



Linde Safety Guard

Original instructions

Linde – Your Partner



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The high quality of Linde products is also matched by the quality of our service. With ten production plants worldwide and an extensive network of sales partners, we are at your service round the clock and around the world.

Your local Linde partner can offer you a complete package from a single source; ranging

from expert advice on all aspects of sales and service through, of course, to appropriate finance options. Our leasing, hire or lease-purchase agreements provide you with the flexibility to tailor decision-making to your individual business requirements.

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Introduction

Linde Safety Guard assistance system

Linde Safety Guard assistance system

The Linde Safety Guard is an assistance system for the detection of and warning about dangerous situations in the working environment of industrial trucks.

Components

As standard, the assistance system contains the following components:

- Safety Guard display unit
- Safety Guard portable warning unit
- Safety Guard sensors
- Safety Guard inductive charging station

Other components and functions can be added to this version:

- Fifth Safety Guard sensor:
For warnings between industrial trucks
- Safety Guard communication unit:
As an alternative to the display unit
- Safety Guard communication unit from 10/2019
Communication unit in a new housing with CAN bus
- Static warning units:
For warnings at points that are difficult to see
- Safety Guard zone radio module:
For setting up zones in which a truck response must be triggered, e.g. a speed reduction
- Safety Guard active warning vest:
Warning vest with LED light conductors and integrated mobile warning unit for improved detection of persons.



NOTE

The power supply unit with the appropriate truck plug for the radio module is available separately.

➤ Contact your service partner.

Functional description

The Linde Safety Guard is a wireless assistance system for protecting people and ob-

jects in defined danger areas in industrial environments.

The system wirelessly measures the distance between the component mounted on the industrial truck, components at fixed positions in the working area and the mobile components that individuals carry on their person.

In this way, the assistance system can effectively use LED displays, warning sounds and vibrations to warn people of danger and help to avoid potential collisions with industrial trucks. Workplace safety is increased as a result. However, this does not exempt the driver and all people in the work place from their due responsibility and duty of care. Drivers and all other people must ensure that they are behaving in a safe manner in all situations.

For an early and effective warning, the Safety Guard display unit has two warning zones.

The extended area can be configured in such a way that it covers a cone-shaped area to the front and rear. Within this area, the direction towards people with a mobile warning unit is displayed. The immediate vicinity covers a circular area immediately around the industrial truck.

The size of the areas can be configured and must be adapted to the work environment before initial commissioning.

Installation report

The installation report is an agreement between the operating company and the service partner.

The report contains all framework conditions plus details of the configuration of the system and any adaptations made to the work environment.

The installation report is distributed as a form along with the technical documents. Once commissioning is complete, the Linde Safety Guard system is fully documented.

Intended use

The components of the Linde Safety Guard must only be used for their intended purpose. The safety information must be observed.

Restricted approval for use

Linde Safety Guard is approved for use in countries within the European Economic Area and in Turkey. Use in other countries is not authorised by Linde Material Handling.

The current EU declarations of conformity can be found at:

<https://www.linde-mh.com/en/About-us/Media/>

General

The Linde Safety Guard is a wireless assistance system for protecting people and objects in defined danger areas in industrial environments.

The components of the system can be used inside and outside and as mobile or fixed components.

If radio frequency interference at the place of use results in adjustments to suit local conditions, re-registration and approval may be necessary.

Usage

The components of the Linde Safety Guard are used in the working environment of industrial trucks.

The system wirelessly measures the distance between the component mounted on the industrial truck, components at fixed positions in the working area and the mobile components that individuals carry on their person.

The assistance system must not be used as a guide when visibility is poor.

Installation

Components fitted in buildings can be used on roll-up doors and in other danger areas where it is difficult to see, such as junctions. These components warn people about industrial trucks that are approaching or automatically brake industrial trucks.

The components on the industrial truck are permanently connected to the on-board electronics. Only competent persons with electrical knowledge and the relevant experience are permitted to install components at fixed points in the working area and to carry out servicing work and repairs.

The work can be carried out by the service partner.

Environment

The assistance system must be adapted by the service partner at the place of use. Incorrect installation or other wireless networks can cause malfunctions.

Only the service partner is permitted to make adjustments to suit local conditions in the event of radio frequency interference. In this situation, it may be necessary to register and obtain approval again.

➤ Carry out a functional test.

Active warning vest

This product may be used only as a component of the Linde Safety Guard wireless assistance system. It may be used only in countries for which the assistance system is approved.

Limitations for commissioning or for the permission to operate

									
BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR

Symbols used

HR	IT	CY	LV	LT	LU	HU	MT	NL	AT
PL	PT	RO	SI	SK	FI	SE	UK		

This LT2 system (Location Tracking System Type 2), which works in the range from 3.1 GHz to 4.8 GHz (see ECC/REC (11) 09 [i.8]), is intended for tracking people and objects in industrial applications at clearly defined locations. The sending terminals in this system may be located inside or outside and can be

permanently installed or mobile. The system operates at fixed locations and may require approval that requires coordination with possible interference devices with regard to possible malfunctions, ECC report 167 [i.10] and ECC report 170 [i.11].

Symbols used

The terms DANGER, WARNING, CAUTION, NOTE and ENVIRONMENT NOTE are used in these operating instructions for notes on particular hazards or for unusual information that needs to be highlighted:

DANGER

Means that failure to comply can cause risk to life and/or major damage to property.

WARNING

Means that failure to comply can cause risk of serious injury and/or major damage to property.

CAUTION

Means that failure to comply can cause risk of material damage or destruction.



NOTE

Means that particular attention is drawn to combinations of technical factors which may not be evident even to a specialist.



ENVIRONMENT NOTE

The instructions listed here must be complied with as otherwise environmental damage may result.



CAUTION

This label is found on the truck in the areas where particular care and attention are required.

You should refer to the appropriate section in these operating instructions.

For your safety, additional symbols are also used. Please heed the various symbols.

2

Safety

Safety information

Safety information

The operating company must ensure that all people in the area of application of the Linde Safety Guard are informed of its use.

The components of the assistance system must be properly installed and parameterised to ensure that Linde Safety Guard works without errors and that the warning zones are indicated correctly. Prior to commissioning, the system must be checked for correct installation and adherence to the wireless conditions.

Additional acoustic warning systems and the background noise in the area of operation must be taken into account when setting the volume level of the Linde Safety Guard. The acoustic perception of the driver must not be adversely affected. If there is an adverse effect, the visual warnings must also be observed.

The unrestricted function of the assistance system is not guaranteed in every operating status imaginable. Interference can have a negative effect on the system and lead to malfunctions. Even if there is a malfunction, the driver of the industrial truck must resolve the situation safely.

The assistance system functions perfectly up to a speed of 15 km/h. As the speed of industrial trucks that are connected to the system increases, the reaction times of the system and the driver will mean that a greater distance is required to decelerate and stop.

Parameterising an industrial truck with a speed reduction to 0 km/h is only permitted if the operating company can ensure that it is possible for a speed reduction to a standstill to be implemented without posing any dangers.

Heavy mechanical stress can lead to malfunctions. In the event of a malfunction signified by smoke or an odour, switch off the industrial truck.

The following cases can affect operation:

- Damage to components of the assistance system
- Extended storage in adverse conditions
- Challenging application conditions

➤ Contact your service partner.

Hazard assessment

The Linde Safety Guard changes the driving characteristics and the operation of the industrial truck and therefore influences the hazard assessment. It is therefore necessary to adapt the hazard assessment in line with national health and safety directives when installing the system. Drivers of industrial trucks with Linde Safety Guard and persons with mobile components must be instructed on the functionality of Linde Safety Guard.

The driver must familiarise themselves with the operation of an industrial truck with the Linde Safety Guard.

There are various factors that may trigger a reduction in the driving speed of the industrial truck when the industrial truck enters defined danger areas. If this happens, the impact of the reduction in the driving speed on the use of the industrial truck must be analysed, evaluated and documented in order to arrange additional health and safety measures if necessary.

A speed reduction to 0 km/h must not result in a dangerous situation in the area of operation of the industrial truck. The driver and any people in the area of operation must not be endangered.

Safety during installation

Operation and installation of the assistance system on the industrial truck is permitted only when the industrial truck is stationary. For safety and licensing reasons, conversions of or changes to the assistance system are not permitted. Only competent persons may install, open and connect the components.

The stationary components may be installed, opened and connected only when the assistance system is not connected to the power supply. Install all devices with the proper covers. Make sure that seals and screws are properly seated.

Service personnel

Only qualified electricians are permitted to install, open and modify static warning units. The truck must be checked after these actions.

Check the local mains voltage before commissioning. The permissible system voltage range must be in line with the local mains voltage.

Service personnel

Any work to exchange, align and set components of the assistance system and to make adaptations to the industrial truck must be performed by trained and authorised service personnel (competent persons).

The competent person must have specialist knowledge in the field of industrial trucks. In

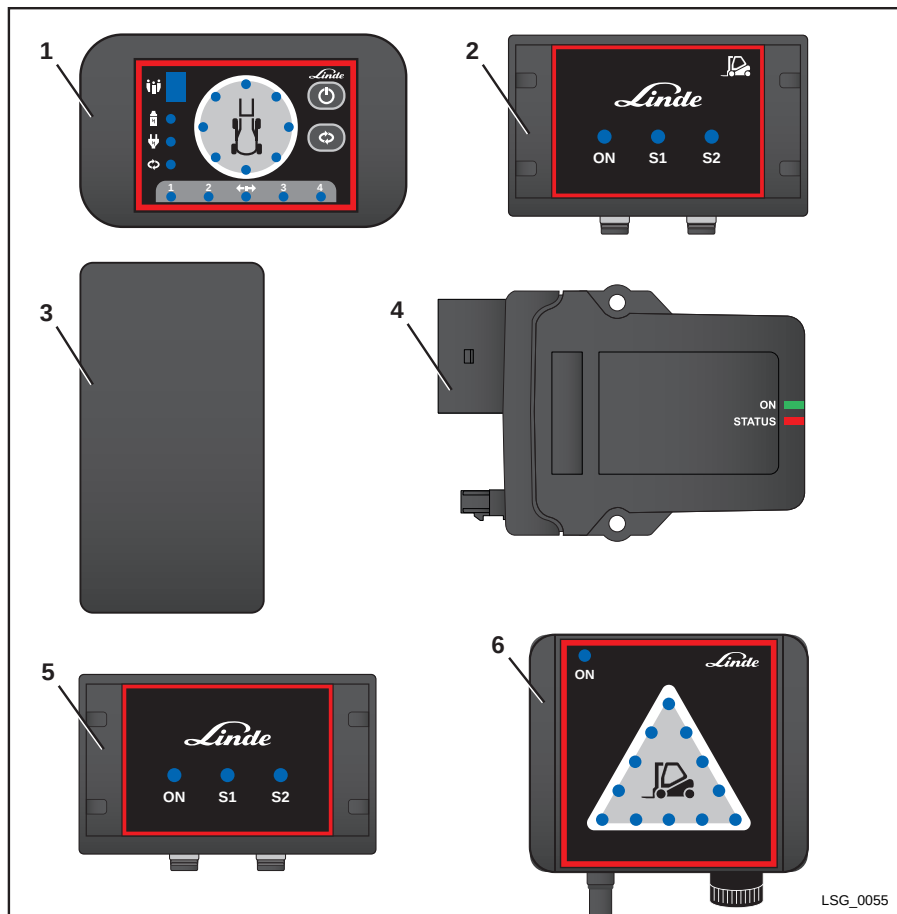
addition, they must have specific system knowledge of the Linde Safety Guard, and the relevant training.

➤ Contact your service partner.

Operating devices and display elements

Overview

Overview



- 1 Safety Guard display unit (Truck Unit)
- 2 Safety Guard communication unit (Truck Unit Small)
- 3 Safety Guard sensor
- 4 Safety Guard communication unit from 10/2019 (Truck Unit Small)

- 5 Safety Guard zone radio module (Zone Marker)
- 6 Safety Guard static warning unit (Static Unit)

Overview

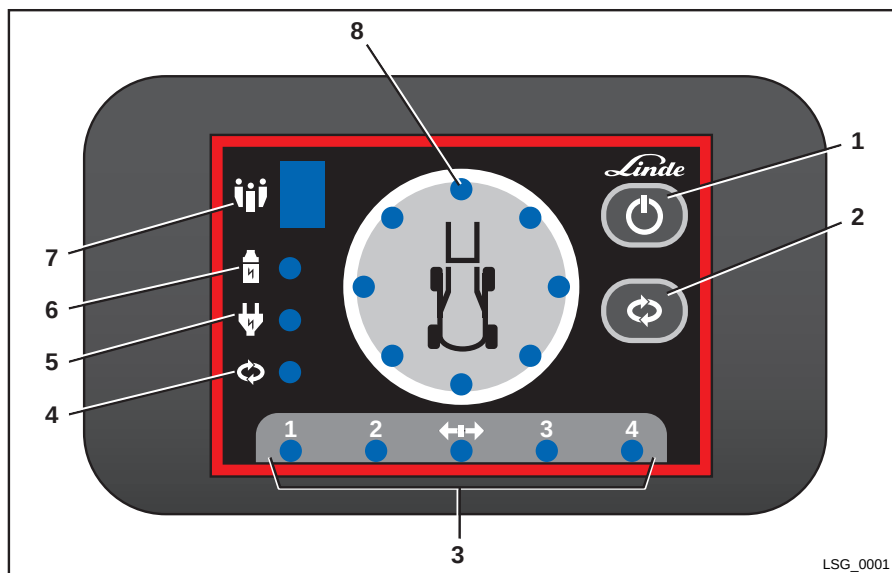


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- | | | | |
|---|--|---|---|
| 1 | Safety Guard portable warning unit (Portable Unit) | 6 | Charging station for the power supply unit from 10/2019 |
| 2 | Safety Guard charging station | 7 | Power bank for the interactive warning vest |
| 3 | Safety Guard charging station from 10/2019 | 8 | Charging station for the power bank |
| 4 | Interactive warning vest | | |
| 5 | Mobile warning unit (Portable Unit) for interactive warning vest | | |

Safety Guard display unit - Truck Unit

Safety Guard display unit - Truck Unit



- | | | | |
|---|------------------------------------|---|---------------------------------------|
| 1 | No function | 5 | Power supply |
| 2 | No function | 6 | No function |
| 3 | Sensors, switching output (middle) | 7 | Number of persons in the warning zone |
| 4 | Pairing active | 8 | Warning zones |

The display unit provides the driver of the industrial truck with an acoustic and visual warning regarding potential dangers. LEDs indicate the number, direction and distance to the dangers and when the driver is entering areas requiring a reduced speed.

The driver also receives information about the status of the sensors, the switching output and whether portable warning units are paired with the display unit.

The display unit responds to the following components:

- Safety Guard portable warning unit
- Safety Guard static warning unit
- Safety Guard zone radio module
- Safety Guard communication unit
- Safety Guard display unit

Sensors, switching output (middle)

The LEDs 1 to 4 indicate the status of the sensors.

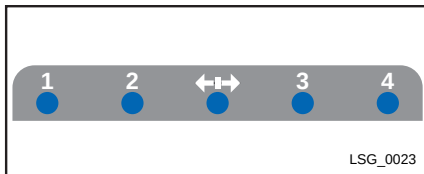
The following operating statuses are possible:

- LED green:
The display unit is switching on. The sensors perform self-testing for 10 seconds.
- LED off:
The display unit is switched on. The sensors are ready for operation.
- LED red:
The display unit is switched on but the respective sensor is not ready for operation. Stop operation. Check the sensor.

The middle LED displays the status of the switching output.

The following operating statuses are possible:

- LED green:
Switching on or changing the switching output from active to inactive.
- LED off:
Switching output inactive.
- LED red:
The switching output is active, e.g. speed reduction is active.

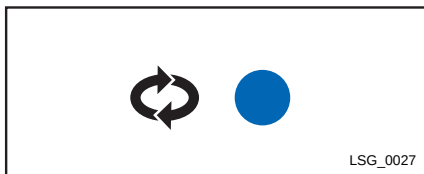


Pairing active

The LED indicates whether a portable warning unit is paired with the display unit. No warning message is triggered for a paired portable warning unit.

The following operating statuses are possible:

- LED off:
No portable warning unit is paired.
- LED green:
Mobile warning unit is paired and within range of the display unit.
- LED red:
Mobile warning unit is paired but not within range of the display unit.

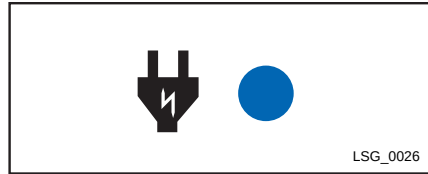


Safety Guard display unit - Truck Unit

Power supply

The LED indicates the operating status of the display unit:

- LED flashes green:
Display unit is ready for operation.
- LED flashes red:
The display unit has registered an error.
The display unit is in programming mode.
- LED lights up red:
The display unit has registered an error.
The display unit is in programming mode.



Number of persons in the warning zone

The display indicates the number of people in the warning zone. The display ranges from 0 - 9 people. If the display flashes, there are more than nine people in the warning zone.

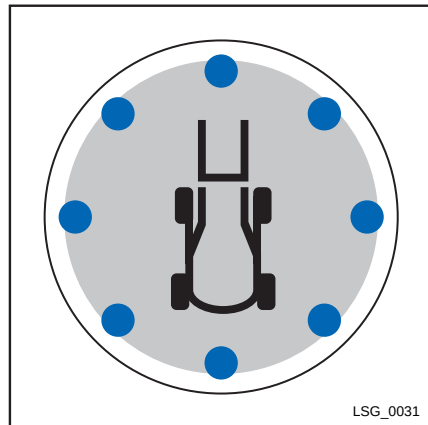


Warning zones

The LEDs for the warning zones indicate whether there are people in one of the warning zones. If there are people in the warning zone, the LEDs flash in a constant rhythm.

The following operating statuses are possible:

- Three LEDs flash red:
A person is in the extended area. The LEDs indicate the direction from which the person is approaching.
- Three LEDs flash orange:
An industrial truck with a truck-to-truck sensor or a communication unit is located in the extended area. The LEDs indicate the direction from which the industrial truck is approaching.
- Multiple LEDs flash red:
There are several people in the extended area. The LEDs indicate the direction from which the people are approaching.
This function must be switched on in the configurator.
- Multiple LEDs flash orange:



There are several industrial trucks in the extended area. The LEDs indicate the direction from which the industrial trucks are approaching.

This function must be switched on in the configurator.

- All LEDs flash red:

There are several people in the extended area. The direction is not displayed.

There are one or more people in the vicinity.

The industrial truck is in the warning zone for a cone.

- All LEDs flash orange:

There are several industrial trucks in the extended area. The direction is not displayed.

There are one or more industrial trucks in the vicinity.

- Four LEDs flash orange:

No driver is sitting on the driver's seat. Pairing of a portable warning unit is active.

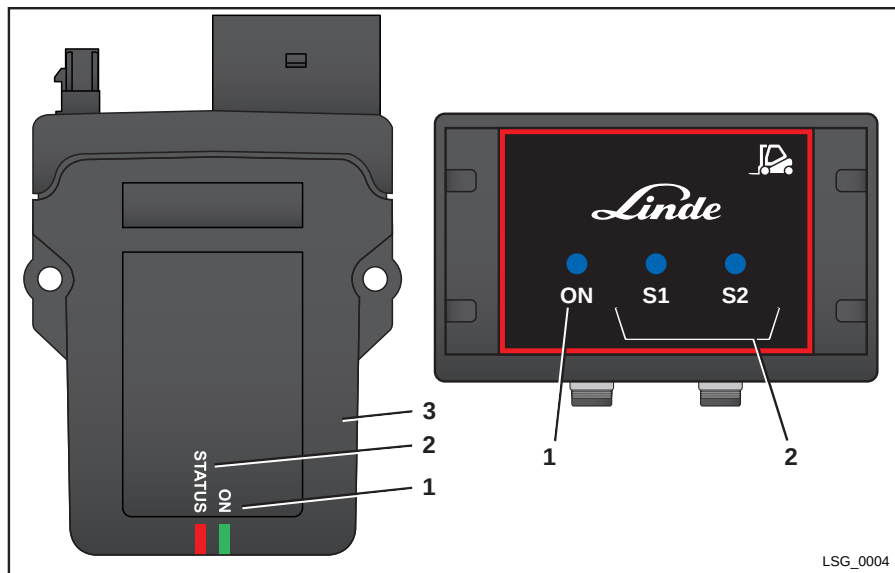


NOTE

If a warning regarding an industrial truck and a person is received at the same time, a mixed display is shown. The warning regarding a person takes priority on the display. If people and industrial trucks are approaching from the same direction, the LEDs only flash red; the number of LEDs is displayed correctly.

Safety Guard communication unit - Truck Unit Small

Safety Guard communication unit - Truck Unit Small



- 1 Operating status
2 Warning zones

- 3 Communication unit from 10/2019

The Safety Guard communication unit is intended to reduce risks through an automatic reduction in the driving speed in defined areas and through truck-to-truck warnings.



NOTE

The communication unit does not provide warnings about people approaching with a portable warning unit.

The communication unit responds to the following components:

- Static warning unit
- Safety Guard zone radio module
- Safety Guard communication unit or Safety Guard display unit with truck-to-truck sensor

Communication unit from 10/2019

The communication unit from 10/2019 is no longer fitted in the view of the driver.

Safety Guard communication unit - Truck Unit Small

The reduction in driving speed and the truck-to-truck warning can be set using the diagnostic program.

The LED displays are not necessary for driving; they are used for test purposes.

The "ON" LED indicates the operating status of the communication unit:

- LED flashes green:
The communication unit is ready for operation.
- LED red / flashes red:
The communication unit has not been configured or there is a fault.



The display of the "STATUS" LED depends on the operating status.

- "STATUS" LED flashes red:
The communication unit is located within a warning zone.
- LED off:
No warning zone detected



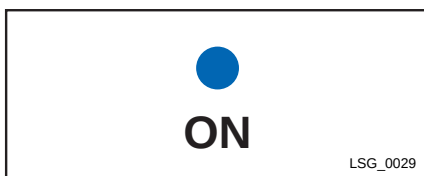
Communication unit has a fault ("ON" LED flashes red):

- "STATUS" LED is permanently red:
Short circuit in the Namur connection
- "STATUS" LED flashes red:
Cable break in the Namur connection
- LED off:
Communication unit is not configured.

Communication unit up to 10/2019

The "ON" LED indicates the operating status of the communication unit:

- LED flashes green:
The communication unit is ready for operation.
- LED red / flashes red:
The communication unit is signalling an error.



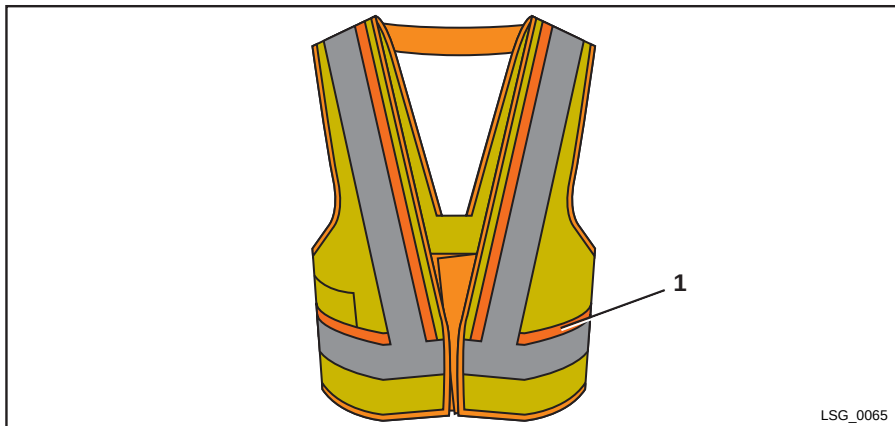
Safety Guard communication unit - Truck Unit Small

The "S1" and "S2" LEDs indicate whether the industrial truck is located in a static warning zone. ▷

- LEDs flash orange:
Radio module or static warning unit in the extended area of the industrial truck.
Truck-to-truck warning in the extended area.
- LEDs flash red:
Radio module or static warning unit in the vicinity of the industrial truck.
Truck-to-truck warning at close range
- LEDs off:
No warning zone detected



Interactive warning vest



1 LED light conductor

The interactive warning vest gives the wearer of the warning vest an acoustic, visual and vibration warning of approaching industrial trucks. To enable this, the mobile warning unit provided for this purpose must be inserted into the interactive warning vest.

As long as the motion detector of the interactive warning vest registers movements, the mobile warning unit is active. If the warning vest is removed, the motion detector deactivates the mobile warning unit to reduce energy consumption. When the warning vest is put on again, the mobile warning unit is activated again.

The active warning vest responds to the following components:

- Safety Guard display unit
- Safety Guard static warning unit

Interactive warning vest

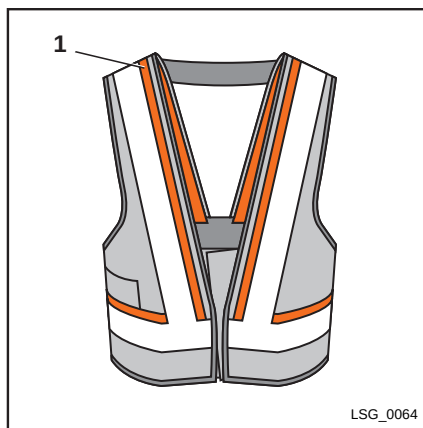
Warning messages

If the person is located in the warning zone of an industrial truck, the LED light conductors (1) flash red.

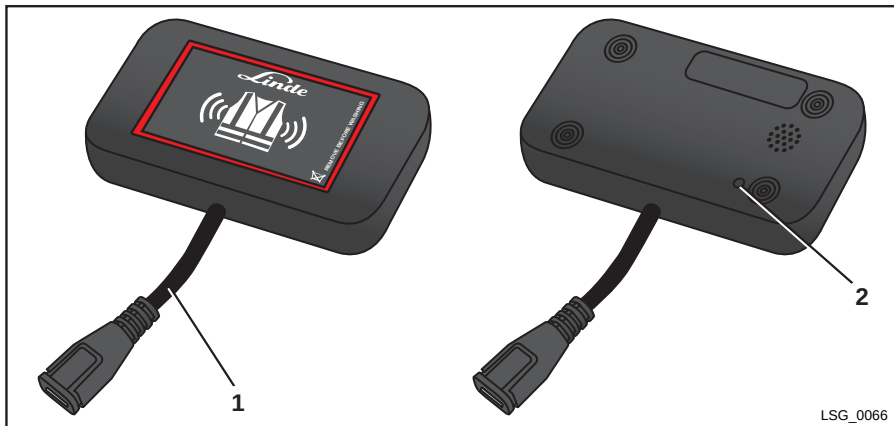
In addition, the mobile warning unit of the interactive warning vest vibrates on the collarbone of the wearer and emits an acoustic signal. The frequency and duration of the warning is dependent on the configuration of the mobile warning unit.

The warning messages are also active in defined areas if:

- The static warning unit of the warning zone is defined as a "relay station" and
- There is an industrial truck in the warning zone.



Mobile warning unit for the interactive warning vest



1 Connecting cable

2 Status display

The mobile warning unit is part of the interactive warning vest. It warns of approaching industrial trucks.

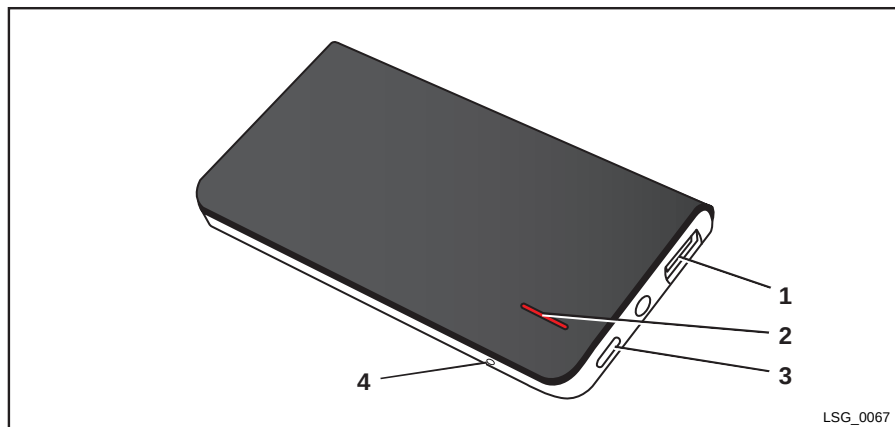
The mobile warning unit is connected to the interactive warning vest and the power bank via the connecting cable (1). When the motion detector of the interactive warning vest registers a movement, the mobile warning unit is activated. The status display (2) flashes green. It shines through the warning vest to the outside.

The portable warning unit responds to the following components:

- Safety Guard display unit
- Safety Guard static warning unit

Power bank

Power bank



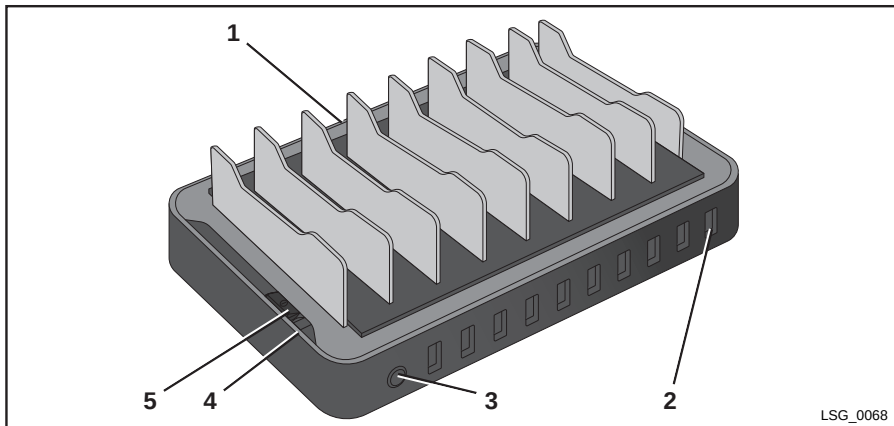
- 1 USB port
- 2 Status display

- 3 Charging connection
- 4 On / off switch

The power bank is used as the power supply for the interactive warning vest with a mobile warning unit inserted. The connection to the interactive warning vest is established via the USB port (1). If the power bank is switched on, the status display (2) lights up orange.

The charging connection (3) allows the power bank to be charged. The power bank is switched on and off via the switch (4).

Charging station for the power bank



- | | | | |
|---|---------------------------|---|----------------------|
| 1 | Charging bay | 4 | Power supply display |
| 2 | Power bank connections | 5 | On/off switch |
| 3 | System voltage connection | | |

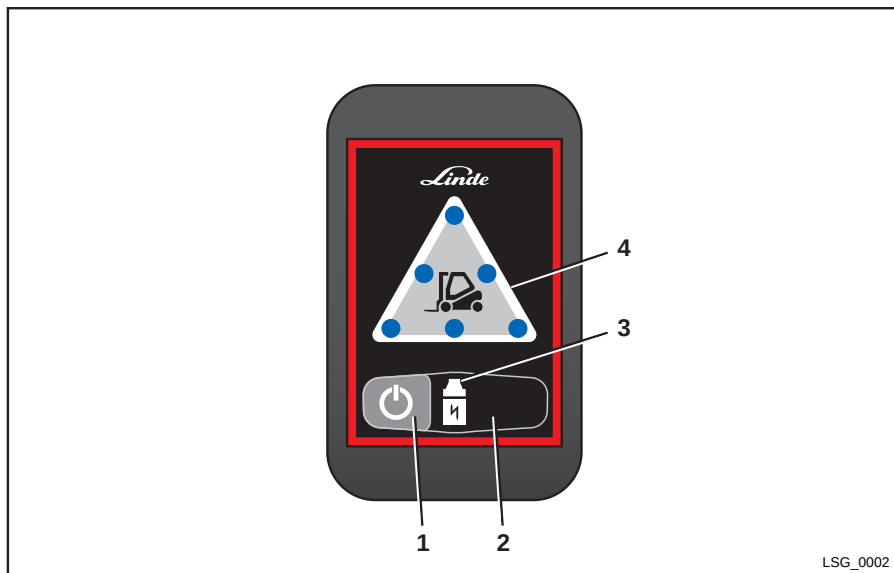
The charging station can charge up to ten power banks simultaneously.

For charging, the power banks are placed in the charging bays (1) and connected to the connections (2) using the cables supplied. The charging station is connected to the system voltage via the connection (3).

The display (4) lights up. Pressing the on/off switch (6) starts the charging process.

Safety Guard portable warning unit - Portable Unit

Safety Guard portable warning unit - Portable Unit



- | | | | |
|---|-------------|---|-----------------------------------|
| 1 | Switch on | 3 | Rechargeable battery charge state |
| 2 | No function | 4 | Warning zone |

The portable warning unit provides the pedestrian with an audible, visual and tactile warning regarding potential dangers.

The portable warning unit responds to the following components:

- Safety Guard display unit
- Safety Guard static warning unit

⚠ CAUTION

Lithium-ion battery destroyed as a result of deep discharge.

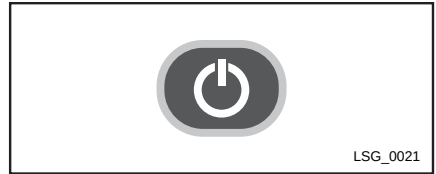
Do not store the Safety Guard portable warning unit for more than one year. Charge the portable warning unit after one year.

Safety Guard portable warning unit - Portable Unit

Switching on

You can use the "switch on / switch off" push button to switch the portable warning unit on and off. To switch on the unit, push and hold the push button until the portable warning unit starts up. The unit vibrates as it is switched on. A feedback tone sounds.

To switch off the unit, push and hold the push button until the portable warning unit shuts down.



Rechargeable battery charge state

The LED indicates the operating status and the charge state of the mobile warning unit.

The following operating statuses are possible:

- LED off:
The mobile warning unit is switched off
- LED flashes green:
The portable warning unit is switched on.
The charge state is more than 20% of the total capacity.
- LED flashes red:
The portable warning unit is switched on.
The charge state is less than 20% of the total capacity. A periodic warning sound is also emitted.



NOTE

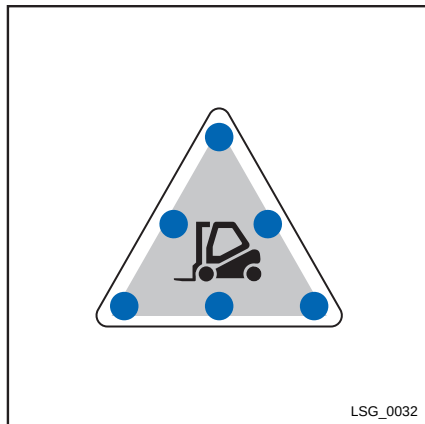
- *Portable warning units with the part number 0009734928 can only be charged using the rectangular Safety Guard charging station.*
- *Portable warning units with the part number 0009734938 can be charged using both Safety Guard charging stations.*

Safety Guard portable warning unit - Portable Unit

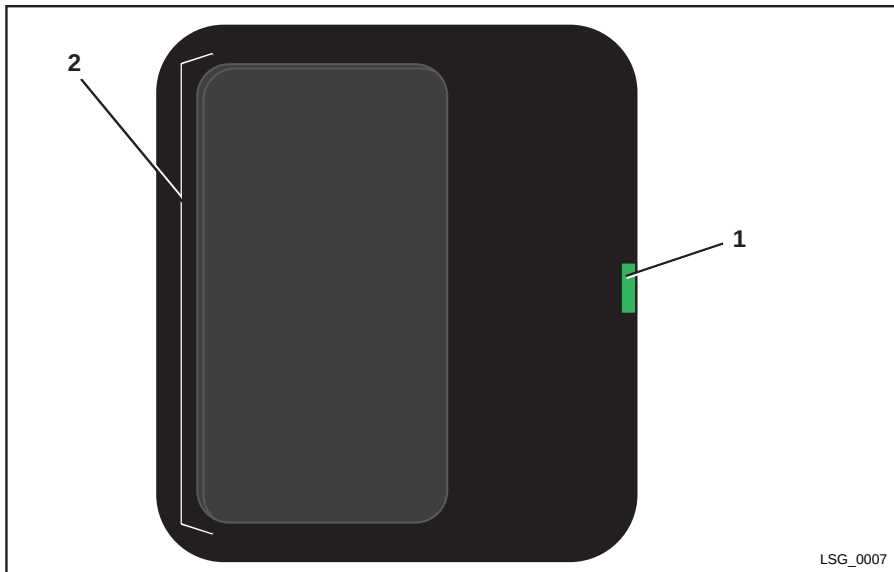
Warning zone

The LEDs of the warning zone indicate whether the person is located in the warning zone of an industrial truck. The LEDs flash. In addition, the warning unit vibrates and emits an acoustic signal. The frequency and duration of the warning is dependent on the configuration of the display unit.

If a static warning unit is configured as a "relay station", the portable warning unit provides a warning when entering this zone ahead of industrial trucks in the zone.



Safety Guard charging station



LSG_0007

1 Charge indicator

2 Charging area

The Safety Guard inductive charging station charges the mobile warning units. To charge a mobile warning unit, place it on the charging area (2).

The following components can be charged:

- Safety Guard mobile warning unit with part number 009734928
- Safety Guard mobile warning unit with part number 009734938
(For the part number, see the back of the devices).

Charge indicator

- LED lights up green:

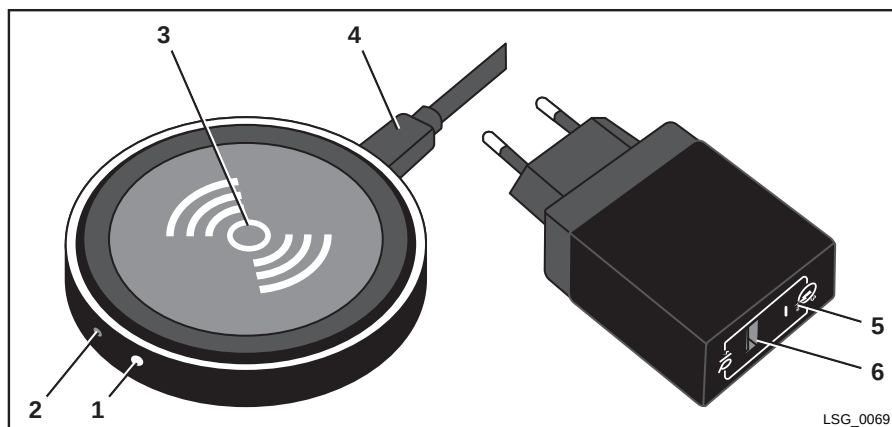
Active charging process for a mobile warning unit

- LED lights up orange:
Charging process interrupted, e.g. due to excessively high temperature

Charging area

This area is where the mobile warning unit is charged.

Safety Guard charging station from 10/2019



- 1 Charge indicator
- 2 Status display
- 3 Charging area

- 4 Mini USB cable
- 5 Status display of the power supply unit
- 6 USB port

The inductive charging station charges the mobile warning units. To charge a mobile warning unit, place it on the charging area (3). The charging station is connected to the power supply unit using a mini USB cable (4) via the corresponding port (6).

The following components can be charged:

- Mobile warning unit for the interactive warning vest
- Safety Guard mobile warning unit with part number 009734938
(For the part number, see the back of the device).

Charge indicator

- The LED lights up blue:
Active charging process for a mobile warning unit
- The LED lights up blue and the LED status display lights up red:
The charging process is ended.

Status display

- LED lights up red:

The charging station is ready for charging.

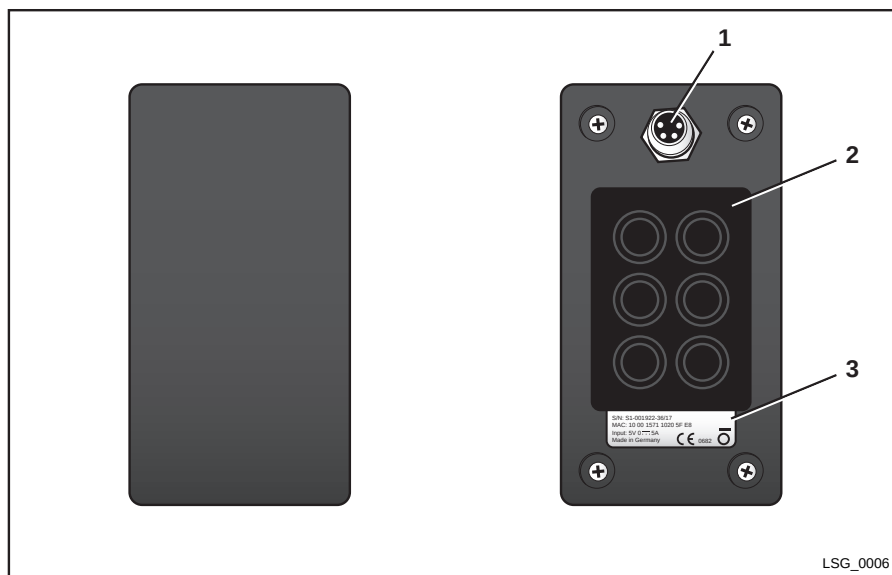
- The LED lights up red and the LED charging indicator lights up blue:
The charging process is ended.
- LED flashes red
Unsupported device detected

Status display of the power supply unit

- LED lights up green:
The power supply unit is connected to the power supply and is ready for operation

Safety Guard sensor

Safety Guard sensor



- 1 Connection
2 Mounting magnet

- 3 MAC address

The sensors are mounted on the industrial truck and connected to the Safety Guard display unit. The sensors create the warning zones around the industrial truck.

Connection

To connect the sensor to the Safety Guard display unit

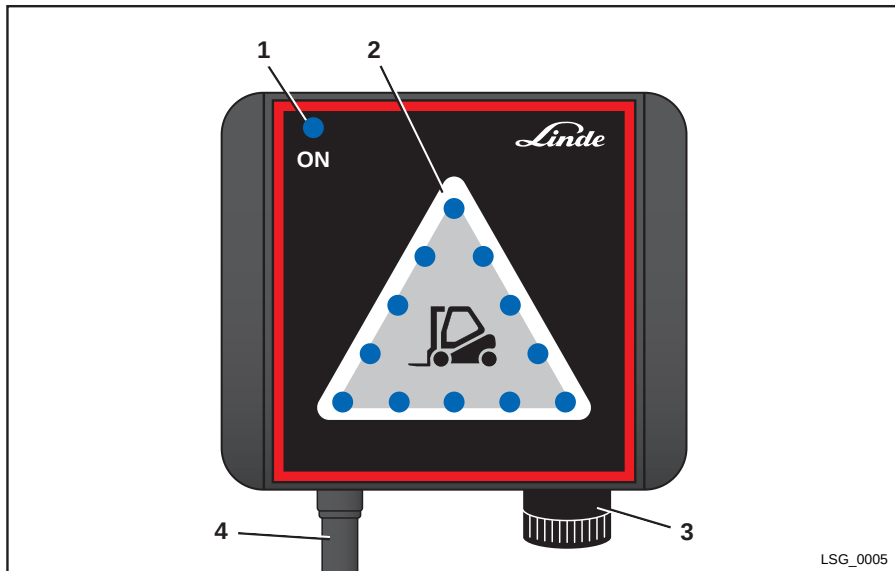
Mounting magnet

To mount the sensors magnetically to the industrial truck

MAC address

The position of the sensors is stored on the display unit via the MAC address.

Safety Guard static warning unit - Static Unit



- 1 Operating status
2 Warning zone

- 3 Acoustic signal transmitter
4 Power supply

The static warning unit is a marking module and warning unit in one. The static warning unit provides acoustic and visual warnings regarding pedestrians and industrial trucks.

The static warning unit is used at blind spots or in the event of poor radio communication.

The static warning unit offers the following additional functions:

- Speed reduction on the industrial truck
- Lift height detection
- Outputs for activating external signalling devices

The static warning unit responds to the following components:

- Safety Guard display unit
- Safety Guard communication unit
- Safety Guard portable warning unit

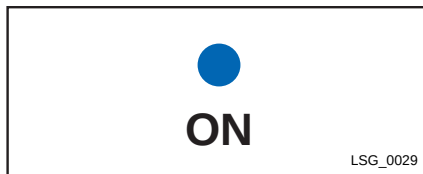
Safety Guard static warning unit - Static Unit

Operating status

The LED indicates the operating status of the static warning unit.

The following operating statuses are possible:

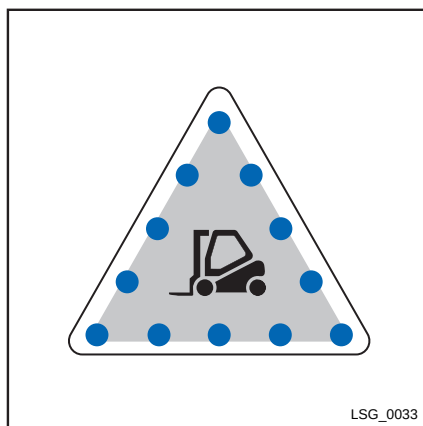
- LED off:
The static warning unit is not connected to the power supply.
- LED flashes green:
The static warning unit is ready for operation.
- LED flashes red:
The static warning unit is signalling an error.



Warning zone

The LEDs flash red if industrial trucks with a display unit or a communication unit enter the warning zone of the static warning unit.

The LEDs flash red if people using a portable warning unit enter the warning zone of the static warning unit.



Acoustic signal transmitter

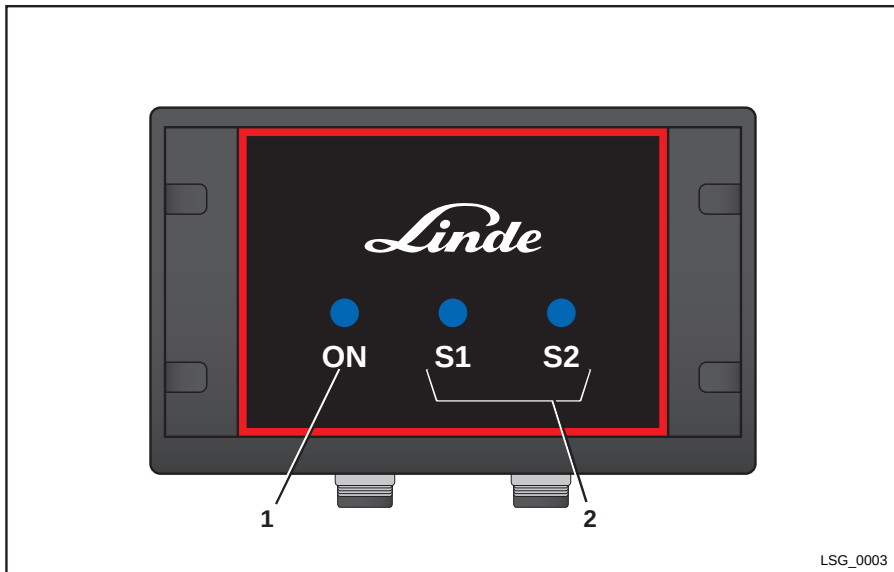
Depending on the configuration, the acoustic signal transmitter sounds a warning tone as soon as an industrial truck with a display unit or a communication unit enters the warning zone.

Depending on the configuration, the acoustic signal transmitter sounds a warning tone as soon as a person using a portable warning unit enters the warning zone.

Power supply

The static warning unit is supplied with 230 VAC.

Safety Guard Zone radio module - Zone Marker



1 Operating status

2 Warning zones

The radio module creates a stationary warning zone and triggers further actions on industrial trucks present in this warning zone. If an industrial truck with a display unit or a communication unit enters the warning zone, the radio module on the industrial truck activates, for example, a speed reduction in the corresponding zone around the radio module.

If several radio modules are used, it is possible to create larger zones to cover an entire hall area.

The radio module responds to the following components:

- Safety Guard display unit
- Safety Guard communication unit

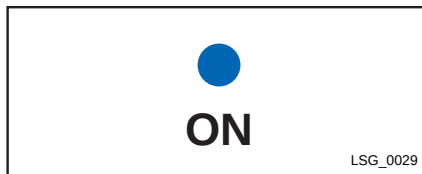
Safety Guard Zone radio module - Zone Marker

Operating status

The LED indicates the operating status of the radio module.

The following operating statuses are possible:

- LED off:
The radio module is not connected to the power supply.
- LED flashes green:
The radio module is ready for operation.
- LED lights up green or red or flashes red:
The radio module is signalling an error.



Warning zones

The LEDs flash if industrial trucks with a display unit or a communication unit are present in the warning zone of the radio module.

The following operating statuses are possible:

- LEDs flash orange:
Industrial truck in the extended area of the radio module.
- LEDs flash red:
Industrial truck in the vicinity of the radio module.



4

Operation

Installation

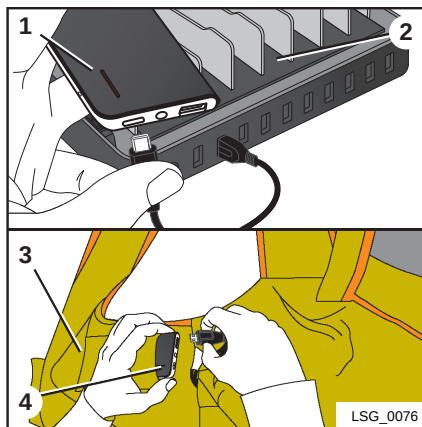
Installation

Putting on the interactive warning vest

- Remove the charged power bank (1) from the charging station (2) and switch the power bank on.

The Statusanzeige (4) lights up orange and shows the charge state.

- Insert the power bank into the pocket on the bottom right (3) and connect it with the USB cable provided for this purpose.

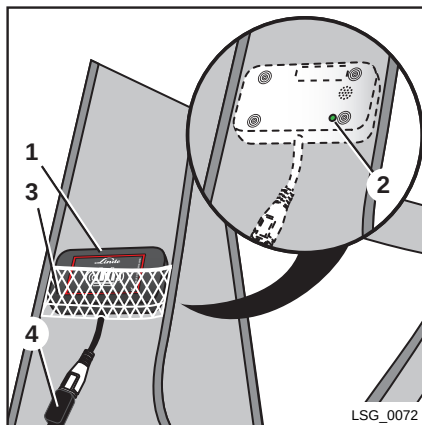


- Insert the mobile warning unit (1) into the designated pocket (3) with the rear side facing outwards and upwards and connect it with the USB cable (4).

The LED (2) on the rear of the mobile warning unit lights up green and the light conductors of the active warning vest light up to 40% of the nominal capacity.

- Close the pocket with the hook and loop fastener and put on the interactive warning vest.

The warning vest is ready for operation as long as it is being worn. If the warning vest is removed and no longer moved, the mobile warning unit switches off. This reduces the energy consumption.



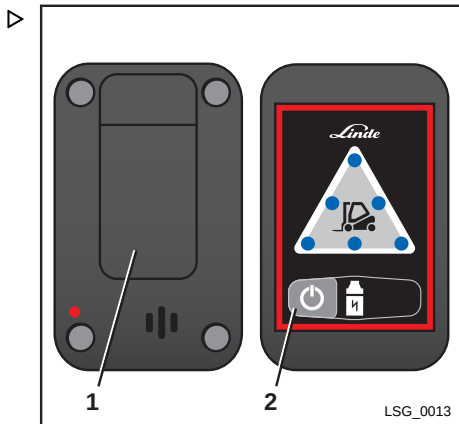
Attaching the mobile warning unit

- Switch on the mobile warning unit. To do this, push and hold the push button (2) for one second.

The mobile warning unit starts. A signal tone is heard, the LEDs of the warning zones light up and the device vibrates briefly.

- Check the charge state of the battery.

The LED must flash green. If the LED flashes red, the mobile warning unit needs charging.



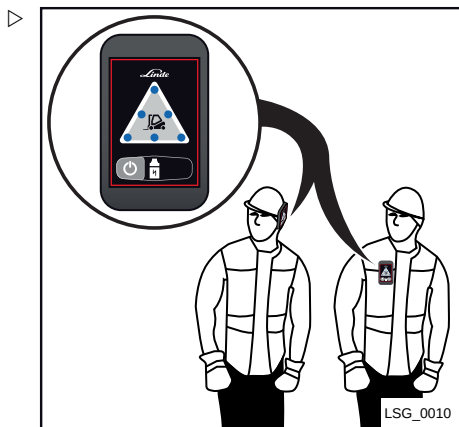
- Attach the mobile warning unit to the outside of your workwear using the clip (1).

⚠ DANGER

Risk of accident and personal injury

Incorrect attachment can lead to incorrect radio communications!

- Wear the mobile warning unit high on your body.
- Wear the mobile warning unit such that it is unobstructed.



Installation

Installing a static warning unit

The static warning unit is mounted at points that are difficult to see and thus allows the early detection of approaching industrial trucks.



NOTE

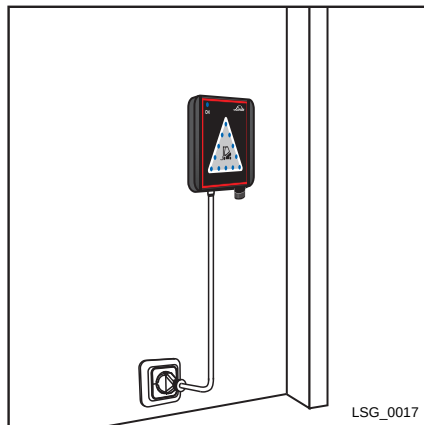
Position the static warning unit so that the LED display is easy to see.

Installation via magnet

The static warning unit can be mounted to metal surfaces using a magnet.

- Mount a self-adhesive magnet with the sticky side on the rear of the housing.
- Attach the static warning unit in the intended location.
- Connect the static warning unit to the 230-V power supply.

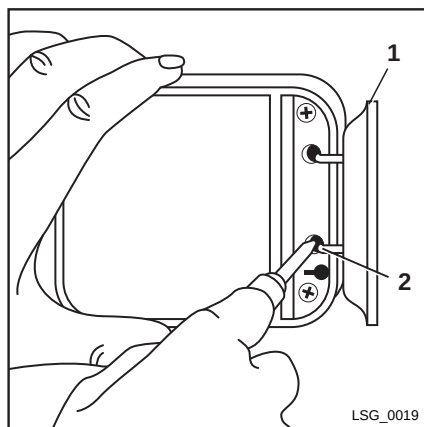
The static warning unit starts and the operating status LED flashes green.



Installation via screw joint

- To expose the fixing points, open the housing panels(1) at the sides.
- Mark the four fixing points on the ground.
- Drill mounting holes and then insert dowels if these are required.
- Mount the static warning unit with four screws and close the housing panels.
- Connect the static warning unit to the 230-V power supply.

The static warning unit starts and the operating status LED flashes green.



Installing the Safety Guard Zone radio module ▸

The radio module creates a stationary warning zone and triggers further actions on industrial trucks present in this warning zone.



NOTE

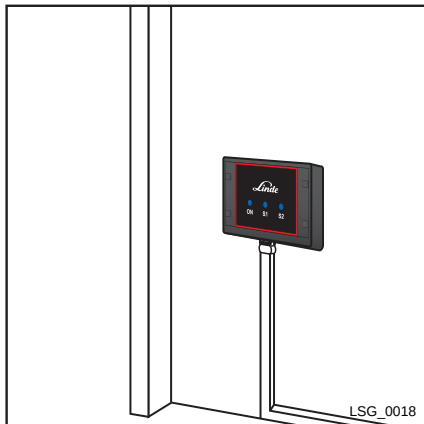
Install the radio module as high up as possible in order to guarantee optimum radio coverage.

Installation via magnet

The Safety Guard Zone radio module can be mounted to metallic surfaces using a magnet.

- Mount a self-adhesive magnet with the sticky side on the rear of the housing.
- Attach the radio module in the intended location.
- Connect the radio module to a 12-24-V DC power supply via the connector plug.

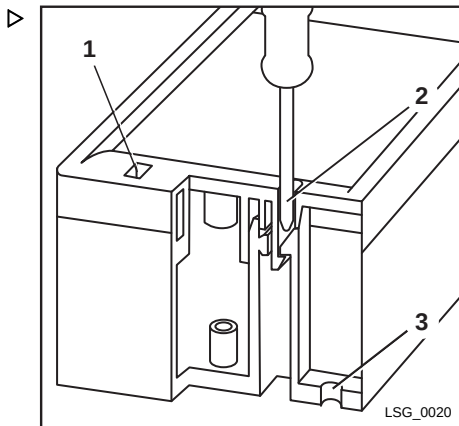
The radio module starts and the operating status LED flashes green.



Installation via screw joint

- Remove the holes cover (1).
- Insert a release tool in the opening (2) and release the upper part of the housing at four points.
- Remove the upper part of the housing.
- Mark the four fixing points (3) on the ground.
- Drill mounting holes and then insert dowels if these are required.
- Secure the radio module with four screws and attach the upper part of the housing. Make sure that the upper part of the housing engages fully.
- Connect the radio module to a 12-24-V DC power supply.

The radio module starts and the operating status LED flashes green.



Pre-shift checks

Pre-shift checks

Service plan

Safety Guard portable warning unit
Check the charge state of the battery
Check that the unit is attached to the outside of the clothing
Checking for correct function
Interactive warning vest
Check the charge state of the power bank
Check connections from the power bank and warning unit
Checking for correct function
Safety Guard display unit
Check for operational readiness
Checking for correct function
Check the pairing with the driver's mobile warning unit
Safety Guard communication unit
Check for operational readiness
Safety Guardsensors
Check the mounting and position
Check the connection to the display unit
Check for operational readiness
Safety Guard static warning unit
Check the mounting and position
Housing panels closed?
Checking for correct function
Check that there is an unobstructed view of the static warning unit
Safety Guard Zone radio module
Check the mounting and position
Upper part of housing in place?
Checking for correct function
Check that there is an unobstructed view of the radio module

Checking the charge state of the mobile warning unit

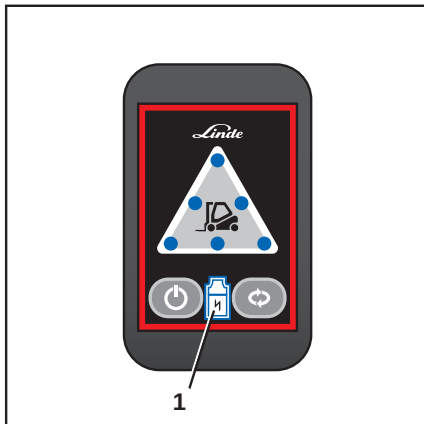
The mobile warning unit must be charged before use.

- Switch on the mobile warning unit.

A short signal tone must be audible and the device must vibrate.

LED (1) continually flashes in green.

- If the LED flashes red, charge the mobile warning unit.



Checking the function of the mobile warning unit

Before the start of work, the mobile warning unit must be checked to ensure that it functions correctly.

- Switch on the mobile warning unit and attach the unit to your clothing.
- Switch on an industrial truck equipped with the Safety Guard display unit.

The Safety Guard display unit switches on.

- With the mobile warning unit attached to your clothing, step into the expanded warning area of the industrial truck.

Pre-shift checks

- Circle the truck while remaining within this warning area. ▷

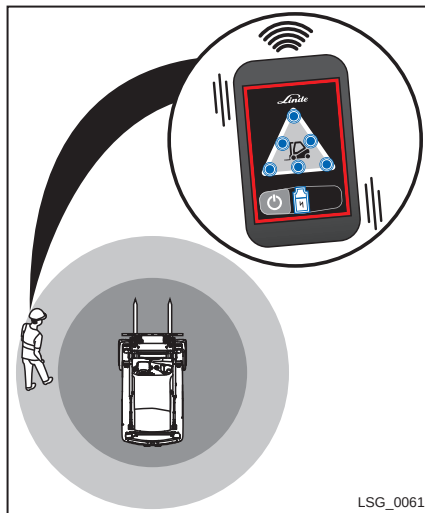
All the LEDs for the warning zone flash on the mobile warning unit. A signal tone must sound and the device must vibrate.

The mobile warning unit is now ready to use.



NOTE

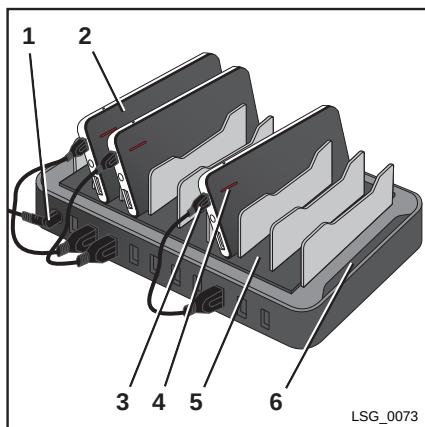
Alternatively, the pre-shift checks can be performed in conjunction with a Safety Guard static warning unit. The Safety Guard static warning unit must be specially configured for this purpose. Contact your service partner.



Charging the power bank

- Connect the charging station (6) to the power supply with the charging cable (1).
- Place the power banks (2) in the charging bays (5).
- Use the USB cable (3) to connect the power bank to the charging station.
- Switch on the charging station.

The LEDs (4) on the power banks flash.



Charging the mobile warning unit

Charging with the charging station from 10/2019 ▷

WARNING

Risk of accident due to discharged battery!

➤ Charge the mobile warning unit after use.

NOTE

Prior to initial commissioning, the mobile warning unit must be fully charged once. If the warning unit is removed from the charging station too early, the LED flashes red even when the charge capacity is over 90%.

The following components can be charged:

- Mobile warning unit for the interactive warning vest
- Safety Guard mobile warning unit with part number 009734938

(For the part number, see the back of the device).

➤ Connect the power supply unit to the power supply.

The LED on the power supply unit lights up green.

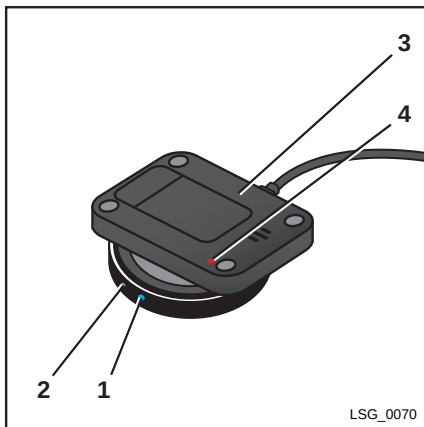
➤ Connect the charging station (1) to the power supply unit via the USB cable.

The status display lights up red. The charging station is ready for operation.

➤ Place the mobile warning unit (3) face down on the charging station.

The mobile warning unit emits a signal tone and the LED (4) on the back of the unit flashes red. The charging display (2) on the charging station lights up blue. The charging process starts.

When the charging process is complete, the LED (4) lights up red permanently. The status display and the charging displays on the charging station both light up permanently.



Pre-shift checks

Charging with the charging station up to 10/2019 ▷

⚠ WARNING

Risk of accident due to discharged battery!

- Charge the mobile warning unit after use.
- Ensure correct positioning on the inductive charging station.



NOTE

Prior to initial commissioning, the mobile warning unit must be fully charged once. If the warning unit is removed from the charging station too early, the LED flashes red even when the charge capacity is over 90%.

- Connect the inductive charging station to the power supply using the power supply unit provided.
- Place the mobile warning unit face down on the marked charging area of the charging station.

The mobile warning unit emits a signal tone and the LED (2) on the back of the unit flashes red. The LED (3) on the charging station lights up green. The charging process starts.

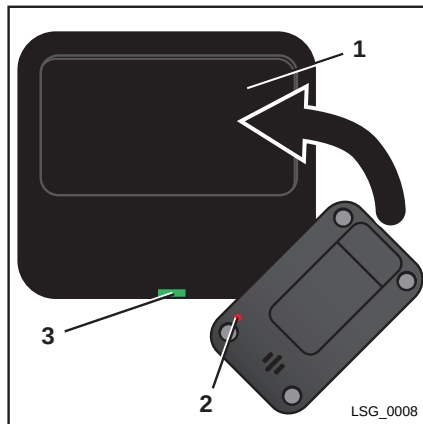
From a charge capacity of 90%, the LED (2) on the mobile charging station flashes green. When the charging process is complete, the LED (2) lights up green permanently.



NOTE

- *Do not leave the charging station in direct sunlight during the charging process*
- *Temperatures above 40°C cause a temporary interruption of the charging process. The LED (3) lights up orange if this happens*

The warning function of the mobile warning unit is deactivated during the charging process. Once the mobile warning unit is removed from the charging station, the warning function is automatically reactivated within three seconds.



Checking the operational readiness of the display unit ▷

Check for operational readiness

- Switch on the industrial truck.

The Safety Guard display unit switches on and is ready for operation after approx. 15 seconds.

- Check LED (1) on the display unit.

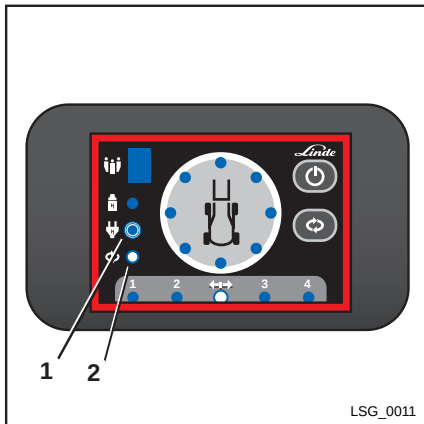
The LED must flash green.

Checking pairing with a mobile warning unit

If the driver is carrying a mobile warning unit, it must be paired with the Safety Guard display unit. This prevents a warning message from being triggered.

Pairing is carried out automatically:

- LED (2) lights up green:
Mobile warning unit is paired and within range of the display unit.
- LED (2) lights up red:
Mobile warning unit is paired but not within range of the display unit.



Checking the operational readiness of sensors ▷

The sensors must be ready for operation before work operations begin. Check LEDs 1 to 4 (1). LED 4 is optional.

- Switch on the industrial truck.

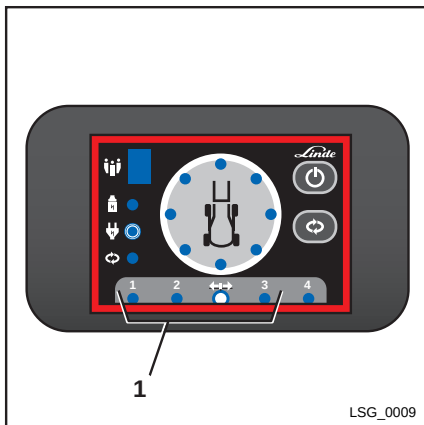
The Safety Guard display unit switches on.

- LEDs 1 to 4 light up green for ten seconds.
- If the sensors are ready for operation, the LEDs go out after ten seconds.

If a sensor is faulty, the corresponding LED lights up red.

Faulty sensors cannot merely be replaced. The sensors must be registered with the Linde Safety Guard system via the configurator.

Contact your service partner for advice



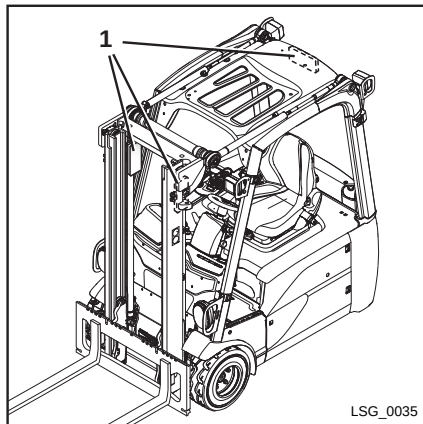
Pre-shift checks

Checking the mounting of the sensors ▷

The sensors can be mounted on the industrial truck in a number of ways. If the sensors are not mounted with permanent solutions, e.g. if they are mounted with a magnet, the sensors can move.

- Before starting working operation, check that all sensors (1) are correctly seated.

The sensors must be fitted on one level. They must be positioned as high up as possible and must not be obscured.



Performing a functional test

⚠ DANGER

Faulty displays possible!

- Always perform a functional test before starting work.

i NOTE

The warning zones are pre-configured by the manufacturer. They must be adapted to suit the local conditions during initial commissioning. To do this, contact the service partner.

Functional test of the Safety Guard display unit

During the functional test, the set warning zones are checked. Two people are required for the testing.

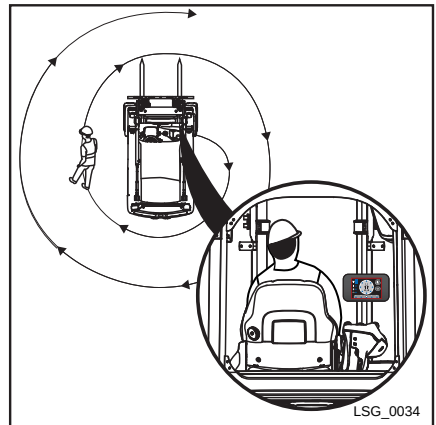
- Switch on the industrial truck.

The display unit switches on.

- Switch on the mobile warning unit and attach the unit to your clothing.
- Walk around the industrial truck in a spiral shape with the mobile warning unit. During this time, the driver checks the display unit.

During the test run, no fault messages or irregularities must appear on the display unit.

- If necessary, have the warning zones set up again by the service partner.



Pre-shift checks

Functional test of the Safety Guard static warning unit ▷



NOTE

The functional test must be completed regardless of the industrial truck component configuration. When using the Safety Guard communication unit, perform the following steps as well.

The functional test checks the warning zones that have been set and any responses that have been set on the industrial truck.

- Switch on the industrial truck.

The display unit switches on.

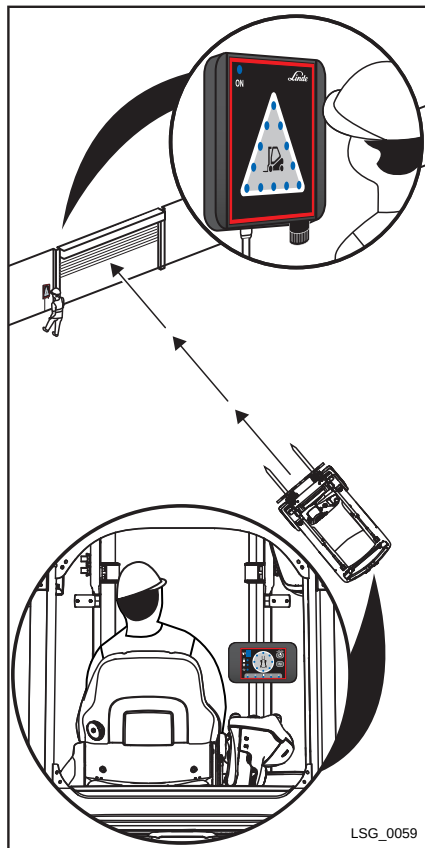
- Check the operational readiness of the static warning unit.

The "operating status" LED must flash green.

- Drive the industrial truck to the warning zone. During this process, the driver monitors the display unit and any responses that have been set on the industrial truck. A second person monitors the static warning unit.

Fault messages and irregularities on the display unit or the static warning unit during the test are not permitted.

- If necessary, have the warning zones and the truck settings set up again by the service partner.



Functional test of the Safety Guard zone radio module

NOTE

The functional test must be completed regardless of the industrial truck component configuration. When using the Safety Guard communication unit, perform the following steps as well.

The functional test checks the warning zones that have been set and any responses that have been set on the industrial truck.

- Switch on the industrial truck.

The display unit switches on.

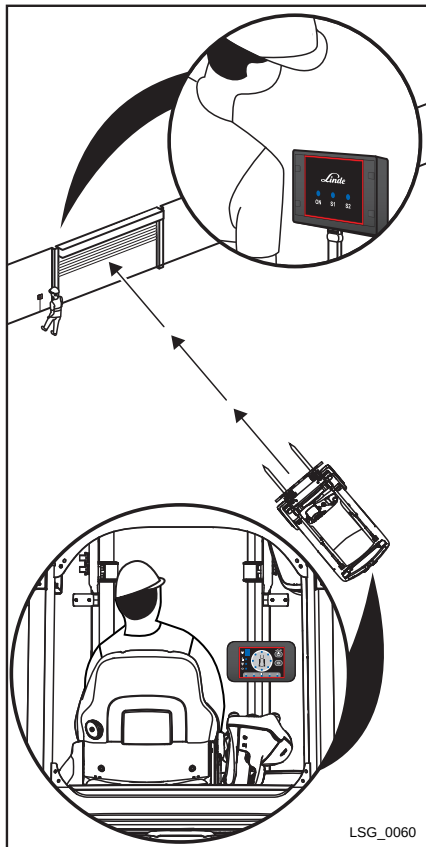
- Check the operational readiness of the Safety Guard zone radio module.

The "operating status" LED must flash green.

- Drive the industrial truck to the warning zone. During this process, the driver monitors the display unit and any responses that have been set on the industrial truck. A second person monitors the Safety Guard zone radio module.

Fault messages and irregularities on the display unit or the radio module during the test are not permitted.

- If necessary, have the warning zones and the truck settings set up again by the service partner.



Operation

Operation

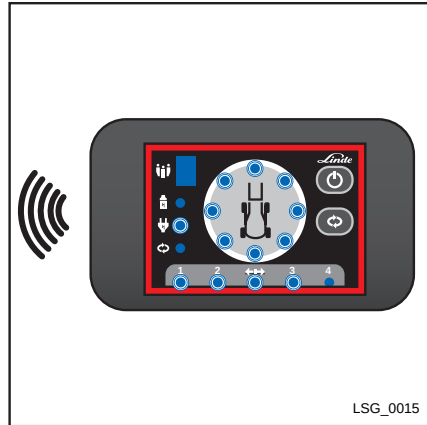
Switching on the display unit

- Switch on the industrial truck.

The display unit starts as follows and runs a self-test:

- The numerical display lights up
- Depending on the number of sensors, the numerical display counts down from 3 or 4 to 0. The warning zone lights up each time
- The switching output LED lights up red and the power supply LED flashes green
- The LEDs for the sensors light up red and the switching output LED lights up green
- The LEDs for the sensors light up green for ten seconds and then go out. A signal tone is emitted

After approximately 15 seconds, the display unit is ready for operation.



Switching on the mobile warning unit

- Push the push button (1) and hold it until the mobile warning unit starts.

The mobile warning unit starts as follows:

- The mobile warning unit emits a signal tone, the LEDs in the warning zone light up and the device vibrates.

The starting procedure is completed.



NOTE

If the push button (1) is released too early, the starting procedure must be repeated. This button safety device prevents the unit being switched on and off accidentally in normal operation.

- To switch off the unit, push the push button (1) and hold it until the mobile warning unit shuts down.

The LEDs light up briefly. A signal tone sounds. The mobile warning unit vibrates briefly and shuts down.

Pairing the mobile warning unit

If a mobile warning unit is within the pairing zone of the industrial truck, the unit is paired automatically with the display unit and muted.



NOTE

The pairing function must be activated by a service partner.

- Move the mobile warning unit into the pairing zone of the display unit.

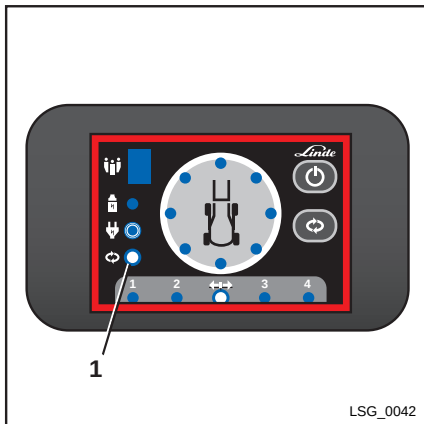
The LED display (1) on the display unit lights up green. The display unit does not issue a warning message.

- To deactivate the pairing function, move out of the warning zones of the industrial truck.



NOTE

Only one mobile warning unit can be paired with the display unit at any one time.



Displays during operation

The components of the Linde Safety Guard must not be operated when in working mode; however, the displays must be observed. The warnings and the operating status that are displayed when the Safety Guard display unit makes contact with other components of the system are described below.

Operation

Interactive warning vest in the extended area ▸

⚠ WARNING

If an industrial truck stops abruptly, this can result in an accident that may cause serious injury and material damage!

➤ Avoid reducing speed to 0 km/h.

➤ People with an interactive warning vest enter the extended area of the industrial truck with the Safety Guard display unit.

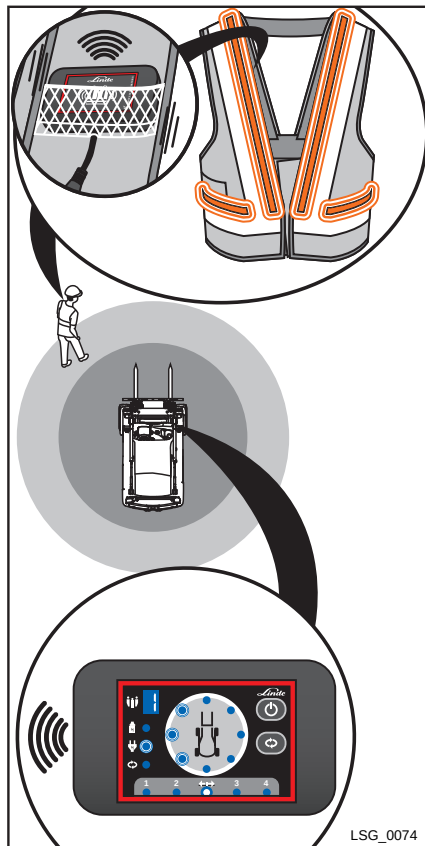
The LEDs for the warning zones on the display unit flash red. A signal tone is emitted. Depending on the programming and equipment, the industrial truck reduces the driving speed and the LED switching output lights up red. In addition to the number of people in the extended area, the display unit also indicates the direction from which a person is approaching.

The following operating statuses are possible:

- One person in the extended area:
Three LEDs flash and indicate the direction from which the person is approaching.
- More than one person in the extended area:
The entire circle flashes red.

The light conductors of the warning display on the interactive warning vest flash red. The mobile warning unit of the vest emits a beep tone and vibrates on the collarbone of the wearer.

Subsequently there is only a visual warning. There is a software option to set a permanent warning.



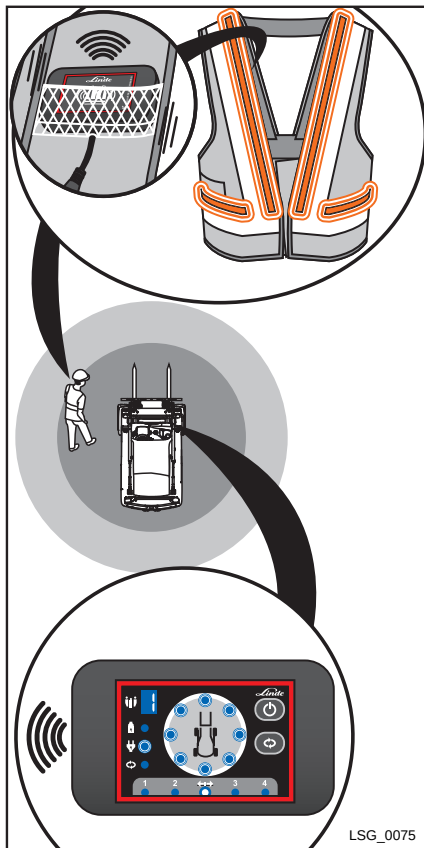
Interactive warning vest in the immediate vicinity

- People with an interactive warning vest enter the immediate vicinity of the industrial truck with the display unit.

All the LEDs for the warning zones on the display unit flash red. A signal tone is emitted. In addition, the number of people in the immediate vicinity is displayed. Depending on the programming and equipment, the industrial truck reduces the driving speed and the LED switching output lights up red.

The light conductors of the warning display on the interactive warning vest flash red. The mobile warning unit of the vest emits a beep tone and vibrates on the collarbone of the wearer.

Subsequently there is only a visual warning. There is a software option to set a permanent warning.



Operation

Mobile warning unit in the extended area

⚠ WARNING

If an industrial truck stops abruptly, this can result in an accident that may cause serious injury and material damage!

➤ Avoid reducing speed to 0 km/h.

➤ People with a mobile warning unit enter the extended area of the industrial truck with the display unit.

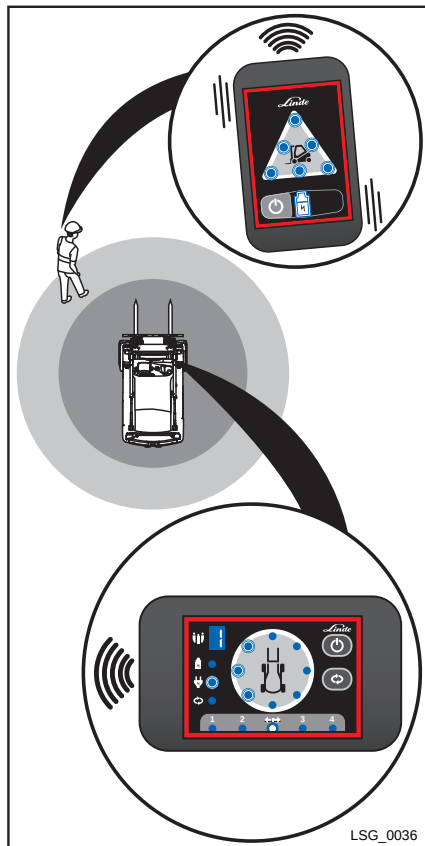
The LEDs for the warning zones on the display unit flash red. A signal tone is emitted. Depending on the programming and equipment, the industrial truck reduces the driving speed and the LED switching output lights up red. In addition to the number of people in the extended area, the display unit also indicates the direction from which a person is approaching.

The following operating statuses are possible:

- One person in the extended area:
Three LEDs flash and indicate the direction from which the person is approaching.
- More than one person in the extended area:
The entire circle flashes red.

All the LEDs for the warning zone flash on the mobile warning unit. A signal tone is output and the device vibrates.

Subsequently there is only a visual warning. There is a software option to set a permanent warning.



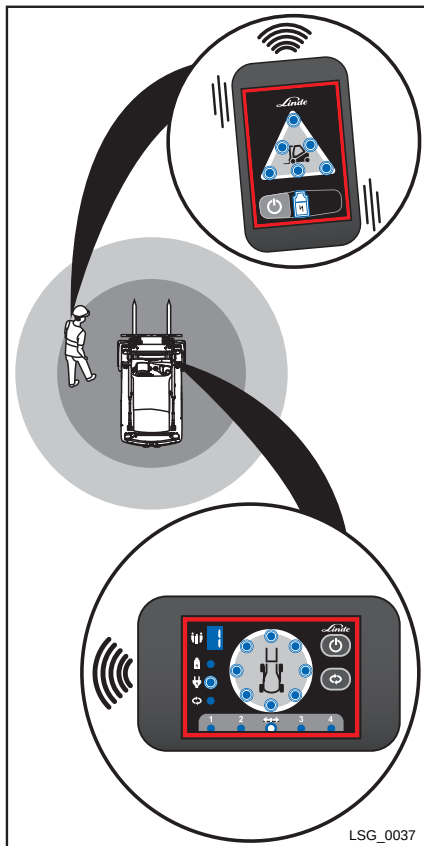
Mobile warning unit in the immediate vicinity ▸

- People with a mobile warning unit enter the immediate vicinity of the industrial truck with the display unit.

All the LEDs for the warning zones on the display unit flash red. A signal tone is emitted. In addition, the number of people in the immediate vicinity is displayed. Depending on the programming and equipment, the industrial truck reduces the driving speed and the LED switching output lights up red.

All the LEDs for the warning zone flash on the mobile warning unit. A signal tone is output and the device vibrates.

Subsequently there is only a visual warning. There is a software option to set a permanent warning.



Operation

Safety Guard static warning unit

⚠ WARNING

If an industrial truck stops abruptly, this can result in an accident that may cause serious injury and material damage!

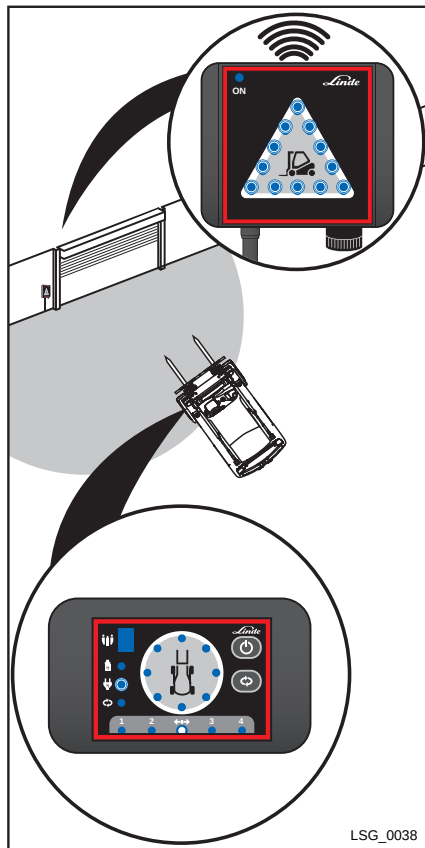
- Avoid reducing speed to 0 km/h.
- Adjust the speed before entering the warning zone.
- Keep the surrounding area in view.

Industrial trucks with Safety Guard display unit

- The industrial truck enters the warning zone for the static warning unit.

The switching output LED lights up red on the display unit.

All the LEDs for the warning zone flash on the static warning unit. An optional signal tone is also possible. Depending on the programming and the equipment, responses on the industrial truck and additional warning lights can be activated.

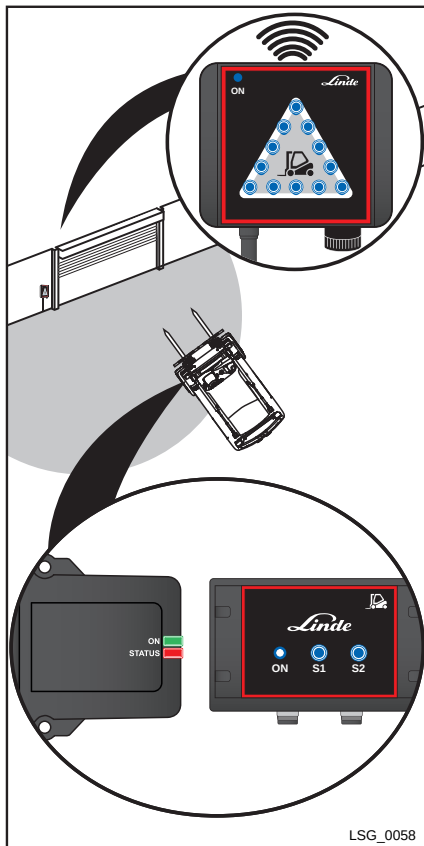


Industrial trucks with Safety Guard communication unit ▷

- The industrial truck enters the warning zone for the static warning unit.

The LEDs for the warning zones light up red on the communication unit. With the communication unit from 10/2019, warnings are programmed via the controller of the industrial truck.

All the LEDs for the warning zone flash on the static warning unit. An optional signal tone is also possible. Depending on the programming and the equipment, responses on the industrial truck and additional warning lights can be activated.



LSG_0058

Operation

Safety Guard zone radio module

⚠ WARNING

If an industrial truck stops abruptly, this can result in an accident that may cause serious injury and material damage!

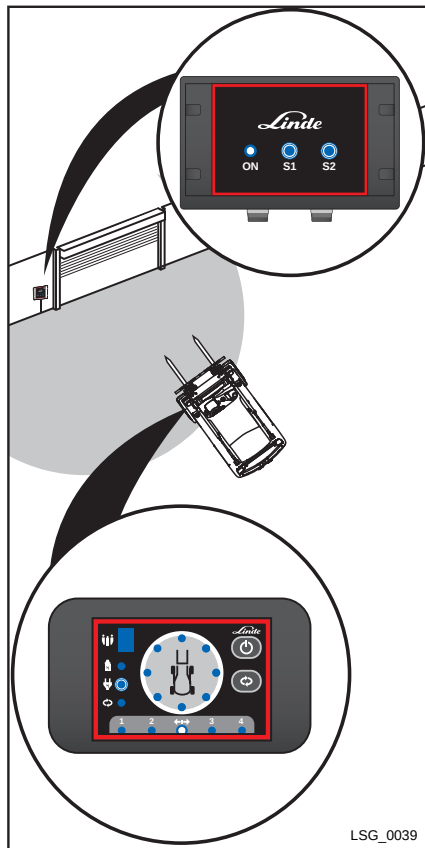
- Avoid reducing speed to 0 km/h.
- Adjust the speed before entering the warning zone.
- Keep the surrounding area in view.

Industrial trucks with Safety Guard display unit

- The industrial truck enters the warning zone of the radio module.

The switching output LED lights up red on the display unit.

The LEDs for the warning zones light up red on the radio module. An optional signal tone is also possible. Depending on the programming and the equipment, responses on the industrial truck and additional warning lights can be activated.

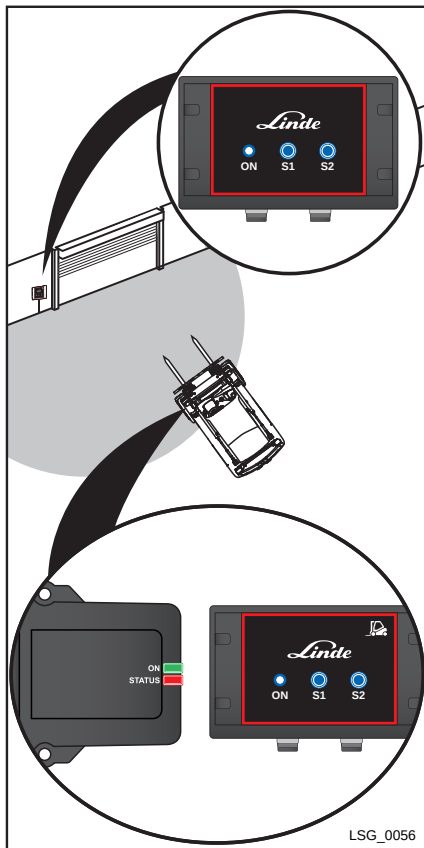


Industrial trucks with Safety Guard communication unit ▷

- The industrial truck enters the warning zone of the radio module.

The LEDs for the warning zones light up red on the communication unit. With the communication unit from 10/2019, warnings are programmed via the controller of the industrial truck.

The LEDs for the warning zones light up red on the radio module. An optional signal tone is also possible. Depending on the programming and the equipment, responses on the industrial truck and additional warning lights can be activated.



Operation

Warning between industrial trucks

The warning between industrial trucks works when the industrial trucks are equipped with Safety Guard display units and a fifth Safety Guard sensor. Alternatively, the warning works if the industrial trucks are equipped with a Safety Guard communication unit or a Safety Guard communication unit from 10/2019.

Industrial trucks with Safety Guard display unit

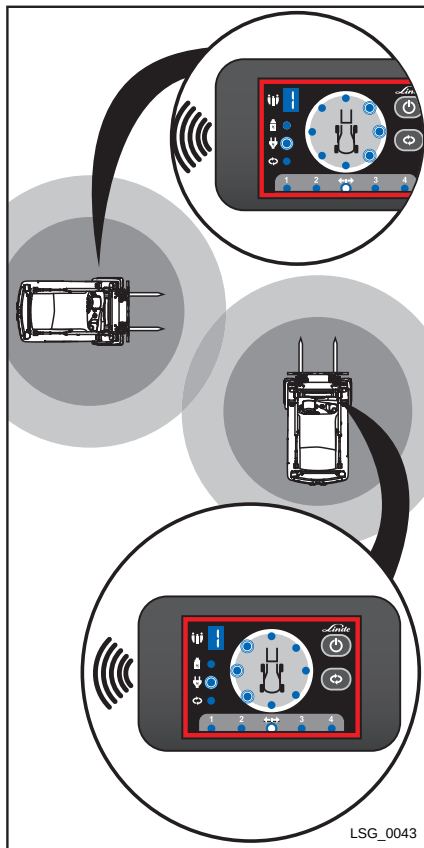
The display is the same as for contact with a mobile warning unit.

- The industrial truck with display unit enters the extended area.

The LEDs for the warning zones flash on the display unit and indicate the direction from which the industrial truck is approaching.

- The industrial truck with display unit enters the immediate vicinity.

All the LEDs for the warning zones flash on the display unit.



LSG_0043

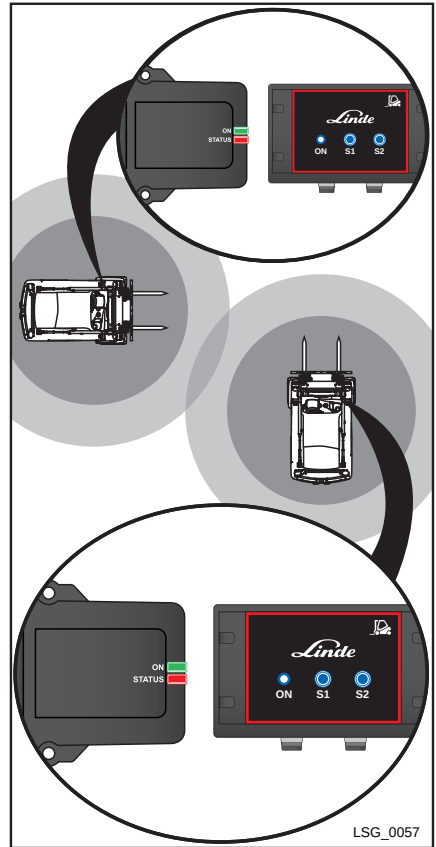
Industrial trucks with Safety Guard communication unit ▷

- The industrial truck with a communication unit reaches the extended area.

The LEDs for the warning zones flash orange on the communication unit. With the communication unit from 10/2019, warnings are programmed via the controller of the industrial truck.

- The industrial truck with the communication unit reaches the immediate vicinity.

The LEDs for the warning zones flash red on the communication unit. In the communication unit from 10/2019, warnings are programmed via the controller of the industrial truck.



Maintenance and disposal

Maintenance

Maintenance

CAUTION

Risk of surface damage from using incorrect cleaning materials.

- Do not use aggressive cleaning materials.
- Do not use cleaning materials containing abrasive particles

Regularly cleaning the components of the Linde Safety Guard increases the service life of the system. After daily use, perform the following steps:

- Check the display units, the sensors and the warning units for contamination.
- Remove coarse dirt with a soft brush.
- Remove fine dust and film with a damp cloth.

CAUTION

Lithium-ion battery destroyed as a result of deep discharge.

Do not store the Safety Guard portable warning unit for more than one year. Charge the portable warning unit after one year.

Cleaning the active warning vest

CAUTION

Components can be destroyed by moisture.

- Remove the power bank and mobile warning unit before washing.

NOTE

The LED light strip on the warning vest cannot be replaced. If the LED light strip has reached the end of its service life, the warning vest must be replaced.

The average service life of the LED light strip is 2000 hours or 20 wash cycles. The initial light output can drop to 50% over the average service life. The reduction in the light output depends on the use and the cleaning procedure, which impairs the ability of the light conductor to emit light.

When cleaning the interactive warning vest, follow the instructions below:

-  Wash at maximum 60°C
-  Do not bleach
-  Do not dry in a rotary dryer
-  Do not iron
-  Clean with perchloroethylene
-  Remove electrical components before cleaning

Disposal



ENVIRONMENT NOTE

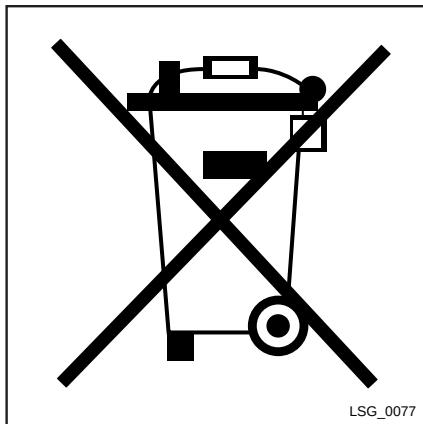
Waste electronic equipment and batteries are raw materials and are not considered household waste. Disposal with household waste is not permitted.

- *At the end of their service life, waste equipment and batteries must be disposed of in accordance with the national regulations*



ENVIRONMENT NOTE

We recommend working with a waste management company for disposal requirements.



Disposal

Technical data

Safety Guard display unit

Safety Guard display unit

Performance data	Unit	Value
Operating voltage	VDC	12 / 24
Max. power consumption	W	Max. 6.5
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	76 x 120 x 24

Safety Guard active warning vest

Performance data	Unit	Value
Frequency/transmission power	GHz / mW	3.7-4.4/max. 1
Overall system dimensions	mm	600 x 500 x 20
Dimensions of the mobile warning unit	mm	85 x 54 x 18
Overall system weight	kg	0.5
Weight of the mobile warning unit	kg	0.068
Operating temperature	°C	-20 to +60

Safety Guard mobile warning unit

Performance data	Unit	Value
Operating voltage	VDC	3.3
Max. power consumption	W	Max. 2.5
Rechargeable battery capacity	mAh	1000
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	51 x 82 x 14

Safety Guard sensor

Performance data	Unit	Value
Operating voltage	VDC	5
Max. power consumption	W	1
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	45 x 85 x 22

Safety Guard communication unit

Performance data	Unit	Value
Operating voltage	VDC	12 / 24
Max. power consumption	W	Max. 3.5
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	60 x 100 x 40

Safety Guard communication unit from 10/2019

Performance data	Unit	Value
Operating voltage	VDC	12 / 24
Max. power consumption	W	Max. 3.5
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	123 x 86 x 35

Safety Guard static warning unit

Safety Guard static warning unit

Performance data	Unit	Value
Operating voltage	VAC	230
Max. power consumption	W	Max. 6
Range	m	Max. 25
Frequency/transmission power	GHz / mW	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	150 x 180 x 60

Safety Guard Zone radio module

Performance data	Unit	Value
Operating voltage	VDC	12 / 24
Max. power consumption	W	Max. 3.5
Range	m	Max. 25
Frequency/transmission power	GHz	4 / max. 1
Operating temperature	°C	-20 up to +45
Air humidity	%	10-85
Dimensions	mm	60 x 100 x 40

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