

GridScan/Mini

Installation and Operation Manual

Vezava opisana na koncu dokumenta!



CEDES AG is certified according to ISO 9001: 2015

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1. About this manual

2 The "GridScan/Mini Installation and Operation Manual" is the legally binding version and features metric and US measurements.

2

2 The version number is printed at the bottom of each page.

3

3 To make sure you have the latest version, visit www.cedes.com where this manual and related documents can be downloaded.

3

4 1.1 Measurements

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

4

5 1.2 Related documents

5 GridScan/Mini datasheet

6 001 194 en

6

7 1.3 CEDES headquarters

7 CEDES AG

7 Science Park

8 CH-7302 Landquart

8 Switzerland

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2. Safety information

IMPORTANT
READ BEFORE INSTALLATION!

The GridScan/Mini 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 GridScan/Mini 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 GridScan/Mini may cause customer complaints, serious call backs, damage, injury or death.

2.1 Non-intended use

The GridScan/Mini **must not** be used for:

- Equipment in explosive atmospheres
- Equipment in radioactive environments




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

3. Symbols, safety messages

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


Warning of serious health risks

**WARNING**
Serious health risks

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

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

Caution of possible health 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

The GridScan/Mini is a very compact, SIL 2 certified safety light curtain, designed to safeguard any type of automatic door and gate. It has a maximum operating range of 10 m (33 ft) and can handle door speeds of up to 2.5 m/s (8.2 ft/s). The effective door speed has to be evaluated as it depends on the specific application.

The emitter and receiver edges can be installed directly into the guide rail or to the front or the back of the door. Therefore a blanking version as well as a static version (without door blanking) are available. In addition the GridScan/Mini features a unique Frequency Safety Signal, allowing operation according to EN ISO 13849-1:2008 Cat. 2 without periodic testing of the light curtain. This output is included in the TÜV certification of the GridScan/Mini.



Figure 1: Typical GridScan/Mini application environments

4.1 Features of the GridScan/Mini

- Criss-cross beams
- Safety Cat. 2 without testing FSS output
- Direct integration into the door edge (SB and DB type)
- TÜV approved
- Door speeds up to 2.5 m/s (8.2 ft/s)
- Waterproof housing (IP67) and a very high light reserve make GridScan/Mini insensitive to dust, dirt and water
- Electrical synchronization for increased light and strobe immunity
- Short-circuit proof semiconductor output PNP/NPN (push-pull) or FSS output
- Cross section of only 12 mm × 16 mm, side and front mounting possible

4.2 Types - GridScan/Mini

• SB type

The SB type features door blanking and a resolution according to EN 12978:2009. This means there are different resolutions along the length of the edges.

Important: Only the SB type is certified according to EN ISO 13849-1:2008 and EN 12978:2009 if the door is monitored over its full height up to 2.5 m (8.2 ft).

• SB type

The DB type also features door blanking but the resolution is not defined by a standard.

Important: The DB type is certified according to EN ISO 13849-1:2008 but not according to EN 12978:2009.

• ST type

The ST type has no door blanking feature implemented. It can be used as a Cat. 2 safety light curtain for different applications.

Important: The ST type is certified according to EN ISO 13849-1:2008 but not according to EN 12978:2009.

4.3 Type description

GRS/Mini – aa – bbbb – cc, dd, e, f, gg, hh

aa	:	SY	System
		Tx	Emitter
		Rx	Receiver
bbbb	:	Edge length in mm	
cc	:	Number of elements	
dd	:	SB	Safe blanking
		DB	Door blanking
		ST	Static
e	:	N	Output 1 - PNP/NPN (push/pull)
		F	Output 1 - FSS
f	:	–	Test active LOW
		H	Test active HIGH
gg	:	Output 1 (see Chapter 8.1.3) factory settings	
hh	:	Output 2 (see Chapter 8.1.4) factory settings	

Figure 2: Type description

Example:

• GRS/Mini SY-2590-24, SB, N
GridScan/Mini system, 2590 mm edge length, 24 elements, safe blanking, Output 1 (PNP/NPN)

5. Overview

The emitter and receiver edges create a grid of infrared beams offering up to 2.5 m (8.2 ft) in protection height. When the infrared beams are interrupted, the output sends a signal to the connected door controller. As soon as the detection area is clear again, the output switches to indicate that the area is "clear". The blanking system (SB and DB types, Chapter 4.2) is designed to mount directly into the guide rails. As the door closes, the GridScan/Mini recognizes the door as such and does not switch the output.

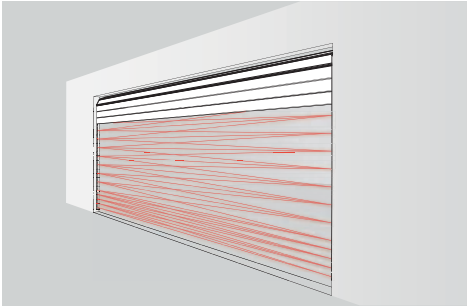


Figure 3: Sectional doors with door blanking (SB and DB types)

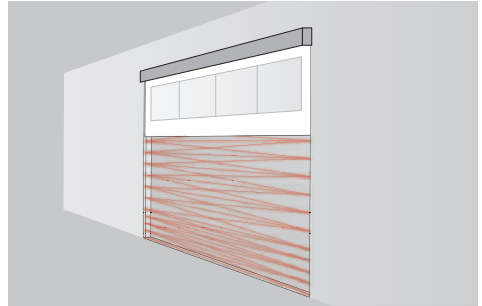


Figure 4: High-speed doors with door blanking (SB and DB types)

5.1 Delivery package

The GridScan/Mini comes with a customer-specific delivery package. A typical delivery package contains:

- 1 × GridScan/Mini emitter edge (Tx)
- 1 × GridScan/Mini receiver edge (Rx)
- 1 × Synchronization cable 10 m (33 ft)
- 1 × Connection cable 5 m (16.5 ft)
- 1 × Installation and Operation Manual

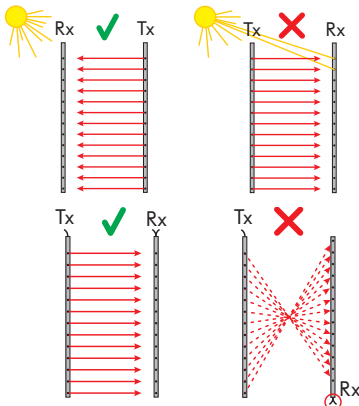


Figure 5: Typical GridScan/Mini delivery package

5.2 General instructions and precautions



- ▶ Never scratch or paint the optical lenses because they form the light path! Do not drill additional holes into the profile. Unpack the profiles just before installation in order to avoid damage.
- ▶ Do not bend or twist the edges!
- ▶ Oil can damage the cables. Contamination must be avoided at all times!



- ▶ Although the GridScan/Mini is insensitive to direct sunlight, avoid all unnecessary exposure if possible, most especially to the receiver.
- ▶ Avoid interference from blinking lights or infrared light sources such as photo cells or other light curtains.
- ▶ Do not install the GridScan/Mini in places where the emitter and receiver edges are directly exposed to light sources such as FL tubes or energy saving lamps.
- ▶ Make sure to place the connection plugs for both the emitter and receiver at the same end.

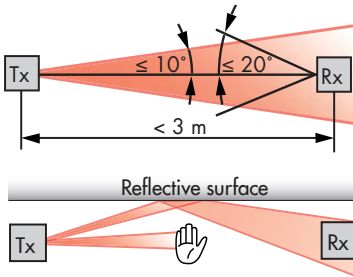


CAUTION Damage to the eye

Although the GridScan/Mini does not emit dangerous amounts of infrared light, long exposure to intense infrared light sources can result in damage to the eyes.

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

5.3 Alignment



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

Reflective surfaces near to or parallel to the safeguarded area can cause reflections and interfere with the GridScan/Mini's functions. Keep a reasonable distance between the sensor edges and any reflective surface.

6. Application overview

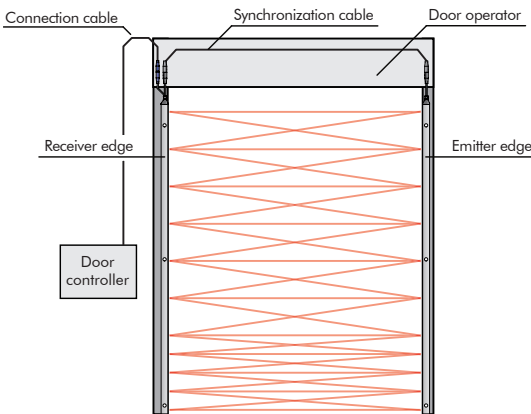


Figure 6: GridScan/Mini application (overview)

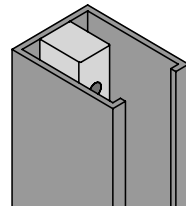


Figure 7: GridScan/Mini with door blanking (SB and DB types)

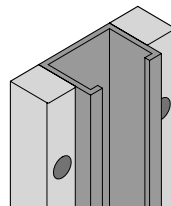


Figure 8: GridScan/Mini with static mounting (ST type)

6.1 Door blanking (SB and DB types)

The GridScan/Mini can differentiate between a light beam interruption caused by an object and a light beam interruption caused by the closing door. The GridScan/Mini does this by analyzing the different interruption patterns.

Closing door interruption pattern:

The light beam interruption of a closing door starts at the topmost beam going downwards. There are two ways to achieve blanking:

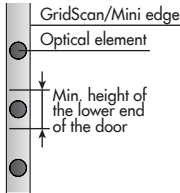


Figure 9.1 Door blanking through door edge

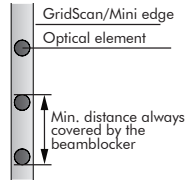


Figure 9.2 Door blanking through beam blocker

When the GridScan/Mini is integrated into the guide rail, the door moves directly in front of the light curtain. This means the lowest section of the door needs to be at least 30 mm in height to ensure that at least one element is completely covered. It is also essential that the door's leading edge extends the full distance between the light curtain's emitter and receiver (Figure 9.1).

If the light curtain is located either in front of or behind the guide rail, the descending door will not interrupt the active beams. However, blanking may still be required if any part of the door (e.g. cable) interrupts the light curtain. A beam blocker can be used but it must be mounted so that at least one element is continuously covered during door closure (Figure 9.2).

7. Installation



WARNING

Electrical and mechanical hazards

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

- ▶ Follow all applicable safety measures.
- ▶ Use only specific and approved tools.
- ▶ If the GridScan/Mini has to be adjusted, the main power supply must be switched off and marked as out of service.

NOTICE

Mechanical damage to the GridScan/Mini

- ▶ Do not drill additional holes into the light curtain.
- ▶ Do not overtighten the mounting screws.
- ▶ Mount the edges on a flat surface.

1. Switch off main power to the door control unit and mark clearly that this system is out of service before performing any work on the system.

2. Mount the receiver edge on one side of the door.

Important for SB and DB types:

Mount the receiver edge into the guiding rail next to the door control unit (Figure 7).

Important for SB type:

In order to fulfill EN 12978:2009 the lower end of the edges have to be at the level of the door closed position.

Important for ST types:

If the GridScan/Mini is statically mounted (Figure 8) the door must not interrupt the beams (without door blanking).

3. Mount the emitter edge across from the receiver edge. If the receiver is mounted in the guiding rail the emitter should be mounted in the guiding rail opposite the receiver. Make sure the optical elements are facing each other (Chapter 5.3).
4. Connect the emitter with the receiver edge using the synchronization cable.
5. Plug the connection cable into the blue plug on the receiver edge and connect it to the door controller (Chapter 8).

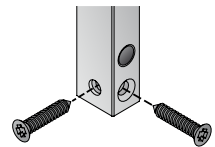


Figure 10: Front and side mounting

8. Electrical connection

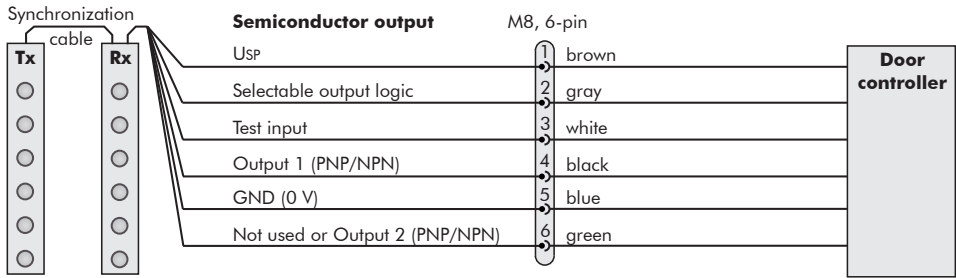


Figure 11: Connection diagram semiconductor output

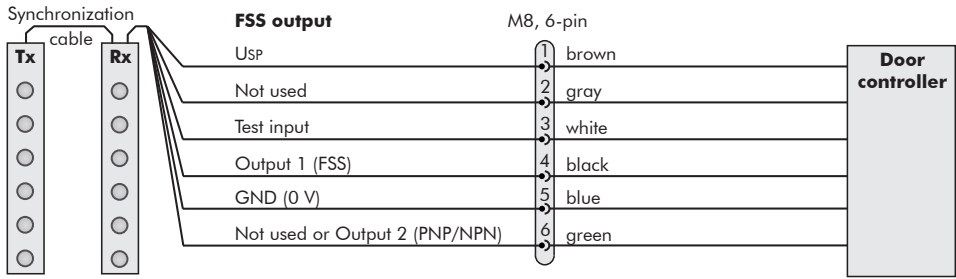


Figure 12: Connection diagram FSS output

Important: Any unconnected (not used) wire must be separated and isolated.

8.1 Outputs

When an object enters the safeguarded area (OBJECT DETECTED) the GridScan/Mini output changes after response time t_2 (Chapter 9). When the object leaves the surveillance area (NO OBJECT) the GridScan/Mini output switches back after release time t_3 .

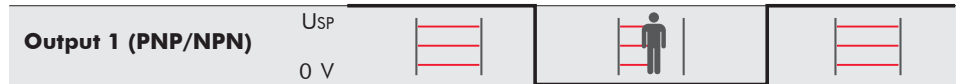
8.1.1 Changing the output 1 (PNP/NPN) logic

Output 1 (PNP/NPN) logic is set using the gray wire. The default logic is LO (light-on); Chapter 9. The output logic is LO if the gray wire is connected to GND (0 V). Connecting the gray wire to Usp (10 ... 30 VDC) changes the output logic to DO (dark-on); Figure 11 and Figure 13.

Gray wire	Output 1 (PNP/NPN) logic
Connected to GND (0 V)	LO
Connected to Usp	DO

Table 1: Output 1 (PNP/NPN) logic selection table

LO/DO selector connected to GND (0 V)



LO/DO selector connected to Usp



Figure 13: Output 1 (PNP/NPN) logic

8.1.2 FSS output (Frequency Safety Signal)

The FSS is a 1 kHz safety output allowing for safeguarding according to EN ISO 13849-1:2008, without using a test signal.

As long as the safeguarded area is free, the FSS output sends a 1 kHz signal. When an object enters the safeguarded area (OBJECT DETECTED) the FSS output switches to LOW/GND (0 V). When the object leaves the safeguarded area (NO OBJECT) the frequency starts again (Chapter 9).

8.1.3 Output 1 - factory settings

Output 1 is delivered in the following versions. The settings refer to the "gg" type description (see Chapter 4.3).

, gg	-	SB and DB type	Output 1 switches when person/object is detected or 3 seconds after door closure (reactivates when the lowest element is 'free' again).
		ST type	Output 1 switches when person/object is detected.
, 1D		SB type	Output 1 switches when person/object is detected or 3 seconds after door closure (reactivates when the 13th element from the bottom (484 mm) is 'free' again).
, 1E		SB type	Output 1 switches when person/object is detected or 3 seconds after door closure (reactivates when the 20th element from the bottom (1800 mm) is 'free' again).
, 1G		SB and DB type	During testing the safeguarded area must be 'free'. Output 1 switches when person/object is detected.

Important: The number '1' stands for Output 1.

Example:

- GRS/Mini SY-2590-24, SB, F, 1E

GridScan/Mini system, 2590 mm edge length, 24 elements, safe blanking, Output 1 (FSS), Output 1 switches when person/object is detected or 3 seconds after door closure

Other options are available on request.

8.1.4 Output 2 - factory settings

Output 2 (PNP/NPN) is delivered in the following versions. The settings refer to the "hh" type description (see Chapter 4.3).

, hh	-		Standard - no Output 2
, 2Z		SB type (optional)	Output 2 switches when person/object is detected using the single-element detection method (13th element from the bottom, 484 mm).

Important: The number '2' stands for Output 2.

Other options are available on request.

8.2 Test input

To fulfil EN ISO 13849-1:2008 the GridScan/Mini with PNP/NPN output (N type) must be tested by the door controller before each door closing cycle.

The GridScan/Mini is available in the standard version with "Test active LOW" and with a "Test active HIGH" version also available (Chapter 4.3).

Important: When the FSS output is used, using the test input is not necessary to achieve safeguarding according to EN ISO 13849-1:2008.

9. Timing diagram

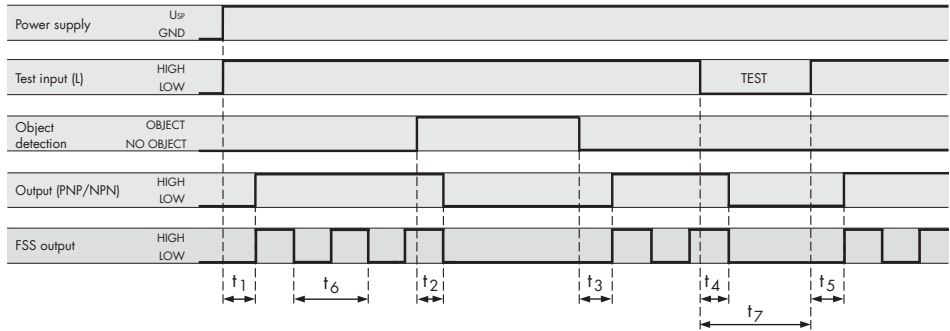


Figure 14: General timing diagram

	Time	Value [ms]
Power-up time	t ₁	max. 2,500
Response time with 32 elements	t ₂	typ. 90 max. 175
Release time	t ₃	typ. 90 max. 175
Test response time	t ₄	max. 100
Restart time	t ₅	max. 200
FSS sequence time	t ₆	1
Test time	t ₇	> 100

Table 2: General timing table

	PNP	NPN
Power supply U _{sp}	10 ... 30 VDC	10 ... 30 VDC
Power supply GND	0 V	0 V
Test input HIGH	> 10 VDC	> 10 VDC
Test input LOW	< 2 VDC	< 2 VDC
Output HIGH	> U _{sp} - 2 VDC	high impedance
Output LOW	high impedance	< 2 VDC

Table 3: General value table

10. Start-up

1. Switch on mains and power-up the door control unit. The LED on the receiver edge blinks during the start-up phase.
2. Check the LED on both edges (power, status).
3. Test if the system is working correctly by letting the door open and close, interrupting the light during the opening and closing process.

11. LED status description

Receiver edge (Rx)

Green LED	Red LED	Sensor status
●	○	Light curtain free
○	●	Safeguarded area interrupted or door closed
○	⦿	Start-up (slow blinking)
○	⦿	Internal malfunction (fast blinking)
○	○	No power or edge is defective (see Chapter 12)

Table 4: LED status description receiver edge

● = LED on ○ = LED off ⦿ = LED blinking

Emitter edge (Tx)

Green LED	Sensor status
●	Power OK
○	No power or edge is defective (see Chapter 12)

Table 5: LED status description emitter edge

12. Troubleshooting

Emitter edge (Tx)	Receiver edge (Rx)	Action
LED off	LED off	<ul style="list-style-type: none"> ▶ Check electrical connections. ▶ Check supply voltage of the door controller.
LED off	LED red	<ul style="list-style-type: none"> ▶ Check the connection of the synchronization cable.
LED green	LED always green (even when interrupted)	<ul style="list-style-type: none"> ▶ Make sure the sensor edges are not mounted close to any shiny or reflective surface. ▶ Restart the system.
LED on/off	LED on/off (flickering red)	<ul style="list-style-type: none"> ▶ Check power supply. ▶ Check connections.
LED green	LED on/off, min. 100 ms off (red, slow blinking, frequency depends on the number of elements)	<ul style="list-style-type: none"> ▶ Make sure the safeguarded area is clear of interruption. ▶ Check the alignment of the light curtain. ▶ Clean elements.
LED green	LED switching between red (interrupted) and green (free) (sporadically flickering)	<ul style="list-style-type: none"> ▶ Make sure the safeguarded area is clear of interruption. ▶ Clean the elements. ▶ Make sure that the cables and edges are located away from sources of electromagnetic interference. ▶ Ensure that the emitter and receiver are correctly aligned and remain so during door closure (e.g. that vibrations do not cause edges to become misaligned). ▶ Restart the system.
LED green	LED always red	<ul style="list-style-type: none"> ▶ Make sure the safeguarded area is clear of interruption. ▶ Reopen door completely. ▶ Clean the elements. ▶ Check the alignment of the light curtain. ▶ Check that the test input is connected to the test output signal of the door control unit and that the signal level and logic (HIGH/LOW) are correct. If the test input is not used, connect it permanently to Usp. ▶ Measure the Usp voltage. ▶ Restart the system.
LED off	LED on/off, min. 100 ms off (red, slow blinking, frequency depends on the number of elements)	<ul style="list-style-type: none"> ▶ Check the connection of the synchronization cable.
LED green	LED on/off (red, fast blinking, 5 Hz)	Internal error occurred <ul style="list-style-type: none"> ▶ Restart the system. ▶ Replace Rx edge.

Important: Whenever a parameter is changed, the system must be restarted.

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

13. Maintenance

Although the GridScan/Mini 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 with a soft towel.
- ▶ Make sure the edges are securely fastened.
- ▶ Check the mounting position, cable routing and connection of the 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.

14. Disposal

The GridScan/Mini 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.

15. Technical data

Optical

Operating range	1...10 m (3 ... 33 ft)
Number of elements	4 ... 50
Aperture angle at 3 m (at 10 ft)	Tx: $\leq \pm 10^\circ$ and Rx: $\leq \pm 20^\circ$
Max. ambient light	100,000 Lux

Mechanical

Cross section	12 mm × 16 mm (0.47 in × 0.63 in)
Max. protection height	2,500 mm (98.5 in)
Housing material	Natural anodized aluminum
Enclosure rating	IP67
Temperature range	-40 °C ... +60 °C (-40 °F ... +140 °F)

Electrical

Supply voltage Usp	10 ... 30 VDC
Current consumption at 24 VDC	100 mA
Output	PNP/NPN (push-pull) or FSS
Output load	100 mA, 100 nF
Typ. response time with 32 elements	90 ms
Max. door speed	2.5 m/s (8.2 ft/s)
Status LED Rx:	
- Object detected	Red
- No object detected	Green
Power LED Tx:	
- Power OK	Green

Connection cable and electrical connection

Synchronization cable

Length	10 m (33 ft)
Diameter	Ø 3.5 mm (Ø 0.14 in)
Material	PVC, black
Plug color	Black
Wires	AWG26
• brown	Usp
• blue	GND (0 V)
• black	Communication
• white	Test signal

Connection cable

Length	5 m (16.5 ft)
Diameter	Ø 4.2 mm (Ø 0.17 in)
Material	PVC, black
Plug color	Blue
Wires	AWG26
• brown	Usp
• blue	GND (0 V)
• black	Output 1 (PNP/NPN or FSS)
• white	Test input
• gray	Selectable output logic
• green	Not used or Output 2 (PNP/NPN)

Types

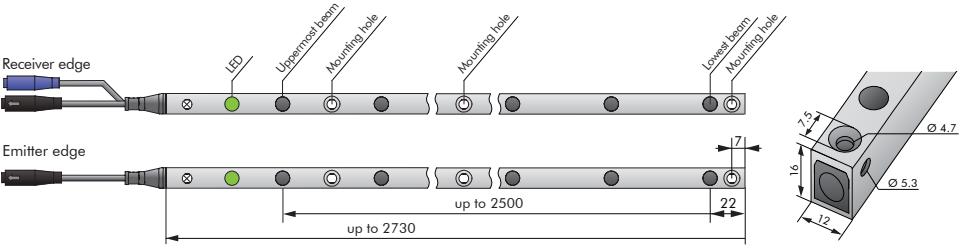
GridScan/Mini SB	With door blanking feature according to EN 12978:2009
GridScan/Mini DB	With door blanking feature
GridScan/Mini ST	For static applications without door blanking function

General

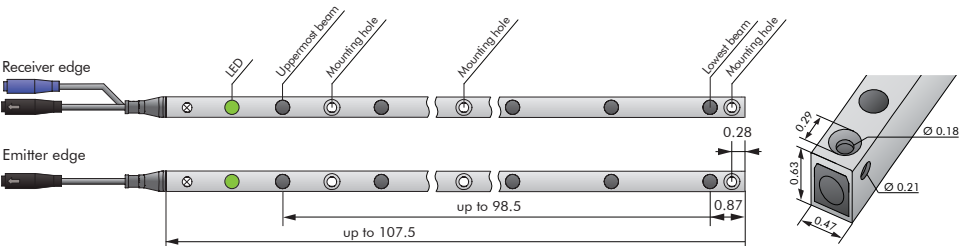
EMC emission	EN 61000-6-3:2007 EN 12015:2014
EMC immunity	EN 61000-6-2:2005 EN 12016:2013
Vibration	IEC 60068-2-6:2007
Shock	IEC 60068-2-27:2008
RoHS	2011/65/EU
Certificates	CE, TÜV
Safety categories	EN ISO 13849-1:2008, Cat. 2, PL D (excl. IEC 61496-2:2006) EN 61508:2011, SIL 2 EN 12978:2009 (SB type)
Applicable standards	UL 325:2012

16. Dimensions

Metric measurements (all dimensions in mm)

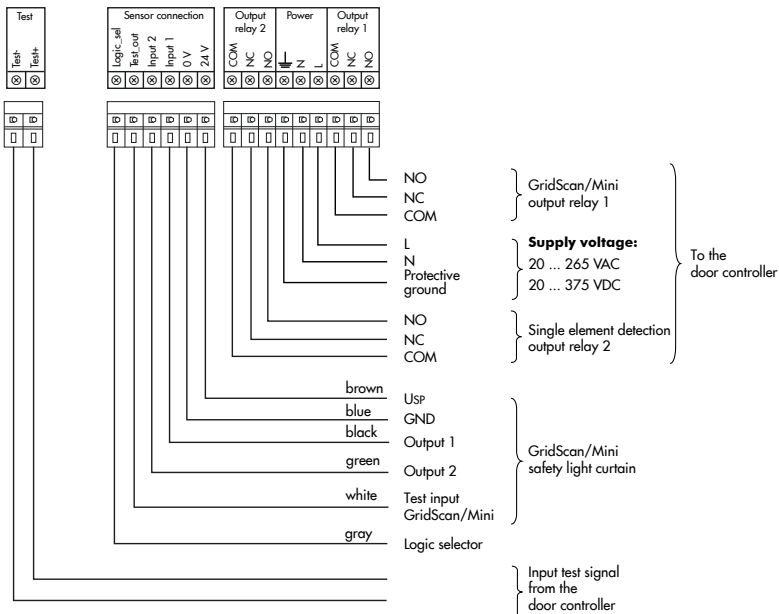


US measurements (all dimensions in inches)

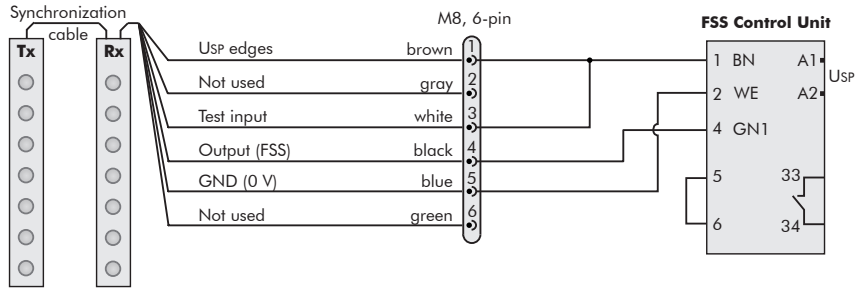


17. Connection diagram

17.1 UPS Plus (Universal Power Supply Plus)

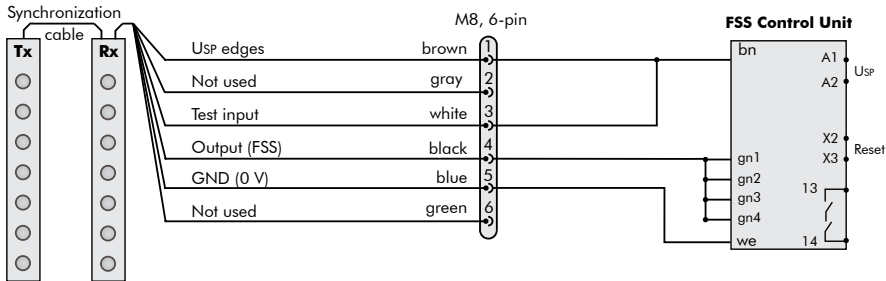


17.2 FSS Control Unit



Supply voltage	24 VDC or 230 VAC
Dimensions	130 × 94 × 57 mm
Enclosure rating	IP56
Certificates	CE, TÜV
Safety category	EN ISO 13849-1 2008 Cat.3 PL C
Ordering information	Part No. 112 183 (24 VDC) Part No. 113 119 (230 VAC)

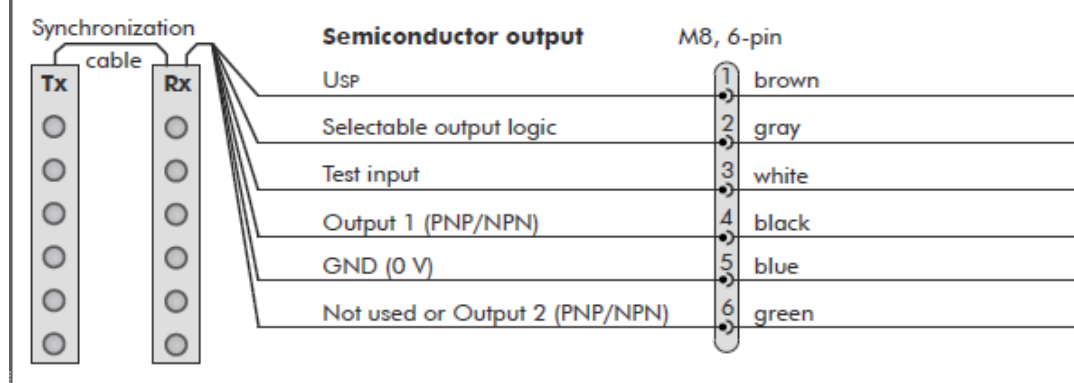
17.3 FSS Control Unit (for DIN-rail)



Supply voltage	24 VAC/DC
Dimensions	22.5 × 100 × 120 mm
Enclosure rating	
- Housing	IP40
- Terminal	IP20
Certificates	CE, TÜV
Safety category	EN ISO 13849-1:2008 Cat.3 PL D
Ordering information	Part No. 112 184

CEDES GridScan/Mini

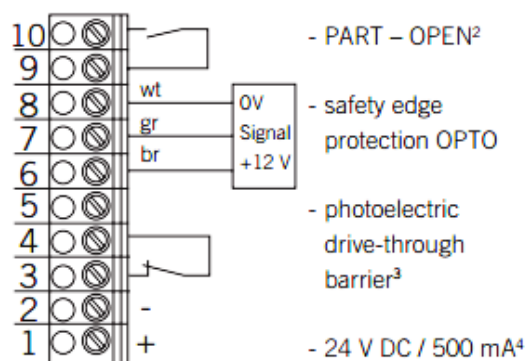
8. Electrical connection



CS 300

Terminal block X4

(for optoelectronic safety edge protection)



GridScan

CS 300

Rjava + bela	----->	1 (+ 24 V DC)
Modra	----->	2 (- 24 V DC)
Črna	----->	7 (signal) (na mesto zelene OSD*)
Zelena + siva	----->	ni uporabljeno

* OSD = Optical Sensing Devices

CS 300

GridScan se veže na letev X4

Zelena dioda v krmilju prikazuje stanje OSD.

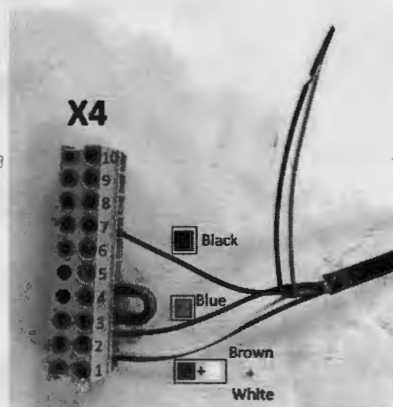
Oranžna dioda v krmilju prikazuje stanje varnostnih stikal.

OPOMBA;

Ko se GridScan zveže v krmilje, zelena dioda ne posveti. Ko se vrata odprejo in sprostijo fotocelice, se zelena dioda prižge in varovanje začne delovati pri zapiranju. Ko so vrata popolnoma zaprta lahko zelena dioda spet ugasne.

VRATA SE LAHKO NASTAVIJO TUDI ČE ZELENA DIODA NE GORI!!!

LIGHT CURTAIN CEDES GRID SCAN



CS300 with Light curtain RAY LG 2526 / Cedes Grid Scan

Einstellung CS300 ab Rev 5.6A
SELBSTH. = MOD 4

