HFM 6x Gen2.0 (HFM 6xS) Reader Rev2.1 EN ASCII

0. Contents

1. Introduction

These operating instructions correspond with the "Directive 1999/5/EC of the European Parliament and the Council on radio equipment and telecommunications transmission equipment and the mutual recognition of the conformity"

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.

1.1 Using the device

The device is exclusively used to read and write passive HF 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
2.1	2020/03/07	HERMOS AG RK	Initial version of customer documentation HFM 6x Gen2.0

3. Used abbreviations and designations

RFID	Radio Frequency Identification
HF	High Frequency 13,56MHz ISO15693
ASCII	American Standard Code for Information Interchange
PoE	Power over Ethernet
DHCP	Dynamic Host Configuration Protocol
AFI	Application Family Identifier
DSFID	Date Storage Format Identifier
RFU	Reserved for future use

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.

WARNING

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

5.2.1 Mandatory signs

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

5.2.2 Warning signs

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

5.2.3 Prohibition signs

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

WARNING

Risk of injury due to insufficient personnel qualifications

There are dangers to personnel and the proper operation due to inadequately qualified personnel.
Only trained personnel may operate the unit.
New operating personnel must be instructed by the existing operating personnel. The operator must regulate precisely 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. Function

6.1 General

HERMOS HF readers are high-frequency identification systems which are using radio transmission to read or write data from HF transponders (13.56 MHz). The readers are communicating with the most commonly used transponders according to ISO15693.
The protocol commands are transferred via the existing interface with the defined transmission parameters. If several interfaces to the host are present and connected, the transfer always takes place on the last used interface. The data are embedded in a defined communication protocol and exchanged between reader and host.

6.2 Basic functions

Depending on the type of the device and the protocol, the reader supports various basic functions:

- Heartbeat request, software version request
- Inventory of transponders
- Reading data
- Writing data
- Setting and reading parameters
- Querying and setting inputs and outputs

The reader are supporting different operating modes.
Normal Mode, polling Mode, automatic reading mode and test mode.

6.2.1 Normal mode

The HF reader is ready for operation after a reset. In this mode, the reader does not perform stand-alone actions. Actions are triggered by protocol commands from the host.

A scanning operation or a reading in the data area is initiated by a command from 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 by activating or dropping a sensor, and it is possible to start an automatic reading. (Parameter 26ff (0x1A))

If the reading is successful, the read data are immediately sent to the host. If several antenna ports are used simultaneously, the readings are executed sequentially.

Write operations (storing data on a transponder) are generally only possible via commands from the host.

6.2.2 Polling mode

HF readers can be set to a status of continuous reading, the so-called polling mode. The device then carries out a reading at regular intervals and outputs the corresponding data of the read HF transponder. (Parameter 39ff)
All protocol commands of the normal mode are working in the polling mode. This may cause time delays in the poll rhythm or the response time of commands.
The polling mode can be activated on all antenna ports. If the poll function is activated on several antenna ports, they are processed sequentially.

6.2.3 Automatic reading mode

Device versions with IO module (at least 1 input) offer the function of an automatic read operation triggered by the input sensor. The automatic read mode (inventory / reading) can be enabled by multiple parameters. After a defined sensor delay time (par.21ff), the reader detects the sensor change. With the "Watchport" parameters (par.26ff), the automatic read operation can be defined for each antenna port.

The reader starts a read operation by triggering the input sensor. If a host connection exists, the data of the automatic read operation is automatically sent to the host.

The result of the reading operation (successful, not successful) is shown via the outputs of the antenna port.

6.2.4 Test mode

The HERMOS HF reading devices support a test mode that facilitates setting up the antenna and checking the reading ranges during commissioning process and the installation of the antennas.

Test mode can be activated with 4 DIP switches in the front of the housing. A description of the test mode functions can be found on a sticker on the housing.
See capture 6.4.2 Testmode sticker und capture 7.7 DIP switch.

The evaluation of the DIP switch depends on parameters 18 (0x12) and 19 (0x13).

The test action to be performed is determined by parameter 149 (0x95).

The result of the reading (successful, not successful) is shown via the status LEDs and the outputs of the antenna port.

6.3 Indicating and control elements

6.3.1 Top view

1. Aluminium housing black
2. Reader type HFM
3. Data Matrix Code
   www.hermos.com

6.3.2 Side view front

1. Power supply port
2. Status- and Power LEDs
3. DIP-switches
4. Ethernet interface (opt. PoE)
5. RS232 interface

Component	Description
Power supply port	Two-pin socket for the connection of the 24V DC power supply. (Optional PoE).
Power-LED	The power LED indicates that the operating voltage is present and the reading device is ready for operation.
Status-LEDs	The two status LEDs are used for the reading and writing feedback in test and polling mode.
DIP-switches	A test mode can be activated with the DIP switches. The evaluation of the DIP switch depends on parameters 18 (0x12) and 19 (0x13).
Ethernet interface	The reading device features an Ethernet interface depending on the device model. The communication with the device can be carried out via the 10/100 BaseT interface. The Ethernet interface is offered with PoE-capability as an option.
RS232 interface	Depending on thedevice model, the reading device features a RS232 interface. The communication with the device can be carried out via the serial interface (9-pin Sub D) Parameter 1 (0x01) default: 19,200 baud

6.3.3 Side view rear

1. Connectors for IOs (optional)
2. Antenna ports 1 - 6

Component	Description
Connectors for Inputs and Outputs Port 1 - 6	Depending on the device variant, the reader has connections for inputs and outputs. The number of inputs and outputs and the connector type can be customized. Variants see chapter 7.9 External inputs and outputs.
Antenna connections Port 1 - 6	SMA or LEMO connections for connecting the antennas. The number of the antenna connection corresponds to the protocol HeadID/TARGETID.

6.4 Technical data

Technical data	
Power supply (non polar)	18 – 33 V DC
Power consumption (passiv, active, impulse)	70mA@24V, 200mA, max.400mA
Fuse type Nano2	375 mAT
Operating temperature	-0 to 50 °C
Storage temperature	-25 °C to 70 °C
Permissible humanity at 50°C	25 – 80 %
Frequency range	13,56MHz, (ISO 15693)
RF power	Max. 1,1 W
Output resistance	50 Ω
Ethernet interface	10/100 BaseT, (PoE optionally)
Protocol	ASCII / SECS / HSMS
Housing material	Aluminium, black
Dimensions	130 x 124 x 45 mm
Weight	approx. 400 g

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

6.4.1 Device label

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

1. Devicename
2. Part number (variants)
3. Serial number (example)
4. Order number
5. MAC Address
6. Manufacturer

HF Mid Range Reader CE
P/N: HRF.R.HFM.6x.Ax.xx.20x
S/N: 2004HAG00123
PO: HKxxxxxx
MAC: xx:xx:xx:xx:xx:xx
HERMOS AG

6.4.2 Test mode label

The test mode label is on the device housing.

The internal test mode can be activated by turn on DIP switch 4.

The antenna ports can be selected by setting the DIP switches 1 to 3.

DIP-Switches

DIP:	1	2	3	4	5	6
1	OFF	OFF	OFF	OFF	ON	ON
2	OFF	OFF	ON	ON	OFF	OFF
3	OFF	ON	OFF	ON	OFF	ON
4	Test-Mode ON / OFF					

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

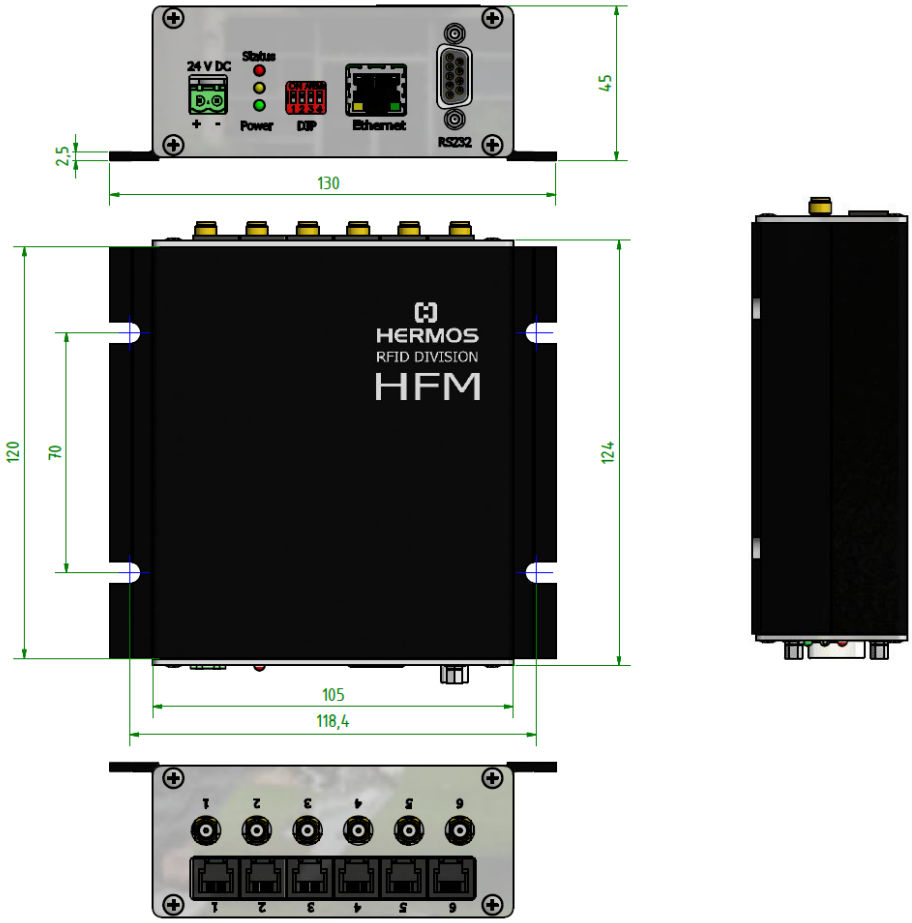
The HF reading device and the accessories can be packed customer-dependent in clean room conditions. In order to maintain this condition, the devices must be unpacked in clean room conditions.

	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.

Installation dimensions:

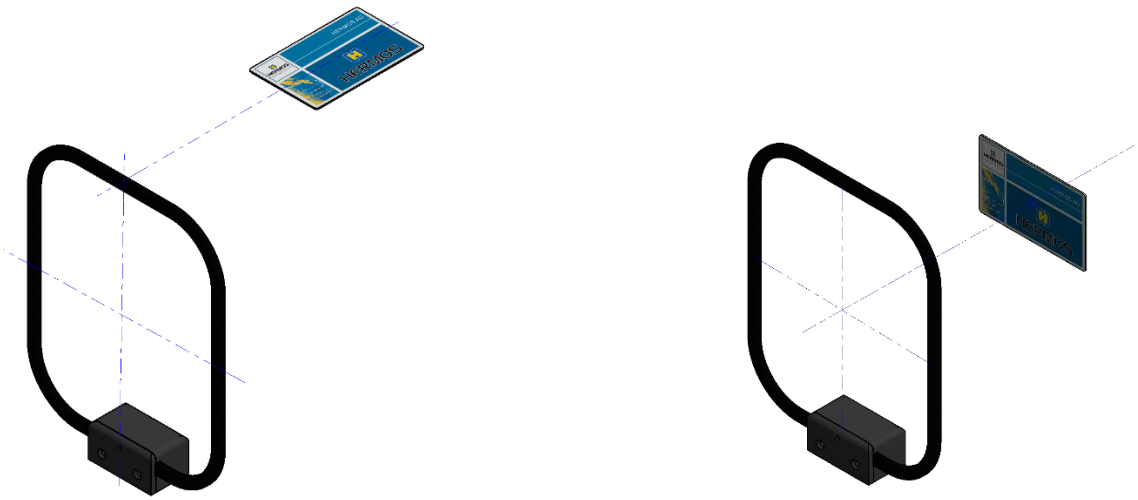


7.5 Installation the antenna

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

7.5.1 Positioning the antenna

The removal and alignment of the transport is critical to ensure reliable reading and writing.
The following diagram displays the optimum alignment and position of the transponder to the antenna.



7.5.2 Connecting the antenna

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

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

7.6 Power supply

The device can be connected to an interior DC power circuit of the equipment or to a DC adapter.

	Risks exist when supplying the device with the incorrect voltage. Only use cables, plugs and adapters supplied by the manufacturer. Observe power ratings of the technical data.

PIN	Signal
1	+24V DC
2	0 V

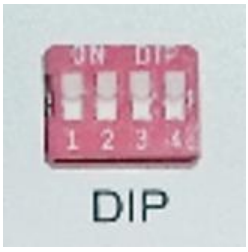
If the device is connected to the power supply, the power LED lights up.
With reading devices with PoE functionality, the power supply can also be connected directly via the Ethernet interface using Power-over-Ethernet (PoE) according to IEEE 802.3af.
Please note that the PoE infrastructure can provide sufficient power.

	Never connect the reading device to an external power supply and a PoE cable at the same time. This can damage the reading device or the connected components.

7.7 DIP-switches

Test mode can be activated via the 4 DIP switches on the device. In test mode, a continuous reading operation is performed at the set antenna port and the result of the reading operation is displayed on the status LED. The test mode is activated by setting DIP switch 4. The selection of the antenna port is changed using the DIP switches 1 - 3.

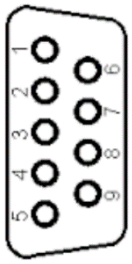
Switch	Function
1	Antenna connection selection (Dip1,Dip2,Dip3) 000 … Antenna connection 1 001 … Antenna connection 2 010 … Antenna connection 3 011 … Antenna connection 4 100 … Antenna connection 5 101 … Antenna connection 6
2	
3	
4	Activated test mode



7.8 RS232 connection

The serial Interface is a 9-pin Sub-D connector socket.
Standard serial connection cable (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



7.9 External In- and Outputs

The reading device provides options for querying input signals and setting output signals (LEDs). Depending on the device variant, the reader has different connections for inputs and outputs. The number of inputs and outputs and the used connector type can be customized.

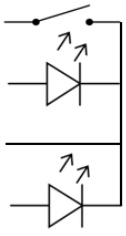
7.9.1 IO Modul WIP-Rack

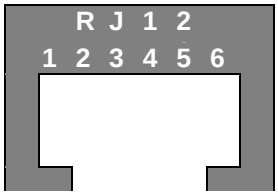
The IOModule WIP-Rack offers 1 inputs and 2 outputs for each antenna port. The connections are implemented as RJ12 sockets.

Rear view:

Pin assignment:

PIN	Signal
1	Tx Display
2	VCC (+3,3V/+5V)
3	INPUT
4	LED 2 (max.10mA)
5	GND
6	LED 1 (max.10mA)





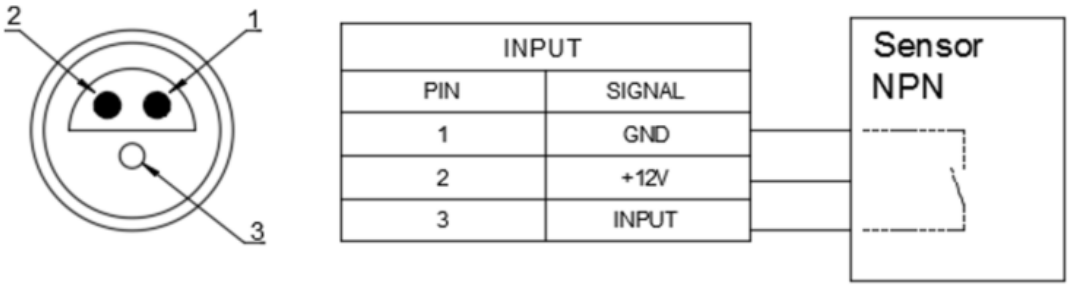
Front view

7.9.2 IO Modul LEMO3

The IO-Module LEMO3 offers 4 inputs. The connections are implemented as 3-pin LEMO sockets.

Rear view:

Pin assignment:



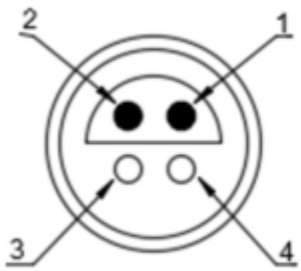
7.9.3 IO Modul LEMO4

The IOModule LEMO4 offers 4 inputs and 8 outputs.
The connections are implemented as 4-pin LEMO sockets.

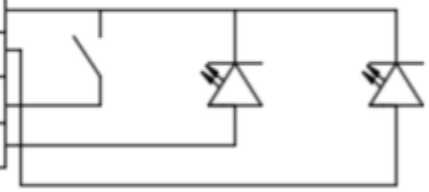
Rear view:

+

Pin assignment:



IN-/OUTPUT	
PIN	SIGNAL
1	GND
2	LED2
3	INPUT
4	LED1

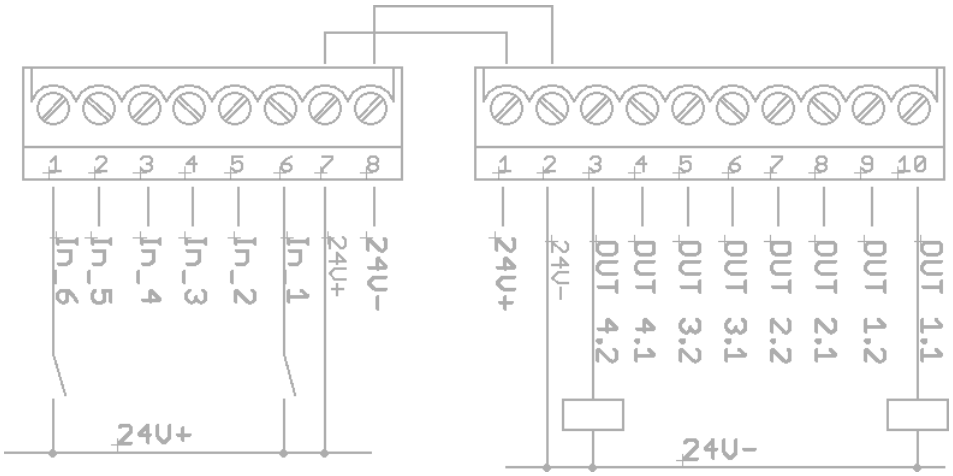


7.9.4 IO Modul Phoenix

The IOModule Phoenix offers 6 inputs and 8 outputs. (24V)
The connections are realized as Phoenix MC 1.5 / 3.81mm sockets

Rear view:

Pin assignment:



8. Commissioning

8.1 Operating conditions

The following requirements must be fulfilled for smooth device operation.

1. The operating temperature must be within the scope of the values specified in the technical data.
2. The device must be connected to the power supply (provide PoE is not used).
3. An antenna must be properly connected to the reading device.
4. A transponder must be within the reading and writing ranges of the connected antenna.
5. For normal operation, deactivate test mode after installation. (All DIP switches off).

Important 	Never expose the device to extreme temperature fluctuations. Temperature fluctuations can result in condensation moisture developing in the device and cause damage.

8.2 The serial interface parameters

The following settings of the serial interface are set at the time of delivery.
The baud rate can be changed with device parameter 0x01.

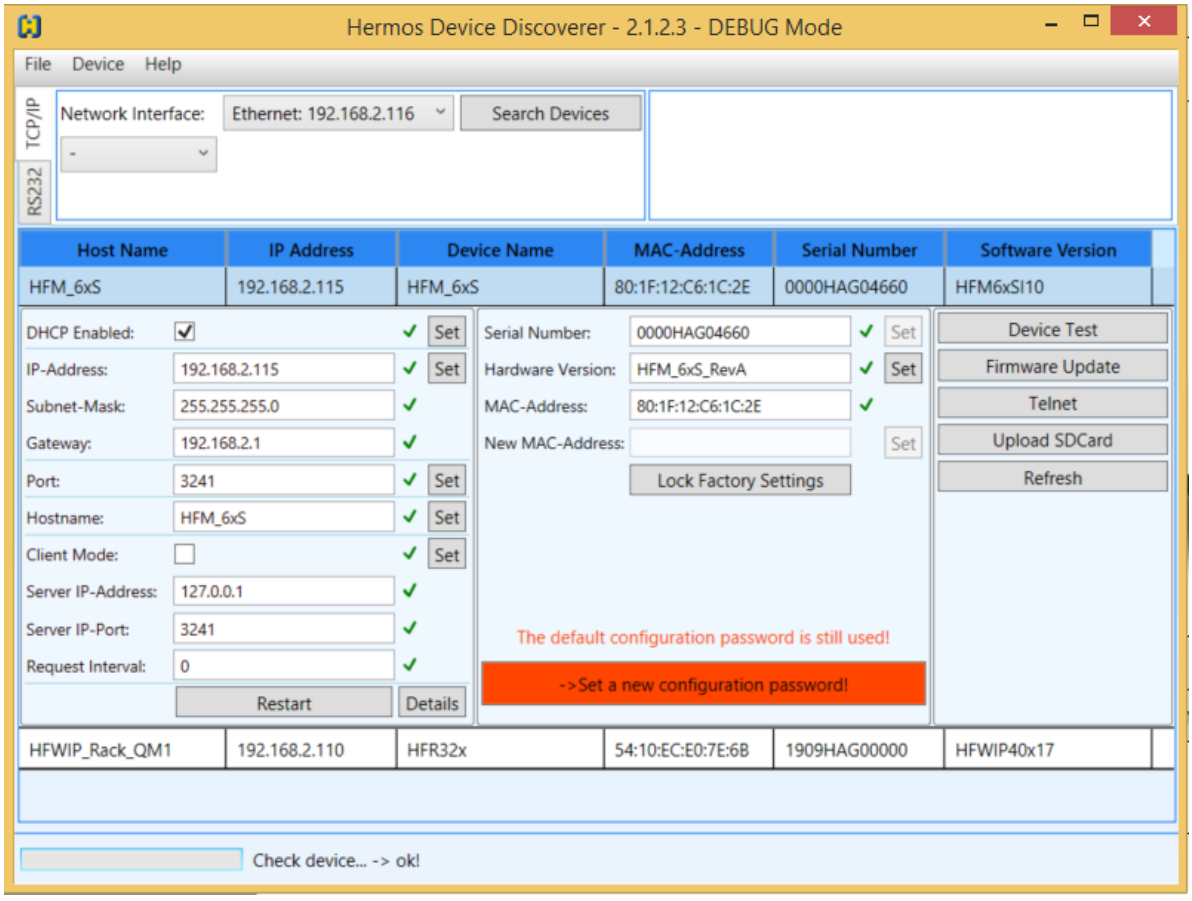
	Wert
Baud rate	19200
Data bits	8
Stop bit	1
Parity	None

8.3 Setting up the network 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.

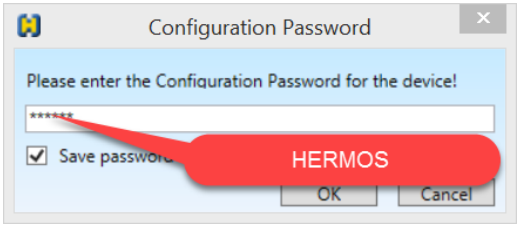
If there is not a DHCP server available in your network, a random IP address is set from the ZeroConf range (169.254.0.0/16) and operations must still be performed to obtain an IP address.

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.



If a configuration password is requested, it is "HERMOS" in the default state.

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

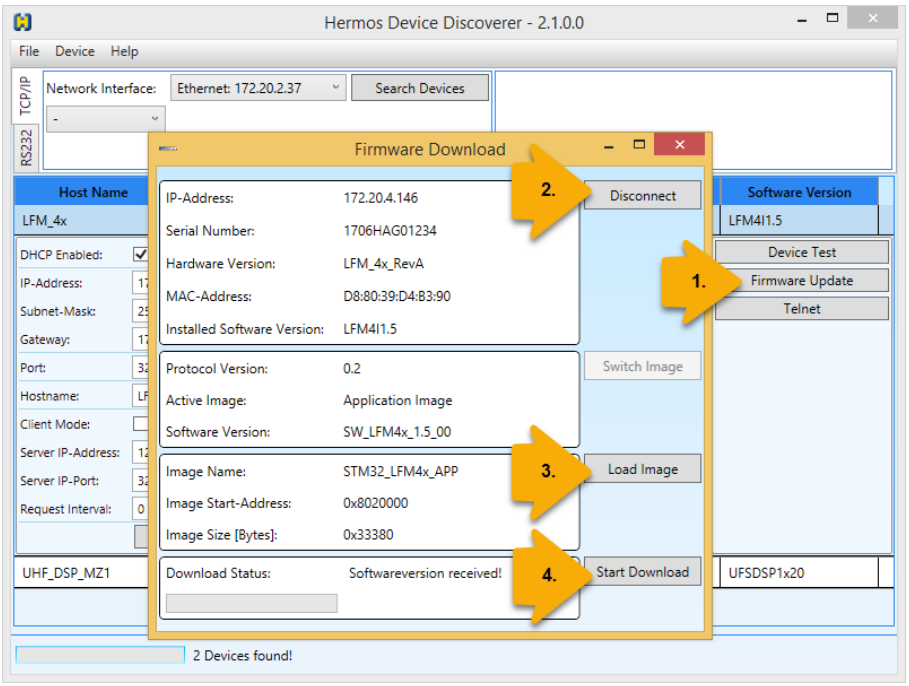
CAUTION

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

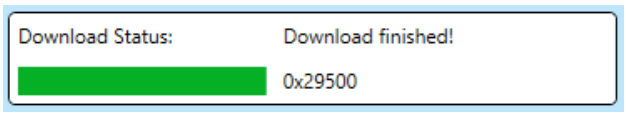
8.4 Firmware update

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 the your interface.
If a password is requested, please use "HERMOS".



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

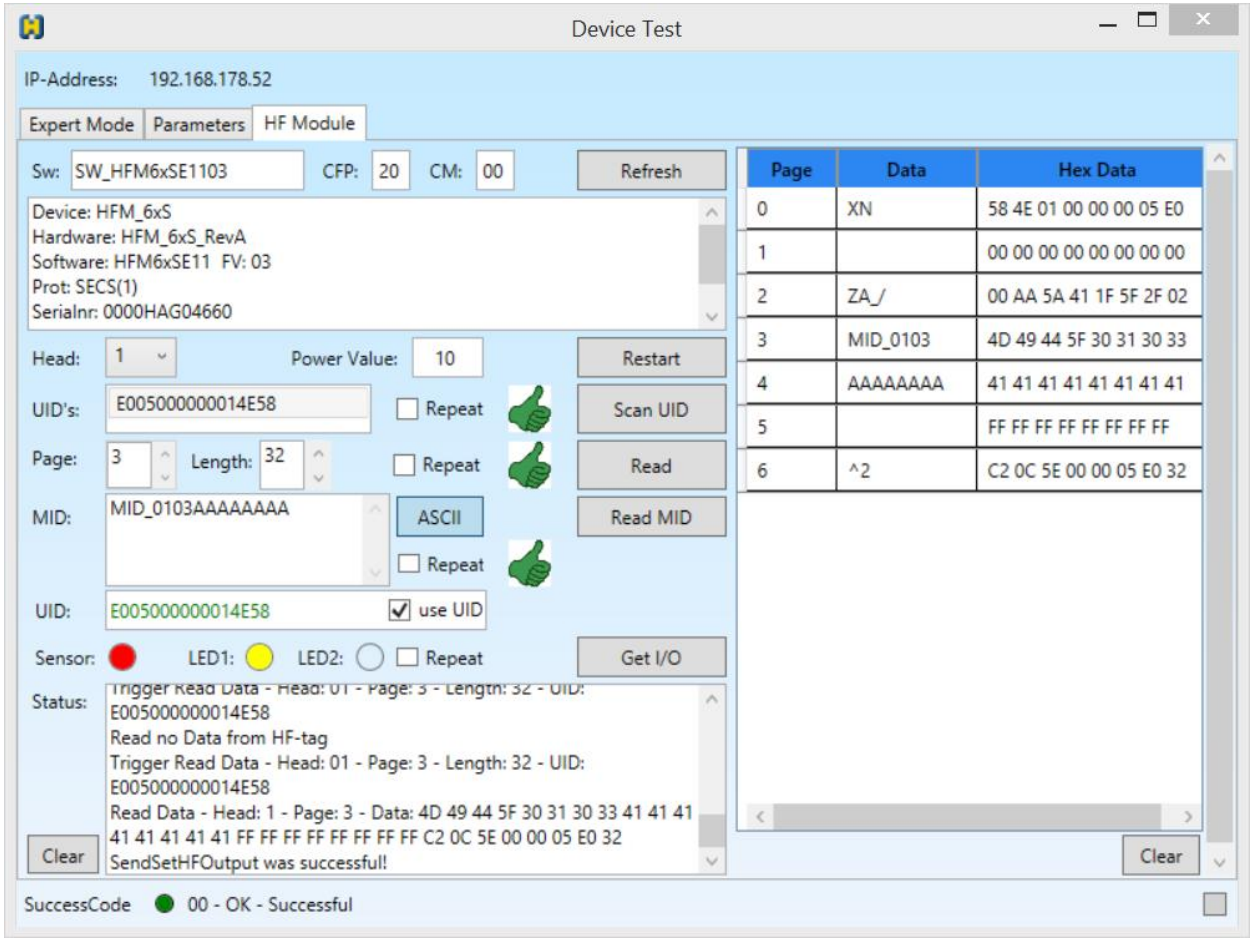
During the download process, do not disconnect the power supply or interrupt the network connection.

8.5 Devicetest with DeviceDiscoverer

Readers can also be tested with the HERMOS "Device Discoverer".

Start the tool with administrator rights and search for the HERMOS device to be tested in the network. Mark the desired reader and select the "Device Test" button regardless of your interface. Another "Device Test" view opens, with which the reader can be tested using a UDP protocol without disconnecting any existing TCP / IP connection.

	The device test is only supported with the device generation HFM 6x Gen2.0. This feature is not available with earlier HFM 6x readers!



9. Operating

9.1 Operating personal

	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 Change of protocol

9.2.1 Information

The reader supports the ASCII or SECS / HSMS protocols for communication with a connected host system. The protocol is selected using automatic protocol recognition. The currently set protocol is displayed on the status LED during the boot process.

SECS: The red status LED stays on for approx. 1 second longer during the self-test

ASCII: The yellow status LED stays on for approx. 1 second longer during the self-test

9.2.2 Automatic protocol detection

The reader automatically adjusts to the protocol used by checking and evaluating the first message after a reset. When changing the protocol, the interface is changed accordingly and reinitialized. This process can take several seconds. Messages that have already been sent will be lost.

The newly recognized protocol is used for further communication. A new change is only possible after another reset. The automatic protocol detection can be activated and deactivated by setting parameter 0x68.

	If the reader receives undefined or random characters, this can lead to an accidental protocol change if the protocol change is permitted. The automatic protocol detection (protocol change) can be activated via Parameter 0x68. The parameter 0x69 then determines whether, when changing the protocol.

9.3 Communication protocol

9.3.1 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.

9.3.2 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", …) *
Antenna port	Optional for messages that refer to a specific antenna connection.
Data	The definition of the message data depends on the protocol command.

* The reading device is set to 0 on delivery.

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)

9.3.3 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.

AFI	2 Bytes

Application Family Identifier.
The AFI defines the application type according to ISO15693. The 'most significant nibble' defines the application family. The 'least significant nibble' defines the sub-type within the family.

AFI first sign	AFI second sign	Description
‚0‘	‚0‘	All families and subfamilies
X	‚0‘	All subfamilies or family X
X	Y	Only the Yth subfamily or family X
‚0‘	Y	Proprietary subfamily Y only
‚1‘	‚0‘ , Y	Transport
‚2‘	‚0‘ , Y	Financial
‚3‘	‚0‘ , Y	Identification
‚4‘	‚0‘ , Y	Telecommunication
‚5‘	‚0‘ , Y	Medical
‚6‘	‚0‘ , Y	Multimedia
‚7‘	‚0‘ , Y	Gaming
‚8‘	‚0‘ , Y	Data storage
‚9‘	‚0‘ , Y	Item management
‚A‘	‚0‘ , Y	Express parcels
‚B‘	‚0‘ , Y	Postal service
‚C‘	‚0‘ , Y	Airline bags
‚D‘	‚0‘ , Y	RFU
‚E‘	‚0‘ , Y	RFU
‚F‘	‚0‘ , Y	RFU

CMD	1 Byte

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

Data	1 to 100 Bytes

The data item is in HEX format.
This means that two ASCII characters in the message are describe by one byte transponder data in HEX format.

Example:

Tag data ASCII: “12345678” (8 Bytes)
Tag data HEX: 0x31 0x32 0x33 0x34 0x35 0x36 0x37 0x38

Data in the message: “3132333435363738” (16 ASCII-characters)

DSFID	2 Bytes

Data Storage Format Identifier.
The DSID byte is used to store an ID for the data format of the day. The DSFID byte can be written and locked.

Head ID	1 Bytes

The number of the antenna port is called HeadID. The Head ID is part of the protocol as it is also used for other devices with multiple antenna connections. (antenna port 1-6)

Length	2 Bytes

Defines the length of the data to be read or written. The length of the data is described in HEX format by two ASCII characters (2 byte).

Example:
Length 1 Byte → 0x01 → "01"
Length 16 Bytes → 0x10 → "10"
Length 26 Bytes → 0x1A → "1A"
Length 100 Bytes → 0x64 → "64" (max. Length)

List of UIDs	1-120 Bytes

Is a list of all unique transponders IDs (ISO15693) received by the device. The list is represented by a character string. Each UID has a length of 8 byte. In this character string each byte of the UID is represented by 2 ASCII characters. This means a complete UID (8 byte) is represented by 16 ASCII characters. The first 2 characters of the whole character string indicate the amount of UID's in the character string. These two characters describe the byte value in HEX format ("02" means 0x02).

Example: List with 2 UID's:

"02 E00700000A7CA966 E00700000A744911"

→ UID 1: 0xE00700000A7CA966
→ UID 2: 0xE00700000A744911

List of UIDs + DSFID	1-120 Bytes

Is a list of the UID's + DSFID Byte (ISO165693) of the transponders received by the device. The list is represented by a character string. Each UID/DSFID unit has a length of 9 byte. In this character string each byte of the UID/DSFID is represented by 2 ASCII characters.
This means a complete UID (8 byte) + DSFID Byte (1 Byte) is represented by 18 ASCII characters.
The first 2 characters of the whole character string indicate the amount of UID's in the character string.
These two characters describe the byte value in HEX format ("02" means 0x02).

Example: List with 2 tags:

"02 E00700000A7CA966AA E00700000A744911BB"

→ UID 1: 0xE00700000A7CA966 AA
→ UID 2: 0xE00700000A744911 BB

Output state	2, 12 Bytes

Shows or sets the state of the outputs at the respective antenna connection (Head ID). The information unit 'Output State' contains the state of both outputs of an antenna connection (if available).
In case of status query of all outputs of the reader, 'Output State' contains the status of all outputs (2 per head). For each head the status is represented by 2 byte → Byte 1 for output 1 and byte 2 for output 2 (if available).

Values: 0 – Output OFF
1 – Output ON
2 – Output blinks
3 – Output maintains current status
4 – Output blinks fast
5 – Output pulsate

Parameter No.	2 Bytes

Number of the parameter.
Two ASCII character (2 byte) designate the parameter number in HEX format.

Example:
Parameter 20 → 0x14 → "14"

Parameter Value	2 Bytes

Value of the parameter.
Two ASCII characters (2 byte) designate the parameter value in HEX format

Example:.
Parameter 192 → 0xC0 → "C0"

Reader-ID	1 Byte

Address of the device (0… E).
At time of delivery the device always has the address 0.
HERMOS recommends keeping the reader ID "0" for all devices using communication via IP connection.

Response-Code	4 Bytes

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

Sensor State	4 Bytes

Shows the current status of the sensors at the respective antenna port (Head ID).

Value 0 → Sensor is not occupied (open)
Value 1 → Sensor is occupied (closed)

Note: Parameter 26 to 30 and 86 to 90 → Sensor normal or inverted.

	Please refer to parameter 26-30, 148 if Sensor is inverted

Serial number	4 Bytes

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

Software version	6-10 Bytes

Character string with software version of the device.
The display is in HEX format. The 12 - 20 characters of the ASCII string describe the 6 - 10 bytes of the software version in HEX format.

Example:
>> V0
<< v048464D367849563132
→ 0x48 0x46 0x4D 0x36 0x78 0x49 0x56 0x31 0x32 = „HFM6xIV12"

Start page	2 Bytes

Defines the start page for a read or write action. The two ASCII characters (2 byte) define thereby the page number in HEX format.

Example:
Page 1 → 0x01 → „01“
Page 16 → 0x10 → „10“
Page 24 → 0x18 → „18“

UID	8 Bytes

Represents the explicit ID of the transponder (ISO 15693). The UID is required if more than one transponder is within the range of the antenna. The UID has a length of 8 byte, which are represented in the message by 16 ASCII characters as a HEX string.

9.3.4 Message example

The following example shows the structure of a complete message (eg "H0"):

ASCII	HEX	Description
‚S‘	**53**	Start character
‚0‘	**30**	Highbyte message length
‚2‘	**32**	Lowbyte message length
‚H‘	**48**	First sign of message: command
‚0‘	**30**	Second sign of message: target 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‘
(only LSB is used)

9.4 ASCII-Commands

Read:

Command	Description
I	Inventory
M	Scan UIDs
X	Read Data
Y	Read Data (addressed with UID)
R	Automatic Read
K	Polling

Write:

Command	Description
W	Write Data
Z	Write Data (addressed with UID)

In- and Output:

Command	Description
B	Sensor Status
O	Set Output
Q	Query Output State
B	Query Input State

Parameter:

Command	Description
F	Query Parameter
P	Set Parameter

Device-Settings:

Command	Description
N	Reset
E	Error Message
H	Heartbeat
V	Query Software Version

Other Read and Write commands:

Command	Description
CMA	Scan UIDs with AFI
CKA	Polling with AFI and DSFID Byte
CRA	Automatic Read with AFI Byte
CWA	Write AFI-Byte
CWD	Write DSFID-Byte
CLA	Lock AFI-Byte
CLD	Lock DSFID-Byte

9.4.1 I – Inventory

The Inventory Command is used to scan an individual transponder within the reading range of the antenna. The reply message contains the UID of the detected transponder.
This command does not contain collision detection and can only be used with one transponder in the antenna area. The Inventory function is faster than a full scan. (refer to "M" command)

If there are more than one transponders in the antenna area, the best positioned transponder in the antenna field is detected.
Error-free reading cannot be guaranteed for several transponders.

Host → Device		
CMD	**Reader-ID**	**Head ID**
I	1 Byte	1 Byte

Device → Host			
CMD	**Reader-ID**	**Head ID**	**UID List**
i	1 Byte	1 Byte	10 Bytes

Example:
>> I01
<< i01 01 E007816306C25F2F

>> I01
<< i01 01 E0070000155AAFD1

9.4.2 M – Scan UIDs

The command M is used for scanning of one individual or a group of transponders in reading range of the antenna. The reply message contains a list of recognized transponders that have been identified by their UID. The Scan function is slower than an Inventory command. (refer to „I“ command)

	All transponders located in the antenna area are detected. The scanning process will take longer than a simple inventory or read function.

Host → Device		
CMD	**Reader-ID**	**Head ID**
M	1 Byte	1 Byte

Device → Host			
CMD	**Reader-ID**	**Head ID**	**UID List**
m	1 Byte	1 Byte	1- 120 Bytes

Example:

```
>> M01                                  antenna port 1, 1 recognized tag
<< m0101E0070000155AAFD1
-----------------------------------------------------
>> M02                                  antenna port 2, 2 recognized tags
<< m0202 E0070000155AAFD1
         E007816306C25F2F
-----------------------------------------------------
>> M03                                  antenna port 3, 4 recognized tags
<< m0304 E0070000155AAFD1
         E005000000012B64
         E0070000155AB098
         E007816306C25F2F
-----------------------------------------------------
```

9.4.3 X – Read data

The command X starts reading of the data area from a transponder.
The data elements start with page and data length. To ensure a safe reading, the transponder type used must be set in parameter 32.
There should be only one transponder in the reading area of the antenna.

If there are several transponders in the antenna area, the best placed transponder in the antenna field is read.
No error-free reading can be guaranteed for several transponders.

Host → Device				
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**
X	1 Byte	1 Byte	2 Bytes	2 Bytes

Device → Host					
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**Data**
x	1 Byte	1 Byte	2 Bytes	2 Bytes	1 -100 Bytes

If a read attempt is not successful, the reader repeats the read operation before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:
>> X01 01 08 Page 01, Length 08
<< x01 01 08 3132333435363738 Data = „12345678“

Addressed Read with UID refer to command:
Y Read addressed (addressed with UID)

9.4.4 Y – Read data addressed with UID

The command Y starts the reading of individual transponders (ISO15693) in a group of transponders (several transponders are in reading range of the antenna). The data elements start page and data length of the data area, the element UID identifies the individual transponder.
The transponder manufacturer and type is specified by the UID, different manufacturers can be read without parameterization of the reader.

	Several transponders can be placed in the reading area of the antenna.

Host → Device					
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**UID**
Y	1 Byte	1 Byte	2 Bytes	2 Bytes	8 Bytes

Device → Host						
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**UID**	**Data**
y	1 Byte	1 Byte	2 Bytes	2 Bytes	8 Bytes	1 -100 Bytes

If a read attempt is not successful, the reader repeats the read operation before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> Y01 01 08 E0070000155AAFD1          Page 01, Length 08, UID „E0070000155AAFD1“
<< y01 01 08 E0070000155AAFD1
              3132333435363738          Data = „12345678“
-----------------------------------------------------
```

	Read data (non addressed) refer to command: X Read data

9.4.5 R – Automatic read

HFM Reader versions with IO module (at least 1 input) provide the function of a sensor-triggered automatic reading. The reader starts a read operation by triggering the input sensor. If a host connection exists, the data of the automatic read operation is automatically sent to the host.

	Automatic read with AFI-Byte refer to command: CRA Automatic read with AFI-Byte

Host → Device					
CMD	**Reader-ID**	**Head ID**	**Type R**	**List length**	**Data / UID**
R	1 Byte	1 Byte	1 Byte	2 Bytes	x Bytes

Device → Host		
CMD	**Reader-ID**	**Head ID**
r	1 Byte	1 Byte

Example:

<< R01001 E0070000155AAFD1	Automatic read UID (Par.26 = 0x50)
>> r01	UID „E0070000155AAFD1“

<< R011 01 04 0C 31323334353637383941424 3	Automatic read data (Par.26 = 0x60)
>> r01	Page 4, Length 12, Data = „123456789ABC“

	The automatic read operation (UID/data) is defined in parameter 26ff. The automatic read data area is defined in parameter 33 and 34.

9.4.6 K – Polling

HF readers can be set to a status of continuous reading, the polling mode. The device then carries out a reading at regular intervals and outputs the corresponding data of the read HF transponder. (Parameter 39ff) A list of UID's of all recognized transponders is sent to the host.

Polling with AFI und DSFID-Byte refer to command:
CKA Polling with AFI und DSFID Byte

Device → Host			
CMD	**Reader-ID**	**Head ID**	**UID List**
K	1 Byte	1 Byte	1 - 120 Bytes

Host → Device		
CMD	**Reader-ID**	**Head ID**
k	1 Byte	1 Byte

The Poll function can be activated by setting reader parameter 39ff.

Example:
<< K0101E0070000155AAFD1
>> k01
<< K0101E007816306C25F2F
>> k01

9.4.7 W – Write data

The command W starts writing a defined data area of a transponder.
The data elements start page and data length are defining the data area. To ensure a safe writing, the transponder type used must be set in parameter 32. There should be only one transponder in the writing area of the antenna.

	If there are more than one transponders in the antenna area, all transponders in the antenna field are written. No error-free writing can be guaranteed for several transponders.

Host → Device					
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**Data**
W	1 Byte	1 Byte	2 Bytes	2 Bytes	1 -100 Bytes

Device → Host		
CMD	**Reader-ID**	**Head ID**
w	1 Byte	1 Byte

If a write attempt is not successful, the reader repeats the write operation before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> W01 01 08 4142434445464748      Page 01, Length 08, Data „ABCDEFGH“
<< w01                             write OK
-----------------------------------------------------
```

	Addressed Write with UID refer to command: Z Write addressed (addressed with UID)

9.4.8 Z – Write data (addressed with UID)

The Y command starts writing a defined data area of individual transponders from a group of several transponders. The data elements start page and data length and data are defining the data area, the element UID identifies the individual transponder.
The transponder manufacturer and type is specified by the UID, different manufacturers can be written without parameterization of the reader.

	Several transponders can be placed in the writing area of the antenna.

Host → Device						
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**UID**	**Data**
Z	1 Byte	1 Byte	2 Bytes	2 Bytes	8 Bytes	1 -100 Bytes

Device → Host		
CMD	**Reader-ID**	**Head ID**
z	1 Byte	1 Byte

If a write attempt is not successful, the reader repeats the write operation before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> Z01 01 08 E0070000155AB098 3132333435363738   Page 01, Length 08, UID „E0070000155AB098“
                                                  Data „ABCDEFGH“
<< z01                                            write OK
-----------------------------------------------------
```

	Write data (non addressed) refer to command: W Write data

9.4.9 L – Locking data area (addressed by with UID)

The command L starts the locking (locking) of the defined data area of a specific transponder from a group of several transponders. In addition to the data blocks to be blocked, the UID of the transponder is transferred as a data element for addressing.
Since the transponder type is included in the UID, transponder types from different manufacturers can be locked without parameterizing the reader.

	Several transponders can be located in the reading area of the antenna.

Host → Gerät					
CMD	**Reader-ID**	**Head ID**	**Start page**	**Length**	**UID**
L	1 Byte	1 Byte	2 Bytes	2 Bytes	8 Bytes

Gerät → Host		
CMD	**Reader-ID**	**Head ID**
l	1 Byte	1 Byte

If a lock attempt is unsuccessful, the reader repeats the process before sending an error message. The number of repetitions is defined in parameter 31.

Example:

```
------------------------------------------------------
>> L01 01 08 E0070000155AAFD1     Page 01, Length 08, UID „E0070000155AAFD1“
<< l01                           →Locking was ok
------------------------------------------------------
```

Caution: The lock process is irreversible and cannot be undone.

9.4.10 B – Sensor Status

The command B is sent by the device if the state of the sensors has changed. The message shows the current status of the sensor. If the host must send a confirmation depending on the internal setting of the device. (Par. 26ff Watchport)

	The command can also be used to query the state of the sensors.

Device → Host			
CMD	**Reader-ID**	**Head ID**	**Sensor Status**
B	1 Byte	1 Byte	1 Byte

Host → Device		
CMD	**Reader-ID**	**Head ID**
b	1 Byte	1 Byte

The Head ID defines the respective sensor.

Example:

```
<< B01 1                                    Sensor occupied
>> b01
-------------------------------------------------------
<< B01 0                                    Sensor free
>> b01
-------------------------------------------------------
```

9.4.11 O – Set Output

The command O changes the status of the outputs of the respective antenna port. The status of both outputs is changed in with one message.

	To keep the current status unchanged use value 3 - keep status. (refer to Output status)

Host → Device				
CMD	**Reader-ID**	**Head ID**	**Output Status**	**Time (optional)**
O	1 Byte	1 Byte	2 Byte	2 Byte

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

The Head ID defines the output.

Example:

<< O01 12 — Head 1, Output 1 = „ON“, Output 2 = „Blink“
>> o01

<< O02 03 — Head 2, Output 1 = „OFF“, Output 2 = „ON“
>> o02

<< O01 10 0A — Head 1, Output 1 = „ON“, 10 Output
>> o01

9.4.12 Q – Query outputs

The command Q is used to query the current status of one or all outputs.
The status of the outputs of one antenna port or all antenna ports can be queried with one command.

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

Device → Host			
CMD	**Reader-ID**	**Head ID**	**Output State**
q	1 Byte	1 Byte	2 or 12 Bytes

Example:

```
-------------------------------------------------
>> Q00                          query all outputs
<< q00 101010101010             state of all outputs (ON, OFF, ON, …)
-------------------------------------------------
>> Q01                          Head 1, query outputs
<< q01 12                       state „ON“, „Blink“
-------------------------------------------------
```

9.4.13 B – Query inputs

The command B is used to query the current status of one or all inputs.
The status of the inputs of one antenna port or all antenna ports can be queried with one command. The position of the DIP-switches can also inquired from the reader.

Host → Device		
CMD	**Reader-ID**	**Head ID**
B	1 Byte	1 Byte

Device → Host			
CMD	**Reader-ID**	**Head ID**	**Input State**
b	1 Byte	1 Byte	2 or 12 Bytes

Example:

```
-------------------------------------------------
>> B00                          query all inputs
<< q00 100000 0000              state of all 6 inputs (occupied, free, …)
                                state of 4 DIP-switches (OFF, OFF, OFF, OFF)

-------------------------------------------------
>> B01                          Head 1, query input
<< b01 1                        occupied
-------------------------------------------------
>> B02                          Head 2, query input
<< b02 0                        free
-------------------------------------------------
>> B07                          query DIP-switch 1
<< b07 0                        state OFF
-------------------------------------------------
```

9.4.14 F – Query parameter

The command F is used for querying individual parameters of a device.
The data elements parameter no. defines the index of the reader parameter. The answer contains the parameter number and the value.

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

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

Example:

```
-------------------------------------------------
>> F004                    Parameter 04      (Delay Time)
<< f00432                  value 0x32 = 50dez.
-------------------------------------------------
>> F027                    Parameter 39 = 0x27 (Polling Frequency)
<< f02700                  value 0x00
-------------------------------------------------
```

9.4.15 P – Set parameter

The command P is used to set parameters of a device. After a parameter has been successfully set, the device sends a confirmation or performs a reset. (depends on the parameter).

	After setting one or more parameters a reset should be per-formed since the parameter influence the initialization of the hardware and a change only becomes effective after a reset.

Take care

Parameter changes are saved in the internal flash memory.
The maximum number of write / erase cycles in the flash memory is limited to approx. 100,000 cycles.

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

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

Example:

```
------------------------------------------------------
>> p02732                    → Parameter 39 (0x27 Polling Frequency), value = 50 (0x32)
<< p0
------------------------------------------------------
```

9.4.16 N – Reset

The command N performs a reset of the reader.
An existing Ethernet connection to the host is disconnected and must be re-established after restarting.

	After setting one or more parameters a reset should be per-formed since the parameter influence the initialization of the hardware and a change only becomes effective after a reset.

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

Example:
>> N0
<< → Re-start of the device, no reply

	After a restart, all outputs are deactivated.

9.4.17 E – Error message

If an error occurs the device will send an error message with the respective error code.
This message must be acknowledged by the host (depending on device settings par. 12).

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

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

More information on error codes and corresponding corrective actions, refer to the section Error Codes.

9.4.18 H – Heartbeat

The command H can be used to query the serial number of the device.

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

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

The response code is not needed for the individual device.
This code is always "0000".

Example:
>> H0
<< h004D20000 → Serial number 0x04D2 = 1234dez

9.4.19 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	max. 20 Bytes

The length of the software version is limited to a maximum of 10 characters.
Each character of the software version is displayed in HEX format, represented by 2 ASCII characters.

Example:

```
-------------------------------------------------
>> V0
<< v0 48464D367849563132          → Software version „HFM6xIV12“
-------------------------------------------------
>> F07B
<< f0 7B 03                       → Fine version = 03
-------------------------------------------------
```

	The fine version of the software can be queried by device parameter 123 (0x7B),

9.4.20 CMA – Scan UIDs with AFI

The command CMA starts a scanning operation and detects all RF transponders with the addressed AFI, in the read range of the antenna. The response message contains a list of all detected transponders with your UID and the DSFID byte.

	Only transponders with the addressed Application Family Identifier are recognized. If 0x00 is used as AFI, all transponders in the antenna area are detected.

Host → Device			
CMD	**Reader-ID**	**Head-ID**	**AFI**
CMA	1 Byte	1 Byte	2 Bytes

Device → Host				
CMD	**Reader-ID**	**Head-ID**	**AFI**	**List von UIDs + DSFID**
cma	1 Byte	1 Byte	2 Bytes	1 - 135 Bytes

Example:

```
-------------------------------------------------
>> CMA01 00                                  → Scan AFI = 0x00
<< cma01 00 03  E0070000155AAFD100           → 3 Tags
                E0070000155AB09800
                E007816306C25F2F00
-------------------------------------------------
>> CMA01 80                                  → Scan AFI = 0x80   (3 Tags in antenna area)
<< cma01 80 01 E0070000155AAFD100            → 1 Tag detected
-------------------------------------------------
>> CMA01 90                                  → Scan AFI = 0x90   (3 Tags in antenna area)
<< cma01 90 01 E0070000155AB09800            → 1 Tag detected
-------------------------------------------------
```

9.4.21 CKA – Polling with AFI

The command is using to perform a scanning or reading operation at regular intervals and filter HF transponders with a valid AFI. The data of all recognized transponders are sent to the host. The confirmation by the host is optional.
The selective polling function can be activated by setting the parameter 36. The AFI value used can be set in parameter 35.

	Polling without AFI refer to command: K Polling

Device → Host			
CMD	**Reader-ID**	**Head ID**	**UID List**
CKA	1 Byte	1 Byte	1 - 120 Bytes

Host → Device		
CMD	**Reader-ID**	**Head ID**
cka	1 Byte	1 Byte

The polling function can be established with parameter 35, 36 and 39ff.

Example:

```
------------------------------------------------------
<< CKA01 80 01 E0070000155AAFD100        → Polling with AFI = 0x80
------------------------------------------------------
```

9.4.22 CRA – Automatic read with AFI

HFM Reader versions with IO module (at least 1 input) provide the function of a sensor-triggered automatic reading. The reader starts a read operation by triggering the input sensor. If a host connection exists, the data of the read operation is automatically sent to the host.
This command is used when parameter 36 has the value 1. The AFI value of parameter 35 is don't care.

	Automatic read without AFI-Byte refer to command: R Automatic read

Device → Host						
CMD	**Reader-ID**	**Head ID**	**AFI**	**Type R**	**List length**	**Data**
CRA	1 Byte	1 Byte	1 Byte	1 Byte	2 Bytes	1-100 Bytes

Host → Device		
CMD	**Reader-ID**	**Head ID**
cra	1 Byte	1 Byte

Example:

<< CRA010 01 E0070000155AAFD1 — Automatic read UID (Par. 26 = 0x50)
>> cra01 — UID „E0070000155AAFD1"

<< CRA011 01 04 0C 31323334353637383941424 — Automatic read data (Par.26 = 0x60)
>> cra01 — Page 4, Length 12, Data = „123456789ABC"

9.4.23 CWA – Write AFI-Byte

The command writes an AFI value on the transponder with the addressed UID.
Transponder types of different manufacturers can be described without parameterization of the reader.

	Several transponders can be placed in the writing area of the antenna.

Host → Device				
CMD	**Reader-ID**	**Head ID**	**UID**	**AFI**
CWA	1 Byte	1 Byte	8 Byte	2 Byte

Device → Host		
CMD	**Reader-ID**	**Head ID**
cwa	1 Byte	1 Byte

If the addressed transponder is not in the antenna area, the reader repeats the write action before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> CWA01E007816306C25F2F80
<< cwa01
-----------------------------------------------------
>> CMA0180
<< cma018001E007816306C25F2F00
-----------------------------------------------------
```

9.4.24 CWD – Write DSFID-Byte

The command writes a DSFID value on the transponder with the addressed UID.
Transponder types of different manufacturers can be described without parameterization of the reader.

	Several transponders can be placed in the writing area of the antenna.

Host → Device				
CMD	**Reader-ID**	**Head ID**	**UID**	**DSFID**
CWD	1 Byte	1 Byte	8 Byte	2 Byte

Device → Host		
CMD	**Reader-ID**	**Head ID**
cwd	1 Byte	1 Byte

If the addressed transponder is not in the antenna area, the reader repeats the write action before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> CWD01E007816306C25F2F80
<< cwd01
-----------------------------------------------------
>> CMA0100
<< cma010001E007816306C25F2F80
-----------------------------------------------------
```

9.4.25 CLA – Lock AFI-Byte

The CLA command locks the AFI byte on the transponders addressed by the UID.
Transponder types of different manufacturers can be described without parameterization of the reader.

	Several transponders can be placed in the writing area of the antenna.

Take Care

The process of locking is permanent and cannot be reversed.

Host → Device			
CMD	**Reader-ID**	**Head ID**	**UID**
CLA	1 Byte	1 Byte	8 Byte

Device → Host		
CMD	**Reader-ID**	**Head ID**
cla	1 Byte	1 Byte

If the addressed transponder is not in the antenna area, the reader repeats the write action before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> CLA01E007816306C25F2F
<< cla01
-----------------------------------------------------
```

9.4.26 CLD – Lock DSFID-Byte

The CLD command locks the DSFID byte on the transponders addressed by the UID.
Transponder types of different manufacturers can be described without parameterization of the reader.

	Several transponders can be placed in the writing area of the antenna.

Take care

The process of locking is permanent and cannot be reversed.

Host → Device			
CMD	**Reader-ID**	**Head ID**	**UID**
CLD	1 Byte	1 Byte	8 Byte

Device → Host		
CMD	**Reader-ID**	**Head ID**
cld	1 Byte	1 Byte

If the addressed transponder is not in the antenna area, the reader repeats the write action before sending an error message. The number of repeats is defined in parameter 31. (r/w maxrepeat)

Example:

```
-----------------------------------------------------
>> CLD01E007816306C25F2F
<< cla01
-----------------------------------------------------
```

9.5 Parameter

The following parameters are used for setting device properties.
The parameters are saved in Flash and are also available if changed after a restart.

CAUTION

Parameter changes are backed up in the internal Flash memory.
The maximum number of writing/deleting cycles in the Flash memory is limited to approx. 100,000 cycles.

Number (DEZ)	Number (HEX)	Parameter name	Description
1	0x01	**Baud rate**	Data transmission rate The baud rate can be changed to the defined values. 12: 1200 Baud 24: 2400 Baud 48: 4800 Baud 96: 9600 Baud 192: 19200 Baud 200: 38400 Baud 201: 57600 Baud Default: 192 19200 Baud
4	0x04	**Delay time**	If an acknowledgement is not sent from the host, the device waits for this time period before it sends the message to the host again. The number of repetitions is defined in parameter 6 (max repeat). 0x0A .. 0xFA (0,1s) → 1 – 25 sec Default: 0x32 … 5 seconds
6	0x06	**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. 0x00 .. 0x1F → 0 – 31 Default: 0x03
11	0x0B	**Reader ID**	This parameter defines the address of the device in the ASC-I1 protocol. We recommend keeping the default setting, since the module can be identified by the hardware interface. 0x00 .. 0x0E → 0 – 14 Default: 0x00
12	0x0C	**Acknowledgement error message**	This parameter defines if an error message must be acknowledged. 0x00 - No acknowledgement expected 0x01 - An acknowledgement is expected Default: 0x01
16	0x10	**Antenna Power Level** (all ports)	This parameter defines the output power at all antenna ports. If the ports are using different power levels, the value of this parameter is 0xFF.

			Minimum: 200mW Maximum: 1000mW 00 … 31 (0x00 – 0x1F) Default : 0x10 … 600mW
18	0x12	**DIP- switch activity**	The DIP switches can be activated or deactivated by this parameter. 0x0000 0000 … all DIP-switches deactivated 0x0000 0001 … DIP-Schalter 1 activated 0x0000 1111 … all DIP-switches activated Default : 0x0000 1111 … 0x0F
19	0x13	**DIP-switch status**	This parameter supplies the current position of the DIP switches. The parameter can only be queried. 0x0000 0000 … all DIP-switches off 0x0000 0001 … DIP-switch 1 is on
20	0x14	**Sensor Activity**	Activate, deactivate sensor 1-6 0x0000 0000 … all sensors are deactivated 0x0000 0001 … sensor 1 is activated 0x0011 1111 … all sensors are activated Default : 0x0011 1111
21	0x15	**Sensor Delay** **Delay time for sensor 1**	Delay time for the sensor event up to start of an action. (refer to Par. 26) 0 … 255 (1/10s) Default : 1 (0,1)
22	0x16	**Sensor Delay** **Delay time for sensor 2**	Delay time for the sensor event up to start of an action. (refer to Par. 27) 0 … 255 (1/10s) Default : 1 (0,1)
23	0x17	**Sensor Delay** **Delay time for sensor 3**	Delay time for the sensor event up to start of an action. (refer to Par. 28) 0 … 255 (1/10s) Default : 1 (0,1)
24	0x18	**Sensor Delay** **Delay time for sensor 4**	Delay time for the sensor event up to start of an action. (refer to Par. 29) 0 … 255 (1/10s) Default : 1 (0,1)
25	0x19	**Sensor Delay** **Delay time for sensor 5**	Delay time for the sensor event up to start of an action. (refer to Par. 30) 0 … 255 (1/10s) Default : 1 (0,1)
26	0x1A	**WatchPort sensor 1** (only for devices with input)	The Watchport parameter defines the behaviour of the reading device when the input signal changes. Bit 0: Input opened („B“-CMD) 0 … deactivated, 1 … activated Bit 1: Input closed („B“-CMD) 0 … deactivated, 1 … activated Bit 2: 0 … Output 1 not inverted 1 … Output 1 inverted

			Bit 3: 0 … Output 2 not inverted 1 … Output 2 inverted Bit 4: Sensor triggered Inventory Bit 5: Sensor triggered Read Bit 6: 0 … „B“ no confirmation expected 1 … „B“ confirmation expected Bit 7: 0 … input signal not inverted, 1 … input signal inverted Default : 0x0000 0011
27	0x1B	**WatchPort sensor 2** (only for devices with input)	Refer to Parameter 26 Default : 0x0000 0011
28	0x1C	**WatchPort sensor 3** (only for devices with input)	Refer to Parameter 26 Default : 0x0000 0011
29	0x1D	**WatchPort sensor 4** (only for devices with input)	Refer to Parameter 26 Default : 0x0000 0011
30	0x1E	**WatchPort sensor 5** (only for devices with input)	Refer to Parameter 26 Default : 0x0000 0011
31	0x1F	**r/w Max Repeat**	This parameter defines the max. amount of read or write attempts in case of a read/write error. 0 … 5 Default : 5
32	0x20	**Transponder type**	This parameter defines the type of the transponder. The type is required for commands X and W since these messages do not use the UID to identify the transponder type. The device must recognize the type in order for the transponders to be able to perform certain functions. The type corresponds to the 2nd byte of the UID. 04 … NXP 05 … Infineon 07 … Texas Instruments Default : 5 … Infineon (depends on CFP=5)
33	0x21	**Autoread Page**	Defines the start page of the data that should be read during the automatic reading. (R-CMD, CRA-CMD) 00 … 255 (depends on tag type) Default : 0x04 (page 4)
34	0x22	**Autoread Data Length**	This parameter defines the length of the data that should be read during the automatic reading (R-CMD, CRA-CMD) 00 … 255 (depends on tag type) Default : 0x0C (12 bytes)
35	0x23	**AFI - Application Family Identifier**	This parameter defines the AFI Byte which is used during scanning with AFI Byte (see parameter 36). (for further development) 00 … 255 Default : 0 … no AFI defined
36	0x24	**Advanced UID**	This parameter defines whether the device uses the standard commands K and R or the expanded command CKS and CRA. CKA and CRA

			commands are using the AFI Byte defined in parameter 35. The DSFID Byte is added to the UID. Bit 0 0 = CMD „K“ und „R“ activated 1 = CMD „CKA“ und „CRA“ activated Bit 1 0 = none DSFID Byte 1 = DSFID added to Inventory and Scan Default : 0x00 R und K CMD activated
39	0x27	**Polling Frequenz**	When a polling frequency is defined, the device performs an EPC scan procedure at regular intervals. If the parameter is set to zero, no polling is performed. 0x00 - 0xFF (5 ms increments) Default: 0x00 no Polling activated
40	0x21	**Polling port**	The polling port determines on which ports the polling function is executed. Bit 1-6 Polling antenna port 1-6 activated Bit 7 0 = all recognized transponders 1 = only new recognized transponders Default : 0x41
42	0x21	**Manufacturer type**	The parameter defines the exact manufacturer type of the transponder. The type is used for the read and write messages without UID transfer. The manufacturer type corresponds to the 3rd byte of the UID of the transponder. Default : 0
43	0x2B	**Polling Fall-Out**	This number indicates how often a transponder does not need to be read during polling until it is classified as "undetected". Only undetected transponders are signalled to the host during a repeated successful reading. Value range: 0x01 - 0xFF Default : 0x03
44	0x2C	**Polling Page**	Defines the start page of the data that should be read during the polling function. (K-CMD, CKA-CMD) 00 … 255 (depends on tag type) Default : 0x04 (page 4)
45	0x2D	**Polling Data length**	This parameter defines the length of the data that should be read during the polling function (K-CMD, CKA-CMD) 00 … 255 (depends on tag type) Default : 0x0C (12 bytes)
47	0x2F	**Polling Mode**	Bit 0 1 = Inventory AFI Bit 1 1 = Inventory AFI/Read Bit 2 1 = Full scan Bit 3 1 = Full scan (AFI) Bit 4 1 = Inventory Bit 5 1 = Inventory Read Bit 6 1 = confirmation expected Bit 7 1 = not used Default : 0x61

51	0x33	**Read Mode**	The Read Mode parameter defines options during a read operation. Bit 0 = 0 … Datarate from Parameter 62 1 … Datenrate from Bit 1 Bit 1 = 0 … Slow-Mode 1 … Fast-Mode Bit 2-3 … not used Bit 4-7 … read repetitions Default : 0x20 (depends on tag type)
52	0x34	**Write Mode**	The Write Mode parameter defines options during a write operation. Bit 0 = 0 … Datarate from Parameter 62 1 … Datenrate from Bit 1 Bit 1 = 0 … Slow-Mode 1 … Fast-Mode Bit 2-3 … not used Bit 4-5 … write repetitions (0-3) Bit 6 = 1 … rotate data bytes Bit 7 = 0 … Single Block CMD (1 = Multi Block) Default : 0x10 (depends on tag type)
54	0x36	**Scan Mode**	The Scan Mode parameter defines options during a scan operation. Bit 0 = 1 … Full Scan, (0=Inventory) Bit 1 = 1 … Set Quiet on next scan Bit 2 = 0 … Scan mask on new tag Bit 3 = 0 … Scan mask on recognized tag Bit 4-7 … scan repetitions Default : 0x1F
56	0x38	**Transmitter Delay**	This parameter defines the waiting period between switching on the transmitter and the reading and writing. 0 … 255 ms Default : 3
57	0x39	**Modulation**	This parameter allows the change of the modulation depth of the HF signal. We recommend keeping the default setting. 0 … Modulation 30% 1 … Modulation 100% Default : 1
58	0x3A	**Input to Output 1**	Transfer one input status to any output. 0X… definition of the input (low nibble) X0… definition of the output (high nibble) Default : 00
59	0x3B	**Input to Output 2**	Transfer one input status to any output. 0X… definition of the input (low nibble) X0… definition of the output (high nibble) Default : 00

62	0x3E	**ISO 15693 Flags**	The ISO 15693 flags define options for the RF transmission. It is recommended not to change the default values. Bit 0 = 0 … ASK (1 = FSK) Bit 1 = 0 … Low data rate (1 = High rate) Bit 2 = 0 … single subcarrier (1 =double subc.) Bit 3 = 0 … Modulation 30% (1 =Mod.=100%) Bit 7= 0 …ReadMultiBlock Bit 7= 1 …ReadSingleBlock Default : 0x88 (depends on tag type)
63	0x3F	**Transmitter Off Delay**	This parameter defines the waiting period between the reading and writing operation and switching off the transmitter. 0 … 255 ms Default : 0x00
64	0x40	**ISO 15693 Option flag**	The ISO 15693 option flag can be set by this parameter. 0 … Option Flag = 0 1 … Option Flag = 1 Default : 0x00 (depends on tag type)
75	0x4B	**Antenna 1 Power Level**	Output power of antenna port 1. Minimum: 200mW Maximum: 1000mW 00 … 31 Default : 0x0F … ca. 600mW
76	0x4C	**Antenna 2 Power Level**	Output power of antenna port 2. Minimum: 200mW Maximum: 1000mW 00 … 31 Default : 0x0F … ca. 600mW
77	0x4D	**Antenna 3 Power Level**	Output power of antenna port 3. Minimum: 200mW Maximum: 1000mW 00 … 31 Default : 0x0F … ca. 600mW
78	0x4E	**Antenna 4 Power Level**	Output power of antenna port 4. Minimum: 200mW Maximum: 1000mW 00 … 31 Default : 0x0F … ca. 600mW
79	0x4F	**Antenna 5 Power Level**	Output power of antenna port 5. Minimum: 200mW Maximum: 1000mW 00 … 31 Default : 0x0F … ca. 600mW
80	0x50	**Antenna 6 Power Level**	Output power of antenna port 6. Minimum: 200mW Maximum: 1000mW 00 … 31

			Default : 0x0F … ca. 600mW
98	0x62	**Protocol**	Query the current protocol. 2 … ASCII Protocol Default : 2
99	0x63	**Customer mode**	Customer-specific behaviour. Multiple parameters are set to defined values. 0x00 … Default values will be set inclusive network settings 0x01 … Default values will be set without network settings 0x04 … NXP tag default values 0x05 … Infineon tag default values 0x07 … TI tag default values Default : 5 Infineon (depends on CFP=5)
100	0x64	**Customer Parameter Set CFP**	This parameter is set by the manufacturer
101	0x65	**Customer Parameter IO Modul**	This parameter is set by the manufacturer and depends on the I/O modul hardware
104	0x68	**Protocollchange allowed**	This parameter determines whether an automatic protocol change is triggered when a message is recognized. A detected protocol change leads to a reset. 0… no protocol change allowed 1… protocol change permitted Default : 0
105	0x69	**Defaultparamter at protocolchange**	This parameter specifies whether default parameters should also be created when a protocol change is detected. 0… do not create any default parameters 1… create default parameters Default : 1
107	0x6B	**Report saved Events** (read only)	The parameter is only available if events or errors have been saved and these can be called up as an ASCII string.
123	0x7B	**Fine version** (read only)	Query of the firmware - fine version.
124	0x7C	**Serialnumber** (read only)	Query of the serial number.
125	0x7D	**Software partnr** (read only)	Query of the software partnr.
126	0x7E	**Hardware version** (read only)	Query of the hardware version.
147	0x93	**Sensor Delay** **Delay time for sensor 6**	Delay time for the sensor event up to start of an action. (refer to Par. 148) 0 … 255 (1/10s)

			Default : 1 (0,1)
148	0x94	**WatchPort sensor 6** (only for devices with input)	Refer to Parameter 26 Default : 0x0000 0011
149	0x95	**Testmode r/w action**	Defines the read or write action that is carried out via DIP 4 when the test mode is activated. 0… do no R / W action 1… scan UID 2… read (without UID) 3… read and write (without UID) Default : 1 UID scannen

9.6 ASCII – Table

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

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

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

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

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

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

10. Service and Troubleshooting

10.1 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.

10.2 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.

10.3 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.

10.4 Error Codes

The following error codes are used to describe error states.

Error ID	Name	Description	Cause
0	none	no error	
1		reserved	
2	ex failed	Execution failed, read or write operation cannot be carried out	Reader is still busy with a former read or write request.
3	write fail	Data transfer to the tag is not possible.	
4	No tag – or antenna installed	No tag in the reading/writing range of the antenna.	Place tag into antenna area. Verify tag type, tag orientation. Verify antenna connection Verify antenna tuning Check RF disrupting
5	Invalid	Invalid parameter or data	Invalid command data parameter is not implemented or out of range.
6	Non-specific error	Unknown error	
7	Unconfig	The device is not configured	Wrong reader address
8	Checksum	Parity or checksum error	Wrong baud rate
9	Unexpected ackn	Unexpected acknowledge	Wrong or double acknowledge
A	locked	Locked page cannot be written	Tag is write protected
B	reserved		
C	Wrong transponder type	Wrong transponder type	Set tag parameters (refer to par. 99)
E	reserved		
F	reserved		
;	Invalid	Invalid command	Unknown command was received
:	msglen	Incorrect Message length	Message is shorter or longer than specified in the length byte.

10.5 Software-Releases

Release-Datum	Version	Description
2020/28/04	HFM6xS10 FV03	Initial release for 512kB Flashsize
2020/05/06	HFM6xS11 FV02	Initial Release for 1 MB Flashsize

10.6 Customer service

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

Phone +49 (0) 9279 – 991 - 0
Fax +49 (0) 9279 – 991 - 100
E-Mail rfid.support@hermos.com
URL: https://www.hermos.com/en/products/rfid/
Downloadarea: http://www.hermos.com/en/protected/

11. Disassembly and storage

11.1 Disassembly

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

11.2 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.

12. Transport and disposal

12.1 Transport

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

12.2 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

13.