Functional description

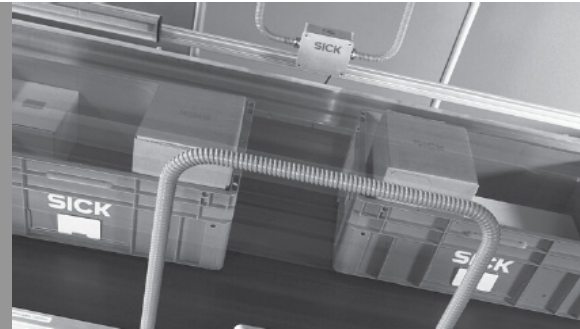# RFI341-1503S04

Preliminary

OPERATING INSTRUCTIONS

RFI341-1503

Radio Frequency Interrogator

SICK
Sensor Intelligence.

Software Versions

Software	Version
DSP Firmware	V1.2.10
ARM7 Firmware	V0.24

Copyright

Trademarks

WindowsTM is a registered trademark or trademark of the Microsoft Corporation in the USA and other countries.

Latest Manual Version

For the latest version of this manual (PDF), see www.sick.com.

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Contents

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1. About this Document

1.1 Purpose

This document provides information on placing the RFI341 Interrogator.

This document contains information about:

• Mounting and electrical installation

• Start-up

• Use and configuration

• Maintenance

• Special applications and practices

1.2 Target Application Group

The target groups for this user guide are:

• Operating electricians

• Technicians and engineers

1.3 Symbols used

Some of the information in this document is especially marked so that it can be accessed quickly.

Warning!

Warnings are provided to prevent injury to operating personnel or serious damage to the RFID Interrogator.

→ Always read warnings carefully and observe them at all times.

Note	Notes provide information on special features or characteristics.
Explanation	Explanations provide background information on technical aspects.
Recommendation	Recommendations provide advice on how to carry out a task more effectively

This symbol refers to additional technical documentation.

2. Safety Information

2.1 Authorized Personnel

- For the RFI341 to function correctly and safely, it must be installed and operated by sufficiently qualified personnel.
- The end user must be supplied with the operating instructions.
- The end user must be provided with expert training and is advised to read the operating instructions.
- The following qualifications are required for the various tasks involved.

2.1.1 Assembly and maintenance

- Practical basic technical training
- Knowledge of the standard guidelines relating to safety in the workplace

2.1.2 Electrical Connection and Replacement

Practical training in electrical technology
- Knowledge of the standard safety guidelines relating to electrical technology
- Knowledge regarding the operation of the devices in the relevant application (e.g. conveyor belt)

2.1.3 Start-up, Operation and Configuration

Knowledge regarding the operation of the devices in the relevant application (e.g. conveyor belt)
- Knowledge of the software and hardware environment of the relevant Application
- Basic understanding of data transfer methods
- Basic understanding of RFID technology

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2.1.4 Intended Use

The RFI341 is designed to detect and decode 13.56 MHz, ISO 15693 compliant RFID transponder signals. It is used together with antennas installed in a reading station and reads from and writes to RFID transponders on objects positioned, e.g., on a conveyor belt.

The RFI341 enables the bi-directional communication with a host for, e.g., further processing.

Any warranty claims against SICK AG will be rendered invalid if the device is used for any other purpose or if changes are made to the device including changes made during the installation and electrical connection procedures.

2.2 General Safety Instructions and Protective Measures

Read carefully the general safety instructions and observe them at all times. This also applies to the warnings provided for the activities described in each chapter of this document.

Risk of injury by electrical current!

The power supply is connected to the main voltages 24V DC.

→   When working with electrical equipment, always follow the relevant safety instructions.

2.3 Quick Stop and Restart

Switching off the power supply of the RFI341 can result in loss of the following:

- The specific application parameter set, if it was set only temporarily
- The last reading in the result buffer

2.4 Environmental Conditions

The RFI341 is designed to cause minimum impact to the environment.

2.4.1 Power Requirements

The RFI341 has a maximum power consumption of 50W.

2.4.2 Disposal after Final Placing out of Operation

Always dispose of unusable or irreparable devices in a manner that is not harmful to the environment and in accordance with the applicable national waste disposal regulations. The RFI341 can be separated into recyclable secondary raw materials and special category waste (electronic scrap). At present, SICK does not accept the return of unusable or irreparable devices.

3. Product Description

THE RFI341 RFID System is used for wireless identification of a variety of objects. It works at a frequency of 13.56 MHz and reads passive ISO/IEC 15693 tags. For a working RFID system, antennas and transponders as well as a host computer are required in addition to the product itself.

3.1 Design

3.1.1 Scope of Delivery

In the packaging, the RFI3411 is supplied with:

- 3-core RS 232 data cable (9-pin Sub D socket, open end), length 1.5 m
- An information sheet with terminal diagram and quick-start instructions
- CD-ROM with:

> RFI341 PC Software for WindowsTM
>
> RFI341 Telegram Listing
>
> RFI341 Operating instructions
>
> RFA3xx Antenna Operation Instructions

Note   The latest versions of all applicable publications/programs on the CD-ROM can be also downloaded from www.sick.com

Chapter 10.1, "Accessories" provides an overview of the available installation accessories and standard antenna types as well as measurement equipment and sensors for reading pulse generation.

3.1.2 Variants

Type	Order No.	Description
RFI341-1503	1043330	RFI341 13,56MHz basic
RFI341-1503S01	1043981	RFI341; Stainless steel with integrated Profibus
RFI341-1503S02	1044537	RFI341 with M12 connectivity
RFI341-1503S04	1045449	RFI341 his device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: Additional Filter to be used as shown in this spec. In case Mux is used the FCC Version need to be used.
Splitter	6036000	One (4W) to two (2W) antenna splitter (passive) ; not for use with ProfiBus-Version
Multiplexer	6036002	One (4W) to up to 4 Antenna (each 4W) mulitplexer
Multiplexer FCC	6037325	FCC Version of the mulitplexer
Filter FCC	6037324	Filter to be used in case FCC Part 15 need to be addressed
Antenna adapter	2046653	Bulgin to BNC antenna connector converter.
Interface cable RS232	**tbd**	M12 to RS232 interface cable
Interface cable Mux Control	6035859	Control interface between RFI341 and external multiplexer

3.1.3 System Requirements

The following are required to start up and operate the RFI341:

1. 24V DC mains power source
2. Using external clock pulse (start/stop interval) e.g. via the sensor inputs, suitable reading pulse sensors for signalling the presence of an object or the end of a reading/writing interval, e.g., a photoelectric reflex switch are required.
3. A higher level computer (host system) with a Ethernet or RS232 to run the PC Demo Software on a PC (Windows XP)
4. A SICK 13.56 MHz antenna, Type RFA3xx

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3.1.4 Product Features and Functions (Overview)

High Performance RFID Interrogator

- 13.56 MHz carrier frequency

- Compliant with the ISO 15693 standard

- High RF transmit output power 4 W

- Reading distance of up to 1.2 m (depended on the used antenna transponder setup)

- RS232 and Ethernet interface (Profibus for the PB version)

- SWR (standing wave ratio) diagnostic

Safety and User Friendly Features

- Robust, compact industrial housing (variant with stainless steel housing), IP 65 (IP66 for the stainless steel version)

- Capable of future improvements thanks to firmware update via serial data interface

- Two driving outputs for actuator management

Easy Operation/Configuration

- Provided with RFI341 PC Demo Software for Windows

- Alternatively controllable with simple command strings

- LED for data indication

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3.1.5 Details (Basic version)

Power LED – indicate that the DC power is on

Data LED – indicate that Tag data will be send

3.1.6 Details (M12 connectivity version)

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3.1.7 Details (Profibus stainless steel version)
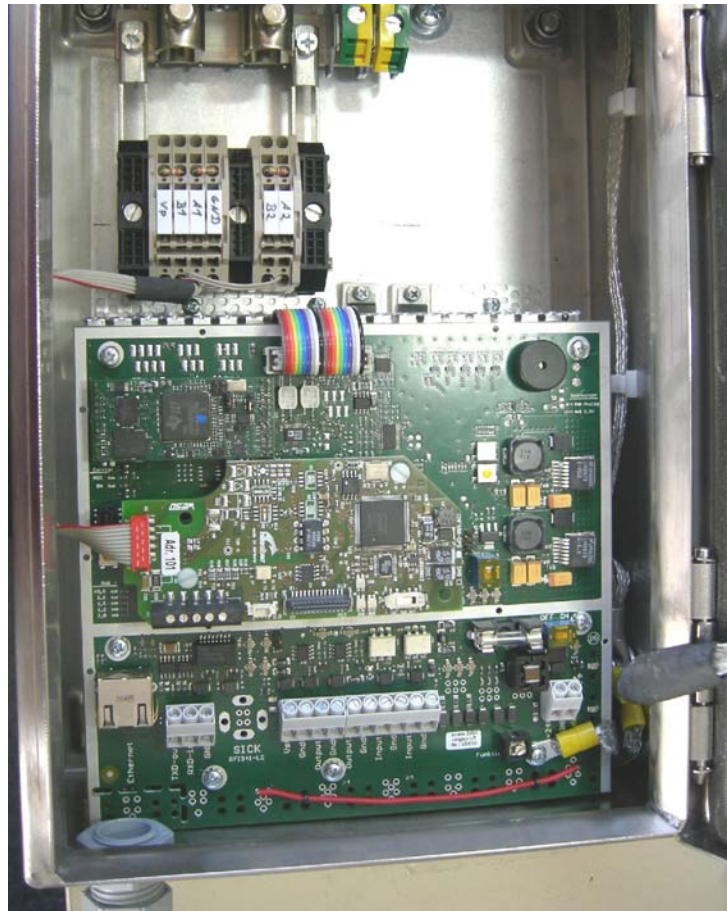
Inside View (main board, profibus CMF gateway, Profibus connection)

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3.1.7 Details (FCC Version)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by SICK AG could void the user's authority to operate this equipment.

ATTENTION

To address the FCC requirements the power supply cable as well as the interface cable must be a shielded version. It need to be ensured, that the shield is direct connected to the PG glant.

The FCC device is only addressing the FCC rules with the antenna RFA331-1020 and RFA341-3520.

Usage of additional Filters required to address FCC rules. The number of Filters required depends on the usage of external components/antennas:

1.) One antenna used direct at the antenna output of the RFI341 require the usage of an FCC Filter at the RFI341 antenna output.

2.) If the splitter is used a Filter is required at the RFI341 antenna output

3.) If a Multiplexer is used a Filter need to be used at the RFI341 Antenna output and at each RF outputs of the Multiplexer.

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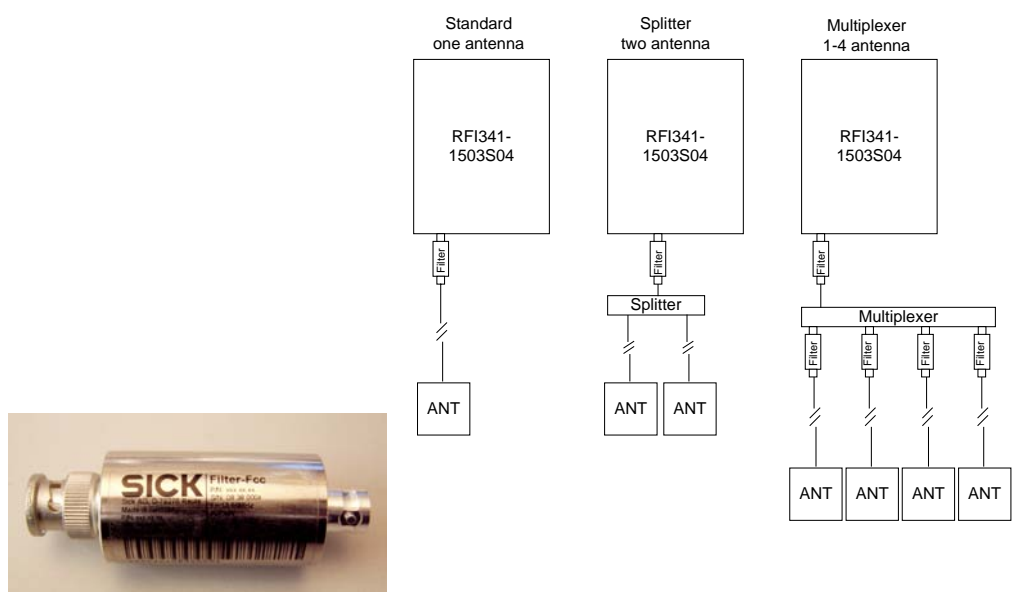
Inside view RFI341-1503S04
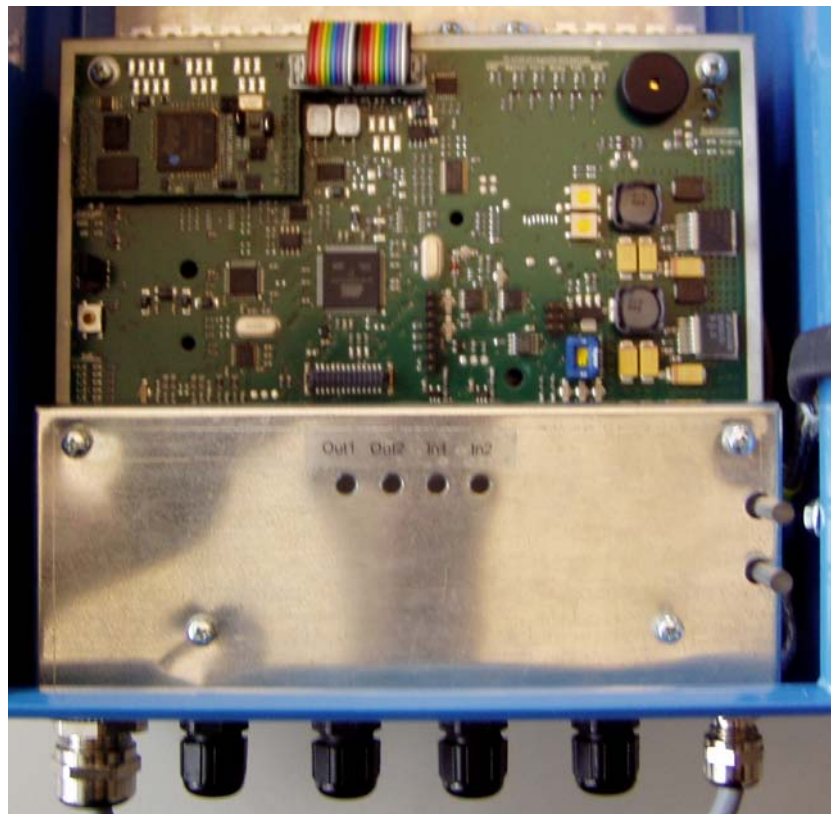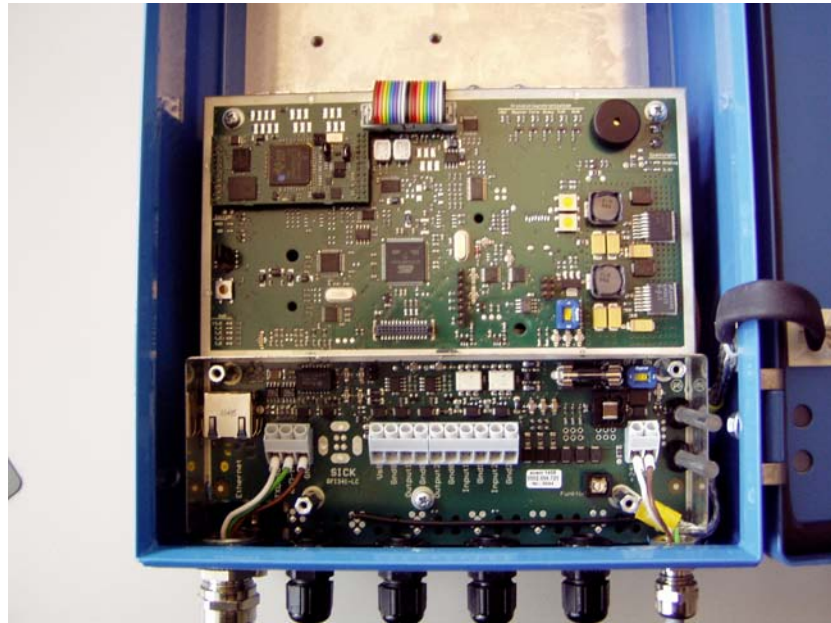
Note   **The FCC Version require a shielded power supply cable**.

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3.1.8 View of Details (Splitter)

Antenna input – must be connected
to RFI341 antenna output

Antenna output – each
0,5 x Tx input power

3.1.9 View of Details (Mutliplexer)

Mux – Antenna output 1 to 4

Mux Control interface –
must be connected to the
RFI Mux Control output

Antenna Mux input –
must be connected to the
RFI341 antenna output

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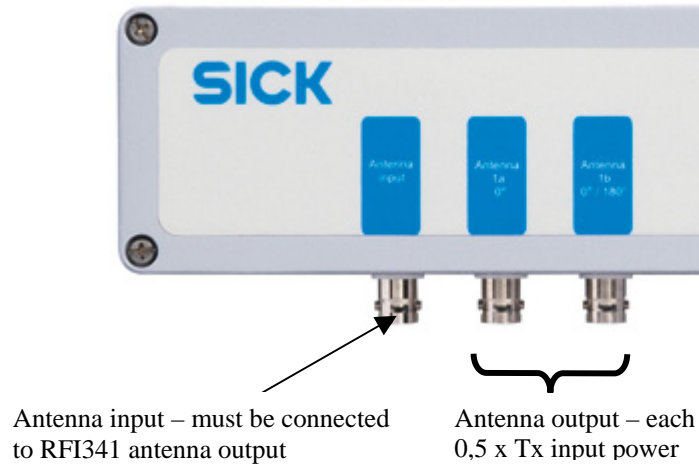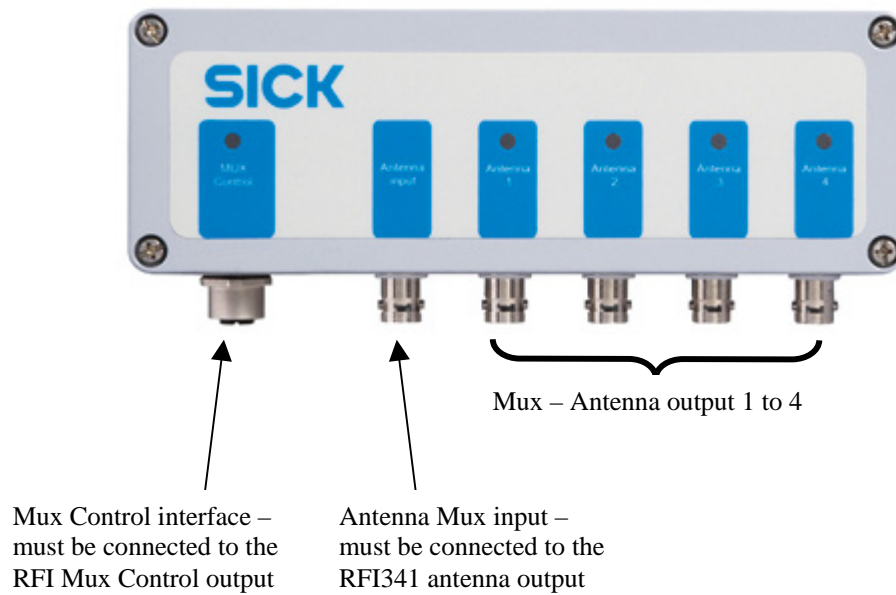
3.2 Functional Description of the device

The device operates according the reader/interrogator "talks first" (ITF) method as defined in the ISO/IEC 15693 Standard. Each transponder in the field remains silent until a request is received. The interrogator can identify simultaneously a number of tags present in the antenna field. The interrogator can write data to and read data from the transponders. Transponders can be addressed by e.g. using the factory programmed, unique read only number (64 bit length). If the data in the user memory of the tag are not write protected, the read/write feature enables the rewriting of the data stored in this memory.

The RFI341 is controlled by the data interface. The commands are described in the document "Telegram Listing RFI341" which enables the use of the features defined in ISO/IEC 15693. Additional commands support the use of sensor inputs and/or actuators. After configuration the device could either work in a mode where the host in controlling the unit or in trigger mode. Configuration in trigger mode means: The device is waiting for a start condition to start reading automatically. Reading results will be transmitted directly or with closing the read window. If the device is running in background mode only a valid escape sequence will terminate this and brings the device back in command mode (see also telegram listing).

To start a reading process, when an object with a transponder is in the field, the RFI341 must be clocked by one of the following:

- A command sequence via the data interface
- The execution (based on a suitable trigger) of a previously defined background command

If a transponder is detected, the relevant data can be send via the data interface to the host. The "Data LED" indicates the presence of tag data.

3.3 Operating Elements and Indicators

3.3.1 Operating Elements

The RFI341 is operated and configured via the data interface (host) using the PC Demo Software (RS232), or command strings send via the host interface. A variety of parameterisation options allows for the adaptation of the device to a wide range of applications.

The following can be set:

ISO Settings including:

- Modulation depth
- Tag modulation type
- Tag data rate
- AFI (Application Field Identifier)
- DSFID (Data Storage Field Identifier)

RFI341 Settings Including:

- RF output power
- Communication parameters for the interface
- Switching on of the RF field (test)
- Port time-out value

Detailed information could be found in the telegram listing

3.3.2 Function of the LEDs

The RFI341 does have several LEDs on the main PCB board. A few of them could be useful for device service functions.

Power LED's

LED's for
SWR
measurement

LED: TXD RXD   Out-1 Out-2 In-1 In-2
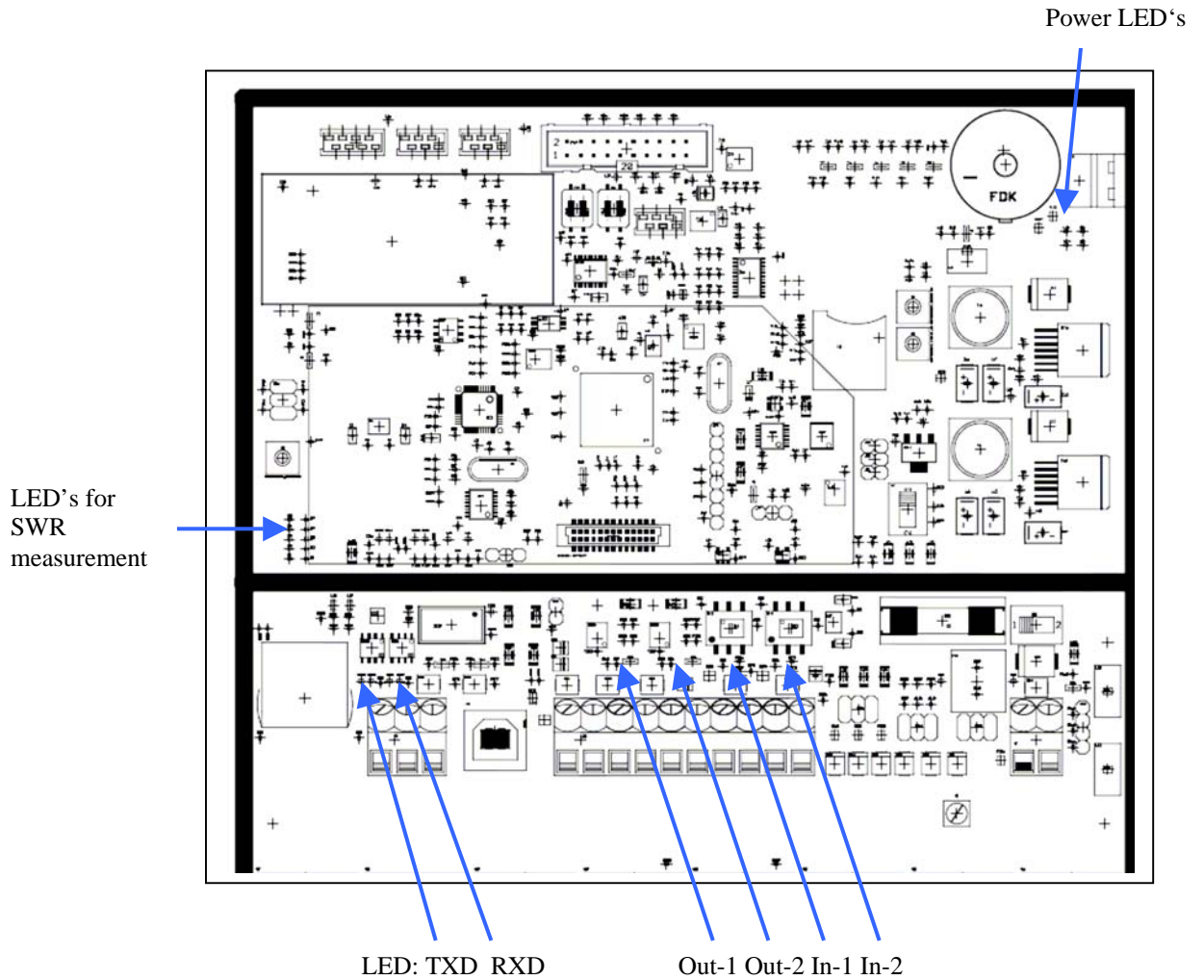
Closed to the terminals there is an indicator for:
- RXT and TXD (Data will be sent from and to Host)
- Input and output LED's indicate the status of the IN/OUT ports
- LED bar indicates the SWR value if measurement manually activated

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4. Assembly

4.1 Overview about the Assembly Steps

- First, select the installation location for the RFA3xx antenna
- Select the installation location for the RFI341
- If used, select the installation location for the sensor(s)

4.2 Preparation for Installation

4.2.1 Component required

- RFI341
- RFA3xx (antenna)
- Antenna connector converter
- Probably a splitter or mulitplexer

4.2.2 Accessories

- Screws
- Reading pulse sensor (if used)
- Warning labels (if required, not included with the RFI341)

4.2.3 Selecting the Installation Location

For the selection of the installation location, the distance between the RFI341 and the RFA3xx antennas as well as the distance between the RFI341 and the host are important.

<u>Distance Between the RFI341 and the Host</u>
The RFI341 can be installed with a maximum data cable length depended on the used interface and the chosen data rate (see chapter 5.4.1)

<u>Distance Between the RFI341 and the RFA321 Antennas</u>
The RFI341 can be installed at a maximum distance given by the antenna cable length. Increasing the cable length will have an impact to the operating performance.

4.2.4 Brackets

The housing can be mounted by using the pre-assembled mounting brackets which are pre-mounted. The position of the brackets can not be changed by the customer. The basic do have the brackets to the left and right whereas the Profibus version does have them on the top and bottom.

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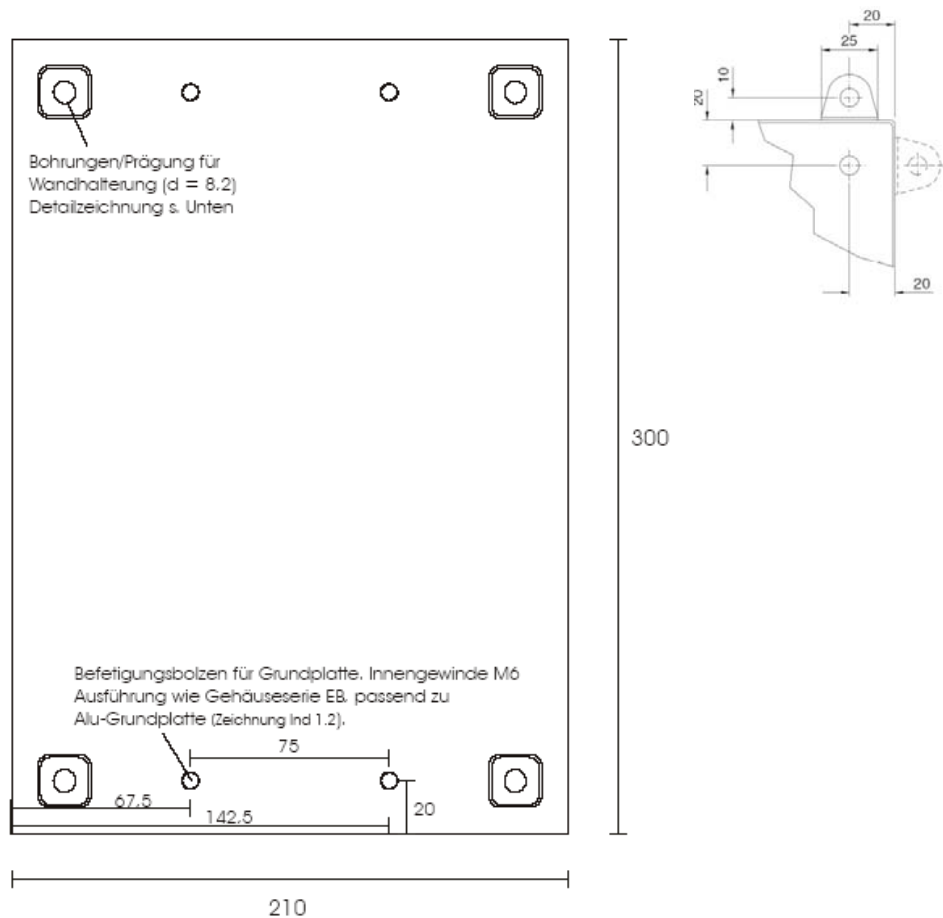
5. Electrical Installation

5.1 Overview of the Installation Steps

- Connect the RFI341 with the Antenna
- Connect the sensors to the RFI341 inputs (if used)
- Connect the actuators to the RFI341 outputs (if used)
- Connect the PC or Profibus data interface of the RFI341
- Connect the power supply to the RFI341

5.2 Electrical Connections (basic version)

The electrical connections of the RFI341 consist of:

- Socket for the RFA3xx antenna connection
- Mux-Control interface
- PG's for cable connections for:
  - Two galvanic separated switching input terminals with each a separate reference
  - Two switching outputs - 24 V DC in reference
  - Three terminals for the RS 232 data interface, Ethernet RJ45 plug
  - Two terminals for the main supply (24V DC) and Terminals for grounding (PE)
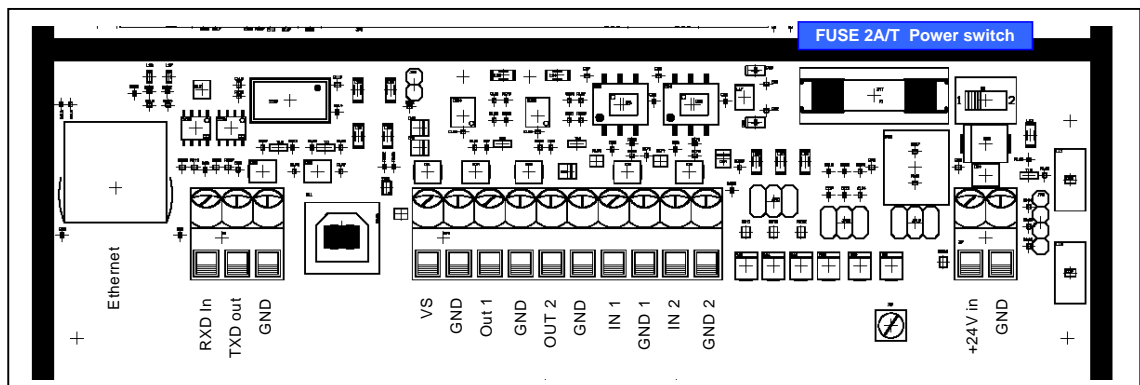
See 5.4.5 / 5.4.6 for In- Output connections

5.3 Electrical Connections (M12 connectivity version)

The M12 Connectivity Version consist out of one PG plug for e.g. Ethernet and M12 plugs for power, RS232, Output and 2 for the Trigger Input. The individual pinning could be found on a sticker that is placed inside the device door.
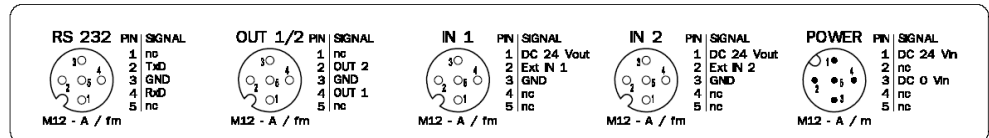
5.4 Preparations for Electrical Installation

5.4.1 Requirements for the RS-232 HOST interface

The host interface can be operated as a RS 232 data interface. The maximum cable lengths are a function of the selected data transfer rate:

Interface Type	Transfer Rate	Distance from Host
RS-232	up to 19,200 bd	10 m (32.8 ft) max.
	38,400 bd	3 m (9.84 ft) max.

Note To prevent interference, do not lay the cable parallel to the mains supply and motor cables over long distances, e.g., in cable ducts.

5.4.2 Requirements for the Profi-Bus interface

The Bus termination is realised with 3 resistors mounted at the terminals. If a device is not the last station in a Profi-Bus network those resistors have to be removed. The shielding need to be fixed with the available shielding brackets at the PG glands.

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5.4.3 Main Power supply

The main power supply is 24V DC with a max input current of less than 2 Ampere (<50W). The power cable need to be shielded if the length extend 3m. The Shield need to be connected with the "Function earth".

Power-up Delay

After the RFI341 is powered, the device will do an internal diagnostic. After the diagnostic is finished the interrogator sends the start-up message or will execute the background mode. This start-up time can be within a window of less than 3 seconds. Refer to the document "Telegram Listing RFI341" for details.

5.4.4 Connect the RS-232 interface
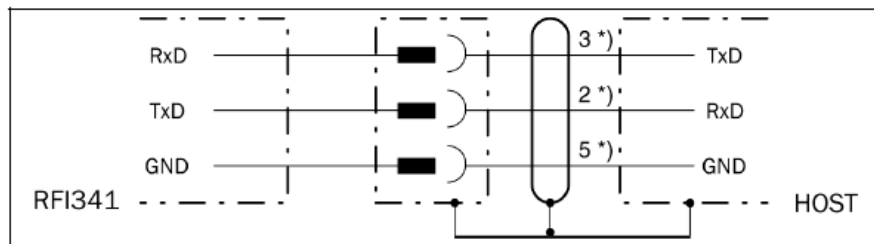
Risk of damage to the interface module!
Electronic components in the RFI341 can be damaged if the host is connected incorrectly.

- Connect the host as shown in the figure above.
- Check the connections carefully before switching on the RFI341.
- Connect the host interface to the RFI341 using shielded cable (EMC requirement). Ensure that the maximum cable length is not exceeded.

Parameter Value

Interface model	RS 232
Data transfer rate	9600 bd (factory setting)
Start bit	1
Data bits	8
Stop bits	1
Parity	No parity
Protocol SICK	STX/ETX

5.4.5 Connecting the "Input 1" Switching Input

If a reading procedure of the RFI341 shall be triggered by an external sensor, then the reading pulse sensor must be connected, e.g., to the Input 1 switching input. The triggering feature is set by the background function as described in the document "Telegram Listing RFI341". The GND1 is galvanically separated. Therefore the reference for the Input 1 level must be provided by the customer. OK1 not assembled.
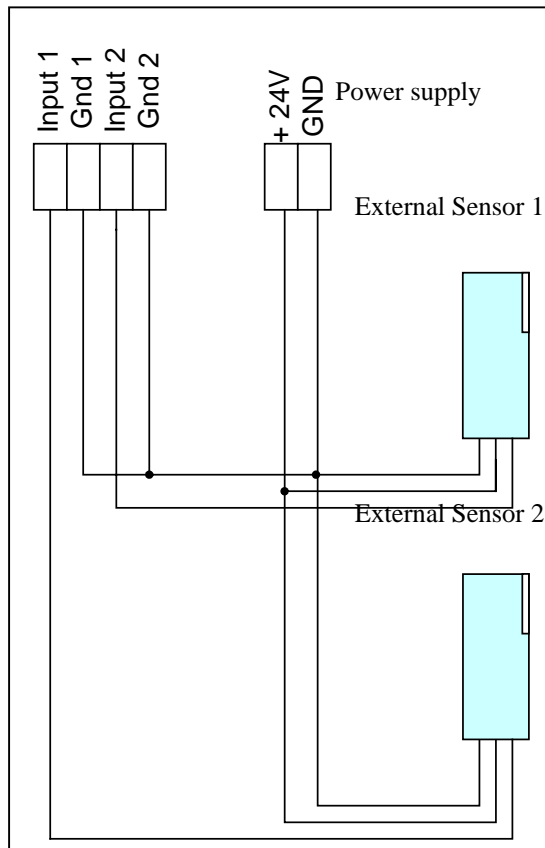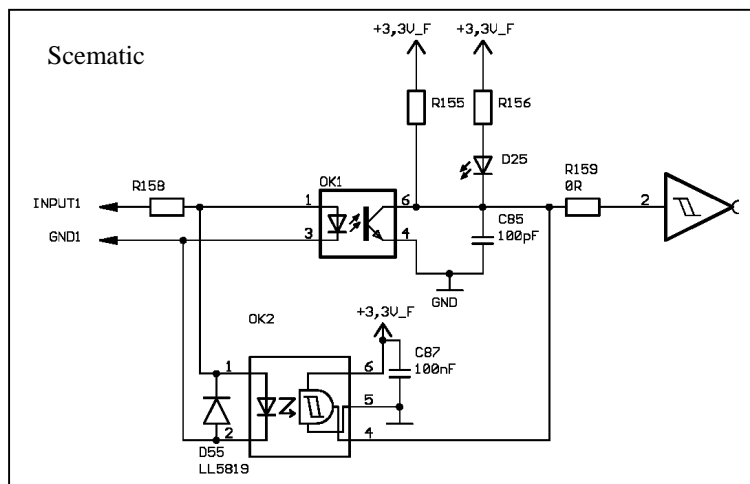
Switching Level
Imax,
U min,
U max
See 9.1 1

GND1 ≠ GND2

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5.4.6 Connecting the Switching Output

The two switching outputs are completely user defined and controlled by special command strings as described in the document "Telegram Listing RFI341". The maximum load current is 400 mA. The outputs are driven with supply power (24V DC norminal). The output drivers are powered with the DC input voltage of nominal 24V DC and with the Dc power supply reference. There is a direct connection between VS0 clamp to 24V DC clamp and from Gnd0 to GND. Optional the output driver could be driven with an external power source. Please contact the application team for further information.

Scematic

+3,3V_F	L28
	PB29
R181 300R	R179 10R
	GND
D37 OUTPUT1	MP7 IC24 ISP742RI
R188	IN VBB
T13 BC850	OUTPUT1 OUT VBB
1k	ST VBB
C101 100pF R189 10k C102 1nF	GND VBB
GND	GND
GND	GND

Output Level see 9.1

VS	➡ Supply Output
GND	
Out 1	
GND	
Out 2	
GND	
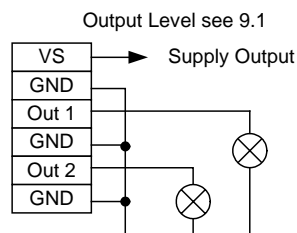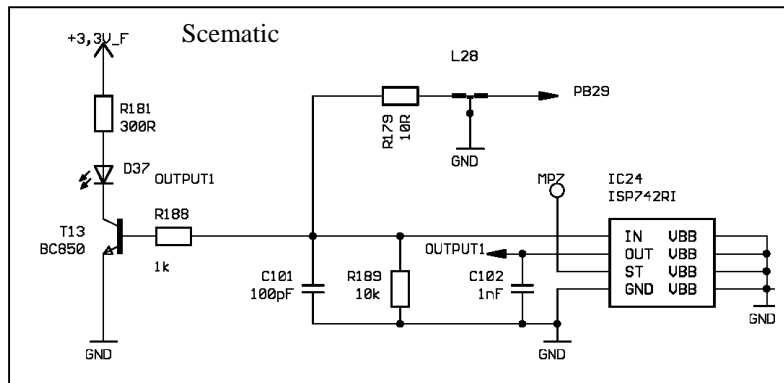
Remark: GND1 (In1) ≠GND2 (In2) ≠ GND (Out1/2)

5.4.7 Ethernet

By default the IP address will be organised by the DHCP server (dynamic mode). If it is intended to use the device in static-IP-address mode the IP address and Subnet Mask must be programmed before according to the used sub-net. For this please use the available parameterisation software or the related STX/ETX commands as described in the telegram-listing.

In Stand-Alone use with a Laptop an cross cable is required and the static IP address must be used. In standard Network configuration a standard patch cable is required.

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5.5 Performing Electrical Installation (Basic-Version)

5.5.1 Overview of the Connection Procedure
- Connect the earth grounding
- Connect the RS-232 data interface or the Ethernet Interface
- Connect the switching inputs "Input 1 and 2", if necessary
- Connect the switching outputs "Output 1 and 2", if necessary
- Connect the splitter to the RFI341 if required
- Connect the multiplexer to the device using the Mux-control interface, if required
- Connect the RFA3xx antenna(s)
- Connect the main supply of 24V DC

5.6 Performing Electrical Installation (Profibus-Version)

5.6.1 Overview of the Connection Procedure

- Connect the earth grounding
- Connect the RS-232 data interface or the Profibus Interface
- Connect the switching inputs "Input 1 and 2", if necessary
- Connect the switching outputs "Output 1 and 2", if necessary
- Connect the RFA321 antenna
- Connect the mains supply 24V DC

5.6.2 Connect the earth ground

5.6.3 Connect the RS232 Interface

If the RS-232 interface is intended to be use, e.g for parameterisation with the SICK software, it needs to be ensured that the Profibus interface interface is disabled (switch at the CMF, see CMF documentation).

5.6.4 Connect the Profi-Bus Interface

If the Profibus interface should be used than the terminals needs to be connected. Dependent of the position in a network the terminal resistors need to be removed. For detailed information please refer to the CMF gateway documentation (8010461). The max datarate of the Profibus interface is limited to 1,5Mbit/sec.

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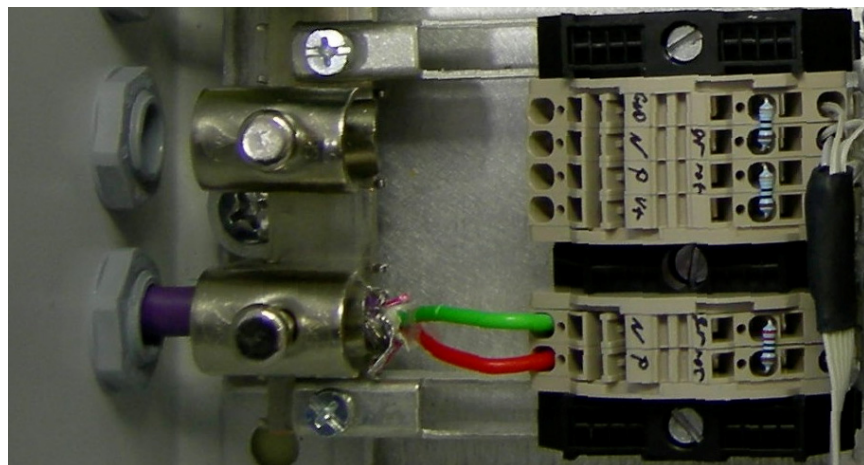
6. Operation

6.1 Overview of the Start-up Steps

- Start the RFI341 with the default settings (Quick start)
- Connect to the PC or HOST
- Use the Demo/Parameterisation-Software to run the device or
- Control the device by using the related command strings or
- Configure (parameterise) the RFI341 for the desired application

6.2 Factory Default Settings

The table below shows the factory setting of the RFI341. The factory default parameters are such that the RFI341 can be put into operation immediately or following a few minor adjustments.

The default settings of the parameters are stored permanently in the RFI341 EEPROM memory. To display the stored settings, use either the PC and execute the "REQUEST SYSTEM SETTINGS, 1010" command as described in the document "Telegram Listing RFI341" or the PC Software and request the display of the system settings. To change the settings, use the software "EDIT SYSTEM SETTINGS, 1011" command.

Parameter	Factory Setting	Comments
RF Output Power	4 W	The output power can be changed
RS-232 baud rate	9,600 bd	Can be changed in various steps from 1200 bd to 115,200 bd
Serial IF time-out	320 ms	Changeable in steps of 10 ms
Read after write	ON	The reader will execute a read after a write command to verify that the written data is consistent with the original data
RFI341 to tag data transmission	FAST	Fast results in 1 of 4 = 26.48 kbit/s Slow results in 1 of 256 = 1.65 kbit/s
Interrupt mode	ON	Each command can be interrupted at any time by sending a STX/ETX command.

6.3 Configuration (Parameterisation)

The RFI341 is configured locally in accordance with the existing application. The read, evaluation and output characteristic, can be parameterised as required. The factory default settings or the application specific parameter set is in affect before changes are made.

The RFI341 can be configured by using either the PC Demo Software or the specific commands sent by the user host software.

6.3.1 Antenna Output Power

The output power of the RFA3xx antennas can be changed in four steps. When the maximum power is not required to meet the system requirements, this can be used to prevent reader interference.

(available steps: 4W / 2W / 1W / 0,75W)

6.3.2 RS232 Data Interface

The RS 232 data interface data rate can be set to different speeds. The RFI341 supports the following settings.

Protocol

Definition	Description
04B0h	1,200 Bd
0960h	2,400 Bd
12C0h	4,800 Bd
2580h	9,600 Bd
4B00h	19,200 Bd
9600h	38,400 Bd
E100h	57,600 Bd
FFFFh	115,200 Bd

6.3.3 Oscillator Switch off delay

Switching off the HF-field results in a power-on reset of all tags present in the reader field. The length of time set should be checked very carefully. In the worse case scenario, the tags which are in the selected or quiet mode will loose this status. Depending on the application, it could be necessary to set this time to a lower value. The factory default setting is 500 ms.

6.3.4 Read after Write Verify

The interrogator can be set so that it will automatically execute a read after write if data is written to the transponder. This requires some time and the user can define whether or not he wants to receive this verification. The factory default setting is set "ON".

6.3.5 HF Reset for Inventory Commands

Setting this feature to "ON" results in a HF reset before an inventory command is executed. The factory default setting is "ON".

6.4 ISO/IEC 15693 settings

The ISO/IEC 15693 Standard allows various settings. To configure correctly for the specific application, it is recommended that the user have a basic understanding of the features described in this standard. Supported functions are:

- Changing of the forward link modulation depth. The factory default setting is 20/100 %
- Changing of the return link modulation type (ASK/FSK). The factory default setting is FSK.
- Transponder response data rate (high or low). The factory default setting is high.
- AFI (Application Field Identifier). If this byte is set to 00h, the interrogator will ignore the AFI, otherwise it will use the set value.
- Inverse UID (start with the LSB instead the MSB). The factory default setting is reverse byte order.
- One Slot inventory: If this value is set to one, the inventory command will start with one time-slot.
- Others (refer to document "Telegram Listing RFI341")

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7. Maintanance

7.1 Maintenance

The RFI341 does not require maintenance.

7.2 Disposal

Irreparable devices or devices that are no longer required are to be disposed of in an environmentally-friendly manner:

1. Always observe the applicable national waste disposal regulations.

2. Remove the RFI341 housing.

3. Remove the electronic modules and the connection cables.

4. Send the metal housing to be recycled.

5. Send the electronic modules and connection cables for disposal as special waste. At present, SICK AG does not accept the returning of unusable or irreparable devices.

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8. Troubleshooting

8.1 Installation errors

The RFA3xx antenna is installed incorrectly with respect to the object carrying the transponder, e.g., the relationship between the transmitted power, antenna size and transponder form factor is unfavourable.

- The RFA3xx antenna is installed close to metal that de-tunes the antenna circuit. This can be checked either by the SWR measurement inside the device. To start this the background function need to be interrupted. Than the SWR bottom need to be switched. The LED bar indicates the SWR status. In addition a beeper signals with frequency the status (high frequency is good, low frequency is bad). Tuning is possible by inside antenna tunable capacitors.

- The trigger sensor is positioned incorrectly.

- Other interrogator antennas are causing interference.

8.2 Electrical Connection Errors

- Interfaces on the RFI341 are connected incorrectly.

8.3 Parameterisation Errors

- Functions are not adjusted to local conditions, e.g., communication parameters for the host interface are set incorrectly.

- ISO or system settings are not in accordance with the transponders used, e.g., wrong AFI used..

9. Technical Data

9.1 RFI341-1503

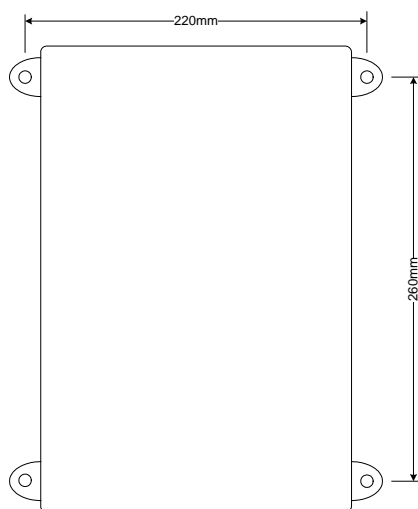| Type RFI341	Host/Data Interface
Protocol	STX/ETX (see document " RFI341 Telegram Listing 8011237 ")
Terminal data interface RS-232	9,600 baud to 115kbaud, start, stop, no parity (8N1)
Ethernet	TCP/IP - 10/100Mbit
RF Interface	Carrier Frequency 13.56 MHz (13.553 to 13.567 MHz)
RF output power (max)	4 W (±1 dB)
Switching Inputs	Vin_{high} max = 30 V, Vin_{high} typ = 24 V, Vin_{high} min = 18 V, Vin_{low} max = 1,5 V Iin_{max} < 4mA
Switching Outputs	Vout = Vin (power supply) − <=1V Iout max = 400mA restive load ; short cut and overload protected
Mains power supply	Operating Voltage 24V DC (20..29V); - slope time < 3 sec - start up time < 4 sec.
Supply Current	< 2,0A
Protection Class	3
Mechanical	
Housing (dimensions) except stainless steal where the with is 210mm instead of 200mm	300 mm x 200 mm x 120 mm (15.8 in x 7.9 in x 4,7 in)
Antenna Connector	BNC (standard and M12 version) TNC (stainless steel version)
Enclosure rating / protection class	IP65 (standard and M12 version) IP66 (stainless steel version)
Operation temperature	-20 °C to 50 °C
Storage temperature	-20 °C to 60 °C (-4 °F to 142 °F)
Colour	SICK blue RAL5012 (standard an M12 Version) Without paint (stainless steel version)
Mechanic	IEC 60068-2-64 (10..500 Hz;1 grms)

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Warning! This is a device for usage in Class A. Therefore radio interference could appear in living quarters.
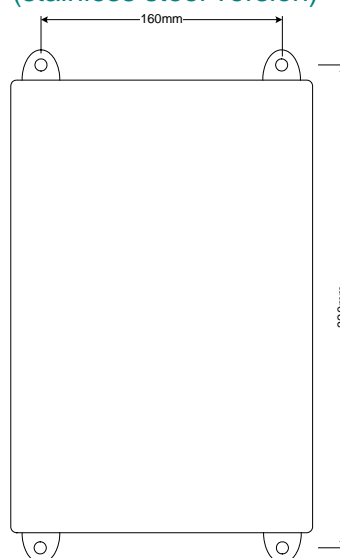
9.2 Dimensional Drawing

Standard and M12 Version do have the brackets to the side whereas the stainless steel version do have it to the top and bottom like shown in the picture below
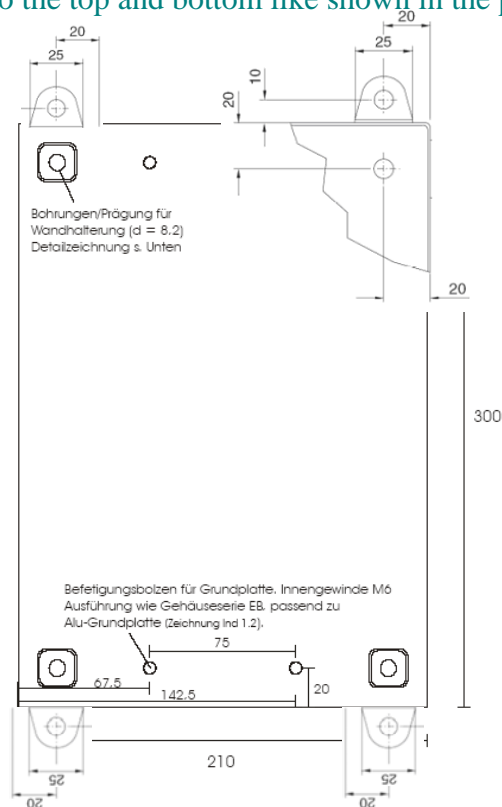
Drill template (standard version)   (stainless steel version)

10. Appendix

10.1 Accessories

Antenna(s)   RFA3xx

Splitter

Multiplexers

Antenna connector converter

RS232 cable (open end)

RS232 cable (M12 / SUBD9)

Mux-Control cable

Transponder

10.2 Glossary, Standard Basics, and Abbreviations

AM

Amplitude Modulation

A method of combining an information signal and a RF carrier with a different voltage level assigned to a digital 0 and 1.

Antenna

A radio frequency transducer.

Antenna de-tuning

Relative to RFID implementations, the reduction in the amount of energy that is available to power a tag or the reduction of the amplitude of the signal reaching the reader due to the environment.

Anticollision

See collision avoidance. Collision avoidance algorithm. RFID interrogator firmware that intercepts multiple simultaneous tag signals, sorts responses and initiate a communication protocol to sequentially collect the information.

Frequency

The number of repetitions of a complete waveform in a specific period of time.1 kHz equals 1,000 complete waveforms in one second. 1 MHz equals one million waveforms per second.

DSFID

Data Storage Format IDentifier

EOF

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End of Frame

Host computer

The computer running software that interacts with the RFID and other devices such as a warehouse management system.

IC

Integrated Circuit

Inductive coupling

Method of creating a current in a conductor without connecting it directly to a power source. A tag responses to a reader by inductively coupling with the reader carrier signal.

Interference

Any environmental condition that creates electrical noise at the same frequency as the communication signal.

Interrogator

Another term for a reader.

ITF

Interrogator Talks First

LSB

Least Significant Bit

Modulation index

An index equal to (a-b)/(a+b) where a and b are the peak and the minimum signal amplitudes respectively.

MSB

Most Significant Bit

Passive RFID tag

Passive tags do not have an on-board powered transmitter. They are activated by the electromagnetic waves of a reader.

PPM

Pulse Position Modulation

Reader

Also called an interrogator. The reader communicates with the RFID tag and passes the information in digital form to a host computer system.

Read range

The distance from which a reader can communicate with a tag. The range is influenced by the power of the reader, antenna size, transponder form factor and environmental conditions.

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RFID

Radio Frequency IDentification. A method of tracking using radio waves that trigger a response from a device attached to an item.

SOF

Start of Frame

Subcarrier

A signal of frequency fs used to modulate the carrier of frequency f0

Tag

A generic term for radio frequency identification device

UID

Universal IDentification code

MSB

Header (EO)	IC Manufacture Code	IC Serial Number
64	56	48
57	49	1

10.3 ISO/IEC 15693 – ISO/IEC 18000-3 Mode 1 Basics

The ISO/IEC 15693 is one of a series of international standards describing the parameters for identification cards as defined in ISO/IEC 7810 and the use of such cards for international interchange.

The ISO/IEC 15693 is intended to allow operation of vicinity cards in the presence of other contactless cards conforming to the ISO/IEC 10534 and ISO/IEC 14443 standards.

The ISO/IEC 18000 series is defined mainly for item management. The Part 3, Mode 1 is compatible with ISO/IEC 15693.

This summary should be used only as a basis for understanding the features given by the ISO/IEC15693 standard. The full documentation can be ordered from ISO/IEC.

ISO/IEC 15693-2 Air Interface and Initialisation

This part of ISO/IEC 15693 describes the electrical characteristics of the contactless interface between the transponder and the interrogator. The interface includes power and bi-directional communications.

Initial Dialog for ISO15693 Transponder

• Activating of the transponder (interrogator RF power on)

• Transponder waiting for a command from the interrogator (ITF)

• Receiving the command from the interrogator

• Transmitting the response to the interrogator

Power Transfer

The power transfer from the interrogator antenna to the transponder is accomplished by radio frequency via coupling antennas. The RF operating field that supplies power to the transponder from the interrogator is modulated for communication.

Frequency

The transponder frequency is 13.56 MHz ± 7 kHz

Communications Signal Interface

For some parameters, special modes are available to comply with different international radio regulations and application requirements.

Modulation

Communications between interrogator and transponders takes place using the ASK modulation principle. If the modulation index is set to 100 %, the noise sensitivity is less. A modulation index of, e.g., 20 % will increase the read/write performance but also increase the noise sensitivity.

Data Rate and Data Encoding

The transponder support two data coding modes
(1 out of 4 at 26.48 kbit/sec and 1 out of 256 at 1.65 kbit/sec).

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ISO/IEC 15693-3 Anticollision and Transmission Protocol

This part of ISO/IEC 15693 describes the anticollision and transmission protocols.

The anticollision is based on a UID that each tag supports. The length of this ID is 64 bits and it is guaranteed by the manufacture of the IC that the ID is unique

AFI

The Application Field Identifier (AFI) should – if available – represent the application for which the transponder is used. It can be programmed and locked within the transponder with the commands given in the document "Telegram Listing RFI341".The AFI consists of 8 bits. If no applicable preselection is possible, use "0h"..

The support of the AFI feature is optional. That means it is possible that ISO 15693 compliant transponders do not offer this AFI feature. It is recommend that only those transponders that offer this AFI byte be used.

Therefore, check carefully the selection of the transponder IC type and the requirements given by the application.

DSFID

The Data Storage Format Identifier (DSFID, 8 bit) can be used to indicate in which manner the user data is structured in the user memory. If no DSFID is used, this value should be "0h".

Anticollision

The purpose of the anticollision is to make an inventory of the transponders present in the field by using their UIDs.

The anticollision is based on slots. The interrogator can use one or sixteen slots. If the interrogator wants to ensure that tags are present for an anticollision or knows that only one transponder is present in the field, the slot length of one is adequate.

If additional transponders are in the field, the interrogator will detect this by a erroneous CRC.

If more than one tag is in the field and the interrogator uses the 16 slots, each transponder will calculate a number (with help from UID) between 1 and 16 and replies in a special slot. It can occur that more than one tag replies in the same slot.

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In this case, the interrogator will skip to the next slot. Within the next inventory session, these transponders will participate whereas those that have been successfully read (UID) could be not present – depending on the function, which may set these transponders to the quiet stage. This process could be repeated until all transponders are identified. Tags colliding in a slot could be separated with masks according to ISO Standard.

<u>Command Codes</u>

The ISO 15693 requires that only two commands to be mandatory in an IC. These are "Inventory and Stay quiet". All other commands are defined but optional.

Therefore, ensure that the tag used supports the application requirements. These include:

• Read and write feature

• Lock block feature

• Read and write of multiple blocks

• AFI and DSFID features

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