cegard/Smart controller CGSM-B-OR1; CGSM-B-PC1 with EasyGate IP

Installation and Operation Manual

CEDES AG is certified according to ISO 9001: 2015

English Pages 2 -28 Original version

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Contents

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, please visit our product page at www.cedes.com/en/products-for/elevators-escalators/.

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 Operating manual CabSafe 3D
117 941 Operating manual cegard/Smart light curtain
118 748 Operating manual cegard/Smart NT light curtain

For documents related to the 2N EasyGate IP device, visit www.cedes.com.

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
PCB	Printed circuit boards
LC	Light curtain
NA	North America
Tx	Transmitter edge **REMARK:** In the manual, for the expression transmitter - emitter is used.
Rx	Receiver edge

2 Safety information

WARNING

The cegard/Smart 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.
- ► Please note that objects thinner than the beam spacing may not be detected.
- ► Observe all warnings included in the documentation and attached to the sensor.
- ► Do not use the sensor(s), controller or cables if any of these items has been damaged.
- ► Keep the instruction manual on site.

The cegard/Smart 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 to ensure safe operation of the whole application.

Any alterations to the device(s) 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.

In North American applications, voltages greater than 42 Volts require that the wiring to the power supply and/or the door drive must be made through a Greenfield fitting. Ensure that the electrical installation complies with all applicable standards, laws, and regulations that apply.

Failure to follow instructions given in this manual and/ or other related documents related to the cegard/Smart system may cause customer complaints, serious callbacks, damage, injury, or death.

2.1 Non-intended use

The cegard/Smart system **must not** be used for:

- Protection of dangerous machines 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 cegard/Smart system is intended for automatic doors in elevator applications where it detects persons or objects standing between the elevator doors. If the system is equipped with a CabSafe-3D sensor, approaching passengers walking from the landing side towards the elevator entrance can also be detected. All other applications must be approved by CEDES.

3 Symbols, safety massages

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

3.1 Safety massage category

Warning of serious health risks

WARNING
Serious health risks

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

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

Caution of possible health risk

CAUTION
Possible health risks

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

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

Notice of damage risk

NOTICE
Risk of damage

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

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

4 Introduction

4.1 cegard/Smart system overview

The cegard/Smart is an elevator door protection solution that complies with the requirements of:

- EN 81-20 (2020) Protective Light Curtain Device,
- ASME A17.1-2016 / CSA B44:16 and earlier as a reopening device(s) for Power-Operated Horizontally Sliding Doors and Gates,
- ASME A17.1-2019 / CSA B44:19 and later as a reopening device(s) for Power-Operated Horizontally Sliding Doors and Gates with CabSafe 3D sensor included

when installed in compliance with these operating instructions.

A cegard/Smart system consists of a combination of the following components, depending on your application needs:

- A cegard/Smart controller CGSM-B-OR1 or CGSM-B-PC1,
- A cegard/Smart light curtain for detection of a person or object in the path of elevator doors
- A CabSafe 3D sensor for approaching detection of a person(s) or object(s) [required for certain regions in North America]
- A cegard/Smart extension module,
- A communication capability of data with the communication integrated in the 2N EasyGate IP device

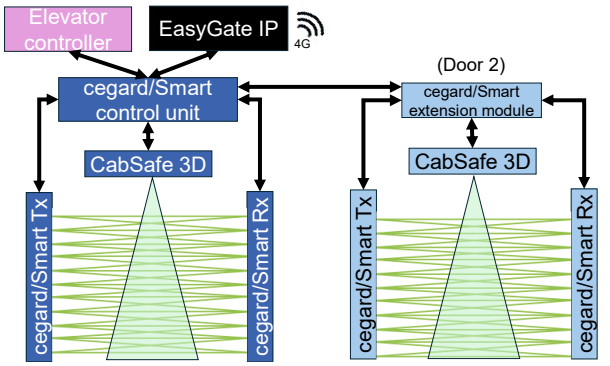

Figure 2: Principal cegard/Smart-B system architecture

CEDES offers different types of cegard/Smart controllers. The conventional cegard/Smart-B controller offers

- a relay output for the door or elevator controller to reopen the door and
- a 2N EasyGate IP interface to communicate with the CEDES Elevate cloud

In addition to that, the cegard/Smart-B-OR1 and cegard/Smart-B-PC1 controllers provide semiconductor outputs for

- hospital bed and wheelchair detection (-B-OR1)
- passenger counting (-B-PC1)

Controller	Relay output	CAN communication	IO outputs	CEDES Elevate cloud
CGSM-B	✓	-	-	✓
CGSM-B-OR1	✓	✓*	✓	-
CGSM-B-PC1	✓	✓*	✓	-

Table 1: Controller variants (= For CAN communication contact your nearest CEDES partner.)*

The IO outputs or the CAN interface of these controllers can be connected directly to an elevator control or to a dispatch control system to manage the next elevator ride. Typical examples are:
- the initiation of a priority ride if a hospital bed is recognized or
- the immediate initiation of a door closing after the detection of a selected number of passengers entered in the case of a dispatch system.

The cegard/Smart can be used in center, left- or right-side opening elevator door applications.

The cegard/Smart LC could also be used in static light curtain installations. However, if an IoT connection is desired with the full advantages of the CEDES Elevate cloud system, a dynamic mounting is required.

The cegard/Smart CGSM-B-OR1 and -B-PC1 controllers:
- Perform continuous monitoring and testing of connected cegard/Smart light curtain(s),
- Perform continuous monitoring and testing of connected CabSafe 3D sensor(s),
- Manage configuration parameters for system components, e.g., CabSafe 3D sensor(s) and
- Logically combine sensor signals into a single output that represents the system state
- Provide information about the type of objects passing the elevator entrance (-B-OR1) or the number of passengers (-B-PC1).

When people or objects are detected, either by the cegard/Smart light curtain or the CabSafe 3D sensor, or both, the cegard/Smart controller signals to the door controller. This allows the door controller to hold the door open, indicate that a door reversal is necessary, or allow the doors to close.

With the 4G functionality, data of the built-in object recognition algorithms can be monitored, modified and maintained by CEDES. Consult your local CEDES representative for details.

This document contains the technical specifications of the cegard/Smart controller CGSM-B-OR1 and -B-PC1 and its installation procedure.

The following chapters provide a description of:
- the cegard/Smart controller: See Chapter 5
- controller configuration: See Chapter 6

Elevator comfort improves due to contactless detection of approaching people while simultaneously increasing the availability of the elevator. Therefore, a CabSafe-3D sensor can be integrated in a cegard/Smart system to detect approaching passengers. The CabSafe 3D sensor is installed in or at the transom of the elevator car and the detection field is oriented towards the lobby area. The detection field is automatically adjusted during the movement of the door(s).

The cegard/Smart system is designed and developed to fulfill the requirements of
- EN 81-20
- ASME A17.1-2016 and earlier
- CSA B44:16 and earlier

Combined with the CabSafe-3D sensor, it can be used for applications which require
- ASME A17.1-2019 and later
- CSA B44:19 and later.

For correct function, only system components described in this Installation and Operation Manual shall be used.

Consult the operating instructions of connected cegard/Smart components for additional information and requirements (see chapter 1.2)

WARNING
Serious health risks

Door protection systems, such as the cegard/Smart system, do not provide absolute safety for elevator passengers passing through the doorway. They cannot be used as fail-safe 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 ASME A17.1 / CSA B44 compliance

For North America, the cegard/Smart system provides a complete elevator door protection solution that complies with ASME A17.1- 2019 / CSA B44:19 and ASME A17.1-2022 / CSA B44:22 Safety Code for Elevators and Escalators when installed in accordance with this manual and consisting of the following components:
- a cegard/Smart controller
- a cegard/Smart light curtain to detect persons or objects between the elevator doors; and
- a CabSafe 3D sensor to detect a person or object approaching the elevator entrance.

The approaching object detection means of the cegard/Smart begins with the opening of the elevator door(s). When this occurs, the cegard/Smart system is initialized by a signal from one of the following:
- the cegard/Smart 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 cegard/Smart controller to start monitoring both the cegard/Smart light curtain and CabSafe 3D sensor 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 operator will either reverse or hold the doors in their open state.

A timer (greater than 5 s per ASME A17.1-2019 / CSA B44:19) is implemented in the cegard/Smart controller that minimizes the effects of cross-traffic. The timer starts when a person or object is detected approaching the elevator cab. If this timer expires before an infringement of the cegard/Smart light curtain (i.e. person or object actually entered the elevator cab), the CabSafe 3D sensor will be rendered inoperative. If the cegard/Smart light curtain detects a person or object, this timer is reset.

The CabSafe 3D sensor is also rendered inoperative when the elevator doors are less than 450 mm (17.72 in) from the fully closed position. This distance is monitored based on a signal from one of the following:
- the cegard/Smart 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, this sequence starts over on the next door opening.

5 cegard/Smart controller

5.1 Overview

The cegard/Smart controller is responsible for the communication with the individual components (cegard/Smart light curtain and if required by code the CabSafe 3D sensor). It provides a signal to the elevator controller that indicates when the elevator door(s) can be closed. The cegard/Smart controller continuously tests the attached sensor components, including when the door has reached its fully open position. If a component fails, the cegard/Smart controller provides a signal to hold the door open and indicates that a fault has occurred.

5.2 Features

Regardless of which cegard/Smart controller configuration is used, the following features are available:
- 4G/LTE enabled
- Suitable for both new installation and modernization
- 100 … 240 VAC 50/60 Hz or 24 V DC incoming power
- Relay output that combines the signals from
  - cegard/Smart light curtain, and
  - CabSafe 3D sensor
  - DIP switch hardware configuration
- Extension module for two doors, e.g. front/rear applications

5.3 Variants

This installation and operation manual is related to the controller models:
- CGSM-B-OR1 and
- CGSM-B-PC1

5.3.1 CGSM-B-OR1

This controller has an algorithm that detects, analyzes and categorizes the objects that move through the protective field of the connected cegard/Smart light curtain. If an object is assigned to a category (e.g. hospital bed or wheelchair), an output is set. If the object leaves the elevator again, the output is reset.

By factory default, the two IO outputs of a CGSM-B-OR1 controller are assigned to hospital bed and wheelchair detection.

Other objects can be easily initialized by CEDES using the integrated 4G/LTE connection. Such special objects could be for example:
- ► Bicycles
- ► Scooters
- ► Children
- ► Robots

Contact your nearest CEDES branch to find out more about these options, as well as about the possibility of a CAN-Bus communication.

5.3.2 CGSM-B-PC1

This controller has an algorithm that counts the number of passengers passing through the protective field of the light curtain. The number is communicated to the connected elevator controller via a semiconductor output. The controller allows passenger traffic to be recorded at each station.

The controller also offers communication capability with a CAN-Bus interface. For CAN communication, contact your nearest CEDES branch.

5.4 Safety Instructions

WARNING

- ► Follow all applicable safety measures.
- ► Switch off main power to the elevator control system and mark clearly that the elevator is out of service.
- ► Do not mount the cegard/Smart controller on the moving door panel.
- ► Make sure that your installation complies with all applicable regulations and safety measures.
- ► Avoid any damage to the cegard/Smart controller. Observe the ESD protection protocol when removing the controller 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 cegard/Smart controller.
- ► It is prohibited to make any changes to the cegard/Smart controller itself (other than DIP switch settings).
- ► Only the CEDES cegard/Smart light curtains and CabSafe 3D sensors can be connected to a cegard/Smart controller.
- ► Connection cords with a length exceeding 2 m shall be protected in a raceway.

WARNING

- ► For the USA and Canada: Connect all wiring with more than 42 V through a Greenfield fitting.
- ► Disconnect power before opening the control unit to prevent electrical shock. Otherwise serious injury or death may occur!

Figure 3: Connection of Greenfield fitting and cable protection

5.5 Mechanical installation

The cegard/Smart controller may be mounted in any orientation on a flat surface.

The mounting holes for the cegard/Smart controller are shown in the dimensional information presented in Chapter 19. Ensure that the mounting location provides a stable and robust installation.

Refer to the relevant documents provided in chapter 1.2 for installation of other components included with your cegard/Smart system.

Elevators with two entrances can be supported by a single cegard/Smart controller using an extension module. Different mounting arrangements are possible (Figure 4 and Figure 5).

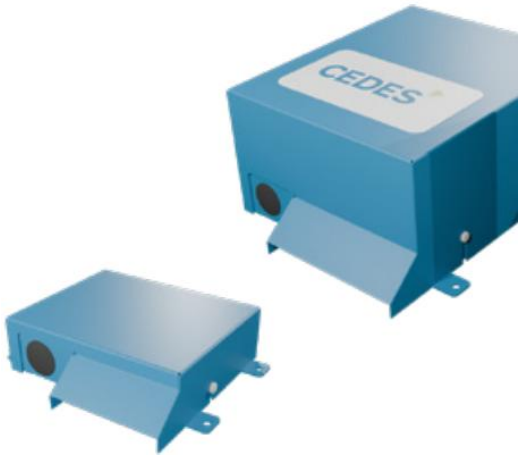

Figure 4: cegard/Smart with a separate extension module on the car roof surface

Figure 5: cegard/Smart extension module on top of the controller

Included with each extension module is a 5 m (16.4 ft) interconnect cable that connects the extension module to the cegard/Smart controller.

For the instructions of the mechanical installation of the EasyGard IP device, check the documentation available on www.cedes.com.

5.6 Electrical connections

5.6.1 cegard/Smart controller

Principal set-up of a cegard/Smart CGSM-C controller and the connections are shown in Figure 6. The controllers are set up with two PCBs:

1. Incoming power /Gateway PCB and
2. Sensor connection PCB

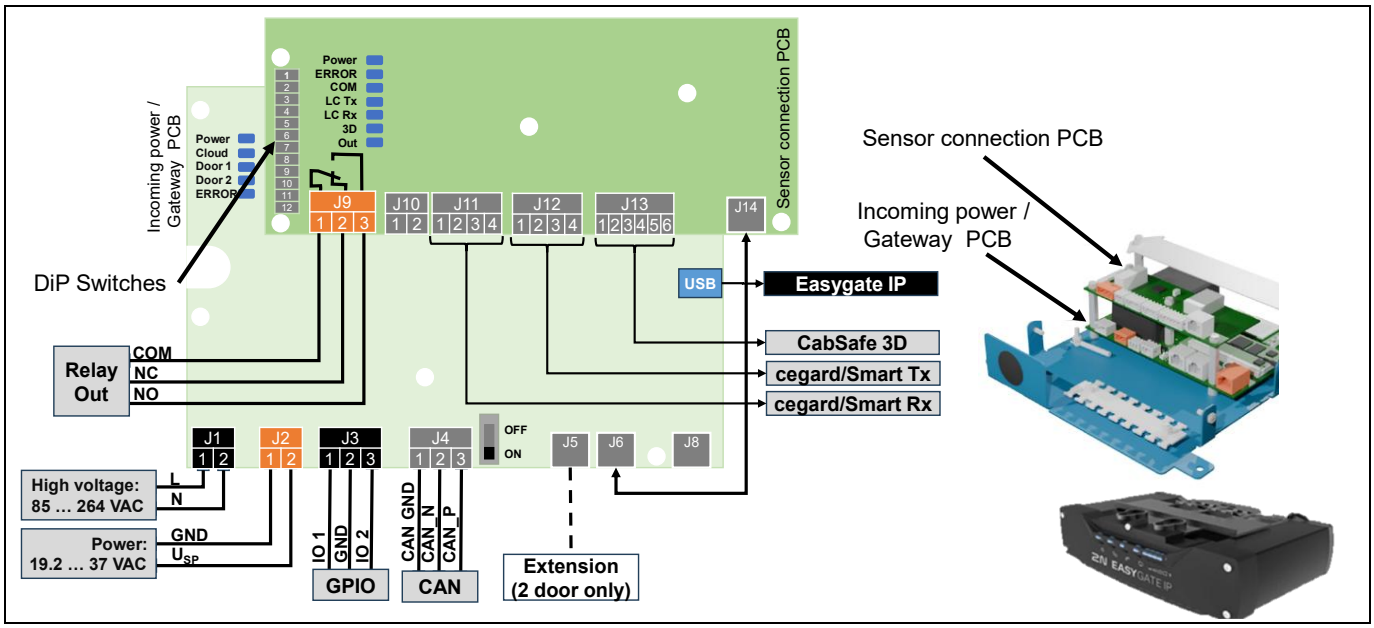

Figure 6: cegard/Smart board components for a cegard/Smart controller

The timing and the specification of the two IO outputs (IO1 and IO2 at J3) are defined in chapter 8 and chapter 18.1.

Plug J6 of the incoming power / Gateway PCB is used for the internal connection of the sensor connection board (plug J14) inside the controller. Connector J5 is used for the connection of the extension module in case of a second car door.

For more information about the CAN connection (plug J4) and the associated termination resistance switch (ON/OFF) shown in Figure 6, please contact your nearest CEDES representative.

To connect the EasyGate IP, use the USB-C connection cable (Length= 1m; CEDES part-#: 303 855) and connect it to the Gateway PCB as shown in Figure 6. The EasyGate IP device can be powered by

- 240 / 12 V; 1 A, power adapter (included) or
- direct current supply: 9 to 30 V DC

5.6.2 Sensor connection board / Extension module

All cegard/Smart controllers type CGSM-B and cegard/Smart extension modules include a sensor connection board that provides connection for the cegard/Smart light curtain (and if required for the CabSafe 3D sensor) and a relay output that represents the system state.

For elevators with two sets of doors (Figure 2; e.g., front and rear entry), a cegard/Smart extension module is used for the second set of sensors and connected to the incoming power (sensor connection board as shown in Figure 7).

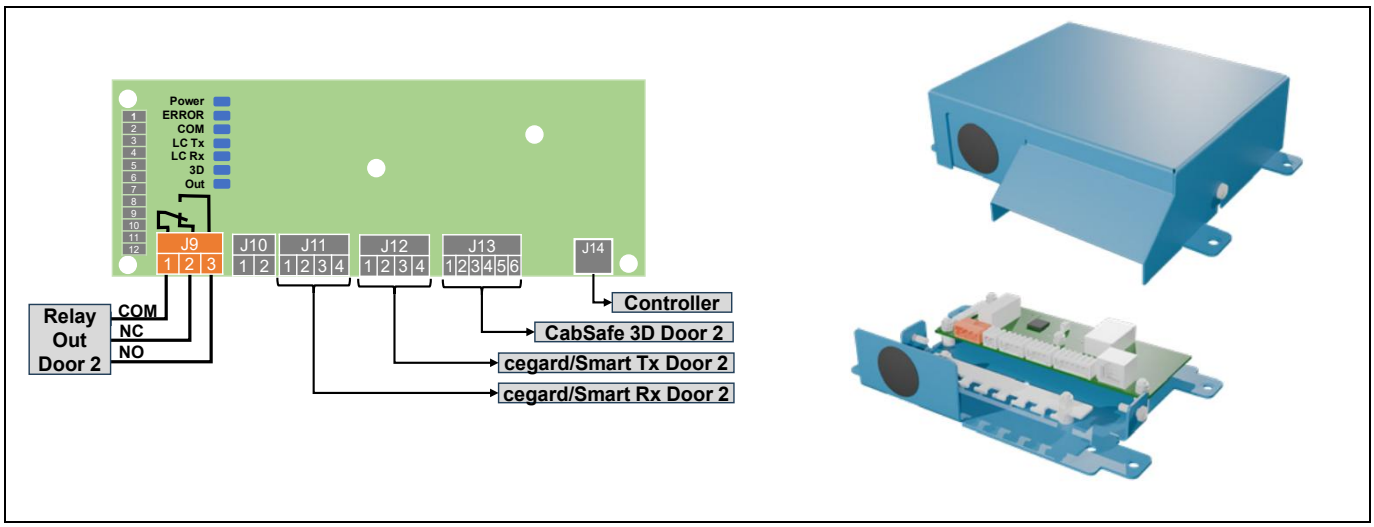

Figure 7: cegard/Smart sensor connection PCB / extension module

A cegard/Smart extension module plug J14 is connected to the cegard/Smart controller plug J5. Only use cable 117 766 (5 m) or 117 767 (8m) for connection between these two components.

6 IoT functionality

According to Table 1, the controllers CGSM-B-OR1 and CGSM-B-PC1 have currently no IoT functionality implemented, which means that there is currently no CEDES Elevate dashboard capability available. However, the controllers are prepared to be updated to a SW with integrated IoT functionality as soon as it is available.

If an IoT functionality is desired, a second cegard/Smart controller type CGSM-B (including a second EasyGate IP) must be installed (Figure 8). The light curtain can then be connected in parallel to both controllers. Both controllers then receive and analyse the data from the light curtain. The advantage of such a combination is that

- immediate object recognition data are available for the control of an elevator and
- process and operation data are available in the CEDES Elevate dashboard

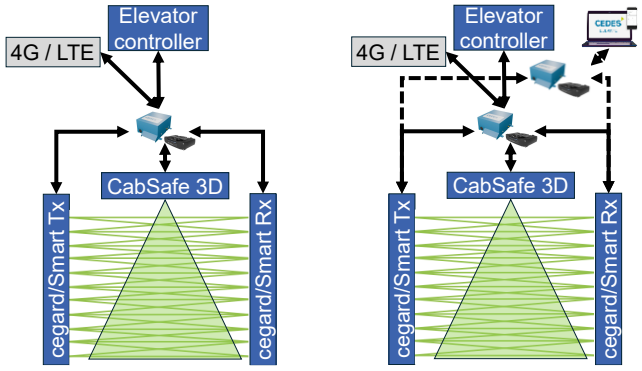

Figure 8: cegard/Smart LC system with a CGSM-B-OR1 or CGSM-B-PC1 connected to CEDES Elevate dashboard

7 Controller sensor configuration

7.1 Overview

The cegard/Smart system is configured using twelve (12) DIP switches. The DIP switches are located on the sensor connection PCB as shown in Figure 9 below. For light curtain only (2D) operation, refer to Chapter 7.5.

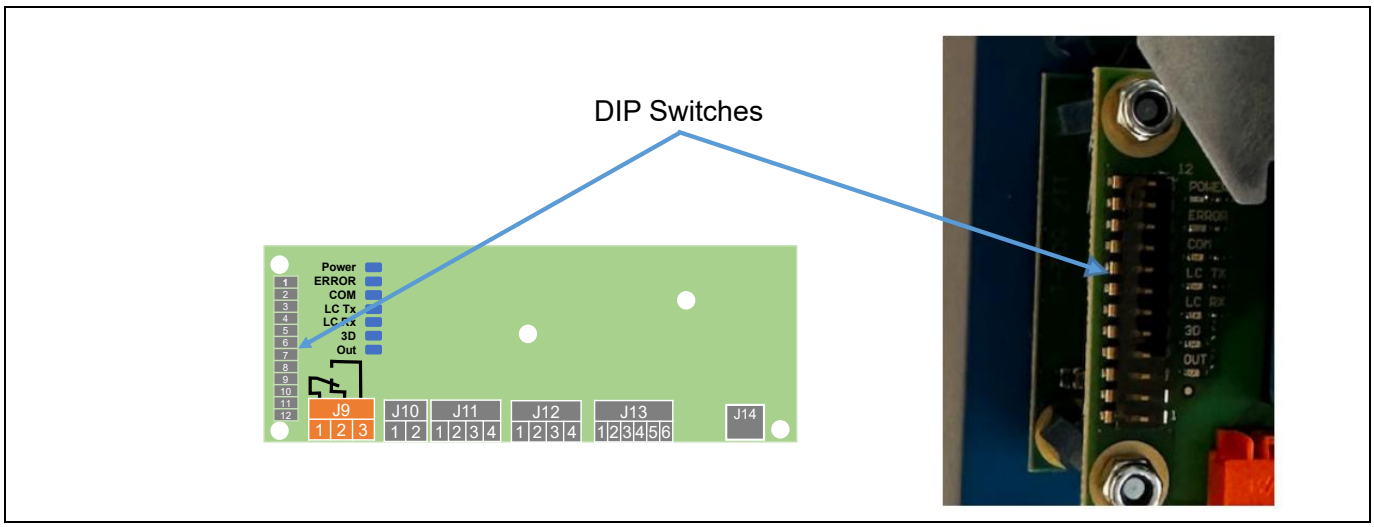

Figure 9: DiP switch location on sensor connection PCB and on the extension PCB

The functions associated with these DIP switches are summarized below and further described in subsequent sections of this chapter.

DIP	Function
1 2	3D mounting position
3 4	Render inoperative means
5 6 7 8	Door height
9	2D/3D versus 2D only functionality
10	Logic
11	Frequency
12	Special function – reduced region of interest

Table 2: Overview functional settings

CAUTION

► Do not change settings of any switch if the cegard/Smart controller is powered on. Damage can occur!

7.2 3D mounting position

Mounting position	DIP 1	DIP 2
No function *	0	0
Left (Figure 11)	1	0
Right (Figure 12)	0	1
Center (Figure 10)	1	1

Table 3: Mounting position of sensor as seen from the hallway into the elevator entrance (= factory default)*

DIP 1 and DIP 2 define the elevator entrance type. The mounting position referenced in Table 3 is the location of the CabSafe 3D sensor as you look into the elevator cabin from the lobby (Figure 10, Figure 11 and Figure 12 for graphical representation of each position type). When DIP 9 = 0 / “OFF” (2D/3D functionality is active), DIP 1 and DIP 2 must be set for left, right or centre mounting position. A configuration fault occurs if this is not the case.

Notes:

- When DIP 9 is “1” / ON (2D operation only), the state of DIP 1 and DIP 2 is not monitored.
- If DIP 1 and DIP 2 are both 0 / “OFF”, a configuration fault occurs.

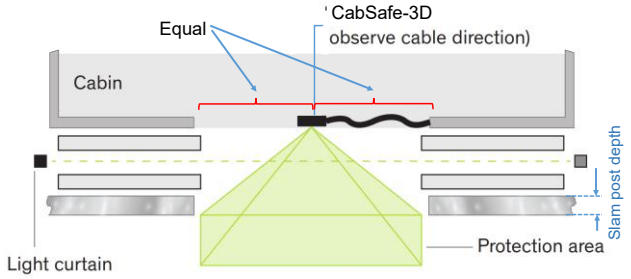

Figure 10: CabSafe 3D sensor mounted in center opening

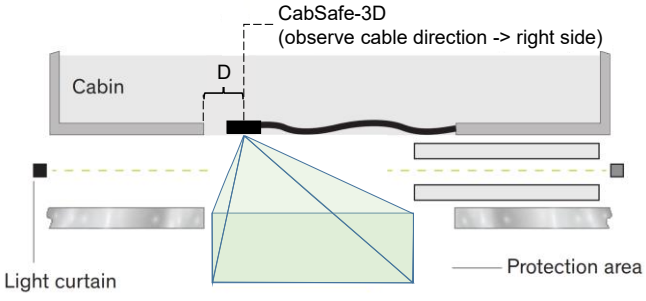

Figure 11; CabSafe 3D sensor mounted on the left side

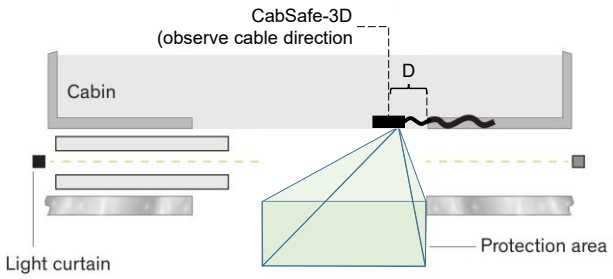

Figure 12: CabSafe 3D mounted on the right side

7.3 Render inoperative means

Door closing detection	DIP 3	DIP 4
No function *	0	0
Dynamic installation of the cegard/Smart light curtain	1	0
Using the CabSafe 3D sensor or an elevator control signal (**)	0	1

Table 4: Method used to determine render inoperative function (= 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.)

DIP 3 and DIP 4 define how the CabSafe 3D sensor is rendered inoperative during the door closing process. The render inoperative function is allowed to occur when the doors have reached a position less than 450 mm (17.71 in) from the fully closed position in accordance with ASME A17.1 -2019 / CSA B44:19 and later versions of the North American Elevator Safety Code.

If DIP 3 and DIP 4 are both 0 / “OFF”, a configuration fault occurs.

7.3.1 Render inoperative using the light curtain

When DIP 3 = 1 / “ON” and DIP 4 = 0 / “OFF”, the cegard/Smart light curtain is used to render the CabSafe 3D sensor inoperative. This can be the case when the cegard/Smart light curtain is mounted on, and moves with, the elevator door(s). The cegard/Smart light curtain then indicates to the cegard/Smart controller when the doors have reached a point of less than 450 mm (17.71 in) from the fully closed position in accordance with ASME A17.1-2022 / CSA B44-22 and earlier versions of the North American Elevator Safety Code.

7.3.2 Render inoperative using an external signal

When DIP 3 = 0 / “OFF” and DIP 4 = 1 / “ON”, an external signal can perform the render inoperative function. In certain applications e.g., elevators with glass doors or in static installations where the light curtain does not move with the doors, this connection is needed to reliably render the CabSafe 3D sensor inoperative. The external signal should be connected to connector J10 to perform this function.

An external signal can consist of either
- a retentive contact (e.g., a magnetic switch), or
- a 24 VDC signal from elevator control.

For the retentive contact solution, the contact must be able to reliably switch 24 VDC, 2.3 mA.

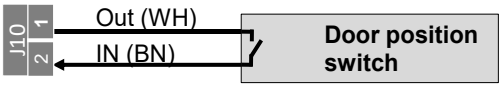

Figure 13: Door position signal from retentive door position switch

CEDES offers an optional magnetic reed switch that fulfils this retentive door position switch requirement. In this case, the magnetic reed switch and the actuator must be positioned so that the actuation occurs when the elevator door position (“W” in Figure 14 and Figure 15) fulfils:

- Elevator door opening ≤ 400 mm and
- Elevator door opening ≥ 300 mm

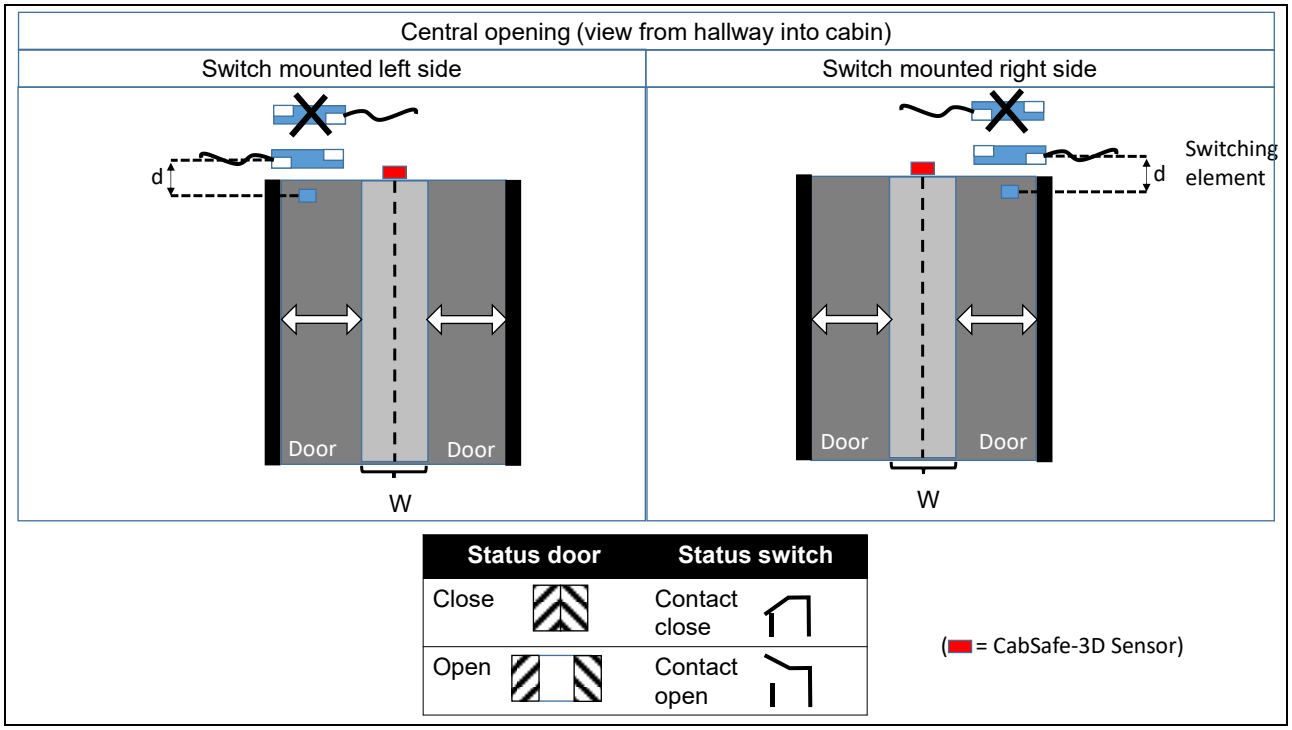

Figure 14: Magnet switch in case of central opening

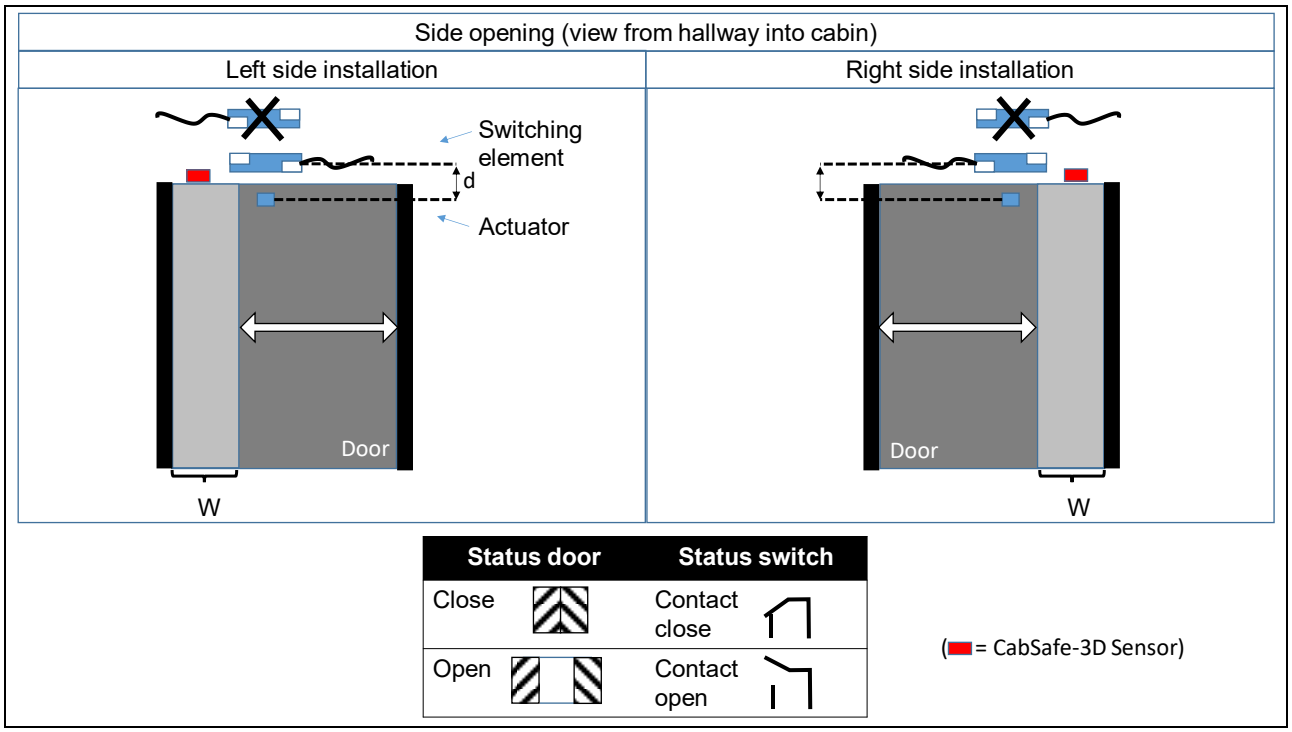

Figure 15: Magnet switch in case of side opening

The cable outlet of the sensor must always be positioned towards the door opening direction at the installed door as indicated in Figure 14 and in Figure 15. It is only one switch required per elevator (for central and for side opening).

Alternatively, an external signal e.g., from elevator control can provide the render inoperative function. In this case, the 24 VDC signal connected to Pin 2 on plug J10 must have the same signal common (0 VDC) as the cegard/Smart controller.

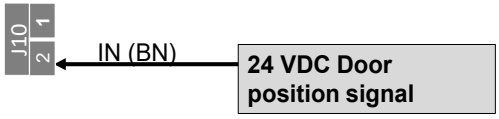

Figure 16: Door position signal from elevator controller to cegard/ Smart controller

In general: The signal at pin 2 of the plug J10 shall be HIGH (+24 VDC) when the door has reached the point when the CabSafe 3D sensor can be rendered

inoperative. This signal must occur and then remain high when the elevator doors ≤ 450 mm (17.71 in) from the fully closed position.

7.4 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 must be changed to enter operation mode.

A configuration fault will occur if:

- More than one of these DIP switches is set to 1 / "ON"
- If DIP 9 is 0 / "OFF" (2D/3D is active) and DIP 5 through *DIP 8 are all set to 0 / "OFF"*

7.5 Settings for 3D active

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

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

The setting of DIP 9 = 1/"ON" causes the cegard/Smart controller to only operate with cegard/Smart light curtain (2D only mode). This functionality requires that the CabSafe 3D sensor be physically disconnected from the cegard/Smart controller, otherwise a configuration fault occurs.

7.6 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 = 1 / "ON", the output logic is inverted from what is shown in Figure 17.

The control unit provides a relay output, a Normally-Open (NO) contact, a Normally-Closed (NC) contact, and Common (COM). The contact rating of the cegard/Smart controller output relay is provided in Chapter 18.1.

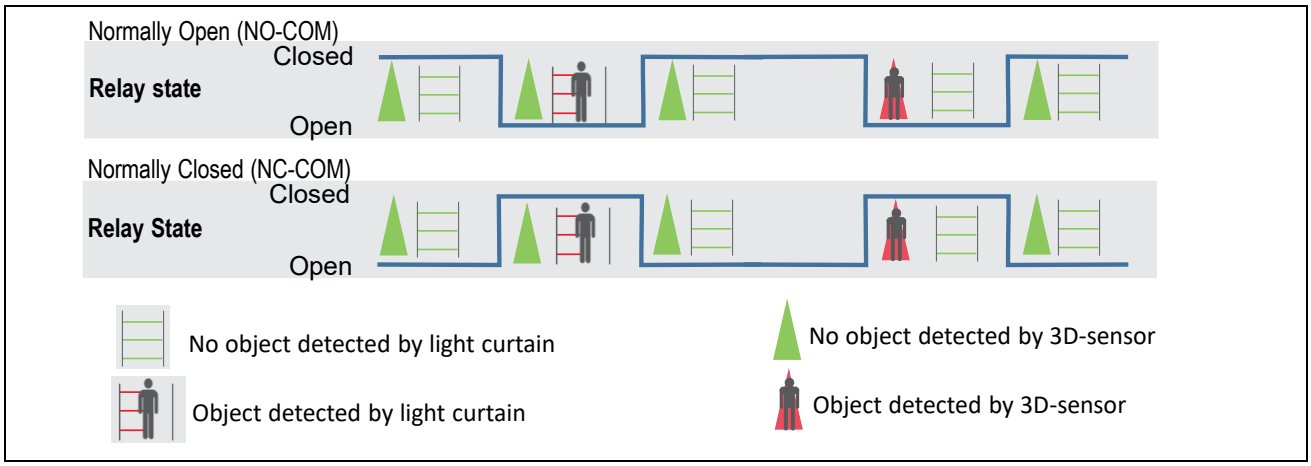

Figure 17: Controller output logic with DIP 10 = 0 / "OFF"

7.7 3D operational frequency selector

Operation frequency selection	DIP 11
Standard *	0
Modified	1

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

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 cegard/Smart controller.

For example, Figure 18 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) as shown in Figure 23. DIP 11 can also be used in e.g., front and rear door applications.

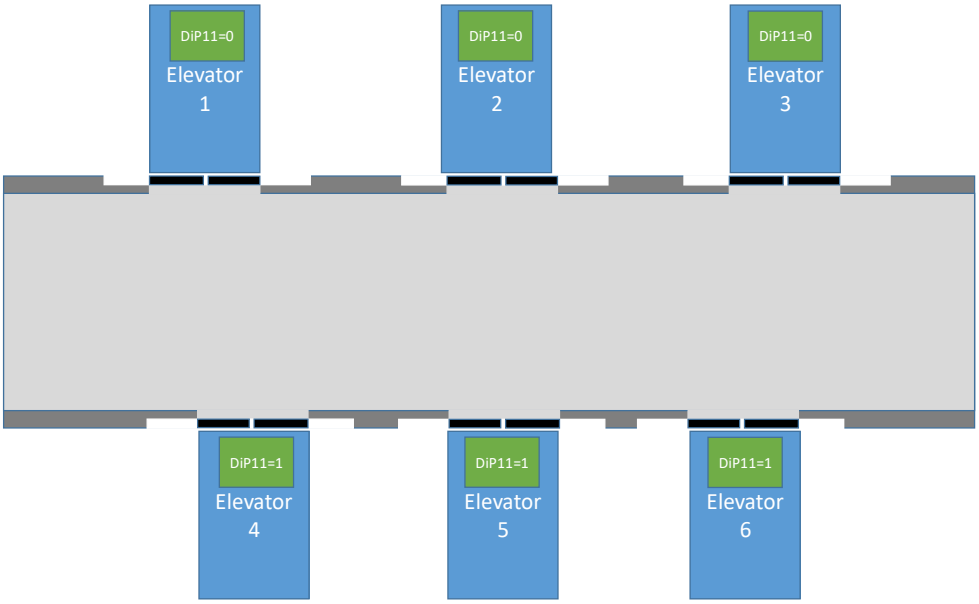

Figure 18: DIP 11 settings for multiple elevators positioned face to face

7.8 Reduced region of interest

In elevator applications with a deep entrance depth (see Figure 10), a permanent door open signal can occur, especially with elevators that have narrower openings. In such cases, a different algorithm can be used by the CabSafe 3D sensor to address this issue by setting DIP 12 = 1 / “ON”.

DIP 12 = 1 / “ON” is only allowed in applications where the elevator door opening width is ≤1,100 mm (43.31 in).

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

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

8 Timing diagram

8.1 Controller CGSM-B-OR1

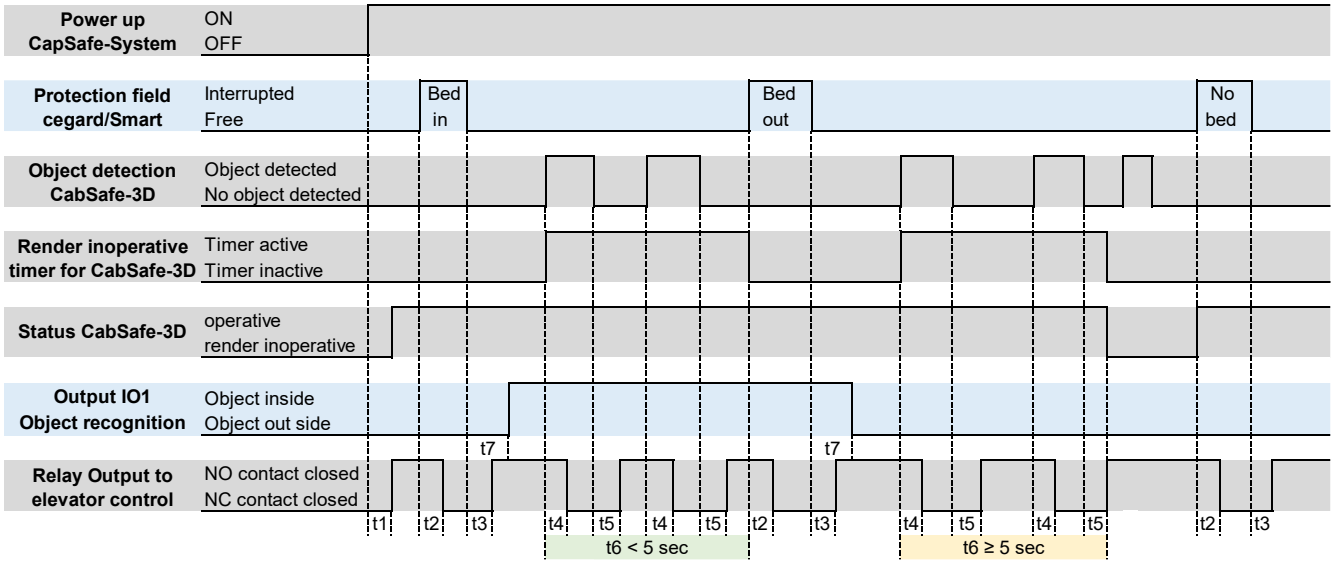

Figure 19: Timing diagram (output logic selection DIP 10 = 0)

Time		Value
t_1	Power-on time	< 5 s
t_2	Typ. reaction time of the cegard/Smart controller output caused by an object entering the detection field of the cegard/Smart 2D sensor	<140 ms
t_3	Typ. release time of the CabSafe controller output after clearance of the detection field of the cegard/Smart 2D sensor	<20 ms + light curtain
t_4	Typ. reaction time of the cegard/Smart controller output caused by an object detection of the CabSafe 3D sensor	<250 ms
t_5	Typ. release time of the cegard/Smart controller output after clearance of the detection field of the CabSafe 3D sensor	1.7 s
t_6	Rendering inoperative timer (Chapter 6.3). Resets on interruption of cegard/Smart 2D sensor or upon reopening of doors after closure. If end of timer is reached, CabSafe 3D sensor is rendered inoperative.	≥5 s acc. to A17.1-2019
t_7	Typ. reaction and release time to indicate “bed in” or “bed out”	< 300 ms

Table 10: Description of the times provided in Figure 19

Remark: the output IO2 has the same timing behavior as the output IO1. The difference is that IO1 signals “beds” only and IO2 signals “wheelchairs” only.

Attention 1:
The correct status of the two outputs is linked to the following boundary conditions:
- The car offers only space for one bed or one wheelchair. This means: if the algorithm detects for example two beds in series without door closing, the controller will not signal a bed inside the car (bed was moved inside and then outside without car movement).
- For elevators with two car doors (e.g. front and rear): the two doors do not open simultaneously.

Attention 2:
An automatic reset feature is implemented for the two IO outputs. The output will be set automatically to “no object detected” in cases where:
- The door is closed longer than 2 minutes
- The door is open longer than 5 minutes after the last object detection.

This feature was implemented to correct any errors in the status that may occur during the automatic categorization by the algorithm.

8.2 Controller CGSM-B-PC1

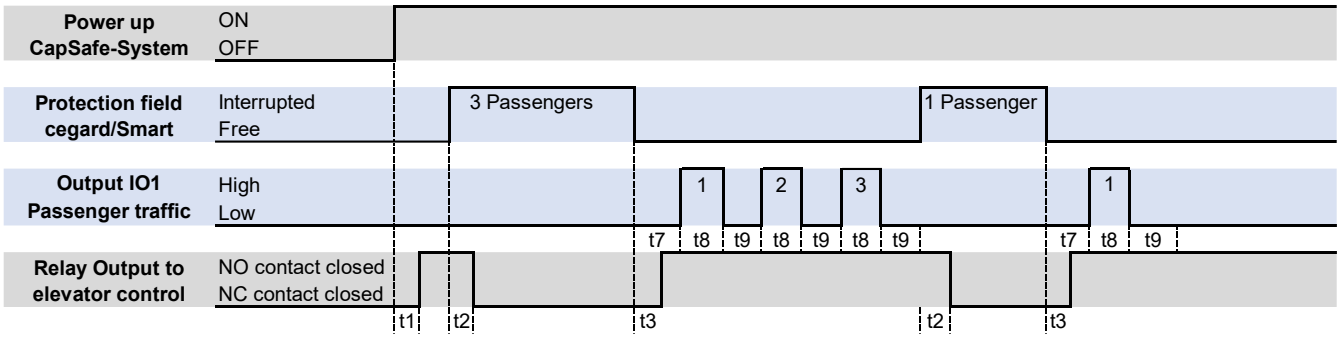

Figure 20: Timing of output IO1 for controller CGSM-B-PC1

Time		Value
t_1	Power-on time	< 5 s
t_2	Typ. reaction time of the cegard/Smart controller output caused by an object entering the detection field of the cegard/Smart 2D sensor	<140 ms
t_3	Typ. release time of the CabSafe controller output after clearance of the detection field of the cegard/Smart 2D sensor	<20 ms + light curtain
For t_4, t_5, t_6 see timing diagram CGSM-B-OR1		
t_7	Typical reaction and release time to indicate passenger traffic	<300 ms
t_8	Rectangular pulse “high”	100 ms

t_9	Rectangular pulse “low”	100 ms

Table 11: Description of the times provided in Figure 20

Attention:
The correct status of the two outputs is linked to the following boundary condition:
- For elevators with two doors: the two doors do not open simultaneously.

9 System installation / integration

Use the following steps to implement the installation and integration of the cegard/Smart system after removal of the existing elevator door re-opening device

1. Mount the cegard/Smart controller on top of the elevator cab
2. Install the cegard/Smart light curtain:
   - ► Mount the emitter and receiver based on your application requirements. In dynamic installations, at least one component (the emitter or receiver) is mounted on the moving door(s). In static installations, the emitter and receiver are both stationary and do not move with the door(s).
     - For dynamic installations with center-opening doors, mount the light curtain emitter and receiver on the elevator doors;
     - For dynamic installations with side-opening doors, mount the light curtain emitter and receiver on the elevator door and strike jamb.
     - For static installations, mount the cegard/Smart light curtain in accordance with the manufacturer’s instructions (e.g., European Universal Mounting Kit).
   - ► Route and connect the cables from the cegard/Smart light curtain emitter and receiver to the mating connector on the cegard/Smart controller, taking care to avoid high voltage power sources.

   Additional information regarding the installation and integration of the cegard/Smart light curtain can be found in 117 941 cegard/Smart light curtain Installation and Operation Manual.
3. For applications that require approaching object detection (3D), install the CabSafe 3D sensor in (for flush mounting) or on the back of (back of transom mounting) the elevator transom.
   - ► Determine proper mounting location of the CabSafe 3D sensor.
   - ► Prepare the mounting location.
   - ► Route and connect the cable from the CabSafe 3D sensor to the corresponding mating connector on the cegard/Smart controller, taking care to avoid high voltage power sources.
   - ► Connect the cable to the CabSafe 3D sensor and then secure the sensor in the mounting location.
   - ► If your application utilizes a magnetic switch for the render inoperative function of the CabSafe 3D sensor, install the magnetic switch and actuator in accordance with Chapter 7.3.2.

   Additional information regarding the installation and integration of the CabSafe 3D sensor can be found in 117 940 CabSafe 3D sensor Installation and Operation Manual.
4. Integrate the IoT gateway.
   - ► Attach the antenna to the controller and then continue to Step 5.
5. Configure the DIP switches in the cegard/Smart controller (Chapter 6 for details).
6. Connect the output relay on the cegard/Smart controller for controlling the door reversal function(s) (Chapter 7.6 for relay state information).
7. When an extension module is used (e.g., for front and rear opening doors),
   - ► Mount the extension module near the door which it will control.

   Note: If space is limited, the extension module can also be attached to the top of the cegard/Smart controller using the push pins included. These pins insert into the top of the cegard/Smart controller into the corresponding holes under the CEDES sticker.

   - ► Attach the interconnect cable between the extension module connector J14 and the cegard/Smart controller connector J5.
   - ► Configure the DIP switches in the extension module (Chapter 6 for details).
   - ► Connect the output relay on the extension module for controlling the door reversal function (Chapter 7.6 for relay state information)
8. Connect power to the cegard/Smart controller.
9. Once power is applied, wait 5 s and then verify that the detection capabilities of all components (cegard/Smart light curtain, CabSafe 3D and cegard/Smart controller) fulfil your application requirements. When used, repeat this process for the components attached to the extension module (Chapter 10 for additional details).
10. Optional: for applications which require CEDES online support, provide the HW number of the installed device to CEDES.

Once these steps are complete, the cegard/Smart system is ready for use.

10 Start-up cegard/Smart controller

1. Ensure that the controller, the light curtain and the 3D sensor are installed in accordance with their respective Installation and Operation Manuals and that the cegard/Smart controller DIP switches are set correctly. Verify that there is no visible damage to any of the devices.
2. If not already the case, switch on power to the system. The POWER LED on the cegard/Smart controller will change from OFF to green ON.
3. Wait 5 s after power cycle to ensure that components have completed the initial start-up sequence.
4. With the elevator door(s) in their fully open position and all detection fields clear of objects, ensure that the LEDs on the controller indicate the following:

LED status	Color
Gateway PCP Power	green
Gateway PCB Cloud	OFF
Gateway PCB door 1	green
Gateway PCB door 2 (for 2 doors only)	green
Sensor connection PCB Power	green
Sensor connection PCB COM	green

Table 12:

Refer to Chapter 12 for further information on LED status.
If any LED state(s) is different than shown above, verify that the installation of:
   - ► The 2D light curtain is correct if the LED “Tx or Rx” is ON and should not be, and
   - ► the 3D Sensor is correct if the LED “3D” is ON and should not be (flashing LED is OK).
   - ► Correct any installation details and cycle power. Return to Step 3 above.
5. Verify that cegard/Smart light curtain and controller function correctly and as expected:
   - ► As the elevator doors are closing, infringe the cegard/ Smart light curtain detection field using your hand. When this infringement occurs, the elevator door(s) must reverse to their fully open position.
   - ► As the elevator doors are closing, infringe the cegard/ Smart light curtain detection field using your foot at sill level. When this infringement occurs, the elevator door(s) must reverse to their fully open position.
6. Verify that CabSafe 3D sensor and controller function correctly and as expected:
   - ► Ensure that the CabSafe 3D sensor is active (LED on sensor is solid blue / not flashing blue). If the CabSafe 3D sensor is inoperative (blue flashing), infringe the cegard/Smart light curtain to change the CabSafe 3D sensor back to active.
   - ► Starting from 1.2 m (4.0 ft) from the landing side of the entrance, walk toward the entrance at a speed between 0.3 m/s and 1.0 m/s (1 ft/s and 3.3 ft/s) perpendicular to the centre of the opening.
   - ► The CabSafe 3D sensor must indicate that an approaching object has been detected (LED turns green) prior to reaching 225 mm (9 in) from the landing side of the landing door and the elevator door(s) must reverse to their fully open position.

If the above procedure is successful, basic functionality of the system has been verified. If the system is installed in accordance with this and the associated component installation and operation manuals, the system fulfils Section 2.13.5 of ASME A17.1 / CSA B44. A third-party certificate is available online in the downloads section of the corresponding product page.

Note: Regarding ASME A17.1 / CSA B44 Force Testing of the Door(s): Since the Approaching Object Detection Means can be rendered inoperative in accordance with Section 2.13.5.2 of ASME A17.1 / CSA B44, testing of the force of the door(s) can be accomplished by measuring the force at the landing door(s) after the approaching object detection means has been rendered inoperative. There are no special procedures required to accomplish this testing.

11 Online connectivity

Certain applications may require a modification of the object recognition algorithm for special objects (chapter 5.3.1):

In such a case, the cegard/Smart type CGSM-B-OR1 or CGSM-B-PC1 controllers must be online to transmit and receive data using an 4G/ LTE communication. Such a connection can be ordered at CEDES if the “Device ID” which is printed on the product label (Figure 21) is provided.

Figure 21: Example for the «Device ID» on product label

Contact your nearest CEDES subsidiary to initiate the maintenance connection.

12 Troubleshooting

There are two groups of LED indicators used for troubleshooting:

- Group one is next to the DIP switches on the sensor connection PCB as shown in Figure 9 below
- Group two is on the power / Gateway PCB shown in Figure 6.

12.1 Sensor connection PCB LED status description

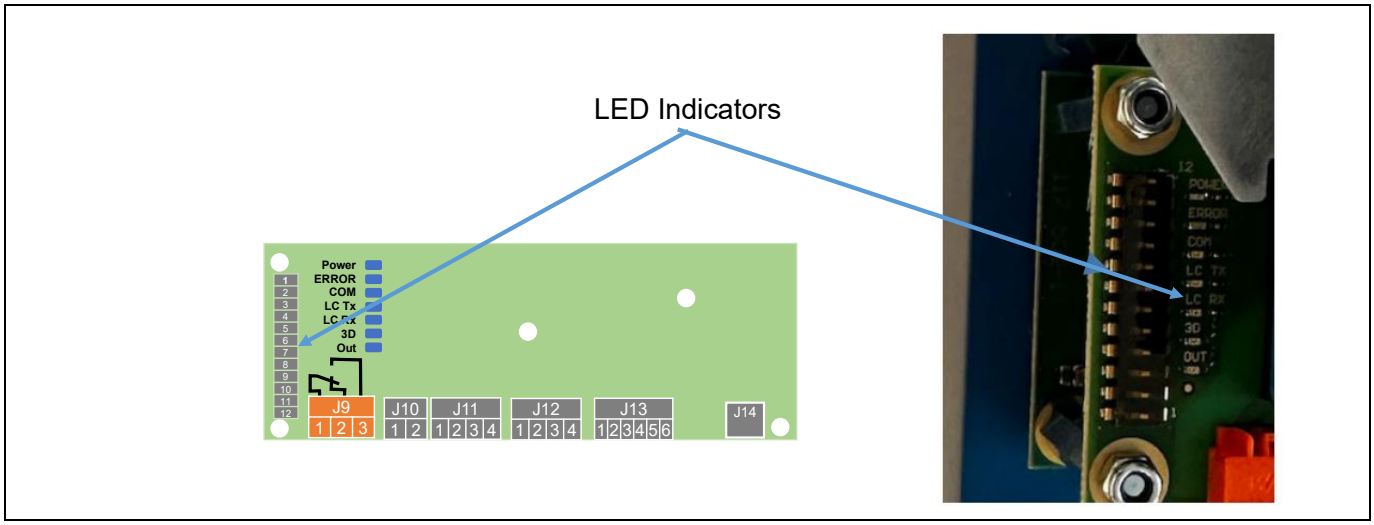

Figure 22: LED indicators on the sensor connection PCB and on the extension PCB

Power (green)	ERROR (red)	Out (orange)	3D (orange)	LC Tx/ LC Rx (orange)	Action
OFF	OFF	OFF	OFF	OFF	• Check electrical connections from controller to power supply. • Check supply voltage of the door controller.
ON	OFF	OFF	OFF	OFF	• No error, normal operation
ON	OFF	ON	OFF	ON	For LC Rx normal operation when cegard/Smart light curtain has detected an object / detection field is interrupted. If the cegard/Smart light curtain is not interrupted, follow troubleshooting instructions in the corresponding manual.
ON	OFF	ON	ON	OFF	Normal operation when CabSafe 3D sensor detects an approaching object. If CabSafe 3D sensor does not detect approaching objects, follow troubleshooting instructions in the corresponding manual.
ON	OFF	OFF	Blinking	OFF	No error and normal operation. Two options • 3D time-out, 5 s timer active (Chapter 8) • Door closed
ON	Blinking	ON	ON or OFF	ON or OFF	Check error code according to the table on the next page (Puls error definition)

Table 13

Pulse error definition:

Error No	Pulse code	Description
1	1 flash, 1 pause	Internal CabSafe 3D sensor error or manipulation: Check if CabSafe 3D sensor is damaged or has been covered. If not, then please replace CabSafe 3D sensor.
2	2 flash, 1 pause	Not used / reserved
3	3 flash, 1 pause	Invalid cegard/Smart controller configuration (chapter 6).

4	4 flash, 1 pause	Internal error, replace cegard/Smart controller.
5	5 flash, 1 pause	Not used / reserved
6	6 flash, 1 pause	Communication issue between cegard/Smart controller and CabSafe 3D sensor.
7	7 flash, 1 pause	Not used / reserved
8	8 flash, 1 pause	Not used / reserved
9	9 flash, 1 pause	General cegard/Smart controller system error (IC temperature, voltage, …)

Table 14

Blinking code:
Flash = 300 ms On / 300 ms Off
Pause = 1’800 ms

12.2 Gateway PCB LED status description

The Gateway PCB has LED indicators to provide system status. These LEDs are located as shown in Figure 23.

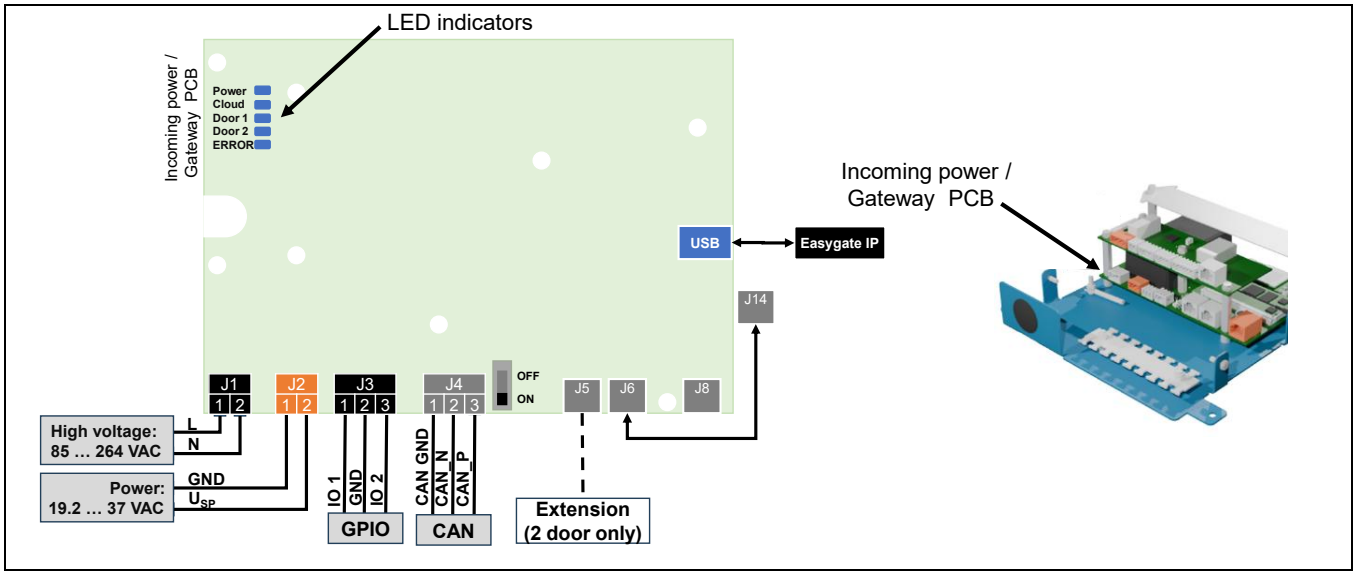

Figure 23: LED Indicators Gateway Interface PCB

Power (green)	Cloud (green)	Door 1 (green)	Door 2 (green)	ERROR (red)	Action
OFF	OFF	OFF	OFF	OFF	• Check electrical connections from controller to power supply.
Flash	X	X	X	X	• Normal operation that indicates that an IoT Edge software update is in progress. This does not affect SIB performance nor the output relay that indicates object presence.
ON	OFF	X	X	X	• Not connected to the CEDES Elevate cloud.
ON	OFF or FLASH	X	X	X	• OFF: Not connected to 4G communication. • 2 pulse / Pause: Connecting to 4G communication. • 3 pulse / Pause: Provisioned but no network connection.
ON	X	OFF	X	X	• Check internal connection to sensor connection PCB.
ON	X	X	OFF	X	• Check connection to extension module.
ON	X	X	X	OFF or FLASH	• ON: HW error – Contact CEDES. Hardware replacement may be required. • 1 pulse / pause: IoT-HW configuration mismatch on internal SIB PCB. Check configuration. • 2 pulse / pause: IoT-HW configuration mismatch on extension module. Check configuration. • 3 pulse / pause: Network error during the 4G communication. Gateway tries to connect but fails. Move elevator so that LTE/ cellular coverage is sufficient for onboarding.

Table 15

13 Maintenance

Although the cegard/Smart controller does not need regular maintenance, a periodic functional check is strongly recommended:

► Make sure the optical elements are clear of dirt and dust. If necessary, clean the front surface of the connected sensors with a soft towel.
► Make sure the edges are securely fastened.
► Check the mounting position, cable routing and connection of the sensors.

14 Disposal

The cegard/Smart system or components of the cegard/Smart 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 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.

15 Product label

Figure 24: Product label examples for cegard/Smart controller and extension module

CGSM-B	
ON 1xx xxx	Part Number used for ordering
PN 1yy yyy	Internal CEDES component part number
cegard/Smart Controller CGSM-B	Description of the cegard/Smart controller variant
Lot Number	Manufacturing date (yymmdd), manufacturing job number (8-digits), employee number responsible for final test (5-digits), and incremented serialization (5-digits)
HW: a.bc	Increasing digits with the following meaning: **a.__:** Major changes, e.g. additional functionality **_.b_:** Changed configuration (e.g. timing), error correction, bug fix, new compilation, no additional functionality **_._c:** 'Cosmetic' update, no functional influence
SW: a.bc	Increasing digits with the following mean: **a.__:** Major changes e.g. additional functionality on the non-IoT function **_.b_:** Changed configuration of the non-IoT functionality **_._c:** Minor software change to the non-IoT functionality

Table 16

16 Delivery package

The cegard/Smart controller and the EasyGate IP is shipped with smaller accessories in one box. The longer items (i.e., cegard/Smart light curtain and associated accessories) are shipped in a separate box. Connection plugs associated with the sensors (i.e., cegard/Smart light curtain, CabSafe 3D sensor), that connect to the cegard/Smart controller are shipped with the sensors.

17 Accessories

17.1 Magnetic switch

A magnetic switch and actuator are available for use with the cegard/Smart controller to precisely render the CabSafe 3D sensor inoperative at a fixed point.

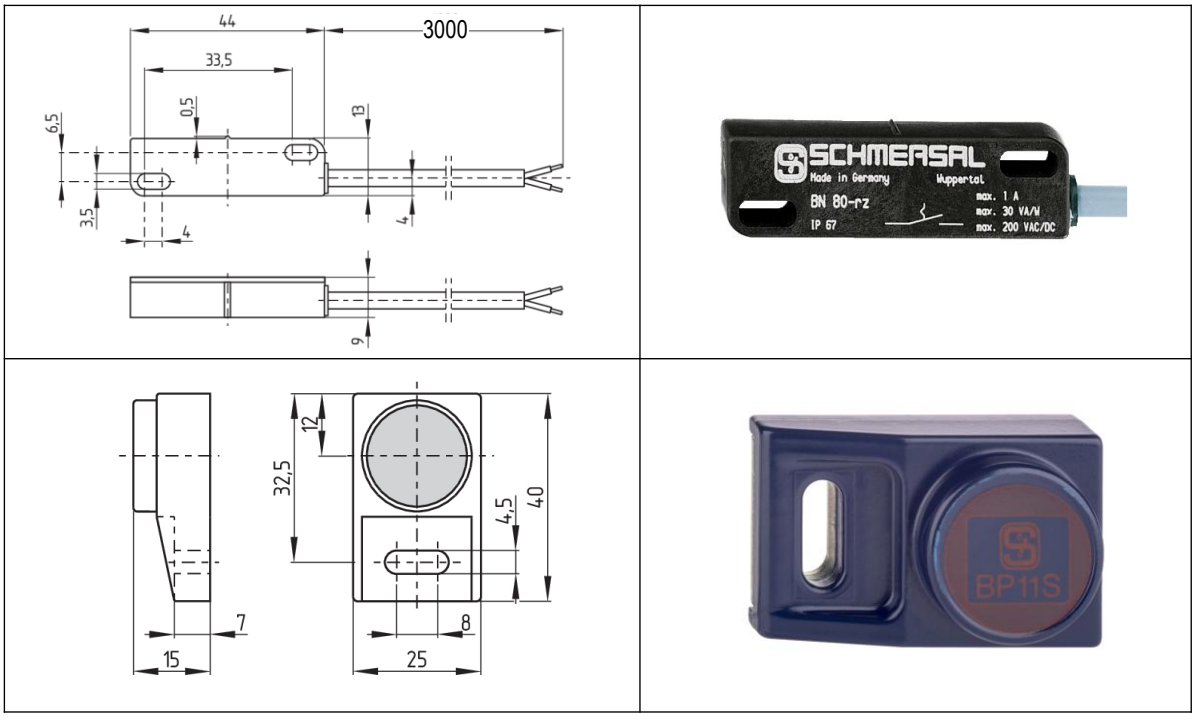

Figure 25: Dimensions door position sensor

Type	Switch: BN 80-RZ
Housing	Thermoplastic enclosure
Contact type	Bistable, 1 reed contact
Enclosure rating	IP67
Range actuating magnet BP 11 S	10 … 30 mm
Cable length	3m, 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_{SP}=24VDC
Mechanical life (operations)	10^9
Weight	26 g

Table 17: Technical data magnet switch

Type	BP 11 S
Housing	Metal
Weight	40 g

Table 18: Technical data actuator

18 Technical data

18.1 cegard/Smart controller and extension

MECHANICAL	
Dimensions (w x h x l)	
Controller	250 × 191 × 110 mm (9.84 × 7.52 × 4.33 in)
Extension	153 × 148 × 45 mm (6.02 × 5.82 × 1.77 in)
Housing material	Metal
Housing color	Blue
Netto weight	
Controller	2 kg
Extension & cable	0.9 kg
Enclosure rating	IP20
Temperature range	
Operation	-30 °C ... +50 °C (-22 ˚F ... +122 ˚F)
Humidity	Max. 95%, non-condensing
Max. altitude	2,000 m above sea level

ELECTRICAL	
Supply voltage USP	
- Low voltage (J2) DC input	19.2 … 37 VDC
- High voltage (J1) AC input	100 … 240 VAC
Max. power-up time	
Typ. power consumption (LC / 3D sensor):	
- 1x Light curtain (LC)	10 W
- 1x LC + 1x 3D-sensor	20 W
- 2x LC + 2x 3D-sensor + extension	45 W
Inrush current (including LC and 3D sensor):	
- At 24 VDC	500 mA RMS
- At 115 VAC	350 mA
- At 230 VAC	200 mA
Output	1x NC/NO relay 2x Solid state (Push-Pull) 1x CAN
Max. relay current	200 VAC / 5 A 125 VDC / 0.5 A 30 VDC / 5 A
Min. switching current (relay)	0.1 A / 5 VDC
Max. number of mechanical relay operations	> 20 ×10^6
Max. relay switching voltage	300 VDC
Typical system response time	
- CabSafe 3D	< 250 ms
- cegard/Smart 2D	20 ms + response time cegard/Smart LC
Output voltage Push-Pull outputs	+24 VDC ± 20% (short circuit approved)
Max. output load (Push-Pull)	100 mA, 100 nF
CGSM-B-OR1 Push pull output designation	
- IO1 (Bed detection)	0 VDC - No bed inside 24 VDC - Bed inside
- IO2 (Wheelchair detection)	0 VDC - No wheelchair inside 24 VDC – Wheelchair inside
CGSM-B-PC1 Push pull output designation	
- IO1 (passenger detected)	0 VDC - No person detected 24 VDC (100ms)- 0 VDC (100 ms) – Rectangular pulse per passenger
- IO2	na
CAN-Interface	Contact CEDES for more information

NOTICE

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 system response time can increase significantly when surge suppression diodes are used.
- ► Never install suppressors directly across the contacts of a connected relay.

The relay output of a cegard/Smart controller is not monitored. A stuck at high of a welded relay contact of a cegard/Smart control unit may lead to a dangerous situation. To ensure detection of a stuck relay, the elevator control system should monitor that a change of state has occurred after a pre-determined number of door motions.

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
RoHS, REACH	2011/65/EU, 1907/2006 EU
FCC*	2014/30/EU, 2014/33/EU Class B
-	

18.2 Controller connectors

Connection	Type	Plug type
AC Power	2-pin (J1)	SAURO CIF02003 (*)
DC Power	2-pin (J2)	WAGO 231-302 (*)
GPIO	3-pin (J3)	SAURO CBF030L8 (*)
CAN	3-pin (J4)	WAGO 734-103 (*)
Door 2	RJ-45 (J5)	Used for connection to cegard/Smart extension module
Door 1	RJ-45 (J6)	Internal connection to sensor connection PCB
Ethernet	RJ-45 (J8)	Reserved
Relay output	3-pin (J9)	WAGO 231-303 (*)
External signal	2-pin (J10)	WAGO 734-102 (*)
cegard/Smart 2D Rx	4-pin (J11)	WAGO 734-104 (*)
cegard/Smart 2D Tx	4-pin (J12)	WAGO 734-104 (*)
CabSafe 3D sensor	4-pin (J13)	WAGO 734-106 (*)
Gateway	RJ-45 (J14)	Internal connection to Gateway PCB (J6) or from an extension module to Gateway PCB (J6)

(*= or equivalent)

18.3 EasyGate IP

For the technical data of the EasyGate IP, device please check the documentation available on the CEDES homepage.

19 Dimensions

19.1 cegard/Smart CGSM-B-*

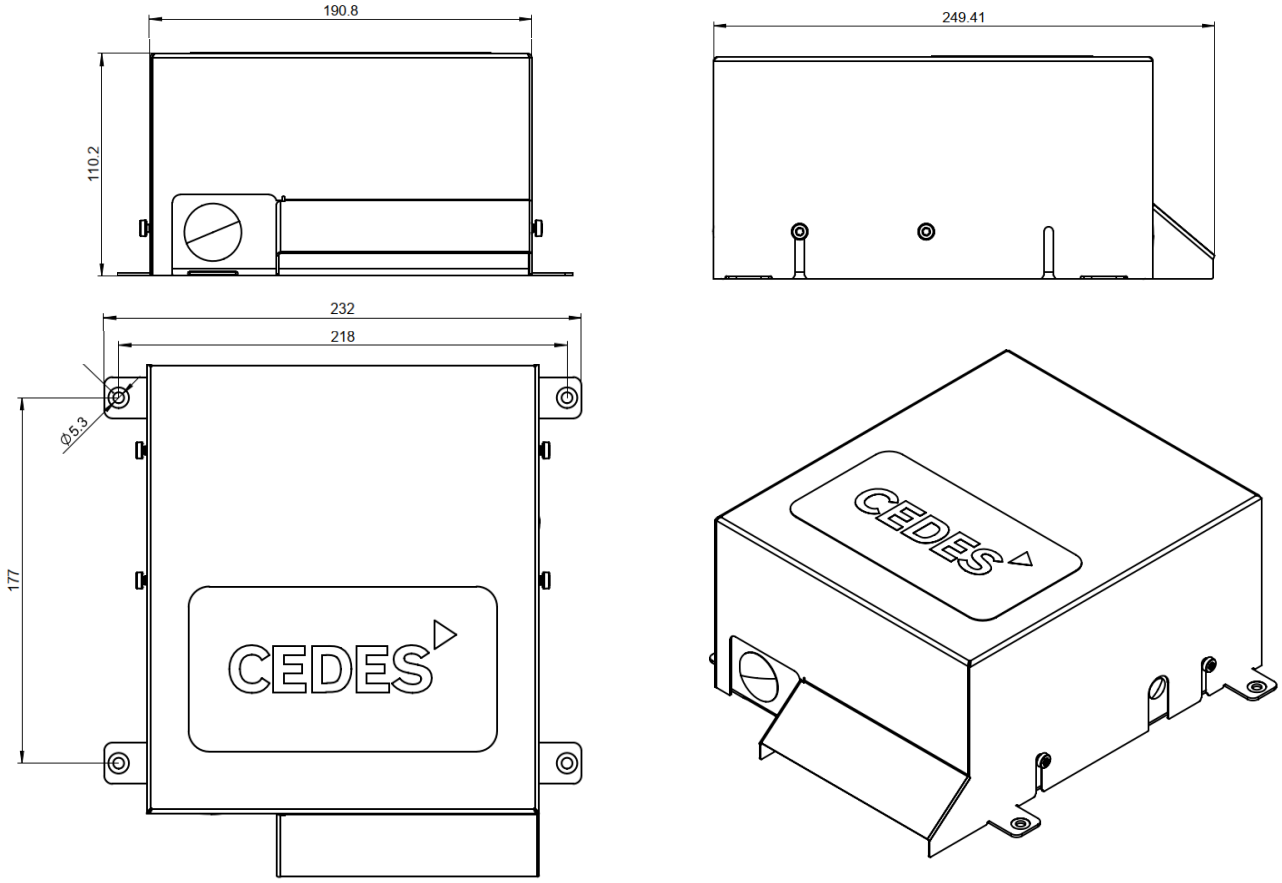

Figure 26: Dimensions cegard/Smart-B controller (in mm)

19.2 Extension module

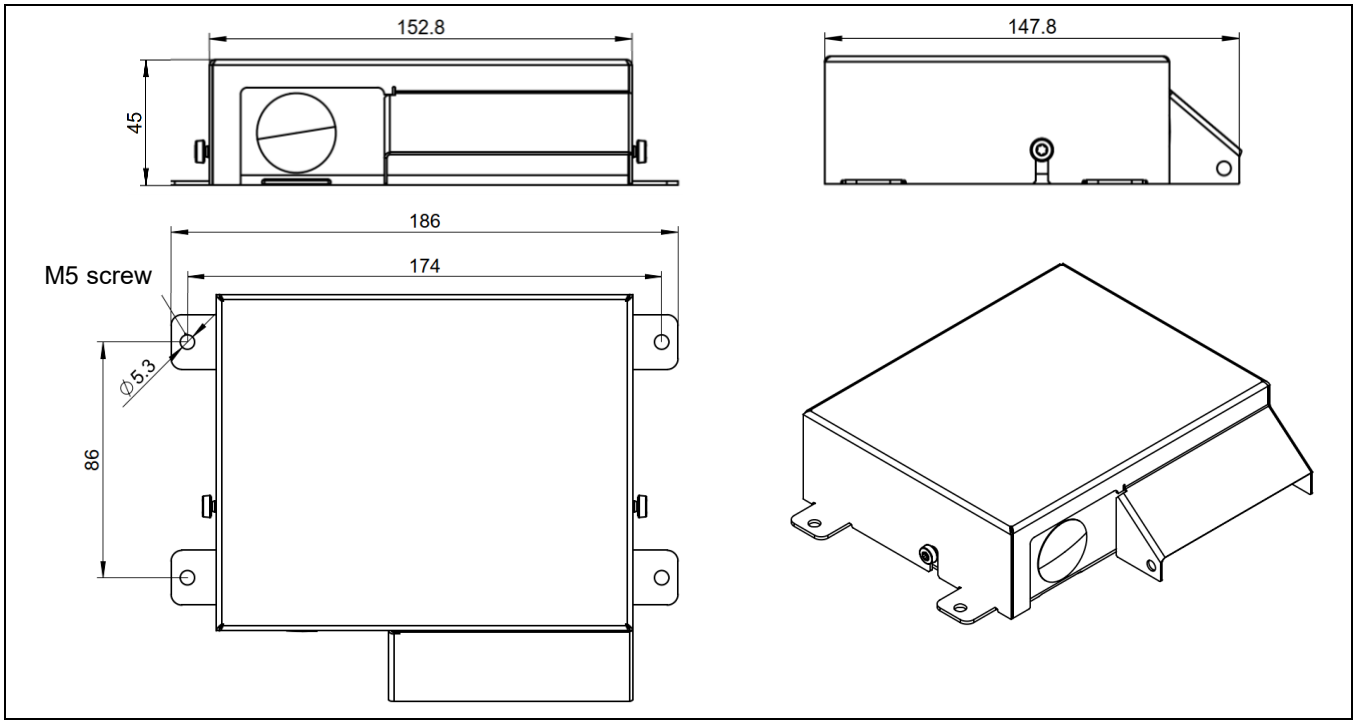

Figure 27: Dimensions cegard/Smart extension module

19.3 EasyGate IP

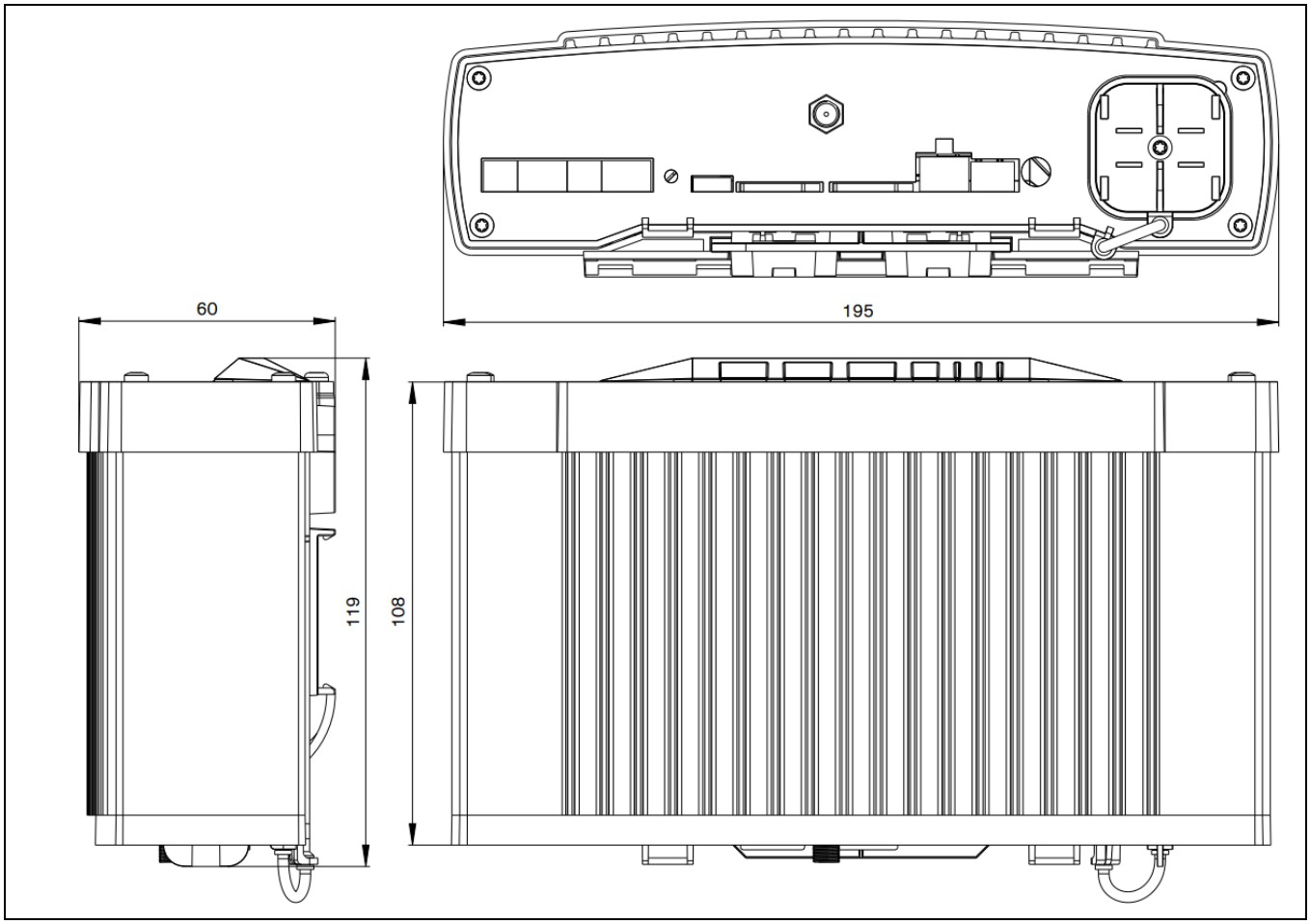

Figure 28: Dimensions EasyGate IP