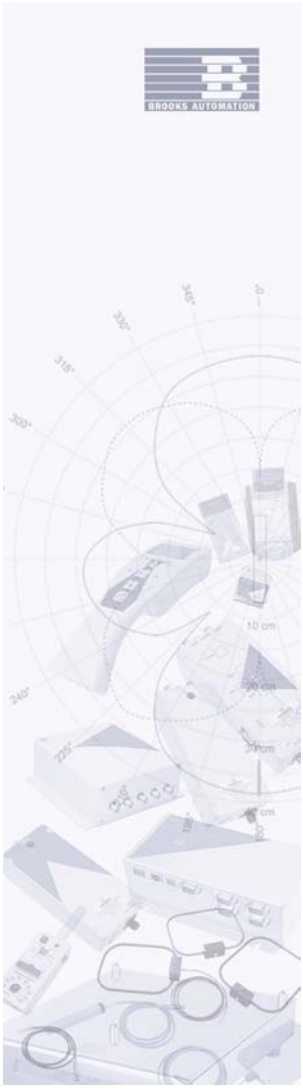

User Manual

HF20 USB-Reader

ASC-I1

ID090001
Rev 01-2009

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Subject to modifications

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1 INTRODUCTION

1.1 About this Device

The BROOKS HF transponder reader is a 13.56 MHz high-frequency identification system that uses FM transmission.

The basic item is a transponder that works as a forgery-proof electronic identity disk.

The reading unit of the system sends an energy impulse via the antenna. The capacitor of the passive, battery-free transponder is charged by this impulse. After that, the transponder returns a signal with the stored data.

As a sight connection between the transponder and the reader is not absolutely necessary, the transponder can also be identified through non-metallic material.

The BROOKS HF transponder reader is a device to read and write to ISO 15693 transponders, to Philips SLI ISO tags, to Philips I-Code and to Philips EPC ICS10 and ICS11 Labels.

2 SAFETY INSTRUCTIONS

This product is manufactured in accordance with state of the art technology and corresponds to recognized safety regulations. Nevertheless, there are dangers associated with the use of the equipment even for its intended purpose. You should therefore read the following safety information carefully and keep it in mind.

Only install and operate this equipment if it is in perfect condition and with reference to this manual. Do not use the equipment if it is damaged.

2.1 Symbols and Types Used in this Manual

	This symbol alerts you to dangerous voltage
	This symbol alerts you to important instructions
	This symbol indicates electromagnetic radiation
	This symbol alerts you to risk of explosion
	This symbol alerts you to risk of fire
	This symbol indicates important additional information
	Electrostatically sensitive components

`13:44:33`
`Incoming:`
`ENQ (05)`
	This type represents transmitted data display

2.2 General Safety Instructions

1 Read and understand all safety and operating instructions before installing and operating the device.

2 Keep these instructions. Store this manual in a place that can be accessed at any time by all persons involved in installing, operating and error handling the device.

3 Heed all warnings. Follow all warnings on the device and in the operating instructions.

4 Install in accordance with the manufacturer's instructions only.

5 People with hearing aids should remember that radio signals transmitted by the device might cause a very unpleasant buzzing noise in their hearing aids.

6 When replacement parts are required, use the replacement parts specified by the manufacturer only. Unauthorized substitutions may result in fire, electric shock, or other hazards.

2.3 Proper Use

This product was developed for reading and writing HF tags only. Any other use of this device would constitute abuse and would render the user’s authority to install and operate the device invalid.

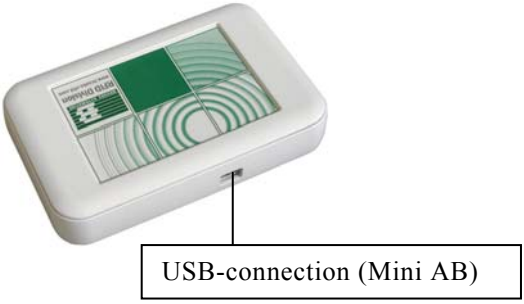
3 PRODUCT DESCRIPTION

3.1 Hardware

The device has an internal antenna. Optional the device is also available with external antenna plug.

Device with internal antenna:

THG-U1M-0C18-SM-0000

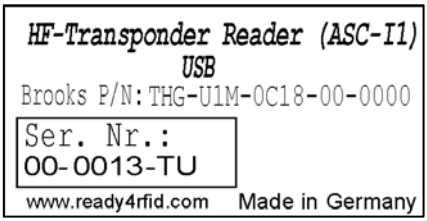


Device with external antenna plug (picture with Pad antenna)

THG-U1M-1C18-SM-0000

3.2 Labeling Information

The label contains the part number and the serial number of the device which is fixed in the reader firmware too.



3.3 Technical Data

Power Supply	Via USB interface
Current Consumption	Active Mode (read or write): 90mA Passive Mode: 40mA
Interface	USB
Operation temperature	-25 °C to 70°C
Storage temperature	-40°C to 85°C
Transmitter Frequency	13.56 MHz
RF-Power	250 mW, 50 Ohm
Dimensions (LxBxH)	107.8 x 68.1 x 21.9 mm
Weight	about 80 g

3.4 Warranty and Liability

The warranty period is 12 months and begins with the moment of delivery of the device as proved by an invoice or other documents.

The warranty includes the repair of all damages to the device that occur within the warranty period, and which are evidently caused by faults of the material or production defects.

The warranty does not include damages caused by incorrect connection, inappropriate handling and non-observance of the technical reports.

4 OPERATION

4.1 Protocol

Common notes:

- The protocol works with packages in ASCII format.
- The standard address according the protocol specification is 0.

After each message to the device a defined response message will be sent back (response message with data or an error message).

We recommend to wait for these response message before send the next message to the reader.

4.1.1 Content of Message

Each message package contains of a head, a message content and the end of the message.

Head	Message Data	End

4.1.2 Head

The contains of a start sign and the length of the message (2 signs).

Head		
Start	Length 1	Length 2

Start: Start sign (ASCII-sign ´S´)

Length 1: Highbyte message length (hexadecimal) - ASCII-signs ´0´..´F´

Length 2: Lowbyte message length (hexadecimal) - ASCII- sign ´0´..´F´

The message length contains the number of signs of the message.

4.1.3 Structure of messages

The message contains a command, a target or source address, the number of antenna head (always 1) and the message data.

Message			
Command	Address	Head	Information

Command: ASCII-sign (see chapter ‚Commands')

Address: Target or source address; ASCII signs '0'...'E' [1)]

Head: Optional – for message which can refer to an individual antenna port.

Information: Depends on the individual command. (contains 0 or more ASCII-signs '0'...'F')

[1)] On delivery the address is configured to ‚0'.

4.1.4 End of Message

The end of the message contains the end sign and 4 signs for the checksum.

End of message				
End sign	Checksum 1	Checksum 2	Checksum 3	Checksum 4

End sign: ASCII-sign no. 13 (hexadecimal 0x0D)

Checksum 1: highbyte – XOR logic over all data (head, information, end sign); ASCII '0'..'F'

Checksum 2: lowbyte – XOR logic over all data (head, information, end sign); ASCII '0'..'F'

Checksum 3: highbyte – addition of all data (head, information, end sign); ASCII '0'..'F'

Checksum 4: lowbyte – addition of all data (head, information, end sign); ASCII '0'..'F'

4.2 Commands

4.2.1 List of Commands

Command	Description
X	Read data
Y	Read data with UID
W	Write data
Z	Write data with UID
F	Request parameter
P	Set parameter
M	Scan for tags (defined tag type)
N	Perform reset
E	Error message
H	Heartbeat (request serial number)
V	Request software version
K	Tag event (card is in polling mode)
D	Destroy EPC Transponder
T	Scan all types of tags subsequently
CMA	Scan with AFI (Inventory)
CKA	Polling with AFI and DSFID Byte
CWA	Write AFI
CLA	Lock AFI
CWD	Write DSFID
CLD	Lock DSFID

4.2.2 Message Items

AFI	2 Byte

Application Family Identifier.

The AFI defines the application type.

The most significiant nibble defines the application family. The least significiant nibble defines the sub type within the application family.

Table 1 — AFI coding

AFI most significant nibble	AFI least significant nibble	Meaning VICCs respond from	Examples / note
'0'	'0'	All families and sub-families	No applicative preselection
X	'0'	All sub-families of family X	Wide applicative preselection
X	Y	Only the Yth sub-family of family X	
'0'	Y	Proprietary sub-family Y only	
'1'	'0', Y	Transport	Mass transit, Bus, Airline
'2'	'0', Y	Financial	IEP, Banking, Retail
'3'	'0', Y	Identification	Access control
'4'	'0', Y	Telecommunication	Public telephony, GSM
'5'	'0', Y	Medical	
'6'	'0', Y	Multimedia	Internet services
'7'	'0', Y	Gaming	
'8'	'0', Y	Data storage	Portable files
'9'	'0', Y	Item management	
'A'	'0', Y	Express parcels	
'B'	'0', Y	Postal services	
'C'	'0', Y	Airline bags	
'D'	'0', Y	RFU	
'E'	'0', Y	RFU	
'F'	'0', Y	RFU	

CMD	1 Byte

Command of the message. See table in chapter 4.2.1.

DSFID	2 Byte

Data Storage Format Identifier.
The DSFID byte can be used to define the data format on the tag. The DSFID byte can be programmed and locked.

Reader ID	1 Byte

Address of the device (0 .. E).

On delivery the card has address 0 by default.

Head ID	1 Byte

Number of antenna port (1). The USB-Reader has only 1 port.

Start Page	2 Bytes

Defines the first or only page for a read or write action. The both ASCII signs (2 bytes) define the page number of the tag in HEX format.

Example: page 1 → 0x01 → "01"
page 16 → 0x10 → "10"
page 25 → 0x19 → "19"

Length	2 Bytes

Defines the length of the data that should be read or written. The both ASCII signs (2 bytes) defines 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)

Data	1 – 100 Bytes

The data are interpreted in HEX format. That mean 2 ASCII signs define one byte tag data in HEX format.

Example:

Tag data in ASCII: "12345678" (8 Bytes)

Tag data in HEX: 0x31 0x32 0x33 0x34 0x 35 0x36 0x37 0x38

Data in the message: "3132333435363738" (16 ASCII signs)

UID	8 Byte

Represents the unique ID of the tag (ISO 15693). The UID is needed if there are more than one tags in the reading range of one antenna to identify the single tag.

Parameter No.	2 Bytes

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

Example: parameter 20 → 0x14 → "14"

Parameter Value	2 Bytes

Value of a parameter. Two ASCII signs (2 bytes) display the value of the parameter in HEX format.

Example: value 192 → 0xC0→ "C0"

List of UID's	1 – 120 Bytes

Is a list of UID's (ISO15693) of tags which were scanned by the reader. The list is shown by a string. Each UID has a length of 8 bytes. In this list each byte of the UID is displayed by two ASCII sign. That means the 8 bytes UID is displayed by 16 ASCII signs.

The first 2 signs of the string show the number of UID's in the list. These two signs display a Byte value in HEX format ('02' means 0x02).

Example: List with 2 UID's:

"02E0070000014CB966E0070000014CB967"
→ UID 1: 0xE0070000014CB966
→ UID 2: 0xE0070000014CB967

In case of an EPC-Transponder the list shows the 12 Byte EPC code.

List of UID's + DSFID	1 – xx Bytes

Is a list of UID's + DSFID Byte (ISO15693) of tags which were scanned by the reader. The list is shown by a string. Each UID/DSFID unit has a length of 9 Bytes. In this list each byte of the UID/DSFID is displayed by two ASCII signs. That means the 9 bytes UID (8 bytes) + DSFID (1 byte) were displayed by 18 ASCII signs.

The first 2 signs of the string show the number of units in the list. These two signs display a Byte value in HEX format (‚02' means 0x02).

Example: List with 2 tags:

"02E0070000014CB96600E0070000014CB96700"
→ Tag 1: 0xE0070000014CB96600
→ Tag 2: 0xE0070000014CB96700

Serial Number	4 Bytes

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

Response Code	4 Bytes

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

Software Version	16 Bytes

String of the software version of the reader. The display of the software version is in HEX format. That means the 16 bytes of the string represent the 8 byte software version string in HEX format.

Example:

v0**54524D4956483232**

→ **0x54 0x52 0x4D 0x49 0x56 0x48 0x32 0x32 = TRMIVH22**

4.2.3 X – Read Data

Command X starts the reading of a tag (regarding the defined type in parameter 32). If this command is used only one tag should be in the reading range of the antenna.

Is there no tag or more than one tag in the reading range of the antenna, the reader replies an error message (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	Start Page	Length
X	1 Byte	1 Byte	2 Bytes	2 Bytes

Reader → Host

CMD	Reader ID	Head ID	Start Page	Length	Data
X	1 Byte	1 Byte	2 Bytes	2 Bytes	1 – 100 Byte

Is there no tag in the reading range of the antenna the reader repeats the reading before an error message will be sent out. The number of repeats is defined in parameter 31 (r/w maxrepeat).

EPC-Transponders only!

Reading and writing of EPC-tags starts always with page 1. Other page numbers are invalid!

The structure of the data depends on the EPC-Type

EPC ICS10: 12 Byte EPC-Code and 2 Byte CRC
Length from 0x01 up to 0x0E

EPC ICS11: 12 Byte EPC-Code, 2 Byte CRC and 5 Byte UID
Length from 0x01 up to 0x13

4.2.4 Y – Read Data with UID

The command Y reads an individual tag of a group of tags (ISO 15693) which are in the reading range of the antenna. The individual tag will be identified by his UID.

Host → Reader

CMD	Reader ID	Head ID	Start Page	Length	UID (optional)							
Y	1 Byte	1 Byte	2 Bytes	2 Bytes	0	1	2	3	4	5	6	7

Reader → Host

CMD	Reader ID	Head ID	Start Page	Length	UID (optional)								Data
y	1 Byte	1 Byte	2 Bytes	2 Bytes	0	1	2	3	4	5	6	7	1 – 100 Bytes

This command is not supported by EPC-Transponders!

4.2.5 W – Write Data

The command W starts the writing to a tag (according type of tag defined in parameter 32). If this command is used only one tag should be in the reading range of the antenna.

Is there no tag or more than one tag in the reading range of the antenna, the reader replies an error message (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	Start Page	Length	Data
W	1 Byte	1 Byte	2 Bytes	2 Bytes	1 – 100 Bytes

Reader → Host

CMD	Reader ID	Head ID
w	1 Byte	1 Byte

Is there no tag in the reading range of the antenna the reader repeats the reading before an error message will be sent out. The number of repeats is defined in parameter 31 (r/w maxrepeat).

EPC-Transponders only!

Reading and writing of EPC-tags starts always with page 1. Other page numbers are invalid!

The structure of the data depends on the EPC-Type

EPC ICS10: 12 Byte EPC-Code and 3 Byte Destroy-Code

Length 0x0C or 0x0F

Attention: The EPC and the Destroy-Code can be written ***once*** only!

EPC ICS11: 12 Byte EPC-Code and 3 Byte Destroy-Code

Length 0x0C or 0x0F

Attention: The Destroy-Code can be written ***once*** only!

4.2.6 Z – Write Data with UID

The command Z writes data to an individual tag of a group of tags (ISO 15693) which are in the reading range of the antenna. The individual tag will be identified by his UID.

Host → Reader

CMD	Reader ID	Head ID	Start Page	Length	UID (optional)								Data
Z	1 Byte	1 Byte	2 Bytes	2 Bytes	0	1	2	3	4	5	6	7	1 – 100 Bytes

Reader → Host

CMD	Reader ID	Head ID
z	1 Byte	1 Byte

This command is not supported by EPC tags!

4.2.7 F – Request Parameter Value

The command F is used to request the value of an individual parameter of the device. The number of the parameter is sent in data item ‘parameter no.’. The response contains the number of the parameter and the value.

Host → Reader

CMD	Reader ID	Parameter No.
F	1 Byte	2 Byte

Reader → Host

CMD	Reader ID	Parameter No.	Parameter value
f	1 Byte	2 Bytes	2 Bytes

4.2.8 P – Set Parameter

Command P can be used to change the value of individual parameters. After successful changing of a parameter the device sends a confirmation message.

After changing the value of a parameter the reader has to perform a reset because of some parameters infect the hardware settings of the reader.

Host → Reader

CMD	Reader ID	Parameter No.	Parameter value
P	1 Byte	2 Bytes	2 Bytes

Reader → Host

CMD	Reader ID
p	1 Byte

4.2.9 Parameter

Parameter 1: (0x01) Baudrate

Transmission rate (not changeable at the moment)

192: **19200 Baud**

default: 192 (0xC0)

Parameter 4: (0x04) RS232 Delay Time

In case of no confirmation message from the host was received the device waits this time before a repeat message will be sent. The number of repeats is defined in parameter 6 (RS232 maxrepeat).

10 – 250 [0.1 s] → 1 – 25 sec.

default: 50 (0x32) (50 * 0.1s = 5s)

Parameter 6: (0x06) RS232 Maxrepeat

If the host sends no expected confirmation message the device repeats the message according the value of this parameter. After that an error message will be sent.

0 – 31

default: 3 (0x03)

Parameter 11: (0x0B) Reader ID

Defines the address of the reader in the ASC-I1 protocol. We recommend to remain the default value 0 because of the device can be identified by the COM port or the IP address.

0 .. E

default: 0 (0x00)

Parameter 12: (0x0C) Acknowledgment Error Message

Defines whether an error message has to be confirmed by the host or not.

0 – no confirmation expected
1 – confirmation expected

default: 1 (0x01)

Parameter 20: (0x14) Sensor activity

Attention! The inputs are not used for this device version!

The external inputs can activated/deactivated by this parameter.

0x00000000	all 5 inputs are deactivated
0x00000001	Input 1 is activated
0x00011111	all 5 inputs are activated

default: 0x00000111 (0x07) inputs 1 to 3 are activated

Parameter 21: (0x15) Sensordelay for sensor 1

Attention! The inputs are not used for this device version!

Delay time for the input signal before an action will be started.

1 .. 255 1/10 s

default: 2 (0x02) (2 * 0.1s = 0.2s)

Parameter 22: (0x16) Sensordelay for sensor 2

See parameter 21.

Parameter 23: (0x17) Sensordelay for sensor 3

See parameter 21.

Parameter 24: (0x18) Sensordelay for sensor 4

See parameter 21.

Parameter 25: (0x19) Sensordelay for sensor 5

See parameter 21.

Parameter 26: (0x1A) Watchport for sensor 1

Attention! The inputs are not used for this device version!

Activates/deactivates the report messages to the host in case of an external input was closed or opened.

To use this feature a sensor must be connected to the reader!

Bit 0: 0 – Report input open is disabled

1 – Report input open is enabled

Bit 1: 0 – Report input closed is disabled

1 – Report input closed is enabled

Bit 2: 0 – no sensor triggered inventory scan with result output via the output

1 – sensor triggered inventory scan with result output via the output

If an input has been triggered and Inventory will be done by the reader and its result will be shown by the proximate 2 outputs. The first proximate output shows if an Inventory was successfully done and the second proximate output will be activated if no tag was read.

Bit 3: 0 – If bit 2 = 1 → The outputs with the result of the inventory scan will be cleared if the input signal changes to OFF.

1 – If bit 2 = 1 → The outputs with the result of the inventory scan remain active until a new inventory scan is triggered by the input.

Bit 4: 0 – no sensor triggered UID scanning

1 – sensor triggered UID scanning

Bit 5: 0 – no sensor triggered reading of tag data

1 – sensor triggered reading of tag data

Bit 6: 0 – no confirmation from host expected

1 – confirmation from host is expected

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

1 – input signal is inverted

Note:

The sensor triggered scanning and reading at the same time is not supported by the reader.

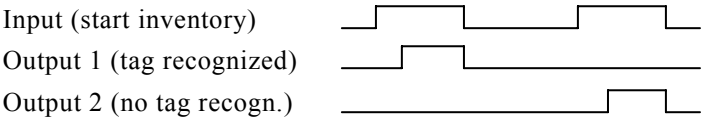
Input is normal(Bit 7) and no confirmation is expected (Bit 6):

0x00000000	no report message
0x00000001	report input was opened
0x00000010	report input was closed
0x00000011	report input was opened and input was closed

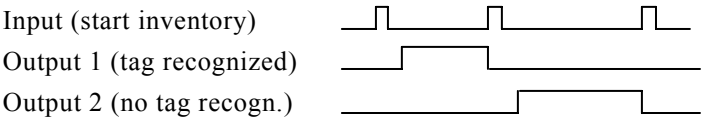
Input is inverted (Bit 7) and confirmation is expected (Bit 6):

0x11000000	no report message
0x11000001	report input was opened
0x11000010	report input was closed
0x11000011	report input was opened and input was closed

Bit 2 = 1 und Bit 3 = 0:



Bit 2 = 1 und Bit 3 = 1:



default: 0x00000011 (0x03)

Parameter 27: (0x1B) Watchport for sensor 2

See parameter 26.

Parameter 28: (0x1C) Watchport for sensor 3

See parameter 26.

Parameter 29: (0x1D) Watchport for sensor 4

See parameter 26.

Parameter 30: (0x1E) Watchport for sensor 5

See parameter 26.

Parameter 31: (0x1F) r/w maxrepeat

Defines the maximum number of read or write attempts in case of read or write error.

0 .. 5

default: 5 (0x05)

Parameter 32: (0x20) Transponder type

Defines the type of tag. The type is used in case of command X and W because of these commands do not use the UID to identify the type of the tag. Therefore the device has to know the type of tag before try to read or write. If a tag of another type supports the same messages like the defined type, the reader can read or write this tag too.

0x04	…	NXP SLI
0x05	…	Infineon tag
0x07	…	TI tag (Tag-it)
0xEF	…	ICODE1 Philips
0xFF	…	EPC Philips ICS10
0xFE	…	EPC Philips ICS11

default: 4 (0x04) (NXP SLI)

Parameter 33: (0x21) AutoReadPage

Attention! The inputs are not used for this device version!

Defines the start page of the data which should be read in the automatic read function (R – command).

0 - 255 page

default: 1 (0x01) (page 1)

Parameter 34: (0x22) AutoReadDataLength

Defines the length of the data which should be read in the automatic read function (R – command).

0 - 100 bytes

default: 0x08 (8 bytes)

Parameter 35: (0x23) AFI – Application Family Identifier

Defines the Application Family Identifier which is used for scanning with AFI (see parameter 36).

0 ... 255 (see item AFI)

default: 0x00 … no AFI defined

Parameter 36: (0x24) Advanced UID

Defines whether the reader is using the normal messages K and R or the extended messages CKA and CRA.
In case of CKA and CRA the AFI is used (if not 0).
Also the DSFID byte will be transmitted with the UID for each tag.

0 – messages K and R
1 – messages CKA and CKR

default: 0x00 – message K and R

Parameter 39: (0x27) Polling Frequency

On polling mode the reader scans permanently for tags of the defined tag type. All recognized tags will be reported through command K (see section ‚Commands').

0 – 255 (5ms)

default: 0 (0x00)

Parameter 40: (0x28) Polling Port

The parameter defines the antenna ports which should be used while polling and which polling mode.

Bit 0: antenna port 1
Bit 1: not used
Bit 2: not used
Bit 3: not used
Bit 4: not used
Bit 5: 1 - At the beginning of the polling the reader scans once for the type of the tag. Was there no valid tag type recognized the reader uses the type defined in parameter 'tag type'.
0 - The tag type defined in parameter ,tag type' is used for the polling.
Bit 6: 1 – Only new recognized tags will be reported to the host.
0 – All recognized tags will be reported to the host.

default: 0x61

Parameter 41: (0x29) EPC Delay time

Delay time for read and write action on an EPC tag. This time the antenna field must be active before the read or write action starts.

0 – 255 10ms

default: 10 (0x0A) (10 * 10ms = 100ms)

Parameter 42: (0x2A) EPC Scan Slots

If there are more than one EPC tags in the reading range it is better to use more time slots to avoid tag collisions. At this moment only one tag will be supported.

1,4,8,16,32 oder 64 slots

default: 1 (0x01)

Parameter 43: (0x2B) Polling Fallout

Defines, how often (scan cycles) an already recognized tag must be outside the reading range before he will send again to the host in case of recognized again in polling mode 0x40.

default: 3 (0x03)

Parameter 56: (0x38) Transmitter Delay

Time between the activation of the transmitter and the read or write action.

0 – 256 ms

default: 0 (0x00)

Parameter 57: (0x39) Modulation

It is possible to change the modulation of the HF module. We recommend to use the default value.

0 .. modulation 30%

1 .. modulation 100%

default: 1 (0x01)

4.2.10 M – Scan

Command M scans the surroundings of the antenna for tags. The response message contains a list of UID'S of all recognized tags.

Host → Reader

CMD	Reader ID	Head ID
M	1 Byte	1 Byte

Reader → Host

CMD	Reader ID	Head ID	List of UID's
m	1 Byte	1 Byte	1 - 120 Bytes

In case of EPC tags the 12 bytes EPC code will be submitted in the list.

Attention: The scanning depends on the setting of parameter 32. Value 0x05 or 0x07 scans ISO15693 tags, 0xFF scans EPC ICS 10 and 0xFE scans EPC ICS 11 tags.

4.2.11 N – Reset

The command N performs a reset of the reader hardware and software. After the reset the device sends a confirmation message.

Host → Reader

CMD	Reader ID
N	1 Byte

Reader → Host

CMD	Reader ID
n	1 Byte

After changing one or more parameters a reset should be performed because of some parameters affects hardware components which must be initialized.

4.2.12 E – Error Message

If an error occurs the device sends an error message with the corresponding error code to the host. This message must be confirmed by the host depending on the setting of parameter 12.

Host → Reader

CMD	Reader ID	Error ID
E	1 Byte	1 Byte

Reader → Host

CMD	Reader ID
e	1 Byte

Error-ID	Description
2	Read failed (reader is busy)
3	Write failed (reader is busy)
4	No tag – there is no tag in the reading range or wrong type
5	Invalid message content or wrong message length
6	Not specified error
7	Wrong Reader-ID
8	Checksum error
9	Unexpected confirmation
C	Wrong type of tag (see parameter 32)
E	Wrong Reader-ID
F	Wrong Head-ID

4.2.13 H – Heartbeat

The command H can be used to request 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 part of the protocol but is not used for this device. The response code is always ‘0000’.

4.2.14 V – Request Software Version

The command V requests 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 bytes of the software version will be displayed by 16 ASCII signs. Each of the 8 bytes is displayed in HEX formats and shown by 2 ASCII signs.

4.2.15 K – Polling

If the reader is in polling mode the reader scans the surrounding of the antenna for tags (inventory). In case of EPC tags the correct type must be set in parameter 32. A list of UID's respectively EPC codes of all recognized tags will be send to the host. The cycle time of these messages is defined in parameter 39.

Reader → Host

CMD	Reader ID	Head ID	List of UID's
K	1 Byte	1 Byte	1 - 120 Bytes

In case of EPC tags the 12 bytes EPC code is sent in the list.

4.2.16 D – Destroy

EPC tags can be destroyed permanently by using the D command. That means after that the tags can not be read.

EPC tag type Philips ICS10:

Host → Reader

CMD	Reader ID	Head ID	12 Byte EPC + 3 Byte Destroy-Code
D	1 Byte	1 Byte	15 Bytes

Reader → Host

CMD	Reader ID	Head ID
d	1 Byte	1 Byte

To use the ‚destroy' feature the Destroy code must be written to the tag first. The Destroy code can not be read. Only if the Destroy code in the command is the same as the Destroy code on the tag, the tag can be destroyed.

EPC tag Philips ICS11:

Host → Reader

CMD	Reader ID	Head ID	12 Byte EPC + 2 Byte CRC + 5 Byte UID + 3 Byte Destroy-Code
D	1 Byte	1 Byte	22 Bytes

Reader → Host

CMD	Reader ID	Head ID
d	1 Byte	1 Byte

The 2 bytes CRC and the 5 bytes UID can be read by command X. The calculation of the 2 bytes CRC is described by the data sheet of the tag.

To use the ‚destroy' feature the Destroy code must be written to the tag first. The Destroy code can not be read. Only if the Destroy code in the command is the same as the Destroy code on the tag, the tag can be destroyed.

4.2.17 T – Scan All Tags

The command T scans all types of tags subsequently. The response message contains a list of recognized tags as well as the type of the tags.

Host → Lesegerät

CMD	Reader ID	Head ID
T	1 Byte	1 Byte

Lesegerät → Host

CMD	Reader ID	Head ID	Number of UID's	List of UID's (2 Byte Type + UID or EPC-Code)
t	1 Byte	1 Byte	2 Bytes	1 - 120 Bytes

In case of EPC tags the 12 bytes EPC code will be submitted in the list.

4.2.18 CMA – Scan with AFI

Command CMA scans the surroundings of the antenna for tags. Only tags with the same AFI as defined in the message will be reported.

The response message contains a list of all recognized tags with the specified AFI, displayed by their UID + DSFID byte.

Host → Reader

CMD	Reader ID	Head ID	AFI
CMA	1 Byte	1 Byte	2 Byte

Reader → Host

CMD	Reader ID	Head ID	AFI	List of UID's+DSFID
cma	1 Byte	1 Byte	2 Byte	1 - 135 Bytes

4.2.19 CKA – Polling mit AFI und DSFID Byte

This command is used in case of parameter 0x24 has value 1.

If the reader is in polling mode (parameter 0x27 is not 0) the reader scans the surroundings of the antenna for tags (inventory). A list of UID's + DSFID Byte of all recognized tags will be sent to the host. The cycle time of these messages is defined in parameter 0x27. If the value of parameter 0x23 is not 0, only tags with the same AFI as defined in parameter 0x23 will be reported.

Reader → Host

CMD	Reader ID	Head ID	AFI	List of UID's + DSFID
CKA	1 Byte	1 Byte	2 Byte	Several Bytes

4.2.20 CWA – Write AFI

Command CWA writes an AFI value to a tag specified by his UID.

If there is no tag within the range of the antenna, the reader sends an error message (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	UID								AFI
CWA	1 Byte	1 Byte	0	1	2	3	4	5	6	7	2 Byte

Reader → Host

CMD	Reader ID	Head ID
cwa	1 Byte	1 Byte

If there is no tag within the range of the antenna, the reader repeats the writing of the AFI before an error message is sent. The number of repeat cycles is defined in parameter 31.

4.2.21 CLA – Lock AFI

Command CLA locks the AFI value on the tag specified by his UID.

If there is no tag in range of the antenna, the reader sends an error message to the host (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	UID							
CLA	1 Byte	1 Byte	0	1	2	3	4	5	6	7

Reader → Host

CMD	Reader ID	Head ID
cla	1 Byte	1 Byte

If there is no tag within the range of the antenna, the reader repeats the writing of the AFI before an error message is sent. The number of repeat cycles is defined in parameter 31.

4.2.22 CWD – Write DSFID

Command CWD writes the DSFID byte to a tag specified by his UID.

Is there no tag within the range of the antenna, the reader sends an error message (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	UID								DSFID
CWD	1 Byte	1 Byte	0	1	2	3	4	5	6	7	2 Byte

Reader → Host

CMD	Reader ID	Head ID
cwd	1 Byte	1 Byte

Is there no tag within the range of the antenna, the reader repeats the lock acktion of the AFI before an error message is sent. The number of repeat cycles is defined in parameter 31.

4.2.23 CLD – Lock DSFID

Command CLD locks the DSFID value on the tag specified by his UID.

Is there no tag in range of the antenna, the reader sends an error message to the host (error 4 – no tag).

Host → Reader

CMD	Reader ID	Head ID	UID							
CLD	1 Byte	1 Byte	0	1	2	3	4	5	6	7

Reader → Host

CMD	Reader ID	Head ID
cld	1 Byte	1 Byte

Is there no tag within the range of the antenna, the reader repeats the lock action of the AFI before an error message is sent. The number of repeat cycles is defined in parameter 31.

4.3 Message Examples

The following message examples show the message content without start sign, length and checksum.

X – Read data (ISO 15693)

reader 0; head 1; page 01; length 08

```
>> X010108
<< x0101084142434431323334
```

Data = "ABCD1234"

Y – Read data with UID (ISO 15693)

reader 0; head 1; page 01; length 08; UID E007000001706102

```
>> Y010108E007000001706102
<< y010108E00700000170610241424344313233 34
```

Data = "ABCD1234"

W – Write data (ISO 15693)

reader 0; head 1; page 01; length 08; Data = "ABCD1234"

```
>> W0101084142434431323334
<< w01
```

Z – Write data with UID (ISO 15693)

reader 0; head 1; page 01; length 08; UID E007000001706102

Data = "ABCD1234"

```
>> Z010108E00700000170610241424344313233 34
<< z01
```

F – Request parameter

reader 0; parameter 01

```
>> F001
<< f001C0
```

value: C0 (192 dec)

P – Set parameter

reader 0; parameter 01; value C0 (192 dec)

```
>> P001C0
<< p0
```

M – Scan (ISO15693)

reader 0; head 1 (parameter 32 is 0x05 or 0x07)

```
>> M01
<< m0104E0070000014CB966E0070000014CB967E
0070000014CB95AE0070000014CB95B
```

UID list: length 04

UID's: E0070000014CB966
E0070000014CB967
E0070000014CB95A
E0070000014CB95B

M – Scan (EPC ICS10)

reader 0; head 1; parameter 32 = 0xFF

```
>> M01
<< m0101210000000001A99217000310
```

EPC-Code list: length 01

EPC-Code: 210000000001A99217000310

E – Error message

error 4 – No Tag (no tag in reading range of antenna)

Command X to read a tag:

```
>> X010108
<< E04
>> e0
```

The error message must be confirmed by the host (depends on parameter 12).

V – Request software version

```
>> V0
```

```
<< v05249564543463130
```

Version: 5249564543463130 → „RIVECF10“

K – Polling-Mode (ISO15693)

Parameter 32 is 0x05 or 0x07

```
<< K0101E007000001CC78B3
<< K0101E007000001CC78B3
<< K0101E007000001CC78B3
<< K0101E007000001CC78B3
```

According the polling frequency (parameter 39) a list with the recognized tags will be sent to the host.

To scan for EPC tags the parameter 32 must be 0xFF for EPC ICS10 or 0xFE for EPC ICS11.

D – Destroy EPC tag

EPC ICS10 tag

```
<< D010F210000000001A99217000310FEFDFC
<< d01
```

EPC ICS11 tag

```
<< D011611112233445566778899AABB64E640001419ADFEFDFC
<< d01
```

T – Scan All Tags

Scan Tag Head 1

```
>> T01
<< t010205E00540000091A06EFF210000000001A99217000293
```

Length of list = 02

Type of tag 1= 05

UID of tag 1 = E00540000091A06E

Type of tag 2 = FF

UID of tag 2 = 210000000001A99217000293 (EPC-Code)

CKA – polling with AFI und DSFID

```
<< CKA010001E00401000058A39B22
```

UID: E00401000058A39B

DSFID: 0x22

5 SERVICE AND ERROR HANDLING

5.1 General

- ☞ **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 the contact information on page 48 of this manual). Have the serial number of the transponder reader ready as shown on the label (see page 10) when contacting the manufacturer.**

5.2 Software Releases

Release Date	Version	Description
12/2006	TRMIVH10	First Version.
09/2008	TRMIVH22	AFI and DSFID functionality implemented.

5.3 Customer Service

BROOKS Automation (Germany) GmbH
RFID Division
Gartenstraße 19
D-95490 Mistelgau
Germany
Tel: +49 9279 991 910
Fax: +49 9279 991 900
E-mail: rfid.support@brooks.com
24 hour technical support hotline (Brooks): +1 978 262 2900

6 TRANSPORTATION, DISPOSAL AND STORAGE

6.1 Transportation

For transportation purposes such as mailing, use a firm cardboard box. Use adequate padding material to protect the device on all sides.

6.2 Disposal

Do not throw the reader away with everyday household trash.

Dispose of the electronic components, antennas and cables as electronic trash.

6.3 Storage

Store the reader and its components in a clean and dry environment. Make sure the contacts remain clean. Observe the necessary storage conditions (for technical data, see page 10).