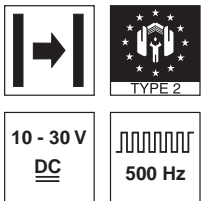


**SLS 96**

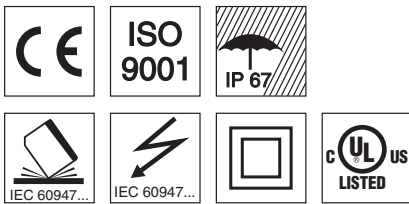
**Protective throughbeam photoelectric sensors**

en 09-2010/11 602075



**65m  
39m**

- Protective throughbeam photoelectric sensor with high performance reserve in visible red light or infrared light, up to category 2 in accordance with ISO 13849-1
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- 2 indicators each at the transmitter and receiver for displaying their status when commissioning and in operation
- Optics heating for use with low temperatures
- Connection via M12 connector or terminal compartment

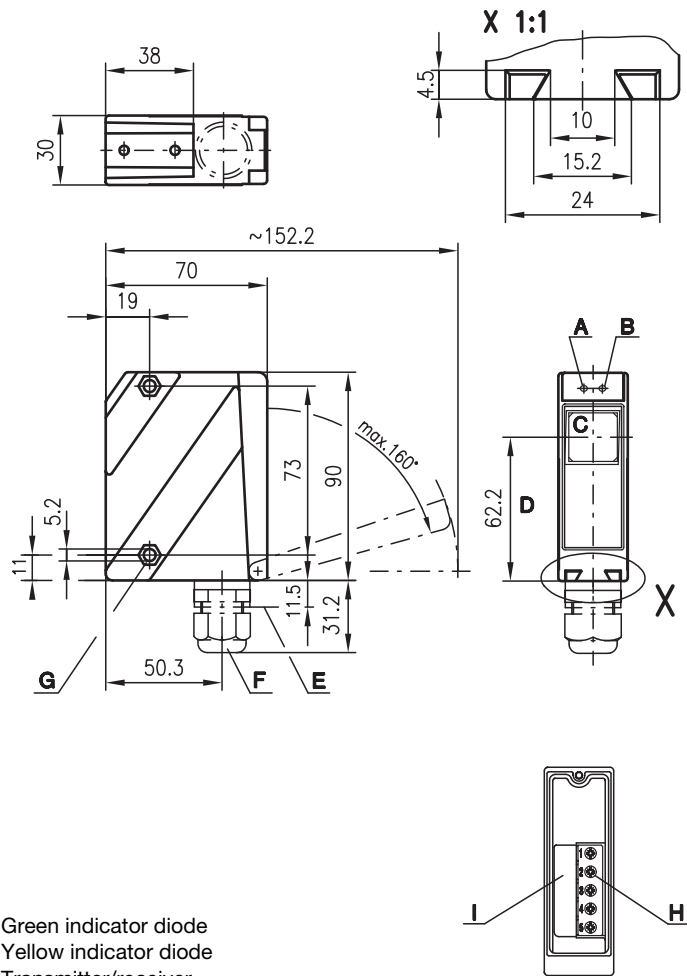


**Accessories:**

(available separately)

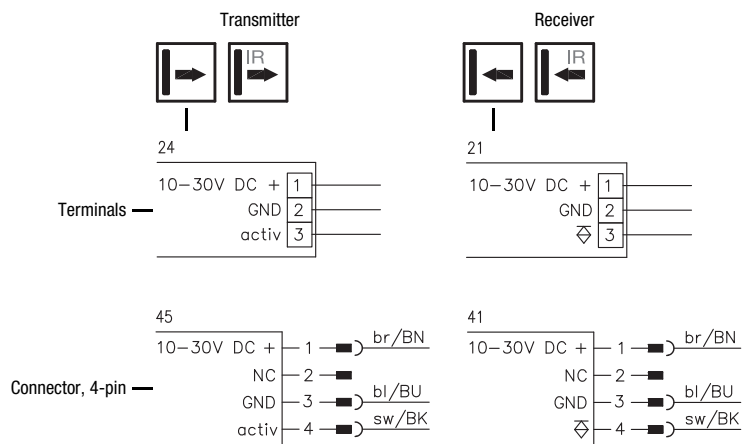
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD ...)
- Ready-made cables (K-D ...)
- Test monitoring units TNT 35 (Part No. 50033058)
- BT 96-ARH alignment aid (Part No. 50080502)
- Sensorscope SAT 5 (alignment control, Part No. 50109545)

**Dimensioned drawing**



- A** Green indicator diode
- B** Yellow indicator diode
- C** Transmitter/receiver
- D** Optical axis
- E** Device plug M12x1
- F** Screwed cable gland M16x1.5 for Ø 5 ... 10mm
- G** Countersinking for SK nut M5, 4.2 deep
- H** Connection terminals
- I** Cable entry

**Electrical connection**



We reserve the right to make changes • DS\_SLS\_96\_en.fm

## Specifications

### Safety-relevant data

Type in accordance with IEC/EN 61496  
 Performance Level (PL) in accordance with ISO 13849-1<sup>1)</sup>  
 Category in accordance with ISO 13849-1<sup>1)</sup>  
 Mean time to dangerous failure (MTTFd)  
 Service life (TM)

### Infrared light

type 2  
 PL d  
 cat. 2  
 400 years  
 20 years

### Red light

0 ... 39m  
 0 ... 30m  
 LED (modulated light)  
 660nm

### Optical data

Typ. operating range limit<sup>2)</sup>  
 Operating range<sup>3)</sup>  
 Light source  
 Wavelength

0 ... 65m  
 0 ... 50m  
 LED (modulated light)  
 880nm

### Timing

Sensor switching frequency  
 Sensor response time  
 Delay before start-up

500Hz  
 1 ms  
 ≤ 200ms

### Electrical data

Operating voltage  $U_B$ <sup>4)</sup>  
 Residual ripple

10 ... 30VDC (incl. residual ripple)  
 ≤ 15% of  $U_B$

Open-circuit current  
 Switching output  
 Function  
 Signal voltage high/low  
 Output current

≤ 50mA  
 PNP transistor  
 light switching  
 $\geq (U_B - 2V) \leq 2V$   
 max. 100mA

### Indicators

#### Receiver

Green LED  
 Yellow LED  
 Yellow LED, flashing

ready  
 light path free  
 light path free, no performance reserve

#### Transmitter

Green LED  
 Yellow LED

ready  
 transmitter active

### Mechanical data

Housing  
 Optics cover  
 Weight  
 Connection type

### Plastic housing

polycarbonate  
 plastic  
 150g  
 terminals or M12 connector

### Metal housing

diecast zinc  
 glass  
 380g

### Environmental data

Ambient temp. (operation/storage)  
 Protective circuit<sup>5)</sup>  
 VDE safety class<sup>6)</sup>  
 Protection class  
 LED class  
 Standards applied

-20°C ... +60°C/-40°C ... +70°C  
 1, 2, 3  
 II, all-insulated  
 IP 67  
 1 (acc. to EN 60825-1)  
 IEC 60947-5-2

### Options

#### Optics heating

#### Low temperature

#### Activation input active

Transmitter active/not active  
 Activation/disable delay  
 Input resistance

for temperature changes, prevents fogging  
 to -35°C

≥ 8V/≤ 2V  
 ≤ 1ms  
 10KΩ ± 10%

- 1) In combination with a suitable test monitoring unit, e.g. TNT 35
- 2) Typ. operating range limit: max. attainable range without performance reserve
- 3) Operating range: recommended range with performance reserve
- 4) For UL applications: for use in class 2 circuits only
- 5) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs
- 6) Rating voltage 250VAC

## Tables

### Infrared light

0	50	65
---	----	----

### Red light

0	30	39
---	----	----

- Operating range [m]
- Typ. operating range limit [m]

## Remarks

- SLS = Pair consisting of
- SLSS = Transmitter
- SLSE = Receiver

### SLS 96K/P-1070-T2-2

SLSS 96K-1080-T2-24  
 SLSE 96K/P-1070-T2-41

### SLS 96K/P-1070-T2-4

SLSS 96K-1080-T2-45  
 SLSE 96K/P-1070-T2-41

### SLS 96K/P-1200-T2-2

SLSS 96K-1210-T2-24  
 SLSE 96K/P-1200-T2-21

### SLS 96K/P-1200-T2-4

SLSS 96K-1210-T2-45  
 SLSE 96K/P-1200-T2-41

### SLS 96K/P-1207-T2-2

SLSS 96K-1210-T2-24  
 SLSE 96K/P-1207-T2-21

### SLS 96K/P-1207-T2-4

SLSS 96K-1210-T2-45  
 SLSE 96K/P-1207-T2-41

### SLS 96M/P-1070-T2-2

SLSS 96M-1080-T2-24  
 SLSE 96M/P-1070-T2-21

### SLS 96M/P-1070-T2-4

SLSS 96M-1080-T2-45  
 SLSE 96M/P-1070-T2-41

### SLS 96M/P-1071-T2-2

SLSS 96M-1090-T2-24  
 SLSE 96M/P-1071-T2-21

### SLS 96M/P-1071-T2-4

SLSS 96M-1090-T2-45  
 SLSE 96M/P-1071-T2-41

### SLS 96M/P-1200-T2-2

SLSS 96M-1210-T2-24  
 SLSE 96M/P-1200-T2-21

### SLS 96M/P-1200-T2-4

SLSS 96M-1210-T2-45  
 SLSE 96M/P-1200-T2-41

**SLS 96**
**Protective throughbeam photoelectric sensors**
**Order guide <sup>1)</sup>**

Selection table		SLS 96K/P-1070-T2-2 Part No. 50081292 (Tr) Part No. 50081293 (Re)	SLS 96K/P-1070-T2-4 Part No. 50031559 (Tr) Part No. 50031561 (Re)	SLS 96K/P-1200-T2-2 Part No. 50028009 (Tr) Part No. 50028010 (Re)	SLS 96K/P-1200-T2-4 Part No. 50028011 (Tr) Part No. 50028012 (Re)	SLS 96K/P-1207-T2-2 Part No. 50028009 (Tr) Part No. 50035078 (Re)	SLS 96K/P-1207-T2-4 Part No. 50028011 (Tr) Part No. 50041109 (Re)	SLS 96M/P-1070-T2-2 Part No. 50025213 (Tr) Part No. 50025192 (Re)	SLS 96M/P-1070-T2-4 Part No. 50025215 (Tr) Part No. 50025193 (Re)	SLS 96M/P-1071-T2-2 Part No. 50029454 (Tr) Part No. 50029455 (Re)	SLS 96M/P-1071-T2-4 Part No. 50080478 (Tr) Part No. 50080479 (Re)	SLS 96M/P-1200-T2-2 Part No. 50025209 (Tr) Part No. 50031562 (Re)	SLS 96M/P-1200-T2-4 Part No. 50031249 (Tr) Part No. 50031250 (Re)
Order code →													
Equipment ↓													
Housing	metal							●	●	●	●	●	●
	plastic	●	●	●	●	●	●						
Light source	red light (30m)			●	●	●	●					●	●
	infrared light (50m)	●	●					●	●	●	●		
Connection	terminals	●		●		●		●		●		●	
	M12 connector		●		●		●		●		●		●
Features	optics heating/low temperature									●	●		
	activation input	●	●	●	●	●	●	●	●	●	●	●	●
	filter for multi-axis operation					●	●						

1) Version 2010 A-Z

## Safety notices

Before using the safety sensor, a risk evaluation must be performed according to valid standards. For mounting, operation and tests, this document as well as all applicable national and international standards and regulations must be observed, printed out and handed to the affected personnel.

Before working with the safety sensor, completely read and observe the documents applicable to your task.

In particular, the following national and international legal regulations apply for the commissioning, technical inspections and work with safety sensors:

- Machinery directive 2006/42/EC
- Use of Work Equipment Directive 89/655/EEC supplemented by Directive 95/63 EC
- Accident-prevention regulations and safety rules
- Other relevant standards
- Standards, e.g. ISO 13855

## Symbols



### Attention!

Warning sign – This symbol indicates possible dangers. Please pay especially close attention to these instructions!



These symbols identify the transmitter.



These symbols identify the receiver.

## Safety sensor area of application

The protective throughbeam photoelectric sensor is an active optoelectronic protective device only in connection with a safety-relevant control system, in which the cyclical testing of transmitter and receiver is carried out in accordance with EN 61496-1, up to category 2 and PL d in accordance with EN ISO 13849-1.



### Attention!

- The safety sensor protects persons at access points or at points of operation of machines and plants.
- The safety sensor only detects persons upon entry to the danger area; it does not detect persons who are located within the danger area. For this reason, a start-up/restart interlock is mandatory.
- No protective function without adequate safety distance.
- The power supply unit used to operate the photoelectric sensor has to be able to compensate for changes and interruptions of the supply voltage acc. to EN 61496-1.
- Also observe the safety notices in the documentation of the connected test device!
- Additional measures must be taken to ensure that the AOPD does not experience a dangerous failure due to glare from other light sources.

## Proper use

The safety sensor must only be used after it has been selected in accordance with the respectively valid instructions and relevant standards, rules and regulations regarding occupational safety and safety at work, and after it has been installed on the machine, connected, commissioned, and checked by a competent person.

## Foreseeable misuse

Any use other than that defined under the "Proper use" or which goes beyond that use is considered improper use. The user must ensure that no optical influence on the AOPD occurs through other forms of light beams, e.g. through

- wireless control devices on cranes,
- radiation from welding sparks,
- stroboscopic lights.

## Competent personnel

Prerequisites for competent personnel:

- He has a suitable technical education.
- He knows the instructions for the safety sensor and the machine.
- He has been instructed by the responsible person on the mounting and operation of the machine and of the safety sensor.

**Responsibility for safety**

Manufacturer and operator must ensure that the machine and implemented safety sensor function properly and that all affected persons are adequately informed and trained.

The **manufacturer** of the machine is responsible for:

- Safe implementation of the safety sensor.
- Imparting all relevant information to the operator.
- Adhering to all regulations and directives for the safe commissioning of the machine.

The **operator** of the machine is responsible for:

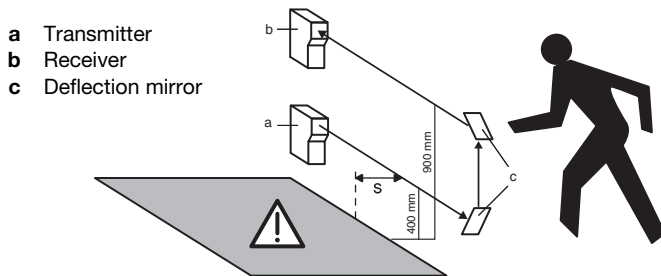
- Instructing the operating personnel.
- Maintaining the safe operation of the machine.
- Adhering to all regulations and directives for occupational safety and safety at work.
- Regular testing by competent personnel.

**Safety distances**



**Attention!**

The protective throughbeam photoelectric sensor must be installed with the correctly calculated safety distance as well as suitable beam distances from a potentially dangerous motion: if an interruption of the light beam occurs, the danger area may only be reached once the machine has already come to a dead stop.



Beam distances in accordance with ISO 13855		
Number of beams	Heights above reference plane, e.g. floor [mm]	Additional distance C [mm]
1	750	1200
2	400, 900	850
3	300, 700, 1100	850
4	300, 600, 900, 1200	850

The safety distance **S** between photoelectric sensor and danger area is calculated using the following formula (ISO 13855):

$$S = (K \cdot T) + C$$

**S:** Safety distance [mm] between photoelectric sensor and danger area.

**K:** Approach speed (constant = 1600 mm/s).

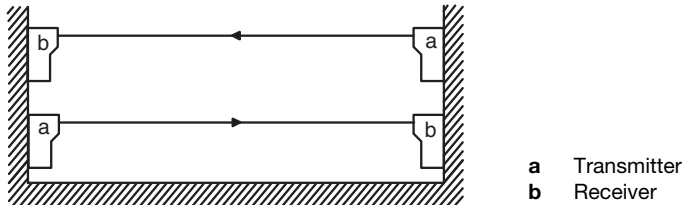
**T:** Time delay [s] between interruption of the light beam and stand-still of the machine.

**C:** Safety constant (additional distance) = 850mm or 1200mm, see table above.

## Multi-axe installation

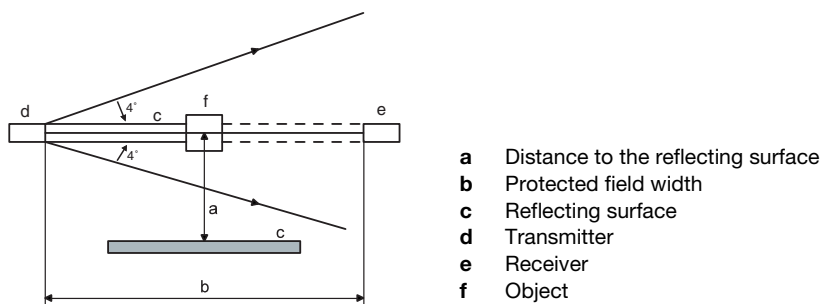
With multi-axe installation the light beams have to run parallel to the reference plane (e.g. floor) and must be aligned mutually parallel.

For this the beam direction must be set oppositely in each case. Otherwise the light beams could cause mutual interference and disturb proper functioning.



## Distance to reflecting surfaces

When mounting, a sufficiently large distance from the optical axis to reflecting surfaces must be selected.



## Commissioning

### Alignment of the sensors

- Mount photoelectric sensors with corresponding fixing brackets from Leuze electronic.
- Apply operating voltage to transmitter and receiver and activate transmitter via activation input (see "Electrical connection").
- Green LEDs on transmitter and receiver and yellow LED on transmitter illuminate.
- Position receiver until the yellow LED illuminates.

Receiver LED blinks yellow: Light path free, but no performance reserve; clean and readjust photoelectric sensor, or check operating conditions.

### Safety notices for test function

1. To perform testing correctly the activation input of the SLS 96 transmitter must be connected to a test monitoring unit.
2. The test duration during access protection must not exceed 150ms.
3. Subsequent to sensor activation the output switching elements of the test monitoring unit must remain in the 'off' state for at least 80ms so that the downstream equipment can be switched off safely when the photoelectric sensor is used for access protection.
4. In order to comply with points 2 and 3, the use of Leuze electronic test monitoring units (TNT 35, MSI-m) is recommended.

## Check

The checks should ensure that the Optoelectronic Protective Devices have been used acc. to the national/international regulations, in particular in accordance with the machine and work-equipment directive.

### Check before initial commissioning

- Observe the nationally and internationally valid regulations.
- Is the required safety distance (protective field of the safety sensor to the next point of operation) maintained?
- Is the safety sensor effective during the entire dangerous movement and in all adjustable operating modes of the machine?
- It must not be possible to climb over, climb under or circumvent the light path.
- Ensure that the sensor only detects persons upon entry to the danger area and does not detect whether persons are located within the danger area.
- Is a start-up/restart interlock present?
- Before they begin work, have a competent person train the operating personnel in their respective tasks.

### Regular testing by competent personnel

The reliable interaction of safety sensor and machine must be periodically tested in order to detect changes to the machine or impermissible tampering with the safety sensor.

- Have all tests performed by competent personnel.
- Observe the nationally and internationally applicable regulations and the time periods specified therein.

### Daily check of the effectiveness of the safety sensor

It is extremely important to examine the effectiveness of the protective field daily so that it is ensured that e.g. even with adjustments to e.g. parameters, the protective function is active at all points.

Interrupt the light beam between the transmitter and receiver (test rod Ø 30mm)

- in front of the transmitter.
- in the middle between the transmitter and receiver.
- in front of and behind the deflection mirror.

It must not be possible to initiate the dangerous state during beam interruption.

## Disposal

For disposal observe the applicable national regulations regarding electronic components.



the **sensor** people

**EG-KONFORMITÄTS-  
ERKLÄRUNG  
(ORIGINAL)**

**EC DECLARATION OF  
CONFORMITY  
(ORIGINAL)**

**DECLARATION CE DE  
CONFORMITE  
(ORIGINAL)**

Der Hersteller

The Manufacturer

Le constructeur

**Leuze electronic GmbH + Co. KG**  
In der Braike 1, PO Box 1111  
73277 Owen, Germany

erklärt, dass die nachfolgend  
aufgeführten Produkte den  
entschlagigen Anforderungen der  
genannten EG-Richtlinien und  
Normen entsprechen.

declares that the following listed  
products fulfil the relevant provisions  
of the mentioned EC Directives  
and standards.

déclare que les produits identifiés  
suivants sont conformes aux  
directives CE et normes mentionnées.

Produktbeschreibung:

Description of product:

Description de produit:

**Einweg-Sicherheits-Lichtschranke,  
Berührungslos wirkende  
Schutzeinrichtung,  
Sicherheitsbauteil nach 2006/42/EG  
Anhang IV**

**Protective throughbeam  
photoelectric sensor,  
Active opto-electronic protective  
device,  
safety component in acc. with  
2006/42/EC annex IV**

**Barrière unidirectionnelle,  
Équipement de protection électro-  
sensible,  
Élément de sécurité selon  
2006/42/CE annexe IV**

**SLS 96  
Seriennummer  
2010 01 A-Z 000001 - 999999**

**SLS 96  
Serial no.  
2010 01 A-Z 000001 - 999999**

**SLS 96  
N° série  
2010 01 A-Z 000001 - 999999**

Angewandte EG-Richtlinie(n):

Applied EC Directive(s):

Directive(s) CE appliquées:

**2006/42/EG  
2004/108/EG**

**2006/42/EC  
2004/108/EC**

**2006/42/CE  
2004/108/CE**

Angewandte Normen:

Applied standards:

Normes appliquées:

**EN 61496-1:2004; IEC 61496-2:2006; EN ISO 13849-1:2009; EN 60947-5-2:2007**

Benannte Stelle /  
Baumusterprüfbescheinigung:

Notified Body /  
Certificate of Type Examination:

Organisme notifié /  
Attestation d'examen CE de type:

**TÜV NORD CERT GmbH  
Benannte Stelle 0044  
Langemarckstr. 20  
45141 Essen**

**44 205 10 377326 003**

Bevollmächtigter für die  
Zusammenstellung der  
technischen Unterlagen:

Authorized person to compile the  
technical file:

Personne autorisée à constituer  
le dossier technique:

**Robert Sammer; Leuze electronic GmbH + Co. KG, business unit safety systems  
Liebigstr. 4; 82256 Fuerstenfeldbruck; Germany**

Owen, *10.11.10*  
Datum / Date / Date

*[Signature]*  
Dr. Harald Grübel, Geschäftsführer / Director / Directeur

Leuze electronic GmbH + Co. KG  
In der Braike 1  
D-73277 Owen  
Telefon +49 (0) 7021 573-0  
Telefax +49 (0) 7021 573-199  
info@leuze.de  
www.leuze.com

Leuze electronic GmbH + Co. KG, Sitz Owen, Registergericht Stuttgart, HRA 250712  
**Persönlich haftende Gesellschafterin** Leuze electronic Geschäftsführungs-GmbH,  
Sitz Owen, Registergericht Stuttgart, HRB 230550  
**Geschäftsführer:** Dr. Harald Grübel (Vorsitzender), Karsten Just  
USt-IdNr. DE 145912521 | Zollnummer 2554232  
Es gelten ausschließlich unsere aktuellen Verkaufs- und Lieferbedingungen  
Only our current Terms and Conditions of Sale and Delivery shall apply

Nr. 609429-2010/11

LEO-ZDM-149-01-FO