

# HRTL 53 "XL" Laser diffuse reflection light scanner with background suppression

en 02-2016/08 50133836-01



**20 ... 450mm**  
250mm with  
black-white error < 10%



10 - 30 V  
DC

2 kHz

A<sup>2</sup>LS

stainless  
steel  
316 L

- Laser diffuse reflection light scanner with visible red light and adjustable background suppression
- 316L stainless steel housing in Hygiene-Design
- Enclosed optics design prevents bacterial carry-overs
- ECOLAB and CleanProof+ tested
- Paperless device identification
- Plastic front cover
- Exact scanning range adjustment through 8-turn potentiometer
- Line-shaped laser light spot permits precise object detection along the line
- Laser class 2

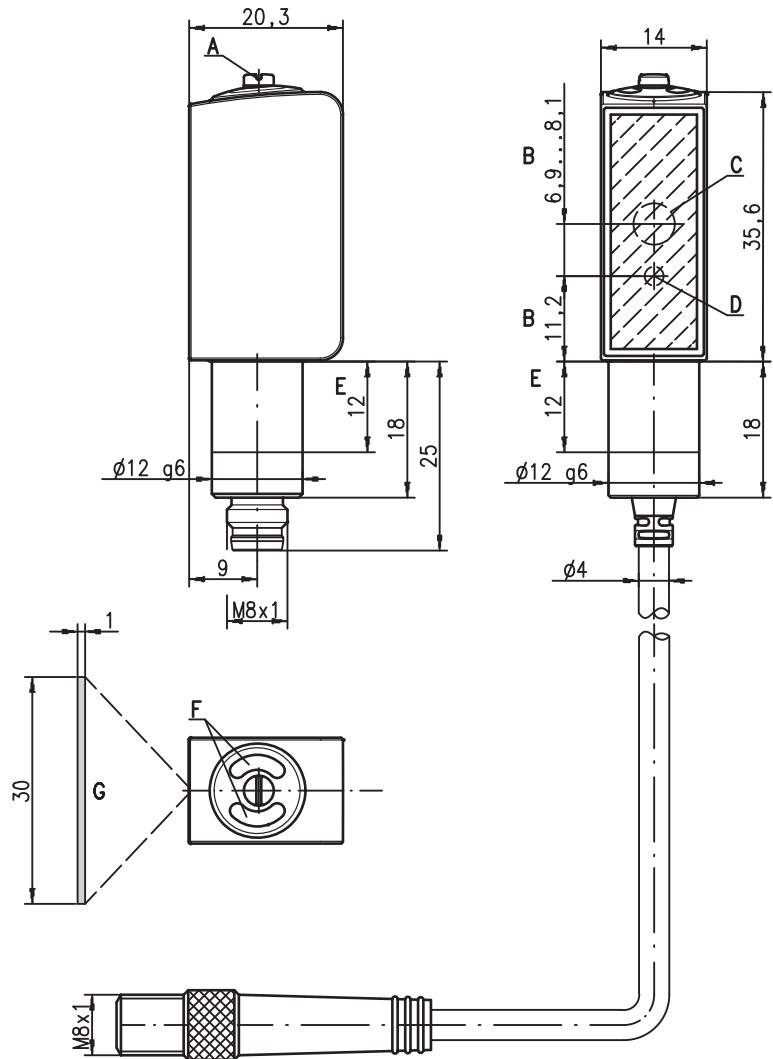


## Accessories:

(available separately)

- Mounting systems (BT 3...)
- Cable with M8 or M12 connector (K-D ...)
- Mounting devices

## Dimensioned drawing



- A** 8-turn potentiometer for scanning range adjustment
- B** Optical axis
- C** Receiver
- D** Transmitter
- E** Permissible clamping range
- F** Indicator diodes
- G** Light spot 1x30mm at scanning range 50mm

## Electrical connection

### Plug connection, 4-pin

10-30V DC +	1	br/BN
OUT 2	2	ws/WH
GND	3	bl/BU
OUT 1	4	sw/BK

### Cable, 4 wires

10-30V DC +	br/BN
OUT 2	ws/WH
GND	bl/BU
OUT 1	sw/BK

### Plug connection, 3-pin

10-30V DC +	1	br/BN
GND	3	bl/BU
OUT 1	4	sw/BK

We reserve the right to make changes • DS\_HRTL53XL\_en\_50133836\_01.fm

## Specifications

### Optical data

Typ. scanning range limit <sup>1)</sup>  
Scanning range <sup>2)</sup>  
Adjustment range of the switching point  
Black/white error < 10% up to  
Light spot  
Light source <sup>3)</sup>  
Laser class  
Wavelength  
Max. output power  
Pulse duration

### Laser class 2

20 ... 450mm  
see tables  
20 ... 450mm  
250mm  
approx. 1 x 30mm<sup>2</sup> at 50mm  
laser, pulsed  
2 according to IEC 60825-1:2007  
650nm (visible red light)  
< 3,3mW  
7,6µs

### Timing

Switching frequency  
Response time  
Response jitter  
Decay time  
Delay before start-up

2,000Hz  
0,25ms  
typ. 65µs  
0,25ms  
≤ 300ms

### Electrical data

Operating voltage  $U_B$  <sup>4)</sup>  
Residual ripple  
Open-circuit current  
Switching output  
Signal voltage high/low  
Output current  
Scanning range

10 ... 30VDC (incl. residual ripple)  
≤ 10% of  $U_B$   
≤ 20mA  
2 push-pull switching outputs  
pin 2: PNP dark switching, NPN light switching  
pin 4: PNP light switching, NPN dark switching  
1 push-pull switching output  
pin 4: PNP light switching, NPN dark switching  
≥ ( $U_B - 2V$ ) ≤ 2V  
max. 100mA  
adjustable via 8-turn spindle

### Indicators

Green LED  
Yellow LED

ready  
object detected - reflection

### Mechanical data

Housing  
Housing design  
Housing roughness <sup>6)</sup>  
Connector  
Optics cover  
Operation  
Weight

AlSi 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404  
HYGIENE-Design  
 $R_a \leq 2.5$   
AlSi 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404  
plastic (PMMA)  
plastic (TPV - PE), non-diffusive  
with M8 connector: 50g  
with 200mm cable and M8 connector: 60g  
with 5000mm cable: 110g  
M8 connector, 4-pin or 3-pin,  
0,2m cable with M8 connector, 4-pin,  
5m cable, 4 x 0,20mm<sup>2</sup>  
via fit (see "Remarks")  
3 Nm (permissible range, see dimensioned drawing)

### Connection type

Fastening  
Max. tightening torque

### Environmental data

Ambient temp. (operation/storage) <sup>7)</sup>  
Protective circuit <sup>8)</sup>  
VDE safety class  
Protection class  
Environmentally tested acc. to  
Standards applied  
Certifications  
Chemical resistance

-30°C ... +70°C/-30°C ... +70°C  
2, 3  
III  
IP 67, IP 69K<sup>9)</sup>  
ECOLAB, CleanProof+  
IEC 60947-5-2  
UL 508 <sup>4)</sup>  
tested in accordance with ECOLAB and CleanProof+ (see Remarks)

- 1) Typ. scan. range limit/adjustment range: max. achievable scanning range/adjustment range for light objects (white 90%)
- 2) Scanning range: recommended scanning range for objects with different diffuse reflection
- 3) Average life expectancy 50,000h at an ambient temperature of 25°C
- 4) For UL applications: for use in class 2 circuits according to NEC only
- 5) The push-pull switching outputs must not be connected in parallel
- 6) Typical value for the stainless steel housing
- 7) Operating temperatures of +70°C permissible only briefly (≤ 15min)
- 8) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
- 9) Only with internal tube mounting of the M8 connector

### UL REQUIREMENTS

Enclosure Type Rating: Type 1  
**For Use in NFPA 79 Applications only.**  
Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers information.  
**CAUTION** – the use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.  
**ATTENTION** ! Si d'autres dispositifs d'alignement que ceux préconisés ici sont utilisés ou s'il est procédé autrement qu'indiqué, cela peut entraîner une exposition à des rayonnements et un danger pour les personnes.

## Tables

### Models of laser class 2:

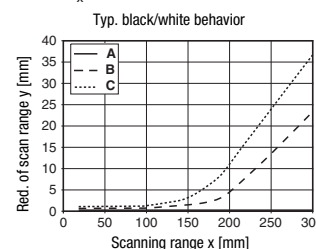
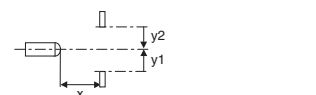
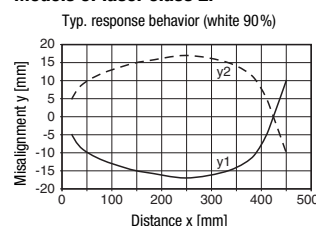
1	20	450
2	20	350
3	20	250

1	white 90%
2	gray 18%
3	black 6%

Scanning range [mm]

## Diagrams

### Models of laser class 2:



- A white 90%
- B gray 18%
- C black 6%



## Remarks

### Operate in accordance with intended use!

- ⚠ This product is not a safety sensor and is not intended as personnel protection.
- ⚠ The product may only be put into operation by competent persons.
- ⚠ Only use the product in accordance with the intended use.

- A list of tested chemicals can be found in the first part of the product description.
- Only secure in designated area using set screw.  
Max. tightening torque 3Nm.

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## Laser safety notices



### ATTENTION, LASER RADIATION – LASER CLASS 2

#### Never look directly into the beam!

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product in **laser class 2** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to "Laser Notice No. 50" from June 24th, 2007.

- ⚠ Never look directly into the laser beam or in the direction of reflecting laser beams!  
If you look into the beam path over a longer time period, there is a risk of injury to the retina.
- ⚠ Do not point the laser beam of the device at persons!
- ⚠ Intercept the laser beam with an opaque, non-reflective object if the laser beam is accidentally directed towards a person.
- ⚠ When mounting and aligning the device, avoid reflections of the laser beam off reflective surfaces!
- ⚠ CAUTION! Use of controls or adjustments or performance of procedures other than specified herein may result in hazardous light exposure.
- ⚠ Adhere to the applicable legal and local regulations regarding protection from laser beams.
- ⚠ The device must not be tampered with and must not be changed in any way.  
There are no user-serviceable parts inside the device.  
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

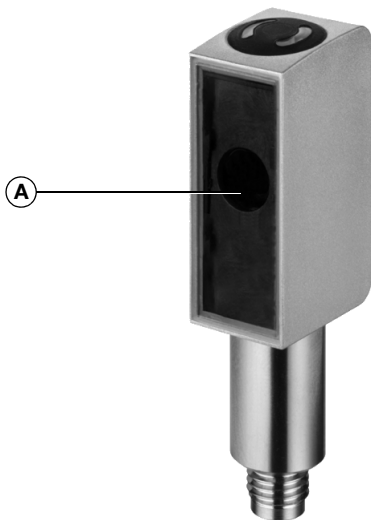
## NOTICE

### Affix laser information and warning signs!

Laser information and warning signs are not affixed to the device (see ①). In addition, self-adhesive laser information and warning signs (stick-on labels) are supplied in several languages (see ②).

- ⚠ Affix the laser information sheet with the language appropriate for the place of use to the device.  
When using the device in the US, use the stick-on label with the "Complies with 21 CFR 1040.10" notice.
- ⚠ Affix the laser information and warning signs near the device if no signs are attached to the device (e.g. because the device is too small) or if the attached laser information and warning signs are concealed due to the installation position.  
Affix the laser information and warning signs so that they are legible without exposing the reader to the laser radiation of the device or other optical radiation.

①



A Laser exit opening

②

**50115039-02**

<p style="text-align: center;"><b>LASERSTRAHLUNG</b> NICHT IN DEN STRAHL BLICKEN</p> <p>Max. Leistung (peak): 3.3 mW Impulsdauer: 7.6 µs Wellenlänge: 650 nm</p> <p style="text-align: center;"><b>LASER KLASSE 2</b> DIN EN 60825-1:2008-05</p>	<p style="text-align: center;"><b>RADIAZIONE LASER</b> NON FISSARE IL FASCIO</p> <p>Potenza max. (peak): 3.3 mW Durata dell'impulso: 7.6 µs Lunghezza d'onda: 650 nm</p> <p style="text-align: center;"><b>APPARECCHIO LASER DI CLASSE 2</b> EN 60825-1:2007</p>
<p style="text-align: center;"><b>LASER RADIATION</b> DO NOT STARE INTO BEAM</p> <p>Maximum Output (peak): 3.3 mW Pulse duration: 7.6 µs Wavelength: 650 nm</p> <p style="text-align: center;"><b>CLASS 2 LASER PRODUCT</b> EN 60825-1:2007</p>	<p style="text-align: center;"><b>RAYONNEMENT LASER</b> NE PAS REGARDER DANS LE FASCEAU</p> <p>Puissance max. (crête): 3.3 mW Durée d'impulsion: 7.6 µs Longueur d'onde: 650 nm</p> <p style="text-align: center;"><b>APPAREIL A LASER DE CLASSE 2</b> EN 60825-1:2007</p>
<p>AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE</p>	
<p>EXPOSITION DANGEREUSE – UN RAYONNEMENT LASER EST ÉMIS PAR CETTE OUVERTURE</p>	

<p style="text-align: center;"><b>RADIACIÓN LASER</b> NO MIRAR FIJAMENTE AL HAZ</p> <p>Potencia máx. (peak): 3.3 mW Duración del impulso: 7.6 µs Longitud de onda: 650 nm</p> <p style="text-align: center;"><b>PRODUCTO LASER DE CLASE 2</b> EN 60825-1:2007</p>	<p style="text-align: center;"><b>RADIAÇÃO LASER</b> NÃO OLHAR FIXAMENTE O FEIXE</p> <p>Potência máx. (peak): 3.3 mW Período de pulso: 7.6 µs Comprimento de onda: 650 nm</p> <p style="text-align: center;"><b>EQUIPAMENTO LASER CLASSE 2</b> EN 60825-1:2007</p>
<p style="text-align: center;"><b>LASER RADIATION</b> DO NOT STARE INTO BEAM</p> <p>Maximum Output (peak): 3.3 mW Pulse duration: 7.6 µs Wavelength: 650 nm</p> <p style="text-align: center;"><b>CLASS 2 LASER PRODUCT</b> IEC 60825-1:2007 Complies with 21 CFR 1040.10</p>	<p style="text-align: center;"><b>激光辐射</b> 勿直视光束</p> <p>最大输出 (峰值): 3.3 mW 脉冲持续时间: 7.6 µs 波长: 650 nm</p> <p style="text-align: center;"><b>2 类激光产品</b> GB7247.1-2012</p>

## Part number code

H	R	T	L		5	3	/	6	6	.	C	2	-	X	L	-	S	8
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### Operating principle

**HRT** Diffuse reflection light scanners with background suppression

### Operating principle

**L** Laser (red light)

### Construction/version

**53** 53 Series

### Switching output/function (OUT 1: pin 4, OUT 2: pin 2)

**/66** 2 x push-pull transistor output, OUT 1: light switching, OUT 2: dark switching

**/6** 1 x push-pull transistor output, OUT 1: light switching, OUT 2: not connected (n. c.)

### Equipment

**N/A** Laser class 1 in accordance with IEC 60825-1

**.C2** Laser class 2 in accordance with IEC 60825-1

### Light spot

**-XL** Wide line-shaped laser light spot

### Electrical connection

**N/A** Cable, PVC, standard length 2000 mm, 4-wire

**-S8.3** M8 connector, 3 pin (plug)

**-S8** M8 connector, 4 pin (plug)

**,200-S12** Cable, PVC, length 200 mm with M 12 connector, 4 pin, axial (plug)

**,5000** Cable, PVC, standard length 5000 mm, 4-wire

## Order guide

The sensors listed here are preferred types; current information at [www.leuze.com](http://www.leuze.com)

### Order code

HRTL 53/66.C2-XL-S8

### Part no.

50134589

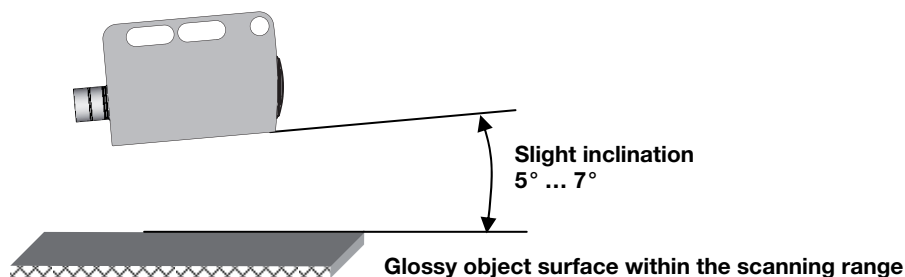
## HRTL 53 "XL" Laser diffuse reflection light scanner with background suppression

### Application notes



- **Detection of glossy surfaces within the scanning range:**

When detecting glossy surfaces (e.g. metals), the light beam should not hit the object surface at a right angle. A slight inclination suffices to prevent undesirable direct reflections. The following rule of thumb applies: the smaller the scanning range, the larger the angle of the inclination (approx.  $5^\circ \dots 7^\circ$ ).

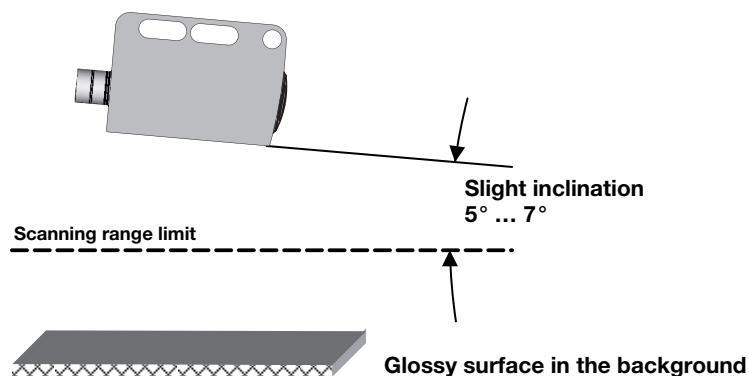


- **Avoiding interference from glossy surfaces in the background:**

If a glossy surface is in the background (distance larger than scanning range limit), reflections may cause interfering signals. These may be avoided by mounting the device at a slight angle (see figure below).

**Attention!**

It is imperative to note the task and the associated inclination of the scanner of approx.  $5^\circ \dots 7^\circ$ .



- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to the scanning range limit.
- The sensors are equipped with effective measures for the maximum avoidance of mutual interference should they be mounted opposite one another. Opposite mounting of multiple sensors of the same type should, however, absolutely be avoided.

