OPERATING INSTRUCTIONS

# RFGS Pro
# Track and trace systems


EN

SICK
Sensor Intelligence.

# Contents

# 1 About these operating instructions

Please read through this chapter carefully before you use the documentation and work with the RFGS Pro.

## 1.1 Purpose of this document

These operating instructions are for giving **technical personnel** instructions on the safe mounting, configuration, electrical installation, commissioning, operation and maintenance of the RFGS Pro.

## 1.2 Target group

These operating instructions are intended for people who install, connect, commission, operate and service the RFGS Pro.

## 1.3 Information depth

**Note** The RFGS Pro is also referred to in these operating instructions as "RFID gate" or "gate" for short.

These operating instructions contain information about the gate on the following topics:

- Mounting
- Electrical installation
- Commissioning and standard configuration
- Maintenance
- Fault diagnosis and troubleshooting
- Part numbers
- Conformity and approval

When planning and using RFID systems such as the RFGS Pro, technical skills are required that are not covered by this document.

The official and legal regulations for operating the RFGS Pro must always be complied with.

The SOPAS configuration software is used to configure the gate for the respective application on site.

**Note** Please also refer to the online RFID information at

http://www.sick.com

There, you can find sample applications and a list of frequently asked questions about RFID.

## 1.4 Abbreviations used

**CAN** Controller Area Network = Standardized fieldbus system that uses a message-based data exchange protocol

**LED** Light Emitting Diode

**MSC** Modular System Controller (MSC800)

**RFID** Radio Frequency Identification = Identification of objects by means of electromagnetic waves

**RFGS** Radio Frequency Gate System = Modular RFID system

**RFU** Radio Frequency Unit = Reader for RFID detection

**SOPAS** SICK OPEN PORTAL for APPLICATION and SYSTEMS Engineering Tool = Software for configuring the RFGS Pro

## 1.5 Symbols used

**Recommendation** Recommendations are designed to assist you in the decision-making process with respect to the use of a certain function or technical measure.

**Note** Notes provide information on the features of a device or application.

**1. / 2. Step-by-step** Instructions that must be carried out in the order described are referred to as step-by-step instructions and are indicated by numbered lists. Read carefully and follow the instructions for action.

➢ **Take action** Instructions for taking action are indicated by an arrow. Read carefully and follow the instructions for action.

Display symbols show the status of the 7-segment display:

 Constant display of characters, e. g., U

 Flashing display of characters, e. g., 8

 Alternating display of characters, e. g., L and 2

Character representation of the 7-segment display can be rotated 180° using SOPAS. In this document, however, character representation of the 7-segment display is always shown in a non-rotated state.

WARNING

**Warning!**

A warning indicates a specific or potential hazard. This is to protect you against accidents and protect devices from damage.

Read carefully and follow the warnings!

Software notes show where you can make the appropriate settings in the SOPAS configuration software.

● Red, ✹ Yellow, ○ Green

LED symbols describe the status of a diagnostics LED. Examples:

● **Red** The red LED is illuminated continuously.

✹ **Yellow** The yellow LED is flashing.

○ **Green** The green LED is off.

# 2 On safety

This chapter concerns your own safety and the safety of the system operator.

➢ Please read this chapter carefully before you begin working with the RFGS Pro.

## 2.1 Qualified safety personnel

The RFGS Pro must only be installed, commissioned and serviced by adequately qualified safety personnel.

The following qualifications are necessary for the various tasks:

### 2.1.1 Mounting and maintenance

- Practical technical training
- Knowledge of the current safety regulations in the workplace

### 2.1.2 Electrical installation and replacement of system components

- Practical electrical training
- Knowledge of current electrical safety regulations
- Knowledge of the operation and control of the devices in their particular application (e.g., conveyor line)

### 2.1.3 Commissioning, operation and configuration

- Knowledge of the mechanical and electrical parameters of the conveyor system and properties of the conveyor line as to operation and use
- Basic knowledge of the Windows operating system used
- Basic knowledge of data transmission
- Basic knowledge of the design and setup (addressing) of Ethernet connections when connecting the MSC800 to Ethernet
- Basic knowledge about and experience using an HTML browser (e.g., Internet Explorer) to use the online help
- Basic knowledge of 1D / 2D code technology

## 2.2 Use areas of the device

The RFGS Pro is a gate sensor system that can reliably detect passing UHF transponders (i.e., RFID tags). The system solution applies to objects with just one tag as well as identification of tags in a group.

The RFGS Pro is primarily designed for harsh, demanding conditions in logistics. The RFGS Pro is a very rugged system.

The gate's integrated intelligent algorithm can distinguish between moving and stationary RFID tags and assign the right tags to the passing object accordingly. The concept prevents false positive reads at the gate directly. Likewise, people can be differentiated from pallets.

Integrated direction detection simplifies acquisition or transfer of goods in an ERP system.

All important gate events are collected and further processed in the central control unit of the gate.

## 2.3 Correct use

The RFGS Pro may only be used as described in section *2.2 Use areas of the device*. It may only be used by trained personnel in the environment in which it was installed and initially commissioned in accordance with these operating instructions.

Operation is allowed in an industrial environment, in logistics or in a manufacturing environment. Operation of the RFGS Pro is not allowed outdoors or in an explosion-protected environment.

If used in any other way or if alterations are made to the system and if the devices are opened – including in the context of assembly and installation – this will void warranty claims directed to SICK GmbH.

**Note** The antenna and reader types are dependent on the country in which the system is operated. They are subject to national standards and regulations.

## 2.4 General safety notes and protective measures

WARNING

**Safety notes**

Observe the following to ensure the safe use of the RFGS Pro as intended.

- The notes in these operating instructions (e.g., regarding the use, mounting, installation or integration in the machine controller) must be observed.
- The national and international legal specifications apply to the installation and use of the system, to its commissioning and to recurring technical inspections, in particular:
  - The accident prevention regulations and work safety regulations
  - Any other relevant safety regulations
- The manufacturer and user of the system are responsible for coordinating and complying with all applicable safety specifications and regulations in cooperation with the relevant authorities.
- The checks must be carried out by qualified safety personnel or specially qualified and authorized personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- These operating instructions must be made available to the operator of the system. The system operator must be instructed by qualified safety personnel and read the operating instructions.

WARNING

**Risk of injury due to falling components**

The weight of the overall system and the individual side panels is max. 150 kg and max. 75 kg, respectively.

➢ Do **not** perform any mounting work alone.

➢ Ask a second person to hold components while mounting.

WARNING

**Risk of injury due to tipping components**

Before the cross-connection has been mounted to the two side panels, there is a risk of upright side panels tipping.

➢ Do **not** perform any mounting work alone.

➢ Ask a second person to hold components while mounting.

WARNING

**Risk of injury due to electric current**

The central control unit of the gate is connected to the power supply (AC 100 ...264 V/ 50 ... 60 Hz).

➢ Only authorized personnel are allowed to perform electrical installations.

➢ The power supply must be disconnected when attaching and detaching electrical connections.

➢ Select and implement wire cross-sections and their correct fuse protection in accordance with the applicable standards.

➢ Observe the current safety regulations when working on electrical systems.

WARNING

**Laser radiation**

The laser scanner used in the RFGS Pro as the trigger (LMS1xx or TiM32x) is equivalent to Laser Class 1 (eye-safe) according to EN 60 825-1 (see the laser warning plate on the device for publication date). This ensures compliance with 21 CFR 1040.10 except for the tolerances according to Laser Notice No. 50 of 26 July 2001. The laser beam is not visible to the human eye.

- Improper use can lead to hazardous radiation exposure.

➢ Do no open the housing (opening the housing does not prevent the laser from switching on).

➢ Pay attention to the laser safety regulations as per IEC 60 825Q1 (latest version).

**Important**

No maintenance is required in order to ensure compliance with Laser Class 1.

The laser output aperture is the inspection window of the LMS1xx or TiM32x optics hood.

The laser operates at a wavelength γ = 905 nm (invisible infrared light). The radiation emitted in normal operation is harmless to human skin and eyes.

The laser warning is located on the right side of the laser scanner.

WARNING

**Location of use**

The RFGS Pro is intended for use in industrial environments and as a stationary system. Radio interference may result when used in residential areas.

## 2.5 Protection of the environment

The **RFGS Pro** has been designed to minimize its impact on the environment. It consumes very little energy.

At work, always act in an environmentally responsible manner. For this reason, please note the following information on disposal.

### 2.5.1 Power consumption

Including its components (laser scanner, controller and interrogator), the **RFGS Pro** consumes max. 50 watts of power.

### 2.5.2 Disposal after final decommissioning

- Always dispose of unusable or irreparable devices in an environmentally safe manner in accordance with the relevant national waste disposal regulations.
- Dispose of all electronic assemblies as hazardous waste. The electronic assemblies are easy to dismantle.

See also section **7.3 Disposal**.

**Note** SICK AG does not take back devices that are unusable or irreparable.

# 3 Product description

This chapter provides information on the special features of the RFGS Pro. It describes the design and operating principle of the device.

## 3.1 Scope of delivery

The delivery of the RFGS Pro includes:

- **Side panels** with pre-assembled cable channels and extruded aluminum profiles
- Pre-assembled **cross-connection** (bracket)
- **Cover plates** (optional)
- **Plug-in system** for extruded aluminum profiles for securing the cover plates (clamp multiblocks)
- **Concrete dowels** and screws for securing the side panels in the floor
- **Universal connecting set** for extruded aluminum profiles for mounting the bracket to the side panels
- **Antenna mount**
- **System components**
  - MSC800 controller
  - RFU630 interrogator
  - LMS1xx / TiM32x laser scanners
  - Antennas (2 or 4)
- **Tower light** (optional)
- **Cable set** for connecting the devices
  - T-piece
  - Cable terminator
  - Ethernet cable (green)
  - CAN cable (purple)
  - Antenna downlead 2 m
  - Antenna downlead 10 m
- CD-ROM that includes the following:
  - SOPAS configuration software
  - **RFGS Pro** operating instructions in German and English as a PDF
  - Adobe Acrobat Reader for reading PDF files

**Important note**

➢ It is recommended that you carefully check for and report transport damage of any kind as soon as possible after receiving the system.

➢ Also verify that the delivery includes all components listed on the delivery note.

## 3.2 Special features

The RFGS Pro is a gate sensor system that can reliably detect passing UHF transponders (i.e., RFID tags). The system solution applies to objects with just one tag as well as identification of tags in a group.

### 3.2.1 Gate structure

The gate consists of two permanently installed side panels and a cross-connection.

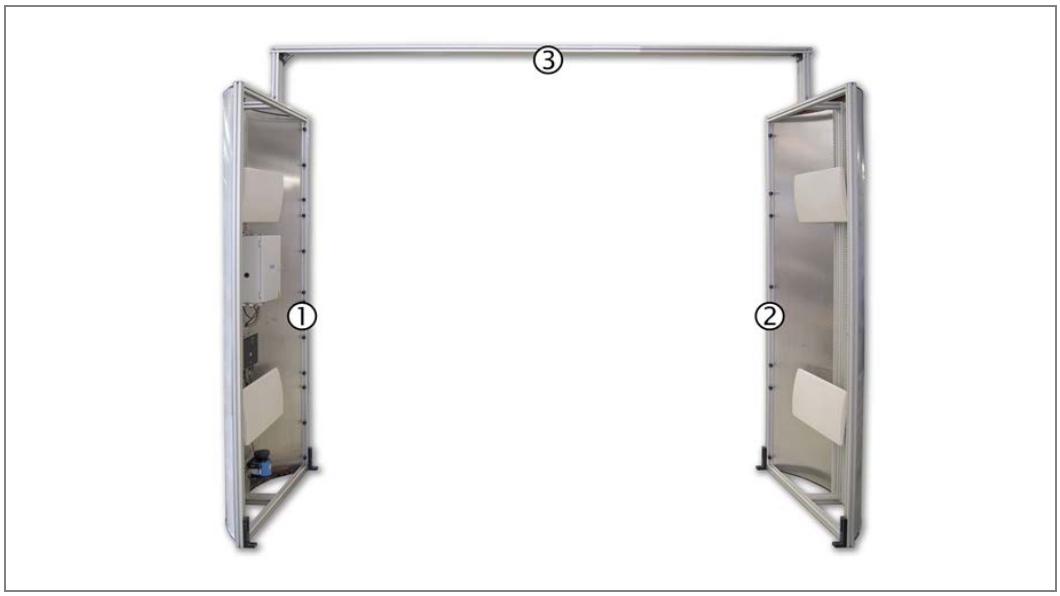



*Fig. 1: Gate structure*

| No. | Component | Explanation |
|---|---|---|
| 1 | Side panel | The left side panel (here) contains one or two **antennas**, the **laser scanner**, **interrogator** and **controller**. |
| 2 | Side panel | The right side panel (here) contains one or two antennas. |
| 3 | Bracket | Bracket for stabilizing the system and for cable routing (two antenna downleads).The bracket can be omitted if the side panels are mounted in a stable manner and the cables are routed on-site. |
| | Cover plates | Optionally, cover plates can be used to cover the side panels. |

In the standard configuration, the following devices are mounted on the inside of the two side panels.

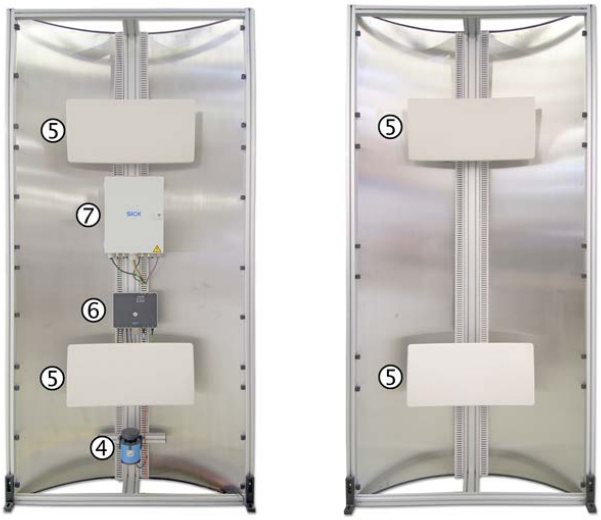



*Fig. 2: Devices in the side panels*

| No. | Component | Explanation |
|---|---|---|
| 4 | Laser scanner | Laser scanners are used to detect objects in the monitored area. Depending on the version, two types of laser scanners are installed.<br>• Laser scanners of the LMS1xx product family with approx. 10 m scanning range (shown here)<br>• Laser scanners of the TiMxx product family with approx. 2 m scanning range |
| 5 | Antennas | RFID antennas detect RFID transponders in the monitored area of the gate.<br>Depending on the version, two or four antennas are used. |
| 6 | Interrogator | The interrogator is the reader for RFID detection. Using up to four external antennas, it processes all current transponders in the carrier frequency range of 860 - 960 MHz. |
| 7 | Controller / control cabinet | The controller is the central control unit of the sensory components for identification of RFID tags.<br>The controller is mounted in the control cabinet. The central power supply is also housed in the control cabinet. |

### 3.2.2 The operating principle of the gate

A laser scanner (trigger) continuously monitors passage through the gate. If an object passes through the gate (e.g., with a hand lift), the laser scanner detects the passing object (e.g., a crate).

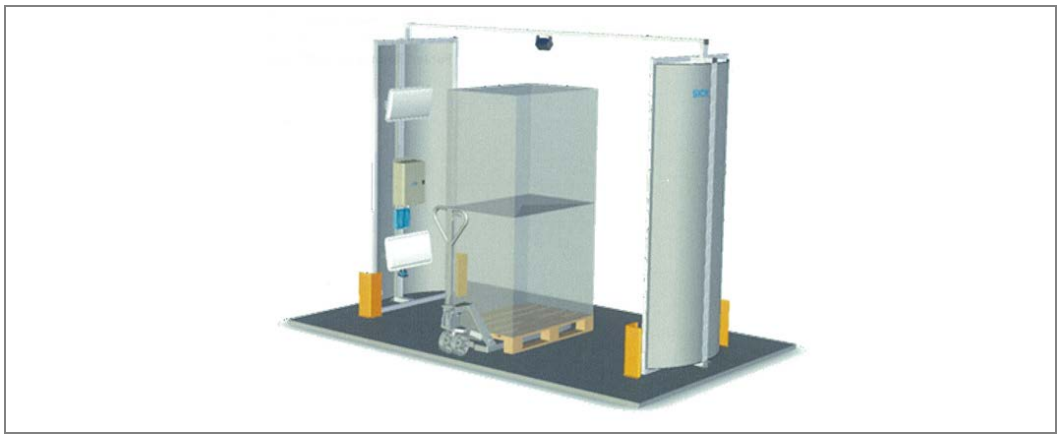


*Fig. 3: Operating principle of the gate*

The RFID unit is activated. That means all RFID tags in the trigger field are detected by the antennas and read by the interrogator.

The detection range can be divided into different zones defined as follows when viewed from above:

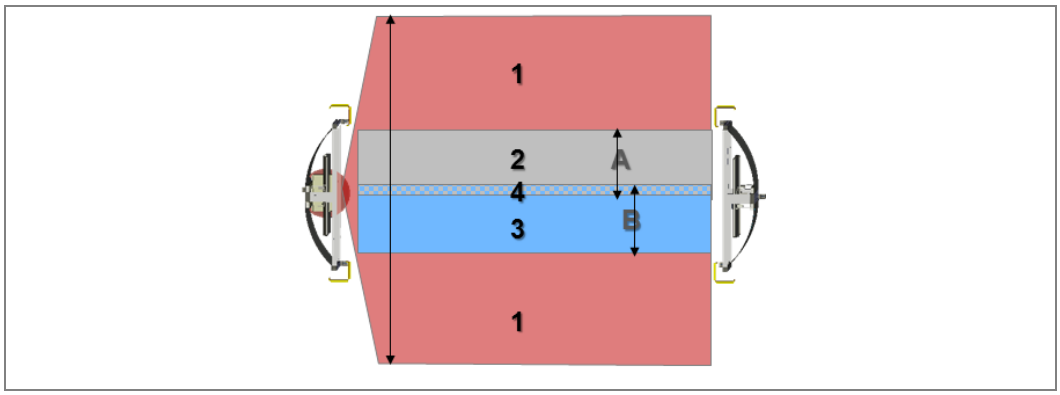



*Fig. 4: The detection range of the 2D laser scanner*

| Representation | Trigger field |
|---|---|
| | 1. Trigger RF antennas |
| | 2. Assignment field A |
| | 3. Assignment field B |
| | 4. Overlapping field |

The read results are evaluated in the controller and forwarded via the host interface to a higher-level system such as an ERP system. Data output is typically two seconds after assignment field A or B is enabled.

After assignment field A/B has been enabled in one direction, direction detection is calculated by the system. If the direction of the object changes within assignment field A/B, the direction detection is invalid.

Only one object may pass through assignment fields A and B at the same time.

The height of the detection range is typically 300 mm.

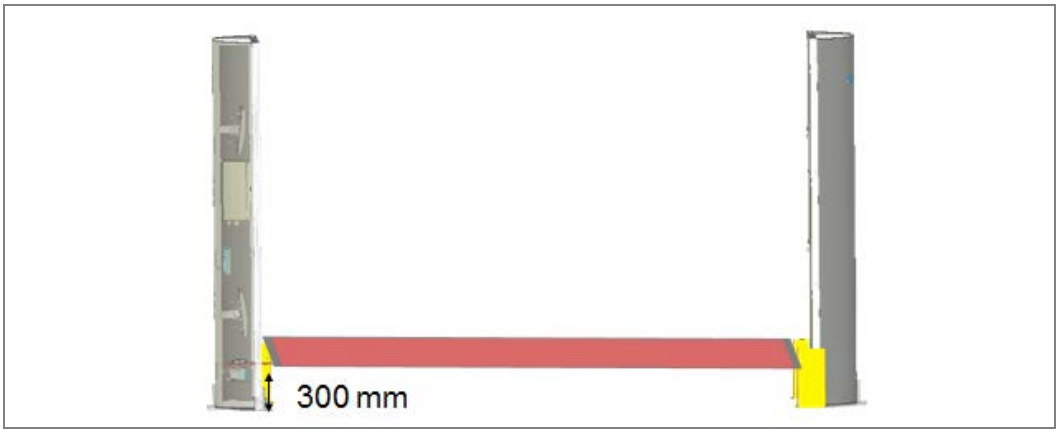



*Fig. 5: The detection range within its height specifications*

After installation and configuration, the system continues running without any further handling and provides the required data.

All customer-specific parameters are saved on an SD card in the controller and interrogator.

The parameters of the laser scanner are saved in the connector cover.

## 3.3 Project planning

### 3.3.1 RFGS Pro system requirements

To operate the gate sensor system, the following are required:

- Supply voltage: AC 100...264 V/50...60 Hz
- Host computer with RS-232, RS-422, Ethernet or Profibus data interface for further processing of the read data

### 3.3.2 Information on project planning

The RFGS Pro requires a stable, level surface. The mounting frame for the devices is included in the scope of delivery. Use the included fasteners and brackets for mounting.

| **Component** | **Explanation** |
|---|---|
| Label / tag type | EPC Global Gen2 Class1 |
| Maximum width of the system | 4 m |
| Required clearance above the floor | Min. 2,900 / 2,300 mm |
| Tags per object | Dependent on distance and speed |
| Objects / triggers | Only one object can pass through the gate simultaneously per trigger |

To achieve an **optimal read result**, the following should be observed.

- The laser beams of the trigger should not extend beyond the application space to prevent detection of neighboring persons or goods.
- Software is used to configure the fields.
- Ensure that no objects (including people) are positioned between the antennas and the transponder during the read process. This would attenuate/reflect the generated UHF field and thereby reduce the scanning range and processing speed of the interrogator.

Other possible factors that could significantly impact the scanning range include:

- Quality of the transponder (antenna gain, the integrated transponder IC and related sensitivity, reflected energy)
- Nature of the object at which the transponder is located (liquid, metal)

## 3.4 Status indicators

The accessible gate LEDs are located on the laser scanner, on the interrogator and in the control cabinet.

### 3.4.1 LEDs on the LMS1xx laser scanner

The laser measurement sensor is fully automatic in normal operation without operator intervention. The LEDs and 7-segment display signal the operational status of the LMS1xx.

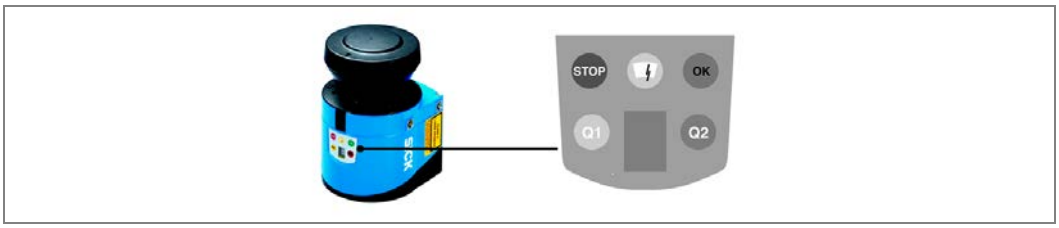



*Fig. 6: Status indicators of the LMS1xx laser scanner*

| Display | Possible cause |
|---|---|
| OK | LMS1xx in operation, no evaluation case reports an event |
| STOP | LMS1xx in operation, at least one evaluation case reports an event |
| | Optics hood is dirty |
| Q1 | Switching output is on |
| Q2 | LMS1xx is in teach-in mode |

*Tab. 1: Meaning of the LMS1xx laser scanner LEDs*

The 7-segment display is used for diagnostics when errors or faults occur (see chapter **8.3.1 LMS1xx laser scanner fault indicator**).

### 3.4.2 LEDs on the TiM32x laser scanner

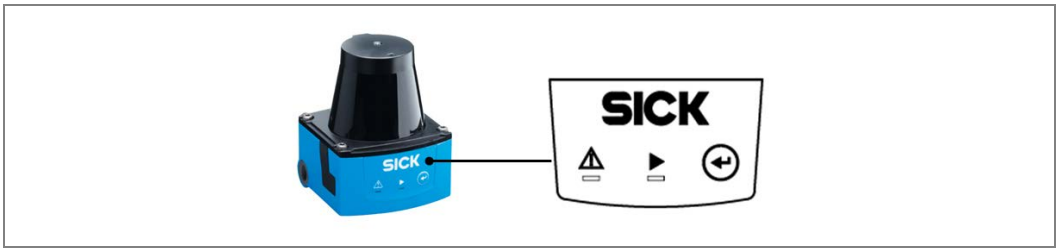



*Fig. 7: Status indicators of the TiM32x laser scanner*

| LED (red) | LED (green) | Status |
|---|---|---|
| – | ○ **Green** | Device ready/monitoring mode |
| ● **Red** | ○ **Green** | Field infringement |
| – | ☼ Green | Teach-in – Start |
| ● **Red** | ○ **Green** | Teach-in – End of advance warning phase |

| | | |
|---|---|---|
| | | 60-second teach-in phase |
| – | **Green** | Teach-in – End of teach-in phase |
| **Red** | – | Error |
| – | – | Device without supply voltage |

*Tab. 2: Status indicators of the TiM32x laser scanner*

### 3.4.3 LEDs on the interrogator


*Fig. 8: Status indicators of the interrogator*

| LED | Color | Meaning |
|---|---|---|
| Ready | Green | Device ready |
| | Red | Hardware fault |
| Result | Green | Read or write successful |
| RF | Green | UHF field activated |
| Data | Green | Data output via host interface |
| CAN | Green | Data traffic via CAN bus |
| LNK TX | Green | Data traffic via Ethernet |
| microSD | Green | MicroSD card inserted and ready for operation |

*Tab. 3 Status indicators of the interrogator*

### 3.4.4 LEDs on the controller

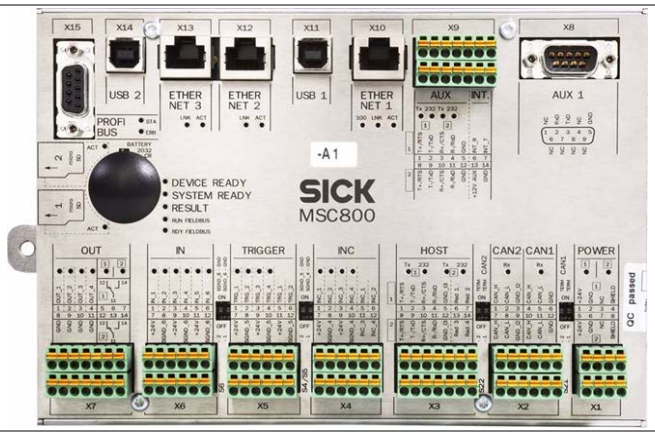



*Fig. 9: Status indicators of the controller*

| LED | Color | Meaning |
|---|---|---|
| READY | Green | ON: Controller is ready for operationOFF: Controller is not ready for operation |
| SYSTEM READY | Green | ON: Complete system consisting of MSC800 and all attached devices is ready for operation<br>OFF: Complete system is not ready for operation |
| RESULT | Green | ON: There is a valid read result<br>OFF: No valid read result |
| RUN FIELDBUS | Green | ON: Fieldbus communication is active<br>OFF: No fieldbus communication |
| READY FIELDBUS | Green | ON: Fieldbus application is ready<br>OFF: Fieldbus application is not ready |
| OUT | Green | ON: Switching output is active<br>OFF: Switching output isdeactivated |
| IN, TRIGGER, INC | Green | ON: Switching output is active<br>OFF: Switching output is deactivated |
| POWER (1/2) | Green | ON: Supply voltage is on<br>OFF: No supply voltage |
| micro-SD<br>ACT | Green | ON: MSC800 reads/writes data to/from SD card<br>OFF: Deactivated |
| PROFIBUS<br>STA<br>ERR | <br>Green<br>Green | <br>ON: Data interface is ready for communication<br>ON: Bus or communication error |
| ETHERNET<br>LNK<br>ACT<br>100 | <br>Green<br>Green<br>Green | <br>ON: Data interface is connected to Ethernet<br>ON: Data transmission<br>ON: Data transmission rate 100 MBit/s<br>OFF: Data transmission rate 10 MBit/s |
| HOST (1/2)<br>AUX (1/2)<br>Tx<br>232 | <br><br>Green<br>Green | <br><br>ON: Data interface is sending data<br>ON: Interface is operating as an RS-232 interface<br>OFF: Interface is operating as an RS-422/485 interface |
| CAN ½<br>Rx | | <br>ON: Data interface is receiving data |

*Tab. 4: Status indicators of the controller*

### 3.4.5 Traffic light (optional)

| Traffic light color | Meaning (at delivery) |
|---|---|
| Green | The RFID gate is ready for operation. All components can be addressed.<br>The green traffic light shows the same information as the **SYSTEM READY** LED on the controller. |
| Yellow | Read process is active: Passing RFID tags are read. |
| Red | The RFID gate is not ready for operation. |

The meaning can be customized.

## 3.5 Interfaces

There are various data interfaces on the MSC800 controller in the control cabinet for distributing read results to any further system.

| Interface | For component | Function |
|---|---|---|
| CAN network | Optional CLV bar code scanner<br>LMS100<br>RFU630 | Component monitoring and triggering |
| Ethernet #1 | Customer interface | Transmits the summarized data to the host |
| Ethernet #2 | RFID Interrogator | Collects the data received and assigns it to an object. |
| Ethernet #3 | Auxiliary interface | Available for maintenance, service and commissioning by a technician |
| Digital I/O's | Photoelectric sensor<br>Incremental encoder | Object trigger<br>Incremental encoder<br>No Read, Good Read |
| RS-232/RS-422Profibus DPEthernet | Host | Sends read tags and reports system errors |
| Serial connection #2 or Ethernet | SICK Visualization Platform | Sends all analysis and diagnostic information |

*Tab. 5: Function of the data interface*

The SOPAS configuration software can be used to configure the data interfaces.

## 3.6 Parameter memory

### 3.6.1 Parameter set on the MSC800 microSD memory card

The configured parameter values are saved as a parameter set in the internal EEPROM of the MSC800 and on the SD memory card (SD 1) of the controller (cloning).

If the logic unit has to be replaced, the memory card makes transferring the parameter set to the new device quick and easy (see chapter **7.2.2 Replacing the controller**).

### 3.6.2 Parameter set on the interrogator microSD memory card

The interrogator also has a removable memory card on which the last modified parameter set is saved or read diagnostic data is recorded externally (see chapter **7.2.7 Replacing an interrogator**).

### 3.6.3 Parameter set on the LMS connector cover

The LMS has parameter memory permanently integrated in the connector cover (cloning).

# 4 Mounting

## 4.1 Preparation for mounting

### 4.1.1 Placing installation-ready gate components

- 2 side panels
- 1 bracket
- Cover plates (optional)

### 4.1.2 Placing installation-ready devices

- MSC800 controller
- RFU630 interrogator
- LMS1xx / TiM32x laser scanner
- Antennas (2 or 4)

### 4.1.3 Placing installation-ready accessories

- Clamp multiblocks for securing the cover plates
- Concrete dowels and screws for securing the side panels in the floor
- Universal connecting set for extruded aluminum profiles for securing the bracket
- Mounting brackets and device mounting kits
- Cable set for connecting the devices
  - T-piece
  - Cable terminator
  - Ethernet cable (green)
  - CAN cable (purple)
  - Antenna downlead 2 m
  - Antenna downlead 10 m
- Water level
- Measuring tape
- Adhesive tape

### 4.1.4 Placing installation-ready tools


*Fig. 10: Required tools*

The following tools are required for installation:

| Tool | Application |
|---|---|
| Wrench 11 | For mounting antennas |
| Wrench 13 | Brackets |
| Wrench 20 | Cable glands |
| Wrench 24 | Cable glands |
| Hexagon socket head screw 5 | For mounting the bracket |
| Hexagon socket head screw 4 | For mounting the components |
| Hexagon socket head screw 3 | For replacing the MSC |
| Screwdriver 5 | For loosening the clamp multiblocks |
| Screwdriver 2.5 | For placing the lines |
| Diagonal cutter | Electrical installation |
| Cable stripping knife | Electrical installation |
| Wire stripper | Electrical installation |
| Multi-grip pliers | Cable glands, for mounting antennas |

*Tab. 6: Required tools*

## 4.2 Setting up the gate

### 4.2.1 Installing side panels

WARNING

**Risk of injury due to tipping components**

Before the cross-connection has been mounted to the two side panels, there is a risk of upright side panels tipping.

➢ Do **not** perform any mounting work alone.

➢ Ask a second person to hold components while mounting.

**Mounting**

Set up the two side panels of the device at the designated place at the specified distance from each other. The side panels are already lined with shielding on the reverse side on site.

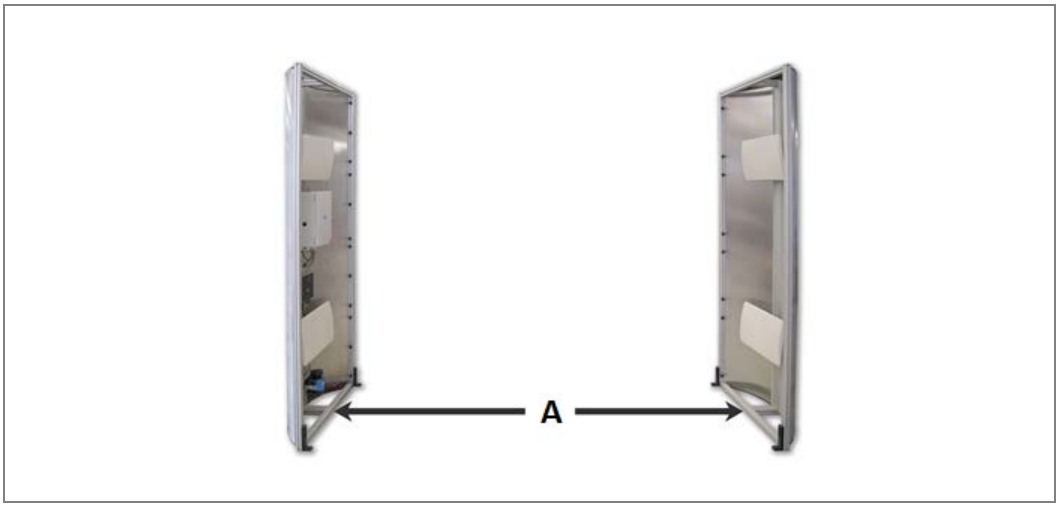



*Fig. 11: Setting up the side panels*

### 4.2.2 Mounting the bracket with universal connectors

The bracket for attaching the side panels is already pre-assembled at the defined length. The universal connector for extruded aluminum profiles included is used to mount the bracket.

Universal connectors for extruded aluminum profiles are rectangular friction-fitted aluminum profile connectors that can be adjusted.

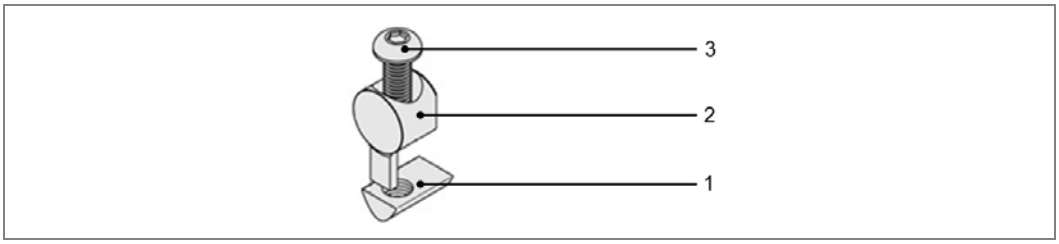



*Fig. 12: Universal connecting set for mounting the bracket*

WARNING

**Risk of injury due to falling components**

Depending on the length, the weight of the bracket can be up to 18 kg.

➢ Do **not** perform any mounting work alone.

➢ Ask a second person to hold components while mounting.

**Mounting**

1. Set up the bracket on the two side panels.
2. Put the slot nut (1) into the slot.
3. Insert the universal connector (2) into the profile of the bracket.
4. Insert the screw (3) into the universal connector.
5. Use the ball head screwdriver to tighten the universal connector.

*Fig. 13: Mounted bracket*

### 4.2.3 Setting up side panels

The adjustable feet can be used to set the side panels upright and the gate in a vertical position.

**Mounting**

1. Adjust the height using the bottom screw (1).
2. Fix the height set using the top screw (2).

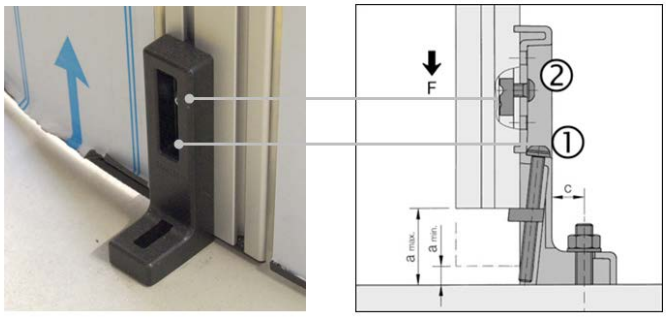



*Fig. 14: Setting up the side panel vertically (level)*

### 4.2.4 Attaching the side panels to the floor

The side panels must be screwed to the floor at all six feet.

1. Use the included 10 mm high-load dowel.
2. Screw down the side panels at all six feet.

## 4.3 Mounting the devices

To mount and run wire to the devices, respective components are already pre-mounted on the insides of the side panels.

- Two mounting rails each with extruded aluminum profiles for attaching the devices (1).
- Two cable channels each (2).

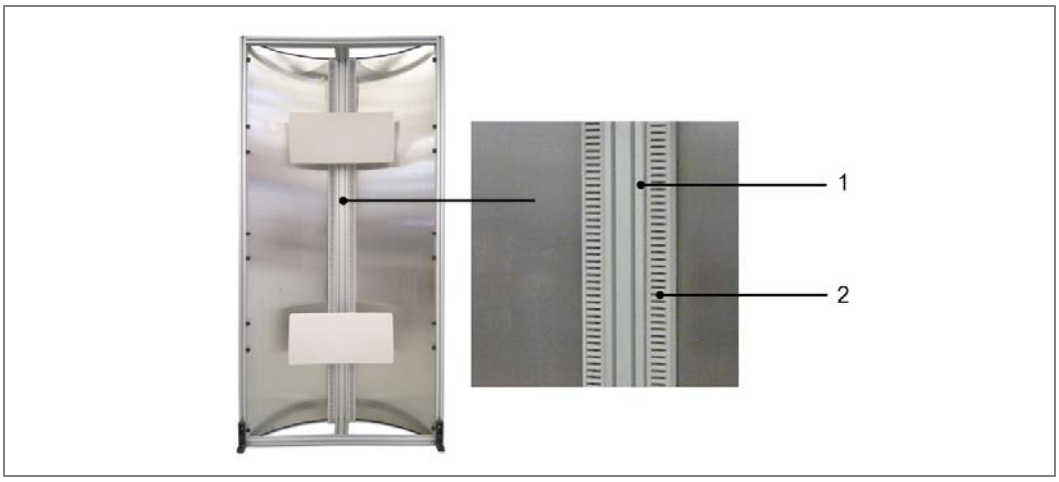



*Fig. 15: Interior setup of the side panels*

**Mounting components to the mounting rail**

The mounting rails are extruded aluminum profiles. Threaded slot nuts can be used to insert screws on the section.

1. Put the slot nut in the slot and hold it there (1).
2. Insert the screw (2).


*Fig. 16: Mounting components to the mounting rail*

### 4.3.1 Mounting the trigger

A laser measurement sensor is used as the trigger. The laser measurement sensor scans the environment and switches on the RFID unit when objects are detected.

LMS1xx or TiM32xx laser scanners can be installed in the gate.

**Height of the laser scanner**

The laser scanner (1) must be mounted at a height that allows reliable detection of objects. For detection of vehicles, the height is somewhat above the base plate so that detection of the vehicle as a whole is ensured and detection of individual wheels is excluded.

The exit height of the laser beams is shown schematically in the figure.

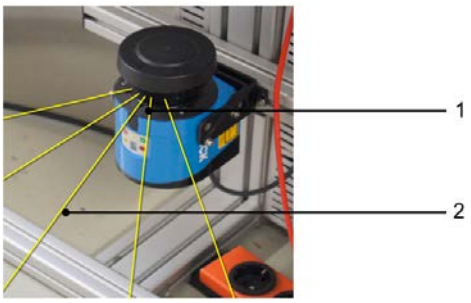



*Fig. 17: Mounting height of the laser scanner*

**Scan height standard values**

| | |
|---|---|
| Standard height for reliable detection of hand lifts, forklifts, etc. | 30 cm |
| Height when using the cover plate down | 30/45 |
| Height when using the cover plate at height 2 | 90/105 |

*Tab. 7: Scan height with standard values*

### 4.3.2 Mounting the LMS1xx

The LMS1xx is an electro-optical laser measurement sensor that uses laser beams to scan the outline of its surroundings on a plane. The LMS1xx measures its surroundings in two-dimensional polar coordinates. If a laser beam hits an object, the position of the object is determined in the form of distance and direction.

The scanning sector is 270°. The scanning range of the LMS1xx is max. 10 m.


*Fig. 18: LMS1xx laser scanner*

### Mounting

The LMS1xx is mounted in the side panel on a pre-assembled crossbar (2) using a mounting kit (1).


*Fig. 19: Mounting the LMS1xx laser scanner*

1. Mount the bracket (1) on the pre-assembled crossbar (2) to the mounting rail at the intended height using an angle bracket.

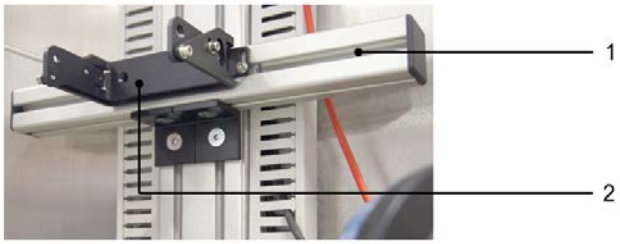



*Fig. 20: Installing the mounting kit for the LMS1xx laser scanner to the crossbar*

2. Mount the LMS1xx laser scanner to the bracket.
3. Mount the LMS1xx to the mounting kit. Mount the LMS1xx as shown.

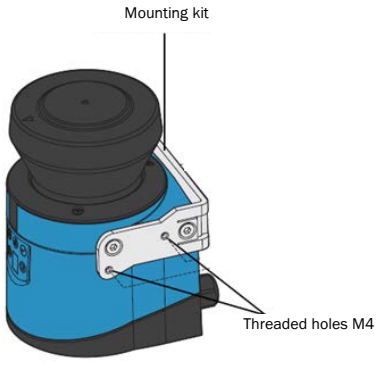



*Fig. 21: Assembly drawing of the mounting kit for the LMS1xx laser scanner*

### Alignment

The LMS1xx must be aligned horizontally to ensure that the laser beam always emits light at the same height and has a level reading field.

## 4.3.3 Mounting the TiM32x

The TiM32x is a laser sensor for surface monitoring that uses SICK's own HDDM technology. This method of measurement is based on the emission of laser pulses. In contrast to other time-of-flight methods, more reflected laser pulses are measured and an average measured value is generated from these. As a result, no gaps arise during scanning and the measurement remains very stable even when affected by ambient light or by other optical systems.

The scanning range of the TiM32x is up to 2 m. The width of the gate may not be any larger when using this device.


*Fig. 22: Mounting the TiM32x laser scanner*

### Mounting

The TiM32x is mounted in the side panel on a crossbar using an included mounting kit.

1. Use an angle bracket (2) to mount the crossbar (1) to the mounting rail at the intended height.

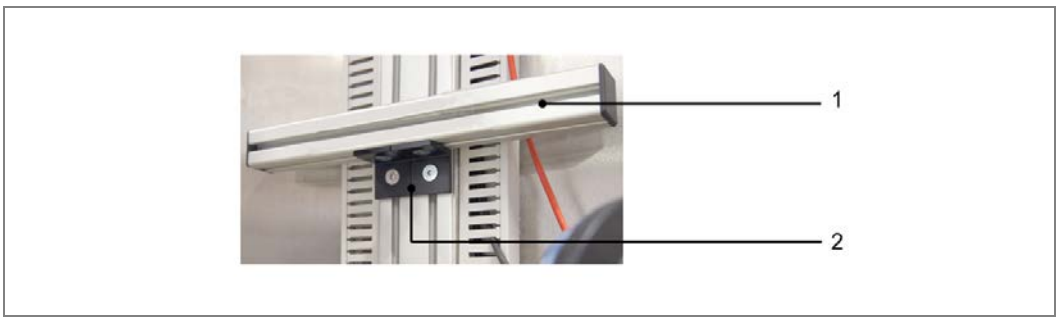



*Fig. 23: Mounting the crossbar for the TiM32x laser scanner*

2. Mount the two straight plates from the enclosed mounting kit on the TiM32x using two screws. Use the two blind-hole threads on the back of the housing.

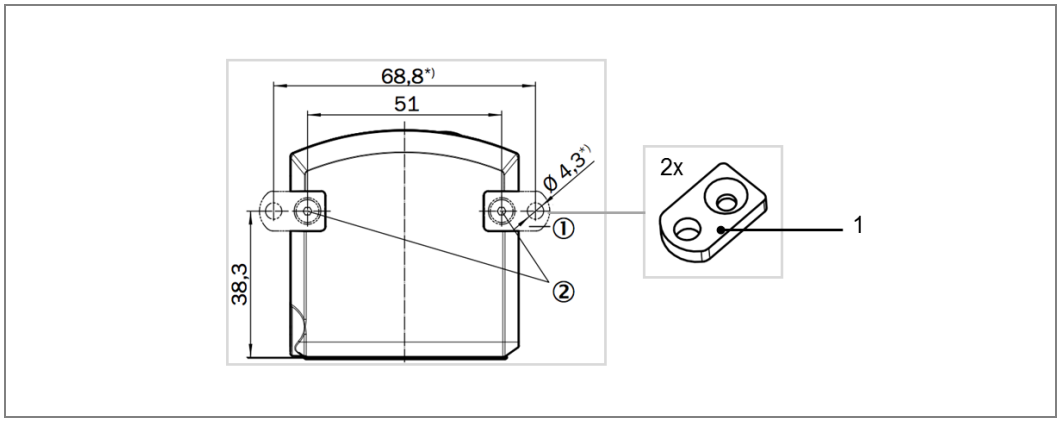



*Fig. 24: Assembly drawing of the mounting kit for the TIM laser scanner*

3. Mount the TiM32x to the crossbar.

**Alignment**

Align the 90° axis of the TiM32x's scanning angle with the center of the area to be monitored. The marking on the lid of the optics hood serves as a bearing alignment aid.

The TiM32x must be aligned horizontally to ensure that the laser beam always emits light at the same height.

### 4.3.4 Mounting the interrogator

The RFU63x interrogator is an intelligent RFID unit for automatic, fixed identification and data feeding of wireless data carriers on moving or stationary objects. The RFU63x is a compact read/write unit that uses a maximum of 4 external antennas to process all current ISO /IEC 18000-6C-compatible transponders in the carrier frequency range of 860 to 960 MHz.

The interrogator (and later, the control cabinet) is mounted based on the exact height of the antenna. The reason is that only **one** front plate has to be removed when servicing the device. The recommended height of the interrogator is (measured from the top edge of the RFU63x to the frame floor):

| | |
|---|---|
| 1 | 500 mm |
| 2 | 1100 mm |
| 3 | 1700 mm |

The RFU63x uses its Ethernet interface to send read results to the controller for further processing.


*Fig. 25: Mounting the interrogator*

**Note** When mounting the interrogator, remember that the length of the cable to the antennas should be as short as possible. In addition, the interrogator must be connected to the controller by two lines.

### Mounting

1. Mount the interrogator to the included mounting set.

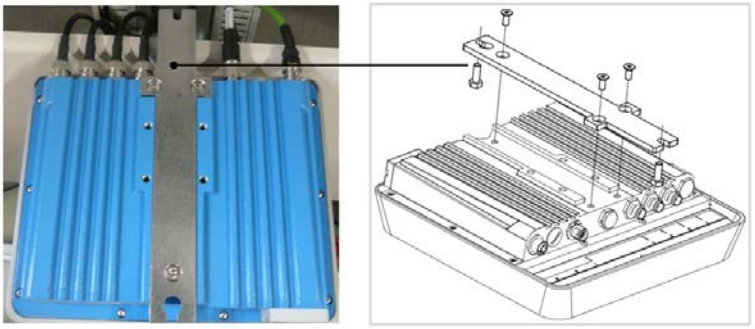


*Fig. 26: Mounting the interrogator to the mounting set*

2. Mount the interrogator with the mounting set to the mounting rail at the designated place.

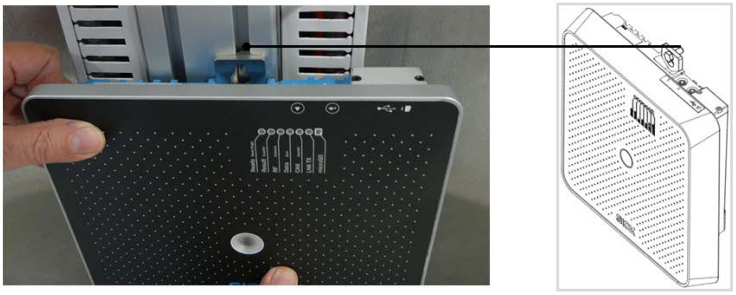


*Fig. 27: Attach the interrogator with the mounting set to the mounting rail*

**Inserting the SD card**

Insert the included memory card into the slot for the interrogator.

1. Loosen the two screws on the cover plate.
2. Insert the SD card into the slot.
3. Replace the screws on the cover plate.

### 4.3.5 Mounting the control cabinet

The control cabinet contains the controller and assembly for the power supply.

The control cabinet is mounted based on the exact height of the antenna. The reason is that only **one** front plate has to be removed when servicing the device. The recommended height of the control cabinet is:

| | |
|---|---|
| 1 | 700 mm |
| 2 | 1300 mm |
| 3 | 1600 mm |

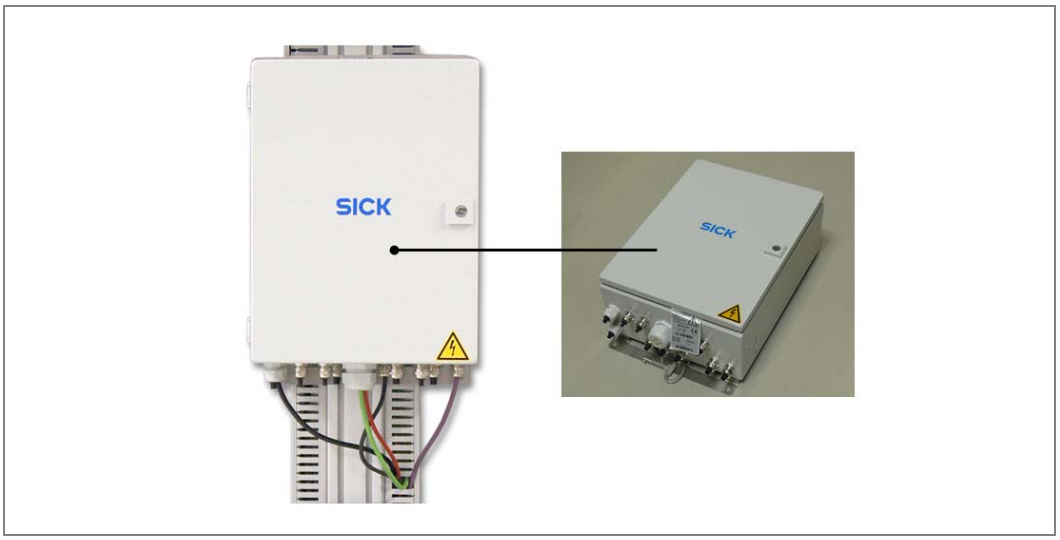



*Fig. 28: Mounting the control cabinet*

**Note** The position of the control cabinet should ensure that cables can be easily routed and that the cabinet is easy to open.

WARNING

**Risk of injury due to falling components**

The weight of the controller can be approx. 10 to 20 kg depending on the variant.

➢ Do **not** perform any mounting work alone.

➢ Ask a second person to hold components while mounting.

### Mounting

The control cabinet is mounted to the mounting rail using the attachment rail.

➢Attach the control cabinet using one fixing screw each at the top and bottom.


*Fig. 29: Mounting the control cabinet with the mounting kit to the mounting rail*

## 4.3.6 Mounting the antennas

### Attachment height

The antennas must be mounted at a height at which the RFID tags are easy to read.

- With two antennas, they should be mounted (left and right) at the expected height of the RFID tags.
- With four antennas, the top antennas should be below the expected height, the bottom antennas above the expected height.
- Symmetrically align the antennas to the expected height of the RFID tags.
- The exact position of the antenna must be determined for the specific customer.

### Inclination

The antennas can be mounted at an angle based on three levels. The following settings are useful:

- Top antenna: Angled down 5°
- Bottom antenna: Angled up 5°

### Mounting

The mounting bracket for the antennas is already attached to the mounting rail.

1. First, attach the counterpiece to the quick connector (2) to the pre-assembled mounting bracket (1). Make sure that you select the correct angle bracket.

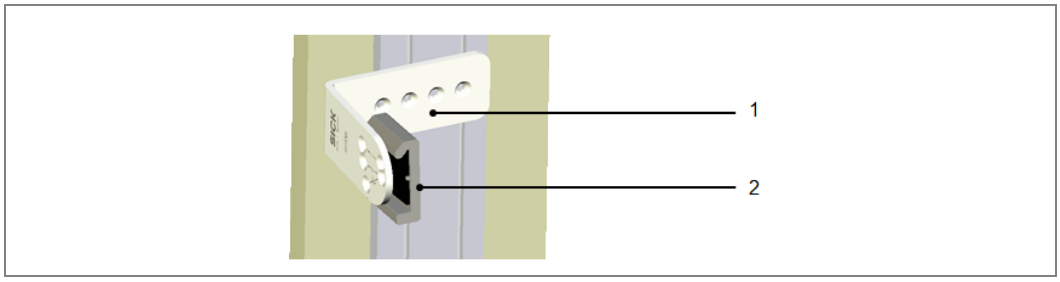



*Fig. 30: Pre-assembled mounting bracket for antennas*

2. Then mount the quick connector (3) to the bracket (4).

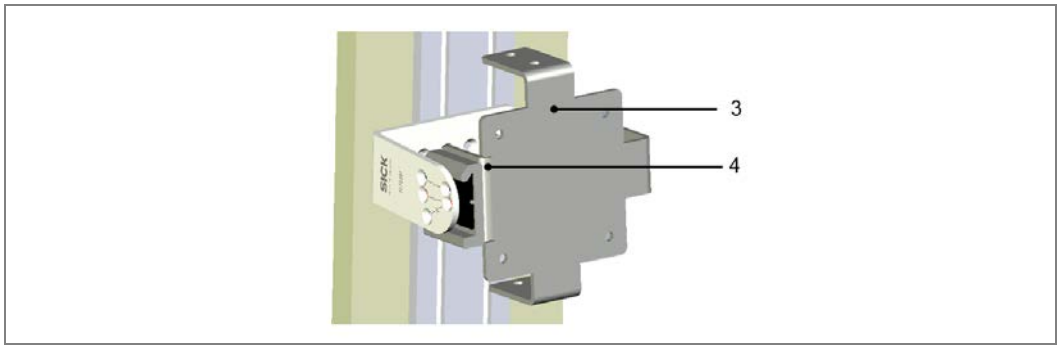



*Fig. 31: Bracket and quick connector on the back of the antenna*

4. Mount the antenna using the quick connector. Click the quick connector onto the counterpiece.

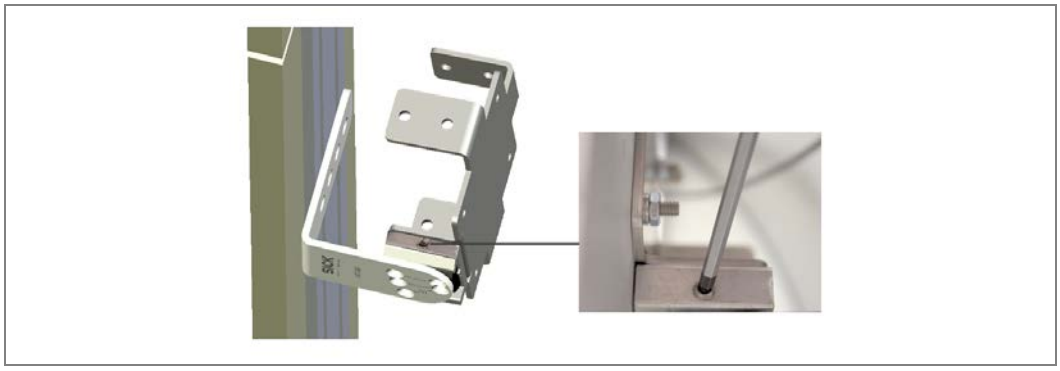


*Fig. 32: Mounting the antenna via the quick connector*

3. Use the ball head screwdriver to tighten the fixing screws.

## 4.4 Dismantling the gate

WARNING

**Risk of injury due to falling components**

Depending on the length, the weight of the **cross-connection** can be up to 18 kg.

➢ Do **not** perform any dismantling work alone.

➢ Ask a second person to hold components while dismantling.

WARNING

**Risk of injury due to tipping components**

After loosening the cross-connection on the two side panels, there is a risk of upright side panels tipping.

➢ Do **not** perform any dismantling work alone.

➢ Ask a second person to hold components while dismantling.

**Dismantling**

1. Switch off the supply voltage.
2. Remove the cover plates.
3. Disconnect all connection cables.
4. Remove all devices from the mounting brackets.
5. Remove the bracket from the side panels.
6. Remove the floor screw for the side panels.

**Note** On final decommissioning, please observe the requirements for environmentally correct disposal in the **Disposal** chapter.

# 5 Electrical installation

WARNING

**Disconnect the power to the system!**

The system could inadvertently start while connecting the devices.

➢ Make sure that the entire system is disconnected from the power supply during the electrical installation.

WARNING

**Risk of injury due to electric current**

The central control unit of the gate is connected to the power supply (AC 100 ...264 V/ 50 ... 60 Hz).

➢ Standard safety requirements must be met when working on electrical systems.

➢ The power supply must be disconnected when attaching and detaching electrical connections.

WARNING

**Risk of injury due to electric current**

Only a qualified electrician or person trained under the guidance and supervision of a qualified electrician is permitted to work on electrical systems or equipment in accordance with electrical regulations.

## 5.1 Components in the control cabinet

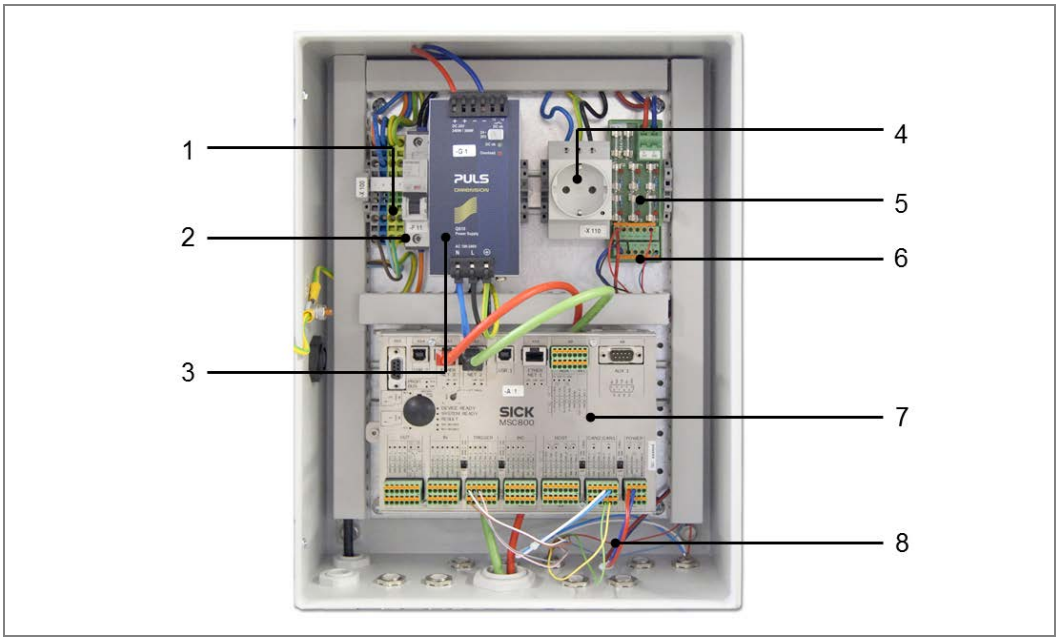



*Fig. 33: Components in the control cabinet*

| No. | Component | Explanation |
|---|---|---|
| 1 | Power supply110 to 230V AC | Terminal strip for connecting the power supply |
| 2 | Fuse/main switch | For switching on/off the complete system<br>(All system components are connected behind the fuse) |
| 3 | Power supply 24V | For powering the components |

| | | |
|---|---|---|
| 4 | Power outlet | May be used for service purposes |
| 5 | Fuses | The fuses are equipped with LEDs that illuminate when a fuse is defective.Top: Two spare fuses (type: T2A and T4A)<br>Based on the technical specification, RFU630 and LMS100 must be fuse protected with 2A. They are at F6 and F5. |
| 6 | Connecting terminal 24V | For internal power supply<br>• Top: +24V<br>• Bottom: Ground |
| 7 | Controller | The controller controls the complete system, evaluates the data and sends the results to a host. |
| 8 | Cable glands | The cable glands are dust-proof and splash-proof.<br>Make sure that the cable glands are correctly installed as required. |

*Tab. 8: Components in the control cabinet*

## 5.2 Cable channels

When possible, route the cables in the cable channels. If necessary, open the cable channel before routing any cables. Cable channels are located in the side panels (1) and in the control cabinet (2).

**Note** We recommend that you use one cable channel exclusively for antenna downleads.

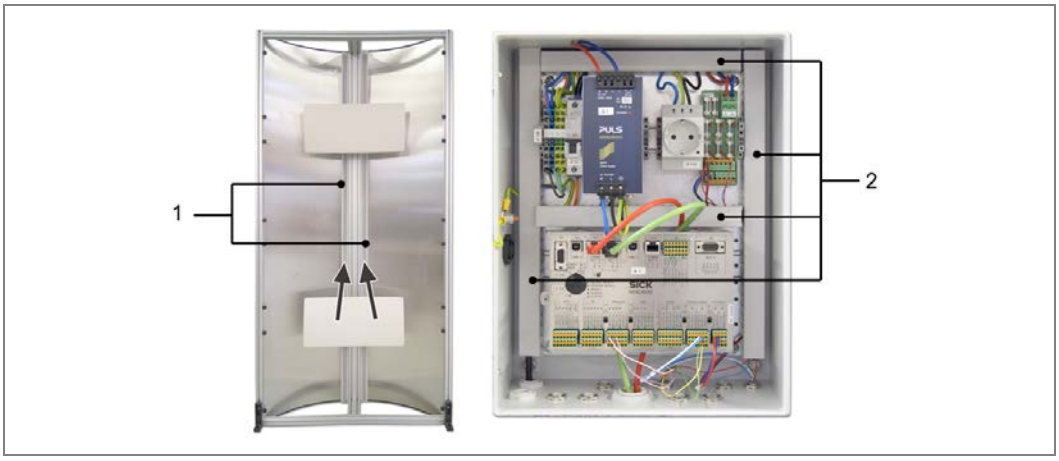



*Fig. 34: Routing cables via cable channels*

## 5.3 Connecting the power supply to the controller

WARNING

**Disconnect the power to the system!**

➢ Make sure that the cable is disconnected from the power supply and measures are taken to prevent reconnection.

### Connecting the power supply

WARNING

**Risk of injury due to electric current**

The power supply (AC 100 ... 264 V/50 ... 60 Hz) is protected by a 1-pin miniature circuit breaker (phase).

**If phase and neutral conductor are swapped when connecting to the -X100 terminal block, there is a risk of electrocution if you touch the respective contacts, even after switching off the input circuit with the miniature F12 circuit breaker.**

- ➢ Carefully connect the power supply to the -X100 terminal block.
- ➢ Verify that the power supply is connected correctly before the main switch is used to switch on the customer's power.

**Note**

To ensure the cables are firmly attached and in compliance with the IP 65 enclosure rating, the lock nut for strain relief on the control cabinet must be tightened.

- ➢ Check that the cables are firmly attached.
- ➢ No visible metal surfaces on the wires are permitted!

Connect the power supply to the -X100 terminal block as follows:

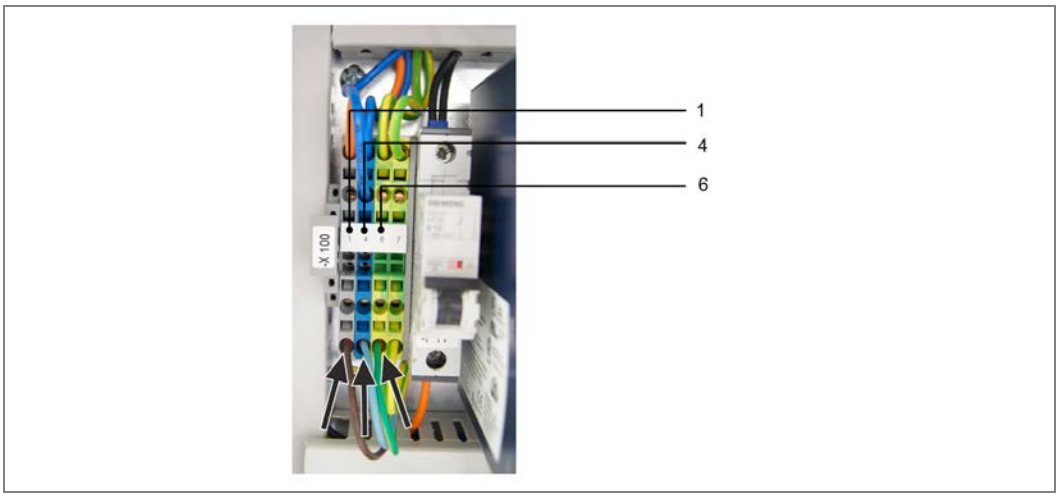



*Fig. 35: Connecting the power supply*

| Terminal | Color of the terminal block | Signal | Function |
|---|---|---|---|
| -X100/1.1 | Gray | L | Power supply AC 100 ... 264 V/50 ... 60 Hz (phase) |
| -X100/1.4 | Blue | N | Power supply AC 100 ... 264 V/50 ... 60 Hz (neutral conductor) |
| -X100/1.6 | Green-yellow | PE | Protective conductor |
| -X100/1.6 | Green-yellow | PE | |

*Tab. 9: MSC800-1100: -X100 terminal block assignment for power supply IN*

## 5.4 Connecting the LMS1xx to the controller

The LMS1xx has a fixed cable with an open end.

**Routing the cable to the control cabinet**

1. Route the open end of the LMS cable to the controller.
2. Use the cable channels.
3. Shorten the cable to the required length.
4. Remove the cable sheath to the length required for a connection of approx. 30 cm.

**Connecting the cable shield**

To protect the CAN communication against external interference, the cable shield must be connected to the housing of the MSC800.

1. Remove the cable insulation to approx. 300 mm.
2. Shorten the shield, leaving 30 mm at the bottom end.
3. Insert the cable through the cable gland screw.
4. Put the shield around the cable gland screw as shown.


*Fig. 36: Connecting the cable shields at the inlet to the controller cabinet*

5. Screw in the cable gland screw. Use wrench 24 to tighten the screw.

**Note** ➢ Make sure that the cable is firmly attached and cannot be pulled out (strain relief)!

**Connecting wires in the controller terminal block**

1. Remove the insulation of the eight wires to a length of approx. 10 mm.
2. Twist the wire ends.

   Do not use conductor sleeves and do not solder the wire ends.
3. Insert the wires in the terminal block as follows: Using a small screwdriver, push the clamping device down.

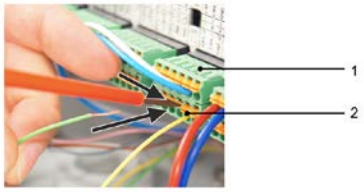



*Fig. 37: Inserting wires in to the controller terminal block*

4. Insert the wire ends. Make sure that no wires are sticking out.
5. Release the clamping device and check that the wires are firmly attached.

**Trigger-connecting cable connections**

Insert the free wire ends in to the terminal blocks **TRIGGER** (1), **CAN 1** (2) and in the **Fuse Block** (3).

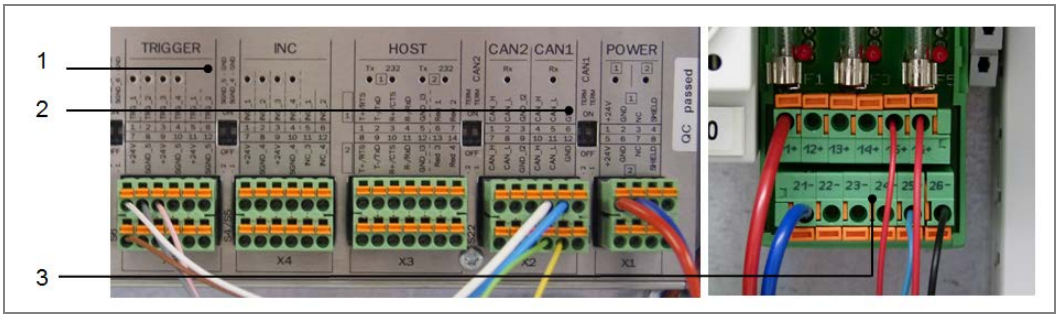



*Fig. 38: Connecting the trigger-connecting cable in the controller terminal blocks*

| Wire color | Terminal block | Connection |
|---|---|---|
| White | TRIGGER X5 | 1 TRG_1 |
| Gray | TRIGGER X5 | 2 TRG_2 |
| Pink | TRIGGER X5 | 3 TRG_3 |
| Brown | TRIGGER X5 | 7 24 V |
| Green | CAN 1 X2 | 10 CAN_H |
| Yellow | CAN 1 X2 | 11 CAN_L |
| **Wire color** | **Area on fuse block** | **Connection** |
| Red | Fuse block F1_6 | 15 + |
| Blue | Fuse block F1_6 | 25 - |

*Tab. 10: Connecting the trigger-connecting cable in the controller terminal blocks*

## 5.5 Connecting the TiM32x to the controller

The TiM32x has a pre-assembled cable with a 12-pin D-sub HD male connector. This cable is connected to a connecting cable that is connected to the controller on its open end. The connection procedure is described for the LMS1xx.

*Fig. 39: TiM32x connection to the controller*

The connecting cable has only six wires for the trigger connection and power supply. The TiM32x does not have a connection to the CAN bus.

Accordingly, the controller cannot be used to centrally configure the TiM32x. The SOPAS configuration software is used via the USB connection to configure the TiM32x separately.

## 5.6 Connecting the interrogator to the controller

The interrogator is connected to the controller by two cables.

- The **CAN cable** connects the interrogator to the CAN Bus and to the power supply. The CAN cable consists of a T-piece and purple (open end) cable.
- The green **Ethernet cable** with welded male connector forms the communications interface between the interrogator and controller.

### Connecting the CAN cable

A T-piece and pre-fabricated (purple) cable connect the interrogator to the controller.

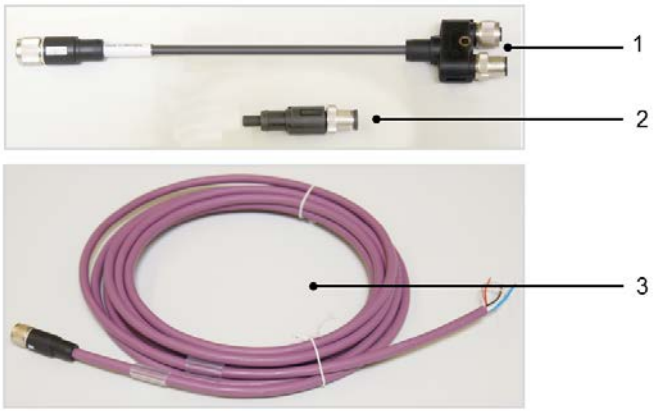



*Fig. 40: CAN cable for connecting the interrogator to the controller*

| No. | Component |
|---|---|
| 1 | T-piece |
| 2 | Terminator |
| 3 | CAN cable (purple) with open end |

*Tab. 11: CAN cable components for connecting the interrogator to the controller*

1. Connect the T-piece (1) to the **System** interrogator connection.

**Note** Insert the connector carefully to prevent the fine contacts from bending!

2. Connect the cable terminator (2) to the T-piece socket (1).
3. Connect the CAN cable to the T-piece connector.
4. Guide the open end of the purple CAN cable through the cable channel and through the cable gland in the control cabinet.
5. Put the shield around the cable gland screw of the controller cabinet as shown above.

**Interrogator-CAN cable connections**

Insert the free wire ends in to the terminal blocks **CAN 1** (1) and in the **Fuse Block** (2).

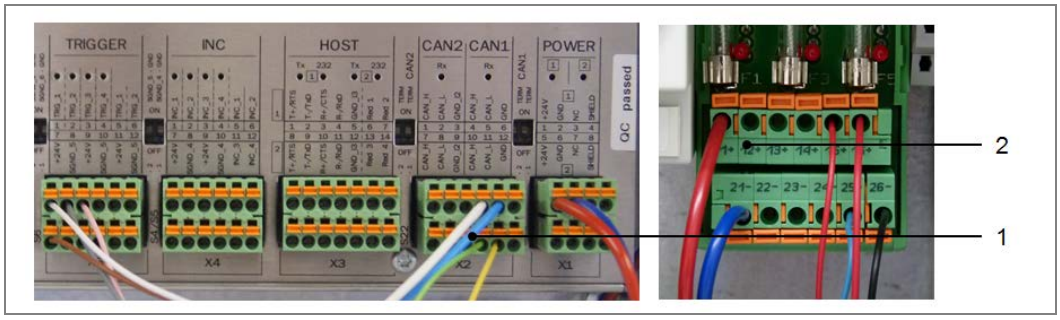



*Fig. 41: Connecting the interrogator-CAN cable in the controller terminal blocks*

| **Wire color** | **Terminal block** | **Connection** |
|---|---|---|
| White | CAN 1 X2 | 4 CAN_H |
| Blue | CAN 1 X2 | 5 CAN_L |
| **Wire color** | **Area on fuse block** | **Connection** |
| Red | Fuse block F1_6 | 16 + |
| Black | Fuse block F1_6 | 26 - |

*Tab. 12: Connecting the trigger-connecting cable in the controller terminal blocks*

**Connecting the interrogator to the controller by Ethernet cable**

1. Guide the Ethernet cable from the interrogator through the cable channel to the controller.
2. Put the rubber sleeve (1) and nut (2) over the cable.

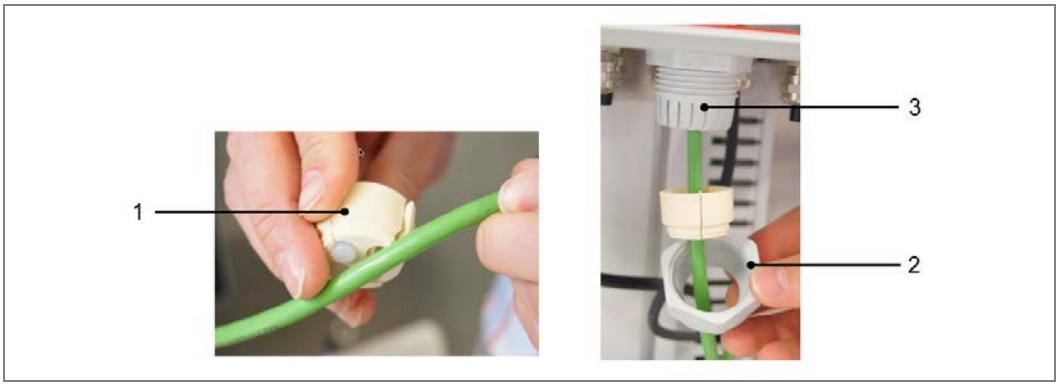



*Fig. 42: Ethernet cable for connecting the interrogator to the controller*

3. Guide the cable as shown through the sleeve and cable gland of the control cabinet (3).
4. Screw on the cable gland.

**Ethernet cable connection**

Connect the interrogator and controller via the Ethernet interface.


*Fig. 43: Communications interface between the interrogator and controller by Ethernet cable*

| **Wire color** | **Interrogator connection** | **Connection** |
|---|---|---|
| Green | Ethernet | 1 |
| **Wire color** | **Area on controller** | **Connection** |
| Green | ETHERNET X12 | 2 |

*Tab. 13: Communications interface between the interrogator and controller by Ethernet cable*

## 5.7 Connecting antennas

The included connecting cables are used to connect the antennas to the antenna inputs of the interrogator.

- The two shorter cables (2 x 2 m) are for connecting the antennas on the controller side.
- The two 10 m cables are for connecting the antennas on the opposing side.

The cable has two different connectors on the ends.


*Fig. 44: Antenna downlead connectors*

| No. | Component |
|---|---|
| 1 | Connection socket on the interrogator side |
| 2 | Connector on the antenna side |

*Tab. 14: Cable connections on the antenna downleads*

**Recommended assignment for the connections**

Assign the connections as shown in the figure below.

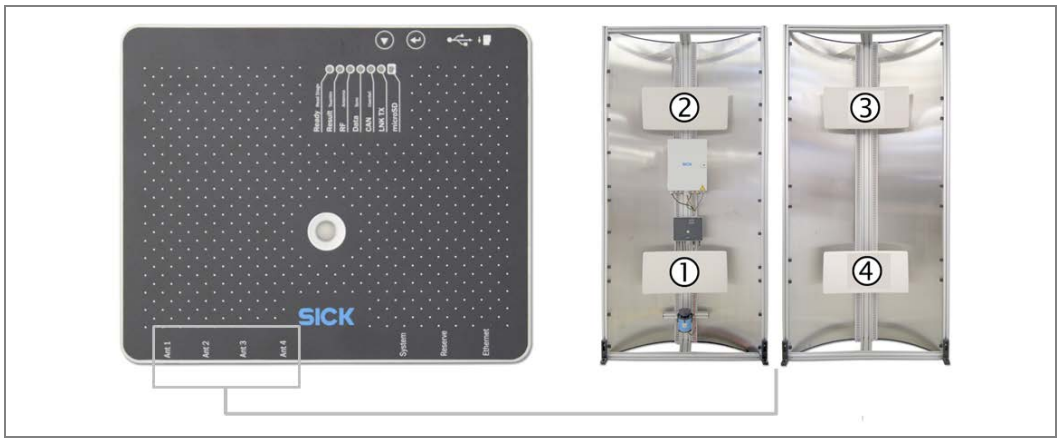



*Fig. 45: Recommended connections for the antennas to the interrogator*

**Rules for correctly routing the cables**

Please note the following when routing the antenna downleads:

- Always route the downleads **from the interrogator to the antenna**. Doing so allows you to wind-up the excess downlead around the antenna mount.
- Make sure that the downleads are **never kinked**. Otherwise, function may be significantly impaired.
- Always wind-up the antenna downleads with a minimum of a **10 cm radius**.
- Wind up the excess downleads around the **antenna mount** (as shown in the image of the dismantled antenna).
- Use a cable tie to secure the downleads.

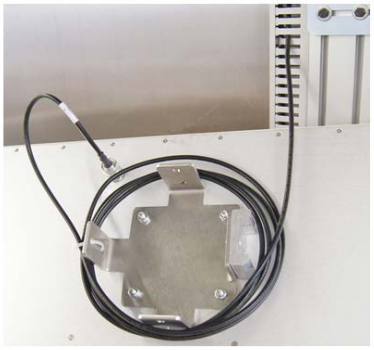


*Fig. 46: Winding up excess antenna downleads on the back of the antenna*

# 6 Commissioning

WARNING

**Do not commission without testing by qualified safety personnel!**

Before operating the gate for the first time, make sure that the gate is first checked and released by qualified safety personnel. Observe the notes provided in chapter **On safety**.

## 6.1 Switching on the system

Switch on the system. The system starts up automatically after connecting the power supply.

**Checking operational readiness**

All gate components are checked for operational readiness.

The interrogator and laser scanner LED displays show the device status during the power-up cycle.

**Operational readiness after 60 sec**

The system is ready for operation after approx. 60 seconds.

## 6.2 Checking the operational readiness of the MSC800

If the controller has been connected correctly, the operational readiness of the system can begin reading after the startup process.

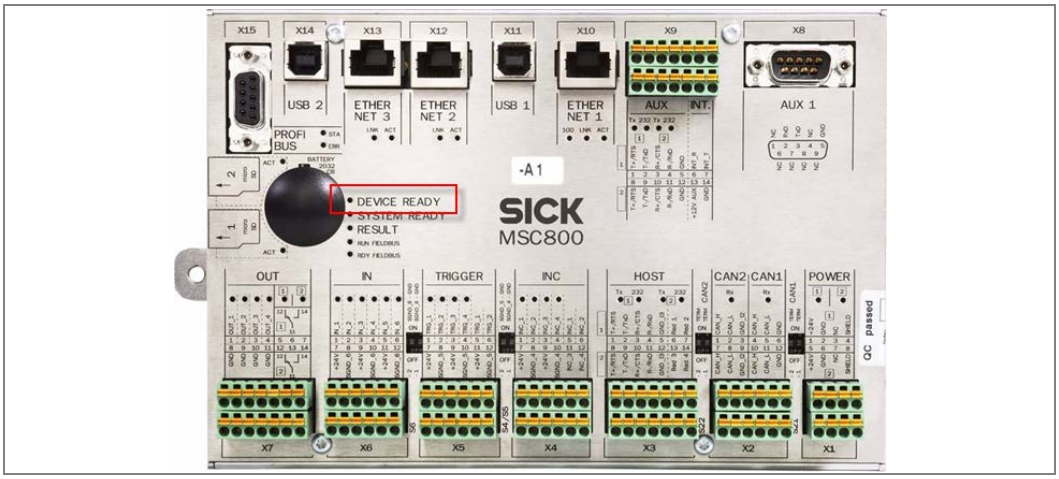



*Fig. 47: Reading the operational readiness of the devices on the controller after startup*

| Component | LED | Meaning |
|---|---|---|
| Controller | Device Ready | The **DEVICE READY** LED illuminates when the controller is ready for operation. |

*Tab. 15: Reading the operational readiness of the devices on the controller after startup*

## 6.3 Configuration (parameterization) using SOPAS

The RFID gate is adjusted by configuring the reading conditions on site. This enables measurement, analysis and output properties to be configured as required.

The included SOPAS configuration software makes interactive configuration possible. You can use the software to configure and test the properties, analysis behavior and output properties of the system as required.

In this chapter, we describe a standard configuration, which ensures proper operation of the RFID gate.

### Installing the SOPAS configuration software

Installation instructions are also available in the booklet included with the CD-ROM sleeve. Install SOPAS on the configuration computer.

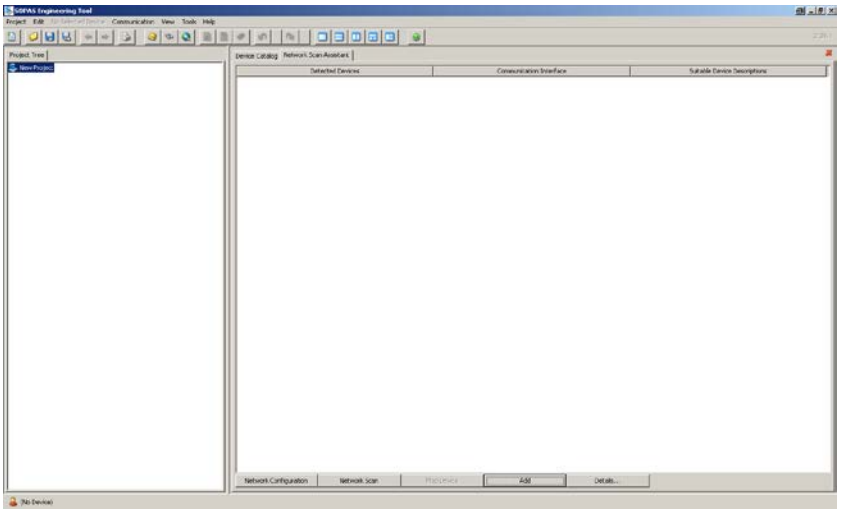
1. Start the configuration PC and insert the installation CD.
2. If installation does not start automatically, launch the **setup.exe** file on the CD-ROM.
3. Follow the operating instructions to complete the installation.

**Establishing an Ethernet connection**

1. Connect the controller to the configuration computer.
2. Use the **ETHERNET 1** input.

### 6.3.1 Launching SOPAS and creating a project

1. Launch SOPAS by double-clicking on the program icon on the desktop. The initial screen is displayed.
2. Log in as a service employee. The password is **servicelevel**.
3. Create a new project on the initial screen. One or more devices are combined and edited in a project.

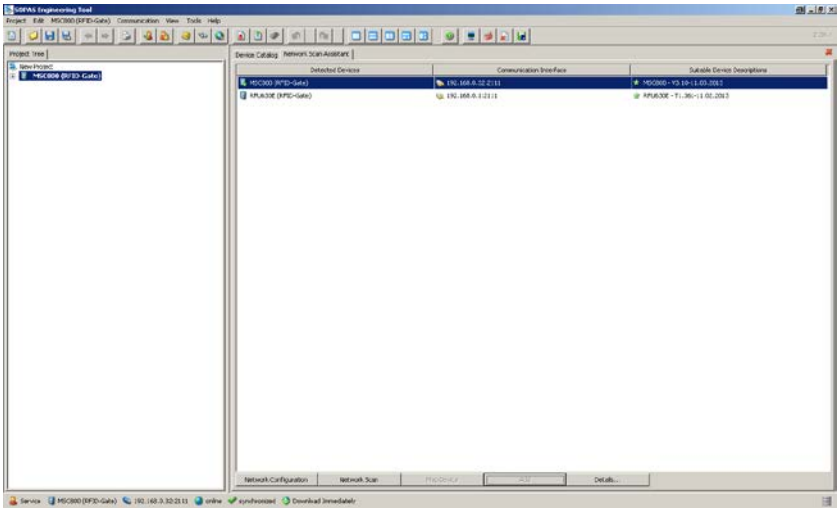


### 6.3.2 Adding a central controller to the project

To add attached devices to the project, use the Network Scan Assistant to search for attached devices and establish a connection to these devices.

1. Click the **Network Scan** button to start the search routine.
2. Any devices found are listed on the right.

3. In this example, drag and drop the **MSC800** central controller to the project tree structure. You can also add a device to the project by clicking the **Add** button.



### 6.3.3 Activating components

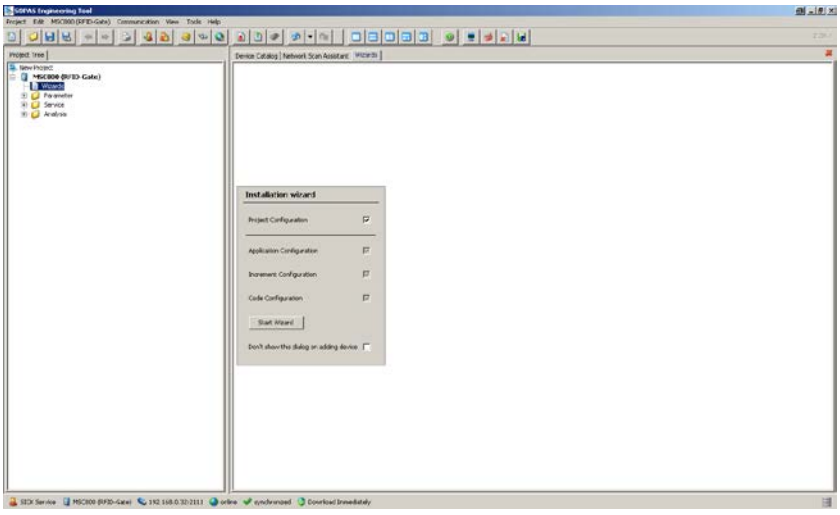
Activate the CAN interface in the RFU630 and LMS100 devices via a separate connection, e.g., Ethernet or serial RS-232.

You can find details in the operating instructions about the respective components.

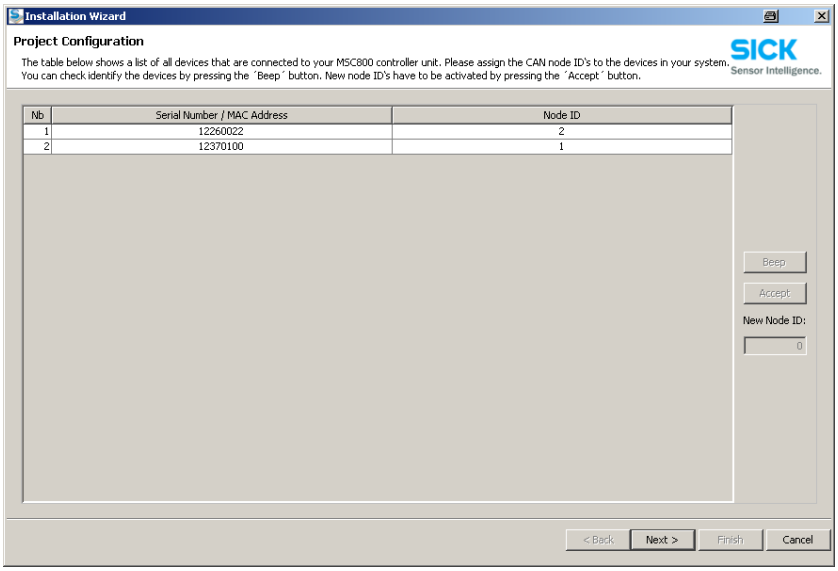
### 6.3.4 Using unique IDs to identify connected devices

In the next step, all devices connected to the controller receive a unique ID.

1. Open the gate in the tree structure of the project. If you have logged on as a service employee, the installation wizard appears first.
2. Double-click to open the wizard.



3. Activate all check marks and launch the wizard. The wizard lists the system devices connected to the central controller. The devices are identified by their serial number.




**Note**

4. Use the **Beep** button to identify the listed devices acoustically, so that you can make a corresponding assignment of serial number and device. Please note that no beep is possible for an LMS.
5. Click in the **Node ID** field and assign a number for the device that is unique for the entire project in the **New Node ID** field. Click the **Accept** button to confirm your entry.

   You have created the conditions for the devices to communicate with each other via the CAN bus network within the RFID gate.

   Recommended values:

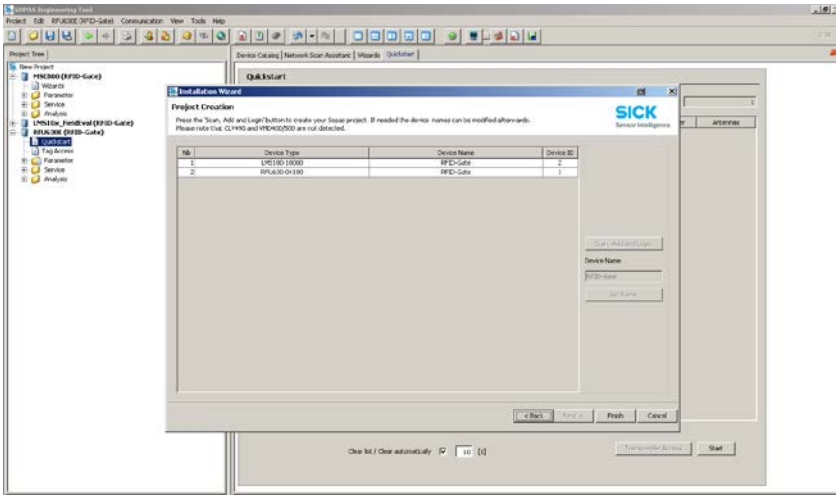
   ➢ Node ID RFU 630: **1**.

   ➢ Node ID LMS: **2**.

### 6.3.5 Transferring connected devices to the project

In the next step, the device IDs are transferred to the project.

1. Click **Next** in the wizard.
2. Select the devices in the list and click the **Scan, Add and Login** button. The devices are added to the project in addition to the controller and are visible in the project tree.
3. The list includes the devices with device type and name.

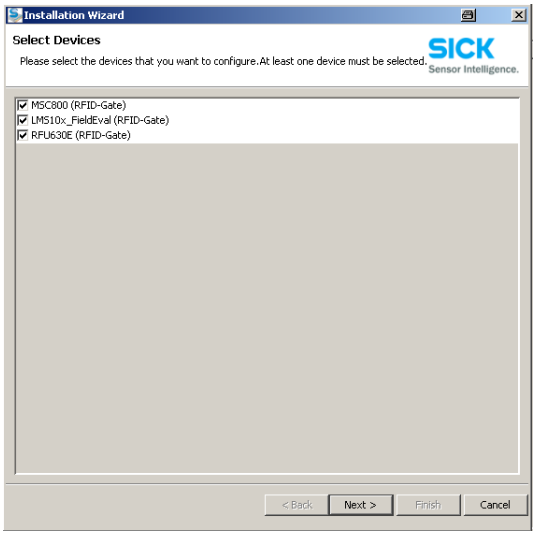



4. Click **Finish** to complete the project configuration. A second wizard is launched.

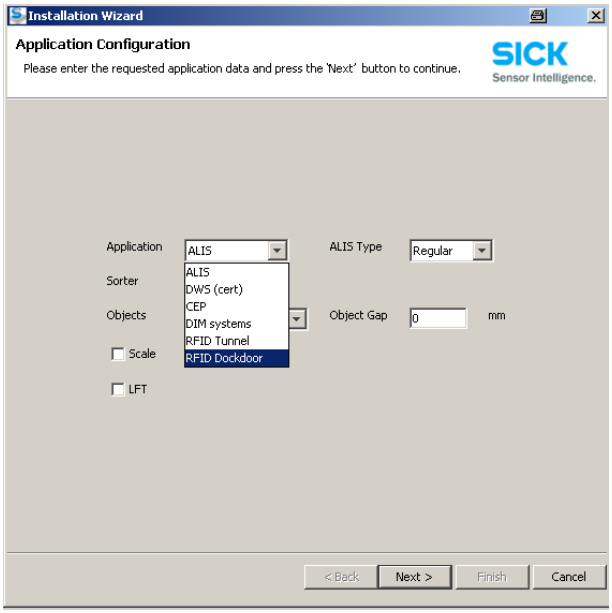
### 6.3.6 Configuring the global system

This wizard is used to define the global parameter settings for the entire gate and to transfer them to the connected devices.

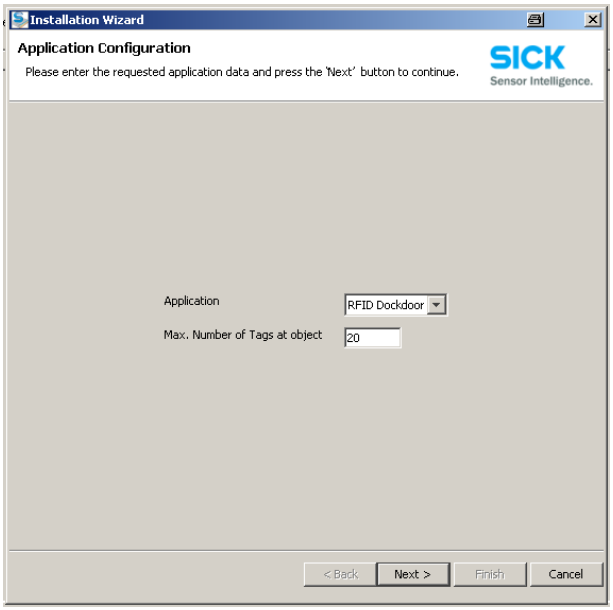
1. Select all components to which the parameter settings should apply (central controller and connected devices).



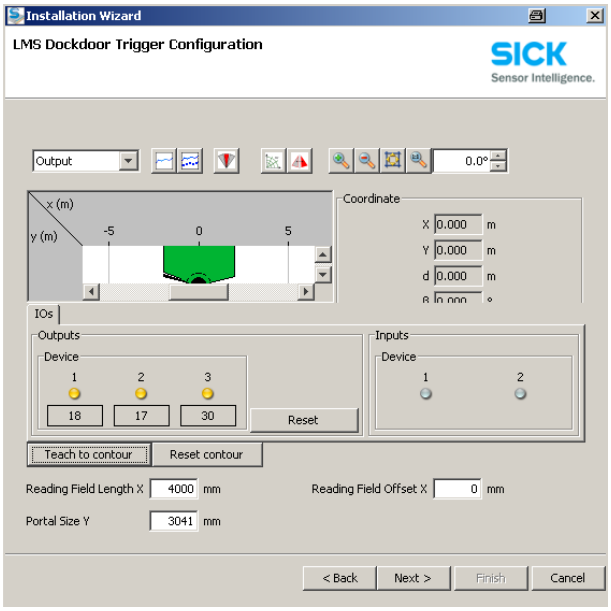
2. Click **Next** to continue. In the **Application** field, select **RFID Dockdoor** (i.e., the entire system).




3. Click **Next** to continue. Specify how many tags the gate should process when passing through.

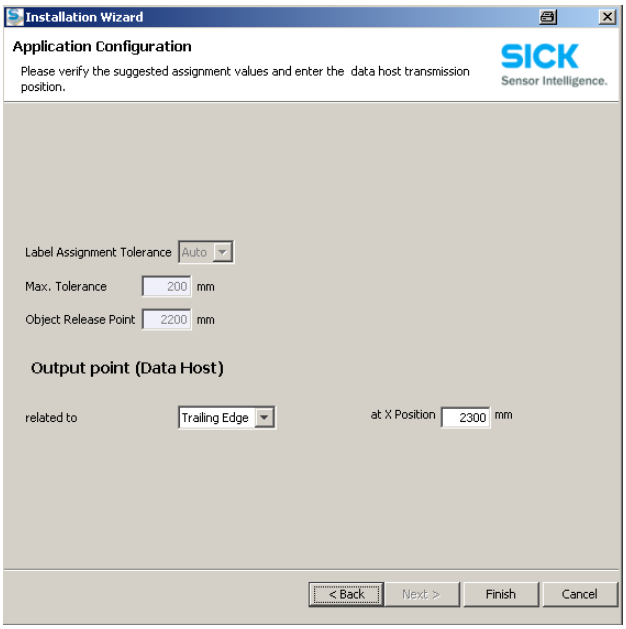


4. Click **Next** to continue. This page is used to configure the reading field of the trigger. The reading field is free of any disturbances when visualized in green.

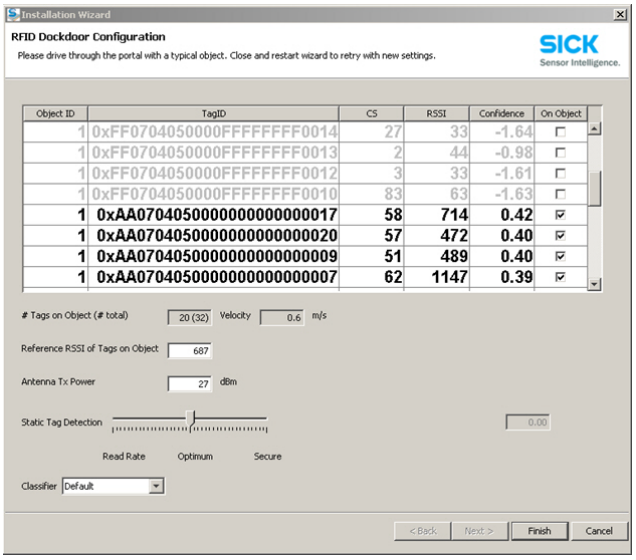



**Note** If the displayed reading field of the trigger is difficult to see in this dialog box, use the mouse to increase the size of the box. The size of the display then automatically increases.

5. Record the distance between the two half-shells in the **Portal Size Y** field.
6. If the LMS is not in the middle of the gate, record the offset in the **Reading Field Offset X** field.
7. Click **Next** to continue and click **Finish** to confirm the suggested environment variables.



8. Verify that the tags are read. Objects should be driven through the gate with suitable RFID tags.




➢ If no tags are read, check the antenna downlead or triggering (see chapter **6.5. Performing a test run**). If necessary, increase the antenna gain.

➢ Check the conditions in the detection range (see chapter **3.2.2. Operating principle of the device**).

**Results**

The global configuration is transferred to all devices connected to the central MSC800 controller.

## 6.4 Checking system readiness

If the system is configured and working properly, the following two LEDs must illuminate on the controller.

| Component | LED | Meaning |
|---|---|---|
| Controller | System Ready | When the controller has received positive feedback from all components and the devices are communicating with each other, the **SYSTEM READY** LED illuminates. |

*Tab. 16: Reading system readiness at the controller after standard configuration*

Standards

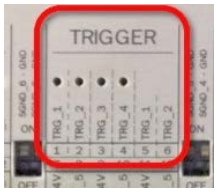
## 6.5 Performing a test run

Finish commissioning the system by performing a test run. The test run must ensure that the trigger is operating correctly and that the tags are read.

Bring one or more standards-compliant UHF transponders within the operating range of the antennas. The UII/EPC of the individual transponders must differ to allow detection of multiple transponders.

### Checking the trigger

The controller indicates whether the trigger is operating correctly in the TRIGGER area.

| Display | LED | Meaning |
|---|---|---|
|  | • TRG_1<br>• TRG_2<br>• TRG_3 | The **TRG_1** LED illuminates when the trigger detects an object in configured area 1.<br>(If person detection is active, objects smaller then 30 x 30 cm are ignored.)<br>The same applies to TRG_2 and TRG_3. |

*Tab. 17: Identifying that the trigger is operating correctly from the controller LEDs*

### Detecting transponders

The process feedback LED in the middle of the front plate of the interrogator in the default configuration uses a blue lamp signal to indicate if a UHF field is available and if transponders are detected.

| Lamp signal behavior LED | Meaning |
|---|---|
| Lights up with medium light intensity | UHF field available |
| High intensity slow flashing | 1 transponder in field |
| High intensity rapid flashing | More than 1 transponder in the image |

### Continuing the configuration process

You can make additional parameter settings in the SOPAS navigation tree under **Parameters**. Among other things, you can view the antenna configuration, selection screen for transponders, object trigger control, configuration for data processing, data output interface(s) and switching inputs and outputs.

Under **Antenna configuration**, you can set the transmitting power for the individual external antenna(s) each with separate sliders for reading and writing. You should also enter the conduction loss and gain of each cable/antenna used.

**Note** Test the settings when the system is in real operation and modify the settings if necessary.

### Saving the configuration

➢ In the project tree, select each device and click on the **Permanently save** symbol.

➢ Click on the **Save as** to create a backup copy of the configuration on the computer.

**Note** Application-specific adjustments (e.g., host's output or interfaces) must be made individually by a qualified technician. Such adjustments are not covered in these operating instructions.

## 6.6 Mounting the cover plates

After the settings have been configured, use clamp multiblocks to mount the cover plates on the side panels. Use six clamp multiblocks per cover plate. This makes it possible to easily attach surface elements in a profile frame.

The clamp multiblock (1) is swiveled into the profile slot and a latch (2) secures the surface element.

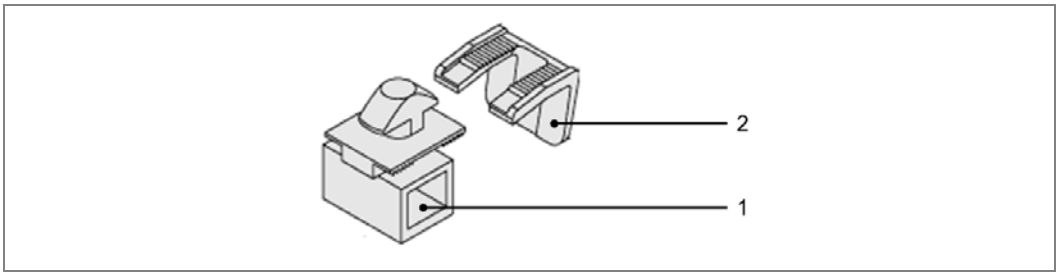



*Fig. 48: Structure of the clamp multiblock for securing the cover plates*

**Mounting**

1. Mark the height of the cover plates (see figure), e.g., with adhesive tape.

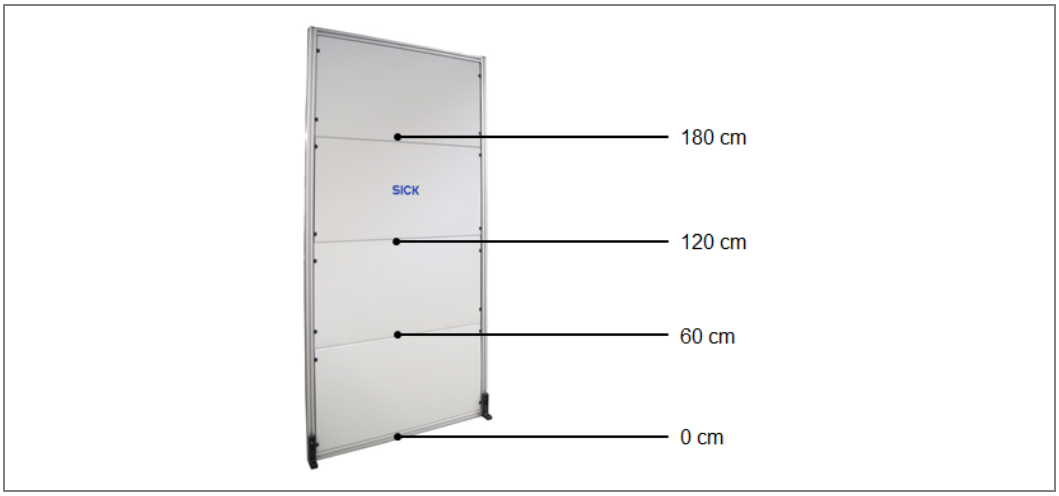



*Fig. 49: Height of the cover plates*

2. Swivel the clamp multiblock in at the required height in the profile slot on the inside of the side panel.

*Fig. 50: Swiveling the clamp multiblock in to the profile slot of the side panel*

3. Attach two blocks to the bottom end, two blocks in the middle and two blocks to the upper end of the cover plate.
4. Hold the cover plate at the designated location.


*Fig. 51: Securing the cover plate to the side panel*

5. Mount the cover plate by inserting the latches into the clamp multiblock. The latch secures the cover plate in a flexible manner.

**Note** Make sure that you attach the cover plate with the cutout to the area in which the 2D laser scanner was mounted.

# 7 Maintenance

The following maintenance work must be carried out at the specified time intervals:

| Device | Maintenance task | Interval | Design |
|---|---|---|---|
| **LMS100** | Cleaning the optics cover | 1 / month* | Trained personnel |
| **Antennas** | Cleaning the antenna cover | 1 / month* | Trained personnel |
| **RFU630** | Cleaning the housing cooling fins | 2 / year* | Trained personnel |
| **General information** | Visual inspection of the 2D scanner and antennas for rotation that may have occurred from contact or something similar | 4 / year | Trained personnel |
| | Visual inspection of the electrical wiring for damage | 1 / year | Specialist |
| | Check of the general RF gate laser performance | 1 / year | Specialist |

* Minimum specification May be required more frequently depending on environmental conditions and the degree of contamination.

*Tab. 18: Maintenance intervals*

## 7.1 Maintenance during operation

### 7.1.1 Cleaning the LMS laser scanner

To achieve the full optical output of the LMS laser scanner, the inspection window of the optics cover should be checked for contamination. This is especially true in rough operating environments (dust, humidity, etc.).

WARNING

**Damage to the optics hood**

The optics hood is made of polycarbonate with a scratch-proof coating. The optical output is weakened by scratches and streaks on the glass.

- ➢ Do not use aggressive cleaning agents.
- ➢ Do not use abrasive cleaning agents.
- ➢ Avoid scratching and chafing motion on the front screen.

**Note** Static charges cause dust particles to be attracted to the front screen. You can mitigate this effect by using anti-static plastic cleaner (SICK part no. 5600006) and a SICK lens cloth (part no. 4003353).

**How to clean the optics hood**

➢ Use a clean, soft brush to remove dust from the optics hood.

➢ Then wipe the front screen with a clean, damp cloth.

### 7.1.2 Visual inspection of the wiring

Regularly check the electrical installation. Check that all cable connections are firmly attached.

WARNING

**Loose connections or scorched cables**

➢ Deficiencies such as loose connections or scorched cables must be rectified immediately.

WARNING

**Damaged cable insulation**

There are life-threatening risks due to electric shock if the insulation of connecting cables is damaged.

## 7.2 Replacing components

Faulty or damaged components must be dismantled and replaced by new or repaired components. All customer-specific parameters are saved on the SD card in each sensor. Therefore, components can be easily replaced without involving a qualified technician.

**Notes** Repairs to the gate components may only be performed by qualified and authorized service personnel from SICK AG.

### 7.2.1 Removing cover plates

When replacing components, you must first detach the cover plates mounted with clamp multiblocks from the side panels.

Use a screwdriver to release the latch.

1. Use a screwdriver to carefully slide out the latch of the clamp multiblock.

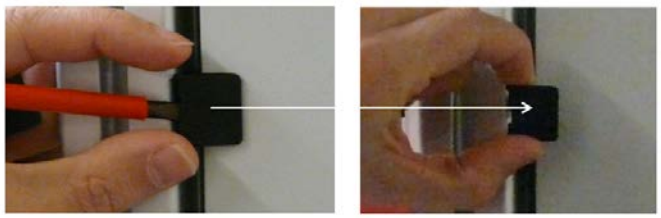


*Fig. 52: Levering the clamp multiblock out of the profile slot of the side panel*

2. Pull the latch out of the terminal block.
3. Once you have detached all latches of a cover plate, you can remove it from the side panels.

### 7.2.2 Replacing the controller

WARNING

**Risk of injury due to electric current!**

The MSC800 is connected to the power supply (AC 100 ... 264 V/50 ... 60 Hz).

➢Standard safety requirements must be met when working on electrical systems.

**Note** ➢Before removing the controller, you should note the cable assignments to the connections.

**Removing connecting cables**

1. Switch off the controller supply voltage.
2. Unplug the connected Ethernet cables (1) from the sockets.


*Fig. 53: Unplugging the cables and terminal blocks from the controller*

3. Unplug the terminal blocks (2) with the cabling from the controller slots. The terminal blocks are coded to prevent unintentional switching.

**Note** Make sure that you do not pull out any wires from the terminal blocks.

**Removing the controller**

4. Loosen the fixing screw (3) of the controller on the left side.
5. Pull the controller to the right and then remove it from the control cabinet.
6. Remove the SD card from the slot (4) in the removed controller.

**Installing the controller**

1. Insert the removed SD card in **Slot SD 1** of the new controller.
2. Insert the new controller in the control cabinet.
3. Pull it to the left and use the fixing screw to secure it in the control cabinet.
4. Return the terminal blocks with cabling to their intended slots.
5. Insert the Ethernet cables in the sockets provided.
6. Switch on the controller supply voltage. The controller starts and after initialization, loads the parameter set from the memory card to the permanent parameter memory of the logic unit.

### 7.2.3 Replacing the battery in the MSC800

A battery powers the real-time clock of the MSC800. The battery must be replaced when drained.


*Fig. 54: Position of the battery in the MSC800 controller*

1. Remove the black plastic cover on the MSC800.
2. Remove the battery from the holder and replace it with a new type 2032 CR battery.
3. Replace the black plastic cover on the MSC800.
4. Dispose of the old battery as special waste according to RoHS guidelines (Europe).
5. Set the system time in the SOPAS software (project tree → MSC800 → System → REAL-TIME CLOCK area.

### 7.2.4 Replacing the power supply

WARNING

**Risk of injury due to electric current!**

The MSC800 is connected to the power supply (AC 100 ... 264 V/50 ... 60 Hz).

➢Standard safety requirements must be met when working on electrical systems.

**Note**

➢Before removing the power supply, you should note the cable assignments to the connections.

**Removing the power supply**

1. Switch off the MSC800 supply voltage.
2. Loosen and disconnect all cables from the power supply module (1).

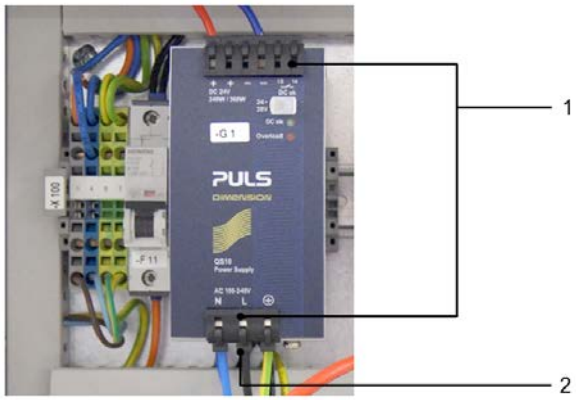



*Fig. 55: Disconnecting the cables from the controller power supply*

3. Unplug the defective power supply module from the control cabinet. Use a suitable screwdriver to slide the black clip forward on the bottom of the power supply (2).
4. Lift the power supply and pull it forward out of the bracket.

**Installing the power supply**

1. Place the new power supply module on the controller mounting rail and press until the power supply module clicks into place.
2. Reconnect all the cables to the power supply.
3. Switch on the controller supply voltage.

### 7.2.5 Replacing an LMS1xx

Replacing an LMS1xx can be simplified when the electrical connection module (lower black part) remains in the system because it contains the parameters.

1. Loosen the four fixing screws used to mount the defective LMS1xx to the mounting kit (2).

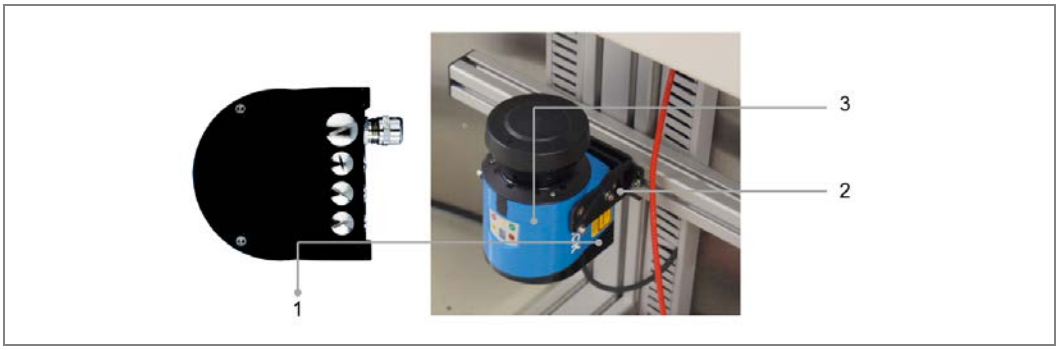



*Fig. 56: Dismantling the LMS1xx and detaching it from the connection module*

2. Remove the LMS1xx (3) from the connection module (1).
3. Put the new LMS1xx on the connection module.
4. Use the fixing screws to mount the LMS1xx to the mounting kit.

### 7.2.6 Replacing a TiM32x

The TiM32x must be completely replaced. Because the device is not wired to the system directly, but connected to the connecting cable socket via a 12-pin M12 plug connector, unplug the connector from the socket and replace the device.

1. Detach the TiM32x from the crossbar by removing the fixing screw.
2. Unplug the connector from the connecting cable socket.
3. Mount the new TiM32x.
4. Plug the device connector back in to the connecting cable socket.

**Note** The TiM32x has no cloning function. If replacing the TiM32x, you must apply the parameters from a backup copy.

### 7.2.7 Replacing an interrogator

**Note** ➢ Before removing the interrogator, you should note the cable assignments to the connections.

**Removing the interrogator**

1. Unscrew the cables to the antennas (1), the CAN cable (2) and the Ethernet cable (3) from the connection sockets.

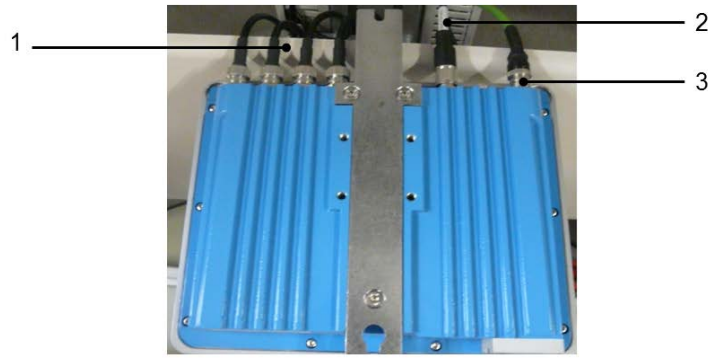



*Fig. 57: Unplugging connecting cables from the interrogator*

3. Unscrew and remove the interrogator fixing screw (1).

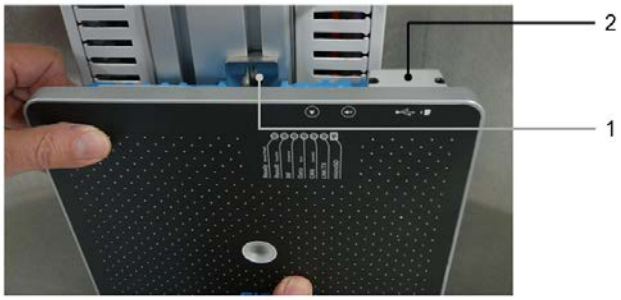



*Fig. 58: Removing the interrogator from the mounting rail*

4. Remove the SD card from the slot (2) in the removed controller. Loosen the two screws on the cover plate.

**Installing the interrogator**

1. Insert the removed SD card in the slot of the new interrogator. Replace the screws on the slot cover plate.
2. Mount the new interrogator on the mounting rail.
3. Attach the cables as before.

### 7.2.8 Replacing an antenna

Antennas must be completely replaced. New antennas are delivered without the counterpart. The counterpart must be mounted to the antenna before replacement.

1. Unscrew the antenna downlead from the antenna socket.
2. Dismantle the defective antenna by loosening the screws on the counterpart of the quick connector and pulling the antenna out towards the front.
3. Rotate the antenna and rebuild the bracket from the defective antenna on the new antenna.

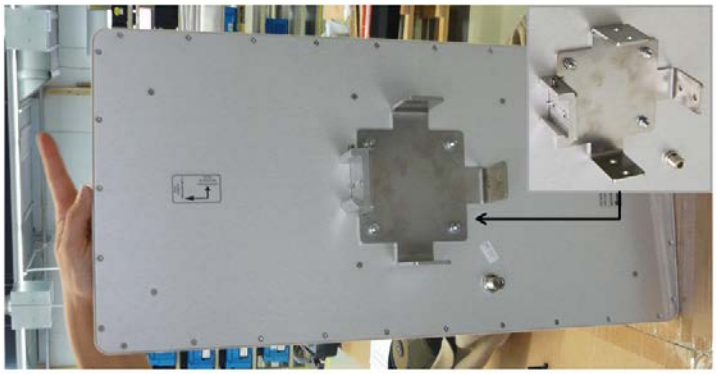


*Fig. 59: Mounting the bracket from the defective antenna to the new antenna*

4. Mount the new antenna using the quick connector. Put the quick connector on the counterpart and use the ball head screwdriver to tighten the fixing screws.
5. Reattach the antenna downlead.

## 7.3 Disposal

Unusable or irreparable devices must be dismantled and disposed of in an environmentally safe manner in accordance with the relevant national waste disposal regulations.

SICK AG is not currently able to take back devices that are irreparable or can no longer be used.

# 8 Fault diagnosis

This chapter describes how to identify and remedy gate faults.

## 8.1 Response to errors

WARNING

**Cease operation if the cause of the malfunction has not been clearly identified.**

Immediately put the machine out of operation if you cannot clearly identify the fault and if you cannot safely remedy the problem.

## 8.2 SICK support

If you cannot remedy the problem with the help of the information provided in this chapter, please contact your respective SICK subsidiary.

## 8.3 Component fault indicators

This section explains what the LED fault indicators of the individual devices mean and how to respond to them.

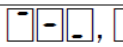
### 8.3.1 LMS1xx laser scanner fault indicator

You can discern the following information from the LEDs:

| Display | Possible cause | Remedy |
|---|---|---|
| OK and STOP off | No operating voltage or operating voltages too low | ➢ Check the power supply and switch it on if necessary. |
| lights up | Optics hood is dirty, operation is still guaranteed | ➢ Clean the optics hood. |
| flashes at 1 Hz | Optics hood is dirty, operation is not guaranteed | ➢ Clean the optics hood. |
| flashes at 4 Hz | System error | ➢ Note the fault indicator of the 7-segment display or run diagnostics from the SOPAS software.<br>➢ Switch off the device and turn it on again, if necessary. |

*Tab. 19: LED display in case of error for the LMS1xx laser scanner*

The 7-segment display provides the following information:

| Display | Possible cause | Remedy |
|---|---|---|
|  | No error. | Device is in measuring mode |
|  | IDLE mode, outputs are in OFF state, laser is switched off. | No error. If the criteria for IDLE mode are withdrawn, operational readiness is restored. |
|  | Motor starts. | No error. |
|  | LMS1xx is defective. | ➢ Send the LMS1xx to the manufacturer for repair. |

*Tab. 20: 7-segment display for the LMS1xx laser scanner*

### 8.3.2 TiM32x laser scanner fault indicator

The following LEDs indicate a fault:

| LED (red) | LED (green) | Status |
|---|---|---|
| ● **Red** | ○ **Green** | Field infringement |
| ☀ **Red** | - | Error |
| - | - | Device without supply voltage |

*Tab. 21: LED display in case of an error for the TiM laser scanner*

### 8.3.3 Interrogator fault indicator

The following LEDs indicate a fault:

| LED | Color | Meaning |
|---|---|---|
| Ready | Red | Hardware fault |
| RF | Red | Antenna or antenna downlead is connected incorrectly.<br>➢ Verify that the antenna or antenna downlead is connected correctly!<br>When working with fewer than four antennas<br>➢ Check if the right ports have been used based on the configuration. More ports are often activated than there are antennas.<br>Antenna is defective.<br>Replace antenna. |

*Tab. 22: LED display in case of an error for the interrogator*

The SOPAS configuration software is used by default for diagnostics in case of an error.

## 8.4 Troubleshooting the controller

Check that all MSC800 interfaces are connected correctly.

### Checking the trigger

With a free reading field, all three LEDs (1) in the **TRIGGER** terminal block illuminate.

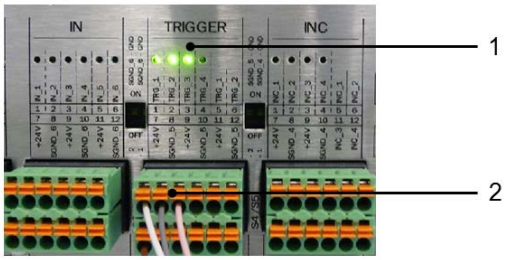



*Fig. 60: Fault situation: Triggering*

If an LED does not light up, it may be caused by:

| Cause | Remedy |
|---|---|
| One of the fields is violated. | ➢Remedy continuing violation based on subject matter! |
| Wire is not attached correctly in the terminal block (2). | ➢Check that the wire is attached correctly! |

*Tab. 23: Fault situation: Triggering*

### Checking the CAN1 cabling

If the LMS1xx and RFU630 are wired correctly, the LED in the **CAN1** terminal block must light up **dimly**.

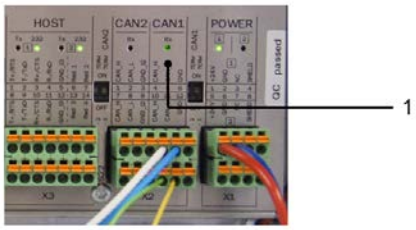



*Fig. 61: Fault situation: CAN1 cabling*

If the LED lights up **brightly** like the others, the CAN connection of the devices is not correct. This can have the following causes:

| Cause | Remedy |
|---|---|
| The wires have been swapped. | ➢Connect the LMS1xx as follows:<br>• Green wire to 10 CAN_H<br>• Yellow wire to 11 CAN_H<br><br>➢Connect the RFU630 as follows:<br>• White wire to 4 CAN_H<br>• Blue wire to 5 CAN_H |
| Wire is not attached correctly in the terminal block. | ➢Check that the wire is attached correctly! |
| Cable terminator is defective. | ➢Replace the cable terminator! |

*Tab. 24: Fault situation: CAN1 cabling*

### Checking the RFU630 interrogator Ethernet connection

The interrogator must be connected to the controller via the **X12** ETHERNET connection. If this is not the case, the **SYSTEM READY** LED does not light up.

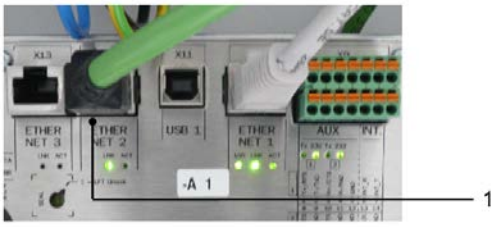



*Fig. 62: Fault situation: RFU630 Ethernet cable*

| Cause | Remedy |
|---|---|
| Ethernet cable is connected incorrectly. | ➢Connect the RFU630 interrogator Ethernet cable via the **X12** connection. |

*Tab. 25: Fault situation: RFU630 Ethernet cable*

## 8.5 Faults in operation

Device faults (hardware/software)

**Controller does not work**

| Cause | Remedy |
|---|---|
| Fuse is defective | ➢ Check the fuse block and replace the defective fuse if necessary! |

**DEVICE READY** LED on the MSC800 does not light up.

| Cause | Remedy |
|---|---|
| Device is defective | ➢ Replace the MSC800 (see chapter **Replacing components**)! |

*Tab. 26: Fault situation: Controller does not work*

**RFU630 does not work**

| Cause | Remedy |
|---|---|
| Fuse is defective | ➢ Check the fuse block and replace the defective fuse if necessary! |

**Ready** LED on the RFU630 lights up red.

| Cause | Remedy |
|---|---|
| Device is defective | ➢ Replace the RFU630 (see chapter **Replacing components**)! |

*Tab. 27: Fault situation: RFU630 does not work*

**RFU630 does not work**

| Cause | Remedy |
|---|---|
| Fuse is defective | ➢ Check the fuse block and replace the defective fuse if necessary. |

LED flashes red.

| Cause | Remedy |
|---|---|
| Device is defective | ➢ Replace the LMX1xx (see chapter **Replacing components**)! |

*Tab. 28: Fault situation: LMS1xx does not work*

**Antenna does not work**

**SYSTEM READY** LED on the MSC800 does not light up.

**RF** LED on the RFU630 lights up red (if no field is violated).

| Cause | Remedy |
|---|---|
| Antenna downlead is defective | ➢ Check that the antenna downlead is attached correctly! |
| Antenna or antenna downlead is connected incorrectly | ➢ Verify that the antenna or antenna downlead is connected correctly! |
| Wrong ports used | When working with fewer than four antennas<br>➢ Check if the right ports have been used based on the configuration. More ports are often activated than there are antennas. |
| Antenna is defective | ➢ Replace the antenna (see chapter **Replacing components**)! |

*Tab. 29: Fault situation: Antenna does not work*

**Checking a continuing violation of fields**

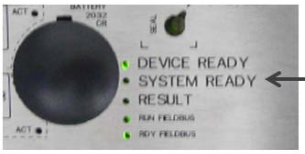
One of the three LEDs in the **TRIGGER** block do not light up (see above).

| Cause | Remedy |
|---|---|
| Object in one of the trigger fields - continuing violation | ➢ Remove the object from the reading field and remedy the continuing violation! |

*Tab. 30: Fault situation: Continuing violation of fields*

**'SYSTEM READY' LED does not light up**

**SYSTEM READY** LED on the MSC800 does not light up.




*Tab. 31: Fault situation: 'SYSTEM READY' LED does not light up*

Possible causes can include:

| Cause | Remedy |
|---|---|
| LMS1xx (triggering) defective | Reading field blocked over longer period<br>➢ Clear reading field<br>➢ Replace device |
| RFU630 is defective. | ➢ Replace device! |
| Controller is defective. | ➢ Replace device! |
| Antenna is defective. | ➢ Replace antenna! |
| CAN cable is attached incorrectly. | ➢ Check the CAN connection for the LMS1xx and RFU630 on the **CAN1** terminal block! |
| Ethernet cable from RFU630 is not connected correctly. | ➢ Connect the RFU630 ETHERNET cable via the X12 connection. |

*Tab. 32: Fault situation: 'SYSTEM READY' LED does not light up*

**Note** Before replacing a device, a detailed fault analysis should be performed using SOPAS.

## 8.6 Detailed fault analysis

The controller outputs faults in different ways. Fault output is staggered and allows a more detailed analysis:

- Communication errors can occur when transmitting telegrams to the MSC800. The MSC800 then returns a fault code.
- For faults that occur when reading, fault codes are written to a **status log**.

### 8.6.1 The status log

- The status log is retained even after switching the device off and on again.
- The system distinguishes between four types of faults:
  - Information
  - Warning
  - Fault
  - Critical fault

  The system saves only the last five entries for each fault type.

**Note** Please contact SICK support for a more detailed analysis of the fault situation!

### 8.6.2 Checking the status log with SOPAS

To display the status log, the SOPAS configuration software must be connected online with the MSC800.

➢ Connect the SOPAS-ET configuration software to the device.

➢ Open the MSC800 project tree, SERVICE, SYSTEM STATUS, SYSTEM INFORMATION tab.

# 9 Technical data

## 9.1 RFGS Pro data sheet

### 9.1.1 Complete system

| Features | Reading field height < 2,000 mm | Reading field height 2,000 <H< 3,000 mm |
|---|---|---|
| Dimensions [WxHxD]<br>Single tray | 1,200 mm x 1,900 mm x 220 mm | 1,200 mm x 2,500 mm x 220 mm |
| Reading field total width | Max. 4,000 mm | |
| MTTR | < 10 min. per component | |
| MTBF | > 80,000 h per component | |
| Operating voltage | AC 100 V ... 264 V; 50 ... 60 Hz | |
| Power consumption<br>Complete max. | 50 W with no external load | |
| Housing | Aluminum frame with stainless steel paneling | |
| Enclosure rating /<br>protection class | IP 54; IP 65 (e.g., antennas) | |
| Maximum total weight<br>without bracket and faceplate | Total 115 kg<br>65 kg with sensors<br>50 kg antennas only | Total 135 kg<br>75 kg with sensors<br>60 kg antennas only |
| Weight of faceplate | 15 kg | 20 kg |
| Weight of bracket | Dependent upon gate width 10 - 20 kg | |
| Ambient operating temperature | 0 °C ... +40 °C | |
| Storage temperature | –20 °C ... +70 °C | |
| Interfaces | RS-232, RS-422, RS-485; Profibus;<br>Ethernet (TCP/IP, FTP, EtherNet IP) | |

Performance RFGS Pro

*Tab. 33: RFGS Pro data sheet*

### 9.1.2 MSC800 controller unit data sheet

| | |
|---|---|
| Functions | Receives all digital signals, e.g., trigger and/or encoder. Combines the results read from the attached sensors, e.g., laser scanner or RFID reader.Calculation, filtering and assignment of results to an object.Output of results to the host interface.Output of the diagnostics data to the attached SVP diagnostics tool (optional). |
| Number of antennas per system | 4 |
| Number of laser scanners<br>per system | 8-12 (optional) |
| Optical indication on the device | 26 x LED status and function indicators |

| | |
|---|---|
| "HOST" data interface | RS-232, RS-422/485, Ethernet, Profibus-DP<br>Data output format is freely selectable |
| "HOST" data transmission rate | Serial: 300 ... 57 600 Bit/s<br>Ethernet: 10/100 MBit/s<br>Profibus-DP: 12MBaud |
| "HOST" logs | SICK Standard, all standard system integrators Interfaces. Customization upon request |
| "Terminal" data interface | RS-232, 9,600 Bit/s, 8 data bits, no parity, 1 stop bit<br>Ethernet TCP/IP |
| Switching inputs | 16 (all inputs are displayed via one LED each)<br>All inputs are optically isolated and protected against reverse polarity. |
| Switching outputs | 4x PNP Imax=30 mA, short-circuit proof, variable signal duration adjustable,<br>2x volt-free relay contacts |
| Interfaces | 1 x serial, AUX (9-pin D-SUB for serial diagnostics)<br>2x serial, Host (wiring)<br>3 x Ethernet , AUX or Host (RJ-45)<br>1 x Profibus, Host (9-pin D-SUB) |
| Power supply | AC 100 ... 264 V/50 ... 60 Hz |
| Housing | Powder-coated metal housing |
| Spray / dust protection | IP 65 (to DIN 40 050) |
| Safety class | Class 3 (VDE 0106/IEC 1010-1) |
| Standardization | EN55011, EN 50082-1, EN 50082-2/ acc. to IEC 68-2-6 Test FC / acc. to IEC68-2-27 Test EA |
| Weight | Approx. 15 kg |
| Operating temperature | 0 to +50 °C |
| Storage temperature | –20 to +70 °C |
| Max. rel. humidity | 95 %, non-condensing |
| Dimensions | 500 x 400 x 155 mm |

*Tab. 34: MSC800 data sheet*

### 9.1.3 RFU630 interrogator data sheet

| | |
|---|---|
| Frequency range | Europe: 865.6 - 867.6 MHz<br>USA/Canada: 902.75 - 927.25 MHz |
| Standards | EPC Class1 Gen2, ISO/IEC 18000-6C |
| RF output | Up to +30dBm, adjustable |
| Antenna connector | 4x, RP-TNC connector (reverse polarity),<br>Impedance 50 Ω |
| Optical indicators | 8 x LED, one multi-color on front |
| Data interfaces | Ethernet 10/100 MBps, RS-232, RS-422/485 |
| Power connection | DC 12 ... 30 V |
| Weight | Approx 3.5 kg |
| Rel. humidity | 90 %, non-condensing |
| Dimensions | 239 x 197 x 40 mm |

*Tab. 35: RFU630 interrogator data sheet*

### 9.1.4 Antenna data sheet

| **Features** | **ETSI** | **FCC** |
|---|---|---|
| Frequency | 865 - 870 MHz | 902 - 928 MHz |
| Gain | 12 dBic | 11 dBic |
| 3dB transmission angle | H 30°V<br>62° | H 30°V<br>63° |
| Impedance | 50 Ω | |
| Polarization | Right circular | |
| Connector | N, jack (female), back | |
| Housing | Aluminum, polycarbonate | |
| Enclosure rating /<br>protection class | IP 54 | |
| Weight | 2.8 kg | |
| Dimensions [WxHxD] | 650 x 320 x 32 mm | 630 x 320 x 40 mm |

*Tab. 36: Antenna data sheet*

### 9.1.5 LMS1xx data sheet

| | |
|---|---|
| Scanning range | Maximum 20 m<br>Maximum 18 m for objects with remission under 10 % |
| Number of fields | Up to 10, independently programmable |
| Light source | Laser diode, infrared (λ=850 nm) |
| Laser class | 1 eye-safe, IR |
| Ambient light safety | 15,000 lx |
| Scanning frequency | 50 Hz / 25 Hz |
| Optical indicators | 2 x LED; 1 x 7-segment display |
| Resolution | Minimum object size 170 mm at 4 m; 85 mm at 2 m |
| Aperture angle | 270° |
| Data interfaces | Power 1/0, 2x IN; 3x OUT |
| Power connection | DC 10.8 ... 30 V |
| Splashwater protection | IP 65, acc. to EN 60529 |
| Weight | Approx. 1,100 g |
| Rel. humidity | 90 %, non-condensing |
| Dimensions | 102 x 152 x 105 mm |

*Tab. 37: LMS1xx data sheet*

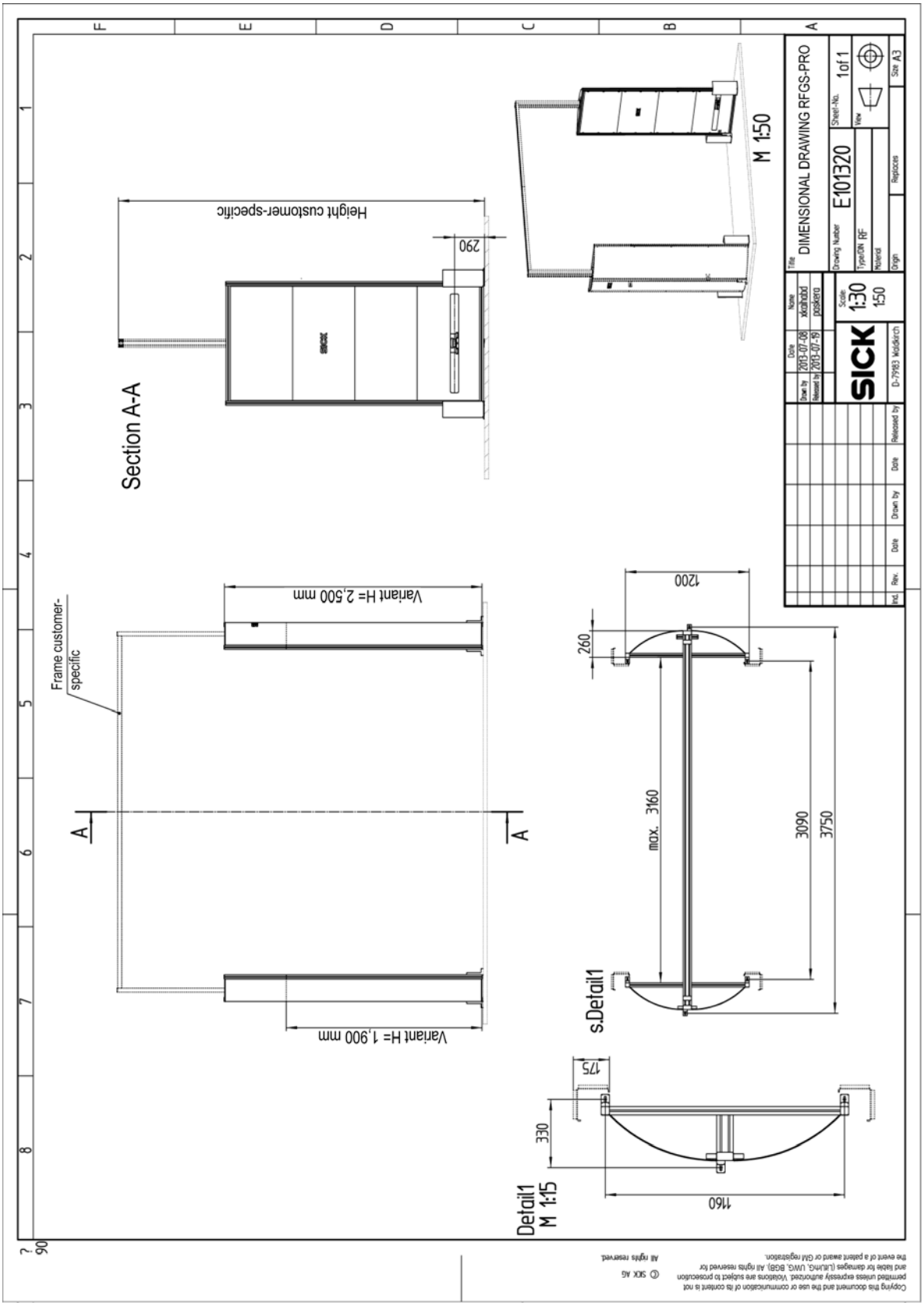
### 9.1.6 TiM32x data sheet

| | |
|---|---|
| Scanning range | Maximum 4 m<br>Maximum 2 m for objects with remission under 10 % |
| Number of fields | 3, independently programmable Maximum 16 field sets, e.g., the four switching inputs |
| Light source | Laser diode, infrared (λ = 850 nm) |
| Laser class | 1 eye-safe, IR |
| Ambient light safety | 15,000 lx |
| Angular resolution | |
| Scanning frequency | 15 Hz |
| Optical indicators | 2 x LED |
| Resolution | Minimum object size 170 mm at 4 m; 85 mm at 2 m |
| Aperture angle | 270° |
| Data interfaces | Power 1/0, 4x IN ; 4x OUT, USB2 for configuration |
| Power connection | DC 10 ... 28 V, SELV/PELV acc. to IEC 60364-4-41: 2005-12 |
| Splashwater protection | IP 65, acc. to EN 60529 |
| Weight | Approx. 150 g |
| Rel. humidity | 90 %, non-condensing |
| Dimensions | 60 x 79 x 79 mm |

*Tab. 38: TiM32x data sheet*

## 9.2 RFGS Pro dimensional drawings

### 9.2.1 Complete system



### 9.2.2 MSC800 controller dimensional drawing

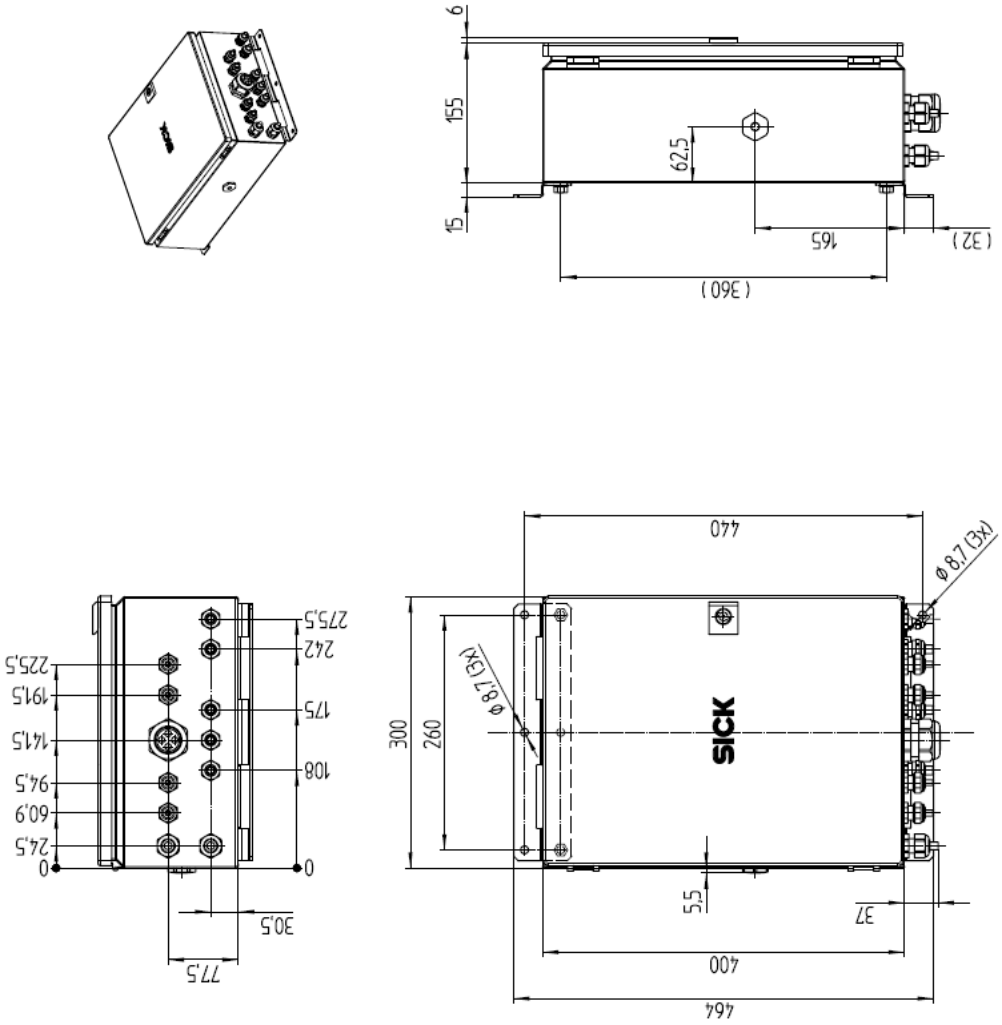



*Fig. 63: MSC800 controller dimensional drawing*

### 9.2.3 RFU630 interrogator dimensional drawing

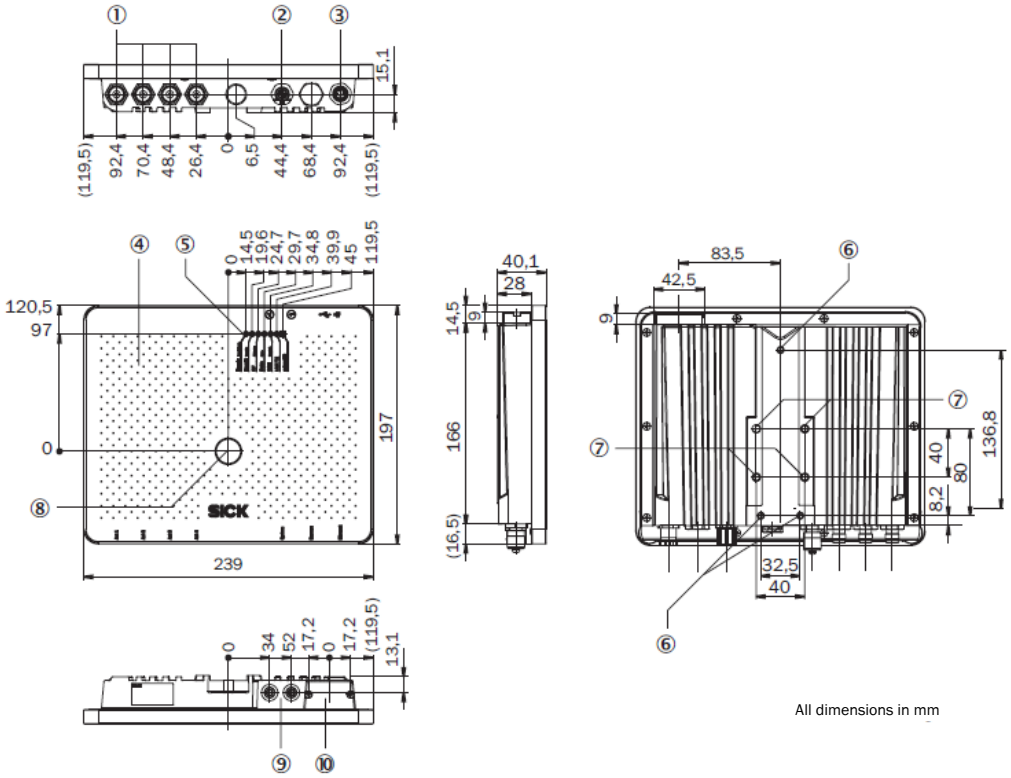



*Fig. 64: RFU630 interrogator dimensional drawing*

### 9.2.4 LMS1xx dimensional drawing

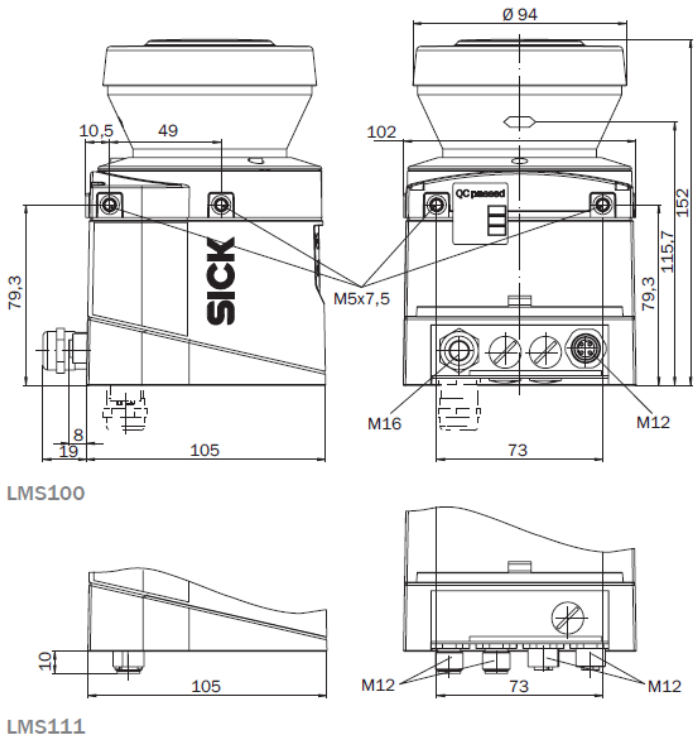



*Fig. 65: LMS1xx dimensional drawing*

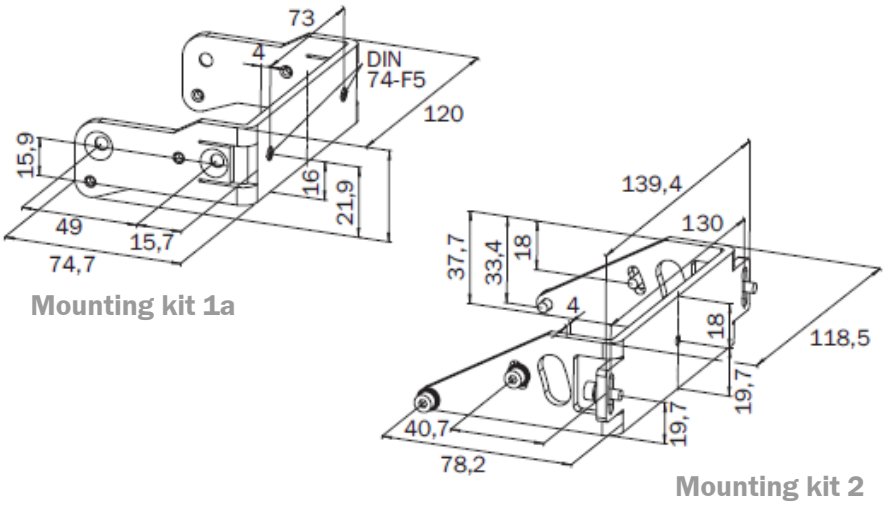



*Fig. 66: LMS1xx fixing screw dimensional drawing*

### 9.2.5 TiM32x dimensional drawing

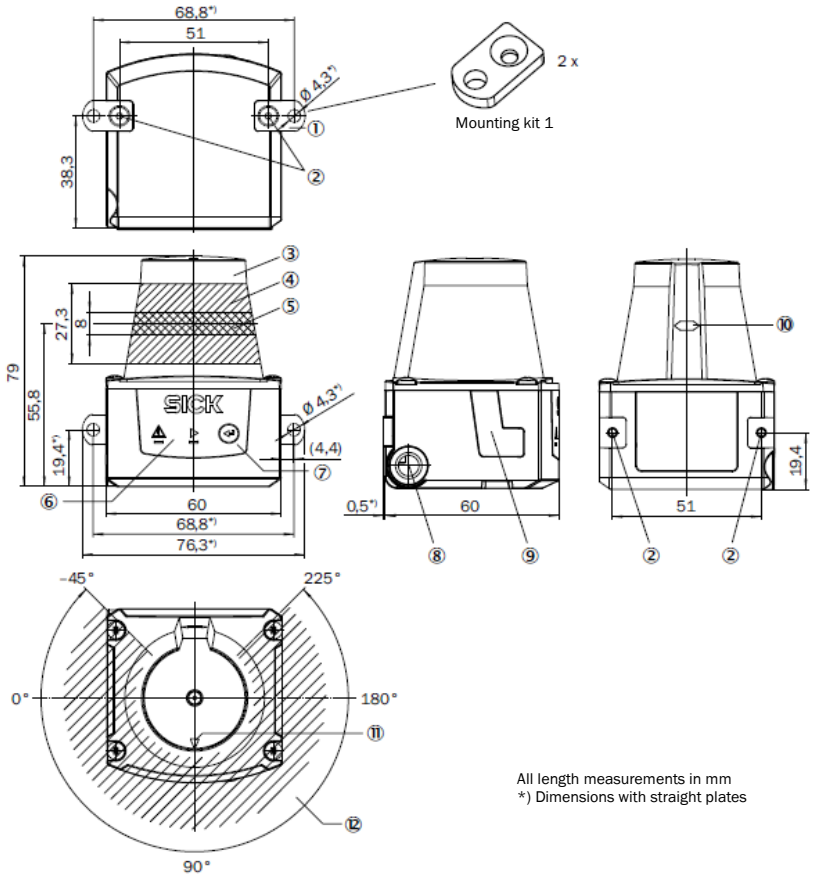
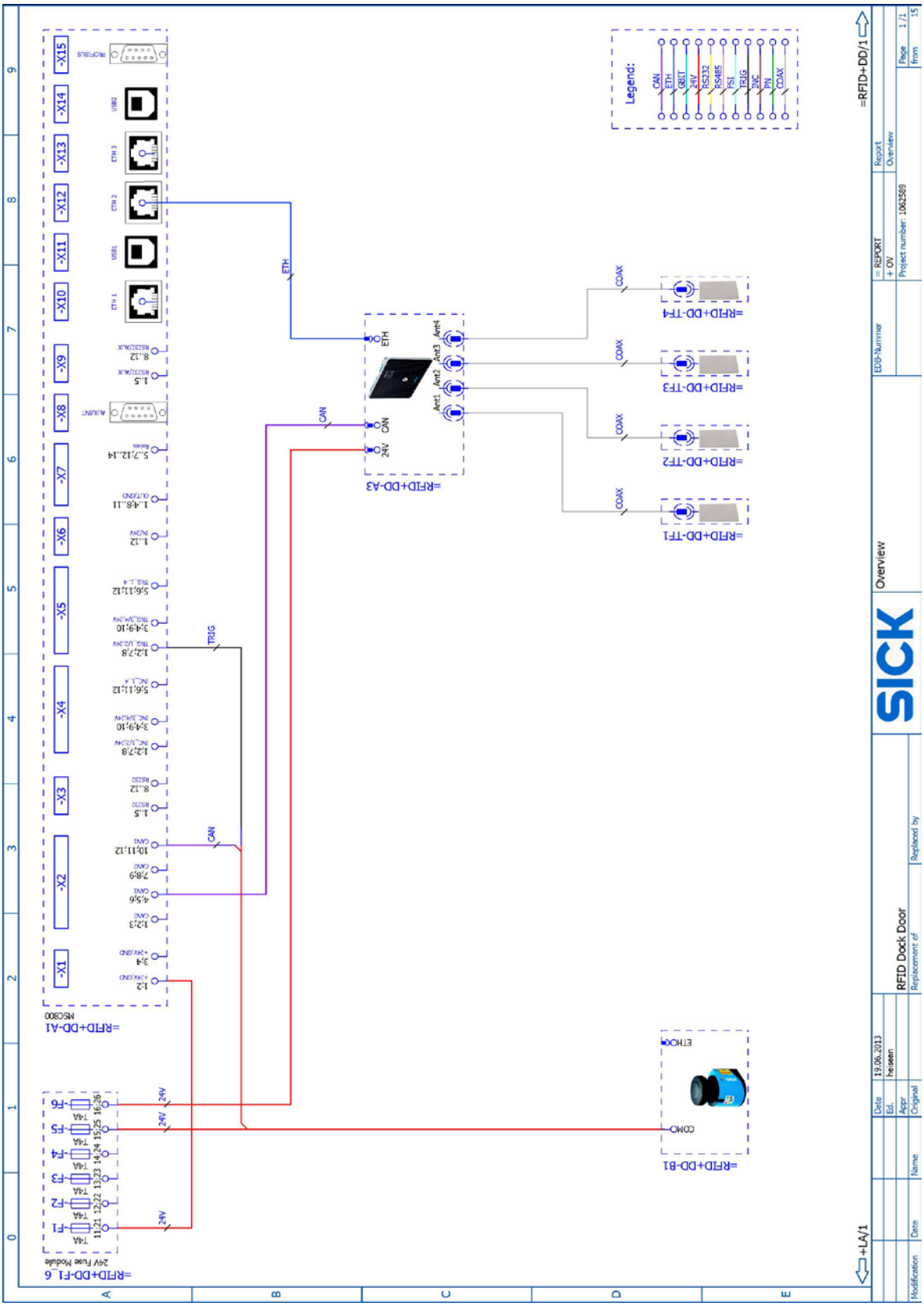



*Fig. 67: TiM32x dimensional drawing*

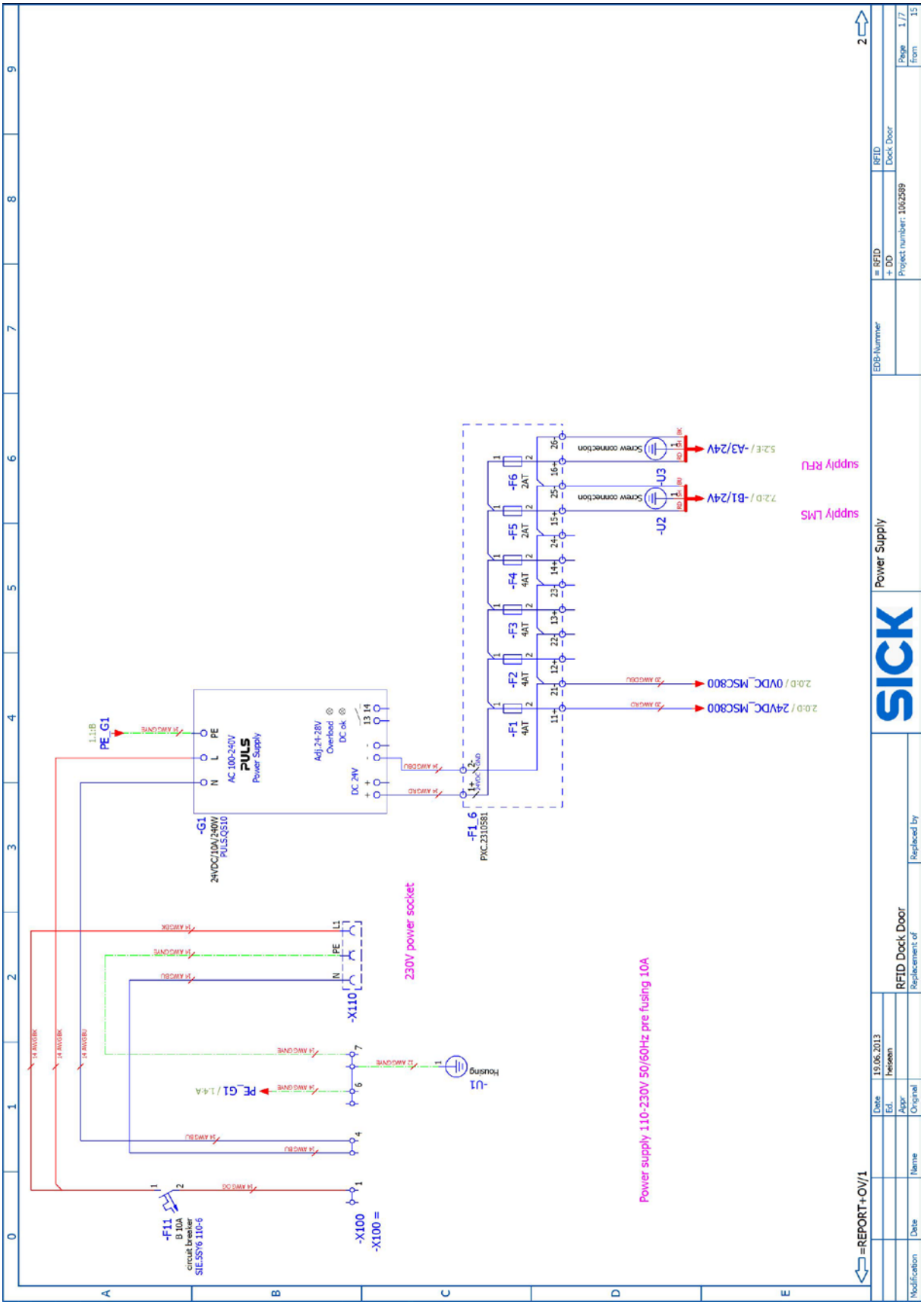
## 9.3 Circuit diagrams

### 9.3.1 Overview

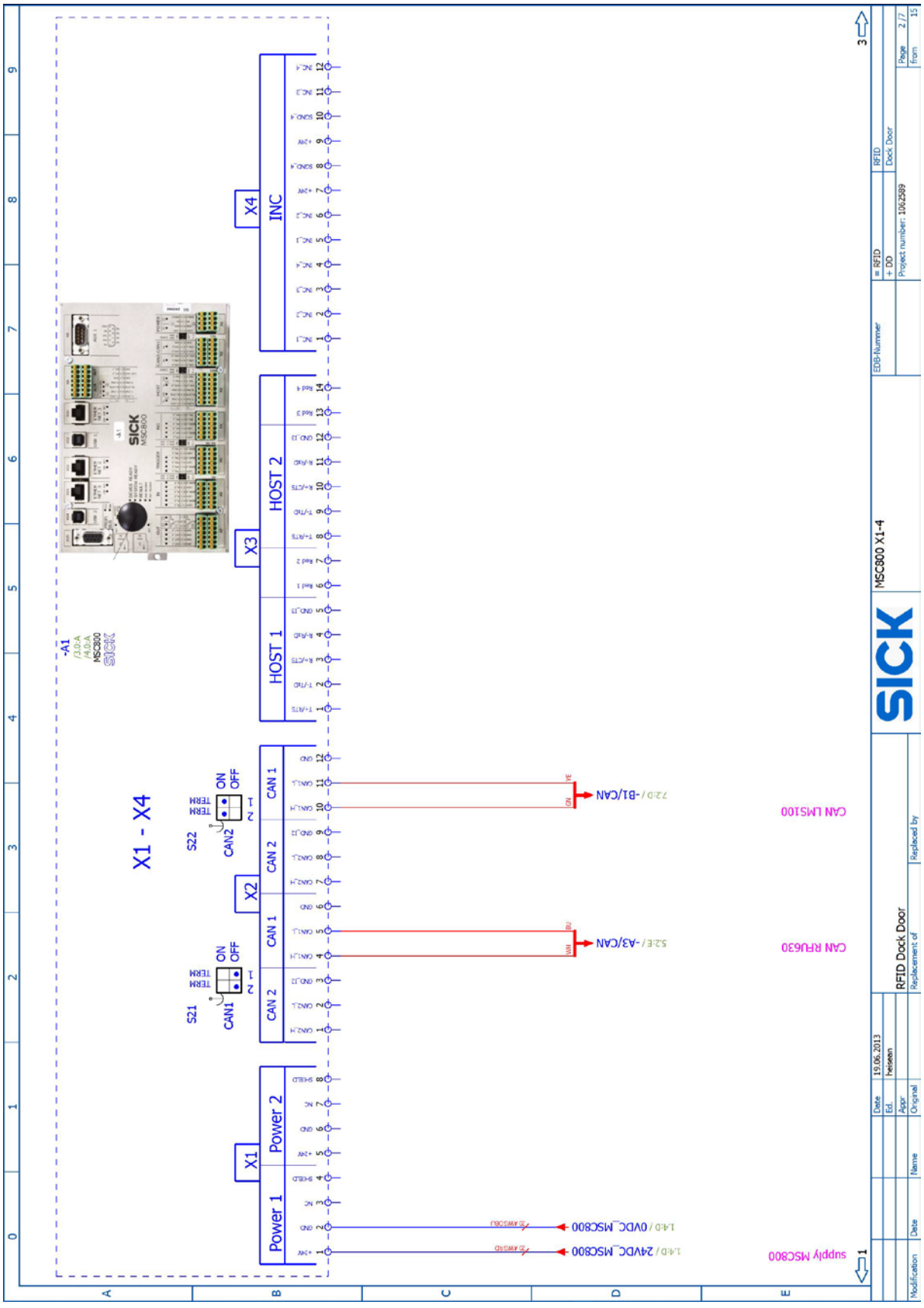


### 9.3.2 Control cabinet

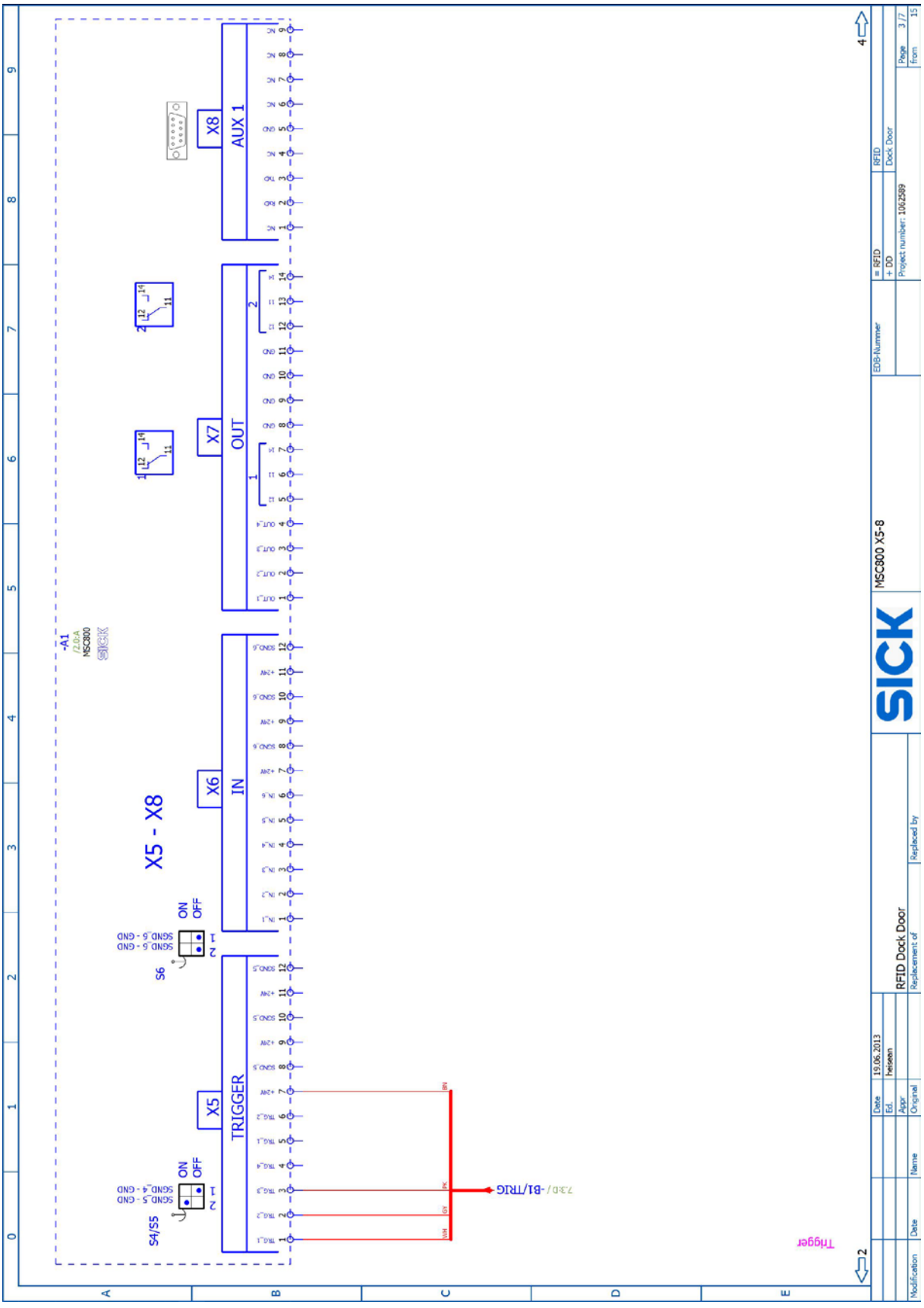
**Power supply**



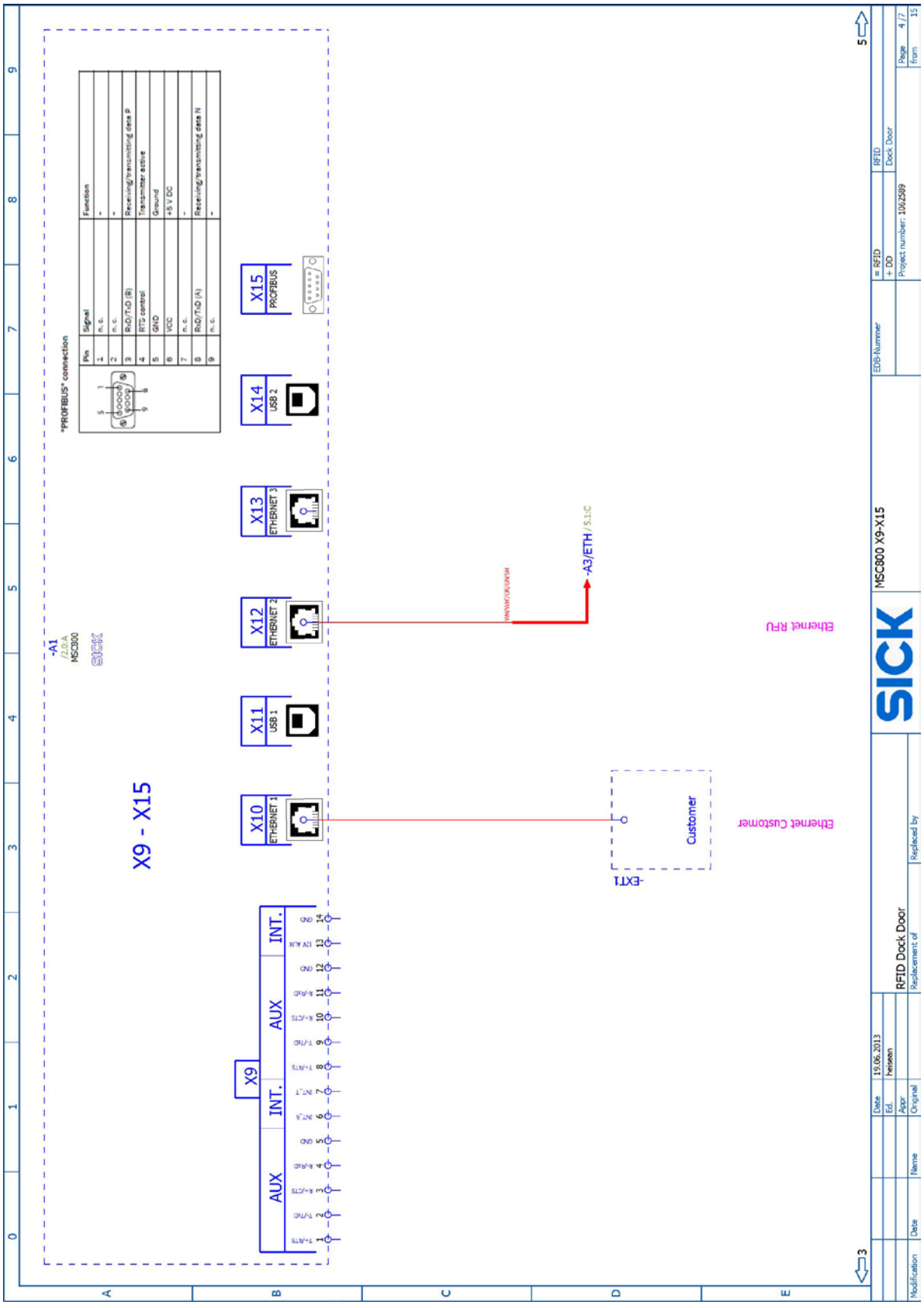
### MSC800 X1-4


X1 - X4
X1
Power 1
Power 2
X2
CAN 1
CAN 2
X3
HOST 1
HOST 2
X4
INC
S21
S22
ON
OFF
TERM
CAN1
CAN2
-A1
MSC800
SICK
MSC800 X1-4
RFID Dock Door
CAN LMS100
CAN RFU630
supply MSC800
24VDC_MSC800
0VDC_MSC800

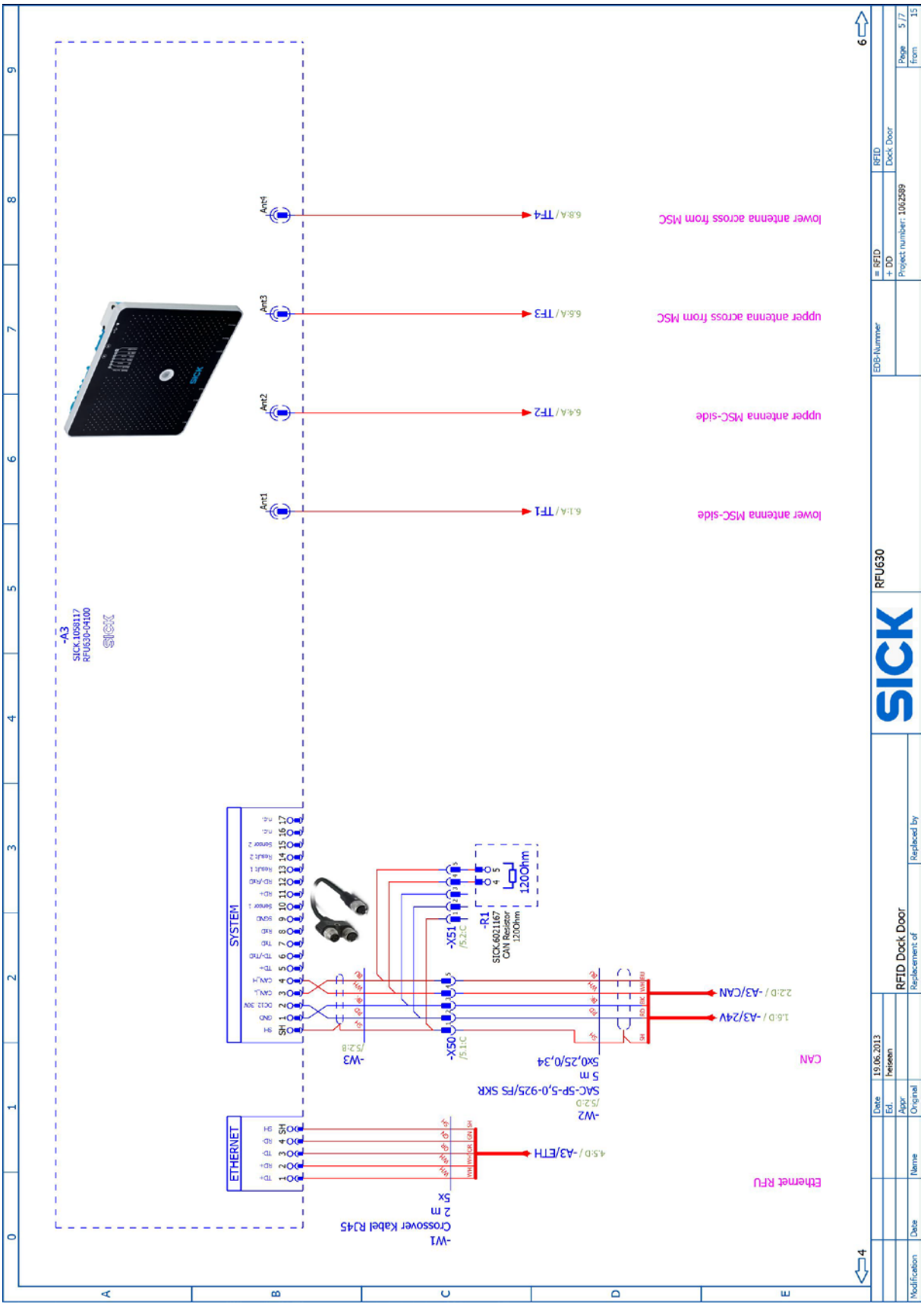
### MSC800 X5-8


X5 - X8
X8
AUX 1
X7
OUT
X6
IN
X5
TRIGGER
S6
S4/S5
ON
OFF
MSC800 X5-8
SICK
RFID Dock Door
Trigger

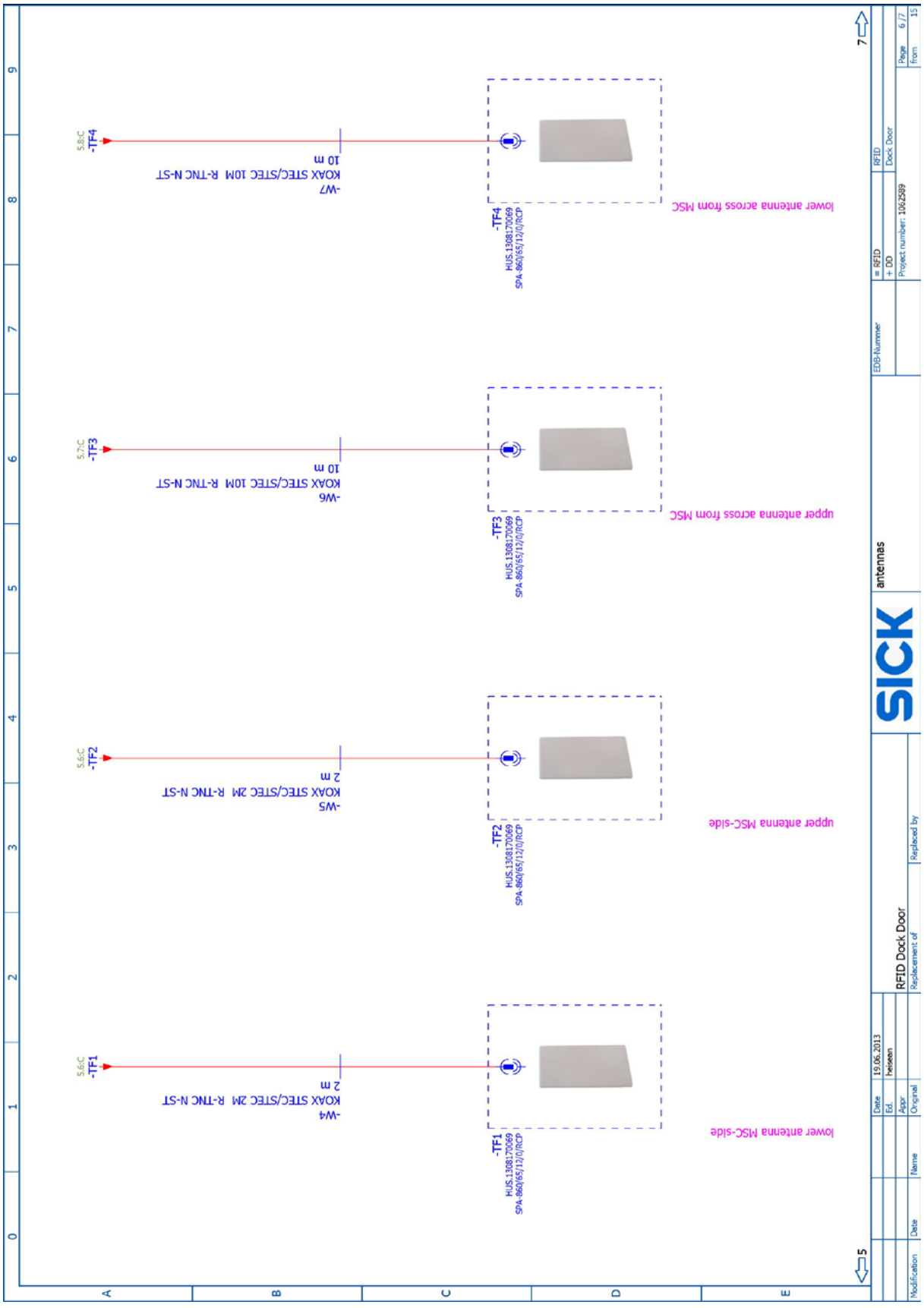
### MSC800 X9-X15



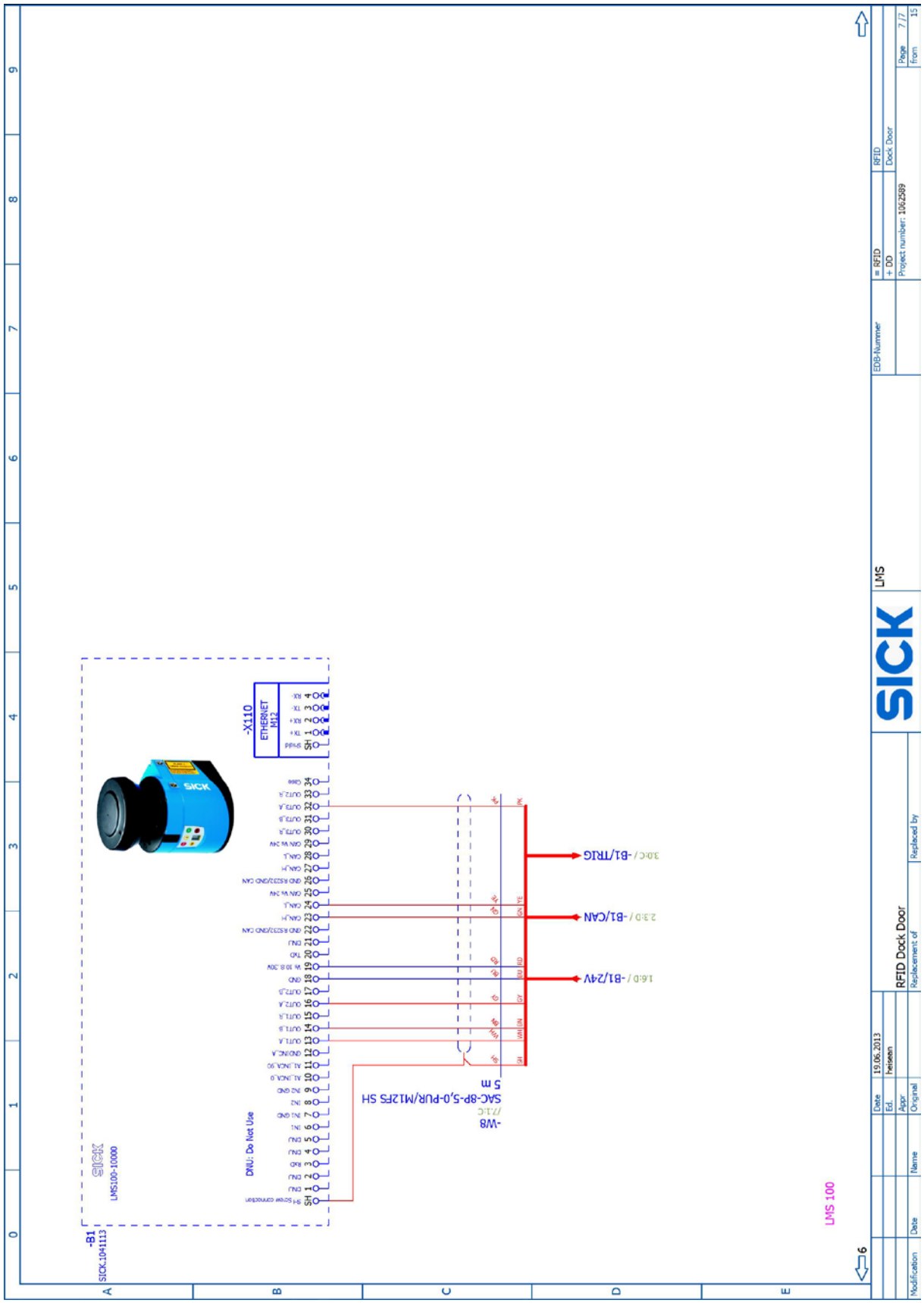
### 9.3.3 RFU630 interrogator



## RFU630 interrogator antennas



### 9.3.4 LMS1xx


-X110
ETHERNET
M12
-B1
SICK:1041113
LMS100-10000
DNU: Do Not Use
-W8
SAC-8P-5,0-PUR/M12FS SH
5 m
-B1/TRIG
-B1/CAN
-B1/24V
LMS
SICK
RFID Dock Door
LMS 100

# 10 Appendix

## 10.1 List of tables

## 10.2 List of figures

## 10.3 Keywords index

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