IDENTIFICATION

MANUAL

ID ISC.ANT.U500/270-DM (EU: 4923.000; FCC: 4922.000)

UHF DM (Direction Detection)

final – public (B)
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FEIG ELECTRONIC

Note

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With this edition of the document, all previous editions become void. Indications made in this manual may be changed without previous notice.

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General information's regarding this document

- The sign "☞" indicates extensions or changes of this manual compared with the former issue.
- If bits within one byte are filled with "-", these bit spaces are reserved for future extensions or for internal testing- and manufacturing-functions. These bit spaces must not be changed, as this may cause faulty operation of the reader.
- The following figure formats are used:
  0...9: for decimal figures
  0x00...0xFF: for hexadecimal figures,
  b0...1 for binary figures.
- The hexadecimal value in brackets "[ ]" marks a control byte (command).

Contents

1. Safety Instructions / Warning - Read before start-up !

- The device may only be used for the intended purpose designed by for the manufacturer.
- The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices which have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.
- Repairs may only be executed by the manufacturer.
- Installation, operation, and maintenance procedures should only be carried out by qualified personnel.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes .
- When working on devices the valid safety regulations must be observed.
- Special advice for carriers of cardiac pacemakers:

  Although this device doesn't exceed the valid limits for electromagnetic fields you should keep a minimum distance of 25 cm between the device and your cardiac pacemaker and not stay in an immediate proximity of the device respective the antenna for some time.

2. Revision History of Document

Revision	Date	Page	Description
0e	2017-10-20		Initial version

3. Abbreviations

ADR	Address
ASK	Amplitude Shift Keying
CB	Config Block
CFG	Configuration Parameter Block
CRC	Cyclic Redundancy Check
DB	Data Block
DIP	Dual Inline Plastic
DRM	Dense Reader Mode
FIFO	First in First out
frq	Frequency
FSK	Frequency Shift Keying
h	Hour
Hz	Hertz
ID	Identification
IDD	Identifier Data
IN	Input
LEN	Length
LOC	Location
LSB	Least Significant Byte
min	Minutes
ms	Milliseconds
MSB	Most Significant Byte
N	Number
OUT	Output
R/W	Read / Write Access
RD	Read
REL	Relay
RF	Radio Frequency
RSSI	Received Signal Strength Indicator
RTC	Real Time Clock
TAB	Table
TR	Transponder
TS	Timeslot
UID	Unique Identifier (read only Serial Number)
WO	Write Only Access
WR	Write

4. Introduction

4.1. The UHF Gate ID ISC.ANT.U500/270 - DM

The ID ISC.ANT.U500/270 – DM contains the ID ISC.LRU1002 Long Range Reader. The ID ISC.ANT.U500/270 – DM is a combined reader/ antenna UHF RFID system. The ID ISC.ANT.U500/270 – DM is able to detect the moving direction of a transponder. In comparison to the ID ISC.LRU1002 the ID ISC.ANT.U500/270 - DM has a total different firmware. On the one hand the ID ISC.ANT.U500/270 - DM has some new features which are not supported by the current ID ISC.LRU1002, on the other hand the ISC.ANT.U500/270 - DM does not support all features of the ID ISC.LRU1002. Therefore the system does not support all register settings which are known from the ID ISC.LRU1002. The new register settings of the ID ISC.ANT.U500/270 - DM can be found in Configuration 8.

The base set of commands and features are compatible with the commands used throughout the product line. The configuration possibilities of the ISC.ANT.U500/270 - DM make it easy to adapt the reader to a wide range of applications by software and hardware configurations.

The reader has two hardware interface ports: Ethernet and USB.

5. Data Transmission between ID ISC.ANT.U500/270-DM and Host

Four different ways of data transmission between ® Readers and host (terminal, PC) are possible. The, **Buffered Read Mode** and **Notification Mode** are used for the data exchange between Transponder and host, whereas the **Configuration Commands** and the **Reader Control Commands** serves for adapting the Reader parameters to the individual range of applications. The following chart shows which method of data transmission is supported by which interface:

	Interface	
	USB	**LAN**
Configuration Commands	√	√
Reader Control Commands	√	√
Buffered Read Mode	√	√
Notification Mode	-	√

5.1. Configuration Commands and Control Commands

This method of data transmission is used for Reader configuration and the diagnosis via the different Hardware Interfaces of the Reader.

The Reader-configuration parameters will be stored in the Reader memory. To store the current configuration during a power down of the Reader the Reader-Configuration has to be stored in the EEPROM. After power up the Reader reads the configuration out of the EEPROM.

The Reader control is immediately processed and the response from the Reader contains status or data information of the control command.

<table>
<tr><th>Host (Terminal / PC / ....)</th><th></th><th colspan="2">Reader</th></tr>
<tr><td rowspan="2">parameter- / control command</td><td rowspan="2">→</td><td colspan="2">parameter received and stored / control command processed</td></tr>
<tr><td>yes</td><td>no</td></tr>
<tr><td rowspan="2"></td><td>←</td><td>status / data</td><td rowspan="2">error status</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
</table>

5.2. Buffered Read Mode

The Buffered Read Mode is a high level operating mode to detect Transponders which are within the detection range of the Reader. This operation mode processes all Transponder read data and filter operations to make the user interface transparent to Transponder data and to minimize data transfers between Reader and host. There are only three commands used to control Buffered Read Mode.

In this operating mode the Reader automatically selects Transponders which are within the detection range of the Reader and reads their requested data. The read Transponder data is stored in a 'FIFO' organized data buffer.

The sampled Transponder data can be read with the 12.4. [0x22] Read Buffer command. This command always reads the first available data sets from the data buffer. However data already read have to be deleted with the 12.6. [0x32] Clear Data Buffer command before the next data sets in the data buffer can be reached with the read command.

If the Buffered Read Mode is enabled in the 7.2. CFG1: Interface and Mode configuration block the Reader immediately starts sampling Transponder data after power up. The Buffered Read Mode can be reinitialized with the 12.7. [0x33] Initialize Buffer command.

If turned to Buffered Read Mode the Reader answers every valid message with data- or status-protocol. The answer includes the control byte which has been received by the Reader.

<table>
<tr><th>Host (Terminal / PC / ....)</th><th></th><th colspan="2">Reader</th></tr>
<tr><td rowspan="4">read data</td><td rowspan="2">→</td><td colspan="2">Transponder data in data buffer?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>status /
data protocol</td><td>status = no valid data</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
<tr><td rowspan="4">clear data</td><td rowspan="2">→</td><td colspan="2">Transponder data read?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>OK status</td><td>status = no valid data</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
</table>

NOTE:

Only read operations are available with the Buffered Read Mode.

5.3. Notification Mode

The Notification Mode is an extended option of the Buffered Read Mode: queued Transponder data and optionally Input / Status events are notified automatically and asynchronously to a host with the 12. Protocols for Buffered Read Mode and Notification Mode response protocol. The destination address and the notification conditions can be set in 7.21. CFG49: Notification Channel configuration block. In general, the notification channel can be used simultaneously with the host interface.

In difference to the Buffered Read Mode procedure, a notification is normally not acknowledged by the host. Thus, the deletion of the transferred data with the 12.6. [0x32] Clear Data Buffer command is not necessary. As an option, the acknowledgement can be enabled to synchronize the notifications with the host to prevent notification overflow in the host application.

The notification message format depends and settings for the read mode in 7.9. CFG11: Read Mode – Read Data as well as settings for the notification trigger in7.21. CFG49: Notification Channel.

An additional option of the Notification Mode is the Keepalive message, which can be sent periodically to the host. The Keepalive message transports valuable information about the reader hardware and antenna tuning status. Keepalive messages are always never acknowledged by the host. The Keepalive message should not be mistaken with the keepalive option of a LAN connection initiated by a host.

6. Interface

The ID ISC.ANT.U500/270-DM has 2 interface ports. The protocol frame of these ports can be different. On the whole protocol frame is described in 6.2. Serial Data Format and Protocol Frames. The TCP/IP protocol frame is described below.

6.1. Characteristics of TCP/IP protocol

If the Reader uses the LAN interface the data is packaged in TCP/IP protocol frames. This means the whole data format and protocol frame which is described in 6.2. Serial Data Format and Protocol Frames is packaged as the data of TCP/IP protocol frames.

If you use the TCP/IP protocol please be aware that the data packaged in the TCP/IP frame is transferred with **Protocol frame: Advanced Protocol-Length** as describe below.

The LAN socket on the reader side uses the **keepalive option** for detecting interrupted connections. The default parameters for keepalive are initialized as listed in the table:

Parameter	Value	Note
idle time	5 seconds	The reader sends every 5 seconds a keepalive probe which has to be acknowledged by the client
repeat count	2	If a keepalive probe is not acknowledged, the reader repeats the probe only two times with an interval of 5 seconds.
interval	5 second	

If the 15 second time span is expired and no keepalive probe response is obtained from the client the connection is closed and the client application must enable a new connection. The keepalive parameters can be modified in the configuration pages for LAN. This keepalive option should not be mistake with the Keepalive message for notification mode.

6.2. Serial Data Format and Protocol Frames

The ID ISC.ANT.U500/270-DM can be configured by different interfaces and data may be written on Transponders or read from Transponders. The communication between Reader and connected host (terminal, PC, etc.) is executed by means of fixed protocols. The used protocol is intended for data bus use and is equipped with a bus address.

During data transfer via the asynchronous interface the Reader supplies the required data or a status byte. The reply contains the transmitted control byte.
There is no reply from the Reader if there is a protocol frame failure.

Protocol frame: Advanced Protocol-Length

Reader ← Host

1	2	3	4	5	(6...n-2)
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	CONTROL-BYTE	(DATA)

n-1	n
LSB CRC16	MSB CRC16

Host ← Reader

1	2	3	4	5	6	(7...n-2)
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	CONTROL-BYTE	STATUS[1]	(DATA)

n-1	n
LSB CRC16	MSB CRC16

NOTE:

The Reader supports the advanced protocol frame only.

STX:

The STX sign (0x02) defines that the protocol can be more than 255 Byte. The protocol length is defined by the 2 Byte Parameter ALENGTH.

ALENGTH (n = 8...65535):

Number of protocol bytes including STX, ALENGTH and CRC16

COM-ADR:

The device bus address has to be 0 or 255

[1] *see ANNEX C: Index of Status Bytes*

CONTROL-BYTE:

Defines the command which the Reader should operate.

STATUS:

Includes the status message or protocol data from or to the Reader.

DATA:

Is an optional data field with variable length. The number of DATA bytes depends on the command. The data will be sent always as MSB first if the Reader is in the Host Command Mode.

CRC16:

Cyclic redundancy check of the protocol bytes from 1 to n-2, as specified by CCITT-CRC16

Polynomial: $x^{16} + x^{12} + x^5 + 1$ (0x8408)

Start Value: 0xFFFF

Direction: Backward

6.3. CRC16 Calculation Algorithm

Polynomial: $x^{16} + x^{12} + x^5 + 1$ ⇒ CRC_POLYNOM = 0x8408;

Start Value: 0xFFFF ⇒ CRC_PRESET = 0xFFFF;

C-Example:

```
unsigned int crc = CRC_PRESET;

for (i = 0; i < cnt; i++)       /* cnt = number of protocol bytes without CRC */
{
        crc ^= DATA[i];
        for (j = 0; j < 8; j++)
        {
                if (crc & 0x0001)
                        crc = (crc >> 1) ^ CRC_POLYNOM;
                else
                        crc = (crc >> 1);
        }
}
```

7. Configuration Parameters

The configuration memory of the Reader is organized in configuration blocks of 16 byte each. These are divided into 14 byte configuration parameters and a 2 byte CRC16 checksum. Each of these configuration blocks takes a number (CFG 0...CFG n).

Structure of a configuration block in Reader configuration memory and Reader EEPROM (CFG):

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Contents	PARAMETER														CRC16	

The parameters are stored in two different configuration memory locations:

- Reader RAM
- Backup EEPROM (used for storing parameter over power down)

Multiple configuration memory locations can be addressed by the value of the parameter CFG-ADR.

CFG-ADR:

CFGn: memory-address of the required configuration block

LOC: specifies the location of the configuration block (RAM / EEPROM)

MODE: specifies one or all configuration blocks

Bit	7	6	5	4	3	2	1	0
Function	LOC	MODE	CFGn: address of configuration block					

The EEPROM configuration blocks are protected by a 16 bit CRC-checksum. The examination of these checksums is executed after each reset of the Reader. If a checksum error is found, the Reader goes into an error status "EE-Init-Mode" and sets the configuration block which is faulty to the default-values.

While the EE-Init-Mode is active, the LED blinks alternately red and green and the Reader answers external commands with the status "0x10 EEPROM Failure". The "EE-Init-Mode" can be exited now by a new reset (cold start or *9.2.* [0x64] System Reset command**).** If after this the checksums of all data records are correct, the Reader shifts to the configured operation mode.

NOTE:

Malfunctions may occur if parameters are configured outside their described range or if unspecified parameters have been changed!

A downgrade of the firmware will result in a complete reset of the EEPROM. All parameters will be reset to factory default.

Structure of configuration parameter description.

Byte	0	1	2	.....n
contents	RAM-eff.	EEPROM-eff.	00 res	.....

not marked

Changing of this parameter becomes immediately effective after writing / saving this configuration block to RAM

gray marked

Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a reset of the RF Controller with 9.2. [0x64] System Reset in mode 0x00.

marked with "00"

these bits or bytes are reserved for future extensions or for internal testing and manufacturing-functions. These bits or bytes and also any not described bits and bytes **must not be changed**, as this may cause faulty operation of the Reader.

7.1. CFG0: Passwords

The parameters of the CFG0 configuration block contain the identification codes to personalize the Reader for a user to prevent outside access to some features of the Reader. For security reasons the READER-ID (password) cannot be read from the host. Instead of the password, zeros are transmitted. Also the command 8.5. [0x83] Reset Configuration isn't available for this configuration block.

Byte	0	1	2	3	4	5	6
Contents	READER-ID				0x00	0x00	0x00
Default	0x00000000						

Byte	7	8	9	10	11	12	13
Contents	0x00	CFG_ACCESS				0x00	0x00
Default	0x00000000						

READER-ID: *(AccessProtection.Password)*

Defines the password with which the host logs into the Reader for a read / write access to the configuration parameter blocks.

CFG_ACCESS: (*AccessProtection.Lock_CFGX*)

Defines the Configuration blocks which are accessible only if the user has had a successful login to the Reader.

Byte	8								9							
Bit	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
CFG No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Byte	10								11							
Bit	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
CFG_NO.	16	17	18	19	20	21	22-29	30-39	40-49	50-59	60-62	63	-	-	-	-

CFG_NO

The Bit in CFG_NO defines if the access to the configuration block is free or if the use should login to the Reader to get access to the configuration block.

b0 ⇒ Access if free

b1⇒ Access need a login

NOTE:

A READER-ID = 0x00000000 disables the password function. CFG_ACCESS has to be 0x00000000

If the Reader ID is not set 0x00000000 the configuration page CFG0 is automatically read protected.

A read with the command 8.3. [0x80] Read Configuration will always get '0x00000000' for the READER-ID.

To change the READER-ID you must write to the CFG0 immediately after the Login to the Reader with the command 9.9. [0xA0] Reader-Login

A changed password becomes valid after a System Reset 9.2. [0x64] System Reset.

The commands 8.4. [0x81] Write Configuration and 8.5. [0x83] Reset Configuration don't change the CFG0 register if all configuration blocks are used. Also access protected Configuration Pages will not be influenced by these Commands.

The command 9.9. [0xA0] Reader-Login is used to enable configuration data access.

It is possible to disable the READER-ID with an activation code, if the READER-ID is unknown. The activation code must be ordered by your supplier or FEIG ELECTRONIC GmbH.

Config Protection

By means of Config Protection, the access to the configuration parameters stored within the Reader is protected by a 32-bit password, the "READER-ID". This means that only after a "Login" with a valid READER-ID the configuration parameters in the EEPROM of the Reader can be read and changed in the EEPROM of the Reader.

7.2. CFG1: Interface and Mode

The parameters of the configuration block CFG1 contain the data communication settings.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x01
Default							

Byte	7	8	9	10	11	12	13
Contents	0x2C	0x00	0x00	0x00	0x00	INTERFACE	READER - MODE
Default						0x94	0x80

INTERFACES: (*HostInterface.Interfaces*)

Flags for enabling the communication ports

Bit	7	6	5	4	3	2	1	0
Function	Discovery	-	-	USB	-	LAN		

LAN:

b0: disable

b1: enable

USB:

b0: disable

b1: enable

Discovery:

b0: disable

b1: enable

READER-MODE: (*OperatingMode.Mode*)

By means of this byte, the Reader mode can be defined.

	7	6	5	4	3	2	1	0
Function	BRM-E	NTF-E	0	0	0	0	0	0

BRM-E:

By setting of this bit the Buffered Read Mode can be enabled

b0: not used

b1: **BRM-Mode**

NTF-E:

By setting of this bit the Notification Mode can be enabled

b0: **Off**

b1: **On (only together with BRM-Mode)**

The following table lists the bit combinations for the reader modes:

		Bit							
		7	6	5	4	3	2	1	0
Reader Mode	Buffered Read Mode	**1**	0	0	0	0	0	0	0
	Notification Mode	**1**	**1**	0	0	0	0	0	0

7.3. CFG2: Inputs / Outputs

The parameters of configuration block CFG2 contain the digital-input and -output settings.

Byte	0	1	2	3	4	5	6
Contents	IDLE-MODE		ACTIVE-STATE		IN-ACTIVE	0x00	0x00
Default	0x2000		0x0000		0x00		

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	OUT2-Time
Default							0x00

IDLE-MODE: ***(DigitalIO.Output.NoX.IdleMode) x=2***

Defines the status of the signal emitters (OUT2) during the idle mode.

Bit	15	14	13	12	11	10	9	8
Function	reserved		OUT2 mode		reserved		reserved	

7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0

Mode	Function	
b01	ON	Signal emitter on
b10	OFF	Signal emitter off
b11	FLASH	signal emitter alternating on with 1Hz

ACTIVE-STATE: ***(DigitalIO.Output.NoX.ActiveState) x=2***

Allocates a flashing-frequency to each output when a transponder was read.

Bit	15	14	13	12	11	10	9	8
Function	reserved		OUT2 frq		reserved		reserved	

7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0

Bit combination	flashing frequency
b11	1 Hz
b10	2 Hz
b01	4 Hz
b00	No Flash (0 Hz)

IN-ACTIVE: ***(DigitalIO.Input.NoX.Mode)x=2***

Determines if the input is active with a closed or open contact:

Bit	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	IN2	-

b0: closed contact activates input

b1: open contact activates input

OUT2-TIME: ***(DigitalIO.Output.No2.SettlingTime)***

Defines the holding time of the digital output OUT2. If the Reader receives a valid Transponder response the antenna assigned to the output is activated for the value in OUT2-TIME.

If OUT2 -TIME is zero the function is disabled.

If OUT2 is high in idle mode, OUT2 will low for OUT2-TIME.

If the flash mode is enabled, the output goes low.

Range: 0x00 ... 0xFF (* 100ms) = 0s ... 25,6s.

NOTE:

Automated Reader Modes (reading of serial number and data):If the serial number was read OK and the data not, no data set will be transferred, but the assigned OUT2 will be active.

7.4. CFG3: RF-Interface

The parameters of the CFG3 configuration block contain global Transponder drivers and Reader settings.

Byte	0	1	2	3	4	5	6
Contents	0x0010		RF-POWER-ANT	REG	0x00	0x00	0x00
Default			0x17 0,8W	0x06 0x04			

Byte	7	8	9	10	11	12	13
Contents	0x00	FREQ_US		0x00	NR_PREFERRED_CHN	PREFERRED_CHN	
Default		0x0000			0x00	0x0000	

NOTE:

To operate an ISO 18000-6-C Transponder the EPC GEN2 driver needs to be enabled. This Firmware Function needs to be activated with an upgrade code first.

RF-POWER-ANT[2]**: (*AirInterface.Antenna.UHF.No1.OutputPower*)**

Defines the RF output power.

Bit	7	6	5	4	3	2	1	0
Function	0	0	LEVEL					

LEVEL

Level of the RF output power

LEVEL	RF-POWER [Watt]	RF-POWER [dBm]
0x10	0,1	20,0
0x11	0,2	23,0
0x12	0,3	24,8
0x13	0,4	26,0
0x14	0,5	27,0
0x15	0,6	27,8
0x16	0,7	28,5
0x17	0,8	29,0
0x18	0,9	29,5
0x19	1,0	30,0

NOTE:

The maximal output power for European Readers is 0,8W

The maximal output power for FCC Readers is 1,0W

If region = Morocco, the maximal output power is 0,5W.

[2] *A plausibility check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].*

REG: (*AirInterface.Region.UHF.Regulation*)

Defines the region specific behavior according to the RF regulations. For European Readers following regions are applicable:

REG	Name	Countries	Number of Channels	Frequency Band
0X06	Europe	Armenia	4	865 MHz – 868 MHz
		Austria		
		Azerbaijan		
		Belarus		
		Belgium		
		Bosnia Herzegovina		
		Bulgaria		
		Croatia		
		Cyprus		
		Czech Republic		
		Denmark		
		Estonia		
		Finland		
		France		
		Germany		
		Greece		
		Hungary		
		Iceland		
		Ireland		
		Italy		
		Latvia		
		Lithuania		
		Luxembourg		
		Macedonia		
		Malta		
		Moldova		
		Netherlands		
		Norway		
		Poland		
		Portugal		
		Romania		
		Serbia		
		Slovak Republic		

REG	Name	Countries	Number of Channels	Frequency Band
		Slovenia		
0x06	Europe	Spain	4	865 MHz – 868 MHz
		Sweden		
		Switzerland		
		Turkey		
		United Kingdom		
0x16	Asia / Oceania	Hong Kong	4	865 MHz – 868 MHz
		Iran		
		Jordan		
		Oman		
		Pakistan		
		Saudi Arabia		
		United Arab Emirates		
		New Zealand		
0x26	Russia	Russia	3	866 MHz – 868 MHz
0x36	Africa	Nigeria	4	865 MHz – 868 MHz
		South Africa		
		Tunisia		
0x46	India	India	3	865 MHz – 867 MHz
0x56	Morocco	Morocco	1	867,7 MHz or 867,9 MHz
0xFE	Unknown	All other countries	-	manually

NOTE:

If Region is [0xFE] Unknown EU please contact your supplier to setup the correct frequency configuration.

If Region is Europe only EU frequencies can be set

The region settings are not affected by the command [0x83] Reset.

For FCC Readers following regions are applicable:

REG	Name	Countries	Number of Channels	Frequency Band
0x04	America	Argentina Canada Chile Colombia Costa Rica Dominican Republic Mexico Panama Puerto Rico USA Uruguay 	50	902 MHz – 928 MHz
0x14	China	China	16	920,5 MHz – 924,5 MHz
0x24	Australia / New Zealand	Australia New Zealand	9	921,5 MHz – 926 MHz
0x34	Brazil	Brazil Peru	10 + 25	902 MHz – 907,5 MHz 915 MHz – 927,5 MHz
0x44	Israel	Israel	3	915 MHz – 916,8 MHz
0x54	Japan	Japan	4	916,7 MHz – 920,9 MHz
0x64	Malaysia	Malaysia	8	919 MHz -923 MHz
0xFF	Unknown	All other countries	-	manually

NOTE:

If Region is [0xFF] Unknown FCC please contact your supplier to setup the correct frequency configuration.

If Region is FCC only FCC frequencies can be set

The region is not affected by the command [0x83] Reset.

FREQ_US:
Defines the Reader specific frequency channel usage.

Byte	8								9							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Function	0	0	upper channel						0	0	lower channel					

upper/lower channel: **(*AirInterface.Region.UHF.FCC.Channel.UpperChannel*)**
(*AirInterface.Region.UHF.FCC.Channel.LowerChannel*)

Frequency which is used by the FCC Reader as upper and lower limit.

upper/lower channel	Frequency
1	902,75 MHz
2	903,25 MHz
3	903,75 MHz
...	
50	927,25 MHz

NOTE:

These settings are only applicable for FCC Readers.

These settings are only applicable if Region [0xFF] Unknown FCC is selected.

NR_PREFERRED_CHN: (*AirInterface.Region.UHF.EU.Channel.EN302208_4_ChannelPlan. PreferredChannels.NoOfChannels*)

Number of channels (1- 4) used by the European Reader.

NOTE:

These settings are only applicable for EU Readers

These settings are only applicable if Region [0xFE] Unknown EU is selected.

PREFERRED_CHN: (*AirInterface.Region.UHF.EU.Channel.EN302208_4_ChannelPlan.PreferredChannels.ChannelNoX*) *x=1-4*

Defines the preferred channels used by the European Reader.

Byte	12								13							
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Function	1. Pref Chn				2. Pref Chn				3. Pref Chn				4. Pref Chn			

NOTE:

These settings are only applicable for EU Readers.

These settings are only applicable if Region [0xFE] Unknown EU is selected.

7.5. CFG4 .. 5: Not used

This configuration is not used/ supported by ID ISC.ANT.U500/270 - DM

7.6. CFG6 .. 7: Reserved

The configuration blocks CFG6 to CFG8 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.7. CFG8: Read Mode – Miscellaneous Settings

The parameters of the CFG8 configuration block contain the special settings for the DM functionality. These are alarm sensitivity and the MISC register.

Byte	0	1	2	3	4	5	6
Contents	0x00	reserved		reserved		0x00	0x00
Default		0x0000		0x0000			

Byte	7	8	9	10	11	12	13
Contents	reserved	reserved	reserved	reserved	reserved	MISC	SENSITIVITY
Default	00	00	00	00	00	00	00

MISC:

Special settings

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	-	reserved		CREATE BLACKLIST	

CREATE BLACKLIST: **(*OperatingMode.BufferedReadMode.Miscellaneous.Blacklist)***

(*OperatingMode.NotificationMode.Miscellaneous.Blacklist)*

	Function
b 00	No Blacklist
b 01	-
b 11	Create Blacklist

For more information about the Blacklist and how to use it see document xxxx

SENSITIVITY: **(*OperatingMode.BufferedReadMode.Miscellaneous.DetectionSensitivity)***

(*OperatingMode.NotificationMode.Miscellaneous.DetectionSensitivity)*

Defines detectionsensitivity

Sensitivity	Function
0x00	Default
0x01	Minimal
0x02	Maximal
0xFF	Reserved

7.8. CFG10: Trigger

The configuration block contains parameters for the trigger configuration.

Byte	0	1	2	3	4	5	6
Contents	TRIGGER-MODE	TRIGGER-USE	0x00	0x00	TRIGGER_2-HOLD-TIME		0x00
Default	0x00	0x00			0x0005 500ms		

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	ACTION
Default							0x00

TRIGGER-MODE

defines the mode of the scanner.

Bit	7	6	5	4	3	2	1	0
Function	Trigger	0	Condi-tion	0	0	0	0	Unlimited Valid Time

Trigger: **(*OperatingMode.BufferedReadMode.Trigger.Enable*)**

(*OperatingMode.NotificationMode.Trigger.Enable*)

b0: Trigger disabled:
The Reader RF Power is on and the Reader scans all the time in BRM Mode.

b1: Trigger enabled:
The Reader start the RF Power and the scan, if the trigger is activated by the external switch.

NOTE:

If Trigger is enabled and not activated by the external switch, the RF-field will be switched off.

Condition: **(*OperatingMode.BufferedReadMode.Trigger.Condition*)**

(*OperatingMode.NotificationMode.Trigger.Condition*)

b0: Level Triggered:
RF Field will be switched on with the rising edge. Trigger Hold Time starts to run with the falling edge

b1: Edge Triggered
RF Field will be switched on with the rising edge. Trigger Hold Time starts to run with the rising edge.

Unlimited Valid Time:

(*OperatingMode.BufferedReadMode.Trigger.Enable_UnlimitTransponderValidTime*)

(*OperatingMode.NotificationMode.Trigger.Enable_UnlimitTransponderValidTime*)

b0: Valid Time is limited to one Trigger Period:
The Valid Time (s. CFG12) is restarted with each Trigger Period and thus not longer than one Trigger Period.

b1: Unlimited Valid Time:
The Valid Time (s. CFG12) is applicable for more than one Trigger Period.

TRIGGER-USE:

Defines the start trigger.

TRIGGER-USE

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	TU 2			

TU-x: **(*OperatingMode.BufferedReadMode.Trigger.Source.Input.NoX.TriggerUse*)**

(*OperatingMode.NotificationMode.Trigger.Source.Input.NoX.TriggerUse*)

X is the input which is used as a trigger (X=2)

b00 trigger not used

b01 trigger start the Reader operation

TRIGGER_X-HOLD-TIME: *x=2*

(OperatingMode.BufferedReadMode.Trigger.Source.Input.NoX.HoldTime)

(OperatingMode.NotificationMode.Trigger.Source.Input.NoX.HoldTime)

(1 ... 65535 * 100 ms = 100 ms ... 6553,5 sec)

The TRIGGER-HOLD-TIME defines the period in which the Reader performs inventory commands and holds the RF Power active.

NOTE:

The time the RF field stays on is depending on the combination of the Trigger Condition and the Hold Time

ACTION:

defines actions in trigger mode.

Bit	7	6	5	4	3	2	1	0
Function	0	0	0	0	NO_READ_ SIGNALIZATION			RF-OFF_AFTER _READ

RF-OFF_AFTER_READ:

(*OperatingMode.BufferedReadMode.Trigger.Enable_RF-OffAfterRead*)

(*OperatingMode.NotificationMode.Trigger. Enable_RF-OffAfterRead*)

Defines if the RF-Field is switched off after a read event

b0 disabled

b1 enabled

NO_READ_SIGNALIZATION:

(*OperatingMode.BufferedReadMode.Trigger.NoReadSignalization*)

(*OperatingMode.NotificationMode.Trigger.NoReadSignalization*)

Defines whether a signal emitter (OUT2) is activated if no transponder was detected.

b000 no signal emitter will be activated

b010 OUT2 will be activated

7.9. CFG11: Read Mode – Read Data

The parameters of the configuration block CFG11 contain Buffered Read Mode and settings. To enable Buffered Read Mode the BRM bit in the READER-MODE register of the configuration block 7.2. CFG1: Interface and Mode must be set.

Byte	0	1	2	3	4	5	6
Contents	TR-DATA-1[3]	TR-DATA-2	TR-DATA-3	BANK	DB-ADR[6]		0x00
Default	0x31	0x00	0x02	0x01	0x0000		

Byte	7	8	9	10	11	12	13
Contents	0x00	DB-N[4]		0x00	0x00	0x00	0x00
Default		0x0001					

TR-DATA-1:

Selects the data types for read operation.

Bit	7	6	5	4	3	2	1	0
Function	Exten-sion	DATE	TIMER		Byte Order DB	-	DB	SNR

SNR: **(*OperatingMode.BufferedReadMode.DataSelector.UID*)**
(*OperatingMode.NotificationMode.DataSelector.UID*)

b0: no Serial Number will be stored
b1: Serial Number will be stored

DB: **(*OperatingMode.BufferedReadMode.DataSelector.Data*)**
(*OperatingMode.NotificationMode.DataSelector.Data*)

b0: no data block will be stored
b1: data block will be stored

[3] *A reasonableness check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].*

[4] *A plausibility check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].*

Byte Order DB: (*OperatingMode.BufferedReadMode.DataSource.ByteOrderOfData*)
(*OperatingMode.NotificationMode.DataSource.ByteOrderOfData*)

b0: MSB first
b1: LSB first

TIMER: (*OperatingMode.BufferedReadMode.DataSelector.Time*)
(*OperatingMode.NotificationMode.DataSelector.Time*)
(
b0: no internal system timer
b1: internal system timer will be active

DATE: (*OperatingMode.BufferedReadMode.DataSelector.Date*)
(*OperatingMode.NotificationMode.DataSelector.Date*)

b0: no date is transferred BRM Data record
b1: date is transferred BRM Data record

NOTE:

The internal system timer is not a real time clock (RTC) and the accuracy cannot be guaranteed.

Extension:

b0: extension flag disabled, Data from TR-Data2 will not be requested

b1: extension flag enabled, Data from TR-Data2 will be requested

TR-DATA-2:

Selects the data types for read operation.

Bit	7	6	5	4	3	2	1	0
Function	-	-	DIRECTION	-	-	-	MAC	IN

DIRECTION: **(*OperatingMode.BufferedReadMode.DataSelector.Dxxxx*)**

(*OperatingMode.NotificationMode.DataSelector.Dxxxx*)

b0: no Direction states will be stored

b1: Direction states will be stored

MAC:

b0: The MAC-Address of the Reader will be not transmitted.

b1: The MAC-Address of the reader will be transmitted.

IN: **(*OperatingMode.BufferedReadMode.DataSelector.InputEvents*)**

(*OperatingMode.NotificationMode.DataSelector.InputEvents*)

b0: no Input states will be stored

b1: Input states will be stored

TR-DATA-3:

Selects the data types for read operation.

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	READ_ COMPL ETE_ BANK	-	-	-

READ_COMPLETE_BANK:

(*OperatingMode.BufferedReadMode.DataSelector.Mode.Read_Complete_Bank*)

(*OperatingMode.NotificationMode.DataSelector.Mode.Read_Complete_Bank*)

If this bit is set the reader will read out all memory blocks from the selected Memory BANK starting from DB-ADR. If DB-ADR is “0” the complete memory bank is read.

b00 Reader reads out the memory blocks according to the settings in DB-ADR, DB-N, D-Start and D-LGT.

b01 Reader reads out all blocks of the selected memory bank starting at DB-ADR

NOTE:

This functionality is has following limitations with respect to the individual memory banks:

EPC Memory: ***max. 512 Bit***
User Memory: ***max. 16 kBit***
TID Memory: ***max. 512 Bit***
Reserved Memory: ***max. 64 Bit***

The Read Complete Bank functionality is not available if Tag Authentication by Host with TAM2 is enabled.

BANK:

Memory bank of the Transponder which will be accessed by the Reader

Bit	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	BANK_NR		

BANK_NR: **(*OperatingMode.BufferedReadMode.DataSource.BankNo*)**

(*OperatingMode.NotificationMode.DataSource.BankNo*)

In case of Class 1 Gen 2 Transponder BANK_NR is defined as follows:

b000 reserved

b001 EPC memory bank

b010 TID memory bank

b011 User memory bank

DB-ADR[1]: (*OperatingMode.BufferedReadMode.DataSource.FirstDataBlock*)
(*OperatingMode.NotificationMode.DataSource.FirstDataBlock*)

Address of first data block. Range: 0x00...0xFF.

DB-N [5]: (*OperatingMode.BufferedReadMode.DataSource.NoOfDataBlocks*)

(*OperatingMode.NotificationMode.DataSource.NoOfDataBlocks*)

Number of data blocks. Range: 0x01...0x20. The data block size in the Buffered Read Mode is always 2 bytes.

[5] *A plausibility check is performed by writing this parameter to the Reader. If an error occurs the Reader answers with STATUS = [0x11].*

7.10. CFG12 .. 13: Not used

This configuration is not used/ supported by ID ISC.ANT.U500/270 - DM

7.11. CFG14: Reserved

The configuration block CFG14 is reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.12. CFG15 .. 16: Not used

This configuration is not used/ supported by ID ISC.ANT.U500/270 - DM

7.13. CFG17 .. 20: Reserved

The configuration blocks CFG17 .. 20 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.14. CFG21 .. 27: Reserved

The configuration blocks CFG21 .. 27 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.15. CFG28 .. 32: Reserved

The configuration blocks CFG28..32 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.16. CFG33 .. 34: LAN-Hostname

The configuration blocks CFG33 .. 34 hold the LAN-Hostname.

CFG 33:

Byte	0	1	2	3	4	5	6
Contents	LENGTH	LAN-HOSTNAME					
Default	0x06	0x55484720444D *UHF D*M					

Byte	7	8	9	10	11	12	13
Contents	LAN-HOSTNAME						
Default	0x000000000000						

CFG 34:

Byte	0	1	2	3	4	5	6
Contents	LAN-HOSTNAME						
Default	0x00000000000000						

Byte	7	8	9	10	11	12	13
Contents	LAN-HOSTNAME						
Default	0x00000000000000						

LENGTH: ***(HostInterface.LAN.Hostname.Length)***

Defines the length of the LAN-Hostname

0x00 disabled
0x01 1 Byte
0x02 2 Bytes
…
0x1B 27 Bytes

NOTE:

The LAN-Hostname can have a maximum length of 27 Bytes.

LAN-HOSTNAME:* (*HostInterface.LAN.Hostname.Name)

Defines the LAN-Hostname

7.17. CFG35 .. 39: Reserved

The configuration blocks CFG35..39 are reserved for future use.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

7.18. CFG40: LAN Settings, Part 1

Configuration of the IP address and port number.

Byte	0	1	2	3	4	5	6
Contents	IP_ADDRESS_LAN				0x00	0x00	0x00
Default	0xC0	0xA8	0x0A	0x0A			
	192	*168*	*10*	*10*			

Byte	7	8	9	10	11	12	13
Contents	0x00	IP_PORT_NUMBER_LAN		0x00	0x00	0x00	0x00
Default		0x27	0x11				
		10001					

IP_ADDRESS_LAN: ***(HostInterface.LAN.IPv4.IPAddress)***

Defines the IP address for wired LAN connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset.

IP_PORT_NUMBER:_LAN ***(HostInterface.LAN.PortNumber)***

Defines the port number for wired LAN connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset.

7.19. CFG41: LAN Settings, Part 2

Configuration of the Subnet Mask and other LAN options.

Byte	0	1	2	3	4	5	6
Contents	SUBNET-MASK-LAN				LAN-OPTIONS	KEEP-CNT	GW-ADDRES-LAN
Default	0xFF *255*	0xFF *255*	0x00 *0*	0x00 *0*	0x01	0x02	0x00

Byte	7	8	9	10	11	12	13
Contents	GW-ADDRES-LAN			0x00	0x00	KEEP-INTERVAL	
Default	0x00	0x00	0x00			0x00	0x05

SUBNET_MASK_LAN: ***(HostInterface.LAN.IPv4.SubnetMask)***

Defines the subnet mask for wired TCP/IP connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC

GW_ADDRESS_LAN: ***(HostInterface.LAN.IPv4.GatewayAddress)***

Defines the gateway address for TCP/IP connection. Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC

LAN-OPTIONS:

Bit:	7	6	5	4	3	2	1	0
Function:	DHCP	SPEED	DUPLEX	HOST-NAME	AUTO-NEGOTIATION	0	0	KEEP-ALIVE

KEEP-ALIVE: ***(HostInterface.LAN.Keepalive.Enable)***

b0: Keep-Alive option disabled
b1: Keep-Alive option enabled

AUTONEGOTIATION: ***(HostInterface.LAN.Autonegotiation.Disable)***

b0: Autonegotiation enabled
b1: Autonegotiation disabled

HOSTNAME: ***(HostInterface.LAN.Hostname.Enable)***

b0: Hostname option disabled
b1: Hostname option enabled

DUPLEX: ***(HostInterface.LAN.Autonegotiation.Duplex)***

b0: Half Duplex
b1: Full Duplex

SPEED: ***(HostInterface.LAN.Autonegotiation.Speed)***

b0: 10 Mbit
b1: 100 Mbit

DHCP: ***(HostInterface.LAN.IPv4.Enable_DHCP)***

b0: DHCP client disable
b1: DHCP client enabled

KEEP-CNT: ***(HostInterface.LAN.Keepalive.RetransmissionCount)***

Specifies the maximum number of retransmissions. This is the number of times that the reader re-transmits a keepalive packet to the host to check for connectivity. The valid range is 1..255.

KEEP-INTERVAL: ***(HostInterface.LAN.Keepalive.IntervalTime)***

Set the Keepalive Interval. This is the polling frequency used to determine if a keepalive exchange is needed. This interval is used when the connection failed. The valid range is 1..255 sec.

NOTE:

The command has no effect on this setting

Changing of this parameter only becomes effective after writing / saving this configuration block to EEPROM and a [0x64] System Reset of the RFC.

7.20. CFG47: Summer Winter Time

The parameters of the configuration block CFG47 contains settings for summer winter time overchange.

Byte	0	1	2	3	4	5	6
Contents	0x00	Reserved	0x00	0x00	0x00	0x00	0x00
Default		0x00					

Byte	7	8	9	10	11	12	13
Contents	reserved	WDAY	SMONTH	SDAY_BGN	SDAY_END	SHOUR	MIN_STEP
Default	0x00	0x11	0xA3	0x19	0x19	0x22	0x3C
		0x11	*March /*	*25.*	*25.*	*2 am /*	*+ 60 min*
		Sunday	*October*			*2 am*	

WDAY:

Together with SDAY_x defines the day of the week or date when the respective change should occur.

Bit:	7	6	5	4	3	2	1	0
Function:	WDAY_END (0..7)				WDAY_BGN (0..7)			

WDAY_BGN

0 ⇒ Changeover date is defined by SMONTH_BGN and SDAY_BGN.

1..7 ⇒ Changeover occurs on a defined day of the week (1: Sunday, 2: Monday, ...7: Saturday) in the month SMONTH_BGN. SDAY_BGN defines the time period.

WDAY_END

0 ⇒ Changeover date is defined by SMONTH_END and SDAY_END.

1..7 ⇒ Changeover occurs on a defined day of the week (1: Sunday, 2: Monday, ...7: Saturday) in the month SMONTH_END. SDAY_END defines the time period.

SMONTH:

Defines the starting month for daylight saving time

Bit:	7	6	5	4	3	2	1	0
Function:	SMONTH_END (0..12)				SMONTH_BGN (0..12)			

SMONTH_BGN

1..12 ⇒ Defines the starting month for daylight saving time

0 ⇒ Change disabled

SMONTH_END

1..12 ⇒ Defines the ending month for daylight saving time

0 ⇒ Change disabled

SDAY_BGN / SDAY_END (1...31):

Defines the type of changeover depending on WDAY_BGN and WDAY_END (WDAY_x).

WDAY_x > 0 (weekday changeover):

Changeover occurs on the weekday defined by WDAY which lies between the days SDAY_x and SDAY_x + 6.

Example:
To have the changeover occur on the last Sunday of a month having 31 days, set WDAY = 1 (Sunday) and SDAY_x = 25 (31 - 6). The changeover then takes place on the Sunday which occurs between the 25th and 31st of the month defined by SMONTH_x.

To have the changeover occur for example on the 1st Friday of a month, set WDAY = 6 and SDAY_x = 1.

WDAY_x = 0 (Date changeover)

Changeover occurs on the date defined by SMONTH_x and SDAY_x.

SHOUR:

Defines the time of day in full hours between midnight (0) and 15:00 (15) when the changeover should occur .

Bit:	7	6	5	4	3	2	1	0
Function:	SHOUR_END				SHOUR_BGN			

SHOUR_BGN:

Time in full hours of normal time when daylight saving time begins.

SHOUR_END:

Time in full hours of normal time when daylight saving time ends.

SHOUR_END = T_{SDST} - MIN_STEP

T_{SDST}: Time in daylight saving time when daylight saving time ends.
MIN_STEP: see below

MIN_STEP:

Defines the difference by which the clock time deviates from winter to summer time.

Bit:	7	6	5	4	3	2	1	0
Function:	SIGN	MIN_INC						

SIGN:

Specifies the sign for the minute increments
1 ⇒ "-"
0 ⇒ "+"

MIN_INC (0...127):

Defines the number of minutes by which the clock time deviates in DST mode from standard time.

NOTES:

- ***SHOUR_END and SHOUR_BGN refer to standard time (winter time). If the end of daylight saving time needs to be 3:00 for example and the clock has to be set back by –1 hour, SHOUR_END should be defined as = 2:00. To have the changeover occur on Saturday at 23:59, the changeover time must be configured for Sunday at 00:00.***

7.21. CFG49: Notification Channel

Settings for Notification mode.

Byte	0	1	2	3	4	5	6
Contents	MODE	0x00	0x00	0x00	KEEP-ALIVE	KEEP-ALIVE-TIME	
Default	0x00				0x00	0x00	0x02
	continuously				*Off*	*0s*	

Byte	7	8	9	10	11	12	13
Contents	DEST-IP-ADDRESS				DEST-IP-PORT		HOLD-Time
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x05

MODE:

Defines the basic settings for the notification channel.

Bit:	7	6	5	4	3	2	1	0
Function	ACK	0	0	0	0	0	0	0

ACK: Acknowledge Notification
(OperatingMode.NotificationMode.Transmission.Enable_Acknowledge)

b0: Notification must not be acknowledged
b1: Notification must be acknowledged with protocol [0x32] Clear Data Buffer

KEEP-ALIVE:

Mode for keep alive notification.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	0	EN

EN: ***(OperatingMode.NotificationMode.Transmission.KeepAlive.Enable)***

b0: disabled
b1: enabled

KEEP-ALIVE-TIME:
(OperatingMode.NotificationMode.Transmission.KeepAlive.IntervalTime)

Defines the cycle time for keep alive notification.

	max. time period
KEEP-ALIVE-TIME	0...65535 * 1s

DEST-IP-ADDRESS:

(OperatingMode.NotificationMode.Transmission.Destination.IPv4.IPAddress)

Defines the destination IP address.

DEST-IP-PORT-NUMBER:

(OperatingMode.NotificationMode.Transmission.Destination.PortNumber)

Defines the destination port number.

HOLD-Time:

(OperatingMode.NotificationMode.Transmission.Destination.ConnectionHoldTime)

Defines the connection hold time.

7.22. CFG63: Customer Parameter

The configuration block CFG63 is used for customer parameter.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Default

8. Protocols for Reader Configuration

Via the protocols for Reader configuration, the Reader can be adapted to individual conditions of application within wide limits.

8.1. [0x87] Set System Time and Date

The Set System Time and Date command sets the internal system timer and the date.

Host → Reader

Byte	1	2	3	4	5	6 .. 10	11 .. 13	14 .. 15
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x87]	DATE	TIMER	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x87]	STATUS[6]	CRC16

DATE:

Byte	6	7
TIME	century	year
	0...99	0...99

8	9	10
month	day	time zone
1...12	1...31	0...23

TIMER:

Byte	11	12	13 .. 14
TIME	h	min	ms
	0...23	0...59	0...59999

NOTE:

After setting the system time and date a 10.7. [0x33] Initialize Buffer is necessary if the Buffered Read Mode or Notification Mode is used.

[6] *see ANNEX C: Index of Status Bytes*

8.2. [0x88] Get System Time and Date

The Get System Time and Date command reads the internal system timer and the date

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x88]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 11
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x88]	STATUS[7]	DATE

12 .. 15	16 .. 17
TIMER	CRC16

DATE:

Byte	7	8
TIME	century	year
	0...99	0...99

9	10	11
month	day	time zone
1...12	1...31	0...23

TIMER:

Byte	12	13	14 .. 15
TIME	h	min	ms
	0...23	0...59	0...59999

[7] *see ANNEX C: Index of Status Bytes*

8.3. [0x80] Read Configuration

By using the Read Configuration the actual configuration of the Reader can be detected. In order to do this, the configuration is read in blocks of 14 bytes each and addressed by CFGn in the byte CFG-ADR.

Host → Reader

Byte	1	2	3	4	5	6	7-8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x80]	CFG-ADR	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 20	19-20
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x80]	STATUS	CFG-REC	CRC16

CFG-ADR:

Bit	7	6	5	4	3	2	1	0
Function	LOC	0	CFGn: Address of Configuration Block					

CFGn: memory-address of the required configuration block

LOC: specifies the location of the configuration block
b0 RAM
b1 EEPROM

CFG-REC:

14 bytes configuration block read from address CFGn in CFG-ADR.

NOTE:

A read configuration from EEPROM with reserved configuration blocks will cause an 0x15 error code.

8.4. [0x81] Write Configuration

The configuration of the Reader can be changed by means of the Write Configuration command. In order to do this, the configuration memory is written to with 14 bytes long blocks and addressed by CFGn in the byte CFG-ADR. The description of parameters can be taken from Chapter 7. Configuration Parameters.

Host → Reader

Byte	1	2	3	4	5	6	7...20	19-20
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	CFG-ADR	CFG-REC	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7-8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	STATUS	CRC16

CFG-ADR:

Bit	7	6	5	4	3	2	1	0
Function	LOC	0	CFGn: Address of Configuration Block					

CFGn: memory-address of the required configuration block

LOC: specifies the location of the configuration block

b0 RAM

b1 RAM and EEPROM

CFG-REC:

14 bytes configuration block stored in the configuration memory of the Reader at address CFGn.

NOTE:

A write configuration to EEPROM with reserved configuration blocks will cause an 0x16 error code.

8.5. [0x83] Reset Configuration

Using the command Set Default Configuration each configuration block can be reset to the manufacturer's setting.

Host → Reader

Byte	1	2	3	4	5	6	7...8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x83]	CFG-ADR	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7...8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x83]	STATUS	CRC16

CFG-ADR:

Bit	7	6	5	4	3	2	1	0
Function	LOC	MODE	CFGn: Address of Configuration Block					

CFGn: memory-address of the required configuration block

MODE: specifies one or all configuration blocks

b0 configuration block specified by CFGn

b1 all configuration blocks

LOC: specifies the location of the configuration block

b0 RAM

b1 RAM and EEPROM

NOTE:

A set default configuration command with reserved configuration blocks will cause an error code.

9. Protocols for Reader Control

9.1. [0x63] RF Controller Reset

This protocol allows you to reset the RF Controller.

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	STATUS[8]	CRC16

NOTE:

The RF-field will be switched off after a "RF Controller Reset"

Commands issued after a [0x63] command must be delayed with at least 300 ms, otherwise the reader will not responded.

[8] *see ANNEX C: Index of Status Bytes*

9.2. [0x64] System Reset

This protocol allows you to reset the RF Controller.

Host → Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	Mode	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	STATUS[9]	CRC16

MODE:

Defines Controller which will be reset.

MODE	Controller
0	RF Controller

NOTE:

The RF-field will be switched off after a "System Reset"

Commands issued after a [0x64] command must be delayed with at least 300 ms, otherwise the reader will not responded.

[9] *see ANNEX C: Index of Status Bytes*

9.3. [0x66] Get Reader Info

This protocol allows you to determine the currently installed Firmware version, its type and the types of the Transponders which are supported by the Firmware as well as some other hard- and firmware options of the Reader. Also the Device-ID can be determined.

Host → Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	MODE	CRC16

MODE:

Via the Parameter MODE different information can be requested from the Reader.

0x00: RF-Controller Firmware

0x03: RF-Decoder Firmware

0x04: Firmware Identifier

0x05: Bootloader Firmware

0x10: Hardware Information

0x15: RF-Stack Information

0x16: IDT-Stack Information

0x40: CFG-Information for read

0x41: CFG-Information for write

0x50: LAN-Information: MAC

0x51: LAN-Information: IP-Address

0x52: LAN-Information: Netmask

0x53: LAN-Information: Gateway-Address

0x60: I/O Capabilities

0x61: Peripheral Devices

0x80: Device-ID (Information is required for Firmware upgrades)

0xFF: All (reads all available information at once)

Depending on the MODE Parameter the Reader response has a different structure including different information:

MODE = 0x00 (RFC Controller Firmware)

Host ← Reader

Byte	1	2	3	4	5	6	7...8	9
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[10]	SW-REV	D-REV

10	11	12 .. 13	14 .. 15	16 .. 17	18 .. 19
HW-TYPE	SW-TYPE	TR-TYPE	RX-BUF	TX-BUF	CRC16

SW-REV:

Revision status of the Firmware. Depending on the Mode and Reader type different controllers are meant.

D-REV:

Revision status of the development Firmware. D-REV is set to ‘0’ in customized Firmware revisions.

HW-TYPE:

Displays information about the Hardware Version

SW-TYPE:

Type of RFC Reader Firmware

0x83 ID ISC.ANT.U500/270-DM (131)

TR-TYPE:

Displays the Transponders supported by the RFC software.

RX-BUF:

RX-BUF is the maximum receive buffer size of the Reader. If a protocol from the host exceeds the RX-BUF size the Reader responds with 0x81 PROTOCOL LENGTH ERROR.

TX-BUF:

TX-BUF is the maximum transmit buffer size of the Reader. The Host has to take in to account that a response protocol of the Reader can have this length.

[10] *see ANNEX C: Index of Status Bytes*

Mode = 0x10 (Hardware Information)

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8	9 .. 10
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[11]	HW-INFO	D_HW

11 ..12	13	14	15	16	17	18 .. 19
A_HW	FREQUENCY	PORT_TYPE	Reserved	Reserved	Reserved	CRC16

HW-INFO:

internal use

D-HW:

internal use

A-HW:

internal use

[11] *see ANNEX C: Index of Status Bytes*

FREQUENCY:

Flags for supported frequencies

Bit	7	6	5	4	3	2	1	0
Function	HF	UHF	-	-	-	-	FCC	EU

EU: b0: EU frequencies not supported

b1: EU frequencies supported

FCC: b0: FCC frequencies not supported

b1: FCC frequencies supported

UHF: b0: UHF not supported

b1: UHF supported

HF: b0: HF not supported

b1: HF supported

PORT_TYPE:

Flags for supported communication ports

Bit	7	6	5	4	3	2	1	0
Function	DISC	-	BT	USB	WLAN	LAN	RS4xx	RS232

RS232: b0: not supported

b1: supported

RS4xx: b0: not supported

b1: supported

LAN: b0: not supported

b1: supported

WLAN: b0: not supported

b1: supported

USB: b0: not supported

b1: supported

BT: b0: not supported

b1: supported

DISC: b0: Discovery not supported

b1: Discovery supported

Mode = 0x40 .. 0x41 (Configuration Information for read and write)

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8	9 .. n-2	n-1 .. n
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[12]	NR_OF_ PAGES	PERMISSION	CRC16

NR_OF_PAGES:

Defines the number of read / written configuration pages

PERMISSION:

Byte	7							
Bit	7	6	5	4	3	2	1	0
CFG_NO	0	1	2	3	4	5	6	7

Byte	8							
Bit	7	6	5	4	3	2	1	0
CFG_NO	8	9	10	11	12	13	14	15

Byte	9							
Bit	7	6	5	4	3	2	1	0
CFG_NO	16	17	18	19	20	21	22	23

:
:

Byte	n-2							
Bit	7	6	5	4	3	2	1	0
CFG_NO	X	X	X	X	X	X	X	X

[12] *see ANNEX C: Index of Status Bytes*

Mode = 0x50 .. 0x53 (LAN LConfiguration)

In case of setting Ethernet parameters per DHCP, these parameters can be requested with the following format.

Host ← Reader

Byte	1	2	3	4	5	6	7	8 .. n-2	n-1 .. n
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[13]	FLAGS	DATA	CRC16

FLAGS: indicates additional settings

Byte	5							
Bit	7	6	5	4	3	2	1	0
	0	0	DHCP v4	0	Disa-bled v4	0	Sup-ported v4	0

Supported v4:

b0: not supported

b1: supported

Disabled v4:

b0: LAN channel is enabled

b1: LAN channel is disabled

DHCP v4:

b0: disabled

b1: enabled

DATA (Mode 0x50..0x53):

MODE		DATA
0x50 (LAN-MAC)	FLAGS	6 Byte MAC
0x51 (LAN-IP-Address)	FLAGS	IPv4: 4 Byte IP-Address
0x52 (LAN-Netmask)	FLAGS	IPv4: 4 Byte Netmask
0x53 (LAN-DMteway)	FLAGS	IPv4: 4 Byte Gateway

[13] *see ANNEX C: Index of Status Bytes*

Mode = 0x60 (I/O-Capabilities)

Host ← Reader

Byte	1	2	3	4	5	6	7	8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[14]	NR_OF_ INPUTS	NR_OF_ OUTPUTS

9	10 .. 11
NR_OF_ RELAYS	CRC16

NR_OF_INPUTS:

Indicates the number of available Inputs

NR_OF_OUTPUTS:

Indicates the number of available Outputs

NR_OF_RELAYS:

Indicates the number of available Relays

Mode = 0x61 (Peripheral Devices)

1	2	3	4	5	6	7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	NR_OF_ Devices

(8)	(9)	(10...11)
Type	BUS-Adr	CRC16

NR_OF_Devices:

Indicates the number of devices

[14] *see ANNEX C: Index of Status Bytes*

Type:

Indicates the type of the devices

BUS-Adr:

Indicates the bus address of the device

Mode = 0x80 (Device Information)

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 10	11..14
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[15]	DEV_ID	Custom_L

15 .. 16	17 .. 18	19 .. 20	21 .. 22	23 .. 24
FW_L	TR_DRV_L	FNC_L	-	CRC16

DEV_ID:

Individual device identifier of the Reader.

CUSTOM_L

Indicates which customer Firmware is licensed on the Reader.

FW_L:

Indicates which Firmware version is licensed on the Reader.

TR_DRV_L:

Indicates which Transponder drivers are licensed on the Reader.

FNC_L:

Indicates which optional functions are licensed on the Reader.

[15] *see ANNEX C: Index of Status Bytes*

Mode = 0xFF (All Info Records)

Return of all Info records in one Response.

Host ← Reader

Byte	1	2	3	4	5	6	7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[16]	DATASETS

8	9..38	n-1, n
MODE	DATA	CRC16
Repeated DATASETS times		

MODE

Mode byte

DATA (Mode 0xFF):

Data record according to the definition in the previous sections.

The data record is always 30 byte long and information begins always with byte 0. Unused bytes must be filled with 0x00.

[16] *see ANNEX C: Index of Status Bytes*

9.4. [0x6A] RF Output ON/OFF

The command RF ON/OFF switches the RF field of the Reader antennas ON and OFF.

If the reader works in Auto Read Mode the RF communication can be interrupted by transmitting RF OFF and continued with RF ON.

Host → Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	RF_OUTPUT	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	STATUS[17]	CRC16

RF-OUTPUT:

Set the antenna outputs.

Bit	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	Antenna Output		

Antenna Output

Set all RF outputs active or RF Power off

Antenna Output	Description
b000	RF OFF
b001	RF Power on, all antenna outputs

NOTE:

In the case of sending* RF output ON/OFF *with antenna output = b000 the Reader sends a command to reset the persistence flags of the Transponder. This command is sent on the antenna port which was active before the RF output ON/OFF command is sent to the Reader.

[17] *see ANNEX C: Index of Status Bytes*

9.5. [0x6E] Reader Diagnostic

The command Reader Diagnostic displays several hardware diagnostics on the Reader.

Host → Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	MODE	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. n-2	n-1 .. n
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	STATUS [18]	DATA	CRC16

MODE:

Reader Diagnostic Modes

0x01 Listing of detail information for STATUS = 0x84 (RF-Warning)

0x04 Listing of detail information for STATUS = 0x10 (EEPROM-Failure)

0x20 Listing of detail information for STATUS = 0x18 (Wrong firmware)

0xFF All

DATA:

Response for Reader Diagnostic Modes

[18] *see ANNEX C: Index of Status Bytes*

MODE = 0x01:

Byte	5	6
Contents	FLAGS A	FLAGS B

FLAGS A:

Bit	7	6	5	4	3	2	1	0
Function	TEMP_ ALARM	-	TEMP_ WARN	RF Power CONTROL	-	-	NOISE	-

FLAGS B:

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	|Z| </> Ant4	|Z| </> Ant3	|Z| </> Ant2	|Z| </> Ant1

Error Conditions (Flag A and B):

Error	Set condition	Clear condition Trouble shouting	RF Power	LED 5
NOISE	The noise in the receiver channel is very high	• Select other preferred channel(s) or add more preferred channels (max. four) in CFG3.	ON	ON
RF Power CONTROL	RF-Power out of control range	• configured Power to high • check cable	ON	ON
TEMP_WARN	temp ≥ warning level ≥100°C	• temp < warning level	ON	ON
TEMP_ALARM	temp ≥ alarm level ≥105°C	• cpu reset	OFF	ON
|Z| <>	absolute impedance value **<< or >>** 50 Ohm	• check cable • check antenna matching	ON	ON

MODE = 0x04:

Byte	5-6
Contents	INT_ERROR

INT_ERROR:

Bit	15	14	13	12	11	10	9	8
Function	-	Blacklist	TMTF	-	-			

Bit	7	6	5	4	3	2	1	0
Function	ADC	RTC	UPC	-	RF-Decoder	-	-	EE DEV1

EE_DEV1:

Error during the communication with EEPROM Dev 1

RF-Decoder:

Error during the communication with RF-Decoder

UPC:

Error during the communication with UPC

RTC:

Error during the communication with RTC

ADC:

Error during the communication with ADC

TMTF:

Too Much Transponder in the Field

Blacklist:

Error during creating the blacklist

MODE = 0x20:

ASCII-String with a description of the error.

MODE = 0xFF: READ ALL

Executes all Modes described above an combines their results in one protocol.

Host ← Reader

Byte	1	2	3	4	5	6	7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	STATUS[19]	DATASETS

8	9..38	n-1, n
MODE	DATA	CRC16
Repeated DATASETS times		

MODE

Mode byte

DATA (Mode 0xFF):

Data record according to the definition in the previous sections.

The data record is always 30 byte long and information begins always with byte 0. Unused bytes must be filled with 0x00.

[19] *see ANNEX C: Index of Status Bytes*

9.6. [0x72] Set Output

The command Set Output serves temporary limited or unlimited activation of the outputs of the Reader.

Each output takes the state defined by the byte OUTx-mode for the period of time (OUT-TIME) included in the protocol. The flashing frequency is defined by the byte OUTx-frq. Via this protocol the outputs can be switched on or off for the indicated period of time. If the Reader receives a command Set Output, all times that have been active until then are being overwritten by the new times included in the protocol if they are > 0.

Host → Reader

Byte	1	2	3	4	5	6	7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x72]	Mode	OUT-N

8	9	10 .. 11	n-1...n
OUT-NR	OUT-S	OUT-TIME	CRC16
Repeated OUT-N times			

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x71]	STATUS[20]	CRC16

Mode:

0x01 (reserved)

OUT-N:

Defines the number of output records.This system supports one output, output number 2

[20] *see ANNEX C: Index of Status Bytes*

OUT-NR:

Defines the Typ and the number of the output

Bit	7	6	5	4	3	2	1	0
Function	OUT-Typ			0	OUT-Number			

OUT-typ:

b000 Digital Outputs

any other Bit configuration is reserved.

OUT-S:

OUT-S (Output State) defines the status of the output during the time defined in OUT-TIME and provides the possibility to allocate its own flashing-frequency to each output.

Bit	7	6	5	4	3	2	1	0
Function	0	0	0	0	OUTx-frq		OUTx-mode	

OUTx-mode:

b01	ON	output for OUT-TIME = active
b10	OFF	output for OUT-TIME = inactive
b11	FLASH	output for OUT-TIME = with OSF alternating

OUTx-frq:

b11 1 Hz

b10 2 Hz

b01 4 Hz

b00 8 Hz

OUT-TIME:

By the values defined by “OUT-TIME”, the outputs can be activated temporary limited or unlimited.
An exception is the time value 0 and 65535 (0xFFFF) (see following table).

0x0001	1 x 100ms	→ 100ms
...	...	
0xFFFE	65534 x 100ms	→ 1:49:13 h
0xFFFF	continuously active	

NOTE:

In order to reset a continuously active time, OUT-TIME = 1 has to be sent to the Reader, which effects a change to the idle status after 100 ms.

The continuous activation is being set back after a reset or a power failure.

9.7. [0x74] Get Input

With this protocol the actual status of the digital input.IN2 can be determined at any time.

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x74]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7	8 .. 9
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x74]	STATUS[21]	INPUTS	CRC16

INPUTS:

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	-	IN2	-

b0 digital input = inactive

b1 digital input = active

NOTE:

If the trigger is enabled in Buffered Read Mode the input IN2 isn't available for common use.

[21] *see ANNEX C: Index of Status Bytes*

9.8. [0x8D] Lock Region

This command locks the region in CFG3, after using the command it is no longer possible to change the region.

Host → Reader:

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x8D]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x8D]	STATUS[22]	CRC16

NOTE:

To change the region after a lock, please contact FEIG ELECTRONIC.

[22] *see ANNEX C: Index of Status Bytes*

9.9. [0xA0] Reader-Login

The Reader-Login must be executed after every power up or 9.1. [0x63] RF Controller Reset command, if an access to the configuration parameters is desired.

Host → Reader:

Byte	1	2	3	4	5	6 .. 9	10 .. 11
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	READER-ID	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	STATUS[23]	CRC16

READER-ID:

The READER-ID is a password which protects the configuration parameters from any read and write access.

The READER-ID can be changed in the configuration block 7.1. CFG0: Passwords.

NOTE:

A Reader-Login with wrong READER-ID causes a "Logout".

A "Logout" can be affected via the command 9.1. [0x63] RF Controller Reset.

[23] *see ANNEX C: Index of Status Bytes*

10. Reader Protocols for Peripheral Devices

The Reader configuration protocols allow the Reader to be adapted to the conditions found in individual applications. For this system the Peripheral Device is the UPC. The UPC contains the LEDs.

Note:

To initialize the communication between Reader and UPC, the host has to send a 0x66 Get Reader Info Command, Mode 0x61 Peripheral Devices, first!

10.1. [0x9F] Piggyback Command for Peripheral Devices

This protocol embeds any command for peripheral devices, connected at a communication port of a Reader. The Reader unpacks the internal command and sends it over the specified communication port. The commands described in the following chapters must all be embedded with this Piggyback Command.

If the communication with the peripheral device fails, the command returns with status 0x20.

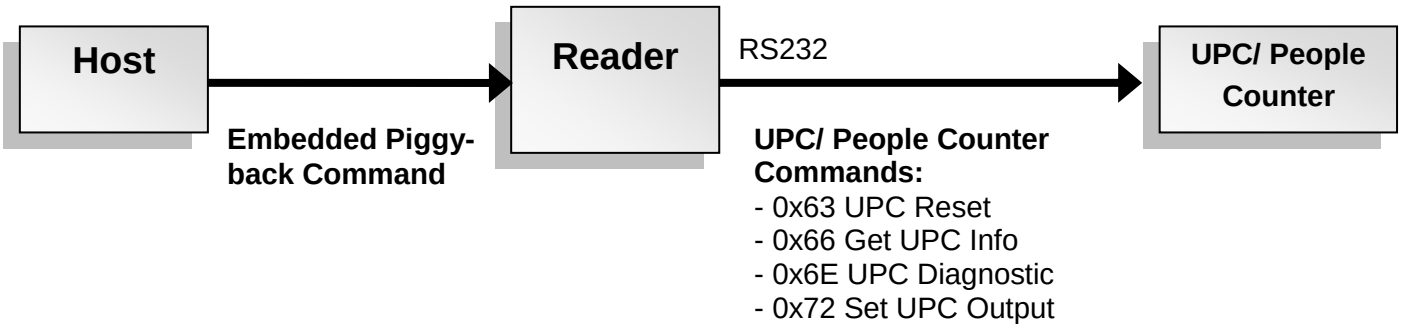


Fig. 1: Communication of a system consisting of a Host, Reader and UPC/ People Counte

Host → Reader

1	2,3	4	5	6	7
0x02	LEN	COM-ADR	[0x9F]	MODE	DEVICE

8	8..LEN-2	LEN-1, LEN
PORT	**EMB-REQ-PRT**	CRC16

Host ← Reader

1	2,3	4	5	6
0x02	LEN	COM-ADR	[0x9F]	STATUS

7..LEN-2	LEN-1, LEN
EMB-RSP-PRT	CRC16

MODE:

The MODE controls the command (RFU).

DEVICE:

The DEVICE defines the peripheral device:

DEVICE	Value
UPC	15

PORT:

The PORT defines the internal communication port:

PORT	Value
RS232	0x01

EMB-REQ-PRT, EMB-RSP-PRT:

Embedded request and response UPC Command.

See next Chapter 11. UPC Commands

11. UPC Commands (Packed in Piggyback protocol frame)

11.1. [0x63] UPC Reset

This protocol allows to reset the CPU Controller of the UPC. The counter values of the people counter remain unchanged.

Host → UPC

Byte	1	2	3	4	5	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	CRC16

Host ← UPC

Byte	1	2	3	4	5	6	n-1 .. n
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	STATUS	CRC16

11.2. [0x66] Get UPC Info

This protocol allows you to determine, the Firmware version, and some other hard- and firmware options of the UPC.

Host → UPC

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	MODE	CRC16

MODE:

0x00: RF-Controller Firmware

0x10: Hardware Information

0xFF: All

MODE = 0x00 (RFC Controller Firmware)

Host ← UPC

Byte	1	2	3	4	5	6	7...8	9
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	SW-REV	D-REV

10	11	12 .. 13	14 .. 15	16 .. 17	18 .. 19
HW-TYPE	SW-TYPE	Reserved	RX-BUF	TX-BUF	CRC16

STATUS:

0x00: Status OK

SW-REV:

Revision Status of the Firmware. Depending on the Mode and Reader type different controllers are meant.

D-REV:

Revision status of the development Firmware. D-REV is set to ‘0’ in customized Firmware revisions

HW-TYPE:

Information about the Hardware Version (CFG Pins)

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	CFG3	CFG2	CFG1

SW-TYPE:

Type of RFC Reader Firmware

ID ISC.ANT.UPC (15)

RX-BUF:

RX-BUF is the maximum receive buffer size of the Reader. If a protocol from the host exceeds the RX-BUF size the Reader responds with 0x81 PROTOCOL LENGTH ERROR

TX-BUF:

TX-BUF is the maximum transmit buffer size of the Reader. The Host has to take in to account that a response protocol of the Reader can have this length.

Mode = 0x10 (Hardware Information)

Host ← UPC

Byte	1	2	3	4	5	6	7 .. 8	9 .. 10
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS	HW-INFO	D_HW

11 ..12	13	14	15	16	17	18 .. 19
A_HW	Reserved	PORT_TYPE	Reserved	Reserved	Reserved	CRC16

HW-INFO:

internal use

D-HW:

byte 9: internal use

byte 10: People Counter support

b0: supported

b1**:** Not supported (The people counter is not supported by DM)

A-HW:

internal use

PORT_TYPE:

Flags for supported communication Interfaces

Bit	7	6	5	4	3	2	1	0
Function	DISC	-	BT	USB	WLAN	LAN	RS4xx	RS232

RS232: b0: not supported

b1: supported

RS4xx: b0: not supported

b1: supported

LAN: b0: not supported

b1: supported

WLAN: b0: not supported

b1: supported

USB: b0: not supported

b1: supported

BT: b0: not supported

b1: supported

DISC: b0: Discovery not supported

b1: Discovery supported

11.3. [0x6E] UPC Diagnostic

The command Reader Diagnostic displays several hardware diagnostics on the UPC.

Host → UPC

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	MODE	CRC16

Host ← UPC

Byte	1	2	3	4	5	6	7 .. n-2	n-1 .. n
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	STATUS	DATA	CRC16

MODE:

Reader Diagnostic Modes

0x04 Listing of detail information for STATUS = 0x10 (EEPROM-Failure)

DATA:

Response for corresponding Diagnostic Modes

STATUS:

0x00 Status OK

MODE = 0x04:

Byte	5-6
Contents	INT_ERROR

INT_ERROR:

Bit	15	14	13	12	11	10	9	8
Function	-	-	-	-	-	-	-	--

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	-	-	EE DEV

EE_DEV:

Communication failure with internal EEPROM

11.4. [0x72] Set UPC output

The command Set UPC Output is used to control the Alarm LED of the DM. Each output takes on the state defined by the byte OUTx-mode for the period of time (OUT-TIME) included in the protocol. The flashing frequency is defined by the byte OUTx-frq. Via this protocol the outputs can be switched on or off for the indicated period of time. If the UPC receives a command Set UPC Output, all times that have been active until then are being overwritten by the new times included in the protocol if they are > 0.

Host → UPC

1	2,3	4	5	6	7
0x02	n	UPC_ADR	[0x72]	Mode	OUT-N

8	9	10,11	n-1...n
OUT-NR	OUT-S	OUT-TIME	CRC16
Repeated OUT-N times			

Host ← UPC

1	2,3	4	5	6	7,8
0x02	8	GPC-ADR	[0x72]	STATUS[24]	CRC16

UPC-ADR:

0: bus address of UPC

Mode:

0x01 (reserved)

OUT-N:

Defines the number of output records. N = 1

OUT-NR:

Defines the Type and the number of the output

Bit:	7	6	5	4	3	2	1	0
Function:	OUT-type				OUT-Number			

OUT-type:

b000 Digital Output, not supported by DM

b001 LED

b002 Buzzer, not supported by DM

OUT-Number:

1

[24] see ***Fehler! Verweisquelle konnte nicht gefunden werden.***

OUT-S:

OUT-S (Output State) defines the status of the output during the time defined in OUT-TIME and provides the possibility to allocate its own flashing-frequency to each output.

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	OUTx-frq		OUTx-mode	

OUTx-mode:

b00	UNCHANGED	OUT-TIME has no effect on the status of the output
b01	ON	output for OUT-TIME = active
b10	OFF	output for OUT-TIME = inactive
b11	FLASH	output for OUT-TIME = with OSF alternating

OUTx-frq:

b11	1 Hz
b10	2 Hz
b01	4 Hz
b00	8 Hz

OUT-TIME:

By the values defined by “OUT-TIME”, the outputs can be activated temporary limited or unlimited.
An exception are the time values 0 and 65535 (0xFFFF) (see following table).

0x0001	1 x 100ms	-> 100ms
...	...	
0xFFFE	65534 x 100ms	-> 1:49:13 h
0xFFFF	continuously active	

Notes:

- ***In order to reset a continuously active time, OUT-TIME = 1 has to be sent to the UPC, which effects a change to the idle status after 100 ms.***
- ***The continuous activation is being set back after a reset or a power failure.***

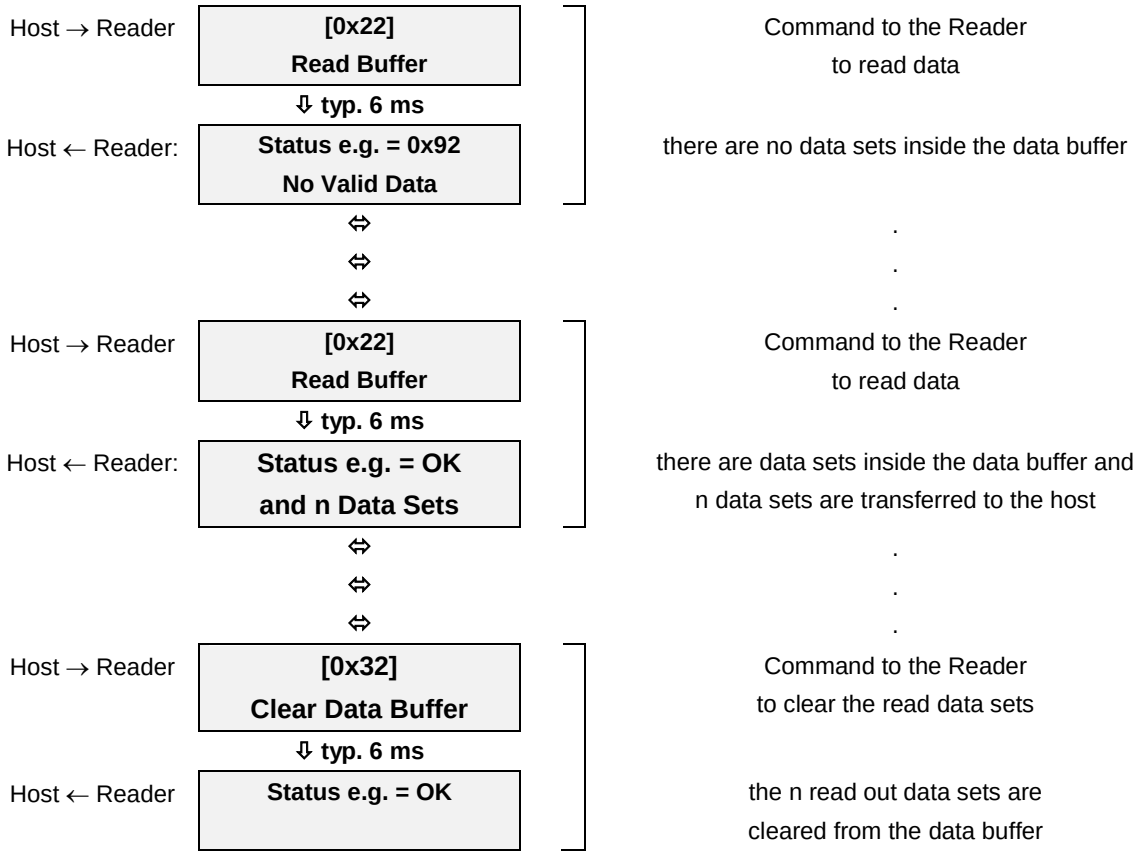
12. Protocols for Buffered Read Mode and Notification Mode

12.1. The Buffered Read Mode Procedure

By using the “BRM” the Reader itself reads data from every Transponder which is inside the antenna field. This mode must be enabled in the 7.2. CFG1: Interface and Mode configuration block and configured in the 7.9. CFG11: Read Mode – Read Data configuration blocks.

The sampled Transponder data sets are stored in a FIFO organized data buffer inside the Reader. The buffered read mode runs offline from any host commands and it is immediately started after power up or a 9.1. [0x63] RF Controller Reset command.

Only two commands are necessary to read out sampled Transponder data sets. The figure below illustrates the Buffered Read Mode procedure:



⇩: Host waits for an answer from the Reader

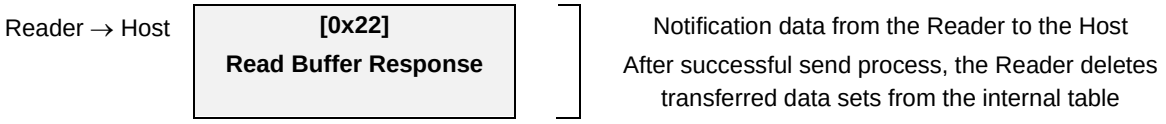
⇔: Host is able to do other jobs e.g. to communicate with other Readers

Additional information about the capacity of the data buffer can be determined with the 12.5. [0x31] Read Data Buffer Info command.

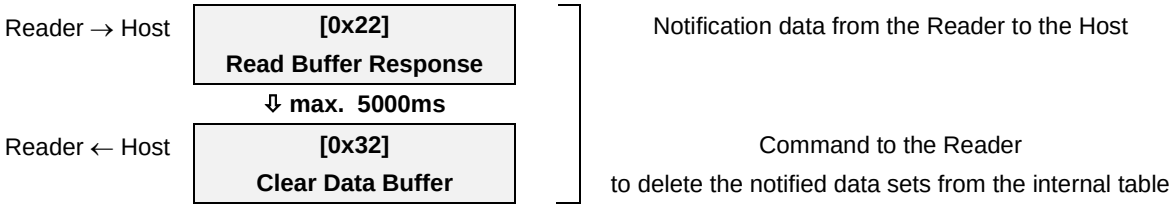
12.2. The Notification Mode Procedure

By using Notification Mode together with the Buffered Read Mode the Reader itself reads data from every Transponder which is inside the antenna field **and** enables a connection to a host to send the queued data asynchronously. This mode must be enabled in the 7.2. CFG1: Interface and Mode configuration block and configured in 7.21. CFG49: Notification Channel configuration block. The settings for the Read Mode define the notification information sent to the host.

Only one command is necessary to send sampled Transponder data sets. The figure below illustrates the Notification Mode procedure:



The reader sends notifications as fast as possible, if the notification trigger is set to continuously or a very short cycle time in time-triggered mode is defined. To prevent a notification overflow in a host application the acknowledgement option can be set. In this case the notification must be acknowledged by the host with an response protocol to synchronize the notification process with the host application. The figure below illustrates this procedure:



The acknowledge 12.6. [0x32] Clear Data Buffer must be in the space of 5 seconds. If no acknowledge is received the Reader repeats the notification as it is configured.

Additional information about the capacity of the data buffer can be determined with the 12.5. [0x31] Read Data Buffer Info command.

In Notification Mode the 12.4. [0x22] Read Buffer command is not applicable.

As an additional option Keepalive messages can be sent periodically to a host. Keepalive notifications are always never acknowledged. The information sent by a Keepalive notification is identical with the command 9.5. [0x6E] Reader Diagnostic with mode = 0x01.

12.3. Transponder Access in the Buffered Read Mode and Notification Mode

The Buffered Read Mode only reads data blocks from the Transponders in the antenna field.

After power up or a 9.1. [0x63] RF Controller Reset command the buffered read mode starts with transponder reading.

12.4. [0x22] Read Buffer

The command Read Buffer reads a number of data sets from the data buffer.

Host → Reader

Byte	1	2	3	4	5	6 .. 7	8 .. 9
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x22]	DATA-SETS	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7	(8)
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x22]	STATUS[25]	TR-DATA1	TR-DATA2

8 .. 9 (9 .. 10)	10 .. n-2 (11 .. n-2)	n-1, n
DATA-SETS	DATA	CRC16

DATA-SETS:

Number of data sets to be transferred from the data buffer. If the data buffer does not contain the requested number of data sets, the Reader responds with all available data sets and an error will occur.

TR-DATA1:

Indicates which data are transferred in the DATA field.

Bit	7	6	5	4	3	2	1	0
Function	ExFlag	DATE	TIMER		Byte Order	-	DB	IDD

IDD = Identifier Data (EPC or EPC+TID)

DB = data block

Byte Order = b0:MSB first, b1:LSB first

DATE = Date stamp from internal system timer

TIMER = Time stamp from internal system timer

ExFlag = Extension flag, if b1= TR-DATA2 will be send

[25] *see ANNEX C: Index of Status Bytes*

TR-DATA2:

Selects the data types for read operation.

Bit	7	6	5	4	3	2	1	0
Function	-	-	DIRECTION	-	-	-	MAC	IN

IN:

Input states

MAC:

b0: no MAC address will be transmitted

b1: MAC address will be transmitted

DIRECTION:

b0: no Direction states will be stored

b1: Direction states will be stored

DATA:

Requested data records from the data buffer. Only selected data will be transferred to the host. See chapter 7.9. CFG11: Read Mode for details.
Each data record has the following structure:

Data Type		**DATA**			
Record Length	byte no.	1	2		
		MSB RecLen	LSB RecLen		
Serial Number	byte no.	1	2	3	4…4+IDD-LEN
		TR-TYP	IDDIB	IDD-LEN	IDD
data blocks	byte no.	1	2	3	4…4+DB-N*DB-SIZE
		DB-N		DB-SIZE	DB
Time	byte no.	1...4			
		TIME			
Date	byte no.	1..5			
		DATE			
Input	byte no.	1	1		
		IN	reserved		
Direction	byte no.	1			
		DIRECTION			
MAC	byte no.	6			
		MAC-ADR			

TR-TYP

Transponder type, see chapter ANNEX A: Codes of Transponder Types

IDDIB

Reserved

IDD-LEN

Defines the length of the IDD in bytes

IDD

EPC value

DB-N

Number of data blocks

DB-SIZE

Defines block size

DB

Data

TIME

Byte	1	2	3,4
TIME	h	min	ms
	0...23	0...59	0...59999

DATE

Byte	1	2
TIME	century	year
	0...99	0...99

3	4	5
month	day	time zone
1...12	1...31	0...23

IN: Input number

Bit	7	6	5	4	3	2	1	0
Function	-	-	-	-	-	-	IN2	-

IN2

b0 Input inactive

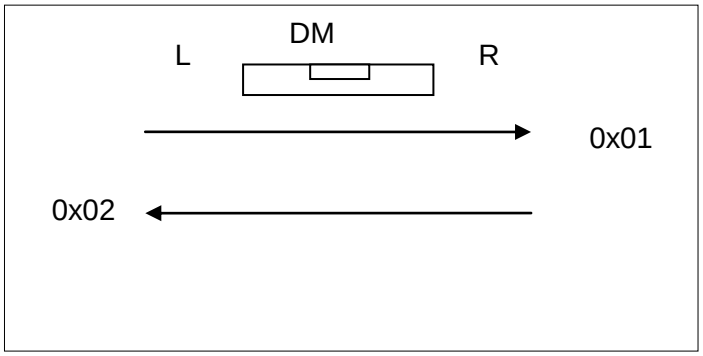
b1 Input active

DIRECTION

0x00: direction unclear

0x01: from left to right (viewing direction to DM)

0x02: from right to left (viewing direction to DM)



MAC-ADR

MAC address of the reader.

NOTE:

This command reads the same data sets until they are cleared with the 12.6. [0x32] Clear Data Buffer command.

This command is only available in the Buffered Read Mode.

Data are only transferred if STATUS = 0x00, 0x84, 0x93.

12.5. [0x31] Read Data Buffer Info

The command Read Data Buffer Info reads the actual parameters of the data buffer.

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	STATUS[26]	TAB-SIZE

9 .. 10	11 .. 12	13 .. 14
TAB-START	TAB-LEN	CRC16

TAB-SIZE:

Maximum count of Transponder data sets in the data buffer.

TAB-START:

Address of first Data Set in the data buffer.

TAB-LEN:

Number of Transponder data sets reserved in the data buffer.

NOTE:

Additional information about the data table status is transferred if STATUS = 0x00, 0x84, 0x93.

[26] *see ANNEX C: Index of Status Bytes*

12.6. [0x32] Clear Data Buffer

The command Clear Data Buffer clears the data sets from the data buffer which were transferred with the 12.4. [0x22] Read Buffer command.

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	STATUS[27]	CRC16

[27] *see ANNEX C: Index of Status Bytes*

12.7. [0x33] Initialize Buffer

The command Initialize Buffer clears the data buffer to an initial state. It does not matter if the data sets in the data buffer were read or not.

Host → Reader

Byte	1	2	3	4	5	6 .. 7
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	CRC16

Host ← Reader

Byte	1	2	3	4	5	6	7 .. 8
Contents	STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	STATUS[28]	CRC16

[28] *see ANNEX C: Index of Status Bytes*

ANNEX

ANNEX A: Codes of Transponder Types

Value	Transponder type
0x84	EPC class 1 Gen 2 / ISO 18000-6-C

ANNEX C: Index of Status Bytes

Hex-value	General
0x00	**OK:** • Data / parameters have been read or stored without error • Control command has been executed
0xF1	**Hardware Warning:** • RFC works not properly • RF Decoder or Hardware Filter works not properly

Hex-value	Parameter Status
0x10	**EEPROM-Failure:** • The EEPROM of the Reader is not able to be written on. • Before writing onto the EEPROM a faulty checksum of parameters has been detected.
0x11	**Parameter-Range-Error:** • The value range of the parameters was exceeded.
0x13	**Login-Request:** • Configuration access without having logged in to the Reader before.
0x14	**Login-Error:** • Login attempt with wrong password.
0x15	**Read Protect:** • The configuration block is reserved for future use.
0x16	**Write Protect:** • The configuration block is reserved for future use.
0x18	**Wrong Firmware:** • Mismatch between RFC Firmware and Hardware

Hex-value	Interface Status
0x80	**Unknown Command:** • The Reader does not support the selected function.
0x81	**Length-Error:** • The selected function has the wrong number of parameters.
0x82	**Command not available:** • A Host command was sent to the Reader in the Buffered Read Mode. • A Buffered Read Mode protocol was sent to the Reader in the standard mode. • The command with More bit does not correspond with the last command.

Hex-value	Interface Status
0x84	**RF-Warning:** Detailed status information can be read with the command 9.5. [0x6E] Reader Diagnostic. • The antenna configuration isn't correct. Check the antenna cables and the antenna matching. • The environment is too noisy. • The RF power doesn't have the configured value. • All RF channel are occupied (EU Reader only).

Hex-value	Buffer Status
0x92	**No valid Data:** • There is no valid data in the Buffered Read Mode. • There is no Transponder in the antenna field.
0x93	**Data Buffer Overflow:** • A data buffer overflow occurred.