# Leuze electronic

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SMART
**SENSOR**
BUSINESS

## CSL 505
Switching light curtains

Original operating instructions

## Table of contents

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## Figures and tables

# 1      General information

## 1.1      About this technical description

These operating instructions contain information regarding the proper and effective use of the CSL 505 switching light curtain. These operating instructions (PDF file) can be downloaded from the Internet at www.leuze.de.

## 1.2      Used symbols and signal words

The symbols used in this technical description are explained below.

⚠ *Attention!*
*This symbol precedes text messages which must strictly be observed. Failure to observe the provided instructions could lead to personal injury or damage to equipment.*

○ *Note!*
冂 *This symbol indicates text passages containing important information.*

## 1.3      Declaration of Conformity

The product satisfies the following standards:

| | |
|---|---|
| EU Directive | 2004/108/EC |
| Interference emission | EN 55022:2010 |
| Interference rejection | EN 55024:2010 |
| Degree of protection | EN 60529 |
| Proximity switch | EN 60947-5-2 |
| Certification | UL 61010-1 (Third Edition):2012-05; CAN/CSA-C22.2 No. 61010-1-1[1] |

Leuze electronic GmbH + Co KG in D-73277 Owen, possesses a certified quality assurance system in accordance with ISO 9001.

$C\epsilon$   CSA

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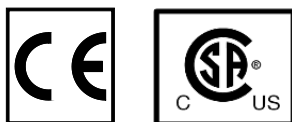
[1] except for the –ER model

# 2 Safety notices

## 2.1 Safety standards

The CSL 505 switching light curtain was developed, manufactured and tested in accordance with the applicable safety standards. It corresponds to the state of the art.

## 2.2 Approved purpose

The CSL 505 switching light curtain is used for detecting objects in defined controlled areas as part of a superordinate overall system.

⚠️ ***Attention!***
*The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use. Leuze electronic GmbH + Co. KG is not liable for damages caused by improper use. Knowledge of this manual is an element of proper use.*

In particular, unauthorized uses include:

- rooms with explosive atmospheres
- for medical purposes
- in circuits which are relevant to safety

⚠️ ***Attention!***
*The CSL 505 switching light curtains as well as their components are not certified safety components within the meaning of the EU machinery directive. They are not allowed to be used as a safety component with human protection function.*

***Areas of application***
The CSL 505 switching light curtains are designed, in particular, for the following areas of application:

- Object detection in storage and materials-handling applications
- Overhang controls in transport systems
- Object detection and process controls in the packaging industry
- Object qualification in the surface industry

## 2.3    Working safely

⚠ ***Attention!***
*Access to or changes on the device, except where expressly described in this operating manual, is not authorized.*

Unless explicitly stated otherwise, the device and its input and output circuits must be operated with a voltage supply that meets the requirements of PELV/SELV systems. Operation of the isolating device must not be hindered in any way.

The system must be secured to prevent it from being switched on again.

***Safety regulations***
Observe the locally applicable legal regulations and the rules of the employer's liability insurance association.

***Qualified personnel***
Mounting, commissioning and maintenance of the device may only be carried out by qualified personnel. Installation and electrical connection of the light curtains should be performed only by qualified personnel in accordance with the applicable regulations, with the power supply disconnected and the device switched off.

# 3 Product description

## 3.1 General information

The CSL 505 switching light curtains monitor a defined area using invisible, infrared light beams. The light curtain systems consist of a transmitter bar (Tx) and receiver bar (Rx). They function in the same way as a system comprising multiple throughbeam photoelectric sensors. If one of the light beams between the transmitter bar and receiver bar is interrupted, this is registered by the evaluation electronics and signaled at the push-pull signal outputs.

## 3.2 Performance characteristics

- No separate evaluation unit required. The device is operated directly from a 24 V DC supply.
- Two short-circuit proof push-pull signal outputs: Can therefore be used both as PNP and as NPN.
- Plug-and-play: The CSL 505 switching light curtains are fully preconfigured at the factory.
- A teach event automatically adapts the operating range.
- Increased resolution possible thanks to crossed-beam scanning.

## 3.3    Configuration interface

The configuration can be read out and changed using the **CSL505 software**. The **CSL505 software** can be downloaded at the Leuze website: www.leuze.com. The **CSL505-Interface** is used for connection to the serial port of a PC.
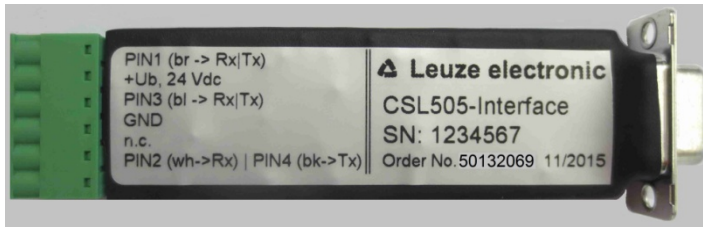


Figure 1: CSL505-Interface
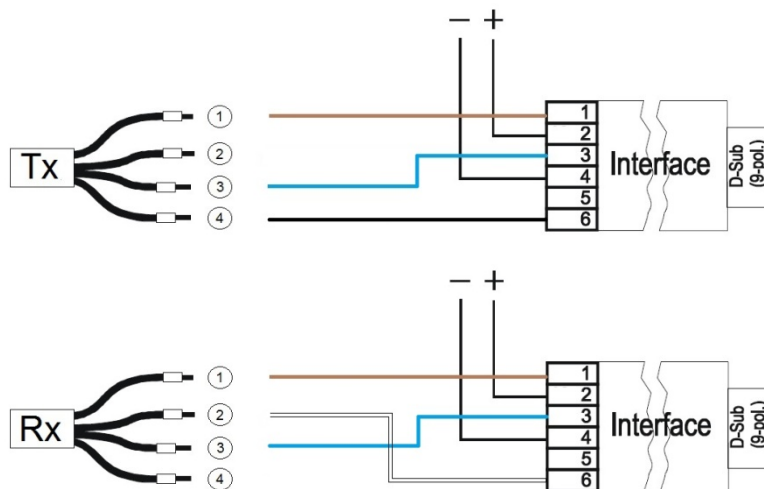


Legend:
1       brown
2       white
3       blue
4       black

Figure 2: Pin assignment of CSL 505 switching light curtain cables

A number of functions are configured via the transmitter and others via the receiver. For a complete list, see Table 5:"Configuration values Receiver" on page 18 and Table 8: "Configuration values for transmitter" on page 20.

1.  Connect the CSL505 interface (part number 50132069) to the +24 V DC power supply unit as indicated by the labeling.

2.  Connect the RS232 interconnection cable (included in the scope of delivery) to the PC.

3.  Connect the transmitter (type CSL-T) or receiver (type CSL-R..) to the CSL505 interface module as indicated by the labeling.

4.  Start the **CSL505 software** and define the COM interface.

5.  Switch on the voltage supply.

The charge process is indicated in the lower right part of the configuration window.

## 3.4 Configuration software

The **CSL505 software** configuration software can be used to change the functionality of the CSL 505 light curtain. The software operates under the Windows® 95/98/2000/NT/XP/7/8 operating systems. Depending on the used parameter list, parameter values may have different designations or be hidden.
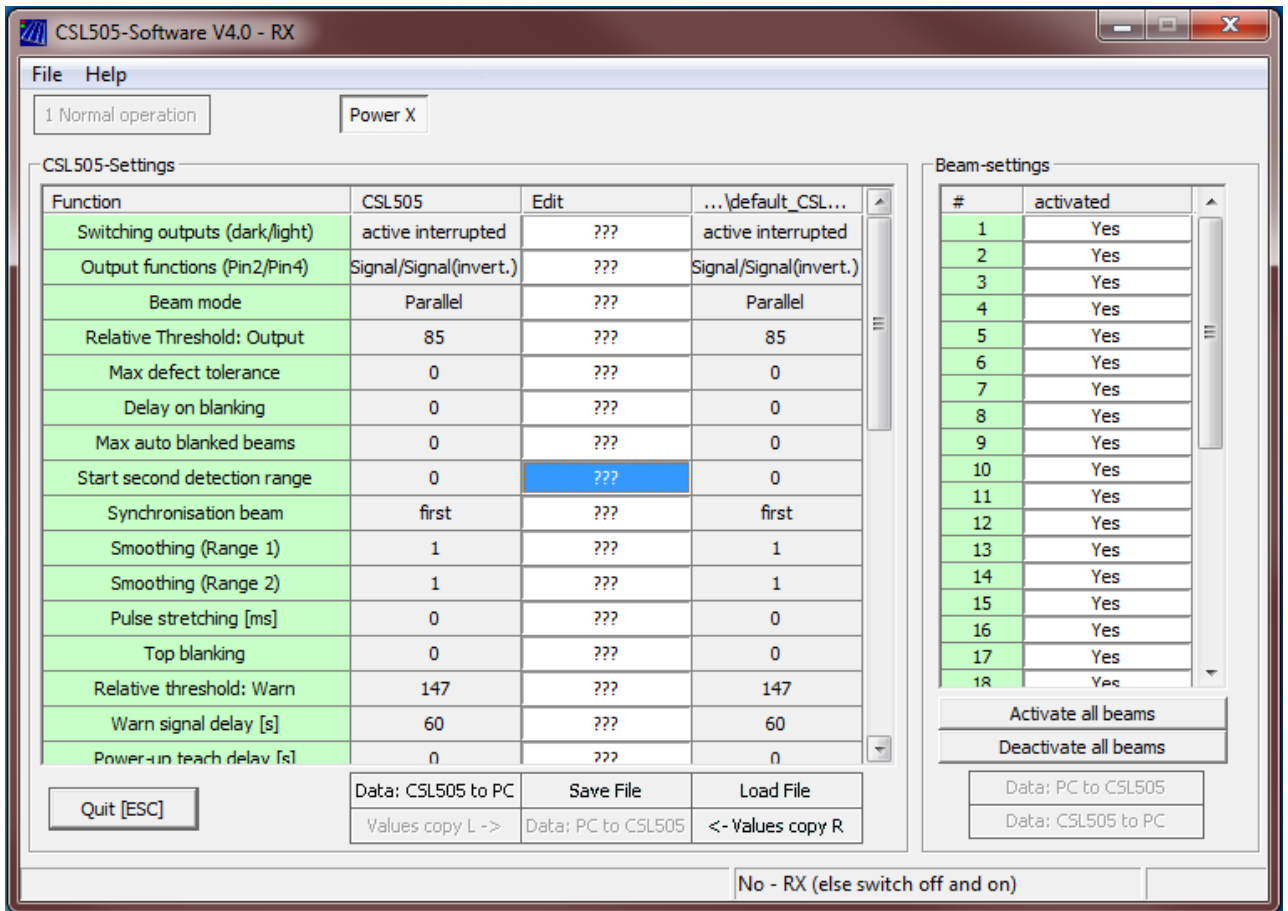


Figure 3: Configuration window of CSL505 software

Parameter values can be saved in a parameter file on the hard drive by clicking the *File: Save* button. Parameter values saved in this way can be imported via the menu *File -> Load parameter file* or by clicking the *File: Load* button.

The connected receiver bar can be activated and deactivated using the *Power X* button.

In general, parameters are changed in the white fields. Changed values are indicated by italic text with a yellow field background.

⚠ *Attention!*
*After entering numeric values, you must confirm the entry with* **<Return>**.

After completing changes to the parameters, the configuration is transferred to the light curtain system by clicking the *Data: PC to CSL505* button.

⚠ *Attention!*
*Please note that only the data of the column above the button are transferred.*
*The transmitted settings are retained even after the system is switched off.*

Use the *1 Normal operation* button to switch the light curtain to the normal detection state.

## 3.5 Parameters (receiver)

The CSL 505 switching light curtains can be configured over a wide range.

### 3.5.1 Switching output (dark/light)

You can configure the CSL 505 switching light curtain to be dark switching or light switching.

This is set using the parameter *Switching output (dark/light)*.

|  | **Dark switching** | **Light switching** |
|---|---|---|
| Monitoring area free | Output inactive | Output active |
| Beam interrupted | Output active | Output inactive |

Input option:                 dark switching / light switching
Factory setting:             dark switching

### 3.5.2 Output functions (pin 2/pin 4)

The CSL 505 switching light curtain has two outputs (pin 2 and pin 4 at the receiver). The function of the outputs can be set using the parameter *Output functions (pin 2/pin 4)*.

For further information, see also the special case "3.5.6 Start beam of second switching range" on page 14.

| **Output assignment** | **Pin 2** | **Pin 4** |
|---|---|---|
| Normal | Signal | Warning (normal), i.e. active when warning is output |
| Normal with inverted warning output | Signal | Warning (inverted), i.e. active when device operation is OK |
| Swapped | Warning (normal), i.e. active when warning is output | Signal |
| Swapped with inverted warning output | Warning (inverted), i.e. active when device operation is OK | Signal |
| Swapped without warning output | - | Signal |
| Antivalent | Signal | Signal (inverted), i.e. active if pin 2 is inactive |

Table 1:      Output functions (pin 2/pin 4)

Signal:                       dark switching or light switching according to parameter *Switching output (dark/light)*.

Factory setting:          antivalent

### 3.5.3    Beam mode
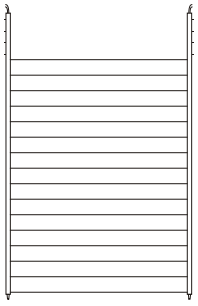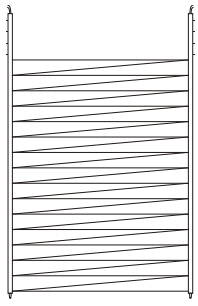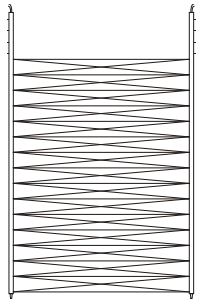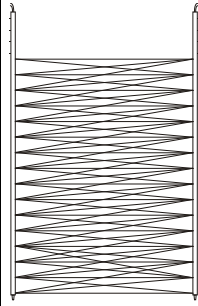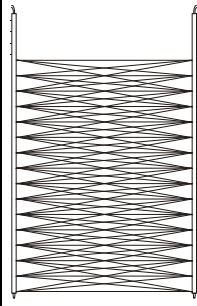
| Beam mode | Parallel beams | Diagonal beams | Single crossed-beam scanning | Multiple crossed-beam scanning | Multiple crossed-beam scanning |
|---|---|---|---|---|---|
| Synchronization beam | First or last | First or last | Load | Load | Load |
| Number of beams | n | 2n-1 | 3n-2 | 4n-4 | 5n-6 |
| Max. perm. number of phys. beams (n) | 160 | 80 | 54 | 41 | 33 |
| Sketch | | | | | |

Table 2:       Beam mode

**Note!**
- A teach event must be performed after this parameter is changed.
- A higher number of beams also increases the cycle time!
- A total of max. 160 logical beams are possible.

Factory settings:

| | Pin 1 | Pin 3 | Description |
|---|---|---|---|
| **Receiver** | +24 V DC | GND | Only parallel beams |
| | GND | +24 V DC | Parallel and diagonal beams |

### 3.5.4   Relative switching threshold

During the teach event, the value for the brightness of every individual beam is measured and saved in a non-volatile memory. The absolute switching threshold per beam is determined by multiplying by the relative switching threshold (percentage of *Relative switching threshold*).

To ensure that the system responds even at low beam coverage levels, the switching threshold must be increased. The default value is 85 (corresponds to approx. 33 %). The switching threshold should be set to max. 179 (corresponds to approx. 70 %).

*Use*

| Define switching threshold automatically | *Relative switching threshold* = 0 |
| --- | --- |
| Improve detection of transparent objects | High switching threshold |
| Reduce effect of reflection bypass | High switching threshold |
| Tolerate rough environmental conditions | Low switching threshold |

Input option:          0 to 255
Factory setting:       85

### 3.5.5   Blanking of beams

Various options are available for blanking beams.

It is important to note that the synchronization beam must always remain active!

### 3.5.5.1   Manual blanking via CSL505 software

You configure manual blanking in the beam configuration area on the right side of the CSL505 software program window. Select there the receiver element that is to be deactivated.

### 3.5.5.2   Automatic blanking during teach event (auto blanking)

All interrupted beams are blanked automatically during the teach event.

*Blanking threshold* specifies the signal strength below which beams are blanked automatically during the teach event.

If *Blanking threshold* is set to 0, the function is deactivated.

Input option:          0 to 255
Factory setting:       100

### 3.5.5.3   Blanking of defective beams

The parameter *Blanking of defective beams* specifies the number of beams that are tolerated. If this number exceeds the value for *Blanking of defective beams*, a serious error is signaled. Below this number, defective beams are blanked and not taken into consideration during evaluation.

All other blanked beams are not added to *Blanking of defective beams*.

Input option:          0 to 160
Factory setting:       0

**3.5.5.4 Autom. beam bl. delay [s]**

Time that must pass before a beam interruption is blanked. Specified in seconds.

Input option:          0 to 255
Factory setting:       0

**3.5.5.5 Maximum automatic beam blanking**

Permanently interrupted beams can be blanked automatically.

*Automatic beam blanking* is used to set how many adjacent beams of the same type (e.g. parallel beams) are allowed to be blanked. The count restarts after an active beam.

*Example*
*Automatic beam blanking = 1*
Beam 3, 5 and 8 can be blanked. If beam 9 is additionally covered, this beam is not blanked and the CSL 505 switching light curtain remains interrupted.

This function is often used for elevator applications and enables permanently interrupted beams to be blanked automatically.

| | **Automatic beam blanking** |
|---|---|
| 0 | None |
| 1 | 1 beam |
| 2 | 2 beams of same type |
| ... | ... |

Table 3:     Automatic beam blanking

**3.5.6 Start beam of second switching range**

With *Start beam of second switching range* you split the CSL 505 switching light curtain into two ranges.

The state of the ranges is indicated at the outputs pin 2 and pin 4.

| **Output functions** | **Pin 2** | **Pin 4** |
|---|---|---|
| Normal | Range 1 | Range 2 |
| Normal with inverted warning output | Range 1 | Range 2 inv. |
| Swapped | Range 2 | Range 1 |
| Swapped with inverted warning output | Range 2 inv. | Range 1 |
| Swapped without warning output | | Range 1 |
| Antivalent | Range 1 | Range 1 inv. |

Table 4:     Output functions

○
⫯ *Note!*
  • Switching ranges with non-parallel beams overlap.
  • If the synchronization beam is interrupted, both ranges switch.
  • The dark switching or hell switching (factory setting) parameter applies to both ranges.
  • If "1" is selected, the two ranges together cover the entire monitoring range.
  • *Smoothing* can be defined for each range

**3.5.7    Synchronization beam**

*Synchronization beam* is used to define whether the first beam (at the cable outlet) or the last beam is used for optical synchronization.

○
⅂⅃  *Note!*
- The transmitter and receiver must be set to the same value.
- The synchronization beam cannot be suppressed.
- Interruption of the synchronization beam is signaled at both ranges.

Input option:              first / last
Factory setting:         first

**3.5.8    Smoothing**

*Smoothing (range 1)* specifies the number of beams which must be interrupted before beam interruption is signaled. The interrupted beams do not have to occur consecutively.

If ranges are used (see the section 3.5.6 "Start beam of second switching range" on page 14), the value for the second range is defined using *Smoothing (range 2)*.

*Example*
- *Smoothing (range 1)* = "5":
  Output switches when 5 or more beams have been interrupted.
- Special function with: *Start beam of second switching range* = "1":
  Both smoothing values relate to the entire monitoring range.
- *Smoothing (range 1)* = "2":
  *Smoothing (range 2)* = "3":
  *Start beam of second switching range* = "10":
  If, for example, beam 4 and 7 are interrupted, range 1 switches; if beams 10, 11 and 20 are interrupted, the second range switches.

**3.5.9    Pulse stretching [ms]**

The parameter value *Pulse stretching [ms]* delays the change in state of the switching outputs by the set value in milliseconds (ms). A maximum delay of 255 ms is possible.

Input option:              0 to 255
Factory setting:         0

**3.5.10    Top blanking**

When the device is switched on, the beams covered at the beginning of the bar can be permanently blanked. *Top blanking* specifies how many consecutive beams can be blanked.

This function is intended for elevator applications and only available where *Synchronization beam = last*.

**3.5.11    Relative switching threshold: Warn**

If the intensity of the received signal remains below a set value (*Relative switching threshold: Warn* for a certain period (*Warn signal delay [s]*), the CSL 505 switching light curtain signals a "minor error".

*Possible remedies:*
- Clean the beam exit.
- Align the transmitter and receiver and perform the teach event again.

If *Relative switching threshold: Warn* is set to "0", the "soiling alarm" is deactivated.

Input option:              0 to 255
Factory setting:         147

**3.5.12  Warn signal delay [s]**

Time after which soiling is signaled. See the section 3.5.11 "Relative switching threshold: Warn" on page 15.

Input option:          0 to 255
Factory setting:      60

**3.5.13  Power-up teach delay [s]**

Switching threshold setting is activated at power-up. After a time (in seconds) has elapsed, the determined reference values are saved in a non-volatile memory, provided that the monitoring range was free. Otherwise the original reference values are used. This teach event at power-up is deactivated with "0" and "255".

Input option:          0 to 255
Factory setting:      0

**3.5.14  Blanking warning**

*Blanking warning* specifies the position (beam number) as of which an error message is issued in the event of blanking.

Input option:          0 to 160
Factory setting:      0

**3.5.15   Overview table of configuration values for receiver**

| Configuration values | Default value (value range) | Description |
|---|---|---|
| *First beam* | 1 | Value is always 1 |
| *Last beam[2]* | xx | Value is dependent on bar |
| *Switching output (dark/light)* | Dark switching | Light switching<br>Dark switching |
| *Output functions (pin 2/pin 4)* | Antivalent | Normal<br>Normal with inverted warning output<br>Swapped<br>Swapped with inverted warning output<br>Swapped without warning output<br>Antivalent |
| *Beam mode* | Parallel<br><br>Diagonal with Rx polarity reversal | Parallel<br>Diagonal<br>Crossed-beam*<br>2x crossed beam*<br>3x crossed beam*<br>(*only where *Synchronization beam = last*) |
| *Relative switching threshold* | 85<br>(0…255) | 85 corresponds to 33 % (255 corresponds to 100 %)<br>0 = Automatic switching threshold setting active. |
| *Blanking of defective beams* | 0<br>(0…160) | Max. number of defective beams that are blanked automatically. |
| *Autom. beam bl. delay [s]* | 0<br>(0…255) | Time that must pass before a beam interruption is blanked. Specified in seconds. |
| *Automatic beam blanking* | 0<br>(0…160) | Number of consecutive beams of the same type which can be blanked. |
| *Start beam of second switching range* | 0 | This beam is the beginning of the 2nd range. Recommended for *"parallel"* beam mode only! |
| *Synchronization beam* | First | First = Synchronization using first beam.<br>Last = Synchronization using last beam. |
| *Smoothing (range 1)* | 1<br>(1…160) | Number of interrupted beams as of which an interruption is detected. |
| *Smoothing (range 2)* | 1<br>(1…160) | Number of interrupted beams as of which an interruption is detected. (range 2) |
| *Pulse stretching [ms]* | 0<br>(0…255) | Time period in ms between output changes. (Value range: 0 – 255 ms) |
| *Top blanking* | 0<br>(0…160) | Number of consecutive beams which can be blanked during start-up.<br>Only where blanking threshold = 0. |
| *Relative switching threshold: Warn* | 147<br>(0…255) | Threshold for soiling warning.<br>Corresponds to 57 % (value * 256) |
| *Warn signal delay [s]* | 60<br>(0…255) | Time after which soiling is signaled.<br>Specified in seconds. |

[2] Only the value of the physically present beams should be set; an incorrect value can lead to malfunctions.

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| Configuration values | Default value (value range) | Description |
|---|---|---|
| *Power-up teach delay [s]* | 254 (0…255) | Improved teach behavior beginning with V.1.1 Allows the reference values to be saved '1' to '255' seconds after switching on. |
| *Blanking threshold* | 100 (0…255) | Signal strength below which beams are blanked during the teach event. '0' deactivates the function. |
| *Blanking warning* | 0 (0…160) | Beam number as of which an error message is issued in the event of blanking (not defective!). |

Table 5:      Configuration values Receiver

## 3.6    Parameters (transmitter)

When the transmitter is switched off by means of an input signal, a switching operation is specifically triggered, e.g. for a start test. Various functions are configurable.

When the transmitter is deactivated, the receiver reacts in the same way as for a beam interruption, and the transmitter LED flashes.

The transmitter cycle is not stopped; the system is therefore quickly ready for operation again after transmitter activation.

### 3.6.1    High signal or Low signal at input

Use the parameter value *High signal at input* for transmitter deactivation with active transmitter input, or *Low signal at input* for transmitter deactivation with inactive transmitter input.

| Parameter "High signal at input" or "Low signal at input" for deactivation with signal at transmitter input | | | | |
|---|---|---|---|---|
| **Active** | | **Inactive** | | |
| **Low** | **High** | **Low** | **High** | **Comment** |
| 0 | 0 | 0 | 0 | Transmitter deactivation off. |
| 0 | 1 | 1 | 0 | Only the synchronization beam is switched off. The warning output remains unchanged e.g. for a start test. |
| 0 | 2 | 2 | 0 | The synchronization beam remains active; all other beams are switched off. If the warning output is active, it switches after *Automatic beam blanking delay [s]* (see the section 3.5.5.4 „Autom. beam bl. delay [s]" on page 14). |
| **0** | **3** | 3 | 0 | All beams are switched off, e.g. to prevent interference at multiple sensors. The warning output remains unchanged. |

(Factory setting in **bold type**)

Table 6:     High signal and Low signal at input

### 3.6.2 Operating range

The parameter *Operating range* is used to switch over to "reduced" operating range.
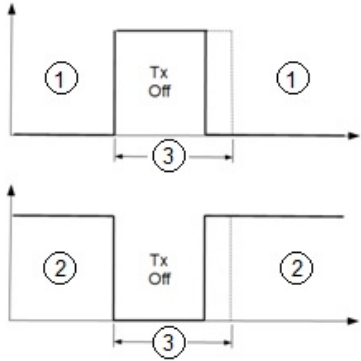
| Operating range | Comment | |
|---|---|---|
| 0 | Increased transmitter power (factory setting in parameter set 1) | |
| 1 | Reduced transmitter power (factory setting in parameter set 2) | |
| 2 … 255 Disable transmitter deactivation | Start test with range switching option<br><br>Selectable at the input:<br>24 V reduced, 0 V normal<br><br>The value corresponds to a time delay in steps of 2.56.<br><br>Example:<br>200 gives a time delay of 512 ms. During the time delay, the transmitter is deactivated according to the mode set for transmitter deactivation. If the input signal returns to the original value within the delay time, transmitter deactivation is ended. | 1 Extended operating range<br>2 Reduced operating range<br>3 Time delay<br> |

Table 7:     Operating range

Factory settings:

| | Pin 1 | Pin 3 | Description |
|---|---|---|---|
| **Transmitte** | +24 V DC | GND | Extended operating range: 1000 … 5000 mm (10000 mm for –ER) |
| | GND | +24 V DC | Reduced operating range: 300 … 1300 mm |

### 3.6.2.1  Overview table of configuration values for transmitter

| | Default value (value range) | Description |
|---|---|---|
| *First beam* | 1 | Value is always 1 |
| *Last beam* | xx | Value is dependent on bar |
| *High signal at input* | 3 | Transmitter deactivation with active transmitter input |
| *Low signal at input* | 0 | Transmitter deactivation with inactive transmitter input |
| *Operating range* | 0 or 1 (0…255) | Extended (0) or reduced (1) operating range 2…255: Disable transmitter deactivation |
| *Synchronization beam* | First | First = Synchronization using first beam Last = Synchronization using last beam |

Table 8:     Configuration values for transmitter

# 4 Mounting and commissioning
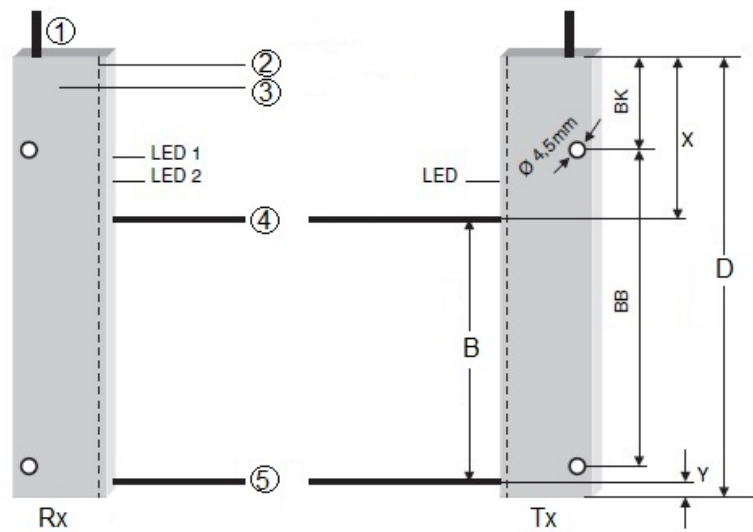


Legend:
1     M8 connector/connection cable
2     Front screen
3     Aluminum housing
4     First beam
5     Last beam

Figure 4: Mounting the CSL 505 switching light curtain

The dimensions are given in the following tables: Table 14: "Dimensions CSL 505" on page 34 or Table 15: "Dimensions of CSL 505, special variant "VB" on page 35.

1.  Transmitter and receiver must be mounted at the same height relative to one another.

2.  The transmitter and receiver bars must be aligned with each other with an accuracy of about 10°.

3.  Do not place any mechanical load on the bars or bend them, etc.

4.  Be careful during horizontal mounting, as liquids may be detected on the front cover as if they were objects. If they remain there for a long time, they may penetrate the bar and damage the electronics. Increased risk of soiling.

5.  Protect the cable from being crushed and from exposure to strong electromagnetic effects.

6.  Strong extraneous light effect (caused for example by strobe lights, direct sunshine) on the receiver bar should be avoided.

7.  Prevent optical sensors (for example other light curtains, photoelectric sensors) from affecting each other by positioning them appropriately or blocking them from each other, etc.

8.  There must be no reflecting surfaces near the light curtain. Otherwise objects may not be detected due to the reflection.

The CSL 505 switching light curtain is ready for operation maximum 1.5 seconds after the receiver is switched on.

## 4.1    Electrical connection

1. Bars must only be connected while there is no voltage in the system.

2. Avoid ground loops; all bars must have the same grounding potential.

3. A potential difference of 60 V between the bar housing and the supply voltage must not be exceeded.

4. Insulate unused wires.

### 4.1.1    M8 connector variant
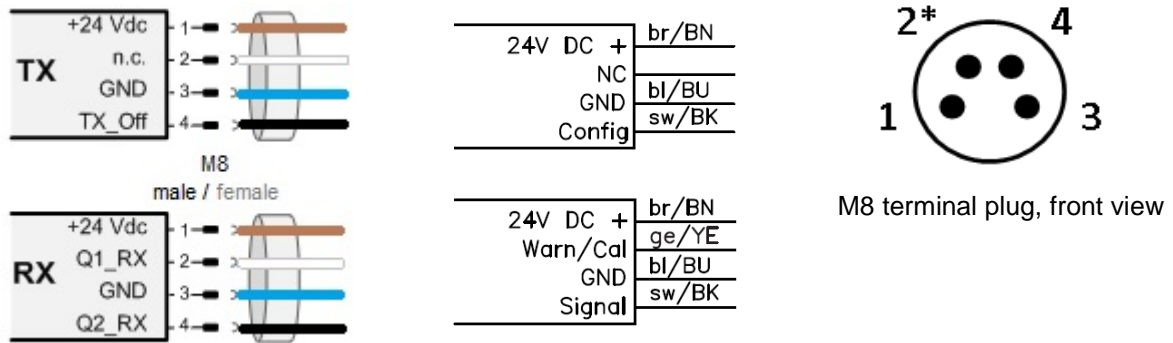


Figure 5: M8 connector version, open cable end

| Pin | Tx | Rx |
|---|---|---|
| 1, 3 | +24 V DC, GND | |
| 2* | n.c. | Dark switching |
| 4 | Tx_Off | Light switching |

\* Used for the teach event

By reversing the polarity of the supply voltages on the transmitter and receiver, it is possible to switch between predefined device functions:

| | Pin 1 | Pin 3 | Description |
|---|---|---|---|
| **Transmitte** | +24 V DC | GND | Extended operating range: 1000 … 5000 mm |
| | GND | +24 V DC | Reduced operating range: 300 … 1300 mm |

| | Pin 1 | Pin 3 | Description |
|---|---|---|---|
| **Receiver** | +24 V DC | GND | Only parallel beams |
| | GND | +24 V DC | Parallel and diagonal beams |

The depicted assignments are standard settings. The assigned functions can be freely configured.

## 4.2    Teach event

The teach behavior is dependent on the set operating mode. Three different operating modes are available (automatic, PNP or NPN). These differ in the way that the input pins must be connected in order to start a teach event.

Note that pins 2 and 4 can be both input as well as output pins.

Whether a teach event is started is always decided on the basis of the pinning during start-up. If no voltage is applied to pin 2 or pin 4, the light curtain always starts in process mode.

### 4.2.1    Teach modes

#### Automatic mode (factory setting)

In automatic mode, it makes no difference whether pin 2 or pin 4 is used as the teach input. Both are possible. It is recommended that pin 2 be used as the switching input since pin 4 is used as the switching output in process mode.

| Process mode: | Teach: |
|---|---|
| Pin 2: GND | Pin 2: +24V or GND |
| Pin 4: GND | Pin 4: GND or +24V |

#### PNP setting

In PNP mode, only pin 2 is used to activate the teach event. During start-up of the CSL505, a check is performed to determine whether a 24V voltage is applied to pin 2. If this is the case, the teach event starts.

| Process mode: | Teach: |
|---|---|
| Pin 2: GND | Pin 2: +24V |
| Pin 4: GND | Pin 4: GND |

#### NPN setting

In NPN mode, only pin 4 is used to activate the teach event. During start-up of the CSL505, a check is performed to determine whether a 24V voltage is applied to pin 4. If this is the case, the teach event starts.

| Process mode: | Teach: |
|---|---|
| Pin 2: GND | Pin 2: GND |
| Pin 4: GND | Pin 4: +24V |

Please only use the described connection logic. Other bit patterns are not supported.

#### 4.2.2 Teach behavior

##### Automatic mode

1. When switching on, connect pin 2 or pin 4 of the receiver bar to + 24 V DC.

   => Teach event starts (flashing signals different to those in normal operation)

2. Both LEDs on the receiver bar illuminate.

   => Teach event successful. The first valid teach values are stored.

3. Exit teach mode by completely disconnecting the voltage supply. Before the next start, the voltage at pin 2 or pin 4 must also be disconnected.

*Example of practical implementation:*

1. Insert a bridge between the connection of pin 2 and the supply voltage (+24 V DC).

2. Make sure that the monitoring range is free.

3. Switch on the operating voltage.

4. Switch off the operating voltage.

5. Remove the bridge.

##### PNP, switching

1. When switching on, connect pin 2 of the receiver bar to + 24 V DC.

   => Teach event starts (flashing signals different to those in normal operation)

2. Both LEDs on the receiver bar illuminate.

   => Teach event successful. The first valid teach values are stored.

3. Exit teach mode by completely disconnecting the voltage supply. Before the next start, the voltage at pin 2 must also be disconnected.

##### NPN, switching

1. Connect pin 4 of the receiver to either an NPN digital input or to 24 V DC.

2. Connect pin 2 of the receiver to 0 V DC and switch on the device.

   => The teach event starts (this is indicated by flashing LEDs; different from the normal operating mode)

3. Both LEDs on the receiver illuminate.

   => Teach event successful. The light barrier stores the sensitivity adjustments.

4. Exit teach mode by disconnecting the voltage supply and disconnecting pin 4 from voltage.

O
II
*Note!*

- The teach event is important for ensuring the function of the CSL 505 switching light curtain.
- A teach event is always performed on the receiver.
- Make certain that transmitter and receiver are optimally aligned with one another. This ensures the best performance reserve after you have performed a teach.
- Therefore, perform the teach event after every change to the light curtain.
- For an error-free teach event, the monitoring range must be clear and both LEDs of the receiver bar must illuminate continuously.
  The exception is described in the section 3.5.5.2 "Automatic blanking during teach event (auto blanking)" on page 13.

*Flash codes during teach event*

| One LED flashes | Defective beams | One LED flashes |
|---|---|---|
| LEDs flash in phase | Differences too great or not yet calibrated. Check the alignment of the transmitter and receiver and the monitoring range. | LEDs flash in phase |
| LEDs flash out of phase | The self test has not detected any faults. | LEDs flash out of phase |

Table 9:     Flash codes during teach event

**4.2.3    Compatibility with previous version < V2.30**

With the CSL 505, automatic mode is integrated beginning with firmware V2.30. This is called up when you connect the light curtain to the software and is then displayed in the lower right area (see also figure 3). If you would like to operate a CSL505 with the old teach behavior, you can switch back to this behavior. The "Power-Up Teach" parameter, which permits multiple values, can be called up via the software for this purpose. The default value is "254". To activate the old teach process, you must select a value of "0" or "255" here.

Menu item in the configuration software of the CSL 505

| Power-up teach delay [s] | ??? | 254 |
|---|---|---|

## 4.3     LED indicators/Error diagnostics

If the CSL 505 switching light curtain detects a fault, the LEDs show one of the following error codes. Depending on the output assignment and output function, a warning output may be evaluated.

As soon as the cause of the fault is rectified, the warning output becomes inactive again.
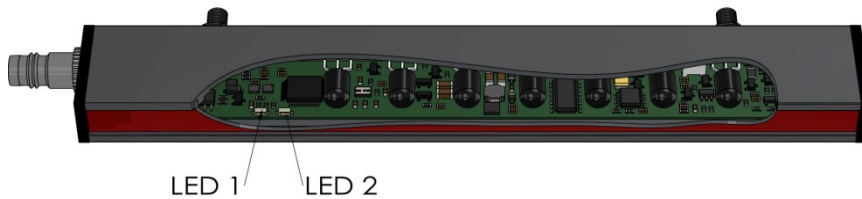


Figure 6: LED indicators/Error diagnostics

### 4.3.1     Receiver bar

| LED 1 | LED 2 | Operating state | Monitoring area |
|---|---|---|---|
| Off | Off | Off | Unknown |
| On | On | Ready | Free |
| On | Off | Ready | Beam interrupted |
| Flashes | On | Minor error | Free |
| Flashes | Off | Minor error | Beam interrupted |
| Flashes (double) | Off | Configuration error | Unknown |
| Flashes | Flashes (in phase) | Serious error | Unknown |
| Flashes | Flashes (out of phase) | Serious error | Unknown |

Table 10:     LED indicators of receiver bar

***Minor error:***
The CSL 505 switching light curtain continues to operate but with reduced functionality, e.g. beam blanking; soiling alarm ***Relative switching threshold: Warn***.

***Serious error:***
The CSL 505 switching light curtain no longer functions.

### 4.3.2     Transmitter bar

| LED | Operating state |
|---|---|
| Off | Off |
| On | Ready |
| Flashes | Error |

Table 11:     LED indicators of transmitter bar

Make sure that the values for ***Last beam*** and ***Synchronization beam*** are correctly set and identical in the receiver and transmitter.

## 4.4      Substitution of Vario B

The CSL505 switching light curtain enables a smooth substitution of Vario B.

### 4.4.1      Receiver bar

In existing installations with a dark-switching Vario B PNP-type or a light-switching Vario B NPN-type, pin 2 of the CSL505 receiver must be used instead of pin 4.

In existing installations with a Vario B diagonal-beam type, the CSL505 switching light curtain must be connected with the polarity of the voltage supply reversed at pin 1 and pin 3.

### 4.4.2      Transmitter bar

In existing installations with all Vario B types, the function assignment of the electrical connection remains unchanged on the transmitter bar.

# 5 Maintenance

The CSL 505 switching light curtain does not require regular maintenance.
If the front cover should become soiled, clean it with a moist cloth.

- Do not use any cleaners which contain solvents to clean.
- Do not use any high-pressure cleaners or steam jet cleaners
- When cleaning, take care not to scratch the front cover
- If necessary, realign the light curtain and perform the teach event again.

# 6    Technical data

## 6.1    General specifications

**Optical data**

| | |
|---|---|
| Operating range | Approx. 300 to 5000 mm[3] (teach event required)<br>Factory presetting: approx. 4 m<br>Operating range can be set by reversing polarity:<br>approx. 300 to 1300 mm (reduced operating range) or<br>approx. 1000 to 5000 mm (extended operating range) |
| Maximum number of beams | 160 logical beams |

**Timing**

| | |
|---|---|
| Response time | Cycle time approx. 1 ms/beam plus basic time (approx. 4 ms).<br>After interruption of synchronization beam approx. 1-2 cycles. |
| Delay time at power-up | Approx. 810 ms + 1-2 cycles |

**Electrical data**

| | | |
|---|---|---|
| Operating voltage | 18 to 30 V DC with max. 10 % ripple. | |
| | Use reverse-polarity protected, grounded voltage supply! | |
| Power consumption | Extended operating range | Nominal 3.1 W, peak 6.5 W (2 MHz, 100 µs) |
| | Reduced operating range | Nominal 1.3 W, peak 2.3 W (2 MHz, 100 µs) |
| Switch-on current | Max. 7.5 A, 40 µs | |
| Outputs | Push-pull switching current max. 150 mA | |
| Input of transmitter | Positive switching; permissible input voltage 0 to 30 V DC<br>Input resistance typ. 6 kΩ; switching threshold typ. 4 V | |
| Protective circuit | Polarity reversal protection, short circuit protection, inductive protection for all outputs | |

**Mechanical data**

| | | |
|---|---|---|
| Light curtain housing | Aluminium, natural anodising, front cover made of plastic, dark red. | |
| Connection | Receiver: | M8 plug, 4-pin |
| | Transmitter: | M8 plug, 4-pin |
| Protection class | IP 65 | |

**Environmental data**

| | |
|---|---|
| Operating temperature | -30 °C to +50 °C |
| Storage temperature | -40 °C to +65 °C |
| Elevation | < 2000 m |
| Degree of contamination | 2 |

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[3] approx. 1000 … 10000 mm for -ER model

## 6.2 Nomenclature

Part designation: CSLbbb-fss-xxxx-vv-ee

| CSL | Operating principle: switching light curtain |
|---|---|
| bbb | Series: 505 for CSL 505 |
| f | Function classes:<br>T: Transmitter<br>R: Receiver |
| ss | Beam spacing:<br>   05:     5 mm<br> 12.5:  12.5 mm<br>   25:   25 mm<br>   50:   50 mm<br> 100:  100 mm |
| xxxx | Measurement field length [mm], dependent on beam spacing:<br>For values see tables |
| vv | Special variant:<br>VB: Profile and mounting system compatible with VARIO B |
| ee | Electrical connection:<br>M8: M8 connector<br>xxxx: length of the cable tail in mm |

Table 12:     Part number code

## 6.3 Dimensioned drawings
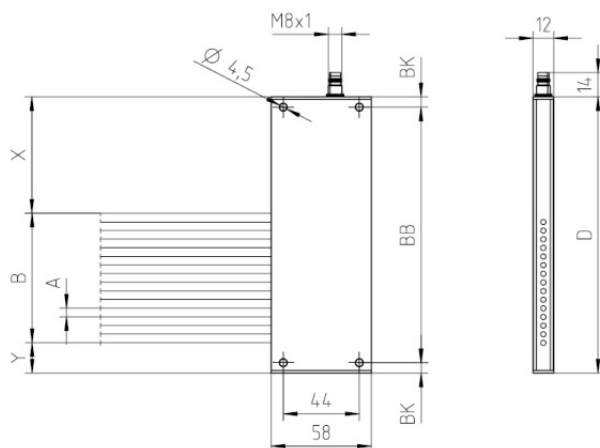


Figure 7: CSL 505 with beam spacing 5 mm
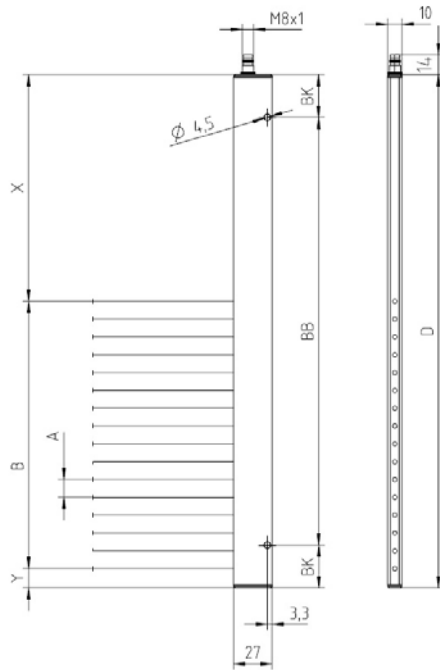
Figure 8: CSL 505 with beam spacing > 5 mm

## 6.4    Dimensions

The housings have the following dimensions:

| Beam spacing | Width (mm) | Depth (mm) |
|---|---|---|
| 5 mm | 12 | 58 |
| 12.5 / 25 / 50 / 100 mm | 10 | 27 |

Table 13:    Dimensions housing

Dimensions CSL 505:

| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R05-35-M8 CSL505-T05-35-M8 | 5 | 8 | 35 | 120 | 4 | 108 | 6 | 17.5 | 67.5 |
| CSL505-R05-75-M8 CSL505-T05-75-M8 | 5 | 16 | 75 | 160 | 4 | 148 | 6 | 17.5 | 67.5 |
| CSL505-R05-115-M8 CSL505-T05-115-M8 | 5 | 24 | 115 | 200 | 4 | 188 | 6 | 17.5 | 67.5 |
| CSL505-R05-155-M8 CSL505-T05-155-M8 | 5 | 32 | 155 | 240 | 4 | 228 | 6 | 17.5 | 67.5 |
| CSL505-R05-195-M8 CSL505-T05-195-M8 | 5 | 40 | 195 | 280 | 4 | 268 | 6 | 17.5 | 67.5 |

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| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R05-195-4000[4]<br>CSL505-T05-195-4000 | 5 | 40 | 195 | 280 | 4 | 268 | 6 | 17.5 | 67.5 |
| CSL505-R05-235-M8<br>CSL505-T05-235-M8 | 5 | 48 | 235 | 320 | 4 | 308 | 6 | 17.5 | 67.5 |
| CSL505-R05-275-M8<br>CSL505-T05-275-M8 | 5 | 56 | 275 | 360 | 4 | 348 | 6 | 17.5 | 67.5 |
| CSL505-R05-315-M8<br>CSL505-T05-315-M8 | 5 | 64 | 315 | 400 | 4 | 388 | 6 | 17.5 | 67.5 |
| CSL505-R05-355-M8<br>CSL505-T05-355-M8 | 5 | 72 | 355 | 440 | 4 | 428 | 6 | 17.5 | 67.5 |
| CSL505-R05-395-M8<br>CSL505-T05-395-M8 | 5 | 80 | 395 | 480 | 4 | 468 | 6 | 17.5 | 67.5 |
| CSL505-R12.5-88-M8<br>CSL505-T12.5-88-M8 | 12.5 | 8 | 88 | 150 | 2 | 100 | 25 | 13.5 | 48.5 |
| CSL505-R12.5-188-M8<br>CSL505-T12.5-188-M8 | 12.5 | 16 | 188 | 250 | 2 | 100 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-288-M8<br>CSL505-T12.5-288-M8 | 12.5 | 24 | 288 | 350 | 2 | 200 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-388-M8<br>CSL505-T12.5-388-M8 | 12.5 | 32 | 388 | 450 | 2 | 300 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-488-M8<br>CSL505-T12.5-488-M8 | 12.5 | 40 | 488 | 550 | 2 | 400 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-588-M8<br>CSL505-T12.5-588-M8 | 12.5 | 48 | 588 | 650 | 2 | 500 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-688-M8<br>CSL505-T12.5-688-M8 | 12.5 | 56 | 688 | 750 | 2 | 600 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-788-M8<br>CSL505-T12.5-788-M8 | 12.5 | 64 | 788 | 850 | 2 | 700 | 75 | 13.5 | 48.5 |
| CSL505-R12.5-888-M8<br>CSL505-T12.5-888-M8 | 12.5 | 72 | 887.5 | 950 | 2 | 800 | 75 | 13.5 | 49.0 |
| CSL505-R12.5-988-M8<br>CSL505-T12.5-988-M8 | 12.5 | 80 | 987.5 | 1050 | 3 | 400 | 125 | 13.5 | 49.0 |
| CSL505-R25-175-M8<br>CSL505-T25-175-M8 | 25 | 8 | 175 | 250 | 2 | 100 | 75 | 20.0 | 55.0 |
| CSL505-R25-275-M8<br>CSL505-T25-275-M8 | 25 | 12 | 275 | 350 | 2 | 200 | 75 | 20.0 | 55.0 |
| CSL505-R25-375-M8<br>CSL505-T25-375-M8 | 25 | 16 | 375 | 450 | 2 | 300 | 75 | 20.0 | 55.0 |
| CSL505-R25-475-M8<br>CSL505-T25-475-M8 | 25 | 20 | 475 | 550 | 2 | 400 | 75 | 20.0 | 55.0 |
| CSL505-R25-575-M8<br>CSL505-T25-575-M8 | 25 | 24 | 575 | 650 | 2 | 500 | 75 | 20.0 | 55.0 |
| CSL505-R25-675-M8<br>CSL505-T25-675-M8 | 25 | 28 | 675 | 750 | 2 | 600 | 75 | 20.0 | 55.0 |
| CSL505-R25-775-M8<br>CSL505-T25-775-M8 | 25 | 32 | 775 | 850 | 2 | 700 | 75 | 20.0 | 55.0 |
| CSL505-R25-875-M8<br>CSL505-T25-875-M8 | 25 | 36 | 875 | 950 | 2 | 800 | 75 | 20.0 | 55.0 |

[4] with 4 m cable tail

| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R25-975-M8 CSL505-T25-975-M8 | 25 | 40 | 975 | 1050 | 3 | 400 | 125 | 20.0 | 55.0 |
| CSL505-R25-975-4000[5] CSL505-T25-975-4000-ER[5,6] | 25 | 40 | 975 | 1050 | 3 | 400 | 125 | 20.0 | 55.0 |
| CSL505-R25-1075-M8 CSL505-T25-1075-M8 | 25 | 44 | 1075 | 1150 | 3 | 500 | 75 | 20.0 | 55.0 |
| CSL505-R25-1175-M8 CSL505-T25-1175-M8 | 25 | 48 | 1175 | 1250 | 3 | 500 | 125 | 20.0 | 55.0 |
| CSL505-R25-1275-M8 CSL505-T25-1275-M8 | 25 | 52 | 1275 | 1350 | 3 | 600 | 75 | 20.0 | 55.0 |
| CSL505-R25-1375-M8 CSL505-T25-1375-M8 | 25 | 56 | 1375 | 1450 | 3 | 600 | 125 | 20.0 | 55.0 |
| CSL505-R25-1475-M8 CSL505-T25-1475-M8 | 25 | 60 | 1475 | 1550 | 4 | 400 | 175 | 20.0 | 55.0 |
| CSL505-R25-1575-M8 CSL505-T25-1575-M8 | 25 | 64 | 1575 | 1650 | 4 | 500 | 75 | 20.0 | 55.0 |
| CSL505-R25-1675-M8 CSL505-T25-1675-M8 | 25 | 68 | 1675 | 1750 | 4 | 500 | 125 | 20.0 | 55.0 |
| CSL505-R25-1775-M8 CSL505-T25-1775-M8 | 25 | 72 | 1775 | 1850 | 4 | 500 | 175 | 20.0 | 55.0 |
| CSL505-R25-1875-M8 CSL505-T25-1875-M8 | 25 | 76 | 1875 | 1950 | 4 | 600 | 75 | 20.0 | 55.0 |
| CSL505-R25-1975-M8 CSL505-T25-1975-M8 | 25 | 80 | 1975 | 2050 | 4 | 600 | 125 | 20.0 | 55.0 |
| CSL505-R25-2175-M8 [7] CSL505-T25-2175-M8 [7] | 25 | 88 | 2175 | 2250 | 5 | 500 | 125 | 20.0 | 55.0 |
| CSL505-R25-2375-M8 [7] CSL505-T25-2375-M8 [7] | 25 | 96 | 2375 | 2450 | 5 | 520 | 185 | 20.0 | 55.0 |
| CSL505-R50-350-M8 CSL505-T50-350-M8 | 50 | 8 | 350 | 430 | 2 | 300 | 65 | 20.0 | 60.0 |
| CSL505-R50-750-M8 CSL505-T50-750-M8 | 50 | 16 | 750 | 830 | 2 | 700 | 65 | 20.0 | 60.0 |
| CSL505-R50-1150-M8 CSL505-T50-1150-M8 | 50 | 24 | 1150 | 1230 | 3 | 500 | 115 | 20.0 | 60.0 |
| CSL505-R50-1550-M8 CSL505-T50-1550-M8 | 50 | 32 | 1550 | 1630 | 4 | 500 | 65 | 20.0 | 60.0 |
| CSL505-R50-1950-M8 CSL505-T50-1950-M8 | 50 | 40 | 1950 | 2030 | 4 | 600 | 115 | 20.0 | 60.0 |
| CSL505-R50-2350-M8 CSL505-T50-2350-M8 | 50 | 48 | 2350 | 2430 | 5 | 520 | 175 | 20.0 | 60.0 |
| CSL505-R50-2750-M8 CSL505-T50-2750-M8 | 50 | 56 | 2750 | 2830 | 6 | 500 | 165 | 20.0 | 60.0 |
| CSL505-R50-3150-M8 CSL505-T50-3150-M8 | 50 | 64 | 3150 | 3230 | 6 | 600 | 115 | 20.0 | 60.0 |
| CSL505-R100-700-M8 CSL505-T100-700-M8 | 100 | 8 | 700 | 780 | 2 | 700 | 40 | 20.0 | 60.0 |

[5] with 4 m cable tail
[6] with greater operating range
[7] These variants with special lengths have neither diagonal nor crossed-beam scanning.

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| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R100-1100-M8<br>CSL505-T100-1100-M8 | 100 | 12 | 1100 | 1180 | 3 | 500 | 90 | 20.0 | 60.0 |
| CSL505-R100-1500-M8<br>CSL505-T100-1500-M8 | 100 | 16 | 1500 | 1580 | 4 | 500 | 40 | 20.0 | 60.0 |
| CSL505-R100-1900-M8<br>CSL505-T100-1900-M8 | 100 | 20 | 1900 | 1980 | 4 | 600 | 90 | 20.0 | 60.0 |
| CSL505-R100-2300-M8<br>CSL505-T100-2300-M8 | 100 | 24 | 2300 | 2380 | 5 | 520 | 150 | 20.0 | 60.0 |
| CSL505-R100-2700-M8<br>CSL505-T100-2700-M8 | 100 | 28 | 2700 | 2780 | 6 | 500 | 140 | 20.0 | 60.0 |
| CSL505-R100-3100-M8<br>CSL505-T100-3100-M8 | 100 | 32 | 3100 | 3180 | 6 | 600 | 90 | 20.0 | 60.0 |

Table 14: Dimensions CSL 505

Legend:
| | | | | |
|---|---|---|---|---|
| AB | Number of bore holes | | Y | Distance housing edge - last beam |
| BK | Bore hole to profile edge | | X | Distance housing edge - first beam (connection) |
| BB | Bore hole to bore hole | | | Profile length D = X + measurement field length + Y |
| **all dimensions in mm** | | | | Tolerance of the beam positions: ± 2mm |

The following dimensions are applicable for special variant "VB":

| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R12.5-88-VB-M8<br>CSL505-T12.5-88-VB-M8 | 12.5 | 8 | 87.5 | 260 | 2 | 200 | 30 | 13.5 | 159 |
| CSL505-R12.5-188-VB-M8<br>CSL505-T12.5-188-VB-M8 | 12.5 | 16 | 187.5 | 360 | 2 | 300 | 30 | 13.5 | 159 |
| CSL505-R12.5-288-VB-M8<br>CSL505-T12.5-288-VB-M8 | 12.5 | 24 | 287.5 | 460 | 2 | 300 | 80 | 13.5 | 159 |
| CSL505-R12.5-388-VB-M8<br>CSL505-T12.5-388-VB-M8 | 12.5 | 32 | 387.5 | 560 | 2 | 400 | 80 | 13.5 | 159 |
| CSL505-R12.5-488-VB-M8<br>CSL505-T12.5-488-VB-M8 | 12.5 | 40 | 487.5 | 660 | 2 | 500 | 80 | 13.5 | 159 |
| CSL505-R12.5-588-VB-M8<br>CSL505-T12.5-588-VB-M8 | 12.5 | 48 | 587.5 | 760 | 2 | 700 | 30 | 13.5 | 159 |
| CSL505-R12.5-688-VB-M8<br>CSL505-T12.5-688-VB-M8 | 12.5 | 56 | 687.5 | 860 | 2 | 700 | 80 | 13.5 | 159 |
| CSL505-R12.5-788-VB-M8<br>CSL505-T12.5-788-VB-M8 | 12.5 | 64 | 787.5 | 960 | 3 | 400 | 80 | 13.5 | 159 |
| CSL505-R25-175-VB-M8<br>CSL505-T25-175-VB-M8 | 25 | 8 | 175 | 360 | 2 | 300 | 30 | 20 | 165 |
| CSL505-R25-375-VB-M8<br>CSL505-T25-375-VB-M8 | 25 | 16 | 375 | 560 | 2 | 400 | 80 | 20 | 165 |
| CSL505-R25-575-VB-M8<br>CSL505-T25-575-VB-M8 | 25 | 24 | 575 | 760 | 2 | 700 | 30 | 20 | 165 |
| CSL505-R25-775-VB-M8<br>CSL505-T25-775-VB-M8 | 25 | 32 | 775 | 960 | 3 | 400 | 80 | 20 | 165 |
| CSL505-R25-975-VB-M8<br>CSL505-T25-975-VB-M8 | 25 | 40 | 975 | 1160 | 3 | 500 | 80 | 20 | 165 |
| CSL505-R25-1175-VB-M8<br>CSL505-T25-1175-VB-M8 | 25 | 48 | 1175 | 1360 | 3 | 600 | 80 | 20 | 165 |
| CSL505-R25-1375-VB-M8<br>CSL505-T25-1375-VB-M8 | 25 | 56 | 1375 | 1560 | 4 | 500 | 30 | 20 | 165 |

| Designation | Beam spacing A | Number of beams | Measurement field length B | Profile length D | AB | BB | BK | Y | X |
|---|---|---|---|---|---|---|---|---|---|
| CSL505-R25-1575-VB-M8 CSL505-T25-1575-VB-M8 | 25 | 64 | 1575 | 1760 | 4 | 500 | 130 | 20 | 165 |
| CSL505-R25-1775-VB-M8 CSL505-T25-1775-VB-M8 | 25 | 72 | 1775 | 1960 | 4 | 600 | 80 | 20 | 165 |
| CSL505-R25-2175-VB-M8 [8] CSL505-T25-2175-VB-M8 [8] | 25 | 88 | 2175 | 2360 | 5 | 520 | 140 | 20 | 165 |
| CSL505-R25-2375-VB-M8 [8] CSL505-T25-2375-VB-M8 [8] | 25 | 96 | 2375 | 2560 | 5 | 600 | 80 | 20 | 165 |
| CSL505-R50-350-VB-M8 CSL505-T50-350-VB-M8 | 50 | 8 | 350 | 560 | 2 | 400 | 80 | 20 | 190 |
| CSL505-R50-750-VB-M8 CSL505-T50-750-VB-M8 | 50 | 16 | 750 | 960 | 3 | 400 | 80 | 20 | 190 |
| CSL505-R50-1150-VB-M8 CSL505-T50-1150-VB-M8 | 50 | 24 | 1150 | 1360 | 3 | 600 | 80 | 20 | 190 |
| CSL505-R50-1550-VB-M8 CSL505-T50-1550-VB-M8 | 50 | 32 | 1550 | 1760 | 4 | 500 | 130 | 20 | 190 |
| CSL505-R50-1950-VB-M8 CSL505-T50-1950-VB-M8 | 50 | 40 | 1950 | 2160 | 5 | 500 | 80 | 20 | 190 |
| CSL505-R50-2350-VB-M8 CSL505-T50-2350-VB-M8 | 50 | 48 | 2350 | 2560 | 5 | 600 | 80 | 20 | 190 |
| CSL505-R50-2750-VB-M8 CSL505-T50-2750-VB-M8 | 50 | 56 | 2750 | 2960 | 5 | 700 | 80 | 20 | 190 |
| CSL505-R50-3150-VB-M8 CSL505-T50-3150-VB-M8 | 50 | 64 | 3150 | 3360 | 5 | 800 | 80 | 20 | 190 |
| CSL505-R100-700-VB-M8 CSL505-T100-700-VB-M8 | 100 | 8 | 700 | 970 | 3 | 400 | 85 | 20 | 250 |
| CSL505-R100-1100-VB-M8 CSL505-T100-1100-VB-M8 | 100 | 12 | 1100 | 1370 | 3 | 600 | 85 | 20 | 250 |
| CSL505-R100-1500-VB-M8 CSL505-T100-1500-VB-M8 | 100 | 16 | 1500 | 1770 | 4 | 500 | 135 | 20 | 250 |
| CSL505-R100-1900-VB-M8 CSL505-T100-1900-VB-M8 | 100 | 20 | 1900 | 2170 | 5 | 500 | 85 | 20 | 250 |
| CSL505-R100-2300-VB-M8 CSL505-T100-2300-VB-M8 | 100 | 24 | 2300 | 2570 | 5 | 600 | 85 | 20 | 250 |
| CSL505-R100-2700-VB-M8 CSL505-T100-2700-VB-M8 | 100 | 28 | 2700 | 2970 | 5 | 700 | 85 | 20 | 250 |
| CSL505-R100-3100-VB-M8 CSL505-T100-3100-VB-M8 | 100 | 32 | 3100 | 3370 | 5 | 800 | 85 | 20 | 250 |

Table 15:     Dimensions of CSL 505, special variant "VB"

Legend:     AB     Number of bore holes           Y     Distance housing edge - last beam
            BK     Bore hole to profile edge      X     Distance housing edge - first beam (connection)
            BB     Bore hole to bore hole               Profile length D = X + measurement field length + Y
            **all dimensions in mm**              Tolerance of the beam positions: ± 2mm

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[8] These variants with special lengths have neither diagonal nor crossed-beam scanning.

# 7 Accessories and scope of delivery

## 7.1 Accessories

| Part no. | Part designation | Description |
|---|---|---|
| 50132069 | CSL505-Interface | Programming interface for configuration incl. connection cable. CSL505 software available for download. |
| - | CSL505 software | Configuration software available for download at www.leuze.com |

Table 16: Accessories

M8 connection cables in various lengths, sheathing material and design:

| Part no. | Part designation | Description |
|---|---|---|
| 50130848 | KD U-M8-4A-V1-020 | Connection cable: M8 socket, 4-pin, axial, PVC cable, length 2,000 mm, open cable end |
| 50130850 | KD U-M8-4A-V1-050 | Connection cable: M8 socket, 4-pin, axial, PVC cable, length 5,000 mm, open cable end |
| 50130871 | KD U-M8-4W-V1-050 | Connection cable: M8 socket, 4-pin, angled, PVC cable, length 5,000 mm, open cable end |
| 50130851 | KD U-M8-4A-V1-100 | Connection cable: M8 socket, 4-pin, axial, PVC cable, length 10,000 mm, open cable end |
| 50130853 | KD U-M8-4A-V1-200 | Connection cable: M8 socket, 4-pin, axial, PVC cable, length 20,000 mm, open cable end |
| 50130854 | KD U-M8-4A-P1-020 | Connection cable: M8 socket, 4-pin, axial, PUR cable, length 2,000 mm, open cable end |
| 50130856 | KD U-M8-4A-P1-050 | Connection cable: M8 socket, 4-pin, axial, PUR cable, length 5,000 mm, open cable end |
| 50130875 | KD U-M8-4W-P1-050 | Connection cable: M8 socket, 4-pin, angled, PUR cable, length 5,000 mm, open cable end |
| 50130857 | KD U-M8-4A-P1-100 | Connection cable: M8 socket, 4-pin, axial, PUR cable, length 10,000 mm, open cable end |
| 50130876 | KD U-M8-4W-P1-100 | Connection cable: M8 socket, 4-pin, angled, PUR cable, length 20,000 mm, open cable end |

Table 17: Connection cables

## 7.2 Scope of delivery

Transmitter and receiver both have their part number.

- Transmitter / receiver with supplementary sheet

These operating instructions (PDF file) can be downloaded from the Internet at www.leuze.de.

○ *Note!*
*Connection cables, interconnection cables, mounting brackets, etc. are not included in the scope of delivery and must be ordered separately.*