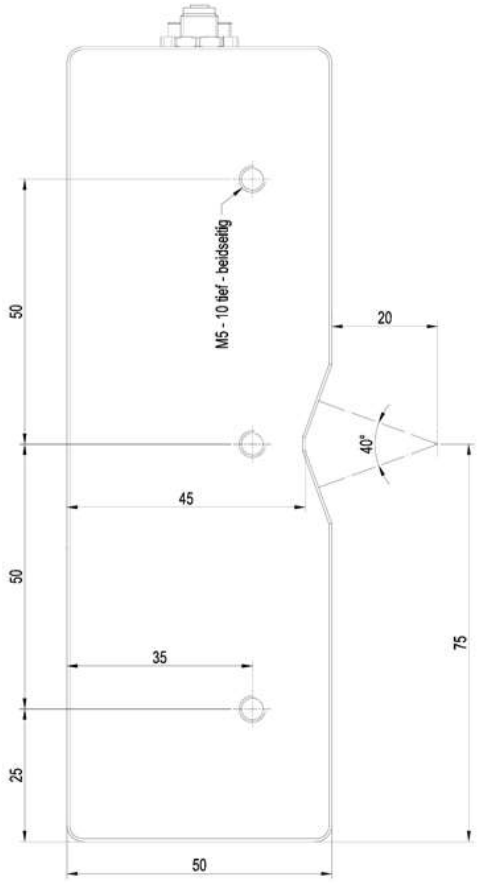
For inline gloss measurement, it is necessary to ensure that the measuring distance, i.e. the distance between the gloss measurement system and the surface to be measured, is constant and corresponds to the specified measuring distance.

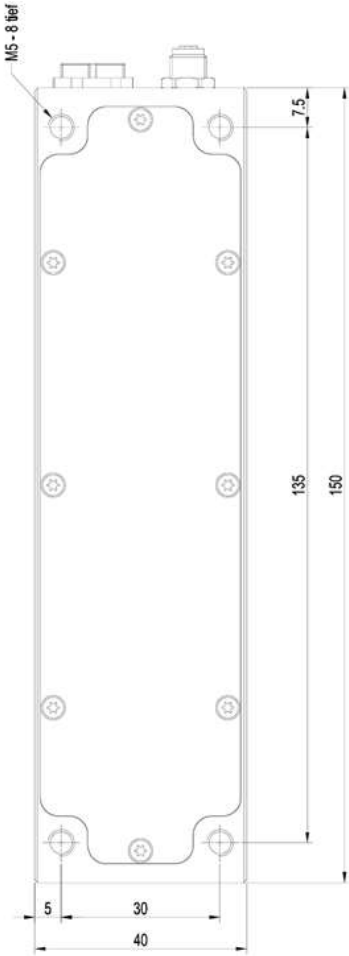
In addition to the stated measuring angles, different apertures are available for each measuring angle. This allows light spot sizes from 1mm in diameter to be realized, which means that correspondingly small objects can be measured.

GLOSS-20-20°
GLOSS-20-45°
GLOSS-20-75°
GLOSS-15-60°
GLOSS-5-85°

GLOSS-20-20°

- 20° gloss measurement (for high-gloss surfaces)
- Working distance: 20 mm +/- 10%
- Ambient light compensation
- Parameteriseable under Windows
- RS232 interface (USB, Ethernet or Profinet adapter)
- 3 digital outputs (0 V / +24 V)
- 1 analog output (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital inputs (external teaching, external trigger for analog outputs)





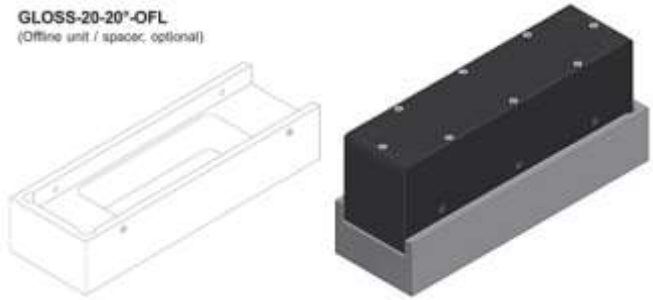
Connection to PLC:
8-pole fem. connector Binder Series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (digital 0: 0 … 1V, digital 1: +Ub - 10%)
4	yellow	IN1 (digital 0: 0 … 1V, digital 1: +Ub - 10%)
5	grey	OUT0 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
7	blue	OUT2 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
8	red	ANALOG (0...+10V or 4 … 20mA)

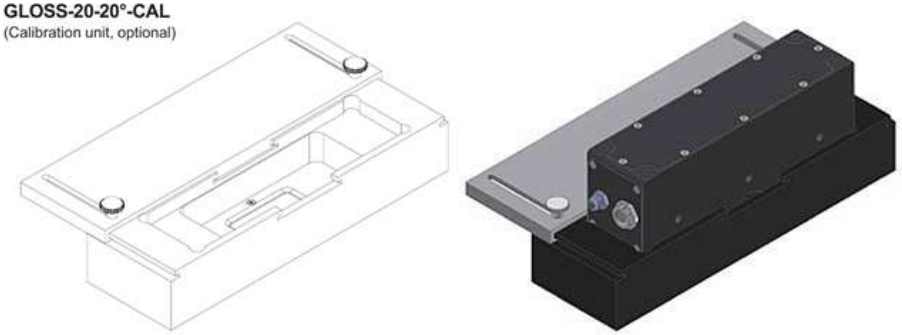
Connection to PC:
4-pol. fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

GLOSS-20-20°-OFL
(Offline unit / spacer, optional)



GLOSS-20-20°-CAL
(Calibration unit, optional)

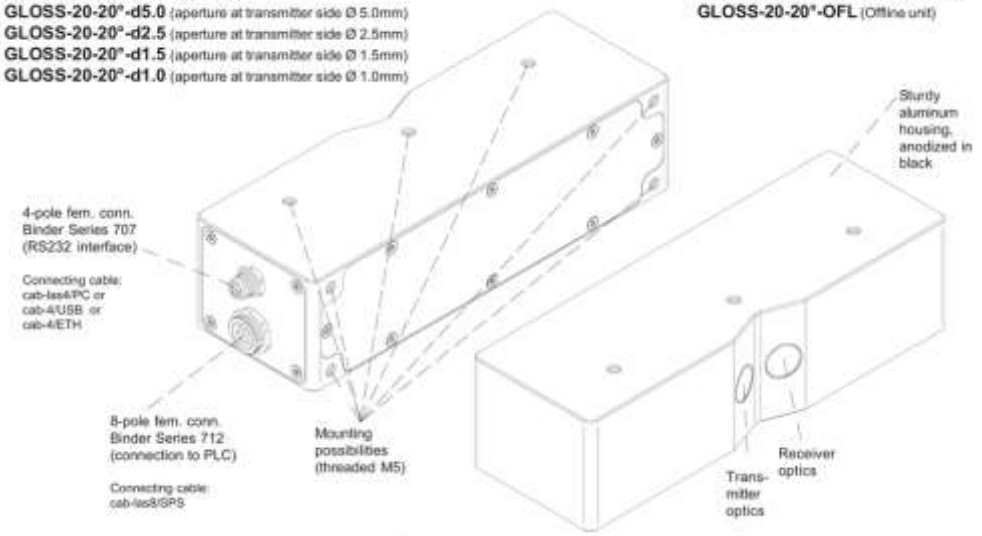


Product name:

GLOSS-20-20° (without aperture)
GLOSS-20-20°-d5.0 (aperture at transmitter side Ø 5.0mm)
GLOSS-20-20°-d2.5 (aperture at transmitter side Ø 2.5mm)
GLOSS-20-20°-d1.5 (aperture at transmitter side Ø 1.5mm)
GLOSS-20-20°-d1.0 (aperture at transmitter side Ø 1.0mm)

Accessories:

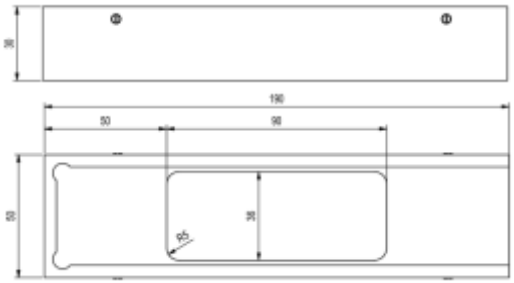
GLOSS-20-20°-CAL (Calibration unit)
GLOSS-20-20°-OFL (Offline unit)



GLOSS-20-45°

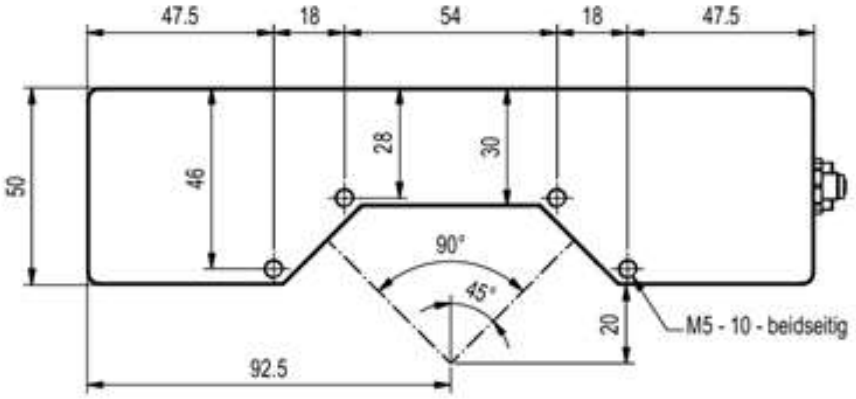
- 45° gloss measurement (TAPPI standard - for glossy surfaces)
- Working distance: 20 mm +/- 10%
- Ambient light compensation
- Parameteriseable under Windows
- RS232 interface (USB, Ethernet or Profinet adapter)
- 3 digital outputs (0 V / +24 V)
- 1 analog output (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital inputs (external teaching, external trigger for analog outputs)

GLOSS-20-45°-OFL



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

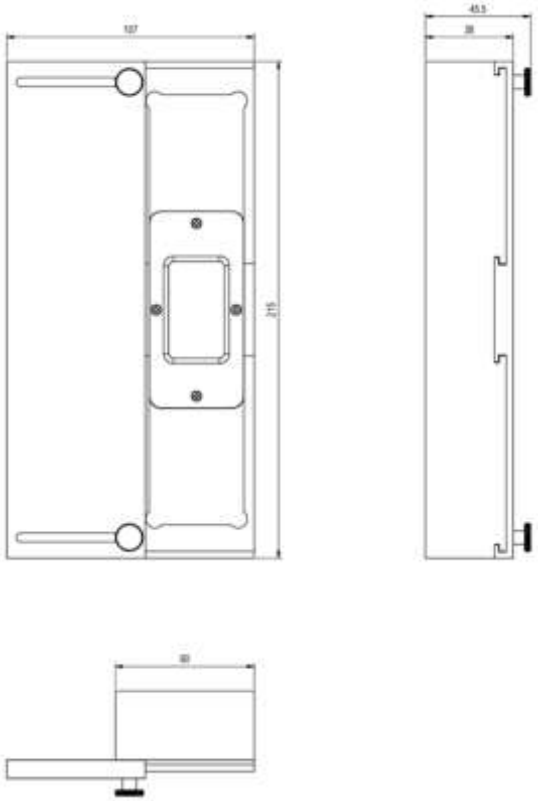
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
4	yellow	IN1 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
5	grey	OUT0 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
7	blue	OUT2 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
8	red	ANALOG (0...+10V or 4 ... 20mA)

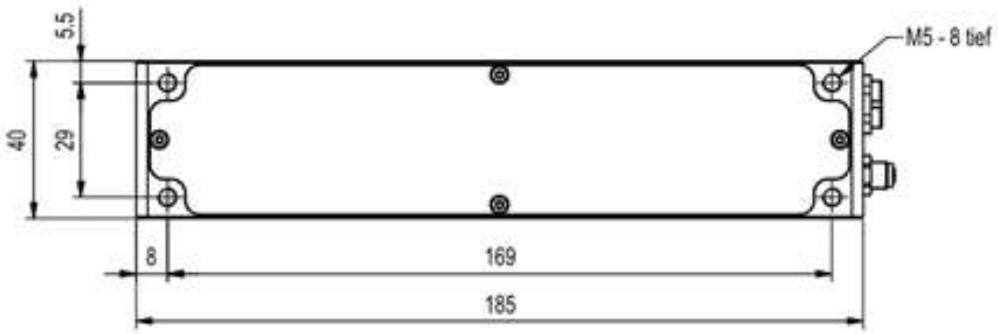


Connection to PC:
4-pol. fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

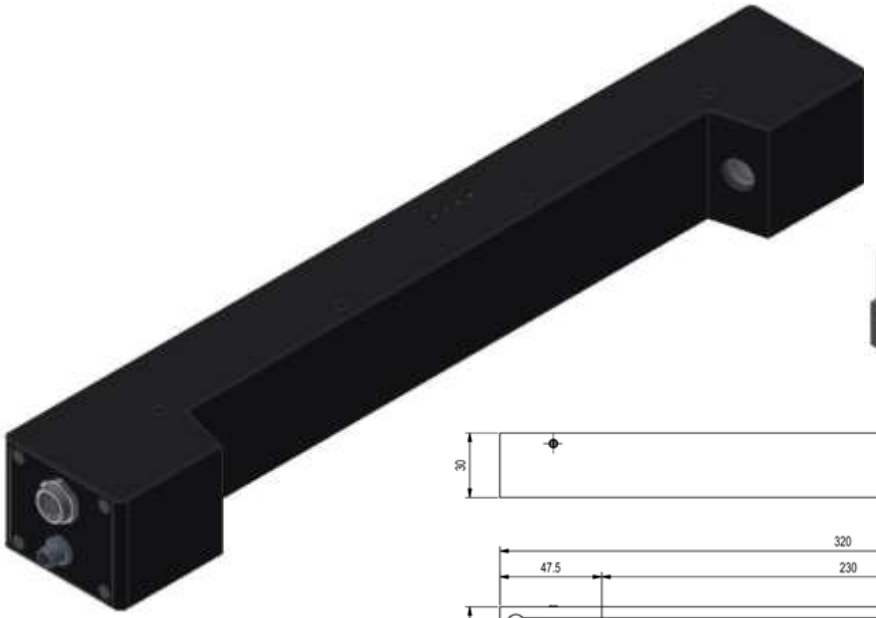
GLOSS-20-45°-CAL



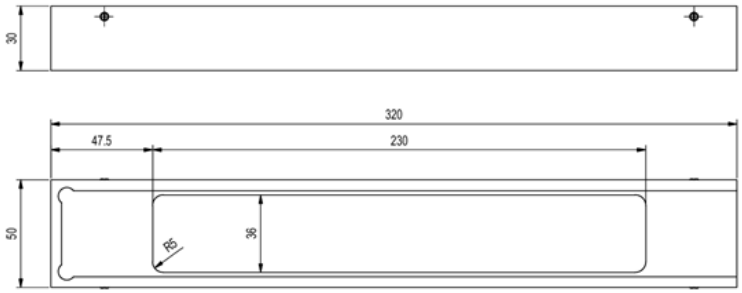


GLOSS-20-75°

- 75° gloss measurement (TAPPI standard - for matt surfaces)
- Working distance: 20 mm +/- 10%
- Ambient light compensation
- Parameteriseable under Windows
- RS232 interface (USB, Ethernet or Profinet adapter)
- 3 digital outputs (0 V / +24 V)
- 1 analog output (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital inputs (external teaching, external trigger for analog outputs)



GLOSS-20-75°-OFL

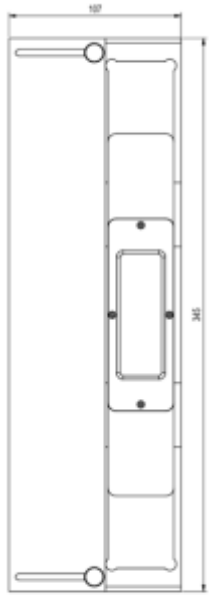


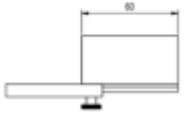
Connection to PLC:
8-pole fem. connector Binder Series 712

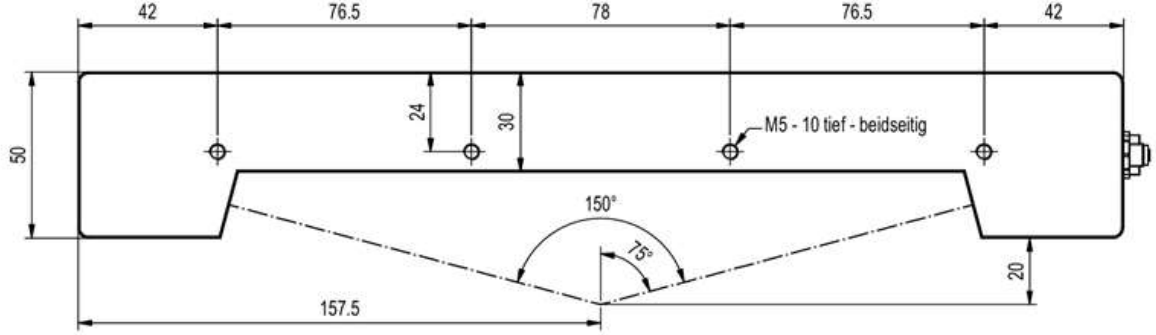
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
4	yellow	IN1 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
5	grey	OUT0 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
7	blue	OUT2 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
8	red	ANALOG (0...+10V or 4 ... 20mA)

Connection to PC:
4-pol. fem. connector Binder Series 707

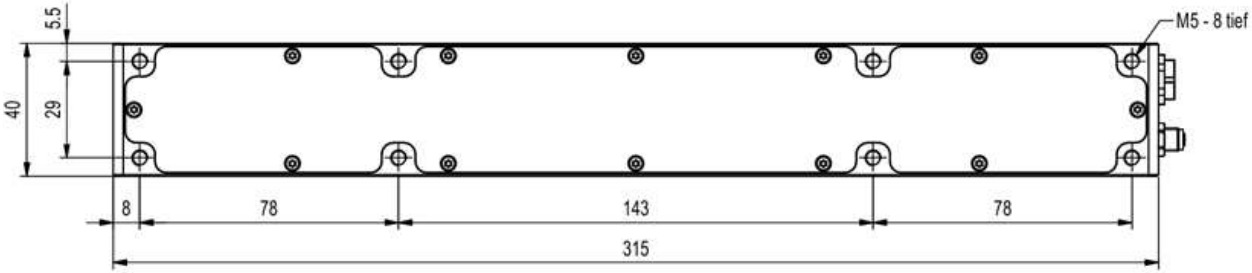
Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD





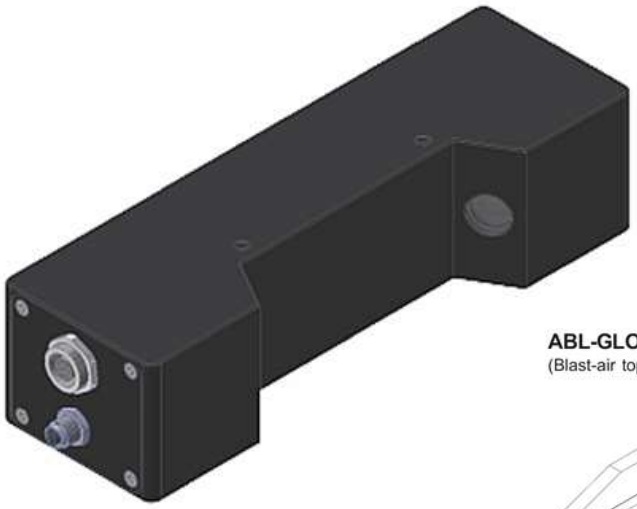


GLOSS-20-75°-CAL

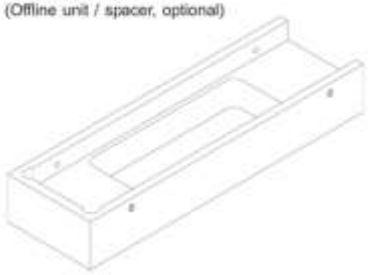


GLOSS-15-60°

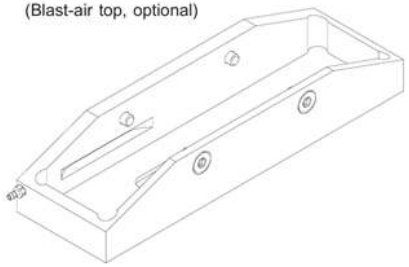
- 60° gloss measurement (for semi-gloss surfaces)
- Working distance: 15 mm +/- 10%
- Ambient light compensation
- Parameteriseable under Windows
- RS232 interface (USB, Ethernet or Profinet adapter)
- 3 digital outputs (0 V / +24 V)
- 1 analog output (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital inputs (external teaching, external trigger for analog outputs)



GLOSS-15-60°-OFL
(Offline unit / spacer, optional)



ABL-GLOSS-15-60°
(Blast-air top, optional)



Connection to PLC:

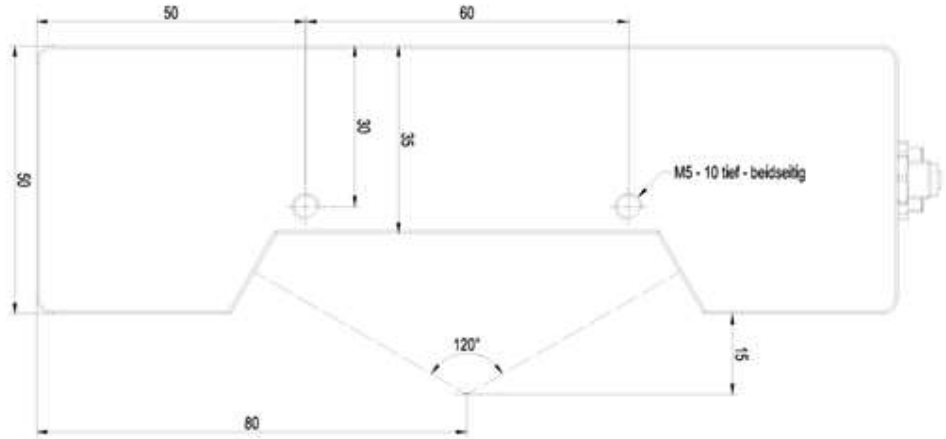
8-pole fem. connector Binder Series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (digital 0: 0 … 1V, digital 1: +Ub - 10%)
4	yellow	IN1 (digital 0: 0 … 1V, digital 1: +Ub - 10%)
5	grey	OUT0 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
7	blue	OUT2 (digital 0: Type 0 … 1V, digital 1: Type +Ub - 10%)
8	red	ANALOG (0...+10V or 4 … 20mA)

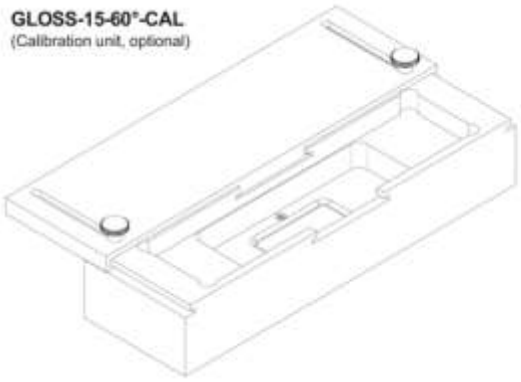
Connection to PC:

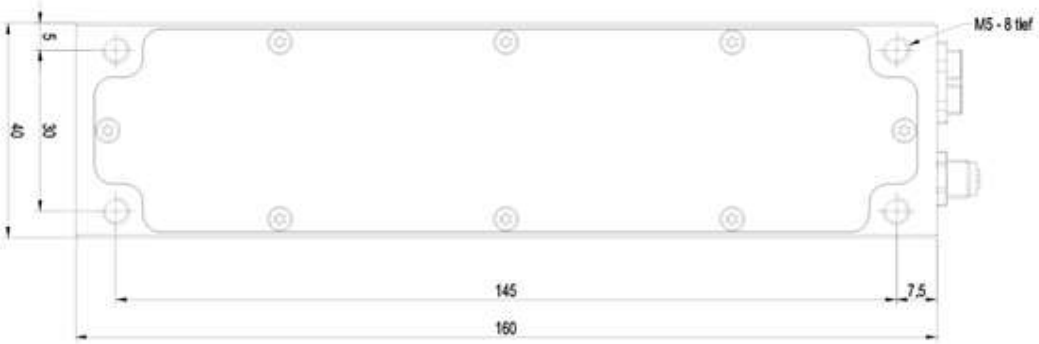
4-pol. fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD



GLOSS-15-60°-CAL
(Calibration unit, optional)





GLOSS-5-85°

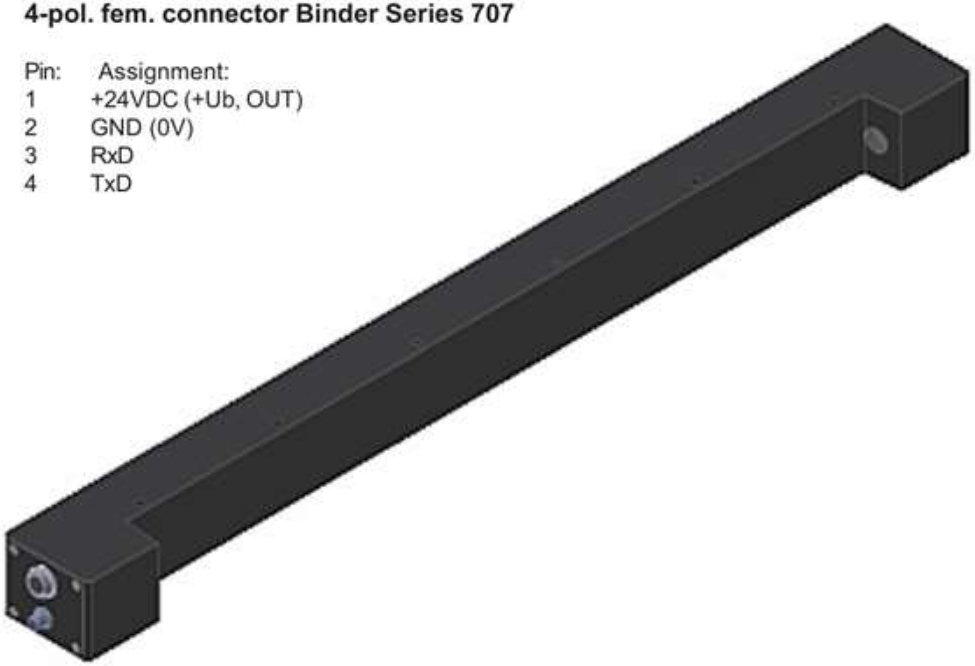
- 85° gloss measurement (for matt surfaces)
- Working distance: 5 mm +/- 10%
- Ambient light compensation
- Parameteriseable under Windows
- RS232 interface (USB, Ethernet or Profinet adapter)
- 3 digital outputs (0 V / +24 V)
- 1 analog output (0 V ... +10 V, 4 mA ... 20 mA)
- 2 digital inputs (external teaching, external trigger for analog outputs)

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

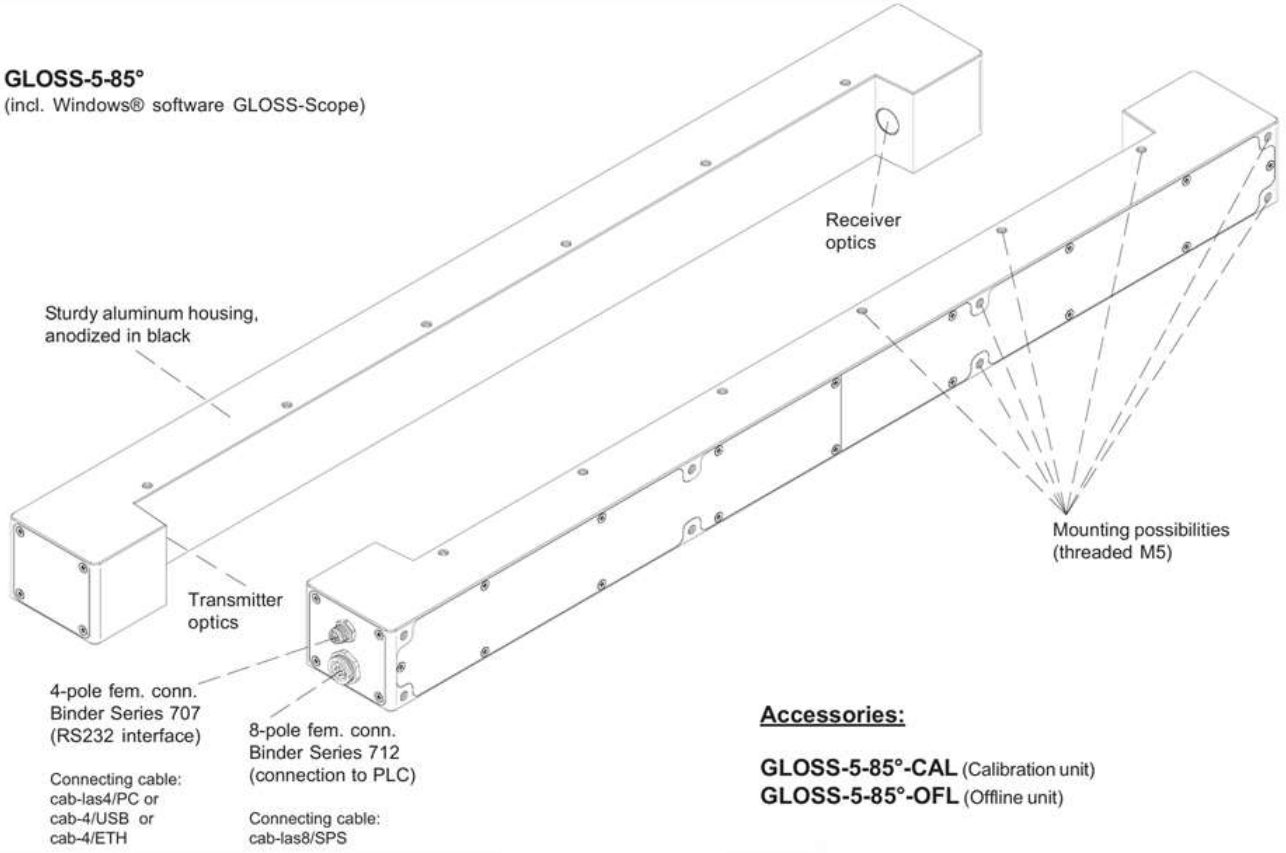
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
4	yellow	IN1 (digital 0: 0 ... 1V, digital 1: +Ub - 10%)
5	grey	OUT0 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
6	pink or black	OUT1 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
7	blue	OUT2 (digital 0: Type 0 ... 1V, digital 1: Type +Ub - 10%)
8	red	ANALOG (0...+10V or 4 ... 20mA)

Connection to PC:
4-pol. fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

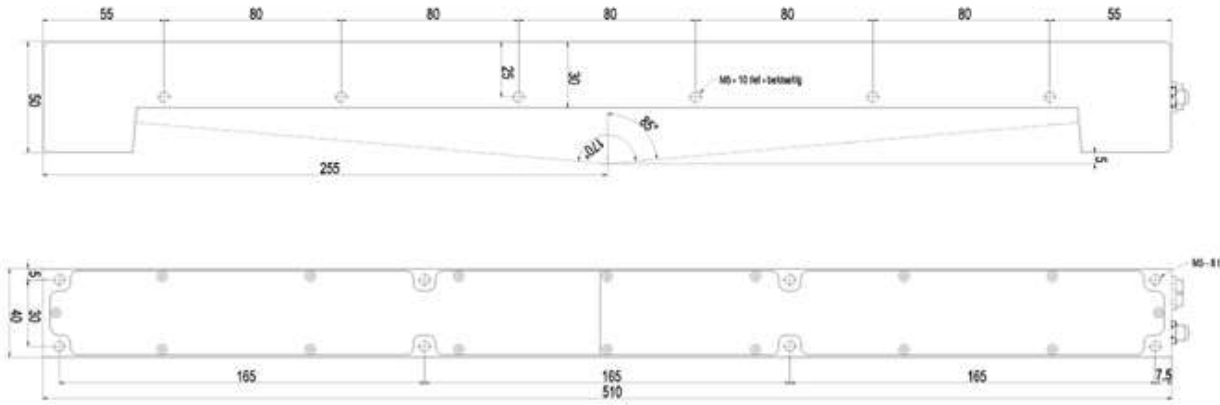


GLOSS-5-85°
(incl. Windows® software GLOSS-Scope)



Accessories:

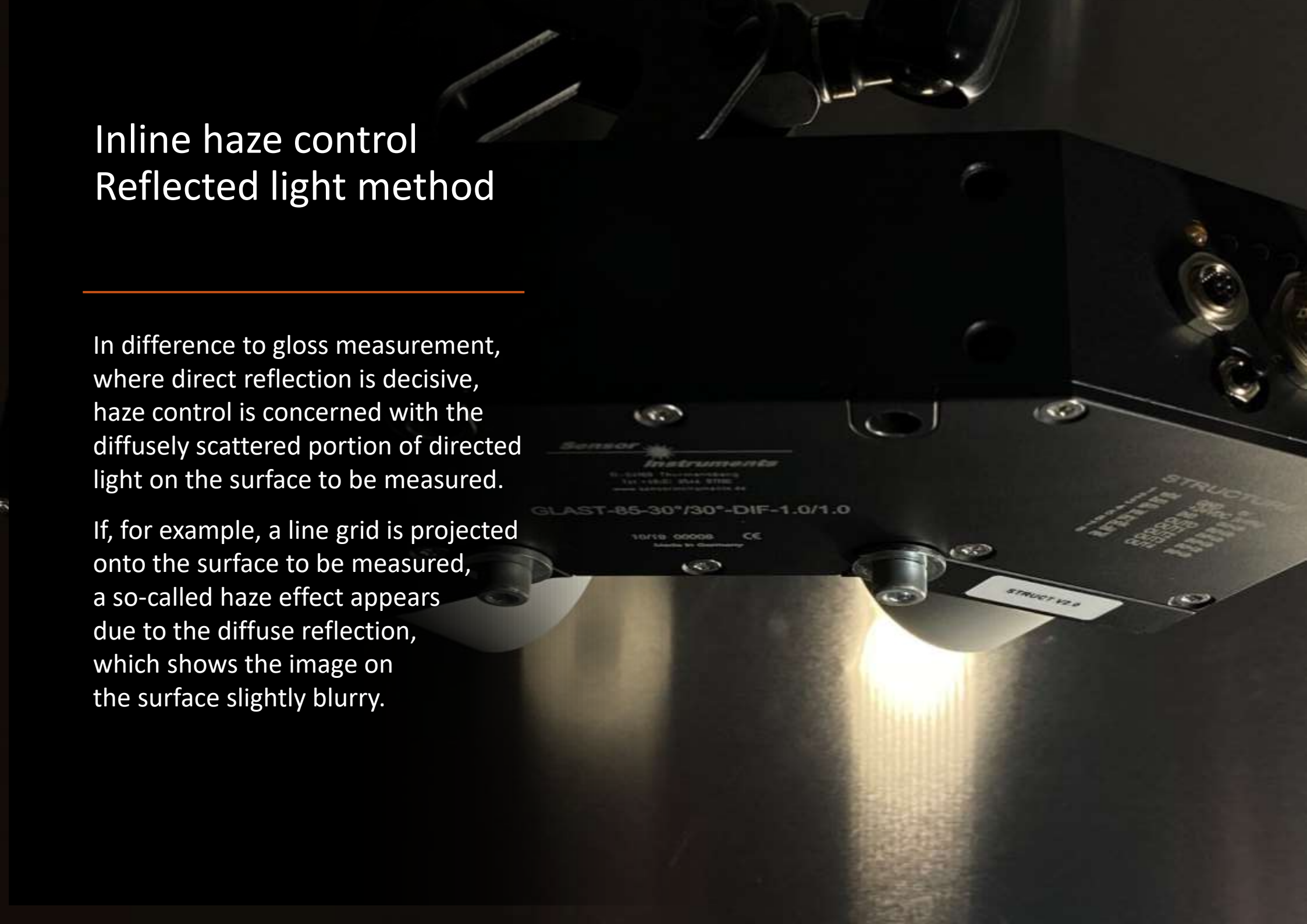
GLOSS-5-85°-CAL (Calibration unit)
GLOSS-5-85°-OFL (Offline unit)



Inline haze control
Reflected light method

In difference to gloss measurement, where direct reflection is decisive, haze control is concerned with the diffusely scattered portion of directed light on the surface to be measured.

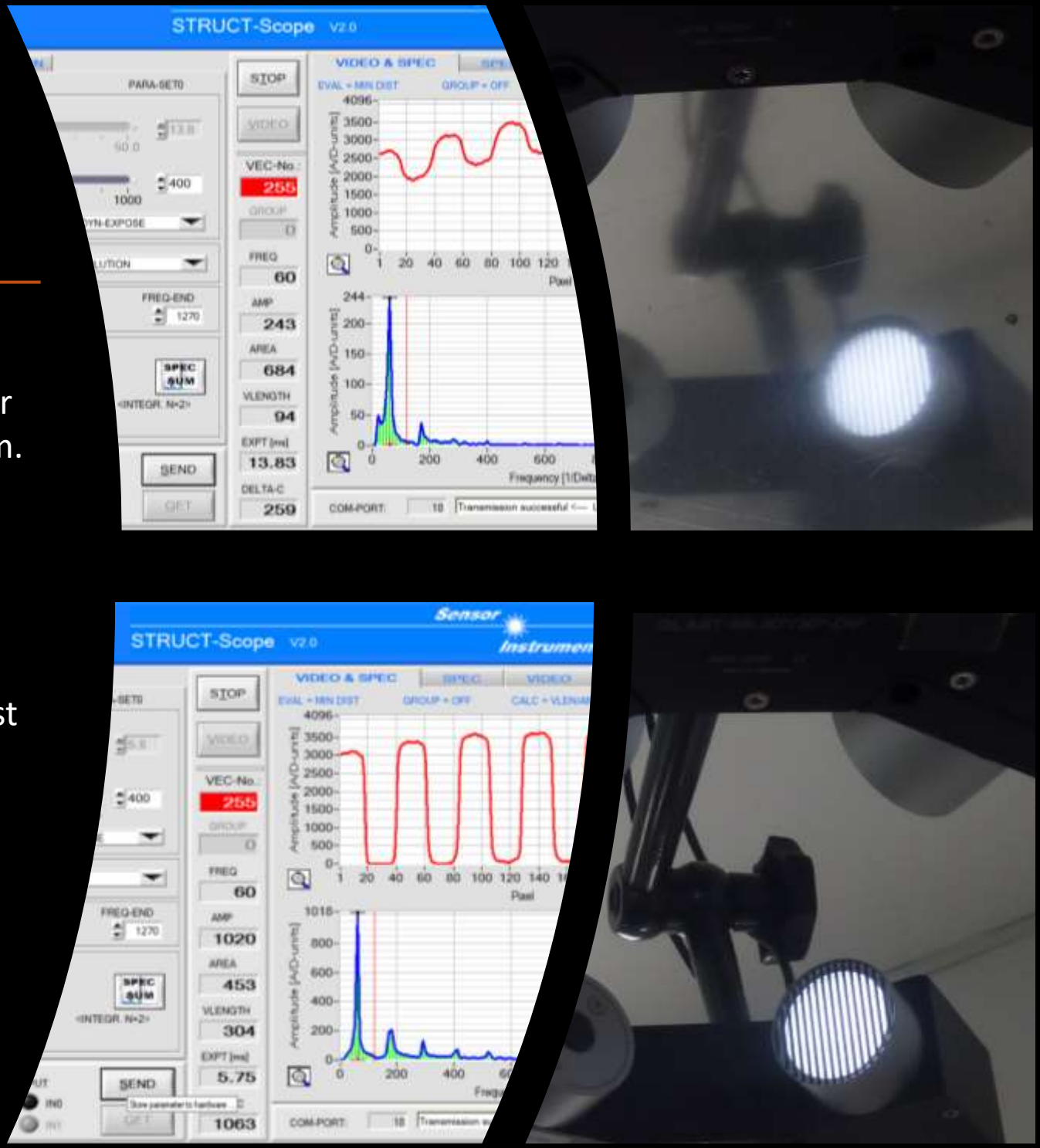
If, for example, a line grid is projected onto the surface to be measured, a so-called haze effect appears due to the diffuse reflection, which shows the image on the surface slightly blurry.



Inline haze control

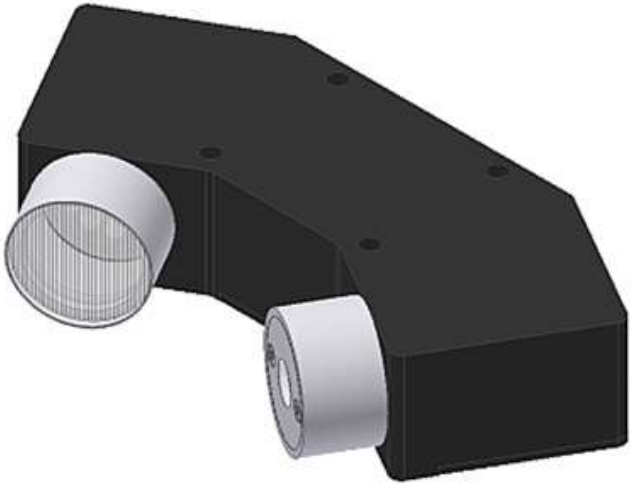
The haze effect is measured using imaging optics including a line sensor integrated into the measuring system. If a haze-free surface is present, the image on the line appears with high contrast, i.e. light-dark transitions in the line grid show a high amplitude on the video signal. However, if the surface is slightly diffuse, the contrast is reduced and the amplitude on the video signal decreases accordingly.

GLAST-85-30°/30°-DIF-0.5/0.5
GLAST-85-30°/30°-DIF-1.0/1.0
GLAST-85-30°/30°-DIF-2.0/2.0



GLAST-85-30°/30° series

- Working distance: 85 mm +/- 2 mm
- Determination of the direct reflection behaviour of glossy objects by way of spatial frequency analysis (frequency and Amplitude) of a line grid
- Diffuse lighting with three different line grids available (0.5/0.5, 1.0/1.0, 2.0/2.0)
- Receiver: Line scan detector (512 pixel) incl. projection lens
- RS232 interface (USB, Ethernet, or Profinet adapter available)
- Parameteriseable via PC software

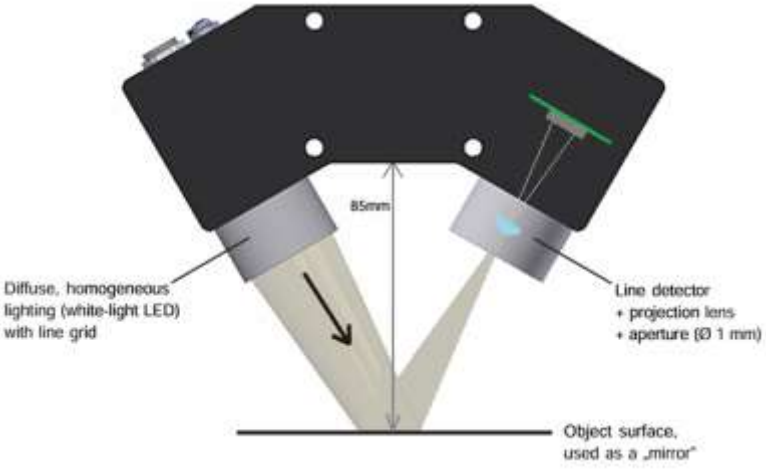


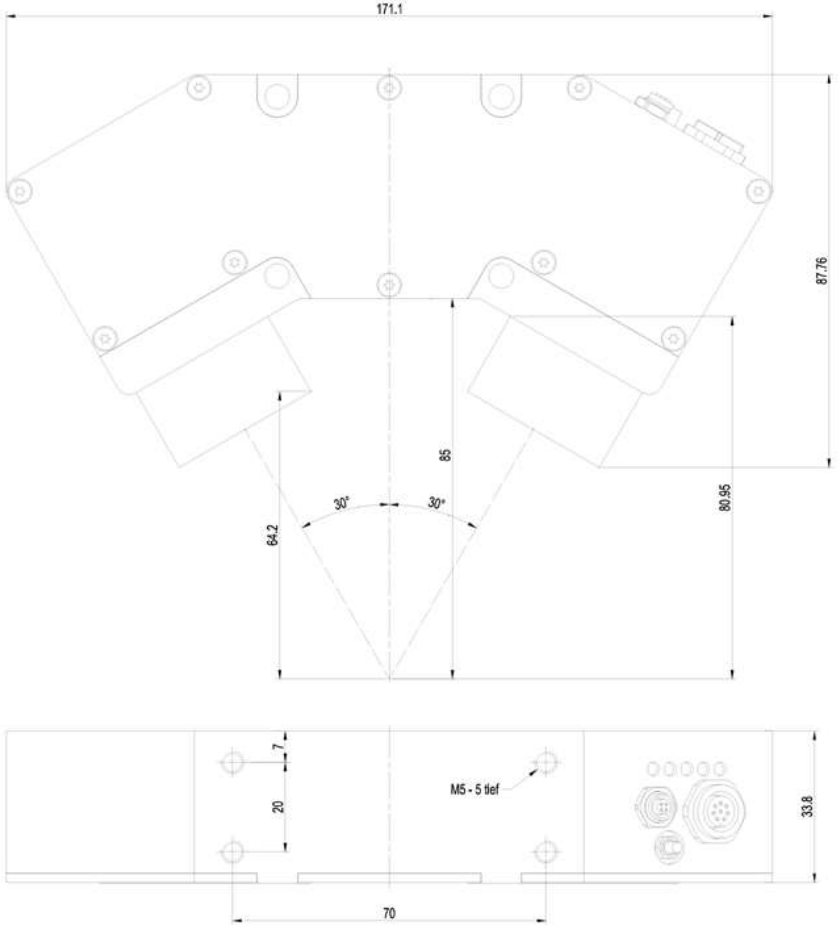
Connection to PLC:
8-pole fem. connector Binder Series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0
4	yellow	OUT0
5	grey	OUT1
6	pink	OUT2
7	blue	OUT3
8	red	OUT4

Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

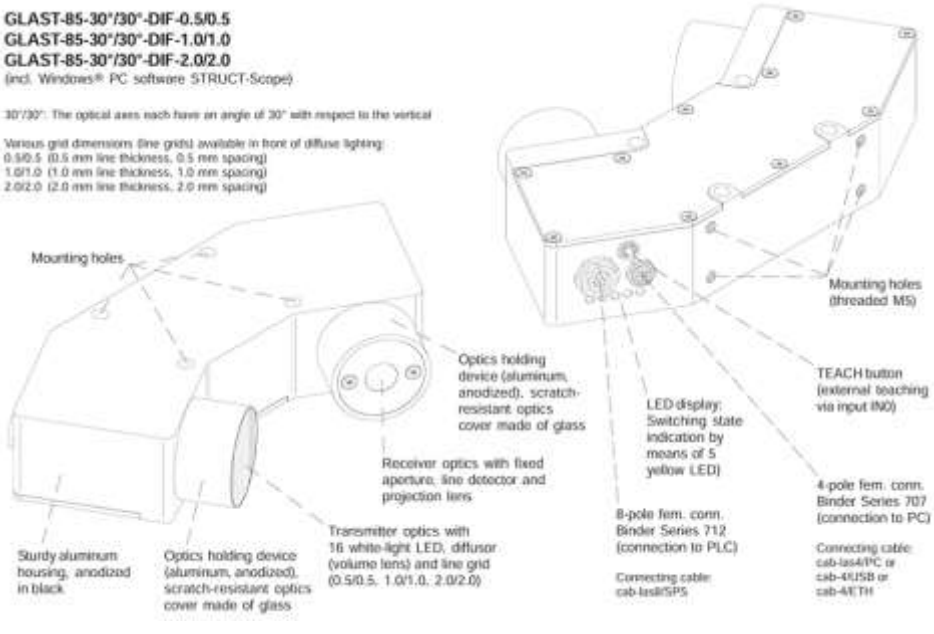




GLAST-85-30°/30°-DIF-0.5/0.5
GLAST-85-30°/30°-DIF-1.0/1.0
GLAST-85-30°/30°-DIF-2.0/2.0
(incl. Windows® PC software STRUCT-Scope)

30°/30°: The optical axes each have an angle of 30° with respect to the vertical

Various grid dimensions (line grids) available in front of diffuse lighting:
0.5/0.5 (0.5 mm line thickness, 0.5 mm spacing)
1.0/1.0 (1.0 mm line thickness, 1.0 mm spacing)
2.0/2.0 (2.0 mm line thickness, 2.0 mm spacing)



Inline haze control
Through-light method

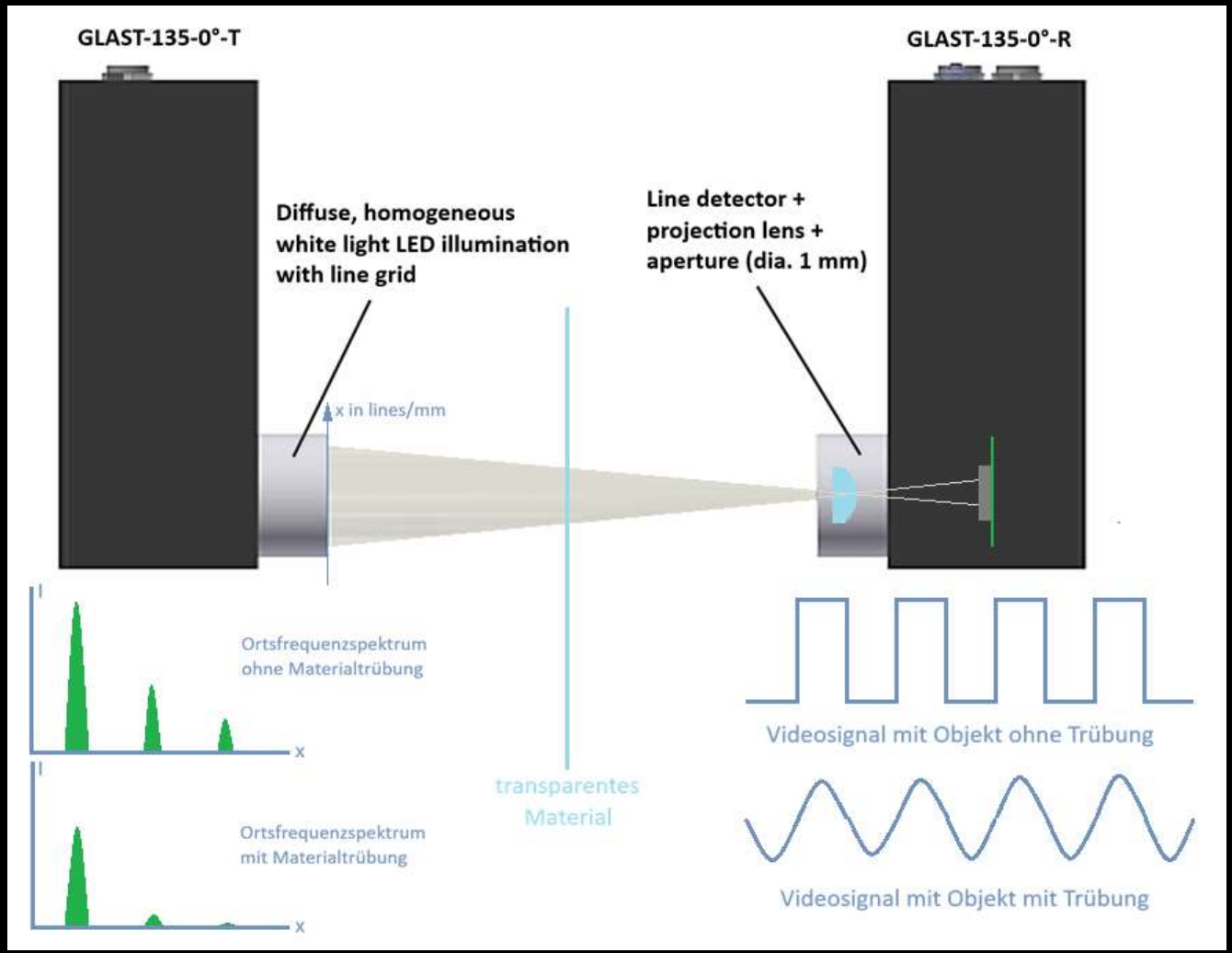
For transparent plastic films, haze control is performed in transmitted light mode

Here as well, a diffusely illuminated line grid is sharply imaged onto the receiver‘s line detector by means of a projection lens.

If a transparent film is positioned in the optical path between transmitter and receiver, the contrast of the projected image is influenced by the film‘s scattering behaviour.

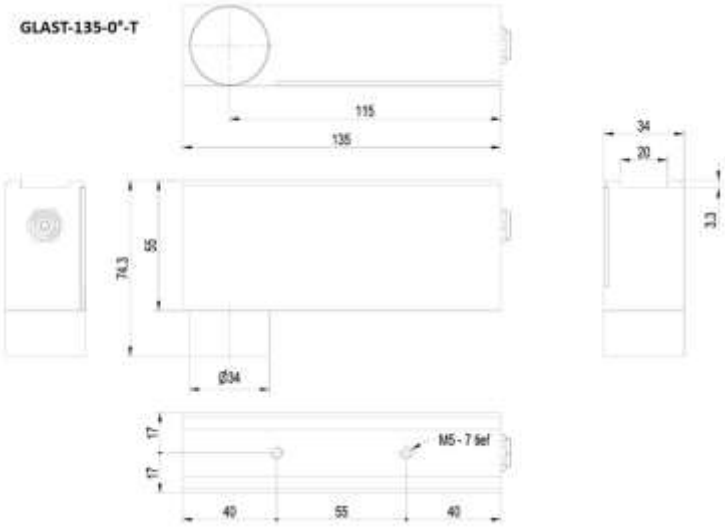
The same principle applies: the more diffuse the film, the lower the image contrast.

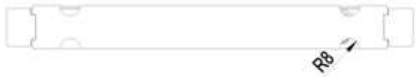
GLAST-135-0°-T
GLAST-135-0°-R



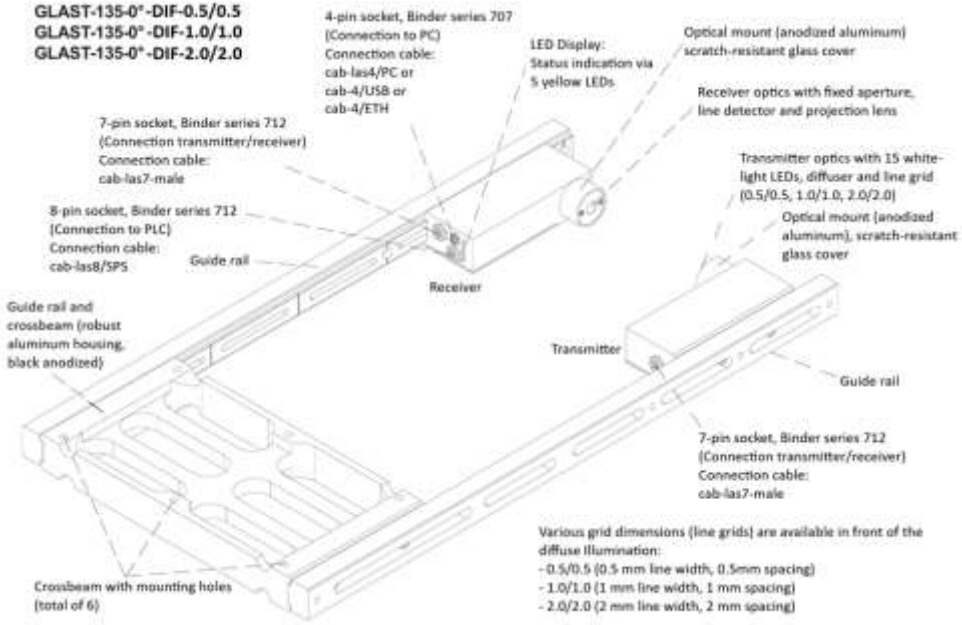
GLAST-135-0° series

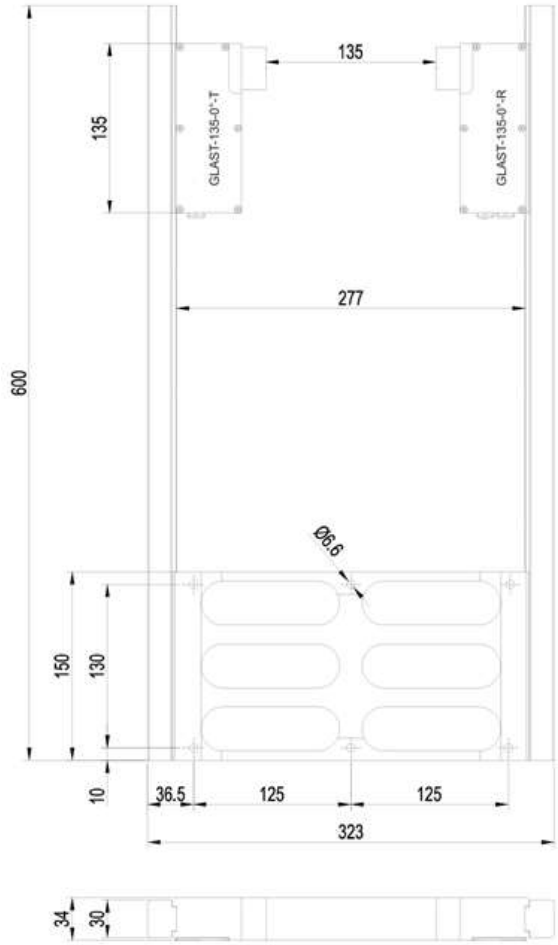
- Measuring distance: 135 mm +/- 2 mm
- Determination of forward scattering of transparent films by means of spatial frequency analysis (frequency and amplitude) using diffusely illuminated line gratings and imaging optics
- Diffuse illumination with three selectable line gratings (0.5/0.5, 1.0/1.0, 2.0/2.0)
- Receiver side: projection optics with line sensor (512 pixels)
- RS232 interface (USB, Ethernet and Profinet available)
- Switching state indication via 5 yellow LEDs
- Parametrization via PC Software
- Haze control





GLAST-135-0°-DIF-0.5/0.5
GLAST-135-0°-DIF-1.0/1.0
GLAST-135-0°-DIF-2.0/2.0

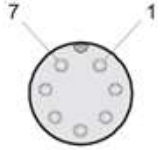




Connection transmitter/Receiver:
7-pin female connector, Binder series 712

Pin assignment:

Pin	Assignment
1	GND (0 V)
2	+3.3 V DC
3	SS
4	MISO
5	MOSI
6	SCLK
7	+3.3 V DC



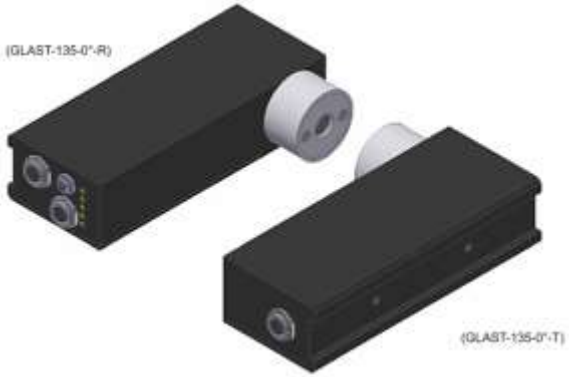
Pin Assignment:

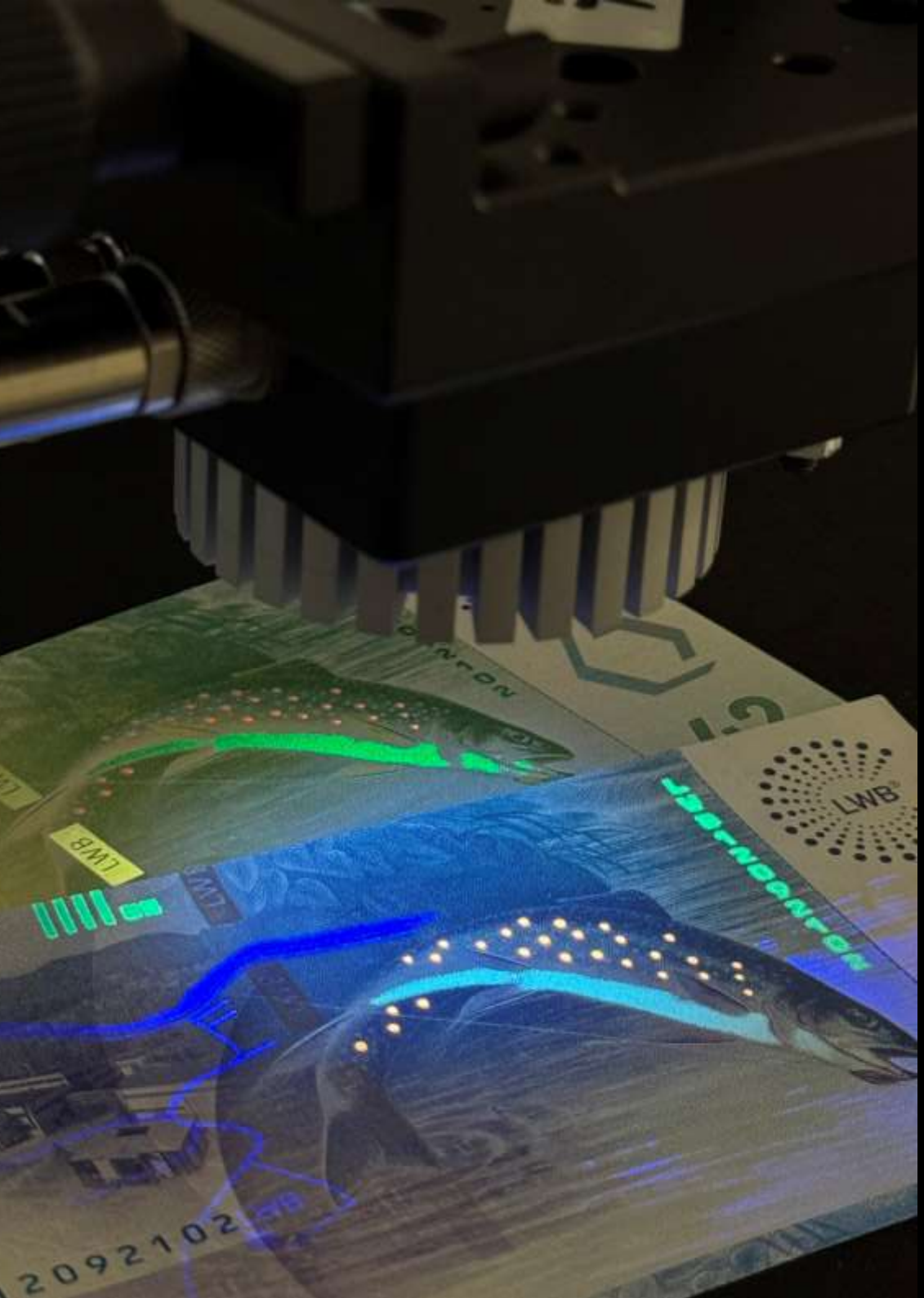
Connection GLAST-135-0°-R (Receiver) to PLC 8-pin socket, Binder Series 712

Pin	Color	Assignment
1	white	GND (0 V)
2	brown	+24 V (+/- 10%)
3	green	IN0
4	yellow	OUT0
5	grey	OUT1
6	pink or black	OUT 2
7	blue	OUT 3
8	red	OUT 4

Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD





Inline fluorescence measurement

Fluorescent surfaces are characterized by the fact that they respond to the exposure to light (primary light) of a certain wavelength by emitting secondary light. Once the primary emission has ceased, the secondary emission also ends abruptly. Thus, there is no afterglow.

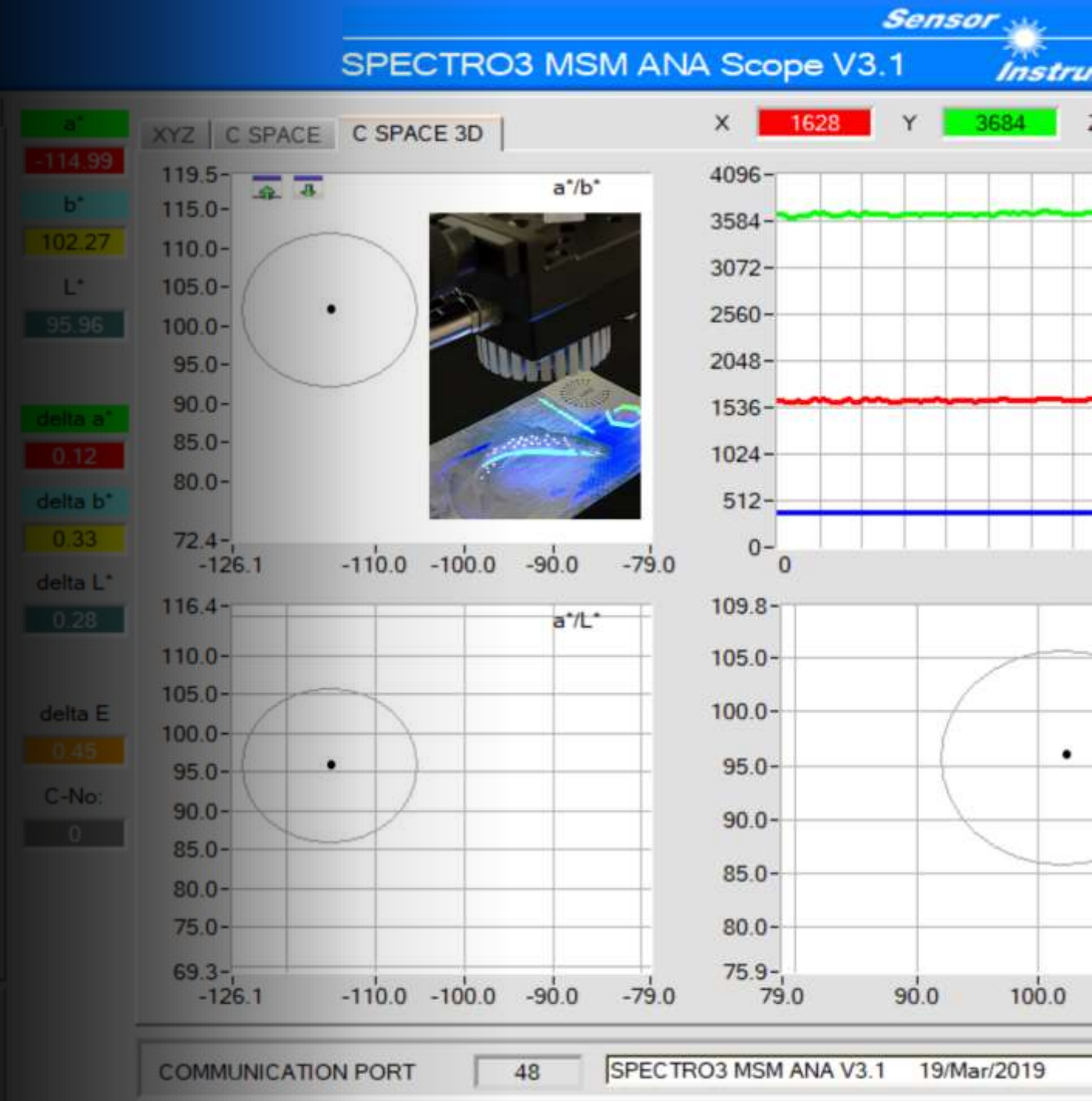
Typical excitation wavelengths are in the so-called UVA range (typically 365nm), but certain phosphors can also be excited in the blue or red wavelength range. Secondary emission thereby occurs in the longer-wave visible range or in the near infrared range.

Inline fluorescence measurement

A color sensor system equipped with UVA LEDs is used for inline fluorescence measurement.

By using optical long-pass filters, secondary light as from the blue wavelength range can hit the color detector.

SPECTRO-3-30-UV/BL-MSM-ANA

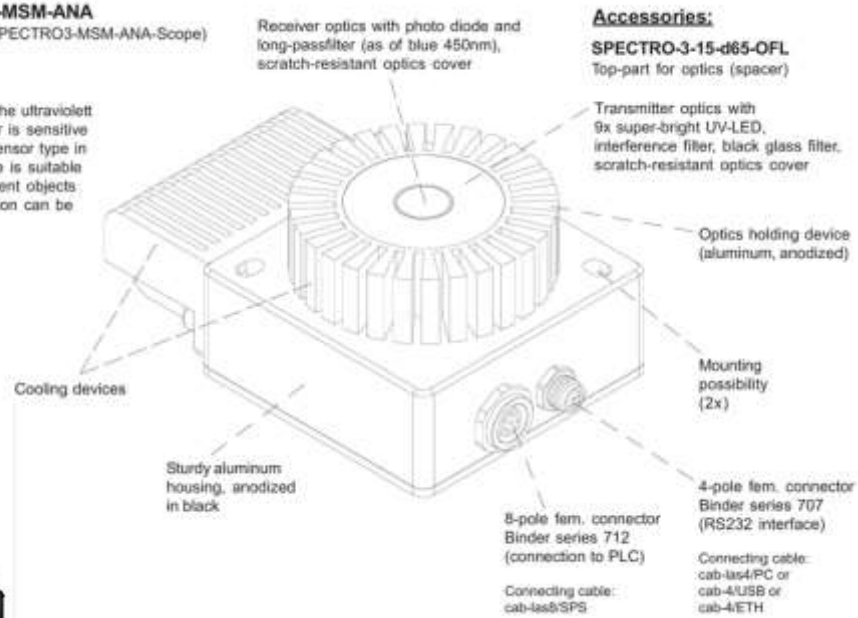


SPECTRO-3-FIO-UV/BL-MSM-ANA

- Big working range: typ. 1 mm ... 500 mm
- Various UV light conducting fiber optics available
- RS323 interface (USB, Ethernet, and Profinet adapter available)
- UV-LED, 365 nm (AC-, DC- and Pulse- Operation)
- Detection of different luminescent Colors
- Ambient light compensation (in AC- and PULSE- operation)
- Scan frequency max. 35 kHz (in DC - operation)
- Switching frequency max. 35 kHz (in DC - operation)
- External TEACH via PC or PLC (IN0)
- Parameteriseable via PC - software, scope function

SPECTRO-3-30-UV/BL-MSM-ANA
(incl. Windows® software SPECTRO3-MSM-ANA-Scope)

UV/BL:
The transmitter operates in the ultraviolett range, whereas the receiver is sensitive as of the blue range. This sensor type in reflective operation therefore is suitable for the detection of fluorescent objects which by way of UV excitation can be caused to emit light.



Accessories:

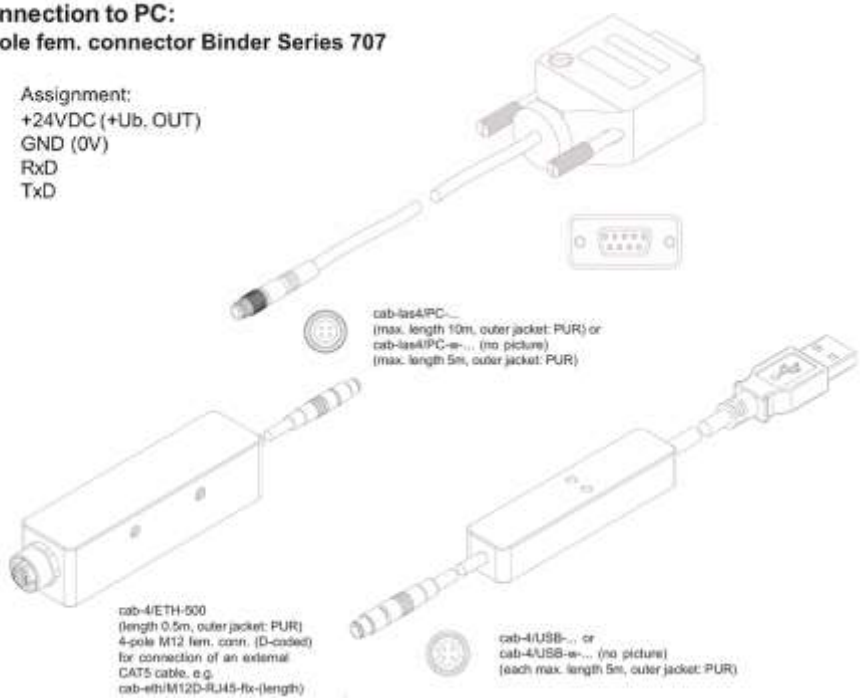
SPECTRO-3-15-d65-OFL
Top-part for optics (spacer)

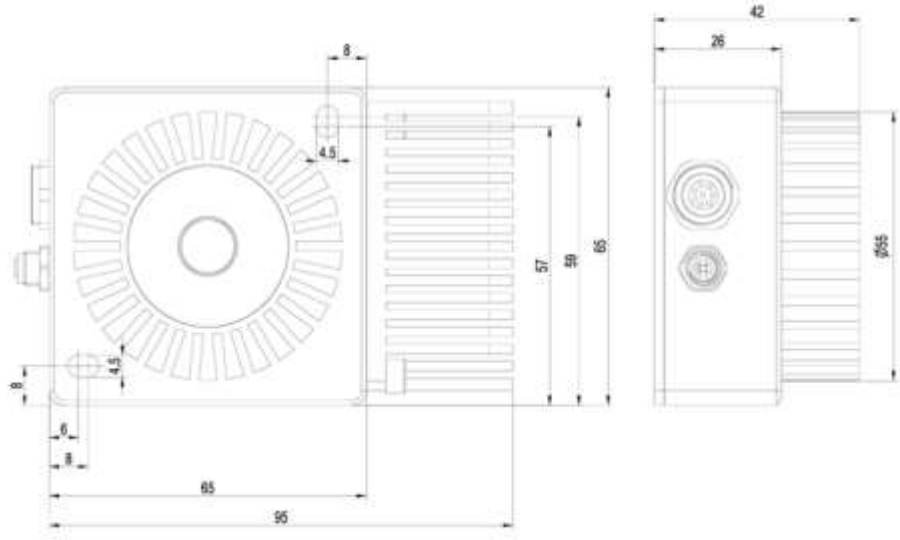
Connection to PLC:
8-pole fem. connector Binder series 712
ANA - type

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
4	yellow	OUT0 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
5	grey	OUT1 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT2 X, x, a*, u*, u' or C* (Analog: 0 ... +10V or 4 ... 20mA)
7	blue	OUT3 Y, y, b*, v*, v' or h* (Analog: 0 ... +10V or 4 ... 20mA)
8	red	OUT4 Z, Y or L* (Analog: 0 ... +10V or 4 ... 20mA)

Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD





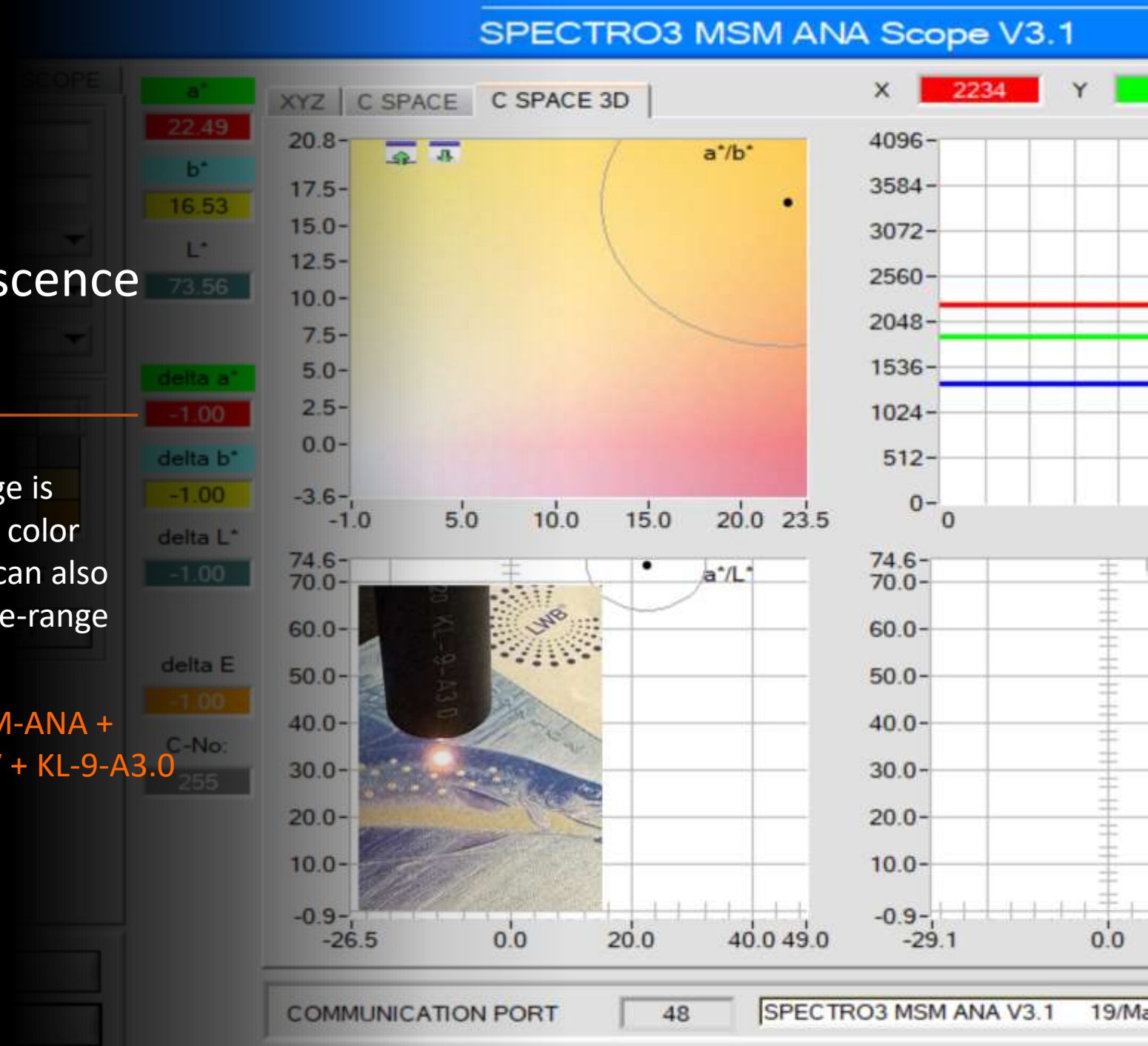
Spot inline fluorescence measurement

For measuring very small fluorescent surfaces, sensors with attachment optics that are connected to the measuring system via an optical fiber are most suitable. This allows light spot sizes from approx. 1mm in diameter or cross-sections of 2mm x 0.3mm to be realized.

Spot inline fluorescence measurement

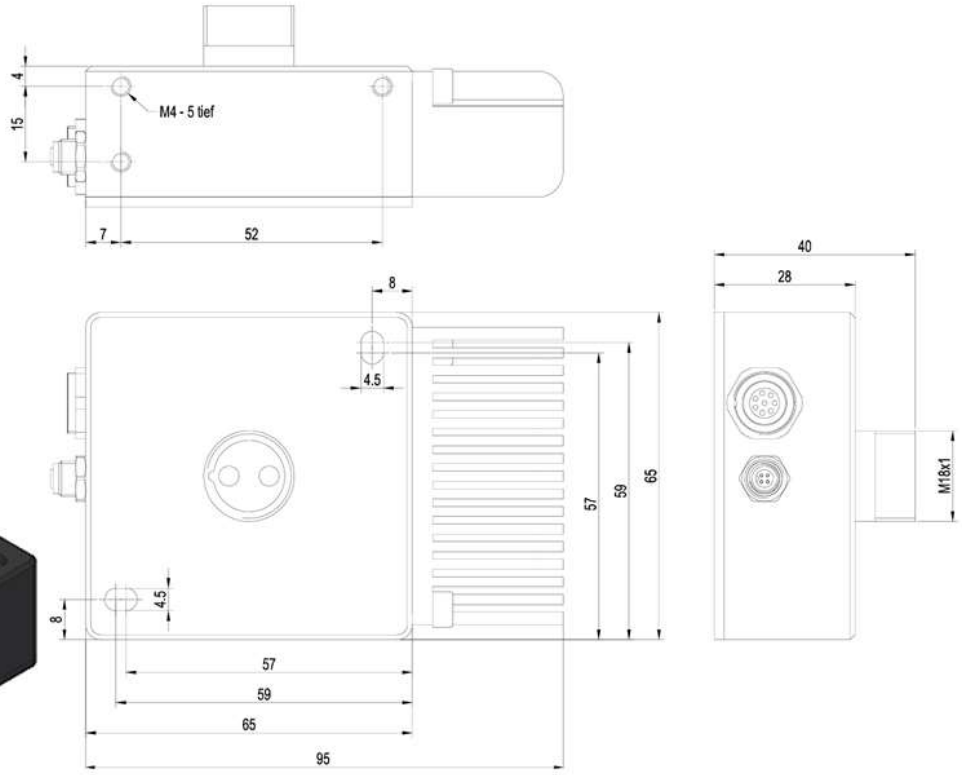
The visible wavelength range is evaluated here as well. The color of the secondary emission can also be determined using a three-range detector (L*a*b*).

SPECTRO-3-FIO-UV/BL-MSM-ANA + R-S-A3.0-(3.0)-1200-22°-UV + KL-9-A3.0



SPECTRO-3-FIO-UV/BL series

- Big working range: typ. 1 mm ... 500 mm
- Various UV light conducting fiber optics available
- RS323 interface (USB, Ethernet, and Profinet adapter available)
- UV-LED, 365 nm (AC-, DC- and Pulse- Operation)
- Detection of different luminescent Colors
- Ambient light compensation (in AC- and PULSE- operation)
- Scan frequency max. 35 kHz (in DC - operation)
- Switching frequency max. 35 kHz (in DC - operation)
- External TEACH via PC or PLC (IN0)
- Parameteriseable via PC - software, scope function



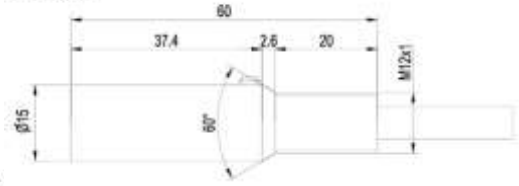
Connection to PLC:
8-pole fem. connector Binder series 712
ANA - type

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
4	yellow	OUT0 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
5	grey	OUT1 (Digital 0: 0 … 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT2 X, x, a*, u*, u' or C* (Analog: 0 ... +10V or 4 ... 20mA)
7	blue	OUT3 Y, y, b*, v*, v' or h* (Analog: 0 ... +10V or 4 ... 20mA)
8	red	OUT4 Z, Y or L* (Analog: 0 ... +10V or 4 ... 20mA)

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

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0
4	yellow	OUT0 (Digital 0: typ. 0…1V, Digital 1: typ. +Ub - 10%)
5	grey	OUT1 (Digital 0: typ. 0…1V, Digital 1: typ. +Ub - 10%)
6	pink or black	OUT2 (Digital 0: typ. 0…1V, Digital 1: typ. +Ub - 10%)
7	blue	OUT3 (Digital 0: typ. 0…1V, Digital 1: typ. +Ub - 10%)
8	red	OUT4 (Digital 0: typ. 0…1V, Digital 1: typ. +Ub - 10%)

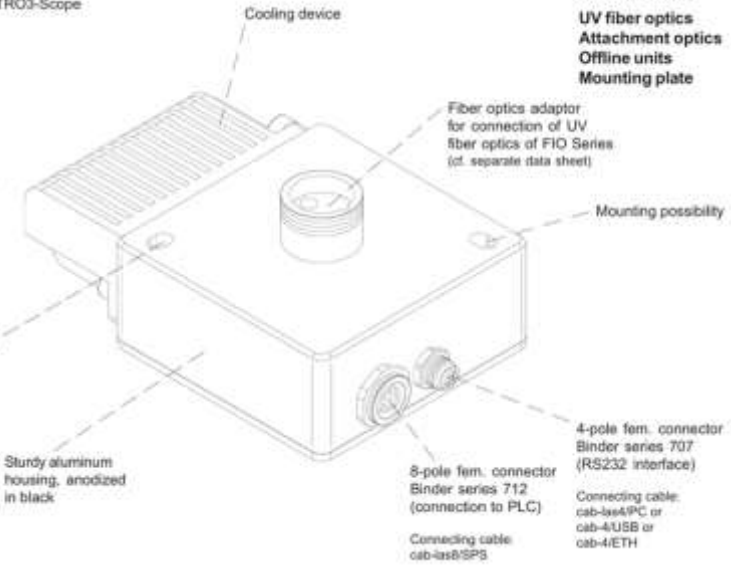
KL-8-R2.1



SPECTRO-3-FIO-UV/VIS-JR-HP
(incl. Windows® PC software SPECTRO3-Scope and SPECTRO3-COMFORT-Scope)

UV/VIS:
The transmitter here operates in the UV range, whereas the receiver operates in the visible range. Suitable fiber optics are available both for reflective and for through-beam operation. These fiber optics have quartz fibers at the transmitter side, and standard 67° fibers at the receiver side.

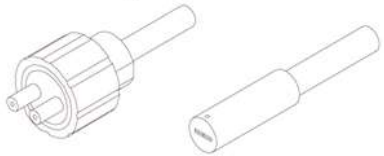
Accessories:
UV fiber optics
Attachment optics
Offline units
Mounting plate

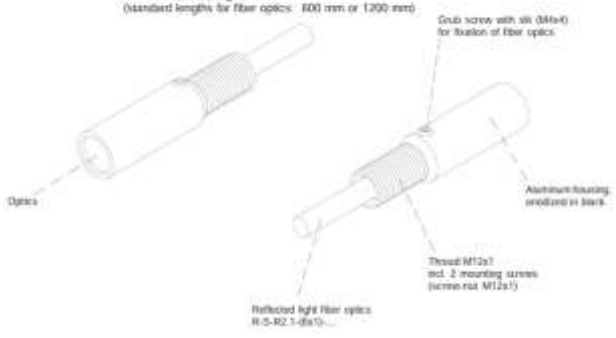


Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

R-S-R2.1-(6x1)-1200-22°-UV





Inline phosphorescence measurement

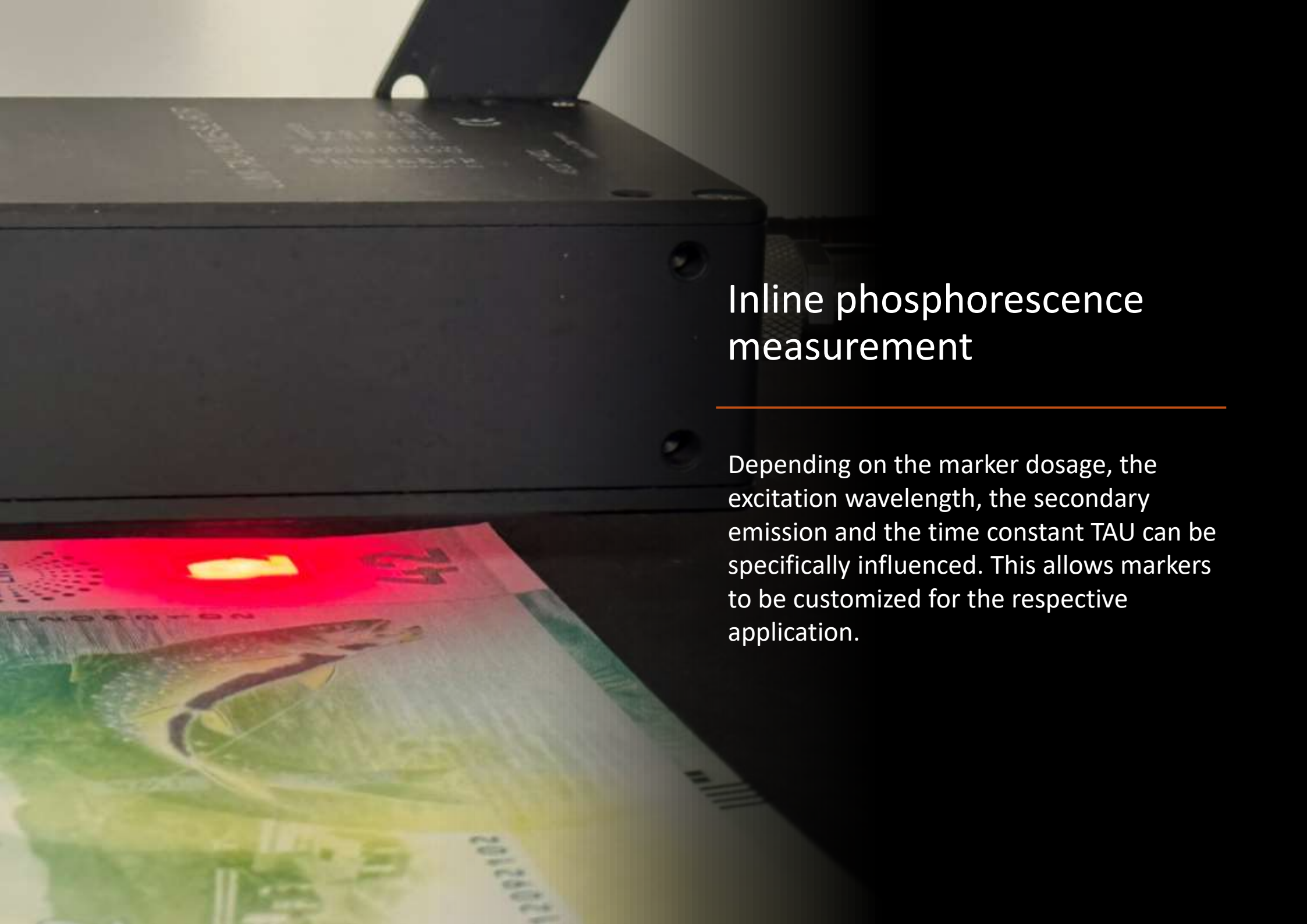
In contrast to fluorescent surfaces, an afterglow can be detected on phosphorescent surfaces, the intensity of which decays exponentially with a marker-specific time constant (TAU) after the end of the primary emission.

Depending on the marker used, suitable excitation wavelengths extend from the UVA range (e.g. 365nm) through the visible wavelength range (e.g. blue or red) to the near infrared range.
The primary emissions are either in the visible wavelength range or in the near infrared range.

Inline phosphorescence measurement

The marker-specific, exponential decay curve can be described using two parameters: The initial intensity INT (here: 455) and the time constant TAU (here: 250µs).

LUMI-TAU-INLINE-SL-IR/IR



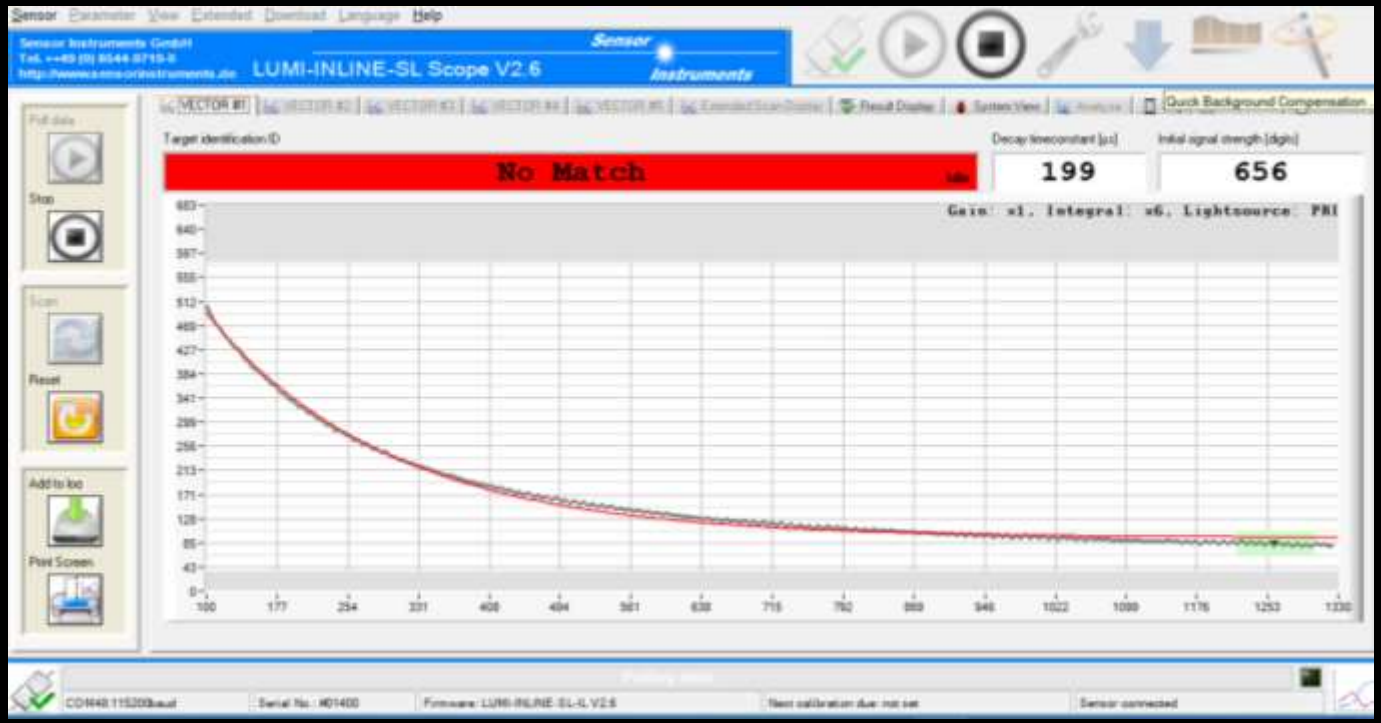
Inline phosphorescence measurement

Depending on the marker dosage, the excitation wavelength, the secondary emission and the time constant TAU can be specifically influenced. This allows markers to be customized for the respective application.

Inline phosphorescence measurement

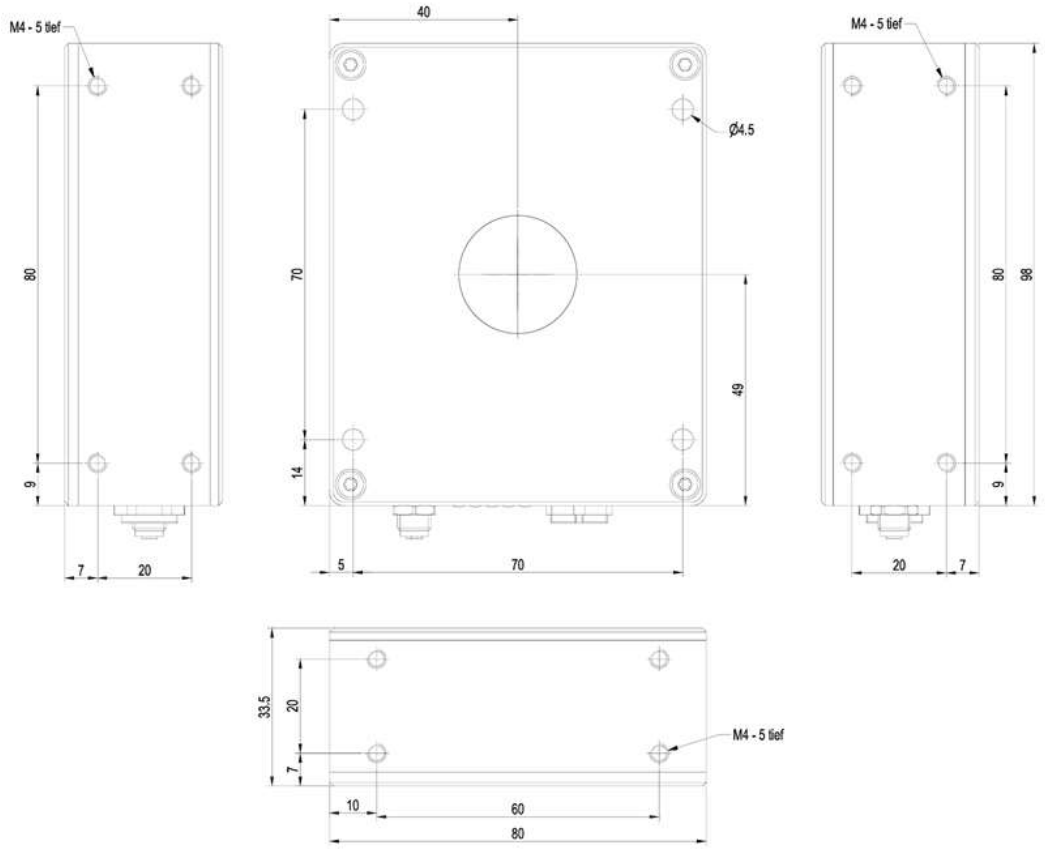
As can be seen in this application, the time constant TAU shifts towards lower values (here: 199µs) with an INT value of 656.

LUMI-TAU-INLINE-SL-IR/IR



LUMI-TAU-INLINE-SL series

- Monitoring of UP or DOWN converters with regard to concentration ("INTensity")
- Monitoring of relaxation times (time constants "TAU")
- PC software for trend display and tolerance exceedance of concentration (INT) and time constants (TAU)
- Up to 2 analog outputs (0 V...+10 V or 4 mA...20 mA) for outputting concentration (INT) ot time constants (TAU)
- Up to 6 switching outputs for selectable output of various information
- Up to 5 digital inputs for controlling various sensor functions
- PC software for parameterization of the measurement System
- Large detection area (typ. 25 mm dia.)
- IR LEDs, typ. 940nm, class 1
- Scratch-resistant IR filter glass
- RS232 interface (USB- , Ethernet- and Profinet- adapter available)
- RS485 interface (optional)



Connection to PLC:

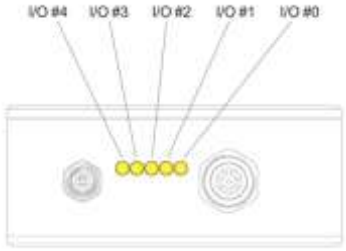
8-pin socket, Binder Series 712

Pin	Color	Assignment
1	white	GND (0V)
2	brown	+24V (+/- 10%)
3	green	I/O
4	yellow	I/O
5	grey	I/O
6	pink	I/O
7	blue	I/O
8	red	I/O

Connection to PC:

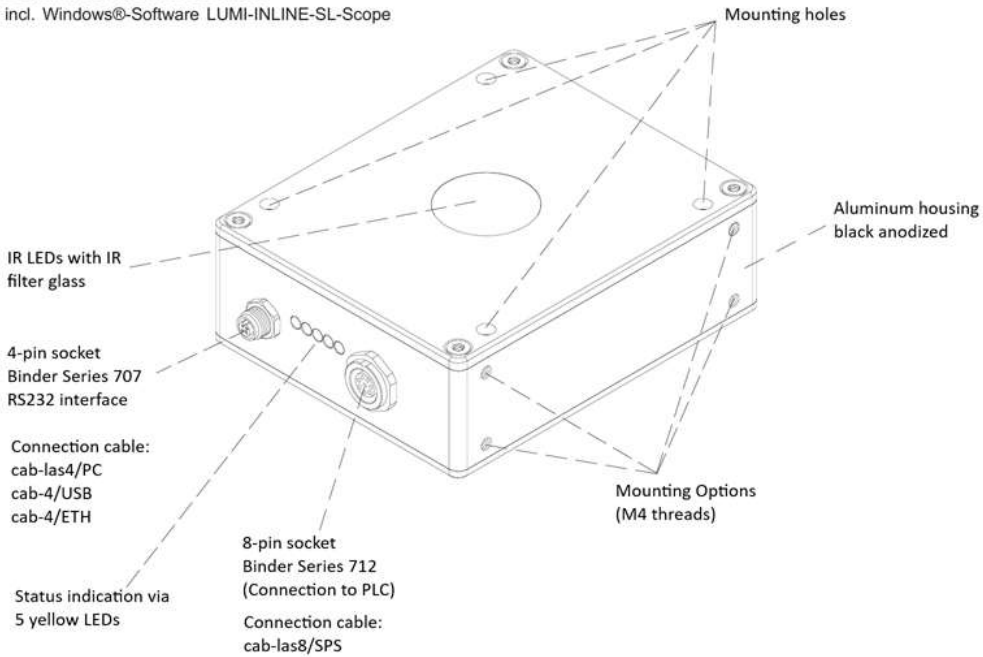
4-pin socket, Binder Series 707

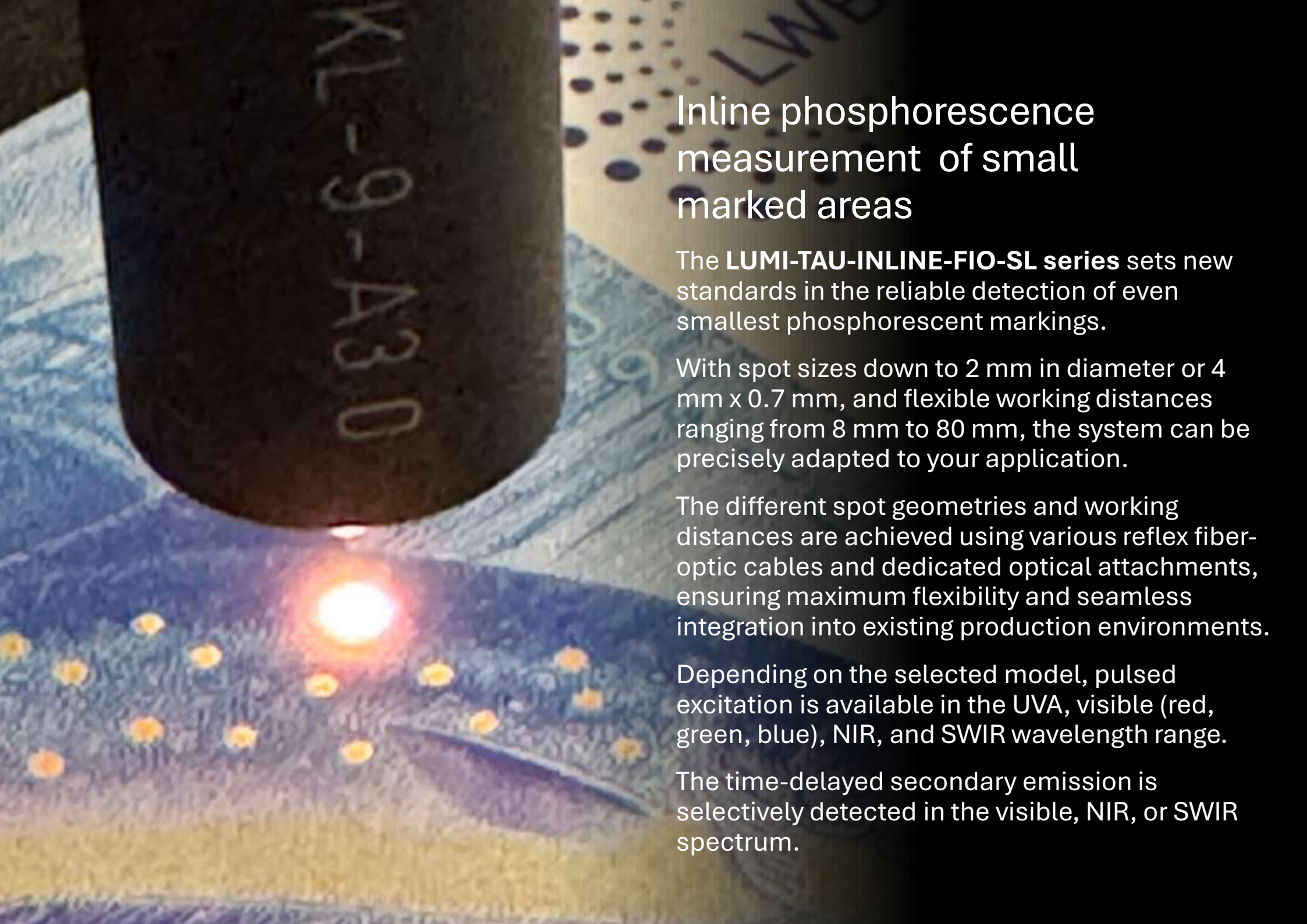
Pin:	assignment:
1	+24 V (+Ub)
2	GND (0V)
3	RxD
4	TxD



LUMI-TAU-INLINE-SL-IR/IR

incl. Windows®-Software LUMI-INLINE-SL-Scope





Inline phosphorescence measurement of small marked areas

The **LUMI-TAU-INLINE-FIO-SL series** sets new standards in the reliable detection of even smallest phosphorescent markings.

With spot sizes down to 2 mm in diameter or 4 mm x 0.7 mm, and flexible working distances ranging from 8 mm to 80 mm, the system can be precisely adapted to your application.

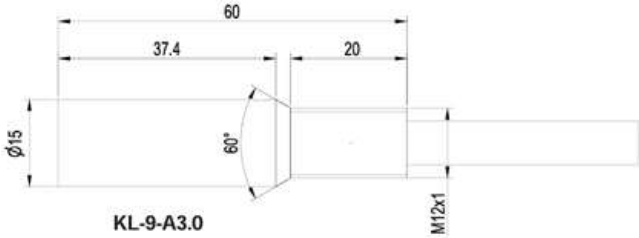
The different spot geometries and working distances are achieved using various reflex fiber-optic cables and dedicated optical attachments, ensuring maximum flexibility and seamless integration into existing production environments.

Depending on the selected model, pulsed excitation is available in the UVA, visible (red, green, blue), NIR, and SWIR wavelength range.

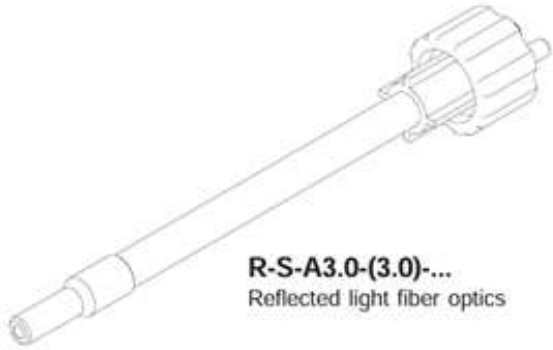
The time-delayed secondary emission is selectively detected in the visible, NIR, or SWIR spectrum.

LUMI-TAU-INLINE-FIO-SL series

- Monitoring of UP or DOWN converters with regard to concentration ("INTensity")
- Monitoring of relaxation times (time constants "TAU")
- PC software for trend display and tolerance exceedance of concentration (INT) and time constants (TAU)
- Up to 2 analog outputs (0 V...+10 V or 4 mA...20 mA) for outputting concentration (INT) ot time constants (TAU)
- Up to 6 switching outputs for selectable output of various information
- Up to 5 digital inputs for controlling various sensor functions
- PC software for parameterization of the measurement System
- Large detection area (typ. 25 mm dia.)
- IR LEDs, typ. 940nm, class 1
- Scratch-resistant IR filter glass
- RS232 interface (USB- , Ethernet- and Profinet- adapter available)
- RS485 interface (optional)
- Optical fiber interface (suitable for R-S-... optical fiber types)
- Various frontends available (KL-...)
- Working range: depending on the KL-frontend (typ. 8 mm ... 80 mm)
- Spot size at working distance (typ. 2 mm ... 6 mm dia. or 4 mm x 0.7 mm ... 12 mm x 2 mm depending on the optical front end and working distance



KL-9-A3.0



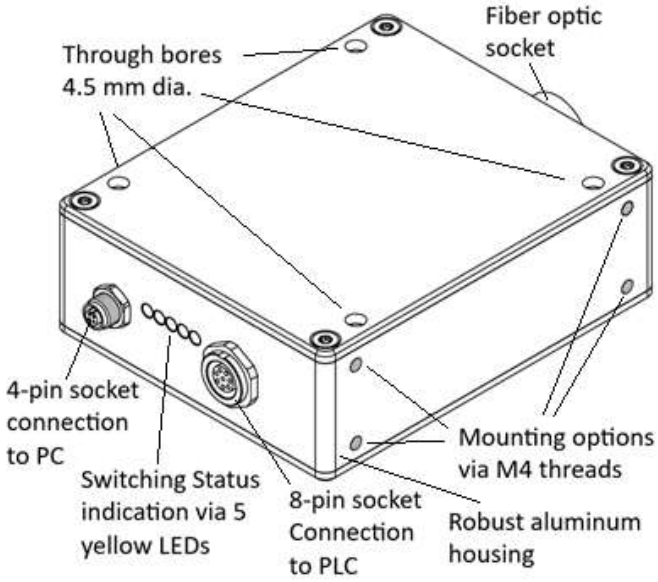
R-S-A3.0-(3.0)-...
Reflected light fiber optics

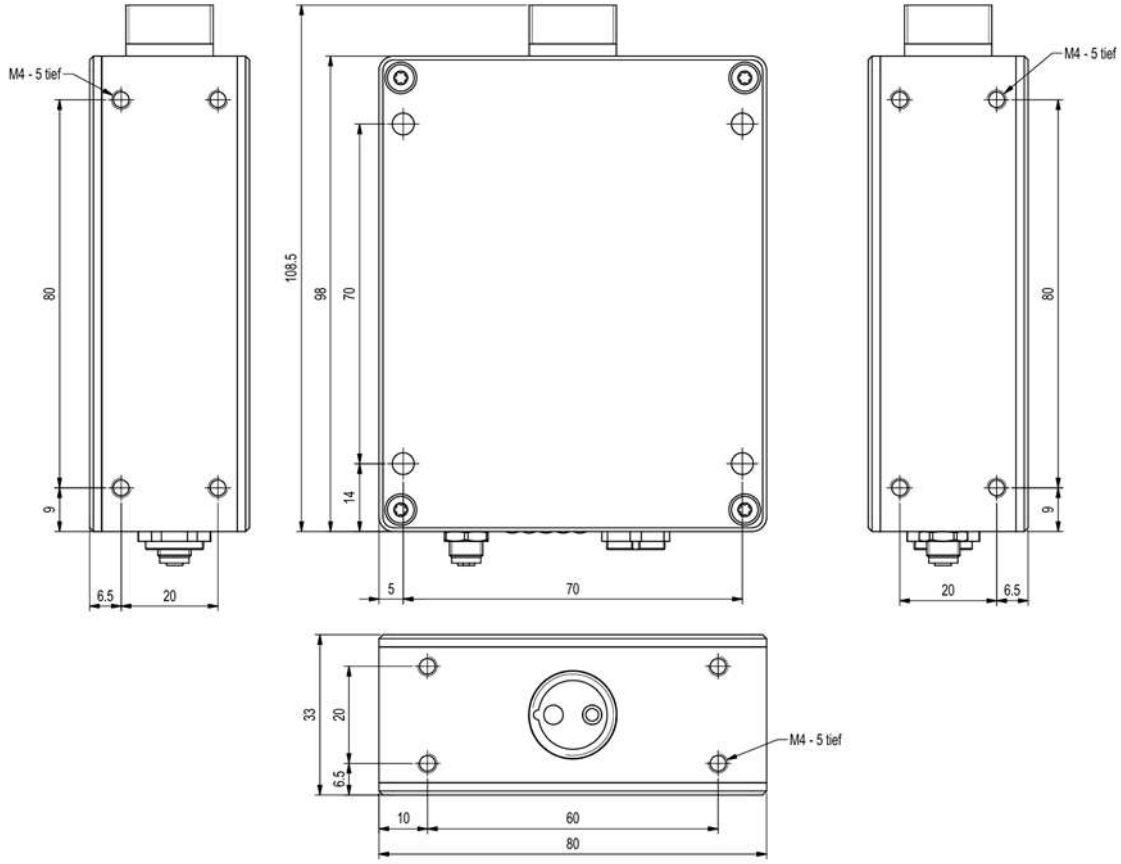
Connection to PLC:
8-pin socket, Binder Series 712

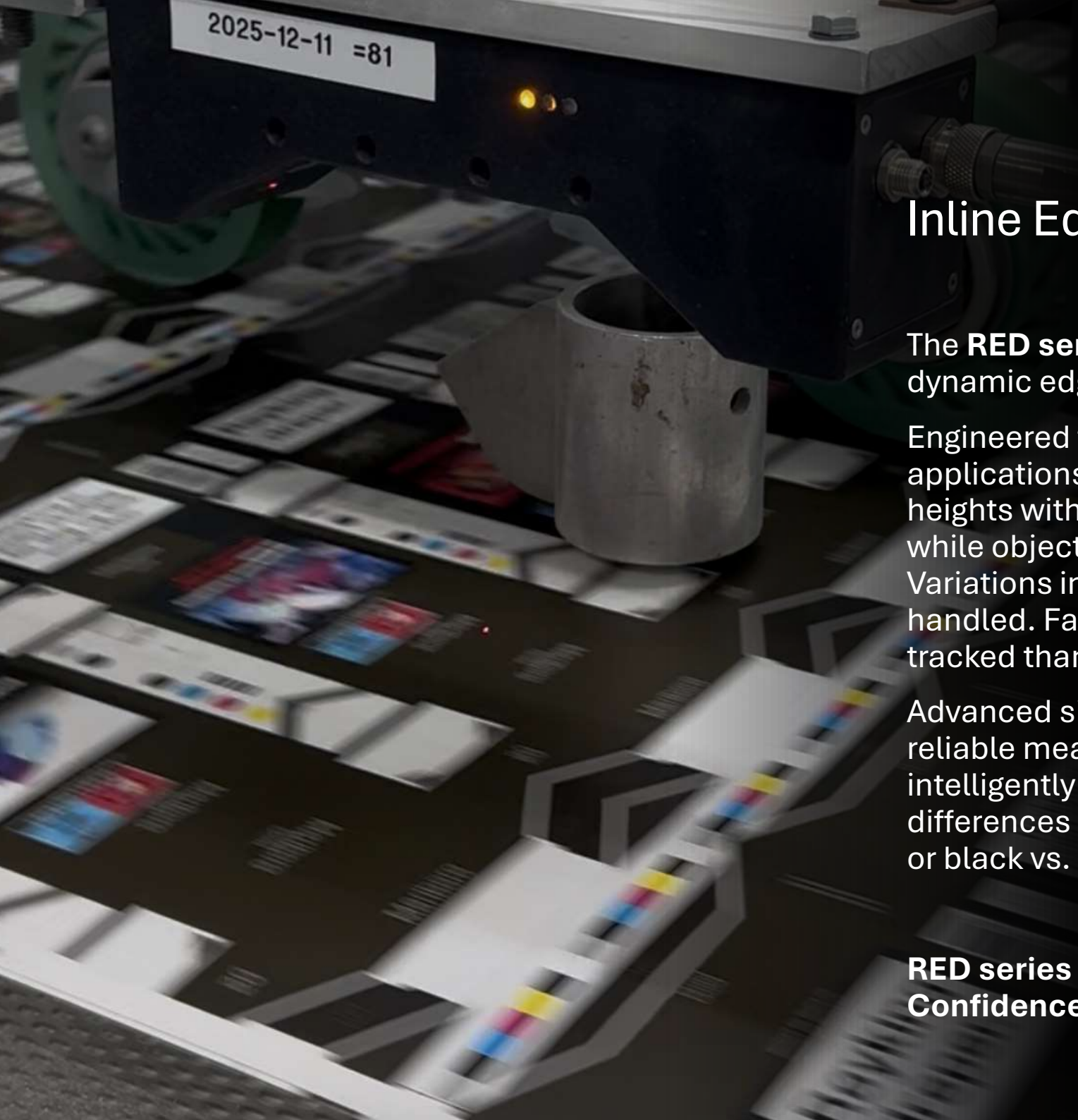
Pin	Color	Assignment
1	white	GND (0V)
2	brown	+24V (+/- 10%)
3	green	I/O
4	yellow	I/O
5	grey	I/O
6	pink	I/O
7	blue	I/O
8	red	I/O

Connection to PC:
4-pin socket, Binder Series 707

Pin:	assignment:
1	+24 V (+Ub)
2	GND (0V)
3	RxD
4	TxD







Inline Edge Detection

The **RED series** sets a new benchmark in dynamic edge detection.

Engineered for high-performance applications, it captures ultra-fine edge heights with outstanding precision – even while objects are moving at high speed. Variations in object distance? Seamlessly handled. Fast production lines? Effortlessly tracked thanks to its exceptional scan rate.

Advanced signal processing ensures reliable measurement results and intelligently compensates for surface differences such as matte vs. glossy or black vs. white.

RED series – Precision in Motion.
Confidence in Every Edge.

Function principle of the RED - sensor

The laser sensors of **RED series** comprise a laser transmitter and two receivers. As shown in the picture, the laser beam is focussed at an angle onto the edge opposite to the direction of feed. When the edge arrives, it blocks the beam path receiver CH1, whereas the signal at receiver CH0 slightly increases due to the more favourable angle of impringement.

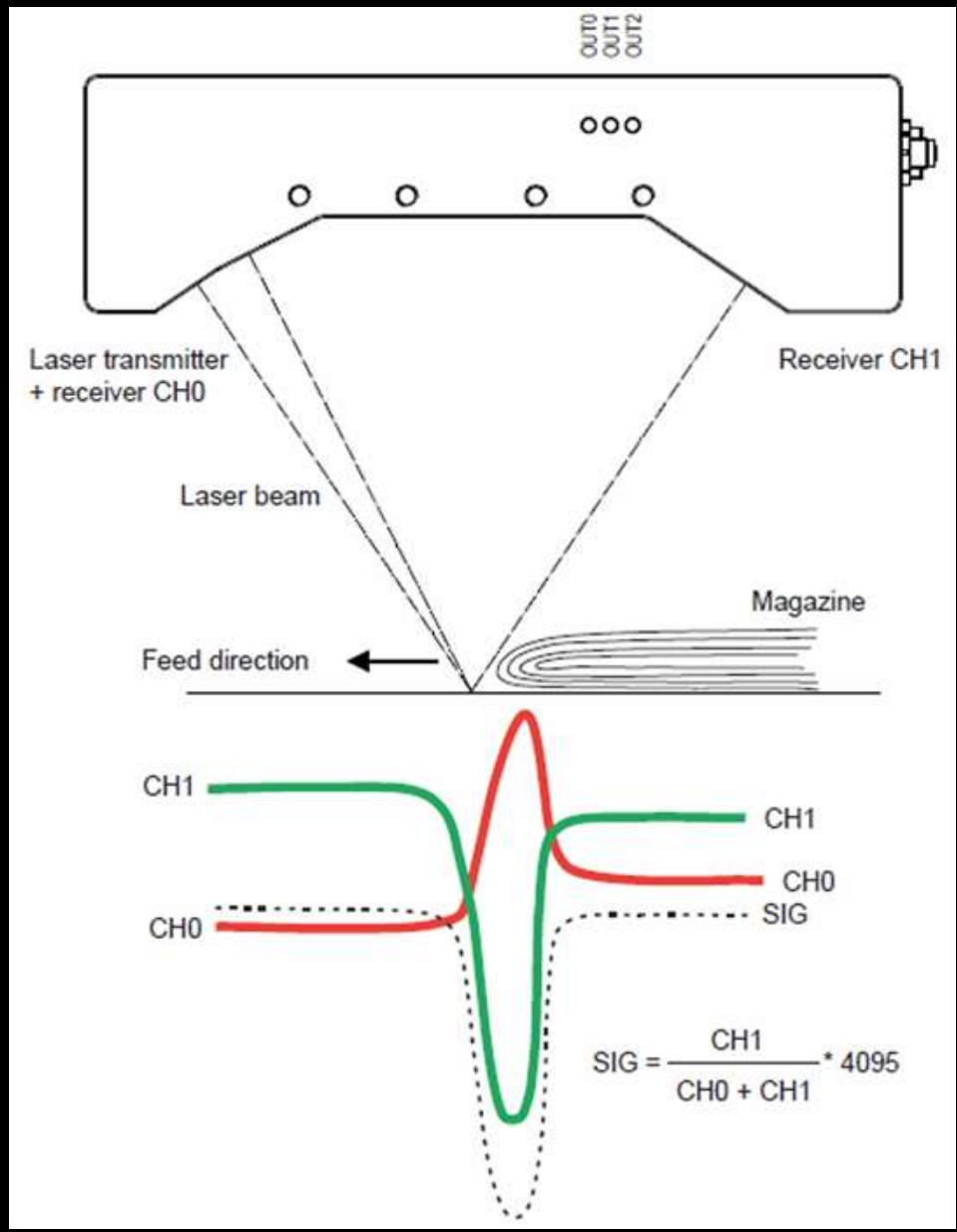
The standardised value of signals **CH0** and **CH1** is used at the starting signal **SIG** for all further algorithms of the sensor.

RED-55-P / -L

RED-60-CLS-P / -L

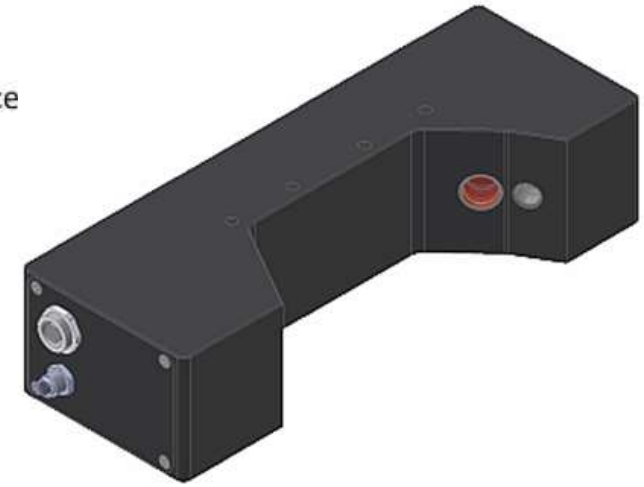
RED-110-P / -L

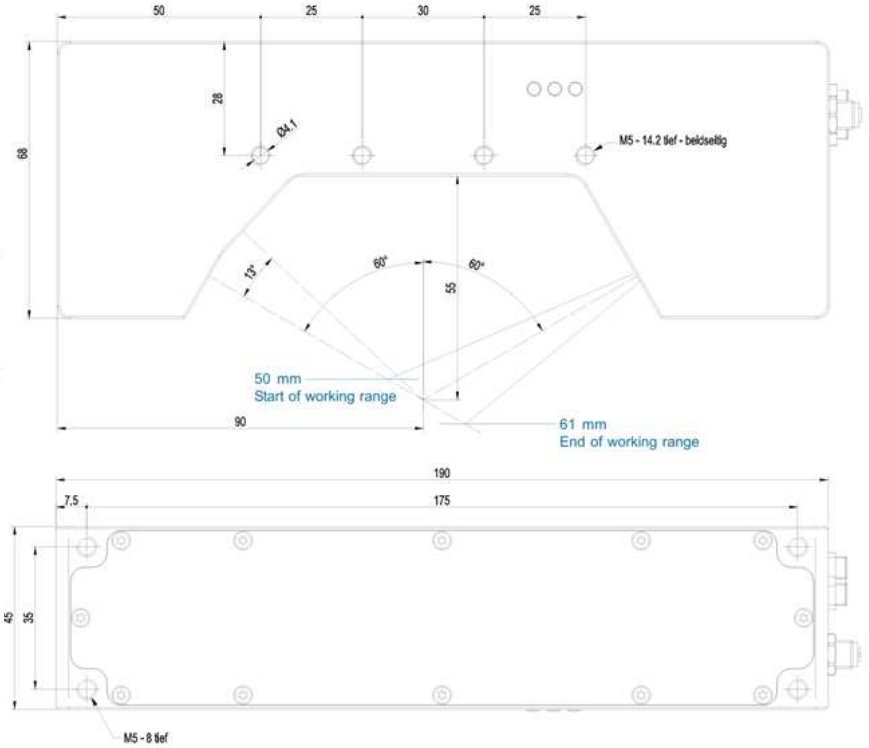
RED-110-XL-P / -L



RED-55-P/-L

- Reference distance: 55 mm
- Working range: typ. 50 mm ... 61 mm
- Laser power automatic adjusted to the product
- Extern trigger mode available
- Proof edge detection even with changing surface quality (glossy/matt, dark/bright)
- High scan frequency max. 85 kHz
- Insensitive to outside light (interference filter, pulsed laser light)
- RS232 interface (USB-, Ethernet- and Profinet-Adapter available
- 2 digital inputs (IN0, IN1)
- 3 digital Outputs (OUT0, OUT1, OUT2)
- Switching frequency max. 60 kHz
- 1 analog output (0V ... +10 V or 4 mA ... 20 mA)
- Analog bandwidth typ. 90 kHz (-3 dB)
- Switching state indication via 3 LEDs (OUT0, OUT1, OUT2)





Connection to PLC:

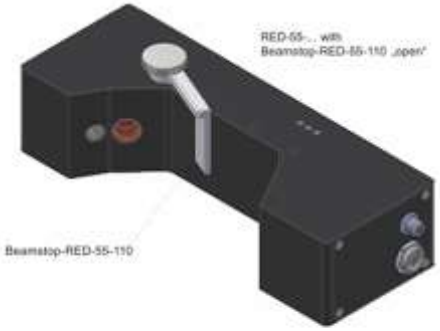
8-pole fem. connector Binder Series 712

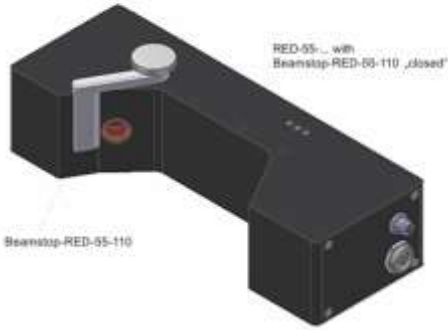
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (± 10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
7	blue	OUT2 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
8	red	ANALOG (0V...+10V or 4mA...20mA)

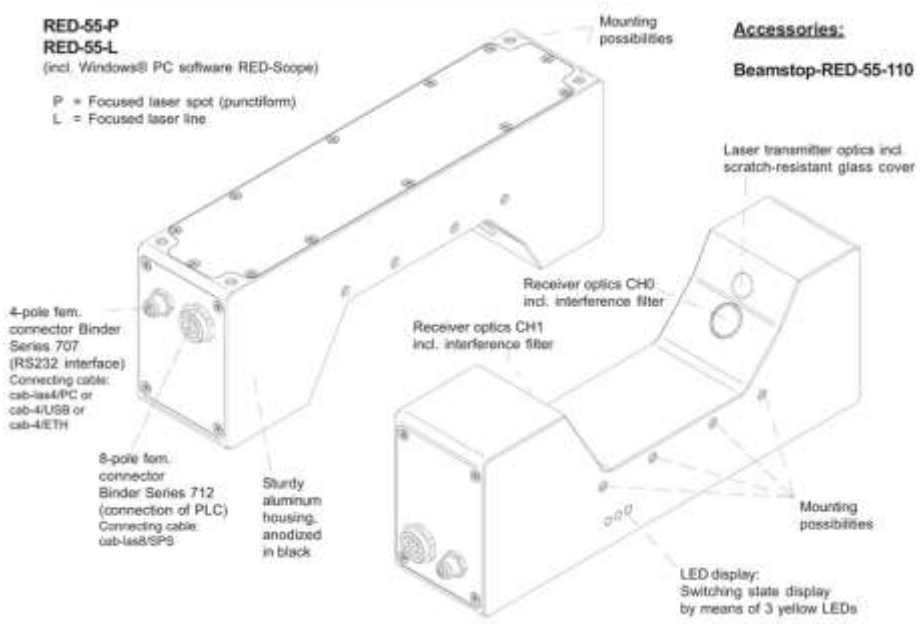
Connection to PC:

4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

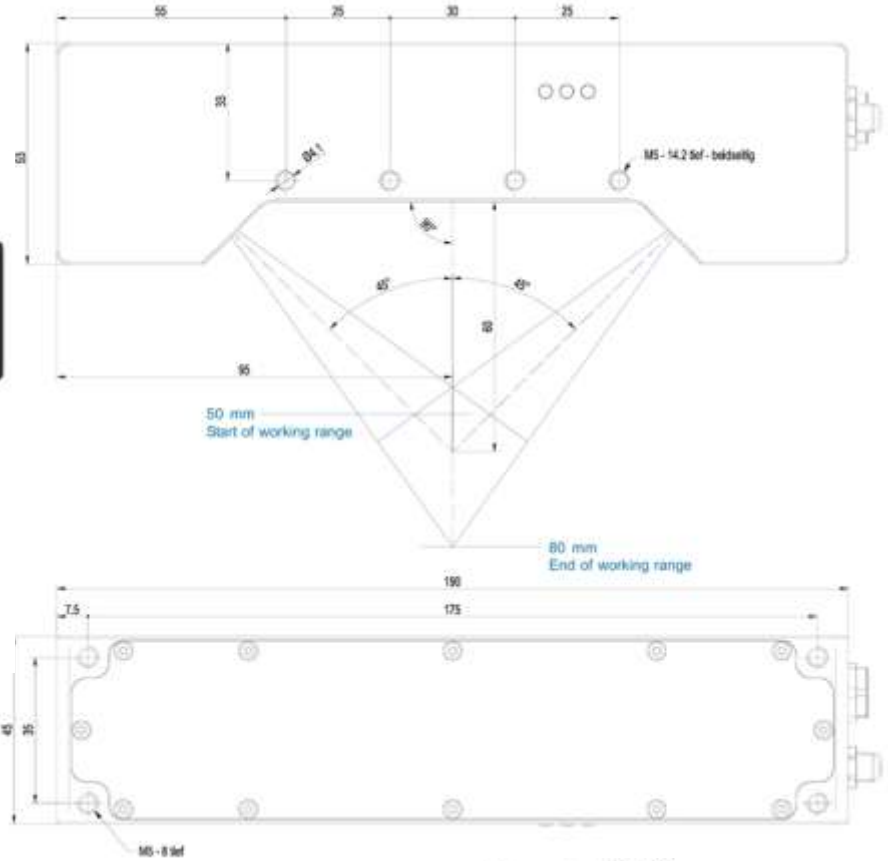






RED-60-CLS-P/-L

- Reference distance: 60 mm
- Working range: typ. 50 mm ... 80 mm
- Laser power automatic adjusted to the product
- Extern trigger mode available
- Proof edge detection even with changing surface quality (glossy/matt, dark/bright)
- High scan frequency max. 85 kHz
- Insensitive to outside light (interference filter, pulsed laser light)
- RS232 interface (USB-, Ethernet- and Profinet-Adapter available
- 2 digital inputs (IN0, IN1)
- 3 digital Outputs (OUT0, OUT1, OUT2)
- Switching frequency max. 60 kHz
- 1 analog output (0V ... +10 V or 4 mA ... 20 mA)
- Analog bandwidth typ. 90 kHz (-3 dB)
- Switching state indication via 3 LEDs (OUT0, OUT1, OUT2)

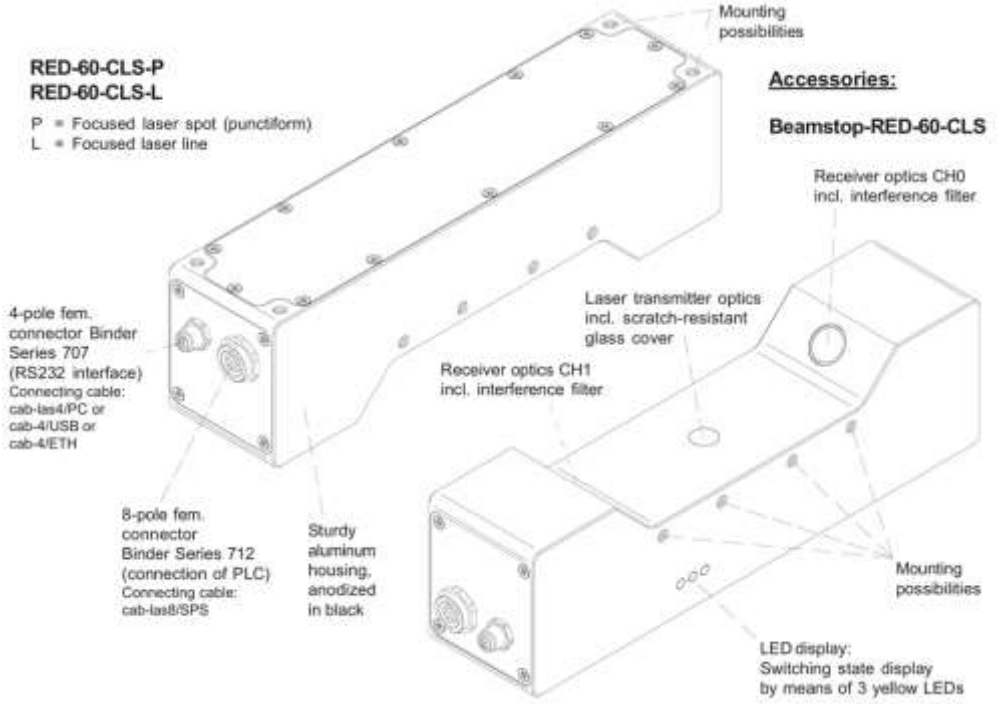


Connection to PLC:
8-pole fem. connector Binder Series 712

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (± 10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%
6	pink or black	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%
7	blue	OUT2 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%
8	red	ANALOG (0V...+10V or 4mA...20mA)

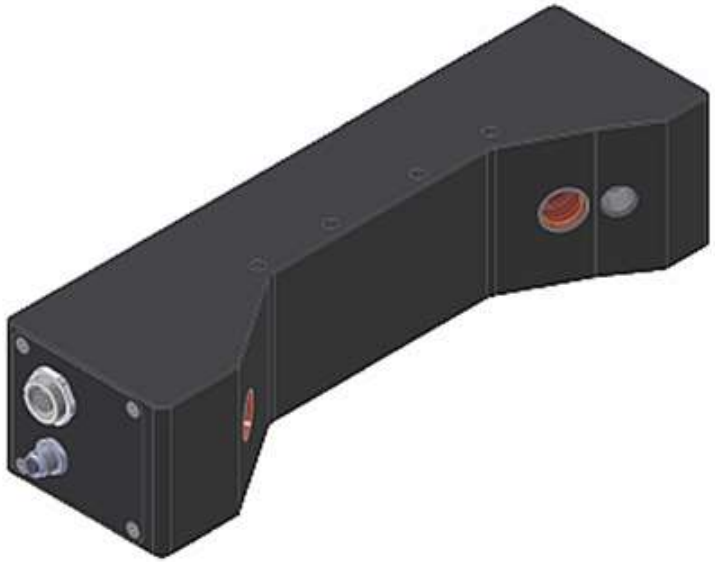
Connection to PC:
4-pole fem. connector Binder Series 707

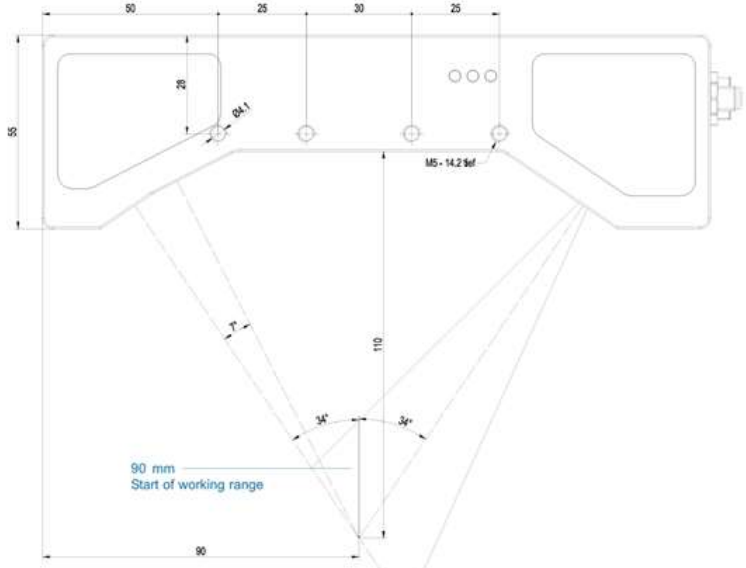
Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD



RED-110-P/-L

- Reference distance: 110 mm
- Working range: typ. 90 mm ... 130 mm
- Laser power automatic adjusted to the product
- Extern trigger mode available
- Proof edge detection even with changing surface quality (glossy/matt, dark/bright)
- High scan frequency max. 116 kHz
- Insensitive to outside light (interference filter, pulsed laser light)
- RS232 interface (USB-, Ethernet- and Profinet-Adapter available
- 2 digital inputs (IN0, IN1)
- 3 digital Outputs (OUT0, OUT1, OUT2)
- Switching frequency max. 60 kHz
- 1 analog output (0V ... +10 V or 4 mA ... 20 mA)
- Analog bandwidth typ. 90 kHz (-3 dB)
- Switching state indication via 3 LEDs (OUT0, OUT1, OUT2)



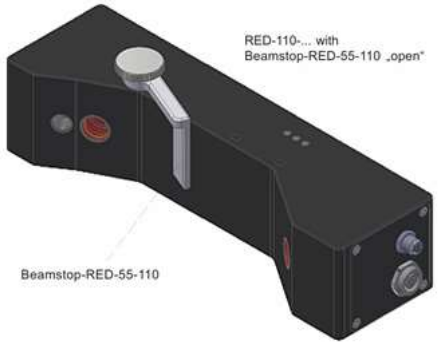


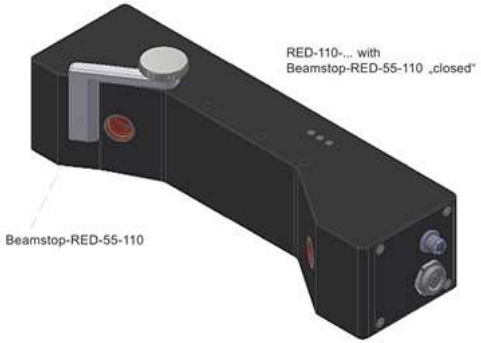
Connection to PLC:
8-pole fem. connector Binder Series 712

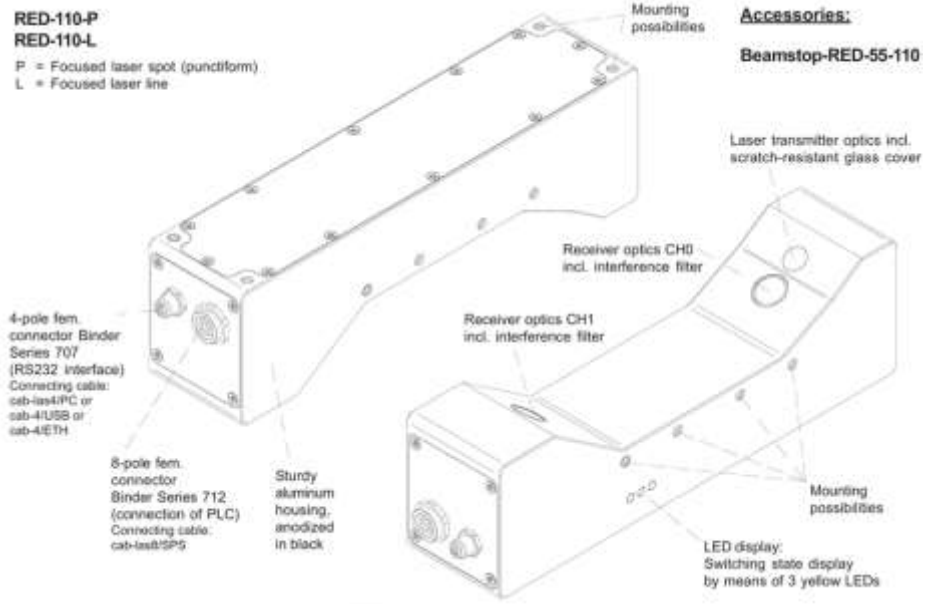
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (± 10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
7	blue	OUT2 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
8	red	ANALOG (0V...+10V or 4mA...20mA)

Connection to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

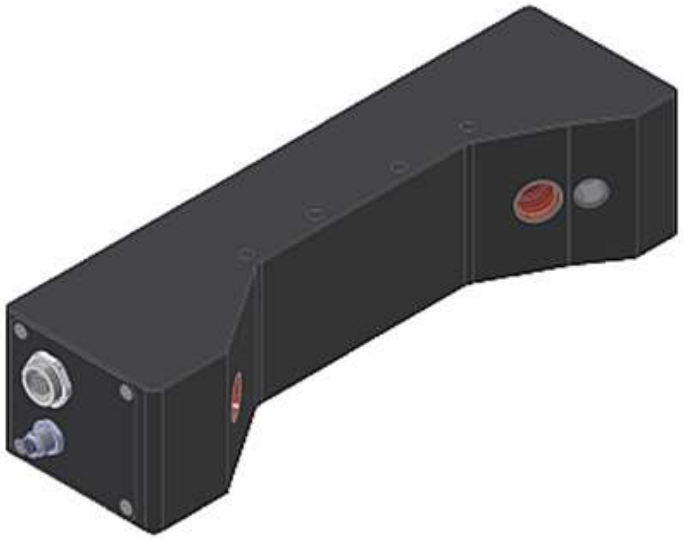


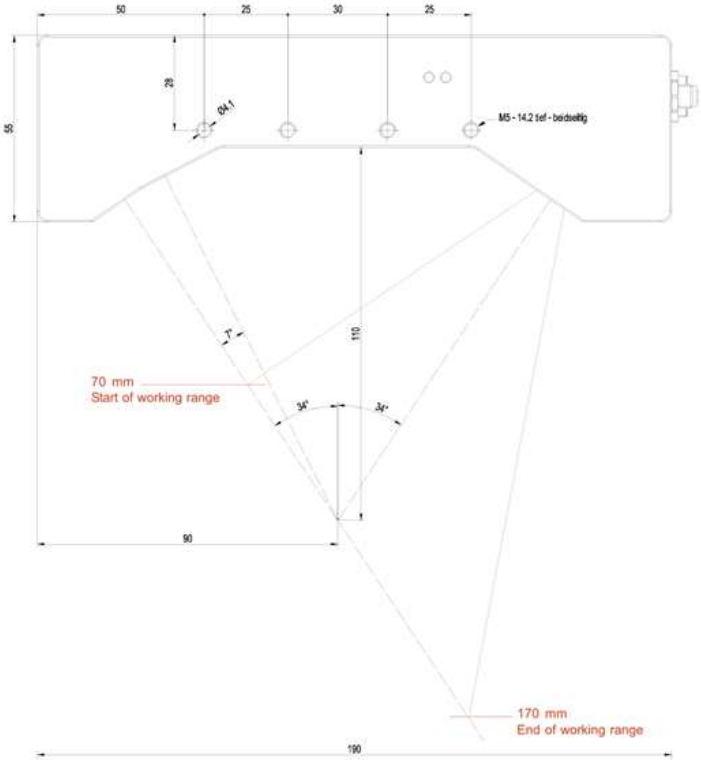




RED-110-XL-P/-L

- Reference distance: 110 mm
- Working range: typ. 70 mm ... 170 mm
- Laser power automatic adjusted to the product
- Extern trigger mode available
- Proof edge detection even with changing surface quality (glossy/matt, dark/bright)
- High scan frequency max. 85 kHz
- Insensitive to outside light (interference filter, pulsed laser light)
- RS232 interface (USB-, Ethernet- and Profinet-Adapter available
- 2 digital inputs (IN0, IN1)
- 3 digital Outputs (OUT0, OUT1, OUT2)
- Switching frequency max. 60 kHz
- 1 analog output (0V ... +10 V or 4 mA ... 20 mA)
- Analog bandwidth typ. 90 kHz (-3 dB)
- Switching state indication via 3 LEDs (OUT0, OUT1, OUT2)





Connection to PLC:

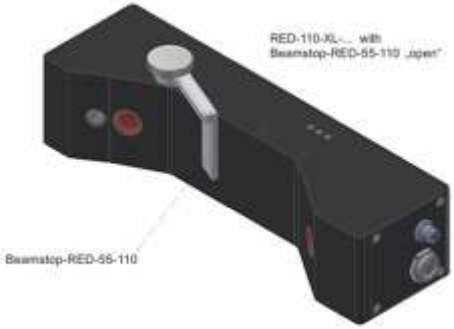
8-pole fem. connector Binder Series 712

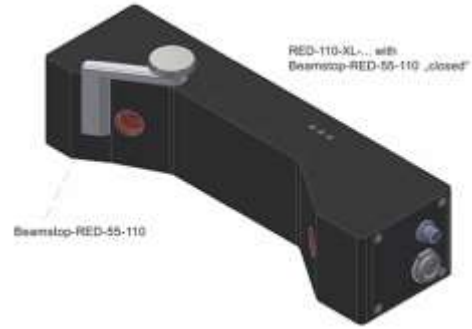
Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (± 10%)
3	green	IN0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
4	yellow	IN1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
5	grey	OUT0 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
6	pink or black	OUT1 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
7	blue	OUT2 (Digital 0: 0 ... 1V, Digital 1: +Ub - 10%)
8	red	ANALOG (0V...+10V or 4mA...20mA)

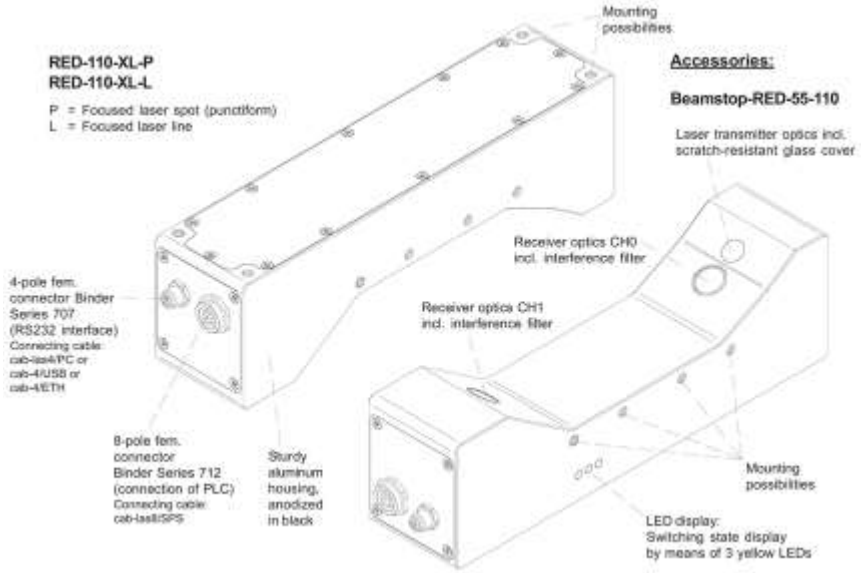
Connection to PC:

4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD







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Maintain control over the surface properties

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