

HRTL 55 Laser diffuse reflection light scanner with background suppression

en 01-2011/02 50110334



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

10 - 30 V
DC

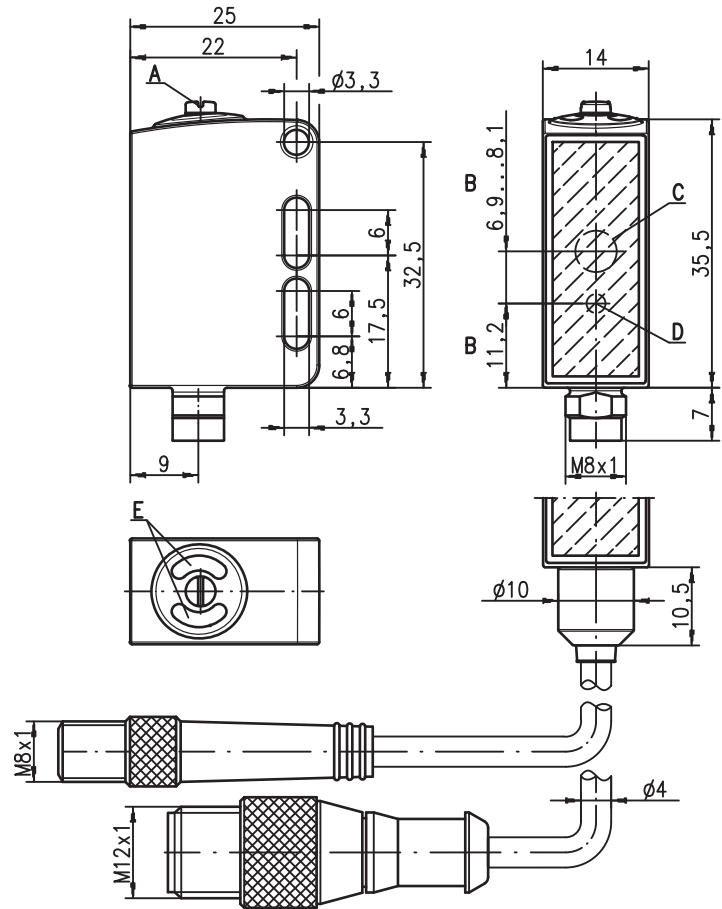
2 kHz

A²LS

stainless steel
316 L

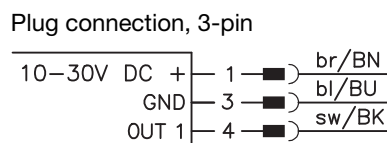
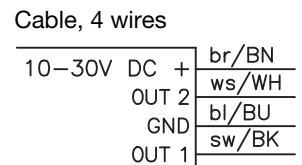
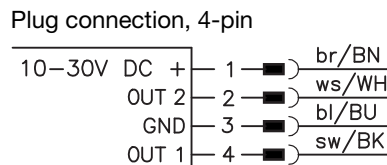
- Laser diffuse reflection light scanner with visible red light and adjustable background suppression
- 316L stainless steel housing in WASH-DOWN-Design
- Enclosed optics design prevents bacterial carry-overs
- ECOLAB and CleanProof+ tested
- Paperless device identification
- Plastic front cover
- Exact 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** Indicator diode

Electrical connection



We reserve the right to make changes • DS_HRTL55_en.fm

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

Accessories:

- (available separately)
- Cable with M8 or M12 connector (K-D ...)
 - Cable for food and beverages
 - Mounting devices

Specifications

Optical data

Typ. scanning range limit ¹⁾	10 ... 400mm
Scanning range ²⁾	see tables
Adjustment range of the switching point	20 ... 400mm
Black/white error < 10% up to	170mm
Light beam diameter	approx. 1 mm, consistent
Light beam characteristic	collimated
Squint angle	typ. ± 2°
Light source ³⁾	laser, pulsed
Wavelength	650nm (visible red light)
Max. output power	< 0.81mW
Pulse duration	7µs

Laser class 1

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	≤ 15% of U_B
Open-circuit current	≤ 20mA
Switching output	.../66 ⁵⁾ 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
Signal voltage high/low	≥ ($U_B - 2V$) / ≤ 2V
Output current	max. 100mA
Scanning range	adjustable via 8-turn potentiometer

Indicators

Green LED	ready
Yellow LED	object detected - reflection

Mechanical data

Housing	AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404
Housing design	WASH-DOWN-Design
Housing roughness ⁶⁾	$R_a \leq 2.5$
Connector	AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404
Optics cover	plastic (PMMA)
Operation	plastic (TPV - PE), non-diffusive
Weight	with M8 connector: 40g with 200mm cable and M12 connector: 60g with 5000mm cable: 110g
Connection type	M8 connector, 4-pin, 0.2m cable with M12 connector, 4-pin, 5m cable, 4 x 0.20mm ²

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 69K ⁹⁾
Environmentally tested acc. to	ECOLAB, CleanProof+
Laser class	1 (according to EN 60825-1 and 21 CFR 1040.10 with Laser Notice No. 50)
Standards applied	IEC 60947-5-2
Certifications	UL 508 ⁴⁾
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) Operating temperatures of +70°C permissible only briefly (≤ 15min)
- 8) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
- 9) Only in combination with M12 connector

Tables

Models of laser class 1:

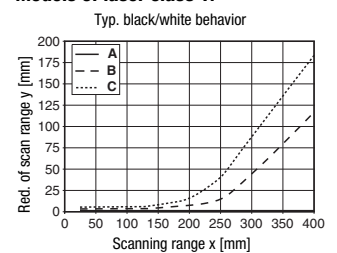
1	15	400
2	15	250
3	15	170

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

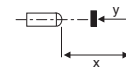
□ Scanning range [mm]

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.

HRTL 55 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

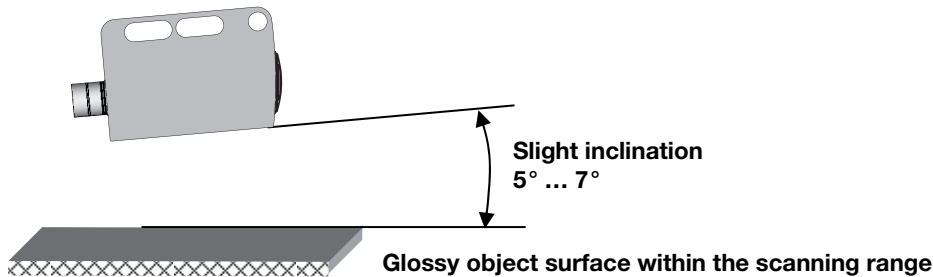
The sensors listed here are preferred types; current information at www.leuze.com

Order code	Part No.
HRTL 55/66, 5000	50115205
HRTL 55/66-S8	50115206
HRTL 55/66, 200-S12	50115204

Application notes



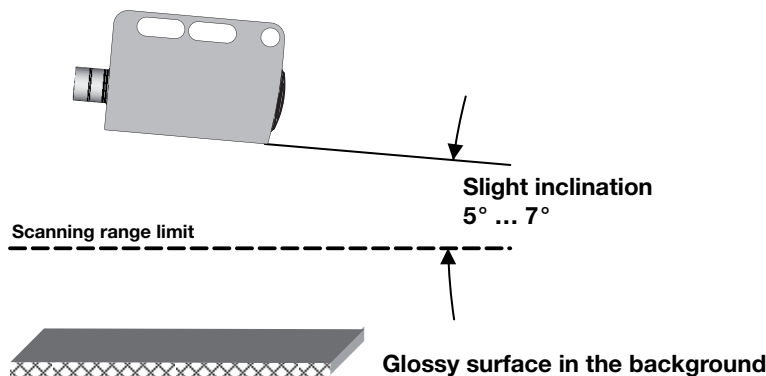
- **Approved purpose:**
This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.
- **Detection of glossy surfaces within the scanning range:**
When detecting glossy surfaces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



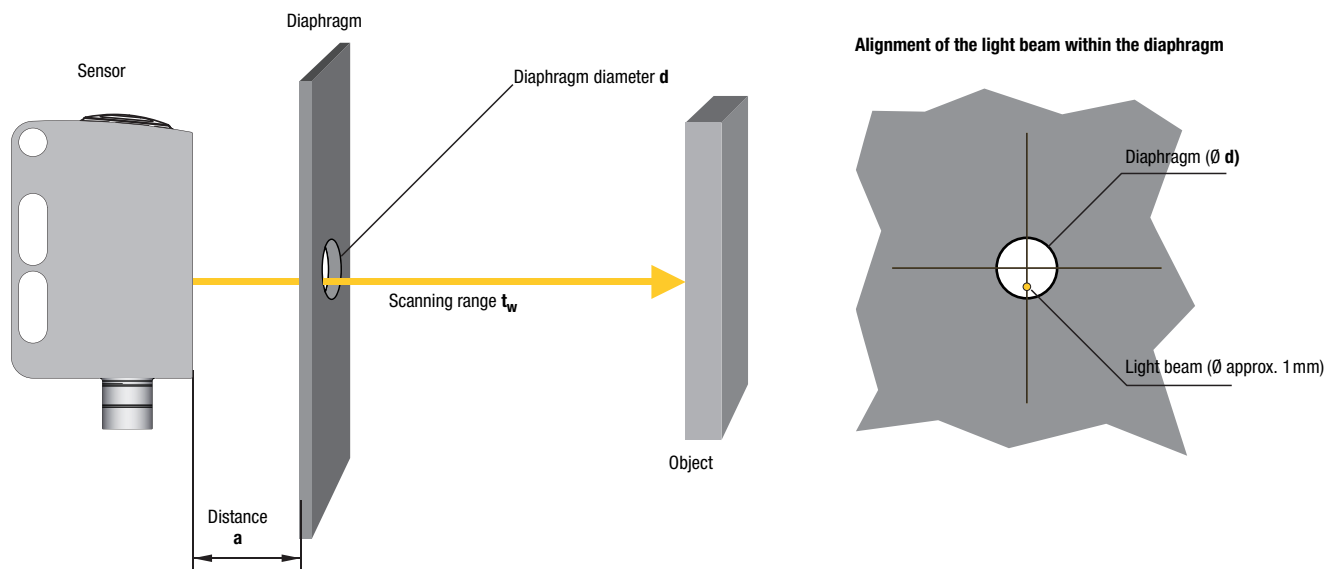
- Objects should only be moved in laterally from the right or left. Moving in objects from the connection side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to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

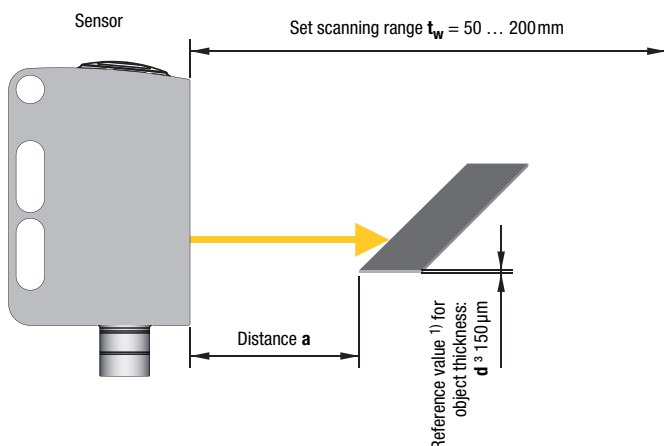
It is sometimes necessary to mount the sensor behind plant parts so that the light beam has to pass through an opening (diaphragm) that is as small as possible. Here, the detection depends, among other things, on set scanning range t_w , distance a between diaphragm and sensor, and diaphragm diameter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

