LFP Handheld Rev1.0
Product Manual

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1. Introduction

The device complies with the guideline "Radio Equipment Directive 2014/53/EU (RED)" of the European Parliament and the Council on radio equipment and telecommunications terminal equipment and the mutual recognition of conformity.

These operating instructions are addressed to the operator, who must pass them over to the personnel responsible for installation, connection, use and repairs of the device.

The operator has to ensure that the information given in the instruction manuals and in the enclosed documents have been read and understood.

The instruction manuals have to be held in a known and easily accessible place and must be consulted even in the slightest doubt.

The manufacturer assumes no responsibility for damage to persons, animals, property or the device itself caused by improper use, non-compliance with or insufficient observance of the safety criteria contained in these instruction manual or by modification of the device or the use of unsuitable spare parts.

The copyright for the instruction manual lies solely with

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As of: September – 2017

1.1 Using the Device

The device is used exclusively to read passive LF transponders.

Any other use of the device or any use beyond its intended purpose is considered non-intended and thus improper.

In this case, the device safety and the device protection provided may be compromised. HERMOS AG is not liable for damages resulting from such use.

The device has been developed for use in an industrial environment as a built-in device for other systems. It has not been developed as a stand-alone or mobile device in a non-industrial environment, such as domestic, vehicle or open air use.

Intended use also includes the following:

- Following all the operating instructions
- Following all the safety instructions

Improper use which can endanger the operator, third parties or the device include:

- The use of the device contrary to its intended purpose
- Modifications to the device as well as attachments and conversions
- Operating the device when there are obvious problems

Risk of injury due to unauthorized modifications

WARNING

Dangers exist due to unauthorised modifications to the device.

Only original spare parts from the manufacturer may be used. No modifications, attachments or conversions may be made to the device without the permission of HERMOS AG.

Risk of injury and malfunction due to improper use

WARNING

Dangers exist due to improper use of the device.

The device must only be used in accordance with its intended purpose.

2. Version History

Version	Date	Author	Amendments
1.0	07.06.2018	HERMOS AG RK	Initial version of customer documentation

3. Abbreviations and Designations Used

RFID	Radio Frequeny Identification
LF	Low Frequency 134,2 kHz
USB	Universal serial bus, bus system for computers

4. General Instructions

All previous editions of this document are no longer valid with the issue of this version.

The information in this document is compiled to the best of our knowledge and belief. HERMOS AG does not guarantee the accuracy and completeness of the information provided in this document and is also not liable for consequential damages due to incorrect or incomplete information.

4.1 Objective of the Product Manual

The product manual serves as support and contains all necessary information which must be observed for general safety, transport, installation and operation.

The product manual with all safety instructions (as well as all additional documents) has to be:

- Followed, read and understood by all persons working with the device (in particular, knowledge of the safety instructions)
- Open to the public
- Consulted in the slightest doubt (security)

Objectives:

- Prevent accidents
- Increase service life and reliability of the device
- Reduce the costs of production downtime

4.2 Warranty and Liability

The "General Terms and Conditions of Sale and Delivery" of HERMOS AG 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 damage to the device that occurs during the warranty period and is clearly caused by material or manufacturing defects.

Warranty and liability claims in the event of personal injury or property damage are excluded if they are attributable to one or more of the following causes:

- Improper use of the device
- Non-observance of the information in the operating instructions
- Unauthorised structural modifications to the device
- Inadequate repair and maintenance measures
- Disaster events due to impact with foreign objects or force majeure

5. Safety Instructions and Warnings

5.1 Scope and Symbols

Follow the general safety instructions as well as the special safety instructions included in the chapters.

The device is built according to the latest state of the art technology and recognized safety regulations. To avoid danger to life and limb of the operator, third parties or the device when using it, use the device exclusively for its intended purpose and in perfect condition with regard to safety.

Bodily injuries and/or property damages resulting from non-compliance with the instructions provided in the operating instructions are the responsibility of the company operating the device or the assigned personnel.
Faults that may compromise safety must be eliminated immediately.

DANGER

Risk of death, injury and property damage
There is a risk of danger due to disregard of the product manual and the safety
information contained therein.
Read the product manual carefully before initial operation.
Fulfil all required safety conditions.

5.2 Safety Symbols - According to DIN 4844-2

The following special safety symbols in accordance with DIN 4844-2 are used at the corresponding passages in the text of this product manual and require special attention depending on the combination of the signal word and symbol.

WARNING

Risk of injury due to disregarding the safety symbols.
Risks exist when disregarding warnings in the operating instructions.
Follow all warnings.

5.2.1 Mandatory Signs

	Observe additional information		**Use safety goggles**
	Wear ear protection		**Wear safety shoes**
	Important note		

5.2.2 Warning Signs

	Warning of a hazardous area		**Warning of hazardous electrical voltage**
	Warning of electromagnetic radiation		**Warning of flammable substances**
	Warning of explosive substances		**Warning of electrostatically sensitive components**

5.2.3 Prohibition Signs

	Unauthorised access is prohibited		**Fire, open flame and smoking prohibited**
	Switching prohibited		**Prohibition**

5.2.4 Other Signs

	Dispose of packaging material according to regulations		**Recycling**

5.3 Obligations

5.3.1 Operator´s Obligations

A safety-related condition and use of the device is a requirement for safe operation of the device. Therefore, the operator has the obligation to ensure that the following points are observed:

- The device may only be operated by trained and authorised personnel!
- Have personnel who must be trained, instructed or within the scope of general training work only on the device under the supervision of an experienced person!
- Have the personnel confirm by their signature that the operating instructions have been understood!
- Precisely establish responsibilities according to the various task areas (operation, installation)!
- Operating personnel must be required to immediately report any occuring and identifiable safety deficiencies to their superior!

5.3.2 Responsibilities of Operating Personnel

The operating personnel is obligated to contribute to the prevention of work accidents and their consequences by their personal conduct.

WARNING

Risk of injury due to insufficient personnel qualifications

There are dangers to personnel and the proper operation due to inadequately qualified personnel.
Only trained personnel may operate the unit.
New operating personnel must be instructed by the existing operating personnel.
The operator must regulate the personnel's areas of responsibility, competence, and monitoring precisely.
The personnel for the areas of responsibility mentioned above must have the corresponding qualification for this work (training, instruction).
If necessary, this can be done by the manufacturer on behalf of the operator.
In case of disregard, all warranty claims are void.

5.3.3 ESD Instructions

CAUTION

Static electricity can damage electronic components in the device. All persons who install or maintain the device must be trained in ESD protection.

ESD protective measures must be taken when opening the unit.

- Disconnect the power supply before removing or adding components!
- Observe the basic principles of ESD protection
- Take the appropriate ESD precautionary measures

5.3.4 Residual Risks

Despite all precautionary measures taken, there may still be residual risks that are not apparent.
Adhering to the safety instructions, the intended use, and the product manual as a whole can reduce residual risks.

DANGER

Danger Caused by Electrical Current

Electrical residual energy remains in lines, equipment and devices after shuttingdown the device.

Only qualified electricians may perform work on the electrical supply system.

ATTENTION

Disconnect the unit from the power supply system if active parts of the unit can be accessed using tools. Access is only permitted by authorised personnel.

Regularly check the electrical equipment of the unit. Regularly check all moving cables for damage within the scope of maintenance and repair work.

DANGER

Dangers of Fire and Explosion
There is a risk of fire and explosions in the vicinity of the device.

Smoking, exposed flames and fire are strictly prohibited in the vicinity of the unit. Do not store any flammable liquids within the hazardous area of the device.

A fire extinguisher must be kept in the vicinity of the device.

WARNING

Warning of Electromagnetic Radiation
Electromagnetic radiation is generated when data is transmitted and received.
Position the antenna so that it is not in the vicinity of the human body or touches it during transmission.

The device complies with EN50364:2010 (Human Exposure).

5.3.5 Supplemental Instructions

- Read and understand all safety and operating instructions before installing and operating the device.
- This documentation was written for specifically trained personnel. The installation, operation and error handling may only be carried out by specifically trained personnel.
- Keep these instructions. Keep this documentation in a location that is accessible to all personnel involved into the installation, use and error handling of the device.
- Follow all warnings. Follow all warnings given on and in the device as well as in the documentation.
- Install the device only in accordance with the manufacturer´s instructions.
- Use only the accessories and cables from the manufacturer.
- Troubleshooting that is not described in this documentation may only be performed by the manufacturer.
- When plugging cable connections, only pull on the plug and not on the cable.
- Never overbend antenna cables or subject them to mechanical forces.
- Only use spare parts specified by the manufacturer.

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

- Applicable, legally binding accident prevention regulations
- Applicable binding regulations at the place of use
- Technical standards for safety and professional work
- Existing environmental protection regulations
- Other applicable regulations

5.3.6 Regulations and Certifications

The electrical design and documentation comply with the DIN / VDE, EN / IEC regulations.

Functional Description

5.4 Functionality

5.4.1 General Information

The LFP Handheld Reader USB is a radio frequency identification system that uses radio transmission to read or write data from LF transponders (134.2 kHz).
The core piece is an LF transponder (134.2 kHz) which operates as a forgery-proof electronic tag.

The reading unit of the system transmits an energy pulse via the antenna. The transponder is supplied with energy by this pulse. The transponder then sends the stored data back to the device.

The reading process takes approx. 100ms (communication between transponder and device).

Since a line of sight between the device and transponder is not absolutely necessary, the transponder can also be identified through non-metallic material.

The LF Handheld Reader USB reads all 134.2kHz transponders according to ISO18000-2 (and ISO11785) common on the market.

5.4.2 Normal Operation

During normal operation, the LFP handheld reader is immediately ready for operation after a reset.

It does not perform any independent actions in this mode.

Pressing the read button triggers an automatic reading and, if the reading is successful, the data of the LF tag are output.

5.4.3 Polling Mode

The reader can be set to a state of continuous reading, the so-called polling mode. The device then performs a readout at regular intervals and outputs the data of the read LF transponder.

5.5 Illustration

5.5.1 Membrane Keypad

1. Power LED
2. Antenna LED
3. Status LED
4. Menu Button
5. Set Button
6. Read Button (1)

5.5.2 Rear View

1. Read Button (2)
2. USB Connection Cable

Description of the Components

Component	Description
Power LED	The power LED illuminates when the reader is plugged into a USB port and indicates operation readiness.
Antenna LED	The antenna LED indicates the execution of an RFID read or write process.
Status LED	The status LED indicates a successful reading process. In ASCII protocol mode, this behaviour can be activated or deactivated via parameters.
Menu Button	Use the menu button to switch the LFP handheld reader to a setup mode to configure the settings.
Set Button	The set button is used to select parameters in the menu and to transfer parameter settings.
Read Button (1)	The read button triggers an automatic reading. The execution of the reading is indicated by the antenna LED, the result of the reading is indicated by the status LED. In setup mode, the read button (1) is used to configure the parameters. The function is identical to read button (2).
USB Connection Cable	The USB connection cable is fixed to the LFP handheld reader. The length of the connection cable is adjustable.
Read Button (2)	The function is identical to read button (1).
Antenna	With the integrated antenna, ranges of up to 100mm are possible, depending on the transponder type.
Signal Buzzer	An internal signal buzzer is provided for acoustic indication of readings. In both operating modes the buzzer can be activated or deactivated via parameters.

5.6 Technical Data

Technical Data	
Connection	USB, variable cable length (max. 3m)
Operating Temperature	-25 °C bis 50 °C
Storage Temperature	-40 °C bis 85 °C
Permissible humidity at 50°C	25 – 80 %
Transmission Frequency	134,2 kHz , ISO18000-2
Reading Range	Type 100mm, with 32mm glass transponder
Protection	IP 40
Housing Material	ABS
Dimensions	approx. 185 x 90 x 60 mm
Voltage	5 V (+/- 5%)
Power Consumption	Type 80mA / 300mA (passive / active)
Protocol	ASCII, Hex, Keyboard Emulation

5.6.1 Device Label

The device label is located on the LFP reading device housing.
It contains a CE mark as well as an article and serial number.

1. Designation
2. Articel Number (Variants)
3. Serial Number (Example)
4. MAC address
5. Manufacturer

LFP USB Handheld Reader CE
P/N: HRF.R.LFP.0I.YU.10.30A
S/N: 1701HAG00123
HKxxxxxx
HERMOS AG

5.6.2 Device Label FCC ID 2AP5OLFP

FCC

- The Federal Communications Commission (FCC) warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF exposure statement portable devices)

This device complies with the RF exposure SAR test exclusion requirements for portable devices, if a minimum separation distance 50mm is kept. However, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

- FCC §15.105 (b):
  NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

6. Installation

Follow the basic safety instructions in the chapter safety instructions.

6.1 Safety Instructions

	The device is exclusively designed for indoor use in an industrial environment. The device may only be installed indoors with a temperature and humidity level within the range of the specified technical module parameters.
	Never use the unit near or in water. Never pour liquids of any type over the unit. However, if the unit should still 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.
	Never expose the device to extreme temperature fluctuations, since otherwise condensation develops inside the device and causes damages.
	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 and magnetic disks, and metal objects. This could result in reduced read and write ranges.
	Never use the unit in explosive areas (such as paint warehouses).
	Do not use the device in areas where it is exposed to vibrations or shocks.
	The installation location must be adequately illuminated during the installation.
	Never install the unit during a lightning storm.

	Ensure that the installation meets FCC (country specific) requirements for human exposure to radio frequencies.

6.2 Qualified Installation Personnel

	The unit must only be installed by specially trained personnel. If you have any doubts about the qualifications, please contact the manufacturer.
	If the unit is operated by untrained personnel, the reading device and/ or connected devices may be damaged.

6.3 Unpacking

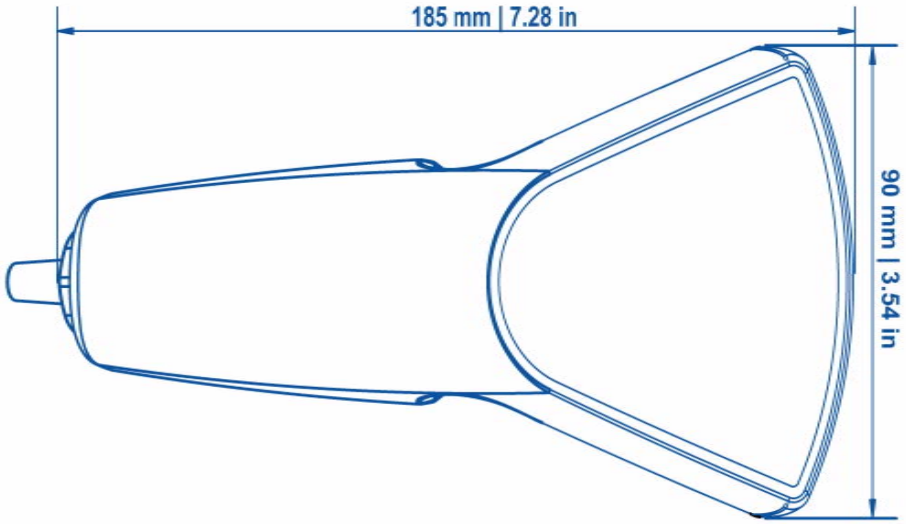
The LFP reading device and the accessories can be packed customer-dependent under clean room conditions. In order to maintain this condition, the devices must be unpacked under clean room conditions.

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

6.4 Power Supply

	Danger exists if the device is supplied with the wrong voltage. Only use cables, plugs and adapters from the manufacturer. Observe the connection values of the technical data.

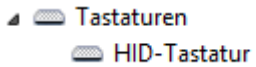
6.5 Dimensions



6.6 Connecting the LFP Reader

6.6.1 LFP Reader Operating Mode Keyboard Emulation

The LFP reader with set keyboard emulation can be connected to any USB port of a running PC. The driver is automatically detected and installed. After a few seconds the operating system of your computer reports the successful installation and the reader is ready for operation.



The LFP reader with keyboard emulation works like a connected keyboard. It is displayed as an additional HID keyboard in the device manager of your system.

6.6.2 LFP Reader Operating Mode ASCII Protocol

The LFP reader with set ASCII protocol can be connected to any USB port of a running PC. Before connecting the reader, however, the driver for the virtual COM port must be successfully installed so that the connected device can be addressed via the virtual COM port. The driver is available in the download area of the RFID products on the HERMOS homepage.

Homepage: www.hermos.com

User Name: Customer_LF

Password: 781692

→ After downloading and unpacking the driver, the installation is started by running the application CP210xVCPInstaller_x64.exe or CP210xVCPInstaller_x86.exe.

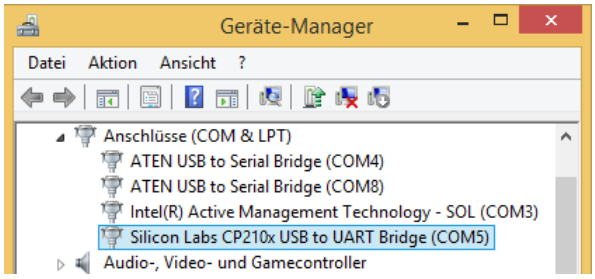
→ When using a single USB reader, select the "SingleReader" driver. The reader can be operated on any USB port of the PC.

→ When using several USB readers simultaneously, select the "MultiReader" driver. A virtual serial port is assigned to each USB port. A reader can be installed on each USB port of the PC.

→ The USB reader is now connected to a USB interface of the PC, the computer recognizes the device and automatically starts the driver installation.

→ Follow the further installation instructions and install the software via "Install the software automatically". If the automatic installation fails, start the manual installation.

→ If the driver is successfully installed and the USB reader is plugged in, it can be accessed via the virtual COM port. In the Device Manager of the Control Panel, the corresponding virtual COM port is displayed as "Silicon Labs USB to UART Bridge.



6.6.2.1 Parameters of the Serial Interface

Serial communication takes place via a virtual COM port, which has the following unchangeable communication parameters.

	Figure
Baudrate	19200
Data bits	8
Stop bits	1
Parity	Even

7. Operation

7.1 Operating Personnel

	The device should only be operated by specially trained personnel. If you are in doubt about the required qualification, please contact the manufacturer. Operation of the device without the specific expertise can lead to damage to the device or connected devices.

7.2 Setting the Operating Mode

The LFP reader has 2 different operating modes:

- Keyboard emulation analog keypad
- ASCII protocol communication via virtual COM port

Switch between the two operating modes via the connected membrane keypad:

→ Press and hold the "Read" key on the membrane keypad

→ Press the "Menu" key on the membrane keypad and hold it together with the "Read" key for about 10 seconds until all LEDs and the buzzer light up

→ When the two keys are released, the operating mode is changed and the device is restarted

7.3 Operating Mode Keyboard Emulation

If the device is plugged in or restarted, the Keyboard Emulation operating mode is indicated by the following combination of LEDs and signal buzzer:

- The antenna LED, the status LED and the buzzer are briefly switched on and off again (test of the membrane keypad)
- Short waiting time
- The antenna LED, the status LED and the buzzer are briefly switched on and off twice in succession

The LFP reader USB works like a connected keyboard. To read a transponder, place the cursor in a text document or in a text input field of the active application. Hold the device near a transponder and press the read button.

An active reading is indicated by the antenna LED lighting up.

The LFP reader reads the transponder and writes the read data via the USB interface into the text document or input field.

The data format (ASCII or HEX) can be adjusted in the setup mode.

7.3.1 Setup Mode

A setup mode is only available in Keyboard Emulation mode.

In the setup mode of the LFP reader you can change parameter settings.

To enter the mode, connect the LFP reader to your PC and start any text editor.

Press and hold the menu button on the reader to switch to setup mode and a setup menu appears in the editor.

```
1  HERMOS AG
2  USB_LFSH_1.0FV02
3  Parameter List:
4  PAR: Customer:= 00
```

The settings in setup mode are made with the read button and the set button. (See 8.4 State diagram operating modes)

Press and hold the menu key to return the device to operating mode. Exiting the setup mode is indicated by the output "EXIT".

7.3.2 Parameters

Parameter Name	Short Description
Customer	Selection of customer settings
Retry	Number of read attempts
ShowTagType	Show tag type
ReadPage	Page of the tag to be read
ReadLength	Length of the read data
MIDFormat	Formatting the MID
Polling	Activate polling mode
AddTabCR	Add carriage return or tab
ASCIICoded	Output in ASCII or HEX format
Prefix	Preceding character before reading result
Suffix	Subsequent character after reading result
Language	Language setting keyboard
Peep/Summer	Switching the signal buzzer on or off
ShowNoneVisibleASCII	Display of invisible signs
NumPrefix	Number of prefix characters
NumSuffix	Number of suffix characters
PollingFrequenz	Reading frequency in polling mode
SpecialSettings	Configuring Special Settings

7.3.2.1 Parameters - Customer

The parameter defines whether the reader is configured with the standard settings of the parameters or with customer-specific settings.

Figures:	Standard	= 00
	Customer Mode 1	= 01
	Customer Mode 2	= 02

Standard: 00 (Standard Settings)

<u>Customer Mode Parameter Set 1:</u>
If the reader is in customer mode 1, the following parameters differ from the standard settings:

Parameter ReadPage → 00
Parameter AddTabCR → add Tab
Parameter Language → English

In addition, the setup menu is locked when the reader is in customer mode 1. To access the setup menu, press the following key combination:

Hold down the menu button and briefly press the read button 3 times. Then release the menu button. You are now back in the parameter menu.

<u>Customer Mode Parameter Set 2:</u>
If the reader is in customer mode 2, the following parameters differ from the standard settings:

Parameter ReadPage → 00
Parameter Prefix → 19
Parameter Language → English

7.3.2.2 Parameters - Retry

Defines the internal reading repetitions in case of an incorrect reading.

0x00 – 0x1F 0 to 31 Reading repetitions

Standard: 0x00

7.3.2.3 Parameters - ShowTagType

It is possible to display the type of transponder. For this purpose, a number for the transponder type is output before the actual transponder data. This behaviour can be switched on and off.

on Transponder type is displayed
off Transponder type is not displayed

The transponder types are indicated by the following figures:

01 - Read Only Transponder
02 - Read/Write Transponder
03 - Multipage Transponder

Standard: off

7.3.2.4 Parameters - ReadPage

This parameter defines the start position (page!) of a read within a multipage transponder.

0x00 – 0x11 Page 1 to page 17

Standard: 0x01

If the value is 0, the different transponder types are read as follows:
Multipage Transponder - only page 1 is read (8 bytes)
Read Only - entire transponder is read (8 bytes)
Read/Write - entire transponder is read (8 bytes)

The transponder types ***Read Only*** and ***Read/Write*** can only be read with value 0.

7.3.2.5 Parameters - ReadLength

This parameter defines the length of the data (8-byte intervals) to be read during a read. The data of the 17 pages of a multi-page transponder can be read at most. The actual maximum possible number of bytes to be read is limited by the first page to be read (parameter ReadPage) and is calculated from the remaining pages.

0x08 – 0x88 read (n*8) bytes, where n = 1..17 (Page)

Standard: 0x08 (Read 8 bytes)

7.3.2.6 Parameters - MIDFormat

This parameter defines the format in which the MID data of the transponder are to be output.

0 : Not formatted; starting with the starting page
1 : MSB first output; starting with the end page; ends with the start page
2 : LSB first output; starting with the end page; ends with the start page
3 : MSB first output; starting with the start page; ending with the end page
4 : LSB first output; starting with the start page; ending with the end page

Standard: 0

Example: Data in transponder:
Data Page 1: - - - - 1234 (hex: 20 20 20 20 31 32 33 34).

Data Page 2: 56789531 (hex : 35 36 37 38 39 35 33 31).

Output with different formats (StartPage=0, ReadLength=16 bytes):

Format 0: - - - - 123456789531 (Hex: 20 20 20 20 31 32 33 34 35 36 37 38 39 35 33 31).

Format 1: 56789531- - - -1234 (Hex: 35 36 37 38 39 35 33 31 20 20 20 20 31 32 33 34).

Format 2: 135987654321- - - - (Hex: 31 33 35 39 38 37 36 35 34 33 32 31 20 20 20 20).

Format 3: - - - - 123456789531 (Hex: 20 20 20 20 31 32 33 34 35 36 37 38 39 35 33 31).

Format 4: 4321- - - -13598765 (Hex: 34 33 32 31 20 20 20 20 31 33 35 39 38 37 36 35).

7.3.2.7 Parameters - Polling

This parameter defines whether the reader should work in polling mode (continuous reading at intervals of parameter PollTimer). After the polling mode is activated in the parameter, the user has to press the read button for the reader to start polling. Press the read button again to stop polling. With each successful reading, the data is output.

off	= 00	Polling off
on	= 01	Polling on, activate the poll function with the read button.
on_read	= 02 *)	Polling on, activate the poll function with the read button. Polling ends after the first successful reading.
on_reset	= 03 *)	Polling on, poll function is started automatically after a reset.

Standard: 0x00

*) not implemented in every software version

7.3.2.8 Parameters - AddTabCR

This parameter defines whether a carriage return, a TAB or both is added to the end of the reading result.

none	= 00	Do not add CR or TAB
add CR	= 01	Add CR (ASCII 0x0D)
add TAB	= 02	Add TAB (ASCII 0x09)
add CR TAB	= 03	Add CR and TAB (ASCII 0x0D+0x09)

Standard: 0x01

7.3.2.9 Parameters – ASCII-Coded

The data read out can optionally be output in HEX or ASCII format.

HEX	= 00	HEX format
ASCII	= 01	ASCII format

Standard: 0x01

7.3.2.10 Parameters - Prefix

This parameter defines whether the output string should be preceded by an additional character.

0x00 – 0x8F	HEX code for prefix

Standard: 0x00 (No prefix)

7.3.2.11 Parameters - Suffix

This parameter defines whether an additional character is to be appended to the output string.

0x00 – 0x8F	HEX code for suffix

Standard: 0x00 (kein Suffix)

7.3.2.12 Parameters - Language

This parameter defines the keyboard layout.

English	= 00	English layout
Germany	= 01	German layout

Standard: 0x01

7.3.2.13 Parameters - Peep/Summer

This parameter activates or deactivates the internal signal buzzer of the reader during the reading process.

off	= 00	Buzzer off
on	= 01	Buzzer on

Standard: 0x01

7.3.2.14 Parameter - ShowNoneVisibleASCII

This parameter defines whether a non-visible ASCII character on the screen is represented by a □ or not.
This parameter is only relevant for the ASCIICoded "ASCII" setting.

off	= 00	□ not indicated
on	= 01	□ indicated

Standard: 0x00

7.3.2.15 Parameters - NUMPrefix

Defines the number of prefix characters to be added before the output string.

0x00 – 0x10	Number of prefix characters

Standard: 0x00 (No prefix)

7.3.2.16 Parameters - NUMSuffix

Defines the number of suffix characters to be added after the output string.

0x00 – 0x10	Number of suffix characters

Standard: 0x00 (No suffix)

7.3.2.17 Parameters - Polling Frequency

This parameter may not yet be available in all software versions!
The speed of the polling frequency is defined by this parameter.

0x00	Fastest frequency possible during polling
0x01 – 0x14	Breaks between polls. (Multiplication factor 100ms)

Standard: 0x0A

7.3.2.18 Parameter - Special Settings

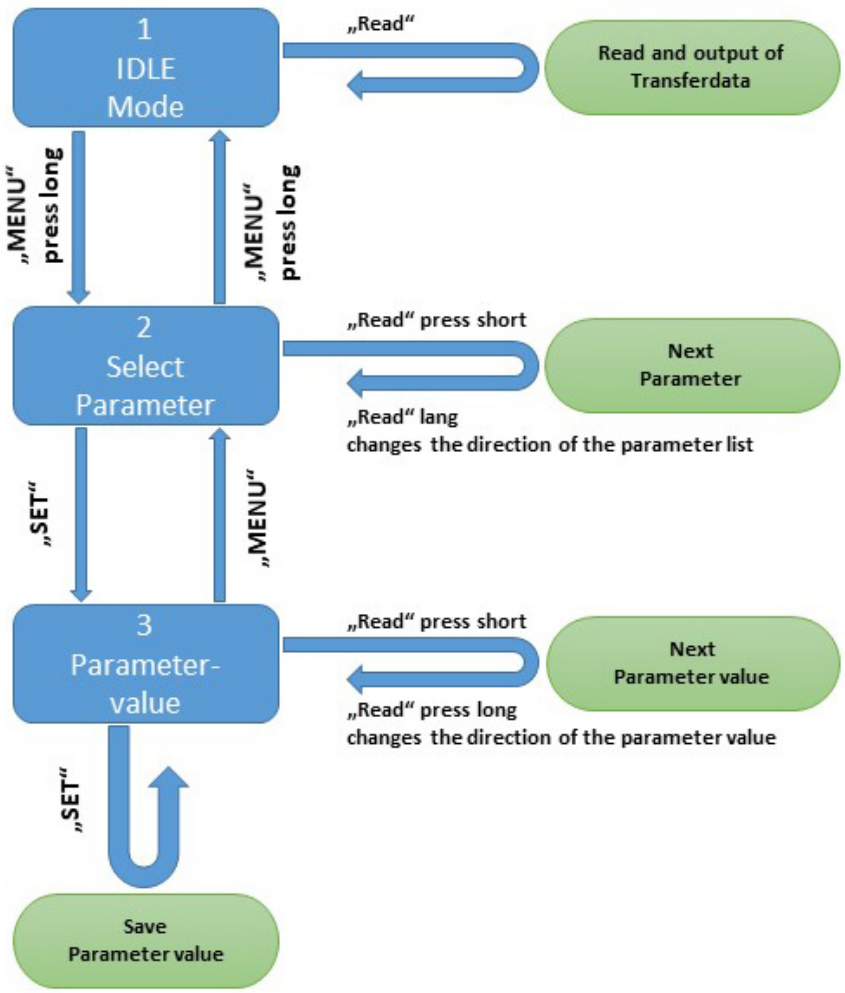
This parameter should make it possible to activate further special functions in the future.
This parameter is addressed bitwise (Bit0 to Bit7).

0x00	Standard behaviour

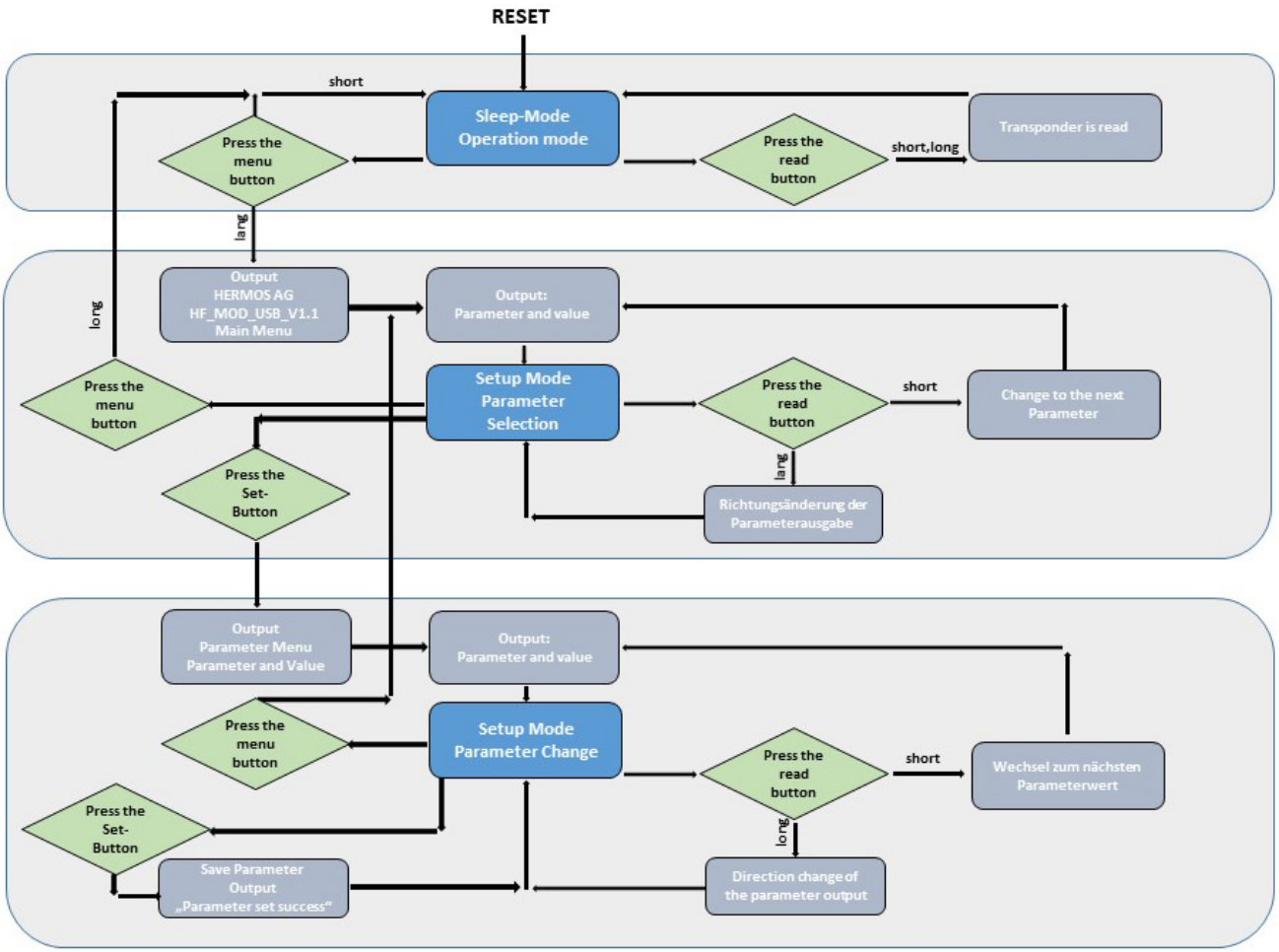
Standard: 0x00 (Standard behaviour)

State Diagram Operating Modes

The following status diagram shows the operating modes and the transitions for the keyboard emulation operating mode.



7.3.3 Process Diagram



7.3.4 ASCII - Table

DEZ	HEX	CTRL	Code
0	0	^@	NUL
1	1	^A	SOH
2	2	^B	STX
3	3	^C	ETX
4	4	^D	EOT
5	5	^E	ENQ
6	6	^F	ACK
7	7	^G	BEL
8	8	^H	BS
9	9	^I	HT
10	A	^J	LF
11	B	^K	VT
12	C	^L	EF
13	D	^M	CR
14	E	^N	SOH
15	F	^O	SI
16	10	^P	DLE
17	11	^Q	DC1
18	12	^R	DC2
19	13	^S	DC3
20	14	^T	DC4

DEZ	HEX	CTRL	Code
21	15	^U	NAK
22	16	^V	SYN
23	17	^W	ETB
24	18	^X	CAN
25	19	^Y	EM
26	1A	^Z	SUB
27	1B	^[	ESC
28	1C	^\	FS
29	1D	^]	GS
30	1E	^^	RS
31	1F	^_	US

DEZ	HEX	CTRL
32	20	BLANK
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7

DEZ	HEX	CTRL
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

DEZ	HEX	CTRL
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_
96	60	'
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g

DEZ	HEX	CTRL
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	□

7.3.5 Control and Function Symbols

HEX	Button
0x01	CTRL-A
0x02	CTRL-B
0x03	CTRL-C
0x04	CTRL-D
0x05	CTRL-E
0x06	CTRL-F
0x07	CTRL-G
0x08	CTRL-H
0x09	CTRL-I
0x0A	CTRL-J
0x0B	CTRL-K
0x0C	CTRL-L
0x0D	CTRL-M
0x0E	CTRL-N
0x0F	CTRL-O
0x10	CTRL-P
0x11	CTRL-Q
0x12	CTRL-R
0x13	CTRL-S
0x14	CTRL-T
0x15	CTRL-U
0x16	CTRL-V
0x17	CTRL-W
0x18	CTRL-X
0x19	CTRL-Y
0x1A	CTRL-Z

HEX	Button
0x81	F1
0x82	F2
0x83	F3
0x84	F4
0x85	F5
0x86	F6
0x87	F7
0x88	F8
0x89	F9
0x8A	F10
0x8B	F11
0x8C	F12

7.4 ASCII Protocol Operating Mode

If the device is plugged in or restarted, the ASCII protocol operating mode is indicated by the following combination of LEDs and signal buzzers:

- The antenna LED, the status LED and the buzzer are briefly switched on and off again (test of the membrane keypad).
- Short waiting time
- The antenna LED is switched on and off briefly at least one more time.

The LFP reader USB communicates with a higher-level host system via a virtual COM port using the ASCII protocol. To read a transponder, hold the device near a transponder and press the read button.

An active reading is indicated by the antenna LED lighting up.

The LFP reader reads the transponder and transmits the read data either via the standard ASC-I1 protocol or the ASC-W1 protocol. Both protocols are ASCII protocols and differ only slightly in commands and parameters. The desired ASCII protocol specification is selected via parameter 64. In the following chapters, the different specifications are indicated at the appropriate points.

7.4.1 Structure of the Communication Protocol

Communication is carried out via ASCII packets.

A specific response is sent to the reader after each command. We recommend waiting for this response before sending a new command.

7.4.2 Packet Content

Each message packet consists of a packet header (header = 3 characters), the message data (2 or more characters) and the packet end.

Packet Header	Message Data	Packet End

Packet Header

The packet header contains a start character and the message length. The message length consists of 2 hexadecimal bytes and defines the number of characters in a message.

Packet Header		
Start Character	**Length 1 (high byte)**	**Length 2 (low byte)**

Start	Start character (ASCII character „S“)
Length 1	High byte of the message length (ASCII character „0“-“F“)
Length 2	Low byte of the message length (ASCII character „0“-“F“)

Advanced ASCII format:

The advanced ASCII format is defined for ASCII messages whose message length exceeds 255 characters. The packet header contains two start characters and the message length. The message length consists of 4 hexadecimal bytes and defines the number of characters in a message.

Packet Header					
Start 1	**Start 2**	**Length 1**	**Length 2**	**Length 3**	**Length 4**

Start 1 First start character (ASCII character „S“)
Start 2 Second start character (ASCII character "X" = extended ASCII protocol)
Length 1 High byte of the message length (ASCII-character „0“-„F“)
Length 2 Byte packet length (ASCII character „0“-“F“)
Length 3 Byte packet length (ASCII character „0“-“F“)
Length 4 Low byte of the message length (ASCII character „0“-“F“)

Message Data

The message contains a command character, a target or source address and the actual message data.

Message Data		
Command	**Address**	**Data**

Command The command is defined by an ASCII character. (See protocol commands)
Address Target/source address (ASCII characters „0“, „1“, …, „E“) *****
Data The definition of the message data depends on the protocol command.

* The reader address can be set via parameters. When delivered, the address is set to "0".

Packet End

The packet end contains an end character and a checksum consisting of 4 characters.

Packet End				
End Character	**Checksum 1**	**Checksum 2**	**Checksum 3**	**Checksum 4**

End Character ASCII end character <CR> (hex 0x0D).

Checksum 1 High byte XOR logic of all data (packet header, data and end character). (ASCII character „0“…“F“)

Checksum 2 Low byte XOR logic of all data (packet header, data and end character).

	(ASCII character „0“…“F“)
Checksum 3	High byte addition of all data (packet header, data and end character). (ASCII character „0“…“F“)
Checksum 4	Low byte addition of all data (packet header, data and end character). (ASCII character „0“…“F“)

7.4.3 Data Elements

The data elements that are used by default ASCII messages, which are described in the message details section, are defined in this section.

CMD	1 Byte

Command of the message, see table in Chapter “Commands“.

Data	16 Bytes

The data is represented in HEX format by 2 ASCII characters. The data always includes every 8 bytes of the corresponding page of the transporter.

Example:

Transponder data in ASCII-Format	„12345678“ (8 bytes)
Transponder data in HEX-Format	0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38
Data in message	„3132333435363738“ (16 ASCII-characters)

Output Index	1 Byte

The output index defines the index of the output that is addressed.

1 Signal buzzer
2 Antenna LED
3 Status LED

Output State	1 Byte

The data element shows or sets the current status of the outputs.

0 Switch off the output permanently
1 Switch on the output permanently
2 Output flashes with approx. 1 Hz

3 Output remains unchanged
4 Output flashes with approx. 2 Hz

Parameter No.	1 Byte

The number of the parameter is displayed as an ASCII character in HEX format.

Example:	Parameter 1	"01" (2 ASCII characters: 0x30, 0x31)
	Parameter 10	"0A" (2 ASCII characters: 0x30, 0x41)
	Parameter 20	"14" (2 ASCII characters: 0x31, 0x34)

In ASC-W1 mode, the data element displays the number of a parameter in hexadecimal format ("0" to "F") using 1 ASCII character.

Example:	Parameter 1	"1" (1 ASCII character: 0x31)
	Parameter 15	"F" (1 ASCII character: 0x46)

Parameter Value	2 Bytes

In the standard ASC-I1 mode, the data element displays the value of a parameter using 2 ASCII characters (2 bytes) in decimal format (“00” bis “99”).

Example:	Value 45	"45" (2 ASCII characters: 0x34, 0x35)

In ASC-W1 mode the data element indicates the value of a parameter by means of 2 ASCII characters (2 bytes) in hexadecimal format („00“ to „FF“).

Example:	Value 45 (decimal)	"2D" (2 ASCII characters: 0x32, 0x44)

Reader-ID	1 Byte

The reader ID defines the address of the device „0“ to „E“.
Adjustable via parameters.

Response-Code	4 Bytes

This feature is not required for the individual device. This code is always „0000“.

Page	1 Byte

The page of the transponder for a read / write operation is defined by 2 ASCII characters (2 bytes) in decimal format.

Example:	Page 1	→	"01"
	Page 10	→	"10"
	Page 17	→	"17"

If the device is operating in ASC-W1 mode, the page should be interpreted in hexadecimal form:
The page of the transponder for a read / write operation is defined by 2 ASCII characters (2 bytes) in hexadecimal format.

Example:	Page 1	→	"01" („81“ if page is locked)
	Page 10	→	"0A" („8A“ if page is locked)
	Page 17	→	"11" („91“ if page is locked)
	Read/Only	→	"F0"
	Read/Write	→	"F1"

Serial Number	4 Bytes

Contains the 4-byte long serial number of the device.
The serial number is located on the bottom of the reader's label.

Example: "1707HAG04660" complete serial number
Decimal „04660“ (the last 5 characters of the complete serial number)
Hexadecimal serial number „1234“
The gateway ID is the last two digits and has the value 0x34

Software Version	16 Bytes

The data item contains the software version currently used in the reader.
The version string is displayed with up to 16 characters.

Example: "4C464D3449312E31" hex-String („LFM4I1.1“)

Button No.	1 Byte

Displays the number of the button as an ASCII character whose status has changed or is being queried.

Value „1“ → Read button
Value „2“ → Set button
Value „3“ → Menu button

Button State	1 Byte

Displays the current status of the respective button as an ASCII character.

Value „0“ → Button is not pressed
Value „1“ → Button is pressed

Timeout	2 Bytes

The data element Timeout defines the period of time that elapses until the LEDs are switched off.
The timeout is defined in hexadecimal notation.
When the timeout expires, the LED turns off.

Example: „00“ … permanently on
„01“ to „FF“ … 1 s to 255 s timeout

7.4.4 Protocol Commands

Read:

Command	Description
X	Read Data
R	Automatic Read
K	Polling Read

Write:

Command	Beschreibung
W	Write Data

Settings:

Command	Description
G	Query Parameter
F	Query Parameter (Device is operated in ASC-W1 mode)
P	Set Parameter
N	Reset
e	Error Message
E	Error message (Device is operated in ASC-W1 mode)
H	Heartbeat
V	Software Version
L	Lock page of a transponder

In- and Output:

Command	Description
O	Set Output
Q	Query Output/ Input State
A	Sensor event: Sensor removed (device is operated in ASC-W1 mode)
B	Sensor event: Sensor detected (device is operated in ASC-W1 mode) Sensor event: Change of a sensor status
B	Sensor event: Change of a sensor status

7.4.4.1 X – Read Data

Command X starts reading a transponder.
If there is no transponder within the reading range of the antenna, the reader sends an error message (error 4 - no transponder).
The data element "Page" can have the following values.

Value	Description
„01“ … „17“	Read page #
„98“	Read multiple pages to the end character or a blank character 1)
„99“	Read out all transponder data

1) „E“ or „F“ in ID, Bit 0…3 of the read ID

In ASC-W1 mode, the data element „page“ can have the following values:

Value	Description (ASC-W1 Mode)
„01“ … „11“	Read page # of a multipage transponder
„F0“	Read/Only transponder
„F1“	Read/Write transponder
„00“	Read the first page of all transponder types

Host → LF Reading Device		
CMD	**Reader-ID**	**Page**
X	**1 Byte**	**2 Bytes**

LF Reading Device → Host			
CMD	**Reader-ID**	**Page**	**Data**
x	**1 Byte**	**2 Bytes**	**16 Bytes**

If there is no transponder in the reading range of the antenna, the reader repeats the reading function several times before an error message is sent. The number of repetitions is defined in parameter 4 (‚r / w maxrepeat'). If reading is still not possible, the reader sends the error message ‚no tag (4)' to the host after the repetitions have been carried out.
No confirmation is expected from the host.
For a multi-page read request (98 or 99), the protocol is retried. At the end of reading, the reader sends an additional packet.
If the sensor check is activated (parameter 1: readmode), the assignment of the external input is checked before the initiation of a read process by the host. The reading process is only started if the sensor is occupied, otherwise the error message ‚no tag (4)' is sent.

7.4.4.2 R – Automatic Read

By assigning the external input, an automatic read operation can be triggered.
The command „R“ sends the read data to the host. The host then has to confirm the message.
Depending on the setting of the reader (parameter 1: readmode), the reader reads the following pages:

Read Mode:

0	→	Reading the page defined in parameter 2
1	→	sequential reading of a transponder to the end character (‚E‘ - end character or ‚F‘ empty) in ID bit 0 … 3
2	→	Reading the entire transponder (all pages)

LF Reading Device → Host			
CMD	**Reader-ID**	**Page**	**Data**
R	**1 Byte**	**2 Bytes**	**16 Bytes**

Host → LF Reading Device	
CMD	**Reader-ID**
r	**1 Byte**

When reading several pages (par. 1: readmode „tag“ or „everything“) the command is repeated for each read page. The last package contains the command ‚R‘ and the reader ID.

The host expects a confirmation of the read data. If there is no confirmation from the host, the command is repeated. (Par.5: ‚RS232 delay time‘, par.6: ‚RS232 maxrepeat‘).

If a reading is not possible, the reader automatically repeats the reading with the set parameters. (Par.3: ‚r / w delay time‘, par.4 ‚r / w maxrepeat‘).
If no reading is possible, the reader sends the error message ‚no tag (4)‘ to the host.

The delay time for the presence sensor can be set (parameter 0: ‚sensor delay‘).
An automatic reading is only possible if all messages to be confirmed have been confirmed by the previous reading or the waiting time (par.6: ‚RS232 repeattime‘) has elapsed after the last transmission.

7.4.4.3 K – Reading in Polling Mode

If the reader is in polling mode, cyclical readings are performed by the device. The reading frequency in polling mode is determined by the polling frequency (parameter 39: Polling frequency). The data to be read and the behaviour in polling mode is determined by further polling parameters (parameters 40 to 43). Polling mode is activated or deactivated via the polling frequency (parameter 39: polling frequency) and the polling mode (parameter 40: polling mode). The read transponder data is automatically sent to the host with the command "K".

LF Reading Device → Host			
CMD	**Reader-ID**	**Page**	**Data**
K	**1 Byte**	**2 Bytes**	**16 Bytes**

Host → LF Reading Device	
CMD	**Reader-ID**
k	**1 Byte**

The setting of the polling mode (parameter 40: Polling Mode) determines whether a confirmation is expected from the host or not. If there is no confirmation expected from the host, the command is repeated. (Parameter 5: 'RS232 delay time'; Parameter 6: 'RS232 maxrepeat').

7.4.4.4 W – Write Data

The command W starts writing a defined data area of a transponder.
If there is no transponder in the write range of the antenna, the reader sends an error message (error 4 - no transponder).

Host → LF Reading Device			
CMD	**Reader-ID**	**Page**	**Data**
W	**1 Byte**	**2 Bytes**	**16 Bytes**

LF Reading Device → Host	
CMD	**Reader-ID**
w	**1 Byte**

If the describing of the tag fails, the reader repeats the writing operation several times before sending an error message. The number of repetitions is defined in parameter 4 (‚r / w maxrepeat'). If writing is still not possible, the reader sends the error message ‚no tag (4)' to the host after the repetitions have been carried out.

If the sensor check is activated (parameter 1: readmode), the assignment of the external input is checked before the host starts the writing process. The writing process is only started if the sensor is occupied, otherwise the error message 'no tag (4)' is sent.

7.4.4.5 G – Query Parameter

With the command „G“ the values of all public parameters of the device can be queried.

Host → LF Reading Device	
CMD	**Reader-ID**
G	**1 Byte**

LF Reading Device → Host			
CMD	**Reader-ID**	**Parameter No.**	**Parameter Value**
g	**1 Byte**	**1 Byte**	**2 Bytes**

The reader sends an individual protocol packet for each available public parameter. After the last parameter, the reader sends a last packet including the command ‚g‘ and the reader ID.

The values returned for the data item parameter value in the response are decimal values (00-99). The values for the data item Parameter No. are hexadecimal values (0-F).

7.4.4.6 F – Query Parameter

The command „F“ can be used to query the value of a public parameter of the device.

Host → LF Reading Device		
CMD	**Reader-ID**	**Parameter No.**
F	**1 Byte**	**2 Bytes**

LF Reading Device → Host			
CMD	**Reader-ID**	**Parameter No.**	**Parameter Value**

f	**1 Byte**	**2 Bytes**	**2 Bytes**

The reader sends an individual protocol packet for the requested public parameter.

The values returned in the response for the data elements parameter number and parameter value are each hexadecimal values (00-FF).

In ASC-W1 mode, the following format results for the command F:

Host → LF Reading Device		
CMD	**Reader-ID**	**Parameter No.**
F	**1 Byte**	**1 Byte**

LF Reading Device → Host			
CMD	**Reader-ID**	**Parameter No.**	**Parameter Value**
f	**1 Byte**	**1 Byte**	**2 Bytes**

The reader sends an individual protocol packet for the requested public parameter.

The values returned in the response for the data elements parameter number and parameter value are each hexadecimal values (00-FF).

7.4.4.7 P – Set Parameters

The command „P“ can be used to change the value of individual parameters.
After a parameter has been successfully changed, the reader sends a confirmation message.

Host → LF Reading Device			
CMD	**Reader-ID**	**Parameter No.**	**Parameter Value**
P	**1 Byte**	**2 Bytes**	**2 Bytes**

LF Reading Device → Host	
CMD	**Reader-ID**
p	**1 Byte**

The data elements parameter number and parameter value used in the query are each hexadecimal values (00-FF).

In ASC-W1 mode, the following format is also supported for the P command:

Host → LF Reading Device			
CMD	**Reader-ID**	**Parameter No.**	**Parameter Value**
P	**1 Byte**	**1 Byte**	**2 Bytes**

LF Reading Device → Host	
CMD	**Reader-ID**
p	**1 Byte**

The data elements parameter number and parameter value used in the query are hexadecimal values (0-F or 00-FF).

7.4.4.8 N – Reset

The command “N” performs a reset of the hardware/software of the reader.
After performing the reset operation, the device sends a confirmation message.

Host → LF Reading Device	
CMD	**Reader-ID**
N	**1 Byte**

LF Reading Device → Host	
CMD	**Reader-ID**
n	**1 Byte**

After a hardware reset, a confirmation („n0“) is sent to the host.

7.4.4.9 e – Error Message

This message is only available in standard ASC-I1 mode!
If an error occurs the device will send an error message with the respective error code to the host.

LF Reading Device → Host		
CMD	**Reader-ID**	**Error ID**
e	**1 Byte**	**1 Byte**

Further information about error codes and the corresponding corrective measures can be found in the chapter Error Codes.

7.4.4.10 E – Error Message

This message is only available in ASC-W1 mode!
If an error occurs, the device sends an error message with the corresponding error code to the host.

The host expects a confirmation of the read data. If no confirmation is received from the host, the command is repeated. (Par. 5: 'RS232 delay time'; Par. 6: 'RS232 maxrepeat').

LF Reading Device → Host		
CMD	**Reader-ID**	**Error ID**
E	**1 Byte**	**1 Byte**

Further information about error codes and the corresponding corrective measures can be found in the chapter Error Codes.

Host → LF Reading Device	
CMD	**Reader-ID**
e	**1 Byte**

H – Heartbeat

The command „H“ sends a heartbeat request to the reader.
The reader responds with its serial number and a response code.

Host → LF Reading Code	
CMD	**Reader-ID**
H	**1 Byte**

LF Reading Device → Host			
CMD	**Reader-ID**	**Serial Number**	**Response-Code**
h	**1 Byte**	**4 Bytes**	**4 Bytes**

Only with the heartbeat command the address "F" (gateway address!) can also be used for the data element reader ID. The response code is part of the protocol, but is not used for this device. The response code is always'0000'.

V – Query Software Version

The command “V” is used to query the software version of the LF reading device.

Host → LF Reading Device	
CMD	**Reader-ID**
V	**1 Byte**

LF Reading Device → Host		
CMD	**Reader-ID**	**Software Version**
v	**1 Byte**	**16 Bytes**

The 8 characters of the software version are represented by 16 ASCII characters. Each character is described in hex format and transmitted by 2 ASCII characters.

7.4.4.11 L – Lock Data Area

A single page of a multipage transponder can be disabled. The page can still be read, but not rewritten. The process cannot be reversed.

Host → LF Reading Device		
CMD	**Reader-ID**	**Page**
L	**1 Byte**	**2 Bytes**

LF Reading Device → Host	
CMD	**Reader-ID**
I	**1 Byte**

If the lock of the transponder page fails, the reader repeats the procedure several times before an error message is sent. The number of repetitions is defined in parameter 4 (‚r / w maxrepeat'). If writing is still not possible, the reader sends the error message ‚no tag (4)' to the host after the repetitions have been carried out.
If the page was already locked, a positive confirmation will be sent (same as the first block).
If the sensor check is activated (parameter 1 readmode), the assignment of the external input is checked
before the blocking process is started by the host. The locking process is only started when the sensor is occupied, otherwise the error message ‚no tag (4)' is sent.

!	Locking a page cannot be reversed. This page is permanently write protected.

7.4.4.12 A – Activation Button

This message is only available in ASC-W1 mode!
Sensor event messages can be activated in the "Watch Port" parameter (par. 07).
If this is activated, the reader reports every drop of the read button.
The message must be confirmed by the host.

Host → LF Reading Device	
CMD	**Reader-ID**
A	**1 Byte**

LF Reading Device → Host	
CMD	**Reader-ID**
a	**1 Byte**

The button event is detected after an adjustable delay time (par. 0 Sensor Delay).
During the delay time, the sensor signal must be stable.

!	This message is only available in ASC-W1 mode! All buttons can be deactivated in parameter 1 "Read Mode". The buttons can also be deactivated individually via parameter 0x1A.

7.4.4.13 B – Button Activated

This message is only available in ASC-W1 mode!
Sensor event messages can be activated in the "Watch Port" parameter (par. 07).
If this is activated, the reader reports every time the read button is pressed.
The sensor message must be confirmed by the host.

Host → LF Reading Device	
CMD	**Reader-ID**
B	**1 Byte**

LF Reading Device → Host	
CMD	**Reader-ID**
b	**1 Byte**

	This message is only available in ASC-W1 mode! All buttons can be deactivated in parameter 1 "Read Mode". The buttons can also be deactivated individually via parameter 0x1A.

7.4.4.14 B – Button Status Change

This message is only available in standard ASC-I1 mode!
Sensor event messages can be activated in the "Watch Port" parameter (par. 07).
If this is activated, the reader reports every change of a button to the host.
Depending on the setting of the reader, the host must send a confirmation.

Host → LF Reading Device			
CMD	**Reader-ID**	**Button No.**	**Button State**
B	**1 Byte**	**1 Byte**	**1 Byte**

LF Reading Device → Host		
CMD	**Reader-ID**	**Button No.**
b	**1 Byte**	**1 Byte**

!	All buttons can be deactivated in parameter 1 "Read Mode". The buttons can also be deactivated individually via parameter 0x1A.

7.4.4.15 O – Set Output

The command O can be used to set the state of the outputs.
The status of an output (Signal buzzer or LED) is changed in a message. In the current version, the value of the data element Head-ID always has the value „1“ for the outputs.

Host → LF Reading Device					
CMD	**Reader-ID**	**Head-ID**	**Output Index**	**Output State**	**Timeout ***
O	**1 Byte**	**1 Byte**	**1 Byte**	**1 Byte**	**2 Bytes**

LF Reading Device → Host		
CMD	**Reader-ID**	**Head-ID**
o	**1 Byte**	**1 Byte**

* The specification of a time duration (timeout) is optional.

7.4.4.16 Q – Querying the Status of the Outputs

The command “Q” can be used to query the current status of all outputs. The status of the outputs is queried in a message. In the current version, the value of the data element Head-ID always has the value „1“ for the outputs.

Host → LF Reading Device		
CMD	**Reader-ID**	**Head-ID**
Q	**1 Byte**	**1 Byte**

LF Reading Device → Host					
CMD	**Reader-ID**	**Head-ID**	**Output State Read Button**	**Output State Set Button**	**Output-State Menu Button**
q	**1 Byte**	**1 Byte**	**1 Byte**	**1 Byte**	**1 Byte**

7.4.5 Parameters

	When using the “G” command, only some of the public parameters are retrieved!

The data element "Parameter No." can have the following values. The following list contains the public parameters of the ASC-I1 protocol:

No. (dec)	No. (hex)	“G“ Command Support	Parameter Name	Description
0	**0x00**	**Yes**	Sensor Delay	Delay time for the presence sensor. 01 .. 99 (0.1 seconds) Standard: 10 ... (1 second)
1	**0x01**	**Yes**	Read Mode	Read mode for reading automatically started by external input. 00 - read only one page 01 - read to end character or empty character2) 02 - read all pages 10 - read only one page with previous sensor Check1) 11 - read to end character/empty character with previous sensor check 1) 2) 12 - read all pages with previous sensor check1) 99 - Deactivate sensor 1) If sensor check is activated (first byte = 1), the assignment of the read button is checked before initiating a read/write operation. If this is not the case, the "NOTAG" error message is sent. 2) 'E' or 'F' in ID Bit 0...3 of the read ID Standard: 00 ... (read only one page)
2	**0x02**	**Yes**	Read Page	Page for readmode "00". 00 - First page of each transponder 01 .. 17 - Page of a multi-page transponder Standard: 00 ... (read first page)
3	**0x03**	**Yes**	r/w Repeat Time	Time between two read/write attempts. 01 .. 99 (0,1 s) Standard: 05 ... (0,5 seconds)
4	**0x04**	**Yes**	r/w Max Repeat	Max. number of read/write attempts. 01 .. 99 Standard: 05
5	**0x05**	**Yes**	RS232 Repeat Time	If no confirmation message has been received from the host, the device waits for this time before sending a message again. The number of repetitions is defined in parameter 6 ('RS232 max repeat').

				01 .. 99 (0,1 s) Standard: 45 ... (4,5 seconds)

6	**0x06**	**Yes**	RS232 Max Repeat	The reader repeats the message according to the value of this parameter if the host does not send the expected confirmation message. Then an error message is sent. 00 - Endless 01 .. 99 - Number of attempts Standard: 3
7	**0x07**	**Yes**	Watch Port	Bit0 (0x01): Activates/ deactivates the event message to the host that button has been enabled. Default: 0 (deactivated) Bit1 (0x02): Activates/ deactivates the event message to the host that the button has been pressed. Default: 0 (deactivated) Bit2 (0x04): Activates/ deactivates automatic reading triggered by read button Default: 1 (activated) Bit3 (0x08): A confirmation message is expected on sensor messages A and B. Default: 1 (confirmation expected) Bit4 (0x10): A confirmation message is expected on the message of automatic read R. Default: 1 (confirmation expected) Standard: 0x1C
9	**0x09**	**No**	Transponder Charging Time	Transponder charging time in milliseconds. Range: 00-FF Standard: 32(50ms)
14	**0x0E**	**No**	Sensor Polarity	Polarity of all sensors 00 - Identification 01 - Interruption Standard: 00
15	**0x0F**	**Yes**	Reader Address	ReaderID (0 ... E) Standard: 0
18	**0x12**	**No**	Bounce Time Button Off	This time defines the bounce time for pressing the button. 00 .. 255 (0,1 s) Standard: 0x01 (100ms)
19	**0x13**	**No**	Bounce Time Button On	This time defines the bounce time for releasing the button. 00 .. 255 (0,1 s) Standard: 0x01 (100ms)
20	**0x14**	**No**	Button Activity	Bit0 (0x01): Read button is activated/ deactivated Standard: 1 (activated) Bit1 (0x02): Set button is activated/ deactivated Standard: 1 (activated)

				Bit2 (0x04): Menu button is activated/ deactivated Standard: 1 (activated) Standard parameter value: 0x07 (all 3 buttons active)

36	**0x24**	**No**	LED Setup	Defines the behaviour of the signal buzzer and the status LED during automatic reading and polling Bit0 (0x01): If the reading is successful in polling mode, the buzzer is briefly switched on if the tag is newly recognized. Standard: 1 (activated) Bit1 (0x02): The status LED is briefly switched on after successful reading in polling mode Standard: 1 (activated) Bit2 (0x04): If reading is successful in polling mode, the buzzer is briefly switched on if the transponder is already reported. Standard: 1 (activated) Bit4 (0x10): The buzzer is briefly switched on after successful automatic reading Standard: 1 (activated) Bit5 (0x20): The status LED is briefly switched on after successful automatic reading. Standard: 1 (activated) Standard Parameter Valuet: 0x3F
38	**0x26**	**No**	Keyboard Test	The keyboard is subjected to a short self-test during the reset process. The log type is also displayed. 00 - Keyboard test deactivated 01 - Keyboard test activated Standard: 0x01
39	**0x27**	**No**	Polling Frequency	Time between 2 readings when the device is in polling mode. 0 Polling deactivated 1..255 Poll time in 100ms cycle
40	**0x28**	**No**	Polling Mode	Bit0 .. Bit3 (0x00 to 0x0F): The lower 4 nibbles of the poll mode determine whether a K-message without data is to be sent with each read attempt if no transponder was read. 00 - Send K message 01 - no K message 02 - Send K-message only once Standard: 1 (No K message without data) Bit4 (0x10): Activates or deactivates polling Standard: 1 (Polling activated) Bit6 (0x40): If bit6 is set, a K message is only output if the tag was read for the first time. If bit 6 is deleted, a K message is sent with each successful reading Standard: 1 (Send K message once) Bit7 (0x80): Activates or deactivates the acknowledge of the K message.

				Standard: 1 (Acknowledge expected) Standard Parameter Value: 0xD1
41	**0x29**	**No**	Polling Page	Defines the page to be read during polling. 00 - read all transponder types (page 1) 01 ... 17 - the specified page of a multipage transponder Standard: 0x00
42	**0x2A**	**No**	Polling Verify	Defines the number of read cycles how often a transponder must be read until it is considered recognized. Evaluation of the parameter has not yet been converted. 01 .. 255 Standard: 0x01
43	**0x2B**	**No**	Polling Fallout	Defines the number of read cycles that a transponder that has already been read must not be read until it is considered to have been removed. 01 .. 255 Standard: 0x03
64	**0x40**	**No**	Customer Mode	This parameter determines the mode in which the reader is operated. Default parameters are also created when the customer mode is set. 0x00 - Protocol standard ASC-I1 0x03 - Protocol ASC-W1 0x10 - Keyboard emulation with customer 0 settings 0x11 - Keyboard emulation with customer 1 settings 0x12 - Keyboard emulation with customer 2 settings Standard: „00“
70	**0x46**	**No**	Software Version	This read-only parameter can only be read out and supplies the complete software version as an ASCII string. Standard: „SW_LFSH_1.x_yz“ x and yz are variable
71	**0x47**	**No**	Serial Number	This read-only parameter can only be read out and returns the provided 12-digit serial number as an ASCII string. Standard: „abcdHAGvwxyz“ abcd and vwxyz are variable
72	**0x48**	**No**	Hardware Version	This read-only parameter can only be read out and returns the hardware version as an ASCII string. Standard: „LFS_HLG_RevA“ "A" defines the hardware revision
96	**0x60**	**No**	Default Parameter	Depending on the set customer mode (par. 0x40), the corresponding default values are created via this parameter. The query of the parameter is provided by the software fine version. 0x00 - Create default values Standard: „00“

For the ASC-W1 mode, the following parameters either have a different meaning or are additional parameters:

No. (dec)	No. (hex)	Parameter Name	Description
8	**0x8**	Parameter8	Parameter has no further function. Range: 00-01 Default: 1
9	**0x9**	Transponder Charging Time	Analog parameter 29 standard ASCI-I1
10	**0xA**	Polling Verify	Analog parameter 42 standard ASCI-I1
11	**0xB**	Polling Fallout	Analog parameter 43 standard ASCI-I1
12	**0xC**	Polling Readfactor	Analog parameter 39 standard ASCI-I1
13	**0xD**	Parameter13	Parameter has no further function. Range: 00-FF Default: 0

7.4.6 Message Examples

ASCII	HEX	Description
‚S'	**53**	Start character
‚0‘	**30**	High byte message length
‚2‘	**32**	Lowbyte message length
‚H‘	**48**	Message first character: value
‚0‘	**30**	Message second character: destination address
CR	**0D**	End character
‚2‘	**32**	Highbyte – Checksum XOR
‚4‘	**34**	Lowbyte – Checksum XOR
‚3‘	**33**	Highbyte – Checksum Addition
‚A‘	**41**	Lowbyte – Checksum Addition

Calculation of the XOR checksum:
53 XOR 30 XOR 32 XOR 48 XOR 30 XOR 0D = 24 → '2' '4'

Calculation of the addition checksum:
53 + 30 + 32 + 48 + 30 + 0D = 13A → '3' 'A'
(LSB is used)

The following examples are based on the standard ASC-I1 protocol:

V – Query Software Version
>> V0
<< v04C46534849312E30

Command	V		
Reader-ID	1		
Software Version	'4C46534849312E30'	→	ASCII "LFSHI1.0"

X - Read data (Reading from page 1 of the multipage transponder)
>> X001
<< x0013132333435363738

Command	X		
Reader-ID	1		
Page	01		
Data	'4142434445464748'	→	ASCII "ABCDEFGH"

R – Automatic Reading
<< R1013132333435363738
>> r1

Command	R		
Reader-ID	1		
Page	01		
Data	'3132333435363738'	→	ASCII "12345678"

W – Write Data (Write Page 17 of the multipage transponder)
>> W0173137333435363738
<< w0

Command	W		
Reader-ID	0		
Page	17 (decimal!!)		
Data	'3137333435363738'	→	ASCII "12345678"

P – Set Parameter 0x27
<< P0270A
>> p0

Command	P
Reader-ID	0
Parameter	27 (2-digit hexadecimal)
Parameter Value	0A (2-digit hexadecimal)

F – Query Parameter 0x27
<< F027
>> f0270A

Command	F
Reader-ID	0
Parameter	27 (2-digit hexadecimal)

K – Polling Reading

<< K0013132333435363738
>> k0
Command K
Reader-ID 0
Page 01
Data '3132333435363738' → ASCII "12345678“

7.4.7 Error Codes

ID	Name	Description	Possible Cause	Remedial Action
0	none	No error		none
1	auto fail	Automatic reading is not possible	Reader still processes previous read or write requests	Wait until previous request is completed
2	ext fail	Action started from host cannot be executed. (e.g. reading or writing)	Reader still processes previous read or write requests	Wait until previous request is completed
3	write fail	Data transmission to the transponder is not possible.	Reader still processes previous read or write requests	Wait until previous request is completed
4	no tag	No transponder or antenna installed	Antenna is not connected correctly	Check antenna connection
			Antenna is not tuned	Perform antenna tuning
			No readable transponder within the reading range	Move the transponder into the antenna area. Check the type and function of the transponder
			Antenna / transponders are misaligned	Check alignment of antenna and transponder
			Antenna is damaged or too close to metal	Replace antenna, check tuning
			Interference field at transmission frequency	Check the antenna environment for possible sources of interference. (monitors, servo motors,...)
5	invalid	unknown parameter or unknown data	Data sent with a command is wrong	Check command syntax and data content
			Transmission parameters are not implemented or out of range	Check parameter syntax and value
6	unknown	unknown fault		none
7	Unconfig	The device is not yet configured	Incorrect reader address is transmitted	Check message syntax, check parameter F "Reader address
8	check	Parity and/or checksum error	Wrong baud rate is set	Check the baud rate of the serial interface (Com-Port)
			Transmission error with serial communication	Check the RS232 cable and connector, check sources of interference with RS232

9	void ackn	No valid acknowledgement (unexpected acknowledge)	Serial communication is interrupted	Check the RS232 cable and connector, check sources of interference with RS232
			Ethernet communication is interrupted	Check Ethernet cable and connector, check IP address settings
			Double or false acknowledgement	Check communication settings on the host
A	Locked	Locked side cannot be written	Page to be written is permanently write-protected	Check page number to be written, replace tag with new one
B	No ackn	Maximum number of trans-missions of the message to be acknowledged has occurred (RS232 maxrepeat), the terminal did not confirm within the specified time frame	Host system does not acknowledge the message	Check availability of host system, check RS232 cables and connectors, check Ethernet cables and connectors, check IP address settings
C	Bad type	Wrong transponder type	An incorrect transponder type is used (Read only or Read/Write instead of Multipage)	Check and replace transponder type
:	Msg len	Message too long or too short or message is not received completely	Message too long or too short or message is not received completely	Message length is longer than displayed on the length byte Check message length and length byte
			Messages are displayed longer than in the length byte	Check message length, check length byte
			Not all characters are trans-mitted (Intercharacter timeout)	Check message syntax, check RS232 or Ethernet connection
;	Invalid	Invalid command	Unknown command was sent	Check message syntax

8. Service and Troubleshooting

8.1 General Information

Follow the basic safety instructions in the chapter safety instructions.

- The maintenance of the reading device and its components may only be performed by the manufacturer
- Observe the instructions in this section when errors occur. Do not perform any further troubleshooting measures in addition to the described measures.
- In case of doubt concerning errors and handling them, contact the manufacturer.

8.2 Troubleshooting Personnel

Troubleshooting must only be performed by specially trained personnel.

In case of doubts concerning the necessary qualifications, contact the manufacturer.

The handling of device errors by untrained personnel as well as the incorrect handling of the device can result in personal injuries as well as damages to the reading device and/or connected devices.

8.3 Safety Instructions

All components of the antenna oscillating circuit carry high voltage.

Only use spare parts specified by the manufacturer.

Unauthorised substitution of parts can result in fire, electric shock or other hazards.

Electrostatic charges damage electronic components within the device.

ESD protective measures must be applied before opening the device.

Carefully remove the housing covers to prevent damage. Do not operate the device when the housing is open.

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

Only use fuses specified by the manufacturer.

8.4 Software Releases

Release Date	Version	Description
June 2018	LFSHI1.0	Initial release

8.5 Customer Service

HERMOS AG
Track & Trace RFID Division
Gartenstraße 19
D-95490 Mistelgau
Deutschland

Phone +49 (0) 9279 – 991 - 0
Fax +49 (0) 9279 – 991 - 100
E-Mail rfid@hermos.com

9. Disassembly and Storage

9.1 Disassembly

To disassemble, remove the cable from the USB port.

9.2 Storage

Store the reading device and its components in a clean and dry environment.
Make sure that the power supply has been removed.
Observe the required storage conditions specified in the technical data.

10. Transport and Disposal

10.1 Transport

Use a solid cardboard box for the transport.
Use enough cushioning material to protect the device on all sides.

10.2 Disposal

The device and its components are made of various materials.
Disconnect the electronic components from the housing and attachments and dispose of them separately.

	➲ Do not dispose of the unit in normal domestic waste. ➲ Dispose of the materials separately and according to the legal regulations of your country. ➲ Housing and attachments as plastic waste ➲ Electronic components, antennas and cables as electronic waste