

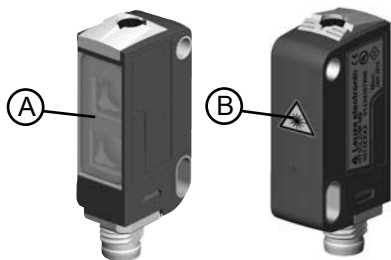
## Laser diffuse reflection sensor

### HT3CL

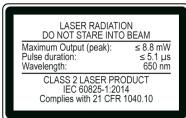
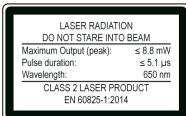


We reserve the right to make changes – 2021/07/25 – 50137128-02

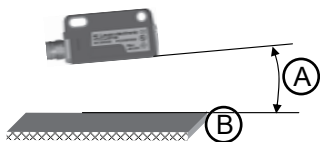
1



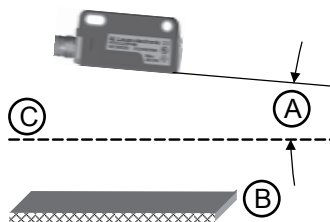
50134032-01



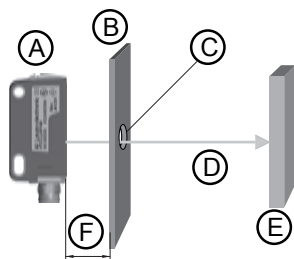
## 3



## 4

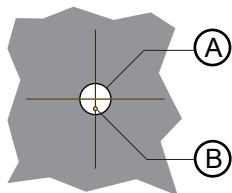


## 5

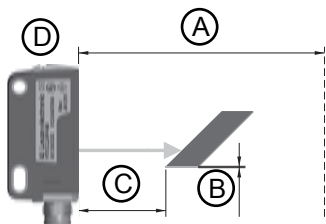


# Leuze

6



7



**Laser safety notices - laser class 1** **ATTENTION****LASER RADIATION – CLASS 1 LASER PRODUCT**

The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of **laser class 1** and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

- ↪ Observe the applicable statutory and local laser protection regulations.
- ↪ 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.

**Laser safety notices - Class 2 laser product** **ATTENTION****LASER RADIATION – CLASS 2 LASER PRODUCT****Do not stare into beam!**

The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of **laser class 2** and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

- ↪ Never look directly into the laser beam or in the direction of reflected laser beams!  
If you look into the beam path over a longer time period, there is a risk of injury to the retina.
- ↪ Do not point the laser beam of the device at persons!
- ↪ Interrupt the laser beam using a non-transparent, non-reflective object if the laser beam is accidentally directed towards a person.
- ↪ When mounting and aligning the device, avoid reflections of the laser beam off reflective surfaces!
- ↪ **CAUTION!** Use of controls or adjustments or performance of procedures other than specified herein may result in hazardous light exposure.
- ↪ Observe the applicable statutory and local laser protection regulations.
- ↪ 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.

**NOTICE****Affix laser information and warning signs!**

Laser information and warning signs attached to the device. Also included with the device are self-adhesive laser warning and laser information signs (stick-on labels) in multiple languages.

- ↳ Affix the laser information sheet to the device in the language appropriate for the place of use.  
When using the device in the US, use the stick-on label with the "Complies with 21 CFR 1040.10" notice.
- ↳ Affix the laser information and warning signs near the device if no signs are attached to the device (e.g. because the device is too small) or if the attached laser information and warning signs are concealed due to the installation position.  
Affix the laser information and warning signs so that they are legible without exposing the reader to the laser radiation of the device or other optical radiation.

**1**

- A Laser aperture
- B Laser warning sign

**2**

Laser information and warning signs

## Application notes

### Detection of glossy surfaces within the operating range

When detecting glossy surfaces (e.g. metals), the light beam should not hit the object surface at a right angle. A slight inclination is enough to detect the object reliably. The following applies: the smaller the range, the greater the angle of inclination (approx.  $5^\circ$  to  $7^\circ$ ).

## 3

- A Slight inclination  $5^\circ \dots 7^\circ$
- B Glossy object surface within the operating range

### Avoiding interference from glossy surfaces in the background

If a glossy surface is in the background (distance larger than maximum range), reflections may cause interfering signals. They may be avoided by mounting the device at a slight inclination (see figure).

#### NOTICE



It is imperative to note the task and the associated inclination of the sensor of approx.  $5^\circ \dots 7^\circ$ .

- Only move objects in from the right or left side. Avoid moving in objects from the connector side or operating side.
- Outside of the operating range, the sensor operates as an energetic diffuse reflection sensor. Light objects can still be reliably detected up to the maximum range.
- 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 must absolutely be avoided.

## 4

- A Slight inclination  $5^\circ \dots 7^\circ$
- B Glossy surface in the background
- C Maximum range



## 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 range  $t_w$ , distance  $a$  between diaphragm and sensor, and diaphragm diameter  $d$ . Here are some reference values:

### NOTICE



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

Distance $a$ [mm] between sensor and diaphragm	Diaphragm diameter $d$ [mm], dependent on 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

## 5

- A Sensor
- B Diaphragm
- C Diaphragm diameter  $d$
- D Range  $t_w$
- E Object
- F Distance  $a$

## 6

### Alignment of the light beam within the diaphragm

- A Diaphragm (diameter  $d$ )
- B Light beam (diameter approx. 1 mm)

### ***Detection of smallest objects***

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

**7**

- A Set range  $t_w = 50 \dots 200$  mm
- B Reference value for objects:  $d \geq 150 \mu\text{m}$
- C Distance  $a$
- D Sensor

#### ***NOTICE***



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

### ***Electrical connection***

#### **⚠ CAUTION**



#### **UL applications!**

For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).