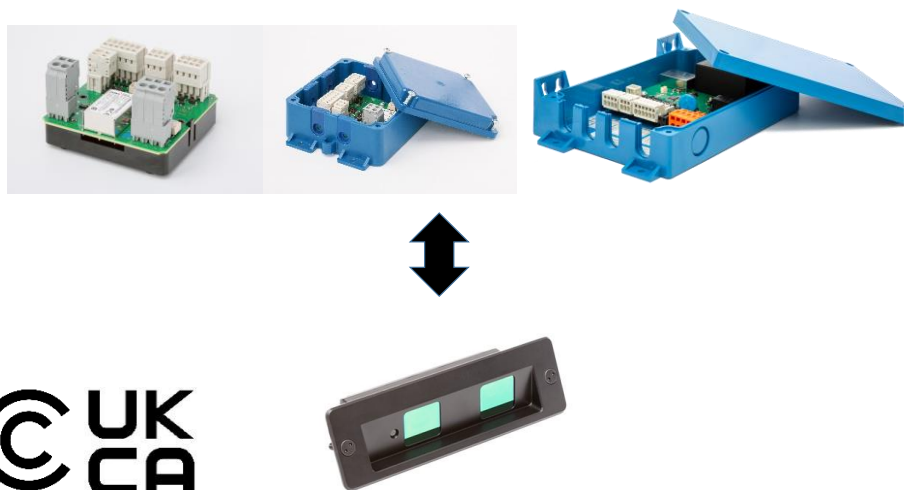


# CabSafe 3D Sensors & Controllers

## Installation and Operation Manual



CEDES AG is certified according to ISO 9001: 2015

English

Pages

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## 1 About this manual

This installation and operation manual in English, with metric measurements 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](http://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

116 101 CE/UKCA confirmation  
116 106 Operating manual cegard/Pro CabSafe 2D Light Curtain

1.3 CEDES headquarters

CEDES AG  
Science Park  
CH-7302 Landquart  
Switzerland

2 Safety information

IMPORTANT READ BEFORE INSTALLATION!

The CabSafe system 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 if it is damaged in any way.
- ▶ Keep the instruction manual on site.

The CabSafe system 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 CabSafe system may cause customer complaints, serious call backs, damage, injury or death.

2.1 Non-intended use

The CabSafe 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



Figure 1: Non-intended use

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 CabSafe 3D Time-of-Flight (TOF) sensor, the ce-gard/Pro (CabSafe 2D) light curtain, and the CabSafe Controller are the components that make up a CabSafe system. The CabSafe system is intended to safeguard automatic doors in elevator applications where it detects persons or objects approaching the elevator door 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.<br>2.<br>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 message 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 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 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 Introduction CabSafe System**

The CabSafe System provides a complete elevator door protection solution that complies with ASME A17.1-2019 / CSA B44:19 Safety Code for Elevators and Escalators when installed in compliance with these operating instructions. The CabSafe System consists of:

- A CabSafe Controller
- A cegard/Pro Light Curtain (hereafter referred to as the CabSafe 2D) to detect persons or objects between the elevator doors; and
- A CabSafe 3D Time-of-Flight Sensor to detect persons or object approaching the elevator entrance.

The CabSafe system is designed for and can be used in center-opening as well as left- or right-side opening elevator door applications. It is suitable for both dynamic and static light curtain installations.

The CabSafe Controller:

- Performs continuous testing of the CabSafe 2D and CabSafe 3D sensor
- Logically combines the signals from the CabSafe sensors into one output to elevator control
- Manages configuration parameters for the CabSafe system.

This document contains the technical specifications of the CabSafe 3D sensors and the CabSafe Controllers

and their installation procedure. The technical specification of the CabSafe 2D light curtain is provided in the separate CEDES user manual 116 106.

The CabSafe Controller tests the function as well as detects the signals from the entrance area sensor and the light curtain together. Depending on an internal sequencing, the CabSafe Controller either holds the door open, allows it to reverse or allows it to close.

The comfort of the CabSafe system improves due to contactless detection of approaching persons with a simultaneous increase in the availability of the cabin. The CabSafe 3D detection field is automatically adjusted during movement of the door(s). When installed correctly, the CabSafe 3D sensor is rendered inoperative 450 mm (17.72 in.) before full door closure based on the

- the CabSafe 2D light curtain (only for dynamic installations);
- a door position signal from the door control; or
- a door position switch (e.g. magnetic or optical sensor)

The CabSafe system is designed and developed to fulfill the requirements of the ASME A17.1-2019 / CSA B44:19 and previous versions of the Elevator and Escalator Safety Code. For correct function, only system components described in this document and the cegard/Pro (CabSafe 2D) Installation and Operation Manual (see CEDES document 116 106) shall be used.

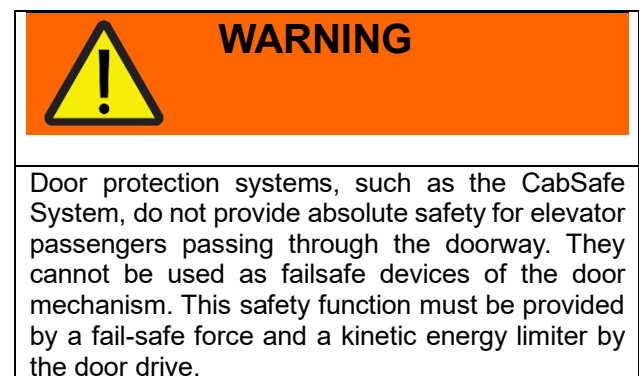
**4.1 CabSafe System Overview**

Figure 2 shows the principal of the CabSafe System architecture. The CabSafe 2D transmitter (Tx), receiver (Rx) and the CabSafe 3D sensor are all connected to the CabSafe Controller.

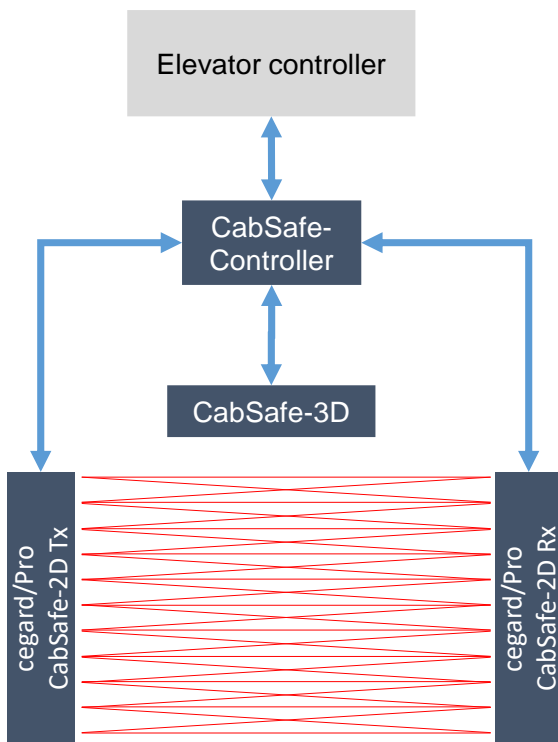


Figure 2: Principal CabSafe system architecture

The following chapters provide a description for following components:

|                     |           |
|---------------------|-----------|
| CabSafe Controllers | Chapter 5 |
| CabSafe 3D sensors  | Chapter 6 |

For a description of the cegard/Pro (CabSafe 2D) light curtain, please refer to the cegard/Pro Installation and Operating Instructions: CEDES part number 116 106.

## 4.2 General Operation

The operating sequence of the CabSafe System begins with the opening of the elevator door(s). As this occurs, the CabSafe System is initialized by a signal from one of the following:

- the CabSafe 2D light curtain (dynamic installation only);
- the elevator control; or
- a door position sensor (e.g. a magnet switch or a fork type light barrier).

The CabSafe 3D detection field is calibrated within one second of the doors reaching their fully open position, and the opening also causes the CabSafe Controller to start monitoring the CabSafe 2D 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 will change state so that the door operator will reverse the doors or hold them in their open state.

A timer (3D-time in Figure 10) has been implemented in the CabSafe controller to minimize the effects of cross-traffic in the CabSafe 3D detection field. The timer starts when a person or object is detected approaching the elevator cab. If this timer expires before an infringement of the CabSafe 2D (i.e. person or object actually entered the elevator cab), objects in the CabSafe 3D detection field will be ignored. When an object is detected by the CabSafe 2D, this timer is reset. Originally this timer was defined with 20 sec and was changed to 5 sec in January 2021 (see also chapter 5.3).

The CabSafe 3D is rendered inoperative once the doors are less than 450 mm (17.72 in) apart. This distance is monitored based on a signal from one of the following:

- the CabSafe 2D light curtain (dynamic installation only);
- the elevator control; or
- a door position switch (e.g. a magnet switch or a fork type light barrier) .

After the doors have reached their fully-closed state, the sequence starts over.

## 5 CabSafe Controller

### 5.1 Overview

The CabSafe Controller is responsible for the communication with the individual components (CabSafe 2D light curtain and CabSafe 3D sensor). It provides a signal to the elevator control that indicates when the elevator door can be closed. The CabSafe Controller manages regular testing of the CabSafe components, including when the door has reached its fully open position. If a CabSafe component fails, the CabSafe Controller provides a signal to hold the door open and indicates a fault has occurred.

The CabSafe Controller is available either as:

- CabSafe 100 for low supply voltage range and
- CabSafe 200 for a wide supply voltage range

The CabSafe 100 Controller is available with either a:

- Push-Pull output; or a
- Relay output.

Additionally, each CabSafe 100 Controller output type is available as a:

- PCB mounted on a PCB carrier (Figure 3a); or
- PCB mounted in an IP54 enclosure (Figure 3b).

The CabSafe 200 controller designed for modernization purposes with a wider supply voltage range is available with a relay in an IP54 enclosure (Figure 3c).



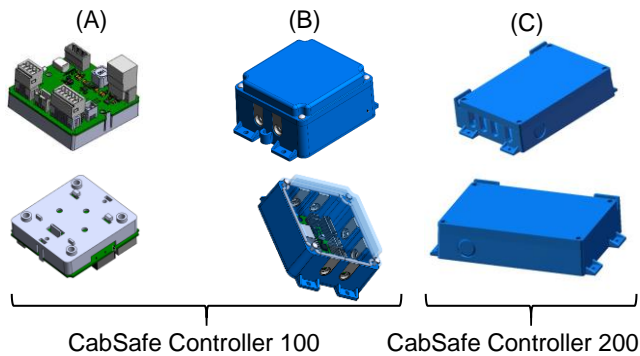


Figure 3: (a) CabSafe Controller 100 PCB on a PCB carrier, (b) CabSafe Controller 100 PCB in a box, (c) CabSafe Controller 200 with wide supply voltage range for modernization applications [Drawings: see chapter 5.23]

## 5.2 Features

- PCB for new installations or enclosure solution (IP54) for modernization
- Push-pull or relay version
- Wide supply voltage range version for modernization
- One output logically combines the signals from:
  - o cegard/Pro CabSafe 2D Light Curtain
  - o CabSafe 3D Sensor
- Different door geometries selectable
- No SW configuration required

## 5.3 Software versions

The functionality and/or feature list of the CabSafe Controller may change or expand during the life cycle of the product. Table 1 provides an overview that implements the FW version:

| Software (SW) Version | New feature or functionality change  |
|-----------------------|--|
| 1.02                  | Product launch   |
| 1.10                  | Rendering inoperative time changed from 20 sec to 5 sec (see chapters 4.2 and 5.11). |
| 1.11                  | DIP12 functionality added (see chapter 5.9.7)  |

Table 1: SW Versions of CabSafe Controller

## 5.4 Safety Instructions

### WARNING

- Switch off main power to the elevator control system and mark clearly that the elevator is out of service.
- Do not mount the CabSafe Controller on the moving door panel.
- Follow all applicable safety measures.

- Make sure that your installation complies with all applicable regulations and safety measures.
- Avoid any damage to the CabSafe Controller
- Observe the ESD protection protocol when removing the PCB from the packaging and during installation.
- Don't drill additional holes into the PCB
- Don't touch the PCB during operation.
- To avoid mechanical stress to the PCB, plug/unplug the connectors only when the PCB is mounted to the PCB carrier or PCB box.
- Use only appropriate connections to the CabSafe Controller.
- In the USA, all connections requiring 42 Volts or greater must be wired through Greenfield tubing and fittings. Disconnect power before opening the control unit to prevent electrical shock. Do not remove any inside electronics.
- It is prohibited to make any changes to the CabSafe Controller itself (only DIP switch settings).
- Only the CEDES CabSafe 2D and CabSafe 3D sensors can be connected to a CabSafe Controller
- Connection cord with a length exceeding 2 meters shall be protected in a raceway.

## 5.5 System integration

The CabSafe Controller provides DIP switches (chapter 5.9) to configure

- elevator door types (center and side opening)
- elevator door entrance height
- method to inactivate the CabSafe 3D sensor when the door is closing

After the

- setting of the DIP switches according to the elevator door type and height,
- the installation of all CabSafe components
- the connection of all CabSafe components to the CabSafe Controller and
- verification of the detection capabilities of all CabSafe components

the CabSafe system is ready for use.

## 5.6 Mechanical installation

The CabSafe Controller boxes and the CabSafe Controller carrier can be mounted in any orientation on a flat surface.

The mounting holes of

- the CabSafe Controller 100 PCB carrier (dimensions in chapter 5.23.1),
- the CabSafe Controller 100 Box (dimensions in chapter 5.23.2) or

- the CabSafe Controller 200 Box with the wider supply voltage range (dimensions in chapter 5.23.3)

provide a stable and robust installation. The PCB carrier can also be snapped on a 45mm DIN rail.

For the CabSafe Controller 100: up to 6 cables can be guided through grommets (two grommets on three sides of the CabSafe controller box, see also Figure 3 b). The shipping kit of the controller contains two types of grommets with different hole diameter:

- 4x grommets with Ø4.5mm
- 2x grommets with Ø3.0mm

The grommets with the smaller diameter should be used for thinner cables (e.g. for the connection cable of the cegard/Pro CabSafe 2D transmitter (Tx), white M8 plug). Depending on the required sealing rate of the final installation the cables can be guided through the rubber grommets in different ways:

- Press the M8 connection plug through the hole of the grommet
- Cut the grommet on one side so that the cable can be inserted from the side and then position the grommet in the CabSafe controller. alternatively
- remove the WAGO plug, guide the cable through the grommet, reconnect the WAGO plug

Each standard shipping kit for the CabSafe Controller 100 also contains two blind stoppers which can be used if only four or five cables are connected to the CabSafe controller.

For increased protection of a CabSafe Controller 100 or CabSafe Controller 200 against moisture, use a

silicon sealant around the cable entry points and on the sealing of the cover.

For the USA and Canada:



## **WARNING** **Serious health risks**

- Connect all wiring with more than 42 V through a Greenfield fitting.
- Disconnect power before opening the UPS to prevent electrical shock. Otherwise serious injury or death may occur!

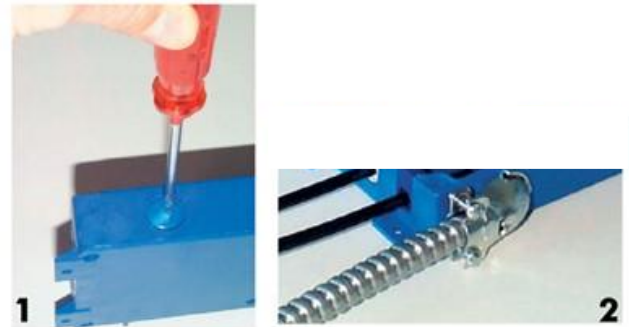


Figure 4: Installation of a Greenfield fitting

Figure 4 displays the basics steps for an installation of a Greenfield fitting:

1. Knockout hole for Greenfield fitting
2. Final Installation of the Greenfield fitting (from T&B or other UL/CSA approved manufacturer)

## 5.7 Electrical connections

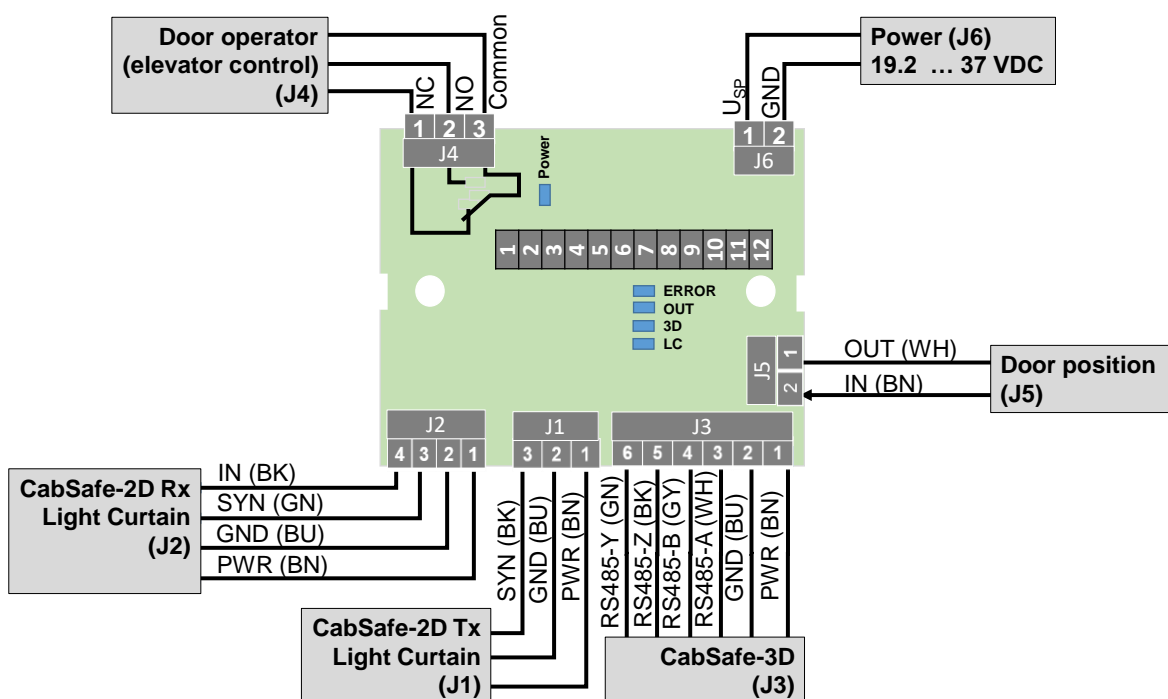


Figure 5: Electrical connections CabSafe Controller 100 with relay output

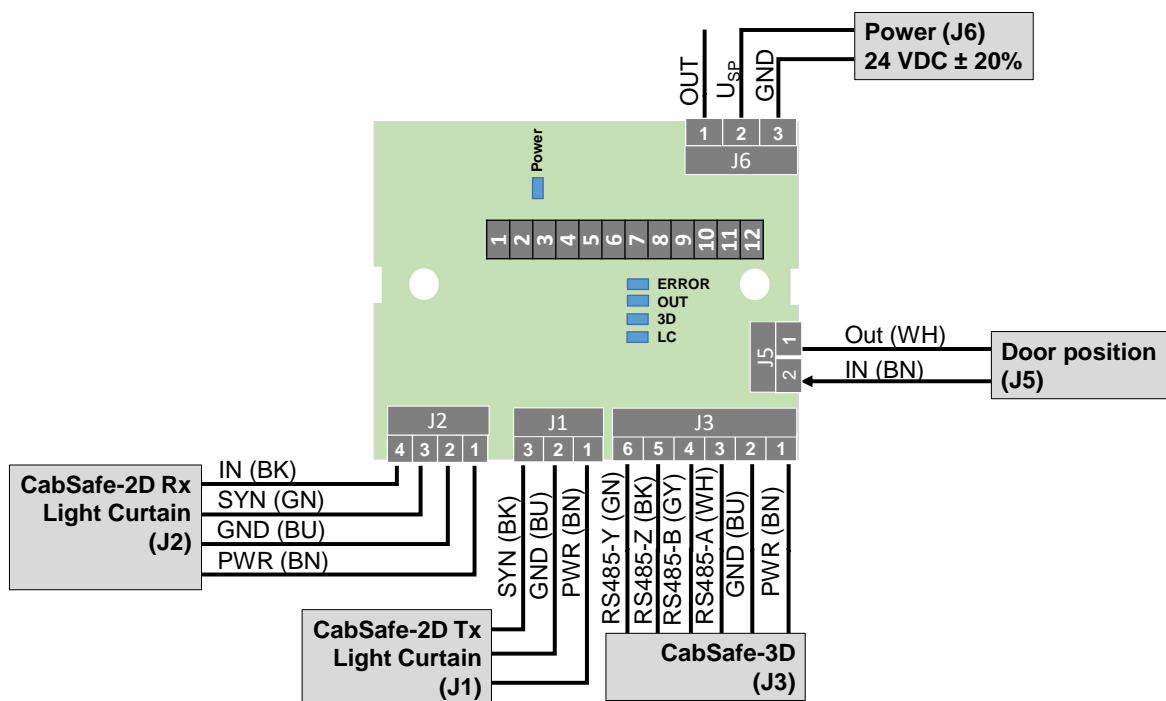


Figure 6: Electrical connections CabSafe Controller 100 with push pull output



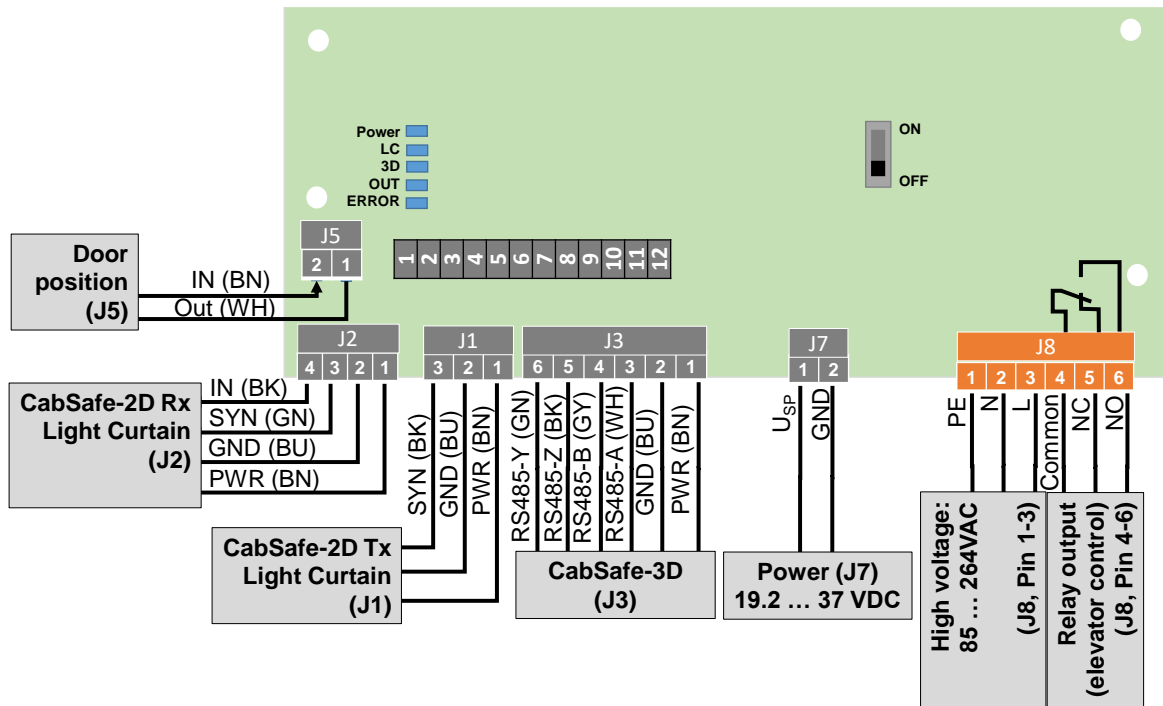


Figure 7: Electrical connections CabSafe Controller 200 with relay output

High voltage power supply:

N: AC neutral, plus or minus for DC

L: AC hot, plus or minus for DC

PE: Protective earth

Details for the door position signal/switch are provided in chapter 5.8.

Chapter 5.12 provides additional information for the connection of the controller output.

## 5.8 Door position signal

The connection of the door position signal is only required for static light curtain installations. For dynamic installations (when the light curtain is mounted on the door(s)), the CabSafe 2D light curtain can provide the door closing signal to the CabSafe Controller. So for dynamic installations a connection to the connector J5 is not required.

For static installations, the CabSafe Controller expects a door position signal which is provided by either the elevator control or from a door position sensor.

For the door position signal (Connector J5) either

- a contact (e.g. a magnetic switch) or
- a 24 VDC signal

can be used. In case of a contact: the contact must be able to switch a current of 2.3 mA. In case of a 24 VDC signal: the ground (GND) of the signal source must have the same 0 V DC reference:

- CabSafe100: the ground (GND) of the signal source must be connected to the same ground (GND) that the Controller is connected to.

- CabSafe200: the ground (GND) of the signal source must be connected to the ground (GND) pin 2 at J7. That has also the case if the Controller is operated with high AC-voltage (J8).

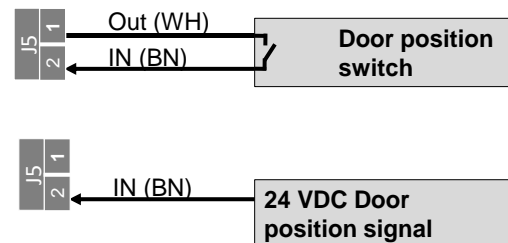


Figure 8: Options for the door position signal

In general: the signal at pin 2 of the plug J5 shall be high (+24 VDC) when the door is closed.

The actuation should occur when the elevator door opening is between:

- Elevator door opening  $\leq 400$  mm (15.75 in.) and
- Elevator door opening  $\geq 300$  mm (11.81 in.). [For elevators with no glass doors  $\geq 0$  mm (0 in.) is possible.]

For a correct function DIP #3 and DIP #4 must be set according to chapter 5.9.2.

The timing of the door position signal to render the CabSafe-3D sensor inoperative is provided in Figure 9:

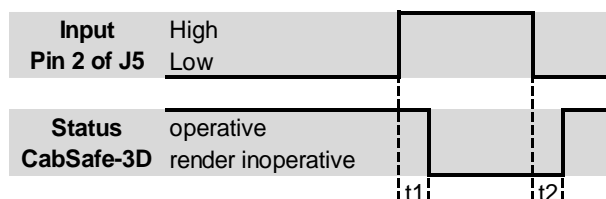


Figure 9: Timing for the door position signal

The time to render the CabSafe-3D sensor from operative to inoperative:  $t1 \leq 21$  ms.

The time to render the CabSafe-3D sensor from inoperative to operative:  $t2 \leq 21$  ms.

Notice:

The door position signal to the CabSafe Controller (see Figure 8) can also be generated by an elevator control or other sensors (e.g. fork type barrier).

## 5.9 Functional selection DIP switches

The configuration of the CabSafe-System is managed by settings of twelve (12) DIP switches. The location of the switches is shown in Figure 5, Figure 6 and Figure 7. The switches are described further in the tables that follow.

| DIP | Function               |
|-----|------------------------|
| 1   | Mounting position      |
| 2   |                        |
| 3   | Door closing detection |
| 4   |                        |
| 5   | Door height            |
| 6   |                        |
| 7   |                        |
| 8   |                        |
| 9   | Bypass                 |
| 10  | Logic                  |
| 11  | Frequency              |
| 12  | Region                 |

Table 2: Overview functional settings

| CAUTION   |
|---|
| Do not change settings of any switch if the CabSafe-Control unit is powered on. Damage may occur! |

### 5.9.1 Settings for the 3D sensor mounting position

| Mounting position  | DIP 1 | DIP 2 |
|--------------------|-------|-------|
| No function *      | 0     | 0     |
| Left (Figure 25)   | 1     | 0     |
| Right (Figure 26)  | 0     | 1     |
| Center (Figure 24) | 1     | 1     |

Table 3: Mounting position of sensor in the transom seen from the hallway into the cabin (\*= Factory default.)

At least the position of one DIP has to be changed to enter operation mode.

### 5.9.2 Settings for the door position detection

| Door closed detection  | DIP 3 | DIP 4 |
|--|-------|-------|
| No function *  | 0     | 0     |
| Dynamic installation of the CabSafe 2D: by light curtain   | 1     | 0     |
| Static installation of the CabSafe 2D: by door position signal or an elevator control signal (*) | 0     | 1     |

Table 4: Definition of how the door closing or door closed is detected (\*= factory default)

(\*-> Recommended setting for glass door elevators, assuming that the light curtain is not installed at the leading door edge because of the visible cable guiding.)

At least the position of one DIP has to be changed to enter operation mode.

### 5.9.3 Settings for the door opening height:

| Door height range                   | DIP 5 | DIP 6 | DIP 7 | DIP 8 |
|-------------------------------------|-------|-------|-------|-------|
| No function *                       | 0     | 0     | 0     | 0     |
| 6.66 ft to 7.5 ft (2.03 m to 2.3 m) | 1     | 0     | 0     | 0     |
| >7.5 ft to 8.5 ft (>2.3 m to 2.6 m) | 0     | 1     | 0     | 0     |
| >8.5 ft to 9 ft (>2.6m to 2.74m)    | 0     | 0     | 1     | 0     |
| >9 ft to 10 ft (>2.74m to 3.05m)    | 0     | 0     | 0     | 1     |

Table 5: Door height range (\*= factory default)

At least the position of one DIP has to be changed to enter operation mode.

### 5.9.4 Settings for 3D Active:

| Bypass 3D sensor | DIP 9 |
|------------------|-------|
| 3D active *      | 0     |
| 3D inactive      | 1     |

Table 6: DIP settings to bypass 3D sensor (\*= factory default)

A setting of DIP 9 to "1" causes that the CabSafe Controller is only operated with the 2D sensor. This functionality requires that the 3D sensor to be physically disconnected from the CabSafe Controller, otherwise an error is displayed.

### 5.9.5 Output logic selector

| Output logic selection | DIP 10 |
|------------------------|--------|
| Standard *             | 0      |
| Inverted               | 1      |

Table 7: DIP settings to change output logic (\*= factory default)

With DIP 10 the output logic is inverted (see chapter 5.12).

### 5.9.6 Operation frequency selector

| Operation frequency selection | DIP 11 |
|-------------------------------|--------|
| Standard *                    | 0      |
| Modified                      | 1      |

Table 8: DIP settings to 3D sensor operation frequency. (\*= factory default)

With DIP 11 the operation frequency of the CabSafe 3D sensor is modified. (see chapter 6.7).

### 5.9.7 Region setting

In applications with deep slam post (deep strike jamb or entrance depth, Figure 24), a permanent door open signal may occur. In such cases, a change in the algorithms of the 3D sensor is required and can be activated using DIP 12.

| Region setting                                | DIP 12 |
|---|--------|
| Standard *                                    | 0      |
| Additional filtering for special applications | 1      |

Table 9: DIP settings to change filter settings (\*= factory default)

### 5.11 Timing diagram

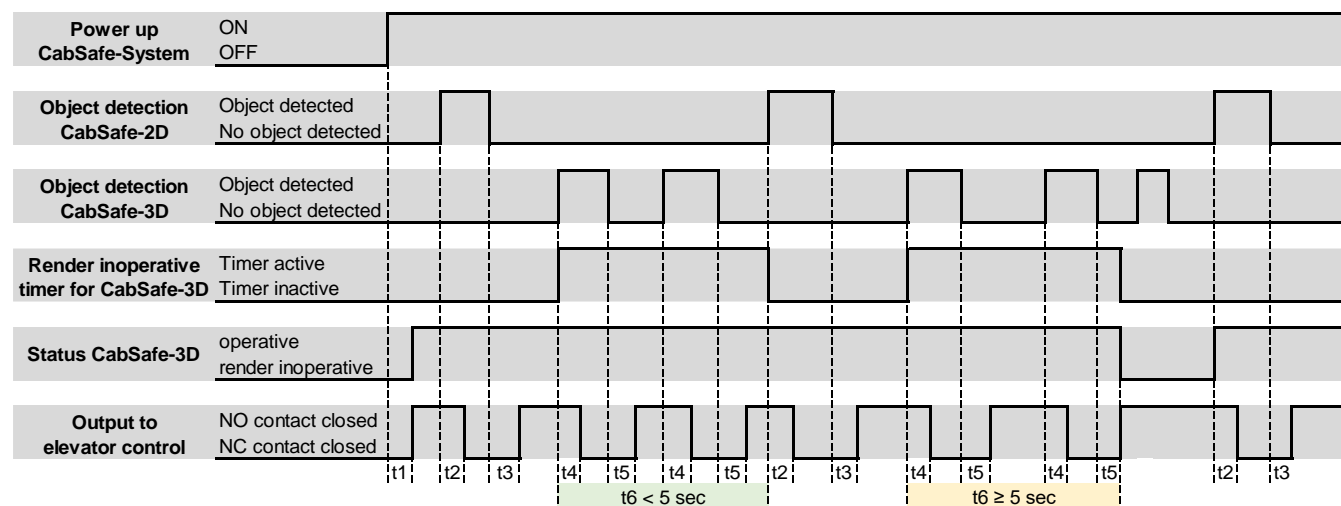


Figure 10: Timing diagram (Output logic selection DIP10 = 0)

The timing diagram for the door position signal is provided in Figure 9.

| Time | Description   | Value   |
|------|---|---------|
| t1   | Power on time   | < 5 s   |
| t2   | Typ. reaction time of the CabSafe Controller output caused by an object entering the detection field of the CabSafe 2D sensor | <140 ms |

A change of the DIP switch 12 setting is only allowed in applications with a door width smaller than or equal to 1'100mm (43.31 in) (see also Table 26).

### 5.10 Buzzer

The CabSafe Controller 200 has an integrated buzzer. The buzzer indicates the status of the output of the CabSafe system. If the CabSafe system output signals that an object is detected, then the buzzer is on.

In addition to the DIP-switches (chapter 5.9), the CabSafe Controller 200 has a separate switch to turn the buzzer functionality on and off (see Figure 7).

| Buzzer                                 | Switch |
|--|--------|
| Buzzer off *                           | OFF    |
| Buzzer indicates CabSafe system output | ON     |

Table 10: Switch settings for the buzzer functionality. (\*= factory default)

#### Installation tip:

When the buzzer is switched on with the sliding switch, the status of the output signal is indicated with a buzzer signal. This function is very helpful after installation to check the proper function of the CabSafe system.

If the CabSafe system or the light curtain do not operate as described in this section, please refer to chapter 5.16 "Trouble shooting".

|    |  |                                       |
|----|--|---------------------------------------|
| t3 | Typ. release time of the CabSafe Controller output after clearance of the detection field of the CabSafe 2D sensor   | < 20 ms +<br>Light curtain            |
| t4 | Typ reaction time of the CabSafe Controller output caused by an object detection of the CabSafe 3D sensor  | < 250 ms                              |
| t5 | Typ. release time of the CabSafe Controller output after clearance of the detection field of the CabSafe 3D sensor   | 1.7 s                                 |
| t6 | Rendering inoperative timer (see chapter 4.2; chapter 5.3). Resets on interruption of CabSafe 2D sensor or upon reopening of doors after closure. If end of timer is reached, CabSafe 3D sensor is rendered inoperative. | ≥ 5 sec<br>According to<br>A17.1-2019 |

Table 11: Descriptions of the times provided in Figure 10

## 5.12 Controller output

The connection of the push-pull output is schematically described in Figure 11:

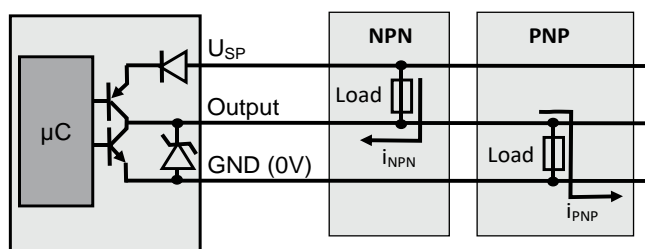


Figure 11: Schematic electric connections for the CabSafe Controller with push pull output

The contact rating of the CabSafe Controller 100 and CabSafe Controller 200 output relay is provided in Table 22. Make sure that you use a pilot relay when switching higher voltage DC loads greater than 0.5 A.

The use of some type of surge suppression to help protect and extend the operating life of the outputs is recommended when switching inductive load

devices, such as motors or solenoids. The potentially high current surges that are created when switching inductive load devices, requires this extra protection. By adding a suppression device directly across the coil of an inductive device, the life of the outputs is prolonged.

### CAUTION

The response time of the circuit often increases drastically, when surge suppression diodes are used.

Never install suppressors directly across:

- the semiconductor outputs, or
- the contacts of a connected relay.

The semiconductor output respectively relay output of a CabSafe controller is not monitored. A stuck at high of the semiconductor output or a welded relay contact of a CabSafe controller may lead to a dangerous situation. To monitor the output a change of state after a certain number of door motions must be implemented.

### 5.13 Controller output logic

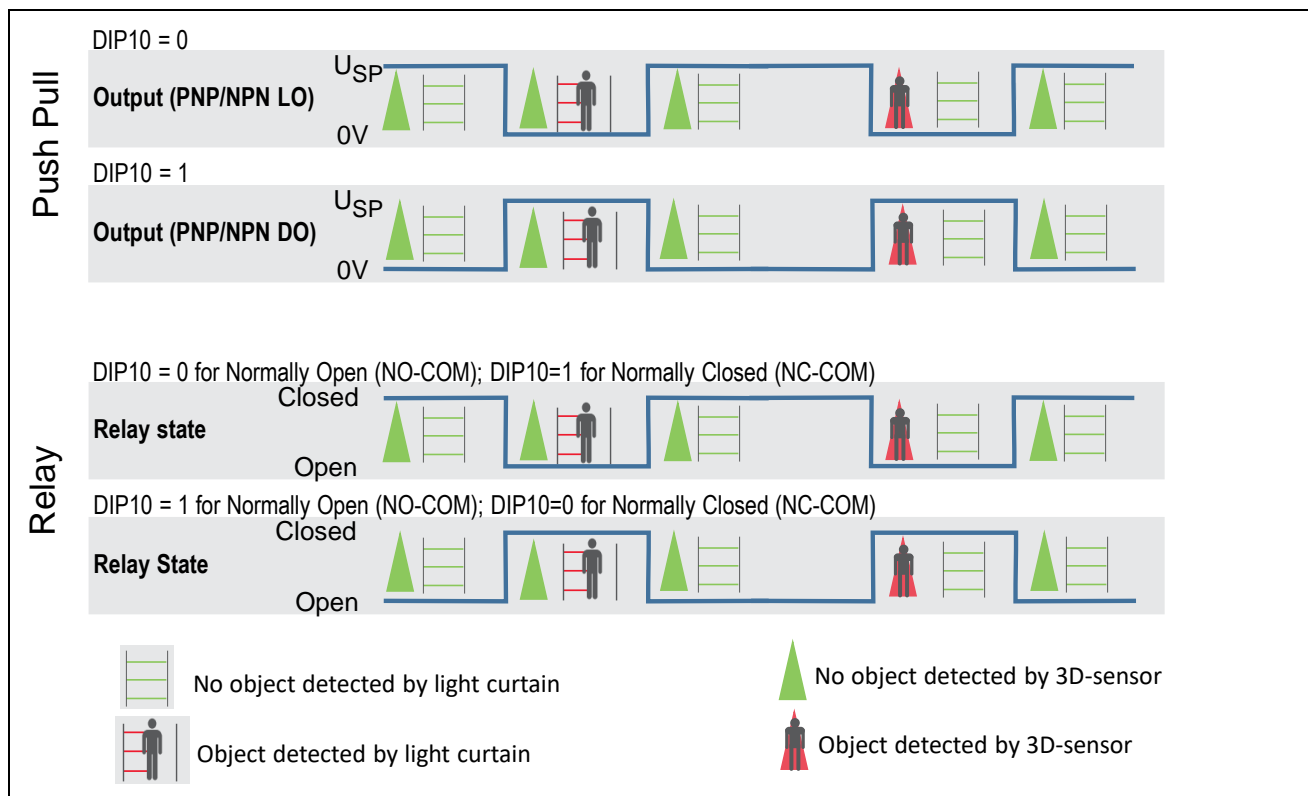


Figure 12: Controller output logic

### 5.14 Startup CabSafe Controller

1. Make sure that the CabSafe 2D and CabSafe 3D sensors are connected.
2. Switch on supply. The POWER-LED at the CabSafe Controller will change from OFF to Green ON.
3. After 5 seconds power up time and elevator door open check the LED "3D". If the LED is OFF means: there is no object detected with the CabSafe 3D sensor.
4. Check the LED "LC". If the LED is OFF means: there is no object detected with the CabSafe 2D light curtain.
5. Test if the LED "OUT" changes state by interrupting the protective field of the CabSafe 2D light curtain. Perform the test of the light curtain from inside of the cabin. The light curtain must signal object detected at all times if
  - a. an object with a height of 80 mm (3.15 in.) is detected at any position of the protective field and
  - b. an object with a height of 50 mm (1.97 in.) is detected at any position at the floor during this test.
6. Test if the LED "OUT" changes state by interrupting the detection field of the CabSafe 3D sensor. Correct function shall be tested by a person walking from outside towards the cabin (walking speed between 0.3 m/s and 1.0 m/s). The CabSafe 3D sensor must signal object detected at all tests.

### 5.15 LED status description

| LED   | Status   | Description |
|-------|----------|-------------|
| POWER | OFF      | Power OFF   |
|       | Green ON | Power ON    |

Table 12: Description Power LED

| LED   | Status    | Description  |
|-------|-----------|--|
| ERROR | OFF       | System running   |
|       | Pulse     | See Table 14 for error codes   |
| Out   | OFF       | Relay output = energized (NO contact closed)/ PNP output = ON<br>DIP10=0: No object detected by the CabSafe 3D sensor or by the CabSafe 2D light curtain   |
|       | Orange ON | Relay output = de energized (NC contact closed)/ PNP output = OFF<br>DIP10=0: Object detected by the CabSafe 3D sensor or by the CabSafe 2D light curtain  |
| 3D    | OFF       | No object detected by the CabSafe 3D sensor  |
|       | Pulse     | 3D rendered inoperative (Pulse signal: 300 ms On, 900 ms pause) <ul style="list-style-type: none"> <li>- by a door position signal</li> <li>- by light curtain or</li> <li>- by 3D-time out (see chapter 4.2 and Figure 10)</li> </ul> |
|       | Orange ON | Object detected by the CabSafe 3D sensor   |
| LC    | OFF       | No object detected by the CabSafe 2D light curtain (LC)  |
|       | Orange ON | Object detected by the CabSafe 2D light curtain (LC)   |

Table 13: Description status LEDs

Pulse error definition:

| Error No | Pulse code       | Description   |
|----------|------------------|---|
| 1        | 1 flash, 1 pause | Internal CabSafe 3D-sensor error or manipulation:<br>Check first if CabSafe 3D sensor is manipulated (e.g. covered). If not, then please replace CabSafe Controller |
| 2        | 2 flash, 1 pause | Reserved  |
| 3        | 3 flash, 1 pause | Configuration error<br>Invalid CabSafe Controller DIP switch setting, see 5.9   |
| 4        | 4 flash, 1 pause | Internal error, please replace CabSafe Controller   |
| 5        | 5 flash, 1 pause | Reserved  |
| 6        | 6 flash, 1 pause | Communication problem<br>CabSafe Controller <-> CabSafe 3D Sensor   |
| 7        | 7 flash, 1 pause | Reserved  |
| 8        | 8 flash, 1 pause | Reserved  |
| 9        | 9 flash, 1 Pause | General CabSafe Controller system error (IC temperature, voltage, ...)  |

Table 14: Error code description

Blinking code:

Flash = 300 ms On / 300 ms Off

Pause = 1'800 ms

The error no. 6 is only indicated at the controller and not on the CabSafe-3D sensor (see Table 30).



## 5.16 Trouble Shooting

| PWR<br>(Green) | ERROR<br>(Red) | Out<br>(Orange) | 3D<br>(Orange) | LC<br>(Orange)  |  |
|----------------|----------------|-----------------|----------------|-----------------|--|
| OFF            | OFF            | OFF             | OFF            | OFF             | <ul style="list-style-type: none"> <li>Check electrical connections from Controller to power supply.</li> <li>Check supply voltage of the door controller.</li> </ul>  |
| ON             | OFF            | OFF             | OFF            | OFF             | No error, normal operation   |
| ON             | OFF            | ON              | OFF            | ON              | No error and normal operation if protective field of CabSafe 2D light curtain is interrupted<br>If CabSafe 2D Light Curtain is not interrupted, follow trouble shooting instructions in CabSafe 2D user manual |
| ON             | OFF            | ON              | ON             | OFF             | No error and normal operation if CabSafe 3D sensor detects approaching object.<br>If CabSafe 3D sensor does not detect approaching object, follow trouble shooting instructions in chapter 6.11                |
| ON             | OFF            | OFF             | BLK            | OFF             | No error and normal operation.<br>Two options <ul style="list-style-type: none"> <li>3D time out, 5 s timer active (see chapters 4.2; 5.3 and Figure 10)</li> <li>Door closed</li> </ul>                       |
| ON             | BLK            | ON              | ON             | ON<br>or<br>OFF | Check error blinking code according to Table 14  |

Table 15: Trouble shooting

## 5.17 Product label

### 5.17.1 Product label Controller 100 PCB



Figure 13: Product Label CabSafe Controller 100 PCB

The label includes information according to table below:

|                                  |  |
|----------------------------------|--|
| ON 1xx xxx                       | Customer order number (ON) existing of 6 numbers with space after the third  |
| PN 1xx xxx                       | Internal CEDES part number (PN) existing of 6 numbers with space after the third   |
| CabSafe Controller 100-R-00, EVR | Description of the CabSafe Controller (acc. to type description, see chapter 5.19).  |
| Lot number                       | Manufacturing Date (200417), manufacturing job number (00654321), employee number responsible for final test (01234), and incremental count (000048) build the lot number. |

|                              |   |
|------------------------------|---|
| HW / SW Index (see also 5.3) | Increasing digits with the following meaning:<br><b>1.xx</b> : major changes, e.g. additional functionality<br><b>x.0x</b> : changed configuration (e.g. timing), error correction, bug fix, new compilation, no additional functionality<br><b>x.x0</b> : 'cosmetic' update, no functional influence |
|------------------------------|---|

Table 16: Description of label content

### 5.17.2 Product label Controller 100 Box

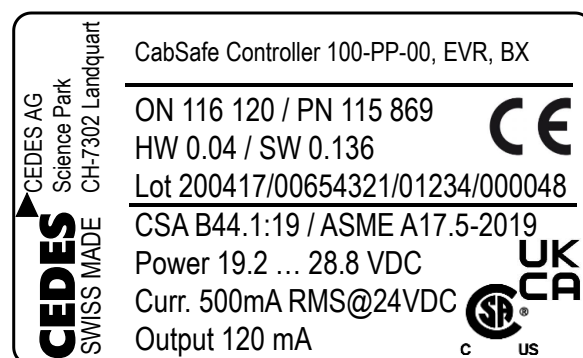


Figure 14: Product Label CabSafe Controller 100 Box (Push-Pull output)

5.17.3 Product label Controller 200 Box

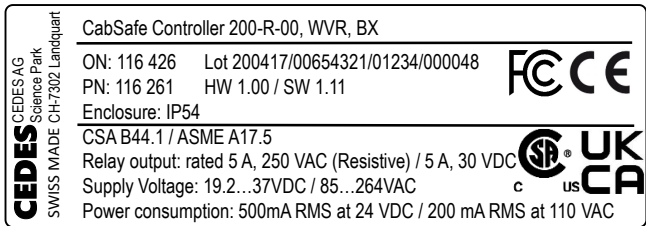


Figure 15: Product Label CabSafe Controller 200 Box (Relay output)

For the description of the label content see Table 16.

5.18 Maintenance

The CabSafe Controller does not need regular maintenance.

5.19 Type description CabSafe Controller

Coding:

CabSafe Controller abb-cc-dd, eee, ff

Examples:

- CabSafe Controller 100-PP-00
- CabSafe Controller 100-R-00, EVR

|    | Options | Description   |
|----|---------|---|
| a  | 1       | Series:   |
|    | 2       | Low supply voltage range<br>Wide supply voltage range |
| bb | 00      | SW series 00  |
| cc | PP      | Output type:  |
|    | R       | Push pull<br>Relay                                    |

|     |                           |   |
|-----|---------------------------|---|
| dd  | 00                        | DIP-Switch settings:<br>00 -> All DIP = 0   |
| eee | (blank)<br>EVR            | Supply voltage:<br>24 VDC +/-20%<br>extended voltage range [19-37 VDC]                  |
|     | WVR                       | WVR -> wide voltage range<br>[see supply voltage for CabSafe Controller 200 Table 22]   |
| ff  | (blank)<br>PC<br>BX<br>BI | Housing type:<br>pure PCB<br>PCB on carrier<br>Box<br>Box including silicon sealing kit |

Table 17: Type description

5.20 Delivery package

The CabSafe Controller Boxes as well as the CabSafe Controller PCB's are shipped without connection plugs for the CabSafe 2D light curtain and CabSafe 3D sensor. The connection plugs of the individual CabSafe components are shipped together with the CabSafe components itself.

5.21 Accessory magnet switch

For static installations of the CabSafe 2D light curtain the following magnetic switch can be installed to provide a door closing signal to the CabSafe Controller.

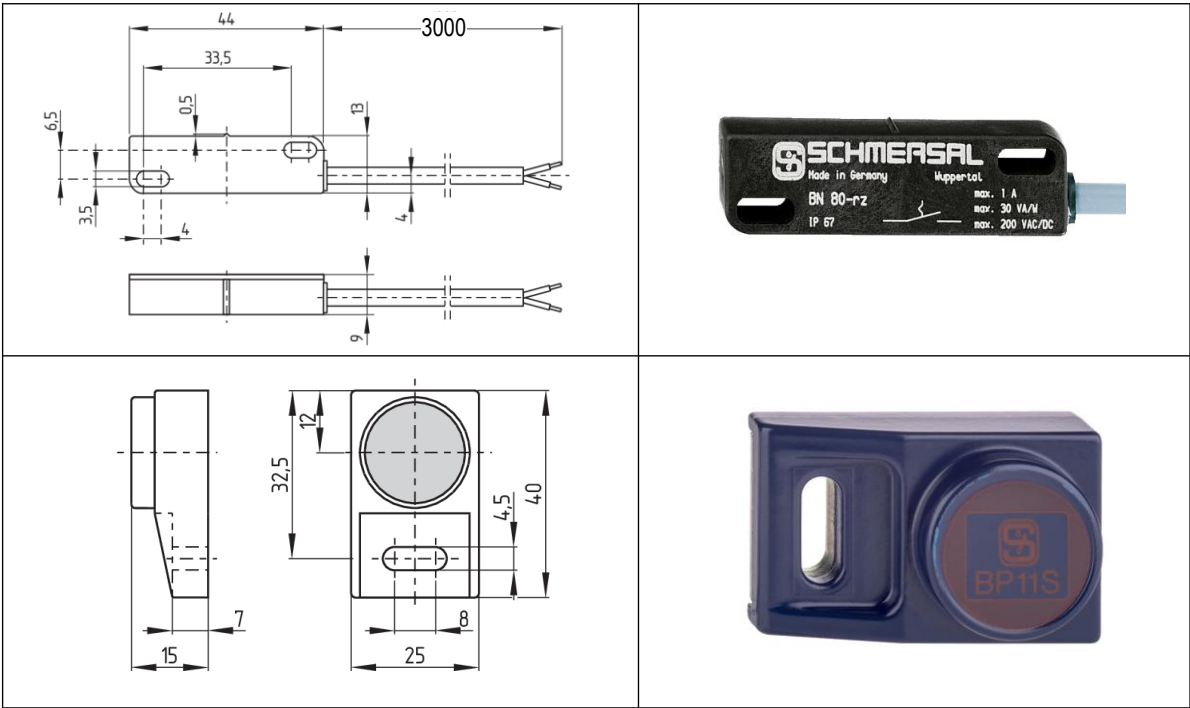


Figure 16: Dimensions door position sensor

The sensor and the actuator have to be positioned so that the actuation occurs when the elevator door opening ("W" in Figure 17 and Figure 18) is between:

- Elevator door opening  $\leq 400$  mm and
- Elevator door opening  $\geq 300$  mm

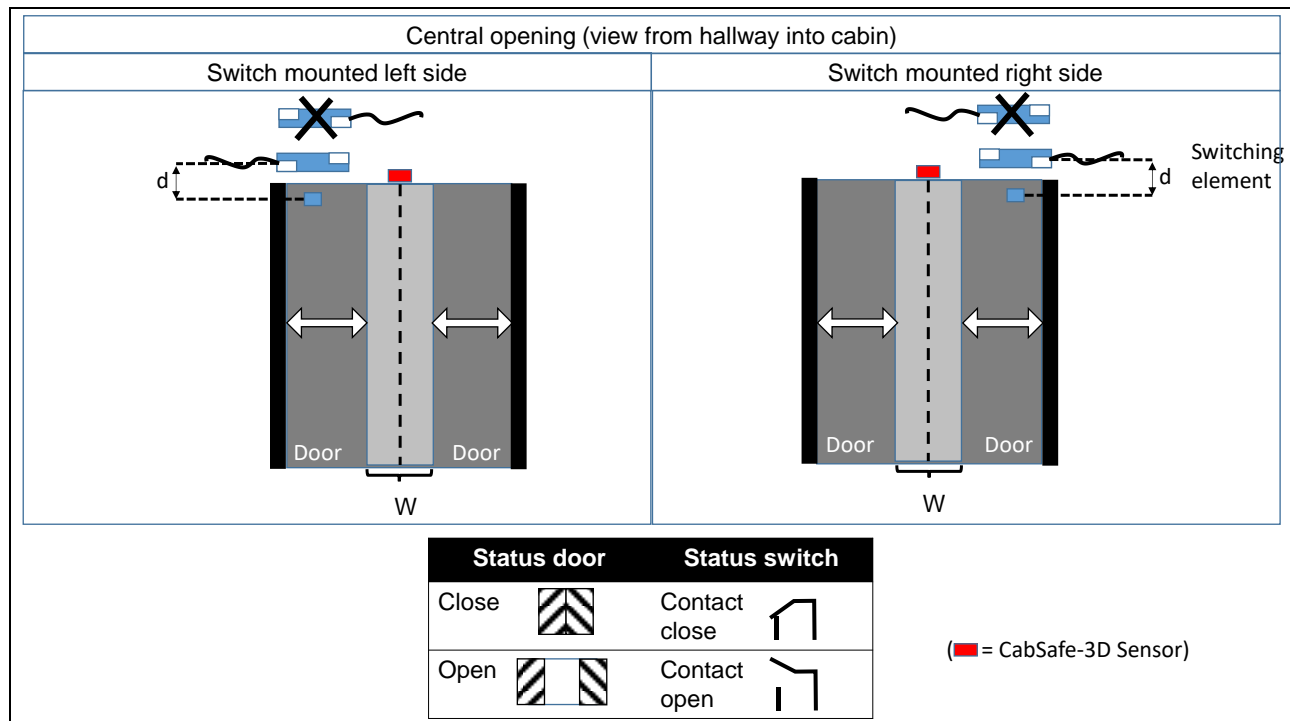


Figure 17: Magnet switch in case of central opening

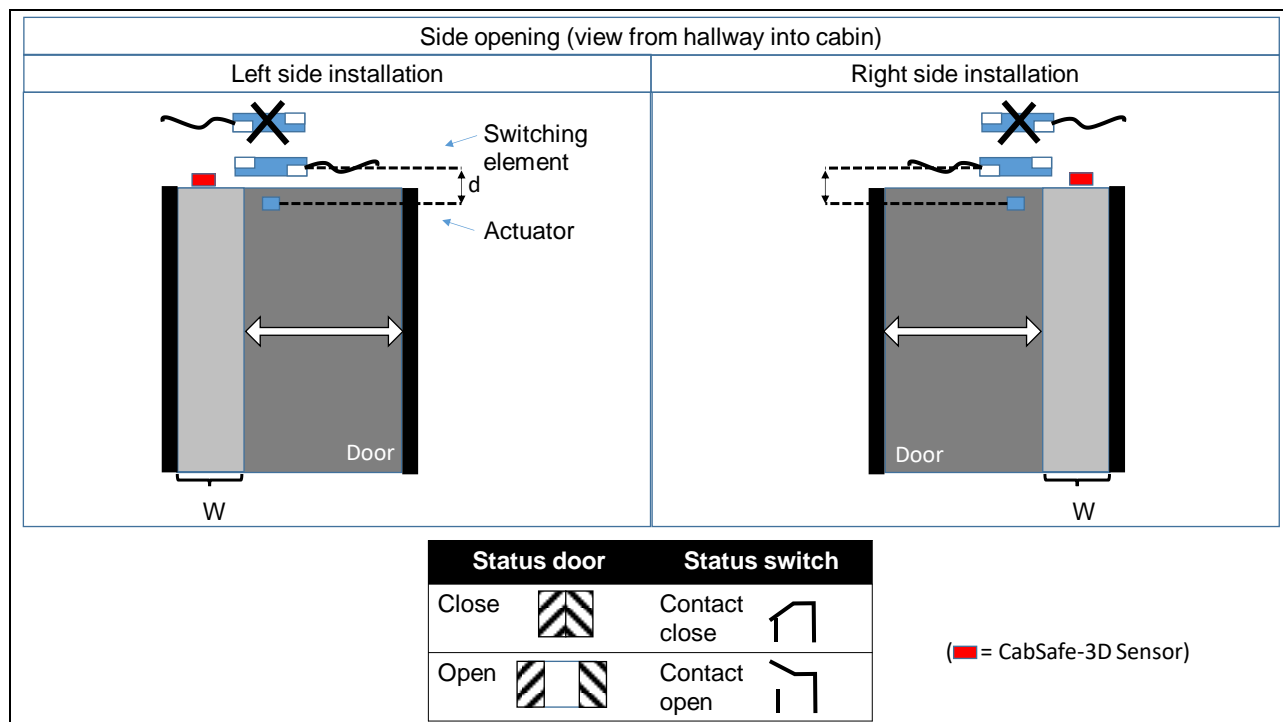


Figure 18: Magnet switch in case of side opening

The cable outlet of the sensor must always be positioned towards the door opening direction at the installed door as indicated in Figure 18. It is only one switch required per elevator (for central and for side opening).

| Description                    | Min.            | Max.   | Comments  |
|--------------------------------|-----------------|--------|---|
| Type                           |                 |        | Switch: BN 80-RZ  |
| Housing                        |                 |        | Thermoplastic enclosure   |
| Contact type                   |                 |        | Bistable, 1 reed contact  |
| Enclosure rating               | IP67            |        |   |
| Range actuating magnet BP 11 S | 10 mm           | 30 mm  |   |
| Cable length                   |                 | 3 m    | PVC   |
| Operating temperature range    | -25°C           | + 75°C |   |
| Bounce time                    |                 | 0.5 ms |   |
| Switching current              |                 | 0.5 A  | 2.3 mA provided by CabSafe Controller at U <sub>SP</sub> =24VDC |
| Mechanical life (operations)   | 10 <sup>9</sup> |        |   |
| Weight                         |                 | 26 g   |   |

Table 18: Specification magnet switch

| Description | Min. | Max. | Comments |
|-------------|------|------|----------|
| Type        |      |      | BP 11 S  |
| Housing     |      |      | Metal    |
| Weight      |      | 40 g |          |

Table 19: Specification actuator

## 5.22 Technical data CabSafe Controller

### 5.22.1 Mechanical

| Attribute                     | Value  |
|-------------------------------|--|
| Controller 100 Box            |  |
| Dimensions (l x h x w)        | 120 x 94.1 x 51 mm<br>(4.72 x 3.70 x 2.01 in.)<br>(See Figure 20)    |
| Material                      | PC/ABS blend   |
| Color                         | Blue   |
| Weight (incl. PCB)            | 140 Grams  |
| Controller 100 PCB on adapter |  |
| Dimensions                    | 71.4 x 68.3 x 47.5 mm<br>(2.81 x 2.69 x 1.87 in.)<br>(See Figure 19) |
| Material                      |  |
| Color                         | Black  |
| Weight (incl. PCB)            | 45 Grams   |
| Controller 200 Box            |  |
| Dimensions (l x h x w)        | 200 x 129 x 44.5<br>(7.87 x 5.08 x 1.75 in.)<br>(See Figure 21)      |
| Material                      | ABS  |
| Color                         | Blue   |
| Weight (incl. PCB)            | 434 g  |

Table 20: Mechanical data

### 5.22.2 Environmental

| Attribute  | Value                               |
|--|-------------------------------------|
| Enclosure rating PCB                               | IP00                                |
| Enclosure rating boxes<br>(Controller 100 and 200) | IP54                                |
| Operating temperature<br>Controller                | -20°C ... +60°C (-4°F<br>... 140°F) |

Table 21: Environmental data

### 5.22.3 Operation characteristics

| Attribute   | Value   |
|---|---|
| Supply voltage U <sub>SP</sub><br>CabSafe Controller 100<br>Push pull version<br>Relay version<br>CabSafe Controller 200<br>Low voltage (J7)<br>DC Input<br>High voltage (J8)<br>AC Input | 24 VDC +/- 20%<br>19.2 ... 37 VDC<br><br>19.2 ... 37 VDC<br><br>85 ... 264VAC |
| Max. ripple of DC supply<br>voltage   | ± 10% within supply<br>voltage range  |
| Supply voltage light curtain<br>(J1 and J2)   | 24 VDC  |
| Supply voltage 3D sensor<br>(J3)  | 24 VDC  |
| Max. power up time<br>CabSafe Controller 100<br>CabSafe Controller 200  | < 5 s<br>< 6 s  |
| Average power<br>consumption (including<br>CabSafe 2D light curtain<br>and CabSafe 3D sensor)<br>DC & Door closed<br>DC & Door open<br>AC & Door closed<br>AC & Door open                 | 6 W<br>12 W<br>10 W<br>20 W   |
| Inrush current (including<br>CabSafe 2D light curtain<br>and CabSafe 3D sensor)<br>At 24 VDC<br>At 115 VAC<br>At 230 VAC  | 11 A<br>20 A<br>40 A  |

|   |   |
|---|---|
| Current (including CabSafe 2D light curtain and CabSafe 3D sensor)<br>At 24 VDC<br>At 115 VAC<br>At 230 VAC | 500 mA RMS<br>350 mA<br>200 mA                                  |
| Output type<br>Controller 100<br>Controller 200   | Push-Pull or Relay<br>Relay                                     |
| Max Push-Pull current / capacitance   | 120 mA /<br>100 nF  |
| Max. relay current<br>Controller 100<br>Controller 200  | 1 A / 30VDC<br>250 VAC / 5 A<br>125 VDC / 0.5 A<br>30 VDC / 5 A |
| Min. switching current (relay)  | 0.01 A / 5 VDC  |
| Max. number of mechanical relay operations  | > 20 x10 <sup>6</sup>   |
| Max. relay switching voltage:<br>Controller 100:<br>Controller 200:   | 37 VDC<br>300 VDC   |
| Typical system response time<br><br>CabSafe 3D<br>CabSafe 2D  | < 250 ms<br>< 20 ms + response time CabSafe 2D light curtain    |

Table 22: Operation characteristics

#### 5.22.4 Connectors

| Attribute   | Value      | Plug type                | Remark                                       |
|---|------------|--------------------------|--|
| 3D sensor   | 6-pin (J3) | WAGO 734-106 (*)         | Plugs already connected at connection cables |
| CabSafe-2D Tx                                     | 3-pin (J1) | WAGO 734-103 (*)         |  |
| CabSafe-2D Rx                                     | 4-pin (J2) | WAGO 734-104 (*)         |  |
| Door position                                     | 2-pin (J5) | WAGO 734-102 (*)         |  |
| <b>CabSafe Controller 100 [Push Pull version]</b> |            |                          |  |
| Power/ Output                                     | 3-pin (J6) | WAGO 231-103 (*)         |  |
| <b>CabSafe Controller 100 [Relay version]</b>     |            |                          |  |
| Power   | 2-pin (J6) | WAGO 231-102 (*)         |  |
| Output  | 3-pin (J4) | WAGO 231-103 (*)         |  |
| <b>CabSafe Controller 200 [Relay version]</b>     |            |                          |  |
| Power 24VDC                                       | 2-pin (J7) | SAURO CBF020LT-0N (*)    |  |
| High power/ Relay output                          | 6-pin (J8) | WAGO 231-306/026-000 (*) |  |

Table 23 CabSafe Controller Connectors [\* -&gt; or equivalent]

#### 5.22.5 General


| Attribute  | Value   |
|--|---|
| EMC emission   | EN 12015:2014   |
| EMC immunity   | EN 12016:2013<br>ISO 22200:2009   |
| Vibration  | IEC 60068-2-6:2007  |
| Shock  | IEC 60068-2-27:2008   |
| RoHS, REACH  | 2011/65/EU, 1907/2006 EU<br> |
| Certificates<br>cCSAus<br><br>Liftinstituut<br><br>CE<br>FCC | CSA B44.1:19 / ASME A17.5-2019<br>ASME A17.1-2019 / CSA B44:19<br>2014/30/EU, 2014/33/EU<br>Class B (*)         |

Table 24 CabSafe Controller Certification

(\* NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.)

## 5.23 Dimensions CabSafe Controller

### 5.23.1 Dimensions Controller 100 PCB carrier

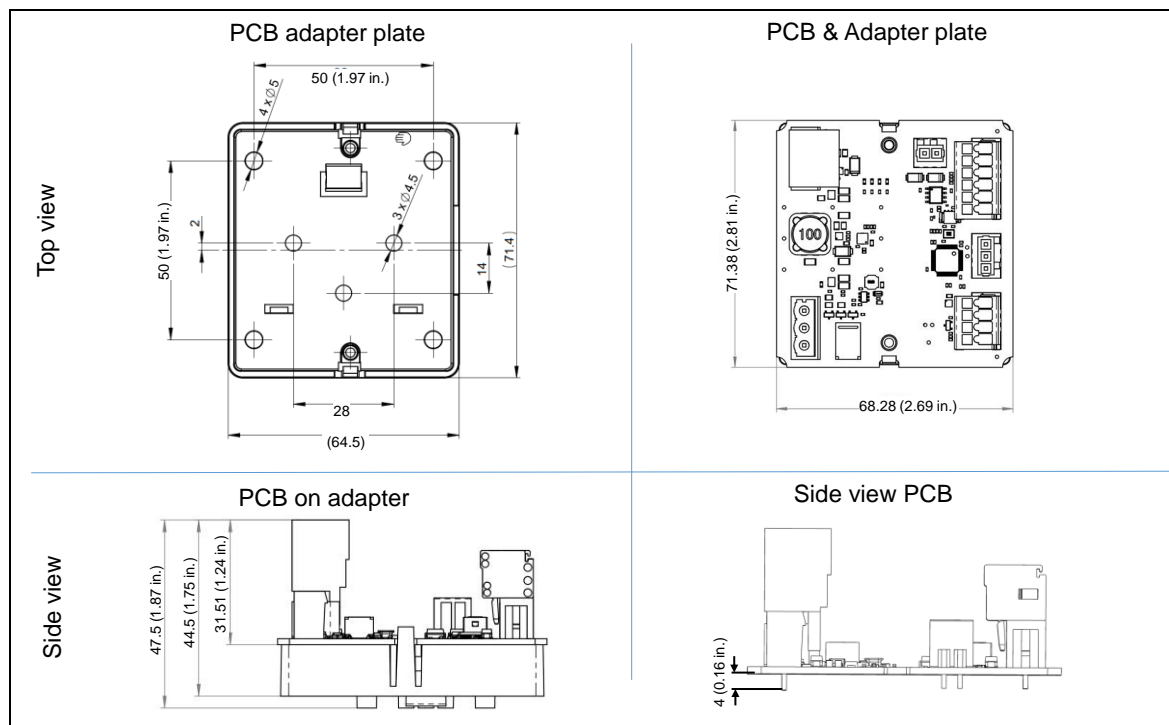


Figure 19: Dimensions CabSafe Controller 100 PCB carrier solutions

### 5.23.2 Dimensions Controller 100 Box

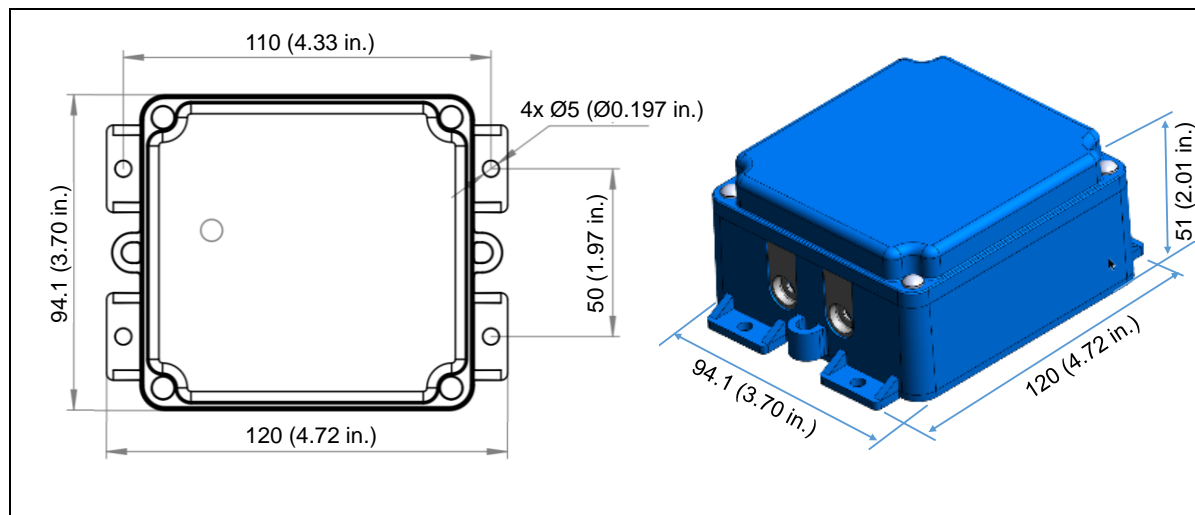


Figure 20: Dimensions CabSafe Controller 100 Box solution



### 5.23.3 Dimensions Controller 200 Box

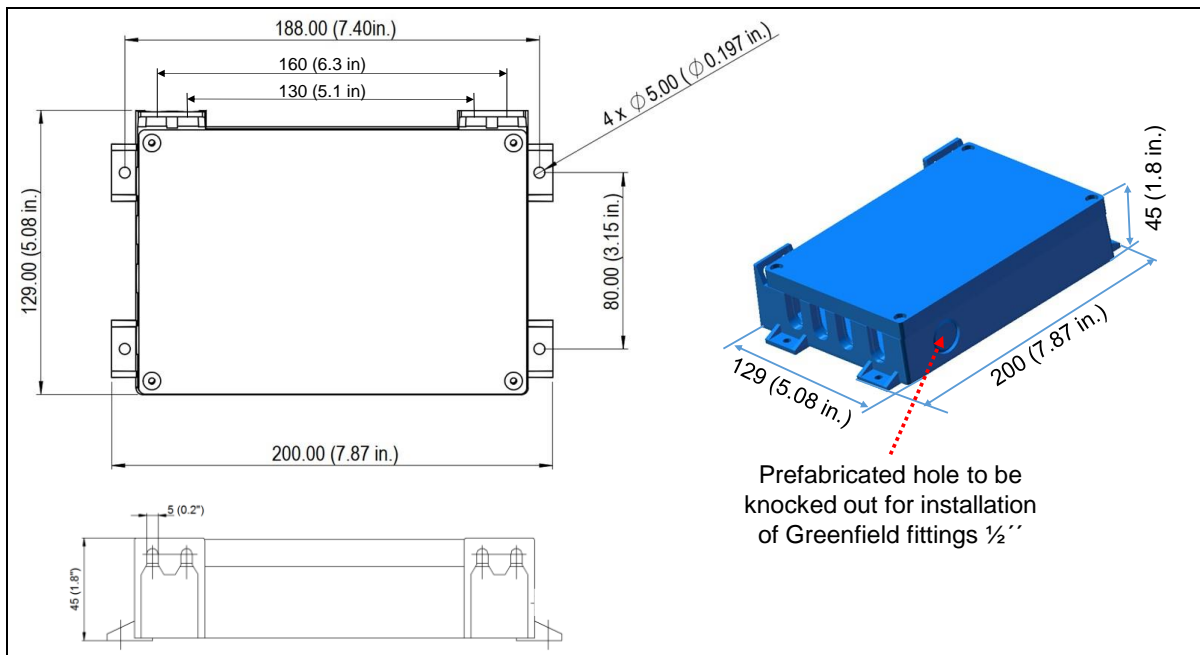


Figure 21: Dimensions CabSafe Controller 200 Box solution

## 6 CabSafe 3D sensors

### 6.1 Overview CabSafe 3D sensor

The CabSafe 3D sensor is used to detect the presence of persons or objects approaching the elevator cab entrance. To fulfill the requirements of ASME A17.1-2019 / CSA B44:19, the CabSafe 3D must be used in conjunction with a CabSafe Controller and a CabSafe 2D light curtain.

As an extension to existing door-protection devices, the purpose of the CabSafe 3D sensor is to monitor the entrance area of the elevator door for people or objects approaching the elevator cab. By using "Time of Flight" (TOF) technology, the CabSafe 3D sensor can detect the difference between a person (or object) approaching the elevator cab and a stationary person or object in the elevator cab entrance area. The sensor's compact housing is optimized for difficult mounting locations, including narrow elevator cab transoms.

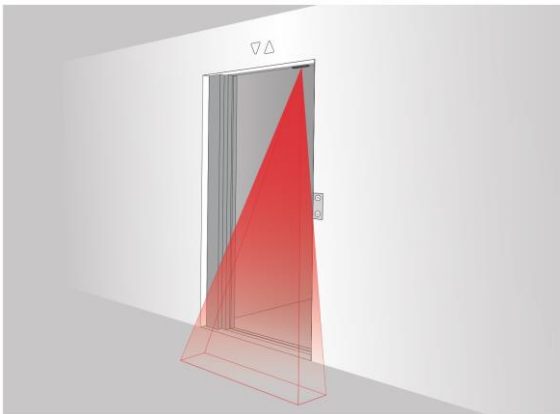


Figure 22: Principal installation of a CabSafe 3D sensor (example for side opening)

### 6.2 Features of the CabSafe 3D sensor:

- Fulfills requirements of ASME A17.1-2019 / CSA B44:19
- Suitable for both center- and side-opening applications
- Easy installation
- Reliable object detection using Time-of-Flight (TOF) technology
- Integrated LED indication
- Reduces accidents caused by being hit by the elevator door(s)
- Reduces damage to the elevator doors
- Easy configuration of the monitored area
- Automatic door recognition

### 6.3 Type description CabSafe 3D sensor kit

CabSafe 3D – a – bb – ccc

|            |                                    |
|------------|------------------------------------|
| <b>a</b>   | Version                            |
|            | - Series one                       |
|            | 2 Series two (future)              |
| <b>bb</b>  | Mounting brackets                  |
|            | FB Flush mounting black finish     |
|            | FS Flush mounting stainless finish |
| <b>ccc</b> | Sensor type                        |
|            | - Generic                          |
|            | TDL Tall Door Left                 |
|            | TDR Tall Door Right                |

#### Example:

CabSafe 3D-FB

### 6.4 Safety information

The CabSafe 3D sensor must be used in conjunction with a CabSafe Controller and a CabSafe 2D light curtain. It is the responsibility of the installer to ensure that, on completion, the installation complies with all the relevant codes and regulations that pertain to elevator door protection devices.

#### 6.4.1 Non-intended use

The CabSafe 3D sensor must not be used for:

- Elevator with pure glass doors (see 6.5.1.2)
- Protection of dangerous machines
- Equipment in explosive atmospheres
- Equipment in radioactive environments



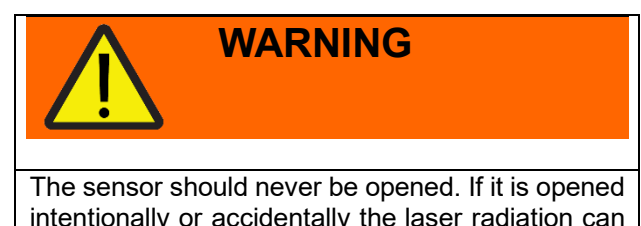
Use only specific and approved safety devices for such applications, otherwise serious injury or death or damage to property may occur.

#### 6.4.2 Hazards of laser radiation



CabSafe 3D sensor is in conformance with IEC 60825-1, 2014 Ed.3 and 21 CFR 1040.10\*

\*According to the document Laser Notice. 56 issued by FDA on May 8, 2019



reach to a hazardous Class 4 level and exposure to eyes and skin from direct, reflected and scattered radiation must always be avoided.

Do not operate the device with a defective or missing cover glass or lens. In case of such an event switch off the power supply immediately.

Use of additional optics in any form in front of the sensor or modifying the sensor or its optical components in anyway is absolutely prohibited. Noncompliance will lead to unforeseeable outcome.

## 6.5 Installation CabSafe 3D sensor

Following precautions must be followed when the CabSafe 3D sensor is integrated into a CabSafe system.

- The CabSafe 3D sensor must be applicable for the size of the elevator door entrance (see chapter 6.5.1.1).
- The CabSafe 3D sensor must be connected to the CabSafe Controller (see Figure 5).
- The switch settings in the CabSafe Controller must be set according to the
  - o mounting position of the sensor (chapter 6.5.1 and 5.9) and
  - o elevator entrance height (chapter 6.5.1 and 5.9)
  - o opposite elevator installations (chapter 6.7 and 5.9.6)
- Use only the dedicated mounting brackets of the CabSafe 3D sensor (see 6.5.4)
- Prepare and install sensor at the recommended mounting positions (see 6.5.3)
- For elevators with glass doors consider specific door design instructions and different mounting instructions for the CabSafe 3D sensor (see 6.5.1).

The installation should be done in the following order:

- Switch off power and mark clearly that this elevator is out of service (LOTO Lock Out Tag Out).
- Mechanical installation of the CabSafe 3D sensor (chapter 6.5.1)
- Make sure the DIP Switches of the CabSafe Controller are set according to the installation (see chapter 5.9).
- Electrical installation and integration of CabSafe 3D sensor to the CabSafe Controller
- Power-up and test for proper function.

## 6.5.1 Field of application

### 6.5.1.1 Elevator door widths and heights

Six CabSafe 3D sensors are available:

| Type (see chapter 6.3) | Color of bracket | Remark                                 |
|------------------------|------------------|--|
| CabSafe 3D-FB          | Black            | Standard                               |
| CabSafe 3D-FS          | Stainless        |  |
| CabSafe 3D-FB-TDL      | Black            | Tall Door, sensor on Left (Figure 25)  |
| CabSafe 3D-FS-TDL      | Stainless        |  |
| CabSafe 3D-FB-TDR      | Black            | Tall Door, sensor on Right (Figure 26) |
| CabSafe 3D-FS-TDR      | Stainless        |  |

Table 25: CabSafe 3D sensors

For most elevator applications the standard CabSafe 3D sensor can be used. Installation of the standard CabSafe 3D sensor, as well as the CabSafe 3D-TDL and the CabSafe 3D-TDR sensor, using the instructions that follow are suitable for (see Table 26):

|                    |  | Mounting position  |   |  |
|--------------------|--|--|---|--|
|                    |  | Left   | Center  | Right  |
| <b>Sensor type</b> | CabSafe 3D-FB<br>CabSafe 3D-FS         | elevator door heights from<br>2.03 m to 2.43 m (6.67 ft to 8 ft)<br><br>and door opening widths up to<br>1.37 m (4.5 ft) * | elevator door heights from<br>2.03 m to 3.05 m (6.67 ft to 10 ft)<br><br>and door opening widths up to<br>1.37 m (4.5 ft) * | elevator door heights from<br>2.03 m to 2.43 m (6.67 ft to 8 ft)<br><br>and door opening widths up to<br>1.37 m (4.5 ft) * |
|                    | CabSafe 3D-FB-TDL<br>CabSafe 3D-FS-TDL | elevator door heights from<br>2.43 m to 3.05 m (8 ft to 10 ft)<br><br>and door opening widths up to<br>1.37 m (4.5 ft) *   | NOT applicable  | NOT applicable   |
|                    | CabSafe 3D-FB-TDR<br>CabSafe 3D-FS-TDR | NOT applicable   | NOT applicable  | elevator door heights from<br>2.43 m to 3.05 m (8 ft to 10 ft)<br><br>and door opening widths up to<br>1.37 m (4.5 ft) *   |

Table 26: Applicable door dimensions (\*: DIP 12 = 0; see chapter 5.9.7).

**IMPORTANT****for a correct installation**

- The CabSafe TDL (Tall Door Left) must be installed on the left side of the elevator door entrance when looking from the hallway to the cabin (Figure 25).
- The CabSafe TDR (Tall Door Right) must be installed on the right side of the elevator door entrance when looking from the hallway to the cabin (Figure 26).

The installation distance from the post for a CabSafe 3D-TDL or a CabSafe 3D-TDR sensor is equal to the distance of the standard sensor.

**WARNING**

The maximum door opening width reduces to 1'100 mm (43.31 in.) if DIP 12 is set to on (see chapter 5.9.7).

**6.5.1.2 Glass door elevators**

For elevators with glass doors the following requirements must be considered in addition to chapter 6.5.1.1:

- The leading edge of all doors must be metal (preferred brushed stainless steel) and shall have side lengths of equal or more than 40 mm (1.57 in.).

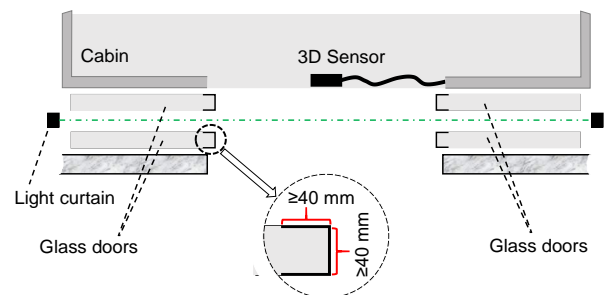


Figure 23: Metal side lengths for glass doors

- The mounting distance "S" is reduced according to chapter 6.5.3.3.
- The signal change for the door position must be generated for a door opening between 300 mm (11.81 in.) and 400 mm (15.75 in.), see chapter 5.8.
- Static mounting of the CabSafe 2D light curtain, assuming that the light curtain is not installed at the leading door edge because of the visible cable guiding, see chapter 5.9.2.

## 6.5.2 Mechanical installation



Electrical shock and unexpected movement of the protected application can cause serious injury or death.

- ▶ Follow all applicable safety measures.
- ▶ Use only specific and approved tools.
- ▶ If the CabSafe 3D sensor has to be adjusted, the main power supply must be switched off and marked as out of service (LOTO Lock Out Tag Out).

### NOTICE

Mechanical damage to the CabSafe 3D sensor

- ▶ Do not drill additional holes into the sensor.
- ▶ Do not overtighten the mounting screws.
- ▶ Mount the brackets on a flat surface

## 6.5.3 Mounting position

### IMPORTANT for a correct installation

- A. Cable must exit right when looking into the elevator cabin (Figure 24, Figure 25, Figure 26)
- B. The field of view of the sensor must be oriented towards the outside of the elevator cabin.
- C. Elevators with glass doors or extraordinary reflective surfaces require
  - a reduced installation distance to the door (see chapter 6.5.3.3) and
  - a metal frame at the leading edge of the doors (see 6.5.1.2).

The mounting position of the CabSafe 3D sensor is dependent on the type of door opening.

### 6.5.3.1 Center opening door

The center of the sensor mounting bracket must be located in the center of the door entrance.

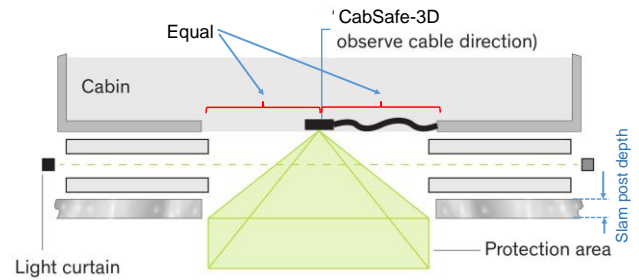


Figure 24: Mounting location and orientation - center opening door

### 6.5.3.2 Side opening door (left or right):

The sensor located near the slam post (strike jamb) and a minimum distance from the slam post (strike jamb) must be maintained; see Figure 25 and Figure 26 for details.

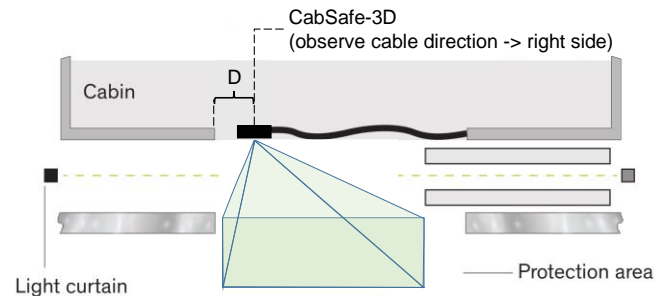


Figure 25: Mounting location and orientation –sensor mounted on left side

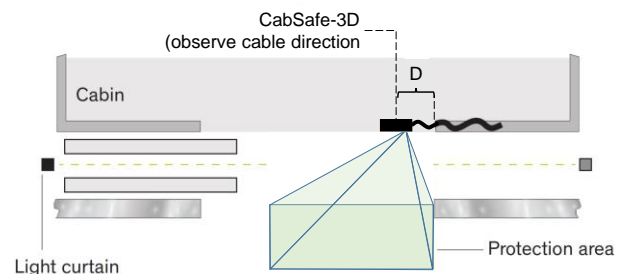


Figure 26: Mounting location and orientation – sensor mounted on right side

For left- and right-side door opening, the center of the mounting bracket should be positioned at a distance  $D = 240 \pm 10 \text{ mm}$  ( $9.45 \pm 0.4 \text{ in}$ ) from the slam post (strike jamb).

### 6.5.3.3 Mounting distance to the door

In flush mounting applications the center of the CabSafe 3D sensor should be positioned at a distance between 25 mm and 70 mm (0.98 in. and 2.76 in.) from the cabin door

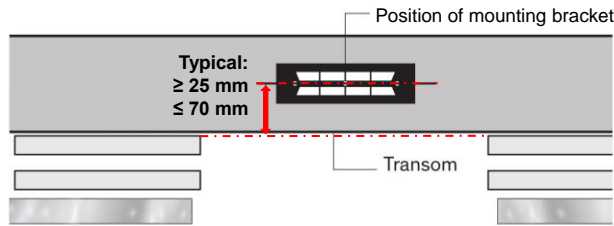


Figure 27: Typical installation distance CabSafe 3D sensor to the front of the cabin door (top view)

**IMPORTANT**  
for glass elevators

For glass elevators the installation distance S has to be in the range of 25 mm to 70 mm (0.98 in. to 2.76 in.).

For backside transom applications (see also 6.5.4.4: for center, left or right door opening the maximum distance “S” of the center of the CabSafe 3D sensor to the front of the hoist way door (see Figure 28) shall be equal or less than 314 mm (12.36 in.) [Figure 28 to Figure 30].

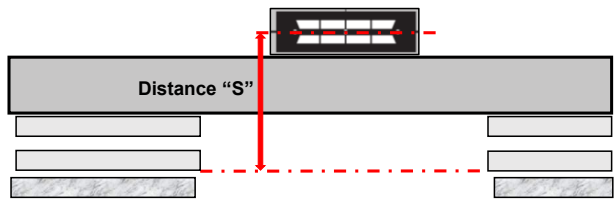


Figure 28: Installation distance CabSafe 3D sensor to the front of the hoistway door (top view)

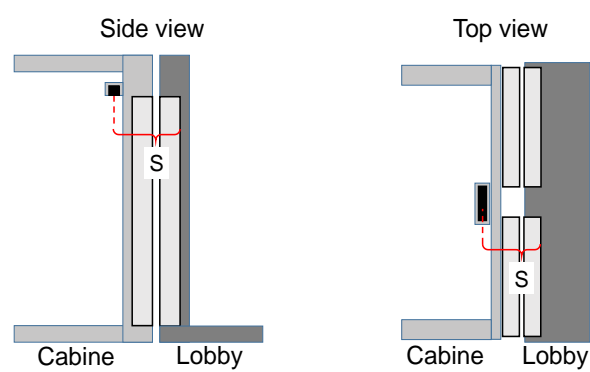


Figure 29: Installation distance CabSafe 3D sensor to the front of a single speed hoist way door

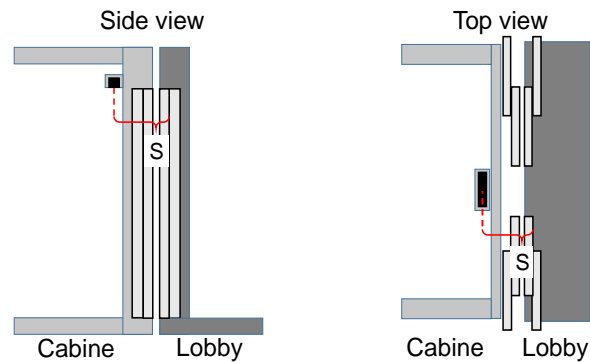


Figure 30: Installation distance CabSafe 3D sensor to the front of a two-speed hoist way door (telescope)

6.5.4 Mounting brackets

The following mounting brackets are available for the installation of a CabSafe 3D sensor in the transom

| Type                  | Remark   |
|-----------------------|--|
| Flush mounting        | Optional mounting plate for thin transoms (< 2 mm [0.079 in.]) available |
| Back transom mounting | Mainly for modernization   |

Table 27: Mounting hardware



#### 6.5.4.1 Dimensions flush mounting bracket

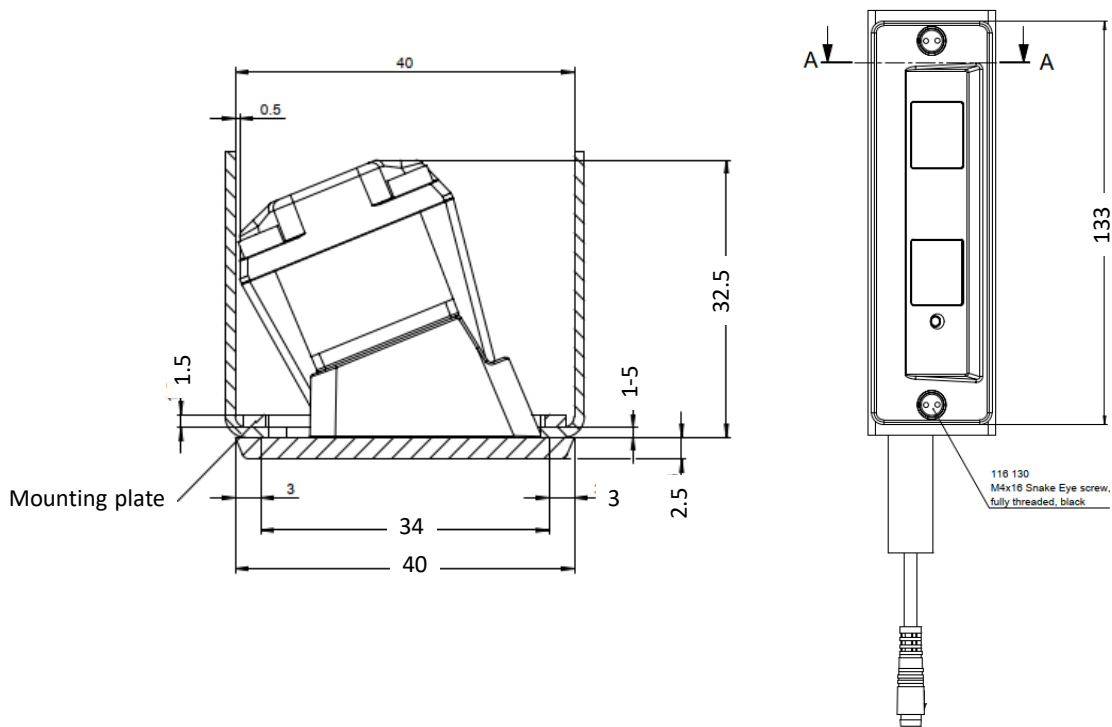


Figure 31: CabSafe 3D installed with flush mounting bracket and mounting plate

The dimensions of the flush mounting bracket looking outside of the transom are: 133 x 40 x 2.5 mm (5.2 x 1.24 x 0.51 in.). Two holes with a diameter of Ø 4.5 mm (0.177 in.) are used to mount the bracket (see Figure 44).

#### 6.5.4.2 Cut out for flush mounting

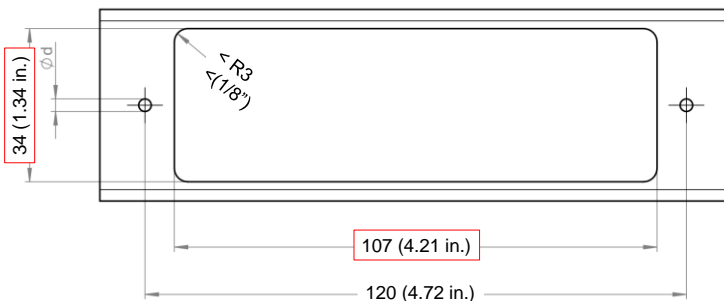


Figure 32: Cut out to install flush mount

The minimum cut out for the installation of the CabSafe 3D sensor is 107 x 34 mm (4.21 x 1.34 in.). The corner radius should be smaller than < 3 mm (0.118 in.).

For the two screws holes a diameter ("d") of 4.5 mm (0.177 in.; 3/17") shall be used if the sensor is

mounted with the mounting plate (see chapter 6.5.4.3).

#### 6.5.4.3 Mounting plate kit

A mounting plate is available which is recommended for very thin transoms (transom thickness less than 2 mm (0.0787 in.)).

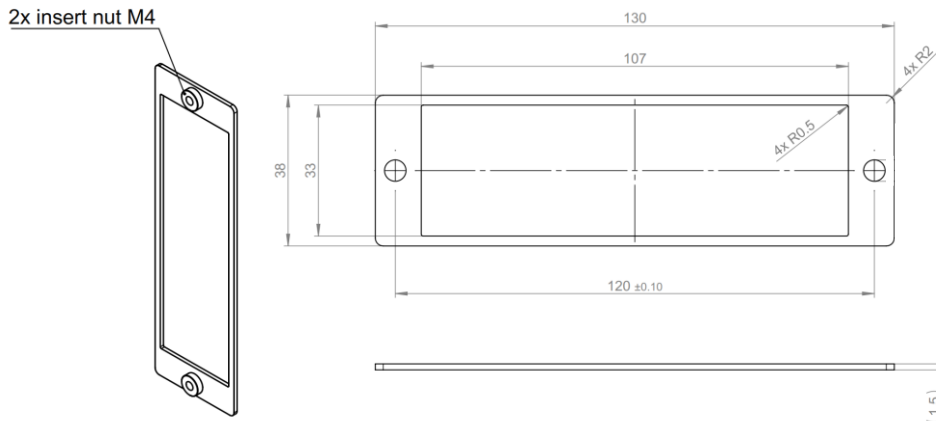


Figure 33: Mounting plate

The common sensor shipping kit includes the mounting plate, two snake eye screws (M4x16 mm, black, No. 8) and the corresponding bit (Hex Shank Size 1/4").

#### 6.5.4.4 Back transom mounting

The Back of Transom mounting bracket is an accessory which can be used as an alternative to flush mounting the sensor in the elevator cab transom.

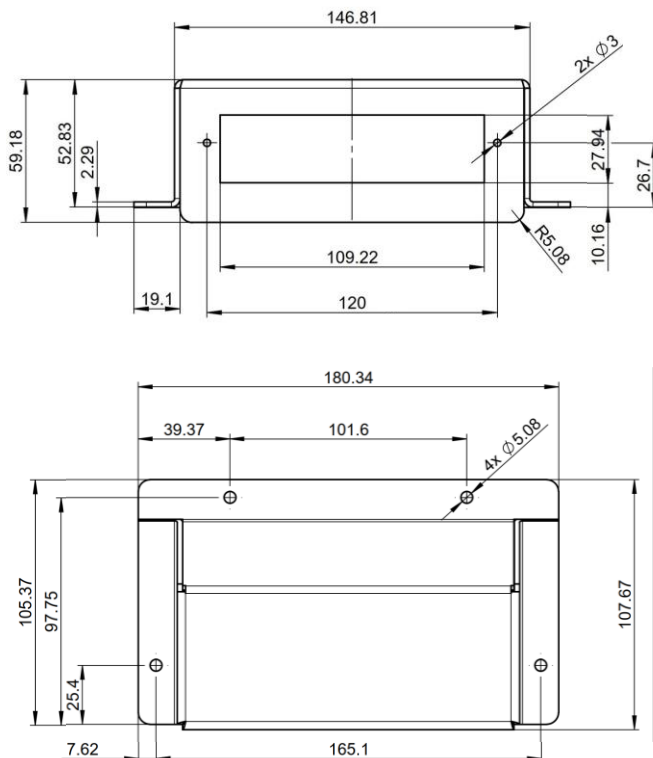


Figure 34: Dimensions Back of Transom mounting

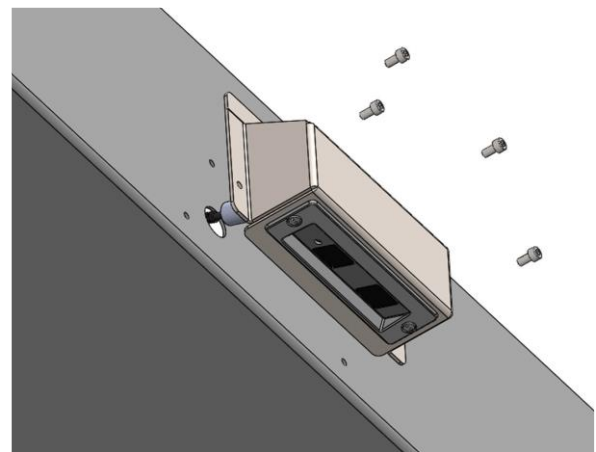


Figure 35: Back of Transom bracket

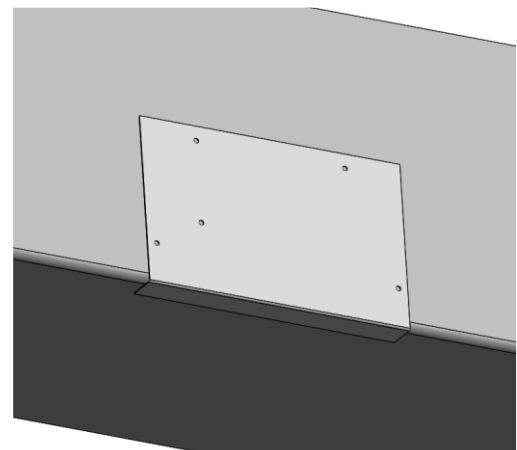


Figure 36: Mounting template

The bracket is constructed of stainless steel and should be installed on the transom in accordance with the requirements provided in chapter 6.5.1 to 6.5.3.

The back of transom sensor kit includes the following components:

- Back of Transom Bracket
- Mounting Template

- Four (4) Stainless Steel Tamper-Resistant Button Head Torx Screws  
M5 x 0.80mm Thread, T25 Driver, 10mm Length
- Bushing for 7/8-inch hole

In addition, the following drill bits, tap and hole saw are needed (not included):

- 1/8-inch drill bit (for pilot holes)
- M4.2 drill bit
- M5 - 0.8 tap
- 7/8-inch hole saw (for bushing hole)

The mounting template provides the hole locations for the Back of Transom bracket (Figure 37).

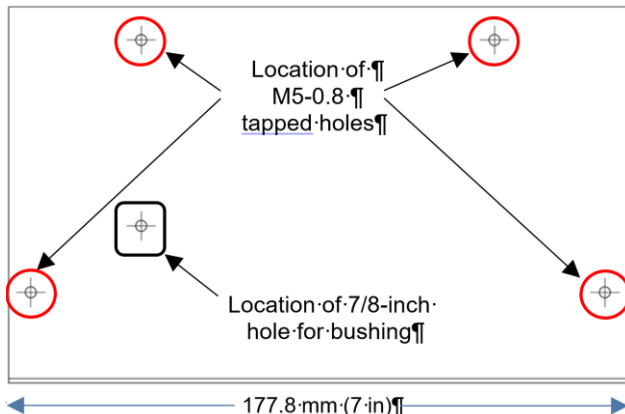


Figure 37: Mounting template

The mounting template shall be located in the following manner on the back of the transom:

- For center opening applications, the template should be centered in the center of the opening; or
- For side opening applications, the template should be located  $\sim 151.1 \text{ mm} \pm 10 \text{ mm}$  ( $\sim 5.95 \pm 0.4 \text{ in}$ ) from the slam post.
- For maximum distance "S" see chapter 6.5.3.3

The bottom of the template should wrap around the bottom of the transom.

Then,

- 1) the 1/8-inch drill bit shall be used to drill pilot holes at each of the locations on the template.
- 2) the four perimeter holes (shown in the diagram above) shall be drilled using an M4.2 bit.
- 3) the four perimeter holes shall be tapped using the M5-0.8 tap.
- 4) Drill the hole located more to the center left using the 7/8-inch hole saw.

The sensor shall be assembled into the back of transom bracket. Therefore the sensor is inserted into the bottom of the bracket and then secured using the tamper-proof spanner screws that were included with the sensor.

When complete, the sensor should be mounted as shown in Figure 38. Note: the cable should exit to the right of the sensor as shown.



Figure 38: CabSafe 3D Sensor installed in back of transom bracket

The bushing shall be inserted into the 7/8-inch hole of the transom and then the cable be routed from the CabSafe Controller through the hole and connect the CabSafe 3D sensor.

The mounting bracket is secured to the transom using the M5 screws included with the back of transom bracket into the four tapped mounting holes. The lip at the bottom of the bracket should be positioned under the transom such that the bracket mounts flush to the side wall of the transom.

## 6.6 Electrical connection CabSafe 3D

Cable connection

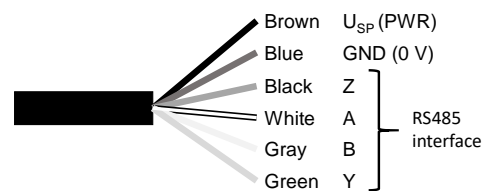


Figure 39: Electrical connection CabSafe 3D sensor

**Important:** The CabSafe 3D sensor must be connected to the corresponding input at a CabSafe Controller (see Figure 5 and Figure 6).

For cable guiding see also chapter 5.3.

## 6.7 Field of view

The position of the field of view relative to the sensor depends on if the sensor is set for center, left or right opening (see chapter 5.9.1). The 3D detection field fulfills the approaching object requirements specified in ASME A17.1-2019 / CSA B44:19 as shown in Figure 40 below.

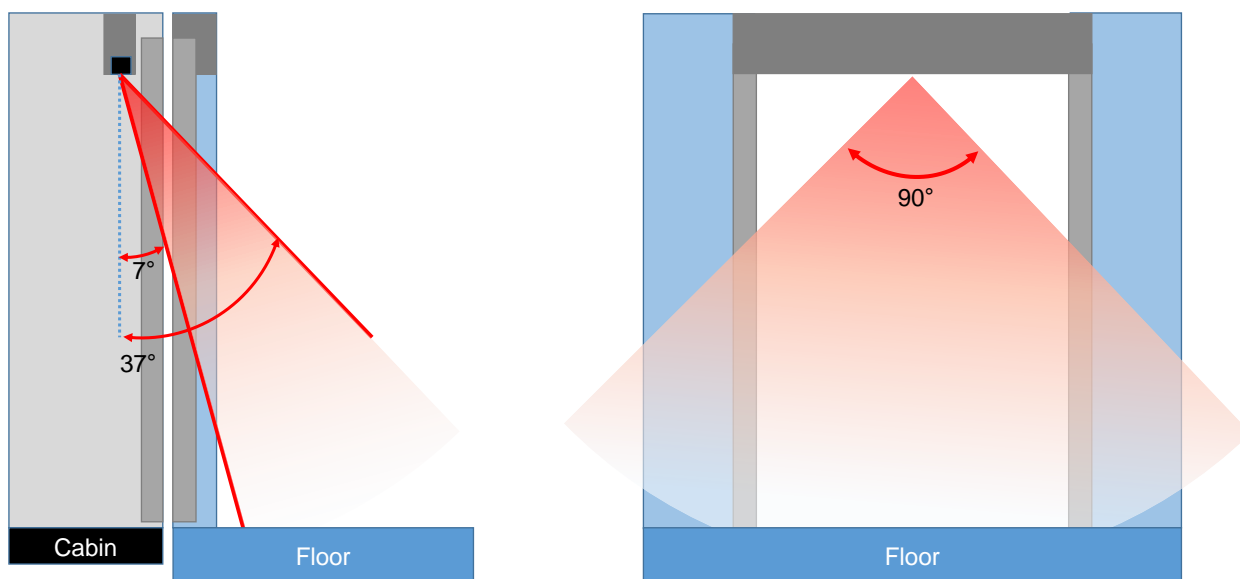


Figure 40: Field of view (approximate data)

For elevator banks that have elevators that face each other, interference between approaching object sensors can occur. To prevent such interference, the operation frequency of the CabSafe 3D sensor should be configured using DIP11 on the CabSafe Controller (see chapter 5.9.6)

For example, Figure 41 shows a bank of elevators where there are three elevators on one side of a hallway and three elevators on the opposite side of the hallway. For these applications, DIP11 is set to “0” on the one side (i.e. top elevators shown in the diagram) and to “1” on the other side (i.e. bottom elevators shown in the diagram). illustrates schematically a hall way with several elevators installed side by side as well as opposite:

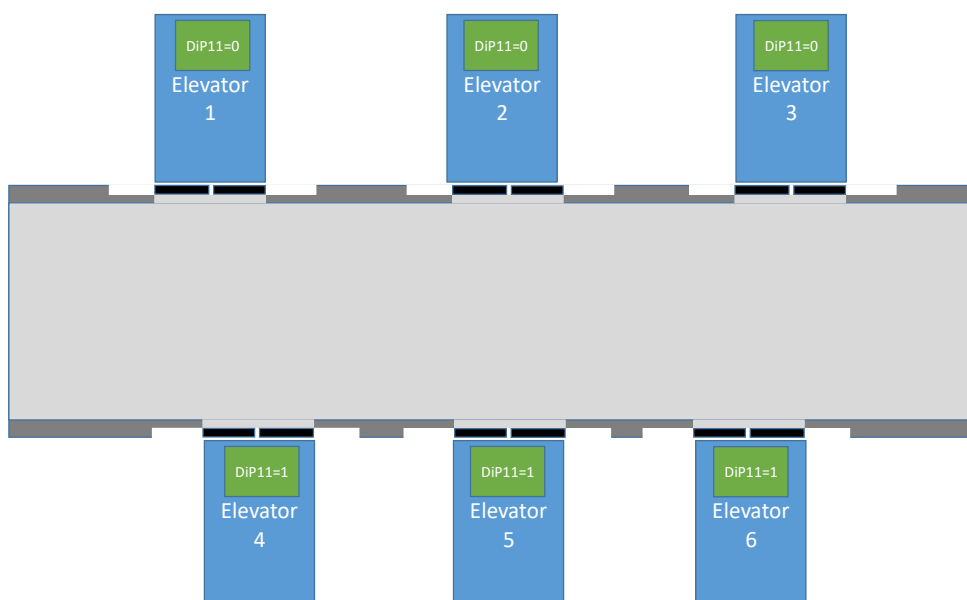


Figure 41: Schematic hall way with multiple elevators positioned face to face.

6.8 Timing diagram

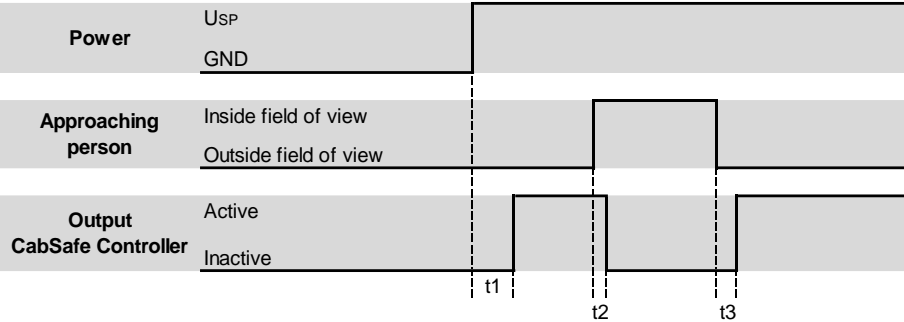


Figure 42: Timing diagram

|                              | time | Value [ms] |
|------------------------------|------|------------|
| Power Up time CabSafe System | t1   | < 5 s      |
| Typical response time        | t2   | <250 ms    |
| Release time                 | t3   | Min. 1.5 s |

Table 28: Descriptions for the timings in Figure 42

The CabSafe 3D sensor detects moving persons and objects. The recalibration time of CabSafe 3D sensor is set to 1.5 s. This means a moving object that becomes static for more than 1.5 s is then ignored by the CabSafe 3D sensor.

Information:

Door open times > 3 minutes and

- no detection of the 3D-Sensor and no detection of the CabSafe 2D light curtain or
- a permanent interruption of the CabSafe 2D light curtain

cause a reduced frame rate of the CabSafe 3D sensor, upon any detection within the 3D and/or 2D field, the 3D sensor will return to normal operation.

## 6.9 Start-up CabSafe 3D

After installation (chapter 6.5):

1. Switch on mains and power-up the elevator control unit.
2. Check the LED on the front of the CabSafe 3D sensor (see Table 29).
3. Test and document if the system is working correctly by interrupting the CabSafe 3D walking toward the elevator cab entrance and ensuring that you are detected by the CabSafe 3D sensor.

## 6.10 LED status description

The LED of the CabSafe 3D sensor is a 3 color LED (Red / Green / Blue).

| LED color  | LED state                 | Description                         |
|------------|---------------------------|-------------------------------------|
| OFF        | ○                         | No power                            |
| Green      | ●                         | Object detected                     |
| Blue       | ●                         | No object                           |
| Blue pulse | ☼ 300 ms on, 900 ms pause | Sleep (3D inoperative)              |
| Red        | ☼                         | Error, see table "Error Pulse Code" |

Table 29: LED indicators CabSafe 3D

● = LED on; ○ = LED off; ☼ = LED blinking

| Error No | Pulse Code       | Description  |
|----------|------------------|--|
| 1        | 1 flash, 1 pause | Internal sensor error or manipulation                                |
| 3        | 3 flash, 1 pause | Configuration error (wrong DIP-switch setting on CabSafe Controller) |
| 4        | 4 flash, 1 pause | Internal sensor error, replace sensor                                |

Table 30: Error code description

Pulse code:

flash = 300 ms On / 300 ms Off  
pause = 1800 ms

The error no. 6 is only indicated at the controller and not on the CabSafe-3D sensor (see Table 14).

## 6.11 Troubleshooting

| LED                  | Action   |
|----------------------|--|
| OFF                  | ► Check electrical connections.<br>Check supply voltage of the door controller.  |
| Blue ON              | Normal operation, no object detected   |
| Green ON             | Normal operation, object detected  |
| Blue ON/OFF-blinking | ► Normal operation, <ul style="list-style-type: none"> <li>• the CabSafe 3D sensor is «rendered inoperative» (chapter 4.2)</li> <li>• 3D-timeout (after 5 seconds; chapters 4.2, 5.3 and 5.11)</li> </ul> For dynamic installations and the CabSafe 3D sensor is rendered inoperative by the light curtain: check alignment of CabSafe 2D light curtain in case the blinking continuous at open door immediately after interrupting the light curtain. |
| Red blinking         | ► Make sure that the optic of the CabSafe 3D sensor is oriented towards the outside of the cabin.<br>► Make sure the field of view is clear of interruption.<br>► Clean the optical windows with a soft cloth.<br>► Make sure that the cable is located away from sources of electromagnetic interference.<br>► Measure the supply voltage to the CabSafe Controller.<br>► Restart the system.   |

Table 31: Troubleshooting

If a problem persists, please contact your local CEDES representative. Visit [www.cedes.com](http://www.cedes.com) for contact data.

## 6.12 Maintenance

Although the CabSafe 3D sensor does not need regular maintenance, a periodic functional check is strongly recommended:

- Make sure the front lenses are clear of dirt and dust. If necessary, clean the front lenses with a soft cloth.
- Ensure that the sensor is securely mounted.
- Check the mounting position, cable routing and connection of the sensor.
- Check the detection behavior of the CabSafe 3D sensor



**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.

**WARNING**

The sensor should never be opened. If it is opened accidentally, the laser radiation can reach Class 4 level and exposure of eyes or skin to direct or scattered radiation must always be avoided.

In the case of a defective or missing cover glasses or lenses, switch the power supply off immediately.

**6.13 Product label**

The product label is attached to the back side of the sensor.

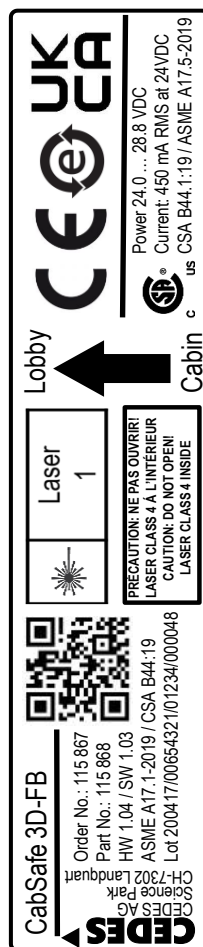


Figure 43: Product labels CabSafe 3D-FB sensor

The label includes information according to the Table 32

|               |  |
|---------------|--|
| 1xx xxx       | Customer order number consisting of 6 digits with space after the third  |
| 1xx xxx       | CEDES internal part number consisting of 6 digits with space after the third   |
| CabSafe 3D    | Part description of the CabSafe 3D sensor (see also chapter 6.3)   |
| Lot number    | Manufacturing Date (190719), manufacturing job number (12345678), employee number responsible for final test (01234), and serialization (123456).  |
| HW / SW Index | Increasing digits with the following meaning:<br>1.xx: major changes, e.g. additional functionality<br>x.0x: error correction, bug fix, new compilation, no additional functionality<br>x.x0: 'cosmetic' update, no functional influence |
| 2D Bar code   | Part number and Lot number   |

Table 32: Label information

Printed part numbers and order numbers for the individual CabSafe 3D sensors:

| Product type (see chapter 6.3 and 6.5.1.1) | Order / part number        |
|--|----------------------------|
| CabSafe 3D-FB                              | ON: 115 867<br>PN: 115 868 |
| CabSafe 3D-FB-TDL                          | ON: 116 400<br>PN: 116 402 |
| CabSafe 3D-FB-TDR                          | ON: 116 403<br>PN: 116 404 |
| CabSafe 3D-FS                              | ON: 116 310<br>PN: 116 311 |
| CabSafe 3D-FS-TDL                          | ON: 116 405<br>PN: 116 406 |
| CabSafe 3D-FS-TDR                          | ON: 116 407<br>PN: 116 408 |

Table 33: Printed label information

**6.14 Technical Data CabSafe 3D sensor****6.14.1 Mechanical**

| Attribute                          | Value   |
|------------------------------------|---|
| Sensor body dimensions (l x h x w) | 104.9 x 32.5 x 40 mm (4.13 x 1.28 x 1.57 in.) |
| Flush mount (l x h x w)            | 133 x 40 x 2.5 mm (5.24 x 1.57 x 0.098 in.)   |
| Material                           | Aluminum                                      |
| Surface treatment                  | Electrophoretic coating                       |
| Black                              | Copper-Nickel-                                |
| Stainless                          | Chromium plated                               |
| Weight                             | 173 Gramm                                     |

Table 34: Mechanical data

### 6.14.2 Environmental

| Attribute             | Value                               |
|-----------------------|-------------------------------------|
| Enclosure rating      | IP65                                |
| Operating temperature | -20°C ... +50°C<br>(-4°F ... 122°F) |
| Storage temperature   | -40°C ... +85°C<br>(-4°F ... 185°F) |
| Max. ambient light    | 50'000 Lux                          |

Table 35: Environmental data

### 6.14.3 Operation characteristics

| Attribute                      | Value  |
|--------------------------------|--|
| Wavelength of light            | Infrared, 850 nm                                   |
| Min. installation height       | 2 m (6.56 ft.)                                     |
| Max. installation height       | Up to 3.05m (10 ft) [see chapter 6.5.1]            |
| Max. elevator door width       | Up to 1.37 m (4.5 ft) [see chapter 6.5.1]          |
| Supply voltage U <sub>SP</sub> | 24 – 28.8 VDC (provided by the CabSafe Controller) |
| Current                        | 450 mA RMS at 24VDC                                |
| Communication interface        | RS485  |
| Number of status LEDs          | 1 multicolor                                       |

Table 36: Operational characteristics

### 6.14.4 Connection cable and connectors

| Attribute                       | Value   |
|---------------------------------|---|
| Pig tail                        |   |
| Length                          | 250 mm (9.84 in.)                             |
| Dimension ferrite               | Ø15 mm (0.59 in.),<br>Length 40 mm (1.57 in.) |
| Connector                       | M8-6pin, black, Ø10 mm (0.39 in.)             |
| Material                        | PVC, black                                    |
| Connection cable                |   |
| Length                          | 2.8 m (9.19 ft.) or 5 m (16.4 ft)             |
| Connector                       | M8-6pin, black, Ø10 mm (0.39 in.)             |
| Material                        | PVC, black                                    |
| Connector to CabSafe Controller | WAGO, 6-pin                                   |
| Wires                           |   |
| AWG                             | AWG26   |
| brown                           | USP   |
| blue                            | GND (0V)                                      |
| black                           | Communication (RS485)                         |
| white                           | Communication (RS485)                         |
| gray                            | Communication (RS485)                         |
| green                           | Communication (RS485)                         |

Table 37: Specification for cables and connectors

### 6.14.5 General

| Attribute            | Value   |
|----------------------|---|
| EMC emission         | EN 12015:2014                                       |
| EMC immunity         | EN 12016:2013<br>ISO 22200:2009                     |
| Vibration            | IEC 60068-2-6:2007                                  |
| Shock                | IEC 60068-2-27:2008                                 |
| Eye Safety           | IEC 60825-1:2014 Ed.3; 21 CFR 1040.10               |
| RoHS, REACH          | 2011/65/EU, 1907/2006 EU                            |
| Certificates cCSAus  | CSA B44.1:19 / ASME A17.5-2019                      |
| Liftinstituut CE     | ASME A17.1-2019 / CSA B44:19 2014/30/EU, 2014/33/EU |
| FCC                  | Class B (*)   |
| FDA Accession Number | 2010829   |

Table 38: General data

(\* = See note for FCC in 5.22.5)

## 6.15 Dimensions CabSafe 3D sensor

All dimensions in this chapter are in mm.

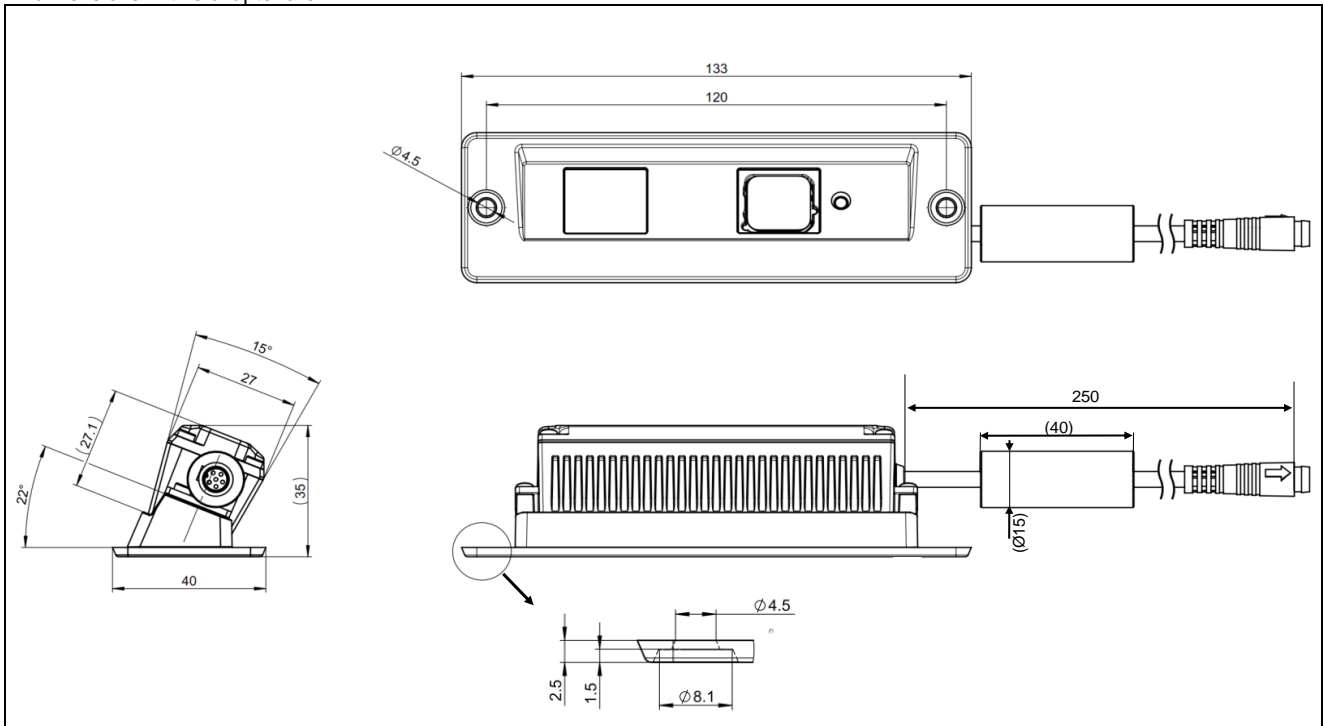


Figure 44: Dimensions CabSafe 3D sensor body

Dimensions for the installed sensor are provided in chapter 6.5.4.

## 7 Disposal

The CabSafe-System or components of the CabSafe-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.