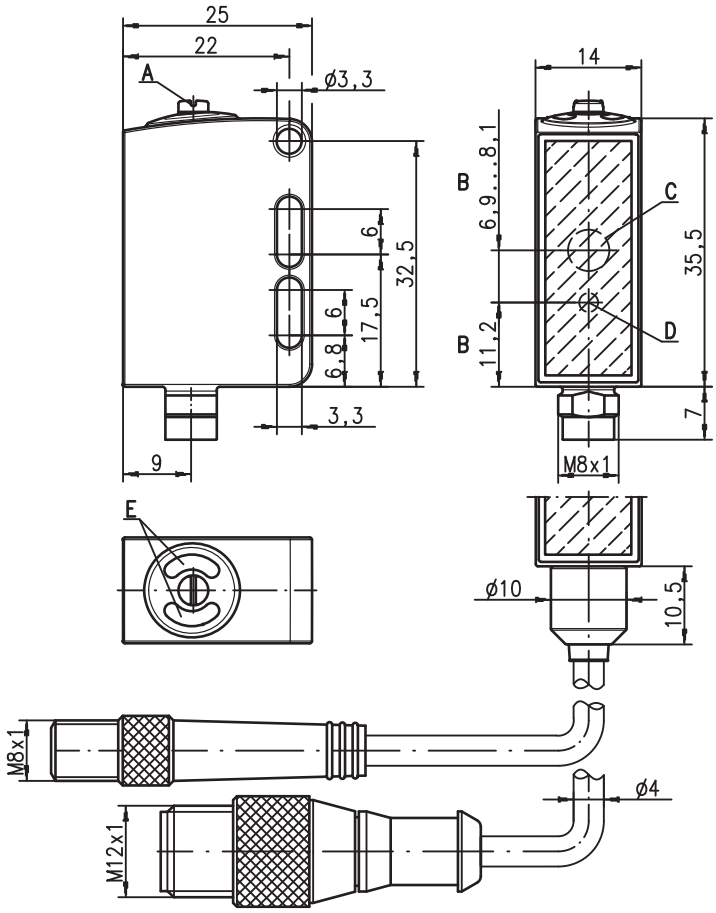
HRTL 55 Laser diffuse reflection light scanner with background suppression

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 WASH-DOWN-Design
- Enclosed optics design prevents bacterial carry-overs
- ECOLAB and Clean*Proof*+ 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

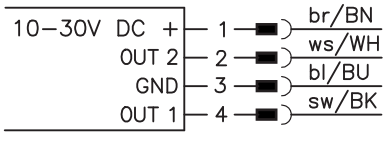
Accessories:

(available separately)

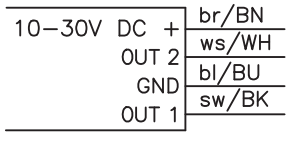
- Cables with M8 or M12 connector (KD …)
- Cables for food and beverages
- Mounting devices

Electrical connection

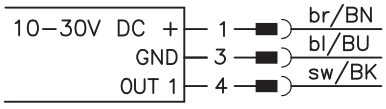
Plug connection, 4-pin



Cable, 4 wires



Plug connection, 3-pin



en 02-2017/11 50110334-01

Specifications

Optical data		**Laser class 1**
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. 1mm, consistent
Light beam characteristic		collimated
Squint angle		typ. ± 2°
Light source [3]		laser, pulsed
Laser class		1 according to IEC 60825-1:2007
Wavelength		650nm (visible red light)
Max. output power		< 0.81mW
Pulse duration		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		≤ 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]		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: 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 0.20mm²
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, Clean*Proof*+
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 Clean*Proof*+ (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 in combination with M12 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:

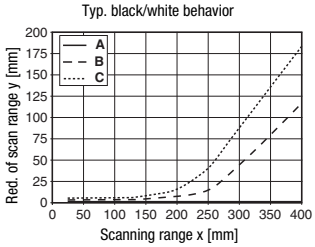
1	15	400
2	15	250
3	15	170

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

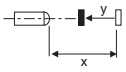
Scanning range [mm]

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.

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 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*

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

Laser safety notices

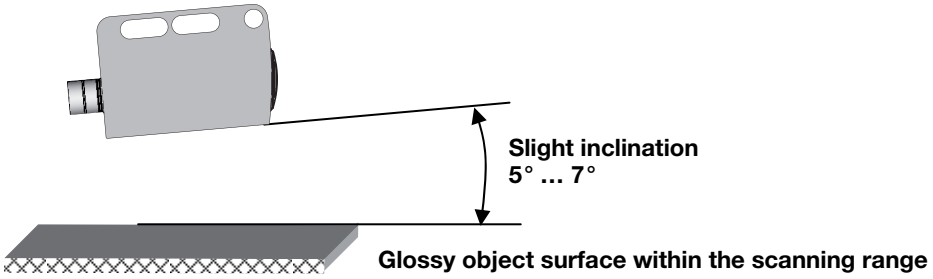
ATTENTION, LASER RADIATION – LASER CLASS 1

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.

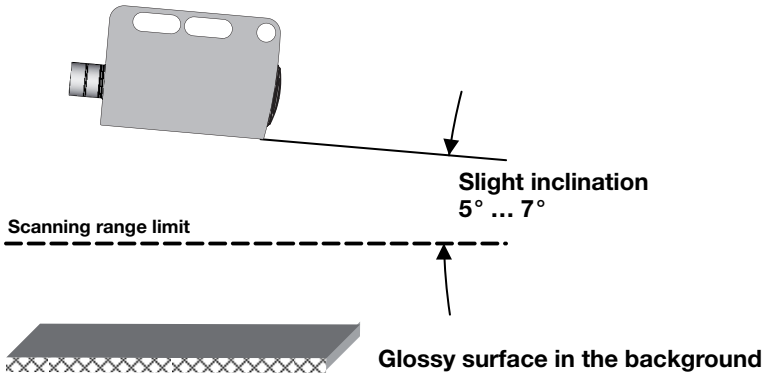
- Adhere to the applicable legal and local regulations regarding protection from laser beams.
- The device must not be tampered with and must not be changed in any way.
  There are no user-serviceable parts inside the device.
  Repairs must only be performed by Leuze electronic GmbH + Co. KG.

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°.

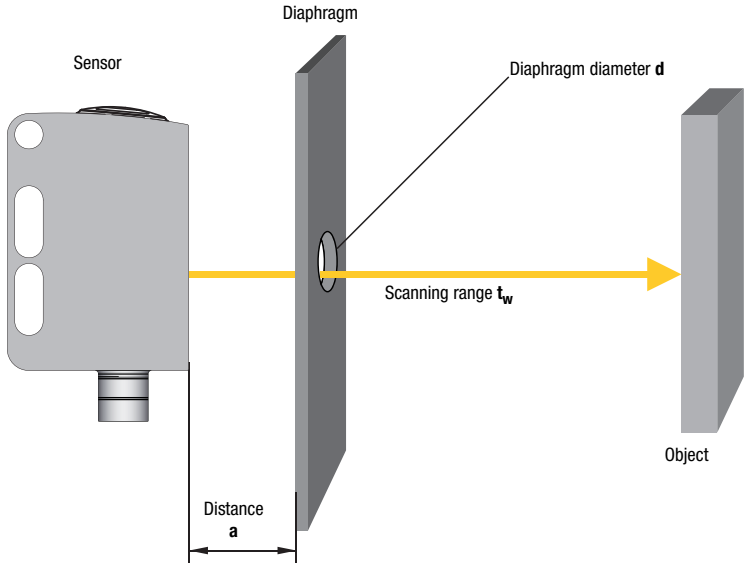


- Objects should only be moved in laterally from the right or left. Moving in objects from the connection side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to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

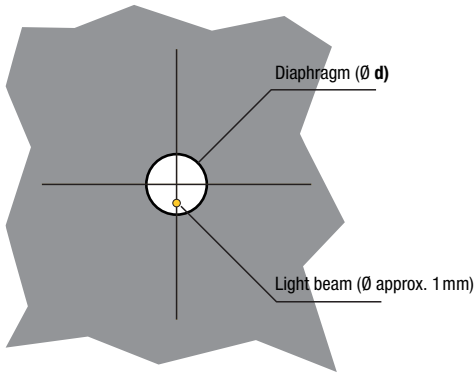
Object detection behind diaphragms

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

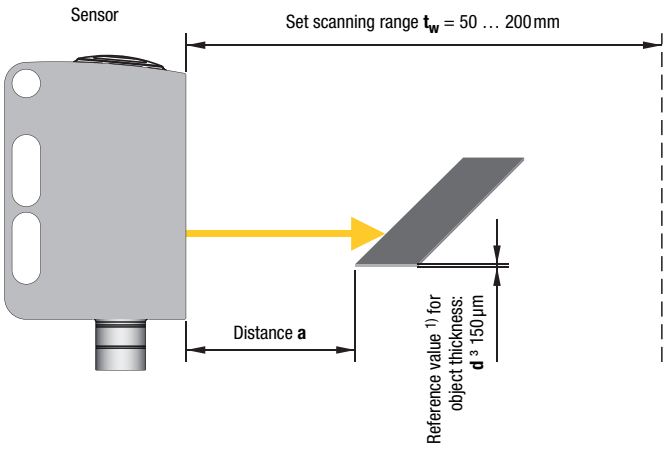


Alignment of the light beam within the diaphragm



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.