

HRTL 53

Laser diffuse reflection light scanner with background suppression

en 02-2017/11 50108094-01

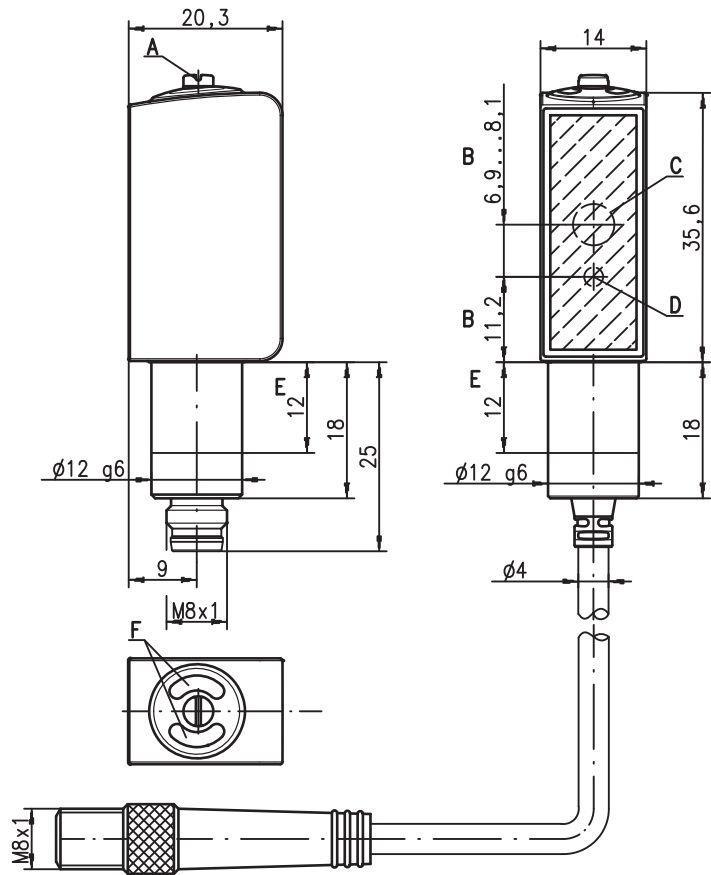


10 ... 400mm
170mm with
black-white error < 10%



- 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

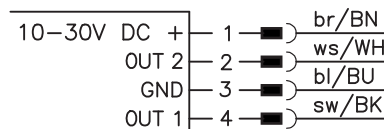
Accessories:

(available separately)

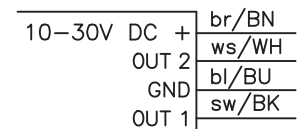
- Mounting systems (BT 3...)
- Cable with M8 or M12 connector (KD ...)
- Mounting devices

Electrical connection

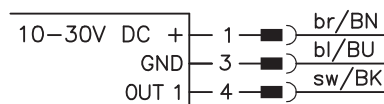
Plug connection, 4-pin



Cable, 4 wires



Plug connection, 3-pin



We reserve the right to make changes • PAL_HRTL53_en_50108094_01.fm

Specifications

Optical data

Typ. scanning range limit ¹⁾
 Scanning range ²⁾
 Adjustment range of the switching point
 Black/white error < 10% up to
 Light beam diameter
 Light beam characteristic
 Squint angle
 Light source ³⁾
 Laser class
 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
 1 according to IEC 60825-1:2007
 650nm (visible red light)
 < 0.81mW
 7µs

Timing

Switching frequency 2,000Hz
 Response time 0.25ms
 Response jitter typ. 65µs
 Decay time 0.25ms
 Delay before start-up ≤ 300ms

Electrical data

Operating voltage U_B ⁴⁾ 10 ... 30VDC (incl. residual ripple)
 Residual ripple ≤ 10% of U_B
 Open-circuit current ≤ 20mA
 Switching output .../66⁵⁾ 2 push-pull switching outputs
 pin 2: PNP dark switching, NPN light switching
 pin 4: PNP light switching, NPN dark switching
 .../6 ⁵⁾ 1 push-pull switching output
 pin 4: PNP light switching, NPN dark switching
 ≥ (U_B-2V)/≤ 2V
 max. 100mA
 adjustable via 8-turn potentiometer

Signal voltage high/low
 Output current
 Scanning range

Indicators

Green LED ready
 Yellow LED object detected - reflection

Mechanical data

Housing AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404
 Housing design HYGIENE-Design
 Housing roughness ⁶⁾ Ra ≤ 2.5
 Connector AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404
 Optics cover plastic (PMMA)
 Operation plastic (TPV - PE), non-diffusive
 Weight with M8 connector: 50g
 with 200mm cable and M8 connector: 60g
 with 5000mm cable: 110g
 Connection type M8 connector, 4-pin or 3-pin,
 0.2m cable with M8 connector, 4-pin,
 5m cable, 4 x 0.20mm²
 via fit (see "Remarks")
 Fastening 3 Nm (permissible range, see dimensioned drawing)
 Max. tightening torque

Environmental data

Ambient temp. (operation/storage) ⁷⁾ -30°C ... +70°C/-30°C ... +70°C
 Protective circuit ⁸⁾ 2, 3
 VDE safety class III
 Protection class IP 67, IP 69K⁹⁾
 Environmentally tested acc. to ECOLAB, CleanProof+
 Standards applied IEC 60947-5-2
 Certifications UL 508, C22.2 No.14-13 ⁴⁾ ⁷⁾ ¹⁰⁾
 Chemical resistance 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) UL certified in the temperature range -30°C to 55°C, 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
- 10) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.24A min, in the field installation

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 1:

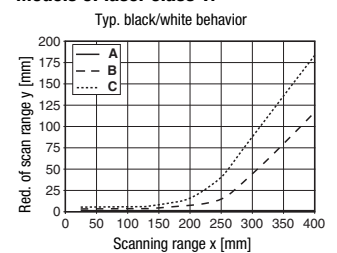
1	15	400
2	15	250
3	15	170

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

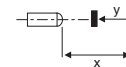
□ Scanning range [mm]

Diagrams

Models of laser class 1:



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



Remarks

Observe 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.

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

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

Order code

Part no.

HRTL 53/66, 5000

50115202

HRTL 53/66-S8

50115203

Laser safety notices



ATTENTION, LASER RADIATION – LASER CLASS 1

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

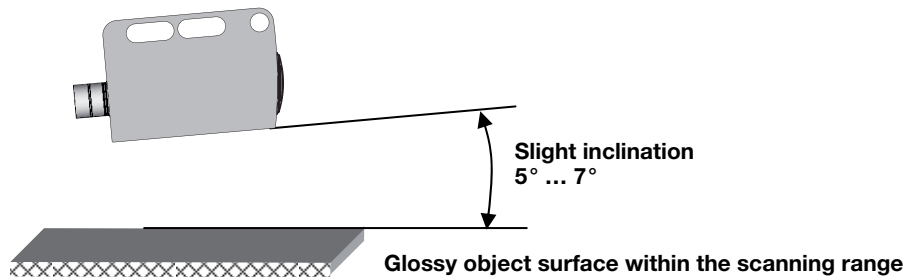
- ↳ Adhere to the applicable legal and local regulations regarding protection from laser beams.
- ↳ The device must not be tampered with and must not be changed in any way.
 - There are no user-serviceable parts inside the device.
 - Repairs must only be performed by Leuze electronic GmbH + Co. KG.

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° ... 7°).

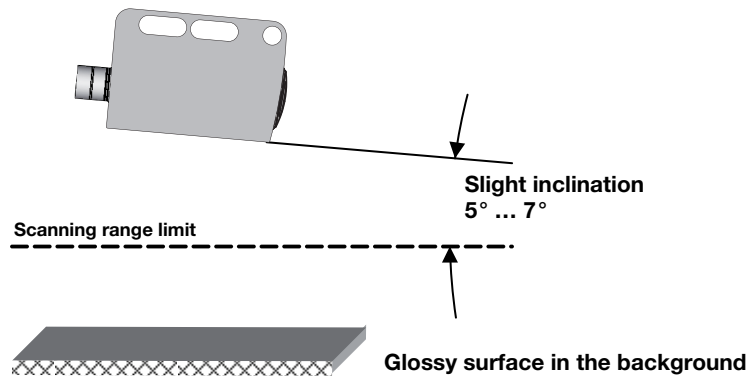


● **Avoiding interference from glossy surfaces in the background:**

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° ... 7°.

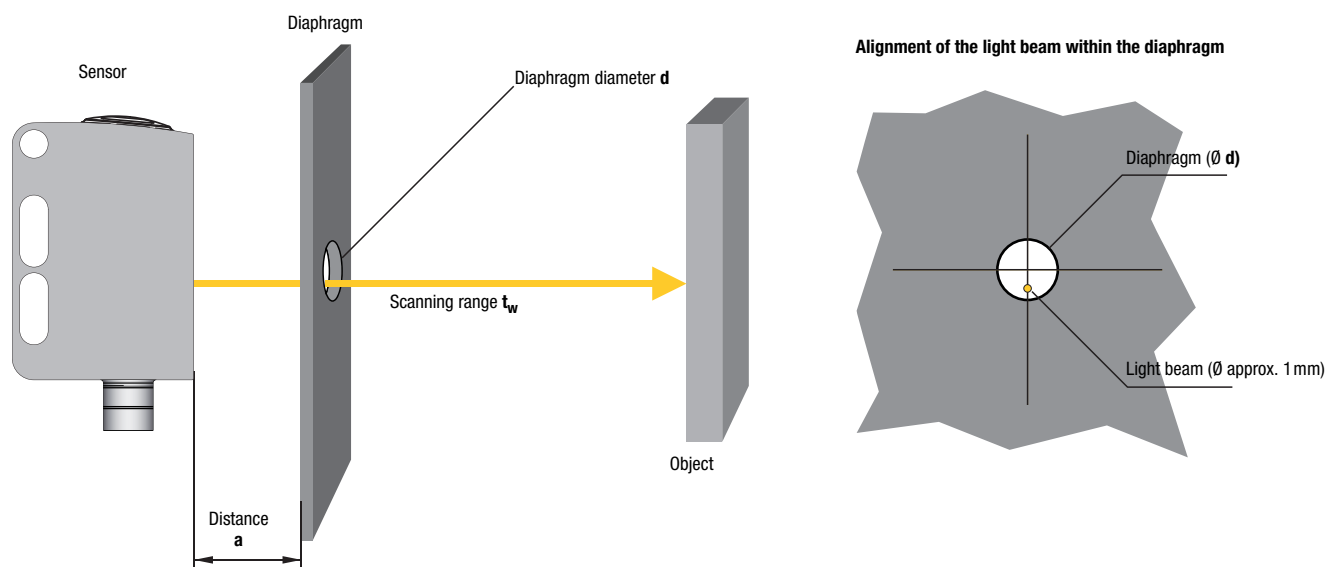


- Objects should only be moved laterally from the right or left. Moving in objects from the connection side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to the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

Object detection behind diaphragms

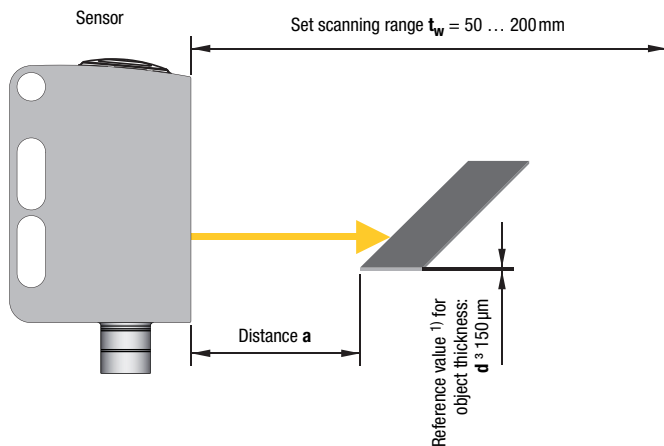
It is sometimes necessary to mount the sensor behind plant parts so that the light beam has to pass through an opening (diaphragm) that is as small as possible. Here, the detection depends, among other things, on set scanning range t_w , distance a between diaphragm and sensor, and diaphragm diameter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

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 .



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

