HERMOS

Englisch

Customer manual

LFM 4x Reader Rev1.4

0. Table of contents

Feh

1. Introduction

These operating instructions correspond with the "*Radio and Telecommunications Terminal.Equipment Act and Directive 2014/53/EU (RED)* "

CE

These operating instructions are intended for the operator who must pass these on to the personnel responsible for installation, connection, use, and repairs of the machine.

The operator must ensure that the information contained in these operating instructions and in the accompanying documents has been read and understood.
The operating instructions must be kept at a known place that is easy to reach, and they must be consulted if there is the slightest doubt.

The manufacturer assumes no responsibility for damage to persons, animals, or objects or to the unit itself arising from the improper use or the disregard or insufficient consideration to the safety criteria contained in these operating instructions or based on modifications of the unit or the use of unsuitable replacement parts.

As of: July - 2018

1.1 Using the device

The device is exclusively used to read and write passive LF transponders.
Any other use of the machine 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 was developed for the use in an industrial environment as a built-in device in other systems. It was not developed as a stand-alone or mobile device in a non-industrial environment, such as dome- stic, 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 unit, the user and third parties, include:

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

WARNING

Danger of injury due to unauthorised modifications

There are risks from unauthorised modifications on the device.
Only original spare parts from the manufacturer must be used. No modification, attachment or conversion may be performed on the device without the permission of HERMOS AG.

WARNING

Danger of injury and interruption of operation due to improper use

There are risks through the improper use of the device.

The device must only be used according to its intended use.

2. Version history

Version	Date	Author	Amendments
1.0	12.05.2017	HERMOS AG, MZ	Initial version of customer documentation
1.1	10.07.2017	HERMOS AG, RK	Document revised and added parameters
1.2	19.01.2018	HERMOS AG, RK	ASC-W1 mode documented
1.3	09.07.2018	HERMOS AG, RK	Factoryparametersets 4 and 5 documented
1.4	26.02.2019	HERMOS AG, RK	Chapter 9.3 and Reader-ID revised Chapter 9.4 Factoryparametersets revised Chapter 10.5 und 11.4 Changes of parameters Chapter 12.6 added softwarerevision V1.5 Chapter 8.3 revised

3. Used abbreviations and designations

RFID	Radio Frequency Identification
LF	Low Frequency 134,2 kHz
SEMI	Semiconductor Equipment and Materials
SECS	SEMI Equipment Communications Standard
HSMS	High-Speed SECS Message Service
PoE	Power over Ethernet
DHCP	Dynamic Host Configuration Protocol

4. General instructions

All previous versions of this document lose their validity with the issue of this version.

We compiled the information in this document according to the best of our ability. HERMOS AG does not guarantee the accuracy and completeness of the information provided in this document and is also not liable for consequential damages based on faulty or incomplete information.

4.1 Objective of the product manual

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

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

- Followed, read and understood by all persons working with the unit (especially knowledge of the safety instructions)
- Easily available at all times to all persons
- Consulted if even the slightest doubt arises (safety)

Objectives:

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

4.2 Warranty and liability

The „General Terms and Conditions of Sale and Delivery“ of HERMOS AG shall apply.

The warranty period is 24 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 unit that occur during the warranty period, and were clearly caused by material or manufacturing defects.

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

- Improper use of the unit
- Disregarding the information in the operating instructions
- Unauthorised structural modifications of the unit
- Insufficient maintenance and repairs
- 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 special safety instructions included in the chapters.

The unit was built according to state-of-the-art technology and recognised safety regulations. In order to prevent danger to life and limb of the user, third parties, or the unit, only use the unit 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 pro- vided in the operating instructions are the responsibility of the company operating the unit 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 putting the unit into operation for the first time. 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 combi- nation of the signal word and symbol.

DANGER

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		

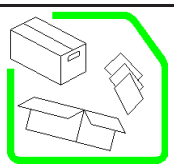
5.2.2 Warning signs

	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		Prohibited

5.2.4 Other signs

	Verpackungsmaterial vorschriftsgemäß entsorgen		Recycling

5.3 Obligations

5.3.1 Operator's obligations

A safe condition and use of the unit is a requirement for a safe operation of the unit. For that reason, the operator has the obligation to ensure that the following points are adhered to:

- ⇨ The unit may only be operated by trained and authorised personnel.
- ⇨ Prohibit unsafe or dangerous working methods! If necessary, check the conduct and actions of its personnel!
- ⇨ Have personnel who must be trained, instructed or within the scope of general training work only on the unit 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 occurring and identifiable safety deficiencies to their superior!

5.3.2 Responsibilities of operating personnel

The operating personnel are 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 qua- lified personnel.
Only trained personnel may operate the unit.
New operating personnel must be instructed by the existing operating personnel. The operator must precisely regulate the personnel's areas of responsibility, com- petence, 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 unit. All persons who install or maintain the unit must be trained in ESD protection.

ESD protective measures must be applied when opening the unit.

⇨ Disconnect the power supply prior to removing or adding components!

⇨ Observe the basic principles of ESD protection

⇨ Take the appropriate ESD precautionary measures

5.4 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 re- duce residual risks.

DANGER

Danger caused by electrical current
Electrical residual energy remains in lines, equipment and devices after shutting down 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 develops when transmitting and receiving data. Arrange the antenna in such a position that it is not in the vicinity or make

contact with the human body while transmitting.

The device satisfies the standard EN50364:2010 (Human Exposure).

5.5 Supplemental 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 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 with the installation, use, and error handling of the device.
- ⇨ Follow all warnings. Follow all warnings on and in the device and in the documentation.
- ⇨ Install the unit only in accordance with the manufacturer‘s instructions.
- ⇨ Use only the accessories and cables from the manufacturer.
- ⇨ Troubleshooting that is not described in the chapter a service and troubleshooting may only be performed by the manufacturer.
- ⇨ When connecting cable connections, only pull on the plug and not on the cable.
- ⇨ 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 unit.

- ⇨ 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

5.5.1 Regulations and certifications

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

6. Functional description

6.1 General information

LF reading devices are radio frequency identification systems that use radio transmission to read or write data of LF transponders (134,2 kHz), which operate as tamper-proof electronic tags. The LF reading devices communicate with common transponders (134,2kHz) according to ISO 18000-2 and ISO 11785 that are available on the market.
The data is transmitted via the existing interface with the preset transmission parameters. If several interfaces are available and connected to the host, the transmission is always carried out on the most recently used interface. The data is embedded in a defined communication protocol and exchanged between the reader and host.

6.2 Basic functions - operating modes

During normal operation, the LF reading device supports various basic functions:

- Heartbeat function, software version query
- Scanning of transponders in the antenna area (UID)
- Reading data
- Writing data
- Locking data
- Setting and reading out parameters
- Setting and querying inputs and outputs

The LF devices can be set in 3 other operating modes by setting the parameters: Polling operation (optional), sensor-triggered automatic reading and test mode.

6.2.1 Normal operation

During normal operation, the LF reading device is immediately ready for operation after a reset. It does not perform any automatic actions in this mode (standby). During normal operation, actions are triggered by protocol commands from the host.
A scanning procedure or reading in the data area is initiated by a command of the host system using the communication protocol.¬
In addition to the actions triggered by the host, a corresponding message can be automatically sent to the host and an automatic reading operation can be started by activating or releasing a sensor. When the reading operation is successful, the read data is immediately transmitted to the host. If several antenna ports are occupied simultaneously, the reading operations are processed sequentially.
Writing actions (data saved to a transponder) are generally only possible via commands from the host.

6.2.2 Polling mode

LF reading devices can be set into a continuous reading state, which is referred to as polling mode. The device then performs reading operations at regular intervals and outputs the corresponding data of the read LF transponder.
The reading device also continues carrying out protocol messages in polling mode. This may, however, result in delays in the poll rhythm. The polling functionality is optional customer-specific available!

6.2.4 Test module

The HERMOS LF reading devices support a test mode that facilitates setting up the antenna and checking the reading ranges during commissioning. HF reading devices feature several DIP switches on the housing. These switches can be used to activate test mode.
The functions in test mode are described on a sticker located on the reading device housing. The evaluation of the DIP switch depends on parameters

If the device is in test mode, the red status LED flashes at about 1 Hz. The yellow status LED then indicates the status of the test mode. If the read or write process was unsuccessful, the yellow LED flashes at the read or write frequency. If the read or write process is successful, the yellow LED remains permanently lit.

With the existing I / O module, HERMOS LF readers with ASC-W1 protocol also show the successful or incorrect reading of the transponder at the respective first output port. See also behavior of the output ports in test mode.

see also chapter **„DIP-switch“**

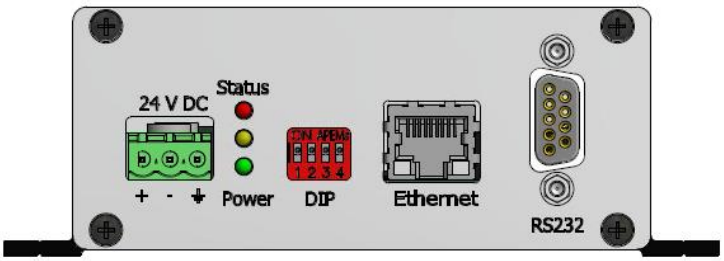
6.3 Illustration

6.3.1 Top view

1. Black and white anodised aluminium housing
2. Reading device type imprint
3. Data Matrix Code
   www.hermos.com

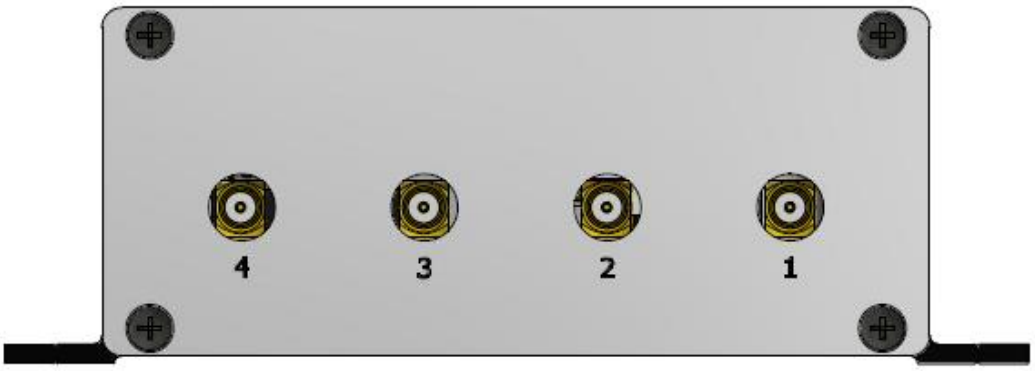
6.3.2 Front view

1. Power supply connection
2. Status- and power LEDs
3. DIP-switch
4. Ethernet interface
5. RS232 interface



Component	Description
Power supply connection	Three-pin socket for the connection of the 24V DC power supply.
Power-LED	The power LED indicates that the operating voltage is present and the rea- ding device is ready for operation.
Status-LEDs	The two status LEDs are used for the reading and writing feedback in test and polling mode. If the device is in test mode, the red status LED flashes at about 1 Hz. The yellow status LED then indicates the status of the test mode. If the read or write process was unsuccessful, the yellow LED flas- hes at the read or write frequency. If the read or write process is successful, the yellow LED remains permanently lit. In normal operation, if an error occurs, the display of this occurs via the red LED: Red LED constantly on: read error (no tag) red LED flashing rapidly: antenna error (tuning, cable break). This display will reset automatically with the next valid reading. After a restart, a short self-test of the LEDs, then display of the protocol: SECS: The red LED goes on briefly ASCII: The yellow LED goes on briefly
DIP-switch	DIP-switch 4 starts an automatic antenna tuning. DIP-switch 3 activates a test mode. DIP-switch 1 and 2 serve the antenna selection.
Ethernet interface	The reading device features an Ethernet interface depending on the de- vice model. The communication with the device can be carried out via the 10/100 BaseT interface.
RS232 interface	Depending on the device model, the reading device features a RS232 in- terface. The communication with the device can be carried out via the serial interface (9-pin Sub D)

6.3.3 Back view



6.4 Technical Specification

Technical data	
Voltage (protected against reverse polarity)	20 – 28 V DC,
Power consumption (passive, reading, pulse-by-pulse)	75mA@24V, 200mA, max.400mA
Fuse type Nano2	375 mA
Operating temperature	-0 to 50 °C
Storage temperature	-20 °C to 70 °C
Permissible humidity at 50°C	25 – 80 %
Transmission frequency	134,2 kHz
Ethernet interface	10/100 BaseT,
Protocol	ASCII, SECS / HSMS
Housing material	Aluminium, black and white anodised
Protection	IP40
Reader dimensions	130 x 124 x 45 mm
Weight	approx. 500 g

6.4.1 Power supply and current input

Description	Min.	Typ	Max.	Unit
Voltage (reverse polarity protected)	20	24	28	V (DC)
Current consumption (Read/Write Pulse manner (50ms)		110 330		mA
Current (passive)		80		mA

6.4.2 Device labels

The device label is located on the reading unit housing.
It contains a CE mark, article/serial number and the MAC address.

1. Designation
2. Article number (variants)
3. Serial number (example)
4. MAC address
5. Manufacturer

LFM Reader 4x
P/N: HRF.R.LFM.4x.Xx.xx.xxx
S/N: 1704HAG00123
P/O: HKxxxxxx
MAC: D8:80:39:xx:xx:xx
HERMOS AG

6.4.3 Device Label FCC ID 2AP5OLFM-4X

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 (mobile and fixed devices)

This device complies with the RF exposure requirements for mobile and fixed devices. However, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

- FCC §15.105 (a):

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.

FCC ID: 2AP5OLFM-4X
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

6.4.4 Test mode sticker

The device label is located on the reading unit housing.
By setting the **DIP-switch** 3 the test mode is activated.
The test mode read or write is set with the DIP switch 4.
The selection oft he antenna port is changed by the DIP switched 1 and 2.

Further functions see section DIP switch.

DIP Switches

DIP /Ant Port:		**1**	**2**	**3**	**4**
1		off	off	on	on
2		off	on	off	on
3	Testmode	on/off			
4	3 off: Start Antenna Tuning 3 on: Off-Read / On-Write				

7. Installation

Follow the basic safety instructions in the chapter Safety instructions.

7.1 Safety instructions

	The unit is exclusively designed for indoor use in an industrial environment. The unit may only be installed indoors with a temperature and humidity level with in 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 regis- ters, stoves or other devices (including amplifiers) that generate heat. Do not install the unit in a flammable environment.
	Never expose the device to extreme temperature fluctuations, since con- densation otherwise develops inside the unit 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.

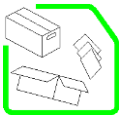
	Make sure that the installation meets the requirements of the FCC (country specific) for human exposure to radio frequencies.

7.2 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.

7.3 Unpacking

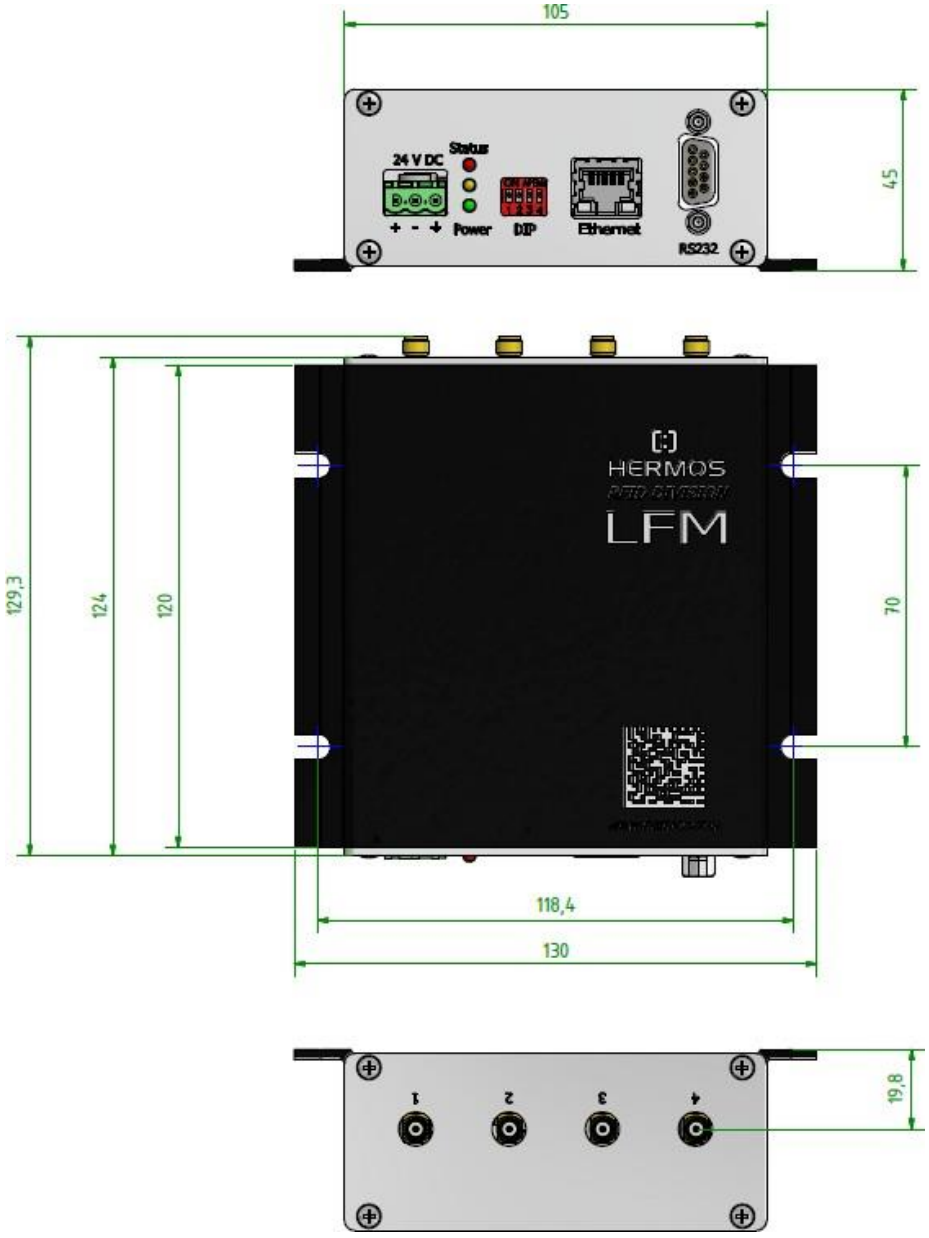
The LF reading device and the accessories can be packed customer-dependent in clean room conditions. In order to maintain this condition, the devices must be unpacked in clean room conditions.

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

7.4 Mounting the device

	The mounting surface must be stable, non-flammable, dry and clean. If necessary, clean it before you install the device. Only use components, cable and mounting materials provided by HERMOS. Only mount the components at the designated locations and make sure that the operating and ambient conditions specified in the technical data are always maintained.

Dimensions



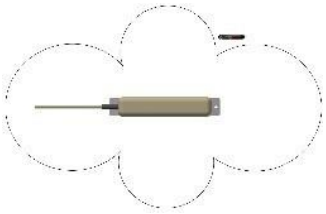
7.5 Installing the antenna

	When installing the antenna, observe the required reading and writing ranges. The reading device can only be used properly if the transponder is located within the reading and writing range of the antenna.

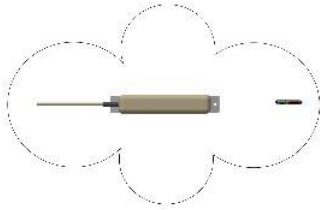
7.5.1 Positioning the antenna

The removal and alignment of the transponder tot he antenna is critical to ensure reliable reading and writing. The following diagram displays the optimum alignment and position of the transponder to the antenna. After positioning, the antenna must be tuned to the ambient conditions.
The tuning function can be started with the DIP switch 4.

Transponder parallel to the antenna axis:

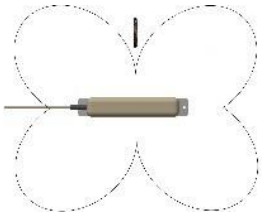


Transponder is outside the antenna range

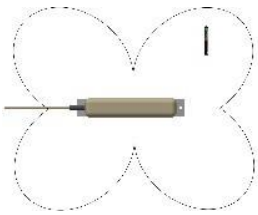


Transponder is within the antenna range

Transponder vertical to the antenna axis:



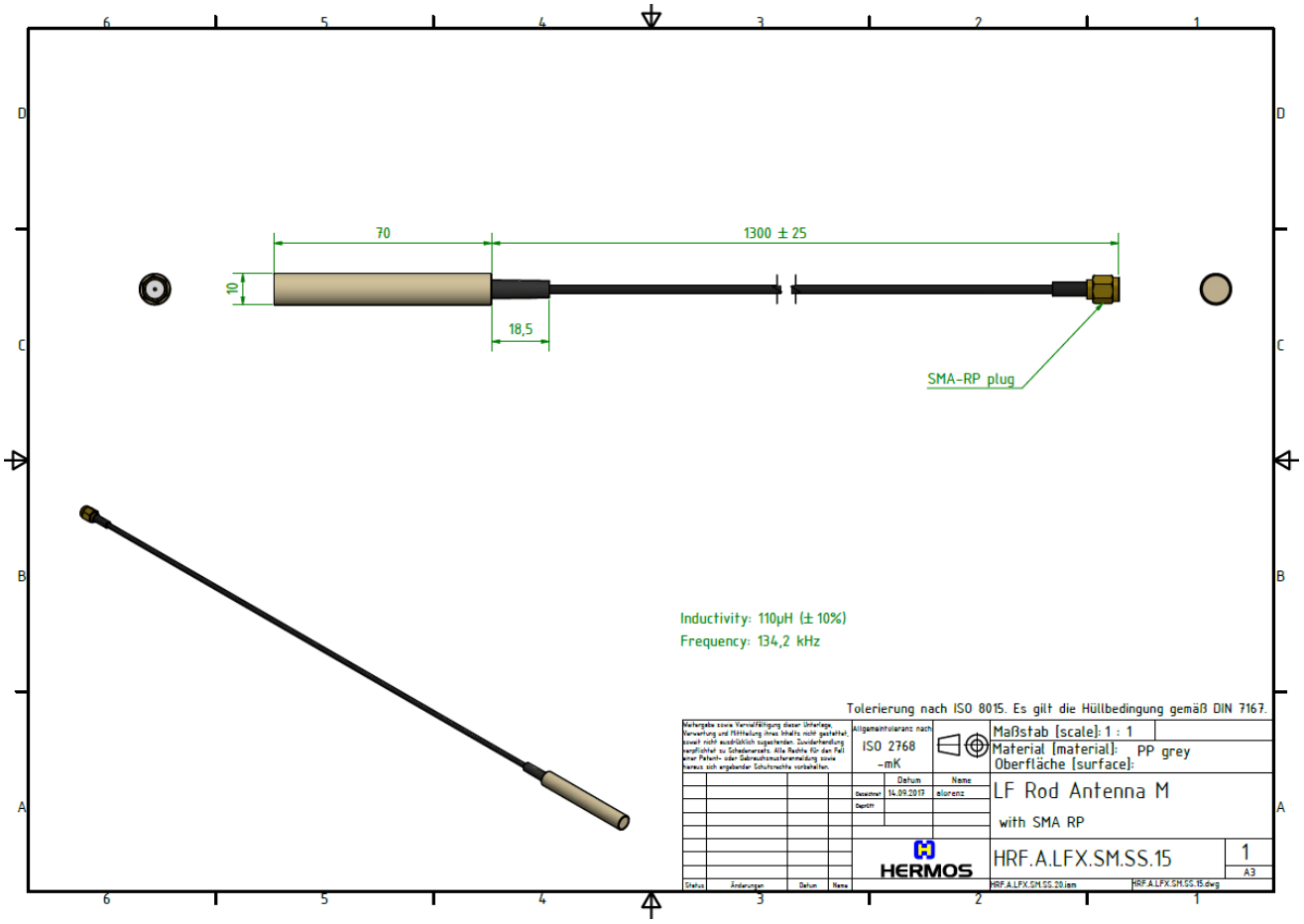
Transponder is outside the antenna range



Transponder is within the antenna range

7.5.2 Rod Antenna M dimensions

Art.Nr. (HRF.A.LF.SM.SS.15)



7.5.3 Connecting the antenna

Connect the antenna at the antenna connection at the rear of the reading unit. Observe the label here.

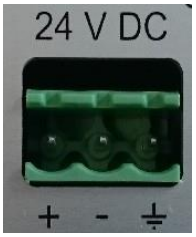
	Use the antennas and antenna cable from the manufacturer to ensure optimum reading and writing ranges.

7.6 Power Supply

The device can be connected to the system‘s internal power supply or an external power supply.

	There are risks if the device is supplied with the incorrect voltage. Only use cables, plugs and adapters from the manufacturer. Observe power ratings provided in the technical data.

PIN	Signal
1	+24V DC
2	0 V
3	GND



If the device is connected to the power supply, the power LED lights up.

7.7 DIP-switch

Test mode can be activated via the 4 DIP switches on the device. In test mode, a continuous reading operation is performed at the set antenna port and the result of the reading operation is displayed on the status LED.

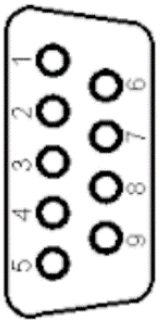
The test mode is activated by setting DIP switch 3DIP switch 4 can be used to select between test reading and test writing The selection of the antenna port is changed using the DIP switches 1 and 2.

Switch	Function
1	Antenna connection selection off, off … Antenna connection 1 off, on … Antenna connection 2 on, off … Antenna connection 3 on, on … Antenna connection 4
2	
3	off: Operation mode on: Activated test mode
4	DIP 3 off: Deactivated test mode off->on Start Antenna Tuning DIP 3 on: Activated test mode Selection of the test function: off = Read, on = Write

7.8 RS232 connection

The serial interface is implemented as a Sub-D plug connector (9-pin). A serial connection line (1:1 circuit) can be used.

PIN	Signal
1	NC (Optional GND)
2	TxD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC (Optional +5V)



8.Commissioning

8.1 Operating conditions

The following requirements must be fulfilled for smooth device operation.

1. The operating temperature must be within the scope of the values specified in the technical data.

2. The device must be connected to the power supply (provide PoE is not used).

3. An antenna must be properly connected to the reading device.

4. A transponder must be within the reading and writing ranges of the connected antenna.

5. For normal operation, deactivate test mode after installation. (All DIP switches off).

8.2 The serial interface parameters

The following settings of the serial interfaces are set on delivery. The baud rate can be changed in the SECS protocol with the parameter 0x01. If you want to change the baud rate in the ASCII protocol, then please contact the manufacturer HERMOS.

	Signal
Baudrate	19200
Datenbits	8
Stoppbits	1
Parität	ASCII: Even SECS/HSMS: None

8.3 Parameter of the ethernet interface

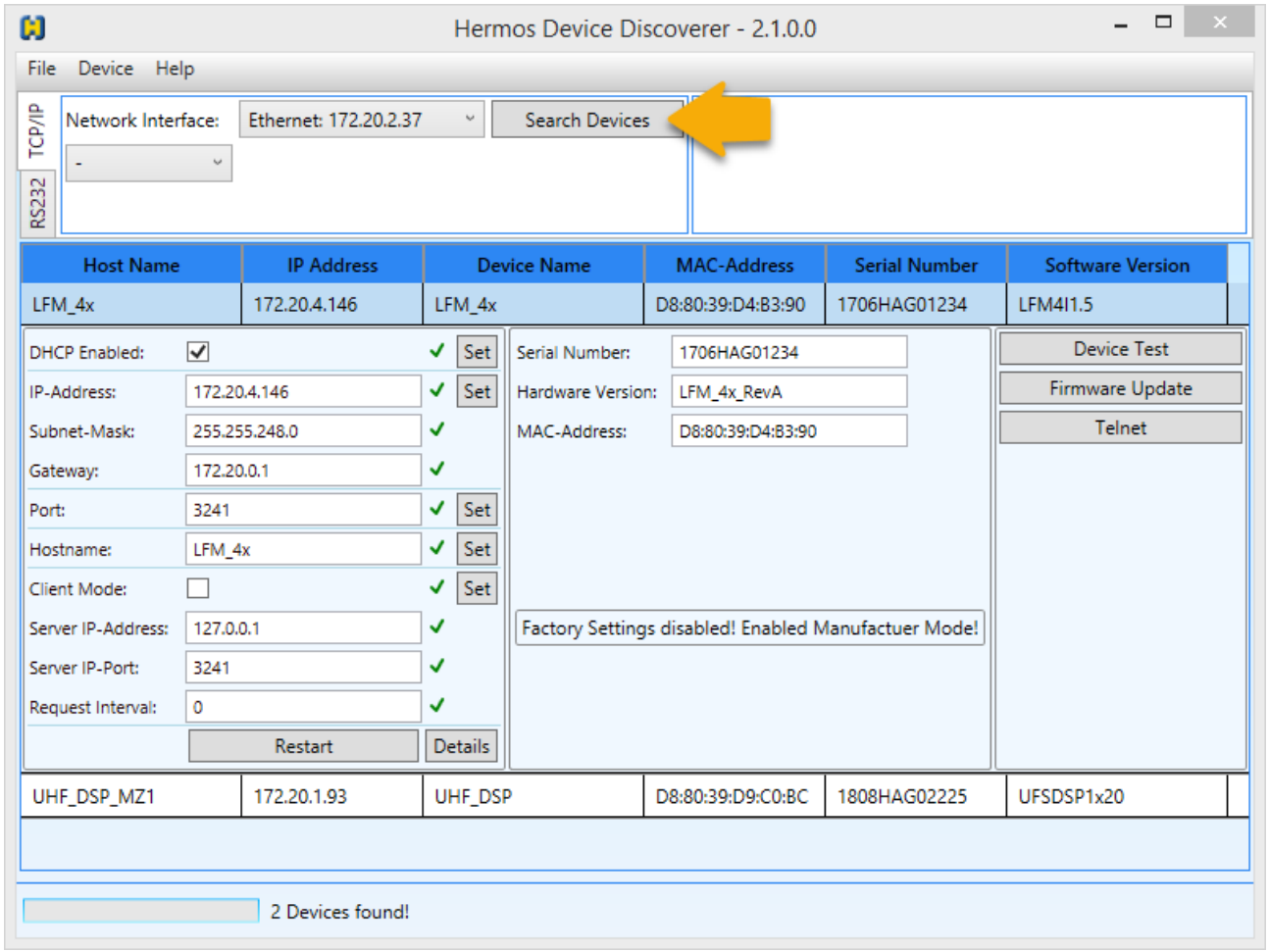
The unit is connected to the customer network via a 10/100BaseT Ethernet interface. The DHCP (Dynamic Host Configuration Protocol) is activated on delivery.

If there is not a DHCP server available in your network, a random IP address is set from the Zero- Conf range (169.254.0.0/16) and operations must still be performed to obtain an IP address. If an IP address could be obtained or with a static IP address, the device can be connected via TCP / IP port 3241 in the delivery state.

The HERMOS „DeviceDiscoverer“ is available for configuring the network setting.

8.3.1 Change networksettings with DeviceDiscoverer

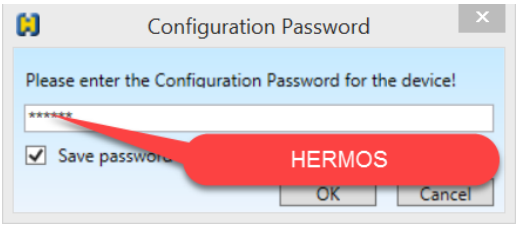
HERMOS components can be found in the LAN network and settings can be easily changed using the „DeviceDiscoverer“.



1. Select your network interface if you have several options on your PC.

2. Your network is automatically scanned for all HERMOS reading devices using the „Search Devices“ button.

3. Select the desired reading device in the list to open the network settings. Here, you can edit the network settings and apply them to the reading device by pressing the respective button. Use „HERMOS“ if you are asked to enter a password!



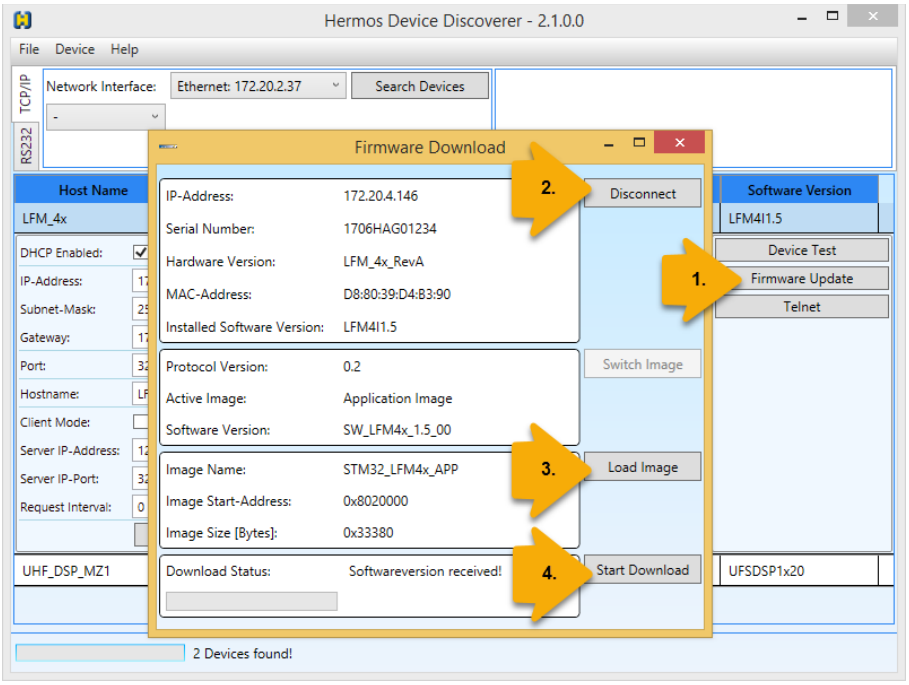
After parameters are changed, the reading device reboots and can be read in using „Search Devices“.

CAUTION

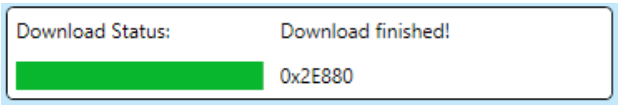
Changing network settings generally cause the reading device to reboot. This closes an existing HSMS host connection.

8.3.2 Firmware update with DeviceDiscoverer

Firmware updates can also be performed using the HERMOS „DeviceDiscoverer“. Start the tool with administrator rights and scan the network for all HERMOS devices.
To do an update, mark the desired reading device and select „Firware Update”.
Use „HERMOS“ if you are asked to enter a password!



1. Click the "Firmware Update" button to open the new Firmware Download window for the selected reader.
2. It is usually not necessary to open the download connection as this happens automatically. Otherwise, pressing the Connect button will open the download connection.
3. Select the new firmware file using the load image button.
4. Start the download process.
   Wait until the „Download Finished“ message appears.



CAUTION

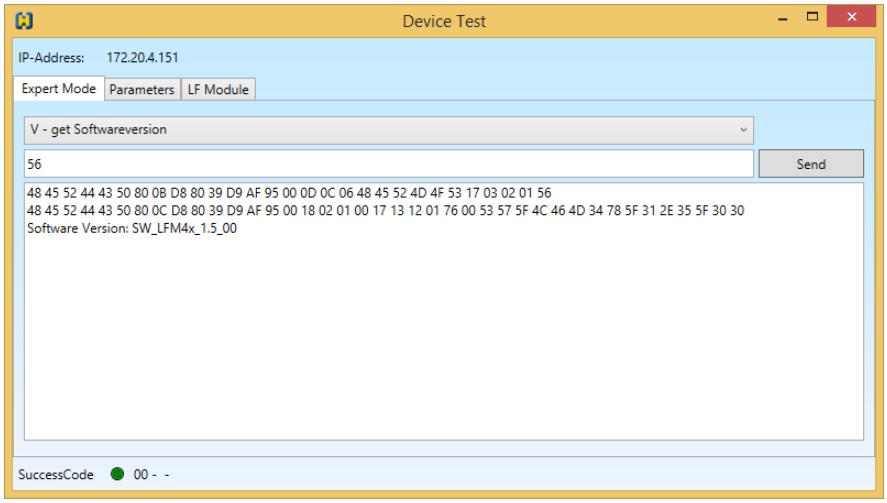
During the download process, do not disconnect the power supply or interrupt the network connection.

8.3.3 Test Device with DeviceDiscoverer

This feature is not yet supported by all HERMOS readers and is only available for the LFM4x as of software version V1.5.

Readers can also be tested with the HERMOS "Device Discoverer" if you have one support feature. Start the tool with administrator rights and search for the HERMOS device under test in the network. Select the desired reader and select the "Device Test" button independently of your interface. A further "Device Test" view is opened with which the addressed reader can be tested via the UDP protocol without having to disconnect any existing TCP / IP connection.

Expert Mode:
In the "Expert Mode" tab you can select from a list of test commands and send this after any modification. The Trace window below shows all traffic generated when testing with UDP. The success code of the response message is displayed in the status bar at the bottom left.



Below is the structure of the UDP action commands to own test actions on the reader to be able to define. Depending on the command, the head number and data may be optional data elements

Structure of the request message:

Len	Actionr	CMD	optional Headnr	opt. Daten	Description
0x02	0x00	0x4E (‚N‘)			Trigger Readerreset
0x02	0x01	0x56 (‚V‘)			Get Softwareversion
0x02	0x02	0x53 (‚S‘)			Get UDP Revision
0x04	0x03	0x46(‚F‘)	0x01	0x1A (Parnr.)	Get Parameter Head 0x01 Par. 0x1A
0x04	0x04	0x50(‚P‘)	0x01	0x07, 0x03	Set Parameter Head 0x01 Par. 0x07 Value 0x03
0x04	0x05	0x49(‚I‘)	0x01	0x10 (auto tune)	Trigger Tuning (0x10 auto tune) Head 0x01
0x05	0x06	0x58(‚X‘)	0x01	0x02, 0x08	Trigger Read Page 0x02 Length 0x08 at Head 0x01

Structure of the response message:

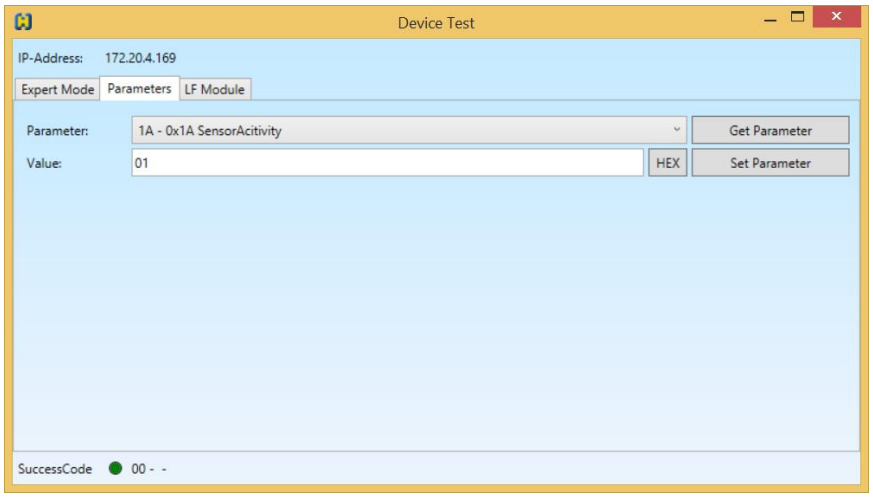
Länge	Actionr	CMD	Success-Code	opt.Headnr	opt. Daten	Erklärung
0x03	0x00	0x6E (‚n')	0x00 (ok)			ResponseTriggered Reset
0x12	0x01	0x76 (‚v')	0x00 (ok)		0x53, 0x57,…, 0x30	Response Get Softwareversion
0x04	0x02	0x73(‚s')	0x00 (ok)		0x01	Response Get UDP Revision 0x01
0x06	0x03	0x66(‚f')	0x00 (ok)	0x01	0x1A, 0x0F	Response Get Parameter Head 0x01 Par 0x1A Value 0x0F
0x03	0x03	0x66(‚f')	0x36 (invalid parnr)			Response Get Parameter Error 0x35 Invalid parnr
0x04	0x04	0x70(‚p')	0x00 (ok)	0x01		Response Set Parameter Head 0x01
0x04	0x04	0x70(‚p')	0x37(invalid value)			Response Set Parameter Error 0x37 Invalid value
0x05	0x05	0x69(‚i')	0x00 (ok)	0x01	0x04 (Tuningwert)	Response Tuning Head 0x01 Wert 0x04
0x03	0x05	0x69(‚i')	0x35 (invalid)			Response Tuning Error 0x35 Invalid Value
0x0D	0x06	0x78(‚x')	0x00 (ok)	0x01	0x02, 0x31…0x38	Response Read Head 0x01 Page 0x02 Data 0x31…0x38
0x03	0x06	0x78(‚x')	0x34 (No Tag)			Response Read Error 0x34 NoTag

A success code of 0x00 in the response message indicates the correct execution of the UDP action commands, otherwise an error has occurred.

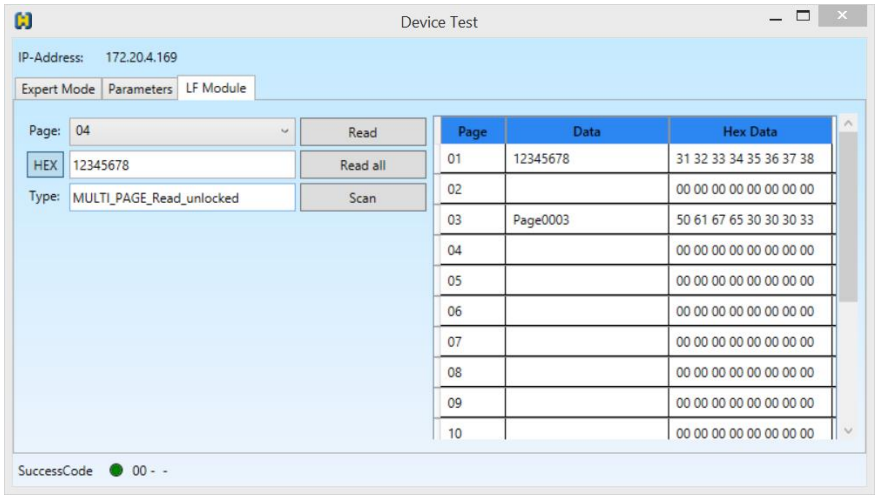
Parameters:
In the "Parameters" tab you can choose from a list of parameters that can be read and written.

CAUTION

When setting and reading parameters, it must be carefully considered which communication protocol is currently set. Some parameters are defined differently in different protocols.



LF Module:
In the register "LF Module" a test reading can be carried out. One or more pages of a multipage transponder can be read out. The success code of the triggered reading is displayed in the status bar at the bottom of the window. Via a scan, the first page of every readable 134.2 kHz LF transponder is read out and displayed.



9. Operating

9.1 Operating personnel

The device should only be operated by specially trained personnel. If you have any doubts about the required qualifications, please contact the manufacturer.
The operation of the device without special expertise can result in damages to the device or on connected devices.

9.2 Protocol change

9.2.1 General

To communicate with a connected host system, the reader supports ASCII or SECS / HSMS protocols. The protocol selection takes place by means of automatic protocol recognition.
The currently set protocol is displayed on the status LED during the boot process.
SECS: The red LED goes on briefly after self test
ASCII: The yellow LED goes on several times

9.2.2 Automatic protocol detection

The reader automatically adjusts to the protocol used by checking and evaluating the first message after a reset. The interface is changed accordingly when the protocol is changed and reinitiali- zed. This process can take several seconds. Already sent messages are lost. The newly recognized protocol is used for further communication. A renewed change is only pos- sible after another reset. Automatic protocol detection can be disabled by setting parameter 98 (0x62).

If the reader receives undefined or random characters, this may result in an accidental protocol change.
Automatic protocol detection can be deactivated in parameter 98 (0x62).

9.3 Addressing the antenna port

The reader LFM 4x is equipped with 4 antenna ports. Each of these ports has its own antenna tuning with which the connected antenna is tuned to the ambient conditions.
In the set protocol, the read or write commands are always executed by port. The 4 antenna ports from 1 to 4 are numbered consecutively and are addressed accordingly in the logging command.

In the ASCII protocol, the reader ID decides on the selection of the antenna port.
The reader ID („1“ to „4“) responds to the respective antenna port 1 to 4. Depending on the Factoryparameterset, it is possible to select the value range of the reader ID from „0“ to „3“ or from „1“ to „4“.
In the SECS protocol, the target ID is used to select the antenna port: Target ID „01“ to „04“ responds to the respective antenna port 1 to 4.
For customer-specific solutions, another reader (eg HFS ESN) can be connected to the RS232 interface. This reader is then used to communicate via the Target ID „05“ or Reader ID „05“.

9.4 Customer Factoryparametersets

The reader LFM 4x can be delivered with a few Factoryparametersets. The settings of the Factoryparameterset is part of the factory settings and can only be changed by Hermos. If customer needs another Factoryparameterset setting, please ask Hermos for the necessary steps. The installed Factoryparameterset can be read by parameter 64 (use command “G164”).

Factoryparameterset 0: (standard ASC-I1 mode)
The antenna will be addressed by the ReaderID or TargetID „1“ to „4“.
At the rs232 connector a HFS ESN reader is connected and can be adressed by ReaderID “5”. For SECS protocol there is no MID area defined.

Factoryparameterset 1: (standard ASC-I1 mode)
The antenna will be addressed by the ReaderID or TargetID „1“ to „4“. For SECS protocol there is no MID area defined.
The rs232 connector can be used for serial host communication.

Factoryparameterset 2: (standard ASC-I1 mode)
The antenna will be addressed by the ReaderID or TargetID „1“ to „4“.
For SECS protocol the default MID area of 2 pages / 16 characters is defined. The rs232 connector can be used for serial host communication.

Factoryparameterset 3: (ASC-W1 mode)
The antenna is addressed by the ReaderID „0“ to „3“, or TargetID „1“ to „4“. For SECS protocol there is no MID area defined.
The rs232 connector can be used for serial host communication.
For the TCP/IP communication the complete end packet of the ASCI-I1 protocol will be transmitted (end character and 4 bytes checksum).
P-command: The parameter value will be interpreted as hexadecimal value.
The additional F-command can be used to deliver the parameter value with hexadecimal interpretation. X/R/W-command: The page value will be interpreted as hexadecimal value.
Errors will be send with the command “E”. With default settings a confirmation has to be send. The additional B-command can be used for signal the detection of an object.

Factoryparameterset 4: (standard ASC-I1 mode)
The antenna will be addressed by the ReaderID „0“ to „3“ or TargetID „1“ to „4“.
For the SECS protocol, the standard MID range of 2 pages / 16 characters is defined. The RS232 port can be used for serial host communication.

Factoryparameterset 5: (standard ASC-I1 mode)
The antenna will be addressed by the ReaderID „0“ to „3“ or TargetID „1“ to „4“.
For the SECS protocol, the standard MID range of 2 pages / 16 characters is defined. The RS232 port can be used for serial host communication.
This mode supports the 24 volt I / O module with 6 sensors and 8 outputs. The two additional sensors are represented by an extended range for ReaderID or Portnumber PTN.

10. ASCI-I1 Communication protocol

10.1 Structure of the communication protocol

The communication is carried out via ASCII packets.
After each command to the reading device, a specific reply is transmitted. We recommend waiting for this reply before transmitting a new command.

10.2 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“ = advanced 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, the number of the antenna port (head) and the actual message data.
The number of the antenna port is not required for all messages.

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“, …) *
Data The definition of the message data depends on the protocol command.

* Depending on Factoryparameterset, the readers are addressed via the address „0 ... 3“ or „1 ... 4“.

Packet end

The end of the packet 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“)

	The checksum is not necessary when using the TCP/IP interface (No transmission). The end character is only transmitted. If the device is operated in ASC-W1 mode, the complete end packet is transmitted (end character and 4 bytes checksum).

10.3 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.

Tuning value	2 Byte

The tuning value is a set value for the optimal antenna tuning. For optimum read and write ranges, the value is automatically determined by the reader. The value is measured in 16 steps (0-F). He can also be targeted.

Example: „08“ … automatic tuning from the reader
„10“ … manual tuning 0x00
„1F“ … manual tuning 0x0F

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 of a Readerhead that is addressed. Each Readerhead has 2 LEDs.

Example:	1	LED1 of the port
	2	LED2 of the port
	3	red status LED
	4	yellow status LED

Output State	4 Bytes

The data element shows or sets the current status of the outputs.
The Data Element Output State includes the status of each output on the reader. The status is displayed as 1 byte for each sensor.

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 (1 byte) in HEX format.

Example:	Parameter 1	„1“
	Parameter 2	„2“
	Parameter 15	“F“

Parameter Value	2 Bytes

With single-digit parameter numbers from „0“ to „F“, the actual parameter value can be decimal or hexadecimal depending on the mode.

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“

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“(hexadecimal)

Reader-ID	1 Byte

The reader ID defines the address of the antenna port.
The reader LFM 4x can be read at all 4 antenna ports (1-4).
The antenna port is selected via the reader ID and is continuous.

In ASC-W1 -mode the 4 antenna ports with the reader ID „0“ to „3“ are addressed. General messages also possible at address F (HF). Value range of 1-4, or 0-3.

Response-Code	4 Bytes

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

Page	1 Bytes

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 4 byte of the serial number.
The serial number is also on the adhesive label of the device.

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: „4C464D3449312E35“ hex-String („LFM4I1.5“)

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“ bis „FF“ ... 1 s bis 255 s Timeout

10.4 Protocol Commands

Read:

Command	Description
X	Read Data
R	Automatic Read

Write:

Command	Description
W	Write Data

Device-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 side of a transponder
I	Coordinate RF-modules
J	Querying the coordination of the RF-module

In- and Output:

Command	Description
O	Set Output
Q	Query Output/Input State
A	Sensor event: Sensor removed
B	Sensor event: Sensor detected (Device is operated in ASC-W1 mode)

	For customer-specific device variants (->Factoryparametersets), another reader can be connected to the RS232 interface. The commands specified for this device are not part of this documentation.

10.4.1 X - Read data

Host ⇨ Device		
CMD	Reader-ID	Page
X	1 Byte	2 Bytes

Device ⇨ Host			
CMD	Reader-ID	Page	Data
x	1 Byte	2 Bytes	16 Bytes

The data element „page“ can have the following values:

Page	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:

Page	Description
„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

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 multipage 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.

10.4.2 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 (readpage)

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)

Device ⇨ Host			
CMD	Reader-ID	Page	Data
R	1 Byte	2 Bytes	16 Bytes

Host ⇨ 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 repeat 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.5: ‚RS232 repeat time‘, par.6: ‚RS232 maxrepeat‘) has elapsed after the last transmission.

10.4.3 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 ⇨ Device			
CMD	Reader-ID	Page	Data
W	1 Byte	2 Bytes	16 Bytes

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 start of the write process by the host. The write process is started only when the sensor is busy, otherwise the error message ‚no tag (4)‘ is sent.

10.4.4 G – Query parameter

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

Host ⇨ Device	
CMD	Reader-ID
G	1 Byte

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. From the list of public parameters only the parameter 0 to 7 and parameter F will be send.

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).

10.4.5 F – Query parameter

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

Host ⇨ LF Device		
CMD	Reader-ID	Parameter No.
F	1 Byte	1 Byte

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 (0-F or 00-FF).

	In the case of two-digit hexadecimal parameter numbers (Parameter No.), the parameter number and the parameter value double-digit hexadecimal are also used in the response.

10.4.6 P – Set parameter

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 ⇨ Device			
CMD	Reader-ID	Parameter No.	Parameter Value
P	1 Byte	1 Byte	2 Bytes

Device ⇨ Host	
CMD	Reader-ID
p	1 Byte

Depending on the Factoryparameterset selected, the data elements parameter number and parameter value must be interpreted differently. For single-digit hexadecimal parameter no. the following interpretations must be observed:

In the standard ASC-I1 protocol mode the data element „Parameter Value“ with decimal values (00-99) has to be used. The values for the data item „Parameter No.“ are hexadecimal values (0-F).

Only in ASC-W1 mode (Factoryparameterset 3) the data elements „Parameter No.“ and „Parameter Value“ have to be used as hexadecimal values (0-F or 00-FF).

	For two-digit hexadecimal parameter numbers (Parameter No.), the parameter value must always be sent in two digits hexadecimal.

10.4.7 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 ⇨ Device	
CMD	Reader-ID
N	1 Byte

Device ⇨ Host	
CMD	Reader-ID
n	1 Byte

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

If TCP / IP is used as the interface, the host will not receive an acknowledgment, because an existing TCP/IP connection is interrupted by the reset.

10.4.8 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.

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.

10.4.9 E – Error message

This message is only available in ASC-W1 mode. If there is an error, the device sends an error messa- ge with the appropriate error code to the host.

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

Device ⇨ Host		
CMD	Reader-ID	Error ID
E	1 Byte	1 Byte

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

Host ⇨ Device	
CMD	Reader-ID
e	1 Byte

10.4.10 H – Heartbeat

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

Host ⇨ Device	
CMD	Reader-ID
H	1 Byte - also Reader ID F allowed

Device ⇨ Host			
CMD	Reader-ID	Serial number	Response-Code
h	1 Byte	4 Bytes	4 Bytes

The heartbeat function can be performed for all 4 antenna ports (1-4).
If another reader is operated as a customer variant on the RS232 port, a heartbeat can be sent to the external reader via reader ID „5“.
The response code is part of the protocol but is not used for this device. The response code is always ‚0000‘.

10.4.11 V – Query software version

The command V is used to query the software version of the device.

Host ⇨ Device	
CMD	Reader-ID
V	1 Byte

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.

10.4.12 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 ⇨ Device		
CMD	Reader-ID	Pages
L	1 Byte	2 Bytes

Device ⇨ Host	
CMD	Reader-ID
L	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.

10.4.13 I – Adjust RF module

It is necessary to adjust the RF module in ordert to adapt an antenna tot he ambient conditions optimally. The tuning achieves an optimal read / write range for the present installation environment. Tuning is performed one at a time for each antenna port and the determined tuning value is stored for each antenna.
For optimal results, the vote should be automatic, but the voting value can also be set manually.

Host ⇨ Device		
CMD	Reader-ID	Tuning Value
I	1 Byte	2 Bytes

Device ⇨ Host	
CMD	Reader-ID
i	1 Byte

To start the auto-tuning process, select the value 08.

Example: I108 … automatic tuning of antenna 1

If the reader can not determine the appropriate calibration, the error „5 - Invalid“ is sent instead of the confirmation.

10.4.14 J – RF module Queries the vote

The command „J“ can be used to query the tuning values of the individual antennas. Each antenna port has its own tuning value.

Host ⇨ Device	
CMD	Reader-ID
J	1 Byte

Device ⇨ Host		
CMD	Reader-ID	Tuning value
j	1 Byte	2 Bytes

The tuning value is a set value for the optimal antenna tuning.
For optimum read and write ranges, the value is automatically determined by the reader (I-message). The value is measured in 16 steps (0-F).

10.4.15 A – Sensor event object removed

The message of sensor events can be activated in the parameter „Watch-Port“ (par. 07). If this is activated, the reader reports every drop of the external sensor.
The sensor message must be confirmed by the host.

Host ⇨ Device	
CMD	Reader-ID
A	1 Byte

LF Lesegerät ⇨ Host	
CMD	Reader-ID
a	1 Byte

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

	In parameter 1 „Read Mode“ the sensor can be deactivated.

10.4.16 B – Sensor event object detected

The message of sensor events can be activated in the parameter „Watch-Port“ (par. 07). If this is activated, the reader reports any recognition of the external sensor.
The sensor message must be confirmed by the host.

Host ⇨ Device	
CMD	Reader-ID
B	1 Byte

Device ⇨ Host	
CMD	Reader-ID
b	1 Byte

	The assignment of the external sensor results in an automatic reading and is not sent as a sensor event in standard ASC-I1 mode. In the ASC-W1 mode, however, a sensor event B is present. In parameter 1 „Read Mode“ the sensor can be deactivated.

10.4.17 O – Set output

The command O can be used to set the state of the outputs.
The status of all outputs 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 ⇨ Device					
CMD	Reader-ID	Head-ID	Output Index	Output State	Timeout*
O	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes

Device ⇨ Host		
CMD	Reader-ID	Head-ID
o	1 Byte	1 Byte

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

Example: permanently switch on LED 1:
>> O111100
<< 011

Turn red status LED on for 10 seconds:
>> O11310A
<< 011

	The number of available outputs depends on the reader version used.

10.4.18 Q – Querying the status of the inputs and outputs

The Q command 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 ⇨ Device		
CMD	Reader-ID	Head-ID
Q	1 Byte	1 Byte

Device ⇨ Host					
CMD	Reader-ID	Head-ID	Output Index	Output State LED1	Output State LED2
q	1 Byte	1 Byte	1 Byte	1 Byte	1 Bytes

Example: Status LEDs Port 1
>> Q11
<< q1121 LED1 (2 = flash), LED2 (1 = on)

The status of all 4 (The number of sensor states may vary between 4 and 6, depending on the custo- mer mode.) input sensors can be queried via head ID „0“.
In this case, the answer contains the 4 (The number of sensor states may vary between 4 and 6, depending on the Factoryparameterset.) sensor states instead of the 2 output states.

Example: Status of all 4 sensors
>> Q10
<< q100000

10.5 Parameter

	The parameters 0, 1, 2 and 7 are only valid if the reader is equipped with a corresponding I / O module and provides one input per antenna port.

	*): Since software revision V1.5 some parameters are implemented for each antenna port. Addressing of the parameter takes place via the reader ID of the message. In this realisation, the parameter is present once per antenna port. If no parameter arrays should be used, please ask the manufacturer (parameter 63)!

The data element „Parameter No.“ can have the following values. List of public paramters:

Nr. (dez)	Nr. (hex)	Parameter name	Description
0	**0x00**	Sensor delay	Delay time for the presence sensor. 01 .. 99 (0,1 Sekunden) Default: 10 … (1 second) Realisation: a separate parameter for each port *)
1	**0x01**	Read mode	Read mode for reading automatically started by external input. 00 - read only one page 01 - read until the end character or empty character2) 02 - read all pages 10 - read only one page with previous sensor Check1) 11 - read until the end character / empty character with previous sensor check 1) 2) 12 - read all pages with previous sensor Check1) 99 - Disable sensor 1) If the Sensor Check (first byte = 1) is activated, the assignment of the potential-free input is checked before initiating a read / write process. When used, the read / write process is started, otherwise the error message „NOTAG“ is sent. 2) ‚E‘ or ‚F‘ in ID bits 0...3 of the read ID Default: 00 … (read only one page) Realisation: a separate parameter for each port *)
2	**0x02**	Read page	Page for readmode „00“. 01 First page of each transponder 02.. 17 Side of a multipage transponder Default: 01 (read first page) Realisation: a separate parameter for each port *)
3	**0x03**	r/w repeat time	Time between two read / write attempts. 01 .. 99 (0,1 s) Default: 05 … (0,5 seconds) Realisation: a separate parameter for each port *)

4	**0x04**	r/w max repeat	Max. number of read / write attempts. 01 .. 99 Default: 05 Realisation: a separate parameter for each port *)
5	**0x05**	RS232 repeat time	If no confirmation message was received from the host, the device waits for this time before sending another message. The number of repetitions is defined in parameter 6 (‚RS232 max repeat'). 01 .. 99 (0,1 s) Default: 45 … (4,5 seconds)
6	**0x06**	RS232 max repeat	If an acknowledgement is not sent by the host, the device repeats the message according to the set value. Only then is an error message sent. 00 - endless 01 .. 99 - Number of attempts Default: 3
7	**0x07**	Watch port	Activates / deactivates the event message to the host that the dry contact (external output) has been opened (Bit0). Bit0 (=0x01) reporting of contact has been opened: 0 - deactivated 1 - activated Default: 1 Realisation: a separate parameter for each port *)
F	**0x0F**	Reader address	Address of the first antenna port (0 ... E) Default: 1

For ASC-W1 mode the following additional parameters are public:

Nr. (dez)	Nr. (hex)	Parameter name	Description
2	**0x02**	Read page	Page for readmode „00". 00 First page of each transponder 01 … 17 Side of a multipage transponder Default: 00 (read first page) Realisation: a separate parameter for each port *)
7	**0x07**	Watch port	Activates / deactivates the event message to the host that the dry contact (external output) has been opened (Bit0) or closed (Bit1). Bit0 (=0x01) reporting of contact has been opened: 0 - deactivated 1 - activated Bit1 (=0x02) reporting of contact has been closed: 0 - deactivated 1 – activated Default: 1 Realisation: a separate parameter for each port *)

8	**0x08**	Fieldstrength	Parameter is without further function. Range: 00-01 Default: 1
9	**0x09**	Charge time	Transponder charging time in milliseconds. Range: 00-FF Default: 32(50ms) Realisation: a separate parameter for each port *)
10	**0x0A**	Verify	Parameter is without further function. Range: 00-03 Default: 1
11	**0x0B**	Fallout	Parameter is without further function. Range: 00-03 Default: 1
12	**0x0C**	RS232 repeat time	Parameter is without further function. Range: 00-FF Default: 0
13	**0x0D**	Noiselevel adjust	Parameter is without further function. Bereich: 00-FF Default: 0
14	**0x0E**	Sensor polarity	Type of sensor signal to start an automatic read. The setting is applied for the addressed sensor. 0 … read process when sensor is covered 1 … read process when sensor is uncovered Default: 0 Realisation: a separate parameter for each port *)

10.6 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

*): With TCP / IP transmission in the standard ASC-I1 protocol, the checksum bytes are not transmitted. In ASC-W1 mode, however, they are also transmitted!

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. The range of the Reader ID is set from 1 to 4 in this case:

V – Query software version
>> V1
<< v14C464D3449312E35
Command V
Reader-ID 1
Software version ‚4C464D3449312E35' ⇨ ASCII „LFM4I1.5"

I – automatically tune RF module (antenna port 2)
>> I208
<< i2
Commandl I
Reader-ID 2 (Tuning Antenna port 2)

J – RF module Read out tuning value (Antenna port 2)
>> J2
<< j201
Command J
Reader-ID 2 (Antenna port 2)
Data 01 (voting value)

X – Read data (Reading from page 1 of the multipage transponder)
>> X101
<< x1014142434445464748
Command X
Reader-ID 1 (reading on antenna port 1)
Page 01
Data,4142434445464748' ⇨ ASCII „ABCDEFGH"

R - Automatic reading on antenna port 1
<< R10131323334353637 38
>> r1
Command R
Reader-ID 1 (automatic reading on antenna port 1)
Page 01
Data,4142434445464748' ⇨ ASCII „ABCDEFGH „

W – Write data (Write antenna port 2, page 16 Multipage)
>> W2101313233343536373 8
<< w2
Command W
Reader-ID 2 (Write to antenna port 2) Page 10 (10hex = page 16dec.)
Data,3132333435363738' ⇨ ASCII „12345678"

10.7 Error Codes

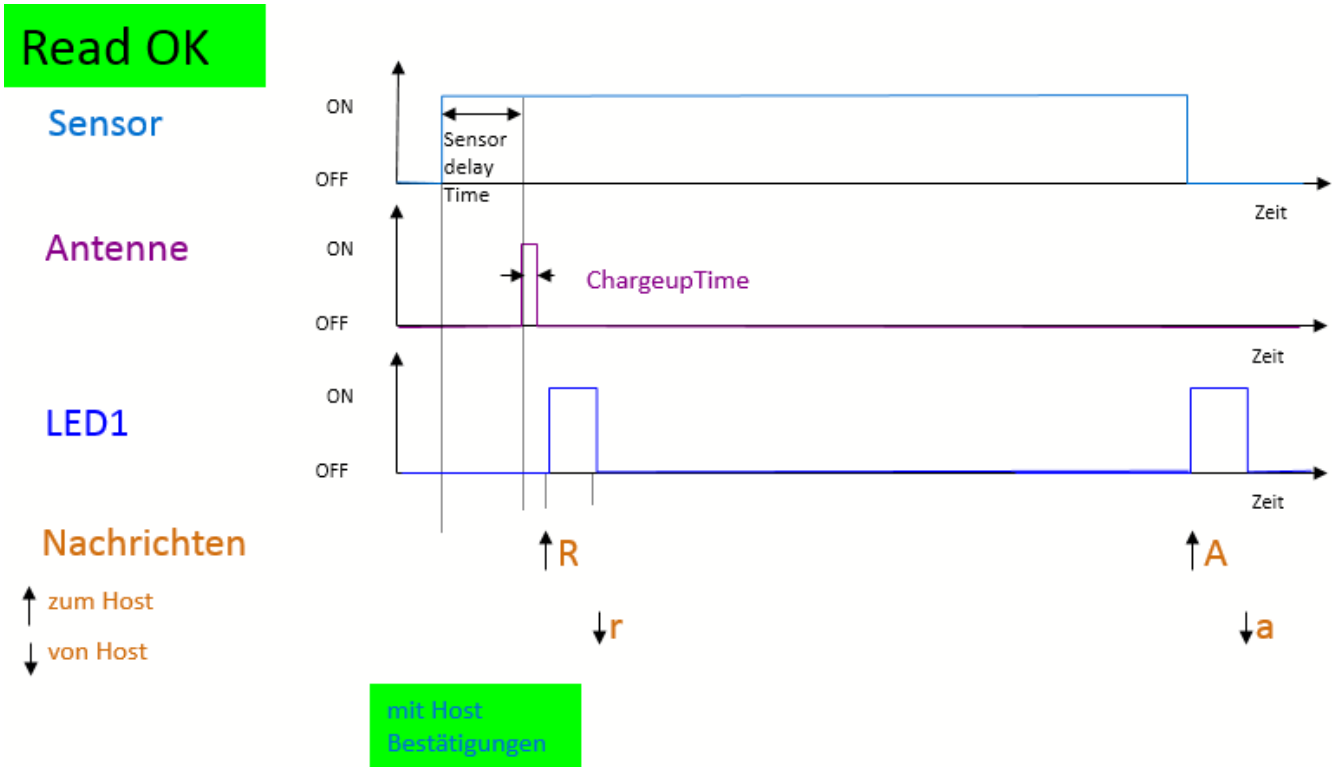
ID	Name	Description	Possible Cause	Corrective action
0	none	No error		none
1	auto fail	Automatic reading is not possible	Reader is still busy with a former read or write request	Wait until the previous request has ended.
2	ext fail	Execution failed, read or write operation cannot be carried out	Reader is still busy with a former read or write request.	Wait until the previous request has ended.
3	write fail	Data transfer to the tag is not possible.	Reader is still busy with a former read or write request.	Wait until the previous request has ended.
4	no tag	No transponder or antenna installed	Antenna is not connected properly	Check antenna connection
			Antenna is not tuned	Antenna tuning
			No readable transponder within the reading range	Put the transponder in the antenna area. Check the type and function of the transponder
			Antenna / transponder are misaligned	Check the alignment of the antenna and the transponder
			Antenna is damaged or too close to metal	Replace the antenna, check the tuning
			Interference field at transmission frequency	Check antenna environment for possible sources of interference. (Monitors, servomotors…)
5	invalid	Invalid parameter or data	Invalid command data	Check command syntax and data content
			Parameter is not implemented or out of range	Check parameter syntax and value
6	unknown	Unknown errors		none
7	Unconfig	The device is not configured	Wrong reader address	Check message syntax, check parameter F „Reader address
8	check	Parity or checksum error	Wrong baud rate	Check the baud rate of the serial interface (Com port)
			Transmission error at serial communication	Check RS232 cable and connector, Check sources of interference with RS232
9	void ackn	unexpected acknowledge	Serial communication is interrupted	Check 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 wrong acknowledgment	Check communication settings at the host
A	Locked	Locked page cannot be written	Tag is write protected	Check the page number to be written, exchange the tag for the new one

B	Unconfig	Maximum number of send messages has been confirmed (RS232 maxrepeat), The terminal did not confirm within the specified timeframe	Host system does not acknowledge the message	Check availability oft he host system, Check RS232 cable and connector Ethernet cable and connector, Check IPAddress settings
C	Bad type	Wrong transponder type	A wrong 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 not received completely	Message too long or too short or not received completely	Message length is longer than indicated on the length byte, Check message length and length byte
			Message is longer than specified in the length byte	Check message length, check length byte
			Not all characters are transfered (Intercharacter Timeout)	Check message syntax, Check RS232 or Ethernet connection
;	Invalid	Invalid command	Unknown command was received	Check message syntax

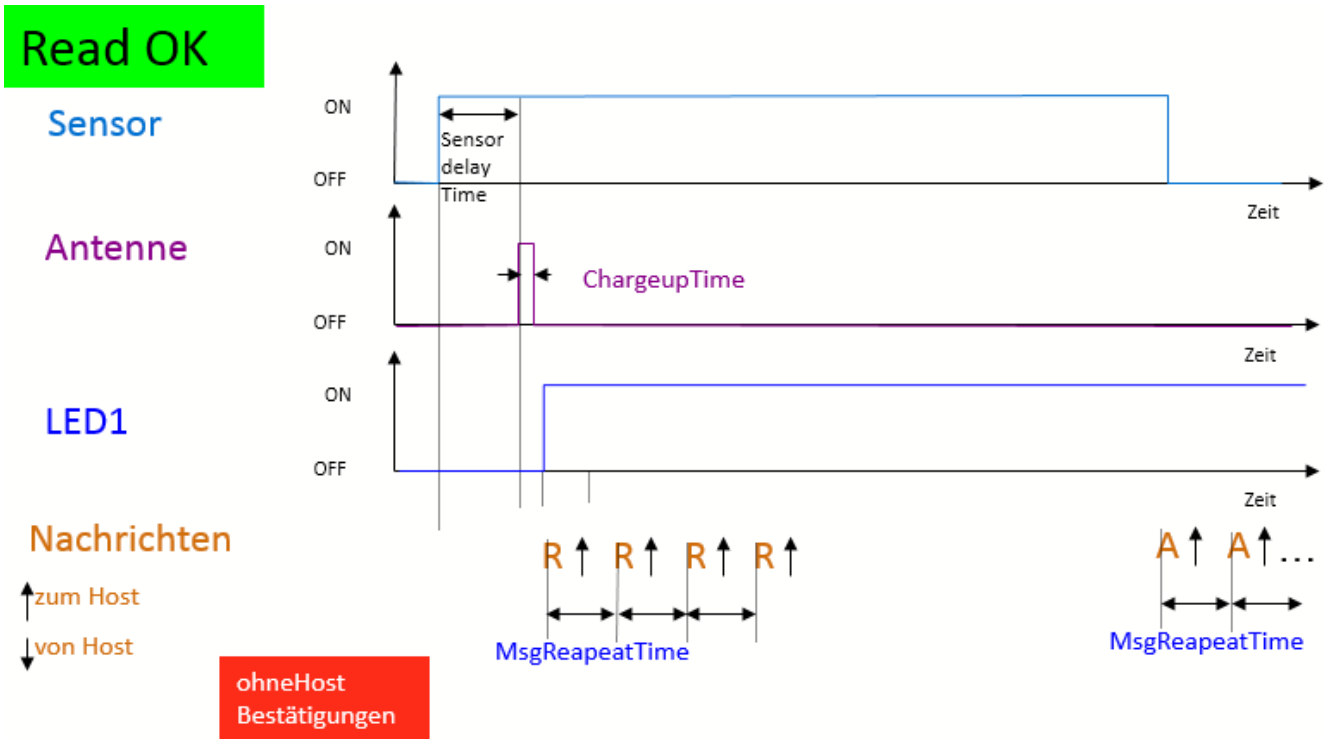
10.8 Wiring of the outputs

For readers with I / O modules, depending on the Factoryparameterset, the outputs of the respective antenna port are switched accordingly when reading.

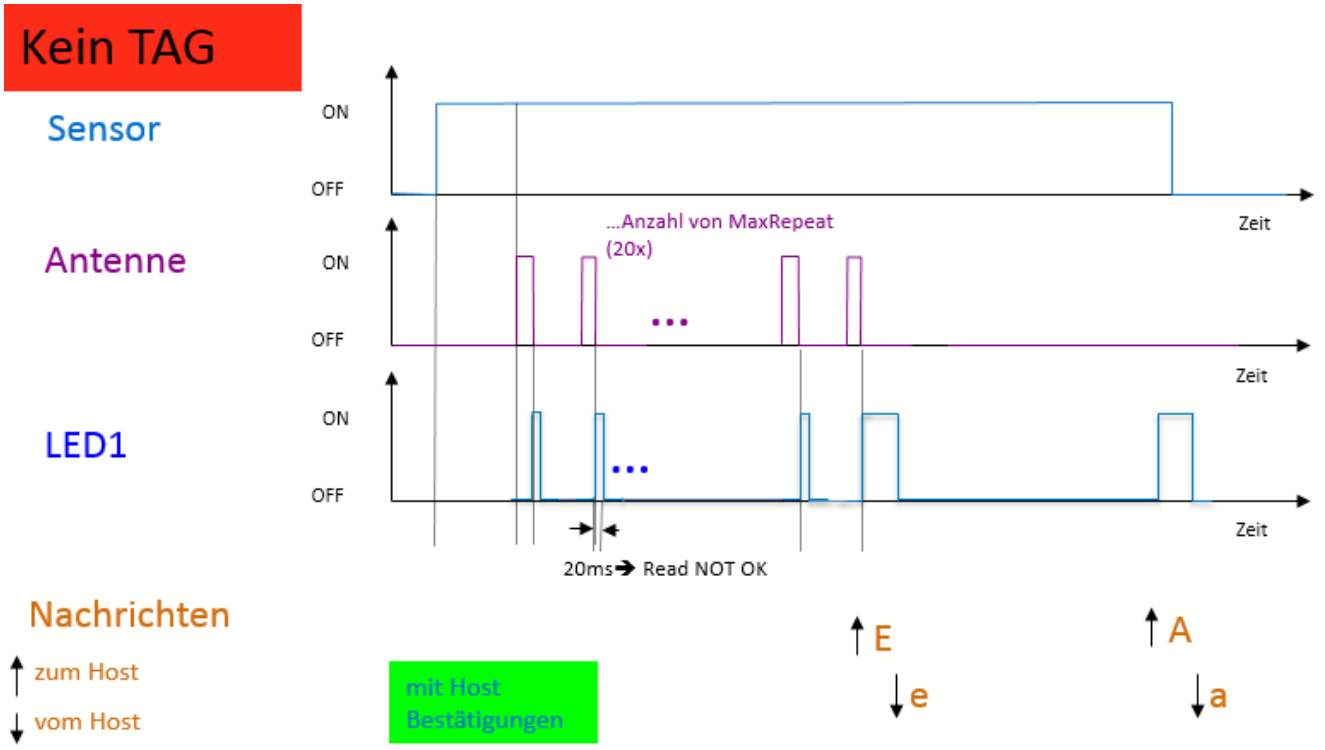
10.8.1 ASC-W1 Mode: Reader in operation mode and sensor triggered reading



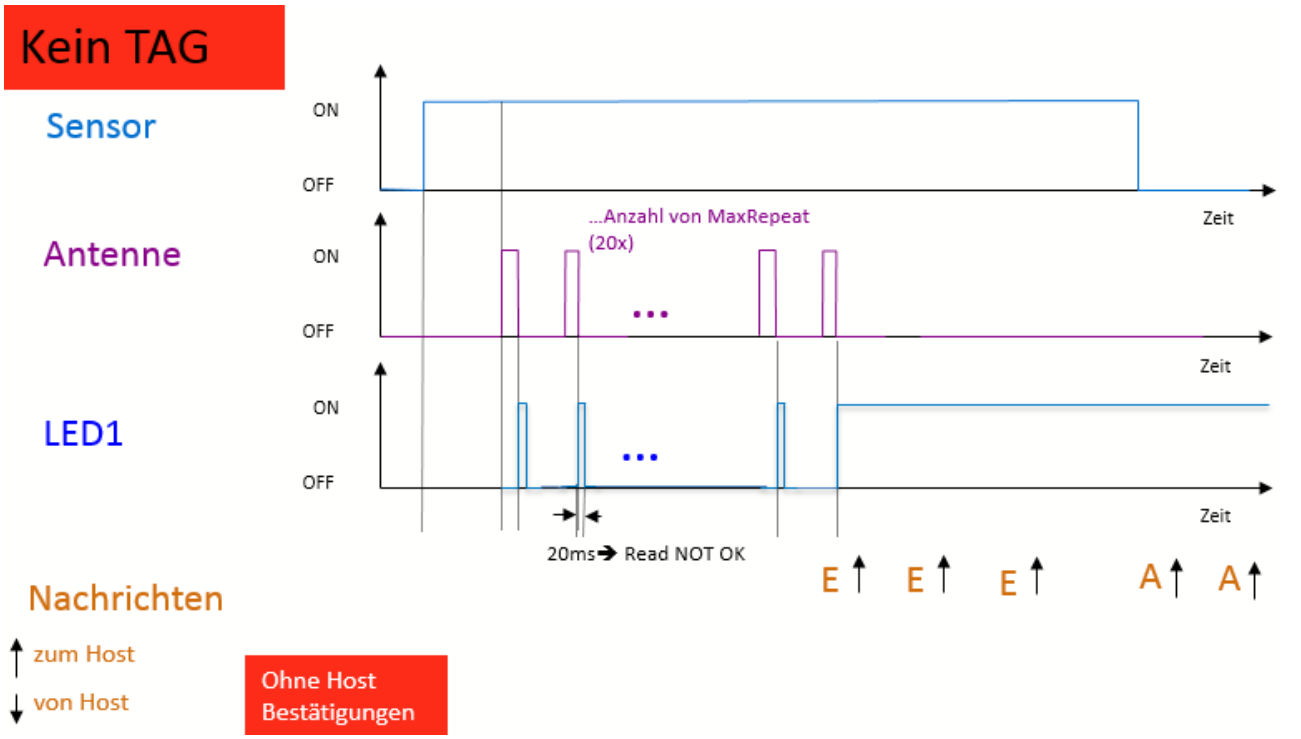
Picture 1: Successful reading with instant host confirmation



Picture 2: Successful reading with missing host confirmation

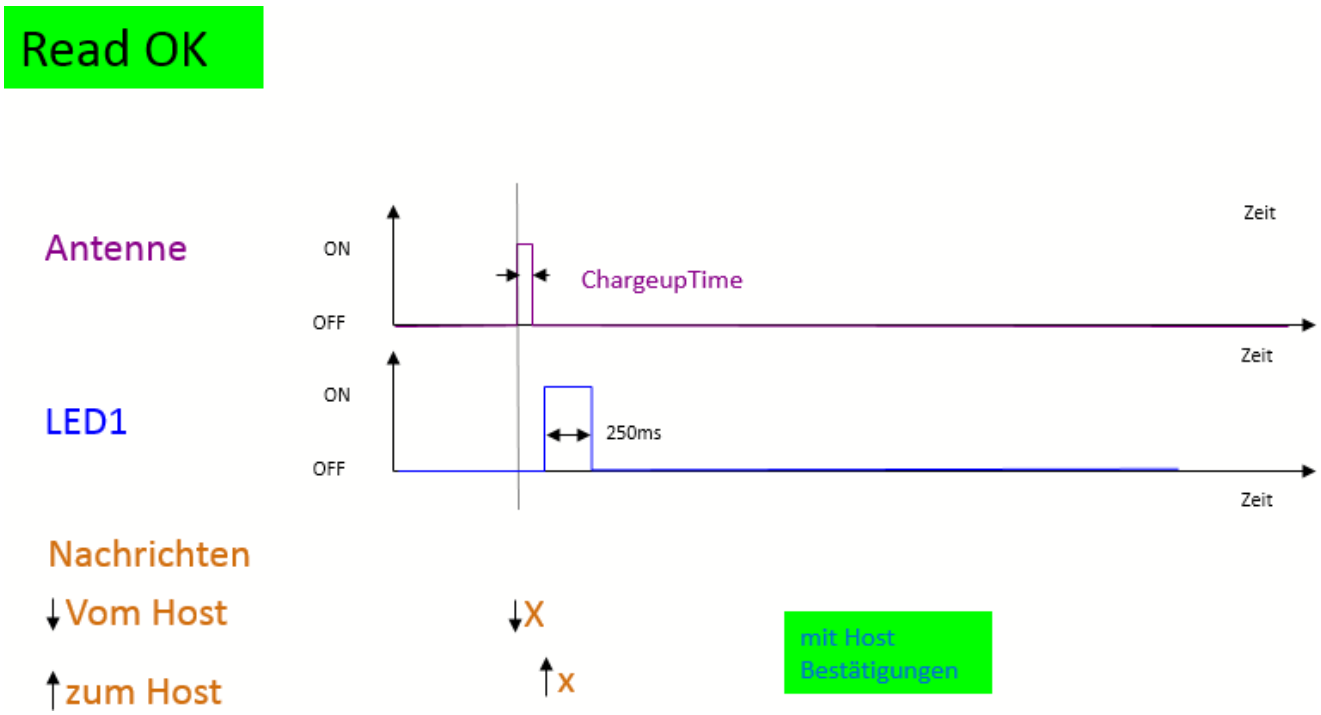


Picture 3: Unsuccessful reading with instant host confirmation



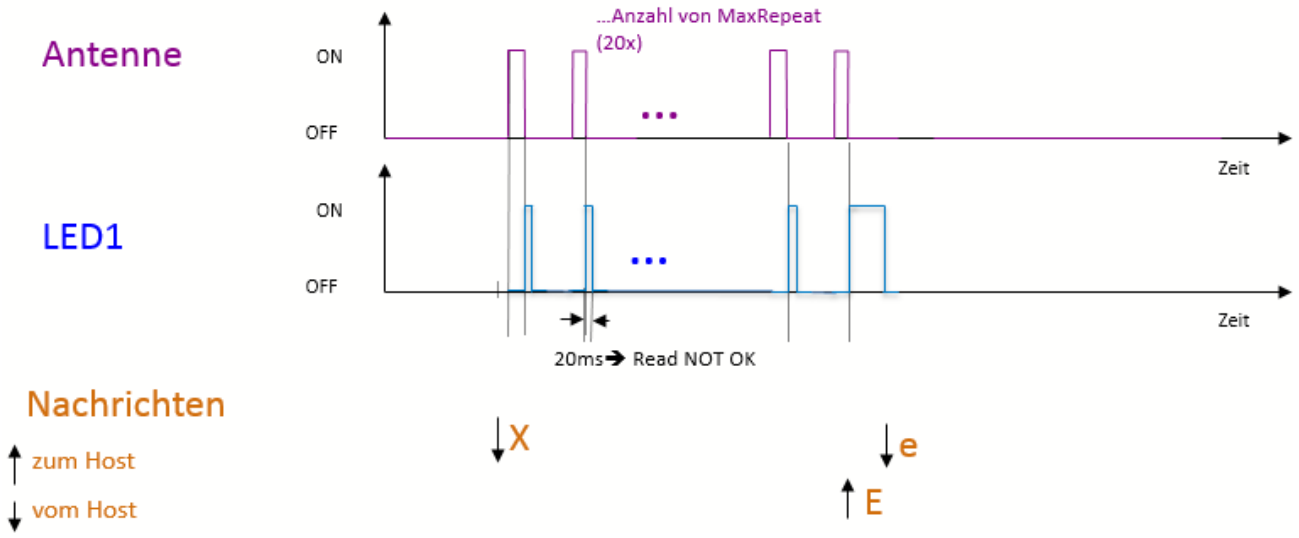
Picture 4: Unsuccessful reading with missing host confirmation

10.8.2 ASC-W1-Mode: Reader in operation mode and external triggered reading



Picture 5: Successful external reading X

Kein TAG



Picture 6: Unsuccessful external reading X

10.9 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	□

11.SECS / HSMS Communications protocol

The SECS I standard defines a communication interface that is suitable for exchanging messages between the semiconductor processing systems and a host. A host is a computer or computer network that exchanges the information with the systems to carry out the production.

The standard does not define the data contained in the message. The meaning of the messages must be defined by a standard that defines the message content – e.g. by the SEMI Equipment Communications Standard E5 (SECS-II).
This message record describes the communication between a reading device with SECS-I and a host. The host and the RFID reading device can communicate via a RS232 interface (SECS-I) or an Ethernet interface (10/100BaseT) with HSMS protocol. The meaning of the messages is provided in the message details section in which the message content is defined.
Serial communication (SECS-I):
The data is transmitted or received as a serial bit stream with 10 bits per character in a supported data rate. A standard character has a start bit, 8 data bits and a stop bit. No parity bits or other controls are used for transmitting the individual bytes.
Default setting: 19200 / 8N1

Details about the data definition and the data transmission are provide in the SEMI Standard E4. (SEMI Equipment Communication Standard 1 Message Transfer SECS-I)

Ethernet communication (HSMS):
The reading device functions as a HSMS server. This means that it waits for a connection request from a HOST PC (client).
TCP/IP: IP-Adress xxx.xxx.xxx.xxx Port 3241
If there is a connection request from a HOST, a HSMS connection is set up and the SECS II messages defined in the message record are transmitted from the reading device to the respective HOST and vice versa. The HSMS connection remains intact until it is specifically terminated by the host or the reading device.
All reading devices available in the network (LAN) can be operated from any HOST PC. A HSMS reading device, however, can no longer be connected to more than one HOST simultaneously.
The network settings can be changed using a configuration tool provided by HERMOS. Each change to the network settings causes the unit to reboot and thus disconnects existing communication connections.

11.1 Structure of a message

The communication structure and process is defined by the SEMI Equipment Communications Standards E4, E5 and E37 (SECS-I, SECS-II, HSMS).

SECS message blocks always have a specified structure that consists of 1-4 length bytes, 10 bytes of message headers and message data.

	Byte	MSB	Description
Length	0		Length without checksum
Header	1	R	Upper Device ID (reader-ID)
	2		Lower Device ID (gateway-ID)
	3	W	Upper Message ID (stream)
	4		Lower Message ID (function)
	5	E	Upper block number
	6		Lower block number
	7		System byte 1
	8		System byte 2
	9		System byte 3
	10		System byte 4
Data	11-254		Message data
Checksum	255, 256		16 Bit checksum

The **length** contains all the bytes transmitted after the length byte with the exception of the two checksum bytes. The maximum block length allowed by the SECS-I is 254 bytes and the minimum is 10 bytes.

The **reverse bit** (R bit) indicates the direction of the message. The R bit (MSB) is set to „0“ for messages to the reading device and „1“ for messages to the host.

The **device ID** is a unique number to establish the connection with the reading device. It consists of an 8-bit gateway ID (bit 0-7) and a 7-bit reader ID (bit 8-14). The gateway ID in the delivery state corresponds to the last two hexadecimal characters of the serial number of the reader. The reader ID has the value 0x01 in the delivery state. Of course, the device ID can be changed via the corresponding parameters Gateway ID and Reader ID within the validity range. See example with Reader ID 0x01 and Gateway ID 0x00:

Upper Devic-ID (Reader-ID)	**R-Bit**	0	0	0	**0**	**0**	**0**	**1**

Lower Device-ID (Gateway-ID)	**0 0 0 0 0 0 0 0**

Direction reading device to host	0x8000
Direction host to system (reading device)	0x0000

The W bit indicates whether the transmitter of the primary message wait for a reply. If the W bit contains the value 1, it means that a reply is expected.

The message ID determines the format and the content of the transmitted message. It consists of a stream and a function. The stream defines the message group and the function, the exact meaning and the syntax of the message. A primary message (request) is defined as an uneven message. A secondary message is defined as an even message (reply).

The end bit indicates whether a block is the last block of the message. A value of 1 means that the block is the last block. Since all messages can be transmitted in a block, the block number always has the value 1.

The system bytes in the header of each message are used to distinguish primary messages. The system bytes of the reply message must correspond to the system bytes of the corresponding primary message. The system bytes are incremented for each primary message.

The checksum is calculated as the numerical sum of the unsigned binary values of all bytes – after the length byte and before the checksum as well as in an individual block.

For more detailed information about the structure and transmission procedure, see SEMI E4, E5, E37, E99.
(SEMI Equipment Communication Standard Message Transfer SECS)

11.2 Directory Data Elements

This section defines the data elements used in the standard SECS-II messages described in the message details section.

Syntax:

Name — A unique name for this data item. This name is used in the message definitions.

Format — A unique name for this data item. This name is used in the message definitions. The allowed element format code that can be used for this default data element. Element format codes are displayed in hexadecimal and octal, as described in chapter Data element.
The notification „3 ()“ indicates a signed integer format (30, 31, 32, 34).

Description — A description of the data element with the meaning of each value. Where used standard messages in which the data element occurs.

ACKC3	Format: B[1]

Verification code

0	...	Sensor 0 was the Initiator
1	...	error, not accepted

ACKC5	Format: B[1]

Verification code

0	...	No error
1	...	error, not accepted

ALARM STATE	Format: A[1]

The value of the alarm state refers to the last read. If a read or write error occurs, the alarm state is activated. A successful read or write deactivates the alarm state. When leaving the maintenance mode, the alarm state is also deactivated.

0	...	No error
1	...	error, not accepted

ALCD	Format: B[1]

Alarm-Codebyte
Only the occurrence of an error is reported. Errors are usually not reset.
Bit 8 = 1 Alarm activated
Where used S5F1

ALID	Format: B[1]

Alarm Identifier
Only the occurrence of an error is reported. Errors are usually not reset.

0	No error
1	Automatic reading failed, the reader is busy
2	External read failed, the reader is busy
3	External write failed, the reader is busy
4	No transponder could be detected when the sensor was covered, or the carrier was removed too soon (sensor uncovered)
5	Invalid command or parameter detected
6	Unknown error
7	Reserved
8	parity error or checksum error detected
9	An unexpected confirmation has been sent
10	Locked page could not be described
11	Reserved
12	Wrong transponder type
13	External read or write failed because the sensor is not covered
14	Reserved
15	Reserved
16	Reserved

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

Where used S5F1

ALID	Format: A[max40]

Alarm text
The length of the alarm text is between 0 and 40 characters. Depending on the version of the reader, information about the condition of the sensor or the sensors is also transmitted in the event of an error message from the reader

The information should be interpreted as follows:

ALTX[0] Initiator of an error message
“0”: Sensor 0
“1”: Sensor 1 (not available)
“F”: Not assignable

ALTX[1] State of the sensor 0
“0”: Sensor is not used
“1”: Sensor is busy
“E”: Sensor status is not available
“F”: Sensor is not sent

ALTX[3] ‘:’ a semicolon separates the alarm text from the sensor states

Where used S5F1

ATTRID	Format: A[max25]

Name for an attribute for a specific object type.

CIDRW Attribut definitions:

„Configuration“	⇨	Number of heads
„AlarmStatus“	⇨	Current CIDRW sub-state of the alarm state
„OperationalStatus“	⇨	Current CIDRW sub-state in normal operation
“SoftwareRevisionLevel“	⇨	Change (version) of the software - maximum 8 bytes
„CarrierIDOffset“	⇨	Offset of the CID in the CID field (MID area)
„CarrierIDLength“	⇨	Length of the CID in the CID field (MID area)
„SERIALNUM“	⇨	Series number string
„HARDWARE“	⇨	String of the Hardware-Release
„SELF_TEST_RESULT“	⇨	Supply the result of the last self-test
„MANUFACTURER“	⇨	String of the manufacturer
„ECID_00“ ⇨ Parameter 0	⇨	Gateway ID
„ECID_01“ ⇨ Parameter 1	⇨	Baudrate
„ECID_02“ ⇨ Parameter 2	⇨	Inter-character timeout T1
„ECID_03“ ⇨Parameter 3	⇨	Block protocol timeout T2
„ECID_04“ ⇨Parameter 4	⇨	Reply timeout T3
„ECID_05“ ⇨Parameter 5	⇨	Inter-block timeout T4
„ECID_06“ ⇨Parameter 6	⇨	Retry limit RTY
„ECID_07“ ⇨Parameter 7	⇨	TARGETID high byte
„ECID_08“ ⇨Parameter 8	⇨	TARGETID low byte
„ECID_09“ ⇨Parameter 9	⇨	Heartbeat time
„ECID_11“ ⇨Parameter 11	⇨	ReaderID
„ECID_12“ ⇨Parameter 12	⇨	HeadID
„ECID_20“ ⇨Parameter 20	⇨	Sensor Delay for presence sensor
„ECID_22“ ⇨Parameter 22	⇨	Sensor triggered action for presence sensor
„ECID_23“ ⇨Parameter 23	⇨	Triggered read frequency
„ECID_24“ ⇨Parameter 24	⇨	r/w max repeat
„ECID_25“ ⇨Parameter 25	⇨	Transponder Type
„ECID_26“ ⇨Parameter 26	⇨	Sensor activity
„ECID_27“ ⇨Parameter 27	⇨	Sensor Watchport for presence sensor
„ECID_29“ ⇨Parameter 29	⇨	Transponder load duration (read mode)
„ECID_30“ ⇨Parameter 30	⇨	r/w synchronize
„ECID_33“ ⇨Parameter 33	⇨	Automatic Antenna adjustment
„ECID_34“ ⇨ Parameter 34	⇨	Sensor type for presence sensor
„ECID_35“ ⇨ Parameter 35	⇨	Special features
„ECID_36“ ⇨ Parameter 36	⇨	DIP switch activation

„ECID_37“➪ Parameter 37 ➪ MID area
„ECID_38“➪ Parameter 38 ➪ Test after software reset
„ECID_40“➪ Parameter 40 ➪ Transponder load duration (write-mode)
„ECID_41“➪ Parameter 41 ➪ Delay time between read cycles
„ECID_42“➪ Parameter 42 ➪ CarrierIDOffset
„ECID_43“➪ Parameter 43 ➪ CarrierIDLength
„ECID_44“➪ Parameter 44 ➪ FixedMID
„ECID_45“➪ Parameter 45 ➪ MIDFormat
„ECID_75“➪ Parameter 75 ➪ DIP switch state (read only)
„ECID_80“➪ Parameter 80 ➪ Auto adjust value antenna port 1 (read only)
„ECID_81“➪ Parameter 81 ➪ Auto adjust value antenna port 2 (read only)
„ECID_82“➪ Parameter 82 ➪ Auto adjust value antenna port 3 (read only)
„ECID_83“➪ Parameter 83 ➪ Auto adjust value antenna port 4 (read only)
„ECID_97“➪ Parameter 97 ➪ Default protocol (read only)
„ECID_98“➪ Parameter 98 ➪ Protocol change allowed
„ECID_99“➪ Parameter 99 ➪ Customer Code

Header attribute definitions:

„HeadStatus“ ➪ Current state corresponds to „OperationalStatus“
„HeadID“ ➪ Headnumber 00-xx (2Ziffern)

Where used S5F1

ATTRVAL	Format: A[max4]

Value of the specified attribute.

CIDRW-attribute definitions:

„Configuration” Number of antenna ports „04“
„AlarmStatus” Current CIDRW sub-state of the ALARMSTATUS
„0“ …NO
„1“ …ALARMS

„OperationalStatus“ Current CIDRW sub-state of IN OPERATION
„IDLE“ …reader is rest mode
„BUSY“ …reader is busy
„MANT“ …maintenance mode

„SoftwareRevisionLevel“ Revision (version) of the software (max. 8 bytes)
„SERIALNUM“ serial number string (max. 15 bytes)
„HARDWARE“ String of the hardware release (max. 10 bytes)

„SELF_TEST_RESULT“	Returns the result of the last self-test. A self-test can be triggered by message S18F13 using SSCMD.
„MANUFACTURER“	String from the manufacturer „HERMOS“
„ECID_00“ bis „ECID_99“	see data element ECV parameters 0 - 99

Head attribute definitions:

„HeadStatus“	Current state
„IDLE“	Reader in REST mode
„BUSY“	reader is busy
„NOOP“	Not in operation
„HeadID“	corresponds to the 2-digit target ID of the first antenna port „01“ or „00“

Where used S18F2, S18F3

CPVAL	Format: A[]

State request value

OpStatus	Operating status, maintenance or rest mode „OP“ ... operating status „MT“ ... maintenance status
LEDStatus	LED-status „Off“ ... switch off the LED „On“ ... switch on the LED „Flash“ ... switch the LED to flashing mode with 1Hz
LedNo	LED-number, 1 Byte „1“ first LED of the Reader Heads (if available) „2“ second LED of the Reader Heads (if available) „3“ red status LED of the reader „4“ green status LED of the reader
Timeout	Timeout duration, Units seconds „00“: permanently „01“ bis „FF“: Timeout from 1 to 255 s. After the timeout, the LED goes off.

Where used S18F13

	The number of LEDs per antenna input depends on the design of the hardware.

DATA	Format: A[max200]

The data element is a vector or string of unformatted data.
The DATA area depends on the MID area of the transponder and can be between page 1 and page 17. Read-write transponder DATA corresponds to 8 byte MID
Read-only transponder DATA corresponds to 8 byte MID

Where used S18F6, S18F7

DATALENGTH	Format: U2

The DATA LENGTH corresponds to the number of bytes to be read or written. The scope depends on the length of the MID range (parameter 37).

Where used S18F5, S18F7

DATASEG	Format: A[2]

Used to identify the requested data.
The DATASEG corresponds to the page number (PAGEID) of the transponder.
„00“ First page of each transponder or first page of the DATA area.
Multipage transponders (pages 1 to 17):

„01“	page 1	„81“	Locked page 1
...	...	...	...
„11“	page 17	„91“	Locked page 17

Read-Only-Transponder „F0“ Read only one page
Read-Write-Transponder „F1“ Read or write only one page

Where used S18F5, S18F7

EAC	Format: B[1]

Confirmation code for new reader attribute

0 ... parameter successfully set
1 ... parameter could not be set

Where used S2F16

ECID	Format: U1

Parameter number of the reader.
The values are displayed as decimal values.

Where used S2F13, S2F15

ECV	Format: U1

Value of the reader parameter.
The values are displayed as decimal values, see parameters.

Where used S2F14, S2F15

MDLN	Format: A[6]

Plant model number (Hardware version)

Where used S1F2

MF	Format: B[1]

Material Format Code
20: The material port number corresponds to the sensor number and the sensor status.

Where used S3F5, S3F7

MHEAD	Format: B[10]

The data element MHED consists of the head of the SECS message block associated with the defective message block.

Where used S9F1, S9F3, S9F5, S9F9

MID	Format: A

Material ID, predefined area on the transponder in which the unique identifier of the cassette / box is stored. Depending on the type of transponder, the length of the MID can be changed.

Multipage-Transponder: The MID length can be set from „0“ (no MID) to „10“ (MID occupies the first 10 pages).
Read-Write-Transponder: The MID corresponds to the DATA (writable) Read-Only-Transponder: The MID corresponds to the DATA(fixed)

Where used S18F10, S18F11

	Please note the parameters 42-45

MIDAC	Format: B[1]

Material ID verification code

0 Material ID confirmed; the presence sensor was the initiator

1 Not specified

2 Material ID confirmed - reaction to externally triggered process; the message can not be assigned to a sensor

>2 Material ID not confirmed

The initiator can be taken from the data element PTN.

Where used S3F14

MIDRA	Format: B[1]

Material ID verification code

2 confirmation, MID will be sent later in S3F13

Where used S3F12

OFLACK	Format: B[1]

Confirmation code for OFFLINE request.

0 ONLINE accepted (reader is online)

Where used S1F16

ONLACK	Format: B[1]

Confirmation code for ONLINE request.

0 ONLINE accepted (reader is online)

Where used S1F18

PAGEDATA	Format: B[9]

The data element corresponds to the transponder data. It contains the transponder page and the data content of the page.

PAGEDATA [0] Correspond to the page number. The value of the page number is displayed in the data element „DATASEG“.

PAGEDATA [1-8] The 8 bytes (one page) of the transponder ID follow.

Where used S3F7, S3F13

PTN	Format: B[1]

Information about the condition of up to two sensors and the initiator of the message.

Initiator Bit0 ….Bit 4:

The initiator sets the number of the sensor that triggered the message.

1 … 4 port1 to port4

Sensorstate Bit5 ….Bit 7:

The current state of the sensor is described with 3 bits.

0 … Sensor is not occupied

1 … Sensor is occupied or detected

7 … Sensor not defined

Example: 0x24 means Sensor ist deteced (0x20) and the initiator was sensor at port4 (0x04)

Where used S3F5, S3F7, S3F13

PM Information	Format: A[2]

Information about the operating mode

„NE“ … normal execution

„MR“ … operating mode „maintenance“ required

Where used S18F2, S18F4, S18F8, S18F10, S18F12, S18F14

RAC	Format: B[1]

Confirmation code reset

0 … Reset could be executed

1 … Reset could not be executed

Where used S18F20

RIC	Format: B[1]

1 … Power-up-Reset

2 … Software reset (without reset of the Ethernet component)

Where used S2F19

SHEAD	Format: B[10]

Head of the stored SECS message block. Only the last message is saved. This must be confirmed by the host.

Where used S9F9

SOFTREV	Format: A[max 6]

Software version

Where used S1F2

SSACK	Format: A[2]

Result information about the status of the request for the service request.

„NO“ Normal Operation

Indicates the success of the requested operation.

„EE“ Execution error

Transponder data cannot be read. MID sequence cannot be read, as valid ASCII characters were not found exclusively in the defined MID area. However, the condition of the facilities is normal.

„CE“ Communication error

Syntax error in message, message format, or value.

„HE“ Hardware error

Error in the head of the ID reader / writer, head of the ID reader / writer is deactivated.

„TE“ Transponder error, reading / writing unsuccessful (Tag Error)

„NT“ No transponder detected in the antenna area. (No Tag)

Where used S18F2, S18F4, S18F8, S18F10, S18F12, S18F14

SSCMD	Format: A[max 18]

Specifies an operation to be performed by the subsystem. Used to distinguish between the various subsystem commands displayed.

„ChangeState“ … change status

„GetStatus“ … query staus

„Reset“ … reset CIDRW

„PerformDiagnostics“ … A diagnosis is made.

„ADJUST“ … triggers an automatic alignment of the antenna.

„HERMOSDefParams“ … Basic setting of the readers parameters.

„SetLED „ … Set one of the device LEDs.

CPVAL‘s 1 <LEDStatus>
2 <Timeout>
3 <LEDNo>

Where used S18F13

Status list	Format: A[2]

The status list provides information about the system status.
Consists of „PM Information“ and the current values of the CIDRW attributes „AlarmStatus“, „Operating Status“ and „HeadStatus“.

Status list
L,4
<PMInformation>
<AlarmStatus>
<OperatingStatus>
<HeadStatus>

Where used S18F2, S18F4, S18F8, S18F10, S18F12, S18F14

TARGETID	Format: A[2]

The TargetID is defined with 2 decimal ASCII characters and corresponds to the antenna connections. The 2-digit target ID (Head-ID) is used to set the antenna port 1 to 4 for which the action is to be carried out. (see Adressing the antenna ports). The use of the 4-digit TARGETID is currently not supported.

Where used S18F1, S18F3, S18F4, S18F7, S18F9, S18F11, S18F13

11.3 Protocol commands

The message record describes the communication data between a reading device with and a host. The following functions can be used via commands by the host in the reading device or automatically transmitted from the reading device to the host:

Stream 1: (System state)

• Are you there request	S1F1	(Host⇨ Reader)
• Request Offline	S1F15	(Host⇨ Reader)
• Request Online	S1F17	(Host⇨ Reader)

Stream 2: (System control)

• Read parameter	S2F13	(Host⇨ Reader)
• Write parameter	S2F15	(Host⇨ Reader)
• Transmit reset	S2F19	(Host⇨ Reader)

Stream 3: (Material state)

• MID detected by sensor	S3F5	(Reader ⇨ Host)
• MID removed from sensor	S3F7	(Reader ⇨ Host)
• Read MID	S3F13	(Reader ⇨ Host)

Stream 5: (Exception handling)

• Alarm message	S5F1	(Reader ⇨ Host)

Stream 9: (System error)

• Unrecognised device ID	S9F1	(Reader ⇨ Host)
• Unrecognised stream type	S9F3	(Reader ⇨ Host)
• Unrecognised function type	S9F5	(Reader ⇨ Host)
• Invalid data	S9F7	(Reader ⇨ Host)
• Transmission timeout	S9F9	(Reader ⇨ Host)

Stream 18: (System state)

• Read parameter	S18F1	(Host⇨ Reader)
• Write parameter	S18F3	(Host⇨ Reader)
• Read data	S18F5	(Host⇨ Reader)
• Write data	S18F7	(Host⇨ Reader)
• Read MID	S18F9	(Host⇨ Reader)
• Write MID	S18F11	(Host⇨ Reader)
• Subsystem command	S18F13	(Host⇨ Reader)

11.3.1 Stream 1 (system state)

S1F0: ABORT TRANSACTION (reading device <-> host)

This message is used instead of an expected reply to cancel an action. The function 0 is defined in each stream and has the same meaning in each stream.

S1F0 (header only, no additional elements)

S1F1: ARE YOU THERE REQUEST (reading device <-> host, reply)

Determines whether the reading device or the host is online. S1F1 W (header only, no additional elements)

S1F2: ON-LINE DATA (host -> reading device)

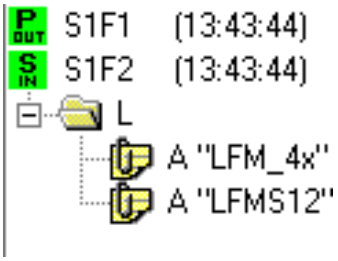
The host indicates that it is online.

S1F2
<L[2]
<A[6] MDLN >
<A[6] SOFTREV

S1F2: ON-LINE (reading device -> host)

The reading device indicates that it is online.

S1F2
<L[2]
<A[6] MDLN >
<A[6] SOFTREV >
>



S1F15: REQUEST OFF_LINE (host -> reading device, reply)

The reading device contains a request to change the communication state to „offline“.

The reading device can only be set to „online“ again using the message S1F17 (or reset S2F19); all other messages are cancelled by message SxF0.

.

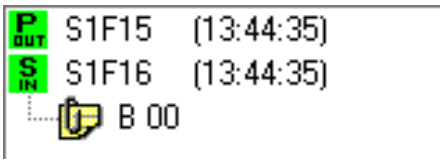
S1F15 W (header only, no additional elements)

S1F16: OFFLINE ACKNOWLEDGE (reading device -> host)

Acknowledgement.

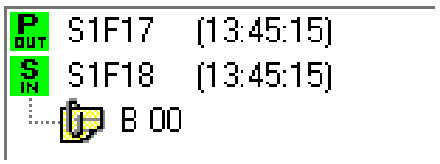
S1F16

<B[1] OFLACK>.



S1F17: REQUEST ON_LINE (host -> reading device, reply)

The reading device contains a request to change the communication state to „online“. S1F17 W (header only, no additional elements)



S1F18: ONLINE ACKNOWLEDGE (reading device -> host)

Acknowledgement

S1F18

<B[1] ONLACK>

11.3.2 Stream 2 (system control)

S2F0: ABORT TRANSACTION (reading device <-> host)

This message is used instead of an expected reply to cancel an action. S2F0 (header only, no additional elements)

S2F13: EQUIPMENT CONSTANT REQUEST (host -> reading device, reply)

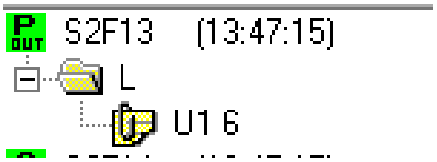
The host requests an attribute (parameter) from the reading device.

S2F13 W

<L[1]

<U1[1] ECID>

>



S2F14: EQUIPMENT CONSTANT DATA (reading device -> host)

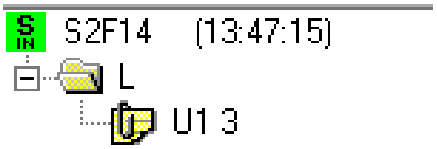
The reading device transmits the requested attribute (parameter) to the host.

S2F14

<L[1]

<U1[1] ECV>

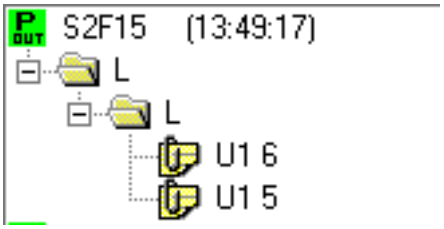
>



S2F15: NEW EQUIPMENT CONSTANT SENT (host -> reading device, reply)

The host changes a reading device attribute (parameter).

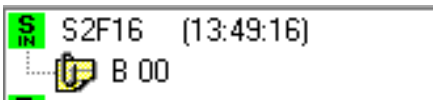
S2F15 W
<L[1]
<L[2]
<U1[1] ECID>
<U1[1] ECV>



S2F16: NEW EQUIPMENT CONSTANT ACKNOWLEDGE (reading device ->host)

The reading device acknowledges the reading device parameter).

S2F16
<B[1] EAC>



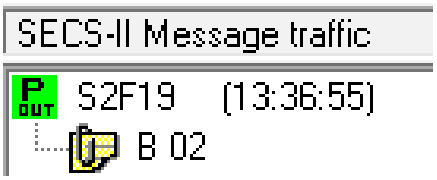
S2F19: RESET SENT (host -> reading device, reply)

The host transmits a request to the reading device to reset the hardware and software.

If a heartbeat time (parameter 9) is set, the reading device transmits a S1F1 message once the reset operation is complete.

A power-up reset takes a few seconds.

S2F19 W
<B[1] RIC>



S2F20: RESET ACKNOWLEDGE (reading device -> host)

The reading device acknowledges the reset.

This message is only displayed if a software reset (RIC=2) has been triggered.

S2F20
<B[1] RAC>

11.3.3 Stream 3 (Material-state)

S3F5: Material found (MID FOUND) (reading device-> host, reply)

The reader sends the information that material has been detected on the input sensor. This message is sent only when a sensor is connected and activated.
(see par. 26 Sensor Activity and par. 27 Watchport)

```
S3F5 W
    <L[2]
        <B[1] MF >
        <B[1] PTN >
    >
```

S3F6: Material found confirmation (MID FOUND, ACK) (host -> reading device)

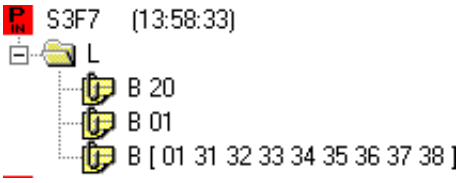
The host confirms the message material found.

```
S3F6
    <B[1] ACKC3 >
```

S3F7: Material lost (MID LOST) (reading device -> host, reply)

The reader sends the information that material has been removed from the input sensor. This message is sent only when a sensor is connected and activated.
(see par. 26 Sensor Activity and par. 27 Watchport)
The PAGEDATA are only indicated if the last reading was successful.

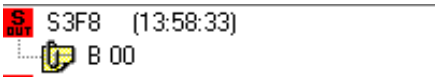
```
S3F7 W
    <L[2]
        <B[1] MF >
        <B[1] PTN >
        <B[9] PAGEDATA >

    >
```



S3F8: Material lost confirmation (MID LOST, ACK) (host -> reading device)

The host confirms the message material lost.

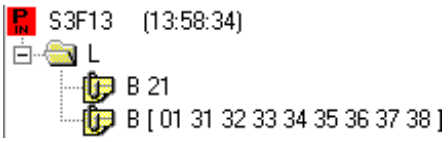
```
S3F8
    <B[1] ACKC3 >
```



S3F13: MID found (MID READ) (reading device -> host, reply)

The reader sends the MID of the set up material to the host.

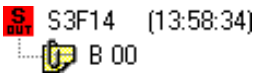
S3F13 W
<L[2]
<B[1] PTN >
<B[9] PAGEDATA >
>



S3F14: Material found confirmation (MID FOUND, ACK) (host -> reading device)

The host confirms the received MID data.

S3F14
<B[1] MIDAC >



11.3.4 Stream 5 (Exception handling)

S5F1: Alarm Report (reading device -> host, reply)

The reader reports an error to the host.

S5F1 W
<L[3]
<B[1] ALCD > Alarmcodebyte
<B[1] ALID > Alarm-ID
<A[MAX 40] ALTX > Alarmtext
>

S5F2: Alarm Report confirmation (Host -> Lesegerät)

The host confirms the alarm message.

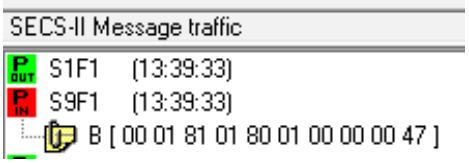
S5F2
<B[1] ACKC5 >

11.3.5 Stream 9 (system error)

S9F1: UNRECOGNIZED DEVICE ID (reading device -> host)

The device ID in the header of the message block does not correspond to the expected device ID.

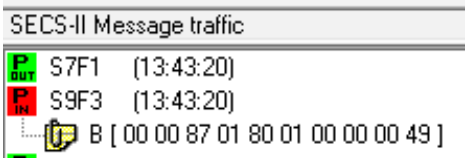
S9F1
<B[10] MHEAD >



S9F3: UNRECOGNIZED STREAM TYPE (reading device -> host)

The reading device does not recognise the stream type in the header of the message block.

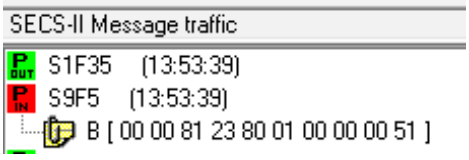
S9F3
< B[10] MHEAD >



S9F5: UNRECOGNIZED FUNCTION TYPE (reading device-> host)

The reading device does not recognise the function number in the header of the message block.

S9F5
< B[10] MHEAD >

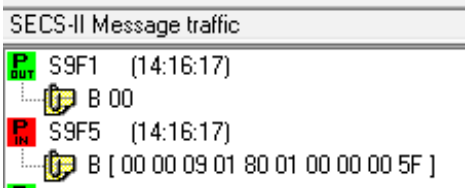


S9F7: ILLEGAL DATA (reading device -> host)

The reading device does not recognise the data in the message.

S9F7

< B[10] MHEAD >



S9F9: TRANSACTION TIMER TIMEOUT (reading device -> host)

This message indicates a timeout of a transmission timer and the cancellation of the corresponding transaction. Only the most recently transmitted message (that must be acknowledged by the host) is saved and its acknowledgement is monitored by time.

S9F9

< B[10] SHEAD >

11.3.6 Stream 18 (control and data transfer)

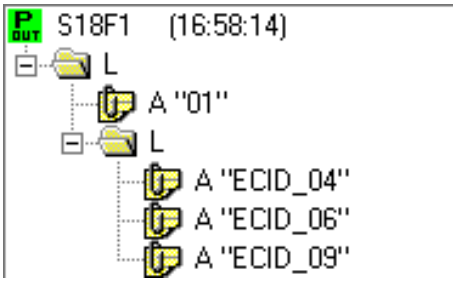
S18F0: ABORT TRANSACTION (reading device -> host)

This message is used instead of an expected reply to cancel an action. S18F0 (header only, no additional elements)

S18F1: Read parameter (host -> reading device, reply)

This message requests the current values of the parameters or states. Several attributes can be queried simultaneously by one message.

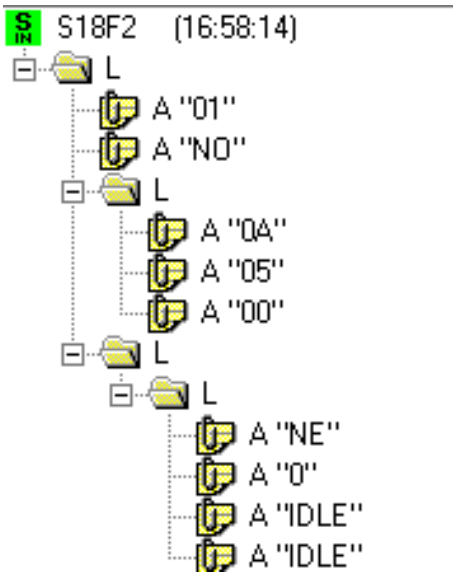
```
S18F1 W
 <L,2
<TARG
 ETID>
        < Ln
          <ATTRID1>
          …
          <ATTRIDn>
        >
     >
  >
```



S18F2: Read parameter, confirmation (reading device -> host)

This message requests the current values of the requested parameters or states.

```
S18F2
  <L,4
      <TARGETID>
      <SSACK>
      < L,n
          <ATTRVAL1>
          …
          <ATTRVALn>
              >
      < L,1
          <STATUSLISTE>

      -->
   >
```

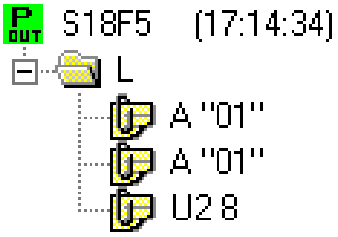


If the ATTRID of the S18F1 message is not known, the corresponding element ATTRVAL receives the value <nothing>.

S18F5: Read data (host -> reading device, reply)

This message is used for requesting the antenna head specified in the TARGETID for reading data (from the data area). DATASEG defines the start address of the data to be read. DATALENGTH defines the data volume of the data to be read.

```
S18F5 W
<L,3
        <TARGETID>
        <DATASEG>
        <DATALENGTH>
>
```

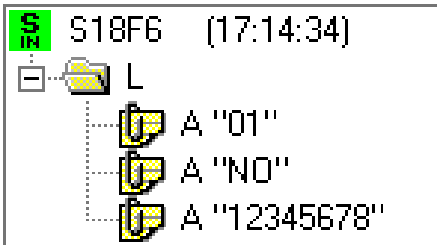


If both the DATASEG as well as the DATALENGTH are missing (elements with zero length), all pages of the data area are queried. If only the DATALENGTH is missing, all data on the specified start address is queried.
If the TARGETID is not known, a communication error (CE) occurs.

S18F6: Read data, confirmation (reading device -> host)

This message is used to return the requested information of the antenna head specified in the TARGETID or acknowledge the result of the request.

```
S18F6
<L,3
        <TARGETID>
        <SSACK>
        <DATA>
>
```

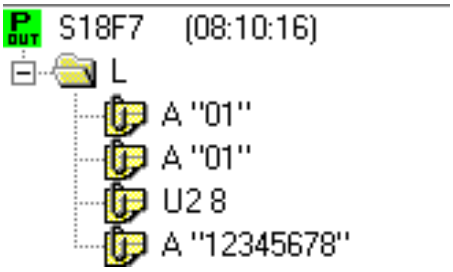


S18F7: Write Data (host -> reading device, reply)

This message is used for requesting the antenna head specified in the TARGETID to write data. DATA- SEG defines the start address of the data to be written. DATALENGTH defines the data volume of the

data to be written.

S18F7 W
<L,4
<TARGETID>
<DATASEG>
<DATALENGTH>
<DATA>
>

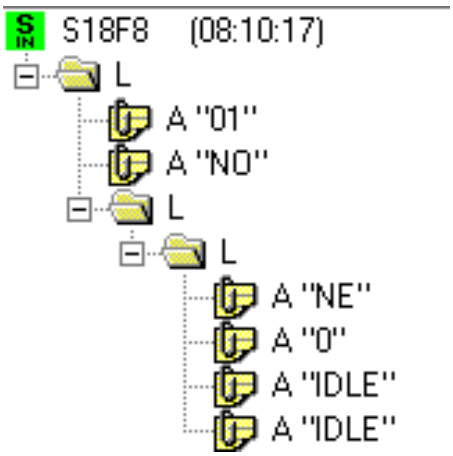


If both the DATASEG as well as the DATALENGTH are missing (elements with zero length), all pages of the data area are overwritten. If only DATALENGTH is missing or if DATALENGTH has the value zero, all data within the specified section must be written.
If the TARGETID is not known, a communication error (CE) occurs.
If DATASEG is missing (elements with zero length), the DATALENGTH value determines the length of the data to be written. If the length of the data to be written is greater than the value of the DATALENGTH, a communication error (CE) occurs.

S18F8: WRITE DATA ACKNOWLEDGE (WDA) (reading device ->host)

This message indicates whether the process for writing data on the antenna port specified in the TARGETID was successful or failed.

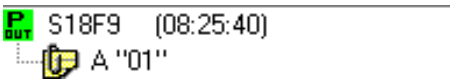
S18F8
<L,3
<TARGETID>
<SSACK>
< L,1
...<STATUSLISTE>
>
>



S18F9: Read MID (host -> reading device, reply)

This message is used for requesting the antenna head specified in the TARGETID for reading the MID.

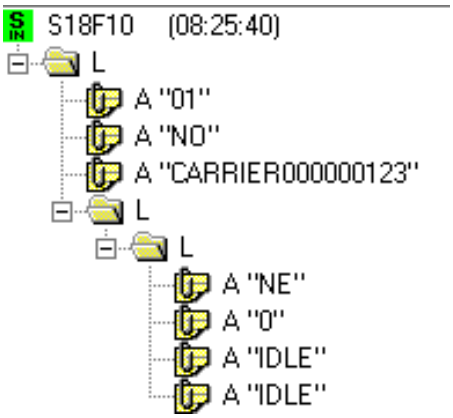
S18F9,W
<TARGETID>



S18F10: Read MID acknowledgement (reading devicet -> host)

This message returns a requested MID from the antenna head specified in the TARGETID.

S18F10
<L,4
<TARGETID>
<SSACK>
<MID>
< L,1
<STATUSLISTE>
>
>

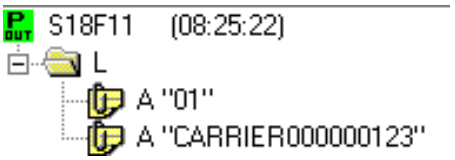


The reading device can be in maintenance mode (MT) or operating mode (OP) to read the MID with the message S18F9.

S18F11: Write data (host -> reading device, reply)

This message is used for writing the MID on the antenna head specified in the TARGETID.

S18F11,W
<TARGETID>
<MID>

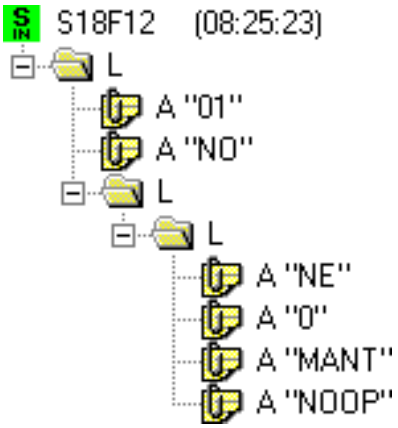


	The reading device must be in maintenance mode to write the MID with the Message S18F11. If the reading device is not in maintenance mode, the execution is cancelled and acknowledged with SSACK = „EE“ equipment error.

S18F12: Write Data, Acknowledgment (reading device -> host)

This message indicates whether the process for writing the MID on the subsystem specified in the TAR- GETID was successful or failed.

S18F12
<L,4
<TARGETID>
<SSACK>
< L,1
<STATUSLISTE>
>
>

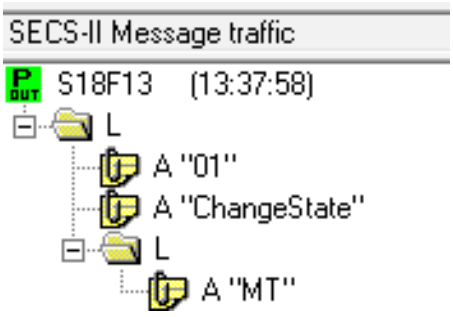


The reading device can be in maintenance mode (MT) to write the MID with the message S18F11.

S18F13: SUBSYSTEM COMMAND (host -> reading device, reply)

This message is used for requesting the subsystem specified in the TARGETID for executing a specific procedure.

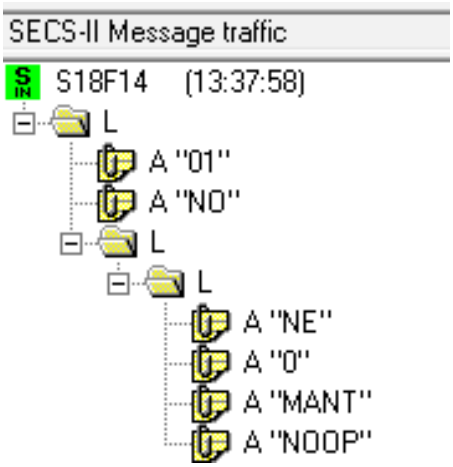
```
S18F13 ,W
<L,3
        <TARGETID>
        <SSCMD>
        <L,n
            1.  <CPVAL>
                …
            n.  <CPVALn>
        >
    >
```



S18F14: SUBSYSTEM COMMAND, ACKNOWLEDGE (Reading device-> host)

This message reports the result of the requested procedure.

```
S18F14 ,W
<L,3
        <TARGETID>
        <SSACK>
        < L,1
          <STATUSLISTE>

        >
     >
```



11.4 Parameter

	*): Since software revision V1.5 some parameters are implemented for each antenna port (→parameter array). Addressing of the parameter takes place via the reader ID of the message. In this realisation, the parameter is present once per antenna port. If no parameter arrays should be used, please ask the manufacturer (parameter 63)!

	**): Since software revision V1.5, the reader is always started with the default baud rate 19200Bd because of the protocol recognition. Please ask manufacturer HERMOS if other baud rate is required!

Nr. (DEZ)	Nr. (HEX)	Parameter name	Description
0	0x00	**Gateway ID**	The gateway ID is part of the device ID. The reading unit simultaneously acts as gateway and reader (CID-RW with integrated read head). It corresponds to the „Lower Device-ID“ in the message header. 00 .. 255 Default: Low Byte of serial number
1	0x01	**Baud rate**	Data transmission rate of the RS232 interface Default: 192 19200 Baud **)
2	0x02	**Inter-character Timeout T1**	1 … 100 1/10 s Default : (5) 0,5 s
3	0x03	**Block protocol Timeout T2**	1 … 250 1/10 s Default : (30) 3 s
4	0x04	**Reply Timeout T3**	1 … 120 1 s Default : (10) 10 s
5	0x05	**Inter-block Timeout T4**	1 … 120 1 s Default : (45) 45 s
6	0x06	**Retry limit RTY**	Number of retry attempts for a question or message. Default : 3
9	0x09	**Heartbeat time**	The reader sends a S1F1 message to the host at specified intervals. 0 … no heartbeat 1 … 255 1 s (1-255s) Default : 0 … no Heartbeat
11	0x0B	**ReaderID**	The reader ID is part of the device ID. The reader ID corresponds to the 7 LSB (least significant bits) of the „Upper Device ID“ in the message header. 00 … 127 (0x00 – 0x7F) Default : 0x01

14	0x0E	**Sensor polarity for individual presence sensor**	Type of sensor signal to start an automatic read. The setting is applied for the addressed sensor. 0 … read process when sensor is covered 1 … read process when sensor is uncovered Default : 0 Realisation: a separate parameter for each port *)
18	0x12	**Sensorstate of all heads**	The sensor status of each head is represented by a bit. The parameter can only be queried (readonly). 1 … Sensor is assigned 0 … Sensor is not assigned Bsp. 0b00001010 : Sensor at Head2 and Head4 is assigned
19	0x13	**Data length autoread**	The parameter determines the number of bytes read from the tag during an automatic read 0 … 136 (maximale 17 pages !!) Default: 8 Databytes Realisation: a separate parameter for each port *)
20	0x14	**Sensor delay time**	Delay of the sensor event before a sensor event is triggered and an automatic read operation is started. 0 … 255 (1/10s) Default: 10 (1s) Realisation: a separate parameter for each port *)
21	0x15	**Readmode sensor triggered reading**	Read mode for reading automatically started by external input. 00 - read only one page 01 - read until the end character or empty character2) 02 - read all pages 10 - read only one page with previous sensor Check1) 11 - read until the end character / empty character with previous sensor Check 1) 2) 12 - read all pages with previous sensor Check1) 1) If the Sensor Check (10, 11 and 12) is activated, the assignment of the potential-free input is checked before initiating a read / write process. When used, the read / write process is started, otherwise the error message „NOTAG“ is sent. 2) ‚E‘ or ‚F‘ in ID bits 0 ... 3 of the read ID Default: 00 … (read only one page) Realisation: a separate parameter for each port *)
22	0x16	**Page number for readmode 00**	The page to read for readmode 00: 0: Read all transponders 1: Page 1 Read multipage transponders ... 17: Page 17 Read multipage transponders 240: read read-only transponder 241: read read-write transponder Default: 0 (read all transponders) Realisation: a separate parameter for each port *)

23	0x17	**Triggered read frequency**	For a read / write error, the triggered reading frequency sets the time between two read / write attempts for a transponder; Read frequency in case of a triggered read (no polling) 02 … 10 (1/10s) Default: 5 (0,5s) Realisation: a separate parameter for each port *)
24	0x18	**r/w max repeat**	Maximum number of read and write retries 0 … 255 Default: 5 Realisation: a separate parameter for each port *)
25	0x19	**Transponder Type**	The parameter defines the validity of the read data of the transponder. 0 … read / write type TIRIS Each transponder page consists of 8 data bytes and 2 bytes CRC checksum. The validity of the data bytes is verified by a checksum 1 … A transponder page is interpreted as 10 data bytes without checksum. Default: 0
26	0x1A	**Sensor Activity**	The sensor activity of each head is represented by a bit. For each sensor exactly one bit is provided. 0 … Sensor not activated 1 … Sensor activated Standard: 0x0F
27	0x1B	**Watchport for individual Presence Sensor**	Enables a message to the host if a sensor has been used or if the occupancy has been removed. A sensor is required on use this feature. 0 …message no action 1 …message Sensor assignment has been removed 2 …message Sensor assignment has been detected 3 …message occupancy detected and removed. Default: 3 Realisation: a separate parameter for each port *)
29	0x1D	**Transponder load duration (read mode)**	Charging time of a transponder during the reading process. The default setting should not be changed. Default: 50 … (50ms) Realisation: a separate parameter for each port *)
30	0x1E	**r/w synchronize**	Activates / deactivates the synchronization of the reader. When synchronization is enabled, the reader detects interference or other active readers and synchronizes the read cycle . 0 … synchronization deactivated 1 … synchronization activated Default: 1 … activated

33	0x21	**Automatic antenna tuning**	The parameter controls the allowed triggers of an automatic adjustment of the antenna . 0 … autom. Customization is not activated 1 ... autom. Adaptation via DIP4 2 ... autom. Adaptation by external command 3 ... autom. Adaptation via DIP4 or external command Default: 3
34	0x22	**Sensor polarity of all presence sensors**	Type of sensor signal to start an automatic read. One bit is provided for each sensor (Bit0 Sensor 1, ..., Bit3 Sensor 4) with the following meaning 0 … read when sensor is covered 1 … read when sensor is uncovered Value range Parameter: 0x00 bis 0x0F Default: 0 (reading starts on all sensors when sensor is covered)
35	0x23	**Spezial Features**	**Bit 0**: After a hardware reset, the reader will auto-read if the presence sensor is covered. 0 ... execute read operation after reset, when sensor is covered 1 ... Do not execute a read after reset, when the sensor is covered (standard) **Bit 1**: Trigger sensor-triggered automatic read operation 0 ... reading after detected sensor trigger 1 ... No automatic reading with detected sensor **Bit 2**: 0: non volatile memory is used for saving the reader ID at reset process **Bit 2**: 1: non volatile memory ist not used **Bit 3**: without function **Bit 4**: set external head LED1 at sensor triggered read **Bit 5**: page transfer when reading the first page of a multipage transponder 0 ... without page transfer 1 ... with page transfer **Bit 6**: external head LED1 will be influenced at ASC-W1 mode **Bit 7**: external head LED2 will be influenced at ASC-W1 mode Default: 0x01 … (0000 0001)

36	0x24	**DIP switch activation**	Bit 0 to bit 4 defines the behavior of the four externally accessible DIP switches. Bit0: DIP 4 active Bit1: DIP 3 active Bit2: DIP 2 active Bit3: DIP 1 active Bit4: Value (1): If no test mode is activated (DIP3 = OFF), the set antenna port (via DIP1 and DIP2) is tuned automatically by changing the DIP 4 from OFF to ON. If tuning is successful, the adjustment for the port is saved and the Status LED is switched on. Default: 0x1F
37	0x25	**MID Area**	The parameter defines the range of the MID. The parameter defines the maximum number of pages of a transponder reserved for the MID. One page usually has 8 bytes of data. The default value is customer specific 0…10 pages Default: 0,1 or 2 pages
38	0x26	**Test after software reset**	This parameter activates / deactivates the initial test after a software reset . 0 … No initial test after software reset 1 … initial test after software reset Default: 0
40	0x28	**Transponder load duration (write mode)**	Charging time of a transponder during the writing process. The default setting should not be changed Default: 50 … (50ms)
41	0x29	**Delay time between read cycles**	Delay time between two read cycles. A reduction of the delay increases the reading speed. 1 .. 250 (1 ms) Default: 10 … (10ms)
42	0x2A	**CarrierIDOffset**	Sets the offset of the CID (= MID) within the MID area. The valid value range depends on the value of the MIDArea (maximum MID range) and the CarrierID-Length. Default: 0
43	0x3B	**CarrierIDLength**	Sets the length of the CID (= MID) within the MID area. The valid value range depends on the value of the MIDArea (maximum MID range) and the Carrie-rIDLength. The default value is customer specific! Default: 0 or 16

44	0x2C	**FixedMID**	Defines the read and write behavior of the CID length specified in SEMI E99-03. 0 ... Dynamic CID length The length of the MID is variable. Valid Lengths are from 1 - CID Length Bytes. 1 ... Fixed CID length The length of the MID is at CID Length established. A departure from this length leads to an error message. The default value is customer specific! Default: 0 or 1
45	0x2D	**MIDFormat**	Defines the physical format of the MID data in the transponder. 0 … E99 standard format left justified. Default: 0
59	0x3B	**Hardware Error (read only)**	The read-only parameter provides the information as to whether a tuning or antenna error was detected during reading. If there is an error, this is also indicated by the fast flashing red status LED. 0… no error 1… tuning error 2… antenna error 3… tuning and antenna error
60	0x3C	**Threshold Noise Level**	The parameter sets the threshold for the noise level, which is used as a measure of whether an interference field is present in the environment of the antenna. 0… 255 Default: 20
61	0x3D	**Noise Level (read only)**	The read-only parameter provides the information as to which noise level in the environment of the antenna could currently be measured. The value is a measure of ambient noise and interference in the environment of the antenna. Values above an adjustable threshold (parameter 60) are interpreted as a interference (noise).
62	0x3E	**Noise Detected (read only)**	The read-only parameter provides the information as to whether the ambient noise level measured in the environment of the antennas is interpreted as interference (threshold Noise Level exceeded). See also parameters 60 and 61.
70	0x46	**Software Version String (read only)**	The read-only parameter returns the complete identifier of the current firmware.
71	0x47	**Serial number string (read only)**	The read-only parameter provides the complete serial number string.

72	0x48	**Hardwarerevision String (read only)**	The read-only parameter provides the complete identifier for the hardware version.
75	0x4B	**DIP switch status (read only)**	The parameter is used to query the position of all DIP switches. Bit0: DIP 4 (0=off, 1=on) Bit1: DIP 3 (0=off, 1=on) Bit2: DIP 2 (0=off, 1=on) Bit3: DIP 1 (0=off, 1=on) The result is independent of parameter 36 (0x24).
76	0x4C	**Saved fatal errors or events (read only)**	The read-only parameter retrieves all errors and events stored in a ring memory. Since only about 25 characters are read out of the memory per call, it may need to be retrieved several times until it is completely emptied. Fatal errors and the creation of default paramters will be saved.
80	0x50	**Antenna tuning of the antenna 1**	By automatically adjusting the antenna, the influence of ambient conditions can be minimized 00 ... 15 value of antenna adjustment
81	0x51	**Antenna tuning of the antenna 2**	See parameter 80
82	0x52	**Antenna tuning of the antenna 3**	See parameter 80
83	0x53	**Antenna tuning of the antenna 4**	See parameter 80
84	0x54	**Antenna tuning of the addressed antenna**	By automatically adjusting the antenna, the influence of ambient conditions can be minimized 00 ... 15 value of antenna adjustment Default: 08 Realisation: a separate parameter for each port *)

96	0x60	**Set default parameters**	Via this parameter default parameters of the reader can be established. Factor setting parameters remain unaffected! 0... reset all parameters 1... reset all parameters except network settings The query of the parameter returns the fine version of the software version.
97	0x61	**Default protocol**	This parameter provides information about the currently set protocol. Automatic protocol selection distinguishes between "ASCII" and "ASCII" 1 "SECS" protocol. Setting the parameter causes the reader to be restarted if the protocol is changed.… SECS/HSMS 2 … ASCII Default: 1
98	0x62	**Protocol change allow**	This parameter can be used to allow a detected protocol change. This will then set the new default protocol and restart the device. If the protocol change is suppressed, no automatic change takes place. 0 … protocol change not allowed 1 ... protocol change allowed Default: 1
99	0x63	**Customer Code**	Special customer parameter settings that differ from the basic settings. Several parameter values are set by a customer code. The following parameters are defined: 0 … device version according to SEMI E99-0303 Par. 37 = 2 Par. 42 = 0 Par. 43 = 16 Par. 44 = 1 Par. 45 = 0 3 … device version before SEMI E99-0303 Par. 37 = 1 Par. 42 = 0 Par. 43 = 8 Par. 44 = 0 Par. 45 = 0 4 … device version without MID Par. 37 = 0 Par. 42 = 0 Par. 43 = 0 Par. 44 = 1 Par. 45 = 0 Default: 0

11.5 Examples of a SECS / HSMS message

Start routine of the HSMS protocol:

```
16:00:31 Length Byte   ( 00 00 00 0A )
16:00:31 Select.req    ( FF FF 00 00 00 01 80 00 00 01 )
16:00:31 Length Byte   ( 00 00 00 0A )
16:00:31 Select.rsp    ( FF FF 00 00 00 02 80 00 00 01 )
16:00:31 Length Byte   ( 00 00 00 0A )
16:00:31 Linktest.req  ( FF FF 00 00 00 05 80 00 00 02 )
16:00:31 Length Byte   ( 00 00 00 0A )
16:00:31 Linktest.rsp  ( FF FF 00 00 00 06 80 00 00 02 )
16:00:32 Length Byte   ( 00 00 00 0A )
16:00:32 Linktest.req  ( FF FF 00 00 00 05 80 00 00 01 )
16:00:32 Length Byte   ( 00 00 00 0A )
16:00:32 Linktest.rsp  ( FF FF 00 00 00 06 80 00 00 01 )
```

S1F1 – Query Software version

```
16:02:15 Length Byte   ( 00 00 00 0A )
16:02:15 Header        ( 01 34 81 01 00 00 00 00 00 35 )
16:02:15 Length Byte   ( 00 00 00 1C )
16:02:15 Header        ( 01 34 01 02 00 00 00 00 00 35 )
16:02:15 Data          ( 01 02 41 06 4C 46 4D 5F 34 78 41 06 4C 46 4D 53 31 32 )
```

```
P OUT  S1F1   (16:02:15)
S IN   S1F2   (16:02:15)
  L
    A "LFM_4x"
    A "LFMS12"
```

S2F13 – Query parameter 3

```
16:04:39 Length Byte   ( 00 00 00 0F )
16:04:39 Header        ( 01 34 82 0D 00 00 00 00 00 36 )
16:04:39 Data          ( 01 01 A5 01 06 )
16:04:39 Length Byte   ( 00 00 00 0F )
16:04:39 Header        ( 01 34 02 0E 00 00 00 00 00 36 )
16:04:39 Data          ( 01 01 A5 01 03 )
```

```
P OUT  S2F13   (16:04:39)
  L
    U1 6
S IN   S2F14   (16:04:39)
  L
    U1 3
```

S2F15 – Set parameter 3 to value 5

```
16:06:09 Length Byte   ( 00 00 00 14 )
16:06:09 Header        ( 01 34 82 0F 00 00 00 00 00 37 )
16:06:09 Data          ( 01 01 01 02 A5 01 06 A5 01 05 )
16:06:10 Length Byte   ( 00 00 00 0D )
16:06:10 Header        ( 01 34 02 10 00 00 00 00 00 37 )
16:06:10 Data          ( 21 01 00 )
```

```
P OUT  S2F15   (16:06:09)
  L
    L
      U1 6
      U1 5
S IN   S2F16   (16:06:10)
    B 00
```

Automatic reading by sensor event:
S3F5 - Material found
S3F13 - MID read

```
16:08:09 Length Byte   ( 00 00 00 12 )
16:08:09 Header   ( 01 34 83 05 00 00 00 02 00 09 )
16:08:09 Data   ( 01 02 21 01 20 21 01 21 )
16:08:09 Length Byte   ( 00 00 00 0D )
16:08:09 Header   ( 01 34 03 06 00 00 00 02 00 09 )
16:08:09 Data   ( 21 01 00 )
16:08:09 Length Byte   ( 00 00 00 1A )
16:08:09 Header   ( 01 34 83 0D 00 00 00 02 00 0A )
16:08:09 Data   ( 01 02 21 01 21 21 09 01 43 41 52 52 49 45 52 30 )
16:08:09 Length Byte   ( 00 00 00 0D )
16:08:09 Header   ( 01 34 03 0E 00 00 00 02 00 0A )
16:08:09 Data   ( 21 01 00 )
```

```
S3F5   (16:08:09)
  L
    B 20
    B 21
S3F6   (16:08:09)
  B 00
S3F13   (16:08:09)
  L
    B 21
    B [ 01 43 41 52 52 49 45 52 30 ]
S3F14   (16:08:09)
  B 00
```

S3F7 - Material lost

```
16:08:11 Length Byte   ( 00 00 00 1D )
16:08:11 Header   ( 01 34 83 07 00 00 00 02 00 0B )
16:08:11 Data   ( 01 03 21 01 20 21 01 01 21 09 01 43 41 52 52 49 45 52 30 )
16:08:11 Length Byte   ( 00 00 00 0D )
16:08:11 Header   ( 01 34 03 08 00 00 00 02 00 0B )
16:08:11 Data   ( 21 01 00 )
```

```
S3F7   (16:08:11)
  L
    B 20
    B 01
    B [ 01 43 41 52 52 49 45 52 30 ]
S3F8   (16:08:11)
  B 00
```

S18F5 - Read data

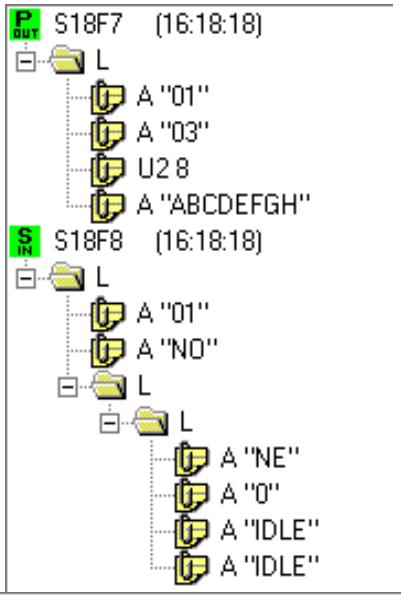
Antenna port: 1
Page: 3
Data length: 8

```
16:14:20 Length Byte   ( 00 00 00 18 )
16:14:20 Header   ( 01 34 92 05 00 00 00 00 00 41 )
16:14:20 Data   ( 01 03 41 02 30 31 41 02 30 33 A9 02 00 08 )
16:14:20 Length Byte   ( 00 00 00 1E )
16:14:20 Header   ( 01 34 12 06 00 00 00 00 00 41 )
16:14:20 Data   ( 01 03 41 02 30 31 41 02 4E 4F 41 08 41 42 43 44 45 46 47 48 )
```

```
S18F5   (16:14:20)
  L
    A "01"
    A "03"
    U2 8
S18F6   (16:14:20)
  L
    A "01"
    A "NO"
    A "ABCDEFGH"
```

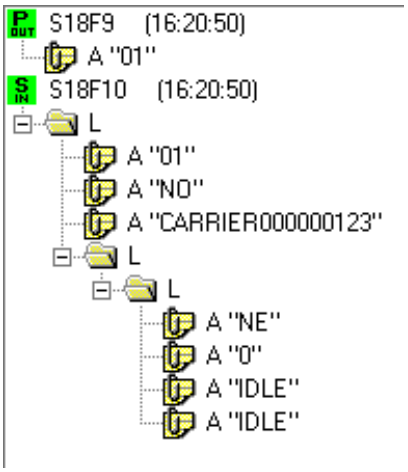
S18F7 - Write data

Antenna port: 1
Page: 3
Data length: 8
Data: „ABCDEFGH




```
16:18:18 Length Byte  ( 00 00 00 22 )
16:18:18 Header  ( 01 34 92 07 00 00 00 00 00 42 )
16:18:18 Data  ( 01 04 41 02 30 31 41 02 30 33 A9 02 00 08 41 08 41 42 43 44 45 46 47 48 )
16:18:18 Length Byte  ( 00 00 00 2B )
16:18:18 Header  ( 01 34 12 08 00 00 00 00 00 42 )
16:18:18 Data  ( 01 03 41 02 30 31 41 02 4E 4F 01 01 01 04 41 02 4E 45 41 01 30 41 04 49 44 4C 45 41 04 49 44 4C 45 )
```

S18F9 – Read MID

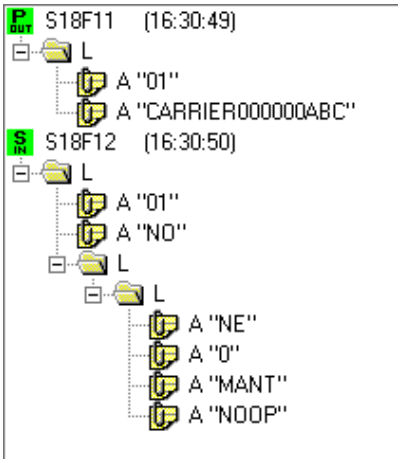



```
16:20:50 Length Byte  ( 00 00 00 0E )
16:20:50 Header  ( 01 34 92 09 00 00 00 00 00 45 )
16:20:50 Data  ( 41 02 30 31 )
16:20:50 Length Byte  ( 00 00 00 3D )
16:20:50 Header  ( 01 34 12 0A 00 00 00 00 00 45 )
16:20:50 Data  ( 01 04 41 02 30 31 41 02 4E 4F 41 10 43 41 52 52 49 45 52 30 30 30 30 30 30 31 32 33 01 01 01 04 41 02 4E 45 41 01 30 41 04 49 44 4C 45 41 04 49 44 4C 45 )
```

S18F11 - Describe MID

With the message S18F11 the MID area can be described. The MID can only be written in maintenance mode.

Use the S18F13 message to put the reading device into the maintenance state.



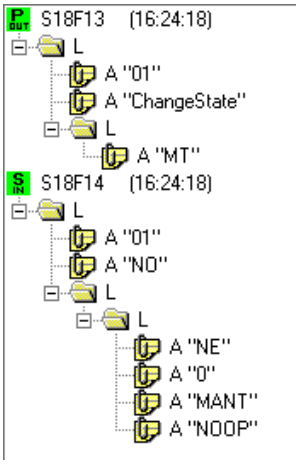
16:30:49 Length Byte (00 00 00 22)
16:30:49 Header (01 34 92 0B 00 00 00 00 00 48)
16:30:49 Data (01 02 41 02 30 31 41 10 43 41 52 52 49 45 52 30 30 30 30 30 30 41 42 43)
16:30:50 Length Byte (00 00 00 2B)
16:30:50 Header (01 34 12 0C 00 00 00 00 00 48)
16:30:50 Data (01 03 41 02 30 31 41 02 4E 4F 01 01 01 04 41 02 4E 45 41 01 30 41 04 4D 41 4E 54 41 04 4E 4F 4F 50)

S18F13 – Subsystem Command „Change to Maintenance Mode”

The reading device must first be set to maintenance mode to write tot he MID area.

SSCMD = „ChangeState“
CPVAL = „MT“ (Maintenance)

The CPVAL „OP“ can be used to switch back to the normal operating mode.



16:24:18 Length Byte (00 00 00 23)
16:24:18 Header (01 34 92 0D 00 00 00 00 00 47)
16:24:18 Data (01 03 41 02 30 31 41 0B 43 68 61 6E 67 65 53 74 61 74 65 01 01 41 02 4D 54)
16:24:18 Length Byte (00 00 00 2B)
16:24:18 Header (01 34 12 0E 00 00 00 00 00 47)
16:24:18 Data (01 03 41 02 30 31 41 02 4E 4F 01 01 01 04 41 02 4E 45 41 01 30 41 04 4D 41 4E 54 41 04 4E 4F 4F 50)

11.6 Error codes

SSACK	Name	Description	Cause	Corrective action
NO	Normal operation	Indicates the success of the requested operation		no
EE	Execute Error	Transponderdaten und Lese-ID-Sequenz können nicht gelesen werden	Reader processes previous read or write request	Please wait until previous query is finished
			Transponder has no or too few valid ASCII characters in the MID area	Program transponder with valid ASCII characters in the MID area
			Parameters for MID range do not match the transpon-der data	Adjust reader parameter for MID area according to transponder data area for MID
			Wrong reader mode (MANT / OP) for functional operation	Switch to proper mode (MANT to write MID)
CE	Communica tion Error	Syntax error with message or message format or wrong value	List format, list set or data type is wrong	Check SECS message syntax
			Data sent with a command is incorrect	Check command syntax and data
			Send parameter is not im-plemented or out of range	Check parameter syntax and value

12. Service and Troubleshooting

12.1 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.

12.2 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.

12.3 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 prior to opening the unit.

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.

12.4 Error indications on the device

Power-LED is off

- Check the power supply and the connecting cables!
- Remove the power adapter. Open the case and check the fuse. Replace the fuse with a fuse specified by the manufacturer!
- If the above measures do not resolve the problem, contact the manufacturer.

12.5 No communication with the reading device

- Check the interface connection cable for damage and correct connection!
- Check the power LED is lit, and make sure that the status indicator does not indicate an error.
- Try to read in the reader with the HERMOSDevice-Discoverer and check the device settings.
- If the above measures do not correct the error, please contact the manufacturer.

12.6 Software releases

Release-date	Version	Description
12.05.2017	LFM4I1.1 (ASCII) LFMS11 (SECS/HSMS)	Initial release
24.01.2018	LFM4I1.3 (ASCII) LFMS13 (SECS/HSMS)	ASC-W1 Mode, I/O‘s Erweiterung um Kunden-modus 4 mit ReaderID 0 bis 3.
09.07.2018	LFM4I1.4 (ASCII) LFMS14 (SECS/HSMS)	Another Factoryparameterset 5, which makes special settings for the 24 volt I / O module (6 sensors and 8 outputs). ReaderID from value 0.
17.01.2019	LFM4I1.5 (ASCII) LFMS15 (SECS/HSMS)	- Partial parameterization per antenna port - Readertest over UDP Protocol - Storing of FatalErrors in the EEPROM and their retrieval

12.7 Customer service

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

Phone	+49 (0) 9279 – 991 -0
Fax	+49 (0) 9279 – 991 -100
E-Mail	rfid@hermos.com
URL:	http://www.hermos.com/de/produkte/rfid/

13. Disassembly and storage

13.1 Disassembly

- Remove the power supply
- Remove all cables
- Loosen and remove the mounting screws
- Remove the reading device from the installation area

13.2 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.

14. Transport and disposal

14.1 Transport

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

14.2 Disposal

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

- Do not dispose of the unit in normal household 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