TLS 500

Installation and Operation Manual

CEDES AG is certified according to ISO 9001: 2008

English

Pages 2 - 12

110 605 | 130208 | V 1.1

CEDES

Contents

1. About this manual

This 'TLS 500 Installation and Operation Manual', with metric and US measurements is the original version.
The version number is printed at the bottom of each page.
To make sure you have the latest version, visit www.cedes.com from where this manual and related documents can be downloaded.

1.1 Measurements

Unless stated otherwise, measurements are given in mm (non-bracketed numbers) and inches (numbers in brackets).

1.2 Related documents

TLS 500 datasheet en
Part No. 001 181 en

TLS 500 Quickguide en de fr it es pl zh
Part No. 112 015

1.3 CEDES headquarters

CEDES AG
Science Park
CH-7302 Landquart
Switzerland

CEDES AG reserves the right to modify or change technical data without prior notice.

2. Safety information

IMPORTANT!
READ BEFORE INSTALLATION!

The TLS 500 was developed and manufactured using state-of-the-art systems and technologies. However, injury and damage to the sensor can still occur.

To ensure safe operating conditions:

- Read all enclosed instructions and information.
- Follow the instructions given in this manual carefully.
- Observe all warnings included in the documentation and attached to the sensor.
- Do not use the sensor if it is damaged in any way.
- Keep the instruction manual on site.

The TLS 500 should only be installed by authorized and fully trained personnel! The installer or system integrator is fully responsible for the safe integration of the sensor. It is the sole responsibility of the planner and/or installer and/or buyer to ensure that this product is used according to all applicable standards, laws and regulations in order to ensure safe operation of the whole application.

Any alterations to the device by the buyer, installer or user may result in unsafe operating conditions. CEDES is not responsible for any liability or warranty claim that results from such manipulation.

Failure to follow instructions given in this manual and/or other documents related to the TLS 500 may cause customer complaints, serious call backs, damage, injury or death.

2.1 Non-intended use

The TLS 500 **must not** be used for:

- The safeguarding of dangerous machines
- Equipment in explosive atmospheres
- Equipment in radioactive environments

Use only specific and approved safety devices for such applications, otherwise serious injury or death or damage to property may occur!

3. Symbols, safety messages

Symbol	Meaning
▸	Single instruction or measures in no specific order
1. **2.** **3.**	Instructions in specific order
•	List, in no order of importance
→	Reference to a chapter, illustration or table within this document
Important:	Important information for the correct use of the sensor

3.1 Safety message categories

Warning of serious health risks

WARNING
Serious health risks

Highlights critical information for the safe use of the sensor. **Disregarding these warnings can result in serious injury or death.**

- Follow the measures highlighted by the triangle-shaped arrows
- Consult the safety information in Chapter 2 of this manual

Caution of possible health risks

CAUTION
Possible health risks

Highlights critical information for the safe use of the sensor. **Disregarding these warnings can result in injury.**

- Follow the measures highlighted by the triangle-shaped arrows
- Consult the safety information in Chapter 2 of this manual

Notice of damage risk

NOTICE
Risk of damage

Disregarding these notices can lead to damage to the sensor, the controller and/or other devices.

- Follow the measures highlighted by the triangle-shaped arrows

4. Introduction

CEDES' ultra-compact TLS 500, which is only half the size of a matchbox, monitors the approach areas to automatic doors and escalators, detecting intending users and ensuring comfortable and safe operation. It can also be used to safeguard the dangerous area between sections of folding doors often found on public transportation.

Its elegant design allows it to blend in perfectly with any application's surroundings. This, alongside its easy mounting and alignment, make it the ideal door sensor for the widest variety of automatic doors. Its incredible reliability, combined with robust construction, adjustable range and optional automatic blanking of stationary objects, means the TLS 500 offers a very impressive price/performance ratio.

4.1 Application examples

- Approach to escalators
- Door opener
- Touchless switch
- Safeguarding of automatic door edges

Figure 1: A typical TLS 500 application environment

4.2 Features of the TLS 500

- Measures just 32 × 22 × 27.5 mm (1.26 × 0.87 × 1.08 in)
- Electronics housed in an elegant matt-black unit
- Easy mounting and alignment
- Plug-and-play thanks to intelligent software
- Discreet green/red LEDs indicate the sensor's status
- Range from 0.2 m to 6 m (0.65 ... 19.7 ft)
- Insensitive to ambient light up to 100'000 Lux

4.3 Type description

TLS 500 – x – xxx – xx

Output logic
LO Light on
DO Dark on

Output type
PNP
NPN

Sensor type
N Standard
P Adjustable recalibration time
VR Adjustable range

Figure 2: TLS 500 type description

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5. Overview

The TLS 500 measures the reflection from objects compared with background reflection. Any change in the values is detected as an object and the output switches.
During startup the TLS 500 takes a background light measurement and saves this as a reference value. When an object enters the detection area, the reflection value changes. The bigger the difference in light reflection between the object and the background, the easier it is to detect said object.
High contrast between objects and background results in high sensitivity.

CAUTION
Damage to the eye

Although the TLS 500 does not emit dangerous amounts of infrared light, long exposure to intense infrared light sources can result in damage to the eyes.
To avoid any risks:

- Never look directly into the active infrared emitter from a close distance.

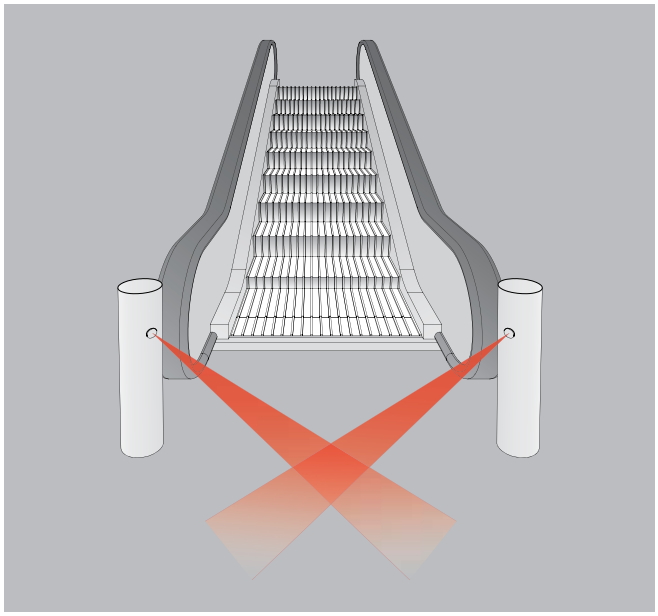

Figure 3: Two TLS 500-VRs monitoring an escalator approach

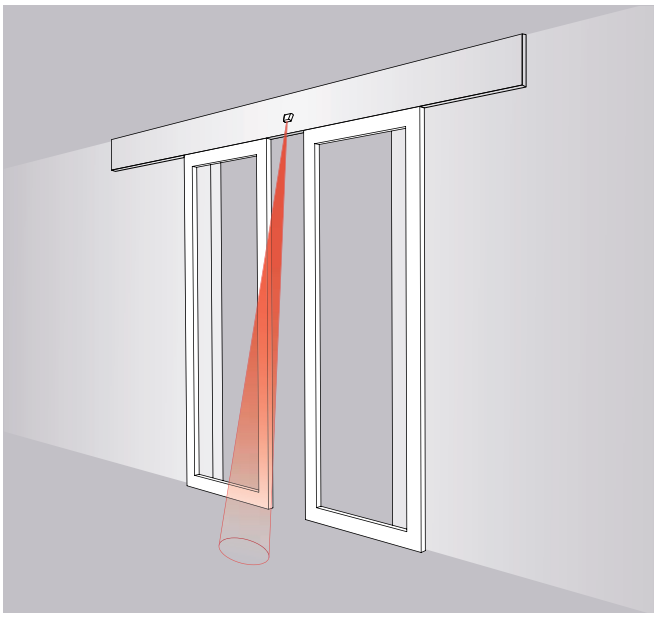

Figure 4: TLS 500-N monitoring an automatic sliding door

5.1 Delivery package

Each delivery package contains:

- 1 × TLS 500 sensor
- 1 × mounting bracket
- 2 × mounting screws
- 1 × blue screwdriver
- 1 × quick installation guide

Figure 5: TLS 500 components

5.2 TLS 500 product overview

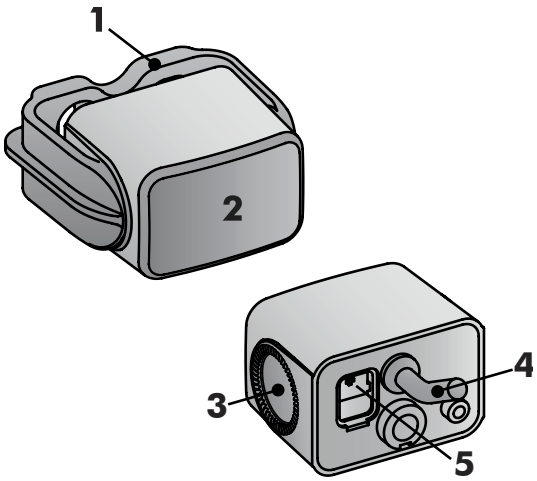

Figure 6: TLS 500 overview

1 Mounting bracket
2 Optical window
3 Toothing for sensor alignment
4 Connection cable
5 Potentiometer

5.3 Detection area dimensions

The detection area dimensions of the sensor depend on application, installation, mounting heights and settings. **All measurements in mm (normal numbers) and inches (in brackets)**

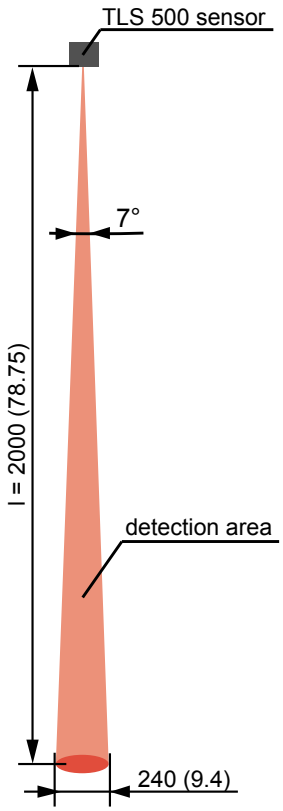

Figure 7: Detection area dimensions

6. Configuration

> ***NOTICE***
> **Mechanical damage to the TLS 500**
> ▸ Do not turn the potentiometers beyond their mechanical limits

1. The potentiometer on the back of the TLS 500 is covered by a flap → Chapter 5.2. Lift the rubber flap at the back of the TLS 500 carefully with the slotted side of the blue screw driver provided.
2. Using the screw driver, turn the potentiometer to either fully left or fully right.
3. Set the potentiometer to the correct value according to the application
   → Figure 8 (P-type) or Figure 9 (VR-type)
4. Put the flap back over the cover

6.1 N-type

The N-type needs no configuration; the recalibration time is fixed at 10 s.
Recalibration time means the time until an immobile person or object is accepted by the sensor as background.

6.2 P-type

With the P-type, the recalibration time can be adjusted from 3 s up to 180 s.
Recalibration time means the time until an immobile person or object is accepted by the sensor as background.

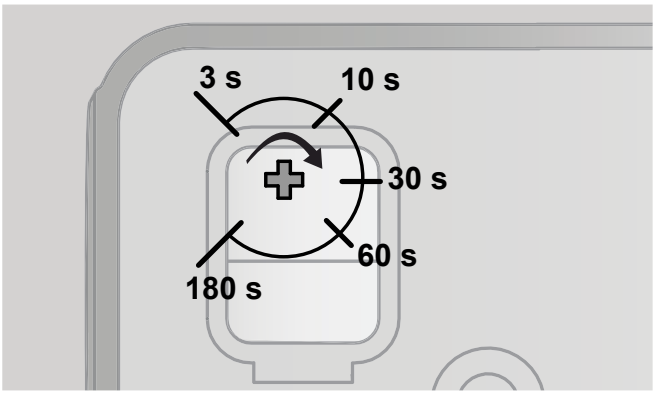

Figure 8: Configuring the TLS 500 P-type (in seconds)

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6.3 VR-type

With the VR-type, the operation range (in m and inches) can be adjusted.

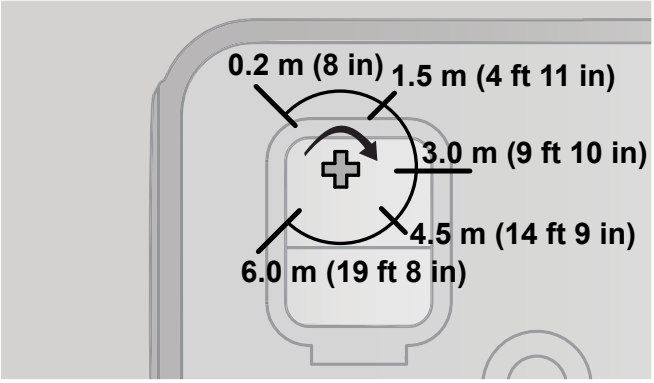

Figure 9: Configuring the TLS 500 VR-type (in m and in)

6.4 Correction factor

Due to different background reflections, a correction factor has to be taken into account for setting the sensing distance.

Reference material	Correction factor f
Kodak white	1.0
Kodak grey	0.6
Bright concrete	0.6 ... 0.8
Dry gravel	0.4 ... 0.5
Dark carpet	0.3 ... 0.5
Grey plastic floor (PVC etc.)	0.4 ... 0.8
Bright wood, brown cardboard	0.7 ... 0.8
Glass, metal plate 90°	1.2 ... 2.0
Black floor, asphalt	0.4 ... 0.5
Cotton white	0.5 ... 0.7
Dull black card board	0.1 ... 0.3
Applies only when beam axis is perpendicular to surface	

Example: TLS 500-VR on a wooden floor

Mounting height		3 m
Correction factor		0.7 ... 0.8
Range setting	3 m / 0.7 … 0.8 =	3.75 ... 4 .3 m

7. Installation

WARNING
Electrical and mechanical hazards

Electrical shock and unexpected mechanical movement can cause serious injury or death.

- Before installing and configuring the TLS 500 make sure the controller and all relevant devices are powered off
- Use only specific and approved tools
- Follow all applicable safety measures
- Do not over-tighten the mounting screws
- Do not drill additional holes into the TLS 500
- If the TLS 500 must be readjusted, the main power supply must be switched off and marked as out of service

Carry out the system installation according to the following steps:

1. Switch off main power for the installation area and mark it clearly with “OUT OF SERVICE”.
2. Fix the mounting bracket onto to the chosen location using the mounting screws.

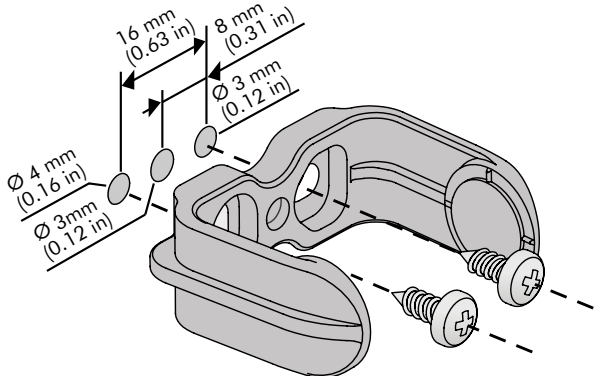

Figure 10: Mounting bracket fixing

3. Open the potentiometer flap on the back of the TLS 500.

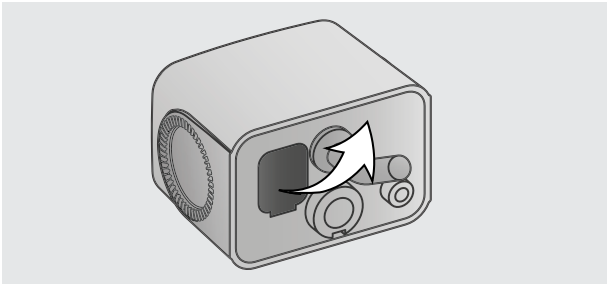

Figure 11: Opening the TLS 500 potentiometer flap

4. Snap the TLS 500 into the mounting bracket.

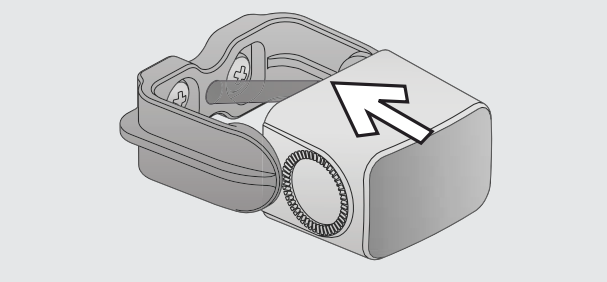

Figure 12: Snapping on the TLS 500 mounting bracket

5. Adjust potentiometer and sensor alignment (VR- and P-types only) → Chapter 6.

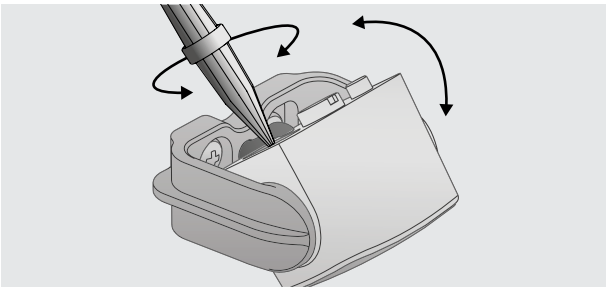

Figure 13: Potentiometer adjustment and alignment

6. Close the potentiometer flap.

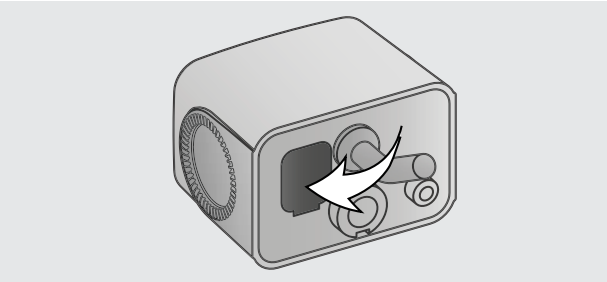

Figure 14: Closing the TLS 500 potentiometer flap

7. Connect the other end of the cable (open wires) to the controller. For detailed controller wiring → Chapter 8.
8. Verify your settings by switching on the power and performing a test run → Chapter 10.1.

8. Electrical connection

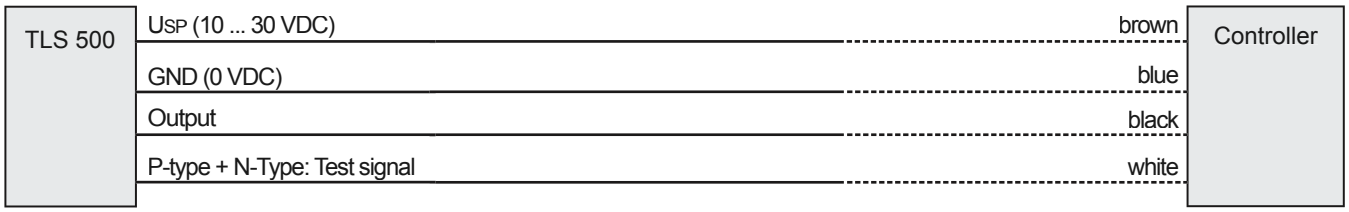

Figure 15: TLS 500 connection diagram

8.1 Semiconductor output

The TLS 500 is available as a PNP or NPN version with either a dark-on (DO) or light-on (LO) type.
The DO output is ON when an object or person is detected, OFF if the detection area is free. The LO output is OFF when an object or person is detected, ON if the detection area is free → Chapter 9.

NOTICE
Possible damage to the semiconductor output

- PNP outputs need a pull-down resistor (10 ... 47 kΩ)
- NPN outputs need a pull-up resistor (10 ... 47 kΩ)

8.2 Test input

TLS 500 performs a test cycle as follows: The illumination is switched off and the sensor recognizes the change and switches the output.

Important: Please be aware that this works only with the N- and P-type when they “see” the floor.
The test input cannot be used with the VR-type and has to be connected to USP.

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9. Timing diagram

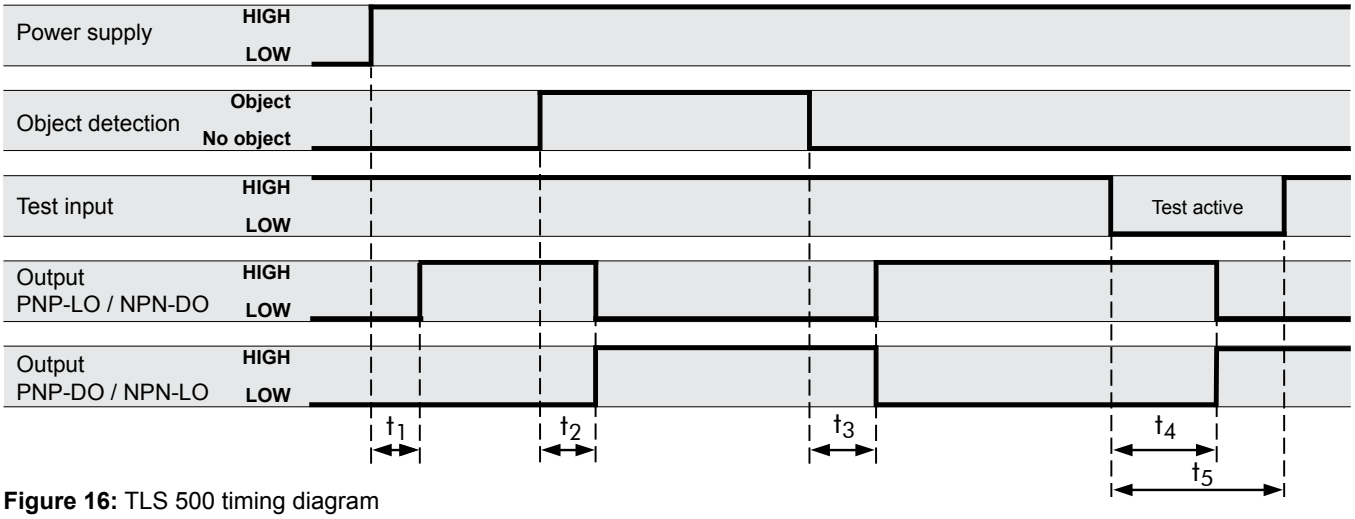

Figure 16: TLS 500 timing diagram

	Time	Value
Power-up time	t_1	< 150 ms
Response time	t_2	< 150 ms
Release time	t_3	< 150 ms
Response time test input	t_4	< 150 ms
Time at test	t_5	> t_4

Table 1: TLS 500 timing table

	Value
Output HIGH	≥ U_{SP} - 4 V
Output LOW	< 4 V

Table 2: TLS 500 value table

10. Start-up

1. Switch on mains and/or power up the controller.
2. Check if LED lights up → Chapter 11.
3. Perform a test run with the controller using the test input → Chapter 10.1.

Important: Check the detection area of the sensor. If adjustments to the sensor calibration are needed, switch off main power and/or the controller again for your own safety.

10.1 Test run

It is recommended to perform a test run with the controller:

1. Switch the test input to LOW.
2. Check the output's response → Chapter 9.

11. LED signals

The TLS 500 uses a red and a green LED to indicate its status. LED signals differ between the various types of TLS 500.

TLS 500 type	No object	Object detected
PNP-DO	Red LED on	Green LED on
PNP-LO	Green LED on	Red LED on
NPN-DO	Red LED on	Green LED on
NPN-LO	Green LED on	Red LED on

Table 3: LED signals

Example of LED signals for TLS 500 N-NPN-LO:

- Green LED on = no object detected
- Red LED on = object detected.
- The sensor cannot differentiate between an object and a person. Therefore any object entering the detection field is also detected.
- When an object or person does not move for more than 10 s (recalibration time), the TLS 500 accepts this object as background and switches the output to free again. The green LED lights up.

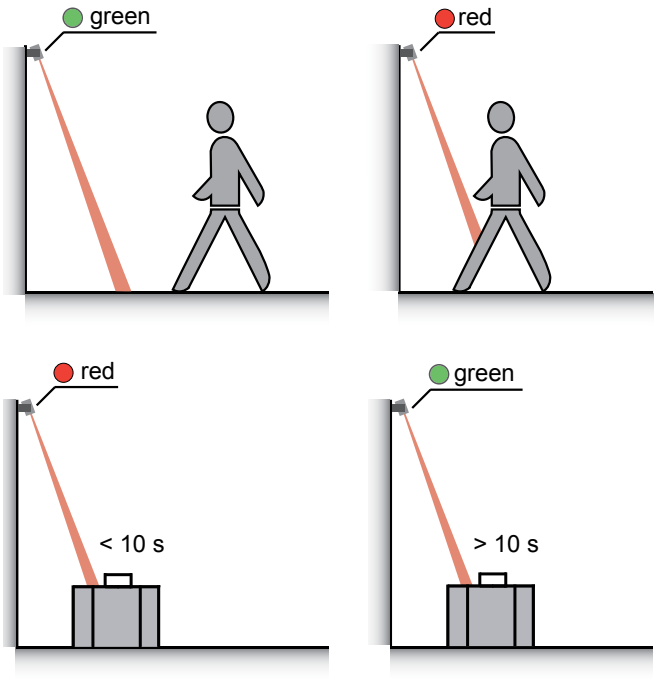

Figure 17: LED status for the TLS 500 N-NPN-LO

12. Troubleshooting

Sensor status	Action
Object is in detection area but the LED indicates 'no object'	▸ Make sure the detection area length is set correctly (VR-type only) ▸ Check the sensor range in relation to the correction factor ▸ Check if the sensor is inactivated through a permanent test signal
No LED visible	▸ Check electrical connections
LED is blinking (N or P-type only)	▸ Sensor sees no floor or the floor is specular (extremely reflective)
Detection area is free but the LED signals 'object detected'	▸ Check sensor range setting (VR-type only) ▸ Make sure ambient light conditions are stable

If a problem persists, please contact your local CEDES representative. Visit www.cedes.com for contact data.

13. Maintenance

Although the TLS 500 does not need regular maintenance, a periodical functional check is strongly recommended as follows:

- ▸ Check the mounting position and detection area of the sensor.
- ▸ Clean the optical window with a soft towel and a little soapy water.

NOTICE
Damage to the optical window

- ▸ Never use any solvents, cleaners or mechanically abrasive towels or high-pressure water to clean the sensor.

14. Disposal

The TLS 500 should only be replaced if a similar protection device is installed. Disposal should be carried out using the most up-to-date recycling technology according to local regulations and laws. There are no harmful materials used in the design and manufacture of the sensor. Traces of such dangerous materials may be found in the electronic components but not in quantities that are harmful.

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15. Technical data

Optical

Max. operating range (on Kodak white)	6 m
Diameter of active light spot at 2 m distance	0.24 m
Aperture angle	±3.5°
Min. distance to background	0.2 m
Recalibration time (N-type)	10 s
Recalibration adjust time (P-type)	3 ... 180 s
Max. ambient light	100,000 Lux

Mechanical

Dimensions (w × h × d)	32 × 24 × 22 mm
Housing material	Polycarbonate (UL 94-V0)
Housing color	Black (other colors upon request)
Enclosure rating	IP65
Operating temperature range	−40 °C... +60 °C
Relative humidity (non-condensing)	0 ... 95 %

Electrical

Supply voltage U_{SP}	10 ... 30 VDC
Current consumption at 24 VDC	12 mA
Output	PNP or NPN
Output logic	Light-on (LO) or dark-on (DO)
Max. power-up time	150 ms
Max. response time	150 ms
Max. test response time	150 ms

Connection cable and electrical connection

Length	2 m
Diameter	Ø 3.4 mm
Material	PVC, black
Wires	AWG26
• brown	U_{SP} (10 ... 30 VDC)
• blue	GND (0 V)
• black	Output
• white	Test input (N- and P-type) If no test signal is available, connect white wire with U_{SP}

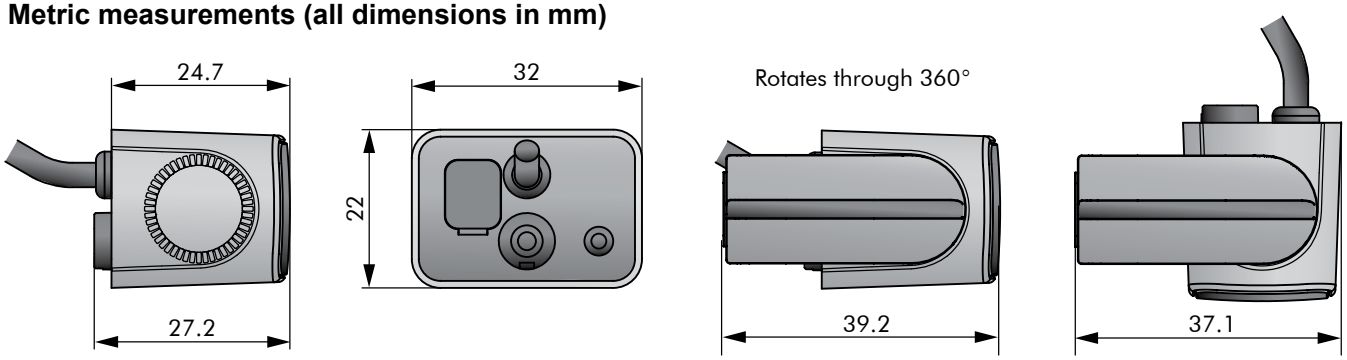
General

EMC emission	EN 61000-6-3:2007
EMC immunity	EN 61000-6-2:2005
Shock	EN 60068-2-27:2009
Vibration	EN 60068-2-6:2008
RoHS	2011/65/EU
Certificate	CE

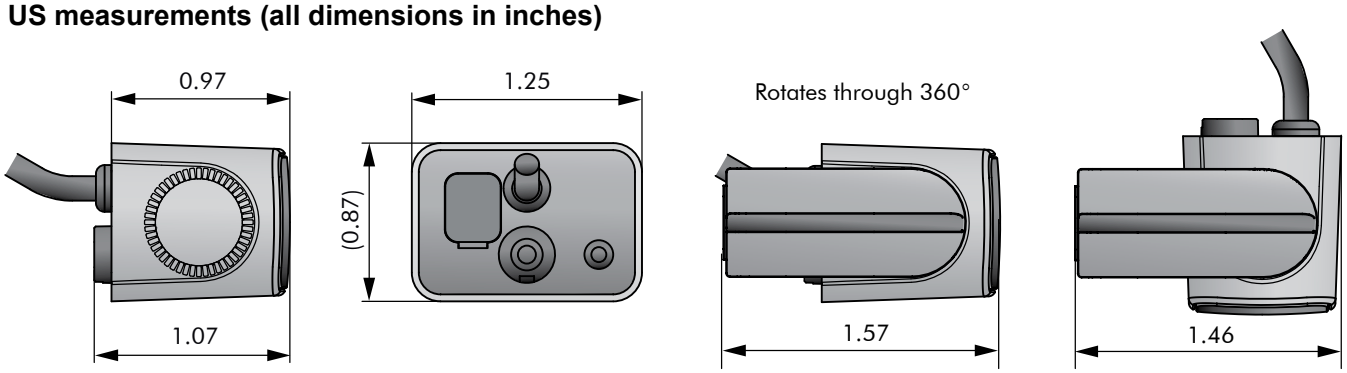
16. Dimensions

These are the most important dimensions of the TLS 500.

Metric measurements (all dimensions in mm)

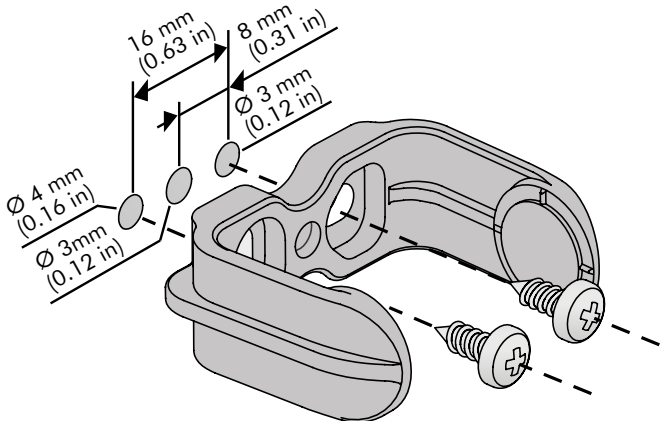


US measurements (all dimensions in inches)



16.1 Mounting bracket dimensions

Dimensions in mm and inches (in brackets)



CEDES AG, Science Park | CH-7302 Landquart
Phone: +41 81 307 2323 | Fax: +41 81 307 2325 | info@cedes.com | www.cedes.com

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