

HRTL 3B

Laser diffuse reflection light scanner with background suppression

en 01-2010/12 50114049



15 ... 400(500) mm
170(250) mm with
black/white error < 10%



- Laser diffuse reflection light scanner with visible red light and adjustable background suppression
- 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
- Standard device in laser class 1 in accordance with EN 60825-1; extended scanning area with excellent black/white ratio in laser class 2
- High switching frequency and short response time for fast events and high-precision applications

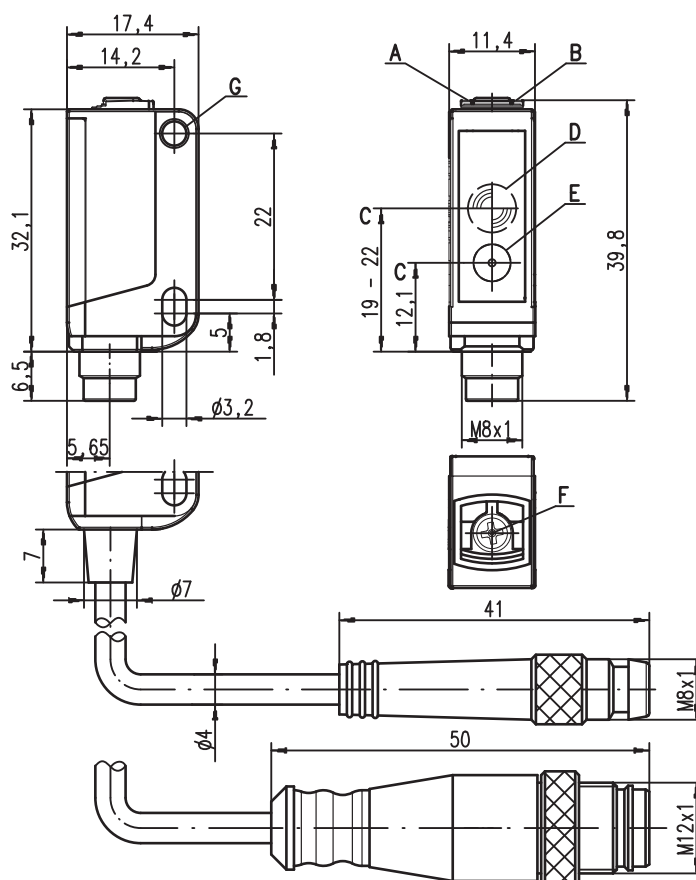


Accessories:

(available separately)

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

Dimensioned drawing



- A** Green indicator diode
- B** Yellow indicator diode
- C** Optical axis
- D** Receiver
- E** Transmitter
- F** 8-turn potentiometer for scanning range adjustment
- G** Attachment sleeve

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-wire

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_HRTL3B_en.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⁾
 Wavelength
 Max. output power
 Pulse duration

Laser class 1

10 ... 400mm
 see tables
 20 ... 400mm
 170mm
 approx. 1 mm, consistent
 collimated
 typ. $\pm 2^\circ$
 laser, pulsed
 650nm (visible red light)
 $\leq 0.81\text{mW}$
 7 μs

Laser class 2

5 ... 500mm
 20 ... 500mm
 250mm
 $\leq 3.3\text{mW}$
 7.6 μs

Timing

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

2,000Hz
 0.25ms
 typ. 65 μs
 0.25ms
 $\leq 300\text{ms}$

Electrical data

Operating voltage U_B ⁴⁾
 Residual ripple
 Open-circuit current
 Switching output

10 ... 30VDC (incl. residual ripple)
 $\leq 10\%$ of U_B
 $\leq 20\text{mA}$
 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
 $\geq (U_B - 2\text{V})/\leq 2\text{V}$
 max. 100mA
 adjustable via 8-turn potentiometer

Signal voltage high/low
 Output current
 Scanning range

.../66 ⁵⁾

.../6 ⁵⁾

Indicators

Green LED
 Yellow LED

ready
 object detected - reflection

Mechanical data

Housing ⁶⁾
 Color
 Optics cover
 Fastening
 Weight

plastic (PC-ABS); 1 attachment sleeve, nickel-plated steel
 red RAL 3000
 plastic (PMMA)
 through holes for 2 x M3
 with connector: 20g
 with 200mm cable and connector: 40g
 with 2m cable: 50g
 2m cable (cross section 4x0.20mm²),
 connector M8 metal,
 0.2m cable with connector M8 or M12

Connection type

Environmental data

Ambient temp. (operation/storage)
 Protective circuit ⁷⁾
 VDE safety class

-10°C ... +55°C / -30°C ... +70°C
 1, 2, 3
 II for cable ⁸⁾,
 III for metal plug

Protection class
 Laser class

IP 67
 1 (in accordance with
 EN 60825-1)
 2 (in accordance with
 EN 60825-1)

Standards applied
 Certifications

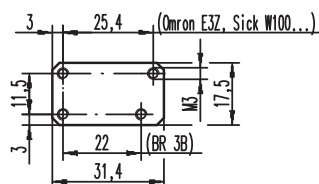
IEC 60947-5-2
 UL 508 ⁴⁾

- 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) Patent Pending Publ. No. US 7,476,848 B2
- 7) 1=overload protection, 2=polarity reversal protection, 3=short circuit protection for all transistor outputs
- 8) Rating voltage 50V

Remarks

Adapter plate:

BT 3.2 (Part No. 501 03844) for alternate mounting on 25.4mm hole spacing (Omron E3Z, Sick W100...)



Tables

Models of laser class 1:

1	15	400
2	15	250
3	15	170

Models of laser class 2:

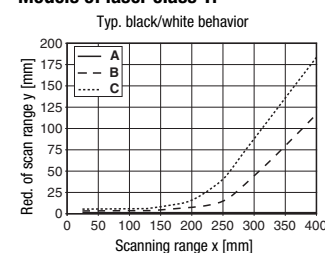
1	15	500
2	15	400
3	15	250

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

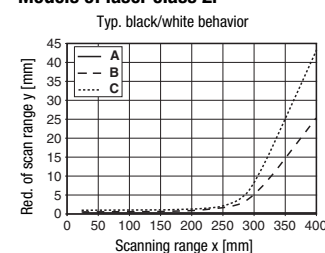
☐ Scanning range [mm]

Diagrams

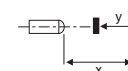
Models of laser class 1:



Models of laser class 2:

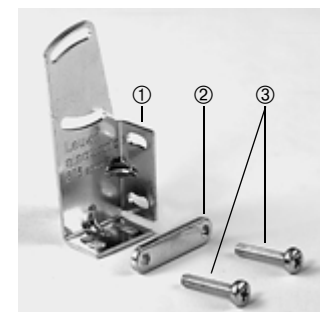


- A white 90%
- B grey 18%
- C black 6%



Remarks

Mounting system:



- ① = BT 3 (Part no. 50060511)
- ②+③ = BT 3.1 ¹⁾ (Part no. 50105585)
- ①+②+③ = BT 3B (Part no. 50105546)

1) Packaging unit: PU = 10 pcs.

HRTL 3B Laser diffuse reflection light scanner with background suppression

Part number code

H	R	T	L		3	B	/	6	6	.	C	2	,	2	0	0	-	S	8	.	3
---	---	---	---	--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Operating principle

HRT Diffuse reflection light scanners with background suppression

Operating principle

L Laser (red light)

Construction/version

3B 3B 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-S8.3 Cable, PVC, length 200mm with M 8 connector, 3 pin, axial (plug)

,200-S8 Cable, PVC, length 200mm with M 8 connector, 4 pin, axial (plug)

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

Order guide

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

Order code

Part No.

HRTL 3B/66 50114760

HRTL 3B/66-S8 50114581

HRTL 3B/66, 200-S8 50114761

HRTL 3B/66, 200-S12 50114762

HRTL 3B/66-C2 50114763

HRTL 3B/66-C2-S8 50114582

HRTL 3B/66-C2, 200-S8 50114764

HRTL 3B/66-C2, 200-S12 50114765

Application notes

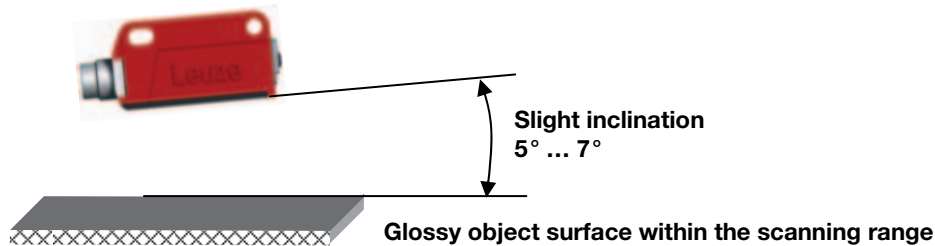


- **Approved purpose:**

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. $5^\circ \dots 7^\circ$).

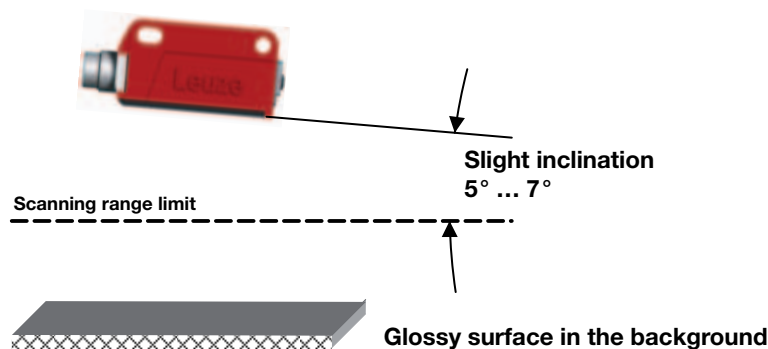


- **Avoiding interference from glossy surfaces in the background:**

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. $5^\circ \dots 7^\circ$.



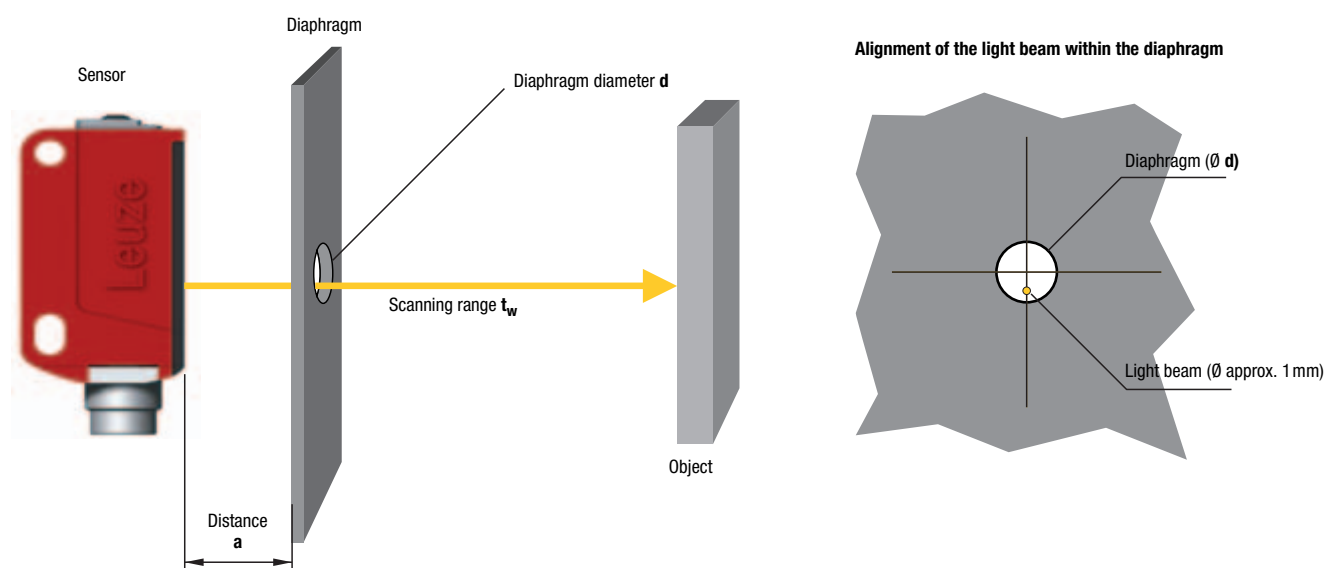
- Objects should only be moved in laterally from the right or left. Moving in objects from the connection side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection light scanner. Light objects can still be reliably detected up to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

HRTL 3B Laser diffuse reflection light scanner with background suppression

Object detection behind diaphragms

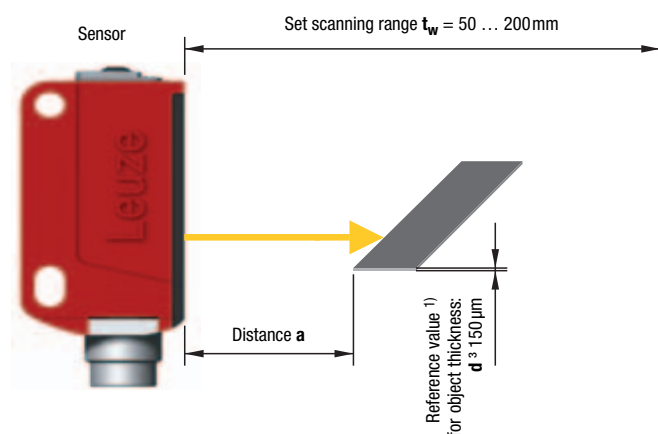
It is sometimes necessary to mount the sensor behind plant parts so that the light beam has to pass through an opening (diaphragm) that is as small as possible. Here, the detection depends, among other things, on set scanning range t_w , distance a between diaphragm and sensor, and diaphragm diameter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

