cegard/Smart NT Light Curtain

Installation and Operation Manual

CEDES AG is certified according to ISO 9001: 2015

English Pages 2 - 22

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Contents

1 About this manual

The "cegard/Smart NT Light Curtain Installation and Operation Manual" with metric **is the original version**.

The version number is printed at the bottom of each page. To make sure you have the latest version, check the product page on www.cedes.com.

1.1 Measurements

Measurements are, if not stated otherwise, given in mm (non-bracketed numbers) and imperial dimensions (numbers in brackets).

1.2 Related documents

117 960 CE/UKCA confirmation
117 940 CabSafe 3D Operating Manual
115 944 Operating manual CabSafe controller
117 845 Operating Manual cegard/Smart controller
118 730 Operating Manual cegard/Smart OR/PC controller

1.3 CEDES headquarters

CEDES AG
Science Park
CH-7302 Landquart
Switzerland

1.4 List of abbreviations

Abbr.	Description
ESD	Electrostatic discharge
EU	European Union
FSS	Frequency Safety Signal-output
LC	Light curtain
NA	North America
PCB	Printed circuit boards
Rx	Receiver edge
Tx	Transmitter edge **REMARK**: In the manual, for the expression transmitter - emitter is used.

2 Safety information

IMPORTANT READ BEFORE INSTALLATION!

The cegard/Smart NT 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 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, controller or cables if any of these items has been damaged.
- ► Keep the instruction manual on site.

The cegard/Smart NT shall 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 may cause customer complaints, serious call backs, damage, injury or death.

2.1 Non-intended use

The cegard/Smart NT system must not be used for:
- Protection of dangerous machine such as presses,
- Equipment in explosive atmospheres,
- Equipment in radioactive environments,
- Outside the specified environments

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

2.2 Intended use

The intended use of a cegard/Smart NT light curtain system is to detect persons or objects in elevator applications with automatic doors for persons or objects standing between the elevator doors.

The cegard/Smart light curtain, the CabSafe 3D Time-of-Flight (TOF) sensor, and the CabSafe or cegard/Smart controller are the components that make up a CabSafe or cegard/Smart system. Such a system is intended to detect persons or objects in elevator applications with automatic doors for both persons or objects approaching the elevator door(s) as well as persons or objects standing between the elevator doors. All other applications must be approved by CEDES.

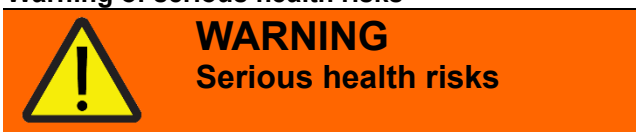
3 Symbols, safety messages

3.1 Symbols

Symbol	Meaning
►	Single instruction or measures in no particular order
1. 2. 3.	Sequenced instructions
•	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

3.2 Safety massage category

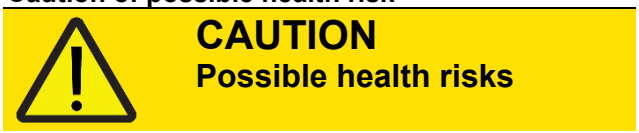
Warning of serious health risks



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 user manual

Caution of possible health risk



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 user manual

Notice of damage risk

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

- ► Follow the measures highlighted by the triangle-shaped arrows

4 cegard/Smart NT light curtain

4.1 Overview

The cegard/Smart NT light curtain is used to detect the presence of persons or objects located between the doors of an elevator. It can be operated connected

- directly to an elevator or door controller or
- integrated in a CEDES CabSafe system or
- integrated in a CEDES cegard/Smart system.

To enable the CEDES Elevate IOT and cloud functionality it is typically mounted on the elevator cabin doors and is part of a system that includes a cegard/Smart controller and optionally a CabSafe 3D sensor necessary to fulfil ASME A17.1-2019 / CSA B44-19 and later versions. Earlier versions of this Code and all versions of EN 81-20 do not require approaching object detection means.

The cegard/Smart NT light curtain performs the following functions:

- Detects the presence of person(s) or objects between the elevator doors,
- Measures and reports door operational data e.g., vibration, speed, and status to the IoT Cloud through an IoT enabled controller.
- Monitors the position of the elevator doors as a means of rendering the CabSafe 3D sensor inoperative.

The main components of the cegard/Smart light curtain include an emitter (Tx) and a receiver (Rx). The emitter projects an array of infrared light beams to the receiver that consists of straight beams and a series of criss-cross beams (see Figure 4). These beams are sequenced, one after the other at a specific frequency. The receiver is designed to only accept the specific pulse frequency from the emitter. This enables the rejection of ambient light and thus enhances the system robustness in various environments.

Interruption of one or more infrared beams causes the receiver to change its output state and communicate this status to the connected elevator door controller, CabSafe controller, cegard/Smart or other compatible controller units. The light curtain respectively the controller changes its output state which is connected to the elevator door control. When the detection field is clear again, the output state changes back to indicate that the protective field area of the cegard/Smart light curtain is now "clear".

Besides object presence detection, the cegard/Smart NT light curtain measures acceleration and distance data. This data is also communicated to the cegard/Smart or other compatible CEDES controller, where the data is processed further.

The cegard/Smart NT light curtain system is suitable for centre, left and right side-opening elevator applications. Best IOT performance occurs in dynamic installations where the light curtain is mounted on the elevator cab door(s).

This document contains the technical specifications of the cegard/Smart NT light curtain and its installation procedure. The technical specifications for the cegard/Smart controllers, CabSafe Controllers and CabSafe 3D TOF sensors are separate documents (Chapter 1.2 for details).

For correct function, only system components described in this document and the corresponding system components described in Chapter 1.2 shall be used.

WARNING
Serious health risks

Door protection systems, such as the cegard/Smart NT, do not provide absolute safety for elevator passengers passing through the doorway. They cannot be used as failsafe devices of the door mechanism. This safety function must be provided by a fail-safe force and a kinetic energy limiter in the door drive.

4.2 Features

- Fulfills requirements for person or object detection between the elevator doors based on
  - EN81-20, and
  - ASME A17.1-2022 / CSA B44:22 and any earlier
- Large operating range
- Provides multiple door diagnostic data for optimized door maintenance.
- For IOT applications ideal for dynamic installations (mounted on cab doors).
- Suitable for center and side-opening applications
- Provides multiple criss-cross beams that are active until doors are nearly closed for reliable detection of persons or objects.
- High sensitivity for shock and vibration detection
- Precise door position information
- Optimized elevator door diagnostics
- Easy installation and alignment
- Front and side mounting holes
- IP65 enclosure rating

4.3 Type description

cegard/Smart NT aa – bbbb – cc

aa :	Tx Emitter Rx Receiver Tx/Rx Emitter and Receiver
bbbb:	Edge length (mm)
cc :	Number of elements

4.4 Possible applications

Any cegard/Smart NT light curtain provides the following outputs:

- Push pull,
- FSSL
- RS485

Any cegard/Smart NT light curtain system offers the IOT capability. This means, if not already installed at the beginning, any application equipped with a cegard/Smart NT light curtain can be easily converted to an IOT cloud based system by adding a CEDES cegard/Smart controller.

The following table provides an overview for which applications the different outputs can be used:

Output	Application	Chapter
Push-pull	Elevator or door controller	5.1 6.4.1
FSSL	CabSafe controller	5.2 6.4.2
RS485	cegard/Smart controller	5.2 6.4.3

Table 1

4.5 Light curtain system components

The cegard/Smart NT light curtain consists of

- an emitter (Tx) and
- a receiver (Rx) edge,
- connection cables associated with each device, and
- associated mounting hardware

The emitter and receiver both have their own built-in controllers to evaluate operational data and communicate that data to the cegard/Smart or other compatible controller. The emitter and receiver are electrically connected directly to the cegard/Smart controller.

4.5.1 European light curtain kit

A typical delivery for EU contains components as shown in Figure 1:

Figure 1:

- 1 × Emitter edge (Tx) with a pig tail cable (white plug)
- 1 × Receiver edge (Rx) with a pig tail cable (blue plug)
- 2 × Connection cables (each 5 m)
- Mounting accessories for an installation on the elevator door(s) [dynamic application]

4.5.2 North American light curtain kit

A typical delivery for North America contains components as shown in Figure 2:

Figure 2

- 1 × Emitter edge (Tx) with a pig tail cable (white plug)
- 1 × Receiver edge (Rx) with a pig tail cable (blue plug)
- 2 × Connection cables (each 5 m)
- Mounting accessories for an installation on the elevator door(s) [dynamic application]

Additional mounting accessories are available on request.

4.6 Protection field

Table 2 provides the minimum and maximum number of beams:

No. of optical elements	No. of straight only beams	Criss-cross beams
41	41	121

Table 2

During door closing, when the distance between emitter and receiver edges is decreasing the ±1 criss-cross beams are turned off (switching point at approx. 100 ... 300 mm).

Besides object detection, the cegard/Smart NT light curtain measures acceleration and distance data. This data is communicated to the cegard/Smart controller, where it is processed further.

5 Applications

5.1 cegard/Smart NT connected to elevator controller

The Figure 3 shows the principal of the cegard/Smart architecture for applications according to

- EN81-20:2020 or
- ASME A17.1-2016 / CSA B44:16 and previous versions.

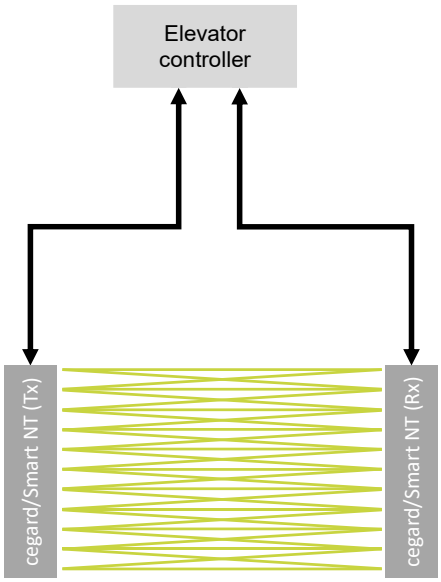


Figure 3: Principal cegard/Smart NT system architecture (not in a CabSafe or cegard/Smart environment)

No control unit is required. The light curtain can be connected directly to the elevator or door control unit.

5.2 cegard/Smart NT connected to cegard/Smart or CabSafe controller

Figure 4 shows the principal of an application where the cegard/Smart NT light curtain is embedded in an architecture for applications according to:

- ASME A17.1-2019 / CSA B44:19 and
- ASME A17.1-2022 / CSA B44:22 and
- EN81-20:2020

The light curtain emitter (Tx), the receiver (Rx) and the CabSafe 3D sensor are all connected to a CEDES cegard/Smart or to a CabSafe controller.

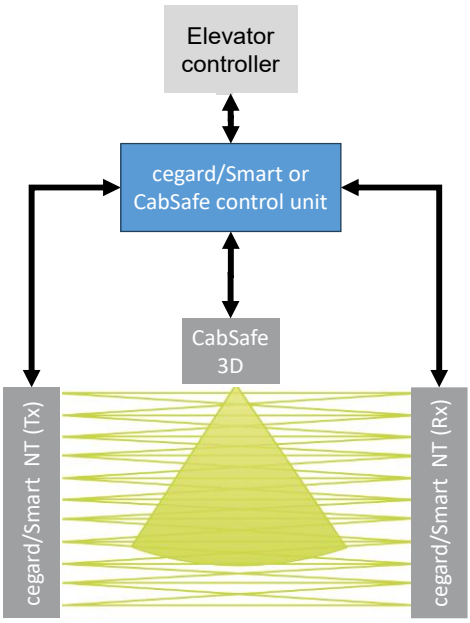


Figure 4: Principal cegard/Smart NT light curtain system in a CabSafe or cegard/Smart environment

A CEDES CabSafe System consists of:

- a CEDES CabSafe controller (type: CabSafe100 or CabSafe200),
- a cegard/Smart light curtain that detects persons or objects between the elevator and landing doors; and
- a CabSafe 3D Time-of-Flight (TOF) sensor (hereafter, CabSafe 3D) that detects persons or objects approaching the elevator entrance.

A complete CEDES cegard/Smart System consists of:

- a cegard/Smart controller (type: CGSM-B, CGSM-C, CGSM-E)
- a cegard/Smart NT light curtain that detects persons or objects between the elevator and landing doors; and
- a CabSafe 3D Time-of-Flight (TOF) sensor (hereafter, CabSafe 3D) that detects persons or objects approaching the elevator entrance.

The operating sequence of the cegard/Smart NT system begins with the opening of the elevator door(s). As this occurs, the system is initialized by a signal from one of the following:

- the light curtain (dynamic installation only);
- elevator control; or
- a door position sensor (e.g. a magnet switch or a fork type light barrier).

The CabSafe 3D, when used to fulfil 2019 and 2022 ASME A17.1 / CSA B44 code requirements, detection field is calibrated within one second of the doors reaching their fully open position, and the opening also causes the controller to start monitoring the light curtain and CabSafe 3D sensors for the presence of

persons or objects between the elevator doors or approaching the elevator doors. When a person or object is detected, the output changes state so that the door control will either reverse the doors or hold them in their open state.

A timer (see Timing Diagram in the cegard/Smart or CabSafe controller manual) has been implemented in the controller to minimize the effects of cross-traffic in the approaching object detection field. The timer starts when a person or object is detected approaching the elevator cabin. If this timer expires before an infringement of the cegard/Smart light curtain (i.e. person or object actually entered the elevator cab), objects in the approaching object detection field will be ignored once the timer has expired. When an object is detected by the light curtain, the timer is reset.

After the doors have reached their fully closed state, the sequence begins again.

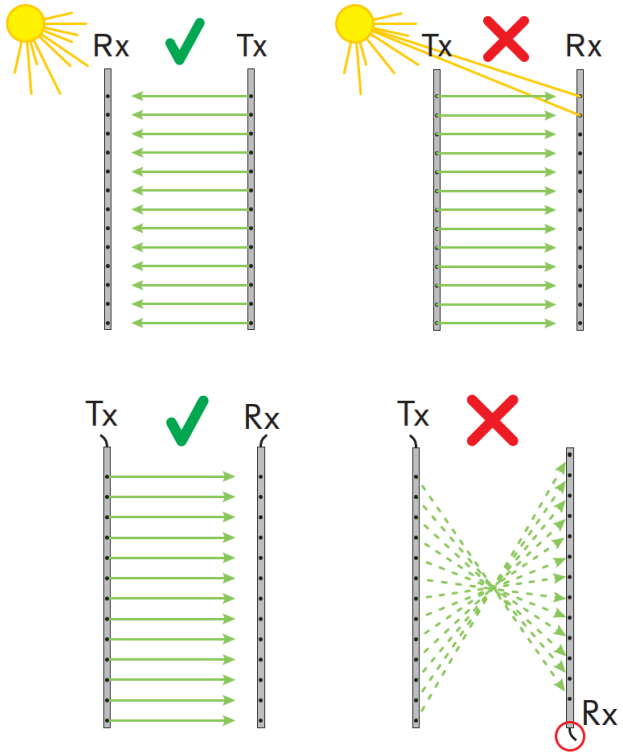
A cegard/Smart (or a CabSafe controller):
- perform continuous testing of the light curtain and CabSafe 3D sensor,
- logically combine the signals from the CabSafe 3D and light curtain into a single output to elevator control,
- manages configuration parameters for the cegard/Smart (or the CabSafe system),

The cegard/Smart controller also communicates data to the CEDES Elevate Cloud for further analysis and visualization.

6 Installation

6.1 General instructions and precautions

- ► Never scratch or paint the optical windows because they form the light path! Do not drill additional holes into the profile. Unpack the profiles just before installation in order to avoid damage.
- ► Do not bend or twist the edges!
- ► Oil can damage the cables. Contamination must be avoided at all times!
- ► Chemicals can damage the profile and optical characteristic. Contact with chemicals must be avoided at all times!
- ► Although the cegard/Smart system is robust to direct sunlight, avoid unnecessary exposure, when possible, especially the receiver unit.



- ► Avoid interference from blinking / strobe lights or infrared light sources such as photocells, infrared security cameras or other light curtains.
- ► Do not install the cegard/Smart NT system in places where the emitter and receiver edges are directly exposed to light sources such as fluorescent tubes or energy saving lamps.
- ► Make sure to orient the connection plugs for both the emitter and receiver at the same end.
- ► Due to the nature of door system designs, (which as complete systems are not failsafe), in extremely rare conditions doors can close even when an obstacle is present. Therefore, there must be, by code, other safety means to prevent passengers from being hurt by the elevator doors. These dangerous situations should and can be detected by the elevator control, which should, in such a case, take the elevator out of service.
- ► The cegard/Smart NT system (as well as all other door protection systems on the market) cannot – by its nature – provide absolute safety for elevator passengers passing through the door-way. It must not be used as the final fail-safe device of the door mechanism. This ultimate safety function has to be provided by a fail-safe force and kinetic energy limiter.

CAUTION
Damage to the eye

Although the cegard/Smart NT does not emit dangerous amounts of infrared light, long exposure to intense infrared light sources can result in damage to the eyes.
- ► Never look directly into the active infrared emitter from a close distance.

6.2 Alignment

The optical axis of the emitter and the receiver edge need to be aligned towards each other to ensure the light curtain functions reliably.

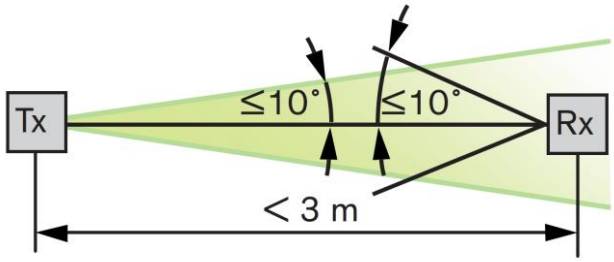


Figure 5: Alignment angles

Reflective surfaces near to or parallel to the detection zone can cause reflections. Although the cegard/Smart is very robust against such reflections, it is always advisable to keep a reasonable distance between the sensor edges and any reflective surfaces.

Figure 6: Reflective surfaces

6.3 Mechanical installation

cegard/Smart NT light curtain systems are designed for center-opening as well as left- or right-side opening elevator door applications. It supports dynamic (light curtain mounted on the cabin doors) and static (light curtain is fixed on the frame of the elevator cabin) installations. However, static installations cannot provide data related to the elevator doors (e.g., door vibration, closing / opening time, etc.).

WARNING
Electrical and mechanical hazards

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

- ► Switch off main power to the elevator control system and mark clearly that the elevator is out of service.
- ► Follow all applicable safety measures.
- ► Make sure that your installation complies with all applicable regulations and safety measures.

Notice
Mechanical damage

- ► Do not drill additional holes into the light curtain.
- ► Do not overtighten the mounting screws.
- ► Mount the edges on a flat surface.
- ► Do not bend the edges during transport or during the installation.

Important:
It is very important to pay attention to proper cable installation to ensure the highest possible reliability and lifetime of the light curtain cables. Guide the cables of the emitter/receiver to the controller. A small bending radius reduces the cable lifetime dramatically.

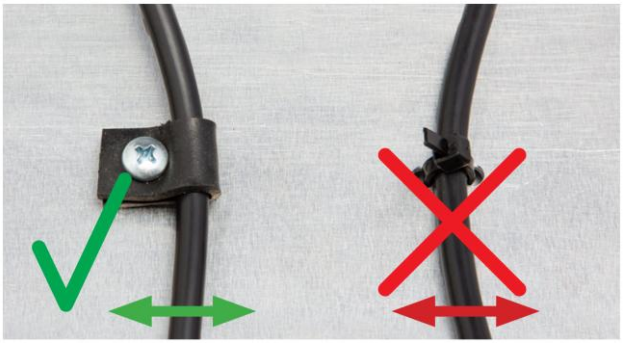


Figure 7: Cable clamp (left) versus cable tie

- ► Use the cable clamp to fix the cables (where the cable can move (bend). Use cable ties only there when the cable does not move as the doors open or close.
- ► Install the cable guide wire to prevent possible cable swing (Figure 8).

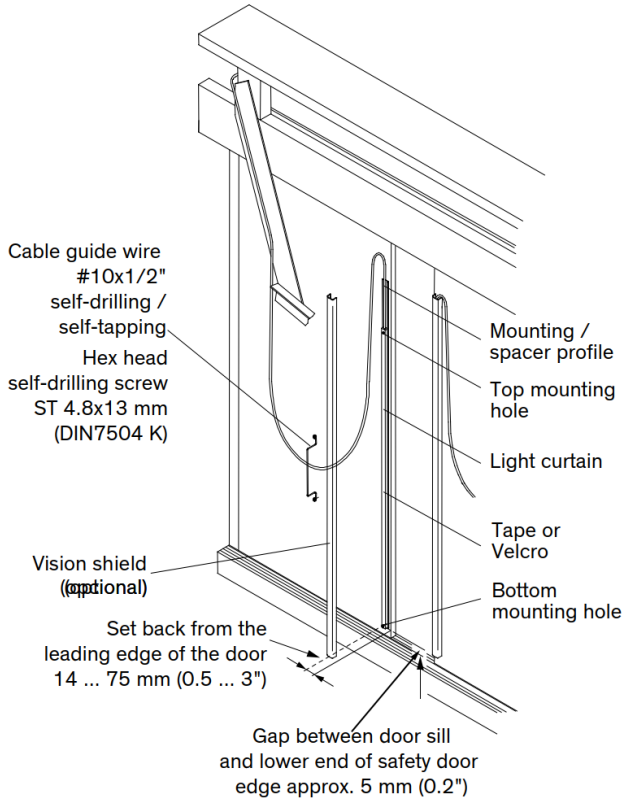


Figure 8: Typical cable guiding in a dynamic installation

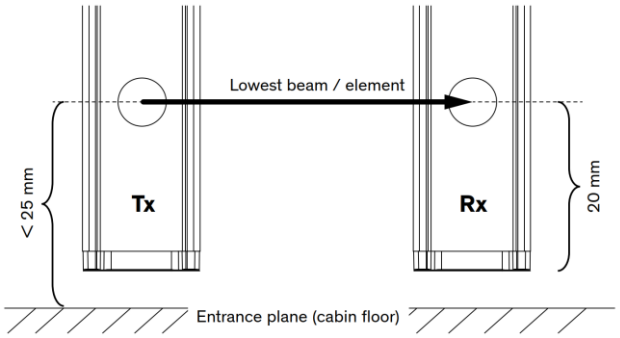


Figure 9

► Receiver and emitter need to mount at the same height and both connectors are on top.

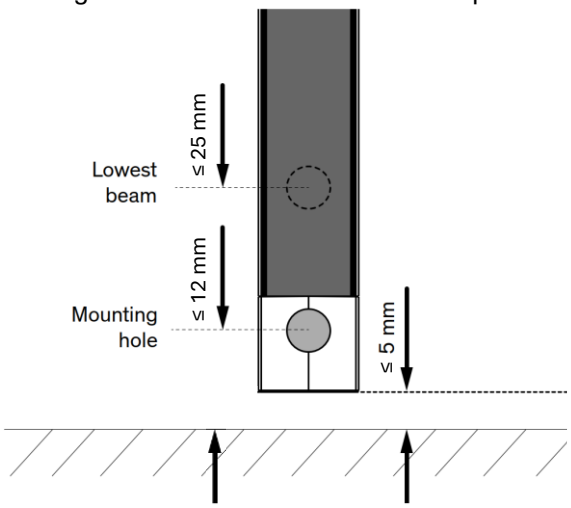


Figure 10

► EN 81-20: Lowest beam shall be less than 25 mm above entrance level.

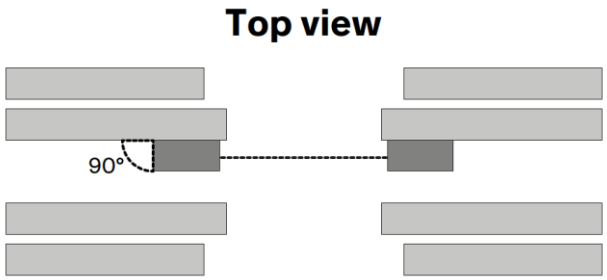


Figure 11

► Check the alignment of the edges. The receiver needs to be mounted 180° to the emitter.
Important: Make sure the optical elements are facing each other.

6.3.1 Mounting with a CabSafe-3D System

Important for installations in a CabSafe system: for a reliable detection of the door closing/opening is, that the light curtain edges have a distance “A”

- less than 100 mm (3.94 in.)
- but more than 10 mm (0.394 in.)

when the door is in the fully closed position (Figure 12**Error! Reference source not found.**).

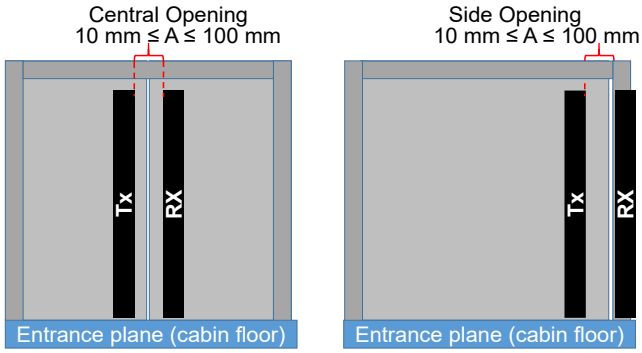


Figure 12: Installation distance cegard/Smart NT light curtain for dynamic installation (door closed)

6.3.2 Mounting according to EN 81-20

To be compliant to the international standard EN 81-20 and/or North American standard ASME A17.1 / CSA B44, the cegard/Smart NT light curtain must be installed so that the lowest beam (bottom end) is positioned less than 25 mm (0.984 in.) above floor (Figure 9).

Furthermore EN 81-20 and ASME A17.1 / CSA B44 also require a detection capability (resolution) of 50 mm starting 25 mm above floor up to a height of 1’600 mm of the door opening. A cegard/Smart light curtain installed so that the lowest beam is at a level of 25 mm provides a resolution of ≤50 mm up to the position of the highest beam (Figure 26).

6.3.3 Mounting options using spacer / mounting profile and vision shield

The standard mounting kit in the North American cegard/Smart NT light curtain kit includes two (2) spacer profiles, one (1) mounting profile and two (2) vision shields. These components mount to the elevator door(s) and/or strike jamb in the following manner. Use the provided felt strip or double-faced tape to secure the emitter and receiver in the middle position when either is mounted with its optical axis parallel to the elevator cabin doors e.g., as shown below.

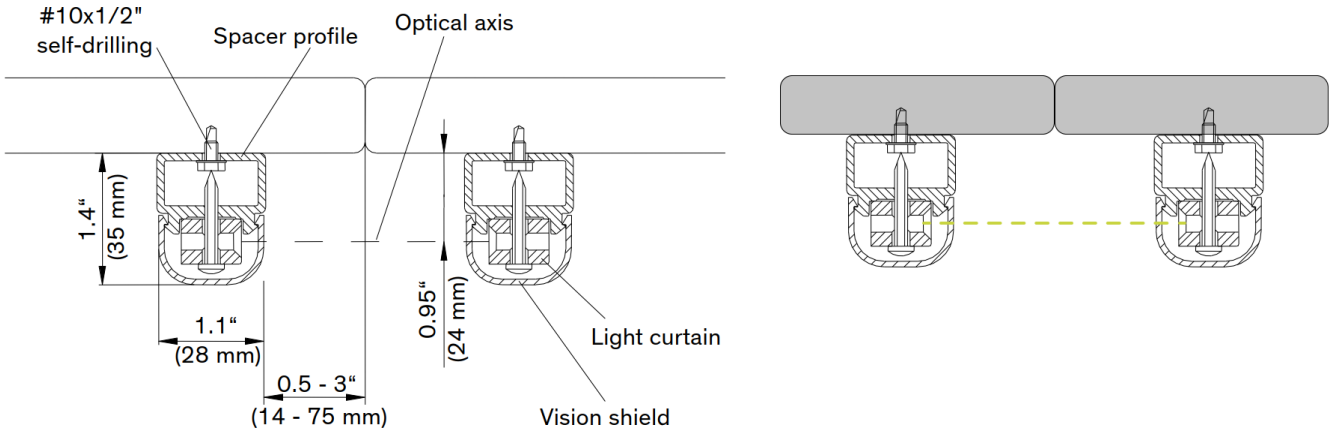


Figure 13: Mounting details for center opening doors using two (2) spacer profiles

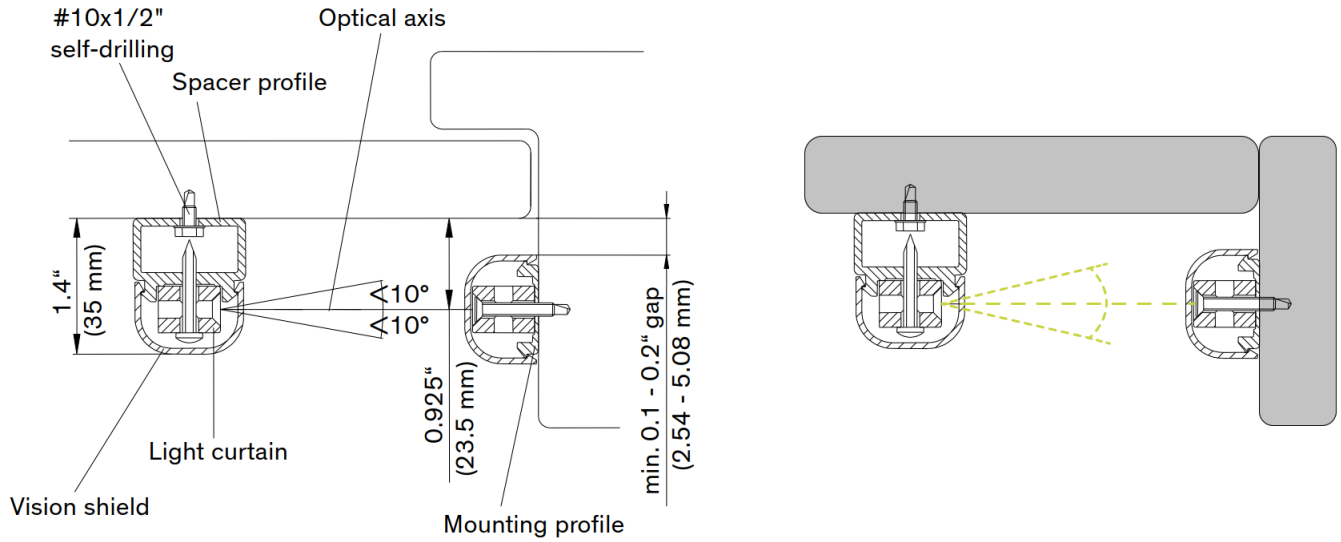


Figure 14: Mounting details of side opening doors with spacer and mounting profile

6.3.4 Mounting clips

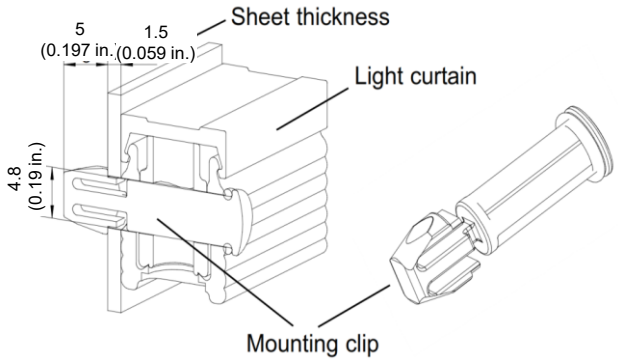
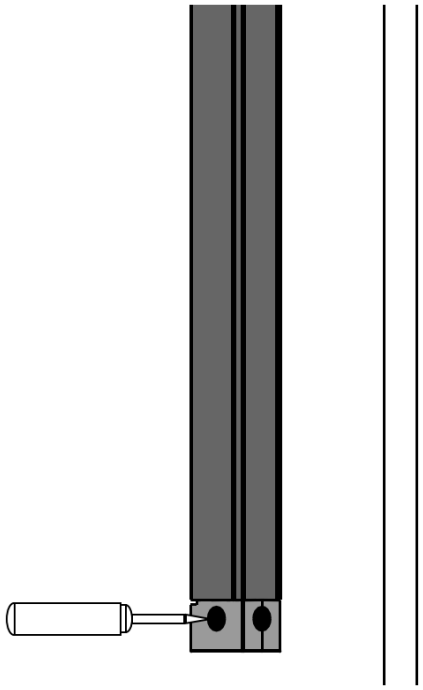
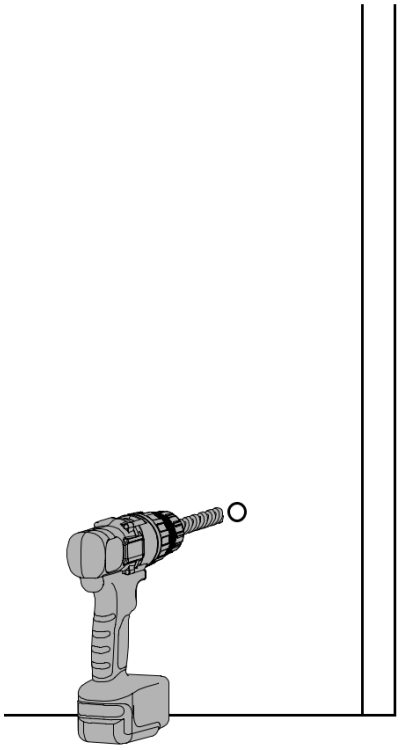


Figure 15: Mounting clips (for top and bottom side mounting holes [7mm, 1,995mm])

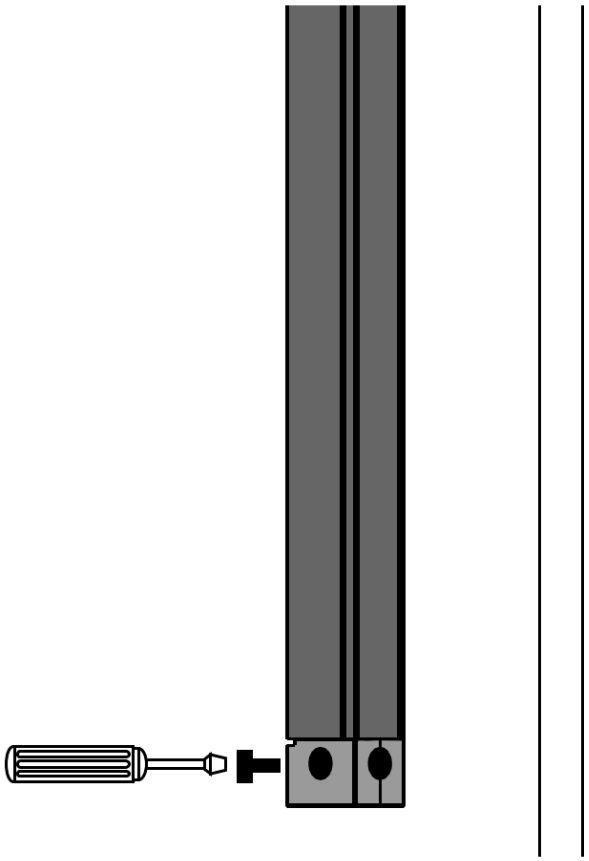
6.3.5 Mounting options directly on the elevator doors



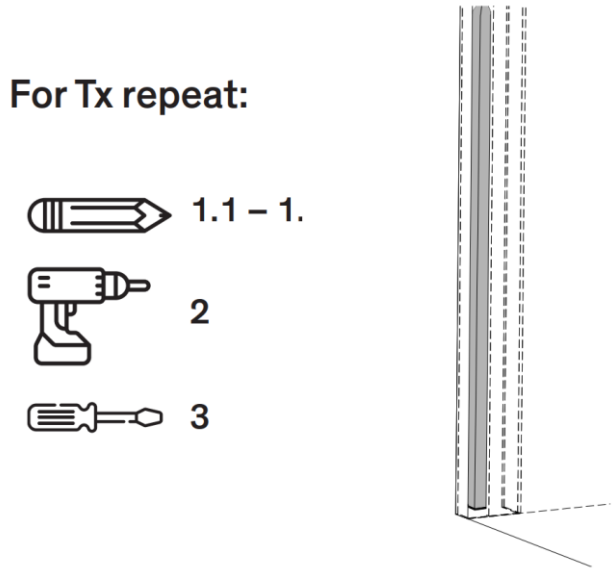
► Mark the mounting holes for the emitter / receiver that will be mounted first.



► Drill the holes for mounting on the marked positions.



► Mount the edge with the screws from the side in the drilled holes.



► Repeat steps 1-3 for the emitter / receiver that remains

6.4 Electrical installation

Connect the cegard/Smart NT light curtain emitter and receiver to
- an elevator controller (chapter 6.4.1), or a
- CEDES CabSafe controller (chapter 6.4.2), or a
- cegard/Smart controller (chapter 6.4.3).

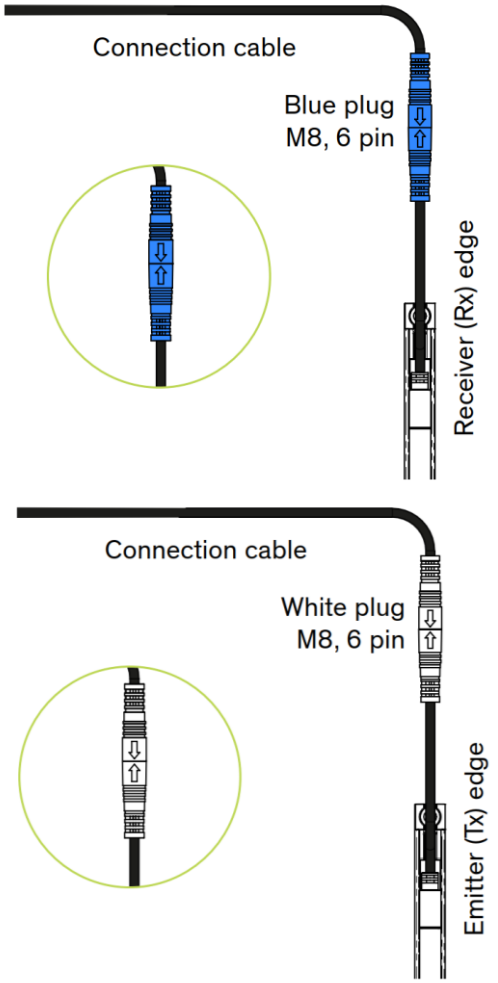


Figure 16: Tx and Rx cable connection

- ► Connect the connection cable (blue plug) on the receiver edge and guide the cable to the controller.
- ► Connect the connection cable (white plug) on the emitter edge and guide the cable to the controller.
- ► Plug the connector into the corresponding receptacle on the controller.
- ► Make sure the detection area between the edges is not interrupted by door wings, cables, etc.
- ► Guide the connection cables using appropriate mounting material, e.g., cable protection tubes, neoprene cable ties or cable guide wires depending on the type of mounting kit that is included.
- ► To meet North American regulations: connection cord with length exceeding 2 m (6.56 ft) shall be protected in a raceway.
- ► Improperly fixed and guided cables can reduce cable lifetime drastically.

The cegard/Smart NT meets all standards for resistance to electromagnetic interference (EMI). However, it is prudent to guard against such interference. Therefore, do not guide cegard/Smart NT connection cables close to cables carrying high voltage and/or high current. The cegard/Smart NT cables should also be mounted as far away as possible from the door drive motor or motor inverter (VVVF-drives) to avoid EMI problems

Important:
- ► Any unconnected (not used) wire must be separated and isolated.
- ► The maximum cable length which shall not exceeded is provided in Chapter 10.
- ► The connection cables should not be guided close to high voltage and/or current wires.
- ► The connection cables should not be close to the door motor and/or door drive.

NOTICE

- ► Ensure that the cable bending radius is greater than 80 mm (3.15 in.) when cables are mounted.
- ► If the cables are not properly fixed and guided, their lifetime could be reduced drastically. They can also be damaged due to possible swinging and snagging in the hoist way! Always follow the cable guide instructions carefully, which can be found in the appropriate mounting kit installation and operation manual.
- ► It is very important to install cables properly to ensure the highest possible reliability and lifespan of the light curtain.

NOTICE

- ► The colour coding of the connection cables for cegard/Smart NT does not match the colour coding of cegard/Pro. For installations where a cegard/Pro is exchanged by a cegard/Smart NT also the connection cables for Rx and Tx must be exchanged.

- ► **WARNING**

To connect cegard/Smart NT use only cables dedicated for cegard/Smart NT. If cables are not exchanged, damage of products occur.

6.4.1 Push-pull output

cegard/Smart NT connected directly to an elevator controller

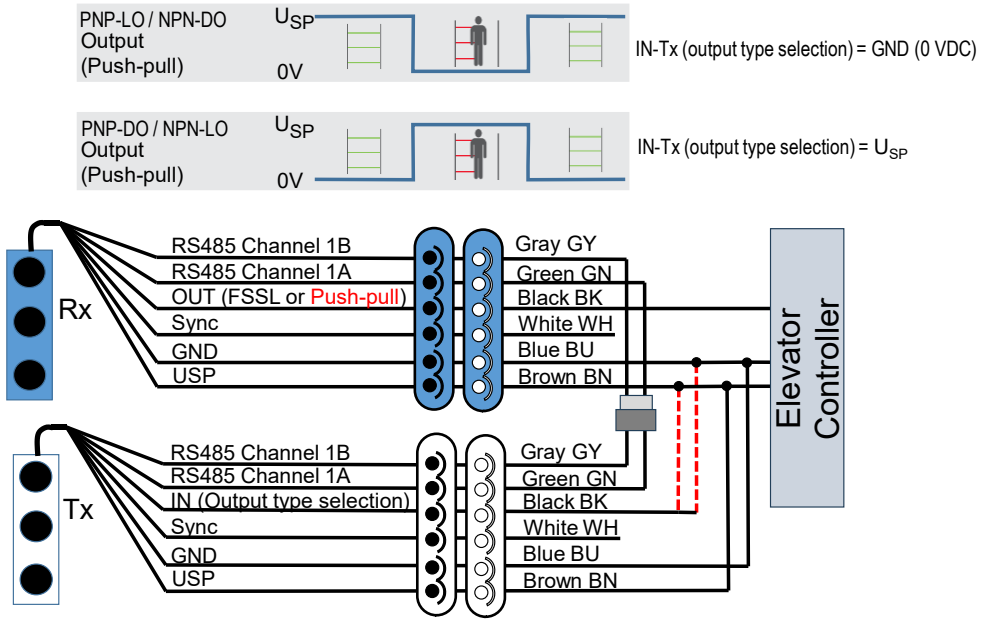


Figure 17: cegard/Smart NT system wired with push-pull output

When an object enters the safeguarded area (OBJECT DETECTED) the cegard/Smart NT light curtain output changes state after response time t2 (see chapter 11**Error! Reference source not found.**). When the object leaves the safeguarded area (NO OBJECT) the cegard/Smart NT light curtain output switches back after release time t3 (see **Error! Reference source not found.**).

The output logic of the push-pull output at the Rx (black) can be selected by connecting the black wire of the Tx either to 24VDC or to 0 VDC (red dotted in Figure 17).
The output logic is LO if the Tx black wire is connected to GND (0 V). Connecting the Tx black wire to U_{SP} changes the output logic to DO (dark-on).

Gray wire	Output Logic
Connected to GND (0V)	PNP LO (NPN DO)
Connected to USP	PNP DO (NPN DO)

Table 3: Push pull output logic

The logic will be defined by the power-up sequence. After the power up the logic will not change until the next power-up is made.
.

6.4.2 FSSL output

cegard/Smart NT light curtain connected to a CEDES CabSafe controller

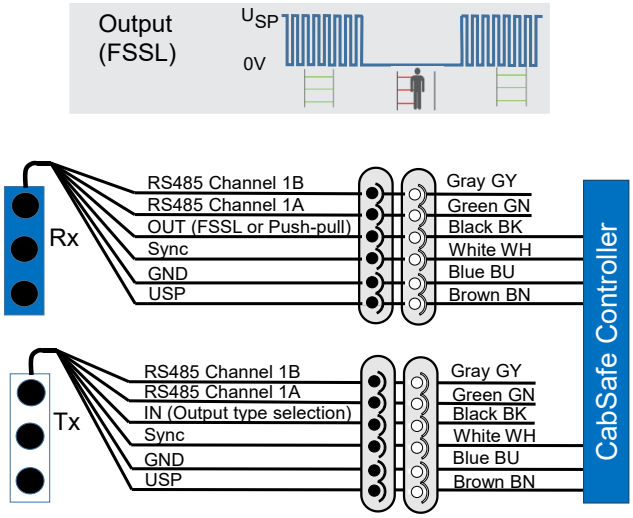


Figure 18: cegard/Smart NT system wired with FSSL output

"Frequency Safety Signal-output" (= FSS-output), a pulsed signal that is operated with a maximum frequency of 2.0 kHz. The output frequency changes with the distance between the emitter and receiver edge allowing for dynamic installations to rely on the cegard/Smart NT light curtain to indicate to the CabSafe Controller that the door is closing or opening.

As long as the safeguarded area is free, the FSS output sends a pulsed signal. The frequency depends on the distance between the Tx and the Rx edge (see chapter 11).

The default logic is Light ON (LO) (Figure 19). When an object enters the safeguarded area (OBJECT DETECTED), the FSS output switches to LOW/GND (0 V). When the object leaves the safeguarded area (NO OBJECT) the frequency starts again.

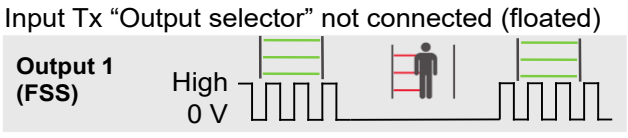


Figure 19: Principal timing diagram for the FSS output

The following precautions must be followed when the cegard/Smart NT light curtain is connected to a CabSafe controller:

- The cegard/Smart NT light curtain must be connected to the CabSafe Controller (see user manual "CabSafe 3D sensor and CabSafe Controller")
- For static installations of the cegard/Smart NT light curtain, a door position signal has to be provided that informs the CabSafe Controller about the door position (signal from the elevator control or from a sensor).
- The max. door closing speed shall not exceed 0.5 m/s (1.64 ft/s).

When the cegard/Smart NT light curtain is connected to a CabSafe Controller (Figure 20), the connection is realized with specific plugs:

- Colored M8 plugs are used for the connection of the cables to the pigtails at the edges.
- Terminal connectors are used to connect the cables to the CabSafe-Control unit.

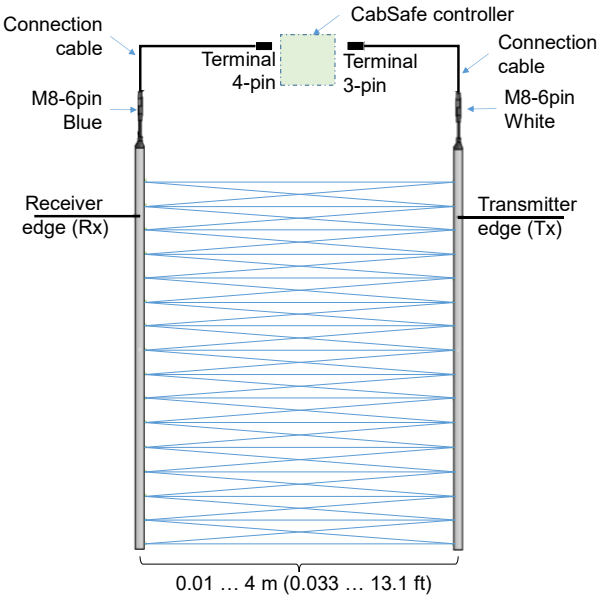


Figure 20: Overview cegard/Smart NT light curtain system in a CabSafe controller environment

For the cegard/Smart NT Rx (receiver edge): the green and the gray wires are not used and be left unconnected (floating) when connected to a CabSafe Controller.

For the cegard/Smart NT Tx (emitter edge): the green and the gray and the black wires are not used.

NOTICE

► The colour coding of the connection cables for cegard/Smart NT does not match the colour coding of cegard/Pro. For installations where a cegard/Pro is exchanged by a cegard/Smart NT also the connection cables for Rx and Tx must be exchanged.

► **WARNING**
To connect cegard/Smart NT use only cables dedicated for cegard/Smart NT. If cables are not exchanged, damage of products occur.

6.4.3 RS485 output

cegard/Smart NT connected to a CEDES cegard/Smart controller. All data of the cegard/Smart NT light curtain edges (including the status of the

protective field) are transmitted via RS-485 interface to the cegard/Smart controller

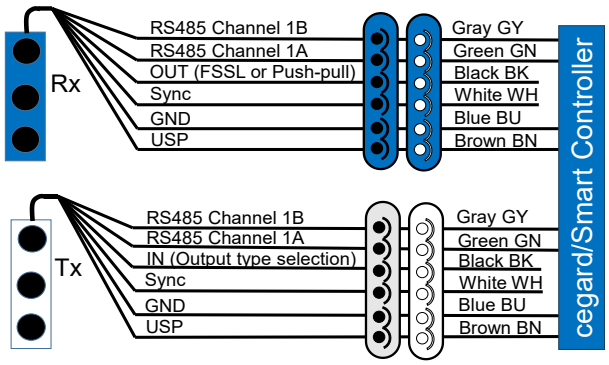


Figure 21: cegard/Smart NT system wired with RS485 outputs

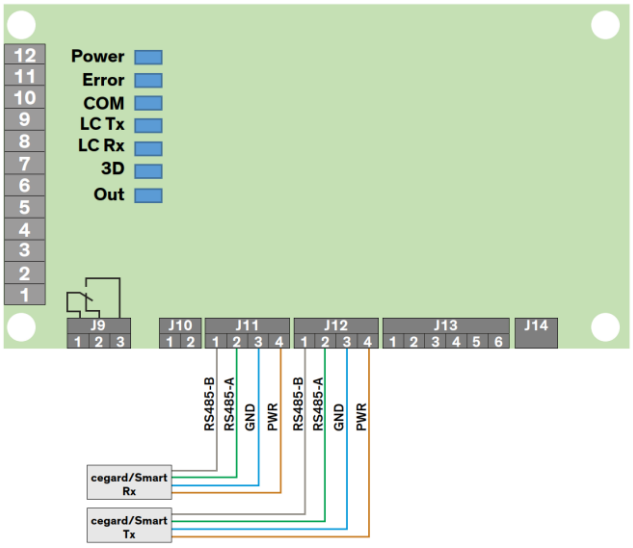


Figure 22: Wiring example for the connection of a cegard/Smart NT LC to cegard/Smart controller sensor interface board

The following precautions must be followed when the cegard/Smart NT light curtain is connected to a cegard/Smart controller (type: CGSM-B, CGSM-C or CGSM-E):

- The cegard/Smart NT light curtain must be connected to the cegard/Smart Controller (see user manual “cegard/Smart Controller”)
- For static installations of the cegard/Smart NT light curtain, a door position signal has to be provided that informs the cegard/Smart Controller about the door position (signal from the elevator control or from a sensor).
- The max. door closing speed shall not exceed 0.5 m/s (1.64 ft/s).

When the cegard/Smart NT light curtain is connected to a cegard/Smart Controller (Figure 20), the connection is realized with specific plugs:

- Colored M8 plugs are used for the connection of the cables to the pigtails at the edges.
- Terminal connectors are used to connect the cables to the cegard/Smart control unit.

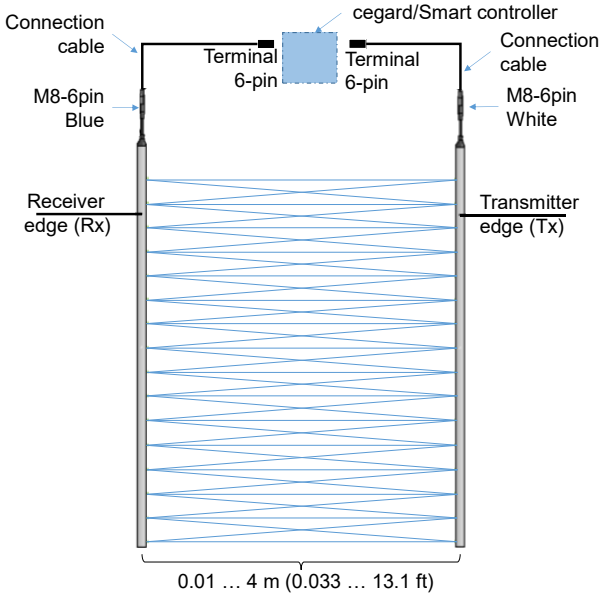


Figure 23: Overview cegard/Smart NT light curtain system in a cegard/Smart controller environment

For the cegard/Smart NT Rx (receiver edge) and Tx (emitter edge): the white and the black wires are not used and be left unconnected (floating) when connected to a cegard/Smart Controller.

6.5 Timing of outputs

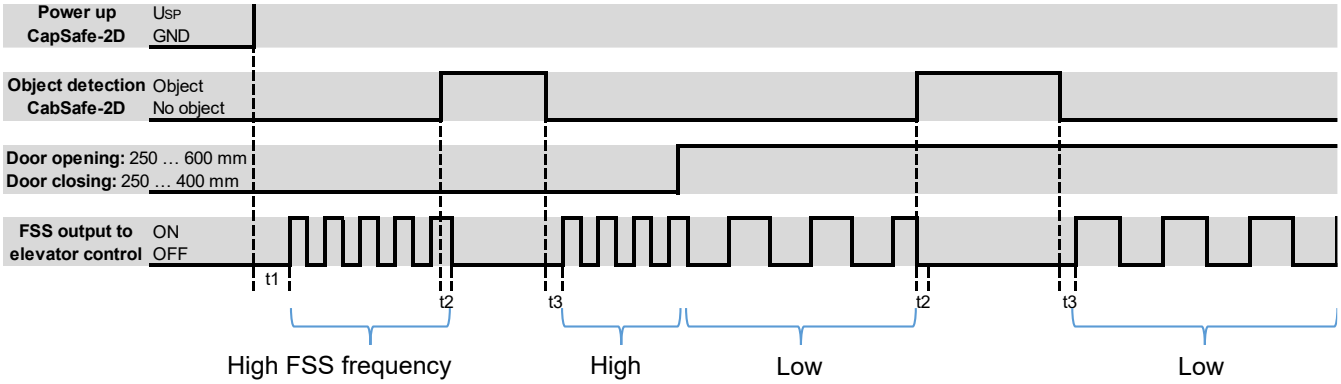


Figure 24: Timing diagram (for FSS frequencies check chapter 11)

	time	Value [ms]
Power Up time	t1	See chapter 11**Error! Reference source not found.**
Response time	t2	
Release time	t3	

*Table 4: Descriptions for the timings in **Error! Reference source not found.***

There is no difference in the values of the times if FSS output or if PNP/NPN output is selected.

6.6 Start-up

After installation:

1. Switch on mains and power-up the elevator control unit. The LED on the receiver edge blinks during the start-up phase.
2. Check the LED on both edges (power, status).
3. Test if the system is working correctly by interrupting the cegard/Smart NT light curtain:
   - For ASME A17.1-2019 / CSA B44:19 use a non transparent test object with the dimensions stated in the code: 80 mm (3.15 in.) above floor level and 50mm (1.97 in.) at floor level. The cegard/Smart NT light curtain as well as the CabSafe Controller (or the cegard/Smart controller) must signal object detected at all times during this test.
   - For EN 81-20: use a non transparent test object with the dimensions stated in the code: 50mm (1.97 in.) The cegard/Smart NT light curtain as well as the CabSafe Controller (or the cegard/Smart controller) must signal object detected at all times during this test (from the bottom to the top of the protective field).

6.7 Indicator LED status description

Emitter edge (Tx)

• Power (Indicator LED 1)

RED LED	Sensor status
●	Power ok
o	No power or edge is defective

Table 5

Receiver edge (Rx)

• Power (Indicator LED 1)

RED LED	Sensor status
●	Power ok
o	No power or edge is defective

Table 6

• Output Status (Indicator LED 2)

RED LED	Sensor status
●	Detection field interrupted / object detected
o	Detection field free / no object detected

Table 7

● = LED on, o = LED off

6.8 Troubleshooting

Emitter (Tx) indicator LED 1 - Power	Receiver (Rx) indicator LED 1 - Power	Receiver (Rx) indicator LED 2 Output status	Action
OFF	OFF	OFF	► Check electrical connections ► Check supply voltage ► Restart the system.
OFF	Red ON	Red ON	► Check the power supply and the connection of the emitter (Tx) cable (white M8 connector).
Red ON	OFF	OFF	► Check the power supply and the connection of the receiver (Rx) cable (blue M8 connector)
Red ON	Red ON	OFF	► No object detected. ► Normal operation (no action required).
Red ON	Red ON	Red ON	► Normal operation, object detected. ► Check alignment or remove object. ► Check if front windows are clean. ► Check power supply. ► Check connections.
Red ON		Red ON/OFF Sporadic blinking	► Make sure the detection area is clear of interruption. ► Clean the front window. ► Make sure that the cables and edges are located away from sources of electromagnetic interference (EMI). ► Make sure that no other infrared light sources or ambient light sources are nearby or facing the receiver e.g., a security camera. ► Ensure that the emitter and receiver are correctly aligned and remain aligned during door closure (e.g. that vibrations do not cause edges to become misaligned). ► Measure the USP voltage. ► Restart the system.

Table 8

The emitter and receiver indicator LEDs locations are shown in Chapter 11.7.

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

7 Maintenance

► Although the cegard/Smart NT light curtain does not need regular maintenance, a periodic functional check is strongly recommended:
► Make sure the optical windows are clear of dirt and dust. If necessary, clean the front surface with a soft towel.
► Make sure the edges are securely fastened.
► Check the mounting position, cable routing and connection of the sensor.
► Check the detection behaviour of the cegard/Smart NT light curtain according to the requirements of local regulations (for EN 81-20 or ASME A17.1/CSA B44, whichever applies to your application, see Chapter 6.3).

NOTICE
Damage to the optical elements

► Never use any solvents, cleaners or mechanically abrasive towels or high-pressure water to clean the sensor.
► Avoid scratching the optical elements while cleaning.

8 Product exchange

NOTICE
Product exchange

► cegard/Smart NT edges are always shipped in pairs. In case of a replacement do not replace a single edge. Always replace both edges!

9 Disposal

A cegard/Smart NT light curtain system should only be replaced if a similar protection device is installed. Disposal should be done 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.

Waste Electrical and Electronic Equipment (WEEE): At the end of life, this equipment should be collected separately from any unsorted municipal waste.

10 Product label

Each cegard/Smart NT light curtain edge is labelled with a product label. The label is attached on the side of the profile on each emitter and receiver.

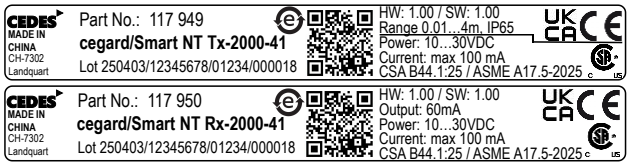


Figure 25: Product label cegard/Smart NT light curtain

The label includes information according to the table below:

1xx xxx	Part number existing of 6 numbers with space after the third
cegard/Smart NT Tx-2000-41	Description of the cegard/Smart NT edge (acc. to type description see below). 2000 refers to the edge length in mm (see 4.3)
Lot number	The lot number consists of the following fields: Manufacturing date (250403), manufacturing job number (12345678), employee number responsible for final test (01234), and incremental counter (000018).
HW / SW Index	Increasing digits with the following meaning: **1.xx:** Major changes, e.g. additional functionality **x.0x:** Error correction, bug fix, new compilation, no additional functionality **x.x0:** 'Cosmetic' update, no functional influence
2D Bar code	Part number and lot number

Table 9

	Product Line	cegard/Smart
a	Type	«Tx/Rx» - Pair of edges including cables (excl. cegard/Smart control unit) «Rx» - Receiver only «Tx» - Emitter only
-		
b	Edge length	«2000» - 2'000 mm length
-		
c	Element number	«41» - 41 Elements

Product Line	a	b	c	Description
cegard/Smart NT	Tx/Rx	2000	41	System (Rx and Tx)

Table 10

Example:
cegard/Smart NT Tx/Rx-2000-41

11 Technical data

11.1 Optical

Operating range	0 ... 4 m (0 ... 13.1 ft)
No. of optical elements	41
Max. no. of beams	121
Wave length	Infrared, 850 nm

Table 11

11.2 Mechanical

Dimensions (w × h × l)	11.5 × 16 × 2’000 mm (0.453 × 0.63 × 78.74 in)
Protection height	1’823 mm (71.77 in)
Housing material	Aluminium, black powder coated
Weight - Pair of edges - Pair of cables	 1’000 g 250 g

Table 12

11.3 Environmental

Enclosure rating Edges Connectors	 **IP65** IP65
Temperature range - Operation - Storage	 -30 °C ... +60 °C -30 °C ... +60 °C
Max. ambient light	100’000 Lux

Table 13

11.4 Electrical

Supply voltage U_{SP}	10 ... 30 VDC
Typ. current consumption at 24 VDC (pair)	< 60 mA
Max. inrush current per edge	< 5 A (< 200 µs))
Output	Push-pull RS485 FSSL
Push-pull output logic	NO / NC selectable
Output voltage	USP - 2VDC
Max. output load (Push pull)	100 mA, 100 nF
FSS Frequencies **Near distance (low)** **Far distance (high)**	 1.0 kHz (950 to 1’050 Hz) 2.0 kHz (1’950 to 2’050 Hz)
FSS output HIGH	> U_{SP} - 2 VDC
FSS output LOW	< 2 VDC
Max. output load (FSS)	20 mA, 100 nF
Termination of RS485	120 Ω (internally)
Baud rate	230,400 bit per second
Max. response time	130 ms
Max. release time	480 ms
Typ. power-up time	< ?00 ms
Emitter (Tx) indicator LED 1	 Red ON Power
Receiver (Rx) indicators LED 1 (Red ON) LED 2 (Red ON) LED 2 (OFF)	 Power Object detected No object detected

Table 14

11.5 Connection cable and electrical connection

Length - connection cable - Pigtail - Extension cable	 400 mm (15.75 in.) 5 m (16.4 ft)
Max. cable length	14 m (45.9 ft) per edge
Connector	M8, 6-pin, Ø10 mm (0.394 in.)
Cable diameter	Ø 4.2 mm (0.165 in.)
Material	PVC, black
Plug color - Tx - Rx	 White Blue
Wires	AWG26
• Brown	U_{SP}
• Blue	GND (0 V)
• Green	RS485 Channel 1 A
• Gray	RS485 Channel 1 B
• Black	Tx: Output selection Rx: Output
• White	Tx: Synchronization Rx: Synchronization

Table 15

11.6 General

EMC emission	EN 12015:2021
EMC immunity	EN 12016:2013 ISO22200:2009
Vibration	IEC 60068-2-6:2007
Shock	IEC 60068-2-27:2008
Cable durability	IEC 60227-2:2003
RoHS	2011/65/EU
Certificates - Europe - USA / Canada	 CE/UKCA; EN 81-20:2020 cCSAus; CSA B44.1:25 / ASME A17.5-2025

Table 16

11.7 Dimensions

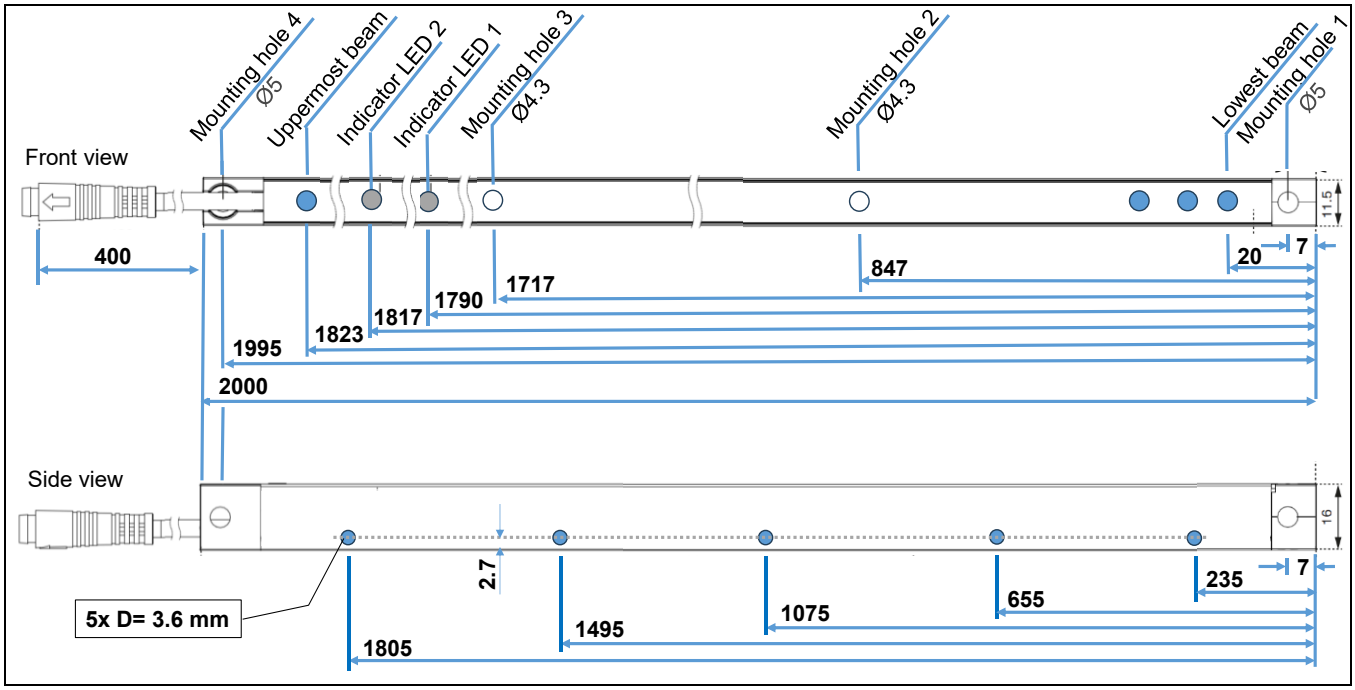


Figure 26: Dimensions in mm. Proportions not to scale

Numbers of elements	Position lowest beam	Safety length (Upper most beam))	Mechanical length	Resolution R	Mounting holes Ø 3.6 mm (Ø 0.142 in.)	Mounting hole Ø 5 mm (Ø 0.197 in.)	Mounting hole Ø 4.3 mm (Ø 0.169 in.)	Indicator LED 1	Indicator LED 2
41	20 (0.787 in.)	1’823 (71.77 in.)	2,000 (78.74 in.)	≤ 50 (1.97 in.)	235 (9.25 in.) 655 (25.79 in.) 1075 (42.32 in.) 1495 (58.86 in.) 1805 (71.06 in.)	7 (0.276 in) 1’995 (78.54 in.)	847 (33.35 in.) 1717 (67.60 in.)	Tx: 1’817 (71.5 in.) Rx: 1’817 (71.5 in.)	Tx: n/a (n/a in.) Rx: 1,790 (70.5 in.)

Table 17

Detailed view:

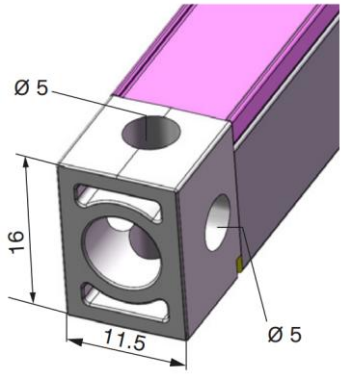


Figure 27