IDENTIFICATION

MANUAL

ID ISC.MR102

Standard Reader

from Firmware-Version 2.10 or higher

final – public (B)
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FEIG ELECTRONIC

Note

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FEIG ELECTRONIC GmbH
Lange Strasse 4
D-35781 Weilburg-Waldhausen
Tel.: +49 6471 3109-0
http://www.feig.de

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General information's regarding this document

- 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.

Revision History of documentation

Revi-sion	Date	Page	Description
0e	12.04.11		Initial version
1e	04.06.12	32	CFG03: Tag detect, blue LED for ID ISC.ANTS370/270-A
	14.11.12	several	Support of ISO18000-3m3 implemented
		40	Read Complete Bank added in CFG11
2e	15.04.15	57	CFG33/34: TCP/IP Hostname implemented
		60	CFG41: Additional parameter for LAN settings
		127	NXP SLIX 2 integrated
3e	05.09.17	40; 139	CFG11: Notification Mode with MAC output configurable
4e	16.02.18	70	Get Reader Info, new Hardware Version
		132	ST25 Transponder implemented
	06.07.18	25	CFG1: HID Delay
	06.07.18	51	CFG20: RF-ON Holdtime
	06.07.18	76	Reader Diagnostic Mode 0x01: Temperature
	06.07.18	101	Extended Get System Information
	06.07.18	105	Extended Get Multiple Block Security Status

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
FIFO	First in First out
frq	Frequency
FSK	Frequency Shift Keying
h	Hour
Hz	Hertz
ID	Identification
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

2. Data Transmission between OBID i-*scan*® ID ISC.MR102 and Host

Different ways of data transmission between OBID i-*scan*® Readers and host (terminal, PC) are possible. The **ISO15693Host Commands** are used for the data exchange between Transponder and host, whereas the **Configuration Commands** and the **Control** 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		
	asynchronous (RS232 / RS485)	**USB**	**LAN**
Configuration and control commands	●	●	●
ISO Host Commands	●	●	●
Scan-Mode	●	● (HID)	-
Notification Mode	-	-	●

2.1. Configuration Commands and Control Commands

This method of data transmission is used for Reader configuration and the diagnosis via the asynchronous interface or Ethernet Interface

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>

2.2. ISO15693 Host Commands

The ISO Host Commands provide the exchange of data between a host and Transponders via the Reader as long as the Transponder remains in the detection range of the Reader.

Note:
During the writing of data on a Transponder, it must be ensured that the Transponder is located within the detection range of the Reader during the entire process. If the Transponder is removed from detection range of the Reader during a writing process, this will cause a loss of data.

The Reader distinguishes between three different modes:

Addressed mode:

Before reading or writing data in addressed mode, the UID of the Transponder has to be known. This is executed by sending the protocol "7.1.1. [0x01] Inventory If a Transponder is located within the detection range of the Reader at that time, it answers with its UID. For all following read- / write orders the Transponder must be addressed with its correct UID.

The following chart will show the necessary steps for the communication with a Transponder in addressed mode:

<table>
<tr><th>Host (Terminal / PC / ....)</th><th></th><th colspan="2">Reader</th></tr>
<tr><td rowspan="4">Inventory
to get the UID</td><td>→</td><td colspan="2">Transponder in antenna field ?</td></tr>
<tr><td></td><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>status /
number of Transponders / UID</td><td>status =
no Transponder</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
<tr><td rowspan="4">read data from Transponder with UID</td><td>→</td><td colspan="2">Transponder with
correct UID in antenna field ?</td></tr>
<tr><td></td><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>status /
Transponder read data</td><td>status =
no Transponder
in Reader field</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
<tr><td rowspan="4">write data to Transponder with UID</td><td>→</td><td colspan="2">Transponder with
correct UID in antenna field ?</td></tr>
<tr><td></td><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>OK status</td><td>status =
no Transponder
in Reader field</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
</table>

Non-addressed mode:

In non-addressed mode, it is not necessary to know the UID of the Transponder. This mode is useful-, if only one Transponder is located within the range of the Reader.

The following chart will show the necessary steps for the communication with a Transponder in non-addressed mode:

<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 in antenna field ?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>status / Transponder read data</td><td>status = no Transponder in Reader field</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
<tr><td rowspan="4">write data</td><td rowspan="2">→</td><td colspan="2">Transponder in antenna field ?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>←</td><td>OK status</td><td>status = no Transponder in Reader field</td></tr>
<tr><td>←</td><td colspan="2"></td></tr>
</table>

Selected:

In this mode the Reader communicates only with the one, selected Transponder.

Before reading or writing data in selected mode, the UID of the Transponder has to be known. This is executed by sending at first the protocol "7.1.1. [0x01] Inventory". In a second step the Transponder must be selected with the select command (see: 7.1.6. [0x25] Select) which must include its UID.

The following chart will show the necessary steps for the communication with a Transponder in selected mode:

Host (Terminal / PC / ....)		Reader	
Inventory to get the UID	→	Transponder in antenna field ?	
		Yes	No
	←	status / number of Transponders / UID	status = no Transponder
	←		
select Transponder with UID	→	Transponder with the correct UID in antenna field ?	
		Yes	No
	←	status / Transponder read data	status = no Transponder in Reader field
	←		
read data	→	selected Transponder in antenna field ?	
		Yes	No
	←	status / Transponder read data	status = no Transponder in Reader field
	←		
write data	→	selected Transponder in antenna field ?	
		Yes	No
	←	OK status	status = no Transponder in Reader field
	←		

2.3. Scan Mode

In this operation-mode the Reader autonomously sends out data to the host as soon as a Transponder is within the detection range and valid data could be read.

In Scan Mode the contents of the message block (UID, data block) can be adapted to each user-application. Scan mode is available via the asynchronous Interface and the USB Interface.
If an USB-Reader is used in scan mode, the reader sends its data automatically over the HID interface of the operating system. In this case, you cannot catch the data with the FEUSB.DLL or any other libraries. The reader works like a USB keyboard.

The Reader starts the output of the protocol block as soon as all required data have been read correctly from the Transponder. If the number of transmitted user data is too large, only the maximal number of transmitted data will be sent plus the end character.

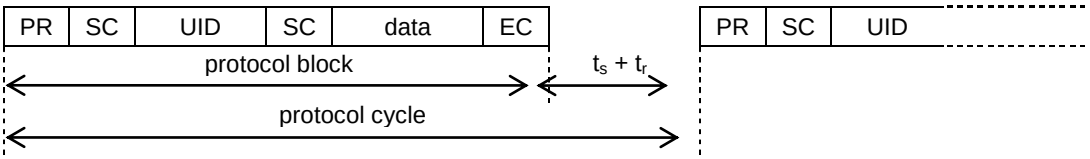
Scan-Mode via asynchronous interface:

The data will be sent out depending on their configuration according to the following scheme, the sequence of which cannot be changed.

Depending to the configuration and the number of Transponders in the detection range of the Reader the transmitted protocols have a different format.

Example 1:

One Transponder in detection range and UID and data block should be read:



Example 2:

3 Transponder in detection range only UID should be read:

PR	SC	UID1	EC	UID2	EC	UID3	EC

Example 3:

3 Transponder in detection range only data block should be read:

PR	SC	data1	EC	data2	EC	data3	EC

Example 4:

2 Transponder in detection range UID and data block should be read:

PR	SC	UID1	SC	data1	EC	UID2	SC	data2	EC

PR:	Com-Prefix (optional)	ts:	SCAN-LOCK-TIME
UID:	Serial-Number. (fix)	tr:	time to the next new Transponder reading
data:	data blocks (free programmable)		
SC	Separation character (optional)		
EC	End character (optional)		

Example 5:

COM-ADR	Separation Character	Header				UID	Separation Character	Data-Blocks	END Character		
COM-ADR	SEP-CHAR	USR1	USR2	USR3	USR4	UID	SEP-CHAR	DB	USR 1	USR 2	USR 3

Scan-Mode via USB-Interface (HID-Mode):

If an USB-Reader is set to Scan-Mode the reader works like a keyboard. The data will be transferred as USB Key Code.

Different USB Key Code tables can be loaded into the reader using the demo program ISOStart. USB Key codes for German and English are available. Other languages can be created by the user and with the help of ISOStart.

If the number of transmitted user data is too large, only the maximal number of transmitted data will be sent plus the end character.

Note:

- ***If configuration protocols shall be sent to the Reader while the Scan-Mode is active, no Transponder should be within the detection range of the Reader during this time.***
- ***Only read operations are available with the Scan Mode or Notification Mode.***

3. Interface

The Reader ID ISC.MR102 is available with 4 different interface ports (RS232; RS485; USB; LAN). The protocol frame of this ports can be different. On the asynchronous serial interface the whole protocol frame is described in 3.2. Serial Data Format and Protocol Frames. The TCP/IP protocol frame is described below.

3.1. Protocol Frames of TCP/IP protocol

If the Reader use the Ethernet Interface the data is packaged in a TCP/IP protocol frame. This means the whole data format and protocol frame which is described in 3.2. Serial Data Format and Protocol Frames is packaged as the data of a TCP/IP protocol frame. By using the FETCP.DLL you can easily extract or package the application data you receive from or you sent to the Reader.

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.

3.2. Serial Data Format and Protocol Frames

The Reader ID ISC.MR102 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	(DATA)

n-1	n
LSB CRC16	MSB CRC16

STX:

If the responded protocol of the Reader starts with the STX sign (0x02) the protocol frame is Advanced Protocol-Length. Then the protocol length is defined by the 2 Byte Parameter ALENGTH.

ALENGTH (n = 8...65535):

Number of protocol bytes including STX, ALENGTH and CRC16

LENGTH (n = 6...255): Standard Protocol-Length (up to 255 Byte)

Number of protocol bytes including LENGTH and CRC16.

COM-ADR:

0..254 address of device in bus mode

Note:

The Reader can be addressed via COM-ADR 255 at any time!

CONTROL-BYTE:

Defines the Command which the Reader should operate.

STATUS [1]**:**

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

DATA:

Is a optional data field with variable length. The number of DATA byte depend on the command. The data will be sent always as MSB first if the Reader is in the ISO-Host Command Mode.

CRC16:

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

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

Start Value: 0xFFFF

Direction: Backward

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

Data format:

Start bits:	1
Data bits:	8
Stop bits:	1
Parity:	even (default) odd none

3.3. CRC16 Calculation Algorithm

Polynom: $x^{16} + x^{12} + x^5 + 1 \Rightarrow$ CRC_POLYNOM = 0x8408;

Start Value: 0xFFFF $\Rightarrow$ 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);
        }
}
```

4. Configuration Parameters (CFG)

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 used in chapter 5. Protocols for Reader Configuration

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 6.3. [0x63] command**).** If after this the checksums of all data records are correct, the Reader shifts to the configured operation mode.

Notes:

- ***Malfunctions may occur if parameters are configured outside their described range or if unspecified parameters have been changed!***
- ***A firmware update resets the EEPROM to default settings and the Reader goes into the error status "EE-Init-mode".***

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 Reader reset

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.

4.1. 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 data from this configuration block cannot be read from the host, they are “write-only”. Also the command 5.3. [0x83] Set Default 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		0x00	0x00	0x00	0x00		

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_CFGxx)*

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	-	40-49	-	-	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

To change the READER-ID you must write to the CFG0 immediately after the Login to the Reader with the command 6.14. [0xA0] Reader-Login

Notes:

- ***A READER-ID = 0x00000000 disables the password function.***
- ***A read with the command [0x80] Read Configuration will always get '0x00000000'.***
- ***A changed password becomes valid after a Reader reset.***
- ***The command 5.3. [0x83] Set Default Configuration don't change the CFG0 register if all configuration blocks are used.***
- ***The command 6.14. [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 with the command 6.14. [0xA0] Reader-Login can configuration parameters in the EEPROM of the Reader may be read and changed in the EEPROM of the Reader.

4.2. CFG1: Interface

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

Byte	0	1	2	3	4	5	6
Contents	COM-ADR	0x00	BAUD[2]	TRANS-FORM[1]	0x00	0x00	TR-RESPONSE-TIME
Default	0x00 *0x00*		0x08 *38400 Baud*	0x01 *e,8,1*			0x01

Byte	7	8	9	10	11	12	13
Contents	TR-RESPONSE-TIME	0x00	0x00	Protocol Mode	SCAN-INTERFACE	Interface	READER - MODE
Default	0x2C *1,5 sec.*			0x00	USB:0x02 RS232:0x00 RS485: 0x01	0x80	0x00

COM-ADR: ***(HostInterface.Serial.BusAddress)***

Bus address of the Reader (0 .. 254) for communication via the asynchronous interface, especially for applications with the RS485 interface.

Notes:

- ***Do not configure address 255!***
- ***Via the COM-Adr 255 in the send protocol, the Reader is able to be addressed at any time. It answers then with the configured address.***

BAUD[1]: ***(HostInterface.Serial.Baudrate)***

By means of this byte the baud rate of the asynchronous interface can be defined.

0x05: 4800 baud
0x06: 9600 baud
0x07: 19200 baud
0x08: 38400 baud
0x09: 57600 baud
0x0A: 115200 baud

Note:

- ***Changing of BAUD only becomes effective after writing / saving configuration block CFG1 to EEPROM and a reset of the Reader.***
- ***The Reader set the baud rate to 38400 baud, if the user set an invalid baud rate.***
- ***The baud rate is used for both interface port's (RS232 and RS484) of the ID ISC.MR102.***

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

TRANS-FORM[3]**:**

By means of this byte, several parameters for the data transmission format of the asynchronous interface can be defined.

Bit:	7	6	5	4	3	2	1	0
Function:	0	0	0	0	S	D	P	

P: ***(HostInterface.Serial.Parity)*** Kind of Parity

b00: no Parity
b01: even Parity
b10: odd Parity
b11: **- do not use -**

D: ***(HostInterface.Serial.Databits)*** Number of Data Bits

b0: 8 Data Bits
b1: **- do not use -**

S:…*(HostInterface.Serial.Stopbits)* Number of Stop Bits

b0: 1 Stop Bit
b1: **- do not use –**

Note:

- ***Changing of TRANS-FORM only becomes effective after writing / saving configuration block CFG1 to EEPROM and reset of the Reader.***
- ***Always 8 Data Bits and 1 Stop Bits should be used***

TR-RESPONSE-TIME: ***(AirInterface.TimeLimit)***

By means of this parameter the maximum duration for the Transponder command can be defined.

The TR-RESPONSE-TIME starts after the Reader has received a new command. At the latest after the TR-RESPONSE-TIME elapsed the Reader will send an answer protocol. In this case, the current commands between Reader and Transponder are aborted. If this time is too short the Interface Status " 0x83 RF Communication Error" will appear.

	max. response duration
TR-RESPONSE-TIME	0...65535 * 5 ms

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

Note:

- ***TR-RESPONSE-TIME has no effect with the protocols for Reader Configuration and the protocols for Reader Control.***
- ***The TR-RESPONSE Time must be < "Block Timeout" in the Host COM-Port settings.***

Protocol Mode: ..***(HostInterface.Miscellaneous.ProtocolSelection)***

By setting of this parameter the Protocol Mode can be enabled

0x00: support of Advanced Protocol Mode (default)

0x01: support of Advanced and Standard Protocol Mode.

We recommend to use Advanced Protocol Mode!
See: 3.2. Serial Data Format and Protocol Frames

SCAN-INTERFACE: (*OperatingMode.ScanMode.Interface*)

Selection of the communication port for Scan-Mode

Bit	7	6	5	4	3	2	1	0
Function	HID_DELAY		-			IF-NO		

IF-NO: Interface Number
b000: RS232
b001: RS485
b010: USB
b011: **- do not use –**
b1xx: **- do not use –**

HID_DELAY:

By means of this parameter the data output in Scan-Mode (HID) can be delayed if used with slow host systems.

HID_DELAY	Delay
b00	1 ms
b01	5 ms
b10	10 ms
b11	30 ms

INTERFACE: (*HostInterface.Interfaces*) (only for ID ISC.MR012-E)

By setting of this parameter the Network-Discovery can be enabled

0x00: Network-Discovery disabled.

0x80: Network-Discovery enabled.

The Network-Discovery is the functionality that allows to discover and to setup the network configuration of the FEIG-Network-Reader with UDP commands (UDP = User Data Protocol).

READER-MODE: *(OperatingMode.Mode)*

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

Bit:	7	6	5	4	3	2	1	0
Function:	NF-E		0	0	0	0	0	SCAN-E

SCAN-E:

By setting of this bit the Scan-Mode can be enabled

b0: **Host Mode** (see chapter 7. Protocols for ISO15693 Host Commands)
b1: **Scan Mode**

NF-E:

By setting of this bit the Notification Mode can be enabled

b00: **Off**
b11: **On**

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

		Bit							
		7	6	5	4	3	2	1	0
Reader Mode	Host-Mode	0	0	0	0	0	0	0	0
	Scan Mode	0	0	0	0	0	0	0	**1**
	Notification Mode	**1**	**1**	0	0	0	0	0	0

4.3. CFG2: Inputs / Outputs general

Via the following parameters the operation mode of the LED can be configured at any time. One byte each is reserved for the active and mute position, by means of which the individual operation modes according to the schedule below may be adjusted. In addition to this, for the active- and mute position different flashing frequencies of the LED may be defined. So, the LED may be used as an operation indicator.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	0x00	IDLE-STATE	IDLE-FLASH	0x00	0x00
Default				0xA9	0x00		

Byte	7	8	9	10	11	12	13
Contents	ACTIV-STATE	ACTIV-FLASH	ACTIV-GRN-TIME	ACTIV-RED-TIME	0x00	0x00	0x00
Default	0x26	0x00	0x0A	0x0A			
			1 sec.	*1 sec.*			

Note:

- ***The following configuration values are not valid for the ID ISC SPAD102.***
- ***The blue LED on the ID ISC SPAD102 will be active if the HF-field is active.***
- ***The blue LED on the ID ISC SPAD102 will flash slowly if a tag has been detected.***
- ***The Readers ID ISC.MR102 dispose of a two colored LED (red / green). The color orange can be obtained by combining both basic colors red and green.***

Colors

LED Color:	red	green
red	1	0
green	0	1
orange	1	1

IDLE-STATE / ACTIVE-STATE

One byte each for idle- and tag-detect state is used to set the operation mode of the signal transmitter.

Bit:	7	6	5	4	3	2	1	0
Function:	Startup LED	0	0	0	RED		GRN	

GRN / RED /Output ***(DigitalIO.Signaler.LED.Green.IdleState)***
(DigitalIO.Signaler.LED.Green.ActiveState)
(DigitalIO.Signaler.LED.Red.IdleState)
(DigitalIO.Signaler.LED.Red.ActiveState)

Bit Combination	Signal device
b00	unchanged
b01	on
b10	off
b11	flashing

Startup LED (only idle state) ***(DigitalIO.Signaler.Enable_StartupSignal)***

When this option is selected, the Reader will switch the LEDs on for two seconds to indicate that the Reader is ready after the Reader is supplied with power. If the Reader is reset by software, only both LEDs switch on for 2 seconds.

IDLE-FLASH / ACTIV-FLASH: ***(DigitalIO.Signaler.LED.Green.IdleFlashFrequency)***
DigitalIO.Signaler.LED.Green.ActiveFlashFrequency
(DigitalIO.Signaler.LED.Red.IdleFlashFrequency)
(DigitalIO.Signaler.LED.Red.ActiveFlashFrequency)

By means of the two bytes "IDLE-FLASH" and "ACTIV-FLASH" the signal transmitter may be provided with a flashing frequency for idle and active position.

Bit:	7	6	5	4	3	2	1	0
Function:	0		0		RED		GRN	

Bit combination	flashing frequency
b11	1 Hz
b10	2 Hz
b01	4 Hz
b00	8 Hz

ACTIV-xxx-TIME… ***(DigitalIO.Signaler.LED.Green.ActivationTime)***
(DigitalIO.Signaler.LED.Red.ActivationTime)

If a Transponder was detected, the transmitter and the duration can be set by the bytes ACTIV-STATE and ACTIV-FLASH. Each signal transmitter (LED) may be activated temporarily limited.

Signal transmitter	**time range**
ACTIV-GRN-TIME	0...255 x 100 ms
ACTIV-RED-TIME	0...255 x 100 ms

4.4. 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	TAG-DRV[4]		0x00	0x80	0x00	0x00	0x00
Default	0x0009 MR102-A /-B /-U (0x0208 MR102-A /-B /-U) 0x0009 MR102-PoE						

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

TAG-DRV[1]:

Defines the Transponder types that are operated by the Reader.

Byte:	0								1							
Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Driver	0	0	0	0	0	0	**J**	0	0	0	0	0	**D**	0	0	**A**

b0 ⇒ Driver for the Transponder type is inactive

b1 ⇒ Driver for the Transponder type is active

A: ***(Transponder.Driver.HF.ICode1)***
Driver for I-Code 1

D: ***(Transponder.Driver.HF.ISO_15693)***
Driver for ISO15693

J: ***(Transponder.Driver.HF.ISO_18000-3M3)***
Driver for ISO18000-3M3

In principle, only those Transponder drivers should be active that are used in the actual application. Thus, the reaction time of the Reader for Transponder read- / write-operations is reduced and the danger of a parasitic Transponder access is minimized.

Note:

- ***Two different firmware versions are available for the MR102-A /-B /-U.***
  - with support of ISO15693 + I-code1 *(Standard)*
  - with support of ISO15693 + ISO18000-3M3*(Upgrade Code required)*
- ***The standard firmware for the MR102-E supports:***
  - ISO15693 + I-Code1 + ISO18000-3M3*(Upgrade Code required)*

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

FU-COM:

Defines if the Reader itself try to controls a function unit in the RF Line.

Bit:	7	6	5	4	3	2	1	0
Function	DC ON /OFF	Tag Detect	0	0	0	0	0	0

DC ON/OFF…*(AirInterface.Antenna.HF.Miscellaneous.Enable_DCPower)*
defines whether the Reader provides DC voltage on the antenna output for an external LED, e.g. for ID ISC.ANTS370/270-A. (See also Mounting Instruction)
b0 disabled
b1 enabled

Tag Detect
defines whether the Reader provides a tag detect signal on the antenna output for an external LED, e.g. for ID ISC.ANTS370/270-A. (See also Mounting Instruction)
b0 disabled
b1 enabled flashing of blue LED if a tag is detected

4.5. CFG4: Transponder Parameters

The parameters of the CFG4 configuration block contain general Transponder settings.

Byte	0	1	2	3	4	5	6
Contents	ICODE-MODE	0x00	0x00	0x00	ISO 15693 MODE	ISO 15693 AFI	ISO15693 OPTION
Default	0x01				0x0B	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	ISO-CMD-OPTION	0x00	0x00	0x00	0x00	0x00	ISO-Blocksize
Default	0x03						0x04

ICODE-MODE: (only I-Code 1 Transponders)

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

FAST ***(Transponder.HF.ICode1.LinkRate.FastMode)***

b1 Fast Mode (1 / 1)

ISO 15693 MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	AFI	NO-TS	DATA-RATE	SUB-CARRIER	MOD	DATA CODING

DATACODING

b0 **- do not use -**

b1 Fast Mode (1 / 4)

MOD

b0 **- do not use -**

b1 10%

SUB-CARRIER

b0 ASK (one sub-carrier)

b1 **- do not use -**

DATA-RATE

b0 **- do not use -**

b1 high

NO-TS…*(Transponder.HF.ISO_15693.Anticollision.NoOfTimeslots)*

b0 16 timeslots
b1 1 timeslot

Note:

Anticollision (reading of more than one transponder at the same time) is possible with-1- and 16-timeslots

ISO 15693 AFI: ***(Transponder.HF.ISO_15693.SelectionMask.Enable_AFI)***

Application Family Identifier to select a Transponder

b0 Disabled
b1 Enabled

ISO 15693 OPTION:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	WR-OPTION		0	0

WR-OPTION: ***..(Transponder.HF.ISO_15693.Miscellaneous.WriteOption)***

b00: automatically set
b10: Tag Option = 0
b11: Tag Option = 1

Note:

If WR-OPTION is automatically set, the Reader sets the WR-OPTION to 0, if the ISO15693 Host Command is in non-addressed mode

ISO-CMD-OPTION: (only ISO15693 Transponder driver)

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

BREAK ***(Transponder.HF.ISO_15693.Miscellaneous.CommandBreak)***

b11 Complete timeslot length at “NO Transponder”

ISO-Blocksize:

Bit:	7	6	5	4	3	2	1	0
Function	Read Mode		Blocksize	DB-Blocksize				

DB-Blocksize:…*(Transponder.HF.ISO_15693.Miscellaneous.ReadOption.)*

Defines the block size of an ISO-transponder which is not listed in the MFR-table (see: 8.3. Supported ISO15693 Host commands for ISO15693 Transponders) or if the transponder is used in the non-addressed mode.

Range: 0x01 ... 0x1F
A value of 0x00 will be automatically set to a block size of 4byte.

Blocksize:…*(Transponder.HF.ISO_15693.Miscellaneous.ReadOption.)*

b0: Automatic (If transponder is known)
b1: Manuel (As specified in DB-Blocksize)

Read Mode:…*(Transponder.HF.ISO_15693.Miscellaneous.ReadOption.ReadMode)*

b00: Automatic Mode (If transponder is known)
b01 Single Read
b10 Multiple Read

4.6. CFG5: Anticollision

The parameters of the CFG5 configuration block contain anticollision settings.

Byte	0	1	2	3	4	5	6
Contents	TIMESLOTS[5]	0x00	0x00	0x00	0x00	0x00	0x00
Default	0x31						

Byte	7	8	9	10	11	12	13
Contents	0x00	0x00	0x00	0x00	Anticollision	0x00	0x00
Default				0x04			

TIMESLOTS[1]: (only I-Code 1 Transponders)

Number of timeslots with which Transponders will be read.

Bit:	7	6	5	4	3	2	1	0
Function	0	MAX-TS			0	MIN-TS		

MIN-TS:…*(Transponder.HF.ICode1.Anticollision.MinimalTimeslots)*

Minimum number of timeslots.

MAX-TS:…*(Transponder.HF.ICode1.Anticollision.MaximalTimeslots)*

Maximum number of timeslots.

MIN-TS / MAX-TS	Number of Timeslots
b011	16
b010	8
b001	4
b000	1

Each I-Code 1 Transponder responds in a chosen timeslot. Choosing too much timeslots compared to the number of Transponders in the antenna field means that only a small number of Transponders can be selected at one time. On the other hand are too many timeslots is very time consuming. The optimum number of timeslots is about twice the number of Transponders expected in the antenna field at the same time.

The Reader calculates the expected number of Transponders and sets the corresponding number of timeslots between MIN-TS and MAX-TS. To set up a fixed timeslot, both MIN-TS and MAX-TS must contain the value of the desired timeslot.

Anticollison: (ISO15693 / I-Code 1 Transponders)***(Transponder.Anticollision.Enable)***

b0: anticollision disabled

b1: anticollision enabled

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

4.7. CFG6: Customer Command Option Bytes

Byte	0	1	2	3	4	5	6
Contents	0x00	**EM**	**FUJITSU**	**Infineon**	**KSW**	0x00	**NXP**
Default		0x00	0x00	0x00	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	**ST**	0x00	**TI**	0x00	0x00	0x00	0x00
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Note:

There are application notes available from FEIG ELECTRONIC GmbH for the description of the customer commands.

It is also recommended to read the transponder specification from the according transponder manufacturer.

4.8. CFG7 - 10: Reserved

The configuration block CFG7-10 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

4.9. CFG11 Read Mode Data

The parameters of the CFG11 configuration block contain Scan Mode settings.

Byte	0	1	2	3	4	5	6
Contents	TR-DATA-1	TR-DATA-2	TR-DATA-3	0x00	DB-ADR		0x00
Default	0x01	0x00	0x00		0x0000		

Byte	7	8	9	10	11	12	13
Contents	0x00	DB-N		0x00	D-START	D-LGT	
Default		0x0001			0x00	0x0004	

Note:

- ***Changing of parameter only becomes effective after writing / saving configuration block CFG12 to EEPROM and reset of the RF Controller with 6.4. [0x64] System Reset in mode 0x00.***

TR-DATA-1:

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	Extension	0	TIMER	0	Byte Order DB	0	DB	SNR

SNR … ***(OperatingMode.NotificationMode.DataSelector.UID)***
(OperatingMode.ScanMode.DataSelector.UID)
b0: no Serial Number will be stored
b1: Serial Number will be stored

DB ***(OperatingMode.NotificationMode.DataSelector.Data)***
(OperatingMode.ScanMode.DataSelector.Data)
b0: no data block will be stored
b1: data block will be stored

Byte Order DB ***(OperatingMode.NotificationMode.DataSource.ByteOrderOfData)***
(OperatingMode.ScanMode.DataSource.ByteOrderOfData)
b0: MSB first
b1: LSB first

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

see chapter 6.12. [0x85] Set System Timer for details).

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	-	-	-	-	-	-	MAC	-

MAC:

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

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

TR-DATA-3:

Selects the data types for read operation.

Bit:	7	6	5	4	3	2	1	0
Function	-	-	-	READ_COMPLETE_BANK	-	-	-	COM Prefix

COM Prefix: (Scan Mode only)

(OperatingMode.ScanMode.DataFormat.BusAddressPrefix)

b0: no COM Prefix is send

b1: The Reader will transmit the COM-ADR before each data set.

READ_COMPLETE_BANK:

***OperatingMode.ScanMode.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.

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

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	0	BANK_NR	

BANK_NR: **(*OperatingMode.ScanMode.DataSource.BankNo*)**
(*OperatingMode.NotificationMode.DataSource.BankNo*)
In case of ISO18000-3M3 Transponder BANK_NR is defined as follows:
b00 reserved
b01 EPC memory bank
b10 TID memory bank
b11 User memory bank

DB-ADR[1]: ***(OperatingMode.NotificationMode.DataSource.FirstDataBlock)***
(OperatingMode.ScanMode.DataSource.FirstDataBlock)
0x00...0xFF
Address of first data block. Range: 0x00...0xFF.

DB-N [6]: ***OperatingMode.NotificationMode.DataSource.NoOfDataBlocks***
OperatingMode.ScanMode.DataSource.NoOfDataBlocks
Number of data blocks.

D-START: **(OperatingMode.ScanMode.DataSource.FirstByte)**
This parameter defines the first byte in the raw data (defined by DB-ADR and D-LGT), which will be transferred in Scan-Mode. To transfer the whole data block D-START must be set to 0.

Note:
The size of one data block depends on the type of Transponder.

D-LGT: ***OperatingMode.ScanMode.DataSource.NoOfBytes***
D-LGT defines the length of raw data which are transmitted in the Scan-Mode.

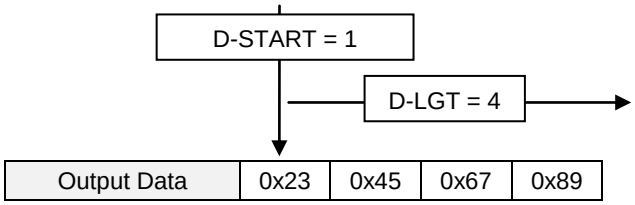
Number of **data bytes** to be transferred, starting with the D-START.

Note:
The maximum number of data block bytes is limited to 64bytes

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

Example:
data block

Byte	0	1	2	3	4	5	6	7
Data	0x01	0x23	0x45	0x67	0x89	0xAB	0xCD	0xEF



Output Data	0x23	0x45	0x67	0x89

4.10. CFG12: Read Mode - Filter

Byte	0	1	2	3	4	5	6
0x00	VALID-TIME[1]		TR-ID				0x00
Default	0x0037 5,5sec.		0x01	0x00	0x00	0x01	

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

VALID-TIME: (0...65535 x 100 ms = 0 ms ... 6553,5 sec)

(OperatingMode.NotificationMode.Filter.TransponderValidTime)
(OperatingMode.ScanMode.Filter.TransponderValidTime)

The period of time during which a Transponder can't be read a 2nd time.

Note:

- ***Changing of VALID-TIME only becomes effective after writing configuration block CFG12 to EEPROM and reset of the RF Controller with 6.4. [0x64] System Reset in mode 0x00.***

TR-ID: (only for Scan Mode and Notification Mode)

TR-ID sets the parameters for Transponder identification.
If several Transponders has the same content in the addressed data block, only one dataset will be generated.

Byte:	2	3	4	5
Function	TR-ID-SOURCE	TR-ID-DB-ADR		TR-ID-DB-N

TR-ID-SOURCE: ***(OperatingMode.Miscellaneous.TransponderIdentification. Source)***

Sets the data source for Transponder identification.
b0 data block
b1 Serial Number

TR-ID-DB-ADR ***(OperatingMode.Miscellaneous.TransponderIdentification. DataBlockNo)***

Sets the address of the data block for Transponder identification. If ID-SOURCE selects the Serial Number as data source, the ID-DB-ADR will be ignored.

TR-ID-DB-N ***(OperatingMode.Miscellaneous.TransponderIdentification. NoOfDataBlocks)***

Sets the number of data blocks to be read for Transponder identification. If ID-SOURCE selects the Serial Number as data source, the ID-DBN will be ignored.

4.11. CFG13 Scan Mode

The configuration block CFG13 contains the Scan Mode settings

Byte	0	1	2	3	4	5	6
Contents	DB-USE	SEP-CHAR	SEP-USER	END-CHAR	END-USR1	END-USR2	END-USR3
Default	0x02	0x20	0x2C	0x01	0x00	0x00	0x00

Byte	7	8	9	10	11	12	13
Contents	0x00	HEADER-USR1	HEADER - USR2	HEADER - USR3	HEADER - USR4	0x00	LEN-USR
Default		0x00	0x00	0x00	0x00		0x00

DB-USE:

Defines the data format of the data and the value of the data.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	DB-FORMAT			

DB-FORMAT ***(OperatingMode.ScanMode.DataFormat.Format)***

b0000 unformatted hex-data

In this case the data are transferred as they were read by the reader

b0010 ASCII formatted hex-data

In this case the raw data from the Transponder were converted to ASCII - Code before transfer. For this purpose, the data bytes first are separated into their Nibbles and then changed into ASCII signs according the following table.

raw data (hex / binary)		ASCII data (ASCII / hex)	
0x0	b0000	'0'	0x30
0x1	b0001	'1'	0x31
0x2	b0010	'2'	0x32
0x3	b0011	'3'	0x33
0x4	b0100	'4'	0x34
0x5	b0101	'5'	0x35
0x6	b0110	'6'	0x36
0x7	b0111	'7'	0x37
0x8	b1000	'8'	0x38
0x9	b1001	'9'	0x39
0xA	b1010	'A'	0x41
0xB	b1011	'B'	0x42
0xC	b1100	'C'	0x43
0xD	b1101	'D'	0x44
0xE	b1110	'E'	0x45
0xF	b1111	'F'	0x46

SEP-CHAR: ***(OperatingMode.ScanMode.DataFormat.SeparationChar)***

Selects the separation character between two data types for the send data.

Bit:	7	6	5	4	3	2	1	0
Function	USER	‘ ‘	‘,‘	‘;’	TAB	CR	LF	CR+LF

ASCII	Hex
CR+LF	0x0D and 0x0A
LF	0x0A
CR	0x0D
TAB	0x09
‘;’	0x3B
‘,’	0x2C
‘ ‘	0x20
USER	user defined in SEP-USR
none	0x00

Note:

Only one option could be selected.

SEP-USR: ***(OperatingMode.ScanMode.DataFormat.UserSeparationChar)***

User defined separation character.

END-CHAR: ***(OperatingMode.ScanMode.DataFormat.EndChar)***

Selects the end character between two data types for the send data.

Bit:	7	6	5	4	3	2	1	0
Function	USER	‘ ‘	‘,‘	‘;’	TAB	CR	LF	CR+LF

ASCII	Hex
CR+LF	0x0D and 0x0A
LF	0x0A
CR	0x0D
TAB	0x09
‘;’	0x3B
‘,’	0x2C
‘ ‘	0x20
USER	user defined in SEP-USR
none	0x00

Note:

Only one option could be selected.

END-USR1...3: ***(OperatingMode.ScanMode.DataFormat.UserEndCharx)***

User defined end character.

HEADER-USR1...4: ***(OperatingMode.ScanMode.DataFormat.UserHeaderCharx)***

User defined Header character.

LEN-USR:

Defines the length of the HEADER character and END character.

Bit:	7	6	5	4	3	2	1	0
Function	HEADER-LEN				END-LEN			

END-LEN ***(OperatingMode.ScanMode.DataFormat.NoOfUserEndChars)***

b0000 END-USR1

b0001 END-USR1

b0010 END-USR1 +2

b0011 END-USR1 + 2 + 3

HEADER-LEN ***(OperatingMode.ScanMode.DataFormat.NoOfUserHeaderChars)***

b0000 no HEADER byte

b0001 HEADER-USR1

b0010 HEADER-USR1 +2

b0011 HEADER-USR1 + 2 + 3

b0100 HEADER-USR1 + 2 + 3 + 4

Example of scan data:

COM-ADR	**Separation Character**	**Header**				**UID**	**Separation Character**	**Blocks**	**Separation Character**	**Timer**
COM-ADR	SEP-CHAR	USR1	USR2	USR3	USR4	UID	SEP-CHAR	DB	SEP-CHAR	Timer

END Character		
USR1	USR2	USR3

4.12. CFG14-15: Reserved

The configuration block CFG14-15 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

4.13. CFG16: Persistence Reset

The parameters in CFG16 are used to configure the Reader reset timing of the persistence flags of the Transponders. The timing for reset of the persistence flags is used by the Reader in Host Mode and Scan Mode.

Byte	0	1	2	3	4	5	6
Contents	0x00	0x00	PER-RESET-TIME		0x00	0x00	0x00
Default	0x00	0x00	0x0028 40 x 5ms = 200ms		0x00	0x00	0x00

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

PER-RESET-TIME:

(Transponder.PersistenceReset.Antenna.No1.PersistenceResetTime)

The timer value specifies a time which determine the reset of the Transponder persistence flags by the Reader. The timer PER-RESET-TIME starts after the Reader gets a response at the antenna port. After this time has expired the Reader send a persistence reset command to the Transponders at the antenna port.

Timer ticks = 5ms

Maximum timer value = 5ms x 65534[0xFFFE] = 5,46125 min.

The value 65535 [0xFFFF] indicates that no persistence reset is performed by the Reader

4.14. CFG17-19: Reserved

The configuration blocks CFG17-19 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

4.15. CFG20: RF-Parameter

The parameters of the CFG20 configuration block contain the receiver settings.

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	Ignore-Error	0x00	0x00	0x00	0x00	0x00	RF-ON HOLDTIME
Default	0x00						0x00

IGNORE-ERROR :

Defines whether a error has valid data or not.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	0	Weak Collision ISO18000-3M3	Weak Collision ISO15693

Weak Collision ISO15693:

(AirInterface.Miscellaneous.HF.ISO_15693_ICode1.ErrorHandling.Weak-Collision)

b1: a weak collision has valid data

b0: a weak collision has corrupted data and the data will be ignored

Weak Collision ISO18000-3M3:

(AirInterface.Miscellaneous.HF.ISO_18000_3M3.ErrorHandling.WeakCollision)

b1: a weak collision has valid data

b0: a weak collision has corrupted data and the data will be ignored

RF-ON HOLDTIME:

Defines the time after the RF-Field will switch off automatically after tag communication.

Unit: 100ms

0x00: RF-Field will not switch off

4.16. CFG21: Reserved

The configuration blocks CFG21 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

4.17. CFG22-23: Selection mask for ISO18000-3M3

The configuration blocks CFG22 … 23 hold a selection mask for selection ISO18000-3M3 Transponders..

CFG 22:

Byte	0	1	2	3	4	5	6
Contents	S_MASK_LGT	S_MODE	S_START_ POINTER		S_MASK_MSB		
Default	0x00	0x00	0x0000		0x00	0x00	0x00

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

CFG 23:

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

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

S_MASK_LGT: ***(Transponder.HF.ISO_18000_3M3.SelectionMask.No1.MaskLength)***

Defines the length of the mask in Bit

If S_MASK_LGT is 0 the selection mask is disabled

S_MODE: ***(Transponder.HF.ISO_18000_3M3.SelectionMask……***

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

S_BANK: ***(Transponder.HF.ISO_18000_3M3.SelectionMask.No1.Bank)***

Defines whether mask applies to EPC, TID, User memory

b00 reserved

b01 EPC memory bank

b10 TID memory bank

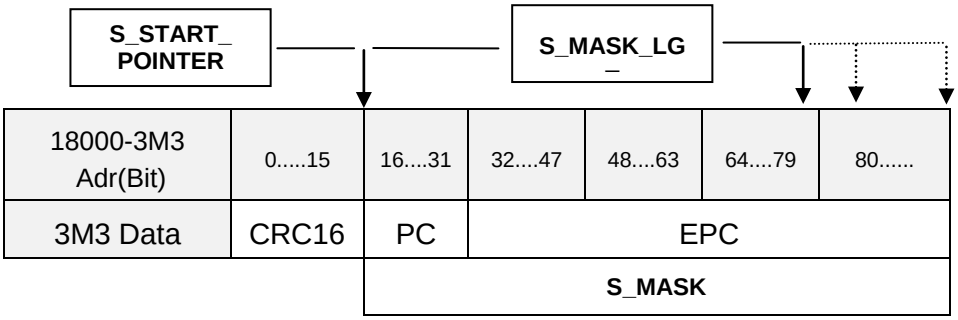
b11 User memory bank

S_START_POINTER: ***(Transponder.HF.ISO_18000_3M3.SelectionMask.No1.FirstBit)***

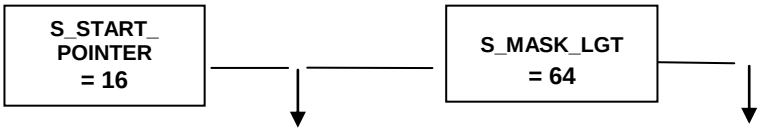
Defines the memory bit address on which the bit String of the Mask is compared to the memory of the Tag.

S_MASK: ***(Transponder.HF.ISO_18000_3M3.SelectionMask.No1.Mask)***

contains the bit string that the Tag compares against the memory location.

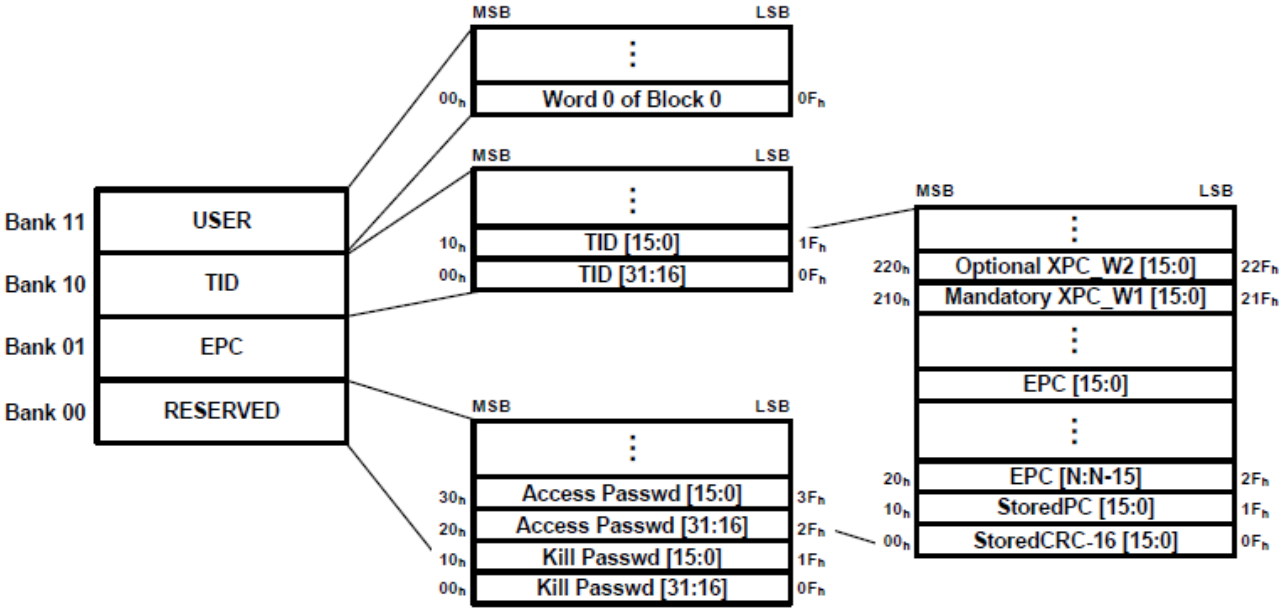


Example:



18000-3M3 Adr(Bit)	0.....15	16....31	32....47	48....63	64....79	80.....		Transponder Response
EPC 1	CRC16	0x3000	0xA02A	0x0510	0x15A0	0x1234	-->	**YES**
EPC 2	CRC16	0x3000	0xA02A	0x0510	0x15A0	0x6789	-->	**YES**
EPC 3	CRC16	0x3000	0xA02A	0x0510	0x15A**1**	0x6789	-->	**NO**
S_MASK	**not checked**	**0x3000**	**0xA02A**	**0x0510**	**0x15A0**	**not checked**		

18000-3M3 Memory specification:



4.18. CFG24-32: Reserved

The configuration blocks CFG24-32 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

4.19. CFG33-34: LAN-Hostname

The configuration block CFG33 and 34 hold the LAN-Hostname.

CFG 33:

Byte	0	1	2	3	4	5	6
Contents	LENGTH	LAN-HOSTNAME					
Default	0x00	0x000000000000					

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

CFG 34:

Byte	14	15	16	17	18	19	20
Contents	LAN-HOSTNAME						
Default	0x00000000000000						

Byte	21	22	23	24	25	26	27
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

4.20. 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

4.21. CFG40: LAN Settings, Part 1 *(only for MR102-PoE, SPAD102-E)*

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

Byte	7	8	9	10	11	12	13
Contents	-	IP_PORT_NUMBER_LAN		-	-	-	-
Default	0x00	0x27	0x11	0x00	0x00	0x00	0x00
		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 of the LAN-adapter.

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 of the LAN-adapter.

4.22. CFG41: LAN Settings, Part 2 *(only for MR102-PoE, SPAD102-E)*

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*	0x19	0x02	0x00

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

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.

AUTO-NEGOTIATION: **(*(HostInterface.LAN.Autonegotiation.Disable)***

b0: enabled

b1: disabled

HOST-NAME: **(*(HostInterface.LAN.Hostname.Enable)***

b0: disabled

b1: enabled

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

b0: half

b1: full

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

b0: 10 MBit/s

b1: 100 MBit/s

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

b0: dhcp-client disabled.

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.

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

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.

Notes:

- ***The command 5.3. [0x83] Set Default Configuration 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.***

4.23. CFG49: Notification Channel *(only for MR102-PoE, SPAD102-E)*

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

Byte	7	8	9	10	11	12	13
Contents	DEST-IP-ADDRESS				DEST-IP-PORT		HOLD-Time
Default	0x00	0x00	0x00	0x00	0x00	0x00	0x01

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	DATA-TRIGGER	

DATA-TRIGGER:

b00: continuously

The data records are notified always immediately. For detailed message conditions, see. The message format is described in 9. Protocols for Notification Mode.

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

TIME-TRIGGERED-TIME:
(OperatingMode.NotificationMode.Transmission.TimeTriggeredTime)

Defines the cycle time in time-triggered mode.

	max. time period
TIME-TRIGGERED-TIME	0...255 * 1s

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.

4.24. 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

5. Protocols for Reader Configuration

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

5.1. [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

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

Host ← Reader

1	2	3	4	5	6	7 .. 20	21-22
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x80]	STATUS[7]	CFG-REC	CRC16

CFG-ADR[8]:

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.

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

[8] *see Chapter 4. Configuration Parameters (CFG)*

5.2. [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 4. Configuration Parameters (CFG)

Host → Reader

1	2	3	4	5	6	7...20	21-22
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	CFG-ADR	CFG-REC	CRC16

Host ← Reader

1	2	3	4	5	6	7-8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x81]	STATUS[9]	CRC16

CFG-ADR[10]:

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.

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

[10] *see chapter 4. Configuration Parameters (CFG)*

5.3. [0x83] Set Default Configuration (Reset)

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

Host → Reader

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

Host ← Reader

1	2	3	4	5	6	7...8
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

Notes:

- ***A set default configuration with reserved configuration blocks will cause an error code.***
- ***It is not possible to reset the TCP/IP setting in CFG40-49 to default.***

6. Protocols for Reader Control

6.1. [0x52] Baud Rate Detection

This protocol serves to determine the actual baud rate of the Reader's asynchronous interface.

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x52]	0x00	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x52]	0x00	CRC16

Note:

- ***The return protocol will only be sent if the inquiry is executed with the baud rate and actual parity of the Reader.***
- ***A USB reader will send status 0x00 (OK) if reader can be detected.***

6.2. [0x55] Start Flash Loader

This protocol starts the Flash Loader inside the Reader. Use the windows program "OBIDFirmwareUpdateTool" to process the firmware update. Please refer to the Application Note "N30300-....pdf" for details.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	0x00	[0x55]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	0x00	[0x55]	0x00	CRC16

Note:

- ***This command is only available if the correct COM-ADR of the Reader is used. (Do not use 0xFF)***
- ***Do not flash the DSP-Revision G or greater with Firmwareversion's less than 1.09. See 6.5. [0x65] Get Software Version***

6.3. [0x63] Software Reset

This protocol allows you to perform a reset of Reader CPU.

Host → Reader

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

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x63]	STATUS[11]	CRC16

Note:

- ***The RF-field will be switched off after a "CPU Reset"***
- ***The communication interface will not be reset.***

6.4. [0x64] System Reset

This protocol allows you to reset the RF Controller.

Host → Reader

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

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	STATUS[12]	CRC16

MODE:

Defines the controller which will be reset.

MODE	Controller
0x00	RF Controller

Note:

- ***The RF-field will be switched off after a "CPU Reset"***
- ***The communication interface will be reset.***

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

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

6.5. [0x65] Get Software Version

This protocol allows you to determine, the software version of the Reader, its type and the types of the Transponders which are supported by the software.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x65]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8	9
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x65]	STATUS[13]	SW-REV	D-REV

10	11	12,13	14,15
HW-TYPE	SW-TYPE	TR-TYPE	CRC16

SW-REV:

Version of the firmware.

D-REV:

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

HW-TYPE:

Displays options which are supported by the Reader Hardware

Bit:	7	6	5	4	3	2	1	0
Function:	reserved	reserved	reserved	reserved	reserved	HWV	A-Power	USB

USB:

b0: USB

b1: non USB

A-Power:

b0: reserved

b1: 1,2 Watt

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

HWV:

b0: new HW (2017)

b1: old HW

SW-TYPE:

Displays the type / model of the Reader
(see: ANNEX G: Codes of Reader Types)

TR-TYPE:

Displays the Transponders supported by the software.

Bit:	15	14	13	12	11	10	9	8
Function:	-	-	-	-	-	-	ISO18000-3M3	-

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	ISO 15693	-	-	I-Code1

Note:

- ***Only ID ISC.MR102-E can support all three transponder types with the same firmware***
- ***Firmware for ID ISC.MR102-A/-B/-U can support ISO15693 and I-Code1 or ISO15693 and 18000-3M3. Different firmware versions are available.***

6.6. [0x66] Get Reader Info

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

Host → Reader

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

Host ← Reader

Depending on the MODE Parameter the reader response has a differing structure with several information's:

Mode = 0 [0x00] (Controller Firmware)

1	2	3	4	5	6	7,8	9
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	STATUS[14]	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

Host ← Reader

Mode = 128 [0x80] (Device_ID)

1	2	3	4	5	6	7-10	11...14
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	res.	CRC16

MODE:

Via the Parameter MODE different information could requested from the Reader.

0x00: General hard- and firmware information's

0x80: Device-ID
This Information's are necessary for some firmware updates or firmware upgrades.

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

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

SW-REV / D-REV / HW-TYPE / SW-TYPE / TR-TYPE:

see: 6.5. [0x65] Get Software Version

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.

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.

6.7. [0x69] RF Reset

The RF-field of the Reader antenna can be switched off for **t_{rf} = 15 ms** by the command RF Reset. Thus, all Transponders which are within the antenna field of the Reader will be reset to their base setting.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x69]	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x69]	STATUS[16]	CRC16

Notes:

- ***After a RF Reset the Reader is not able to receive a new Transponder before expiration of t_{rf} .***
- ***After a RF Reset, a Transponder which is located within the field has to be re-selected.***
- ***The response of this command will be sent after the RF Reset was completed.***

6.8. [0x6A] RF ON/OFF

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

Host → Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	RF	CRC16

Host ← Reader

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

RF:

0x00 RF-Field of Reader antenna is OFF
0x01 RF-Field of Reader antenna is ON

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

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

6.9. [0x6D] Get Noise Level

The command Get Noise Level reads the actual Noise Levels from the Reader.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6D]	CRC16

Host ← Reader

1	2	3	4	5	6	7...12	13...14
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6D]	STATUS[18]	NOISE-LEVEL	CRC16

NOISE-LEVEL:

Byte	7,8	9,10	11,12
NOISE-LEVEL	min. NL	avg. NL	max. NL

Value min.NL, avg.NL and max.NL in mV.

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

6.10. [0x6E] Reader Diagnostic

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

Host → Reader

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

Host ← Reader

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

MODE:

Reader Diagnostic Modes

0x01 Listing of detail information for STATUS = 0x84.

DATA:

Response for Reader Diagnostic Modes

MODE = 0x01:

7	8
FLAGS A	FLAGS B

FLAGS A:

Bit:	7	6	5	4	3	2	1	0
Function:	TEMP ALARM	-	-	False Power	-	< |Z| >	NOISE	-

FLAGS B:

Bit:	7	6	5	4	3	2	1	0
Function:	-	-	-	-	-	DC Power Error	-	-

Error Conditions (1st Byte):

Error	Set condition	Clear condition	RF Power	alternating LED red/green 8Hz
False Power	No HF Power	Check antenna connection	OFF	ON
Wrong antenna Impedance	absolute impedance value |Z|<<50Ω<<|Z|	Check and tune antenna	ON	ON
	HF-short circuit		OFF	
NOISE	Noise to high	Check environment, antenna, cable	ON	ON
DC Power Error	Short circuit on antenna output and DC < 1V	Check cable and antenna	ON	ON
TEMP ALARM	temp ≥ alarm level ≥100°C	temp < alarm level	OFF	ON

6.11. [0x72] Set Output

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

Via this command 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 over-written by the new times included in the command if they are > 0.

Host → Reader

1	2	3	4	5	6	7
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

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x72]	STATUS	CRC16

Mode: 0x01

OUT-N:

Defines the number of output records.

OUT-NR:

Defines the type and the number of the output

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

OUT-Typ:

b001 LED
b000 Output (blue LED on ID ISC.SPAD or ID ISC.ANTS370270)

OUT-Number:

b0001 LED green or Output (blue LED on ID ISC.SPAD or ID ISC.ANTS370270)
b0010 LED red

Notes:

- ***The blue LED on ID ISC.SPAD or ID ISC.ANTS370270 need an active H-field and must be configured in 4.4. CFG3: RF-Interface***

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	0	0	OUTx-mode	

OUTx-mode:

b00: OFF
b01: ON
b10: FLASHING SLOW
b11: FLASHING FAST

OUT-TIME:

By the values defined by “OUT-TIME” the outputs can be activated temporary limited or unlimited.
Accepted 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 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.***

6.12. [0x85] Set System Timer

The Set System Timer command sets the internal system timer of the CPU. The actual internal system time is stored in each data set after a Transponder select, read or write command.

Host → Reader

1	2	3	4	5	6-9	10,11
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x85]	TIMER	CRC16

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x85]	STATUS	CRC16

TIMER:

Byte	6	7	8,9
TIME	h	min	ms
	0...23	0...59	0...59999

Note:

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

6.13. [0x86] Get System Timer

The Get System Timer command reads the internal system timer of the CPU.

Host → Reader

1	2	3	4	5	6,7
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x86]	CRC16

Host ← Reader

1	2	3	4	5	6	7...10	11...12
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x86]	STATUS[1]	TIMER	CRC16

TIMER:

Byte	7	8	9,10
TIMER	h	min	ms
	0...23	0...59	0...59999

Note:

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

6.14. [0xA0] Reader-Login

The Reader-Login must be executed after every power up or **6.4. *[0x64] System Reset*** command, if an access to the configuration parameters is desired.

Host → Reader:

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

Host ← Reader

1	2	3	4	5	6	7,8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	STATUS[19]	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 4.1. CFG0: Passwords.

NOTE:

- ***A Reader-Login with wrong READER-ID cause a "Logout".***
- ***A "Logout" can be effected via the command 6.4. *[0x64] System Reset*.***

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

7. Protocols for ISO15693 Host Commands

Some ISO15693 Host commands can be used to access ISO15693, I-Code 1 and ISO18000-3m3 Transponders. The following combinations are possible:

	Transponder Types		
	ISO15693	I-Code 1	ISO18000-3m3
7.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands	√	√	√
7.1.1. [0x01] Inventory	√	√	√
7.1.2. [0x02] Stay Quiet	√	-	-
7.1.3. [0x22] Lock Multiple Blocks	√	-	-
7.1.4. [0x23] Read Multiple Blocks	√	√	√
7.1.5. [0x24] Write Multiple Blocks	√	√	√
7.1.6. [0x25] Select	√	-	-
7.1.7. [0x26] Reset to Ready	√	-	-
7.1.8. [0x27] Write AFI	√	-	-
7.1.9. [0x28] Lock AFI	√	-	-
7.1.10. [0x29] Write DSFI	√	-	-
7.1.11. [0x2A] Lock DSFI	√	-	-
7.1.12. [0x2B] Get System Information	√	-	-
7.1.13. [0x2C] Get Multiple Block Security Status	√	-	-
[0xB3] EPC Commands	-	-	√
8.1.1. [0xB3] [0x18] Kill	-	-	√
8.1.2. [0xB3] [0x22] Lock	-	-	√

7.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands

This command sends ISO 15693 defined RF commands to the Transponder.

Host → Reader

1	2	3	4	5	6...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	REQUEST-DATA	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	STATUS	RESPONSE-DATA	CRC16

REQUEST-DATA:

Command specific request

RESPONSE-DATA:

Command specific response

Notes:

- ***Data is only transferred if STATUS = 0x00, 0x83, 0x94, 0x95.***
- ***These commands aren't available if Scan-Mode, or Notification Mode is active.***

7.1.1. [0x01] Inventory

This command reads the UID of all Transponders inside the antenna field. If the Reader has detected a new Transponder, the Transponder will be automatically set in the quiet state by the Reader. In this state the Transponder does not send back a response for the next inventory command.

The Transponder sends back a response every time:

- if the Transponder has left the antenna and reentered the antenna field or
- if a 6.7. [0x69] RF Reset command was send to the Reader or
- if the Persistence Reset Time has expired.
- 4.6. CFG5: Anticollision is disabled

REQUEST-DATA

6	7
0x01	MODE

RESPONSE-DATA **(standard)**

7	8	9	10...17
DATA-SETS	TR-TYPE	DSFID	IDD
	Repeated DATA-SETS times		

RESPONSE-DATA **(ISO18000-3M3 Transponder)**

RESPONSE-DATA if ANT = 0

7	8	9	10	11...n
DATA-SETS	TR-TYPE	IDDT	IDD_LEN	IDD
	Repeated DATA-SETS times			

MODE:

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

MORE:

b0 new Inventory requested

b1 more data requested (IF Status 0x94 appears-> more data sets are available)

DATA-SETS:

Number of Transponder data sets to be transferred in this Reader response.

TR-TYPE:

Bit:	7	6	5	4	3	2	1	0
Function	RF_TEC		-	-	TYPE_NO			

RF_TEC:

Indicates the RFID - Technology of the present Transponder:
b00: 13,56 MHz Transponder
b10: ISO18000-3M3 Transponder

TYPE_NO

Displays the Transponder type of the present Transponder
(see: ANNEX A: Codes of Transponder Types).

IDDT: (only ISO18000-3M3)

Identifier Data Type
Defines the type of Data transmit beginning at Byte 9.

DSFID: (only ISO15693 Transponders)

Data Storage Family Identifier.

IDD-LEN:

Identifier Data Length defines the length of the IDD in Byte.

IDD:

Identifier Data of the Transponder

Notes:

- ***This command supports all Transponders.***
- ***Depending on the Persistence Reset time settings in 4.13. CFG16: Persistence Reset the transponder can be read a second time after the Persistence Reset time has elapsed.***
- ***If the STATUS byte of the protocol frame has the value 0x94, more UID's can be read out of the Reader with MORE = b1.***
- ***STATUS Byte 0x94 (More Data) is displayed dependence on the Tag Typ:***

Tr-Type	*ISO15693*	*ISO18000-3M3*
amount of Transponder setting status 0x94 *(with Advanced Protocol Length)*	***> 49***	***>29***

7.1.2. [0x02] Stay Quiet

This command sets one Transponder to Quiet State.

REQUEST-DATA

6	7	8-15
0x02	MODE	UID

MODE:

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

ADR:

b001 addressed

UID:

Read only UID of the Transponder.

Note:

- ***This command is only available for ISO15693Transponders.***

7.1.3. [0x22] Lock Multiple Blocks

This command locks one or more data blocks.

The supported ISO15693 Host commands depend on the different ISO15693 Transponder types, they are described in chapter 8.3. Supported ISO15693 Host commands for ISO15693 Transponders.

Note:

This command is only available for ISO15693 Transponders.

REQUEST-DATA

6	7	8	9	1 or 2 Bytes (def. by EXT_ADR)	1 Byte
0x22	MODE	UID	BANK	DB-ADR	DB-N

RESPONSE-DATA (STATUS = 0x03)

7
DB-ADR-E

RESPONSE-DATA (STATUS = 0x95)

7	8
ISO15693 ERROR	DB-ADR-E

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	0	0	ADR		

ADR:

b000 non-addressed
b001 addressed
b010 selected

EXT_ADR:

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and **2** byte DB-ADR Field

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

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	0	BANK_NR	

BANK_NR:

Defines the memory area on the transponder.

b00 reserved
b01 reserved
b10 reserved
b11 User memory bank

DB-ADR:

First block number to be locked. Depending on EXT_ADR. First block can be any value between 0 and 255 or 0 and 65535.

DB-N:

Number of data blocks to be locked from the Transponder, starting at DB-ADR.
The maximum number of DB-N, depends on the interface transmit buffer size TX-BUF.
The maximum number of DB-N is:
(TX-BUF - 10)/(DB-Size+1) ⇒ Standard Protocol
(TX-BUF - 12)/(DB-Size+1) ⇒ Advanced Protocol

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95.

DB-ADR-E:

Block number where the error occurred.

7.1.4. [0x23] Read Multiple Blocks

This command reads one or more data blocks. The supported Host commands depend on the different Transponder types.

REQUEST-DATA

6	7	1 Byte	UID_LNG Bytes	1Byte
0x23	MODE	UID_LNG	UID	BANK

1 Byte	A_PW_LGT Bytes	1 or 2 Bytes (def. by EXT_ADR)	1 Byte
A_PW_LGT	A_PW	DB-ADR	DB-N

RESPONSE-DATA (STATUS = 0x95)

7
TAG ERROR

RESPONSE-DATA

7	8	9	10...n
DB-N	DB-SIZE	SEC-STATUS	DB
		Repeated DB-N times	

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	READ_ COMPLETE _BANK	EXT_ADR	UID_LF	SEC	ADR		

ADR:

b000 non-addressed
b001 addressed
b010 selected

SEC:

b0 SEC-STATUS always = 0x00
b1 security status of followed data block in SEC-STATUS

UID_LF:

If this bit is set the parameter UID_LNG must inserted into the protocol.

b0: The protocol UID_LNG doesn't include the UID_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.

b1: The protocol includes the parameter UID_LNG. The UID has a variable length as defined in UID_LNG.

EXT_ADR:

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and **2** byte DB-ADR Field

READ_COMPLETE_BANK: *(ISO18000-3M3)*

If this bit is set the reader will automatically read out all blocks of the selected memory bank. Only available in the extended address mode.

b0: Reader reads out the memory blocks according to the settings for DB-ADR and DB-N

b1: Read reads out the compete memory bank

Notes:

- ***This functionality is limited to memory banks with a maximum size of 340 Byte.***

UID_LNG:

Is a optional parameter and depends on the setting of UID_LF (see MODE). UID_LNG defines the length of the following UID field.

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

BANK:

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

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

BANK_NR:

In case of ISO18000-3M3 Transponder BANK_NR is defined as follows:

b00 reserved
b01 EPC memory bank
b10 TID memory bank
b11 User memory bank

A_FLAG:

Indicates whether the reader tries to read a ISO18000-3M3 tag in Secured State. If A_FLAG is set the protocol contains the access password.
A_FLAG:
b0 no access password in protocol
b1 access password and access password length in protocol. Reader execute access command

A_PW_LNG:

Length of Access Password.

A_PW:

Access password which is used to access to the secured state of the Tag.

DB-ADR:

First block number to be read. Depending on EXT_ADR. First block can be any value between 0 and 255 or 0 and 65535.

DB-N:

Number of data blocks to be read from the Transponder, starting at DB-ADR.
The maximum number of DB-N, depends on DB-Size and the interface transmit buffer size TX-BUF. The maximum number of DB-N is:
(TX-BUF - 10)/(DB-Size+1) e.g. Block size 4 (DB-N = (512 – 10) / (4+1) = 100).

DB-SIZE:

Number of bytes of one data block. This value depends on the specification of the Transponder

SEC-STATUS: (only ISO15693 Transponder)

Block security status of followed data block. If supported by the ISO15693 transponder.

DB:

Requested data block. The block size is defined by DB-SIZE.

TAG ERROR:

TAG ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Notes:

- ***Only one Transponder can be read in the non-addressed mode.***
  - ***ISO15693:***

- A read from 1 block uses a Read Single Block command to the ISO15693 Transponder.
- If a ISO15693 Transponder does not support Read Multiple Blocks commands several Read Single Block commands are used for this Transponder.

7.1.5. [0x24] Write Multiple Blocks

This command writes one or more data blocks.

REQUEST-DATA

6	7	1 Byte	UID_LNG Bytes	1Byte
0x24	MODE	UID_LNG	UID	BANK

1 Byte	A_PW_LGT Bytes	1 or 2 Bytes (def. by EXT_ADR)	1 Byte	1 Byte	DB-N times DB-SIZE Bytes
A_PW_LGT	A_PW	DB-ADR	DB-N	DB-SIZE	DB
					Repeated DB-N times

RESPONSE-DATA (STATUS = 0x03)

7	(8)
DB-ADR-E	(DB-ADR-E)[1]

RESPONSE-DATA (STATUS = 0x95)

7	8	(9)
TAG ERROR	DB-ADR-E	(DB-ADR-E)[1]

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	UID_LF		ADR		

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID_LF:

If this bit is set the parameter UID_LNG must inserted into the protocol.

b0: The protocol UID_LNG doesn't include the UID_LNG byte and the UID field has a fixed length of 8 byte, from byte 6 to byte 13.

b1: The protocol includes the parameter UID_LNG. The UID has a variable length as defined in UID_LNG.

[1] *used in extended address mode*

EXT_ADR:

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and **2** byte DB-ADR Field

UID_LNG:

Is a optional parameter and depends on the setting of UID_LF (see MODE). UID_LNG defines the length of the following UID field.

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

BANK:

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

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

BANK_NR:

In case of ISO18000-3M3 Transponder BANK_NR is defined as follows:

b00 reserved

b01 EPC memory bank

b10 TID memory bank

b11 User memory bank

A_FLAG:

Indicates whether the reader tries to read a ISO18000-3M3 tag in Secured State. If A_FLAG is set the protocol contains the access password.

A_FLAG:

b0 no access password in protocol

b1 access password and access password length in protocol. Reader execute access command

A_PW_LNG:

Length of Access Password.

A_PW:

Access password which is used to access to the secured state of the Tag.

DB-ADR:

First block number to be read. Depending on EXT_ADR First block can be any value between 0 and 255 or 0 and 65535.

DB-N:

Number of data blocks to be written to the Transponder, starting at DB-ADR.
The maximum number of DB-N, depends on DB-Size and the interface receiver buffer size RX-BUF. The maximum number of DB-N is:
(RX-BUF - 20)/(DB-Size) e.g. Block size 4 (DB-N = (280 – 20) / 4 = 65)

DB-SIZE:

Number of bytes of one data block.

DB:

Data of the data block to be written to the Transponder. The required block size is defined by DB-SIZE. The number of the expected bytes are DB-N * DB-SIZE.

TAG ERROR:

TAG ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

DB-ADR-E:

Block number where the error occurred.

Notes:

- ***If an error occurred during a write command, the number of the block were the error occurred will be send to host***
- ***ISO15693:***
  - ***A write to 1 block uses a Write Single Block command to the Transponder. This will be managed by the Reader internally.***
  - ***If a Transponder does not support Write Multiple Blocks commands several Write Single Block commands are used for this Transponder.***
- ***I-Code1:***
  A write command on I-Code1 Transponders can only be performed in the addressed mode.

7.1.6. [0x25] Select

This command sets one Transponder to the Select State. Only one ISO15693 Transponder can be selected at once. An already selected Transponder will automatically be set to Ready State.

REQUEST-DATA

6	7	8...15
0x25	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b001 addressed

UID:

Read-only UID of the Transponder.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

- ***This command is only available for ISO15693 Transponders.***

7.1.7. [0x26] Reset to Ready

This command sets one Transponder to Ready State.

REQUEST-DATA

6	7	(8...15)
0x26	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

- ***This command is only available for ISO15693 Transponders.***

7.1.8. [0x27] Write AFI

This command writes a new AFI code to one Transponders

The supported ISO15693 Host commands depend on the different ISO15693 Transponder Types,which are described in chapter 8.3. Supported ISO15693 Host commands for ISO15693 Transponders.

REQUEST-DATA

6	7	(8...15)	8 / (16)
0x27	MODE	UID	AFI

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

AFI:

Application Family Identifier of the Transponder.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

This command is only available for ISO15693 Transponders.

7.1.9. [0x28] Lock AFI

This command locks the AFI register in one Transponders.

The supported ISO15693 Host commands depend on the different ISO15693 Transponder types,which are described in chapter 8.3. Supported ISO15693 Host commands for ISO15693 Transponders.

REQUEST-DATA

6	7	(8...15)
0x28	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

This command is only available for ISO15693 Transponders.

7.1.10. [0x29] Write DSFI

This command writes the DSFID to one ore more Transponders.

The supported ISO15693 Host commands depend on the different ISO15693 Transponder types, which are described in chapter 8.3. Supported ISO15693 Host commands for ISO15693 Transponders.

REQUEST-DATA

6	7	(8...15)	8 / (16)
0x29	MODE	UID	DSFID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

DSFID:

Data Storage Format Identifier of the Transponder.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

This command is only available for ISO15693 Transponders.

7.1.11. [0x2A] Lock DSFI

This command locks the DSFID register in one Transponders.

The supported ISO15693 Host commands depend on the different ISO15693 Transponder types, which are described in chapter 8.3. Supported ISO15693 Host commands for ISO15693 Transponders.

REQUEST-DATA

6	7	(8...15)
0x2A	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

MODE:

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

ADR:

b000 non-addressed
b001 addressed
b010 selected

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

Note:

This command is only available for ISO15693 Transponders.

7.1.12. [0x2B] Get System Information

This command reads the system information from one Transponder.

REQUEST-DATA

6	7	(8...15)
0x2B	MODE	UID

RESPONSE-DATA (STATUS = 0x95)

7
ISO-ERROR

RESPONSE-DATA (if EXT-ADR = 0)

7	8...15	16	17...18	19
DSFID	UID	AFI	MEM-SIZE	IC-REF

RESPONSE-DATA (if EXT-ADR = 1)

7	8	9...16	17	18...20	21	22…25
DSFID	INFO-FLAG	UID	AFI	EXT-MEM-SIZE	IC-REF	CL

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT-ADR	0	0	ADR		

ADR:

b000 non-addressed
b001 addressed
b010 selected

EXT-ADR:

Defines the command type.

b0: Standard Get System Information

b1: Extended Get System Information

INFO-FLAG: (only for EXT-ADR = 1)

Response information flag.

Bit	Flag Name	Description
0	DSFID	0: DSFID field is not present 1: DSFID field is present
1	AFI	0: AFI field is not present 1: AFI field is present
2	VICC memory size	0: Data field on VICC memory size is not present 1: Data field on VICC memory size is present

3	IC reference	0: Information on IC reference field is not present 1: Information on IC reference field is present
4	MOI	0: 1 byte addressing 1: 2 byte addressing
5	VICC Command list	0: Data field of all supported commands is not present 1: Data field of all supported commands is present
6	CSI Information	0: CSI list is not present 1: CSI list is present
7	Extended Get System Info parameter Field	0: One byte length of Info flag field 1: Two byte length of Info flag field

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

ISO-ERROR:

ISO15693 error code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

DSFID:

Data Storage Format Identifier of the Transponder.

UID:

The LSB (32bits) from the Read only Serial Number of the Transponder.

AFI:

Application Family Identifier. If not supported by the Transponder, this value will return 0x00.

Manufacturer Code:

Manufacturer specific code (see: ANNEX A: Codes of Transponder Types)

MEM-SIZE: (if EX-ADR == 0)

Memory size of the Transponder. If not supported by the Transponder, this value will return 0x0000.

Byte	17		18
Bit:	7 .. 5	4 .. 0	7 .. 0
content	res.	Block size in Bytes	Number of blocks

MEM-SIZE: (if EX-ADR == 1)

Memory size of the Transponder. If not supported by the Transponder, this value will return 0x0000.

Byte	18		19-20
Bit:	7 .. 6	5 .. 0	15 .. 0
content	res.	Block size in Bytes	Number of blocks

IC-REF:

IC reference (version) of the Transponder. If not supported by the Transponder, this value will return 0x00.

CL:

Command List

Byte	22-25			
content	CL Byte 4	CL Byte 3	CL Byte 2	CL Byte 1

CL Byte 1:

Bit	Meaning	Comment
0	Read single block is supported	
1	Write single block is supported	
2	Lock single block is supported	
3	Read multiple block is supported	
4	Write multiple block is supported	
5	Select is supported	Including Select state
6	Reset to Ready is supported	
7	Get multiple block security status is supported	

CL Byte 2

Bit	Meaning	Comment
0	Write AFI is supported	
1	Lock AFI is supported	
2	Write DSFID is supported	

3	Lock DSFID is supported	
4	Get System Information is supported	
5	Custom commands are supported	
6	RFU	0 shall be returned
7	RFU	0 shall be returned

CL Byte 3

Bit	Meaning	Comment
0	Extended read single block is supported	
1	Extended write single block is supported	
2	Extended lock single block is supported	
3	Extended read multiple block is supported	
4	Extended write multiple block is supported	
5	Extended Get Multiple Security Status is supported	
6	RFU	0 shall be returned
7	RFU	0 shall be returned

CL Byte 4

Bit	Meaning	Comment
0	Read Buffer is supported	Means Response Buffer is supported
1	Select Secure State is supported	Means VCD or Mutual authentication are supported
2	Final Response always includes crypto result	Means that flag b3 will be set in the Final response
3	AuthComm crypto format is supported	
4	SecureComm crypto format is supported	
5	KeyUpdate is supported	
6	Challenge is supported	
7	If set to 1 a further Byte is transmitted	0 shall be returned

Note:

This command is only available for ISO15693 Transponders.

7.1.13. [0x2C] Get Multiple Block Security Status

This command reads the public block security status from one Transponder.

REQUEST-DATA

6	7	(8...15)	(9 / 16)	1 or 2 Bytes (def. by EXT_ADR)	9 / (17)
0x2C	MODE	UID	BANK	DB-ADR	DB-N

RESPONSE-DATA (STATUS = 0x95)

7
ISO15693 ERROR

RESPONSE-DATA

7	8
DB-N	SEC-STATUS
	Repeated DB-N times

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	EXT_ADR	0	0	ADR		

ADR:

b000 non-addressed
b001 addressed
b010 selected

EXT_ADR:

If this bit is set the command includes extended address fields.

b0: Transponder memory addressing is done by the 1 byte DB-ADR Field.

b1: Transponder memory addressing is done by BANK and **2** byte DB-ADR Field

UID:

Read-only serial number of the Transponder. The UID is required only in the addressed mode.

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	0	BANK_NR	

BANK_NR:

Defines the memory area on the transponder.

b00 reserved
b01 reserved
b10 reserved
b11 User memory bank

DB-ADR:

First block number from which security status is requested. First block number can be any value between 0 and 255.

DB-N:

Number of Security data blocks to be read from the Transponder, starting at DB-ADR. The maximum number of DB-N is 255.

ISO15693 ERROR:

ISO15693 ERROR code of Transponder response. This byte is only available if STATUS = 0x95. See: ANNEX F: Transponder Error Codes

SEC-STATUS:

Block security status .

Note:

This command is only available for ISO15693 Transponders

8. [0xB3] Host commands for EPC Transponders

This command sends special commands to EPC Transponder.

Host → Reader

1	2	3	4	5	6...n-2	n-1,n
0x02	n		COM-ADR	[0xB3]	REQUEST-DATA	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
0x02	n		COM-ADR	[0xB3]	STATUS	RESPONSE-DATA	CRC16

REQUEST-DATA:

EPC specific request

RESPONSE-DATA:

EPC specific response

Notes:

- ***Data is only transferred if STATUS = 0x00, 0x83, 0x94, 0x95.***

8.1. ISO18000-3M3 Commands [0xB3]

This commands supports the functions of the ISO18000-3M3 Transponder

8.1.1. [0xB3] [0x18] Kill

This command writes one or more data blocks by using the Block write command of ISO18000-3M3 Transponder.

REQUEST-DATA

6	7	1 Byte	EPC_LNG Bytes
0x18	MODE	EPC_LF	EPC

1 Byte	K_PW_LNG Bytes	1 Byte
K_PW_LNG	K_PW	RECOM Bits

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	EPC_LF	RECOM	ADR		

ADR:

b000 non-addressed
b001 addressed

EPC_LF:

If this bit is set the parameter EPC_LNG must inserted into the protocol.

b1: The protocol includes the parameter EPC_LNG. The EPC has a variable length as defined in EPC_LNG.

RECOM

b1: If this bit is set the Recommissioning Bits will be inserted into the protocol.

EPC_LNG:

Is a optional parameter and depends on the setting of EPC_LF (see MODE). EPC_LNG defines the length of the following EPC field.

EPC:

EPC of the Transponder. The EPC is required only in the addressed mode.

K_PW_LNG:

Length of Kill Password.

K-PW:

Kill Password.

RECOM Bits:

Recommissioning Bits according to EPC Global description.

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	0	0	Asserted 3SB	2SB	LSB

Notes:

- **ISO18000-3M3**
  - ***A ISO18000-3M3 Transponder can be killed in addressed mode only***
  - ***Kill password K_PW has to contain the kill code.***
  - ***Kill password length K_PW_LGT=1***

8.1.2. [0xB3] [0x22] Lock

This command Lock different memory portions of a ISO18000-3M3 Transponder.

REQUEST-DATA

6	7	1 Byte	EPC_LNG Bytes
0x22	MODE	EPC_LNG	EPC

1 Byte	1 Byte	LOCK_LNG Bytes	1 Byte	A_PW_LNT Bytes
EPC_TYPE	LOCK_LNG	LOCK_DATA	A_PW_LNG	A_PW

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	0	0	0	EPC_LF	0	ADR		

ADR:

b000 non-addressed
b001 addressed

EPC_LF:

If this bit is set the parameter EPC_LNG must inserted into the protocol.

b1: The protocol includes the parameter EPC_LNG. The EPC has a variable length as defined in EPC_LNG.

EPC_LNG:

Is a optional parameter and depends on the setting of EPC_LF (see MODE). EPC_LNG defines the length of the following EPC field.

EPC:

Read-only serial number of the Transponder. The EPC is required only in the addressed mode.

EPC_Type:

Type of Transponder according ANNEX A: Codes of Transponder Types.

LOCK_LNG:

Length of LOCK_DATA Field

LOCK_DATA:

Lock data which will be written to the Tag.

A_PW_LNG:

Length of Access Password.

A_PW:

Access password which is used to access to the secured state of the Tag.

Notes:

- **ISO18000-3M3**
  – A ISO18000-3M3 Transponder can be locked in non addressed mode only
  – Lock data LOCK_DATA has to contain the kill code which is written to the Transponder.
  – Lock data length Lock_LNG=1

8.2. [0xBF] ISO15693 Transparent Command

This command sends user transparent commands to the Transponder.

Host → Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xBF]	MODE	RSP-LENGTH

MODE 1+2+6	9...10	11...n-2	n-1,n
	CMD-RSP-DELAY	REQUEST-DATA	CRC16

MODE 3+4	11...12	13...14	15...n-2	n-1,n
	CMD-RSP-DELAY	EOF-PULSE-DELAY	REQUEST-DATA	CRC16

MODE 5	9...10	11 – 12	13 ... n-2	n-1,n
	CMD-RSP-DELAY	MULTIPLE 302 GRIDS	REQUEST-DATA	CRC16

Host ← Reader

1	2	3	4	5	6	7...n-2	n-1,n
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xBF]	STATUS[20]	RESPONSE-DATA	CRC16

MODE:

Bit:	7	6	5	4	3	2	1	0
Function	TxCRCEn	0	0	0	X	Options		

Options:

Options for request.

b001 = read request

Response is sampled corresponding to CMD-RES-DELAY

b010 = write request with Option “0”

The Reader tries to sample the response after CMD-RES-DELAY + a multiple of 302µs. If there is no response within 20ms the command sends back Status “no Transponder” 0x01

b011 = write request with Option “1”

The Reader tries to sample the response after CMD-RES-DELAY. If

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

there is no response the Reader sends a EOF after EOF-PULSE-DELAY and tries to sample the response after CMD-RES_DELAY

b100 = inventory request

The Reader tries to sample the response after CMD-RES-DELAY. If ISO15693 “Nb_slot_flag” Flag is:

“0” the Reader sends a EOF after EOF-PULSE-DELAY and tries again to sample the response in the next timeslot (after CMD-RES_DELAY). This is done 16 times.
In this case the RSP-LENGTH defines the response length in one timeslot. Transponder responses with other response length will be ignored. If there is a CRC error in one of the timeslots the protocol status is set to 0x02 [CRC error]. The user should calculate which Transponder data hold the CRC error.

“1” the Reader sends back the received data.

b101= request with grid position of response

The Reader tries to sample the response after ISO15693-3 CMD-RES-DELAY. If there is no response the Reader sample at the time/grid specified in MULTIPLE 302us GRIDS. If there is no response the command sends back status "no Transponder" 0x01. The maximum value for MULTIPLE 302us GRIDS is 125 (→ 302,08us * 125 = 37,76ms)
Depending on the Error-Flag in the Transponder response the length of the sample data is:
- 4 Byte if Error-Flag is "1"
- REP-LENGTH if Error-Flag is "0"

b110= read request without any ISO15693 specific data checks and ISO15693 data interpretation

Response is sampled corresponding to CMD-RES-DELAY.
cause by the fact that no data check is performed inside of the Reader all data with response length same as response length specified in the Host command to the Reader will be transfers with status 0x00. If response length of data from Transponder and response length specified in the Host command to the Reader are unequal, status 0x01 “No Transponder” will be the response of the Reader.
The user of the command mode 6 has to control the data coding and decoding option of the Reader by setting CFG8/Byte 4 – ISO-Mode in the manner the Reader should code the data in the RF forward link and decode the data in the RF return link.

TxCRCEn:

b0 A CRC is calculated over the transmitted data and the CRC byte(s) are appended to the data stream

b1 No CRC is inserted/transmitted

RSP-LENGTH:

Length of the Transponder response in bit without SOF and EOF. If the Error-Flag in the Transponder response is set, the length of the sample data is 4 Byte.
This value need to be specified correctly now!

CMD-RSP-DELAY:

Response delay for Transponder response (ISO15693: t1)
e.g. ISO15693 average value: 0x021F * 590ns = 320,4 µs

Note:
If the parameter is set to "0x0000 the default value 0x021F will be used.

EOF-PULSE-DELAY:

EOF Pulse delay is used in write operations with ISO15693 write option "1". EOF to define the response delay for Transponder response (ISO15693: t1)
e.g. ISO15693 maximum value: 0x846A * 590ns = 20ms

REQUEST-DATA:

Complete Transponder request without SOF, CRC16 and EOF.

Note:
The read and write option FLAGS in the REQUEST-DATA must correspond to the MODE Byte in the request protocol. Reader is always forcing the command in the way specified by MODE Byte in the request protocol

RESPONSE-DATA:

Complete Transponder response without SOF and EOF. A CRC16 check is performed inside the Reader. However the Transponder CRC16 is transferred with the response data.

Notes:

- ***Data is only transferred if STATUS = 0x00, 0x02, 0x83, 0x84, 0x94.***
- ***The response data ever contains the in RSP-LENGTH defined number of data bytes.***

Note:

This command is only available for ISO15693 Transponders.

This command is not available if the Scan Mode is switched on.

Supported ISO15693 Host commands

8.3. Supported ISO15693 Host commands for ISO15693 Transponders

The command codes listed in the following table supports the various Transponder commands and operations that are available for each ISO15693 Transponder type.

8.3.1. Fujitsu (MB89R116)

IC manufacturer identifier: 0x08

Chip ID: 0h = 00000000b (Bit 47 - 40 of UID)

Memory organization: 256 x 8 Byte = 16kBit

Number of blocks	256 (user area: 0 – 249)
Block size	8 byte
WR-OPTION	0 or 1

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks*	√	√	√	√	Security Status is always 0x00
0x24	Write Multiple Blocks**	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

*** The Custom Specific Commands Read Multiple Blocks Unlimited [0xA3] will be used automatically by the Reader. In non addressed Mode only one or two blocks can be read and the parameter DB-Blocksize in CFG4 should be set to 8.**

**** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to "00: automatically set". Up to two blocks of data can be written for one request.**

8.3.2. Fujitsu (MB89R118)

IC manufacturer identifier: 0x08

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

Memory organization: 256 x 8 Byte = 16kBit

Number of blocks	256 (user area: 0 – 249)
Block size	8 byte
WR-OPTION	0 or 1

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks*	√	√	√	√	Security Status is always 0x00
0x24	Write Multiple Blocks**	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

*** The Custom Specific Commands Read Multiple Blocks Unlimited [0xA3] will be used automatically by the Reader. In non addressed Mode only one or two blocks can be read and the parameter DB-Blocksize in CFG4 should be set to 8.**

**** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to "00: automatically set". Up to two blocks of data can be written for one request.**

8.3.3. Fujitsu (MB89R118)

IC manufacturer identifier: 0x08

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

Memory organization: 256 x 8 Byte = 16kBit

Number of blocks	256 (user area: 0 – 249)
Block size	8 byte

Command Code	**Function**		**Mode**			**Comment**
			non-addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 or 1
0x23	Read Multiple Blocks*	√	√	√	√	Security Status is always 0x00
0x24	Write Multiple Blocks**	√	√	√	√	WR-OPTION = 0 or 1
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 or 1
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 or 1
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

*** The Custom Specific Commands Read Multiple Blocks Unlimited [0xA3] will be used automatically by the Reader. In non addressed Mode only one or two blocks can be read and the parameter DB-Blocksize in "CFG4 Transponder Parameters" should be set to 8.**

**** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to "00: automatically set" in "CFG4 Transponder Parameters". Up to two blocks of data can be written for one request.**

- **10% Modulation and ASK SUB-CARRIER and Datacoding 1 of 4 must be configured in the reader.**

8.3.4. Fujitsu (MB89R119)

IC manufacturer identifier: 0x08

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

Memory organization: 64 x 4 Byte = 2kBit

Number of blocks	64 (user area: 0 – 57)
Block size	4 byte
WR-OPTION	0 or 1

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	-	
0x23	Read Multiple Blocks	√	√	√	-	Security Status is always 0x00
0x24	Write Multiple Blocks*	√	√	√	-	
0x25	Select	-	-	-	-	
0x26	Reset to Ready	√	√	√	-	
0x27	Write AFI	√	√	√	-	
0x28	Lock AFI	√	√	√	-	
0x29	Write DSFID	√	√	√	-	
0x2A	Lock DSFID	√	√	√	-	
0x2B	Get System Information	√	√	√	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	

*** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter is set to "00: automatically set". Up to two blocks of data can be written for one request.**

8.3.5. Infineon (ISO address mode) 0xE0

IC manufacturer identifier: 0x05

memory organization:

SRF55V10P: 256 x 4 Byte = 8kBit

Number of blocks	256 (user area: 0...249)
Block size	4 byte
WR-OPTION*	0

SRF55V02P: 64 x 4 Byte = 2kBit

Number of blocks	64 (user area: 0...57)
Block size	4 byte
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√	√	√	
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	
0x2B	Get System Information	-	-	-	-	
0x2C	Get Multiple Block Security Status	√	√	√	√	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameters" is set to "00: automatically set".**

8.3.6. Infineon (My-d Light)

Chip ID: A1h = 10100001b (Bit 47 - 40 of UID)

Memory organization: 18 x 4 Byte = 576Bit

Number of blocks	18 (user area: 0...12)
Block size	4 byte
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√		-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√ **	√	√	Single Read
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	
0x2B	Get System Information	-	-	-	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	
Custom specific commands						
0x90	Write Byte	√	√	√	√	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameters" is set to "00: automatically set".**

** **Reading of more than one block in non addressed mode is only possible, if parameter "Read Mode" in CFG4 is set to "01: Single Read".**

8.3.7. NXP (I-Code SLI)

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)

Memory organization: 32 x 4 Byte = 1kBit

Number of blocks	32 (user area: 0 – 27)
Block size	4 byte
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√	√	√	
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameters" is set to "00: automatically set".**

8.3.8. NXP (I-Code SLI-S)

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

Memory organization: 40 x 4 Byte = 1280Bit

Number of blocks	40 (user area: 0 – 39)
Block size	4 byte
WR-OPTION*	0

Number of pages	10 (user area: 0 – 9)
Page size	16 byte = 4 Blocks
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√ **	√	√	Single Read
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	-	-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameters" is set to "00: automatically set".**

** **Reading of more than one block in non addressed mode is only possible, if parameter "Read Mode" in CFG4 is set to "01: Single Read".**

8.3.9. NXP (I-Code SLI-L)

Chip ID: 3h = 00000110b (Bit 47 - 40 of UID)

Memory organization: 16 x 4 Byte = 512Bit

Number of blocks	16 (user area: 0 – 7)
Block size	4 byte
WR-OPTION*	0

Number of pages	4 (user area: 0 – 1)
Page size	16 byte = 4 Blocks
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√ **	√	√	
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	-	-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in " CFG4 Transponder Parameters" is set to "00: automatically set".**

** **Reading of more than one block in non addressed mode is only possible, if parameter "Read Mode" in CFG4 is set to "01: Single Read".**

8.3.10. NXP (I-Code SLIX)

Chip ID: 2h = 00000001b (Bit 47 - 40 of UID)

Memory organization: 32 x 4 Byte = 1280Bit

Number of blocks	28 (user area: 0 – 27)
Block size	4 byte

Number of pages	10 (user area: 0 – 9)
Page size	16 byte = 4 Blocks

Command Code	**Function**		**Mode**			**Comment**
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	-	-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in " CFG4 Transponder Parameters " is set to "00: automatically set".**

** **Reading of one block in non addressed mode is only possible, if parameter "Read Mode" in "CFG4 Transponder Parameters" is set to "b01: Single Read".**

8.3.11. NXP (I-Code SLIX-S)

Chip ID: 2h = 00000010b (Bit 47 - 40 of UID)

Memory organization: 64 x 4 Byte = 2048Bit

Number of blocks	40 (user area: 0 – 39)
Block size	4 byte

Number of pages	10 (user area: 0 – 9)
Page size	16 byte = 4 Blocks

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	-	-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in " CFG4 Transponder Parameters " is set to "00: automatically set".**

** **Reading of one block in non addressed mode is only possible, if parameter "Read Mode" in "CFG4 Transponder Parameters" is set to "b01: Single Read".**

8.3.12. NXP (I-Code SLIX-L)

Chip ID: 2h = 00000011b (Bit 47 - 40 of UID)

Memory organization: 16 x 4 Byte = 512Bit

Number of blocks	8 (user area: 0 – 7)
Block size	4 byte

Number of pages	2 (user area: 0 – 1)
Page size	16 byte = 4 Blocks

Command Code	**Function**		**Mode**			**Comment**
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√ **	√	√	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	-	-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in " CFG4 Transponder Parameters " is set to "00: automatically set".**

** **Reading of one block in non addressed mode is only possible, if parameter "Read Mode" in "CFG4 Transponder Parameters" is set to "b01: Single Read".**

8.3.13. NXP (I-Code SLIX2)

Chip ID: 1h = 00000001b (Bit 47 - 40 of UID)
Type indicator bits: 01b (Bit 36 – 35 of UID)

Memory organization: 80 x 4 Byte = 2560Bit

Number of blocks	80 (user area: 0 – 79)
Block size	4 byte

Command Code	Function		Mode			Comment
			non-addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√	DB-Size = 4
0x24	Write Multiple Blocks	√	√	√	√	DB-Size = 4, WR-OPTION = 0 *
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in " CFG4 Transponder Parameters " is set to "00: automatically set".**

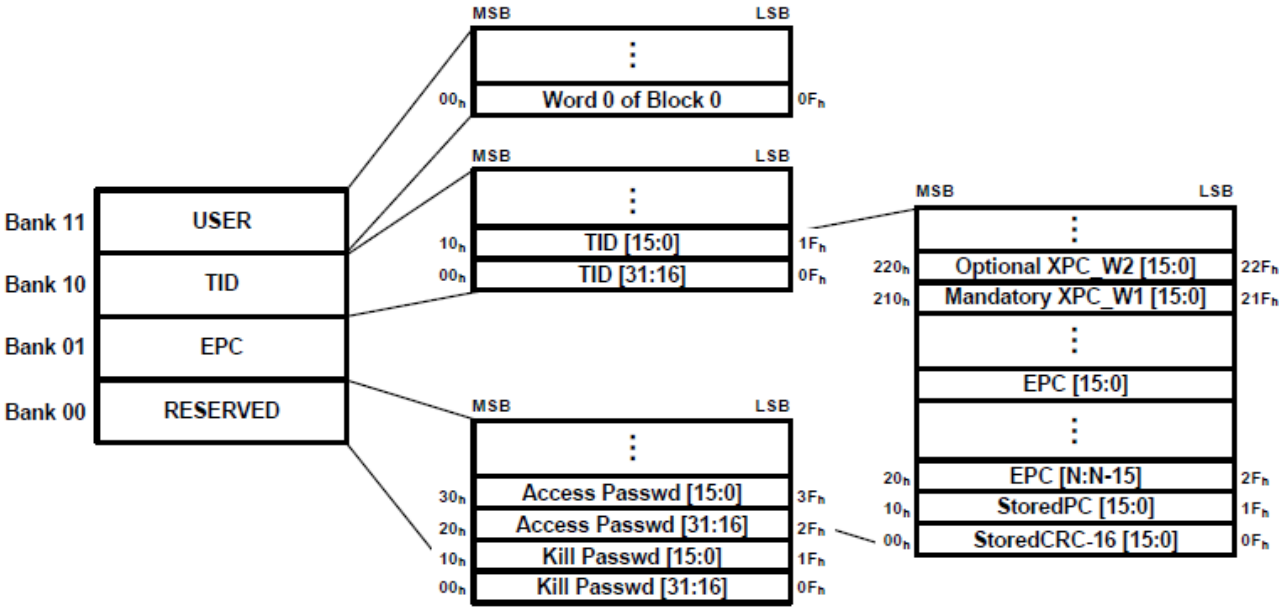
8.3.14. NXP ICode ILT-M (ISO18000-3M3)

Memory organization:

Reserved memory (32 bit ACCESS and 32 bit KILL password)	64 bit
EPC (excluding 16 bit CRC-16 and 16 bit PC)	240 bit
TID (including unique 48 bit serial number)	96 bit
User memory	512 bit

Command Code	Function		Mode		Comment
			non-addressed	addressed	
0xB0 0x01	Inventory	√	-	-	
0xB0 0x23	Read Multiple Blocks	√	√	√	
0xB0 0x24	Write Multiple Blocks	√	√	√	
0xB3 0x18	Kill	√		√	
0xB3 0x22	Lock	√		√	

18000-3M3 Memory specification:



8.3.15. STMicroelectronics (LRI64)

IC manufacturer identifier: 0x02

memory organization: 16 x 1 Byte = 128Bit

Number of blocks	5 (user area: 10...14)
Block size	1 byte
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	-	-	-	-	
0x23	Read Multiple Blocks	√	√ **	√	-	Single Read
0x24	Write Multiple Blocks	√	√	√	-	
0x25	Select	-	-	-	-	
0x26	Reset to Ready	-	-	-	-	
0x27	Write AFI	-	-	-	-	
0x28	Lock AFI	-	-	-	-	
0x29	Write DSFID		-	-	-	
0x2A	Lock DSFID		-	-	-	
0x2B	Get System Information	√	√	√	-	
0x2C	Get Multiple Block Security Status		-	-	-	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in ”CFG4 Transponder Parameter” is set to “00: automatically set”.**
* ** **Reading of LRIS2k in non addressed mode is only possible, if parameter “Read Mode” is set to “01”: Single Read“ in CFG4.**
*

8.3.16. STMicroelectronics (LRI2k / LRIS2k)

LRI2k:
Chip ID: 8h = 001000xxb (Bit 47 - 42 of UID)

LRIS2k:
Chip ID: Ah = 001010xxb (Bit 47 - 42 of UID)

memory organization: 64 x 4 Byte = 2kBit

Number of blocks	64 (user area: 0...63)
Block size	4 byte
WR-OPTION*	0

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√ **	√	√	LRIS2k: Single Read
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	√	√	√	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	

* **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameter" is set to "00: automatically set".**

** **Reading of LRIS2k in non addressed mode is only possible, if parameter "Read Mode" is set to "01": Single Read" in CFG4.**

8.3.17. STMicroelectronics (M24LR64-R)

IC manufacturer identifier: 0x02

Product Code for M24LR64-R: Bit 47-42 of UID

Bit 47 - 42	Product ID
001011xxb	Bh

memory organization: 64 x 32 x 4 Byte = 64kBit

Number of sectors	64 (0...63)
Number of blocks	2048 (user area: 0...2047) 32 blocks per sector
Block size	4 byte

Command Code	**Function**		**Mode**			**Comment**
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	-	-	-	-	
0x23	Read Multiple Blocks	√	-	√	√	
0x24	Write Multiple Blocks	√	-	√	√	WR-OPTION = 0 *
0x25	Select	√	√	√	√	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	-	√	√	

Note:

- **The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameter" *(ID ISC.PR/PRH/MR101/MR102 or ID ISC.LR2000/2500)* is set to "00: automatically set" (see the according System Manual).**
- **Each sector (32 blocks) must be read separately. For reading data from different sectors a Read Multiple Block command for each sector must be used.**

8.3.18. STMicroelectronics (ST25DVxxK-IE/JF)

IC manufacturer identifier: 0x02

Product Code: Bit 47-40 of UID

Bit 47 - 42	Product ID	Type
00100100b	24h	ST25DV04K-IE
00100101b	25h	ST25DV04K-JF
00100110b	26h	ST25DV16K-IE ST25DV64K-IE
00100111b	27h	ST25DV16K-JF ST25DV64K-JF

memory organization for ST25DV64K: 64 x 32 x 4 Byte = 64kBit

Number of blocks	2048 (user area: 0...2047)
Block size	4 byte

memory organization for ST25DV16K: 16 x 32 x 4 Byte = 16kBit

Number of blocks	512 (user area: 0...511)
Block size	4 byte

memory organization for ST25DV04K: 4 x 32 x 4 Byte = 4kBit

Number of blocks	128 (user area: 0...127)
Block size	4 byte

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x32	Extended Lock Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x23	Read Multiple Blocks	√	√	√	√	
0x33	Extended Read Multiple Blocks	√	√	√	√	
0x24	Write Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x34	Extended Write Multiple Blocks	√	√	√	√	WR-OPTION = 0 *
0x25	Select	√	√	√	√	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	WR-OPTION = 0 *
0x28	Lock AFI	√	√	√	√	WR-OPTION = 0 *
0x29	Write DSFID	√	√	√	√	WR-OPTION = 0 *
0x2A	Lock DSFID	√	√	√	√	WR-OPTION = 0 *
0x2B	Get System Information	√	√	√	√	
0x3B	Extended Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	
0x3C	Extended Get Multiple Block Security Status	√	√	√	√	

*** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 Transponder Parameter" is set to "00: automatically set" (see the according System Manual).**

Note:

Reading / Writing of more than 255 data blocks is currently not supported with this reader type

8.3.19. Texas Instruments (Tag-it HFI Pro / Standard)

IC manufacturer identifier: 0x07

Chip ID: Ch = 1100xxxxb (Bit 47 - 44 of UID)

Standard:
Product ID: 0h = 000b (Bit 43 – 41 of UID)
memory organization: 11 x 4 Byte = 48Byte (8 * 4 Byte = 256 Bit user data)

Number of blocks	11 (user area: 0 – 7)
Block size	4 byte
WR-OPTION	1

Pro:
Product ID: 0h = 100b (Bit 43 – 41 of UID)
memory organization: 12 x 4 Byte = 48Byte (8 * 4 Byte = 256 Bit user data)

Number of blocks	12 (user area: 0 – 7)
Block size	4 byte
WR-OPTION	1

Command Code	**Function**		**Mode**			**Comment**
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	-	
0x23	Read Multiple Blocks	√	√ *	√	-	Single Read
0x24	Write Multiple Blocks	√	√	√	-	
0x25	Select	-	-	-	-	
0x26	Reset to Ready	-	-	-	-	
0x27	Write AFI	-	-	-	-	
0x28	Lock AFI	-	-	-	-	
0x29	Write DSFID	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	
0x2B	Get System Information	-	-	-	-	

0x2C	Get Multiple Block Security Status	-	-	-	-	
0xA3	Inventory Read Multiple Blocks	-	-	-	-	
0xAB	Inventory Get System Information	-	-	-	-	
0xAC	Inventory Get Multiple Block Security Status	-	-	-	-	
0xA2	Write 2 Blocks	-	-	-	-	
0xA3	Lock 2 Blocks	-	-	-	-	
0xA4	Kill (only Tag-it HFI Pro)	√		√		
0xA5	WriteBlockPwd (only Tag-it HFI Pro)	√		√		

Note:

*** Reading of more than one block in non addressed mode is only possible, if parameter "Read Mode" in CFG4 is set to "01: Single Read".**

**** The WR-OPTION will be set automatically by the FEIG Readers if the WR-OPTION parameter in "CFG4 General" is set to "00: automatically set".**
When using the "non-addressed" mode the WR-OPTION must be set manually to "WR-OPTION = 1".

8.3.20. Texas Instruments (Tag-it HFI Plus)

IC manufacturer identifier: 0x07

Chip ID: 0h = 0000xxxxb oder 8h = 1000xxxxb (Bit 47 - 44 of UID)

memory organization: 64 x 4 Byte = 2kBit user data

Number of blocks	64 (user area: 0 – 63)
Block size	4 byte
WR-OPTION	1

Command Code	Function		Mode			Comment
			non addressed	addressed	select	
0x01	Inventory	√	-	-	-	
0x02	Stay Quiet	√	-	√	-	
0x22	Lock Multiple Blocks	√	√	√	√	
0x23	Read Multiple Blocks	√	√	√	√	
0x24	Write Multiple Blocks	√	√	√	√	
0x25	Select	√	-	√	-	
0x26	Reset to Ready	√	√	√	√	
0x27	Write AFI	√	√	√	√	
0x28	Lock AFI	√	√	√	√	
0x29	Write DSFID	√	√	√	√	
0x2A	Lock DSFID	√	√	√	√	
0x2B	Get System Information	√	√	√	√	
0x2C	Get Multiple Block Security Status	√	√	√	√	
0xA3	Inventory Read Multiple Blocks	-	-	-	-	
0xAB	Inventory Get System Information	-	-	-	-	
0xAC	Inventory Get Multiple Block Security Status	-	-	-	-	
0xA2	Write 2 Blocks	√	√	√	√	
0xA3	Lock 2 Blocks	√	√	√	√	

****** **The WR-OPTION will be set automatically by the FEIG readers if the WR-OPTION parameter in "CFG4 General" is set to "00: automatically set"**
When using the "non-addressed" mode the WR-OPTION must be set manually to "WR-OPTION = 1".

Note:

- **The "Write_2_Blocks" command and "Lock_2_Blocks" command will be used automatically by the reader. This will only become an effect if the block address starts with an even-numbered address.**
- **In the case of writing / locking an odd number of blocks the "Write_2_Blocks"/"Lock_2_Blocks" command will be combined with the "write single Block"/ "Lock single Block" command.**

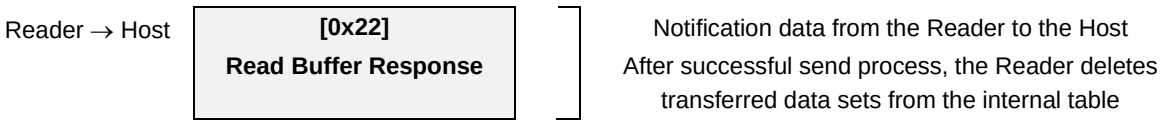
9. Protocols for Notification Mode

Notification mode is only available if a TCP/IP interface is available.

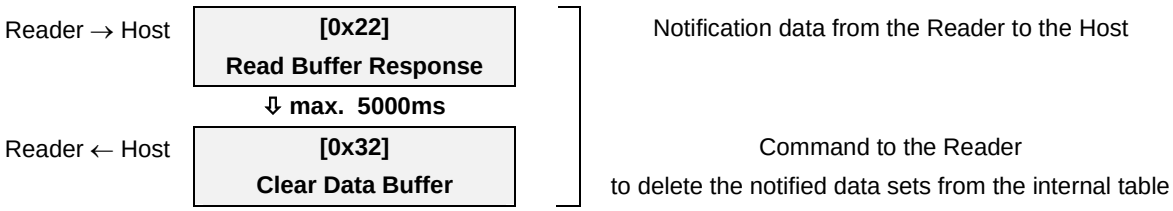
9.1. The Notification Mode Procedure

By using Notification 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 4.2. CFG1: Interface configuration block and configured in 4.9. CFG11 Read Mode Data configuration block. The settings for the Read Mode defines 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 a response protocol to synchronize the notification process with the host application. The figure below illustrates this procedure:



The acknowledge protocol 9.3. [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 9.2. [0x31] Read Data Buffer Info command.

As an additional option Keepalive messages can be sent periodically to a host. Keepalive notifications are never acknowledged. The information sent by a Keepalive notification is identical with the command 6.10. [0x6E] Reader Diagnostic with mode = 0x01.

9.1.1. DATA Structure in Notification Mode

Requested number of data sets from the data buffer. Only selected data will be transferred to the host. See chapter 4.9. CFG11 Read Mode Data for details.
Each data set has the following structure:

Data Type		**DATA**			
Record Length	byte no.	1	2		
		MSB RecLen	LSB RecLen		
Serial Number	byte no.	1	2	3	3+LEN
		TR-TYP	IDDT	IDD-LEN	IDD
Data Blocks	byte no.	1	2	3	4…4+DB-N*DB-SIZE
		DB-N		DB-SIZE	DB
Timer	byte no.	1...4			
		TIMER			
MAC	byte no.	6			
		MAC-ADR			

9.2. [0x31] Read Data Buffer Info

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

Host → Reader

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

Host ← Reader

1	2	3	4	5	6	7...8	9,10
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	STATUS[21]	TAB-SIZE	TAB-START

11,12	13,14
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.

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

Notes:
Additional information about the data table status is transferred if STATUS = 0x00, 0x84, 0x85, 0x93.

9.3. [0x32] Clear Data Buffer

The command Clear Data Buffer clears the data sets from the data buffer which were transferred with the command.

Host → Reader

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

Host ← Reader

1	2	3	4	5	6	7...8
STX (0x02)	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	STATUS[22]	CRC16

9.4. [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

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

Host ← Reader

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

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

ANNEX

ANNEX A: Codes of Transponder Types

Value	Transponder type
0x03	ISO15693 Tags
0x01	I-Code1
0x84	ISO18000-3M3

The Information will be send by performing the 7.1.1. [0x01] Inventory command.

ANNEX B: Codes of Identifier Data Types (IDDT)

Value	IDDT
0x00	EPC
0x02	EPC and TID (UID)

The Information will be send by performing the 7.1.1. [0x01] Inventory command.

ANNEX C: Time Behavior of the Asynchronous Interface

The execution times of the asynchronous interface depend on:

- The extent of the data that needs to be read or written
- Type and amount of Transponders supported by the Reader
- Position of the Transponder at the time of the request
- Probable local electromagnetic interference present
- The success or failure of the request

	min.	max.	Unit
EE-Parameter change 1 Block (16 Bytes) all (8) Blocks	5	 300 600	 ms ms
6.7. [0x69] RF Reset		15	ms
7.1. [0xB0] Host commands for ISO15693 Mandatory and Optional Commands	5	23	ms

[23] *as configured in 4.2. CFG1: Interface TR-RESPONSE-TIME*

ANNEX D: Time Behavior of ISO15693 Host Commands

The execution times for ISO15693 Host Commands depend on:

- Amount of Transponders in the antenna field (duration of the anticollision process),
- The extent of the data that needs to be read or written
- Types of Transponders supported by the Reader,
- Position of the Transponder at the time of the requirement,
- Probable local electromagnetic interferences present.

Time Behavior for [0x01] Inventory and ISO15693 Transponders

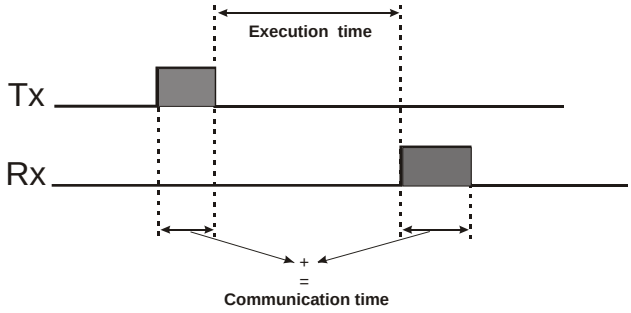
All times apply to the following parameters: ISO15693 MODE (4.5. CFG4: Transponder Parameters).

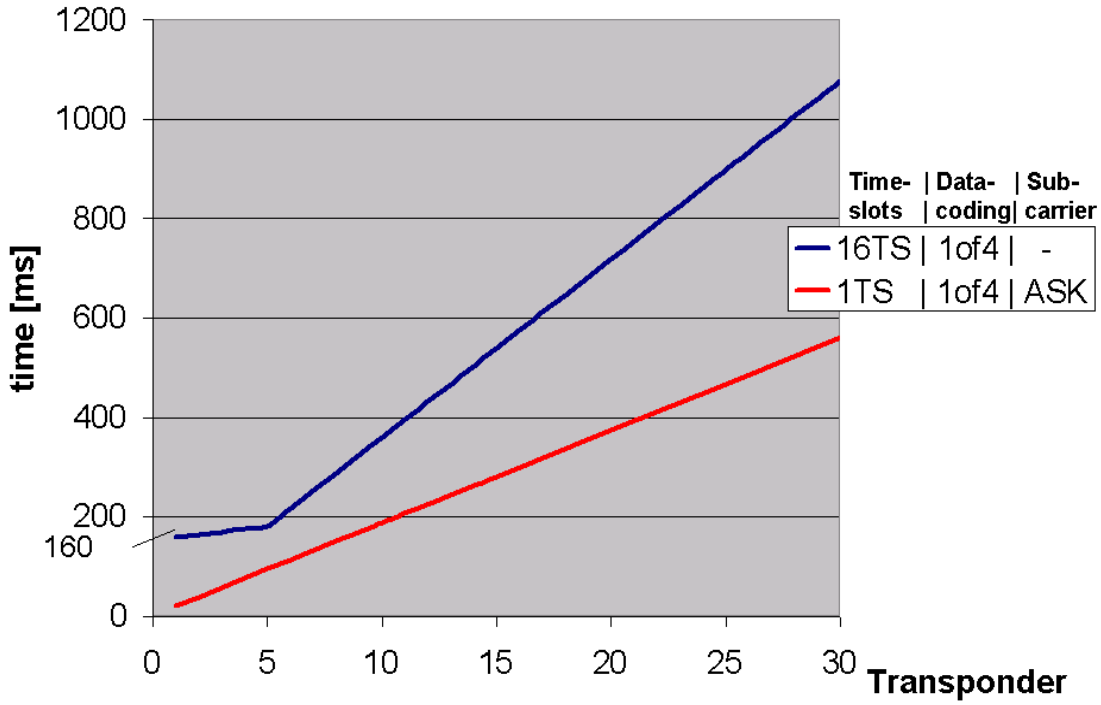
- AFI disabled
- Anticollision enabled
- only ISO15693 Transponder driver active

The modulation and the subcarrier have a negligible influence on the reaction time.

The following diagrams shows the average value of timing behavior, dependent on the number of Transponders. For certain UID's the real timing can be higher or lower as show below.

The timing is measured inclusive of the communication time at 38,4Kbaud. A modified baud rate will slightly increase the timing but the Inventory timing is mostly determine by the anticollision so you may neglect the communication time.




1200
1000
800
600
400
200
160
0
time [ms]
0
5
10
15
20
25
30
Transponder
Time-slots | Data-coding | Sub-carrier
16TS | 1of4 | -
1TS | 1of4 | ASK

ANNEX E: Index of Status Bytes

Hex-value	General
0x00	**OK:** Data / parameters have been read or stored without error Control command has been executed

Hex-value	Transponder Status
0x01	**No Transponder:** No Transponder is located within the detection range of the Reader. The Transponder in the detection range has been switched to mute. The communication between Reader and Transponder has been interfered and the Reader is not able to read the Transponder anymore.
0x02	**Data False:** CRC16 data error at received data.
0x03	**Write-Error:** Negative plausibility check of the written data: Attempt to write on a read-only storing-area. Too much distance between Transponder and Reader antenna. Attempt to write in a noise area.
0x04	**Address-Error:** The required data are outside of the logical or physical Transponder-address area: The address is beyond the max. address space of the Transponder. The address is beyond the configured address space of the Transponder.
0x05	**Wrong Transponder-type:** This command is not applicable at the Transponder: Attempt to write on or read from a Transponder. A special command is not applicable to the Transponder.

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.
0x17	**Firmware activation required:** The firmware must be activated first using ISOStart demo program and the command “Set Firmware Upgrade”. The update code must be ordered by Feig Electronic. 1. Read the Device-ID using the command [0x66] Firmware version (Mode 0x80) 2. Send the Device-ID and the serial number of the reader to Feig Electronic 3. Write the upgrade code into the reader using the command [0x5F] Set Firmware Update

Hex-value	Interface Status
0x80	**Unknown Command:** The Reader does not support the selected function.
0x81	**Length-Error:** Protocol is too short or too long
0x82	**Command not available:** Reader is set to a wrong mode Command is not supported

0x83	**RF communication error:** This error indicates that there is an error in communication between the Transponder and the Reader. Reason for this can be: The collision handling algorithm was not continued until no collision is detected, reasons for the break: - TR-RESPOSE-TIME in CFG1: Interface is to short - Transponder is in the in the limit reading range - to much noise in the antenna field
0x84	**RF-Warning:** Detailed status information can be read with the command 6.10. [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.
0x92	**No valid Data:** There is no valid data in the Buffered Read Mode. There is no Transponder in the antenna field. The **VALID-TIME**[24] hasn't elapsed for Transponders in the antenna field.
0x93	**Data Buffer Overflow:** A data buffer overflow occurred.
0x94	**More Data:** There are more Transponder data sets requested than the response protocol can transfer at once.
0x95	**Tag Error** • A Tag error code was sent from the transponder. The Tag error code is shown in the following byte. Tag Errors for ISO15693 and ISO18000-3M3 Transponder are listed below.

[24] *see 4.10. CFG12: Read Mode - Filter*

ANNEX F: Transponder Error Codes

Error-Code for ISO15693 Transponder

Hex-value	Response error code definition
0x01	The command is not supported, i.e. the request code is not recognized
0x02	The command is not recognized, for example: a format error occurred
0x03	The option is not supported
0x0F	Unknown error
0x10	The specified block is not available (doesn't exist)
0x11	The specified block is already locked and thus cannot be locked again
0x12	The specified block is locked and its content cannot be changed
0x13	The specified block was not successfully programmed
0x14	The specified block was not successfully locked
0xA0 - 0xDF	Custom command error codes
all others	reserved for future use

Error-Code for ISO18000-3M3 Transponder

Hex-value	Response error code definition
0x03	Memory overrun: The specified memory location does not exist or the EPC length field is not supported by the tag
0x04	Memory locked: The specified memory location is locked and/or permalocked and is either not writeable or not readable
0x0B	Insufficient power: The tag has insufficient power to perform the memory-write operation
0x0F	Non-specific error: The tag does not support error-specific codes
0x00	Other error: "Catch-all" for errors not covered by other codes
all others	reserved for future use

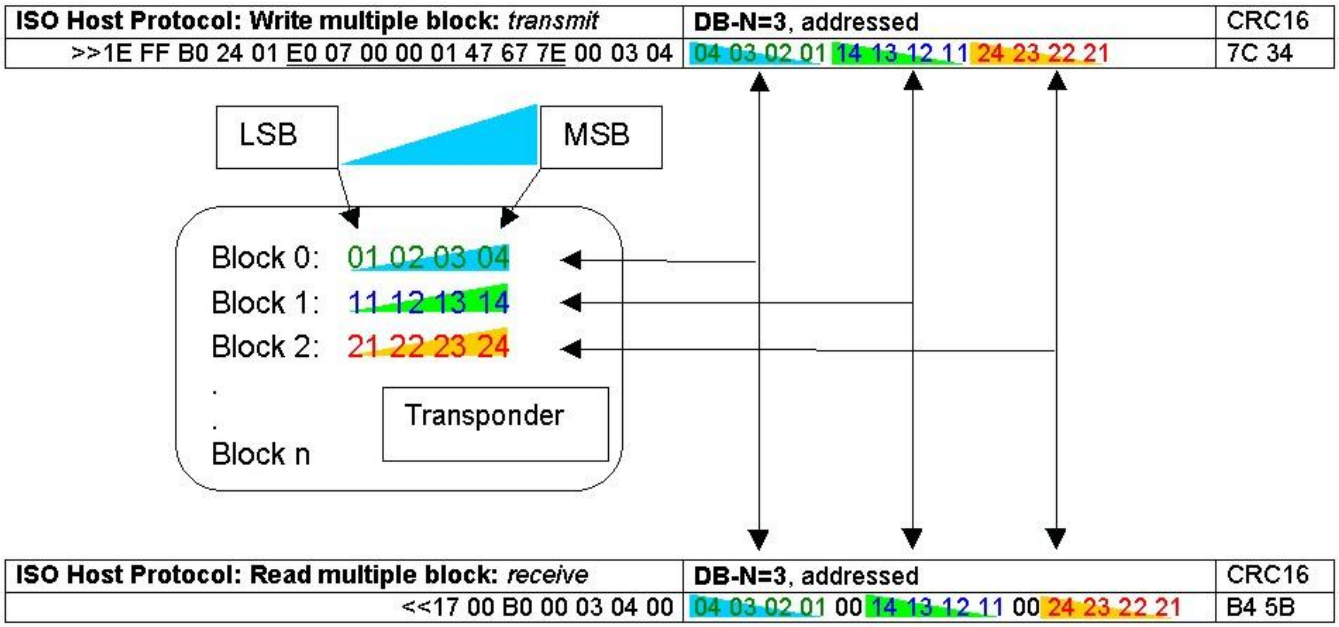
ANNEX G: Codes of Reader Types

No.	Reader Type
11	ID ISC.DAT
12	ID ISC.UMUX
13	ID ISC.GPC
20	ID RW40.30-U
30	ID ISC.M01
31	ID ISC.M02
33	ID ISC.M02M8
40	ID ISC.LR100
41	ID ISC.LR200
42	ID ISC.LR2000
43	ID ISC.LR2500-B
44	ID ISC.LR2500-A
45	ID ISC.LR1002
50	ID ISC.MU02
54	ID ISC.MRU102
55	ID ISC.MRU200
56	ID ISC.MRU200-U
60	ID ISC.PRH101
61	ID ISC.PRH101-U (USB-Version)
62	ID ISC.PRHD102
63	ID ISC.PRH102
71	ID ISC.PRH100–U (USB-Version)
72	ID ISC.PRH100
73	ID ISC.MR100–U (USB-Version)
74	ID ISC.MR100 / .PR100
75	ID ISC.MR200-A / -E
76	ID ISC.MR101-A
77	ID ISC.MR102
78	ID ISC.MR101-U
80	ID CPR.M02
81	ID CPR.02
82	ID CPR40.30-Ux
83	ID CPR40.0x-Ax / -Cx
84	ID CPR.M03 (586/#)
85	ID CPR.03 (584/#)
86	ID CPR30
87	ID CPR.52
88	ID CPR.04-U
92	ID ISC.LRU1000
93	ID ISC.LRU2000
94	ID ISC.LRU3000
100	ID MAX50

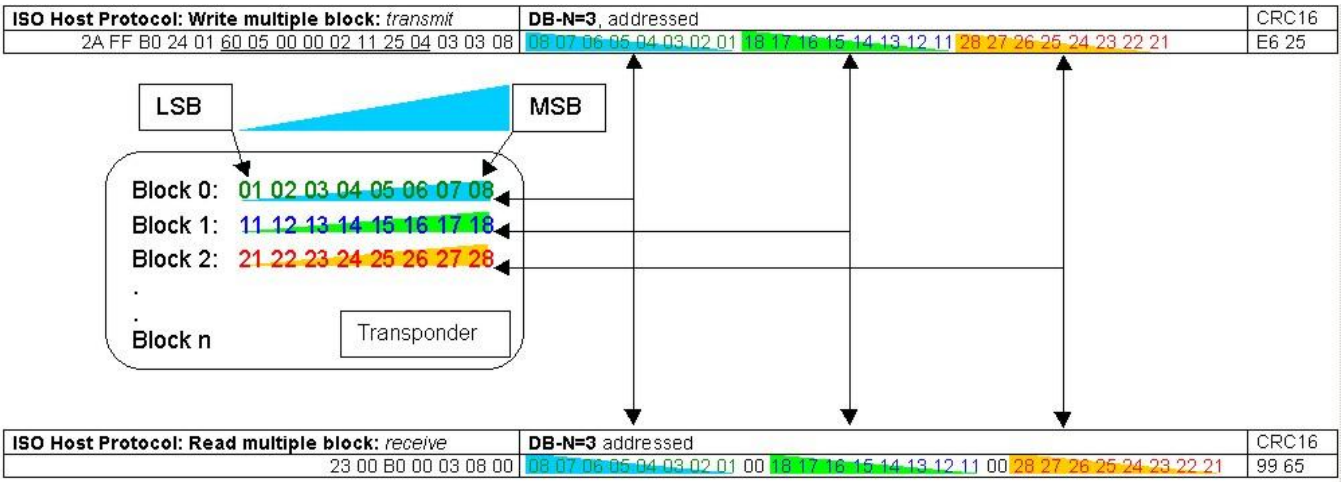
ANNEX H: Examples for Read Data

The setting "**LSB first**" and "**MSB first**" gives the direction of the received data bytes

ISO15693 Host Command (DB-Size of the Transponder = 4 bytes)



ISO15693 Host Command (DB-Size of the Transponder = 8 bytes)



ANNEX I: Labeling of configuration parameter

Label	Namespace	Filter	CFG-Block	Byte-No.	No. of Bytes	Bit-No.	No. of Bits
READER-ID	AccessProtection.Password	Expert	0	0	4		
CFG_ACCESS	AccessProtection.Lock_CFG0	Expert	0	8	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG1	Expert	0	8	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG2	Expert	0	8	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG3	Expert	0	8	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG4	Expert	0	8	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG5	Expert	0	8	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG6	Expert	0	8	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG7	Expert	0	8	1	7	1
CFG_ACCESS	AccessProtection.Lock_CFG8	Expert	0	9	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG9	Expert	0	9	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG10	Expert	0	9	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG11	Expert	0	9	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG12	Expert	0	9	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG13	Expert	0	9	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG14	Expert	0	9	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG15	Expert	0	9	1	7	1
CFG_ACCESS	AccessProtection.Lock_CFG16	Expert	0	10	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG17	Expert	0	10	1	1	1
CFG_ACCESS	AccessProtection.Lock_CFG18	Expert	0	10	1	2	1
CFG_ACCESS	AccessProtection.Lock_CFG19	Expert	0	10	1	3	1
CFG_ACCESS	AccessProtection.Lock_CFG20	Expert	0	10	1	4	1
CFG_ACCESS	AccessProtection.Lock_CFG21	Expert	0	10	1	5	1
CFG_ACCESS	AccessProtection.Lock_CFG22_29	Expert	0	10	1	6	1
CFG_ACCESS	AccessProtection.Lock_CFG40_49	Expert	0	11	1	0	1
CFG_ACCESS	AccessProtection.Lock_CFG63	Expert	0	11	1	3	1
COM-ADR	HostInterface.Serial.BusAddress		1	0	1		
BAUD	HostInterface.Serial.Baudrate		1	2	1		
TRANS-FORM (P)	HostInterface.Serial.Parity		1	3	1	0	2
TRANS-FORM (D)	HostInterface.Serial.Databits		1	3	1	2	1
TRANS-FORM (S)	HostInterface.Serial.Stopbits		1	3	1	3	1
TR-RESPONSE-TIME	AirInterface.TimeLimit		1	6	2		
Protocol Mode	HostInterface.Miscellaneous.ProtocolSelection	Expert	1	10	1		
INTERFACE	OperatingMode.ScanMode.Interface		1	11	1	0	3
READER-MODE	OperatingMode.Mode		1	13	1		
IDLE-STATE GRN / RED /Output	DigitalIO.Signaler.LED.Green.IdleState		2	3	1	0	2
IDLE-STATE GRN / RED /Output	DigitalIO.Signaler.LED.Red.IdleState		2	3	1	2	2

Label	Namespace	Filter	CFG-Block	Byte-No.	No. of Bytes	Bit-No.	No. of Bits
IDLE-STATE Startup LED	DigitalIO.Signaler.Enable_StartupSignal		2	3	1	7	1
IDLE-FLASH	DigitalIO.Signaler.LED.Green.IdleFlashFrequency		2	4	1	0	2
IDLE-FLASH	DigitalIO.Signaler.LED.Red.IdleFlashFrequency		2	4	1	2	2
ACTIVE-STATE GRN / RED	DigitalIO.Signaler.LED.Green.ActiveState		2	7	1	0	2
ACTIVE-STATE GRN / RED	DigitalIO.Signaler.LED.Red.ActiveState		2	7	1	2	2
ACTIV-FLASH	DigitalIO.Signaler.LED.Green.ActiveFlashFrequency		2	8	1	0	2
ACTIV-FLASH	DigitalIO.Signaler.LED.Red.ActiveFlashFrequency		2	8	1	2	2
ACTIV-xxx-TIME	DigitalIO.Signaler.LED.Green.ActivationTime		2	9	1		
ACTIV-xxx-TIME	DigitalIO.Signaler.LED.Red.ActivationTime		2	10	1		
TAG-DRV (J)	Transponder.Driver.HF.ISO_18000_3M3		3	0	1	1	1
TAG-DRV (A)	Transponder.Driver.HF.ICode1		3	1	1	0	1
TAG-DRV (D)	Transponder.Driver.HF.ISO_15693		3	1	1	3	1
FU-COM (DC)	AirInterface.Antenna.HF.Miscellaneous.Enable_DCPower	Expert	3	13	1	7	1
FU-COM (Tag Detect)		Expert	3	13	1	6	1
ISO 15693 MODE (NO-TS)	Transponder.HF.ISO_15693.Anticollision.NoOfTimeslots	Expert	4	4	1	4	1
ISO 15693 MODE (AFI)	Transponder.HF.ISO_15693.SelectionMask.Enable_AFI	Expert	4	4	1	5	1
ISO 15693 AFI1	Transponder.HF.ISO_15693.SelectionMask.AFI1	Expert	4	5	1		
ISO 15693 OPTION (WR-OPTION)	Transponder.HF.ISO_15693.Miscellaneous.WriteOption		4	6	1	2	2
TID-Length	Transponder.Miscellaneous.TIDLength	Expert	4	11	1		
IDDIB	Transponder.Miscellaneous.IdentifierInterpretationMode	Expert	4	12	1		
ISO-Blocksize (DB-Blocksize)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption. BlockSize	Expert	4	13	1	0	5
ISO-Blocksize (Blocksize)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption. BlockSizeSelection	Expert	4	13	1	5	1
ISO-Blocksize (Read Mode)	Transponder.HF.ISO_15693.Miscellaneous.ReadOption. ReadMode	Expert	4	13	1	6	2
MIN-TS	Transponder.HF.ICode1.Anticollision.MinimalTimeslots	Expert	5	0	1	0	4
MAX-TS	Transponder.HF.ICode1.Anticollision.MaximalTimeslots	Expert	5	0	1	4	4
Anticollision	Transponder.Anticollision.Enable		5	11	1	2	1
FUJITSU (FAST)	Transponder.HF.CustomerCommandOptions.Fujitsu. FastInventory	Expert	6	2	1	0	1
FUJITSU (FCmds)	Transponder.HF.CustomerCommandOptions.Fujitsu. FastCommands	Expert	6	2	1	1	2
Infineon (RDWR_CMDS)	Transponder.HF.CustomerCommandOptions.Infineon. ReadWrite_Commands	Expert	6	3	1	1	1
ST (FCmds)	Transponder.HF.CustomerCommandOptions. STMicroelectronics. FastCommands	Expert	6	7	1	1	2
TR-DATA1 (SNR)	OperatingMode.NotificationMode.DataSelector.UID		11	0	1	0	1
TR-DATA1 (SNR)	OperatingMode.ScanMode.DataSelector.UID		11	0	1	0	1
TR-DATA1 (DB)	OperatingMode.NotificationMode.DataSelector.Data		11	0	1	1	1
TR-DATA1 (DB)	OperatingMode.ScanMode.DataSelector.Data		11	0	1	1	1
TR-DATA1 (Byte Order DB)	OperatingMode.NotificationMode.DataSource. ByteOrderOfData		11	0	1	3	1

Label	Namespace	Filter	CFG-Block	Byte-No.	No. of Bytes	Bit-No.	No. of Bits
TR-DATA1 (Byte Order DB)	OperatingMode.ScanMode.DataSource.ByteOrderOfData		11	0	1	3	1
TR-DATA1 (TIMER)	OperatingMode.NotificationMode.DataSelector.Time		11	0	1	5	1
TR-DATA1 (TIMER)	OperatingMode.ScanMode.DataSelector.Time		11	0	1	5	1
TR-DATA-3 (COM Prefix)	OperatingMode.ScanMode.DataFormat.BusAddressPrefix		11	2	1	0	1
TR-DATA-3 (READ_ COMPLETE_BANK)	OperatingMode.NotificationMode.DataSelector.Mode. ReadCompleteBank		11	2	1	3	1
TR-DATA-3 (READ_ COMPLETE_BANK)	OperatingMode.ScanMode.DataSelector.Mode. ReadCompleteBank		11	2	1	3	1
BANK (BANK No)	OperatingMode.NotificationMode.DataSource.BankNo		11	3	1	0	2
BANK (BANK No)	OperatingMode.ScanMode.DataSource.BankNo		11	3	1	0	2
DB-ADR	OperatingMode.NotificationMode.DataSource. FirstDataBlock		11	4	2		
DB-ADR	OperatingMode.ScanMode.DataSource.FirstDataBlock		11	4	2		
DB-N	OperatingMode.NotificationMode.DataSource. NoOfDataBlocks		11	8	2		
DB-N	OperatingMode.ScanMode.DataSource.NoOfDataBlocks		11	8	2		
D-START	OperatingMode.ScanMode.DataSource.FirstByte		11	11	1		
D-LGT	OperatingMode.ScanMode.DataSource.NoOfBytes		11	12	2		
VALID-TIME	OperatingMode.NotificationMode.Filter.Transponder ValidTime		12	0	2		
VALID-TIME	OperatingMode.ScanMode.Filter.TransponderValidTime		12	0	2		
TR_ID (TR-ID-SOURCE)	OperatingMode.Miscellaneous.TransponderIdentification. Source	Expert	12	2	1		
TR_ID (TR-ID-DB-ADR)	OperatingMode.Miscellaneous.TransponderIdentification. DataBlockNo	Expert	12	3	2		
TR_ID (TR-ID-DB-N)	OperatingMode.Miscellaneous.TransponderIdentification. NoOfDataBlocks	Expert	12	5	1		
DB-USE (DB-FORMAT)	OperatingMode.ScanMode.DataFormat.Format		13	0	1	0	4
DB-USE (SEP-CHAR)	OperatingMode.ScanMode.DataFormat.SeparationChar		13	1	1		
DB-USE (SEP-USR)	OperatingMode.ScanMode.DataFormat.UserSeparationChar		13	2	1		
DB-USE (END-CHAR)	OperatingMode.ScanMode.DataFormat.EndChar		13	3	1		
DB-USE (END-USR1)	OperatingMode.ScanMode.DataFormat.UserEndChar1		13	4	1		
DB-USE (END-USR2)	OperatingMode.ScanMode.DataFormat.UserEndChar2		13	5	1		
DB-USE (END-USR3)	OperatingMode.ScanMode.DataFormat.UserEndChar3		13	6	1		
DB-USE (HEADER-USR1)	OperatingMode.ScanMode.DataFormat.UserHeaderChar1		13	8	1		
DB-USE (HEADER-USR2)	OperatingMode.ScanMode.DataFormat.UserHeaderChar2		13	9	1		
DB-USE (HEADER-USR3)	OperatingMode.ScanMode.DataFormat.UserHeaderChar3		13	10	1		
DB-USE (HEADER-USR4)	OperatingMode.ScanMode.DataFormat.UserHeaderChar4		13	11	1		
LEN-USR (END-LEN)	OperatingMode.ScanMode.DataFormat.NoOfUserEndChars		13	13	1	0	4
LEN-USR (HEADER-LEN)	OperatingMode.ScanMode.DataFormat.NoOfUser HeaderChars		13	13	1	4	4
PER-RESET-TIME	Transponder.PersistenceReset.Antenna.No1.Persistence ResetTime	Expert	16	2	2		
IGNORE-ERROR ISO18000-3M3	AirInterface.Miscellaneous.HF.ISO_18000_3M3. ErrorHandling. WeakCollision	Expert	20	7	1	1	1

Label	Namespace	Filter	CFG-Block	Byte-No.	No. of Bytes	Bit-No.	No. of Bits
S_MASK_LGT	Transponder.HF.ISO_18000_3M3.SelectionMask.No1. MaskLength		22	0	1		
S_MODE	Transponder.HF.ISO_18000_3M3.SelectionMask.No1.Bank		22	1	1	0	2
S_START_POINTER	Transponder.HF.ISO_18000_3M3.SelectionMask.No1.FirstBit		22	2	2		
S_MASK_MSB	Transponder.HF.ISO_18000_3M3.SelectionMask.No1.Mask		22/23	4	24		
HOSTNAME (Length of hostname)	HostInterface.LAN.Hostname.Length		33	0	1		
HOSTNAME (hostname)	HostInterface.LAN.Hostname.Name		33/34	1	27		
IP_ADDRESS_LAN	HostInterface.LAN.IPv4.IPAddress		40	0	4		
IP_PORT_NUMBER:_LAN	HostInterface.LAN.PortNumber		40	8	2		
SUBNET-MASK-LAN	HostInterface.LAN.IPv4.SubnetMask		41	0	4		
LAN Option (KEEP-ALIVE)	HostInterface.LAN.Keepalive.Enable		41	4	1	0	1
DISABLE AUTONEGOTIATION	HostInterface.LAN.Autonegotiation.Disable		41	4	1	3	1
ENABLE HOSTNAME	HostInterface.LAN.Hostname.Enable		41	4	1	4	1
DUPLEX	HostInterface.LAN.Autonegotiation.Duplex		41	4	1	5	1
SPEED	HostInterface.LAN.Autonegotiation.Speed		41	4	1	6	1
LAN Option (DHCP)	HostInterface.LAN.IPv4.Enable_DHCP		41	4	1	7	1
KEEP-CNT	HostInterface.LAN.Keepalive.RetransmissionCount		41	5	1		
GW-ADDRESS-LAN	HostInterface.LAN.IPv4.GatewayAddress		41	6	4		
KEEP-INTERVAL	HostInterface.LAN.Keepalive.IntervalTime		41	12	2		
MODE (ACK)	OperatingMode.NotificationMode.Transmission.Enable_ Acknowledge		49	0	1	7	1
KEEP-ALIVE (EN)	OperatingMode.NotificationMode.Transmission.KeepAlive. Enable		49	4	1	0	1
KEEP-ALIVE-TIME	OperatingMode.NotificationMode.Transmission.KeepAlive. IntervalTime		49	5	2		
DEST-IP-ADDRESS	OperatingMode.NotificationMode.Transmission.Destination. IPv4.IPAddress		49	7	4		
DEST-IP-PORT-NUMBER	OperatingMode.NotificationMode.Transmission.Destination. PortNumber		49	11	2		
HOLD-Time	OperatingMode.NotificationMode.Transmission.Destination. ConnectionHoldTime		49	13	1		