Brooks
RFID DIVISION

English

Product Manual

RFID Reader UF70 Certum

The product manual must be read prior to the initial start-up. Observe the safety instructions! Store for future use. This documentation is not subject to revisions.

ID120037 05/2012

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Information

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

CE

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

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

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

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

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RFID DIVISION

Brooks Automation (Germany) GmbH
RFID Division
Gartenstr. 19
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Germany

Status: May 2012

Archiving

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

Symbols and signal words

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

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

Target group

This product manual is addressed to personnel with the following areas of responsibility:

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

Definition according to DIN EN 60204-1:

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

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

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Contents

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Contents

1 Identification

This chapter gives you an overview of the following topics:

- ➔ Designated use
- ➔ Incorrect use

Model

RFID Reader UF70 Certum

Serial number	00 – 0001 – UF70
Part number	TUG-E1ML-4O00-F4-00E1 ETSI version, protection class IP40 TFG-E1ML-4O00-F4-00E1 FCC version, protection class IP40 TUG-E1ML-4O00-R4-00E1 ETSI version, protection class IP65 TFG-E1ML-4O00-R4-00E1 FCC version, protection class IP65

Manufacturer

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E-mail	info.rfid@brooks.com
Website	www.brooks-rfid.com

For information on the label, see ➔ Device label.

1.1 Designated use

This product is exclusively developed for reading and writing of passive UHF transponders (e.g. EPC Class1 Gen2). Any other use of this device constitutes misuse and renders the user's authority to install and operate the device invalid.

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

Intended use also includes the following:

- following all instructions in the product manual
- following all safety information

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

User information FCC

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IMPORTANT

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.

1.2 Incorrect use

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

- the use of the device, contrary to its intended use (➔ Designated use)
- modifying, extending or reconstructing the device without first consulting Brooks Automation (Germany) GmbH
- operating the device when there are obvious problems

WARNING 	**Risk of injury through incorrect modifications** There are risks from unauthorized modifications to the machine. Only use original spare parts from the manufacturer. Do not make any changes, attachments or modifications to the device without the approval of Brooks Automation (Germany) GmbH.

WARNING 	**Risk of injury and malfunction of machine operation through incorrect use** There are risks attached to using the device incorrectly. Use the device exclusively according to its intended use.

2 Declaration of Conformity

Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)

Declaration of Conformity in accordance with the Radio and Telecommunications Terminal Equipment Act (FTEG) and Directive 1999/5/FC (R&TTE Directive)

Hersteller / Verantwortliche Person *Manufacturer / responsible person*	**BROOKS Automation (Germany) GmbH / Herr Dittrich**
erklärt, dass das Produkt *declares that the product*	**UF70 Certum**
Type (ggf. Anlagenkonfiguration mit Angabe der Module) *Type (if applicable, configuration including the modules)*	
Telekommunikations(Tk-)endeinrichtung *Telecommunications terminal equipment*	Funkanlage *Radio equipment*
Verwendungszweck *Intended purpose*	**Identification system**
Geräteklasse *Equipment class*	**2**

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of § 3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose.

Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a))
Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a))

angewendete harmonisierte Normen *Harmonized standards applied*	**EN 60950-1:2006**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards/ Spezifikationen) *Other means of proving conformity with the essential requirements (standards / specifications used)*	- - -

Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit (§ 3 (1) 2, Artikel 3 (1) b)
Protection requirements concerning electromagnetic compatibility § 3(1)(2), (Article 3(1)(b))

angewendete harmonisierte Normen *Harmonized standards applied*	**EN 301 489-1 V1.8.1** **EN 301 489-3 V1.4.1**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards/ Spezifikationen) *Other means of proving conformity with the essential requirements (standards / interface specifications used)*	

Maßnahmen zur effizienten Nutzung des Funkfrequenzspektrums
Measures for the efficient use of the radio frequency spectrum

Luftschnittstelle bei Funkanlagen gemäß § 3(2) (Artikel 3(2))
Air interface of the radio systems pursuant to § 3(2) (Article 3(2))

angewendete harmonisierte Normen *Harmonized standards applied*	**EN 302 208-1 V1.3.1** **EN 302 208-2 V1.3.1**
Einhaltung der grundlegenden Anforderungen auf andere Art und Weise (hierzu verwendete Standards/ Spezifikationen) *Other means of proving conformity with the essential requirements (standards/specifications used)*	**- - -**

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Mistelgau, July 21, 2011

(Place and date of issue)

Gerald Dittrich

(Name and signature)

3 General Instructions

This chapter gives you an overview of the following topics:

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

3.1 Liability and warranty

The “General sales and delivery conditions” of Brooks Automation (Germany) GmbH always apply.

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

The warranty includes repairs of all damage to the device that occurs during the warranty period and was clearly caused by material or manufacturing defects.

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

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

3.2 Objectives of the product manual

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

This product manual with all safety information (as well as all additional documents) must be:

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

Objectives:

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

4 Safety Instructions

This chapter gives you an overview of the following topics:

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

4.1 Area of application and symbols

DANGER

Danger to life, risk of injuries or damage to property

Risks exist when disregarding the product manual and the safety instructions therein.

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

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

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

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

4.1.1 Safety symbols – in compliance with 4844-2

WARNING	**Risk of injuries when disregarding safety symbols**
	Risks exist when disregarding warnings in the product manual. Please heed the warnings.

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

4.1.2 Warning symbols

Warning against hazardous area

Warning against hazardous electrical voltage

Warning against electromagnetic radiation

Warning against flammable materials

Warning against potentially explosive atmosphere

Warning against electrostatically sensitive components

4.1.3 Prohibition symbols

Unauthorized access is prohibited

Fire, open flame and smoking is prohibited

Switching is prohibited

Prohibition

4.1.4 Other symbols

Dispose of packing material according to regulations

Recycling

Important information

Refer to manual

Disconnect from power supply

4.2 Obligations

4.2.1 Operating company's obligations

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

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

4.2.2 Operating personnel's obligations

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

WARNING

Risk of injuries due to insufficient personnel qualifications

A risk exists for personnel and the proper operation due to insufficiently qualified personnel.

Only trained personnel may operate the device. New operators must be instructed by the current operating personnel. The operating company must precisely regulate and monitor the personnel's areas of responsibility and competence.

Personnel for the areas of responsibility mentioned above must have the corresponding qualification for this work (training, instructions). If necessary, this can be done by the manufacturer on behalf of the operating company.

All warranty claims are void when disregarded.

4.3 ESD instructions

CAUTION

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

ESD protective measures must be applied when opening the device.

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

4.4 Residual risks

Even if all precautions have been taken, there may be unapparent residual risks!

Adhering to the safety instructions, the intended use, and the product manual as a whole can reduce residual risks!

DANGER

Risks from electric current

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

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

ATTENTION

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

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

DANGER

Risk of fire and explosions

Fire and explosions may occur within the vicinity of the device.

Smoking, open flames and fire are strictly prohibited in the vicinity of the device. Do not store any flammable liquids within the hazardous area. Keep a fire extinguisher in the vicinity of the device.

WARNING

Warning against electromagnetic radiation

Electromagnetic radiation develops when transmitting and receiving data.

Set the antenna in such a position that it is not in the vicinity of or touches a human body while transmitting.

4.5 Additional information

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

Safety Instructions

Rules and regulations

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

The following must also be observed:

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

5 Product Specifications

This chapter gives you an overview of the following topics:

- ➔ Function
- ➔ Images
- ➔ Description of the components
- ➔ Technical data

5.1 Function

The Brooks RFID UF70 Certum reader is a multiprotocol reader for reading passive transponders in the frequency range of 865 MHz to 868 MHz for Europe and 902 MHz - 928 MHz for the FCC.

The device operates at 2 W and 1 W HF power at the antenna jack depending on the registration area.

When delivered, the device can read and write transponders according to the EPC Gen2 standard. Other protocols can be added via software updates.

The device has several high performance interfaces for communications.

The reader has four antenna ports for the connection of transmitting and receiving antennas for communicating with RFID transponders.

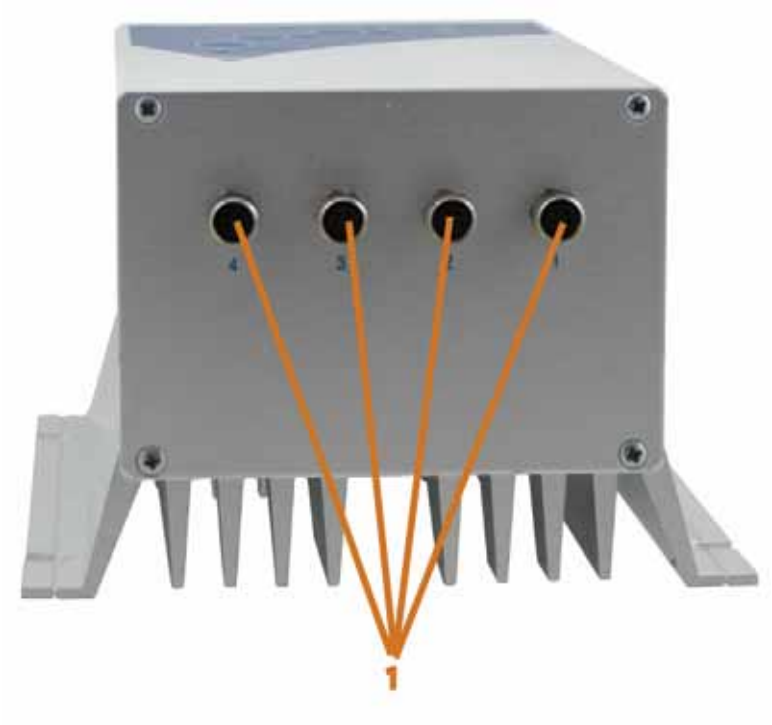
The device also has various interfaces for the connection with the PC, depending on the configuration stage. Power is supplied via a 3-pin M8 connector.

5.2 Images

5.2.1 Front view

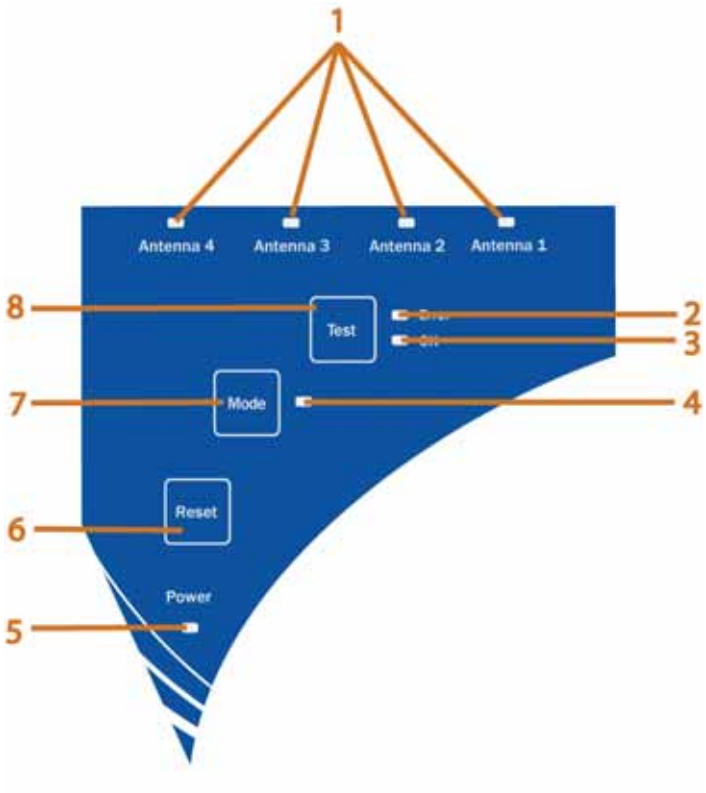
1	Power (24 V)	3	RS232 interface
2	Ethernet interface	4	4 antenna ports

5.2.2 Rear view



1 4 I/Os

5.2.3 Top view



1	Antenna port LED	5	Mode LED
2	Test Error LED	6	Mode button
3	Test OK LED	7	Reset button
4	Test button	8	Power LED

5.3 Description of the components

Components	Description
Power LED	If the correct voltage is applied to the device, the Power LED is green and the device is operational.
Reset button	Pressing this button initiates a power-reset of the device. The reset button must be pressed for at least three seconds until all the LEDs of the foil keypad simultaneously start and the hardware reset is executed.
Mode button	If the mode button and the reset button are simultaneously pressed at a powerup reset for about 15 seconds until all the LEDs of the keypad light up for the second time, the reader will be reset to the default state (default factory setting).
Mode LED	Currently no use.
Test button	Pressing this button switches the device to the reading test mode and is used to select the antenna ports. If the button is pressed for a longer time (at least 2 seconds), then the test mode is activated (Test OK LED and Test Error LED both briefly come on) or disabled (Test OK LED and Test Error LED both go out). Briefly pressing the buttons when the test mode is activated results in switching to the next antenna port.
Test OK LED	When a transponder in the test mode can be successfully identified, this LED turns green.
Test Error LED	When a transponder in the test mode cannot be successfully identified, this LED turns red.
Antenna port LED 1 to 4	These LEDs signal the data traffic to the respective antenna ports. Once data is read or written via the antenna port 1 (above), the antenna port LED 1 (above) turns green.
Antenna ports	Ports to connect the antennas.
I/O ports 1 to 4	A digital input and output can be connected to each antenna port. A 3 wire sensor or dry contact is possible as the input. The output can operate a LED without a series resistor or directly switch 5 V DC (Imax = 100 mA).

Components	Description
RS232 interface	Communications with the device can be made via the serial interface (9 pin sub-D socket). Baudrates of 1,200 Bd up to 57,600 Bd are possible.
Ethernet interface	Communications with the device can be made via the 10/100 BaseT interface.
Voltage supply connection	Contact for connecting the 24 V DC voltage supply

5.4 Technical data

Technical data	
Voltage	24 V DC ± 10%
Power consumption	approx. 0.8 A at 24 V
Operating temperature	-20 to 50 °C -4 °F to 122 °F
Storage temperature	-40 to 85 °C -40 °F to 185 °F
Permissible humidity at 50 °C / 122 °F	25 – 85%
Protection class	IP 40 (optional IP 65)
Housing material	Passivated aluminum
Weight	approx. 1,500 g
Air interface	ISO 18000-6C (EPC Global Class 1 Gen2)
Frequency range Europe	865 – 868 MHz
Frequency range FCC	902 – 928 MHz
Radiation power	< 2 Watt ERP
Transmitting power	programmable in 1 dB steps
Read / write range	up to 8 m
Serial interface RS232	1,200 Bd – 57,600 Bd
Ethernet interface	10/100 BaseT

Device label The device label with the CE mark, part/serial number and MAC address is on the device housing.

1 Part number

2 Serial number

3 MAC address

6 Installation

This chapter gives you an overview of the following topics:

- ➔ Safety instructions
- ➔ Qualified installation personnel
- ➔ Unpacking
- ➔ Assembly of the device
- ➔ Antenna installation
- ➔ Power supply
- ➔ Terminal connection
- ➔ External input and output (optional)
- ➔ Commissioning

Refer to manual

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

6.1 Safety instructions

CAUTION

The device is exclusively designed for indoor use in an industrial environment.

Installation is only allowed in an interior room at a constant temperature between -20 °C / -4 °F and +50 °C / 122 °F, and a relative humidity between 25% and 80%.

Never use the device near or in water.

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

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

Do not install the device in a flammable environment.

CAUTION 	Never expose the device to extreme temperature fluctuations, since otherwise condensation develops in the device and causes damage.
	Do not install the device in the vicinity of voltage lines or other power lines with which they could collide (for example, drilling), which could result in serious injuries or even death.
	The device (especially the antenna) should not be installed in the immediate vicinity of electrical equipment such as medical devices, monitors, telephones, TV sets, magnetic disks and metal objects. This could result in reduced read and write ranges.
	Never use the device in explosive areas (e.g. paint warehouses).
CAUTION 	Do not use the device in areas where it is exposed to vibrations or shocks.
ATTENTION 	The installation location must be adequately illuminated during the installation.
	Never install the device during a lightning storm.
	Verify that the installation meets the requirements of the (country-specific) FCC for human exposure to radio frequencies.

ATTENTION

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

6.2 Qualified installation personnel

CAUTION

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

CAUTION

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

6.3 Unpacking

The device and the accessories are packed under clean-room conditions. In order to maintain this condition, the device must also be unpacked in clean-room conditions.

Disposing of the packaging material

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

6.4 Assembly of the device

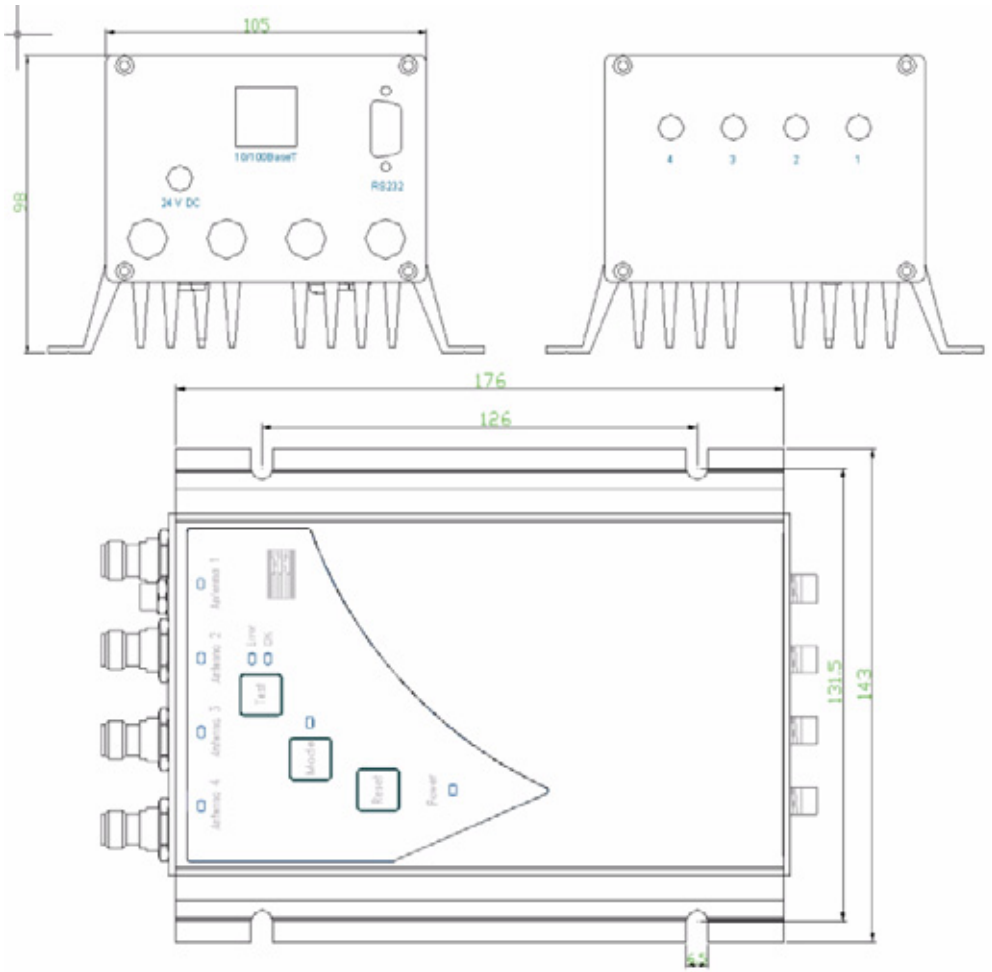
ATTENTION

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

If necessary, clean it before you install the device.

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

Installation dimensions



6.5 Antenna installation

ATTENTION

Consider the required read and write ranges when installing the antenna. The reader can only be used properly if the transponder is located within the individual reading/writing range of the respective antenna.

If the transponder is very close to the antenna, the transponder may be detuned by the metal of the antenna and a reading/writing is not possible. We recommend keeping a minimum distance between transponder and antenna of about 10 mm.

6.5.1 Positioning the antenna

Reliable reading and writing depends on the distance and orientation of the transponder from the antenna.

Depending on the polarization of the antenna and the design of the transponder, the orientation of the two together should be considered when a reliable identification must be guaranteed.

More information on application-specific antenna structures can be obtained from our support team.

6.5.2 Available antenna types

Different types of antennas are available on request.

6.6 Power supply

DANGER

Risk of death from dangerous voltage

Risks exist when supplying the device with the incorrect voltage.

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

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

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

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

If the LED does not light up, please refer to chapter ➔ Error display with LED.

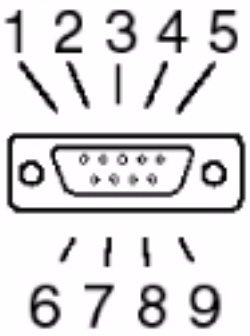
Pin	Signal
1	GND
2	+24 V DC
3	GND

Pins 1 and 3 are both grounded.

6.7 Terminal connection

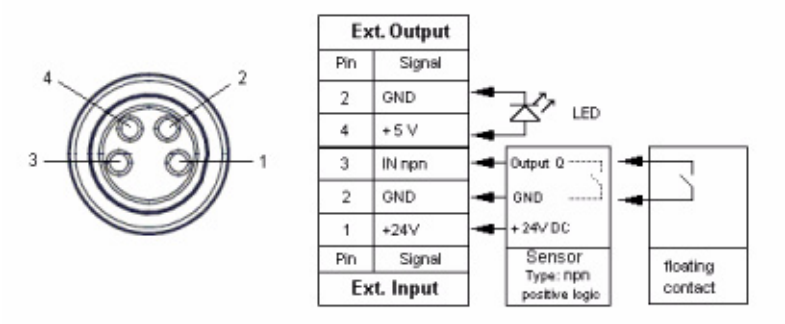
The serial interface is a Sub-D socket (9-pin).
A normal RS232 extension cable can be used.

Pin	DB9
1	NC
2	TxD
3	RxD
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC



6.8 External input and output (optional)

The following I/O versions are possible:



A digital input and output can be connected to each antenna port.

A 3 wire sensor or dry contact is possible as the input.
The output can operate a LED without a series resistor or directly switch 5 V DC.

6.9 Commissioning

6.9.1 Required operating conditions

The following two conditions must be fulfilled for operating the device:

- An antenna must be connected correctly to the reader.
- Connect the power supply and switch on the device (if a POE is not used).
- The transponder must be located within the individual reading/writing range of the antenna (for testing)!

6.9.2 Parameters of the serial interface

Baudrate	57,600
Data bits	8
Stop bit	1
Parity	No

6.9.3 Parameters of the Ethernet interface

The Ethernet is connected via an Ethernet module.
Tools are available that allow the Ethernet settings to be configured.
By using Discovery Tools, all Ethernet devices located in the network can be found.
The respective device can be configured via a web server and a web browser via a double click. If the TCP / IP address is known, the web server can also be directly opened in a browser also follows:

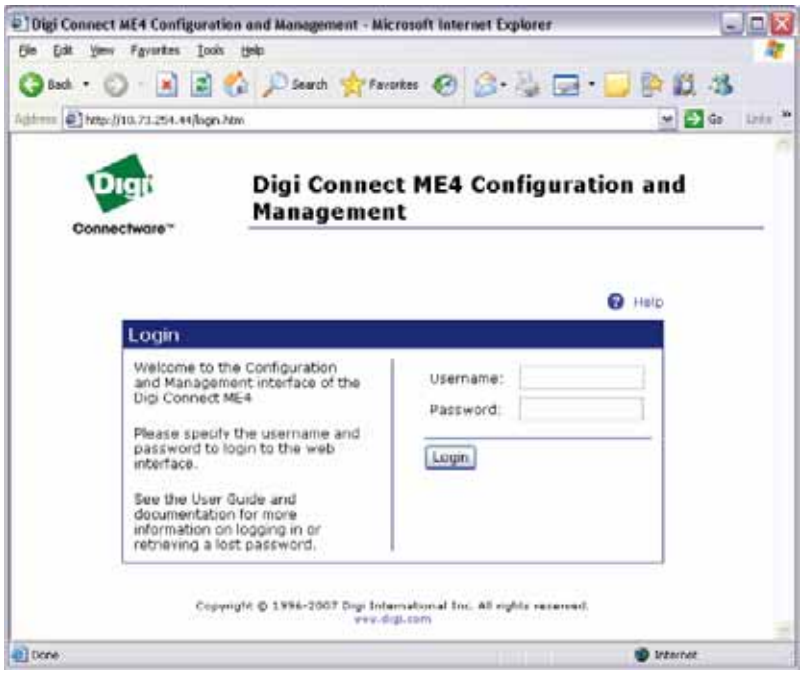
http://xxx.xxx.xxx.xxx/

User: "root"

Password: "dbps"

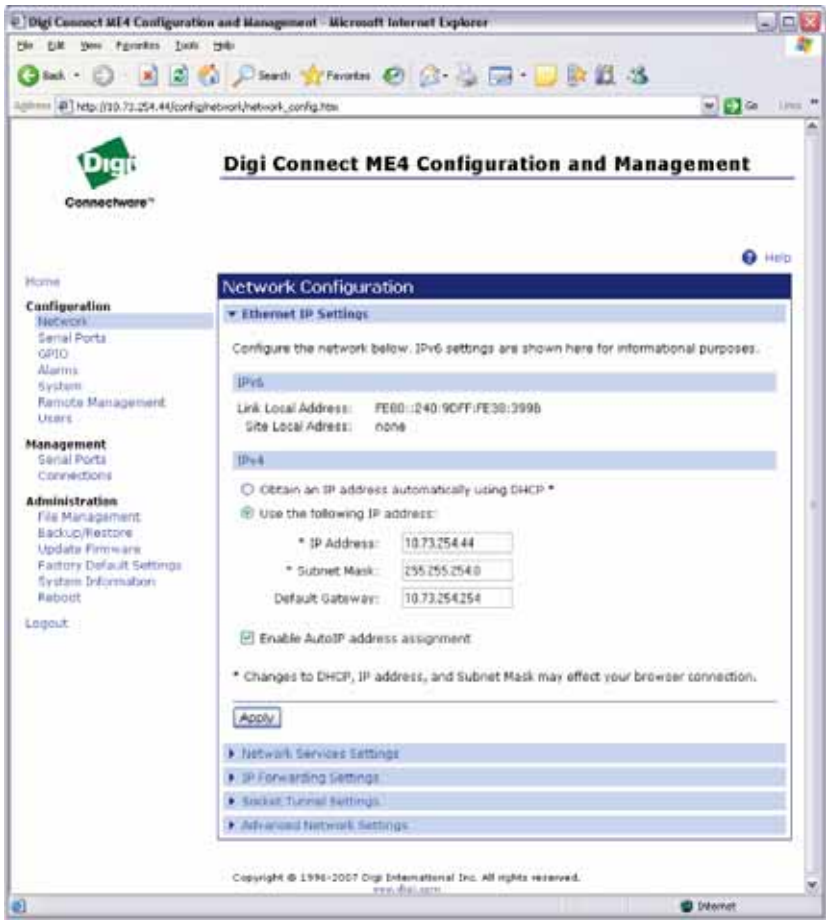
xxx.xxx.xxx.xxx – currently set IP address

Login



The IP address can be set via the "network" link. The settings are transferred with the "apply" button and the device is then rebooted.

Configuration



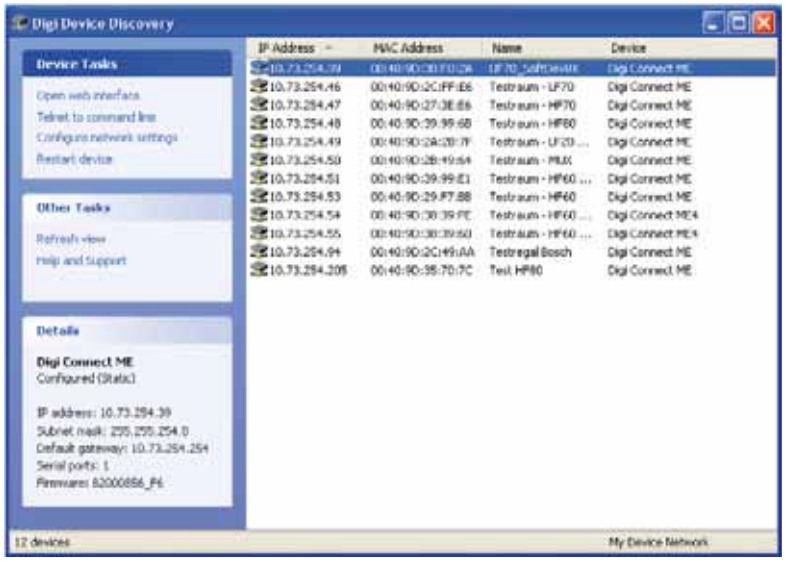
IMPORTANT

The "Factory Default Settings" must not be set under any circumstances as they are not the factory settings of Brooks. Any other settings of the Ethernet device (exept the IP address) must not be changed. Otherwise a fault-free communication cannot be guaranteed by Brooks.

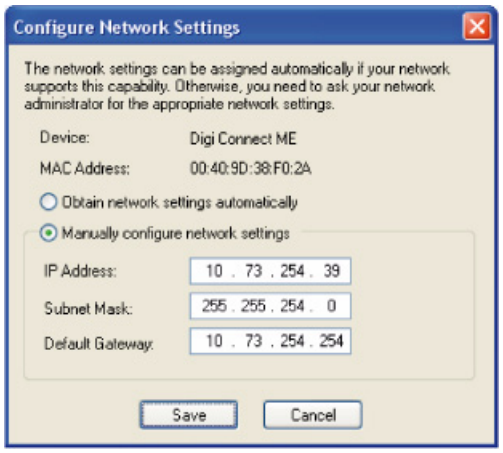
Digi Device Discovery

The tool displays all devices that have a Digi Connect ME. Devices that are not in the same subnet are also displayed. The IP address can be set directly via "configure network settings". Fixed IPs or DHCPs are possible. The web server of the device can be accessed directly via the "open web interface".

Selection window



Input window



7 Operation

This chapter gives you an overview of the following topics:

- ➔ Operating personnel
- ➔ Communication protocol ASC-I1
- ➔ Additional information

7.1 Operating personnel

CAUTION

The UF70 Certum reader should only be operated by specially trained personnel.

If you have doubts about the required qualifications, contact the manufacturer.

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

7.2 Communication protocol ASC-I1

7.2.1 Structure of the communication protocol

General remarks:

- The communication is done with ASCII packages.
- Each device has an RS232 interface and an optional Ethernet interface to which an address from 0 to E can be assigned. The device has a default address of 0 on delivery.
- After each command to the device, a defined response is sent. We recommend waiting for this response before sending a new command.

7.2.2 Package contents

General remarks:

Each package includes a package header (three characters), a message (two or more characters) and the end of the package (five characters).

Package header	Message	End of package

Package header

The header includes the start character (one character) and the package length (two characters)

2 starting characters and 4 length bytes are sent in the extended ASCII protocol.

Package header		
Start	Length 1	Length 2

Start — Start character (ASCII character ´S´)

Length 1 — High byte package length (hexadecimal) – ASCII characters ´0´..´F´

Length 2 — Low byte package length (hexadecimal) – ASCII characters ´0´..´F´

Extended ASCII format:

Package 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') for marking the extended ASCII protocol

Length 1 — High byte package length (hexadecimal) - ASCII characters ´0´..´F´

Length 2 — Byte package length (hexadecimal) - ASCII characters ´0´..´F´

Length 3 — Byte package length (hexadecimal) - ASCII characters ´0´..´F´

Length 4 — Low byte package length (hexadecimal) - ASCII characters ´0´..´F´

The message length describes the number of characters of a message.

Message structure

The message contains a command, a target and source address, the number of the antenna port (Head) and the actual information. The number of the antenna port is not required for all messages.

Message			
Command	Address	Head	Information

Command	ASCII characters (see section ➔ Commands of protocol)
Address	Target or source address; ASCII characters '0'...'E'*)
Head	Optional – for messages that refer to a specific antenna port
Information	Depends on the command (includes none, one or more ASCII characters '0'...'F')

*) The device is pre-configured with an address of '0' on delivery.

End of package

The end of the package includes an end (1 character) and the checksum (4 characters)

End of package				
End	Checksum 1	Checksum 2	Checksum 3	Checksum 4

End	End character ASCII character no. 13 (hexadecimal 0D)
Checksum 1	High-byte – XOR logic for all data (package header, message and end character); ASCII '0'..'F'
Checksum 2	Low byte – XOR logic for all data (package header, message and end character); ASCII '0'..'F'
Checksum 3	High byte – addition of all data (package header, message and end character); ASCII '0'..'F'
Checksum 4	Low byte – addition of all data (package header, message and end character); ASCII '0'..'F'

ATTENTION

When using the TCP/IP interface option, the checksum is not used (is not transmitted).

7.2.3 Commands of protocol

Commands

Command	Description
X or URX	Read data range of all EPC transponders
URY	Read data range of the EPC transponders with special EPC code
M	EPC scanning
URB	EPC bulk reading with time specification
W	Write EPC of a single transponder
UWW	Write data range of all EPC transponders
UWZ	Write data range of the EPC transponders with special EPC code
UMW	Write data range masked of all EPC transponders
UMZ	Write data range masked of the EPC transponders with special EPC code
UBW	Erase block of all EPC transponders
UBZ	Erase block of the EPC transponders with special EPC code
ULW	Retrieving all EPC transponders
ULZ	Retrieving all EPC transponders with special EPC code
UKW	Killing all EPC transponders
UKZ	Killing all EPC transponders with special EPC code
T or UAM	Activate polling: EPC scanning
UAA	Activate polling: Read raw
UAX	Activate polling: Read data range
UAW	Activate polling: Write data range

Command	Description
UAZ	Activate polling: Write data range masked
UAB	Activate polling: Erase block of all EPC transponders
UAL	Activate polling: Retrieving all EPC transponders
UAK	Activate polling: Killing all EPC transponders
UAR	Read transponder rate in the polling operation
UAE	Stop polling
UCX	Activate polling: NXP-UCODE-G2X Read Protect
UCN	Activate polling: NXP-UCODE-G2X Reset Read Protect
UCC	Activate polling: NXP-UCODE-G2X Change EAS
UCE	Activate polling: NXP-UCODE-G2X EAS Alarm
UFW	Set filter data
UFR	Read filter data
UFP	Set filter
UFG	Read filter status
UGL	Read out list of radio profiles
UGP	Determine active radio profile
UPP	Set the active radio profile
UNH	Perform hardware reset
N or UNR	Perform software reset
UPE	Load factory default values
F	Request parameter
P	Set parameter
UGK	Read the number of the active parameter set
UPK	Set the number of the active parameter set
UGD	Read the number of the default parameter set
UPD	Set the number of the default parameter set
B	Sensor status
O	Setting the outputs
Q	Queries of outputs (status)

Command	Description
E	Error message
H	Heartbeat (request serial number)
V or UVR	Request software version
UGT	Read UTC time
UPT	Set UTC time

Message items

Access word	8 bytes

The 4 byte access word is required to access the various memory areas of the EPC transponder. The LSB byte is transmitted first during the transmission. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Example:
0x01020304
ASCII string: "04030201"

Bulk time	4 bytes

2 bytes time in milliseconds specifying how long to read. The LSB byte is transmitted first during the transmission. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Example:
0x0064 (100 ms)
ASCII string "6400"

CMD	1 - 3 bytes

Command of the message. See table in chapter ➔ Commands of protocol.

Data words	2 to N*4 bytes

Data words (2 bytes) are always read or written. The data are interpreted in HEX format. That is, two ASCII characters in the message describe one byte of transponder data in HEX format.

Example:

HEX transponder data:	0x12, 0x34, 0x56, 0x78 (2 data words)
ASCII transmission:	0x31, 0x32, 0x33, 0x34, 0x35, 0x36, 0x37, 0x38
Transmitted ASCII string:	"12345678"

DHCP	1 byte

A network configuration that determines if the static network address is being used or if the DHCP server assigns the network address.

"0" DHCP is not active, use static network address

"1" DHCP is active; obtain network address from the DHCP server

Direction	2 bytes

When polling, the direction flag shows if a transponder enters or leaves the field. The display that a transponder leaves the field can be activated via parameter 0x29. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Values:
"00" (0x00) The transponder leaves the field
"80" (0x80) The RSSI value changed → The transponder moved within the field
"FF" (0xFF) The transponder enters the field

EPC	(2n+1)*2 bytes

With the UHFI20 software version (firmware 2.x), the EPC code has a flexible length n from 0 to 31 data words (2 bytes data). An n byte is placed before the actual EPC code and corresponds to the quantity of EPC data words. The EPC code is transferred so that the LSB byte is transmitted first. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format. The following applies to the number of EPC data words:
0<=n<=31

Example:
ASCII string: "060C0B0A090807060504030201"
→ Number of EPC data words: 0x06
→ EPC: 0x0102030405060708090A0B0C

Ex flag	2 bytes

The extension flag determines which information is included in the recognized EPC transponder. The Ex flag is set by parameter 0x76. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Values:

0x00 do not transmit extensions
0x01 only transmit antenna port
0x02 only transmit RSSI value
0x03 transmit antenna port and RSSI
0x04 transmit time stamp
0x05 transmit time stamp and antenna port
0x06 transmit time stamp and RSSI value
0x07 transmit time stamp, RSSI value and antenna port
0x08 transmit transponder protocol control word
0x09 transmit antenna port and transponder protocol control word
0x0A transmit RSSI value and protocol control word
0x0B transmit antenna port, RSSI value and protocol control word
0x0C transmit time stamp and protocol control word
0x0D transmit time stamp, antenna port and protocol control word
0x0E transmit time stamp, RSSI and protocol control word
0x0F transmit time stamp, RSSI, antenna port and protocol control word

Extension	0 - 12 bytes

If and which extensions are transmitted for each detected EPC transponder is defined by the Ex flag. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format. The activated extensions are transferred in the following order:

2 ASCII characters antenna port
2 ASCII characters RSSI value
8 ASCII characters UTC time stamp (LSB byte is transmitted first)
4 or 8 ASCII character protocol word as applicable including XPC_W1 and XPC_W2

Filter mask	N* 2 bytes

The filter bits required for the development of a filter are defined in HEX format in a filter mask. That is, two ASCII characters in the message equal one byte of data in HEX format. The LSB byte of the filter mask is transmitted first.

Example: N=3
Number of mask bits: 18
Filter mask: "0x03FEFE"
Transmission: "FEFE03"

Filter number	2 bytes

The filters defined for filtering are numbered consecutively from 0 to 31.

Values:
"00" – Filter 0
...
"1F" – Filter 31

Frame ID	2 bytes

The response of the reader can be accomplished in several frames (e.g. if many transponders were scanned). The frame ID that is sent indicates how many response messages follow. Short responses that consist only of a single frame then always have the frame ID "00". Messages consisting of multiple frames should be fully received and assembled by the host before they are processed. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Head ID	1 byte

Number of the antenna port (0 – 4).
"0" read on all antenna ports
"1"-"4" single antenna port

Mask	N* 4 bytes

The bit-oriented mask determines what data will actually be overwritten in the masked write. The mask has the same length as the data to be written and actual data is only written in the places where a 1 is located in the mask. The mask is passed in the same order and length as the masked data to be written.

Example:
N=1 → describe a data word masked
Transponder content: 0x5678
New data: 0x1234
Mask: 0x0F0F
→ new transponder content: 0x5274

Memory address	8 bytes

The memory areas of the EPC transponder are addressed by 4 byte word pointers. The LSB byte is transmitted first during the transmission. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format. The exact memory distribution can be derived from the EPC Global standard.

Memory bank	2 bytes

The EPC transponder has multiple memory banks, which are addressed by number. The exact memory structure can be derived from the EPC Global standard chapter. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Values:
"00" (0x00) Reserved
"01" (0x01) EPC
"02" (0x02) TID
"03" (0x03) User

Number of data words	2 bytes

The number of data words (1 data word consists of 2 bytes), which are read and written, are hereby defined.

The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

On / Off	4 bytes

The use of a defined filter can hereby be enabled or disabled.

Values:
"00" – Filter off
"FF" – Filter on

Output state	1 - 4 bytes

Displays the current status of the outputs at the corresponding antenna port (Head ID). The information unit "Output state" includes the status of each output of an antenna port. In the case of querying the status of all outputs of the reader, the "Output State" contains the status of all 4 outputs (1 per head). The status is represented as 1 byte for each head.

Values:
0 – Output OFF
1 – Output ON
2 – Output flashes
3 – unchanged (query only!)

Parameter no.	2 bytes

Number of the parameter. Two ASCII characters (2 bytes) display the parameter number in HEX format.

Example:
Parameter 20 → 0x14 → "14"

Parameter value	2 bytes

Value of the parameter. Two ASCII characters (2 bytes) specify the value of the parameter in HEX format.

Example:
Value 192 → 0xC0 → "C0"

Payload	6 bytes

If a transponder must be locked, the area of the transponder to be locked can be specified by the payload. The LSB byte is transmitted first during the transmission. Data (3 bytes) are in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format. The exact structure can be derived from the EPC Global standard chapter "Lock".

Example:
Access area with Permalock=1 lock
Payload 0x0300C0
Transfer Protocol "C00003"

Profile number	2 bytes

Radio profiles realized in the reader, which are numbered from 0 to 4.

Radio profiles:
"00" – Tx:40kbps/Rx:80kbps/FM0
"01" – Tx:40kbps/Rx:40kbps/Miller2
"02" – Tx:40kbps/Rx:160kbps/FM0
"03" – Tx:40kbps/Rx:80kbps/Miller2
"04" – Tx:40kbps/Rx:40kbps/Miller4 (default setting)

Reader ID	1 byte

Address of the device ("0" .. "E").
The default address of the card is "0" on delivery.

RECOMMISSION	2 bytes

If a transponder must be made unreadable (or possibly also recommissioned), 3 so-called recommission bits must be transferred. The value and significance of the recommission bits depend on the type of transponder. The 3 bits are interpreted as one byte data in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format. The precise significance of the 3 recommission bits can be seen in the documentation of the EPC transponder and the EPC global standard chapter "Kill".

Response code	4 bytes

This feature is not used for the single reader. This code is always "0000".

Result	2 bytes

The result flag delivers information on whether an action was completed successfully. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Values:

"00" (0x00)	no errors occurred
>0x00	an error occurred

Sensor state	1 byte

Displays the current status of the sensor at the corresponding antenna port (Head ID).

Value 0 → Sensor is uncovered (open)
Value 1 → Sensor is covered (closed)

Serial number	4 bytes

Contains the 4-byte serial number of the reader.
The serial number is also shown on the label of the reader.

Software version	6 - 8 bytes

Character string with the software version of the reader. The display is in HEX format. This means that the 12-16 characters of the ASCII character string describe the 6-8 bytes of the software version in HEX format.

Example:
v0554846493230

→ 0x55 0x48 0x46 0x49 0x32 0x30
= "UHFI20"

Transponder error code	2 bytes

The transponder itself also delivers an error code, which is also transmitted. The data are interpreted in HEX format. That is, two ASCII characters in the message equal one byte of data in HEX format.

Values:

"00" (0x00)	no errors occurred
>0x00	an error occurred

UTC	8 bytes

The Unix time code (UTC) describes the seconds that have passed since 1.1.1970 0:00:00. The Unix time code (UTC) is the same worldwide for a specific time. The 4 bytes of UTC are transmitted in hex format as 2 ASCII characters per byte. The LSB byte is transmitted first.

X or URX - Read data area

The X command starts the reading of a defined data range of the current EPC transponder.
Several EPC transponders can be located in the reading area of the antenna when using this command.

Host → reader						
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of data words
X URX	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host									
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]				
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Exten-sions	EPC	Trans-ponder error code	Number N data words	Data words
x urx	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes	2 bytes	N*4 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Read access password (no transponder is present)
>> X0100000000000200000002
<< x0000A → Result "0A" no EPC transponder is present

Example: Read access password (2 transponders)
>> X0100000000000200000002
<< x0000001
0106010203040506070808080909000200000000
01060B0C090A07080506030401020002000000000

Example: Read access password (many transponders)

>> X0100000000000200000002

<< x0020001

0106480000000000000000000000000200000000

0106010000000000000000000000000200000000

0106060000000000000000000000000200000000

0106270000000000000000000000000200000000

<< x001

0106190000000000000000000000000200000000

0106500000000000000000000000000200000000

0106470000000000000000000000000200000000

0106170000000000000000000000000200000000

0106090000000000000000000000000200000000

0106100000000000000000000000000200000000

0106310000000000000000000000000200000000

0106390000000000000000000000000200000000

0106020000000000000000000000000200000000

0106460000000000000000000000000200000000

0106410000000000000000000000000200000000

0106070000000000000000000000000200000000

0106230000000000000

<< x000

00000000000200000000

0106380000000000000000000000000200000000

0106400000000000000000000000000200000000

0106180000000000000000000000000200000000

0106280000000000000000000000000200000000

0106420000000000000000000000000200000000

0106240000000000000000000000000200000000

0106290000000000000000000000000200000000

0106080000000000000000000000000200000000

0106110000000000000000000000000200000000

0106160000000000000000000000000200000000

0106260000000000000000000000000200000000

0106490000000000000000000000000200000000

URY – Read data area (defined EPC code)

The URY command starts the reading of a defined data range of the current EPC transponders which have a defined EPC code. Several EPC transponders can be located in the reading area of the antenna when using this command.

Host → reader							
CMD	Reader ID	Head ID	EPC	Access word	Memory bank	Memory address	Number of data words
URY	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host									
Overhead response telegram[2]					Data of the participating EPC transponders[1][2]				
CMD	Reader ID	Frame ID	Result[3]	Ex flag[3]	Exten-sions	EPC	Trans-ponder error code	Number N data words	Data words
ury	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes	2 bytes	N*4 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Read access password

>> URY0106010203040506070809 0A0BCD00000000000200000002
<< ury000000101060102030405060708090A0BCD000200000000

M - EPC scanning

The M command starts the scanning of the EPC transponder located in the activated antenna located in the read area.

Host → reader		
CMD	Reader ID	Head ID
M	1 byte	1 byte

Reader → host						
Overhead response telegram[2]					Data of the participating EPC transponders[1][2]	
CMD	Reader ID	Frame ID	Result[3]	Ex flag[3]	Extensions	EPC
m	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example:
>> M01
<< m0010001 → Frame-ID "01"; result "00" and Ex flag "01"
0106470000000000000000000000
0106270000000000000000000000
0106110000000000000000000000
0106490000000000000000000000
0106100000000000000000000000
0106230000000000000000000000
0106420000000000000000000000
0106080000000000000000000000
0106310000000000000000000000
0106290000000000000000000000
0106120000000000000000000000
0106
→ the missing 12 bytes are included in the next message

<< m000
250000000000000000000000
0106480000000000000000000000
0106410000000000000000000000
0106380000000000000000000000

0106280000000000000000000000
0106030000000000000000000000
0106170000000000000000000000
0106190000000000000000000000
0106400000000000000000000000
0106050000000000000000000000
0106090000000000000000000000
0106010000000000000000000000
0106240000000000000000000000
0106460000000000000000000000
0106260000000000000000000000
0106180000000000000000000000
0106390000000000000000000000
0106060000000000000000000000

>> M01

<< m0000A → Result 0x0A, since no transponder is available

>> URM01

<< urm0000A → Result 0x0A, since no transponder is available

>> URM01

<< urm0000001 → Frame-ID "00"; result "00" and Ex flag "01"
01060B0C090A0708050603040102

URB – EPC Bulk reading

The command URB starts a reading of EPC transponders over a predetermined period of time. The EPC of all detected transponders is reported after the completion of the time.

Host → reader			
CMD	**Reader ID**	**Head ID**	**Bulk time**
URB	1 byte	1 byte	4 bytes

Reader → host									
Overhead response telegram[2)]					**Data of the participating EPC transponders[1)2)]**				
CMD	**Reader ID**	**Frame ID**	**Result[3)]**	**Ex flag[3)]**	**Exten-sions**	**EPC**	**Trans-ponder error code**	**Number N data words**	**Data words**
urb	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes	2 bytes	N*4 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example:
>> URB016400 (→ read 100 ms !!)
<< urb0000001
0106010203040506070808080909
01060B0C090A0708050603040102
0106BBCC99AA7788556633441122

>> URB010064
<< urb0000A → Result 0x0A, since no transponder is available

W – Write EPC code

The W command starts the description of the EPC of a present EPC transponder. Only one EPC transponder should be located in the write area of the antenna when using this command.

Host → reader				
CMD	Reader ID	Head ID	Access word	EPC
W	1 byte	1 byte	8 bytes	(2n+1)*2 bytes

Reader → host							
Overhead response telegram					Data of the participating EPC transponders[2)]		
CMD	Reader ID	Frame ID	Result	Ex flag	Extensions	EPC[1)]	Transponder error code
w	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) The transponder here delivers as a response the EPC code which was previously programmed.
2) The response of the transponder is optional and only appears at result "00".

Example: Overwrite EPC transponder with a new EPC code
>> M01 (read old EPC code)
<< m000000101060102030405060708090A0BCD

>> W0100000000060102030405060708090A0B0C
<< w000000101060102030405060708090A0BCD8B

>> M01 (read new EPC code)
<< m000000101060102030405060708090A0B0C

Example: Several transponders are in the field; the action is therefore incorrect
>> W0100000000060102030405060708090A0B0C
<< w0000B → Result 0x0B

UWW – Write data range of all EPC transponders

The UWW command starts to overwrite the defined data range of all EPC transponders located in the field. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader							
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of N data words	Data words
UWW	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes

Reader → host							
Overhead response telegram[2]					Data of the participating EPC transponders[1][2]		
CMD	Reader ID	Frame ID	Result[3]	Ex flag[3]	Extensions	EPC	Transponder error code
uww	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Overwrite EPC transponder with a new EPC code
>> UWW0100000000010200000006010203040506070809 0A0B0C
<< uww000000101060B0C090A070805060304010200
Control reading:
>> M01
<< m0000001
01060B0C090A0708050603040102

Example: Overwrite several EPC transponders with a new EPC code
>> UWW0100000000010200000006010203040506070809 0A0B0C
<< uww0000001
010600000000C006D9DDB233083000
010600000000C006D9DDB233083000
0106BBCC99AA778855663344112200
Control reading:
>> M01
<< m0000001
01060B0C090A0708050603040102
01060B0C090A0708050603040102

01060B0C090A0708050603040102
→ EPC: 02010403060508070A090C0B
→ EPC: 02010403060508070A090C0B
→ EPC: 02010403060508070A090C0B

Example: Write EPC transponder access code
>> UWW0100000000000200000002FFFFFFFF
<< uww00000010106BBCC99AA778855663344112200
Control reading:
>> X01FFFFFFFF000200000002
<< x00000010106BBCC99AA7788556633441122000 2FFFFFFFF

UWZ – Write data range of all EPC-transponders (defined EPC code)

The UWZ command starts to overwrite the defined data range of all EPC transponders located in the field that have a defined EPC code. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader								
CMD	Reader ID	Head ID	EPC	Access word	Memory bank	Memory address	Number N data words	Data words
UWZ	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
uwz	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

2) The response of the transponder is optional and only appears at result "00".

3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Overwrite several EPC transponders with the same EPC code

>> UWZ01060B0C090A07080506030401020000000001020000000601020304050607080 90A0B0C

<< uwz000000101060B0C090A070805060304010200

Control reading:
>> M01
<< m0000001
01060B0C090A0708050603040102
→ EPC: 02010403060508070A090C0B

>> M01
<< m0000001
010601020304050607080 90A0B0C
010601020304050607080 90A0B0C
010601020304050607080 90A0B0C
→ EPC: 0C0B0A090807060504030201
→ EPC: 0C0B0A090807060504030201
→ EPC: 0C0B0A090807060504030201

>> UWZ010601020304050607080 90A0B0C000000000102000000061122334
45566778899AABBCC
<< uwz00000010106010203040506070 8090A0B0C00

>> M01
<< m0000001
0106BBCC99AA7788556633441122
010601020304050607080 90A0B0C
010601020304050607080 90A0B0C

>> UWZ010601020304050607080 90A0B0C000000000102000000061122334455
566778899AABBCC
<< uwz00000010106010203040506070 8090A0B0C00

>> UWZ010601020304050607080 90A0B0C000000000102000000061122334455
566778899AABBCC

<< uwz00000010106010203040506070 8090A0B0C00
>> UWZ010601020304050607080 90A0B0C000000000102000000061122334455
566778899AABBCC

<< uwz0000A

>> M01
<< m0000001
0106BBCC99AA7788556633441122
0106BBCC99AA7788556633441122
0106BBCC99AA7788556633441122
→ EPC: 2211443366558877AA99CCBB
→ EPC: 2211443366558877AA99CCBB
→ EPC: 2211443366558877AA99CCBB

UMW – Write data range of all EPC transponders masked

The UMW command starts to overwrite the defined data range of all EPC transponders located in the field. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader								
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of data words	Data words	Mask
UMW	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes	N*4 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
umw	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: The EPC transponder masks 1 data word of the EPC code, rewrite
>> M01
<< m00000010106BBCC99AA7788556633441122
→ EPC: 2211443366558877AA99CCBB

>> UMW0100000000010200000011111FFFF
<< umw00000010106BBCC99AA778855663344112200

>> M01
<< m00000010106BBCC99AA7788556633441111
→ EPC: 1111443366558877AA99CCBB

Example: The EPC transponder masks 2 data words of the EPC code, rewrite
>> UMW0100000000010200000002AABBCCDD0F0F0F0F
<< umw00000010106BBCC99AA778855663344111200

>> M01
<< m00000010106BBCC99AA778855663C4D1A1B
→ EPC: 1B1A4D3C66558877AA99CCBB

UMZ – Write data range of all EPC-transponders (defined EPC code) masked

The UMZ command starts to overwrite the defined data range of all EPC transponders located in the field that have a defined EPC code. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader									
CMD	Reader ID	Head ID	EPC	Access word	Memory bank	Memory address	Number of data words	Data words	Mask
UMZ	1 byte	1 byte	(2n+1)* 2 bytes	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes	N*4 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
umz	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: The EPC transponder masks 2 data words of the EPC code, rewrite
>> M01
<< m000000101060102030405060708090A0B0C
→ EPC: 0C0B0A090807060504030201

>> UMZ010601020304050607080 90A0B0C00000000010200000002999988880F0F0F0F
<< umz000000101060102030405060708090A0B0C00

>> M01
<< m000000101060102030405060708080809 09
→ EPC: 090908080807060504030201

UBW – Erase block of all EPC transponders

The UBW command starts to delete (erase) the defined blocks of all EPC transponders located in the field. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader						
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of N data words
UBW	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ubw	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: 2 data words of the user area of an EPC transponder are deleted

>> M01
<< m000000101060B0C090A0708050603040102

>> UBW01060B0C090A07080506030401020000000030000000002
<< ubw000000101060B0C090A070805060304010200

UBZ – Erase block of all EPC transponders (defined EPC code)

The UBZ command starts to delete (erase) the defined data range of all EPC transponders located in the field that have a defined EPC code.

Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader							
CMD	Reader ID	Head ID	EPC	Access word	Memory bank	Memory address	Number of N data words
UBZ	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ubz	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: 2 data words of the user area of an EPC transponder are deleted

>> M01
<< m000000101060B0C090A0708050603040102

>> UBZ01060B0C090A07080506030401020000000030000000002
<< ubz000000101060B0C090A070805060304010200

ULW – Locking all EPC transponders

The ULW command starts to lock the defined data range of all EPC transponders located in the field. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader				
CMD	Reader ID	Head ID	Access word	Payload
ULW	1 byte	1 byte	8 bytes	6 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ulw	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Lock the ACCESS block of an EPC transponder
→ Payload 0x0300C0; Permalock=1
>> ULW01FFFFFFFFC00003
<< ulw00000010106BBCC99AA778855663344112200
→ Since Permalock was set, the kill password cannot be read or written after the locking process!

>> UWW0100000000000200000002FFFFFFFE
<< uww00000010106BBCC99AA778855663344112284
>> UWW01FFFFFFFF000200000002FEFEFEFE
<< uww00000010106BBCC99AA778855663344112284
→ Access area can no longer be written!

ULZ – Locking all EPC transponders (defined EPC code)

The ULZ command starts to lock all EPC transponders with the corresponding EPC code located in the field. Several EPC transponders can be located in the write area of the antenna when using this command.

Host → reader					
CMD	Reader ID	Head ID	EPC	Access word	Payload
ULZ	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	6 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ulz	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Lock the Kill block of an EPC transponder
>> UWW0100000000000000000002FEFEFEFE
<< uww00000010106BBCC99AA778855663344112200
→ Kill password written

→ Payload 0x0C00C0; Permalock=1
>> ULZ0106BBCC99AA7788556633441122FFFFFFFF00030C
<< ulz00000010106BBCC99AA778855663344112200
→ Since Permalock was set, the kill password cannot be read or written after the locking process!

>> UWW0100000000000000000002FEFEFEFE
<< uww00000010106BBCC99AA778855663344112284
→ Kill password can no longer be written!

UKW – Killing all EPC transponders

The UKW command starts to kill the defined data range of all EPC transponders located in the field. Several EPC transponders can be located in the write area of the antenna when using this command. The "kill" command is only performed for a transponder if the kill password was previously written and matches! The transponder can no longer be addressed after a successful kill command.

Host → reader				
CMD	Reader ID	Head ID	Kill password	Recommission
UKW	1 byte	1 byte	8 bytes	2 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders[1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ukw	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

Example: Kill an EPC transponder
>> UKW01FEFEFEFEFE
<< ukw000000101060102030405060708090A0B0C00

>> UKW01FEFEFEFEFE
<< ukw0000A
→ The transponder no longer responds!

>> M01
<< m0000A
→ The transponder no longer responds!

IMPORTANT

The respective transponder can no longer be addressed after a successfully conducted kill command.

This command cannot be undone.

UKZ – Killing all EPC transponders (defined EPC code)

The UKZ command starts to kill all EPC transponders with the corresponding EPC code located in the field. Several EPC transponders can be located in the write area of the antenna when using this command. The kill command is only performed if the kill password was previously written! The transponder can no longer be addressed after a successful kill command.

Host → reader					
CMD	Reader ID	Head ID	EPC	Kill password	Recommission
UKZ	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	2 bytes

Reader → host							
Overhead response telegram[2)]					Data of the participating EPC transponders [1)2)]		
CMD	Reader ID	Frame ID	Result[3)]	Ex flag[3)]	Extensions	EPC	Transponder error code
ukz	1 byte	2 bytes	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) The response of the transponder is optional and only appears at result "00".
3) The result and Ex flag is only available in the first transmitted message in messages with several frames.

→ EPC: 2211443366558877AA99CCBB

Example: Kill an EPC transponder
>> M01
<< m00000010106BBCC99AA7788556633441122

>> UKZ0106BBCC99AA7788556633441122FEFEFEFEFE
<< ukz00000010106BBCC99AA778855663344112200
→ The transponder no longer responds!

>> UKZ0106BBCC99AA7788556633441122FEFEFEFEFE
<< ukz0000A
>> M01
<< m0000A
→ The transponder no longer responds!

>> M01
<< m0000A
→ The transponder no longer responds!

IMPORTANT 	The respective transponder can no longer be addressed after a successfully conducted kill command. This command cannot be undone.

T and UAM – Enable read polling EPC

The T or UAM command starts the polling of EPC transponders on the respective antenna port, as long as it is not ended or the device is not reset!! Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

If polling is activated via parameter "polling port" 0x28, polling is restarted automatically after reset. Only the so-called transponder messages appear when activating polling per parameter.

Host → reader		
CMD	**Reader ID**	**Head ID**
UAM T	1 byte	1 byte

Reader → host (confirmation)		
CMD	**Reader ID**	**Result**
uam t	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				**Data of the EPC transponder**		
CMD	**Reader ID**	**Direction**	**Ex flag**	**Extensions**	**EPC**	**Reading cycles[1)]**
uam	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed when transponders are moved out of the field.

Example:

>> P02901 (UHFshow Going active)
<< p0

>> UAM01
<< uam000
<< uam0FF010106BBCC99AA7788556633441122
→ EPC transponder enters the field: 2211443366558877AA99CCBB

<< uam0FF0101060102030405060708080809 09
→ EPC transponder enters the field: 090808080706050403020106

<< uam000010106BBCC99AA77885566334411225502
→ EPC transponder leaves the field: → EPC: 2211443366558877AA99CCBB

<< uam0000101060102030405060708080809095C02
→ EPC transponder leaves the field: 0909080808070605040302 01

<< uam0FF0101060102030405060708080809
→ EPC transponder enters the field: 0909080808070605040302 01

<< uam0000101060102030405060708080809090500
→ EPC transponder leaves the field: 0909080808070605040302 01

UAA – Enable Read Polling Raw

The UAA command starts the polling of EPC transponders on the respective antenna port, as long as it is not ended or the device is not reset! With each polling run all transponders are shown - which may result in a high data traffic. The polling is briefly stopped for intermediate read requests and is continued after the action.

If polling is activated via parameter "polling port" 0x28, polling is restarted automatically after reset. Only the so-called transponder messages appear when activating polling per parameter.

Host → reader		
CMD	**Reader ID**	**Head ID**
UAA	1 byte	1 byte

Reader → host (confirmation)		
CMD	**Reader ID**	**Result**
uaa	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				**Data of the EPC transponder**		
CMD	**Reader ID**	**Direction**	**Ex flag**	**Extensions**	**EPC**	**Reading cycles[1)]**
uaa	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes

1) These data are displayed when transponders are moved out of the field.

Example:

>> UAA01
<< uaa000
<< uaa0FF010106BBCC99AA7788556633441122
→ EPC transponder enters the field: 2211443366558877AA99CCBB

<< uaa0FF0101060102030405060708080809 09
→ EPC transponder enters the field: 090808080706050403020106

<< uaa000010106BBCC99AA77885566334411225502
→ EPC transponder leaves the field: → EPC: 2211443366558877AA99CCBB

<< uaa000010106010203040506070808080909 5C02

→ EPC transponder leaves the field: 0909080808070605040302 01

<< uaa0FF0101060102030405060708080809 09
→ EPC transponder enters the field: 0909080808070605040302 01

<< uaa000010106010203040506070808080909 0500
→ EPC transponder leaves the field: 0909080808070605040302 01

UAX – Polling Read Data

The UAX command starts the asynchronous read (polling) of a defined data range of EPC transponders at the respective antenna port. The polling read data is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader						
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of data words
UAX	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
uax	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the EPC transponder		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Reading cycles[1)]
uax	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)* 2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.
2) Data of the transponder are optional; they appear only at transponder error code "00".

Example: Read EPC (memory bank 01, address 02000000, length 06)
>> UAX010000000010200000006
<< uax000
→ Polling successfully initiated

<< uax000
<<
uax0FF010106BBCC99AA778855663344112200061122334455667788 99AABBCC
<< uax000010106BBCC99AA77885566334411221100
<<
uax0FF010106BBCC99AA778855663344112200061122334455667788 99AABBCC

<< uax0FF0101060102030405060708080809090006090908080708050603040102
<< uax000010106BBCC99AA77885566334411224700
<< uax0FF010106BBCC99AA778855663344112200061122334455667788 99AABBCC
<< uax000010106BBCC99AA77885566334411222400
<< uax0000101060102030405060708080809097100
>> UAE0
<< uae000

UAW – Polling Write Data

The UAW command starts the asynchronous writing (polling) of a defined data range of EPC transponders at the respective antenna port. The polling write data is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader							
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of N data words	Data words
UAW	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
uaw	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Reading cycles
uaw	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example: Write EPC (memory bank 01, address 02000000, length 06)
>> UAW0100000000010200000006010203040506070809 0A0B0C
<< uaw000
→ Polling successfully initiated

<< uaw0FF010106BBCC99AA778855663344112200
<< uaw000010106BBCC99AA77885566334411220500
<< uaw0FF0101060B0C090A070805060304010200
<< uaw0000101060B0C090A07080506030401023000
<< uaw0FF0101060102030405060708080809090 0
<< uaw000010106010203040506070808080909050 0
<< uaw0FF0101060B0C090A070805060304010200
<< uaw0000101060B0C090A07080506030401020700
<< uaw0FF0101060B0C090A070805060304010200

<< uaw0000101060B0C090A07080506030401024E00

>> UAE0
<< uae000
→ Stop polling

Control reading:
>> M01
<< m0000001
01060B0C090A0708050603040102
01060B0C090A0708050603040102
→ EPC: 020104030605080 70A090C0B
→ EPC: 020104030605080 70A090C0B

UAZ – Polling Write Masked Data

The UAZ command starts the asynchronous masked writing (polling) of a defined data range of EPC transponders at the respective antenna port. The polling write masked data is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader								
CMD	Reader ID	Head ID	Access word	Memory bank	Memory address	Number of N data words	Data words	Mask
UAZ	1 byte	1 byte	8 bytes	2 bytes	8 bytes	2 bytes	N*4 bytes	N*4 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
uaz	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Reading cycles
uaz	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example: 1 data word of the EPC masked write (memory bank 01, address 02000000, length 01, mask FFFF)
>> M01
<< m000000101060B0C090A0708050603040102
→ EPC: 02010403060508070A090C0B

>> UAZ0100000000010200000011122FFFF
<< uaz000
→ Polling successfully initiated
<< uaz000
<< uaz0FF0101060B0C090A070805060304010200
<< uaz0000101060B0C090A07080506030401020500
<< uaz0FF0101060B0C090A070805060304112200

<< uaz0000101060B0C090A07080506030411224E00

>> UAE0
<< uae000
→ Stop polling

>> M01
<< m000000101060B0C090A0708050603041122
→ EPC: 221104030605080 70A090C0B

UAB – Erase Block

The UAB command starts the asynchronous erase block (polling) of a defined data range of EPC transponders at the respective antenna port. The polling erase block is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

IMPORTANT

Erasing a block is only supported by a few transponders at this time!

Host → reader							
CMD	Reader ID	Head ID	EPC	Access word	Memory bank	Memory address	Number of N data words
UAB	1 byte	1 byte	(2n+1)*2 bytes	8 bytes	2 bytes	8 bytes	2 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
uab	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
uab	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example: Delete 2 data words of the USER memory area (memory bank 03, address 00000000, length 02)
>> UAB010000000000300000000002
<< uab000
→ Polling successfully initiated

<< uab0FF0101060B0C090A070805060304112200

UAL – Lock EPC

The UAL command starts the asynchronous lock EPC (polling) of defined EPC transponders at the respective antenna port. The polling lock EPC is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader				
CMD	Reader ID	Head ID	Access word	Payload
UAL	1 byte	1 byte	8 bytes	6 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
ual	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
ual	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example: Lock kill password (Payload 0x0C0300 → Permalock=1)
>> UWW0100000000000000000002FEFEFEFE
<< uww000000101000005358004D9DDB233083000
→ Kill password written

>> UAL010000000000030C
<< ual000
→ Polling successfully initiated
→ Since Permalock was set, the kill password cannot be read or written after the locking process!

<< ual0FF0101060000005358004D9DDB233083000

>> UWW0100000000000000000002FEFEFEFE
<< uww000000101060000005358004D9DDB233083084
→ Transponder error 0x84: Kill password is locked!

UAK – Kill EPC transponder

The UAK command starts the asynchronous kill of EPC transponders (polling) at the respective antenna port. The polling kill EPC is executed as long as it is not ended or a reset is executed. Transponder messages only appear if EPC transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action. The "kill" command is only performed for a transponder if the kill password was previously written and matches! The transponder can no longer be addressed after a successful kill command.

Host → reader				
CMD	Reader ID	Head ID	Kill password	Recommission
UAK	1 byte	1 byte	8 bytes	2 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
uak	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
uak	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example: Kill EPC transponder
>> UAK01FEFEFEFE00
<< uak000
→ Polling successfully initiated

<< uak0FF0101060000005358004D9DDB233083000
→ EPC transponder successfully made unreadable!
→ The transponder no longer responds!

Additional example:
>> UAK010000000000
<< uak000
→ Polling successfully initiated
<< uak0FF0101060B0C090A070805060304112280

<< uak0FF0101060B0C090A070805060304112280
<< uak0FF0101060B0C090A070805060304112280
<< uak0FF0101060B0C090A070805060304112280
→ Kill password not set

<< uak0FF01010600000 5358004D9DDB233083002
→ Wrong Kill password

IMPORTANT

The respective transponder can no longer be addressed after a successfully conducted kill command.

This command cannot be undone.

UAR – Polling transponder rate

The UAR command provides the transponder rate of the activated polling action. A transponder list of a standard inventory is first established in the reader in all polling actions before the actual read/write action is executed. The transponder rate is formed via the inventory and specifies how many transponders are detected per second during the inventory.

Host → reader		
CMD	**Reader ID**	**Head ID**
UAR	1 byte	1 byte

Reader → host			
CMD	**Reader ID**	**Result**	**Transponder rate**
uar	1 byte	2 bytes	4 bytes

Example: Read transponder rate at various times

<< n0
>> UAR01
<< uar0000000
>> UAM01
<< uam000
→ Polling Get EPCs started!

<< uam0FF0101060B0C090A0708050603040102
→ EPC: 02010403060508070A090C0B
<< uam0FF0101063700000000000000000000000
→ EPC: 000000000000000000000037
<< uam0FF0101060699053580004D9DDB2330830
→ EPC: 300833B2DDD9048035059906
<< uam0FF0101060899053580004D9DDB2330830
→ EPC: 300833B2DDD9048035059908
<< uam0FF0101061600000000000000000000000
→ EPC: 000000000000000000000016
<< uam0FF0101063800000000000000000000000
→ EPC: 000000000000000000000038
<< uam0FF0101060600000000000000000000000
→ EPC: 000000000000000000000006
<< uam0FF0101061400000000000000000000000
→ EPC: 000000000000000000000014
<< uam0FF0101064000000000000000000000000
→ EPC: 000000000000000000000040
<< uam0FF0101060799053580004D9DDB2330830
→ EPC: 300833B2DDD9048035059907

<< uam0FF0101060500000000000000000000000
→ EPC: 000000000000000000000005
<< uam0FF0101063400000000000000000000000
→ EPC: 000000000000000000000034
<< uam0FF0101061800000000000000000000000
→ EPC: 000000000000000000000018
<< uam0FF0101064300000000000000000000000
→ EPC: 000000000000000000000043
<< uam0FF010106109905358004D9DDB2330830
→ EPC: 300833B2DDD9048035059910
<< uam0FF0101061700000000000000000000000
→ EPC: 000000000000000000000017
<< uam0FF0101064200000000000000000000000
→ EPC: 000000000000000000000042
<< uam0FF0101060700000000000000000000000
→ EPC: 000000000000000000000007
<< uam0FF0101063300000000000000000000000
→ EPC: 000000000000000000000033
<< uam0FF0101061500000000000000000000000
→ EPC: 000000000000000000000015
<< uam0FF0101065200000000000000000000000
→ EPC: 000000000000000000000052
<< uam0FF0101063900000000000000000000000
→ EPC: 000000000000000000000039
<< uam0FF0101060800000000000000000000000
→ EPC: 000000000000000000000008
<< uam0FF0101064100000000000000000000000
→ EPC: 000000000000000000000041
<< uam0FF0101062300000000000000000000000
<< uar0006C00
<< uam0FF0101062300000000000000000000000
→ EPC: 000000000000000000000023
>> UAR01
<< uar0007800
→ EPC: 000000000000000000000023
>> UAR01
<< uar0005800
>> UAR01
<< uar0005800
>> UAR01
<< uar0005900
>> UAR01
<< uar0006100
>> UAR01
<< uar0006100

>> UAR01
<< uar0006C00
>> UAR01
<< uar0006C00
>> UAR01
<< uar0006C00
<< uam0FF0101062300000000000000000000000
→ EPC: 000000000000000000000023
>> UAR01
<< uar0007800

UAE – End polling

The UAE command ends all asynchronous commands (polling) at all antenna ports. If the polling was started per polling port parameter, the parameter must also be reset to finally end this.

Host → reader	
CMD	**Reader ID**
UAE	1 byte

Reader → host		
CMD	**Reader ID**	**Result**
uae	1 byte	2 bytes

Example: end current polling action
>> UAE0
<< uae000

UCX – Activate polling NXP-UCODE-G2X Read Protect

The UCX command starts the asynchronous transponder function (polling operation) "ReadProtect" of all NXP-UCODE-G2X transponders in the field at the respective antenna port. The polling "ReadProtect" is executed as long as it is not ended or a reset is executed.

Transponder messages only appear if NXP-UCODE-G2X transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader			
CMD	Reader ID	Head ID	Access word
UCX	1 byte	2 bytes	8 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
ucx	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
ucx	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example:
>> UCX0100000000
<< ucx000
<< ucx0FF0101060B0C090A070805060304112200

UCN – Activate polling NXP-UCODE-G2X Reset Read Protect

The UCN command starts the asynchronous transponder function (polling operation) "ResetReadProtect" of all NXP-UCODE-G2X transponders in the field at the respective antenna port. The polling "ResetReadProtect" is executed as long as it is not ended or a reset is executed.

Transponder messages only appear if NXP-UCODE-G2X transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader			
CMD	Reader ID	Head ID	Access word
UCN	1 byte	1 byte	8 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
ucn	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
ucn	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example:
>> UCN0100000000
<< ucn000
<< ucn0FF0101060B0C090A070805060304112200

UCC - Activate Polling NXP-UCODE-G2X Change EAS

The UCC command starts the asynchronous transponder function (polling operation) "Change EAS" of all NXP-UCODE-G2X transponders in the field at the respective antenna port. The polling "Change EAS" is executed as long as it is not ended or a reset is executed.

Transponder messages only appear if NXP-UCODE-G2X transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader				
CMD	Reader ID	Head ID	Access word	EAS alarm bit
UCC	1 byte	1 byte	8 bytes	2 bytes

Reader → host (confirmation)		
CMD	Reader ID	Result
ucc	1 byte	2 bytes

Reader → host (transponder message)						
Overhead response telegram				Data of the participating EPC transponders[1)]		
CMD	Reader ID	Direction	Ex flag	Extensions	EPC	Transponder error code
ucc	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes	2 bytes

1) These data are displayed in the order listed for each identified EPC transponder.

Example:
>> UCC010000000001
<< ucc000
<< ucc0FF0101060B0C090A070805060304112200

UCE - Activate polling NXP-UCODE-G2X EAS alarm

The UCE command starts the asynchronous transponder function (polling operation) "EAS alarm" of all NXP-UCODE-G2X transponders in the field at the respective antenna port. The polling "EAS alarm" is executed as long as it is not ended or a reset is executed.

Transponder messages only appear if NXP-UCODE-G2X transponders are actually moved in the field. The polling is briefly stopped for intermediate read requests and is continued after the action.

Host → reader		
CMD	Reader ID	Head ID
UCE	1 byte	1 byte

Reader → host (confirmation)		
CMD	Reader ID	Result
uce	1 byte	2 bytes

Reader → host (transponder message)					
Overhead response telegram				Data of the EPC transponder	
CMD	Reader ID	Direction	Ex flag	Extensions	EPC
uce	1 byte	2 bytes	2 bytes	0-12 bytes	(2n+1)*2 bytes

Example:
>> UCE01
<< uce000

UFW – Set filter data

By setting and activating so-called filters, it is possible to only let certain EPC transponders participate in the inventory. A total of 8 filters can be defined. The UFW command makes it possible to set the data for a filter.

Host → reader									
CMD	Reader ID	Filter Num-ber	On/ Off	Target 1)	Action 1)	Memory bank	Memory address	Number of mask bits N	Filter mask
UFW	1 byte	2 bytes	2 bytes	2 bytes	2 bytes	2 bytes	8 bytes	2 bytes	2 * Round up (N / 8) bytes

1) See EPC Global specification "Select command" for a description

Reader → host			
CMD	Reader ID	Result	Filter Number
ufw	1 byte	2 bytes	2 bytes

Example:
>> UFW00100000001020000010F0F0
<< ufw00001

UFR – Read filter data

By setting and activating filters, it is possible to only let certain EPC transponders participate in the inventory. A total of 32 filters can be defined. The UFR command allows reading of data of a filter.

Host → reader		
CMD	**Reader ID**	**Filter Number**
UFR	1 byte	2 bytes

Reader → host										
CMD	**Reader ID**	**Result**	**Filter Number**	**On / Off**	**Target 1)**	**Action 1)**	**Memory bank**	**Memory address**	**Number of mask bits N**	**Filter mask**
ufr	1 byte	2 bytes	2 bytes	2 bytes	2 bytes	2 bytes	2 bytes	8 bytes	2 bytes	2 * Round up (N / 8) bytes

1) See EPC Global specification "Select command" for a description

Example:
>> UFR001
<< ufr00001000000010200000010F0F0

UFP – Set filter

By setting and activating so-called filters, it is possible to only let certain EPC transponders participate in the inventory. A total of 32 filters can be defined. The use of a particular filter can be switched on and off by the UFP command.

Host → reader									
CMD	Reader ID	Filter Num-ber	On/ Off	Target 1)	Action 1)	Memory bank	Memory address	Number of mask bits N	Filter mask
UFP	1 byte	2 bytes	2 bytes	2 bytes	2 bytes	2 bytes	8 bytes	2 bytes	2 * Round up (N / 8) bytes

1) See EPC Global specification "Select command" for a description

Reader → host			
CMD	Reader ID	Result	Filter Number
ufp	1 byte	2 bytes	2 bytes

Example: Activate filter 01
>> UFP001FF
<< ufp00001
→ Filter 01 was activated

>> UFG001
<< ufg00001FF
→ Current status of filter 01

>> UFR001
<< ufr00001FF0000010200000010F0F0
→ Control read of filter data 01

Example: Deactivate filter 01
>> UFP00100
<< ufp00001
→ Filter 01 was deactivated

UFG – Read filter data

By setting and activating so-called filters, it is possible to only let certain EPC transponders participate in the inventory. A total of 32 filters can be defined. The status of a particular filter can be determined by the UFG command.

Host → reader		
CMD	**Reader ID**	**Filter Number**
UFG	1 byte	2 bytes

Reader → host				
CMD	**Reader ID**	**Result**	**Filter Number**	**On/Off**
ufg	1 byte	2 bytes	2 bytes	2 bytes

Example: Read status of filter 01

>> UFG001
<< ufg0000100
→ "00": Filter 01 is not active

UFP001FF
<< ufp00001
→ Filter 01 was activated

>> UFG001
<< ufg00001FF
→ "FF": Filter 01 is active

UGL – Read list of radio profiles

The radio profiles located in the reader can be read with the UGL command. The profiles are numbered consecutively. The profile description itself is ASCII-coded and is always completed by a zero byte 0x00.

Host → reader	
CMD	**Reader ID**
UGL	1 byte

Reader → host					
Overhead response telegram			**Data of the respective profile[1)2)]**		
CMD	**Reader ID**	**Result[3)]**	**Profile number**	**ASCII profile description**	**Zero bytes**
ugl	1 byte	2 bytes	2 bytes	2*N Bytes	00

1) These data are displayed in the order listed for each identified profile.
2) The description of the profiles is optional and only appears at result "00".
3) The result flag is only available in the first transmitted message in messages with several frames.

Example: Read radio profile list of the reader
>> UGL0
<< ugl000
0054783A34306B6270732F52783A38306B6270732F464D3000
0154783A34306B6270732F52783A34306B6270732F4D696C6C65723200025
4783A34306B6270732F52783A3136306B6270732F464D3000
0354783A34306B6270732F52783A38306B6270732F4D696C6C65723200045
4783A34306B6270732F52783A34306B6270732F4D696C6C65723400

Radio profiles:
0x00 – Tx:40kbps/Rx:80kbps/FM0
0x01 – Tx:40kbps/Rx:40kbps/Miller2
0x02 – Tx:40kbps/Rx:160kbps/FM0
0x03 – Tx:40kbps/Rx:80kbps/Miller2
0x04 – Tx:40kbps/Rx:40kbps/Miller4 (default setting)

UGP – Read active radio profile

The currently used radio profile can be read in the reader with the UGP command.

Host → reader	
CMD	**Reader ID**
UGP	1 byte

Reader → host		
CMD	**Reader ID**	**Profile number**
ugp	1 byte	2 bytes

Example: Read active radio profile of the reader
>> UGP0
<< ugp004
→ Default setting of radio profile 0x04

UPP – Set active radio profile

The active radio profile of the reader can be set with the UPP command.

Host → reader		
CMD	**Reader ID**	**Profile number**
UPP	1 byte	2 bytes

Reader → host		
CMD	**Reader ID**	**Result**
upp	1 byte	2 bytes

Example: Set profile

>> UPP003
<< upp000
→ Profile successfully set

>> UGP0
<< ugp003
→ Current profile read

>> UPP005
<< upp004
→ Profile number out of range

>> UGP0
<< ugp003
→ Current profile read

UNH – Hardware reset

The UNH command performs a hardware reset of the whole UHF reader. Approximately 20 seconds pass after a confirmation until the reset is completed and the reader responds with a reset message.

Host → reader	
CMD	**Reader ID**
UNH	1 byte

Reader → host (confirmation)		
CMD	**Reader ID**	**Result**
unh	1 byte	2 bytes

Reader → host (reset message)	
CMD	**Reader ID**
n	1 byte

Example:
>> UNH0
<< unh000
...up to 20 seconds pass...
<< n0

UNR or N – Software reset

The UNR or N command only triggers a restart of the software. After the software is reset, the device responds with a reset message.

Host → reader	
CMD	**Reader ID**
UNR N	1 byte

Reader → host (confirmation)		
CMD	**Reader ID**	**Result**
unr	1 byte	2 bytes

Reader → host (reset message)	
CMD	**Reader ID**
n	1 byte

Example 1:
>> N0
<< n0

Example 2:
>> UNR0
<< unr000
<< n0

UPE - Factory Reset / Factory Setting

There are 3 options to completely or only partially reset the device to the default status.

1. Only reader-specific parameters (from parameter 100) are reset by the "UPE" command.

Host → reader	
CMD	**Reader ID**
UPE	1 byte

Reader → host	
CMD	**Reader ID**
upe	1 byte

Example:
>> UPE0
<< upe000

2. The complete reader is set to the default status by the FactoryReset parameter (0x63) and a reset is then performed!

Reset with parameter:
>> P06300
<< p0
<< n0

3. If the "Modi" and "Reset" buttons are simultaneously pressed at a powerup reset for about 15 seconds until all the LEDs of the foil keypad light up for the second time, the complete reader will be reset to the default state.

F – Parameter query

The F command is used to query individual parameters of the device. The number of the parameter is transmitted in "Parameter No.". The response contains the parameter number and value. The parameter number and the value should be specified in HEX format: for example, parameter 11 → 0x0B.

Host → reader		
CMD	**Reader ID**	**Parameter no.[1)]**
F	1 byte	2 bytes

Reader → host			
CMD	**Reader ID**	**Parameter no.**	**Parameter value**
f	1 byte	2 bytes	N*2 bytes

1) If a parameter number is not specified, the reader will provide all reader parameters. A single response telegram is then sent for each parameter. The parameter value can be multi-digit (N>=1)!

Example:
>> F02A (request parameter 0x2A)
<< f02A0F

>> F0 (request all parameters)
<< f000A2
<< f001C9

.....
<< f07905
<< f07A01

P – Set parameter

The P command sets the individual parameter values of the device. The device sends a confirmation after successfully setting a parameter. The parameter number and the value should be specified in HEX format: e.g. parameter 11 → 0x0B.

IMPORTANT

After setting one or several parameters, a reset is to be carried out as some parameters affect hardware settings.

Host → reader			
CMD	**Reader ID**	**Parameter No**	**Parameter value**
P	1 byte	2 bytes	N*2 bytes

Reader → host	
CMD	**Reader ID**
p	1 byte

The parameter value can be multi-digit (N>=1)!

Example:
>> F014 (read old value 0x00)
<< f01400

>> P0140F (set value from 0x00 to 0x0F)
<< p0

>> F014 (read new value 0x0F)
<< f0140F

N - Reset The N command performs a reset of the reader hardware. After the reset the Ethernet connection to the device has to be reestablished.

IMPORTANT

After setting one or several parameters, a reset is to be carried out as some parameters affect hardware settings.

Host → reader	
CMD	**Reader ID**
N	1 byte

UGK – Determine active parameter set

For the typical reader parameters (parameter number 100 to max. 240), up to 8 parameter sets can be created and selected. After starting the reader, the default parameter set will automatically become the active parameter set. Any changes to the reader parameters only affect the active parameter set. The active parameter set can be determined by the UGK command.

Host → reader	
CMD	**Reader ID**
UGK	1 byte

Reader → host		
CMD	**Reader ID**	**Parameter set no.**
ugk	1 byte	2 bytes

Example:
<< n0 (Powerup reset)
>> UGK0
<< ugk000
→ Active parameter set number 00 (default value)

UPK – Define the active parameter set

For the typical reader parameters (parameter number 100 to max. 240), up to 8 parameter sets can be created and selected. After starting the reader, the default parameter set will automatically become the active parameter set. Any changes to the reader parameters only affect the active parameter set. The active parameter set can be determined by the UPK command.

Host → reader		
CMD	**Reader ID**	**Parameter set no.**
UPK	1 byte	2 bytes

Reader → host		
CMD	**Reader ID**	**Result**
upk	1 byte	2 bytes

Example:
<< n0 (Powerup reset)
>> UGK0
<< ugk000
→ Active parameter set number 00 (default value)
>> UPK007
<< upk000
→ New active parameter set was successfully defined
>> UGK0
<< ugk007
→ Active parameter set number 07
>> P06A84
<< p0
→ Transmission output of Port 1 changed from 0x6c to 0x84 (parameter set 7!)
...
Poweroff reset
...
<< n0
>> UGK0
<< ugk000

>> F06A
<< f06A6C
→ The default parameter is loaded after a reset

>> UPK007
<< upk000
>> F06A
<< f06A84
→ The transmission output of parameter set 7 has the value 0x84

UGD – Determine default parameter set

For the typical reader parameters (parameter number 100 to max. 240), up to 8 parameter sets can be created and selected. The default parameter set is the one that is loaded when starting the reader and automatically becomes the active parameter set. The parameter set number (0 to 7) of the default parameter set can be determined with the UGD command.

Reader → host	
CMD	**Reader ID**
UGD	1 byte

Host → reader		
CMD	**Reader ID**	**Parameter set no.**
ugd	1 byte	2 bytes

Example:
>> UGD0
<< ugd000
→ Default parameter set number 00 (default value)

UPD – Define default parameter set

For the typical reader parameters (parameter number 100 to max. 240), up to 8 parameter sets can be created and selected. The default parameter set is the one that is loaded when starting the reader and automatically becomes the active parameter set. The parameter set number (0 to 7) of the default parameter set can be defined with the UPD command. If the UPD command has a parameter set number greater than 7, the currently active parameter set is used as the default parameter set.

Reader → host		
CMD	**Reader ID**	**Parameter set no.**
UPD	1 byte	2 bytes

Host → reader		
CMD	**Reader ID**	**Result**
upd	1 byte	2 bytes

Example:
set new default parameter
>> UPD007
<< upd000
→ Default parameter set number successfully set

>> UGD0
<< ugd007
→ Default parameter set number 07
....
Poweroff reset
....
<< n0
>> UGD0
<< ugd007
→ Default parameter set number 07

Example: Set default parameter set as the active parameter set
>> UGD0
<< ugd007
→ Default parameter set number 07
>> UGK0
<< ugk007
→ Active parameter set number 07
>> UPK000
<< upk000

→ Active parameter set 00 successfully set
>> UPD008
<< upd000
→ Active parameter set is stored as the default parameter set!
>> UGK0
<< ugk000
→ Active parameter set 00
>> UGD0
<< ugd000
→ Default parameter set 00

B – Sensor status

The B command is transmitted by the reader if the status of a sensor has changed. The message shows the current status of the sensor. The host must send or not send (Par Watch port Bit 6) a confirmation depending on the internal setting of the reader.

Reader → host			
CMD	**Reader ID**	**Head ID**	**Sensor state**
B	1 byte	1 byte	1 byte

Host → reader		
CMD	**Reader ID**	**Head ID**
b	1 byte	1 byte

Example: Sensor detected, EPC bulk reading, sensor removed

<< B011

<< URB000000101060B0C090A07080506030401020106 0B0C090A0708050603041122

<< B010

O – Set output

The O command changes the status of the respective antenna port.

Host → reader			
CMD	**Reader ID**	**Head ID**	**Output state**
O	1 byte	1 byte	1 byte

Reader → host		
CMD	**Reader ID**	**Head ID**
o	1 byte	1 byte

Example:
>> O010 → Set output 1 "Off"
<< o01
>> O020 → Set output 2 "On"
<< o02
>> O032 → Set output 3 "Flash"
<< o03
>> O044 → Set output 4 "Fast flashing"
<< o04
>> Q00 → Control query
<< q000124

Q – Queries of the output status

The current status of an output can be queried by using the Q command. The status of the outputs of a single antenna port or the entire device can be queried. For a single antenna port, the reader reports the status of the output. Use the Head ID 0 to query the status of all outputs of the reader. The status of each output is represented by 3 characters (status + flash rate).

Host → reader		
CMD	**Reader ID**	**Head ID**
Q	1 byte	1 byte

Reader → host			
CMD	**Reader ID**	**Head ID**	**Output state**
q	1 byte	1 or 4 Bytes	1 or 4 Bytes

Example: (Query after reset, no output was set)
>> Q01
<< q013
>> Q02
<< q023
>> Q03
<< q033
>> Q04
<< q043
>> Q00
<< q003333
Example: I/Os were set
>> O010
<< o01
>> O011
<< o01
>> O021
<< o02
>> O031
<< o03
>> O041
<< o04
>> Q00
<< q001111
>> Q01
<< q011
>> Q02

<< q021
>> Q03
<< q031
>> Q04
<< q041

E – Error message

If an error occurs, the device sends an error message with a suitable error code.

This message must be confirmed by the host (depending on device setting parameter).

Host → reader		
CMD	Reader ID	Error ID
E	1 byte	1 byte

Reader → host	
CMD	Reader ID
e	1 byte

For more information on error codes and the corresponding correcting actions, please refer to ➔ Error codes.

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

Host → reader	
CMD	**Reader ID**
H	1 byte

Reader → host			
CMD	**Reader ID**	**Serial number**	**Response code**
h	1 byte	4 bytes	4 bytes

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

Example:
>> H0
<< h012340000
→ Serial number: 1234

UVR or V – Query software version

The V command queries the software version of the device.

Host → reader	
CMD	**Reader ID**
V	1 byte

Reader → host		
CMD	**Reader ID**	**Software version**
uvr v	1 byte	2*x Bytes

The x characters for the software version are illustrated by 2*x ASCII characters. Each of the x characters is shown in the HEX format, represented by 2 ASCII characters.

Example:
>> V0
<< v0554846493230
→ Software version: UHFI20
>> F063
<< f06300
→ Fine version 0

UGT – Read UTC time

The UGT command reads the time in UTC format.

Host → reader	
CMD	**Reader ID**
UGT	1 byte

Reader → host		
CMD	**Reader ID**	**UTC time**
ugt	1 byte	8 bytes

Example:
>> UGT0
<< ugt01462A348
→ Reader time: 13.08.2008 22:37:08
>> UGT0
<< ugt01F62A348
→ Reader time: 13.08.2008 22:37:19

UPT – Set UTC time The UPT command sets the time in UTC format.

Host → reader		
CMD	**Reader ID**	**UTC time**
UPT	1 byte	8 bytes

Reader → host		
CMD	**Reader ID**	**Result**
upt	1 byte	2 bytes

Example:
>> UPT05F65A348
<< upt000

>> UGT0
<< ugt06865A348
→ Reader time: 13.08.2008 22:51:20

Sensor triggered automatic reading

The response can be set for each of the four inputs by parameters (26 to 29) Watch port. An automatic reading can also be automatically initiated on the respective antenna, in addition to sensor message "B". An EPC bulk reading "urb" is performed over a set time period as an automatic reading. The time frame can be set via parameter (33 and 34) Auto read Bulk time.

Example:

<< B011 → Sensor status at sensor 1 is "On"
<< URB0000001 → Result 0x00 and extension 0x01

01060B0C090A0708050603041122
01060B0C090A0708050603040102

<< B010 → Sensor status at sensor 1 is "Off"

<< B021 → Sensor status at sensor 1 is "On"
<< URB0000A → Result 0x0A no transponder is detected
<< B020 → Sensor status at sensor 1 is "Off"

7.2.4 Parameters

No (dec.)	No (hex)	Parameter name
0	0x00	→ Communications port
1	0x01	→ Baud rate
3	0x03	→ Parity (read only)
4	0x04	→ MsgRepeat Delay Time
6	0x06	→ MsgMaxRepeat
7	0x07	→ First byte of the serial number (read only)
8	0x08	→ Second byte of the serial number (read only)
11	0x0B	→ Reader ID
12	0x0C	→ Acknowledgment Error Message
20	0x14	→ Sensor activity
21	0x15	→ Delay time for sensor 1
22	0x16	→ Delay time for sensor 2
23	0x17	→ Delay time for sensor 3
24	0x18	→ Delay time for sensor 4
26	0x1A	→ Watch port for sensor 1
27	0x1B	→ Watch port for sensor 2
28	0x1C	→ Watch port for sensor 3
29	0x1D	→ Watch port for sensor 4
33	0x21	→ High-byte Auto Read Bulk Time
34	0x22	→ Low-byte Auto Read Bulk Time
39	0x27	→ Adjust I/O numbering
40	0x28	→ Polling port
41	0x29	→ Show UHF Going
93	0x5D	→ Wait Time Reader Response (read only)
94	0x5E	→ Wait Time Reader Acknowledge (read only)
95	0x5F	→ Reader Control Time (read only)
96	0x60	→ Stop Automatic Read (read only)

No (dec.)	No (hex)	Parameter name
97	0x61	→ Stop Sensor Message (read only)
98	0x62	→ Error 'Unexpected' (read only)
99	0x63	→ Factory Reset / Fine Version
100	0x64	→ Global ETSI Channel List
101	0x65	→ ETSI Channel List Antenna 1
102	0x66	→ ETSI Channel List Antenna 2
103	0x67	→ ETSI Channel List Antenna 3
104	0x68	→ ETSI Channel List Antenna 4
105	0x69	→ Channel Switching Mode
106	0x6A	→ Transmission Output Antenna Port 1
107	0x6B	→ Transmission Output Antenna Port 2
108	0x6C	→ Transmission Output Antenna Port 3
109	0x6D	→ Transmission Output Antenna Port 4
110	0x6E	→ Antenna cable port 1 attenuation
111	0x6F	→ Antenna cable port 2 attenuation
112	0x70	→ Antenna cable port 3 attenuation
113	0x71	→ Antenna cable port 4 attenuation
114	0x72	→ Antenna gain port 1
115	0x73	→ Antenna gain port 2
116	0x74	→ Antenna gain port 3
117	0x75	→ Antenna gain port 4
118	0x76	→ Extended Result Flag
119	0x77	→ Glimpsed Timeout Count
120	0x78	→ Observed Threshold Count
121	0x79	→ Observed Timeout Count
122	0x7A	→ Communications standard
123	0x7B	→ ETSI Power Check Over All Allowed Channels
124	0x7C	→ Comm Standard Center Freq CH0
125	0x7D	→ Comm Standard Channel Width

No (dec.)	No (hex)	Parameter name
126	0x7E	→ Comm Standard Max Channel Time
127	0x7F	→ Comm Standard Min Channel Wait Time
128	0x80	→ Comm Standard First Channel
129	0x81	→ Comm Standard Last Channel
130	0x82	→ Tag Comm Intelligent Write
131	0x83	→ Tag Comm Verify Write
132	0x84	→ Tag Comm Query Target
133	0x85	→ Tag Comm Query Sel
134	0x86	→ Host Comm Antenna Independend Operation
135	0x87	→ RF Interface Time to Power Off
136	0x88	→ RF Interface Modulation Type
137	0x89	→ RF Interface Multiplexing Antenna Port 1
138	0x8A	→ RF Interface Multiplexing Antenna Port 2
139	0x8B	→ RF Interface Multiplexing Antenna Port 3
140	0x8C	→ RF Interface Multiplexing Antenna Port 4
141	0x8D	→ RF Interface Multiplexing Antenna Port 5
142	0x8E	→ RF Interface Multiplexing Antenna Port 6
143	0x8F	→ RF Interface Multiplexing Antenna Port 7
144	0x90	→ RF Interface Multiplexing Antenna Port 8
145	0x91	→ RF Interface RSSI Threshold 1
146	0x92	→ RF Interface RSSI Threshold 2
147	0x93	→ RF Interface RSSI Threshold 3
148	0x94	→ RF Interface RSSI Threshold 4
149	0x95	→ RF Interface Multipower Tag Access 1
150	0x96	→ RF Interface Multipower Tag Access 2
151	0x97	→ RF Interface Multipower Tag Access 3
152	0x98	→ RF Interface Multipower Tag Access 4
153	0x99	→ RF Interface Max Allowed Antenna Output Power 1
154	0x9A	→ RF Interface Max Allowed Antenna Output Power 2

No (dec.)	No (hex)	Parameter name
155	0x9B	→ RF Interface Max Allowed Antenna Output Power 3
156	0x9C	→ RF Interface Max Allowed Antenna Output Power 4
157	0x9D	→ Tag Comm Use Pilot Tone
158	0x9E	→ Tag Comm Initial Q
159	0x9F	→ Tag Comm Session
160	0xA0	→ Tag Comm Max Errors
161	0xA1	→ Tag Comm Default Profile
162	0xA2	→ RF Interface Multiplexing Exposure Time 1
163	0xA3	→ RF Interface Multiplexing Exposure Time 2
164	0xA4	→ RF Interface Multiplexing Exposure Time 3
165	0xA5	→ RF Interface Multiplexing Exposure Time 4
166	0xA6	→ RF Interface Multiplexing Exposure Time 5
167	0xA7	→ RF Interface Multiplexing Exposure Time 6
168	0xA8	→ RF Interface Multiplexing Exposure Time 7
169	0xA9	→ RF Interface Multiplexing Exposure Time 8
170	0xAA	→ RF Interface Enable RSSI Threshold At Specific Cmds
171	0xAB	→ RF Interface Flash Write Additional Power
172	0xAC	→ Tag Comm Force Power Off After EPC Write
173	0xAD	→ Tag Comm Transmit Get EPCs Pre Select
174	0xAE	→ Tag Comm Transmit Select If No Filter Is On
175	0xAF	→ Tag Comm Number Of EPC Words
176	0xBO	→ Tag Comm Use Block Write
177	0xB1	→ Tag Comm Disable Receiving NXP Read Protected Tags
178	0xB2	→ Host Comm A Sync Additional RSSI Data Delivery Delta
179	0xB3	→ Host Comm Use Milliseconds As Time stamp

Parameter 0 (0x00)

Communications port

If the highest value bit 0x80 is set, the device automatically detects the active communications port. A reset must be completed to change the communications port. The first message to the reader must then come via the new communications port.

0x11:
Host → reader: Ethernet
Reader → host: Ethernet
0x13:
Host → reader: Ethernet
Reader → host: Ethernet and RS232
0x22:
Host → reader: RS232
Reader → host: RS232
0x23:
Host → reader: RS232
Reader → host: Ethernet and RS232

Default: (0xA2) automatic detection of the communication port

Parameter 01 (0x01)

Baud rate

Data transmission rate

0x0C: 1,200 Baud
0x18: 2,400 Baud
0x30: 4,800 Baud
0x60: 9,600 Baud
0xC0: 19,200 Baud
0xC8: 38,400 Baud
0xC9: 57,600 Baud

Default: (0xC9) 57,600 Baud (See accompanying letter)

Parameter 03 (0x03)

Parity (read only)

Parameter of the RS232 communication port
Parameter can only be read in the default state!
Values:

0 Even parity
1 Uneven parity
2 No parity

Default: (0x02) No parity

Parameter 04 (0x04) **MsgRepeat Delay Time**

If a confirmation is not sent by the host, the device waits this time span before it sends the message to the host again. The number of repetitions is defined in parameter 6 (MsgMaxRepeat).

10 .. 250 [0.1 s]

Default: 0x32 (5 s)

Parameter 06 (0x06) **MsgMaxRepeat**

If a confirmation is not sent by the host, the device repeats the message according to the set value. Only then is an error message sent.

0 – 31

Default: 0x03

Parameter 07 (0x07) **First byte of the serial number (read only)**

Represents the first byte of the serial number ➔ Device label.
This value is write protected!

Parameter 08 (0x08) **Second byte of the serial number (read only)**

Represents the second byte of the serial number ➔ Device label.
This value is write protected!

Parameter 11 (0x0B) **Reader ID**

This parameter defines the address of the device in the ASC-I1 protocol.

0 .. E

Default: 0x00

Parameter 12 (0x0C) **Acknowledgment Error Message**

This parameter defines whether an error message must be confirmed or not.

0 – No confirmation expected
1 – a confirmation is expected

Default: 0x01

Parameter 20 (0x14) **Sensor activity**

The device offers the option to disable the sensor inputs.

0x00000000	All 4 sensors are disabled
0x00000001	Sensor 1 is activated
0x00011111	All 4 sensors are activated

Default: 0x00001111 (0F) all sensors are activated

Parameter 21 (0x15) **Delay time for sensor 1**

This parameter defines the delay time for sensor signal before the event message is sent.

1 .. 255 1/10 s

Default: 0x01 (1 x 0.1 s = 0.1 s)

Parameter 22 (0x16) **Delay time for sensor 2**

See parameter 21.

Parameter 23 (0x17) **Delay time for sensor 3**

See parameter 21.

Parameter 24 (0x18) **Delay time for sensor 4**

See parameter 21.

Parameter 26 (0x1A)

Watch port for sensor 1

This parameter defines the response of the device when triggering the respective input.

IMPORTANT

The sensor must be connected to the input, in order to use this response!

Bit 0: 0 – message input open disabled
1 – message input open activated

Bit 1: 0 – message input closed disabled
1 – message input closed activated

Bit 4/5: 0 – no scanning
1 – EPC bulk reading

Bit 6: 0 – The device does not expect any confirmation from the host
1 – The device expects a confirmation from the host

Bit 7: 0 – The input signal is not inverted (normal)
1 – The input signal is inverted

Default: 0b00110011 (0x33) Report "input open" and "closed" and sensor-triggered EPC bulk reading.

Parameter 27 (0x1B)

Watch port for sensor 2

See parameter 26.

Parameter 28 (0x1C)

Watch port for sensor 3

See parameter 26.

Parameter 29 (0x1D)

Watch port for sensor 4

See parameter 26.

Parameter 33 (0x21)

High-byte Auto Read Bulk Time

An EPC bulk reading is completed in the sensor-triggered automatic reading. The duration of the bulk reading is specified in milliseconds. The high byte of the 2 byte time value is defined here.

0 – 255 page

Default: 0x01 (0x0100: 256 ms)

Parameter 34 (0x22)

Low-byte Auto Read Bulk Time

An EPC bulk reading is completed in the sensor-triggered automatic reading. The duration of the bulk reading is specified in milliseconds. The low byte of the 2 byte time value is defined here.

0x1234 → Lowbyte 0x34

Default: 0x00 (0x0100: 256 ms)

Parameter 39 (0x27)

Adjust I/O numbering

Antennas and I/Os have the same numbering. This applies for inputs and outputs Sensor 1 therefore becomes sensor 4 and vice versa.

0: Do not provide an adjustment (compatibility to previous versions)

1: Adjust I/Os

Default: 0x01

Parameter 40 (0x28)

Polling port

The antenna port is defined with this parameter, on which a polling EPC scan (asynchronous EPC scanning) is performed. Polling is started after a reset according to the value of the parameter polling port.

Value range:
0x00: No polling
0x01: Polling EPC on antenna 1
0x02: Polling EPC on antenna 2
0x04: Polling EPC on antenna 3
0x08: Polling EPC on antenna 4
0x0F: Polling EPC on all 4 antennas

Default: 0x00 (no polling)

ATTENTION

If polling is stopped by the "UAE" command, the parameter polling port is not affected. Polling is restarted according to the parameter at the next reset. Resetting the parameter to value 0x00 stops polling!

Parameter 41 (0x29) **Show UHF Going**

When polling is activated by the EPC transponders (asynchronous reading), the detection as well as the removal of EPC transponders can be displayed.

Value range:
0x00 to 0x03
Bit 0 (0x01): In addition to detecting also display the removal of an EPC transponder

Bit 1 (0x02): During an inventory display the deviation of the RSSI value to the amount of the value of the configuration parameter (Par. 0xB2) in comparison to the RSSI value of the previous inventory

Default: 0x00 (only show detection)

Parameter 93 (0x5D) **Wait Time Reader Response (read only)**

This internal parameter can only be read.

Default: 0x9C (counter 0x9C00)

Parameter 94 (0x5E) **Wait Time Reader Acknowledge (read only)**

This internal parameter can only be read.

Default: 0x14 (counter 0x1400)

Parameter 95 (0x5F) **Reader Control Time (read only)**

This internal parameter can only be read.

Default: 0x0A (1 s)

Parameter 96 (0x60) **Stop Automatic Read (read only)**

Internal parameter that can only be read. Setting the internal parameter causes the automatic reading to be terminated when the sensor drops prematurely.

Default: 0x01 (active)

Parameter 97 (0x61) **Stop Sensor Message (read only)**

Internal parameter that can only be read. Setting of the internal parameter causes the cessation of unconfirmed repetitive sensor messages if the state of the sensor changes.

Default: 0x01 (active)

Parameter 98 (0x62)

Error 'Unexpected' (read only)

Internal parameter that can only be read. Setting the internal parameter causes error 9 (unexpected) to be output only once successively.

Default: 0x01 (active)

Parameter 99 (0x63)

Factory Reset / Fine Version

The reader can be placed in the default status via this parameter. Only value 0x00 is approved here! However, the parameter delivers the fine version of the software upon a query.

Default: 0x00 (Fine version 0)

Parameter 100 (0x64)

Global ETSI Channel List

This parameter specifies all ETSI channels to be used when the global list (par 0x69 channel switching mode) has the value 0. The global ETSI channel list can contain up to 16 entries.

Value range: 0x00 to 0x0F

0x00 no channel
0x01 ETSI channel 1 (865.1 MHz)
...
0x0F ETSI channel 15 (867.9 MHz)

Default: Channels 0x04, 0x07, 0x0A, and 0x0D

Parameter 101 (0x65)

ETSI Channel List Antenna 1

This parameter specifies all ETSI channels of antenna port 1 to be used. The channel switching mode par 0x69 must thereby have a value of 1 so that the relevant list of the corresponding antenna port is used. The ETSI channel list of antenna port 1 can contain up to 16 entries.

Value range: 0x00 to 0x0F
0x00 no channel
0x01 ETSI channel 1 (865.1 MHz)
0x0F ETSI channel 15 (867.9 MHz)

Default: Channels 0x04, 0x07, 0x0A, and 0x0D

Parameter 102 (0x66) **ETSI Channel List Antenna 2**

This parameter specifies all ETSI channels of antenna port 2 to be used. The channel switching mode par 0x69 must thereby have a value of 1 so that the relevant list of the corresponding antenna port is used. The ETSI channel list of antenna port 1 can contain up to 16 entries.

Value range: 0x00 to 0x0F
0x00 no channel
0x01 ETSI channel 1 (865.1 MHz)
0x0F ETSI channel 15 (867.9 MHz)

Default: Channels 0x04, 0x07, 0x0A, and 0x0D

Parameter 103 (0x67) **ETSI Channel List Antenna 3**

This parameter specifies all ETSI channels of antenna port 3 to be used. The channel switching mode par 0x69 must thereby have a value of 1 so that the relevant list of the corresponding antenna port is used. The ETSI channel list of antenna port 1 can contain up to 16 entries.

Value range 0x00 to 0x0F
0x00 no channel
0x01 ETSI channel 1 (865.1 MHz)
0x0F ETSI channel 15 (867.9 MHz)

Default: Channels 0x04, 0x07, 0x0A, and 0x0D

Parameter 104 (0x68) **ETSI Channel List Antenna 4**

This parameter specifies all ETSI channels of antenna port 4 to be used. The channel switching mode par 0x69 must thereby have a value of 1 so that the relevant list of the corresponding antenna port is used. The ETSI channel list of antenna port 1 can contain up to 16 entries.

Value range 0x00 to 0x0F
0x00 no channel
0x01 ETSI channel 1 (865.1 MHz)
0x0F ETSI channel 15 (867.9 MHz)

Default: Channels 0x04, 0x07, 0x0A, and 0x0D

Parameter 105 (0x69) **Channel Switching Mode**

This parameter defines if the global ETSI channel list is used or if each port has its own channel list.

Value range: 0x00 to 0x01
0x00 Use global ETSI channel list
0x01 Use the ETSI channel list of the respective antenna port

Default: 0x00

Parameter 106 (0x6A) **Transmission Output Antenna Port 1**

This value defines the transmission output of antenna port 1.

Value range:
0x00 (0 dBm) The port is disabled.
0x44 to 0x84 (17 dBm to 33 dBm; increment 0.25 dBm)

Default: 0x6C (27 dBm)

Parameter 107 (0x6B) **Transmission Output Antenna Port 2**

This value defines the transmission output of antenna port 2.

Value range:
0x00 (0 dBm) The port is disabled.
0x44 to 0x84 (17 dBm to 33 dBm; increment 0.25 dBm)

Default: 0x00 (0 dBm)

Parameter 108 (0x6C) **Transmission Output Antenna Port 3**

This value defines the transmission output of antenna port 3.

Value range:
0x00 (0 dBm) The port is disabled.
0x44 to 0x84 (17 dBm to 33 dBm; increment 0.25 dBm)

Default: 0x00 (0 dBm)

Parameter 109 (0x6D) **Transmission Output Antenna Port 4**

This value defines the transmission output of antenna port 4.

Value range:
0x00 (0 dBm) The port is disabled.
0x44 to 0x84 (17 dBm to 33 dBm; increment 0.25 dBm)

Default: 0x00 (0 dBm)

Parameter 110 (0x6E) **Antenna cable port 1 attenuation**

This value defines the attenuation of the antenna cable at port 1.
Value range:
0x00 to 0xFF (0 dB to 63.75 dB; increment 0.25 dB)

Default: 0x00 (0 dB)

Parameter 111 (0x6F) **Antenna cable port 2 attenuation**

This value defines the attenuation of antenna cable at port 2.
Value range:
0x00 to 0xFF (0 dB to 63.75 dB; increment 0.25 dB)

Default: 0x00 (0 dB)

Parameter 112 (0x70) **Antenna cable port 3 attenuation**

This value defines the attenuation of the antenna cable at port 3.
Value range:
0x00 to 0xFF (0 dB to 63.75 dB; increment 0.25 dB)

Default: 0x00 (0 dB)

Parameter 113 (0x71) **Antenna cable port 4 attenuation**

This value defines the attenuation of antenna cable at port 4.
Value range:
0x00 to 0xFF (0 dB to 63.75 dB; increment 0.25 dB)

Default: 0x00 (0 dB)

Parameter 114 (0x72) **Antenna gain port 1**

This value defines the antenna gain of the antenna connected to port 1.
Value range:
-128 to 127 (-32 dB to 31.75 dB; increment 0.25 dB)

Default: 0x14 (5 dB)

Parameter 115 (0x73) **Antenna gain port 2**

This value defines the antenna gain of the antenna connected to port 2.
Value range:
-128 to 127 (-32 dB to 31.75 dB; increment 0.25 dB)

Default: 0x14 (5 dB)

Parameter 116 (0x74) **Antenna gain port 3**

This value defines the antenna gain of the antenna connected to port 3.
Value range:
-128 to 127 (-32 dB to 31.75 dB; increment 0.25 dB)

Default: 0x14 (5 dB)

Parameter 117 (0x75) **Antenna gain port 4**

This value defines the antenna gain of the antenna connected to port 4.
Value range:
-128 to 127 (-32 dB to 31.75 dB; increment 0.25 dB)

Default: 0x14 (5 dB)

Parameter 118 (0x76) **Extended Result Flag**

This value defines the data of a detected transponder that are also displayed.

Value range: see information unit "Ex flag" and "Extensions" in ➔ Message items

Default: 0x01 (antenna port only)

Parameter 119 (0x77) **Glimpsed Timeout Count**

Number of unsuccessful inventories until a transponder that was previously detected was removed from the transponder list.
Value range: 0x00 to 0xFF

Default: 0x03

Parameter 120 (0x78) **Observed Threshold Count**

Number of successful transponders before it elevated into the "observed" status (generating of "incoming" message).
Value range: 0x00 to 0xFF

Default: 0x05

Parameter 121 (0x79) **Observed Timeout Count**

Number of unsuccessful inventories until an "observed" transponder looses the "observed" status (generating an "outgoing" message).
Value range: 0x00 to 0xFF

Default: 0x05

Parameter 122 (0x7A) **Communications standard**

The communications standard is selected by this parameter (as far as possible and enabled by the license).

Value range: 0x00 to 0x07
0x00: No communications standard
0x01: Auto detect
0x02: EN302208
0x03: EN302208_LBT
0x04: FCC
0x05: Own special settings
0x06: China
0x07: Thailand

Default: 0x01

Parameter 123 (0x7B) **ETSI Power Check Over All Allowed Channels**

With this parameter, the performance check is conducted via the set channels.

Value range: 0x00 (false) and 0xFF (true)

Default: 0x00 (false)

Parameter 124 (0x7C) **Comm Standard Center Freq CH0**

Parameters for the communications standard "specific".
Mid-frequency channel 0 in kHz

Value range: 0 to 1,048,575 kHz

Default: 0x00000000

Parameter 125 (0x7D) **Comm Standard Channel Width**

Parameters for the communications standard "specific".
Channel width in kHz

Value range: 0 to 65,535 kHz

Default: 0x0000

Parameter 126 (0x7E) **Comm Standard Max Channel Time**

Parameters for the communications standard "specific".
Maximum channel dwell time in ms

Value range: 10 to 65,535 ms

Default: 0x0000

Parameter 127 (0x7F) **Comm Standard Min Channel Wait Time**

Parameters for the communications standard "specific".
Channel width in kHz

Value range: 0 to 65,535 kHz

Default: 0x0000

Parameter 128 (0x80) **Comm Standard First Channel**

Parameters for the communications standard "specific".
Number of the first channel

Value range: 0 to 255

Default: 0x00

Parameter 129 (0x81) **Comm Standard Last Channel**

Parameters for the communications standard "specific".
Number of the last channel

Value range: 0 to 255

Default: 0x00

Parameter 130 (0x82) **Tag Comm Intelligent Write**

Only the changing data are written again during intelligent writing.

Value range: 0x00 (false) and 0xFF (true)

Default: 0xFF (true)

Parameter 131 (0x83) **Tag Comm Verify Write**

Written data are verified again by the control reading.

Value range: 0x00 (false) and 0xFF (true)

Default: 0xFF (true)

Parameter 132 (0x84) **Tag Comm Query Target**

Only transponders with a corresponding inventoried flag (A or B) participate in the inventory round. A detailed description of the parameter is located in the EPC global specification for the query command.

Value range: 0x00 (target A) and 0x01 (target B)

Default: 0x00

Parameter 133 (0x85) **Tag Comm Query Sel**

Defines the transponders that participate in the query command. A detailed description of the parameter is located in the EPC global specification for the query command.

Value range: 0x00 to 0x03

Default: 0x00 (true)

Parameter 134 (0x86) **Host Comm Antenna Independend Operation**

Antennas independent reading, i.e. for each transponder there is only one entry in the observed list, even if it was read at different antennas.

Value range: 0x00 (false) or 0xFF (true)

Default: 0x00

Parameter 135 (0x87) **RF Interface Time to Power Off**

The carrier follow-up time indicates how long the carrier remains on after a transponder operation (subject to the restrictions of the selected communications standard).

Value range: 0 to 65,535 s

Default: 0x0005 (5 s)

Parameter 136 (0x88) **RF Interface Modulation Type**

Modulation type

Value range: 0 (DSB) and 1 (PR-ASK)

Default: 0x01 (PR-ASK)

Parameter 137 (0x89) **RF Interface Multiplexing Antenna Port 1**

First list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by the parameter "Interface Multiplexing Exposure Time 1".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x01

Parameter 138 (0x8A) **RF Interface Multiplexing Antenna Port 2**

Second list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by the parameter "Interface Multiplexing Exposure Time 2".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x02

Parameter 139 (0x8B) **RF Interface Multiplexing Antenna Port 3**

Third list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 3".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x03

Parameter 140 (0x8C) **RF Interface Multiplexing Antenna Port 4**

Fourth list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 4".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x04

Parameter 141 (0x8D) **RF Interface Multiplexing Antenna Port 5**

Fifth list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 5".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x00

Parameter 142 (0x8E) **RF Interface Multiplexing Antenna Port 6**

Sixth list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 6".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x00

Parameter 143 (0x8F) **RF Interface Multiplexing Antenna Port 7**

Seventh list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 7".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x00

Parameter 144 (0x90) **RF Interface Multiplexing Antenna Port 8**

Eighth list entry of the antenna port list!
The multiplexing antenna port list specifies the order of the antenna ports for a multiple antenna inventory. The dwell time of the inventory corresponding with the list entry is defined later by parameter "Interface Multiplexing Exposure Time 8".

Value range:
0x00 no antenna port
0x01 to 0x04 for the respective antenna port

Default: 0x00

Parameter 145 (0x91) **RF Interface RSSI Threshold 1**

RSSI threshold value at port 1 must be reached so that the respective EPC transponder is displayed.

Value range: 0x00 to 0xFF

Default: 0x00

Parameter 146 (0x92) **RF Interface RSSI Threshold 2**

RSSI threshold value at port 2 must be reached so that the respective EPC transponder is displayed.

Value range: 0x00 to 0xFF

Default: 0x00

Parameter 147 (0x93) **RF Interface RSSI Threshold 3**

RSSI threshold value at port 3 must be reached so that the respective EPC transponder is displayed.

Value range: 0x00 to 0xFF

Default: 0x00

Parameter 148 (0x94) **RF Interface RSSI Threshold 4**

RSSI threshold value at port 4 must be reached so that the respective EPC transponder is displayed.

Value range: 0x00 to 0xFF

Default: 0x00

Parameter 149 (0x95) **RF Interface Multipower Tag Access 1**

Variation of the power at antenna port 1 in order e.g. to detect EPC transponders in the immediate antenna vicinity better.

Value range: 0x00 (disabled) to 0xFF (enabled)

Default: 0xFF

Parameter 150 (0x96) **RF Interface Multipower Tag Access 2**

Variation of the power at antenna port 2 in order e.g. to detect EPC transponders in the immediate antenna vicinity better.

Value range: 0x00 (disabled) to 0xFF (enabled)

Default: 0xFF

Parameter 151 (0x97) **RF Interface Multipower Tag Access 3**

Variation of the power at antenna port 3 in order e.g. to detect EPC transponders in the immediate antenna vicinity better.

Value range: 0x00 (disabled) to 0xFF (enabled)

Default: 0xFF

Parameter 152 (0x98) **RF Interface Multipower Tag Access 4**

Variation of the power at antenna port 4 in order e.g. to detect EPC transponders in the immediate antenna vicinity better.

Value range: 0x00 (disabled) to 0xFF (enabled)

Default: 0xFF

Parameter 153 (0x99) **RF Interface Max Allowed Antenna Output Power 1**

The reader limits the power at antenna port 1 to the here defined maximum antenna output power.

Value range: 0x00 (0 dBm (erp)) to 0xFF (63.75 dBm (erp))

Default: 0x84 (33 dBm (erp))

Parameter 154 (0x9A) **RF Interface Max Allowed Antenna Output Power 2**

The reader limits the power at antenna port 2 to the here defined maximum antenna output power.

Value range: 0x00 (0 dBm (erp)) to 0xFF (63.75 dBm (erp))

Default: 0x84 (33 dBm (erp))

Parameter 155 (0x9B)

RF Interface Max Allowed Antenna Output Power 3

The reader limits the power at antenna port 3 to the here defined maximum antenna output power.

Value range: 0x00 (0 dBm (erp)) to 0xFF (63.75 dBm (erp))

Default: 0x84 (33 dBm (erp))

Parameter 156 (0x9C)

RF Interface Max Allowed Antenna Output Power 4

The reader limits the power at antenna port 4 to the here defined maximum antenna output power.

Value range: 0x00 (0 dBm (erp)) to 0xFF (63.75 dBm (erp))

Default: 0x84 (33 dBm (erp))

Parameter 157 (0x9D)

Tag Comm Use Pilot Tone

Transponder pilot tone on and off.

Value range: 0x00 (off) or 0xFF (on)

Default: 0xFF

Parameter 158 (0x9E)

Tag Comm Initial Q

The initial Q results from the number of anticipated transponders (anticipated transponder number = 2Q).

Value range: 0x00 to 0x0F

Default: 0x03

Parameter 159 (0x9F)

Tag Comm Session

Defines the transponder session to be applied (see Gen2 EPCglobal Standard).

Value range: 0x00 to 0x03

Default: 0x02

Parameter 160 (0xA0)

Tag Comm Max Errors

Number of repeat attempts of an air interface command when an anticipated command response remains pending.

Value range: 0x00 to 0xFF

Default: 0x05

Parameter 161 (0xA1) **Tag Comm Default Profile**

A communication profile includes transmission data rate, reception data rate and transponder response encoding (FM0, Miller 2, Miller 4, Miller 8) in meaningful and standard-conforming combinations. The list of supported profiles is available with the UGL command.

Value range: 0x00 to 0xFF

Default: 0x04

Parameter 162 (0xA2) **RF Interface Multiplexing Exposure Time 1**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 1). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 163 (0xA3) **RF Interface Multiplexing Exposure Time 2**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 2). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 164 (0xA4) **RF Interface Multiplexing Exposure Time 3**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 3). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 165 (0xA5) **RF Interface Multiplexing Exposure Time 4**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 4). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 166 (0xA6) **RF Interface Multiplexing Exposure Time 5**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 5). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 167 (0xA7) **RF Interface Multiplexing Exposure Time 6**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 6). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 168 (0xA8) **RF Interface Multiplexing Exposure Time 7**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 7). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 169 (0xA9) **RF Interface Multiplexing Exposure Time 8**

Dwell time on the antenna port, which is defined as the first list entry of the multiplexing antenna port list (par. RF Interface Multiplexing Antenna Port 8). The dwell time indicates how long an inventory is performed on an antenna port (only for polling actions).

Value range: 0 to 65,535 in ms

Default: 100 ms

Parameter 170 (0xAA) **RF Interface Enable RSSI Threshold At Specific Cmds**

Activates or deactivates RSSI threshold check for the specific commands URY, UWZ, UMZ, UBZ, ULZ and UKZ.

Value range: 0; 255

Default: 0xFF (active)

Parameter 171 (0xAB) **RF Interface Flash Write Additional Power**

The transponder requires more power for writing than for reading. Therefore it needs to be closer to the antenna when writing.

If writing errors occur (Write, Lock, Kill,...) the transmission output can be increased in steps of 1/4 dB with the Interface Flash Write Additional Power parameter in order to bridge the gap between reading and writing distance.

Value range: 0 - 48

Default: 0x00

Parameter 172 (0xAC) **Tag Comm Force Power Off After EPC Write**

When writing the EPC code, the checksum of the transponder is changed. Therefore the transponder can not take part in the next inventory. Only by switching the antenna field off and on will the transponder be reactivated and can take part in the inventory process again. The parameter specifies the time in 1 ms steps how long the UHF carrier is switched off after an EPC writing.

Value range: 0 - 255 in ms

Default: 0x00

Parameter 173 (0xAD)

Tag Comm Transmit Get EPCs Pre Select

This parameter only affects the commands M, URM, URB, UAA and UAM. All other commands behave as if the parameter was zero.

Parameter is zero:

1. The first antenna is chosen from the multiplex list.

2. All transponders within receiving range are reset by a Select.

3. An inventory is conducted until no further transponders can be found.

4. If the multiplex list contains additional antennas, the steps are repeated for each of these antennas.

5. The command is finished and the result is transferred to the upper level.

Parameter is non-zero:

1. The first antenna is chosen from the multiplex list.

2. All transponders within receiving range are reset by a Select.

3. If the multiplex list contains additional antennas, this step is repeated for each of these antennas.

4. The first antenna of this list is chosen again and an inventory is conducted until no further transponders can be found.

5. This step is repeated for each antenna of the multiplex list.

6. The command is finished and the result is transferred to the upper level.

This parameter reduces the time for a comprehensive detection of a group of transponders if this group is within receiving range of the antenna, and it is not important which antenna detects which transponder. If during this process a transponder is detected by an antenna, this transponder will not be processed by the subsequent antennas.

Value range: 0; 255

Default: 0x00

Parameter 174 (0xAE)

Tag Comm Transmit Select If No Filter Is On

With a Select filter or Select command at the beginning of an inventory, the reader sets all transponders within the range of the antenna to a defined output state. The transponders will be detected in an additional inventory. If no Select filter is defined, a Select command can be displayed via this parameter. All transponders within antenna reach can be reset with this command.

Value range: 0; 255

Default: 0x00

Parameter 175 (0xAF)

Tag Comm Number Of EPC Words

The UF70 Certum reader can read transponders with an EPC length from 0 to 31 words (0 to 496 Bit EPCs). This parameter can deactivate the automatic detection of the EPC length. The reader therefore reads transponders with a fixed length.

Value range: 0 - 31; 255

Default: 0xFF

Parameter 176 (0xB0)

Tag Comm Use Block Write

With this parameter, the "BlockWrite" command is activated during the writing of data on a transponder. The reader then writes more than 16 Bit (one word) on the transponder with only one command.

IMPORTANT

Not all transponders support the "BlockWrite" command. The information if the respective transponder supports this command can be read in the corresponding data sheets.

Value range: 0; 255

Default: 0x00

Parameter 177 (0xB1)

Tag Comm Disable Receiving NXP Read Protected Tags

A transponder protected with "ReadProtect" of NXP does not transmit an EPC and a valid checksum during an inventory. The data content of EPC and checksum is zero. For the reader to be able to detect these transponders, it lets pass transponders with EPC and checksum zero. These transponders are no longer protected by a valid checksum. In order to avoid the reader detecting transponders that are not present, this parameter should be activated. With this, the reception of "ReadProtect" protected transponders is prevented.

Value range: 0; 255

Default: 0x00

Parameter 178 (0xB2)

Host Comm A Sync Additional RSSI Data Delivery Delta

This parameter influences the behavior of all asynchronous commands (activate polling UAN command) except the UAA command. At asynchronous commands (activate polling) an "incoming" message is generated and transferred to the upper level if a transponder enters the antenna range. If a transponder leaves the antenna range, an "outgoing" message is generated. In order to be able to follow the movements of a transponder within the antenna range, the field intensity (RSSI value) of a transponder between "incoming" and "outgoing" messages has to be observed. This parameter indicates how the field intensity of a transponder needs to change for a "TransponderDataChanged" message to be generated and be transferred to the upper level. No messages are generated at an RSSI value of 255.

IMPORTANT

The Parameter Extended Resultflag (see ➔ Parameter 118 (0x76)) has to be set in a way that the RSSI value is part of the "TransponderDataChanged" message.

Value range: 0 - 255

Default: 0xFF

Parameter 179 (0xB3)

Host Comm Use Milliseconds As Time stamp

In addition to the transponder data, a time stamp can also be transferred to the upper level after an iventory (see parameter 118). This parameter determines if this time stamp contains the time passed in ms since the start of the reader or the UTC time in s since 01.01.1970 0:00:00. If this parameter is activated, the time passed in ms since the start of the reader is transferred as a time stamp.

Value range: 0; 255

Default: 0x00

7.3 Additional information

IMPORTANT

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

8 Service and Troubleshooting

This chapter gives you an overview of the following topics:

- ➔ General remarks
- ➔ Qualified troubleshooting personnel
- ➔ Safety instructions
- ➔ Error codes
- ➔ Error display with LED
- ➔ Reader does not respond
- ➔ Reset
- ➔ Power cut
- ➔ Software releases
- ➔ Customer service

8.1 General remarks

Head the safety chapter

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

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

8.2 Qualified troubleshooting personnel

CAUTION

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

CAUTION

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

8.3 Safety instructions

All antenna resonant circuit components carry high voltages!

WARNING

When replacement parts are required, use only manufacturer-specified parts.

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

Electrostatic charges can damage electronic components within the device.

ESD protective measures must be applied when opening the device (➔ ESD instructions).

CAUTION

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

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

CAUTION

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

Only use fuses specified by the manufacturer.

8.4 Error codes

Error ID	Name	Description	Possible causes	Correcting action
0	none	no error	not used	no
1	auto fail	automatic reading is not possible[1)]	reader is still busy with a former read or write request	wait until the former request is done
2	ex fail	read or write initiated from the host, and/or other actions cannot be carried out[1)]	reader is still busy with a former read or write request	wait until the former request is done
3	write fail	data transfer to the tag not possible[1)]	reader is still busy with a former read or write request	wait until the former request is done
4	no tag	no tag or antenna installed	no readable tag at the reading range	bring a tag into the range of the antenna; verify type and function of the tag
			antenna is not connected correctly	check connection of the antenna
			bad orientation between antenna and tag	check orientation between antenna and tag (see section antenna installation and antennas)
			antenna is not tuned	perform an antenna tuning (see section installation -> DIP switches)
			disrupting field at transmitting freqency	check surronding of antenna for possible disrupting sources (monitors , servo motors...)
			antenna is damaged or too close to metal	replace antenna, verify antenna installation
5	invalid	invalid parameter or data	data sent with a command are wrong	check syntax and data of command
			sent parameter is not implemented or out of range	check syntax and value of parameter

Error ID	Name	Description	Possible causes	Correcting action
6	unknown	unknown error	not used	no
7	unconfig	the device is not configured	wrong reader address was sent	check syntax of message, check parameter F "Reader address"
8	check	parity and/or checksum error	wrong baud rate is set	check baud rate of serial interface (COM port)
			transmision errors on serial communication	check RS232 cable and connectors; check disrupting sources at RS232
9	void ackn	no valid acknowledge (unexpected acknowledge)	double or wrong acknowledgement	check host communication settings
			serial communication is interupted	check RS232 cable and connectors; check disrupting sources at RS232
A	locked	locked page cannot be written	page to be written is locked (write protected forever)	check page number to write; replace tag with new one
:	msg len	message too long or too short, or message is not received in full	length of message is longer than shown at the length byte	check message length, check length byte
			no valid end sign of message (End sign 0x0D) detected	check syntax of message
			not all characters are transmitted (Intercharacter timeout)	check syntax of message, check RS232 connection
;	invalid	invalid command	unknown command was sent	check syntax of command

Error ID	Name	Description	Possible causes	Correcting action
B	no ackn	the message which has to be confirmed has been sent the maximum number of times (rs232 maxrepeat), and has not been confirmed by the terminal within the defined time frame (see parameter 5)	Host system does not acknowledge the message	check availability of host system (terminal); check RS232 cables and connectors

1) because the device is still busy or because a message has not been confirmed by the previous read up to now.

8.5 Error display with LED

Power LED does not light up

- Check the power supply and the connecting cables!
- If the LED does not light up, disconnect the device from the power supply and carefully remove the fuse! Test the fuse. If it is defective, replace it with a fuse specified by the manufacturer!
- If the above measures do not solve the problem, leave the device disconnected and contact the manufacturer!

8.6 Reader does not respond

- Check if the interface connection cable is undamaged and correctly connected to both reader and host!
- Check the status as indicated by the LED!
- If you are unsure of the enabled communication interface, try both (RS232 and Ethernet)!
- Contact Brooks Automation (Germany) GmbH regarding the firmware of the device and the firmware update software!
- If these measures do not solve the problem, contact the manufacturer!

8.7 Reset

- In the case of a malfunction, a hardware reset can be performed by switching the power supply off and on.
- After the reset, the reader performs a self-test. The self-test can take up to five seconds. In the first step of these self-tests, all LEDs light up. If the test was successful, all LEDs, except for the power LED, go out!

8.8 Power cut

After a power cut, the reader performs a reset with self-test (see ➔ Reset).

8.9 Software releases

Release date	Version	Description
March 2011	UHFI20	First version with flexible EPC length

8.10 Customer service

Brooks Automation (Germany) GmbH
RFID Division
Gartenstr. 19
D-95490 Mistelgau
GERMANY

Telephone	+49 (0) 9279 - 991 550
Fax	+49 (0) 9279 - 991 501
E-mail	rfid.support@brooks.com

24 hour technical support hotline (Brooks):

US and Canada	+1 978 262 2900
Europe	+49 1804 2255 4887
Japan	+81 45 477 5980
China	+86 21 5131 7066
Taiwan	+886 3 5525225
Korea	+82 31 288 2500
Singapore	+65 6464 1481

9 Dismantling and Storage

This chapter gives you an overview of the following topics:

- ➔ Dismantling
- ➔ Storage

9.1 Dismantling

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

9.2 Storage

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

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

10 Transport and Disposal

This chapter gives you an overview of the following topics:

- ➔ Transport
- ➔ Disposal

10.1 Transport

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

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

10.2 Disposal

The device and its components are made of various materials.

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

Do not dispose of the device in regular household waste.

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

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

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