Brooks
RFID DIVISION

UF80

Ready for
RFID?
Radio Frequency IDentification

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.

The copyright for this product manual is held solely by

Brooks Automation (Germany) GmbH
RFID Division
Gartenstr. 19
95490 Mistelgau
Germany

or its legal successor.

Status: June 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, transport and storage	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.

Contents

Contents

Contents

1   Identification

This chapter gives you an overview of the following topics:

- ➔ Designated use

- ➔ Incorrect use

Model   RFID Reader UF80

Serial number   1101MIS10001

Part number   TUG-T1M-0P00-C0-02L6 (integrated antenna, ETSI version)
TFG-T1M-0P00-C0-02L6 (integrated antenna, FCC version)
TUG-T1M-2O00-C0-02L6 (external antenna, ETSI version)
TFG-T1M-2O00-C0-02L6 (external antenna, FCC version)

Manufacturer

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   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	**Danger 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 / Mr Dittrich**
erklärt, dass das Produkt *declares that the product*	**UF80**
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*	**1**

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)

- - -

BROOKS Automation (Germany) GmbH

Gartenstr. 19
D-95490 Mistelgau
GERMANY

Telephone   +49 (0) 9279 - 991 550
Fax   +49 (0) 9279 - 991 501
E-mail   info.rfid@brooks.com

Mistelgau, August 3, 2011

(Place and date of issue)

Gerald Dittrich

(Name and signature)

3 General Instructions

This chapter gives you an overview of the following topics:

- ■ ➔ Warranty and liability
- ■ ➔ Objectives of the product manual

3.1 Warranty and liability

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.

Warranty and liability 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)

General Instructions

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 DIN 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
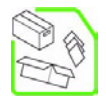
♻️	**Dispose of packing material according to regulations**	♻️	**Recycling**
ℹ️	**Important information**	📖	**Refer to manual**
🔌	**Disconnect from power supply**		

Safety Instructions

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 or undergoing general training to work on the device under the permanent 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

The operating personnel is 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 of the device. 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 operating instructions 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.

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 UF80 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 has a transmission output of between 7 and 26.5 dBm.

5.2 Images

5.2.1 Side view
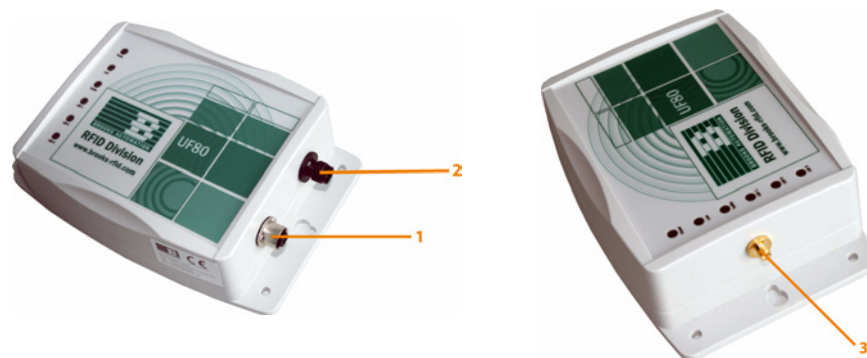
1   Ethernet interface

2   Power (24 V)

3   Antenna port (for external antenna)

5.2.2 Top view

1	Power LED	4	LED 1 (red LED), configurable
2	Link LED	5	LED 2 (green LED), configurable
3	Traffic LED	6	LED 3 (yellow LED), configurable

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.
Link LED	The link LED shows a TCP/IP connection.
Traffic LED	The traffic LED flashes briefly when data are transmitted or received.
Ethernet interface	Communication with the device can be carried out via the 10/100 BaseT interface.
Voltage supply connection	Contact for connecting the 24 V DC voltage supply.
LED 1 - 3	LEDs can be set by the user via a command.

5.4   Technical data

Technical data	
Voltage	24 V DC (20 - 30 V DC)
Power consumption	approx. 0.2 A at 24 V
Ethernet interface	10/100 BaseT
Air interface	ISO 18000-6C (EPCglobal Class 1 Gen2)
Frequency range Europe	865 - 868 MHz
Frequency range FCC	902 - 928 MHz
Transmitting power	7 - 26.5 dBm, parameterizable in 1 dBm steps
Read/write range (integrated antenna)	up to 0.8 m
Read/write range (external antenna)	depending on the antenna (typ. 2 m)
Antenna port (external antenna)	SMA socket, impedance 50 ohm
Dimensions	190 x 126 x 54 mm
Weight	approx. 400 g
Protection class	IP 65
Housing material	Polycarbonate
Operating temperature	-20 °C to 50 °C -4 °F to 122 °F
Storage temperature	-40 °C to 85 °C -40 °F to 185 °F
Permissible humidity at 50 °C / 122 °F	25% - 85%

Product Specifications

Device label The device label with the CE mark, part/serial number, and the 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
- ➔ Ethernet interface 10/100 BaseT
- ➔ 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, which can cause damage.
	Do not install the device in the vicinity of voltage lines or other power lines with which they could collide (for example, when 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.

ATTENTION	The antennas must be positioned at a distance of more than 10 cm from any people in the vicinity.

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	Operating 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 observing the 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 in such a way that air can freely circulate, and the operating and environmental conditions specified under ➔ Technical data are met at all times.

Installation dimensions
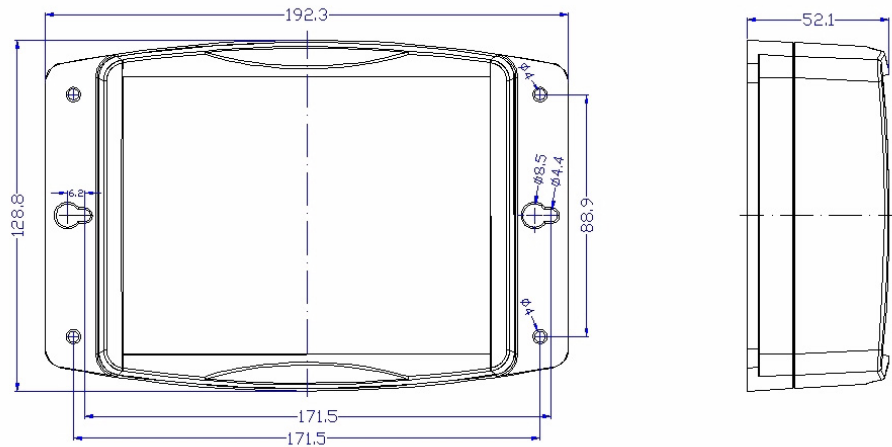
6.5   Antenna installation

ATTENTION

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

If the transponder is very close to the antenna, the transponder may be de-tuned 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 from and orientation of the transponder to the antenna.

Depending on the polarization of the antenna and the design of the transponder, the orientation of the two 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 incorrect voltage.

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

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

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

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

Pin assignment power supply M12 plug

Pin	Signal
1	24 V DC+
2	24 V DC-
3	NC
4	NC
5	NC
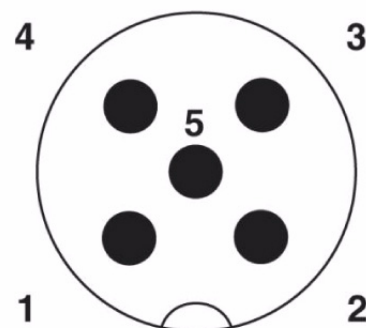
6.7   Ethernet interface 10/100 BaseT

Pin assignment
Ethernet socket
M12
D coded

Pin	Signal
1	TX+
2	RX+
3	TX-
4	RX-
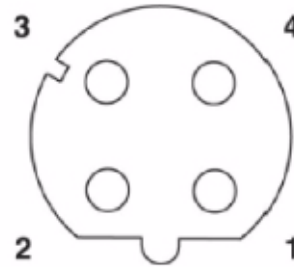
6.8   Commissioning

6.8.1   Required operating conditions

To operate the reader, the following requirements must be met:

⮑   An antenna must be connected correctly to the reader.

⮑   The power supply must be connected.

⮑   The transponder must be located within the individual read/write range of the antenna.

6.8.2   Brooks Device Discoverer

The 10/100 BaseT Ethernet interface has the following default settings:

DHCP mode   OFF
IP address   10.73.254.211
Gateway address   10.73.254.254
Subnet mask   255.255.254.0
TCP/IP   3241

If DHCP is enabled and the DHCP Server is not available, the device initializes the Ethernet connection with the following values:

IP address   169.254.MAC5.MAC6
Gateway   169.254.MAC5.254
Subnet mask   255.255.255.0
Primary DNS Server IP 0.0.0.0
Secondary DNS Server I 0.0.0.0
(MAC address   MAC1:MAC2:MAC3:MAC4:MAC5:MAC6)

Installation

The Brooks Device Discoverer Tool can be used to find a device in the network and to change the network settings easily. After sending a configuration message, the tool requests the device configuration password. Please enter the default passwort for Brooks RFID devices: **BROOKS**.

ATTENTION	Using the UPx commands, the nework setting can also be changed via the host interface.

The tool can also be used to perform a firmware update.
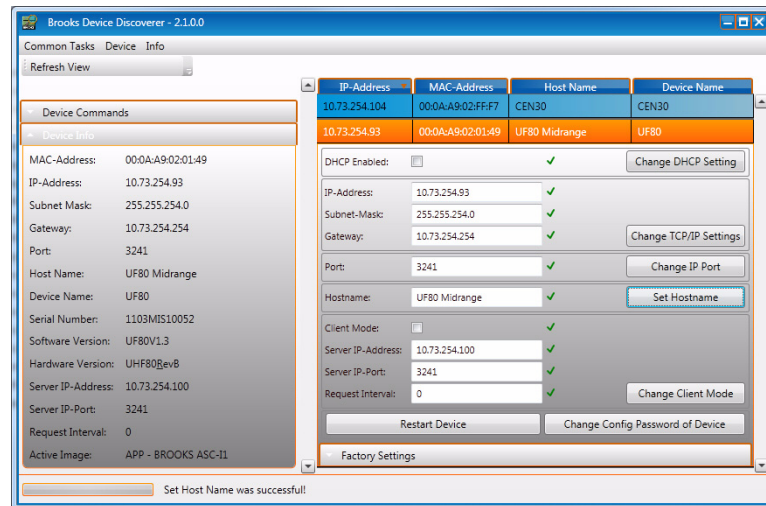
For more information on the tool please refer to the manual of the Brooks Device Discoverer

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 UF80 RFID 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 Ethernet interface to which an address from 0 to E can be assigned. When the reader is delivered, the address is 0.

- After each command to the reader, 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).

Package header		
Start	Length 1	Length 2

Start   Start character (ASCII character 'S')

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

Length 2   Low byte message 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 or source address, the number of the antenna port (Head - here always 1) and the actual information.

Message			
Command	Address	Head	Information

Command   ASCII characters (see section ➜ Commands of protocol)

Address   Target/source address; ASCII characters '0'...'E' [*]

Head   Optional - for messages that refer to a specific antenna port

Information   Depending on the command (contains none, one or more ASCII characters '0'...'F')

[*] The reader is preset with 0 when delivered.

End of package   The end of the package includes an end character (1 character).

End of package
End

End   End character ASCII character number 13 (hexadecimal 0D)

ATTENTION   The end of the message does not contain a checksum, because communication is exclusively carried out via TCP/IP.

7.2.3 Commands of protocol

Commands

Command	Description
URY	➜ URY - Read data range (defined EPC code)
M	➜ M - Scan EPCs
W	➜ W - Write EPC code
UWZ	➜ UWZ - Write data range of all EPC transponders (defined EPC code)
ULZ	➜ ULZ – Locking all EPC transponders (defined EPC code)
F	➜ F - Query parameters
P	➜ P - Set parameter
O	➜ O - Set output
E	➜ E - Error message
H	➜ H - Heartbeat
V	➜ V - Query software version
K	➜ K - Polling
UFD	➜ UFD - Query DHCP Enabled
UPD	➜ UPD - Set DHCP Enabled
UFI	➜ UFI - Query network settings
UPI	➜ UPI - Set network settings
UFN	➜ UFN - Query host name
UPN	➜ UPN - Set host name

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 always transmitted first during the transmission. The data are interpreted in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format.

Example:
0x01020304
ASCII string "04030201"

Data words	2 to N*4 bytes

Data words (2 bytes) are always read or written. The data are interpreted in HEX format. This means that 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

EPC	(2n+1)*2 bytes

For future developments, the EPC code should have a flexible length n from 0 to 31 data words (2 bytes data). The underlying software version UF80V1.1 still uses a fixed EPC length of 6 data words. An n byte is placed before the actual EPC code and corresponds to the quantity of EPC data words. The EPC code is transferred in such a way that the LSB byte is transmitted first. The data are interpreted in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format. The following applies to the number of EPC data words n: $0 <= n <= 31$

Example:

ASCII string	"060C0B0A090807060504030201"
-> Number n 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. This means that 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 value and protocol control word
0x0F	transmit time stamp, antenna port, RSSI value and protocol control word

Extensions	0 to 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. This means that 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	time stamp (number of ms that have passed since the start of the reader, the LSB byte is transferred first)
4 ASCII characters	protocol word PC of the transponder

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. This means that two ASCII characters in the message equal one byte of data in HEX format.

GW-ADR	8 bytes

Gateway address of the network setting with a size of 4 bytes.
The data are in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format.

Example:

Subnet address	255.255.254.0
→	0xFF 0xFF 0xFE 0x00
ASCII string	"FFFFFE00"

Head ID	1 byte

Number of the antenna port (always 1 for this device). The Head ID is part of the protocol, because it is also used for other devices with several antenna ports.

Host name	2 - 30 bytes

Host name with a length of 1 to 15 bytes, whose hexadecimal interpretation is transferred. The individual characters are interpreted in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format.

Example:
Host name   "UF80_10"
→   0x55 0x46 0x38 0x30 0x5F 0x31 0x30
ASCII string   "554638305F3130"

IP-ADR	8 bytes

IP address of the network setting with a size of 4 bytes.
The data are in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format.

Example:
IP address   10.73.254.56
→   0x0A 0x49 0xFE 0x38
ASCII string   "0A49FE38"

Length	2 bytes

Defines the length of the data to be read or written. The two ASCII characters (2 bytes) specify the length of the data in HEX format.

Example:
Length 1 byte   → 0x01 → "01"
Length 16 bytes   → 0x10 → "10"
Length 25 bytes   → 0x19 → "19"
Length 100 bytes   → 0x64 → "64" (maximum length)

List of EPCs	1 - 120 bytes

A list of EPCs scanned by the reader. The list is represented by a character string. Every EPC has a length of 12 bytes. In this character string, every byte of the EPC is represented by 2 ASCII characters. This means that a complete EPC (12 bytes) is represented by 24 ASCII characters.

The first 2 characters of a character string specify the number of EPCs in the character string. These two characters describe a byte value in HEX format ("02" means 0x02).

Example: List with 2 EPCs
02E0070000014CB96677889900E0070000014CB96777889900
$\rightarrow$ EPC 1: 0xE0070000014CB96677889900
$\rightarrow$ EPC 2: 0xE0070000014CB96777889900

Memory address	8 bytes

The memory areas of the EPC transponder are addressed by 4 byte word pointers. The LSB byte is always transmitted first during the transmission. The data are interpreted in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format. The exact memory structure can be derived from the EPCglobal 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 EPCglobal standard. The data are interpreted in HEX format. This means that 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/
written is hereby defined.
The data are in HEX format. This means that two ASCII characters in the message
equal one byte of data in HEX format.

Output state	4 bytes

Displays or sets the current status of the outputs. One byte is designated for each
output. The status of the outputs is transferred in the order IO a, IO b, IO c and
IO d as the last one.

Example:
0 - Output OFF
1 - Output ON
2 - Output flashes
3 - Output keeps the current status

LED 1 -> red LED
LED 2 -> green LED
LED 3 -> yellow LED

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:
Parameter 192 → 0xC0 → "C0"

Reader ID	1 byte

Address of the device ("0" .. "E").
The default address of the card is 0 on delivery.
Brooks recommends leaving the reader ID at "0", since the device can be clearly identified via its IP connection.

Response code	4 bytes

This feature is not used for the individual 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. This means that two ASCII characters in the message equal one byte of data in HEX format.

Values:

0x00	no errors occurred
0x0A	no transponder was found
0x0B	several transponder were found
0x70	transponder could not be selected during the transponder operation
0x71	structure of W command not in line with specifications

IMPORTANT

For writing operations to the transponder, the transponder error code must also be analyzed to be able to make an assessment as to whether the action was competed successfully.

Serial number	4 bytes

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

Software version	6 - 10 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 - 10 bytes of the software version in HEX format.

Example:
v05546383056312E31

$\rightarrow$ 0x55 0x46 0x38 0x30 0x56 0x31 0x2E 0x30 = UF80V1.1

SUB-ADR	8 bytes

Subnet address of the network setting with a size of 4 bytes.
The data are in HEX format. This means that two ASCII characters in the message equal one byte of data in HEX format.

Example:

Subnet address	255.255.254.0
$\rightarrow$	0xFF 0xFF 0xFE 0x00
ASCII string	"FFFFFE00"

Transponder error code	2 bytes

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

Values:

0x00	No errors occurred.
0x83	The specified memory location does not exist or the EPC-length field is not supported by the transponder.
0x84	The specified memory location is locked and/or permalocked and is either not writeable or not readable.
0x8B	The transponder has insufficient power to perform the memory-write operation.
0x8F	The transponder does not support error-specific codes.

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 0A0BCD0000000000000200000002
<< ury00000010106010203040506070809 0A0BCD000200000000

M - Scan EPCs   The M command starts the scanning of the EPC transponders located in the read area of the activated antenna.

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]	**Exten-sions**	**EPC**	**Trans-ponder error code**	**Number N data words**	**Data words**
m	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:
>> 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
      2500000000000000000000000
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
```

W - Write EPC code   The W command starts the writing of the EPC of a present EPC transponder. Only one EPC transponder may 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				**Response of the EPC transponder** [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 the EPC code which was previously programmed as a response.

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

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** [1]	**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 having the same EPC code with a new EPC code

>> UWZ01060B0C090A070805060304010200000000010200000000601020304 05060708090A0B0C
<< uwz000000101060B0C090A070805060304010200

Control reading:
>> M01
<< m0000001
01060B0C090A0708050603040102
→ EPC: 0201040306050807 0A090C0B

>> M01
<< m0000001
01060102030405060708090A0B0C
01060102030405060708090A0B0C
01060102030405060708090A0B0C

→ EPC: 0C0B0A090807060504030201
→ EPC: 0C0B0A090807060504030201
→ EPC: 0C0B0A090807060504030201

>> UWZ010601020304050607080 90A0B0C00000000010200000006 112233445566778899AABBCC
<< uwz0000001010601020304050 60708090A0B0C00

>> M01
<< m0000001
0106BBCC99AA7788556633441122
01060102030405060708090A0B0C
01060102030405060708090A0B0C

>> UWZ010601020304050607080 90A0B0C0000000001020000000611 2233445566778899AABBCC
<< uwz0000001010601020304050 60708090A0B0C00

>> UWZ010601020304050607080 90A0B0C00000000010200000006112 233445566778899AABBCC

<< uwz0000001010601020304050 60708090A0B0C00
>> UWZ010601020304050607080 90A0B0C0000000001020000000611 2233445566778899AABBCC

<< uwz0000A

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

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
\>> M01
<< m00000010106670488EC41381FAC63FB0530
\>> UWZ0106670488EC41381FAC63FB0530000000000000000000000004FEFEFEFEFEFEFEFE
<< uwz00000010106670488EC41381FAC63FB053000
Kill password and access word written
→ Payload 0x0C0300; Permalock=1

\>> ULZ0106670488EC41381FAC63FB0530FEFEFEFE00030C
<< ulz0000001010601020304050 0683D4A960D3000
Since Permalock was set, the Kill password cannot be read or written after the locking process!

\>> UWZ0106670488EC41381FAC63FB0530000000000000000000000002FEFEFEFE
<< uwz0000001010601020304050 0683D4A960D3084
Kill password can no longer be written!

F - Query parameters   The F command is used to query individual parameters (➜ Parameter) 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 are 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 no parameter number is 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:
15.09.2011 09:44:31 Info: Send Message: F062
15.09.2011 09:44:31 Info: Message Stream Sent: 53 30 34 46 30 36 32 0D
15.09.2011 09:44:31 Info: Message Stream Received: 53 30 36 66 30 36 32 33 36 0D
15.09.2011 09:44:31 Info: Received Message: f06236
→ Query of the temperature of the processor value 0x36 equals 54 °C

P - Set parameter The P command sets the individual parameter values (➜ Parameter) of the device. After successfully setting a parameter, the device sends a confirmation or carries out a reset (depending on the parameter).

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

Example:

Reader 0; Parameter 04; Value 0x32 (50 dec.)

>> p00432

<< p0

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

Example:

Set output:

18.08.2011 12:56:02 Info: Send Message: N0

18.08.2011 12:56:02 Info: Message Stream Sent: 53 30 32 4E 30 0D

18.08.2011 12:56:17 Info: Reader Response Timeout - No communication with RFID reader!

→ after a reset, all outputs are off

O - Set output The O command changes the status of the corresponding output. To keep the current status of an output, use value 3 - keep status.

The outputs can always be set, irrespective of whether the corresponding I/O has been configured as input or output.

Host → reader						
CMD	**Reader ID**	**Head ID**	**Output state**			
			Buzzer	**Green LED**	**Yellow LED**	**Red LED**
O	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

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

Output state:
LED 1 -> red LED
LED 2 -> green LED
LED 3 -> yellow LED

Example:
18.08.2011 12:56:20 Info: Send Message: O013333
18.08.2011 12:56:20 Info: Message Stream Sent: 53 30 37 4F 30 31 33 33 33 33 0D
18.08.2011 12:56:20 Info: Message Stream Received: 53 30 33 6F 30 31 0D
18.08.2011 12:56:20 Info: Received Message: o01
→ everything remains off and unchanged

18.08.2011 12:56:38 Info: Send Message: O010123
18.08.2011 12:56:38 Info: Message Stream Sent: 53 30 37 4F 30 31 30 31 32 33 0D
18.08.2011 12:56:38 Info: Message Stream Received: 53 30 33 6F 30 31 0D
18.08.2011 12:56:38 Info: Received Message: o01
→ Buzzer off, green LED on, yellow LED flashes, red LED remains off

18.08.2011 12:56:56 Info: Send Message: O011331

18.08.2011 12:56:56 Info: Message Stream Sent: 53 30 37 4F 30 31 31 33 33 31 0D

18.08.2011 12:56:56 Info: Message Stream Received: 53 30 33 6F 30 31 0D

18.08.2011 12:56:56 Info: Received Message: o01

→ Buzzer on, green LED remains on, yellow LED keeps flashing, red LED on

18.08.2011 12:57:17 Info: Send Message: O010111

18.08.2011 12:57:17 Info: Message Stream Sent: 53 30 37 4F 30 31 30 31 31 31 0D

18.08.2011 12:57:17 Info: Message Stream Received: 53 30 33 6F 30 31 0D

18.08.2011 12:57:17 Info: Received Message: o01

→ Buzzer off, all LEDs on

E - Error message   If an error occurs, the device sends an error message with a corresponding error code.

This message must be confirmed by the host (depending on device setting parameter 12).

Reader → host		
CMD	**Reader ID**	**Error ID**
E	1 byte	1 byte

Host → reader	
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:
15.09.2011 09:47:31 Info: Send Message: H0
15.09.2011 09:47:31 Info: Message Stream Sent: 53 30 32 48 30 0D
15.09.2011 09:47:31 Info: Message Stream Received: 53 30 41 68 30 31 32 33 34 30 30 30 30 0D
15.09.2011 09:47:31 Info: Received Message: h012340000

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**
v	1 byte	16 bytes

The 8 characters for the software version are described by 16 ASCII characters. Each of the 8 characters is shown in HEX format, represented by 2 ASCII characters.

Example:
15.09.2011 09:48:54 Info: Send Message: V0
15.09.2011 09:48:54 Info: Message Stream Sent: 53 30 32 56 30 0D
15.09.2011 09:48:55 Info: Message Stream Received: 53 31 32 76 30 35 35 34 36 33 38 33 30 35 36 33 31 32 45 33 31 0D
15.09.2011 09:48:55 Info: Received Message: v05546383056312E31
→ Version "UF80V1.1"

K - Polling If the reader is in polling mode, the surrounding area of the antenna is scanned for transponders (inventory). Each of the EPCs of the detected transponders are sent to the host in an individual K message. The device can process up to 9 EPCs at the same time.

Reader → host			
CMD	**Reader ID**	**Head ID**	**List of EPCs**
K	1 byte	1 byte	1 - 120 bytes

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

Example:

>> K0101CCBBAA998877665544332211

<< k01

UFD - Query DHCP Enabled This command queries the network setting "DHCP Enabled".

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

Reader → host		
CMD	**Reader ID**	**DHCP**
ufd	1 byte	1 byte

Example:
>> UFD0
<< ufd00
DHCP: "0" → DHCP is not activated

Default value: "1" DHCP enabled

UPD - Set DHCP Enabled   This command sets the network setting "DHCP Enabled".

Host → reader		
CMD	**Reader ID**	**DHCP**
UPD	1 byte	1 byte

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

Example: activate DHCP
>> UPD01
<< upd0

Example: deactivate DHCP
>> UPD00
<< upd0

UFI - Query network settings   This command queries the network settings (IP, subnet and gateway address).

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

Reader → host				
CMD	**Reader ID**	**IP-ADR**	**SUB-ADR**	**GW-ADR**
ufi	1 byte	8 bytes	8 bytes	8 bytes

Example:
>> UFI0
<< ufi00A49FE4EFFFFFE000A49FEFE
IP   0A49FE4E
Sub   FFFFFE0
GW   0A49FEFE

IP address   "0A49FE4E" corresponds to 10.73.254.78
Subnet address   "FFFFFE00" corresponds to 255.255.254.0
Gateway address "0A49FEFE" corresponds to 10.73.254.254

UPI - Set network settings This command sets the network settings (IP, subnet and gateway address).

Host → reader				
CMD	**Reader ID**	**IP-ADR**	**SUB-ADR**	**GW-ADR**
UPI	1 byte	8 bytes	8 bytes	8 bytes

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

Example:

IP   0A49FE4E

Sub   FFFFFE0

GW   0A49FEFE

\>> UPI00A49FE4EFFFFFE000A49FEFE

<< upi0

UFN - Query host name

This command queries the network setting "Host name". With the host name, the reader receives an identifier and can therefore be identified in the network more easily.

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

Reader → host		
CMD	**Reader ID**	**Host name**
ufn	1 byte	2 - 30 bytes

Example:
>> UFN0
<< ufn055463830

Host name   "55463830" corresponds to "UF80"

UPN - Set host name
This command sets the network setting "Host name". With the host name, the reader receives an identifier and can therefore be identified in the network more easily.

Host → reader		
CMD	**Reader ID**	**Host name**
UPN	1 byte	2 - 30 bytes

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

Example:
>> UPN0554638305F31
<< upn0

7.2.4   Parameter

No. (dec.)	No. (hex)	Parameter name
4	0x04	➜ Delay time
6	0x06	➜ MaxRepeat
11	0x0B	➜ Reader ID
12	0x0C	➜ Acknowledgment error message
16	0x10	➜ Attenuation of transmission output
39	0x27	➜ Polling frequency
43	0x2B	➜ Polling fallout
47	0x2F	➜ Polling mode
48	0x30	➜ Buzzer delay
50	0x32	➜ Buzzer volume
64	0x40	➜ Support configuration transponder
65	0x41	➜ Result code start procedure (read only)
66	0x42	➜ MaxRepeat scan configuration transponder
98	0x62	➜ Query temperature of the processor (read only)
99	0x63	➜ Default parameter
118	0x76	➜ Extended result flag
123	0x7B	➜ Fine version (read only)
158	0x9E	➜ Tag comm initial Q
162	0xA2	➜ UHF asic parameter Tx driver current (register 0x0B)
163	0xA3	➜ UHF asic parameter Rx gain
176	0xB0	➜ TCP keep alive

Parameter 4 (0x04)

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 (MaxRepeat).

0x0A - 0xFA (0.1 s) $\rightarrow$ 1 - 25 s

Default: 0x32

Parameter 6 (0x06)

MaxRepeat

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.

0x00 - 0x1F

Default: 0x03

Parameter 11 (0x0B)

Reader ID

This parameter defines the address of the device in the ASC-I1 protocol. We recommend keeping the default setting since the module can be identified via the hardware interface.

0x00 - 0x0E

Default: 0x00

Parameter 12 (0x0C)

Acknowledgment error message

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

0x00 - no confirmation is expected
0x01 - a confirmation is expected

Default: 0x01

Parameter 16 (0x10)

Attenuation of transmission output

This parameter defines the attenuation of the transmission output in dBm.

Attenuation 0x00 -> 26.5 dBm = approx. 450 mW
Attenuation 0x0A -> 26.5 dBm - 10 dBm = approx. 50 mW
Attenuation 0x13 -> 26.5 dBm - 19 dBm = approx. 4 mW

Default: 0x13

**Parameter 39
(0x27)**

Polling frequency

When polling, the reader scans the set transponder type. All detected transponders are read out via the set communication port (see K command). If the parameter is set to zero, there is no polling.

0x00 - 0xFF (5 ms steps)

Default: 0x00

**Parameter 43
(0x2B)**

Polling fallout

This number indicates the number of times a transponder is not read in succession when polling before it is considered "not detected". Only transponders that are not detected are reported to the host during another read operation that is successful.

0x00 - 0xFF

Default: 0x03

**Parameter 47
(0x2F)**

Polling mode

Bit 0 (0x01)	If this bit is set, the buzzer is turned on after a successful read operation.
Bit 1 (0x02)	not used
Bit 2 (0x04)	not used
Bit 3 (0x08)	not used
Bit 4 (0x10)	If the inventory has been successful, the EPC is read out.
Bit 5 (0x20)	not used
Bit 6 (0x40)	not used
Bit 7 (0x80)	not used

Default: 0x11

**Parameter 48
(0x30)**

Buzzer delay

This parameter defines the minimum amount of time the buzzer remains on.

0x00 - 0xFF (factor 50 ms)

Default: 0x32

**Parameter 50
(0x32)**

Buzzer volume

0x00 ... off
0x01 ... volume 1
0x02 ... volume 2
0x03 ... volume 3

Default: 0x01

**Parameter 64
(0x40)**

Support configuration transponder

When the reader is started, a configuration transponder can be read and the reader can then be configured correspondingly.

0x00 … Just like conventional transponders, configuration transponders are displayed at the host during read operations and not analyzed when the reader is started.

0x01 … The configuration transponder is filtered out during read operations and not reported to the superordinate host. The configuration transponder is not analyzed when the reader is started.

0x02 … The configuration transponder is not filtered out during read operations and is reported to the superordinate host. The configuration transponder is analyzed when the reader is started.

0x03 … The configuration transponder is filtered out during read operations and not reported to the superordinate host. The configuration transponder is analyzed when the reader is started.

Default: 0x00

**Parameter 65
(0x41)**

Result code start procedure (read only)

The parameter 0x41 can only be read out and provides information as to how the start procedure went with regard to the configuration transponder.

0x00 … The start procedure of the reader has not been completed yet.

0x01 … The configuration transponder was not analyzed when the reader was started

0x02 … No configuration transponder could be read.

0x03 … Several configuration transponders could be read.

0x04 … A data range of the configuration transponder could not be read.

0x05 … The configuration transponder could be read and the device settings were up to date.

0x06 … The configuration transponder could be read and the device settings were adapted.

0x07 … Due to invalid configuration data, the configuration transponder with the up-to-date device setting was successfully written on.

0x08 … Due to invalid configuration data, it was attempted to adapt the configuration transponder with the up-to-date device settings, which failed.

Default: -

Parameter 66 (0x42)

MaxRepeat scan configuration transponder

The parameter determines the number of times a successful read operation of the configuration transponder has to be repeated during the start procedure, before its settings are analyzed.

0x00 … Not necessary to repeat the read operation, it is sufficient to read the configuration transponder once.

0x01 - 0x0A … 1 to 10 successful repetitions of the read operation are necessary

Default: 0x02

Parameter 98 (0x62)

Query temperature of the processor (read only)

This value can only be queried and provides the current temperature of the processor in °C (signed byte value).

Parameter 99 (0x63)

Default parameter

This parameter is used to reset the reader to its default parameters.

Default: 0x00

Parameter 118 (0x76)

Extended result flag

This value determines which data of a detected transponder are also displayed.

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

Default: 0x01 (antenna port only)

Parameter 123 (0x7B)

Fine version (read only)

This parameter specifies the fine version of the software version.

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 162 (0x02)

UHF asic parameter Tx driver current (register 0x0B)

Sets the reader ASIC parameter "Tx driver current".

Values: 0x00 (low), 0x01 (mid), 0x02 (high)

Default: 0x02 (high)

**Parameter 163
(0x00)**

UHF asic parameter Rx gain

Sets the reader ASIC parameter "Rx gain".

Value	Register 0x05	Register 0x0A	Register 0x0B
0x00 (decrease)	0x05	0x01	0x02
0x01 (low)	0x85	0x41	0x01
0x02 (mid)	0x85	0x81	0x01
0x03 (high)	0x85	0xC1	0x01

Default: 0x00 (decrease)

**Parameter 176
(0xB0)**

TCP keep alive

This parameter defines the time span – in steps of 10 s – in which the reader checks an existing Ethernet connection to the host.

At a value of 0x00, a TCP keep alive check is deactivated.

Default: 0x06 (60 s)

7.3 Additional information

IMPORTANT

Never expose the device to extreme temperature fluctuations since otherwise condensation 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 LEDs
- ➔ Reader does not respond
- ➔ Reset
- ➔ Power cut
- ➔ SCT configuration transponder
- ➔ Software releases
- ➔ Customer service

8.1 General remarks

Refer to manual

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) when contacting the manufacturer!

Service and Troubleshooting

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 of 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 damage. 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.

Service and Troubleshooting

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 LEDs

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 Ethernet cable is undamaged and correctly connected to both reader and host!

- ➲ Check the status as indicated by the LED!

- ➲ 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!

Service and Troubleshooting

8.7   Reset

- In the case of a malfunction, a hardware reset can be performed by briefly interrupting the power supply.

- During the reset, a self-test is performed, and the red, yellow and green LED light up briefly.

- If the configuration transponder is activated, a read operation of the configuration transponder is then initiated and the result is shown accordingly via the three LEDs.

- At the end of the reset procedure, the buzzer makes a brief sound.

8.8   Power cut

After a power cut, the reader performs a self-test (see ➔ Reset).

8.9   SCT configuration transponder

Devices from software version UF80V1.1 support a stationary SCT configuration transponder, which is connected to the cover plate. This variant is available as an option.

If the support of the configuration transponder is activated via parameter 0x40 (see ➔ Parameter 64 (0x40)), the configuration transponder is read out at the end of a reset procedure. If the read operation of the configuration transponder was valid, the device is set according to the data of the configuration transponder. This may result in a flash update of the reader. If, however, a configuration transponder that contains invalid data was detected, the data are transferred from the reader to the configuration transponder. At the end of the transfer, the configuration transponder is marked as valid. As regards the support of the configuration transponder, the configuration transponder may also be updated in case of a subsequent parameterization of the device e.g. via a command. This depends on whether the parameter to be set is also contained in the configuration transponder. After the start procedure of the reader has been completed, the three LEDs on the top of the device show the course of the start procedure for 5 seconds, and the device can then be used in a normal way. Furthermore, a query of parameter 0x41 can at any time provide information as to the course of the last start procedure of the reader. Refer to the description of parameter 0x41 (see ➔ Parameter 65 (0x41)).

Flashing pattern parameter 0x41

0x01 … The configuration transponder was not analyzed when the reader was started.
LED pattern: yellow LED flashes with 5 Hz

0x02 … No configuration transponder could be read.
LED pattern: red LED flashes with 1 Hz

0x03 … Several configuration transponders could be read.
LED pattern: red LED flashes with 1 Hz

0x04 … A data range of the configuration transponder could not be read.
LED pattern: red LED flashes with 1 Hz

0x05 … The configuration transponder could be read and the device settings were up to date.
LED pattern: green LED flashes with 5 Hz

0x06 … The configuration transponder could be read and the device settings were adapted.
LED pattern: green LED on permanently and yellow LED flashes with 1 Hz

0x07 … Due to invalid configuration data, the configuration transponder with the up-to-date device setting was successfully written on.
LED pattern: green LED on permanently and yellow LED flashes with 5 Hz

0x08 … Due to invalid configuration data, it was attempted to adapt the configuration transponder with the up-to-date device setting, which failed.
LED pattern: red LED flashes with 5 Hz

At the present time, only the stationary configuration transponder V0 is supported, which contains the following settings:

IP address, subnet address, gateway address, DHCP and buzzer volume

8.10 Software releases

ETSI

Release date	Version	Description
May 2011	UF80V1.0	First version
August 2011	UF80V1.1	Additional commands implemented Support configuration transponder

FCC

Release date	Version	Description
June 2012	UF80U1.0	First version

8.11 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):

USA 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 housing and dispose of them as follows:

- the housing as scrap metal
- the electronic components, antennas and cables as electronic waste

11 Accessories

This chapter gives you an overview of the following topics:

- ➜ Cables
- ➜ Power supply

11.1 Cables

Type	Part number	Figure
Cable for Ethernet connection (Cable length: 2,000 mm)	EKC5-20-SM12D-RJ45	

11.2 Power supply

Type	Part number	Figure
Power supply 24 V, 0.33 A (IN: 100-240 V OUT: 24 V / 0.33 A)	SVG0,3	

Number of data words 39

O
O - Set output 52
Output state 39

P
P - Set parameter 50
Parameter 11 - Reader ID 65
Parameter 118 - Extended result flag 68
Parameter 12 - Acknowledgment error message 65
Parameter 123 - Fine version 68
Parameter 158 - Tag comm initial Q 68
Parameter 16 - Attenuation of transmission output 65
Parameter 162 - UHF asic parameter Tx driver current 68
Parameter 163 - UHF asci parameter Rx gain 69
Parameter 176 - TCP keep alive 69
Parameter 39 - Polling frequency 66
Parameter 4 - Delay time 65
Parameter 43 - Polling fallout 66
Parameter 47 - Polling mode 66
Parameter 48 - Buzzer delay 66
Parameter 50 - Buzzer volume 66
Parameter 6 - MaxRepeat 65
Parameter 64 - Support configuration transponder 67
Parameter 65 - Result code start procedure 67
Parameter 66 - MaxRepeat scan configuration transponder 68
Parameter 98 - Query temperature of the processor 68
Parameter 99 - Default parameter 68
Parameter no. 39
Parameter value 39
Power supply 28
Prohibition symbols 15

R
Reader ID 40
Relative humidity 24
Response code 40
Result 40

S
Safety instructions 14
Safety symbols 14
Serial number 40
Software version 41

T
Temperature 24
Transponder error code 41