

**HRTL 53 Laser diffuse reflection light scanner with background suppression**

en 01-2011/02 50108094



**10 ... 400mm**  
170mm with  
black-white error < 10%

10 - 30 V  
DC

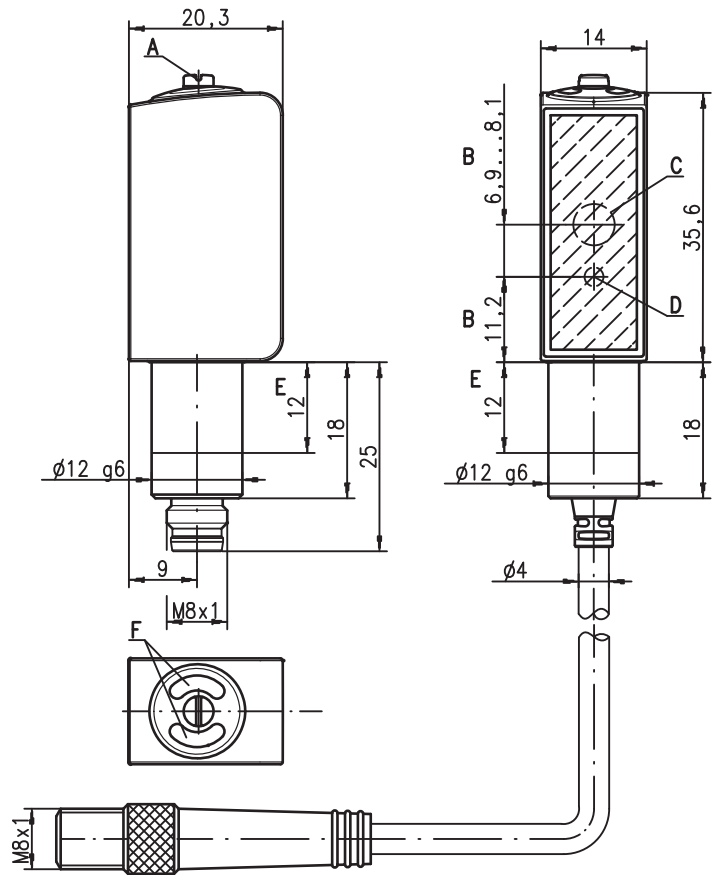
2 kHz

A<sup>2</sup>LS

stainless steel  
316 L

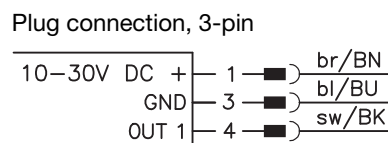
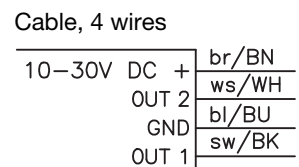
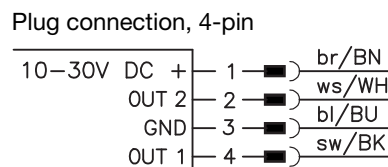
- Laser diffuse reflection light scanner with visible red light and adjustable background suppression
- 316L stainless steel housing in Hygiene-Design
- Enclosed optics design prevents bacterial carry-overs
- ECOLAB and CleanProof+ tested
- Paperless device identification
- Plastic front cover
- Exact scanning range adjustment through 8-turn potentiometer
- Collimated light beam propagation with small beam diameter permits identical switching behavior within the specified scanning range

**Dimensioned drawing**



- A** 8-turn potentiometer for scanning range adjustment
- B** Optical axis
- C** Receiver
- D** Transmitter
- E** Permissible clamping range
- F** Indicator diode

**Electrical connection**



We reserve the right to make changes • DS\_HRTL53\_en.fm

CE, UL LISTED, ECOLAB CleanProof+, CDRH, IEC 60947..., IEC 60947..., IP 69K IP 67, HYGIENE

**Accessories:**

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

**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 beam diameter  
 Light beam characteristic  
 Squint angle  
 Light source <sup>3)</sup>  
 Wavelength  
 Max. output power  
 Pulse duration

**Laser class 1**

10 ... 400mm  
 see tables  
 20 ... 400mm  
 170mm  
 approx. 1 mm, consistent  
 collimated  
 typ. ± 2°  
 laser, pulsed  
 650nm (visible red light)  
 < 0.81mW  
 7µs

**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

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  
 .../6 <sup>5)</sup>  
 1 push-pull switching output  
 pin 4: PNP light switching, NPN dark switching  
 $\geq (U_B - 2V) / \leq 2V$   
 max. 100mA  
 adjustable via 8-turn potentiometer

Signal voltage high/low  
 Output current  
 Scanning range

**Indicators**

Green LED  
 Yellow LED

ready  
 object detected - reflection

**Mechanical data**

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

AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404  
 HYGIENE-Design  
 $R_a \leq 2.5$   
 AISI 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  
 Laser class

-30°C ... +70°C / -30°C ... +70°C  
 2, 3  
 III  
 IP 67, IP 69K<sup>9)</sup>  
 ECOLAB, CleanProof+  
 1 (according to EN 60825-1 and 21 CFR 1040.10  
 with Laser Notice No. 50)  
 IEC 60947-5-2  
 UL 508 <sup>4)</sup>  
 tested in accordance with ECOLAB and CleanProof+ (see  
 Remarks)

Standards applied  
 Certifications  
 Chemical resistance

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

**Tables**

**Models of laser class 1:**

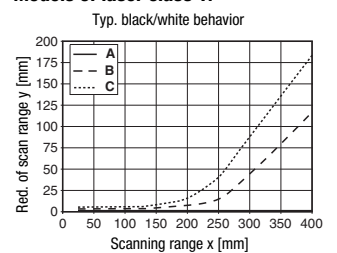
1	15	400
2	15	250
3	15	170

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

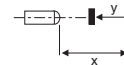
Scanning range [mm]

**Diagrams**

**Models of laser class 1:**



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



**Remarks**

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.

# HRTL 53 Laser diffuse reflection light scanner with background suppression

## Part number code

H	R	T	L	5	3	/	6	6	.	C	2	,	2	0	0	-	S	1	2
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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

**55** 55 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 EN 60825-1

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

### Electrical connection

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

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

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

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

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

## Order guide

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

### Order code

### Part no.

HRTL 53/66, 5000

50115202

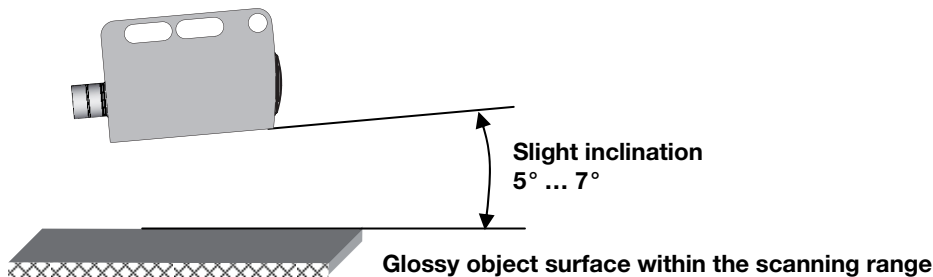
HRTL 53/66-S8

50115203

## Application notes



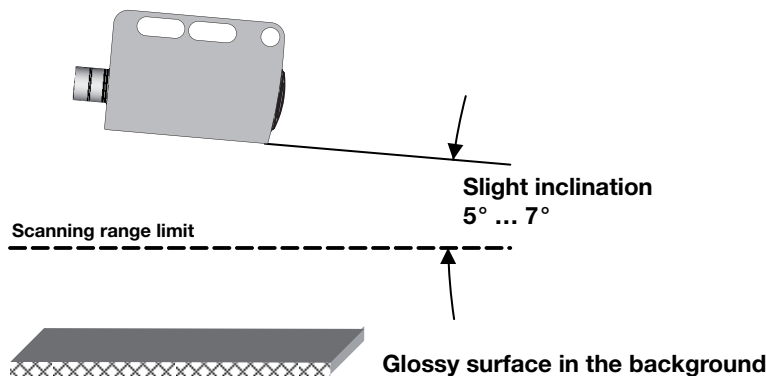
- **Approved purpose:**  
This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.
- **Detection of glossy surfaces within the scanning range:**  
When detecting glossy 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.  $5^\circ \dots 7^\circ$ .



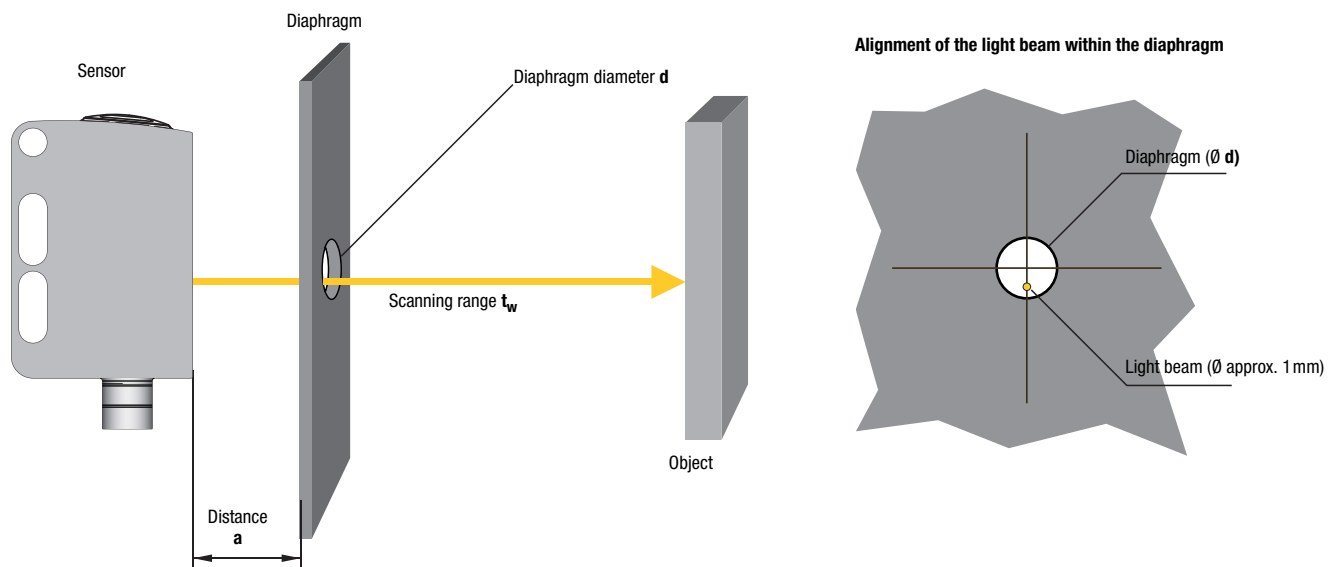
- Objects should only be moved in laterally from the right or left. Moving in objects from the connection side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to 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.

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**Object detection behind diaphragms**

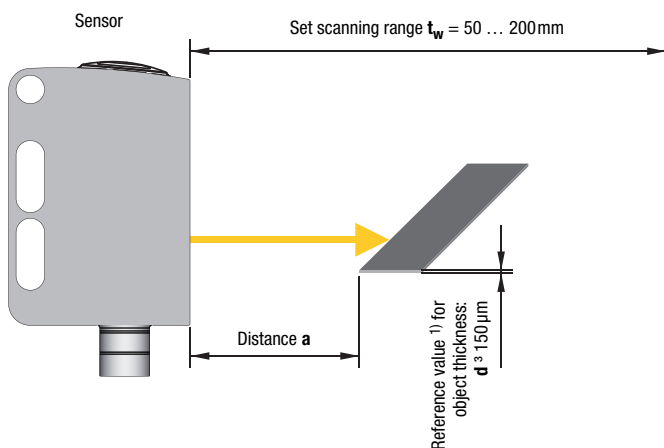
It is sometimes necessary to mount the sensor behind plant parts so that the light beam has to pass through an opening (diaphragm) that is as small as possible. Here, the detection depends, among other things, on set scanning range  $t_w$ , distance  $a$  between diaphragm and sensor, and diaphragm diameter  $d$ . Here are some reference values <sup>1)</sup>:

Distance $a$ [mm] between sensor and diaphragm	Diaphragm diameter $d$ [mm], dependent on scanning range $t_w$ [mm] on a white object (90% diffuse reflection) set on the sensor		
	$t_w = 100$	$t_w = 200$	$t_w = 300$
10	10	10	10
30	8	8	9
50	7	8	9
80	6	7	8
100	6	6	8
120		6	8
150		5	6
180		5	6
200		5	6



**Detection of smallest objects**

The laser scanner can also detect very thin parts (e.g., sheet metal plates or wire). Detection here depends, among other things, on set scanning range  $t_w$ , distance  $a$  to the object, and object size/thickness  $d$ .



<sup>1)</sup> Reference values are not guaranteed properties. Due to the multitude of possible influencing factors, they must be confirmed in the application.

