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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Preliminary information

Purpose of this documentation

This documentation provides you with an overview of the configuration, parameter assignment and programming of the RF290R reader. The programming manual is intended for users and programmers involved in configuration, commissioning and servicing of the RF290R.

To configure the RF290R, you require knowledge of the following:

- Structure of the system (e.g. components used, in particular the transponders)
- Basic knowledge of RFID

Range of validity of this documentation

This documentation is valid for all supplied variants of the RF290R and describes the RF290R as delivered from March 2013 onwards.

Registered trademarks

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1.2 General information and abbreviations/acronyms

General information on this document

- If individual bits in a byte are shown as "-", the bit positions are reserved for future expansion or for internal test and manufacturing functions. These bit positions must not be changed since this can cause incorrect operation of the reader.
- The following number formats are used:
 - 0...9: for decimal numbers
 - 0x00...0xFF: for hexadecimal numbers
 - b0...1: for binary numbers
- The hexadecimal value in brackets "[]" indicates a control byte (command).

1.2 General information and abbreviations/acronyms

Abbreviations/acronyms used

ADR	Address	Address
ASK	Amplitude Shift Keying	Amplitude Shift Keying
СВ	Config Block	Configuration Block
CFG	Configuration Parameter Block	Configuration Parameter Block
CRC	Cyclic Redundancy Check	Cyclic Redundancy Check
DB	Data Block	Data block
FIFO	First In First Out	First in - first out
frq	Frequency	Frequency
FSK	Frequency Shift Keying	Frequency Shift Keying
h	Hour	Hour
Hz	Hertz	Hertz
ID	Identification	Identifier
IN	Input	Input
LEN	Length	Length
LOC	Location	Location
LSB	Least Significant Byte	Least significant byte
min	Minutes	Minutes
ms	Milliseconds	Milliseconds
MSB	Most Significant Byte	Most significant byte
Ν	Number	Number
OUT	Output	Output
R/W	Read/Write Access	Read and write access
RD	Read	Read
REL	Relay	Relay
RF	Radio Frequency	Radio frequency
RO	Read Only Acess	Read-only access
RSSI	Received Signal Strength Indicator	Received Signal Strength Indicator
RTC	Real Time Clock	Real-time clock
ТАВ	Table	Table
TR	Transponder	Transponder
TS	Timeslot	Time slot
UID	Unique Identifier (read only Serial Num- ber)	Unique Identifier (read-only serial num- ber)
WO	Write Only Access	Write-only access
WR	Write	Write

Description

The RF290R is the most powerful reader of the SIMATIC RF200 product series. The reader can directly control antenna multiplexing functions to be able to handle complex antenna adjustments in different gate and portal configurations.

The RF290R can be operated in two different main modes:

- SIMATIC mode (RS-422 interface, protocol 3964R) e.g. with FB/FC 45
- PC mode (RS-232 interface, extended protocol in ISO host mode)

The selection of the main mode is decided by the interface cable used.

Note

This manual only describes the main mode PC mode.

You will find further information on the SIMATIC mode in the manuals of the relevant function blocks in "Industry online support (http://support.automation.siemens.com/WW/view/en/10805817)".

2.1 Safety notes

WARNING

Note for wearers of heart pacemakers

Even if this device does not exceed the valid limit values for electromagnetic fields, you should keep a minimum distance of 25 cm between the antenna and your pacemaker and should not remain for longer periods of time in the immediate vicinity of the device or antenna.

Unauthorized modifications and the use of spare parts and additional devices

Unauthorized modifications and the use of spare parts and additional devices not sold or recommended by the manufacturer can cause fire, electric shock or injury. No liability whatsoever will be accepted if such unauthorized measures are taken.

2.1 Safety notes

NOTICE

Notes on liability

The liability provisions of the manufacturer valid at the time of purchase apply to the device. The manufacturer cannot be made legally responsible for inaccuracies, errors or omissions in the manual or automatically set parameters for a device or for incorrect use of a device.

NOTICE

Use adhering to the regulations

The use of the device and its installation must be in keeping with national legal regulations and local electrical regulations.

When working on devices, the valid safety regulations must be adhered to.

3

Data transmission between RF290R and host

There are five different types of data transmission between the RF290R and the host (terminal or PC). The ISO 15693 host commands, the "Buffered Read Mode" and the "Scan Mode" are used to exchange data between the reader and host. The configuration commands and the control commands of the reader are used to adapt the reader parameters to the individual application.

The following types of communication are supported by the asynchronous interface:

- Configuration commands
- Control commands of the reader
- ISO 15693 host commands
- Buffered Read Mode
- Scan Mode

3.1 Configuration and control commands

This type of data transmission is suitable for configuration and diagnostics of the reader via the asynchronous interface.

The configuration parameters of the reader are stored in its memory. To retain the configuration data when the device is turned off, this must be stored in the EEPROM. When it is turned on again, the reader reads the configuration from the EEPROM.

The reader control is executed immediately. The response of the reader contains status or data information of the command.



Figure 3-1 Sequence of the configuration and control commands

3.2 ISO 15693 host commands

The ISO 15693 host commands are a method of transferring data between the host and transponders using the reader. To allow this, the transponders must be in the antenna field of the reader.

Note

If you write data to a transponder, you need to make sure that the transponder remains in the antenna field of the reader during the entire write procedure. If the transponder leaves the antenna field of the reader during the write access, this results in loss of data. In this case, an error message to this effect is displayed.

The reader distinguishes three modes:

Addressed mode

Before data can be read or written in the addressed mode, the UID of the transponder must be known. You can obtain the UID by sending the command "[0x01] Inventory". If there is a transponder in the antenna field of the reader at this moment, it replies with its UID. For all subsequent read and write commands the transponder must be addressed with the correct UID.

The following graphics show the necessary steps for communication with a transponder in the addressed mode.



Figure 3-2 Sequence when calling up the UID in the addressed mode



Figure 3-3 Sequence when reading in the addressed mode



Figure 3-4 Sequence when writing in the addressed mode

Non-addressed mode

In the non-addressed mode, you do not need to know the UID of the transponder. This mode is useful if there is only one transponder in the antenna field of the reader.

The following graphics show the necessary steps for communication with a transponder in the non-addressed mode.



Figure 3-5 Sequence when reading in the non-addressed mode



Figure 3-6 Sequence when writing in the non-addressed mode

Selected mode

In this mode, the reader communicates only with the one selected transponder.

Before data can be read or written in the selected mode, the UID of the transponder must be known. You can obtain the UID by sending the command "[0x01] Inventory". In a second step, the transponder must be selected with the command "[0x25] Select". This must include the UID of the transponder.

The following graphics show the necessary steps for communication with a transponder in the selected mode.



Figure 3-7 Sequence when calling up the UID in the selected mode



Figure 3-8 Sequence when selecting the UID in the selected mode



Figure 3-9 Sequence when reading in the selected mode



Figure 3-10 Sequence when writing in the selected mode

3.3 Buffered Read Mode

3.3 Buffered Read Mode

The "Buffered Read Mode" is a mode used to detect transponders in the antenna field of the reader. In the "Buffered Read Mode", all transponder data is filtered according to the setting to minimize the amount of data transmitted between reader and host. The "Buffered Read Mode" is controlled using the following commands:

- "0x22 Read Buffer"
- "0x32 Clear data Buffer"
- "0x33 Initialize Buffer"

You will find further information on the commands in the "Buffered Read Mode" in the section "Protocols for the Buffered Read Mode (Page 97)".

In this mode, the reader automatically selects the transponders within its antenna field and reads the required data. The transponder data that is read out is stored in a FIFO data buffer.

The transponder data that has been read out can be read with the command "[0x22] Read Buffer". This command reads the first available data set from the data buffer. If you have already read data, you first need to delete this with the command "[0x32] Clear Data Buffer" before you can fetch the next data record from the buffer with the read command.

If the "Buffered Read Mode" is activated in the configuration block " CFG1: Interface" the reader starts to read transponder data immediately after it is turned on. The "Buffered Read Mode" can be re-initialized with the command "[0x33] Initialize Buffer".

In the "Buffered Read Mode", the reader responds to every valid message with a data or status protocol. The response also contains the control byte that the reader has received.



Figure 3-11 Sequence when reading in Buffered Read Mode

3.4 Scan Mode



Figure 3-12 Sequence when deleting in Buffered Read Mode

Note

Note the following information about the "Buffered Read Mode":

- In "Buffered Read Mode", only read operations are possible.
- The "Buffered Read Mode" can only be used when the "Scan Mode" is turned off.

3.4 Scan Mode

In this mode the reader sends data unsolicited to the host as soon as there is a transponder in the antenna field and it was possible to read valid data.

If "Scan Mode" is set, the content of the message block (UID, data block) can be adapted to any user application. The "Scan Mode" can be used with the asynchronous interface.

The reader begins with the output of the protocol block as soon as all required data has been read correctly from the transponder. If the reader cannot read all data of a protocol block completely and free of errors, it does not output any data. If, for example, the address of the data block is invalid, the UID of the transponder is not sent.

Scan mode via the asynchronous interface

The data is output depending on its configuration according to the following scheme. The specified order cannot be changed.

The format of the protocols sent depends on the configuration and number of transponders in the antenna field of the reader.

Example 1:

There is one transponder in the antenna field. The UID and data block are to be read:

3.4 Scan Mode



Example 2:

There are three transponders in the antenna field. Only the UID is to be read:

PR UID1 EC UID2 EC UID3 EC		PR	UID1	EC	UID2	EC	UID3	EC
----------------------------	--	----	------	----	------	----	------	----

Example 3:

There are three transponders in the antenna field. Only the data block is to be read:

PR Data1 EC	Data2	EC	Data3	EC
-------------	-------	----	-------	----

Example 4:

There are two transponders in the antenna field. The UID and data block are to be read:

PR UID1 SC Data1 EC UID2	SC	Data2	EC
--------------------------	----	-------	----

Description of the parameters

- PR Communications prefix (optional)
- UID Serial number (fixed)
- Data Data blocks (freely programmable)
- SC Separator (optional)
- EC End character (optional)
- ts SCAN-LOCK-TIME
- tr

Time until the next new read out of the transponder

Note

Note the following information about the "Scan Mode":

- If the "Scan Mode" is activated, configuration protocols should only be sent to the reader when there is no transponder in the antenna field of the reader.
- In "Scan Mode", only read operations are possible.

Serial data format and protocol frames

The communication between the reader and connected host (terminal, PC etc.) is handled according to a specified protocol. The protocol used is suitable for use on a data bus and includes a bus address.

The reader only supports the extended protocol frame (not compatible with the simple protocol frame of the SLG D10). When the host application sends a protocol frame, the reader always responds with a protocol frame.

With data transfer via the asynchronous interface, the reader returns the requested data or a status byte. The response contains the transferred control byte. If a bad protocol frame is transferred, the reader does not respond.

Protocol frame

Byte	1	2	3	4	5	(6 (n-2))	(n-1)	n
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	CONTROL- BYTE	(DATA)	LSB CRC16	MSB CRC16
Default	0x02	-	-	-	-	-	-	-

Table 4- 2 Host \leftarrow reader

Byte	1	2	3	4	5	6	(7 (n-2))	(n-1)	n
Content	STX	MSB ALENGTH	LSB ALENGTH	COM- ADR	CONTRO L-BYTE	STATUS	(DATA)	LSB CRC16	MSB CRC16
Default	0x02	-	-	-	-	-	-	-	-

Table 4-3 Description of the protocol byte

Function	Description
STX	If the response protocol of the reader starts with the character STX (0x02), the protocol frame has the extended protocol length. In this case, the protocol length is specified by the 2-byte parameter ALENGTH.
ALENGTH (n = 865535)	Number of protocol bytes including STX, ALENGTH and CRC16
COM-ADR	0254 address of the device in bus mode
	The reader can be addressed at any time using COM-ADR 255.
CONTROL-BYTE	Defines the command that the reader is to execute.
STATUS 1)	Includes the status message or protocol data from or to the reader.

4.1 CRC16 calculation algorithm

Function	Description
DATA	Is an optional data field with a variable length. The number of the DATA byte depends on the command. The data is always sent first as MSB if the reader is in the ISO host command mode.
CRC16	Cyclic redundancy check of the protocol bytes of 1 to n-2, as specified by CCITT-CRC16
	• Polynomial: x ¹⁶ + x ¹² + x ⁵ + 1 (0x8408)
	Start value: 0xFFFF
	Direction: Backward

¹⁾ You will find further information on STATUS in the appendix "Index of the status bytes (Page 104)".

Data format

- Baud rate: 38,400 (default)
- Data bits: 8
- Stop bits: 1
- Parity:
 - even (default)
 - odd
 - none

4.1 CRC16 calculation algorithm

```
Polynomial:
                           x^{16} + x^{12} + x^5 + 1
                                                      \Rightarrow CRC_POLYNOM = 0x8408;
Start value:
                           0xFFFF
                                                      \Rightarrow CRC_PRESET = 0xFFFF;
Example in C:
unsigned int crc = CRC PRESET;
for (i = 0; i < cnt; i++)</pre>
/* 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);
    }
}
```

Configuration parameters (CFG)

The configuration memory of the reader is organized in 16 byte long configuration blocks. These consist of 14 bytes of configuration parameters and a 2 byte long CRC16 checksum. Each of the configuration blocks has a number (CFG0...CFGn).

Table 5-1 Structure of the configuration blocks in the configuration memory and EEPROM of the reader (CFG)

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Content							PARAN	IETER							CRO	C 16

The parameters are stored at two different locations within the configuration memory:

- RAM of the reader
- Backup EEPROM (for storing the parameters when the device is turned off)

With the value of the parameter CFG-ADR that is described in the section "Protocols for the configuration of the reader (Page 43)", you can address the relevant location in the configuration memory.

Name	Description	escription										
CFG-ADR	CFGn: N	Memory addr	ess of the re	equired config	guration bloc	k						
	• LOC: Po	osition of the	configuratio	n block ¹⁾ (RA	M / EEPRO	M)						
	• MODE:	specifies wh	ether one or	all configura	tion blocks a	re addressed	d ¹⁾					
	Bit	7	6	5	4	3	2	1	0			
	Function	LOC				MODE						
	The configu checked ea status "EE-	configuration blocks in the EEPROM are protected by a 16-bit CRC checksum. These checksums are cked each time the reader is reset. If an incorrect checksum is discovered, the reader changes to an error us "EE-Init mode" and resets the incorrect configuration block to default values. e EE-Init mode is activated, the LEDs PWR/PRE (green) and ERR (red) flash alternately. The reader re-										
	If the EE-In sponds to e ting again (correct, the	atus "EE-Init mode" and resets the incorrect configuration block to default values. the EE-Init mode is activated, the LEDs PWR/PRE (green) and ERR (red) flash alternately. The reader re- bonds to external commands with the status "0x10 EEPROM error". You can exit the EE-Init mode by reset- ng again (cold restart or "[0x64] System Reset" command). When the checksum of all data sets is then prrect, the reader changes to the configured operating mode.										
	Byte	()				2		n			
	Content	relates	to RAM	relates to	EEPROM	rese	rved					
		Changes to rameter tak immediately ing or storin figuration bl RAM.	Old restart or "[0x64] System Reset" command). When the checksum of all data sets is then eader changes to the configured operating mode.012 nrelates to RAMrelates to EEPROMreservedChanges to this pa- rameter take effect ing or storing this con- figuration block in RAM.Changes to this pa- rameter take effect ing/storing this config- uration block in EEPROM and reset- ting the reader.These bits or bytes are reserved for future expansions or for internal test and manu- facturing purposes. They must not be changed since this can cause incorrect opera- tion of the reader.									

5.1 CFG0: Passwords

¹⁾ For further information, refer to the section "[0x83] Set Default Configuration (Reset) (Page 45)"

Note

Please note the following:

- If parameters are configured outside their permitted range or if unspecified parameters are changed, malfunctions may result.
- During a firmware update, the EEPROM is reset to the default values.

5.1 CFG0: Passwords

The parameters of the CFG0 configuration block contain identification codes to personalize the reader. With this, you can prevent unauthorized access to several functions of the reader. For security reasons, the data of this configuration block cannot be read by the host. You only have write access. The "[0x83] Set Default Configuration" command is also not available here.

Byte	0	1	2	3	4	5	6
Content		READ	ER-ID		0x00	0x00	0x00
Default		0x000	00000	-	-	-	

Byte	7	8 9		10	11	12	13
Content	0x00		CFG_A	CCESS		0x00	0x00
Default	-		0x000	-	-		

Name	Description																
READER- ID	Defines the parameter b	passv plocks.	vord w	ith wh	ich the	e host l	ogs in	to the	reade	r to ob	otain re	ead/wri	te acc	ess to	the co	onfigura	ation
	To change after logging	the RE g in to	EADEF the re	R ID, yo ader.	ou nee	ed to w	rite to	CFG0	with t	he "[0>	(A0] R	eader	Login"	comm	nand ir	nmedi	ately
	Notes:																
	READE	READER-ID = 0x00000000 deactivates the password function.															
	A read of	A read operation with the command "[0x80] Read Configuration" always results in '0x00000000'.															
	A chang	A changed password becomes valid when the reader is reset.															
	 The con change 	nmand the CF	ls "[0x ⁻ G0 re	82] Sa gister,	ve Co if all c	nfigura configu	ition to ration	EEPF	ROM" a are u	and "[(sed.)x83] S	Set Def	fault C	onfigu	ration'	' do no	ot
	 The "[0> 	(A0] R	eader	Login'	comn	nand a	llows a	access	to the	e config	guratic	on data					
CFG	Defines the	config	guratio	n bloc	ks that	are o	nly acc	cessibl	e if the	user	has lo	gged iı	n succ	essfull	ly to th	e read	ler
ACCESS	Byte				8	3							ç)			
	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

Name	Description	1															
	Byte				1	0							1	1			
	Bit	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	CFG_NO	16	17	18	19	20	-	-	-	-	-	-	-	-	-	-	-
	Function	Desc	ription	Ì													
	CFG_NO	The v whet	value o	of the b e user	oit in C needs	FG_N to log	O defi in to t	nes wh he rea	nether der to	or not obtain	acces	s to th ss to th	e conf ie conf	igurati figurati	on blo on blo	ck is fr ck.	ee or
		• b	0 acce	ess is ⁻	free												
		• b	1 acce	ess reo	quires	a logir	ר										

Configuration protection

The access to the configuration parameters stored on the reader is protected by a 32-bit password ("READER ID"). This means that the configuration parameters in the EEPROM of the reader can only be read or modified after logging in successfully with a valid reader ID using the "[0xA0] Reader Login" command.

5.2 CFG1: COM interface

The parameters of the configuration block CFG1 contain the settings for the data transfer.

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

Byte	7	8	9	10	11	12	13
Content	TR- RESPONSE- TIME	0x00	0x00	0x00	SCAN- INTERFACE	INTERFACE	READER- MODE
Default	0x2C 1.5 seconds	-	-	-	0x00	0x01	0x00

Configuration parameters (CFG)

5.2 CFG1: COM interface

Name	Description	l										
COM-	Bus addres	s of the read	er (0 254)	for communi	cation via the	e asynchronc	ous interface					
ADR	Notes:											
	When the with ST.	nis parametei ATUS = {0x1	r is saved or 1}.	the reader,	a plausibility	test is run. If	an error occ	curs, the read	der replies			
	The add	dress 255 mu	st not be co	nfigured.								
	• The rea	der can be a with the set a	ddressed at ddress.	any time usi	ng the COM	address 255	in the transr	nit protocol.	t then			
BAUD	Here you se	et the baud ra	ate of the as	ynchronous i	interface.							
	BAUD	Baud rate										
	0x05	es with the set address.										
	0x06	Baud rate 4800 Baud 9600 Baud 19200 Baud 38400 Baud 57600 Baud 115200 Baud his parameter is saved on the reader, a plausibility test is run. If an error occurs, the reader replies TATUS = {0x11}. ge to the baud rate only takes effect after writing/saving the configuration block CEG1 in the										
	0x07	19200 Bauc	ł									
	0x08	38400 Bauc	ł									
	0x09	57600 Bauc	ł									
	0x0A	115200 Bau	bu									
	Notes:											
	When the with ST.	When this parameter is saved on the reader, a plausibility test is run. If an error occurs, the reader replies vith STATUS = {0x11}.										
	 A change EEPRO If the us 	ge to the bau M and resett ser sets an in	d rate only ta ing the read valid baud ra	akes effect a er. ate, the reade	fter writing/sa er sets the ba	aving the con aud rate to 38	figuration blo	ock CFG1 in	the			
TRANS-	With this by	/te. vou defin	e various pa	rameters of t	the data trans	sfer format of	f the asynch	ronous interf	ace.			
FORM	Bit	7	6	5	4	3	2	1	0			
	Function	0	0	0	0	S	D	F				
		-	-		-	-						
	Function	Description										
	Р	Type of par	ity									
		 b00 nor 	ne									
		 b01 eve 	en (default)									
		 b10 odd 	, ,									
		 b11 res 	erved									
	D	Number of a	data bits									
	-	 b0 1 bit 										
		 b0 r bit b1 rese 	rved									
	s	Number of a	stop bits									
	-	 b0 8 bit 	s.op 5.00									
			nved									

Name	Description												
	Notes:												
	 When the with ST 	nis paramete ATUS = {0x1	r is saved on 1}.	the reader,	a plausibility	test is run. If	an error occ	curs, the read	der replies				
	Change EEPRC	es to TRANS- M and resett	FORM take	effect only a er.	fter writing/sa	iving the con	figuration blo	ock CFG2 in	the				
	8 data b	oits and a sto	p bit always	need to be u	sed.								
TR- RESPON SE-TIME	With this by TR-RESPC protocol at the reader error" appe The respor RESPONS Notes:	rte, you can s DNSE-TIME b the latest wh and transpon ars. use time is ca E-TIME is be	specify the m begins when en the TR-R der are abor lculated as f tween 1 and	aximum res the reader h ESPONSE-1 ted. If this tir ollows: TR-R 65535.	ponse time fo as received a TME elapses ne is too sho ESPONSE-T	or transponde a new comma . In this case rt, the interfa TIME * 100 m	er commands and. The rea e, the current ice status "0: ns. The range	s. Ider sends a t commands x83 RF comr e of values o	response between nunications f TR-				
	 "TR-RE for cont 	SPONSE-TII rolling the rea	NSE-TIME" has no effect on the protocols for the configuration of the reader and the protocols g the reader.										
	• "TR-RE	SPONSE-TI	ME" must be	lower than "	Block Timeo	ut" in the set	tings of the C	COM port of t	the host.				
SCAN-	Selection o	f the commu	nications por	t for "Scan N	lode".			[
FACE	Bit	7	6	5	4	3	2	1	0				
	Function	-	-	-	-	-		IF-NO					
	Function	Description											
	IF-NO	Interface nu	Imber										
		• 6000 R	S-232 (defau	ult)									
		• b01x re	served										
		 b1xx re 	served										
INTER-	Flag for act	ivating the co	ommunicatio	ns port	1			Γ					
FACE	Bit	7	6	5	4	3	2	1	0				
	Function	-	-	-	-	-	-	-	RS232				
		_											
	Function	Description											
	DC-7-7-7	■ b0 activ	/ate										
	R0202	• DO activ											
	R3232	 b0 activity b1 dead 	ctivate										
READER-	The mode	 b0 activity b1 dead b1 the reader 	ctivate can be defin	ed with this	byte.								
READER- MODE	The mode Bit	b0 active b1 dead b1 dead f the reader 7	ctivate can be defin 6	ed with this 5	byte. 4	3	2	1	0				
READER- MODE	The mode of Bit Function	b0 active b1 dead b1 dead cof the reader 7 BRM-E	ctivate can be defin 6 -	ed with this 5 -	byte. 4 -	3	2	1	0 SCAN-E				
READER- MODE	The mode Bit Function	bo active b1 dear f the reader 7 BRM-E	ctivate can be defin 6 -	ed with this 5 -	byte. 4 -	3 -	2	1	0 SCAN-E				
READER- MODE	The mode of Bit Function	bo active b1 dead b1 dead f the reader 7 BRM-E	ctivate can be defin 6 -	ed with this 5 -	byte. 4 -	3	2	-	0 SCAN-E				
READER- MODE	The mode of Bit Function Function SCAN-E	bo active b1 dead b1 dead b1 dead b7 the reader 7 BRM-E Description By setting the	ctivate can be defin 6 - -	ed with this 5 - Gcan Mode" o	byte. 4 - can be activa	3 - ted.	2	1	0 SCAN-E				
READER- MODE	The mode of Bit Function Function SCAN-E	 b0 active b1 dear b1 dear present the reader 7 BRM-E Description By setting the bolt of the setting the se	ctivate can be defin 6 - his bit, the "S t mode	ed with this 5 - Scan Mode" o	byte. 4 -	<u>3</u> - ted.	2	-	0 SCAN-E				

5.3 CFG2: Inputs / outputs

Name	Description											
	BRM-E	By setting t	his bit, the "S	Scan Mode" o	can be activa	ited.						
		• b0 Hos	b0 Host mode or Scan mode									
		b1 Buffered read mode										
	Bit combinations for the modes of the reader											
	Bit	7	7 6 5 4 3 2 1 0									
	Host mode	0	0	0	0	0	0	0	0			
	Scan Mode	0	0 0 0 0 0 0 0 1									
	Buffered Read Mode	1	0	0	0	0	0	0	0			

5.3 CFG2: Inputs / outputs

The parameters of the configuration block CFG2 contain the settings for the digital inputs.

Every use of REL1 in this document relates to the name OUT in the configuration program RF290R-Set.

Byte	0	1	2	3	4	5	6
Content	ILDE-MODE		0x0	002	IN-ACTIVE	0x00	REL1-TIME
Default	0x80AB			_	0x00	-	0x00

Byte	-	7	8	3	9	10	11
Content	REL1-TIME	0x00	0x00 0x00		0x00	0x00	0x00
Default	0x00	-	-	_	-	-	-

Name	Description																
IDLE-	Decides the status of the signal emitters (OUT1, OUT2 and REL) during the free mode.																
MODE	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Function	RE mo	REL1 0														
	Function	Desc	Description														
	REL1	b00 UNCHANGED: Status of the sensor unchanged															
	mode	• b(01 ON	I: Sign	al emi	tter on											
		• b'	10 OF	F: Sig	nal em	nitter o	ff										
		• b [*]	b11 FLASHING: Signal emitter on/off alternating														

Name	Description												
IN-	Specifies whether the input is active with an open or closed contact.												
ACTIVE	Bit	7	1	0									
	Function	0	0	0	0	0	0	0	IN1				
	Function Description												
	IN1 • b0 input activated when contact closed												
	b1 input activated when contact open												
REL1- TIME	Defines the hold time of the digital output REL1. If the reader receives a valid transponder response, the cor- responding antenna is activated for the value in REL1-TIME. If REL1-TIME is set to zero, the function is deactivated. If REL1 is high in guiet mode, REL1 is low for REL1-TIME.												
	The hold tir	me is calculat	ed as follow	S:									
	• REL1-T	IME * 100 ms	6.										
	• The ran	ge of values	of REL1-TIN	1E is betwee	en 1 and 655	35.							

Note

Buffered Read Mode (reading serial numbers and data)

If the reading of the serial number was OK and the reading of the data was not, no data set is transferred but the assigned REL1 is active.

5.4 CFG3: RF interface

The parameters of the configuration block CFG3 content global settings for the transponder driver and the reader.

Byte	0	1	2	3	4	5	6
Content	TAG-DRV		RF-POWER	0x00	0x00	0x00	0x00
Default	0x0008		0x04	-	-	-	-
	ISO		4 W				

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	-	-	-	-	-

Name	Description	Description										
RF-	Specifies th	Specifies the RF output power.										
POWER	Bit	7	6	5	4	3	2	1	0			
	Function	iction 0 0 LEVEL										

5.5 CFG4: Transponder parameters

Name	Description	
	When this p STATUS =	parameter is saved on the reader, a plausibility test is run. If an error occurs, the reader replies with {0x11}.
	Function	Description
	LEVEL	Level of the RF output power, range: (1 5 W)
		• b001 1W
		• b010 2 W
		• b011 3 W
		• b100 4 W
		• b101 5 W
	Notes:	
	 The RF to every 	hardware is monitored constantly by a monitoring function. If an error occurs, the reader responds command with the error code 0x84.
	 A change EEPRC 	ge to "RF-POWER" only takes effect after configuration block CFG3 has been written to the M and the reader has been reset.

5.5 CFG4: Transponder parameters

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

Byte	0	1	2	3	4	5	6
Content	0x00	0x00	0x00	0x00	ISO15693 MODE	ISO15693 AFI1	ISO15693 OPTION
Default	-	-	-	-	0x0B	0x00	0x00

Byte	7	8	9	10	11	12	13
Content	0x00	ISO15693 AFI2	ISO15693 AFI3	ISO15693 AFI4	0x00	0x00	ISO- Blockgröße
Default	_	0x00	0x00	0x00	_	_	0x04

Name	Description										
ISO15693	Bit	7	6	5	4	3	2	1	0		
-MODE	Function	0	0	AFI	NO-TS	DATA- RATE	0	0	0		
	Function	Description									
	DATA- RATE	b0 reserved									
		• b1 high	• b1 high								
	NO-TS	• b0 16 ti	me slots								
		• b1 1 tin	ne slot								

5.5 CFG4: Transponder parameters

Name	Description									
	AFI	• b0 dead	ctivated							
		• b1 activ	vated							
ISO	First applica	ation family id	dentifier (AFI) for selecting	g a transpon	der				
15693										
ISO15693	Bit	7	6	5	4	3	2	1	0	
-TAGIT-	Function	0	0	0	0	WR-C	PTION	0	0	
OPTION										
	Function	Description								
	WR-	• b00 set	automatical	ly						
	OPTION	• b10 Tag	g-Option = 0							
		• b11 Tag	g-Option = 1							
	Note:									
	If WR-OPT	ION is set au	tomatically, t	the reader se	ets WR-OPTI	ON to 0 if th	ne ISO 15693	host comma	and is not in	
	the addressed mode.									
ISO 15693	Second application family identifier (AFI) for selecting a transponder									
AFI2										
180	Third applic	cation family	identifier (AF	I) for selectin	a second al	nder		i ullerent Ar	T Dytes.	
15693	Note:	Jation lanny								
AFI3	If AFI3 is no	ot 0x00, the i	nventory will	be repeated	a second ar	nd third or fo	urth time with	different AF	l bytes.	
ISO	Fourth appl	lication family	v identifier (A	FI) for select	ing a transpo	onder				
15693	Note:									
AFI4	If AFI4 is not 0x00, the inventory will be repeated a second and third or fourth time with different AFI bytes.									
ISO block	Bit	7	6	5	4	3	2	1	0	
size	Function	Read	mode	Block size			DB block size	9		
	-									
		Description						abla an if the		
	DB DIOCK size	sponder is i	not used in th	ne addressed	sponder that mode.	t is not listed		able of it the	tran-	
		Range: 0x0	1 0x1F							
		If the value	is 0x00, a bl	ock size of 4	bytes is set	automatical	ly.			
	Block size	 b0 auto 	matic (if the	transponder	is known)					
		• b1 man	ual (specifie	d as DB bloc	k size)					
	Read	b00 automatic mode (if the transponder is known)								
	mode	b01 read once								
		• b10 rea	id several tin	nes						

5.6 CFG5: Anticollision

5.6 CFG5: Anticollision

The parameters of the configuration block CFG5 contain anticollision settings.

Byte	0	1	2	3	4	5	6
Content	0x00						
Default	-	-	-	_	-	-	-

Byte	7	8	9	10	11	12	13
Content	0x00	0x00	0x00	0x02	Anticollision	0x00	0x00
Default	_	_	_	_	0x04	_	-

Name	Description												
Anti-	Specifies which transponder data is sent to the host.												
collision	Bit	7 6 5 4 3 2 1											
	Function	0	0 0 0 0 0 ACOLL 0 0										
	Function Description												
	ACOLL	This bit activates the anticollision mode. In the anticollision mode, the reader specifies transpond- er-specific communications parameters.											
		• b0 deactivated: In this case the reader does not process any anticollision procedure with the transponder in the antenna field.											
		 b1 activity transport 	vated (defaul nder in the a	t): In this cas ntenna field.	se the reader	processes t	he anticollisio	on procedure	e with the				

5.7 CFG6: Chip-specific commands

Byte	0	1	2	3	4	5	6
Content	0x00	0x00	FUJITSU	0x00	0x00	0x00	NXP
Default	-	-	0x00	-	-	-	0x00

Byte	7	8	9	10	11	12	13
Content	ST	0x00	0x00	0x00	0x00	0x00	0x00
Default	0x00	-	-	-	-	-	-

Note

It is advisable to read the technical specifications of the transponder from the relevant transponder manufacturer.

5.8 CFG7-10: Reserved

Byte	0	1	2	3	4	5	6
Content	0x00						
Default	-	-	-	-	-	-	-

The configuration blocks CFG7 to CFG10 are reserved for later use.

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	=	=	_	_	_	=	_

5.9 CFG11: Read mode - read data

The parameters of the CFG11 configuration block contain settings for an automatic mode of the reader. To activate an automatic mode of the reader (such as "Buffered Read Mode" or "Scan Mode"), the relevant bit must be set in the "READER-MODE" register of the configuration block "CFG1: Interface". It is useful to activate "Anticollision" in CFG5 if there is a large or unknown number of transponders in the antenna field. The automatic mode of the reader can be used in the multiplex mode of the antenna. The parameters for this function need to be configured in "CFG15: Antenna multiplexing".

Byte	0	1	2	3	4	5	6
Content	TR-DATA-1	TR-DATA-2	TR-DATA-3	BANK	DB-ADR		0x00
Default	0x01	0x00	0x00	0x03	0x0000		_

Byte	7	8	9	10	11	12	13
Content	0x00	DE	3-N	EAS-MODE	D-START	D-L	_GT
Default	-	0x0	001	0x00	0x00	0x0	004

Configuration parameters (CFG)

5.9 CFG11: Read mode - read data

Name	Description											
TR-DATA	Selection o	f data types f	or the read o	operation								
	Bit	7	6	5	4	3	2	1	0			
	Function	Expansion	-	TIMER	ANT	Byte order DB	EAS	DB	SNR			
	Function	Description										
	SNR	b0 no sb1 seria	erial numbei al number is	r is saved saved								
	DB	 b0 no d b1 data 	ata block nu block numb	mber is save er is saved	ed							
	EAS (only I- Code SLI)	b0 no Eb1 exec	AS function cutes EAS co	ommand								
	Byte order DB	b0 MSEb1 LSB	3 first first									
	ANT	b0 the rb1 the r	 b0 the number of the antenna is not saved b1 the number of the antenna (18) where the transponder was identified is saved 									
	TIMER	b0 no internal system timeb1 internal system time is active										
	 Notes: The internal system time is not a real-time clock (RTC) and the accuracy cannot be guaranteed. EAS and simultaneous reading of serial numbers and data blocks is possible. 											
1R-DATA-	Selection o		or the read of		4	2	0	4	0			
-	Bit	1	0	5		3	2	1	0			
	Function	-	-	-	ANT_EAT	-	-	-	-			
	Function	Description										
	ANT Ext	Antenna ex	tended									
		 b0 no E 	SSI									
		 b1 ante 	nna number	with RSSI								
	Note [.]											
	If the exten	ded antenna	is activated.	the bit for th	e number of	the antenna	must be dea	activated.				
TR-DATA-	Selection o	f data types f	or the read o	operation								
3	Bit	7	6	5	4	3	2	1	0			
	Function - - READ_C - - COM-PF OMPLET E_ BANK BANK BANK BANK BANK											

5.9 CFG11: Read mode - read data

Name	Description											
	Function	Description										
	COM-	In "Scan Mo	de" only									
	PREFIX	• b0 no C	OM prefix	is sent.								
		• b1 the r	eader trar	sfers th	e COM-A	ADR befo	ore every	data set	-			
	READ	If this bit is s	et, the rea	ader rea	ds out al	l memor	y blocks	from the	selected	memory ban	k.	
	COM- PLETE BANK	• b0 the r Start and	eader rea d D-LGT.	ds out th	ne memo	ry blocks	s accordi	ng to the	settings	in DB-ADR, I)B-N, D-	
		• b1 the r	eader rea	ds out a	ll blocks	of the se	lected m	emory ba	ank.			
	Note: This functio	onality is restr	ality is restricted to memory banks with a maximum size of 255 bytes.									
DB-ADR	Address of	s of the first data block. Range: 0x000xFF. ¹⁾										
DB-N	Number of	ber of data blocks. Range: 0x010x20.										
	The data bl	The data block size in "Buffered Read Mode" is always 4 bytes. 2)										
EAS-	The EAS-M	The EAS-MODE defines the settings for the automatic read modes.										
MODE	Bit	7	7 6 5 4 3 2 1 0 TAG TYPE									
	Function	-	ALARM- MODE		-	-			TAG	-TYPE		
	Function Description											
	ALARM- MODE	 b0 MODE 0 (The relay only becomes active if EAS was detected.) b1 MODE 1 (The relay becomes active when EAS was detected and/or a UID was read.) 										
	TAG-	Defines whi	ch tag typ	e is supp	ported.							
	TYPE	• b0000 r	eserved									
		• b0001 N	IXP									
		• b0010 F	ujitsu									
D-START	This param "Scan Mode	eter defines t e". To transfe	he first by r the entir	te in the e data b	raw data lock, D-S	a (define START m	d by DB- nust be s	ADR and et to 0.	d D-LGT)	that is transf	erred in	
	Note:											
	The size of	a data block	depends	on the ty	pe of tra	nsponde	er.					
D-LGT	D-LGT defin beginning v	nes the lengtl vith D-START	n of the ra	w data t	ransferre	ed in "Sca	an Mode	". Numbe	er of data	a bytes to be t	ransferred	
	Byte	0	1	2	3	4	5	6	7			
	Data	0x01	0x23	0x45	0x67	0x89	0xAB	0xCD	0xEF			
	D-START = 1											
			¥									
	Output da	ata	0x23	0x45	0x67	0x89	0xAB]				

5.10 CFG12: Read mode - filter

¹⁾ You will find further information on valid addresses and data block sizes in the section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

5.10 CFG12: Read mode - filter

Byte	0	1	2	3	4	5	6
Content	VALID	-TIME		0x00			
Default	0x0	037		-			
	5,5	5 s					

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	_	-	_	_	-	-	_

Name	Description	Description								
VALID-	The period d	luring which a transpond	er cannot be read a seco	ond time.						
TIME	065535 x 1	100 ms = 0 ms 6553.5	S							
	Note:									
	A change to and the CPU	to VALID-TIME only takes effect after configuration block CFG12 has been written to the EEPROM PU has been reset.								
TR-ID	TR-ID specif tent in the ac	ifies the parameters for the transponder identification. If several transponders have the same con- iddressed data block, only one data set is generated.								
	This function	function is available only in "Buffered Read Mode".								
	Byte 2 3 4				5					
	Function	TR-ID-SOURCE	TR-ID-D)B-ADR	TR-ID-DB-N					
	Function	Description								
	TR-ID-	Specifies the data sou	rce for the transponder id	lentification.						
	SOURCE	b0 data block								
		• b1 serial number	b1 serial number							
	TR-ID-DB- ADR	Specifies the address selected as the data set	of the data block for the t ource in ID-SOURCE, ID-	ransponder identification ·DB-ADR is ignored.	. If the serial number is					
	TR-ID-DB-N	Specifies the number of number is selected as	of data blocks to be read the data source in "TR-II	for the transponder ident D-SOURCE", "TR-ID-DB-	ification. If the serial N" is ignored.					

Note

Please note the following:

- A change to TR-ID only takes effect after configuration block CFG12 has been written to the EEPROM and the CPU has been reset.
- The address TR-ID-DB-ADR must be in the range of the selected data blocks: DB-ADR ≤ TR-ID-DB-ADR ≤ DB-ADR1 + DB-N1 - 1.
 "DB-ADR" and "DB-N" are from CFG11.
- If instead of the "serial number", the TR-ID source "Data block" is used, the reading of data blocks in "CFG11: Read mode read data (Page 31)" must also be activated and configured.

5.11 CFG13: Scan Mode

Byte	0	1	2	3	4	5	6
Content	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
Content	0x00	HEADER- USR1	HEADER - USR2	HEADER - USR3	HEADER - USR4	0x00	LEN-USR
Default	-	0x00	0x00	0x00	0x00	-	0x00

Name	Description	l									
DB-USE	Defines the	e data format	of the data a	and the value	e of the data.						
	Bit 7 6 5 4 3 2										
	ORMAT										
	Function	Description									
	db- Format	 b0000 in this c b0010 in this c For this, as show 	unformatted ase, the data ASCII-format ase the raw , the data by m in the follo	hex data a is transferre tted hex data data is conve tes are first c wing table.	ed as it was r a erted to ASC livided into h	read by the re II code by the alf bytes and	eader. e transpond then conve	er before the rted to ASCII	transfer. characters		
		Raw (hex /	data binary)	ASCI (ASCI	l data I / hex)						
		0x0	b0000	'0'	0x30						
		0x1	b0001	'1'	0x31						
		0x2	b0010	'2'	0x32						

Configuration parameters (CFG)

5.11 CFG13: Scan Mode

Name	Description										
		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-	Selection of	f the separat	or between t	wo data type	s for the sen	d data.					
CHAR	Bit	7	6	5	4	3	2	1	0		
	Function	USER	• •	'''	,	TAB	CR	LF	CR+LF		
	ASCII	Hex									
	CR+LF	0xD and									
	. –	0x0A									
		0x0D									
	CR	0x0A									
	TAB	0x09									
	, ,	0x3B									
	,	0x2C									
		0x20									
	USER	user- defined in									
		SEP-USR									
	none	0x00									
	Note:										
	Only one op	otion can be	selected.								
SEP-USR	User-define	ed separator									
END-	Selection of	f the end cha	racter betwe	en two data	types for the	send data.		1			
CHAR	Bit	7	6	5	4	3	2	1	0		
	Function	USER		',	''	TAB	CR	LF	CR+LF		
		-									
	ASCII	Hex									
	CR+LF	0xD and									
	IE										
SEP-USR END- CHAR	Note: Only one op User-define Selection of Bit Function ASCII CR+LF LF CR TAB	user- defined in SEP-USR 0x00 otion can be d separator f the end cha 7 USER Hex 0xD and 0x0A 0x0D 0x0A 0x09	selected. racter betwe 6 ''	en two data 5 ;;	types for the	send data. 3 TAB	2 CR	1 LF	0 CR+LF		
Name	Description										
------------------	-------------	--------------------------------------	------------	--------------	-----	---	-----	------	---	--	--
	· · · ,	0x3B									
	''	0x2C									
	••	0x20									
	USER	user- defined in END- USR13									
	none	0x00									
	Note:										
	Only one o	ption can be	selected.								
END- USR13	User-define	ed end chara	cter								
HEADER- USR14	User-define	d start character									
LEN-USR	Bit	7	6	5	4	3	2	1	0		
	Function		HEADE	R-LEN			END	-LEN			
	Function	Description									
	END-LEN	• b0000 l	END-USR1								
		• b0001 l	END-USR1								
		• b0010 l	END-USR1 +	- 2							
		• b0011 l	END-USR1 +	- 2 + 3							
	HEADER-	• b0000 i	no HEADER	byte							
	LEN	• b0001 l	HEADER-US	R1							
		• b0010 l	HEADER-US	R1 + 2							
		• b0011 l	HEADER-US	R1 + 2 + 3							
		• b0100 l	HEADER-US	R1 + 2 + 3 +	- 4						

Table 5-2 Example of scan data

Header			UID	Delim- iter	Blocks	Delim- iter	Time	Delim- iter	An- tenna	Delim- iter	En	d charac	ter	
USR1	USR2	USR3	USR4	UID	SEP- CHAR	DB	SEP- CHAR	Time	SEP- CHAR	ANT no.	SEP- CHAR	USR1	USR2	USR3

5.12 CFG14: Reserved

5.12 CFG14: Reserved

The configuration block CFG14 is reserved for later use.

Byte	0	1	2	3	4	5	6
Content	0x00						
Default	-	-	-	_	-	-	-

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	-	-	-	-	-

5.13 CFG15: Antenna multiplexing

The parameters in CFG15 are used to configure multiplexing of antennas in the automatic mode of the reader in conjunction with an antenna multiplexer ID ISC ANT.MUX.

Byte	0	1	2	3	4	5	6
Content	MUX-MODE	OUTPUT- CHANNELS	MUX-VALID-TIME-ANT		0x0	0x00	
Default	0x00	0x04	0x00C8		-		-

Byte	7	8	9	10	11	12	13
Content	0xC8	0x00C8		0x00C8		0x00	INPUT- CHANNELS
Default	-	-		-		-	0x01

Name	Description											
MUX-	Activates or deactivates multiplexing and specifies when the next output will be selected.											
MODE	Bit	7	6	5	4	3	2	1	0			
	Function	0	0 0 0 0 0 0 0 MUX Multi- switching plexing condition									
	E											
	Function	Description										
	Multiplex-	b0 deactivate										
	ing	b1 activate										
	MUX	Specifies w	hen the next	output will b	e selected.							
	switching condition	• b0 no re	esponse (if c	communicatio	on on the RF	interface ha	s ended)					
	condition	 b1 rese 	rved									

Name	Description	ption								
OUTPUT-	Specifies the number of output channels used for multiplexing.									
CHAN-	Function	Description								
NELS	OUTPUT- CHAN- NELS	 b001 1 antenna b010 2 antennas b011 3 antennas b100 4 antennas b101 5 antennas b110 6 antennas 								
MUX- VALID- TIME-ANT	As soon as If "no respo the next and munication active anter condition, th	this time has expired (value x 5 ms), the next antenna output is selected. Inse" is selected for the MUX switching condition, the reader switches from the active antenna to tenna if there is no response from any transponder of the active antenna. If the transponder com- time of the active antenna exceeds MUX-VALID-TIME-ANT, the transponder communication of the nna is stopped and the reader switches to the next antenna. If "fixed" is selected as the switching he switch to the next channel is always within this period.								
INPUT-	JT- Specifies the number of inputs									
CHAN-	Function	Description								
NELS	INPUT- CHAN- NELS	 b00 - b01 1 input b10 reserved 								

5.14 CFG16: Reset persistency

The parameters in CFG16 are used to configure the reader reset times for the persistence flags of the transponders. The times for resetting the persistence flags are used by the reader in the ISO host mode, "Scan Mode" and "Buffered Read Mode".

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

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	_	_	_	-	-

5.15 CFG17: Reserved

Name	Description
PER- RESET- TIME	The time value specifies a time that specifies the resetting of the transponder selected status using RF reset of the reader. The time PER-RESET-TIME starts after the reader receives a response from any transponder. When this time expires, the reader generates an RF reset. The PER-RESET-TIME only takes effect if the reader does not use MUX. If MUX is used, the transponder status is reset when there is a switchover from one antenna to the next.
	• Time units = 5 ms
	 Maximum time value = 5 ms x 65534[0xFFFE] = 5.46125 min.
	 The value 65535 [0xFFFF] indicates that the reader will not run an RF reset.

5.15 CFG17: Reserved

The configuration block CFG17 is reserved.

Byte	0	1	2	3	4	5	6
Content	0x0000		0x0	0C8	0x0	0x00	
Default	-			-	-	-	_

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	-	-	-	-	-

5.16 CFG18-19: Reserved

The configuration blocks CFG18 and CFG19 are reserved for later use.

Byte	0	1	2	3	4	5	6
Content	0x00						
Default	-	-	_	_	-	-	-

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	_	_	_	_	_

5.17 CFG20: RF parameters

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

Byte	0	1	2	3	4	5	6
Content	MDS D3xx - optimization	0x00	0x00	0x00	0x00	0x00	0x00
Default	0x02	-	-	-	-	-	-

Byte	7	8	9	10	11	12	13
Content	IGNORE- ERROR	0x00	0x00	0x00	0x00	0x00	0x00
Default	0x01	-	-	-	-	-	-

Name	Description											
MDS	Defines operation of the MDS D3xx mode.											
D3xx -	Bit	7	6	5	4	3	2	1	0			
tion	Function	0 0 0 0 0 0 0 MDS D3xx - optimiza- tion										
	Function	ztion Description										
	MDS D3xx - optimiza- tion	b01 MEb10 ME	b01 MDS D3xx - optimization - ON b10 MDS D3xx - optimization - OFF									
IGNORE-	Defines whether or not an error has valid data.											
ERROR	Bit	7	6	5	4	3	2	1	0			
	Function	0	0	0	0	0	0	0	Weak collision ISO 15693			
	Function Weak	 Description b0 a we 	eak collision	has damage	d data and th	e data will b	e ianored					
	collision ISO 15693	• b1 a we	eak collision	has valid dat	а		- <u>.</u>					

5.18 CFG21-63: Reserved

5.18 CFG21-63: Reserved

The configuration blocks CFG21 to CFG63 are reserved for later use.

Byte	0	1	2	3	4	5	6
Content	0x00						
Default	-	-	-	-	-	-	-

Byte	7	8	9	10	11	12	13
Content	0x00						
Default	-	-	_	_	-	-	_

6

Protocols for the configuration of the reader

With the aid of the protocols for configuring the reader, this can be adapted to individual conditions of various applications within a wide framework.

You can only access the configuration parameters after executing the "[0xA0] Reader-Login (Page 59)" command with the correct READER-ID.

Since your data needs to be protected from unauthorized access, the reader is equipped with the following protection mechanism:

 Configuration protection: Access to the configuration data stored in the EEPROM of the reader is locked.

6.1 [0x80] Read Configuration

You can determine the current configuration of the reader with "Read Configuration". To achieve this, the configuration is read in blocks of 14 bytes and addressed by CFGn in the CFG-ADR byte.

Table 6-1 Host \rightarrow reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x82]	CFG-ADR	CRC16
Default	0x02	-	-	-	-	-	-

Table 6-2 Reader \rightarrow host

Byte	1	2	3	4	5	6	7 20	21, 22
Content	STX	MSB	LSB ALENGTH	COM-ADR	[0x82]	STATUS ¹⁾	CFG-REC	CRC16
Default	0x02	-	-	-	-	-	-	-

Name	Description								
CFG-	Bit	7	6	5	4	3	2	1	0
	Function	LOC	0	0 CFGn: Address of the configuration block					
	Function	Description							
	CFGn	Memory ad	dress of the	required con	figuration blo	ock			

6.2 [0x81] Write Configuration

Name	Description					
	LOC	specifies the memory location of the configuration block				
		• b0 RAM				
		• b1 EEPROM				
CFG-REC	14 byte long	14 byte long configuration block read from address CFGn in CFG-ADR				

²⁾ For more information, refer to the section "Configuration parameters (CFG) (Page 21)".

Note

Error code 0x15

A read configuration from the EEPROM with reserved configuration blocks causes error code 0x15.

6.2 [0x81] Write Configuration

With the "Write configuration" command, you change the configuration of the reader. To do this, you write 14 byte long blocks to the configuration memory. For addressing you use CFGn in the CFG-ADR byte. You will find a description of the parameters in the section "Configuration parameters (CFG) (Page 21)".

Table 6- 3 Host \rightarrow reader

Byte	1	2	3	4	5	6	7 20	21, 22
Content	STX	MSB	LSB ALENGTH	COM-ADR	[0x81]	CFG-ADR	CFG-REC	CRC16
Default	0x02	-	-	-	-	-	-	-

Table 6- 4 Reader \rightarrow host

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

Name	Description											
CFG-	Bit	7	6	5	4	3	2	1	0			
	Function	LOC	0	CFGn: Address of the configuration block								
	Function	Description	Description									
	CFGn	Memory ad	Memory address of the required configuration block									

6.3 [0x83] Set Default Configuration (Reset)

Name	Description					
	LOC	specifies the memory location of the configuration block				
		• b0 RAM				
		• b1 EEPROM				
CFG-REC	14 byte long	g configuration block read from address CFGn in CFG-ADR				

²⁾ For more information, refer to the section "Configuration parameters (CFG) (Page 21)".

Note

Error code 0x16

A write configuration to the EEPROM with reserved configuration blocks causes an error code 0x16.

6.3 [0x83] Set Default Configuration (Reset)

With the "Set Default Configuration" command, you can reset every configuration block to the default settings of the manufacturer.

Table 6- 5 Host \rightarrow reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x83]	CFG-ADR	CRC16
Default	0x02	-	-	_	-	-	_

Table 6- 6 Reader \rightarrow host

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

Name	Description										
CFG-	Bit	7 6 5 4 3 2 1 0									
	Function	LOC MODE CFGn: Address of the configuration block									
	Function	Description									
	CFGn	Memory address of the required configuration block									
	MODE	specifies or	specifies one or all configuration blocks:								
		b0 configuration block specified by CFGn									
		• b1 all c	onfiguration	blocks							

6.3 [0x83] Set Default Configuration (Reset)

Name	Description	
	LOC	specifies the memory location of the configuration block
		• b0 RAM
		• b1 EEPROM
CFG-REC	14 byte lon	g configuration block read from address CFGn in CFG-ADR

²⁾ For more information, refer to the section "Configuration parameters (CFG) (Page 21)".

Note

Error code

A configuration for specifying the default settings with reserved configuration blocks causes an error code.

Protocols for controlling the reader

With the aid of the protocols for controlling the reader, this can be adapted to individual conditions of various applications within a wide framework.

You can only access the configuration parameters after executing the "[0xA0] Reader-Login (Page 59)" command with the correct READER-ID.

Since your data needs to be protected from unauthorized access, the reader is equipped with the following protection mechanism:

 Configuration protection: Access to the configuration data stored in the EEPROM of the reader is locked.

7.1 [0x52] Baud Rate Detection

This protocol is used to determine the baud rate set for the asynchronous interface of the reader.

Table 7-1 Host → reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x52]	0x00	CRC16
Default	0x02	-	_	_	_	-	-

Table 7-2 Reader \rightarrow host

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

Note

Response protocol

The response protocol is sent only when the query is made with the baud rate and correct parity of the reader.

7.2 [0x63] RF-Controller Reset

7.2 [0x63] RF-Controller Reset

With this protocol, you reset the CPU of the reader. All transponders within the antenna field of the reader are reset to their basic settings.

Table 7- 3 Host → reader

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

Table 7-4 Reader \rightarrow host

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

¹⁾ You will find further information in the Appendix (Page 103).

Note

Effects

After resetting the CPU, the RF field is turned off.

The communications interface is not reset.

7.3 [0x64] System Reset

With this protocol, you reset the RF controller.

Table 7-5 Host \rightarrow reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	MODE	CRC16
Default	0x02	-	-	-	-	-	-

Table 7- 6 Reader \rightarrow host

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x64]	MODE	CRC16
Default	0x02	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description
MODE	Defines the controller to be reset.
	MODE 0x00 → RF-Controller

Note

Effects

After resetting the CPU, the RF field is turned off.

The communications interface is reset.

7.4 [0x66] Get Reader Info

With this protocol you can obtain the firmware version of the reader, its type and the transponder types supported by the firmware. The device ID can also be obtained.

Table 7-7 Host \rightarrow reader

Byte	1	2	3	4	5	6	7
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x66]	MODE	CRC16
Default	0x02	-	-	_	_	_	-

Table 7-8 Reader \rightarrow Host

Depending on the MODE parameter, the response of the reader has a different structure with different information:

Parameter	Value										
MODE =	Byte	1	2	3	4	5	6	7, 8	9	10	11
0x00 (Control- ler-	Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x66]	STA- TUS ¹⁾	FW- REV	Re- served	HW- TYPE	Re- served
Firmware)	Default	0x02	-	-	-	-	_	-	-	-	-
	Byte	12, 13	14, 15	16, 17	18, 19						
	Content	TR- TYPE	RX- BUF	TX-BUF	CRC16						
	Default	-	-	-	-						

Protocols for controlling the reader

7.4 [0x66] Get Reader Info

Parameter	Value										
MODE =	Byte	1	2	3	4	5	6	7, 8	9, 10	11 13	14, 15
0x01 (SIMATIC- Firmware)	Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x66]	STA- TUS ¹⁾	FW- REV- SIMA- TIC	[0x5600]	Re- served	CRC16
	Default	0x02	-	-	-	-	-	-	-	-	-
		1	r	r				r			
MODE =	Byte	1	2	3	4	5	6	7, 8	9	10	11
0x05 (Boot- loader-	Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x66]	STA- TUS ¹⁾	FW- REV- Loader	Re- served	Re- served	Re- served
Firmware)	Default	0x02	-	-	-	-	-	-	-	-	-
	Byte	12, 13	14, 15	16, 17	18, 19						
_	Content	Re- served	Re- served	Re- served	CRC16						
	Default	-	-	-	-						
MODE =	Byte	1	2	3	4	5	6	7 10	11 14	15, 16	17, 18
0x80 (Geräte- ID)	Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x66]	STA- TUS ¹⁾	DEV_ID	Re- served	Re- served	Re- served
	Default	0x02	-	-	-	-	-	-	-	-	-
		•	-	-	-	-	-	-			
	Byte	19, 20	21, 22	23, 24							
	Content	Re- served	-	CRC16							
	Default	-	-	-							

Name	Description
MODE	Using the MODE parameter, a variety of information can be obtained from the reader.
	0x00: Controller firmware / hardware information
	0x01: SIMATIC firmware
	0x05: Bootloader firmware
	0x80: Device ID
	OxFF: All (all available information is read out at one time)
FW-REV	Firmware version
FW-REV- SIMATIC	Version of the SIMATIC firmware
FW-REV- Loader	Version of the Bootloader firmware
HW-TYPE	Hardware type of the reader (0x2D)
TR-TYPE	Shows the transponders supported by the software.

Name	Description																
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Function	-	-	-	-	-	-	-	-	-	-	-	-	ISO 156 93	-	-	-
RX-BUF	RX-BUF is the maximum size of the receive buffer 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 size of the send buffer of the reader. The host needs to take into account that a re- sponse protocol of the reader can have this length.																
DEV_ID	Individual d	evice i	dentifi	er of tl	ne rea	der.											

7.5 [0x69] RF Reset

The antenna field of the reader can be turned off with the command "RF Reset" for t_{rf} = 15 ms. All transponders within the antenna field of the reader are reset to their basic settings.

Table 7-9 Host \rightarrow reader

Byte	1	2	3	4	5	6, 7
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x69]	CRC16
Default	0x02	-	=	_	_	-

Table 7- 10 Reader \rightarrow host

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

¹⁾ You will find further information in the Appendix (Page 103).

Note

Effects

After the "RF Reset" command, the reader cannot receive any new transponder until the time $t_{\rm rf}$ has expired.

After the "RF Reset" command, transponders within the antenna field must be selected again.

The response to this command is sent after a successful reset.

7.6 [0x6A] RF Output ON/OFF

7.6 [0x6A] RF Output ON/OFF

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

In the automatic read mode of the reader (Scan Mode, Buffered Read Mode), RF communication can be interrupted with "RF OFF" and continued with "RF ON". After "RF OFF", the reader accepts every host command and RF communication is via the last selected antenna. To select a specific antenna without continuing the automatic read mode, the option flag HM must be set.

Table 7- 11	Host → reader
-------------	---------------

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6A]	RF-OUTPUT	CRC16
Default	0x02	-	_	_	-	-	-

Table 7- 12 Reader \rightarrow host

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

Name	Description	1											
RF-	Specifying	the RF and D	RF and DC power of the antenna output										
OUTPUT	PUT Bit 7 6 5 4 3 2 1												
	Function	HM	HM 0 0 0 0 0 0 RF										
	Function	Description	Description										
	RF	Specify RF	Specify RF output active or RF power OFF										
		• b0 RF 0	OFF										
		• b1 RF 0	NC										
	НМ	Retain host	Retain host mode (applies only in the automatic read mode)										
		• b0 the a	b0 the automatic read mode is continued if the antenna output is higher than zero.										
		• b1 if hig	her than ze	ro, the host r	node is retai	ned and the	antenna outp	out selected.					

7.7 [0x6D] Get Noise Level

The "Get Noise Level" command reads the current noise level from the reader.

Table 7- 13 Host \rightarrow reader

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

Table 7- 14 Reader → host

Byte	1	2	3	4	5	6	7 12	13, 14
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6D]	STATUS ¹⁾	NOISE- LEVEL	CRC16
Default	0x02	-	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description			
NOISE-	Byte	7, 8	9, 10	11, 12
LEVEL	Noise level	minimum noise level	average noise level	maximum noise level

7.8 [0x6E] Reader Diagnostic

The "Reader Diagnostic" command executes a series of hardware diagnostics functions in the reader.

Table 7- 15 Host → reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	MODE	CRC16
Default	0x02	-	_	_	_	-	-

Table 7- 16 Reader \rightarrow host

Byte	1	2	3	4	5	6	7, 8	9, 10
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x6E]	STATUS ¹⁾	DATA	CRC16
Default	0x02	_	_	-	_	-	_	_

Protocols for controlling the reader

7.8 [0x6E] Reader Diagnostic

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description												
MODE	Diagnostics	s modes of th	odes of the reader										
	• 0x01 Lis	st of detailed	information	for STATUS	= 0x84. (rea	der and ante	enna status)						
DATA	Response t	to the diagno	e diagnostics modes of the reader										
	MODE =0x	01											
	Byte				-	7							
	Flags		FLAGS A										
	Bit	7	6	5	4	3	2	1	0				
	Function	TEMP- ALARM	-	TEMP- WARN	Control	-	< Z >	Noise	-				
							·						
	Byte				ł	8							
	Flags		FLAGS B										
	Bit	7	7 6 5 4 3 2 1 0										
	Function	-	-	-	-	-	-	-	MUX				

Table 7-17 Error conditions (FLAGS A)

Error	Set condition	Delete condition	RF power
Noise	Noise error	Set antenna/check cable	ON
< Z >	Z outside control range	Set antenna/check cable	ON
CONTROL	RF power outside control range	Set antenna/check cable	OFF
TEMP-WARN	Temp. ≥ warning value ≥100 °C	Temp. < warning value	ON, reduce
TEMP-ALARM	Temp. ≥ alarm value ≥110 °C	Temp. < alarm value	OFF

Table 7-18 Error conditions (FLAGS B)

Error	Set condition	Delete condition	RF power
MUX	Status != OK	STATUS = OK	ON

Note

Multiplexer

Status != OK (b1) is set when the multiplexer sends an error state or when there is no response from the multiplexer.

7.9 [0x72] Set Output

With the "Set Output" command, you can enable the outputs of the reader for a limited time or an unlimited time.

Each output adopts the state defined by the OUTx-mode byte during the period specified in the protocol (OUT-TIME). The flashing frequency is specified by the OUTx-frq byte. With this protocol, the outputs can be turned on or off for the specified time. If the reader receives a "Set Output" command, all the times active up to now are overwritten by the new times in the protocol provided they are > 0.

Table 7- 19 Host → reader

Byte	1	2	3	4	5	6	7	8	9	10, 11	n -1 n
Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x72]	[0x01]	[0x01]	0x81	OUT-S	OUT- TIME	CRC16
Default	0x02	-	-	-	-	-	-	-	-	-	-

Table 7- 20 Reader \rightarrow host

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

Name	Description										
OUT-S	OUT-S (Ou	utput State) defines the state of the output during the time defined by OUT-TIME.									
	Bit	7	6	5	4	3	2	1	0		
	Function	-	-	-	-	-	-	-	OUT mode		
	Function	Description									
	mode	• b10 OF	F: Output wh	nile OUT-TIN	/IE = inactive						
OUT- TIME	Using the v time values	alues define 0 and 6553	d by OUT-TII 5 (0xFFFF) a	ME, the outp re exceptior	outs can be ac is to this.	ctivated for a	restricted of	r unrestricted	I time. The		
	0x0001	1 x 100 ms	→ 100 ms								
			→								
	0xFFFE	65534 x 100 ms	→ 1:49:13 h								
	0xFFFF	permanent	y active								

Note

Reset activated output

To reset a permanently activated output, send OUT-TIME = 1 to the reader. After this, it changes to the free status after 100 ms.

A permanently activated output is reset in a reset operation or if there is a loss of power.

7.10 [0x74] Get Input

The current status of the digital input IN can be queried at any time with this protocol.

Table 7- 21 Host \rightarrow reader

Byte	1	2	3	4	5	6 8
Content	STX	LSB ALENGTH	MSB ALENGTH	COM-ADR	[0x74]	CRC16
Default	0x02	-	-	-	-	-

Table 7- 22 Reader \rightarrow host

Byte	1	2	3	4	5	6	7	8, 9
Content	STX	LSB ALENGTH	MSB ALENGTH	COM-ADR	[0x74]	STATUS ¹⁾	INPUT	CRC16
Default	0x02	-	-	-	-	-	-	-

Name	Description	1										
INPUT	Bit	Bit 7 6 5 4 3 2 1 0										
	Function	n IN										
	Function	Description										
	IN	• b0 digita	 b0 digital input = inactive 									
		• b1 digit	al input = ac	tive								

7.11 [0x85] Set System Timer

The "Set System Timer" command sets the internal system time of the CPU. The internal system time is saved in every data set following select, read or write commands to a transponder.

Table 7- 23 Host → reader

Byte	1	2	3	4	5	6 9	10, 11
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x85]	TIMER	CRC16
Default	0x02	=	_	_	_	-	-

Table 7- 24 Reader → host

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

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description			
TIMER	Byte	6	7	8, 9
	TIME	h	min	ms
	Value	0 23	0 59	0 59999

Note

Internal system time

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

7.12 [0x86] Get System Timer

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

Table 7- 25 Host → reader

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

7.12 [0x86] Get System Timer

Table 7- 26 Reader \rightarrow host

Byte	1	2	3	4	5	6	7 10	11, 12
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x86]	STATUS ¹⁾	TIMER	CRC16
Default	0x02	_	_	_	_	_	_	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description			
TIMER	Byte	7	8	9, 10
	TIME	h	min	ms
	Value	0 23	0 59	0 59999

Note

Internal system time

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

7.13 [0xA0] Reader-Login

The reader login must be executed each time it is turned on and after every "[0x63] RF-Controller Reset (Page 48)" command if access to the configuration parameters is required.

Table 7- 27 Host → reader

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

Table 7- 28 Reader \rightarrow host

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xA0]	STATUS ¹⁾	CRC16
Default	0x02	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description
READER-ID	The READER-ID is a password that protects the configuration parameters from read and write access. The
	READER-ID can be changed in the configuration block "CFG0: passwords".

Note

Effects

A reader login with the incorrect READER-ID leads to a logout.

A logout can be achieved with the "[0x64] System Reset (Page 48)" command.

Protocols for controlling the reader

7.13 [0xA0] Reader-Login

Protocols for ISO 15693 host commands

8.1 [0xB0] Host commands for mandatory commands according to ISO 15693 and optional commands

This command sends RF commands defined according to ISO 15693 to the transponder.

Table 8-1 Host \rightarrow reader

Byte	1	2	3	4	5	6 n-2	n -1, n
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	REQUEST- DATA	CRC16
Default	0x02	-	-	-	-	-	-

Table 8-2 Reader \rightarrow host

Byte	1	2	3	4	5	6	7 n-2	n-1, n
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xB0]	STATUS ¹⁾	RESPONS E-DATA	CRC16
Default	0x02	-	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Description
REQUEST- DATA	Command-specific request
RESPONSE- DATA	Command-specific response

Note

Restrictions

Data is only transferred if STATUS = {0x00, 0x83, 0x84, 0x93, 0x94, 0x95}.

The command does not work if Buffered Read Mode or Scan Mode is activated.

8.2 [0x01] Inventory

This command reads the UIDs of all transponders in the antenna field.

If the reader has identified a new transponder, it automatically sets this to the quiet state. In this state, the transponder does not send a reply to the next inventory command.

8.2 [0x01] Inventory

The transponder always sends a reply when

- it has left the antenna field and returned to the antenna field again or
- a "[0x69] RF Reset (Page 51)" command was sent to the reader or
- the persistency reset time is set to 0x00 or has elapsed, refer to "CFG16: Reset persistency (Page 39)"

Table 8-3 REQUEST-DATA

Byte	6	7	(8)
Content	0x01	MODE	ANT_SEL

Table 8-4 RESPONSE-DATA (ISO 15693)

Depending on the ANT parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value											
ANT = 0	Byte	7	8	9	10 17							
	Content	DATA- SETS	TR- TYPE	DSFID	UID							
	Default	-	Numbo D	er of repe ATA-SET	titions: S							
ANT = 1	Byte	7	8	9	10	11	12	n +1	n +2	n +3	n +4	n +5
							19					n +8
	Content	DATA- SETS	FLAG S	TR- TYPE	DSFID	UID LEN	UID	re- served	ANT NR	ANT STA- TUS	RSSI	Re- served
	Default	-				Number	of repetit	ions: DAT	A-SETS			

Name	Description	1								
MODE	Bit	7	6	5	4	3	2	1	0	
	Function	MORE	0	0	0	0	0	0	0	
	Function	Description	Description							
	MORE	• b0 new	b0 new inventory requested							
		• b1 mor	e data reque	sted (if statu	s "0x94" is d	isplayed, furt	ther data sets	s are availab	le.)	
ANT_SEL	"ANT_SEL' ventory. "A	' is a bit field NT_SEL" is c	and defines only transferr	the correspo ed when the	nding bits of "ANT" bit is	the antenna set in the mo	on which the	e reader star	ts the in-	
	Bit	7	6	5	4	3	2	1	0	
	Function	-	-	-	-	-	-	-	ANT1	
	Function	Description								

8.3 [0x02] Stay Quiet

Name	Description								
	ANT1	b0 no reb1 read	b0 no reading at this antenna output b1 reading at this antenna output						
DATA- SETS	Number of	Number of transport data sets to be transferred in this reader response.							
FLAGS	"FLAGS" is	a bit field an	d defines wh	nich data is s	ent.				
	Bit	7	6	5	4	3	2	1	0
	Function	-	-	-	ANT	-	-	-	-
	Function	Description	escription						
	ANT	 b1 ante 	nna informa	tion (ANT_C	NT, ANT_NR	, ANT_STAT	US) is sent		
TR-TYPE	Bit	7	6	5	4	3	2	1	0
	Function	0	0	-	-	0	0	1	1
DSFID	only ISO 15	693 transpo	nders						
	Family code	e for data sto	rage. If not ι	used, this val	ue returns {0	x00}.			
UID-LEN	Length of th	ne UID in byte	es						
UID	UID of the t	ransponder (read-only ac	cess)					
ANT_NR	Number of	the antenna	(1)						
ANT_STA TUS	The ANT_S	TATUS can	be 0x00 (OK	() or 0x83 (R	F communica	ations error).	1)		
RSSI	Received S	ignal Strengt	h Indicator						

¹⁾ You will find further information on ANT_STATUS in the appendix "Index of the status bytes (Page 104)".

Note

Anticollision function

The anticollision function of the reader can support up to 100 ISO 15693 transponders at one time.

8.3 [0x02] Stay Quiet

This command changes the transponder to the quiet state.

Is only required if the anticollision function is turned off.

Table 8-5 REQUEST-DATA

Byte	6	7	8 15
Content	0x02	MODE	UID

8.4 [0x22] Lock Multiple Blocks

Name	Description										
MODE	Bit	7	6	5	4	3	2	1	0		
	Function	0	0 0 0 0 0 ADR								
	Function	Description									
	ADR	• b001 ad	dressed								
UID	Write-protected UID of the transponder.										

Note

Only ISO 15693 transponders

This command only works with ISO 15693 transponders.

8.4 [0x22] Lock Multiple Blocks

This command locks one or more data blocks.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 6 REQUEST-DATA

Byte	6	7	8	9	10
Content	0x22	MODE	UID	DB-ADR	DN-N

Table 8-7 RESPONSE-DATA

Depending on the STATUS parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value		
STATUS	Byte		7
= 0x03	Content	DB-ADR-E	-
STATUS	Byte	7	8
= 0x95	Content	ISO15693 Error	DB-ADR-E

8.5 [0x23] Read Multiple Blocks

Name	Description								
MODE	Bit	7	6	5	4	3	2	1	0
	Function	0	0	0	0	0		ADR	
	Function	Description							
	ADR	• b000	b000 not addressed						
		• b001 a	 b001 addressed 						
		• b010 s	selected						
UID	Write-prote	cted serial nu	umber of the	transponder	. This UID is	only require	d in address	ed mode.	
DB-ADR	Number of	the first block	to be locke	d. The first b	lock can have	e a value be	tween 0 and	255.	
DB-N	Number of size. The m	data blocks t naximum nun	o be locked and ber of bytes	starting at Dl is 128.	B-ADR. The r	maximum va	lue of DB-N	depends on	the block
ISO15693	ISO 15693	error code of	f the transpo	nder respons	se.				
ERROR	This byte is only available if STATUS = 0x95								
DB-ADR- E	Block numb	per in which t	he error occi	urred.					

8.5 [0x23] Read Multiple Blocks

This command reads one or more data blocks.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Table 8-8 REQUEST-DATA

Byte	6	7	1 Byte	UID_LNG-Bytes	1 Byte	1 Byte
Content	0x23	MODE	UID_LNG	UID	DB-ADR	DB-N

Table 8-9 RESPONSE-DATA

Depending on the STATUS parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value					
STATUS	Byte		7	7		
= 0x95	Content	TAG E	TAG ERROR			
STATUS	Byte	7	8	9	10 n	
	Content	DB-N	DB-SIZE	SEC-STATUS	DB	
	Default	-	-	Number of rep	etitions DB-N	

8.5 [0x23] Read Multiple Blocks

Name	Description	Description							
MODE	Bit	7	6	5	4	3	2	1	0
	Function	0	0	0	UID_LF	SEC		ADR	
		-							
	Function	Description							
	ADR	• b000	not addresse	d					
		• b001 a	addressed						
		• b010 s	selected						
	SEC	• b0 SEC	-STATUS al	ways = 0x00)				
		 b1 security status of the followed block in SEC-STATUS 							
	UID_LF	If this bit is set, the "UID_LNG" must be included in the protocol.							
		 b0: The length o 	b0: The "UID_LNG" protocol does not contain the UID_LNG byte and the UID field has a fixed length of 8 bytes, from byte 6 to byte 13.						
		• b1: The in "UID_	e protocol co LNG".	ntains the "U	ID_LNG" par	ameter. The	UID as a va	riable length	as defined
UID_LNG	Optional pa UID field.	irameter bas	ed on the se	ting of UID_	LF (C MODE). UID_LNG	defines the I	ength of the	following
UID	Write-prote	cted serial nu	umber of the	transponder	. This UID is	only require	d in address	ed mode.	
DB-ADR	Number of	the first block	to be read.	The first blo	ck can have a	a value betw	een 0 and 2	55.	
DB-N	Number of size. The m	data blocks t naximum nun	o be locked ber of bytes	starting at DI is 128.	3-ADR. The I	maximum va	lue of DB-N	depends on	the block
DB-SIZE	Number of	bytes of a da	ta block. Thi	s value depe	ends on the te	echnical spe	cifications of	the transpor	nder.
SEC-	only with IS	O 15693 tra	nsponders						
STATUS	Block secu	rity status of	the followed	data block. I	f supported b	by the ISO 15	5693 transpo	onder.	
DB	Requested	data block.	he block siz	e is specified	d by DB-SIZE				
TAG ERROR ¹⁾	TAG error of	code of the tr	ansponder ro	esponse. Thi	s byte is only	/ available if	STATUS = ()x95.	

¹⁾ You will find further information in the Appendix (Page 103).

Note

Effects

- Only one transponder can be read in the non-addressed mode.
- ISO 15693:
 - To read a block, a "Read Single Block" command is sent to the ISO 15693 transponder.
 - If an ISO 15693 transponder does not support commands for reading several blocks (Read Multiple Blocks), several commands for reading one block (Read Single Block) are used.

8.6 [0x24] Write Multiple Blocks

This command writes one or more data blocks.

Table 8- 10 REQUEST-DATA

Byte	6	7	1 Byte	UID_LNG- Bytes	1 Byte	1 Byte	1 Byte	DB-N × DB- SIZE-Bytes
Content	0x24	MODE	UID_LNG	UID	DB-ADR	DB-N	DB-SIZE	DB
Default	-	-	-	-	-	-	-	Number of repetitions DB-N

Table 8- 11 RESPONSE-DATA

Depending on the STATUS parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value					
STATUS	Byte	7			(8)	
= 0x03	Content	DB-ADR-E		(DB-ADR-E)		
STATUS	Byte	7	8	3	(9)	
= 0x95	Content	TAG ERROR	DB-ADR-E		(DB-ADR-E ¹⁾)	

¹⁾ Use in the extended addressed mode.

Name	Descrip	tion								
MODE	Bit	7	6	5	4	3	2	1	0	
	Func- tion 0 0 0 UID_LF 0 ADR									
	Func- tion	Description								
	ADR • b000 not addressed • b001 addressed									
		b010 selected								
	UID_L	If this bit is set, the "UID_LNG" must be included in the protocol.								
	F	• b0: The "UID_LNG" protocol does not contain the UID_LNG byte and the UID field has a fixed length of 8 bytes, from byte 6 to byte 13.								
		 b1: The protocol contains the "UID_LNG" parameter. The UID as a variable length as defined in "UID_LNG". 								
UID_LNG	Optiona ing UID	l parameter l field.	based on the	setting of U	IID_LF (C MC	DE). "UID_I	LNG" defines	s the length c	of the follow-	
UID	Write-p	rotected seria	al number of	the transpor	nder. This UI) is only req	uired in addr	essed mode		
DB-ADR	Number	r of the first b	lock to be re	ad. The first	block can ha	ve a value b	oetween 0 an	id 255.		
DB-N	Number block si	^r of data bloc ze. The maxi	ks to be lock mum numbe	ed starting a of bytes is	at DB-ADR. T 128.	he maximur	n value of DI	3-N depends	on the	

Protocols for ISO 15693 host commands

8.7 [0x25] Select

Name	Description
DB-SIZE	Number of bytes of a data block. This value depends on the technical specifications of the transponder.
DB	Requested data block. The block size is specified by DB-SIZE.
TAG ERROR ¹⁾	TAG error code of the transponder response. This byte is only available if STATUS = 0x95.
DB-ADR-E	Number of the block in which the error occurred.

¹⁾ You will find further information in the Appendix (Page 103).

Note

Effects

- If an error occurred during a write command, the number of the block in which the error occurred is sent to the host.
- ISO 15693:
 - To write a block, a "Write Single Block" command is sent to the transponder. This
 operation is managed internally by the reader.
 - If a transponder does not support commands for writing several blocks (Write Multiple Blocks), several commands for writing one block (Write Single Block) are used.

8.7 [0x25] Select

This command changes a transponder to the selected state. Only one ISO 15693 transponder can be selected at any one time. A transponder that has already been selected is automatically changed to the ready state.

Table 8- 12 REQUEST-DATA

Byte	6	7	8 15
Content	0x25	MODE	UID

Table 8-13 RESPONSE-DATA

Byte	7	7
Content	ISO15693 ERROR	_

Name	Description								
MODE	Bit	7	6	5	4	3	2	1	0
	Function	0	0	0	0	0		ADR	
		-							
	Function	Description							
	ADR	• b001 a	addressed						

Name	Description
UID	Write-protected serial number of the transponder. This UID is only required in addressed mode.
ISO15693 ERROR	ISO 15693 error code of the transponder response. This byte is only available if STATUS = 0x95.

8.8 [0x26] Reset to Ready

This command changes a transponder to the ready state.

Table 8- 14 REQUEST-DATA

Byte	6	7	(8 15)
Content	0x26	MODE	UID

Table 8- 15 RESPONSE-DATA

Byte	7	7
Content	ISO15693 ERROR	-

Name	Description	l								
MODE	Bit	7	6	5	4	3	2	1	0	
	Function	0 0 0 0 0 ADR								
	Function	Function Description								
	ADR • b000 not addressed									
		• b001	b001 addressed							
		• b010	selected							
UID	Write-prote	cted serial n	umber of the	transponder	. This UID is	only require	d in address	ed mode.		
ISO15693 ERROR	ISO 15693	error code o	f the transpo	nder respons	se. This byte	is only availa	able if STAT	US = 0x95.		

8.9 [0x27] Write AFI

8.9 [0x27] Write AFI

This command writes a new AFI code to one or more transponders.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 16 REQUEST-DATA

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

Table 8- 17 RESPONSE-DATA

Byte	7	
Content	ISO15693 ERROR	-

Name	Description								
MODE	Bit	7	6	5	4	3	2	1	0
	Function	0	0	0	0	0		ADR	
	ADR								
	b000 not addressed								
	• b001	addressed							
	• b010 :	selected							
UID	Write-prote	cted serial nu	umber of the	transponder	. This UID is	only require	d in address	ed mode.	
AFI	Application	Family Ident	ifier of the tr	ansponder					
ISO15693 ERROR	ISO 15693	error code of	the transpo	nder respons	se. This byte	is only avail	able if STAT	US = {0x95}.	

8.10 [0x28] Lock AFI

This command locks the AFI register in one or more transponders.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 18 REQUEST-DATA

Byte	6	7	(8 15)
Content	0x28	MODE	UID

Table 8- 19 RESPONSE-DATA

Byte		7
Content	ISO15693 ERROR	-

Name	Description	1							
MODE	Bit	7	6	5	4	3	2	1	0
	Function 0 0 0 0 ADR								
	Function Description								
	ADR	b000 not addressed							
		• b001	addressed						
		• b010	selected						
UID	Write-prote	cted serial n	umber of the	transponder	. This UID is	only require	d in address	ed mode.	
AFI	Application	Family Iden	tifier of the tr	ansponder					
ISO15693 ERROR	ISO 15693	error code o	f the transpo	nder respon	se. This byte	is only availa	able if STAT	US = {0x95}.	

8.11 [0x29] Write DSFID

This command writes the DSFID to one or more transponders.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 20 REQUEST-DATA

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

Table 8- 21 RESPONSE-DATA

Byte		7
Content	ISO15693 ERROR	-

Name	Description	1							
MODE	Bit	7	6	5	4	3	2	1	0
	Function	Function 0 0 0 0 0 ADR							
	Function	Function Description							
	ADR • b000 not addressed								
		• b001	addressed						
		• b010	selected						
UID	Write-prote	cted serial n	umber of the	transponder	. This UID is	only require	d in address	ed mode.	
AFI	Application	Application Family Identifier of the transponder							
ISO15693 ERROR	ISO 15693	error code o	f the transpo	nder respons	se. This byte	is only avail	able if STAT	US = {0x95}.	

8.12 [0x2A] Lock DSFID

This command locks the DSFID register in one or more transponders.

Depending on the ISO 15693 transponder type, different ISO 15693 host commands are supported. These are described in section "Supported ISO 15693 host command for ISO 15693 transponders (Page 79)".

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.
Table 8- 22 REQUEST-DATA

Byte	6	7	(8 15)
Content	0x2A	MODE	UID

Table 8-23 RESPONSE-DATA

Byte	7	7
Content	ISO15693 ERROR	-

Name	Description									
MODE	Bit	7	6	5	4	3	2	1	0	
	Function	0	0	0	0	0		ADR		
	Function	Description								
	ADR	b000 not addressed								
		• b001	addressed							
		• b010 :	selected							
UID	Write-prote	cted serial n	umber of the	transponder	. This UID is	only require	d in address	ed mode.		
AFI	Application	Application Family Identifier of the transponder								
ISO15693 ERROR	ISO 15693	error code o	f the transpo	nder respons	se. This byte	is only availa	able if STAT	US = {0x95}.		

8.13 [0x2B] Get System Information

This command reads system information from a transponder.

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 24 REQUEST-DATA

Byte	6	7	(8 15)
Content	0x2B	MODE	UID

8.13 [0x2B] Get System Information

Table 8- 25 RESPONSE-DATA

Depending on the STATUS parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value					
STATUS	Byte			7		
= 0x95	Content	ISO	15693 ERROR	-		
STATUS	Byte	7	8 15	16	17, 18	19
	Content	DSFID	UID	AFI	MEM-SIZE	IC-REF

Name	Description											
MODE	Bit	7	6	5	4	3	2 1 0					
	Function	0 0 0 0 0 ADR										
	Function Description											
	ADR	ADR • b000 not addressed										
		b001 addressed										
		• b010 selected										
UID	Write-protected serial number of the transponder. This UID is only required in addressed mode.											
ISO15693 ERROR	ISO 15693 error code of the transponder response. This byte is only available if STATUS = {0x95}.											
DSFID	Data Storage Format Identifier of the transponder											
UID (only LSB)	The LSB (32 bits) from the write-protected serial number of the transponder.											
AFI	Application	Family Ident	ifier of the tra	ansponder								
	If not suppo	orted by the t	ransponder,	this value is	{0x00}.							
Manufac- turer code	Manufactur	er-specific co	ode (Tag-it ⊦	F → 0x01)								
MEM-	Memory siz	e of the trans	sponder									
SIZE	If not suppo	orted by the t	ransponder,	this value is	{0x0000}.							
	Byte		1	7			1	8				
	Bit	7.	5	4.	0		7.	0				
	Content	Rese	erved	Block siz	e in bytes		Number	of blocks				
IC-REF	IC reference	e (version) o	f the transpo	nder								
	If not suppo	orted by the t	ransponder,	this value is	{0x00}.							
Chip ver- sion	Chip versio	n of the trans	sponder									

8.14 [0x2C] Get Multiple Block Security Status

8.14 [0x2C] Get Multiple Block Security Status

This command reads system status for public blocks from a transponder.

Note

Only ISO 15693 transponders

This command is only available for ISO 15693 transponders.

Table 8- 26 REQUEST-DATA

Byte	6	7	(8 15)	8 / (16)	9 / (17)
Content	0x2C	MODE	UID	DB-ADR	DB-N

Table 8- 27 RESPONSE-DATA

Depending on the STATUS parameter, RESPONSE-DATA has a different structure with different information:

Parameter	Value		
STATUS	Byte	7	7
= 0x95	Content	ISO15693 ERROR	-
STATUS	Byte	7	8
	Content	DB-N	SEC-STATUS

Name	Description	l								
MODE	Bit	7	6	5	4	3	2	1	0	
	Function	0	0	0	0	0		ADR		
	Function	-unction Description								
	ADR	• b000	not addresse	ed						
		b001 addressed								
		• b010 s	selected							
UID	Write-prote	cted serial nu	umber of the	transponder	. This UID is	only require	d in address	ed mode.		
DB-ADR	number of t value betwe	the first data een 0 and 25	block from w 5.	hich the sec	urity status is	requested.	The first bloo	ck number ca	an have a	
DB-N	Number of data blocks to be read starting at DB-ADR. The maximum value of DB-N depends on the block size. The maximum number of bytes is 255.									
ISO15693 ERROR	ISO 15693 error code of the transponder response. This byte is only available if STATUS = {0x95}.									
SEC- STATUS	Block secu	rity status								

Protocols for ISO 15693 host commands

8.14 [0x2C] Get Multiple Block Security Status

9.1 [0xBF] Transparent command according to ISO 15693

This command sends RF commands defined according to ISO 15693 to the transponder.

Note

This command is only available for ISO 15693 transponders. This command does not work if Buffered Read Mode or Scan Mode is activated.

Table 9-1 Host → reader

Byte	1	2	3	4	5	6	7, 8
Content	STX	MSB LENGTH	LSB ALENGTH	COM-ADR	[0xBF]	MODE	RSP- LENGTH
Default	0x02	-	-	-	-	-	-

Table 9-2 Host \rightarrow Reader (mode 1 + 2 + 6)

Byte	9, 10	11 n-2	n-1, n
Content	CMD-RSP-DELAY	REQUEST-DATA	CRC16

Table 9-3 Host \rightarrow Reader (mode 3 + 4)

Byte	11, 12	13, 14	15 n-2	n-1, n
Content	CMD-RSP-DELAY	EOF-PULSE-DELAY	REQUEST-DATA	CRC16

Table 9-4 Host \rightarrow Reader (mode 5)

Byte	9, 10	11, 12	13 n-2	n-1, n
Content	CMD-RSP-DELAY	MULTIPLE 302 GRIDS	REQUEST-DATA	CRC16

Table 9-5 Reader \rightarrow host

Byte	1	2	3	4	5	6	7 n-2	n-1, n
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0xBF]	STATUS ¹⁾	RESPONS E-DATA	CRC16
Default	0x02	-	-	-	_	-	-	-

9.1 [0xBF] Transparent command according to ISO 15693

¹⁾ You will find further information in the Appendix (Page 103).

Name	Descrip	tion									
MODE	Bit	7	6	5	4	3	2	1	0		
	Func- 0 0 0 0 - Options tion Options										
	Func-	Description									
	tion										
 Options for the request. b001 = read request Response is requested according to C b010 = read request Response is queried according to CMI The reader attempts to obtain the resp there is no response after 20 ms, the c b011 = write request with option "1" The reader attempts to obtain the resp the reader sends an EOF after EOF-P CMD-RES_DELAY. b100 = inventory request The reader attempts to obtain the resp "Nb slot flag" is in the state: 						 to CMD-RES-DELAY CMD-RES-DELAY = write request with option "0" response after CMD-RES-DELAY + a multiple of 302 ms. If the command returns the status "no transponder" 0x01. "1" response after CMD-RES-DELAY. If there is no response, OF-PULSE-DELAY and attempts to obtain the response after e response after CMD-RES-DELAY. If the ISO 15693 flag 					
		• b101 =	 "0" the the resp times. In this c sponder curs in a user shown of the second seco	reader send oonse in the ase, RSP-LE responses one of the tin ould calculat reader return grid position	s an EOF aft next time slo ENGTH defin with other res ne slots, the e which trans ns the receive n of the respon	er EOF-PUL t (after CMD- es the respo sponse lengt protocol state sponder data ed data.	SE-DELAY RES_DELA nse length ii hs are ignor us is set to 0 contains th	and attempts Y). This occu n one time slo ed. If a CRC 0x02 [CRC er e CRC error.	to obtain ırs 16 ot. Tran- error oc- ror]. The		
	The reader attempts to obtain the response after ISO15693-3 CMD-RES-DELAY. If ther no response, the reader queries with the time grid specified in MULTIPLE 302us GRIDS there is no response, the command returns the status "no transponder" 0x01. The maxin value for MULTIPLE 302us GRIDS is 125 (at 302.08 us × 125 = 37.76 ms). Depending on the error flag in the transponder response, the length of the query data is								f there is RIDS. If maximum ata is		
			REP-LE	NGTH, if the	e error flag is	"0"					

Name	Descrip	tion					
		 b110 = Read request without ISO 15693-specific data check and ISO 15693 data interpretation Response is queried after CMD-RES-DELAY. Because there is no data check in the reader, all data with the same response length as the response length transferred to the reader in the host command is transferred with the status 0x00. If the response length of the data from the transponder and the response length speci- fied for the reader in the host command are different, the reader responds with the status 0x01 "no transponder". The user of command mode 6 must control the data encryption and decryption option of the reader using CFG4/byte 4 – ISO mode so that the reader encrypts the data in the RF forward connection and decrypts in the RF backward connection. 					
	TxCR CEn	 b0 a checksum is calculated over the sent data and the CRC byte(s) is/are appended to the data stream. b1 no checksum is inserted/sent. 					
RSP- LENGTH	Length respons	of the transponder response in bits without SOF and EOF. If the error flag is set in the transponder se, the length of the read out data is 4 bytes.					
CMD-RSP- DELAY	Response delay of the transponder response (ISO15693: T1) e.g. ISO 15693 average value: {0x021F} \times 590 ns = 320.4 μs						
	If the pa	If the parameter is set to "0x0000", the default value 0x021F is used.					
EOF-PULSE- DELAY	The EO the resp {0x846A	The EOF pulse delay is used with write operations with the ISO 15693 write option "1". It is used to specify the response delay of the transponder response (ISO 15693: T1). e.g. ISO 15693 maximum value: {0x846A} × 590 ns = 20 ms					
REQUEST-	Full trar	Full transponder query without SOF, CRC16 and EOF					
DATA	The FL/ protoco col.	The FLAGS for the read and write options in REQUEST-DATA must match the MODE byte in the query rotocol. The reader always forces a command in the way specified in the MODE byte of the query proto- ol.					
RESPONSE- DATA	Full trar the tran	nsponder resonse without SOF and EOF. The reader runs a CRC 16 checksum test. The CRC16 of sponder is, however, transferred with the response data.					
	Data is	only transferred if STATUS = {0x00, 0x02, 0x83, 0x84, 0x94}.					
	The res	ponse data always consists of the number of data bytes specified in RSP-LENGTH.					

9.2.1 EM Microelectronics (EM4034)

Chip ID: 1h = x00001xxb (bit 46 - 42 of UID)

Table 9- 6Memory arrangement 14 × 4 bytes = 448 bits

Number of blocks	14 (user range: 3 11)
Block size	4 bytes

Command code	mand code Function		Mode			Comment	
-	-		not addressed	addresses	Selection	-	
0x01	Inventory	1	-	-	-	-	
0x02	Stay Quiet	\checkmark	-	\checkmark	-	-	
0x22	Lock Multiple Blocks	-	-	-	-	-	
0x23	Read Multiple Blocks	1	√ ²⁾	1	-	DB-SIZE = 4	
0x24	Write Multiple Blocks ¹⁾	\checkmark	✓	✓	-	DB-SIZE = 4 WR-OPTION = 0	
0x25	Select	-	-	-	-	-	
0x26	Reset to Ready	1	1	1	-	-	
0x27	Write AFI	-	-	-	-	-	
0x28	Lock AFI	-	-	-	-	-	
0x29	Write DSFID	-	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	-	
0x2B	Get System Information	-	-	-	-	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	-	

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically".

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b10: read multiple".

9.2.2 EM Microelectonics (EM4135)

Chip ID: 4h = 000100xx (bit 47 - 42 of UID)

Table 9- 7	Memory arrangement 38 × 8 bytes = 2432 bits

Number of blocks	36 (user range: 13 48)
Block size	8 bytes

Command code	Function		Mode	Comment		
-	-		not addressed	addresses	Selection	-
0x01	Inventory	\checkmark	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 0

Command code	Function		Mode			Comment
0x23	Read Multiple Blocks	1	1	1	1	DB-SIZE = 8
0x24	Write Multiple Blocks ¹⁾	\checkmark	1	1	1	DB-SIZE = 8 WR-OPTION = 0
0x25	Select	\checkmark	-	1	-	-
0x26	Reset to Ready	1	1	\checkmark	1	-
0x27	Write AFI	-	-	-	-	-
0x28	Lock AFI	-	-	-	-	-
0x29	Write DSFID	-	-	-	-	-
0x2A	Lock DSFID	-	-	-	-	-
0x2B	Get System Information	1	1	1	1	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically".

9.2.3 Fujitsu (MB89R116)

IC manufacturer identifier: 0x08

Chip ID: 0h = 0000000b (bits 47 - 40 of UID)

Table 9-8 Memory arrangement 256 × 8 bytes = 16 Kbits

Number of blocks	256 (user range: 0 249)
Block size	8 bytes

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 0 or 1
0x23	Read Multiple Blocks ²⁾	1	1	1	1	Security status is always 0x00
0x24	Write Multiple Blocks ¹⁾	1	1	1	1	WR-OPTION = 0 or 1
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	\checkmark	\checkmark	\checkmark	\checkmark	-
0x27	Write AFI	1	1	1	1	WR-OPTION = 0 or 1

ISO 15693 host commands

9.2 Supported ISO 15693 host command for ISO 15693 transponders

Command code	Function		Mode	Comment		
0x28	Lock AFI	1	1	1	1	WR-OPTION = 0 or 1
0x29	Write DSFID	1	1	\checkmark	1	-
0x2A	Lock DSFID	1	1	\checkmark	1	-
0x2B	Get System Information	1	1	1	1	-
0x2C	Get Multiple Block Security Status	1	\checkmark	\checkmark	\checkmark	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) The user-specific Read Multiple Blocks Unlimited [0xA3] commands are used automatically by the reader. In the nonaddressed mode, only one or two blocks can be read and the DB block size parameter in the "CFG4 transponder parameters" must be set to 8.

9.2.4 Fujitsu (MB89R118)

IC manufacturer identifier: 0x08

Chip ID: 1h = 0000001b (bit 47 - 40 of UID)

Table 9- 9	Memory	arrangement 256	× 8 b	ytes = 16 k	<bits< th=""></bits<>
10000	1110111019	anangomont 200	0.0	,	

Number of blocks	256 (user range: 0 249)
Block size	8 bytes

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	\checkmark	-	\checkmark	-	-
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 0 or 1
0x23	Read Multiple Blocks ²⁾	1	1	1	1	Security status is always 0x00
0x24	Write Multiple Blocks ¹⁾	1	1	1	1	WR-OPTION = 0 or 1
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	1	1	1	WR-OPTION = 0 or 1
0x28	Lock AFI	1	1	1	1	WR-OPTION = 0 or 1
0x29	Write DSFID	1	1	1	✓ ✓	-
0x2A	Lock DSFID	1	1	1	1	-

Command code	Function		Mode	Comment		
0x2B	Get System Information	1	1	1	1	-
0x2C	Get Multiple Block Security Status	\checkmark	\checkmark	\checkmark	\checkmark	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) The user-specific Read Multiple Blocks Unlimited [0xA3] commands are used automatically by the reader. In the nonaddressed mode, only one or two blocks can be read and the DB block size parameter in the "CFG4 transponder parameters" must be set to 8.

9.2.5 Fujitsu (MB89R119)

IC manufacturer identifier: 0x08

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

Table 9- 10 Memory arrangement 64 × 4 bytes = 2 Kbits

Number of blocks	64 (user range: 0 57)
Block size	4 bytes

Command code	Function		Mode	Mode		
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	\checkmark	-	-
0x22	Lock Multiple Blocks	\checkmark	1	1	~	WR-OPTION = 0 or 1
0x23	Read Multiple Blocks	\checkmark	1	1	~	Security status is always 0x00
0x24	Write Multiple Blocks ¹⁾	\checkmark	1	1	-	WR-OPTION = 0 or 1
0x25	Select	-	-	-	-	-
0x26	Reset to Ready	1	\checkmark	1	1	-
0x27	Write AFI	\checkmark	1	1	~	WR-OPTION = 0 or 1
0x28	Lock AFI	\checkmark	1	1	~	WR-OPTION = 0 or 1
0x29	Write DSFID	1	\checkmark	1	1	-
0x2A	Lock DSFID	✓	√	1	1	-

Command code	Function		Mode			Comment
0x2B	Get System Information	1	1	1	1	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

9.2.6 Infineon (ISO address mode) 0xE0

IC manufacturer identifier: 0x05

Table 9-11 Memory arrangementSRF55V10P: 256 × 4 bytes = 8 Kbits

Number of blocks	256 (user range: 0 249)		
Block size	4 bytes		

Table 9-12 Memory arrangementSRF55V02P: 64 × 4 bytes = 2 Kbits

Number of blocks	64 (user range: 0 57)
Block size	4 bytes

Command code	Function		Mode			Comment
-	-	-		addresses	Selection	-
0x01	Inventory	\checkmark	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	\checkmark	1	√	DB-SIZE = 4
0x24	Write Multiple Blocks	1	V	1	√	DB-SIZE = 4 WR-OPTION = 0 ¹⁾
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	1	1	1	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	1	1	1	1	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	-	-	-	-	-
0x2A	Lock DSFID	-	-	-	-	-

Command code	Function		Mode			Comment
0x2B	Get System Information	-	-	-	-	-
0x2C	Get Multiple Block Security Status	\checkmark	\checkmark	\checkmark	1	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

9.2.7 Infineon (My-d-Light)

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

Table 9- 13 Memory arrangement 18 × 4 bytes = 576 bits

Number of blocks	18 (user range: 0 12)
Block size	4 bytes

Command code	Function		Mode			Comment	
-	-		not addressed	addresses	Selection	-	
0x01	Inventory	1	-	-	-	-	
0x02	Stay Quiet	1	-	1	-	-	
0x22	Lock Multiple Blocks	1	\checkmark	1	√	WR-OPTION = 0 ¹⁾	
0x23	Read Multiple Blocks	1	√ ²⁾	1	√	DB-SIZE = 4	
0x24	Write Multiple Blocks	1	V	J	✓	DB-SIZE = 4 WR-OPTION = 0^{1}	
0x25	Select	1	-	1	-	-	
0x26	Reset to Ready	1	1	1	1	-	
0x27	Write AFI	1	1	1	1	WR-OPTION = 0 ¹⁾	
0x28	Lock AFI	1	1	1	1	WR-OPTION = 0 ¹⁾	
0x29	Write DSFID	-	-	-	-	-	
0x2A	Lock DSFID	-	-	-	-	-	
0x2B	Get System Information	-	-	-	-	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	-	

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.8 NXP (I-Code SLI)

Chip ID: 1h = 0000001b (bit 47 - 40 of UID)

Table 9- 14 Memory arrangement 32 × 4 bytes = 1 Kbits

Number of blocks	32 (user range: 0 27)
Block size	4 bytes

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	\checkmark	\checkmark	1	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	\checkmark	\checkmark	\checkmark	DB-SIZE = 4
0x24	Write Multiple Blocks	1	V	J	✓	DB-SIZE = 4 WR-OPTION = 0 ¹⁾
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	\checkmark	\checkmark	\checkmark	1	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x2A	Lock DSFID	1	1	1	1	WR-OPTION = 0 ¹⁾
0x2B	Get System Information	1	\checkmark	\checkmark	√	-
0x2C	Get Multiple Block Security Status	✓	1	1	1	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

9.2.9 NXP (I-Code SLI-S)

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

Table 9-15 Memory arrangement 40 × 4 bytes = 1280 bits

Number of blocks	40 (user range: 0 39)
Block size	4 bytes

Number of pages	10 (user range: 0 9)
Page size	16 bytes = 4 blocks

Command code	Function		Mode	Mode		
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	\checkmark	1	✓	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	√ ²⁾	\checkmark	1	DB-SIZE = 4
0x24	Write Multiple Blocks	J	1	V	✓	DB-SIZE = 4 WR-OPTION = 0^{1}
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	\checkmark	1	\checkmark	-
0x27	Write AFI	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	\checkmark	\checkmark	\checkmark	\checkmark	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x2A	Lock DSFID	\checkmark	\checkmark	\checkmark	\checkmark	WR-OPTION = 0 ¹⁾
0x2B	Get System Information	1	\checkmark	\checkmark	1	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.10 NXP (I-Code SLI-L)

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

Table 9- 16 Memory arrangement 16 × 4 bytes = 512 bits

Number of blocks	16 (user range: 0 7)
Block size	4 bytes

Number of pages	4 (user range: 0 1)
Page size	16 bytes = 4 blocks

Command code	Function		Mode			Comment	
-	-		not addressed	addresses	Selection	-	
0x01	Inventory	1	-	-	-	-	
0x02	Stay Quiet	1	-	1	-	-	
0x22	Lock Multiple Blocks	1	✓	\checkmark	✓	WR-OPTION = 0 ¹⁾	
0x23	Read Multiple Blocks	1	√ ²)	\checkmark	✓	DB-SIZE = 4	
0x24	Write Multiple Blocks	1	\checkmark	V	1	DB-SIZE = 4 WR-OPTION = 0 ¹⁾	
0x25	Select	1	-	1	-	-	
0x26	Reset to Ready	\checkmark	\checkmark	\checkmark	1	-	
0x27	Write AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾	
0x28	Lock AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾	
0x29	Write DSFID	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾	
0x2A	Lock DSFID	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾	
0x2B	Get System Information	1	✓ ✓	\checkmark	√	-	
0x2C	Get Multiple Block Security Status	-	-	-	-	-	

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.11 NXP (I-Code SLIX)

Chip ID: 2h = 0000001b (bits 47 - 40 of UID)

Table 9- 17 Memory arrangement 32 × 4 bytes = 1280 bits

Number of blocks	28 (user range: 0 27)
Block size	4 bytes

Number of pages	10 (user range: 0 9)
Page size	16 bytes = 4 blocks

Command code	Function		Mode	Mode		
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	✓	✓	√	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	√ ²)	✓	\checkmark	DB-SIZE = 4
0x24	Write Multiple Blocks	1	1	\checkmark	√	DB-SIZE = 4 WR-OPTION = 0 ¹
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	\checkmark	-
0x27	Write AFI	1	\checkmark	\checkmark	\checkmark	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	1	1	\checkmark	WR-OPTION = 0 ¹⁾
0x2A	Lock DSFID	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x2B	Get System Information	1	1	✓	√	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.12 NXP (I-Code SLIX-S)

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

Table 9- 18 Memory arrangement 64 × 4 bytes = 2048 bits

Number of blocks	40 (user range: 0 39)
Block size	4 bytes

Number of pages	10 (user range: 0 9)
Page size	16 bytes = 4 blocks

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	1	\checkmark	√	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	√ ²⁾	\checkmark	1	DB-SIZE = 4
0x24	Write Multiple Blocks	1	\checkmark	1	√	DB-SIZE = 4 WR-OPTION = 0 ¹⁾
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	1	1	1	\checkmark	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x2A	Lock DSFID	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x2B	Get System Information	1	✓ ✓	\checkmark	\checkmark	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.13 NXP (I-Code SLIX-L)

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

Table 9- 19 Memory arrangement 16 × 4 bytes = 512 bits

Number of blocks	8 (user range: 0 7)
Block size	4 bytes

Number of pages	2 (user range: 0 1)
Page size	16 bytes = 4 blocks

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	\checkmark	\checkmark	1	~	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	\checkmark	√ ²⁾	1	~	DB-SIZE = 4
0x24	Write Multiple Blocks	\checkmark	1	1	\checkmark	DB-SIZE = 4 WR-OPTION = 0 ¹
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	✓	1	1	-
0x27	Write AFI	1	\checkmark	1	\checkmark	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	1	1	1	WR-OPTION = 0 ¹)
0x2A	Lock DSFID	1	1	1	1	WR-OPTION = 0 ¹⁾
0x2B	Get System Information	\checkmark	✓	1	1	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

2) Reading a block in non-addressed mode is only possible if the "Read mode" parameter in the "CFG4 transponder parameters" is set to "b01: read once".

9.2.14 STMicroelectronics (LRI64)

IC manufacturer identifier: 0x02

Table 9- 20 Memory arrangement 16 × 1 bytes = 128 bits

Number of blocks	5 (user range: 10 14)
Block size	1 bytes

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	-	-	-	-	WR-OPTION = 0 ¹⁾

9.2 Supported ISC) 15693 host	t command for ISO	15693 transponders
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Command code	Function		Mode			Comment
0x23	Read Multiple Blocks	✓	1	✓	-	In non-addressed mode, DB-N must be =1
0x24	Write Multiple Blocks	1	1	1	-	DB-SIZE = 1 WR-OPTION = 0 ¹⁾
0x25	Select	-	-	-	-	-
0x26	Reset to Ready	-	-	-	-	-
0x27	Write AFI	-	-	-	-	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	-	-	-	-	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	-	-	-	-	-
0x2A	Lock DSFID	-	-	-	-	-
0x2B	Get System Information	1	1	1	-	-
0x2C	Get Multiple Block Security Status	-	-	-	-	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

9.2.15 STMicroelectronics (LRI2k, LRIS2k)

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

Product code for LRI2k and LRIS2k:

bit 63-48 = E0 02, bit 47-42: Product ID

LRI2k	00 10 00
LRIS2k	00 10 10

Table 9- 21 Memory arrangement 64 × 4 bytes = 2 Kbits

Number of blocks	64 (user range: 0 63)
Block size	4 bytes

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	\checkmark	-	-	-	-
0x02	Stay Quiet	\checkmark	-	\checkmark	-	-
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	1	1	1	DB-SIZE = 4

Command code	Function	Mode			Comment	
0x24	Write Multiple Blocks	1	1	1	1	DB-SIZE = 4 WR-OPTION = 0^{1}
0x25	Select	✓	✓	✓	✓	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	1	1	1	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	1	1	1	\checkmark	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	1	1	\checkmark	-
0x2A	Lock DSFID	1	1	1	\checkmark	-
0x2B	Get System Information	1	1	1	1	-
0x2C	Get Multiple Block Security Status	1	1	✓	1	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". With one request, up to two blocks can be written with data.

9.2.16 STMicroelectronics (M24LR64-R)

IC manufacturer identifier: 0x02

Product code for M24LR64-R:

Bit 47-42 of UID

Bits 47 42	Product ID
001011	Bh

Table 9-22 Memory arrangement 64 × 32 × 4 bytes = 64 Kbits

Number of sectors	64 (user range: 0 63)	
Number of blocks	2048 (user range: 0 2047)	
	32 blocks per sector	
Block size	4 bytes	

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	\checkmark	-	-	-	-
0x02	Stay Quiet	1	-	1	-	-
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 0 ¹⁾
0x23	Read Multiple Blocks	1	1	1	1	-

ISO 15693 host commands

9.2 Supported ISO 15693 host command for ISO 15693 transponders

Command code	Function		Mode	lode		
0x24	Write Multiple Blocks	1	1	1	1	WR-OPTION = 0 ¹⁾
0x25	Select	1	1	1	1	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	\checkmark	1	1	WR-OPTION = 0 ¹⁾
0x28	Lock AFI	\checkmark	\checkmark	\checkmark	1	WR-OPTION = 0 ¹⁾
0x29	Write DSFID	1	\checkmark	1	1	-
0x2A	Lock DSFID	\checkmark	\checkmark	\checkmark	1	-
0x2B	Get System Information	1	\checkmark	1	1	-
0x2C	Get Multiple Block Security Status	\checkmark	1	\checkmark	1	-

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically".

Note

Effects

Each sector (32 blocks) must be read separately. To read data from different sectors, a "Read Multiple Block" command must be used for each sector.

9.2.17 Texas Instruments (Tag-it HFI Pro / Standard)

IC manufacturer identifier: 0x07

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

Standard: Product ID: 0h = 000b (bits 43 - 41 of UID)

Table 9-23	Memory arrangement 11 × 4 k	ytes = 48 bytes ((8 × 4 bytes = 2	256 bits of user data)
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Number of blocks	11 (user range: 0 7)
Block size	4 bytes

Pro: Product ID: 0h = 100b (bits 43 - 41 of UID)

Table 9- 24 Memory arrangement 12 × 4 bytes = 48 bytes (8 × 4 bytes = 256 bits of user data)

Number of blocks	12 (user range: 0 7)	
Block size	4 bytes	

Command code	Function		Mode			Comment
-	-		not addressed	addresses	Selection	-
0x01	Inventory	1	-	-	-	-
0x02	Stay Quiet	1	-	\checkmark	-	-
0x22	Lock Multiple Blocks	1	\checkmark	1	\checkmark	WR-OPTION = 1 ¹⁾
0x23	Read Multiple Blocks ²⁾	1	\checkmark	1	\checkmark	DB-SIZE = 4
0x24	Write Multiple Blocks	1	1	J	√	DB-SIZE = 4 WR-OPTION = 1 ¹⁾
0x25	Select	-	-	-	-	-
0x26	Reset to Ready	-	-	-	-	-
0x27	Write AFI	-	-	-	-	-
0x28	Lock AFI	-	-	-	-	-
0x29	Write DSFID	-	-	-	-	-
0x2A	Lock DSFID	-	-	-	-	-
0x2B	Get System Information	1	-	1	-	-
0x2C	Get Multiple Block Security Status	✓ ✓	-	1	-	-

 The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". When using the non-addressed mode, the WR-OPTION must be set manually to "WR-OPTION = 1".

2) Reading multiple blocks in non-addressed mode is only possible if the "Read mode" parameter in CFG4 is set to "b01: read once".

9.2.18 Texas Instruments (Tag-it HFI Plus)

IC manufacturer identifier: 0x07

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

Table 9- 25	Memory arrangement 64 × 4 bytes = 2 Kbits user data

Number of blocks	64 (user range: 0 63)
Block size	4 bytes

Command code	Function		Mode	Mode				
-	-		not addressed	addresses	Selection	-		
0x01	Inventory 🗸		-	-	-	-		
0x02	Stay Quiet ✓		-	1	-	-		

Command code	Function		Mode	Comment		
0x22	Lock Multiple Blocks	1	1	1	1	WR-OPTION = 1 ¹⁾
0x23	Read Multiple Blocks ²⁾	1	1	1	1	DB-SIZE = 4
0x24	Write Multiple Blocks	1	1	1	1	DB-SIZE = 4 WR-OPTION = 1 ¹⁾
0x25	Select	1	-	1	-	-
0x26	Reset to Ready	1	1	1	1	-
0x27	Write AFI	1	1	1	1	WR-OPTION = 1 ¹⁾
0x28	Lock AFI	1	1	1	1	WR-OPTION = 1 ¹⁾
0x29	Write DSFID	1	1	1	1	WR-OPTION = 1 ¹⁾
0x2A	Lock DSFID	1	1	1	1	WR-OPTION = 1 ¹⁾
0x2B	Get System Information	1	1	1	\checkmark	-
0x2C	Get Multiple Block Security Status	✓	1	✓	1	-
0xA3	Inventory Read Multiple Blocks	1	-	-	-	-
0xAB	Inventory Get System Infor- mation	✓	-	-	-	-
0xAC	Inventory Get Multiple Block Security Status	✓	-	-	-	-
0xA2	Write 2 Blocks	\checkmark	\checkmark	\checkmark	1	WR-OPTION = 11)
0xA3	Lock 2 Blocks	1	1	1	1	WR-OPTION = 11)

1) The WR-OPTION is set automatically by the reader if the WR-OPTION parameter in the "CFG4 transponder parameters" is set to "00: specified automatically". When using the non-addressed mode, the WR-OPTION must be set manually to "WR-OPTION = 1".

Note

Effects

"Write_2_Blocks" command and the "Lock_2_Blocks" command are used by the reader automatically. This only takes effect if the block address starts with an even address.

If an odd number of blocks are written/locked, the "Write_2_Blocks"/"Lock_2_Blocks" command is combined with the "Write Single Block"/"Lock Single Block" command.

10

Protocols for the Buffered Read Mode

10.1 Sequence in Buffered Read Mode

In Buffered Read Mode, the reader itself reads data from every transponder within the antenna field. This mode must be activated in the "CFG1: COM interface (Page 23)" configuration block and in the "CFG11: Read mode - read data (Page 31)" and "CFG12: Read mode - filter (Page 34)" configuration blocks.

The queried transponder data sets are saved in a FIFO buffer on the reader. The Buffered Read Mode operates independently of host commands and starts immediately after being turned on or the "[0x64] System Reset (Page 48)" command.

To read out queried transponder data sets, you require two commands. In the figure below, you can see the basic sequences in the Buffered Read Mode.

Host → reader	[0x22] Read Buffer	Command to the reader to read out data.
		typ. 6 ms
Host ← reader	Status e.g. = {0x92} no valid data	There are no data sets in the data buffer.
Host → reader	[0x22] Read Buffer	Command to the reader to read out data.
		typ. 6 ms
Host ← reader	Status e.g. = OK and n data sets	There are data sets in the data buffer.
		n data sets are transferred to the host.
Host → reader	[0x32] Clear Data Buffer	Command to the reader to de- lete the read data sets.
		typ. 6 ms
Host ← reader	Status e.g. = OK	The n read out data sets were deleted from the buffer.
The host waits for a reply from th	e reader	

The host waits for a reply from the reader.

The host can handle other tasks, for example communicating with other readers.

You can obtain further information on the capacity of the data buffer with the command "[0x31] Read Data Buffer Info (Page 100)".

10.2 Transponder access in Buffered Read Mode

10.2 Transponder access in Buffered Read Mode

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

The anticollision process can be set up in the configuration block "CFG5: Anticollision (Page 30)".

After turning on or the "[0x64] System Reset (Page 48)" command, the buffered read mode starts reading the transponders.

10.3 [0x22] Read Buffer

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

Table 10-1 Host \rightarrow reader

Byte	1	2	3	4	5	6, 7	8, 9
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x22]	DATA-SETS	CRC16
Default	0x02	-	-	-	-	-	-

Table 10- 2 Reader \rightarrow host

Byte	1	2	3	4	5	6	7	(8)	8, 9 (9, 10)	(10 oder 11 n- 2)	n-1, n
Content	STX	MSB ALENG TH	LSB ALENG TH	COM- ADR	[0x22]	STATU S ¹⁾	TR- DATA1	TR- DATA2	DATA- SETS	DATA	CRC16
Default	0x02	-	-	-	-	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name	Descrip	tion	tion									
DATA- SETS	Number data se maximu	The of data sets transferred from the data buffer. If the data buffer does not contain the specified number of a sets, all existing data sets are transferred and an error is generated. If the response protocol reaches the simum length of 256 bytes, the reader reduces the number of data sets.										
TR-	Selectio	on of data t	ypes for th	e read ope	eration							
DATA1	Bit	7	6	5	4	3	2	1	0			
Func- - TIME ANT Byte - DB IDD tion order												
Func- Description tion												
	IDD	Identificat	ion data (l	JID or EPC	;)							
	DB	Data bloc	k									

Name	Descrip	otion									
	Byte	• b0: N	1SB first								
	order	• b1: L	SB first								
	ANT	Antenna	number								
	TIME	internal s	ystem time								
Note											
	 If the ANT bit in TR_DATA (CFG11) is set in Buffer Info Mode: When a transponder is identified by several antennas, only one data set is saved. The valid time is recorder only for the first identification. If a data set is transferred to the host and the same transponder is identified by another antenna, however the valid time has not yet expired, no other data set is saved. If the ANT bit in TR_DATA (CFG11) is set but not in Buffer Info Mode and a transponder is identified by more than one antenna, the data set for each antenna is saved. 										
TR-	Selectio	on of data t	types for th	e read ope	eration	1				1	
DATA2	Bit	7	6	5	4	3	2	1	0	-	
	Func-	-	-	-	ANT	-	-	-	-		
	uon				EXI						
	Func- tion	Description									
	ANT- Ext	Antenna	Antenna extended antenna number with RSSI								
DATA	Number of data sets requested from the data buffer. Only the selected data is transferred to the host. For de- tails, refer to the section "CFG11: Read mode - read data (Page 31)".										
	Data type		Data								
	data	Byte	1	2							
	set length	Content	MSB RecLen	LSB RecLen							
	Serial	Byte	1	2	3	3 + LEN					
	num- ber	Content	TR-TYP	IDDT	IDD- LEN	IDD					
	Data blocks	Byte	1	2	3	4 4 + DB-N × DB- SIZE					
		Content	DE	3-N	DB- SIZE	DB					
	Time	Byte	1 4								
		Content	TIMER								
	An-	Byte	1								
	tenna	Content	ANT-NO		1	1					
	An-	Byte	1	2	3	4 7					
	ex- tend-	Content	ANT- CNT	ANTx	RSSIx	re- serviert					
	ed	Default	-	Number	of repetition CNT	ons ANT-					

Protocols for the Buffered Read Mode

10.4 [0x31] Read Data Buffer Info

Name	Description										
	F	unction	Descriptio	on							
	A	NT-NO	ANT-NO is a bit field. If the tag is read on more than one antenna and the configu- ration option "All antenna ports act as one reading point" is set, the corresponding bits of each antenna where the transponder is read are set in the bit field.								
		Bit	7	6	5	4	3	2	1	0	
	F	unction	b0	b0	ANT6	ANT5	ANT4	ANT3	ANT2	ANT1	
	F	unction	Descriptio	on							
	A	NT-	= antenna	a counter							
	С	NT	Shows the antennas on which a transponder was read.								
	A	NTx	= antenna	a number							
			The anter decimal p plexers th	The antenna number depends on the number of the output of the multiplexer. The decimal places of the antenna number describe the active outputs of the multiplexers that switch over to the antenna. ANT-CNT = (mux channel)							
	R	SSIx	= Receive	ed Signal S	Strength Inc	licator					

Note

Please note the following:

- This command reads the same data sets until these are deleted with the "[0x32] Clear Data Buffer (Page 101)" command.
- This command works only in Buffered Read Mode.
- Data is only transferred if STATUS = 0x00, 0x83, 0x84, 0x93, 0x94.
- If STATUS = 0x83, 0x84, 0x85, TR-DATA and DATA SETS are always transferred.

10.4 [0x31] Read Data Buffer Info

The "Read Data Buffer Info" command reads the current parameters in the data buffer.

Table 10- 3	Host → reader
-------------	---------------

Byte	1	2	3	4	5	6, 7
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x31]	CRC16
Default	0x02	-	-	-	-	-

Table 10-4 Reader \rightarrow host

Byte	1	2	3	4	5	6	7,8	9, 10	11, 12	13, 14
Content	STX	MSB ALENGT H	LSB ALENGT H	COM- ADR	[0x31]	STATUS	TAB- SIZE	TAB- START	TAB- LEN	CRC16
Default	0x02	-	-	-	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

Name Description	
TAB-SIZE	Maximum number of transponder data sets in the data buffer.
TAB-START	Address of the first data set in the data buffer.
TAB-LEN	Number of reserved transponder data sets in the data buffer.

Note

Further information on the status of the data tables

Further information about the status of the data tables is transferred if STATUS = $\{0x00, 0x84, 0x85, 0x93\}$.

10.5 [0x32] Clear Data Buffer

The "Clear Data Buffer" command removes the data sets from the data buffer that you read with the "[0x22] Read Buffer (Page 98)" command.

Table	10-5	Host →	reader

Byte	1	2	3	4	5	6, 7
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	CRC16
Default	0x02	-	_	_	-	-

Table 10- 6 Reader \rightarrow host

Byte	1	2	3	4	5	6	7,8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x32]	STATUS ¹⁾	CRC16
Default	0x02	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

10.6 [0x33] Initialize Buffer

10.6 [0x33] Initialize Buffer

The "Initialize Buffer" command resets the buffer to a basic status. In this case, it does not matter whether the data sets in the buffer have already been read.

Table 10-7 Host \rightarrow reader

Byte	1	2	3	4	5	6, 7
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	CRC16
Default	0x02	-	-	-	-	-

Table 10-8 Reader \rightarrow host

Byte	1	2	3	4	5	6	7,8
Content	STX	MSB ALENGTH	LSB ALENGTH	COM-ADR	[0x33]	STATUS ¹⁾	CRC16
Default	0x02	-	-	-	-	-	-

¹⁾ You will find further information in the Appendix (Page 103).

A.1 Codes of the transponder types

Value	Transponder type
0x03	ISO 15693 tags

The information is sent by executing the "[0x01] Inventory (Page 61)" command.

A.2 Time response of the asynchronous interface

The reaction times of the asynchronous interface depend on the following factors:

- Amount of data to be read or written
- Type and number of transponders supported by the reader
- Location of the transponder at the time of the query
- Any existing electromagnetic disturbances
- Success or failure of the query

	min.	max.	Unit
EE parameter change	5		ms
1 block (16 bytes)		300	ms
all (8) blocks		600	ms
[0x69] RF Reset	-	15	ms
[0xB0] Host commands for obligatory com- mands according to ISO 15693 and optional commands	5	As configured in "CFG1: COM interface (Page 23)" > parameter "TR-RESPONSE- TIME"	ms

A.3 Time response for ISO 15693 host commands

The response time for the ISO 15693 host commands depends on the following factors:

- Number of transponders in the antenna field (duration of the anticollision process)
- Amount of data to be read or written
- Types of transponders supported by the reader
- Location of the transponder at the time of the query
- Any existing electromagnetic disturbances

Appendix

A.4 Index of the status bytes

Time response of [0x01] inventory and ISO 15693 transponders

All times relate to the following parameters: ISO15693 MODE = 0x0B (see "CFG4: Transponder parameters (Page 28)")

- AFI deactivated
- 16 time slots

The modulation and the sub-carrier have only a negligible influence on the reaction time.

The following diagrams show average values for the time response depending on the number of transponders. With certain UIDs, the times may be longer or shorter than shown below.

The time response is measured including the communication time at 38.4 kBd. Another baud rate increases the times slightly but the inventory time is mainly obtained based on the anticollision which is why you can disregard the communication time.



a Execution time

b + c Communication time

The setting of the time slots should be made depending on the expected number of transponders in the antenna field at one time to ensure the fastest possible processing:

- up to 30 transponders: 1 time slot
- as of to 30 transponders: 16 time slots

A.4 Index of the status bytes

Hexadecimal value	General
0x00	OK:
	Data/parameters read or saved without errors
	Control command executed

Hexadecimal value	Transponder status
0x01	No transponder:
	No transponder within the detection field of the reader
	Transponder in detection field has been switched to silent
	• Disruption in communication between reader and transponder. The reader can no longer detect the transponder.
0x02	incorrect data:
	CRC16 checksum error in the received data
0x03	Write error:
	Plausibility test of written data failed:
	 Attempt to write to a read-only area (only I-CODE1 and Tag-it RF transponders)
	Distance between transponder and reader antenna too great
	Attempt to write during excessive ambient noise
0x04	Address error:
	The requested data is outside the logical or physical address range of the tran- sponder:
	• The address is outside the maximum address range of the transponder.
	• The address is outside the configured address range of the transponder.
0x05	wrong transponder type:
	This command is not supported by this transponder:
	A specific command is not supported by the transponder.

Hexadecimal value	Parameter status
0x10	EEPROM error:
	EEPROM of the reader cannot be written to
	Before the write procedure in the EEPROM, a parameter checksum error occurred.
0x11	Parameter outside the valid range:
	Valid parameter range exceeded
0x13	Login required:
	Access to the configuration without first logging in
0x14	Login error:
	Attempt to log in with the wrong password
0x15	Read protection:
	Configuration block reserved for future use
0x16	Write protection:
	Configuration block reserved for future use

Appendix

A.4 Index of the status bytes

Hexadecimal value	Interface status		
0x80	Unknown command:		
	Selected function not supported by reader		
0x81	Length error:		
	 Selected function has the wrong number of parameters 		
0x82	Command is not possible:		
	The reader is in the wrong mode.		
	Command is not supported		
0x83	RF communication error:		
	This error indicates that there is an error in the communication between the transponder and the reader. Possible reasons for this:		
	The algorithm for collision handling was not continued until no more collisions were detected. Reason for interruption:		
	TR-RESPONSE-TIME in CFG1: COM interface is too short		
	Transponder is in the borderline read area		
	Too much noise in the antenna field		
0x84	RF error:		
	You can read detailed status information with the "[0x6E] Reader Diagnostic (Page 53)" command.		
	 Check for incorrect configuration of the antenna, antenna cable and antenna setting. 		
	Ambient noise too high		
	RF power does not match the configured value		
	 Temperature of the RF end-stage too high, RF power can be reduce or be turned off completely. 		
	Defective RF hardware		

Hexadecimal value	Buffer status
0x92	no valid data:
	No valid data in the Buffered Read Mode
	No transponder in the antenna field
	• VALID-TIME in the "CFG11: Read mode - read data (Page 31)" command for the transponders in the antenna field has not yet elapsed
0x93	Data buffer overflow:
	The data buffer has overflowed

Hexadecimal value	Buffer status
0x94	Other data:
	• More transponder data sets have been requested than the transponder pro- tocol is capable of transferring simultaneously.
0x95	ISO 15693 error:
	Additional error code for ISO 15693 transponder was sent with the response data

A.5 Error codes of the transponders

Hexadecimal value	Definition of the response error code	
0x01	The command is not supported or is request code is not known.	
0x02	The command is not recognized, Example: Format error occurred.	
0x03	The option is not supported.	
0x0F	Unknown error	
0x10	The specified block is not available (does not exist).	
0x11	The specified block is already locked and cannot be locked again.	
0x12	The specified block is locked and its content cannot be changed.	
0x13	The specified block was not programmed successfully.	
0x14	The specified block was not saved successfully.	
0xA0 0xDF	Error codes of user-defined commands	
All others	Reserved for future use	

A.6 LED functions

When applying the power or resetting the reader, all four LEDs flash three times (LED test), and the green "PWR" LED is then lit permanently:

LED	Color	Meaning
PWR	green	Power
		Power is on.
ACT	yellow	Active
		Communication on the interface (to the reader/host).

A.7 Example of read data

LED	Color	Meaning
PRE	green	Presence
		Presence of a transponder in the antenna field was detected.
ERR	red	Error
		Error occurred:
		• Antenna impedance incorrect (not connected, disturbed by metal,)
		• Disturbance level too high (inadequate signal-to-noise ratio, external source of noise,)

When firmware is being downloaded, the "PWR"/"PRE" and "ERR" flash alternately.

If there is a hardware fault or EEPROM error, the "PWR" and "ERR" LEDs flash alternately.

A.7 Example of read data

The setting "LSB first" and "MSB first" (default value) specifies the order of the received data bytes.

ISO 15693 host command (DB-SIZE of the transponder = 4 bytes)




ISO 15693 host command (DB-SIZE of the transponder = 8 bytes)

A.8 Service & Support

Technical Support

You can access technical support for all IA/DT projects via the following:

- Phone: + 49 (0) 911 895 7222
- Fax: + 49 (0) 911 895 7223
- E-mail (mailto:support.automation@siemens.com)
- Internet: Web form for support request (<u>http://www.siemens.com/automation/support-request</u>)

Contacts

If you have any further questions on the use of our products, please contact one of our representatives at your local Siemens office.

The addresses are found on the following pages:

- On the Internet (<u>http://www.siemens.com/automation/partner</u>)
- In Catalog CA 01
- In the catalog ID 10 specially for Industrial Identification Systems

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A.8 Service & Support

Service & support for industrial automation and drive technologies

You can find various services on the Support home page (<u>http://www.siemens.com/automation/service&support</u>) of IA/DT on the Internet.

There you will find the following information, for example:

- Our newsletter containing up-to-date information on your products.
- Relevant documentation for your application, which you can access via the search function in "Product Support".
- A forum for global information exchange by users and specialists.
- Your local contact for IA/DT on site.
- Information about on-site service, repairs, and spare parts. Much more can be found under "Our service offer".

SIMATIC documentation on the Internet

A guide to the technical documentation for the various SIMATIC products and systems is available on the Internet:

SIMATIC Guide manuals (http://www.siemens.com/simatic-tech-doku-portal)

RFID homepage

For general information about our identification systems, visit RFID home page (http://www.siemens.com/ident/rfid).

Online catalog and ordering system

The online catalog and the online ordering system can also be found on the Industry Mall home page (http://www.siemens.com/industrymall/en).

Training center

We offer appropriate courses to get you started. Please contact your local training center or the central training center in

D-90327 Nuremberg.

Phone: +49 (0) 180 523 56 11 ($\in 0.14$ /min. from the German landline network, deviating mobile communications prices are possible)

For information about courses, see the SITRAIN home page (http://www.sitrain.com).