Customer manual
LFM LP Reader Rev.1.2

0. Table of contents

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.

The copyright for the operating instructions lies solely with

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As of: Juli – 2017

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 domestic, vehicle or open air use.

Intended use also includes the following:

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

Improper use, which can endanger the 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

Danger of injury due to unauthorised modifications

WARNING

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.

Danger of injury and interruption of operation due to improper use

WARNING

There are risks through the improper use of the device.

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

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2. Version history

Version	Date	Author	Amendments
1.1	26.09.2018	HERMOS AG RK	Initial version of customer documentation
1.2	16.11.2018	HERMOS AG RK	FCC, additional Parameters

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 provided 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 combination 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**		

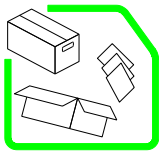
5.2.2 Warning signs

	**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

	**Dispose of packaging material according to rules and regulations**		**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.

Risk of injury due to insufficient personnel qualifications

WARNING

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

5.3.3 ESD Instructions

CAUTION

Static electricity can damage electronic components in the 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 reduce 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 ➔ 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 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
- 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!

6.2.3 Sensor-triggered operation

Device versions with IO port offer the function of a sensor-triggered automatic reading operation. The reading device automatically performs a reading operation when the input is triggered. The type of action

(inventory/reading) can be defined with the parameters „Read mode“ and „Read page“.
The read data is automatically sent to the host.
The result of the reading operation (successful, not successful) can be optionally output via I/O s of the antenna port.

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. These test mode can be activate with a push button.

If the device is in test mode (maintenance mode) three tri-colour LEDs shows the state of the test mode. The chapter "Status LEDs" describes the behaviour in test mode.

➔ see also chapter „push button switches“

6.3 Illustration

6.3.1 Top view

Component	Describtion
Power supply	M12-A plug for 24V DC power supply.
Antenna connection	Lemo antenna connector
Status-LEDs	--->see page 28
Push buttons	Tuning push button switch starts an automatic antenna tuning. Test push button activates the read test mode. On a long press the write test mode is activated.

Ethernet interface	Depending on the device model, the reading device features a 10/100 BaseT Ethernet interface.
RS232 interface	Depending on the device model, the reading device features a RS232 interface (9-pin Sub D female).
GPIO	Optional is a GPIO port available, M8 connector

6.4 Technical data

Technical data	
Voltage (protected against reverse polarity)	24VDC (18 – 30 V DC)
Current consumption @24V (passive, reading, pulse 50ms)	50mA, 200mA, max.580mA
Fuse type Nano2	375 mA
Operating temperature	-0 bis 50 °C
Storage temperature	-20 °C bis 70 °C
Permissible humidity at 50°C	25 – 80 %
Transmission frequency	134,2 kHz
Serial Interface	RS232
Ethernet interface	10/100 BaseT
Protocol	ASCII, SECS / HSMS
Housing material l	Aluminium, black and white anodised
Protection	IP20
Reader dimensions	115 x 82 x 35 mm
Weight	250 g

The device label with the CE label, article and serial number are located on the side of the reading unit.

6.4.1 Power supply and current input

Description	Min.	Typ.	Max.	Unit
Voltage (reverse polarity protected)	18	24	30	V (DC)
Current consumption (Read/Write Pulse 50ms)		200 350	580	mA
Current (passive)		50		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 (only for ethernet type)
5. Manufacturer

6.4.3 Device Label FCC ID 2AP5OLFM-LP

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-LP
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.

7. Installation

Follow the basic safety instructions in the chapter Safety instructions.

7.1 Safety instructions

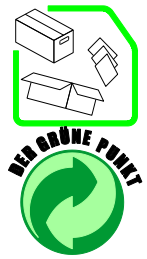
	The unit is exclusively designed for indoor use in an industrial environment. The unit may only be installed indoors with a temperature and humidity level with in the range of the specified technical module parameters.
	Never use the unit near or in water. Never pour liquids of any type over the unit. 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 registers, 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 condensation 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

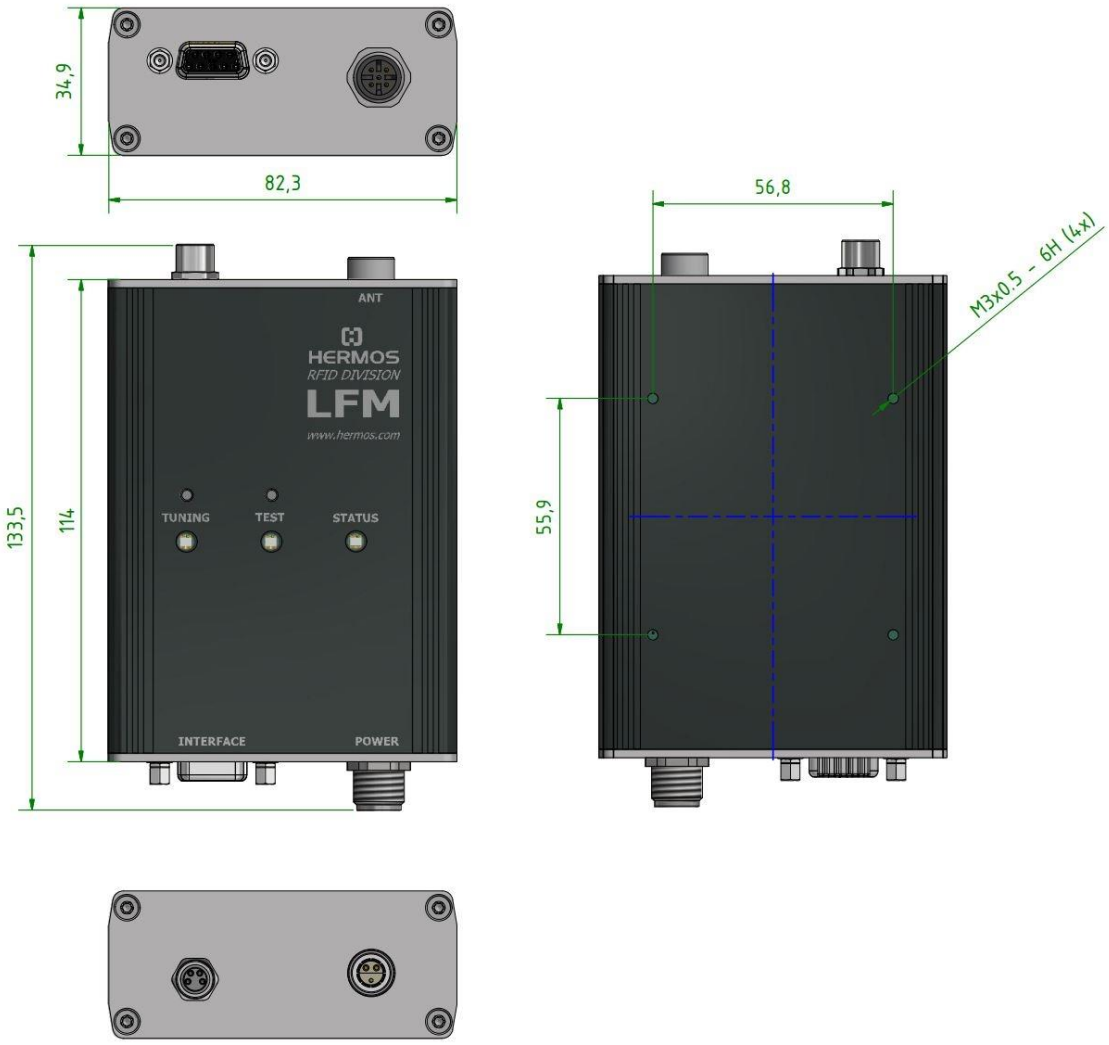
The LF reading device and the accessories can be packed customer-dependent in clean room conditions. In order to maintain this condition, the devices must be unpacked in clean room conditions.

	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:



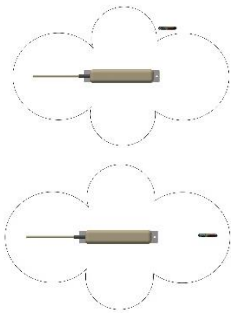
7.5 Installing the antenna

	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. Tune antenna after a new antenna installation!
	Tune antenna after a new antenna installation! The tuning function can be started with the tuning button.

7.5.1 Positioning the antenna

The removal and alignment of the transponder to the 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 tuning button.

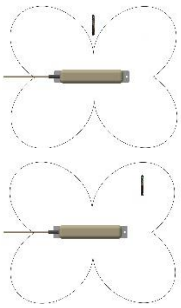
Transponder parallel to the antenna axis:



Transponder is outside the antenna range

Transponder is within the antenna range

Transponder vertical to the antenna axis:

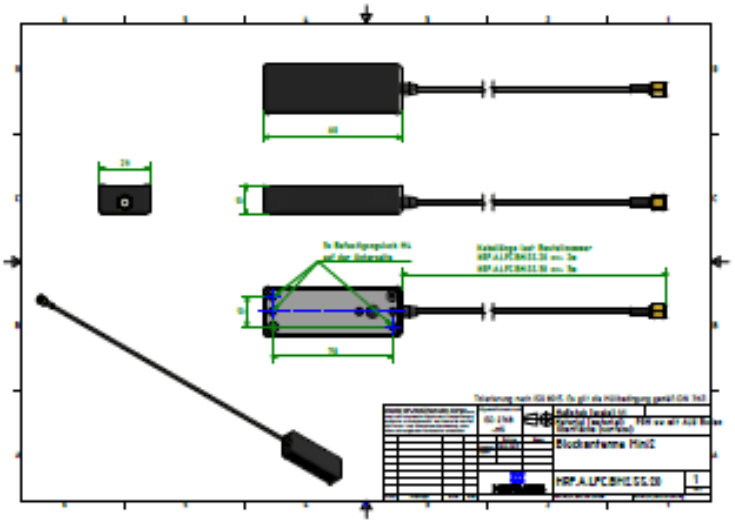


Transponder is outside the antenna range

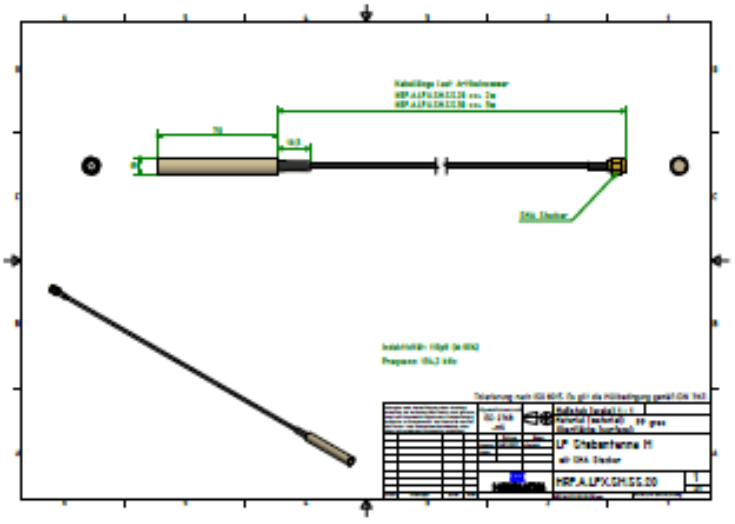
Transponder is within the antenna range

7.5.2 Antennas dimensions

Block antenna Mini2



Rod antenna M, (HRF.A.LFX.SM.LS.20)



The type of connector is only symbolic and may vary!

7.5.3 Connecting the antenna

Connect the antenna at the antenna connection at the rear of the reading unit.

	Use the antennas and antenna cable from the manufacturer to ensure optimum reading and writing ranges.
	Tune antenna after a new antenna installation! The tuning function can be started with the tuning button.

7.6 Power Supply M12-A connector

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

PIN	Signal
1	+24V DC
2	0 V
3,4,5	NC

	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.

If the device is connected to the power supply, the Status LED lights green (->parameter 35).

7.6.1 Tuning push button

If the pushbutton is held down for a defined time (->parameter 54+55), the status of the pushbutton is changed and an automatic antenna tuning is initiated when enabled (->parameter 33 and 36).

If the Reader is in test mode, the test mode for the automatic antenna tuning is briefly interrupted when enabled (->parameter 33).

7.6.2 Test push button

If the button is held pressed for a defined time (->parameter 56+57), the status of the button is changed.

If the state changes from "Off" to "On", the test mode Read is started when the Test push button is enabled (->parameter 36). If the push-button is then held without interruption for a further defined period of time (->parameter 56), it switches to the Write test mode. If the state of the button changes from "On" to "Off", the test mode Read or Write is terminated. The current state of the test mode is indicated by a unique status LED (->Status LED).

7.7 Status LEDs

Status LEDs:
The status LED is a tri-colour/RGB LED. The white or blue status LED indicates the status of the test mode. If the reader is in maintenance mode or the reading test mode is running, the white status LED flashes at about 1 Hz in reading testmode and 2 Hz in maintenance mode. If the reader is in maintenance mode and the writing test mode is running, the blue status LED flashes at about 1 Hz. If the reader is in normal operation mode, the green status LED is permanently shining (->parameter 35).

Test LEDs:
The test LED is a tri-colour/RGB LED. The red and green Test LEDs are used for the reading and writing feedback in test or polling mode.
If the read or write process is successful, the green test LED remains permanently lit. If the read or write process fails, the red test LED shines.

In normal operation mode the red and green test LEDs are used for the last reading and writing feedback. In this mode the red or green test LED will light for 5 seconds (->parameter 84) after the last reading.

Tuning LEDs:
The tuning LED is a tri-colour/RGB LED. The red and green tuning LEDs are used for the tuning feedback. After a successful antenna tuning, the green tuning LED is switched on for 5 seconds (->parameter 84). If no valid antenna tuning is found during antenna tuning or if an invalid tuning is detected during a read operation, the red tuning LED flashes quickly for 5 seconds (->parameter 84 and 85). During automatic antenna tuning, the blue tuning LED flashes.

After a powerup reset, the Tri-Colour LEDs undergo a short self-test and then display the set communication protocol for one second:
SECS: The red status LED goes on briefly
ASCII: The red test LED goes on briefly

7.8 RS232 connection

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

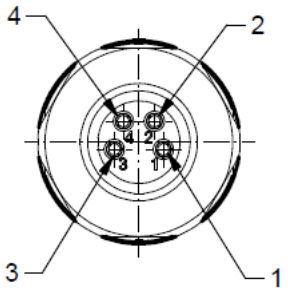
PIN	Signal
1	NC

2	TxD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

7.1 GPIO connection (optional)

A M8 socket (4pos.) is used as connection socket for the GPIO

PIN	Signal
1	+24V
2	LED out
3	GND
4	Input



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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).

3. An antenna must be properly connected to the reading device. If the antenna has not yet been tuned (->Status LEDs), then the automatic tuning must be carried out.

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

5. After startup the reader works in operation mode.

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 in the SECS protocol (->Parameter 0x01). If you want to change the baud rate in the ASCII protocol, then please contact the manufacturer HERMOS.

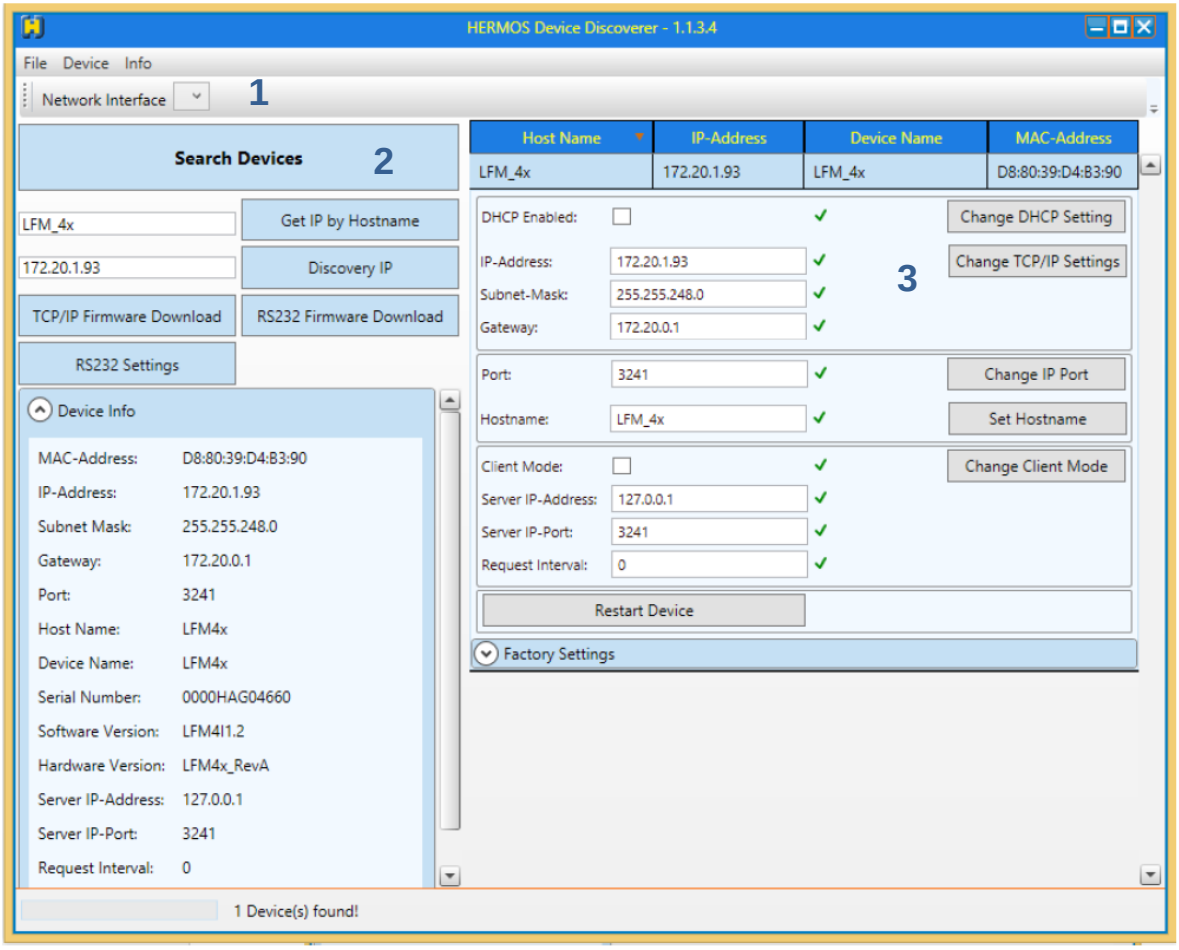
	Value
Baud rate	19200
Data bits	8
Stop bits	1
Parity	ASCII: Even SECS/HSMS: None

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 ZeroConf 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 "Device Discoverer" is available for configuring the network setting. HERMOS components can be found in the LAN network and settings can be easily changed using the "Device Discoverer".



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".

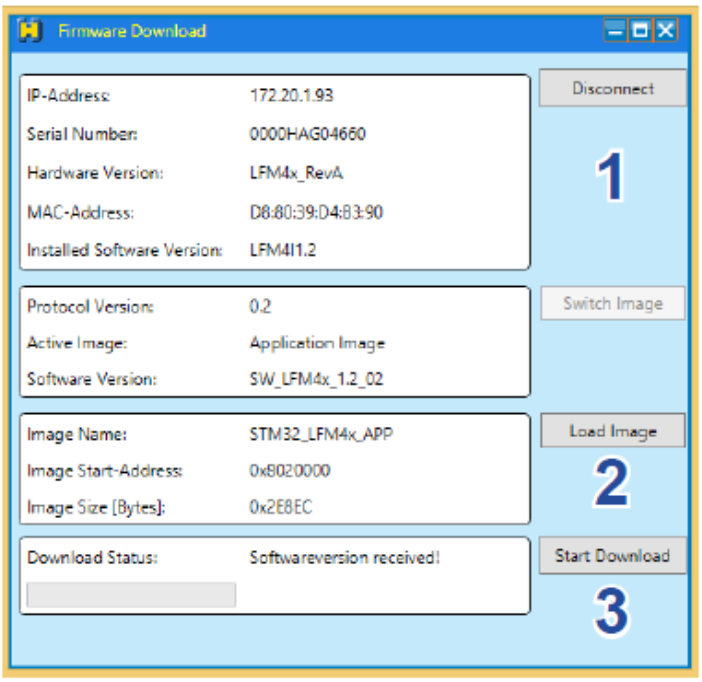
CAUTION

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

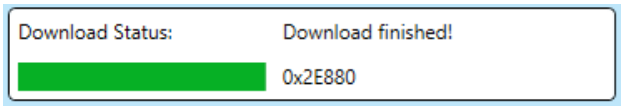
8.4 Firmware update

Firmware updates can also be performed using the "Device Discoverer" HERMOS.
Start the tool with administrator rights and scan the network for all HERMOS devices.

To do this, mark the desired reading device and select "TCP/IP Firmware Download" or "RS232 Firmware Download" button depending on your interface. Use "HERMOS" if you are asked to enter a password!



1. Open the download connection by pressing the connect button.
2. Select the new firmware file using the load image button.
3. 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.

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 (->Status LEDs) during the boot process.

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 reinitialized. 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 possible after another reset. Automatic log detection can be enbaled or disabled with parameter 98.

	If the reader receives undefined or random characters, this may result in an accidental protocol change. Automatic log detection can be deactivated in parameter 98. On default the automatic protocol detection is disabled.

9.2.3 Triggered protocol change

During a powerup reset a protocol change can be performed. To do this, press and hold the test and tuning button during the powerup reset until only red LED lights up at the end. If the red test LED is lit then the protocol has been changed from SECS to ASCII. If the red status LED is lit then the protocol has been changed from ASCII to SECS.

9.3 Customer modes

The reader LFM LP can be delivered with a few customer modes. The settings of the customermode is part of the factory settings and can only be changed by Hermos. If customer needs another customer setting, please ask Hermos for the necessary steps. The customercode can be read by parameter 64.

Customermode 0:
The antenna will be addressed by the ReaderID „0“ or TargetID „1“.
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.

10. ASCI-I1 Communication protocol

The ASCI-I1 communication protocol defines a simple communication interface that is suitable for exchanging messages between a HERMOS reader and a host. A host is a computer or computer network that exchanges the information with the systems to carry out the production.

Serial communication:

On serial communication the ASCI-I1 message is transmitted with 4 bytes ➔checksum. The data is transmitted or received as a serial bit stream with 11 bits per character in a supported data rate. A standard character has a start bit, 8 data bits, a parity bit and a stop bit. An even parity bit is used for transmitting the individual bytes.

Default setting: 19200 / 8E1

Ethernet communication:

On default the reading device functions as a server. This means that it waits for a connection request from a HOST PC (client).

TCP/IP: IP-Adresse xxx.xxx.xxx.xxx Port 3241

After a connection is established, the ASCI-I1 messages defined in the message record are transmitted from the reading device to the respective HOST and vice versa. On default settings ASCI-I1 messages are transmitted without any ➔checksum. The 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 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.

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**	**Antenna port**	**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 customer parameters, the readers are addressed via the address "0 … E" (→ Parameter E).

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.

10.3 Data element

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:
"10" … automatic tuning
"00" … manual tuning 0x00
"0F" … 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 that is addressed. The index is displayed as an ASCII character (1 byte) in HEX format.

Example:
"1" LED1: externe LED of the port
"2" LED2: red LED TEST
"3" LED3: blue LED TEST
"4" LED4: green LED TEST
"5" LED5: red LED TUNING
"6" LED6: blue LED TUNING
"7" LED7: green LED TUNING

"8" LED8: red LED STATUS
"9" LED9: blue LED STATUS
"A" LEDA: green LED STATUS

Output State	1 Byte

The data element shows or sets the current status of one output.
The Data Element Output State includes the status of each output on the reader.
The status is displayed as an ASCII character (1 byte) in HEX format.

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 command and customer mode.

Example for decimal Interpretation: Value 45 „45“
Example for hexadecimal interpretation: Value 45 „2D“ (hexadecimal)

Reader-ID	1 Byte

The reader ID is defined by parameter (->Parameter E).
The reader ID is displayed as an ASCII character (1 byte) in HEX format.

Response-Code	4 Bytes

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

Page	2 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"

Serial number	4 Bytes

Contains 4 byte of the serial number, which are displayed as 4 ASCII characters in HEX format.
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“

Software version	16 Bytes

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

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

Timeout	2 Bytes

The data element Timeout defines the period of time that elapses until the LEDs are switched off.
The timeout is displayed as 2 ASCII characters (2 byte) in HEX format.
When the timeout expires, the LED turns off.

Example: „00“ ... permanently on
„01“ to „FF“ ... 1 s to 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
P	Set Parameter
N	Reset
e	Error message
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

10.4.1 X – Read data

The command X starts reading of the data area from a transponder.
If there is no transponder in the read range of the antenna, the reader sends an error message (error 4 - no transponder).
The data element "page" can have the following values.

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

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

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**

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

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
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 delay time', par.6: 'RS232 maxrepeat').

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

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

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 Bytes**	**2 Bytes**

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

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

10.4.5 F – Query parameter

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

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

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

The reader sends an individual protocol packet for the requested public parameter. The parameter number is a one or two byte hexadecimal value (0-F or 00-FF).

The values returned in the response for the data elements parameter number and parameter value are each hexadecimal values (0-F or 00-FF).

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 customer mode selected, the data elements parameter number and parameter value must be interpreted differently:

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

For two-digit hexadecimal parameter numbers, the value parameter 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, it will not be received 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.
This message must be acknowledged by the host

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

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

10.4.9 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 numberr**	**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'.

10.4.10 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.

10.4.11 L – Lock data area

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

Host → Device		
CMD	**Reader-ID**	**Page**
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.

10.4.12 I – Adjust RF module

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

Host → Device		
CMD	**Reader-ID**	**Vote value**
I	**1 Byte**	**2 Bytes**

Device → Host	
CMD	**Reader-ID**
i	**1 Byte**

To start the auto-tuning process, select the value 10.

Example: I110 … automatic tuning of antenna 1

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

10.4.13 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**	**Vote 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 (00-0F).

10.4.14 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**

Device → 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.

10.4.15 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. However it is possible to activate the sensor B event (->parameter 49). In parameter 1 „Read Mode“ the sensor can be deactivated.

10.4.16 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 external LED of port:
>> O111100 or O1111
<< 011

Turn blue test LED on for 10 seconds:
>> O11310A
<< 011

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

10.4.17 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 LEDA**
q	**1 Byte**	**1 Byte**	**1 Byte**	**1 Byte**	**…**	**1 Byte**

Example: Status LEDs
>> Q01
<< q012000000001 external LED (2 = flash), green status LED (1 = on)

The status of the input sensor can be queried via head ID „0“.
In this case, the answer contains the sensor state (0-1) instead of the 10 output states.
Example: Status of input sensor
>> Q00
<< q000

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.

The data element "page" can have the following values.

Nr. (dez)	Nr. (hex)	Parameter name	Description
0	**0x00**	Sensor delay	Delay time for the presence sensor. 01 .. 99 (0,1 seconds) Default: 10 ... (1 second)
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)
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)
3	**0x03**	r/w repeat time	Time between two read / write attempts. 01 .. 99 (0,1 s) Default: 05 ... (0,5 seconds)
4	**0x04**	r/w max repeat	Max. number of read / write attempts. 01 .. 99 Default: 05
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: 50 ... (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 sensor event messages A or B to the host, that the input sensor has been opened or closed. Bit0 of the Watchport parameter (event message A): 0 - deactivate message A 1 - activate message A when sensor opened/released Bit1[1)] of the Watchport parameter (event message B): 0 - deactivate message B 1 - activate message B when sensor closed/occupied Default: 01
F	**0x0F**	Reader address	Address of the first antenna port (0 ... E) Default: 1

[1)]: The use of the sensor message B depends on internal parameter 49.

	Further internal parameters (from parameter 16 onwards) are available. Please ask the manufacturer HERMOS if you need anything.

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.

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. Different Reader ID's are used (->Parameter E)

V – Query software version
>> V1
<< v14C464D3449312E32

Command	V		
Reader-ID	1		
Software version '4C464D3449312E32 '	→	ASCII " LFM4I1.2"	

I – RF module with connected antenna

>>I210
<<i2

Commandl	I
Reader-ID	2

J – RF module Read out tuning value
<< j201

Command	J	
Reader-ID	2	
Data	01	(voting value)

X – Read data (Reading from page 1 of the multipage transponder)
>> X101
<< x1014142434445464748

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

R - Automatic reading on antenna port
<< R1013132333435363738
>> r1

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

W – Write data (Writing page 16 of the multipage transponder)
>> W2103132333435363738
<< w2

Command	W		
Reader-ID	2		
Page	10	(10hex = page 16dec.)	
Data	'3132333435363738'	→	ASCII "12345678"

O – Permanently switch on LED1 external LED:
>> O111100 or O1111
<< 011

Command	O
Reader-ID	1
Head-ID	1
Output Nr	1
Output State	1
Timeout	00 optional (00=permanently)

O – Turn LED3 blue test LED on for 10 seconds:
>> O11310A
<< 011

Command	O
Reader-ID	1
Head-ID	1
Output Nr	3
Output State	1
Timeout	0A

O – Get the state of all outputs
>> Q01
<< q012000000001
→external LED (2 = flash), green status LED (1 = on)

Command	q	
Reader-ID	0	
Head-ID	1	
Output State LED1	2	FLASH
Output State LED2	0	OFF
Output State LED3	0	OFF
Output State LED4	0	OFF
Output State LED5	0	OFF
Output State LED6	0	OFF
Output State LED7	0	OFF
Output State LED8	0	OFF
Output State LED9	0	OFF
Output State LEDA	1	ON

O – Get the sensor state
>> Q00
<< q000
→sensor state 0 released

Command	q	
Reader-ID	0	
Head-ID	0	
Sensor State	0	Released

10.7 Error Codes

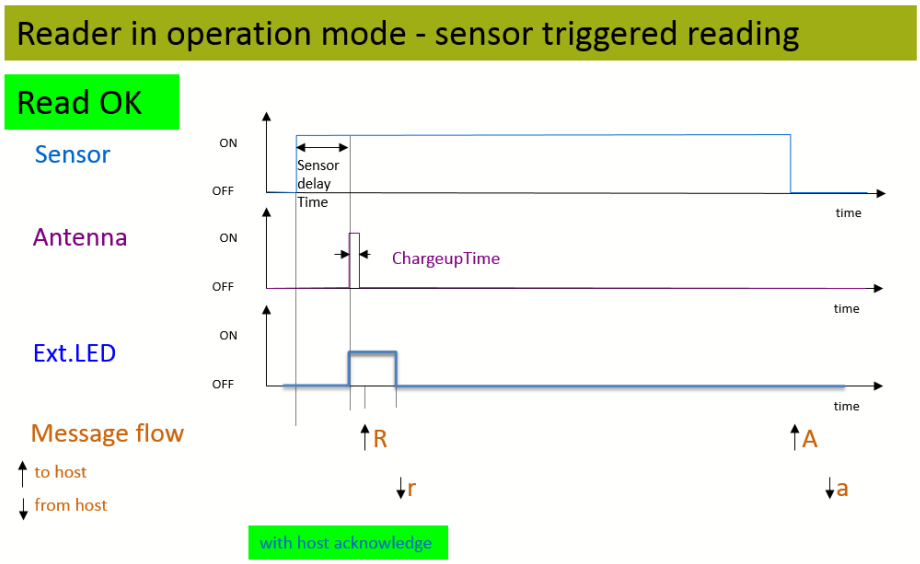
ID	Name	Description	Cause	Corrective action
0	none	No error		none
1	auto fail	Automatic reading is not possible	Reader is still busy with a former read or write request	Wait until the previous request has ended.
2	ext fail	Execution failed, read or write operation cannot be carried out	Reader is still 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		no
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

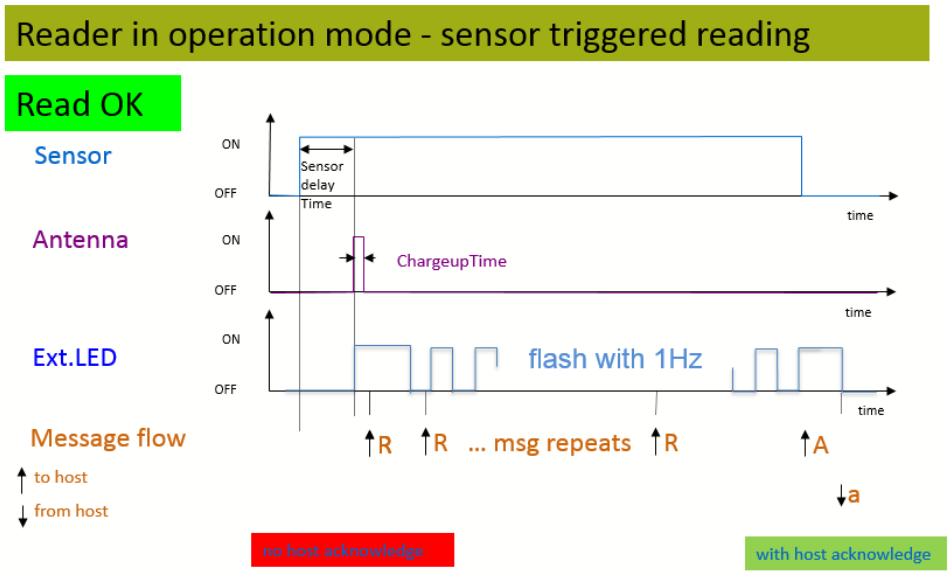
10.8 Wiring of the external output

For readers with input sensor, the external output of the reader is switched accordingly when reading, depending on internal parameter 48. Please ask HERMOS for deactivation!

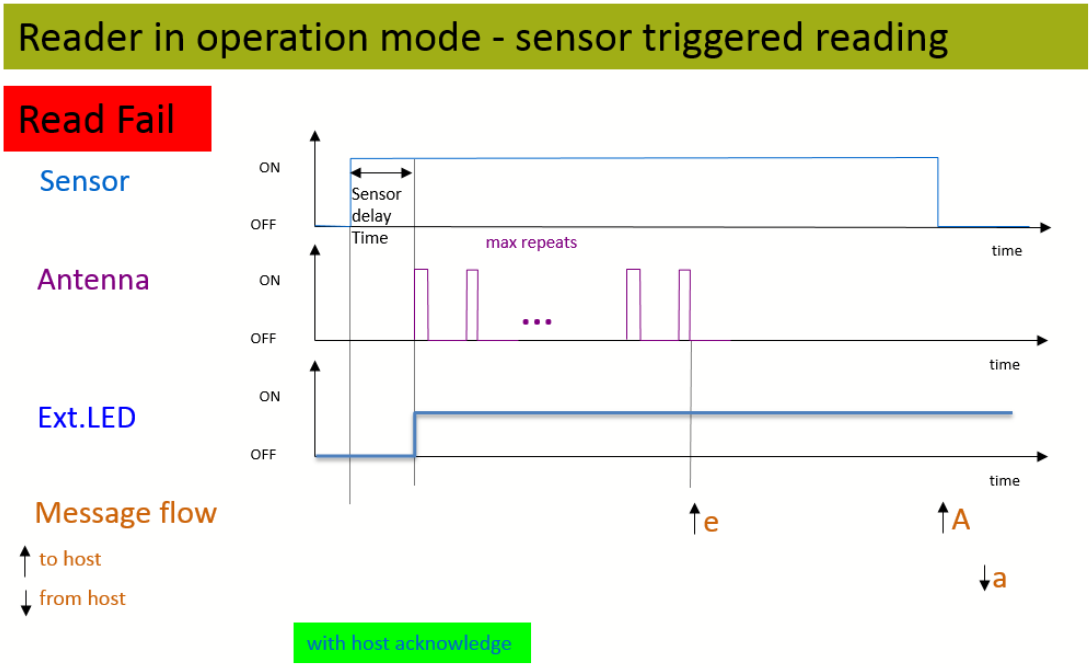
10.8.1 Reader operation mode and sensor triggered reading



Picture1: Successful reading with instant host confirmation



Picture 2: Successful reading with instant host confirmation



Picture 3: Unsuccessful reading with instant host confirmation

LFM LP Reader

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

LFM LP Reader

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-Adresse 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 (->Parameter 0) and Reader ID (->Parameter 0x0B) 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 0x8100
Direction host to system (reading device) 0x0100

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

Where used S3F6, S3F8

ACKC5 **Format: B[1]**

Verification code.

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

Where used S5F2

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 alarm
1	...	alarm

Where used S18F13

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 Reservedt

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

Where used S5F1

ALTX	**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 released
"1": Sensor is occupied
"E": Sensor status is not available
"F": Sensor is not defined

ALTX[2] State of the sensor 1
"0": Sensor is released
"1": Sensor is occupied
"E": Sensor status is not available
"F": Sensor is not defined

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_28" → Parameter 28	➔	Negate external output
"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	➔	Push button switches 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_54"→ Parameter 54 ➔ SWITCHTUNEON
"ECID_55"→ Parameter 55 ➔ SWITCHTUNEOFF
"ECID_56"→ Parameter 56 ➔ SWITCHTESTON
"ECID_57"→ Parameter 57 ➔ SWITCHTESTOFF
"ECID_58"→ Parameter 58 ➔ Push Button switch status (read only)
"ECID_80"→ Parameter 80 ➔ Auto adjust value antenna port 1 (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“ ➔ "01" ID of first antenna port

Where used S5F1

ATTRVAL **Format: A[max4]**

Value of the specified attribute.

CIDRW-attribute definitions:

"Configuration” Number of antenna ports „01“

"AlarmStatus” Current CIDRW sub-state of the ALARM STATUS
"0" …NO
"1" …ALARMS

"OperationalStatus" Current CIDRW sub-state of IN OPERATION
"IDLE” … reader in REST mode
"BUSY” … reader is busy
"MANT" … maintenance mode

"SoftwareRevisionLevel" Revision (version) of the software - maximum 8 bytes

"SERIALNUM" serial number string (max 15 bytes)

"HARDWARE" String of the hardware release (10 bytes max.)

"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“

Where used S18F2, S18F3

ATTRVAL **Format: A[max2]**

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 LedNo LED-number, 1Byte
"1" externe LED of the port
"2" red LED TEST
"3" blue LED TEST
"4" green LED TEST
"5" red LED TUNING
"6" blue LED TUNING
"7" green LED TUNING
"8" red LED STATUS
"9" blue LED STATUS
"A" green LED STATUS

Timeout Timeout duration, Units seconds
„00“: permanently
„01“ to „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 → Parameter

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 OFFLINE-confirmation (reader is offline)

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 status of up to two sensors and the initiator of a message. A second sensor depends on the hardware and is not implemented yet.The initiator represents the number of the sensor that has caused a message.

Initiator: Bit7, Bit 6
0,0 message initiated by Sensor0
0,1 message initiated by Sensor1
1,1 message initiated by external trigger

Sensor1: Bit5, Bit4, Bit3
0,0,0 Sensor released
0,0,1 Sensor occupied
1,1,1 Sensor not defined (Defaultvalue !)

Sensor0: Bit2, Bit1, Bit0
0,0,0 Sensor released
0,0,1 Sensor occupied
1,1,1 Sensor not defined

Example: 0b00111001
→Message initiated by Sensor0, Sensor1 is not defined and Sensor0 is occupied

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]**

Description: 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 can not be read. MID sequence can not 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]**

Description: 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 or 4]**

The TargetID identifies where a request for action or data is to be applied. The TargetID supports 2 byte and 4 byte format.

The 2-digit TargetID (2 ascii characters decimal) is changeable and defined in ➔parameter 12 (Head-ID).
The 4-digit Target-ID (4 ascii characters hexadecimal) is changeable and defined in ➔parameter 7 (TARGETID high byte) and parameter 8 (TARGETID low byte).

Example: "1707HAG04660" complete serial number
Decimal „04660“ (the last 5 characters of the complete serial number)
→Hexadecimal serial number „1234“ (High byte 0x12 and Low byte 0x34)
→High byte serial number 0x12 (➔parameter 7)
→Low byte serial number 0x34 (➔parameter 8)
→Target-ID “1234”

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)

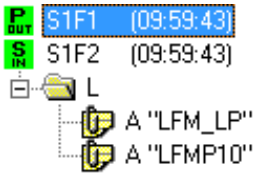
The host indicates that it is online.

```
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".

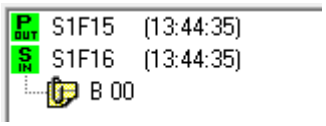
The reading device can only be set to "online" again using the message S1F17 (or reset S2F19); all other messages are cancelled by message SxF0.

.

S1F15 W (header only, no additional elements)

S1F16: OFFLINE ACKNOWLEDGE (reading device -> host)

Acknowledgement.



S1F16
<B[1] OFLACK>.

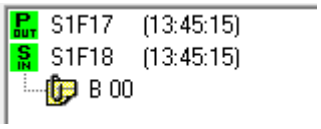
S1F17: REQUEST ON_LINE (host -> reading device, reply)

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)

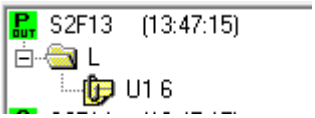
S2F0: ABORT TRANSACTION (reading device <-> host)

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)

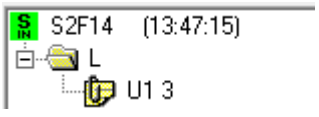
The host requests an attribute (parameter) from the reading device.



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.

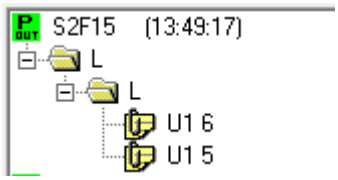


S2F14
<L[1]
<U1[1] ECV>
>

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

The host changes a reading device attribute (parameter).

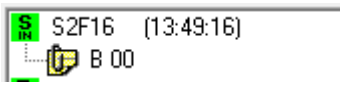
S2F15 W
<L[1]
<L[2]
<U1[1] ECID>
<U1[1] ECV>
>
>



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

The reading device acknowledges the reading device parameter).

S2F16
<B[1] EAC>



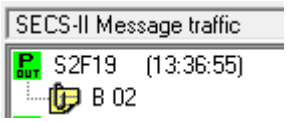
S2F19: RESET SENT (host -> reading device, reply)

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>

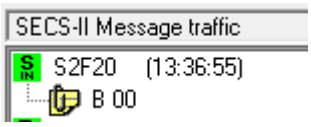


S2F20: RESET ACKNOWLEDGE (reading device -> host)

The reading device acknowledges the reset.

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

S2F20
<B[1] RAC>

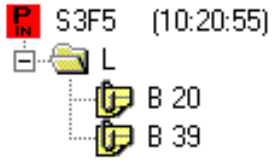


11.3.3 Stream 3 (Material-state)

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)

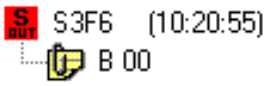
```
S3F5 W
  <L[2]
    <B[1]  MF >
    <B[1]  PTN >
  >
```



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

The host confirms the message material found.

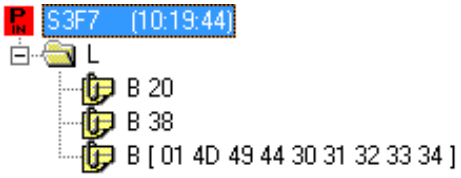
```
S3F6
   <B[1]  ACKC3 >
```



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.

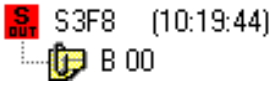
```
S3F7 W
  <L[2]
    <B[1]  MF >
    <B[1]  PTN >
    <B[9]  PAGEDATA >

  >
```



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

The host confirms the message material lost.

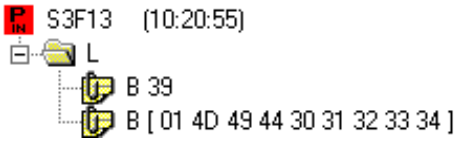
```
S3F8
   <B[1]  ACKC3 >
```



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

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

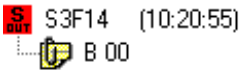
```
S3F13 W
  <L[2]
    <B[1]  PTN >
    <B[9]  PAGEDATA >
  >
```



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

The host confirms the received MID data.

```
S3F14
   <B[1]  MIDAC >
```

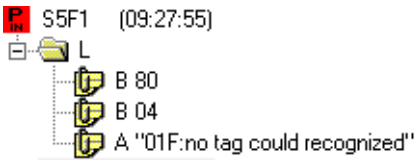


11.3.4 Stream 5 (Exception handling)

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

The reader reports an error to the host.

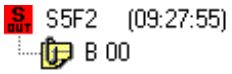
S5F1 W
<L[3]
<B[1] ALCD > Alarmcodebyte
<B[1] ALID > Alarm-ID
<A[MAX 40] ALTX > Alarmtext
>



S5F2: Alarm Report confirmation (Host -> Lesegerät)

The host confirms the alarm message.

S5F2
<B[1] ACKC5 >

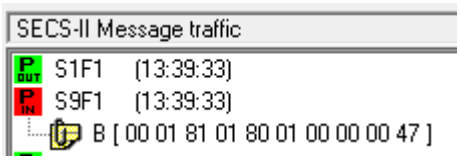


11.3.5 Stream 9 (system error)

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

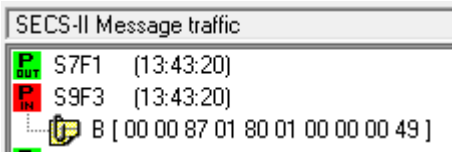
S9F1
<B[10] MHEAD >



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

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

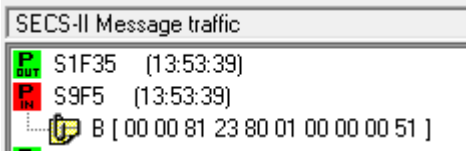
S9F3
< B[10] MHEAD >



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

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

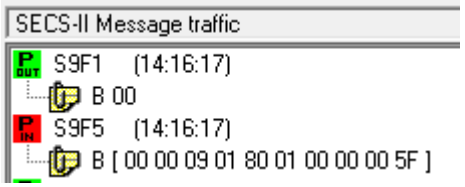
S9F5
< B[10] MHEAD >



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.

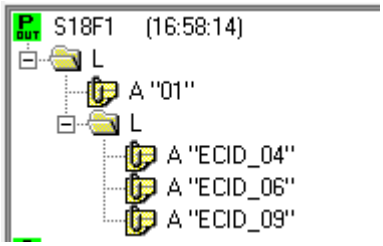
S18F0 (header only, no additional elements)

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.

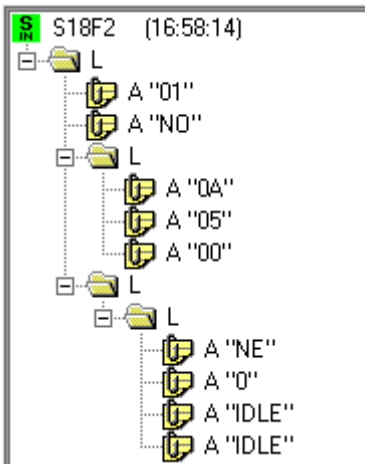
```
S18F1 W
 <L,2
    <TARGETID>
      < Ln
          <ATTRID1>
          ...
          <ATTRIDn>
      >
    >
 >
```



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>
      >
  >
```



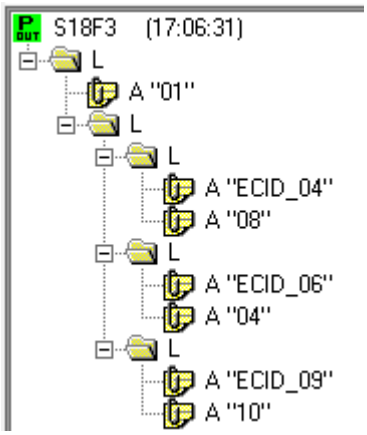
If the ATTRID of the S18F1 message is not known, the corresponding element ATTRVAL receives the value <nothing>.

S18F3: Write parameter (host -> reading device, reply)

The message transmits a request to the reading device to set (overwrite) the value of the transferred parameters.

With a message several attributes can be set at the same time.

```
S18F3 ,W
<L,2
      <TARGETID>
      <L,n
          <L,2
               1 <ATTRID1>
               2 <ATTRVAL1>
          >
          <L,2
               1 <ATTRIDn>
               2 <ATTRVALn>
          >
       >
>
```

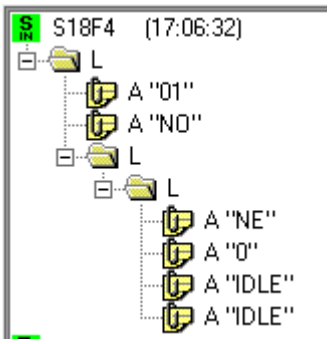


S18F4: Write parameter, confirmation (reading device ->host)

This message acknowledges that the request for writing the parameter values successfully or reports an error.

.

```
S18F4
 <L,3
    <TARGETID>
    <SSACK>
    <STATUSLISTE>
 >
```

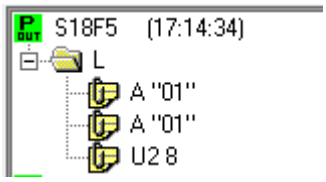


If the ATTRID of the S18F3 message is not known, a communication error (CE) occurs.

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>

>
```



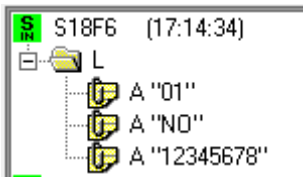
If both the DATASEG as well as the DATALENGTH are missing (elements with zero length), all pages of the data area are queried. If only the DATALENGTH is missing, all data on the specified start address is queried.

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.

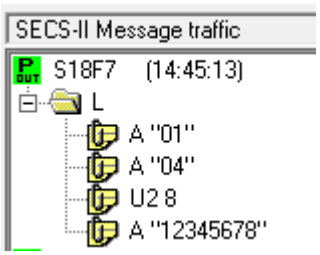
```
S18F6
   <L,3
      <TARGETID>
      <SSACK>
      <DATA>

    >
```



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

This message is used for requesting the antenna head specified in the TARGETID to write data. DATASEG 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>

>
```



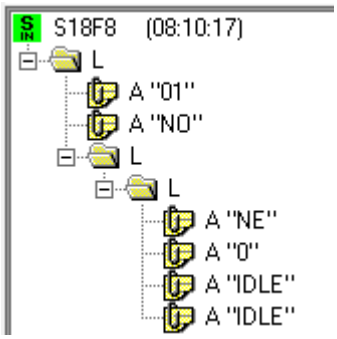
If both the DATASEG as well as the DATALENGTH are missing (elements with zero length), all pages of the data area are overwritten. If only DATALENGTH is missing or if DATALENGTH has the value zero, all data within the specified section must be written.

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.

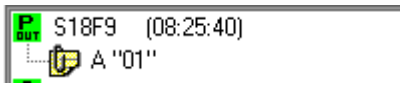
```
S18F8
   <L,3
      <TARGETID>
      <SSACK>
      < L,1
        <STATUSLISTE>
      >

    >
```



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

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

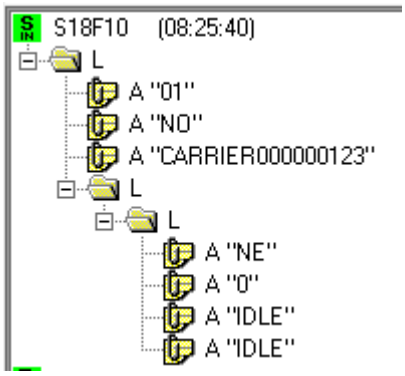
S18F9,W
<TARGETID>



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>
>
>

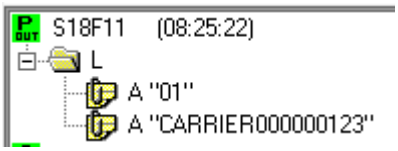


The reading device can be in maintenance mode (MT) or operating mode (OP) to read the MID with the message S18F9.

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>

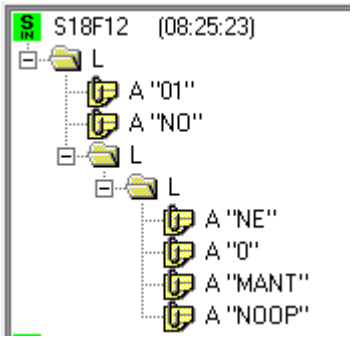


	The reading device must be in maintenance mode to write the MID with the Message S18F11. If the reading device is not in maintenance mode, the execution is cancelled and acknowledged with SSACK = "EE" equipment error.

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

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

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



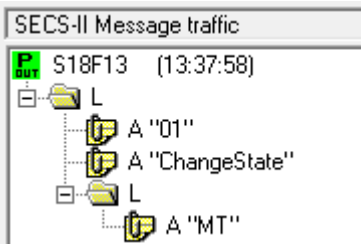
The reading device can be in maintenance mode (MT) to write the MID with the message S18F11.

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

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

.

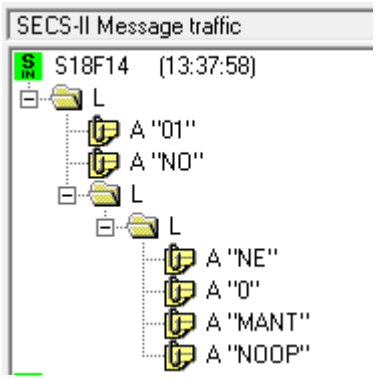
```
S18F13 ,W
<L,3
      <TARGETID>
      <SSCMD>
      <L,n
         1.  <CPVAL>
             ...
         n.  <CPVALn>
       >
>
```



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

Following the list of parameters, a description of each value follows.

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 (CIDRW with integrated read head). It corresponds to the "Lower Device-ID" in the message header. 00 .. 255 Default: Low Byte from the ➔hexadecimal serialnumber
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
7	0x07	**TARGETID high byte**	High byte of the predefined TARGETID. The TARGETID is changeable and the default value is determined from the serialnumber. Default: High byte from the ➔hexadecimal serialnumber
8	0x08	**TARGETID low byte**	Low byte of the predefined TARGETID. The TARGETID is changeable and the default value is determined from the serialnumber. Default: Low byte from the ➔hexadecimal serialnumber
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

12	0x0C	**HeadID**	The parameter defines the 2-digit ➔TARGETID. 00 … 31 Default : 01
14	0x0E	**Sensor polarity for all presence sensors**	Type of sensor signal to start an automatic read. The setting is applied uniformly for all sensors. 0 … read process when sensor is covered 1 … read process when sensor is uncovered Default : 0
18	0x12	**Sensor status of all heads**	The sensor status of each head is represented by a bit. The parameter can only be queried 1 … Sensor is assigned 0 … Sensor is not assigned Example: 0x01 Sensor at Head1 (only one sensor) is occupied
19	0x13	**Data length Autoread**	The parameter determines the number of bytes read from the tag during an automatic read 0 … 136 (max. 17 pages !!) Default : 8 Datenbytes
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)
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)

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)
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)
24	0x18	**r/w max repeat**	Maximum number of read and write retries 0 … 255 Default : 5
25	0x19	**Transponder Type**	The parameter defines the validity of the read data of the transponder. 00 … 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 01 … A transponder page is interpreted as 10 data bytes without checksum . Default: 0
26	0x1A	**Sensor Activity**	Activate / Deactivate. 0 ... Sensor not activated 1 ... sensor activated Default : 1

27	0x1B	**Watchport für 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 to 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
28	0x1C	**Negate external output**	The output signal of the external output (LedNo.=1) can be negated. 0 ... no signal negation 1 ... Signal negation Default: 0
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)
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. Adaption is not activated 1 ... autom. Adaption via push button TUNING 2 ... autom. Adaptation by external command 3 ... autom. Adaption via push button TUNING or external command Default: 3
34	0x22	**Sensor polarity for the individual presence sensor**	Type of sensor signal to start an automatic read. One bit is provided for each sensor (Bit0 Sensor1 (only one input sensor)) with the following meaning 0 … read when sensor is covered 1 … read when sensor is uncovered Default: 0

35	0x23	**Special 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 ... sensor triggered automatic read enabled 1 ... sensor triggered automatic read disabled **Bit 2**: use adjustmentvalues of LFM4x 0 ... use own adjustmentvalues 1 ... use same adjustmentvalues as LFM4x **Bit 3**: use green STATUS LED as power LED **Bit 4**: external output/LED (LedNo. =1) to be switched during read operations 0 ... external output is not influenced 1 ... external output is set during read operations **Bit 5**: page transfer when reading the first page of a multipage transponder 0 ... without page transfer 1 ... with page transfer **Bit 6**: B-message for ASC-I1 protocol 0 ... activate B-message 1 ... deaktivate B-message **Bit 7**: Reading and writing in testmode is indicated by LED flickering 0 ... LED flickering disabled 1 ... LED flickering enabled Default: 0x19 ... (0001 1001)
36	0x24	**Push button switches activation**	The parameter defines the behaviour of the two push button switches. **Bit 0**: activate TUNING push button **Bit 1**: activate TEST push button **Bit 2**: activate TUNING push button in operation mode **Bit 3**: activate TUNING push button in maintenance mode 0 ... deactivate push button 1 ... activate push button Default: 0x0F
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. 0…10 pages Default: 2 pages

38	0x26	**Test after software reset**	This parameter activates / deactivates the .initial test of the keyboard LED's 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 CarrierIDLength . 0 … maximum bytes of MID - 1 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 CarrierIDLength. 1 … maximum bytes of MID Default : 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. Default : 1
45	0x2D	**MIDFormat**	Defines the physical format of the MID data in the transponder. 0 … E99 standard format left justified Default : 0
48	0x30	**External output LED**	External output LED shows reading process 0 … aktivate external LED 1 … deaktivate external LED Default : 1 (corresponds to parameter 35)

49	0x31	**B-Message**	Support of B-Message at ASC-I1 Protocol 0 … deaktivate B-message 1 … aktivate B-message Default : 0 (corresponds to parameter 35)
54	0x36	**SWITCHTUNEON**	Duration how long the push button key TUNING must be pressed until it changes to the state "On". 1 ... 100 (100 ms) Default : 1 (100ms)
55	0x37	**SWITCHTUNEOFF**	Duration how long the push button key TUNING must be pressed until it changes to the state "OFF". 1 ... 100 (100 ms) Default : 1 (100ms)
56	0x38	**SWITCHTESTON**	Duration how long the push button key TEST has to be pressed until it changes to the state "ON". 1 ... 100 (100 ms) Default : 30 (3s)
57	0x39	**SWITCHTESTOFF**	Duration how long the push button key TEST has to be pressed until it changes to the state "OFF". 1 ... 100 (100 ms) Default : 1 (100ms)
58	0x3A	**Push Button switch status (read only)**	The parameter is used to query the state of the push button switches Bit0: TUNING (0=OFF, 1=ON) Bit1: TEST (0=OFF, 1=ON)
59	0x3B	**Hardware error detection (read only)**	The read-only parameter returns the complete identifier of the current firmware. 0 … no hardware error 1 … detect antenna adjustment error 2 … detect antenna volatage error
66	0x42	**Antenna adjustment (read only)**	The read-only parameter returns the antenna adjustment if there is no hardware error. 255 … on hardware error 00 … 15 adjustment
67	0x43	**antenna powerage for all adjust steps (read only)**	The read-only parameter returns the antenna power at a defined adjustment step of the the adjustment procedure. Only available if a automatic antenna adjustment was running before. The fist byte shows the adjustment step (00 … 0F) the next two bytes shows the antenna powerage to this step.

68	0x44	**antenna powerage of the last read/write action (read only)**	The read-only parameter returns the antenna power from the last read or write action. Only available if there was a read or write action before.
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.
80	0x50	**Antenna tuning of the antenna 1**	By automatically adjusting the antenna, the influence of interference can be minimized. 00 ... 15 Value of the automatic adjustment
84	0x54	**Show R/W result time**	Time how long the test and tune LED's indicate the last read, write or tune result. 0 without timeout 1 ... 255 (100 ms) Default : 50 (5s)
85	0x55	**Show Tuning error**	Provides the ability to show tuning errors detected during operation permanently without timeout (Par. 84) 0 show with timeout 1 ignore timeout and show always Default : 0
96	0x60	**Default parameter**	All (the most) parameters of the reader will be set to default values. The set protocol is retained. There is no protocol change! 0… reset all parameters to their default value 1… reset all parameters to their default value, but the network settings are retained
97	0x61	**Default protocol**	This parameter provides information about the currently set protocol. The automatic protocol selection distinguishes between the "ASCII" and the "SECS" protocol. Setting the parameter leads to a restart of the reader when the protocol is changed. 1 … SECS/HSMS 2 … ASCII Default : 2

98	0x62	**Protocol change allowed**	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. 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 mode**	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 – Software version query

```
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   (15:58:33)
S IN   S1F2   (15:58:33)
L
  A "LFM_LP"
  A "LFMP10"
```

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 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
```

LFM LP Reader

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

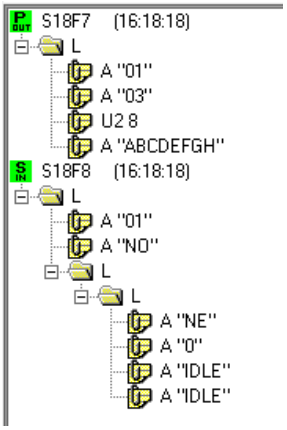
```
16:14:20 Length Byte   ( 00 00 00 18 )
16:14:20 Header   ( 01 34 92 05 00 00 00 00 00 41 )
16:14:20 Data   ( 01 03 41 02 30 31 41 02 30 33 A9 02 00 08 )
16:14:20 Length Byte   ( 00 00 00 1E )
16:14:20 Header   ( 01 34 12 06 00 00 00 00 00 41 )
16:14:20 Data   ( 01 03 41 02 30 31 41 02 4E 4F 41 08 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"
```

LFM LP Reader

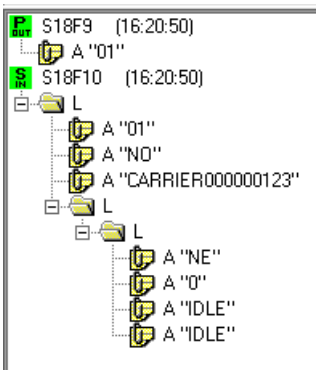
S18F7 - Write data

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 out MID



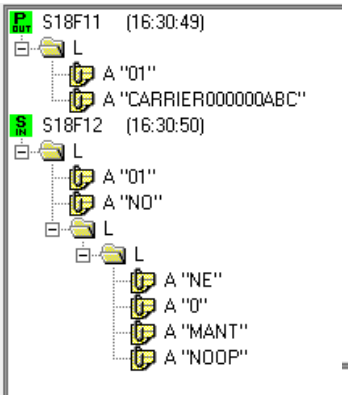

```
16:20:50 Length Byte ( 00 00 00 0E )
16:20:50 Header ( 01 34 92 09 00 00 00 00 00 45 )
16:20:50 Data ( 41 02 30 31 )
16:20:50 Length Byte ( 00 00 00 3D )
16:20:50 Header ( 01 34 12 0A 00 00 00 00 00 45 )
16:20:50 Data ( 01 04 41 02 30 31 41 02 4E 4F 41 10 43 41 52 52 49 45 52 30 30 30 30 30 30 31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

LFM LP Reader

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.



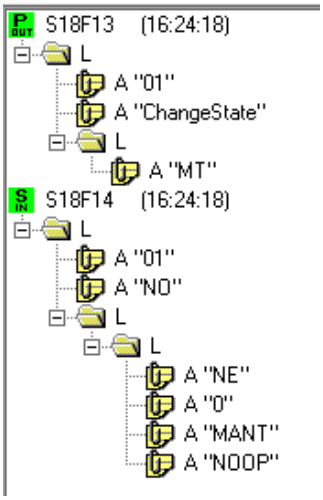

```
16:30:49 Length Byte   ( 00 00 00 22 )
16:30:49 Header        ( 01 34 92 0B 00 00 00 00 00 48 )
16:30:49 Data          ( 01 02 41 02 30 31 41 10 43 41 52 52 49 45 52 30 30 30 30 30 30 41 42 43 )
16:30:50 Length Byte   ( 00 00 00 2B )
16:30:50 Header        ( 01 34 12 0C 00 00 00 00 00 48 )
16:30:50 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 to the MID area.

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

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



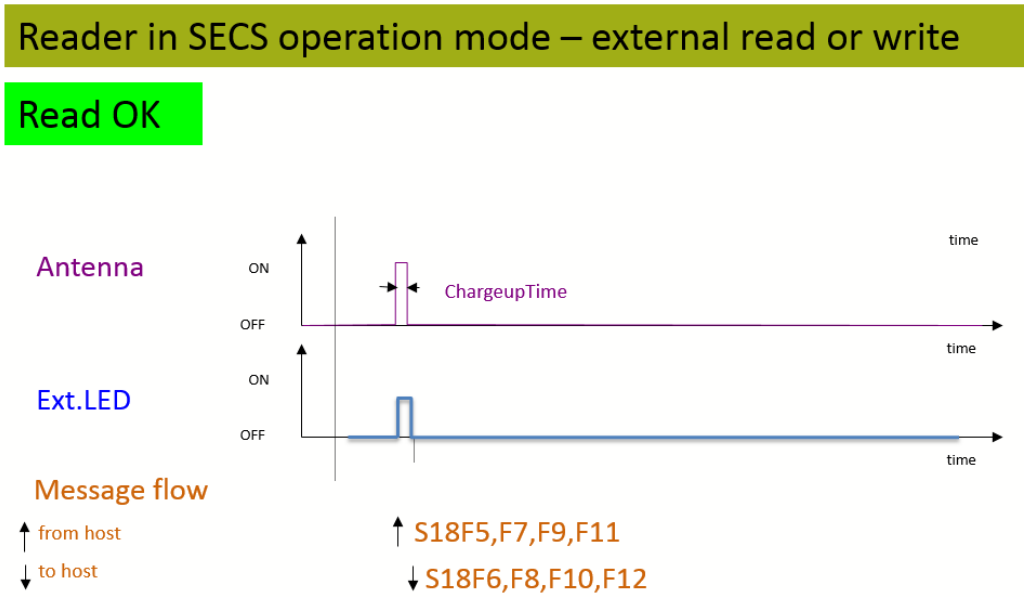

```
16:24:18 Length Byte   ( 00 00 00 23 )
16:24:18 Header        ( 01 34 92 0D 00 00 00 00 00 47 )
16:24:18 Data          ( 01 03 41 02 30 31 41 0B 43 68 61 6E 67 65 53 74 61 74 65 01 01 41 02 4D 54 )
16:24:18 Length Byte   ( 00 00 00 2B )
16:24:18 Header        ( 01 34 12 0E 00 00 00 00 00 47 )
16:24:18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

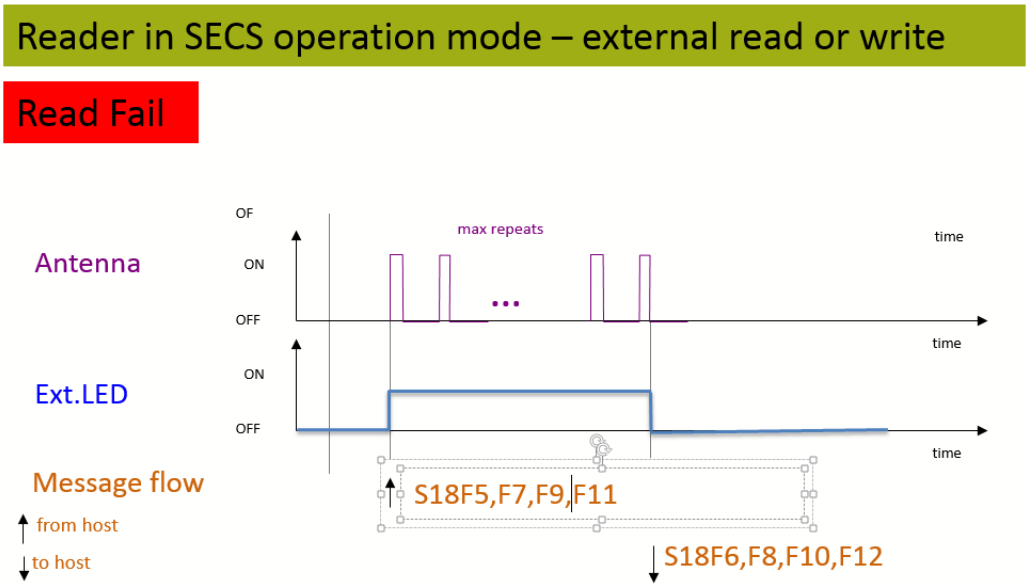
SSACK	Name	Description	Cause	Corrective action
NO	Normal operation	Indicates the success of the requested operation		no
EE	Execute Error	Transponder data and read ID sequence cannot be read	Reader processes previous read or write request	Please wait until previous query is finished
			Transponder has 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 transponder 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	Communication 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 implemented or out of range	Check parameter syntax and value

11.7 Wiring of the external output

The external output of the reader is switched accordingly when an external read or write is triggered, depending on internal parameter 48. Please ask HERMOS for deactivation!



Picture 1: external successful read



Picture 2: external failed read

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

- Depending on parameter 35, the green status LED is used as the power LED
- 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.

Red tuning LED is flashing quickly

- If a antenna failure is detected while a read or write action, the fast flashing red tuning LED indicates the antenna or tuning error
- Press the tuning push button to trigger a new tuning
- If a new tuning does not help change the antenna position and trigger tuning again. In the case of a recurring error, in the worst case, the antenna must be replaced

Red tuning LED is on

- If a tuning process does not find a suitable antenna tuning, than the red tuning LED indicates the tuning error
- Press the tuning push button to trigger a new tuning
- If a new tuning does not help change the antenna position and trigger tuning again. In the case of a recurring error, in the worst case, the antenna must be replaced

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 HERMOS Device-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
16.11.2018	LFMPI1.0 (ASCII) LFMP10 (SECS/HSMS)	Initial release

12.7 Customer service

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Track & Trace RFID Division
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Germany

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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.

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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