



Transponder Reader LF

Product Manual English

It is essential to read this product manual before the first operation. Pay attention to the security advices! These instructions are an important part of the product and must be kept for later use. This publication is not subject to any update service.

This product manual corresponds with "Directive 1999/5/EC of the European Parliament and the Council on radio equipment and telecommunications transmission equipment and the mutual recognition of the conformity".

This product manual is addressed to the operating company who must pass it on to the personnel responsible for installation, connection, use and repairs of the machine.

The plant manager must ensure that the information contained in this product manual and in the accompanying documents has been read and understood.

The product manual must be stored in a place that is familiar and easily accessible to employees and must be consulted whenever an employee is unsure of how to proceed.

The manufacturer does not assume any responsibility for injuries to persons or animals, or damage to property or to the device arising from incorrect use or disregard or insufficient consideration of the safety criteria contained in this product manual or based on modifications of the device or the use of unsuitable spare parts.

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or its legal successor.

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Archiving

- Store the product manual in the vicinity of the device!
- Always keep the product manual handy!

Symbols and signal words

The following symbols and signal words are used in this documentation. The combination of a pictograph and a signal word classifies the respective safety information. The symbol can vary depending on the type of danger.

	Symbol	Signal word	Description
Death		DANGER	This signal word must be used if death or irreversible damage to health can occur if the hazard information is not followed.
Risk of injury and property damage		WARNING	This signal word indicates bodily injuries and property damage including injuries, accidents, and health risks.
		CAUTION	This signal word indicates a risk of property damage. In addition, there is a slight risk of injuries.
No damage		ATTENTION	This signal word warns of malfunctions and may only be used if no damage to health can occur.
		IMPORTANT	This signal word indicates cross-references and ways in which operations are facilitated. It excludes all risks of property damage and injury risks.

Target group

The product manual are addressed to personnel with the following areas of responsibility:

Area of responsibility	Competence
Installation, transport and storage	Specialized personnel
Commissioning, operation and decommissioning	Instructed personnel
Troubleshooting	Specialized personnel

Definition according to DIN EN 60204-1:

Instructed personnel:

Persons who have been instructed and, if required, trained by a specialist as to the tasks assigned to them, the possible risks of incorrect behavior and the required safety equipment and safety measures.

Specialized personnel:

Persons who can evaluate the work assigned to them and recognize possible risks based on their specialized training, knowledge, experience and familiarity with the relevant standards.

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1 Identification

This chapter gives you an overview of the following topics:

- → Model
- → Designated use
- → Incorrect use

1.1 Model

Transponder Reader LF	Series number	e.g. 1511BY0006
	Article number	02-1-000010

Manufacturer



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For information on the label, see → Device label.

1.2 Designated use

This product was developed for reading and writing passive LF-Transponders only. Any other use of this device constitutes misuse and renders the user's authority to install and operate the device invalid.

This product is designed to be mounted and operated in an industrial setting as a built-in-device only. It is not designed to be used as a stand-alone or portable device or in a non-industrial setting, such as a household, vehicle or in the open-air.

Intended use also includes the following:

- following all instructions in the operating instructions
- observing all safety information

Before using the device, the user should ensure that the national approval requirements for use are met.

1.3 Incorrect use

Incorrect use, which can endanger the device, the user and third parties, includes:

- the use of the device contrary to its intended use (→ Designated use)
- modifying, extending or reconstructing the device without first consulting Xedion AG
- operating the device when there are obvious problems

WARNING



Risk of injury through incorrect modifications

There are risks from unauthorized modifications to the machine.

Only use original spare parts from the manufacturer. Do not make any changes, attachments or modifications to the device without the approval of Xedion AG.

WARNING



Risk of injury and malfunction of machine operation through incorrect use

There are risks attached to using the device incorrectly.

Use the device exclusively according to its intended use.

2 General Instructions

This chapter gives you an overview of the following topics:

- → Liability and warranty
- → Objectives of the product manual

2.1 Liability and warranty

The "General sales and delivery conditions" of Xedion AG always apply.

The warranty period is 12 months beginning with the delivery of the device, which is verified by the invoice or other documents.

The warranty includes repairs of all damages to the device that occur during the warranty period and were clearly caused by material or manufacturing defects.

Liability and warranty claims in cases of damage to persons or property are excluded if they can be attributed to one or more of the following causes:

- incorrect use of the device
- disregard of the information in the operating instructions
- unauthorized structural modifications of the device
- insufficient maintenance and repairs
- disasters due to foreign objects or force majeure

2.2 Objectives of the product manual

These operating instructions serve as support and contain all the necessary safety information that must be followed for general safety, transport, installation and operation.

These operating instructions including all safety information (as well as all additional documents) must be:

- followed, read and understood by all persons working with the device (especially the safety information)
- easily available to all persons at all times
- immediately consulted in case of doubt (safety)

Objectives:

- to avoid accidents
- to increase the service life and reliability of the device
- to reduce costs due to production downtimes

3 Safety Instructions

This chapter gives you an overview of the following topics:

- → Area of application and symbols
- → Obligations
- → ESD instructions
- → Residual risks
- → Additional instructions

3.1 Area of application and symbols

DANGER



Danger to life, risk of injuries or loss of property

Risks exist when disregarding the operating instructions and the safety instructions therein.

Carefully read the product manual before initial commissioning. Perform the required safety measures before initial commissioning.

Follow the general safety information as well as the special safety information given in other chapters.

The device was constructed according to state-of-the-art technology and recognized safety regulations. In order to prevent any risks to life and limb of the user, third parties or damage to the device, only use the device for its intended purpose and in perfect condition with regard to safety.

Bodily injuries and/or property damage resulting from non-compliance with the instructions given in the product manual are the responsibility of the company operating the device or of the assigned personnel. Malfunctions that could compromise safety must be eliminated immediately.

3.1.1 Safety symbols - in compliance with DIN 4844-2

WARNING



Risk of injuries when disregarding safety symbols

Risks exist when disregarding warnings in the product manual.

Please heed the warnings

Special safety symbols in accordance with DIN 4844-2 are used in the corresponding passages in the text of these operating instructions and require special attention depending on the combination of signal word and symbol.

3.1.2 Warning symbols



Warning: Hazardous area



Warning against
electromagnetic radiation



Warning: Potentially
explosive atmosphere



Warning against
hazardous electrical
voltage



Warning: Flammable
materials



Warning against
electrostatically sensitive
components

3.1.3 Prohibition symbols



Unauthorized access is
prohibited



Switching is prohibited



Fire, open flame and
smoking is prohibited



Prohibition

3.1.4 Other symbols



Dispose of packing material according to regulations
Important information



Recycling



Disconnect from power supply



Refer to manual



3.2 Obligations

3.2.1 Operating company's obligations

The safe condition and use of the device is a requirement for the safe operation of the device. The company operating the device therefore has the obligation to ensure that the following points are adhered to:

- The device may only be operated by trained and authorized personnel!
- Prevent unsafe and/or dangerous work procedures! If necessary, check employees' actions!
- Only permit personnel to be trained or instructed within the scope of general training on the device under the supervision of an experienced person!
- Personnel must have understood the operating instructions. Have this confirmed by signature!
- Precisely establish responsibilities according to the various task areas (operation, installation)!
- Operating personnel must be committed to immediately reporting to their superior any identifiable safety deficiencies which occur!

3.2.2 Operating personnel's obligations

Operators are obligated to contribute to the prevention of work accidents and the consequences of them by their personal conduct.

WARNING



Risk of injuries due to insufficient personnel qualifications

A risk exists for personnel and the proper operation due to insufficiently qualified personnel. Only trained personnel may operate the device.

New operators must be instructed by the current operating personnel. The operating company must precisely regulate and monitor the personnel's areas of responsibility and competence. Personnel for the areas of responsibility mentioned above must have the corresponding qualification for this work (training, instructions).

If necessary, this can be done by the manufacturer on behalf of the operating company.

All warranty claims are void when disregarded.

3.3 ESD instructions

CAUTION



Static electricity can damage electronic components in the device. All persons installing or maintaining the device must be trained in ESD protection.

ESD protective measures must be applied when opening the device.

- Disconnect the power supply prior to removing or adding components!
- Discharge your body and all tools used prior to touching any components on the interior of the device!
- Touch electronically sensitive parts carefully and only at their corners!

3.4 Residual risks

Even if all precautions have been taken, there may be unapparent residual risks! Adhering to the safety instructions, the intended use and the product manual as a whole can reduce residual risks!

DANGER



Risks from electric current

Electrical energy remains in lines, equipment and devices even when the device is switched off.

Only allow qualified electricians to perform work on the electrical supply system.

ATTENTION



Disconnect the device from the power supply system if active parts of the device can be accessed with tools. Access is only permitted for authorized personnel.

Regularly check the electrical equipment of the device. Regularly check all moving cables for damage within the scope of maintenance and repairs.

DANGER



Risk of fire and explosions

Fire and explosions may occur within the vicinity of the device. Smoking, open flames and fire are strictly prohibited in the vicinity of the device.

Do not store any flammable liquids within the hazardous area. Keep a fire extinguisher in the vicinity of the device.

WARNING



Warning against electromagnetic radiation

Electromagnetic radiation develops when transmitting and receiving data.

3.5 Additional instructions

- Read and understand all safety and operating instructions prior to installing and operating the device.
- This documentation was written for specifically trained personnel. The installation, operation and defect management may only be carried out by specifically trained personnel.
- Retain these instructions. Keep this documentation in a location that is accessible to all personnel involved with the installation, use and troubleshooting of the device.
- Observe all warnings. Follow all warnings on and in the device and in the documentation.
- Install the device only in accordance with the manufacturer's instructions.
- Use only the accessories and cables supplied by the manufacturer.
- Troubleshooting that is not described in the chapter → Service and Troubleshooting may only be performed by the manufacturer.
- People with hearing aids should be aware that the radio signals emitted by the device can cause annoying noises in the hearing aid.
- Do not connect the device to power supplies such as normal household electrical outlets. The device should only be connected to power supplies as specified in this document.
- When removing a cable, only pull on the plug and not on the cable. Connect cable connectors straight and carefully to avoid damaging the contacts.
- Never bend the antenna cables too far or subject them to mechanical forces.
- When spare parts are required, use only the spare parts that were specified by the manufacturer. Unauthorized spare parts can result in fire, electric shock or other hazards.

Rules and regulations

The provisions of the accident-prevention regulations of the government safety organizations always apply to all work on the device.

The following must also be observed:

- applicable legally binding accident-prevention regulations
- applicable binding regulations at the place of use
- the recognized technical rules for safe and professional work
- existing environmental protection regulations
- other applicable regulations

4 Product Specifications

This chapter gives you an overview of the following topics:

- → Function
- → Technical data
- → Device label

4.1 Function

This RFID read/write device operates in the low frequency range of 134.2 kHz. The serial interface is able to connect to practically any type of production equipment. The internal RFID transceiver is compatible to the ISO 11784/785 HDX/FSK standard and provides write and read functionality for conventional HDX/FSK LF transponders. An ideal area of application is production equipment featuring only one or very few identification positions (e.g. Loadport). Communication with a super-ordinate system takes place via various protocol variations

4.2 Technical data

Technical data	
Dimension	125 x 130 x 40 mm
Weight	400 g
Operating temperature	0° to 50 °C
Storage temperature	-40° to 85 °C
Supply voltage	24 V DC (± 3%)
Power consumption	25 mA idle mode / approx. 130 mA read mode
Antenna inductivity (adjustable)	110 µH ± 3%
Antenna frequency	134,2 kHz
Readable transponder types	ISO 11784/785 HDCX/FSK MPT, SAMPT, RW, RO (e.g. RI-TRP-DR2B)
MTBF	≥ 40.000 h
MCBF	≥ 1.000.000 reading cycles
Reading time per page	110 msec average
Power connector (24 V DC)	ODU MINI-SNAP 2p BG0
Antenna connector	ODU MINI-SNAP 3p BG1
Serial interface	RS232 (DSUB-9-female)
Test button	integrated
Available software	ASCII-H V1.xxx
Serial interface specification	Bit rate (bit/sec): 19.200 bit/sec (default) Data bits: 8 Stop bits: 1 Parity: even

4.3 Device label

The device label with the part and serial number can be found on the case of the device.



- 1 Part number
- 2 Serial number

5 Installation

This chapter gives you an overview of the following topics:

- → Safety instructions
- → Qualified installation personnel
- → Disposal of the packing material
- → Assembly of the device
- → Mainboard layout
- → Antenna output power jumper-block J1
- → RS-232 setting jumper-block J10-J15
- → Receiver sensitivity resistor
- → Receiver sensitivity resistor
- → Test button connector description
- → LED light status description
- → Connector pin assignments
- → Power supply



Refer to manual

Follow the general safety instructions in the chapter.

5.1 Safety instructions

CAUTION



The device is exclusively designed for indoor use in an industrial environment. Installation is only allowed in an interior room at a constant temperature between 0 °C / 32 °F and +50°C / 122 °F, and a relative humidity between 25% and 80%.



Never use the device near or in water.

Never pour liquids of any type over the device. If the device should accidentally come in contact with liquid, disconnect it and have it checked by a technician.



Do not install the device near heat sources such as radiators, heat registers, stoves or other devices (including amplifiers) that generate heat.

Do not install the device in a flammable environment.

CAUTION



Never expose the device to extreme temperature fluctuations, since otherwise condensation develops in the device and causes damage.



Do not install the device in the vicinity of voltage lines or other power lines with which they could collide (for example, drilling), which could result in serious injuries or even death.



The device (especially the antenna) should not be installed in the immediate vicinity of electrical equipment such as medical devices, monitors, telephones, TV sets, magnetic disks and metal objects.

This could result in reduced read and write ranges.



Never use the device in explosive areas (e.g. paint warehouses).

CAUTION



Do not use the device in areas where it is exposed to vibrations or shocks.

ATTENTION



The installation location must be adequately illuminated during the installation.



Never install the device during a lightning storm.

ATTENTION



When determining the installation site, keep in mind the length of the antenna wire and the read/write range of the antenna used.

5.2 Qualified installation personnel

CAUTION



The installation is to be carried out by specially trained personnel only. If you are uncertain about their qualification, contact the manufacturer.

CAUTION



Installing the device without special training can result in damage to the reader and/or connected devices.

5.3 Disposal of the packing material



The packaging material consists of cardboard and foil. Dispose of these materials separately and under the respective legal regulations of your country.



5.4 Assembly of the device

ATTENTION

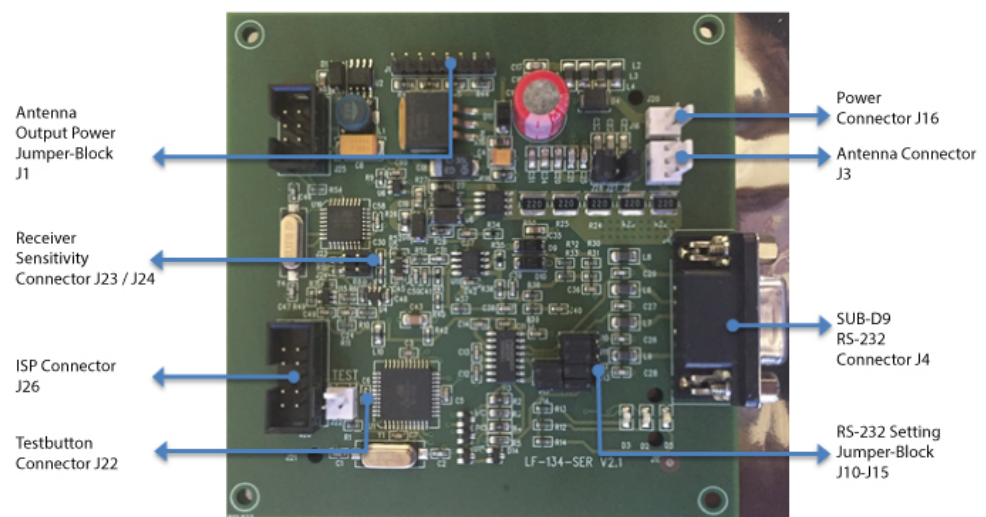


The mounting surface must be stable, non-flammable, dry and clean.

If necessary, clean it before you install the device.

The device must be installed so that air can freely circulate vertically through the heat sink, and the operating and environmental conditions specified under 'Technical data' are met at all times.

5.5 Mainboard layout



5.6 Antenna output power jumper-block J1

Jumper-Block J1 can be used to decrease the RF output power level for the transmitting amplifier, which will result in a decreased reading range also.

This can be necessary if several Antennas needs to placed very closely to each other or if an high read frequency up to 14 cycles/s needs to perform.



All values are calculated values and might be differ a bit.

Jumper Block J1				RF supply Voltage (approx.)	Read distance (approx.)
J1.1	J1.2	J1.3	J1.4		
-	-	-	-	23.75 V	100%
-	-	-	On	14.75 V	85%
On	-	-	-	12.50 V	81%
On	-	-	On	9.70 V	74%
On	On	-	-	8.75	71%
On	On	-	On	7.40 V	67%
On	On	On	-	6.87 V	66%
On	On	On	On	6.07 V	63%

ATTENTION



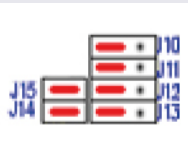
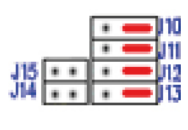
With full output power (no jumper) it is not recommended to read faster than ones per second! For perform high speed cycles up to 14 times per second permanently, the output power must reduced to 85% by setting jumper J1.4 (above R44).

By default no jumper is set (100% output power).

5.7 RS-232 setting jumper-block J10-J15

The serial RS-232 communication interface supports different operation modes. To change these modes, the jumper J10 - J15 need to be modified as shown below.

The default mode is Standard RS-232 with Handshake.

RS-232 Mode	Handshake On	Handshake OFF
Standard	 J10 - J15 (default)	 J10 J11 J14 J15
TTL Level	 J10 - J13	 J10 J11

5.8 Receiver sensitivity resistor

Jumper Block J23/J24		Sensitivity
J23	J24	
Default	-	40 dB gain -> 100x
On	-	29 dB gain -> 30x
Default	On	29 dB gain -> 30x
On	On	23 dB gain -> 15x

5.9 Test button connector description

Connector J22	Functionality
OPEN	Triggered read by Host
First SWITCH (pressed more than 3 sec.)	Test modus is started. Read cycle depending on parameter „RW repeat time“.
Second (short) SWITCH	Test mode is stopped.

ATTENTION



With parameter „RW repeat time“ = 04 (default), the test mode must not be longer than 10 minutes. If more is needed, the parameter „RW repeat time“ should be set to 10.

5.10 LED light status description

In the table below the meaning of all signal LEDs is described.

Status LEDs	Description
Green active	Power OK / idle mode
Yellow active	Reading in progress (read success in test mode)
Red active	Reading error

5.11 Connector pin assignments

5.11.1 Power connector

In the table below the electrical specification is given for connector J16.

PIN	Name	Description
1	Vcc	24 V DC $\pm 3\%$
2	GND	Ground

5.11.2 Antenna connector

in the table below the electrical specification is given for connector J3.

PIN	Name	Description
1	RF-	Antenna (-)
2	GND	Ground (used for wire shield)
3	RF+	Antenna (+)

5.11.3 Serial interface

The serial host interface J4 uses the RS-232 standard with female DSUB-9 connector.

PiN	Name	Description
1 4 6 9	-	not connected
2	RxD	Receive data
3	TxD	Transmit data
5 10 11	GND	Ground
7	RTS	Request to send
8	CTS	Clear to send

5.12 Power supply

DANGER



Risk of death from dangerous voltage

Risks exist when supplying the device with the incorrect voltage.

Only use cables, plugs and adapters supplied by the manufacturer.

Observe power ratings of the technical data (→ Technical data).

ODU MINI-SNAP connector:



6 Protocol Description

This chapter gives you an overview of the following topics:

- → Operating personnel
- → Communication protocol details (ASCII H)

6.1 Operating personnel

CAUTION



The Transponder Reader LF must be operated only by qualified personnel.

If you have any doubts about the qualification required, please contact Xedion AG.

The use of the device by unqualified personnel can cause damages to the Transponder Reader LF and/or to devices connected to it.

6.2 Communication protocol details (ASCII H)

The implementation of all available protocol versions is based on the ASCII communication protocol for RFID Reader - Type TIRIS® by Texas Instruments.

ATTENTION



For detailed descriptions of each Communication Protocol, please refer to the respective Software-Manuals listed below.

6.2.1 Commands terminal to reader

Command	Description
X	start an externally triggered read
W	write tag
G	request parameter
P	change parameter
H	start heartbeat
N	start software reset
M	set/read TransponderMode (single/mpt)
L	lock one page
I	version & serial number query
S	write serial number (require password)
V	version query

6.2.2 Commands reader to terminal

Command	Description
x	data from a page (externally triggered read)
w	response after write to tag
p	response during parameter setting
g	response to read parameter
h	response after heartbeat
n	response after software or hardware reset
e	failure message
m	response/ack after TransponderMode-Settings
l	feedback at locking of one page
i	response to version & serial number query
v	response to version query

7 Service and Troubleshooting

This chapter gives you an overview of the following topics:

- → General remarks
- → Qualified troubleshooting personnel
- → Safety instructions
- → Troubleshooting
- → Customer service

7.1 General remarks



Head the safety chapter

Follow the general safety instructions in the chapter → Safety Instructions.

- The Transponder Reader LF and its components must be serviced by the manufacturer only!
- If errors occur, follow the instructions in this section. Do not carry out any error-eliminating measures other than the ones described in this section!
- If you are uncertain about errors and their handling, contact the manufacturer; see → Customer service. Have the serial number of the Transponder Reader LF ready as shown on the label (see → Manufacturer).

7.2 Qualified troubleshooting personnel

CAUTION



Error handling must only be carried out by specially trained personnel. If you are uncertain about the qualifications that are required, contact the manufacturer.

CAUTION



Error handling the device without the special skills required and unqualified interference with the device can result in personal injury and damage to the reader and/or connected devices.

7.3 Safety instructions



All antenna resonant circuit components carry high voltages!

WARNING



When replacement parts are required, use only manufacturer-specified parts. Unauthorized substitution of parts can result in fire, electric shock or other hazards.



Electrostatic charges can damage electronic components within the device. ESD protective measures must be applied when opening the device (→ ESD instructions).

CAUTION



When removing the cover, consider that the cover may be attached to the device by a cable (LED).

Carefully remove the cover to prevent damages. Do not operate the device when the cover is open!

CAUTION



Never short circuit the fuse! This may result in fire or damage on the device.

Only use fuses specified by the manufacturer..

7.4 Troubleshooting

In case of any problems check the following list point to point:

Description	Correcting action
Power LED is off	Check power supply (try to replace it) or power cable.
RFID tag is out of range	Decrease distance between antenna and tag and check transponder-alignment, recheck read operation
RFID tag is damaged	Replace tag and recheck read operation
Antenna, antenna cable or antenna plug is damaged	Replace antenna and recheck read operation
Power supply has malfunction (under voltage)	Replace power supply and recheck read operation
Reader hardware is damaged	Replace the ID-reader and recheck read operation

7.5 Customer service

For all purchased RFID components XEDION will provide free phone or email support. This includes support for the operation of the components and also support for the integration/installation of components into other equipment. The phone support will be available at normal working times (8:00 a.m. to 5:00 p.m. CET, outside this time frame a voice mail box will be available).

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8 Dismantling and Storage

This chapter gives you an overview of the following topics:

- → Dismantling
- → Storage

8.1 Dismantling

- Remove the power supply!
- Remove all cables!
- Loosen and remove the mounting screws!

8.2 Storage

Store the reader and its components in a clean and dry environment with the power supply disconnected.

Make sure the contacts remain clean. Observe the necessary storage conditions.

9 Transport and Disposal

This chapter gives you an overview of the following topics:

- → Transport
- → Disposal

9.1 Transport

For transportation purposes such as mailing, use a firm cardboard box.

Use adequate padding material to protect the device on all sides.

9.2 Disposal



The device and its components are made of various materials.

Dispose of these materials separately, and observing the legal regulations of your country.



Do not dispose of the device in regular household waste.

Disconnect the electronic components from the case and dispose of them as follows:

- the housing as scrap metal
- the electronic components, antennas and cables as electronic waste

10 Accessories

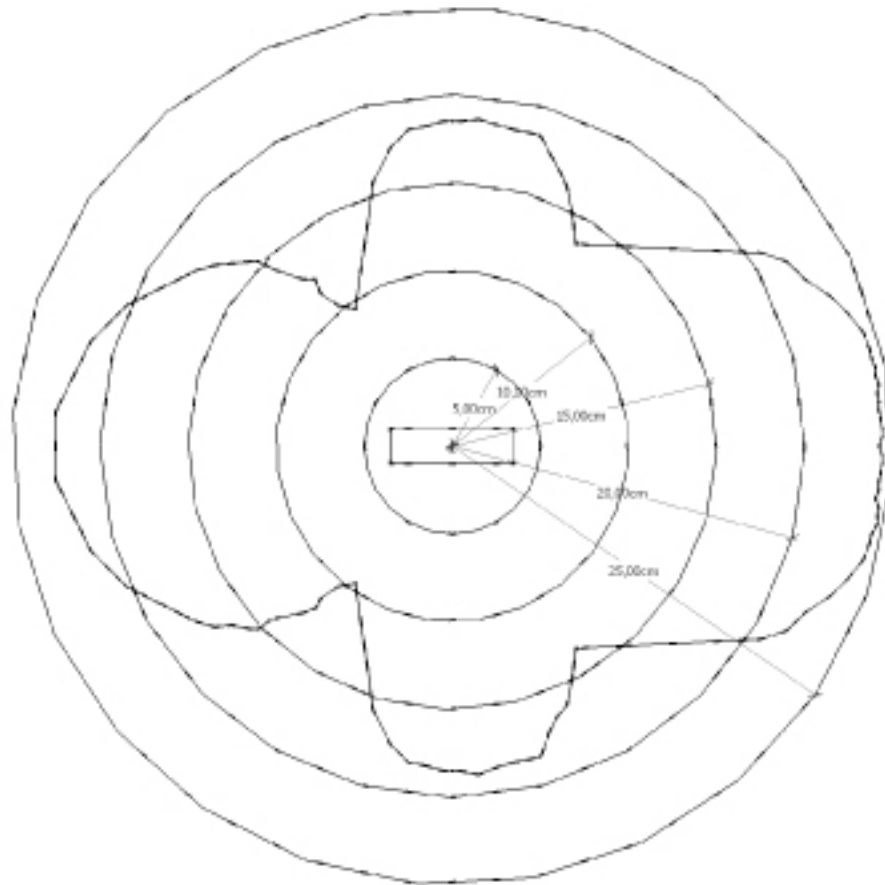
This chapter gives you an overview of the following topics:

- → Antennas
- → Antenna diagram
- → Antenna diagram
- → Transponder

10.1 Antennas

Type	Part-No.	Picture
Mini rod antenna, cable length 1 m (other cable length and types: on request)	01-1-000006	

10.2 Antenna diagram



10.3 Cables

Type	Part-No.	Picture
Power cable, current connector, cable length 1,5 m (other cable length and types: on request)	05-1-000038	
Data / communication cable, RS232 cable, cable length 2 m (other cable length and types: on request)	05-1-000050	

10.4 Transponder

Type	Part-No.	Picture
Glass multipage tag 32 mm	on request	
Disc RO/RW tag ø 30 mm	on request	