

# **BLUEBOX RFID System**

## **COMMUNICATION PROTOCOL**



### **Modbus/TCP**

## Preface

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## Safety Instructions / Warning - Read before start-up!

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

## This manual applies to the following devices:

Read / write LF RFID device with integrated antenna. MODBUS/TCP communication interface.	5222L-MB
Read / write LF RFID device with one external antenna. MODBUS/TCP communication interface.	5232L-MB
Read / write LF RFID device with two external antennas. MODBUS/TCP communication interface.	5242L-MB
Read / write HF RFID device with integrated antenna. MODBUS/TCP communication interface.	5222H-MB
Read / write HF RFID device with one external antenna. MODBUS/TCP communication interface.	5232H-MB
Read / write HF RFID device with two external antennas. MODBUS/TCP communication interface.	5242H-MB
Read / write UHF RFID device with integrated antenna. MODBUS/TCP communication interface.	5222U-MB-S
Read / write UHF RFID device with one external antenna. MODBUS/TCP communication interface.	5238U-MB-S



Read / write UHF RFID device with up to four external antennas. MODBUS/TCP communication interface.

5232U-MB

**This manual is valid as of firmware version:**

Order Number	Carrier	Front End
5222L-MB	2.07M	3.17d
5232L-MB	2.07M	3.17d
5242L-MB	2.07M	3.17d
5222H-MB	2.08M	1.23
5232H-MB	2.08M	1.23
5242H-MB	2.08M	1.23
5222U-MB-S	3.10M	1.35M
5238U-MB-S	3.10M	1.35M
5232U-MB	2.10M	2.35Q

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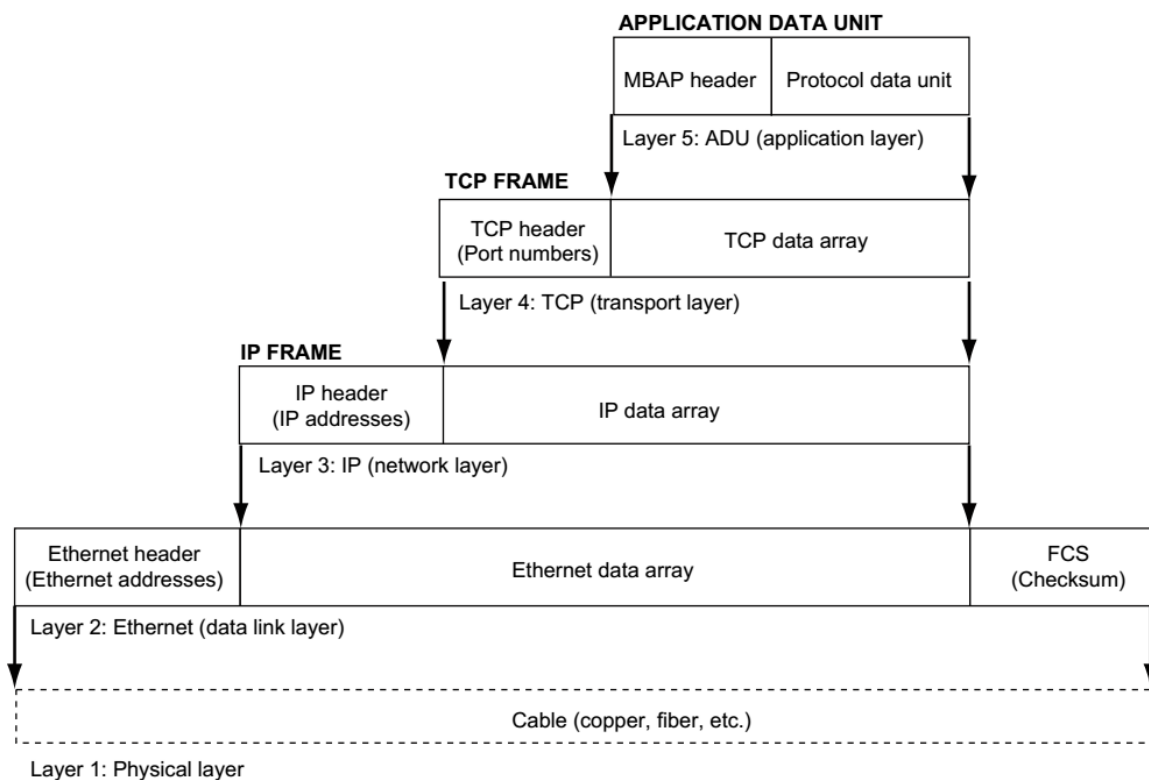
## 1 Introduction

This document describes the message format of the MODBUS/TCP communication protocol used by the host and the reader in order to issuing commands and reply with responses.

MODBUS/TCP is basically the MODBUS serial RTU encapsulated in a TCP/IP wrapper and is used for TCP/IP communications between client and server devices on an Ethernet TCP/IP network. A communicating system over MODBUS/TCP may include different types of device:

- A MODBUS/TCP Client and Server devices connected to an Ethernet TCP/IP network;
- Interconnection devices like bridge, router or gateway.

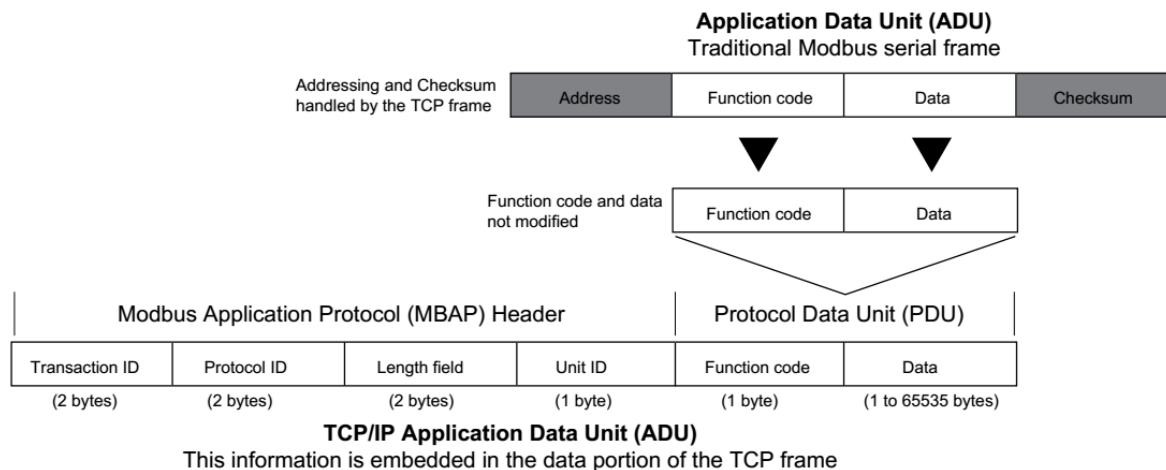
MODBUS/TCP uses the OSI (Open Systems Interconnection) networking model. The MODBUS ADU (Application Data Unit) makes up the OSI application layer and is wrapped inside the data array of the TCP/IP Ethernet data packet. The figure below shows the construction of a TCP/IP Ethernet data packet used for the MODBUS/TCP protocol.



A MODBUS/TCP data packet, or Application Data Unit (ADU) consists of two components:

1. MODBUS Application Protocol (MBAP) header
2. Protocol Data Unit (PDU)

The information contained in the ADU is embedded in the data portion of the TCP frame.



The MBAP Header contains the following fields

Field	Length	Description
Transaction Identifier	2 bytes	ID of a MODBUS request/response transaction. This field is used for transaction pairing, the server will copy in the Transaction ID of the request into the response.
Protocol Identifier	2 bytes	0 = MODBUS protocol
Length	2 bytes	Number of bytes following, including the Unit ID and the byte length of the PDU.
Unit Identifier	1 byte	ID of a remote slave. Used for intra-system communications with other buses i.e. between MODBUS/TCP and a MODBUS serial line slave through a gateway.

The PDU contains the following fields

Field	Length	Description
Function Code	1 byte	The function code identifies the action to be taken using the data bytes that will follow.
Data	n bytes	The data contained in the PDU, it will consist of the data and/or parameters associated with the commands to operate with the <b>BLUEBOX</b> .



## 2 Communication Features

Communicating with **BLUEBOX** devices using MODBUS/TCP requires four basic steps:

- Connect
- Configure
- Read/write
- Disconnect

When opening a TCP/IP connection to the **BLUEBOX**, you normally use port 502 which is the default MODBUS/TCP connection port.

For all inputs and registers, use a slave ID (Unit ID) of 0 for the **BLUEBOX**

### 2.1 Function Codes

The **BLUEBOX** supports the following function codes

Function Code		Description
dec	hex	
03	03	Read holding registers
04	04	Read input registers
06	06	Write single register
16	10	Write multiple registers

Each function has 4 error, or exception codes that will return in case of an error with the transaction

Exception Code		Description
dec	hex	
1	1	Function code received in the query is not recognized or allowed by slave
2	2	Data address of some or all the required entities are not allowed or do not exist in slave
6	6	Slave is engaged in processing a long-duration command

### 2.1.1 Read Holding Registers 03

This function code is used to read a contiguous block of holding registers in the **BLUEBOX**. The request PDU specifies the starting register address and the number of registers.

### 2.1.2 Read Input Registers 04

This function code is used to read a contiguous block of input registers in the **BLUEBOX**. The request PDU specifies the starting register address and the number of registers.

### 2.1.3 Write Single Register 06

This function code is used to write a register in the **BLUEBOX**. The request PDU specifies the register address and the value to be written.

### 2.1.4 Write Multiple Registers 16

This function code is used to write a block of registers in the **BLUEBOX**. The request PDU specifies the starting register address, the number of registers and the values to be written.

## 2.2 Registers Map

The following tables show the input registers and holding registers that apply to **BLUEBOX** devices supporting MODBUS/TCP.

### 2.2.1 Input Registers

Hereinafter the input registers map of the **BLUEBOX**.

Fields	Address		Bytes	Description	Range	Default
	Start	End				
Serial Number	0x0000	0x0002	6	The serial number of the device	-	-
MAC Address	0x0003	0x0005	6	The MAC address of the device	-	-
FW Version	0x0006	0x000D	16	The firmware version of the device	-	-
FW #1 Version	0x000E	0x002D	64	The firmware version of the front end #1 (if present)	-	-

Fields	Address		Bytes	Description	Range	Default
	Start	End				
FW #2 Version	0x002E	0x004D	64	The firmware version of the front end #2 (if present)	-	-
Reader Status	0x004E		2	The status (inputs, outputs, ...) of the device	-	-
Reserved	0x004F	0x00FF	354	Reserved	-	-
Tag Code #1 Len	0x0100		2	Tag code on antenna #1 length in bytes	0 ... 254	0
Tag Code #2 Len	0x0101		2	Tag code on antenna #2 length in bytes (if present)	0 ... 254	0
Tag Code #3 Len	0x0102		2	Tag code on antenna #3 length in bytes (if present)	0 ... 254	0
Tag Code #4 Len	0x0103		2	Tag code on antenna #4 length in bytes (if present)	0 ... 254	0
Tag Code #1	0x0104	0x0182	254	Tag code on antenna #1	-	0x00...
Tag Code #2	0x0183	0x0201	254	Tag code on antenna #2	-	0x00...
Tag Code #3	0x0202	0x0280	254	Tag code on antenna #3	-	0x00...
Tag Code #4	0x0281	0x02FF	254	Tag code on antenna #4	-	0x00...

### Where:

Field	Description
Serial Number	The serial number of the device. It is a numeric code constituted by 12 digits, the bytes of the serial number are BCD-coded and so every byte encodes 2 digits.
MAC Address	The MAC Address of the device.
FW Version	Firmware version of the device. It is a string of 16 ASCII characters that defines the version.
FW #1 Version	Firmware version of the front end #1 (if present). It is a null terminated string of 64 ASCII character that defines the version.
FW #2 Version	Firmware version of the front end #2 (if present). It is a null terminated string of 64 ASCII character that defines the version.
Reader Status	The status (inputs, outputs, ...) of the device. It is an MSB word (2 bytes) that defines the status of the device, see the reader's user manual for details.
Tag Code #1 Len	Tag code on antenna #1 length in bytes. It is an MSB word (2 bytes) that defines the length in bytes of the tag code present on antenna #1 in the range 0 ... 254, 0 in case of no tag.

Field	Description
Tag Code #2 Len	Tag code on antenna #2 (if present) length in bytes. It is an MSB word (2 bytes) that defines the length in bytes of the tag code present on antenna #2 in the range 0 ... 254, 0 in case of no tag.
Tag Code #3 Len	Tag code on antenna #3 (if present) length in bytes. It is an MSB word (2 bytes) that defines the length in bytes of the tag code present on antenna #3 in the range 0 ... 254, 0 in case of no tag.
Tag Code #4 Len	Tag code on antenna #4 (if present) length in bytes. It is an MSB word (2 bytes) that defines the length in bytes of the tag code present on antenna #4 in the range 0 ... 254, 0 in case of no tag.
Tag Code #1	Tag code on antenna #1. It is an MSB byte array padded right with zeros that defines the tag code present on antenna #1.
Tag Code #2	Tag code on antenna #2 (if present). It is an MSB byte array padded right with zeros that defines the tag code present on antenna #2.
Tag Code #3	Tag code on antenna #3 (if present). It is an MSB byte array padded right with zeros that defines the tag code present on antenna #3.
Tag Code #4	Tag code on antenna #4 (if present). It is an MSB byte array padded right with zeros that defines the tag code present on antenna #4.

The Tag code content depends on the reader type and,

a) for LF devices:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM i < 20 for LONG
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM n = 20 for LONG
n+1	0x00		
...	...		
254	0x00		

b) for HF devices:

Byte	Value	Description	Notes
1	0x..	Transponder type	
1+1	0x..	Transponder UID, 1st byte	
1+i	0x..	Transponder UID, i-th byte	$i < n$
1+n	0x..	Transponder UID, n-th byte	$n = \text{UID length}$
1+n+1	0x00		
...	...		
254	0x00		

c) for UHF devices:

Byte	Value	Description	Notes
1	0x..	Transponder type: <ul style="list-style-type: none"> <li>0x02: ISO 18000-63 (EPC Class-1Generation-2).</li> </ul>	Optional parameter present only if the tag type information flag in the general parameters is active. See the reader user manual for more info.
1+1	0x..	Transponder code, 1st byte.	
1+i	0x..	Transponder code, i-th byte.	
1+n	0x..	Transponder code, n-th byte.	
1+n+1	0x..	Last seen RSSI Q value in dB of the identified tag.	Opt. parameter present only if the RSSI information flag in the RF configuration parameters is active. See the device user manual for more info
1+n+2	0x..	Last seen RSSI I value in dB of the identified tag.	Opt. parameter present only if the RSSI information flag in the RF configuration parameters is active. See the device user manual for more info
1+n+3	0x..	Reading antenna of the identified tag: <ul style="list-style-type: none"> <li>0x01: Antenna 1.</li> <li>0x02: Antenna 2.</li> </ul>	Optional parameter present only if the reading antenna information flag in the

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x03: Antenna 3.</li> <li>0x04: Antenna 4.</li> </ul>	general parameters is active. See the reader user manual for more info.
1+n+4	0x00		
...	...		
254	0x00		

### 2.2.2 Holding Registers

Hereinafter the holding registers map of the **BLUEBOX**.

Fields	Address		Bytes	Description	Range	Default
	Start	End				
Cmd Code	0x0300		2	The command code.	0 ... 255	0
Cmd Flags	0x0301		2	The command flags.	0 ... 255	0
Cmd Data Len	0x0302		2	The command data length in bytes.	0 ... 502	0
Cmd Data	0x0303	0x03FF	502	The command data byte array.	-	0x00...
Reserved	0x0400	0x05FF	1532	Reserved	-	-

Where:

Field	Description																																																			
Cmd Code	The command code to execute. It is an MSB word (2 bytes) that defines the command code to execute in the range 0 ... 255. The same field is used for the response.																																																			
Cmd Flags	<div><div>The command flags. It is an MSB word (2 bytes) that defines the command execution status in the range 0 ... 255. Where the single bits are defined as below:</div><table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Reply Nak</td><td>Reply Ack</td><td>Busy</td><td>More</td><td>Req RX</td><td>Req TX</td></tr><tr><td>bits</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>byte</td><td colspan="10">MSB</td><td colspan="6">LSB</td></tr></table></div>												Reply Nak	Reply Ack	Busy	More	Req RX	Req TX	bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	byte	MSB										LSB					
											Reply Nak	Reply Ack	Busy	More	Req RX	Req TX																																				
bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0																																				
byte	MSB										LSB																																									

Field	Description
	<p>Where:</p> <ul style="list-style-type: none"> <li>• Bit 15: Not used;</li> <li>• Bit 14: Not used;</li> <li>• Bit 13: Not used;</li> <li>• Bit 12: Not used;</li> <li>• Bit 11: Not used;</li> <li>• Bit 10: Not used;</li> <li>• Bit 9: Not used;</li> <li>• Bit 8: Not used;</li> <li>• Bit 7: Not used;</li> <li>• Bit 6: Not used;</li> <li>• Bit 5: Reply Nak, set to '1' by the 'slave' means that an error has occurred of the received command has been processed with error and no data;</li> <li>• Bit 4: Reply Ack, set to '1' by the 'slave' means that the received command has been processed with no error and no data;</li> <li>• Bit 3: Busy, set to '1' by the 'slave' means that the 'slave' is processing the command message from the 'master';</li> <li>• Bit 2: More, set to '1' means that the message is composed of several data packets;</li> <li>• Bit 1: Req RX, set to '1' by the 'slave' means that the received command has been processed and a reception request for the 'master', reset to '0' by the 'master';</li> <li>• Bit 0: Req TX, set to '1' by the 'master' means a transmission request for 'slave', reset to '0' by the 'slave'.</li> </ul>
Cmd Data Len	The command data length in bytes. It is an MSB word (2 bytes) that defines the command data length in bytes in the range 0 ... 502. The same field is used for the response.
Cmd Data	The command data. It is an MSB byte array padded right with zeros that defines the data field of the command. The same field is used for the response.

## 2.3 Commands Overview

Holding registers 'Cmd Code', 'Cmd Flags', 'Cmd Data Len' and 'Cmd Data' described in the holding register map are used to send commands to the **BLUEBOX** and wait for reply.

The communication between 'master' and 'slave' for a command message take place with the following handshake:

1. The 'master' loads the buffer with the command message using the 'Cmd Code', 'Cmd Data Len' and 'Cmd Data' fields and subsequently sets to '1' the flag 'Req TX' in 'Cmd Flags' to inform the 'slave' that a data packet is ready to be acquired;

2. The 'slave' acquires the data packet from the 'master' and confirm the completion of the operation by setting to '0' the flag 'Req TX' in 'Cmd Flags';
3. During the execution time of the received command, the 'slave' sets to '1' the flag 'Busy' in 'Cmd Flags' and replies to every register access with exception code 6 to inform the 'master' that it is temporarily not available for further communication;

The case of a message length that needs more than one data packet is not currently supported.

The answer of the 'slave' to a command message from the 'master' can take place through a full answer message or in a short form depending of the type of command. In the case of a short form answer, it take place through the setting to '1' of the flag 'Reply Ack' or the flag 'Reply Nak' (in function of the result of the execution of the command).

The communication between 'slave' and 'master' for an answer message take place with the following handshake:

1. The 'slave' loads the buffer with the answer message using the 'Cmd Data Len' and 'Cmd Data' fields and subsequently sets to '1' the flag 'Req RX' to inform the 'master' that a data packet is ready to be acquired and sets to '0' the flag 'Busy' to inform the 'master' that it is available again for further communication;
2. The 'master' acquires the data packet from the 'slave' and confirm the completion of the operation by setting to '0' the flag 'Req RX';

The case of a message length that needs more than one data packet is not currently supported but it is signaled by the 'slave' by setting to '1' the flag 'More' in 'Cmd Flags' field.

### 2.3.1 Device Reset

This command is used to restart the **BLUEBOX** (the device has the same behavior like when it is powered up).

Field	Value	Description	Notes
Cmd Code	0x0030	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data.



Field	Value	Description	Notes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command doesn't 'produce' data).

### 2.3.2 Read Date/Time

This command sends back the date/time of the **BLUEBOX** available on the internal real time clock device.

Field	Value	Description	Notes
Cmd Code	0x0028	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command fails, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x0028	The command code.	
Cmd Data Len	0x0007	The response data length in bytes.	7 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Year value thousands and hundreds. BCD encoded byte.	
2	0x..	Year value tens and units. BCD encoded byte.	
3	0x..	Month value tens and units. BCD encoded byte.	
4	0x..	Day value tens and units. BCD encoded byte.	
5	0x..	Hour value tens and units. BCD encoded byte.	
6	0x..	Minute value tens and units. BCD encoded byte.	
7	0x..	Second value tens and units. BCD encoded byte.	
8	0x00		
...	...		
502	0x00		

### 2.3.3 Write Date/Time

This command is used to set the date/time of the **BLUEBOX** in the internal real time clock device.

Field	Value	Description	Notes
Cmd Code	0x0029	The command code.	
Cmd Data Len	0x0007	The command data length in bytes.	7 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Year value thousands and hundreds. BCD encoded byte.	
2	0x..	Year value tens and units. BCD encoded byte.	
3	0x..	Month value tens and units. BCD encoded byte.	
4	0x..	Day value tens and units. BCD encoded byte.	
5	0x..	Hour value tens and units. BCD encoded byte.	
6	0x..	Minute value tens and units. BCD encoded byte.	
7	0x..	Second value tens and units. BCD encoded byte.	
8	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.4 Write General Parameters

This command is used to set the operating parameters of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x002F	The command code.	
Cmd Data Len	0x0007	The command data length in bytes.	7 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	General parameter byte 1.	See the reader user manual for details.
2	0x..	General parameter byte 2.	See the reader user manual for details.
3	0x..	General parameter byte 3.	See the reader user manual for details.
4	0x..	General parameter byte 4.	See the reader user manual for details.
5	0x..	General parameter byte 5.	See the reader user manual for details.
6	0x..	General parameter byte 6.	See the reader user manual for details.
7	0x..	General parameter byte 7.	See the reader user manual for details.
8	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).



After the command execution, the **BLUEBOX** resets itself to apply the new parameters.

### 2.3.5 Write Configuration Parameters

This command is used to set the configuration parameters of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x003D	The command code.	
Cmd Data Len	0x0008 or 0x000F	The command data length in bytes.	8 or 15 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	The configuration page (0x00 ... 0x0F, 0x80 ... 0x87).	
1+1	0x..	Configuration parameter byte 1.	See the reader user manual for details.
1+i	0x..	Configuration parameter byte i.	See the reader user manual for details.
1+n	0x..	Configuration parameter byte n. <ul style="list-style-type: none"> <li>n=7 if configuration page is 0x00 ... 0x0F</li> <li>n=14 if configuration page is 0x80 ... 0x87</li> </ul>	See the reader user manual for details.
1+n+1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.6 Set Default Parameters

This command is used to set the default values of the communication and operating parameters of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x0031	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).



After the command execution, the **BLUEBOX** resets itself to apply the new parameters.

### 2.3.7 Read General Parameters

This command is used to get the values of the operating parameters of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x002A	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x002A	The command code.	
Cmd Data Len	0x0007	The response data length in bytes.	7 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	General parameter byte 1.	See the reader user manual for details.
2	0x..	General parameter byte 2.	See the reader user manual for details.
3	0x..	General parameter byte 3.	See the reader user manual for details.
4	0x..	General parameter byte 4.	See the reader user manual for details.
5	0x..	General parameter byte 5.	See the reader user manual for details.
6	0x..	General parameter byte 6.	See the reader user manual for details.
7	0x..	General parameter byte 7.	See the reader user manual for details.
8	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

### 2.3.8 Read Configuration Parameters

This command is used to get the values of the configuration parameters of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x003C	The command code.	
Cmd Data Len	0x0001	The command data length in bytes.	1 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	The configuration page (0x00 ... 0x0F, 0x80 ... 0x87).	
2	0x00		
...	...		
502	0x00		

If the command fails, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x003C	The command code.	
Cmd Data Len	0x0007 or 0x000E	The response data length in bytes.	7 or 14 bytes
Cmd Data	...	The response data byte array.	



Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Configuration parameter byte 1.	See the reader user manual for details.
i	0x..	Configuration parameter byte i.	See the reader user manual for details.
n	0x..	Configuration parameter byte n. <ul style="list-style-type: none"> <li>n=7 if configuration page is 0x00 ... 0x0F</li> <li>n=14 if configuration page is 0x80 ... 0x87</li> </ul>	See the reader user manual for details.
n+1	0x00		
...	...		
502	0x00		

### 2.3.9 'RF Reading' Test

In 'continuous' mode, this command is used to activate/deactivate the 'reading' test mode. It allows the user to easily and quickly test the read range of the reader with fast beeping (100ms) the buzzer for every identified tag.

Field	Value	Description	Notes
Cmd Code	0x00D7	The command code.	
Cmd Data Len	0x0001	The command data length in bytes.	1 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	To activate/deactivate the 'reading test' mode: <ul style="list-style-type: none"> <li>0x00: To deactivate 'reading test' mode;</li> <li>0x01: To activate 'reading test' mode.</li> </ul>	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).



The 'RF reading' test mode setting is stored in non volatile memory and its status is kept at every restart of the **BLUEBOX**.

### 2.3.10 'RF Power' Test

This command is used to easily and quickly test the minimum RF output power needed to read a tag in a fixed position. The reader sweeps from the minimum RF output power to maximum RF output power or until it finds a tag, increasing the RF power of 1 dB every 500ms with fixed Q selection algorithm and Q=0.

Field	Value	Description	Notes
Cmd Code	0x00DA	The command code.	
Cmd Data Len	0x0002	The command data length in bytes.	2 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Antenna to use for test: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Antenna 1.</li> <li>• 0x02 -&gt; Antenna 2.</li> <li>• 0x03 -&gt; Antenna 3.</li> <li>• 0x04 -&gt; Antenna 4.</li> </ul>	
2		RF channel to use for test:	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x01 ... 0x0A if ETSI region is selected;</li> <li>0x01 ... 0x32 if FCC region is selected.</li> </ul>	
3	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

a) if a tag has been identified

Field	Value	Description	Notes
Cmd Code	0x00DA	The command code.	
Cmd Data Len	0x0002	The response data length in bytes.	2 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Minimum RF output power in dBm needed to read the tag.	
3	0x00		
...	...		
502	0x00		

b) if no tag has been found

Field	Value	Description	Notes
Cmd Code	0x00DA	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.11 'RF Sensitivity' Test

This command is used to easily and quickly test the minimum RF input sensitivity needed to read a tag in a fixed position. The reader sweeps from the minimum RF input sensitivity to maximum RF input sensitivity or until it finds a tag, increasing the RF sensitivity of 1 dB every 500ms with fixed Q selection algorithm and Q=0.

Field	Value	Description	Notes
Cmd Code	0x00DB	The command code.	
Cmd Data Len	0x0002	The command data length in bytes.	2 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Antenna to use for test: <ul style="list-style-type: none"> <li>0x01 -&gt; Antenna 1.</li> <li>0x02 -&gt; Antenna 2.</li> </ul>	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x03 -&gt; Antenna 3.</li> <li>0x04 -&gt; Antenna 4.</li> </ul>	
2		RF channel to use for test: <ul style="list-style-type: none"> <li>0x01 ... 0x0A if ETSI region is selected;</li> <li>0x01 ... 0x32 if FCC region is selected.</li> </ul>	
3	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

a) if a tag has been identified

Field	Value	Description	Notes
Cmd Code	0x00DB	The command code.	
Cmd Data Len	0x0002	The response data length in bytes.	2 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Minimum RF output sensitivity in dBm needed to read the tag.	
3	0x00		
...	...		
502	0x00		

b) if no tag has been found

Field	Value	Description	Notes
Cmd Code	0x00DB	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.12 Read Reflected Power

This command is used to read the approximation of the antenna reflected power to easily check the antenna connection.

Field	Value	Description	Notes
Cmd Code	0x00FE	The command code.	
Cmd Data Len	0x0004	The command data length in bytes.	4 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Antenna to use for test: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Antenna 1.</li> <li>• 0x02 -&gt; Antenna 2.</li> <li>• 0x03 -&gt; Antenna 3.</li> </ul>	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x04 -&gt; Antenna 4.</li> </ul>	
2	0x..	The frequency to test in MHz in the range 840 ... 960 MHz. MSB.	The frequency is 3 bytes length
3	0x..		
4	0x..	The frequency to test in MHz in the range 840 ... 960 MHz. LSB.	
5	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x00FE	The command code.	
Cmd Data Len	0x0004	The response data length in bytes.	4 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	The I-channel RSSI value	
3	0x..	The Q-channel RSSI value	
4	0x..	The G value used to calculate the reflected power as defined below	
5	0x00		
...	...		
502	0x00		

And the reflected power is calculated as follows

$$mixDC = \sqrt{Ich^2 + Qch^2}$$

$$Pin(dBm) = 20 \log \left( \frac{mixDC}{G} \right)$$

### 2.3.13 Read RSSI Power

This command is used to read the approximation of the RF signal strength received by the antenna to easily check the presence or not of external RF sources.

Field	Value	Description	Notes
Cmd Code	0x00FD	The command code.	
Cmd Data Len	0x0004	The command data length in bytes.	4 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Antenna to use for test: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Antenna 1.</li> <li>• 0x02 -&gt; Antenna 2.</li> <li>• 0x03 -&gt; Antenna 3.</li> <li>• 0x04 -&gt; Antenna 4.</li> </ul>	
2	0x..	The frequency to test in MHz in the range 840 ... 960 MHz. MSB.	The frequency is 3 bytes length
3	0x..		
4	0x..	The frequency to test in MHz in the range 840 ... 960 MHz. LSB.	
5	0x00		
...	...		
502	0x00		



If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x00FD	The command code.	
Cmd Data Len	0x0004	The response data length in bytes.	4 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	The I-channel RSSI value	
3	0x..	The Q-channel RSSI value	
4	0x..	The G value used to calculate the RSSI power as defined below	
5	0x00		
...	...		
502	0x00		

And the RSSI power is calculated as follows

$$meanRSSI = \frac{Ich + Qch}{2}$$

$$Pin(dBm) = 2.1 * meanRSSI - G$$

### 2.3.14 Digital Output Activation

This command is used to activate each individual output and also to set the duration in case of impulsive use.

Field	Value	Description	Notes
Cmd Code	0x0037	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0002	The command data length in bytes.	2 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Output to activate: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Output 1;</li> <li>• 0x02 -&gt; Output 2.</li> </ul>	
2	0x..	Activation time: <ul style="list-style-type: none"> <li>• 0x01 ... 0x63 (1 ... 99 seconds) for 'Impulsive' output activation;</li> <li>• 0x81 -&gt; 'Continuous' activation;</li> <li>• 0x80 -&gt; 'Continuous' deactivation.</li> </ul>	
3	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.15 Read Device Status

The **BLUEBOX** will answer to this command with a series of information about the current status and particularly about the digital inputs status.

Field	Value	Description	Notes
Cmd Code	0x0036	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers:

Field	Value	Description	Notes
Cmd Code	0x0036	The command code.	
Cmd Data Len	0x0002	The response data length in bytes.	2 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Status byte 1	See the reader user manual for details.
2	0x..	Status byte 2	See the reader user manual for details.
3	0x00		
...	...		
502	0x00		

### 2.3.16 RF Deactivation

In 'continuous' mode, this command is used to suspend the activity of the RF antennas connected to the **BLUEBOX**; see also 'RF activation' command.

Field	Value	Description	Notes
Cmd Code	0x0038	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.17 RF Activation

In 'continuous' mode, this command is used to resume the activity of the RF antennas connected to the **BLUEBOX**; see also 'RF Deactivation' command.

Field	Value	Description	Notes
Cmd Code	0x0039	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.18 Antennas Auto-Tuning

This command is used to start an auto-tuning procedure on the RF output channels to improve the reading performances of the **BLUEBOX**.

Field	Value	Description	Notes
Cmd Code	0x00D4	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command don't 'produce' data).

### 2.3.19 Queue Data Request

In 'continuous' mode, when-the **BLUEBOX** finds a 'new' transponder, it inserts its code in the FIFO queue. This command sends back the first code present in the queue. After executing the command, the code must be deleted from the queue, otherwise each time you make a data request from the queue the same code will be returned.

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) for LF devices with only 1 antenna:

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM i < 20 for LONG

Byte	Value	Description	Notes
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM n = 20 for LONG
n+1	0x00		
...	...		
502	0x00		



If the queue is empty, the answer message will consist of 5 null bytes (0x00, 0x00, 0x00, 0x00, 0x00).

b) for LF devices with 2 antennas:

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM i < 20 for LONG
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM

Byte	Value	Description	Notes
			n = 20 for LONG
n+1	0x..	Antenna that have identified the tag	0x01: Antenna 1 0x02: Antenna 2
n+2	0x00		
...	...		
502	0x00		



If the queue is empty, the answer message will consist of 5 null bytes (0x00, 0x00, 0x00, 0x00, 0x00).

c) for HF devices with only 1 antenna:

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder type	
1+1	0x..	Transponder UID, 1st byte	
1+i	0x..	Transponder UID, i-th byte	i < n
1+n	0x..	Transponder UID, n-th byte	n = UID length
1+n+1	0x00		
...	...		



Byte	Value	Description	Notes
502	0x00		



If the queue is empty, the answer message will consist of 5 null bytes (0x00, 0x00, 0x00, 0x00, 0x00).

d) for HF devices with 2 antennas:

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder type	
1+1	0x..	Transponder UID, 1st byte	
1+i	0x..	Transponder UID, i-th byte	$i < n$
1+n	0x..	Transponder UID, n-th byte	$n = \text{UID length}$
1+n+1	0x..	Antenna that have identified the tag	0x01: Antenna 1 0x02: Antenna 2
1+n+2	0x00		
...	...		
502	0x00		



If the queue is empty, the answer message will consist of 5 null bytes (0x00, 0x00, 0x00, 0x00, 0x00).

e) for UHF devices in case of one ISO 18000-63 (EPC Class-1 Generation-2) transponder present with n bytes ID length:

Field	Value	Description	Notes
Cmd Code	0x0006	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder type: <ul style="list-style-type: none"> <li>0x02: ISO 18000-63 (EPC Class-1 Generation-2).</li> </ul>	Optional parameter present only if the tag type information flag in the general parameters is active. See the reader user manual for more info.
1+1	0x..	Transponder code, 1st byte.	
1+i	0x..	Transponder code, i-th byte.	
1+n	0x..	Transponder code, n-th byte.	
1+n+1	0x..	1st seen RSSI Q value in dB of the tag.	Opt. parameter present only if the RSSI information flag in the RF configuration parameters is active. See the device user manual for more info
1+n+2	0x..	1st seen RSSI I value in dB of the tag.	Opt. parameter present only if the RSSI information flag in the RF configuration parameters is active.

Byte	Value	Description	Notes
			See the device user manual for more info
1+n+3	0x..	Reading antenna of the identified tag: <ul style="list-style-type: none"> <li>0x01: Antenna 1.</li> <li>0x02: Antenna 2.</li> <li>0x03: Antenna 3.</li> <li>0x04: Antenna 4.</li> </ul>	Optional parameter present only if the reading antenna information flag in the general parameters is active. See the reader user manual for more info.
1+n+4	0x..	Gate crossing direction for the identified tag: <ul style="list-style-type: none"> <li>0x01: Crossing from input 1 to input 2.</li> <li>0x02: Crossing from input 2 to input 1.</li> </ul>	Optional parameter present only if 'gate' mode is active. See the reader user manual for more info.
1+n+5	0x00		
...	...		
502	0x00		



If the queue is empty, the answer message will consist of 5 null bytes (0x00, 0x00, 0x00, 0x00, 0x00).

To delete the received code from the queue, the 'master' reply to the **BLUEBOX** with:

Field	Value	Description	Notes
Cmd Code	0x0007	The command code.	
Cmd Data Len	0x0000	The response data length in bytes.	No command data
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command doesn't 'produce' data).

### 2.3.20 Write Data to a EM4305 Transponder

This command is used to write data on the EM4305 transponder with the following possible formats:

- **EM4305 BLUEBOX SHORT**, the code is constituted by 40 bits divided into 10 nibbles (UNIQUE compatible) giving 5 bytes
- **EM4305 BLUEBOX MEDIUM**, the code is constituted by 80 bits divided into 20 nibbles giving 10 bytes
- **EM4305 BLUEBOX LARGE**, the code is constituted by 160 bits divided into 40 nibbles giving 20 bytes

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM

Byte	Value	Description	Notes
			$i < 20$ for LONG
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM n = 20 for LONG
n+1	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x19 is used to work with the antenna nr 1 while the command code 0x69 is used to work with antenna nr 2.

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command doesn't 'produce' data).

### 2.3.21 Read ID Code of a EM4305 Transponder

This command is used to get the ID code of the EM4305 transponder, constituted by 4 bytes.

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the ID has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
1+i	0x..	Transponder identification code, i-th byte	$i < 4$
1+4	0x..	Transponder identification code, 4th byte	$i = 4$
1+4+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x18 is used to work with the antenna nr 1 while the command code 0x68 is used to work with antenna nr 2.

### 2.3.22 Write Data to a T5557 Transponder

This command is used to write data on the T5557 transponder with the following possible formats:

- **T5557 BLUEBOX SHORT**, the code is constituted by 40 bits divided into 10 nibbles (UNIQUE compatible) giving 8 bytes
- **T5557 BLUEBOX MEDIUM**, the code is constituted by 80 bits divided into 20 nibbles giving 10 bytes
- **T5557 BLUEBOX LARGE**, the code is constituted by 160 bits divided into 40 nibbles giving 20 bytes

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM i < 20 for LONG
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM n = 20 for LONG
n+1	0x00		
...	...		
502	0x00		





For devices with 2 antennas, the command code 0x1D is used to work with the antenna nr 1 while the command code 0x6D is used to work with antenna nr 2.

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command doesn't 'produce' data).

### 2.3.23 Read ID Code of a T5557 Transponder

This command is used to get the ID code of the T5557 transponder, constituted by 8 bytes.

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the ID has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0009	The response data length in bytes.	9 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder identification code, 1st byte	The transponder ID code is 8 bytes long
1+i	0x..	Transponder identification code, i-th byte	$i < 8$
1+8	0x..	Transponder identification code, 8th byte	$i = 8$
1+8+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1C is used to work with the antenna nr 1 while the command code 0x6C is used to work with antenna nr 2.

### 2.3.24 Write Data to a Q5 Transponder

This command is used to write data on the Q5 transponder with the following possible formats:

- **Q5 BLUEBOX SHORT**, the code is constituted by 40 bits divided into 10 nibbles (UNIQUE compatible) giving 5 bytes
- **Q5 BLUEBOX MEDIUM**, the code is constituted by 80 bits divided into 20 nibbles giving 10 bytes

- **Q5 BLUEBOX LARGE**, the code is constituted by 160 bits divided into 40 nibbles giving 20 bytes

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM, 20 bytes long for LONG
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM i < 20 for LONG
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM n = 20 for LONG
n+1	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x21 is used to work with the antenna nr 1 while the command code 0x71 is used to work with antenna nr 2.

The answer to this command is given in short form through the 'Reply Ack' / 'Reply Nak' flags (this command doesn't 'produce' data).

### 2.3.25 Read ID Code of a Q5 Transponder

This command is used to get the ID code of the Q5 transponder, constituted by 5 bytes.

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the ID has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0006	The response data length in bytes.	6 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	

Byte	Value	Description	Notes
1+1	0x..	Transponder identification code, 1st byte	The transponder ID code is 5 bytes long
1+i	0x..	Transponder identification code, i-th byte	$i < 5$
1+5	0x..	Transponder identification code, 5th byte	$i = 5$
1+5+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x20 is used to work with the antenna nr 1 while the command code 0x70 is used to work with antenna nr 2.

### 2.3.26 Write Data to a HITAG S Transponder

This command is used to write data on the HITAG S transponder with the following possible formats:

- **HITAG S BLUEBOX SHORT**, the code is constituted by 40 bits divided into 10 nibbles (UNIQUE compatible) giving 5 bytes
- **HITAG S BLUEBOX MEDIUM**, the code is constituted by 80 bits divided into 20 nibbles giving 10 bytes

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder code, 1st byte	The transponder code is 5 bytes long for SHORT, 10 bytes long for MEDIUM
i	0x..	Transponder code, i-th byte	i < 5 for SHORT i < 10 for MEDIUM
n	0x..	Transponder code, n-th byte	n = 5 for SHORT n = 10 for MEDIUM
n+1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the it has been successfully written:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		



b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x23 is used to work with the antenna nr 1 while the command code 0x73 is used to work with antenna nr 2.

### 2.3.27 Read ID Code of a HITAG 1 /HITAG S Transponder

This command is used to get the ID code of the HITAG 1 / HITAG S transponder, constituted by 4 bytes.

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the ID has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0006	The response data length in bytes.	6 bytes

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Transponder type: <ul style="list-style-type: none"> <li>• 0x01: HITAG S 256</li> <li>• 0x02: HITAG S 2048</li> <li>• 0x03: HITAG 1</li> </ul>	
2+1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
2+i	0x..	Transponder identification code, i-th byte	$i < 4$
2+4	0x..	Transponder identification code, 4th byte	$i = 4$
7	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		

Byte	Value	Description	Notes
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x22 is used to work with the antenna nr 1 while the command code 0x72 is used to work with antenna nr 2.

### 2.3.28 Read a Page of a HITAG 1 / HITAG S Transponder

This command is used to get a data page of the HITAG 1 / HITAG S transponder, constituted by 32 bits (4 bytes). Note that it is necessary to know the ID code of the transponder. Refer to the related datasheet to get more information about the HITAG transponder.

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0005	The command data length in bytes.	5 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
i	0x..	Transponder identification code, i-th byte	$i < 4$
4	0x..	Transponder identification code, 4th byte	$i = 4$
5	0x..	Page of transponder to be read	0x00 ... 0x3F
6	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the page has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder data, 1st byte	Every transponder page is 4 bytes long
1+i	0x..	Transponder data, i-th byte	
1+4	0x..	Transponder data, 4th byte	
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x24 is used to work with the antenna nr 1 while the command code 0x74 is used to work with antenna nr 2.

### 2.3.29 Write a Page of a HITAG 1 / HITAG S Transponder

This command is used to write a data page of the HITAG 1 / HITAG S transponder, constituted by 32 bits (4 bytes). Note that it is necessary to know the ID code of the transponder. Refer to the related datasheet to get more information about the HITAG transponder.

Field	Value	Description	Notes
Cmd Code	0x0025	The command code.	
Cmd Data Len	0x0009	The command data length in bytes.	9 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
i	0x..	Transponder identification code, i-th byte	$i < 4$
4	0x..	Transponder identification code, 4th byte	$i = 4$
5	0x..	Transponder page to be written	0x08 ... 0x3F
5+1	0x..	Transponder data, 1st byte	Every transponder page is 4 bytes long
5+i	0x..	Transponder data, i-th byte	$i < 4$
5+4	0x00	Transponder data, 4th byte	$i = 4$
10	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the page is been successfully written:

Field	Value	Description	Notes
Cmd Code	0x0025	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		



Byte	Value	Description	Notes
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0025	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0025	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x25 is used to work with the antenna nr 1 while the command code 0x75 is used to work with antenna nr 2.

### 2.3.30 Read ID Code of a HITAG 2 Transponder

This command is used to get the ID code of the HITAG 2 transponder, constituted by 4 bytes.

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the ID has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
1+i	0x..	Transponder identification code, i-th byte	$i < 4$
1+4	0x..	Transponder identification code, 4th byte	$i = 4$
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x48 is used to work with the antenna nr 1 while the command code 0x98 is used to work with antenna nr 2.

### 2.3.31 Read a Page of a HITAG 2 Transponder

This command is used to get a data page of the HITAG 2 transponder, constituted by 32 bits (4 bytes). Note that it is necessary to know the ID code of the transponder. Refer to the related datasheet to get more information about the HITAG transponder.

Field	Value	Description	Notes
Cmd Code	0x004A	The command code.	
Cmd Data Len	0x0009	The command data length in bytes.	9 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
i	0x..	Transponder identification code, i-th byte	$i < 4$
4	0x..	Transponder identification code, 4th byte	$i = 4$
4+1	0x..	Transponder password, 1st byte	The transponder pwd is 4 bytes long
4+i	0x..	Transponder password, i-th byte	$i < 4$
4+4	0x..	Transponder password, 4th byte	$i = 4$
9	0x..	Page of transponder to be read	0x00 ... 0x07
10	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the page has been successfully read:

Field	Value	Description	Notes
Cmd Code	0x004A	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder data, 1st byte	Every transponder page is 4 bytes long
1+i	0x..	Transponder data, i-th byte	$i < 4$
1+4	0x..	Transponder data, 4th byte	$i = 4$
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x004A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x004A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x4A is used to work with the antenna nr 1 while the command code 0x9A is used to work with antenna nr 2.

### 2.3.32 Write a Page of a HITAG 2 Transponder

This command is used to write a data page of the HITAG 2 transponder, constituted by 32 bits (4 bytes). Note that it is necessary to know the ID code of the transponder. Refer to the related datasheet to get more information about the HITAG transponder.

Field	Value	Description	Notes
Cmd Code	0x004B	The command code.	
Cmd Data Len	0x000D	The command data length in bytes.	13 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder identification code, 1st byte	The transponder ID code is 4 bytes long
i	0x..	Transponder identification code, i-th byte	$i < 4$
4	0x..	Transponder identification code, 4th byte	$i = 4$
4+1		Transponder password, 1st byte	The transponder pwd is 4 bytes long
4+i		Transponder password, i-th byte	$i < 4$
4+4		Transponder password, 4th byte	$i = 4$
9	0x..	Transponder page to be written	0x00 ... 0x07
9+1	0x..	Transponder data, 1st byte	Every transponder page is 4 bytes long
9+i	0x..	Transponder data, i-th byte	$i < 4$
9+4	0x00	Transponder data, 4th byte	$i = 4$
14	0x00		
...	...		
502	0x00		



If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the page is been successfully written:

Field	Value	Description	Notes
Cmd Code	0x004B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x004B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		

Byte	Value	Description	Notes
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x004B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x4B is used to work with the antenna nr 1 while the command code 0x9B is used to work with antenna nr 2.

### 2.3.33 'Reset' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to reset the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x40 is used to work with the antenna nr 1 while the command code 0x60 is used to work with antenna nr 2.

### 2.3.34 'Login' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to log in the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0004	The command data length in bytes.	4 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder password, 1st byte	The transponder pwd is 4 bytes long
i	0x..	Transponder password, i-th byte	$i < 4$
4	0x..	Transponder password, 4th byte	$i = 4$
5	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x41 is used to work with the antenna nr 1 while the command code 0x61 is used to work with antenna nr 2.

### 2.3.35 'Write Password' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to set the password of the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be resumed as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0042	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0008	The command data length in bytes.	8 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder password, 1st byte	The transponder pwd is 4 bytes long
i	0x..	Transponder password, i-th byte	$i < 4$
4	0x..	Transponder password, 4th byte	$i = 4$
4+1	0x..	New password to be set, 1st byte	The transponder pwd is 4 bytes long
4+i	0x..	New password to be set, i-th byte	$i < 4$
4+4	0x..	New password to be set, 4th byte	$i = 4$
9	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0042	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	



Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0042	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0042	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x42 is used to work with the antenna nr 1 while the command code 0x62 is used to work with antenna nr 2.

### 2.3.36 'Standard Read' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to get the data relative to 'standard read' mode of the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0043	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0043	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	First long word read, 1st byte	Every long word is 4 bytes long
1+i	0x..	First long word read, i-th byte	$i < 4$
1+4	0x..	First long word read, 4th byte	$i = 4$
...	...		
...	...	Last long word read, 1st byte	Every long word is 4 bytes long
...	...	Last long word read, i-th byte	$i < 4$
...	...	Last long word read, 4th byte	$i = 4$
...	...		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0043	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0043	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x43 is used to work with the antenna nr 1 while the command code 0x63 is used to work with antenna nr 2.

### 2.3.37 'Selective Read' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to read the data relative to 1 or more long word/s of the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0044	The command code.	
Cmd Data Len	0x0002	The command data length in bytes.	2 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Address of the first long word to be read	
2	0x..	Address of the last long word to be read	
3	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0044	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	First long word read, 1st byte	Every long word is 4 bytes long
1+i	0x..	First long word read, i-th byte	$i < 4$
1+4	0x..	First long word read, 4th byte	$i = 4$
...	...		
...	...	Last long word read, 1st byte	Every long word is 4 bytes long
...	...	Last long word read, i-th byte	$i < 4$
...	...	Last long word read, 4th byte	$i = 4$
...	...		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0044	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0044	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x44 is used to work with the antenna nr 1 while the command code 0x64 is used to work with antenna nr 2.

### 2.3.38 'Write Word' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to write the data relative to a long word of the TITAN transponder. Refer to the related

datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0045	The command code.	
Cmd Data Len	0x0005	The command data length in bytes.	5 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Address of the long word to be written	
1+1	0x..	The long word to be written, 1st byte	Every long word is 4 bytes long
1+i	0x..	The long word to be written, i-th byte	$i < 4$
1+4	0x..	The long word to be written, 4th byte	$i = 4$
6	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0045	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte



Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0045	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0045	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x45 is used to work with the antenna nr 1 while the command code 0x65 is used to work with antenna nr 2.

### 2.3.39 'Write Several Words' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to write the data relative to more long words of the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0046	The command code.	
Cmd Data Len	...	The command data length in bytes.	

Field	Value	Description	Notes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Address of the long word to be written	
1+1	0x..	The long word to be written, 1st byte	Every long word is 4 bytes long
1+i	0x..	The long word to be written, i-th byte	$i < 4$
1+4	0x..	The long word to be written, 4th byte	$i = 4$
...	...		
...	...	The last long word to be written, 1st byte	Every long word is 4 bytes long
...	...	The last long word to be written, i-th byte	$i < 4$
...	...	The last long word to be written, 4th byte	$i = 4$
...	...		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0046	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0046	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0046	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x46 is used to work with the antenna nr 1 while the command code 0x66 is used to work with antenna nr 2.

#### 2.3.40 'Read After Write Word' Command for TITAN Transponder

If the **BLUEBOX** 'continuous' mode is disabled, this command allows to write and read back the data relative to a long word of the TITAN transponder. Refer to the related datasheet to get more information about the TITAN transponder. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as a command involving the TITAN transponder is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0047	The command code.	
Cmd Data Len	0x0005	The command data length in bytes.	5 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Address of the long word to be written	
1+1	0x..	The long word to be written, 1st byte	Every long word is 4 bytes long

Byte	Value	Description	Notes
1+i	0x..	The long word to be written, i-th byte	i < 4
1+4	0x..	The long word to be written, 4th byte	i = 4
6	0x00		
...	...		
502	0x00		

If command is not successfully executed, the answer is given in short form through the 'Reply Ack' / 'Reply Nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0047	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder long word read back, 1st byte	Every long word is 4 bytes long
1+i	0x..	Transponder long word read back, i-th byte	i < 4
1+4	0x..	Transponder long word read back, 4th byte	i = 4
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0047	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0047	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x47 is used to work with the antenna nr 1 while the command code 0x67 is used to work with antenna nr 2.

### 2.3.41 ISO 15963 Transponders 'Inventory' Command

This command is used to get the UID code of the identified ISO 15693 transponders that are present near the antenna/s.

Field	Value	Description	Notes
Cmd Code	0x0010	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0010	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte



Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

b) case of presence of transponder/s:

Field	Value	Description	Notes
Cmd Code	0x0010	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 UID, 1st byte	
1+i	0x..	Transponder 1 UID, i-th byte	$i < 8$
1+8	0x..	Transponder 1 UID, 8th byte	
...	...		
...	...	Transponder n UID, 1st byte	
...	...	Transponder n UID, j-th byte	$j < 8$
...	...	Transponder n UID, 8th byte	
...	...		



For devices with 2 antennas, the command code 0x10 is used to work with the antenna nr 1 while the command code 0x90 is used to work with antenna nr 2.

### 2.3.42 Read a Data Block of an ISO 15693 Transponder

This command is used to get a data block of a known (UID) ISO 15693 transponder. Note that the number of bytes of a block and the number of blocks depends on the transponder type; for example, the **NXP I CODE SLI** transponder is organized in blocks of 4 bytes, the **Fujitsu MB89R118** transponder is organized in blocks of 8 bytes, for more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0011	The command code.	
Cmd Data Len	0x0009	The command data length in bytes.	9 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 8
8	0x..	Transponder UID, 8th byte	
9	0x..	Block number	Max value depends on the specific transponder
10	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0011	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data of the block, 1st byte	
1+i	0x..	Data of the block, i-th byte	$i < n$
1+n	0x..	Data of the block, n-th byte	n depends on the specific transponder
1+n+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0011	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0011	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x11 is used to work with the antenna nr 1 while the command code 0x91 is used to work with antenna nr 2.

### 2.3.43 Write a Data Block of an ISO 15693 Transponder

This command is used to write a data block of a known (UID) ISO 15693 transponder. Note that the number of bytes of a block depends on the transponder type; for example, the **NXP I CODE SLI** transponder is organized in blocks of 4 bytes, the **Fujitsu MB89R118** transponder is organized in blocks of 8 bytes, for more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0012	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 8$
8	0x..	Transponder UID, 8th byte	
9	0x..	Block number	Max value depends on the specific transponder
9+1	0x..	Data to be written in the block, 1st byte	
9+i	0x..	Data to be written in the block, i-th byte	$i < n$
9+n	0x..	Data to be written in the block, n-th byte	n depends on the specific transponder
9+n+1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0012	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0012	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0012	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x12 is used to work with the antenna nr 1 while the command code 0x92 is used to work with antenna nr 2.

#### 2.3.44 Lock a Data Block of an ISO 15693 Transponder

This command is used to lock a data block of a known (UID) ISO 15693 transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0013	The command code.	
Cmd Data Len	0x0009	The command data length in bytes.	9 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 8
8	0x..	Transponder UID, 8th byte	
9	0x..	Block number	Max value depends on the specific transponder
10	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0013	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		



b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0013	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0013	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x13 is used to work with the antenna nr 1 while the command code 0x93 is used to work with antenna nr 2.

### 2.3.45 ISO 15963 Transponder 'Get System Info' Command

This command is used to get the system info data block of a known (UID) ISO 15693 transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0014	The command code.	
Cmd Data Len	0x0008	The command data length in bytes.	8 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 8$
8	0x..	Transponder UID, 8th byte	
9	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0014	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Info Flags: single bits are dedicated to specify the presence of the following fields (0 → absent, 1 → present): <ul style="list-style-type: none"> <li>• Bit 7...4: Not used</li> <li>• Bit 3: IC Reference (1 byte)</li> <li>• Bit 2: Memory Size (2 bytes)</li> <li>• Bit 1: AFI (1 byte)</li> <li>• Bit 0: DSFID (1 byte)</li> </ul>	
2+1	0x..	Transponder UID, 1st byte	
2+i	0x..	Transponder UID, i-th byte	i < 8
2+n	0x..	Transponder UID, 8th byte	
...	0x..	DSFID	Present only if bit 0 of Info Flags is set
...	0x..	AFI	Present only if bit 1 of Info Flags is set
...	0x..	Memory Size – Block Size in bytes 0x00 (1 byte) ... 0x1F (32 bytes)	Present only if bit 2 of Info Flags is set
...	0x..	Memory Size – Number of Blocks 0x00 (1 block) ... 0xFF (256 blocks)	Present only if bit 2 of Info Flags is set
...	0x..	IC Reference	Present only if bit 3 of Info Flags is set
...	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0014	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0014	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x14 is used to work with the antenna nr 1 while the command code 0x94 is used to work with antenna nr 2.

#### 2.3.46 ISO 15963 Transponder 'General Protocol' Command

This command allows to send any ISO 15693 general format protocol command (flags field, command code field, parameters fields, application data fields) to a ISO 15693 transponder and to receive, in case of successful operation, the response of the transponder (flag field, parameters fields, data fields). For more details see the specific transponder data sheet and ISO 15693 protocol. If the 'continuous' mode is enabled, it will be suspended by the execution of this command and will be suspended as long as this command is used; it will be resumed automatically when another type of command will be executed.

Field	Value	Description	Notes
Cmd Code	0x0015	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Data to send to the tag, 1st byte	
i	0x..	Data to send to the tag, i-th byte	i < n

Byte	Value	Description	Notes
n	0x..	Data to send to the tag, n-th byte	n depends on the specific protocol command
n+1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0015	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data received from the tag, 1st byte	
1+i	0x..	Data received from the tag, i-th byte	i < n
1+n	0x..	Data received from the tag, n-th byte	n depends on the specific protocol command response
1+n+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0015	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0015	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x15 is used to work with the antenna nr 1 while the command code 0x95 is used to work with antenna nr 2.

### 2.3.47 ISO 14443A Transponder 'Inventory' Command

This command is used to get the UID code of a ISO 14443A transponder - **MIFARE Ultralight, MIFARE Mini, MIFARE 1k (UID 4), MIFARE 4k (UID 4), MIFARE 1k (UID 7), MIFARE 4k (UID 7), MIFARE Desfire, MIFARE PLUS 2k, MIFARE Plus 4k, NTAG213/215/216** - that is present near the antenna.

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	



Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

b) case of presence of transponder/s:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Transponder 1 type	
2+1	0x..	Transponder 1 UID, 1st byte	
2+i	0x..	Transponder 1 UID, i-th byte	$i < n$
2+n	0x..	Transponder 1 UID, n-th byte	$n = \text{UID length}$
...	...		
...	0x..	Transponder 1 type	

Byte	Value	Description	Notes
...	0x..	Transponder m UID, 1st byte	
...	0x..	Transponder m UID, j-th byte	j < n
...	0x..	Transponder m UID, n-th byte	n = UID length
...	...		



For devices with 2 antennas, the command code 0x18 is used to work with the antenna nr 1 while the command code 0x98 is used to work with antenna nr 2.

#### 2.3.48 Read a Data Block of a MIFARE Mini/1k/4k (UID 4) Transponder

This command is used to get a data block (16 bytes) of a known (UID) **MIFARE Mini/1k/4k (UID 4)** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x000C	The command data length in bytes.	12 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 4
4	0x..	Transponder UID, 4 th byte	
5	0x..	Key type: <ul style="list-style-type: none"> <li>0x00: Key A</li> <li>0x01: Key B</li> </ul>	

Byte	Value	Description	Notes
5+1	0x..	Key code, 1st byte	
5+j	0x..	Key code, j-th byte	j < 6
5+6	0x..	Key code, 6th byte	
12	0x..	Block number: <ul style="list-style-type: none"> <li>• 0x00 ... 0x13 for MIFARE Mini</li> <li>• 0x00 ... 0x3F for MIFARE 1k</li> <li>• 0x00 ... 0xFF for MIFARE 4k</li> </ul>	
13	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x0011	The response data length in bytes.	17 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data of the block, 1st byte	
1+i	0x..	Data of the block, i-th byte	i < 16
1+16	0x..	Data of the block, 16th byte	
18	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x19 is used to work with the antenna nr 1 while the command code 0x99 is used to work with antenna nr 2.

#### 2.3.49 Write a Data Block of a MIFARE Mini/1k/4k (UID 4) Transponder

This command is used to write a data block (16 bytes) of a known (UID) **MIFARE Mini/1k/4k (UID 4)** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x001C	The command data length in bytes.	28 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 4
4	0x..	Transponder UID, 4th byte	
5	0x..	Key type: <ul style="list-style-type: none"> <li>0x00: Key A</li> <li>0x01: Key B</li> </ul>	
5+1	0x..	Key code, 1st byte	

Byte	Value	Description	Notes
5+j	0x..	Key code, j-th byte	j < 6
5+6	0x..	Key code, 6th byte	
12	0x..	Block number: <ul style="list-style-type: none"> <li>0x00 ... 0x13 for MIFARE Mini</li> <li>0x00 ... 0x3F for MIFARE 1k</li> <li>0x00 ... 0xFF for MIFARE 4k</li> </ul>	
12+1	0x..	Data to be written in the block, 1st byte	
12+k	0x..	Data to be written in the block, k-th byte	k < 16
12+16	0x..	Data to be written in the block, 16th byte	
29	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1A is used to work with the antenna nr 1 while the command code 0x9A is used to work with antenna nr 2.

### 2.3.50 Read a Data Block of a MIFARE 1k/4k (UID 7) Transponder

This command is used to get a data block (16 bytes) of a known (UID) **MIFARE 1k/4k (UID 7)** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x000F	The command data length in bytes.	15 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 7$
7	0x..	Transponder UID, 7th byte	
8	0x..	Key type: <ul style="list-style-type: none"> <li>0x00: Key A</li> <li>0x01: Key B</li> </ul>	
8+1	0x..	Key code, 1st byte	
8+j	0x..	Key code, j-th byte	$j < 6$
8+6	0x..	Key code, 6th byte	
15	0x..	Block number: <ul style="list-style-type: none"> <li>0x00 ... 0x3F for MIFARE 1k</li> <li>0x00 ... 0xFF for MIFARE 4k</li> </ul>	



Byte	Value	Description	Notes
16	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x0011	The response data length in bytes.	17 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data of the block, 1st byte	
1+i	0x..	Data of the block, i-th byte	$i < 16$
1+16	0x..	Data of the block, 16th byte	
18	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1D is used to work with the antenna nr 1 while the command code 0x9D is used to work with antenna nr 2.

### 2.3.51 Write a Data Block of a MIFARE 1k/4k (UID 7) Transponder

This command is used to write a data block (16 bytes) of a known (UID) **MIFARE 1k/4k (UID 7)** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x001F	The command data length in bytes.	31 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 7
7	0x..	Transponder UID, 7th byte	
8	0x..	Key type: <ul style="list-style-type: none"> <li>0x00: Key A</li> <li>0x01: Key B</li> </ul>	
8+1	0x..	Key code, 1st byte	
8+j	0x..	Key code, j-th byte	j < 6
8+6	0x..	Key code, 6th byte	
15	0x..	Block number: <ul style="list-style-type: none"> <li>0x00 ... 0x3F for MIFARE 1k</li> <li>0x00 ... 0xFF for MIFARE 4k</li> </ul>	
15+1	0x..	Data to be written in the block, 1st byte	

Byte	Value	Description	Notes
15+k	0x..	Data to be written in the block, k-th byte	k < 16
15+16	0x..	Data to be written in the block, 16th byte	
32	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1E is used to work with the antenna nr 1 while the command code 0x9E is used to work with antenna nr 2.

### 2.3.52 Read a Data Page of a MIFARE Ultralight transponder

This command is used to get a data page (4 bytes) of a known (UID) **MIFARE Ultralight** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0008	The command data length in bytes.	8 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 7$
7	0x..	Transponder UID, 7 th byte	
8	0x..	Page number: • 0x00 ... 0x0F for MIFARE Ultralight	
9	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data of the block, 1st byte	
1+i	0x..	Data of the block, i-th byte	$i < 4$
1+4	0x..	Data of the block, 4th byte	
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1B is used to work with the antenna nr 1 while the command code 0x9B is used to work with antenna nr 2.

### 2.3.53 Write a Data Page of a MIFARE Ultralight Transponder

This command is used to write a data page (4 bytes) of a known (UID) **MIFARE Ultralight** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x000C	The command data length in bytes.	12 bytes



Field	Value	Description	Notes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 7$
7	0x..	Transponder UID, 7th byte	
8	0x..	Page number: • 0x00 ... 0x0F for MIFARE Ultralight	
8+1	0x..	Data to be written in the block, 1st byte	
8+k	0x..	Data to be written in the block, k-th byte	$k < 4$
8+4	0x..	Data to be written in the block, 4th byte	
13	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1C is used to work with the antenna nr 1 while the command code 0x9C is used to work with antenna nr 2.

#### 2.3.54 Read a Data Page of a NTAG213/215/216 transponder

This command is used to get a data page (4 bytes) of a known (UID) **NTAG213/215/216** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0008	The command data length in bytes.	8 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 7
7	0x..	Transponder UID, 7 th byte	
8	0x..	Page number: • 0x00 ... 0x2C for NTAG213	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x00 ... 0x86 for NTAG215</li> <li>0x00 ... 0xE6 for NTAG216</li> </ul>	
9	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0005	The response data length in bytes.	5 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data of the block, 1st byte	
1+i	0x..	Data of the block, i-th byte	$i < 4$
1+4	0x..	Data of the block, 4th byte	
6	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1B is used to work with the antenna nr 1 while the command code 0x9B is used to work with antenna nr 2.

### 2.3.55 Write a Data Page of a NTAG213/215/216 Transponder

This command is used to write a data page (4 bytes) of a known (UID) **NTAG213/215/216** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x000C	The command data length in bytes.	12 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 7$
7	0x..	Transponder UID, 7th byte	
8	0x..	Page number: <ul style="list-style-type: none"> <li>0x00 ... 0x2C for NTAG213</li> <li>0x00 ... 0x86 for NTAG215</li> <li>0x00 ... 0xE6 for NTAG216</li> </ul>	
8+1	0x..	Data to be written in the block, 1st byte	
8+k	0x..	Data to be written in the block, k-th byte	$k < 4$
8+4	0x..	Data to be written in the block, 4th byte	
13	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x1C is used to work with the antenna nr 1 while the command code 0x9C is used to work with antenna nr 2.



### 2.3.56 ISO 14443A-4 Transponder 'RATS' Command

This command allows to select and send a RATS (Request for Answer To Select) command to a ISO 14443A transponder – **MIFARE Desfire, MIFARE PLUS 2k, MIFARE Plus 4k** – to switch, in case of successful operation, from ISO 14443A-3 level to ISO 14443A-4 level. If the 'continuous' mode is enabled, it will be suspended, and the RF field left on, by the execution of this command and will be suspended as long as this command is used; it will be resumed automatically when another type of command will be executed except of the generic ISO 14443A-4 command.

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < n$
n	0x..	Transponder UID, n-th byte	$n = \text{UID length}$
n+1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	

Field	Value	Description	Notes
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	RATS, 1st byte	
1+i	0x..	RATS, i-th byte	$i < n$
1+n	0x..	RATS, n-th byte	
1+n+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0040	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x40 is used to work with the antenna nr 1 while the command code 0xC0 is used to work with antenna nr 2.

### 2.3.57 ISO 14443A-4 Transponder 'General Protocol' Command

This command allows to send any ISO 14443A-4 general format protocol command to a ISO 14443A-4 transponder and to receive, in case of successful operation, the response of the transponder. The transponder must be switched to ISO 14443A-4 level before using the RATS command described before.

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	...	The command data length in bytes.	

Field	Value	Description	Notes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Data to send to the tag, 1st byte	
i	0x..	Data to send to the tag, i-th byte	$i < n$
n	0x..	Data to send to the tag, n-th byte	n depends on the specific protocol command
n+1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Data received from the tag, 1st byte	
1+i	0x..	Data received from the tag, i-th byte	$i < n$

Byte	Value	Description	Notes
1+n	0x..	Data received from the tag, n-th byte	n depends on the specific protocol command response
1+n+1	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0041	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x41 is used to work with the antenna nr 1 while the command code 0xC1 is used to work with antenna nr 2.

### 2.3.58 ISO 14443B Transponder 'Inventory' Command

This command is used to get the UID code of a ISO 14443B transponder – **SR176, SRI512** - that is present near the antenna.

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

b) case of presence of transponder/s:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Transponder 1 type	
2+1	0x..	Transponder 1 UID, 1st byte	
2+i	0x..	Transponder 1 UID, i-th byte	$i < n$

Byte	Value	Description	Notes
2+n	0x..	Transponder 1 UID, n-th byte	n = UID length
...	...		
...	0x..	Transponder 1 type	
...	0x..	Transponder m UID, 1st byte	
...	0x..	Transponder m UID, j-th byte	i < n
...	0x..	Transponder m UID, n-th byte	n = UID length
...	...		



For devices with 2 antennas, the command code 0x20 is used to work with the antenna nr 1 while the command code 0xA0 is used to work with antenna nr 2.

### 2.3.59 Read a Data Block of a SR 176 Transponder

This command is used to get a data block (2 bytes) of a known (UID) **SR 176** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0008	The command data length in bytes.	8 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	i < 7
7	0x..	Transponder UID, 7 th byte	



Byte	Value	Description	Notes
8	0x..	Block number: • 0x00 ... 0x0F for SR 176	
9	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0003	The response data length in bytes.	3 bytes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	Data of the block, 1st byte	
3	0x..	Data of the block, 2nd byte	
4	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x21 is used to work with the antenna nr 1 while the command code 0xA1 is used to work with antenna nr 2.

### 2.3.60 Write a Data Block of a SR 176 Transponder

This command is used to write a data block (2 bytes) of a known (UID) **SR 176** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x000A	The command data length in bytes.	10 bytes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder UID, 1st byte	
i	0x..	Transponder UID, i-th byte	$i < 7$
7	0x..	Transponder UID, 7th byte	
8	0x..	Block number: <ul style="list-style-type: none"> <li>0x00 ... 0x0F for SR 176</li> </ul>	
9	0x..	Data to be written in the block, 1st byte	
10	0x..	Data to be written in the block, 2nd byte	
12	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		



For devices with 2 antennas, the command code 0x22 is used to work with the antenna nr 1 while the command code 0xA2 is used to work with antenna nr 2.

### 2.3.61 PicoPass Transponders 'Inventory' Command

This command is used to get the UID code of the identified PicoPass transponders that are present near the antenna/s.

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

b) case of presence of transponder/s:

Field	Value	Description	Notes
Cmd Code	0x0048	The command code.	
Cmd Data Len	...	The response data length in bytes.	

Field	Value	Description	Notes
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 UID, 1st byte	
1+i	0x..	Transponder 1 UID, i-th byte	$i < 8$
1+8	0x..	Transponder 1 UID, 8th byte	
...	...		
...	...	Transponder n UID, 1st byte	
...	...	Transponder n UID, j-th byte	$j < 8$
...	...	Transponder n UID, 8th byte	
...	...		



For devices with 2 antennas, the command code 0x48 is used to work with the antenna nr 1 while the command code 0xC8 is used to work with antenna nr 2.

### 2.3.62 ISO 18000-63 Transponder 'Inventory' Command

This command is used to get the list of the ID (variable size) of the identified ISO 18000-63 tags that are present near the antennas. If the command can be executed, the response time is variable and depends upon the number of enabled antennas and the activation time of each one.

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0000	The command data length in bytes.	No command data

Field	Value	Description	Notes
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a1) if at least one tag (m tags) is present and flag for reading antenna disabled

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 ID, 1st byte	ID = PC + EPC + CRC
1+i	0x..	Transponder 1 ID, i-th byte	$i < n$
1+n	0x..	Transponder 1 ID, n-th byte	$n = \text{ID length}$
...	...		
...	0x..	Transponder m ID, 1st byte	ID = PC + EPC + CRC
...	0x..	Transponder m ID, j-th byte	$j < n$
...	0x..	Transponder m ID, n-th byte	$n = \text{ID length}$



Byte	Value	Description	Notes
...	...		

a2) if at least one tag (m tags) is present and flag for reading antenna enabled

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 ID, 1st byte	ID = PC + EPC + CRC
1+i	0x..	Transponder 1 ID, i-th byte	$i < n$
1+n	0x..	Transponder 1 ID, n-th byte	$n = \text{ID length}$
...	0x..	Reading antenna of the 1st tag: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Antenna 1.</li> <li>• 0x02 -&gt; Antenna 2.</li> <li>• 0x03 -&gt; Antenna 3.</li> <li>• 0x04 -&gt; Antenna 4.</li> </ul>	
...	...		
...	0x..	Transponder m ID, 1st byte	ID = PC + EPC + CRC
...	0x..	Transponder m ID, j-th byte	$j < n$
...	0x..	Transponder m ID, n-th byte	$n = \text{ID length}$
...	0x..	Reading antenna of the m-th tag: <ul style="list-style-type: none"> <li>• 0x01 -&gt; Antenna 1.</li> <li>• 0x02 -&gt; Antenna 2.</li> <li>• 0x03 -&gt; Antenna 3.</li> <li>• 0x04 -&gt; Antenna 4.</li> </ul>	
...	...		

b) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

This command could also be used to get the RSSI of the read transponders:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0001	The command data length in bytes.	1 byte
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01		
2	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a1) if at least one tag (m tags) is present and flag for reading antenna disabled

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 ID, 1st byte	ID = PC + EPC + CRC
1+i	0x..	Transponder 1 ID, i-th byte	$i < n$
1+n	0x..	Transponder 1 ID, n-th byte	$n = \text{ID length}$
1+n+1	0x..	The RSSI Q-Channel in dB of the 1st transponder.	
1+n+2	0x..	The RSSI I-Channel in dB of the 1st transponder.	
...	...		
...	0x..	Transponder m ID, 1st byte	ID = PC + EPC + CRC
...	0x..	Transponder m ID, j-th byte	$j < n$
...	0x..	Transponder m ID, n-th byte	$n = \text{ID length}$
...	0x..	The RSSI Q-Channel in dB of the m-th transponder.	
...	0x..	The RSSI I-Channel in dB of the m-th transponder.	
...	...		

a2) if at least one tag (m tags) is present and flag for reading antenna enabled

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
1+1	0x..	Transponder 1 ID, 1st byte	ID = PC + EPC + CRC
1+i	0x..	Transponder 1 ID, i-th byte	$i < n$
1+n	0x..	Transponder 1 ID, n-th byte	$n = \text{ID length}$
1+n+1	0x..	The RSSI Q-Channel in dB of the 1st transponder.	
1+n+2	0x..	The RSSI I-Channel in dB of the 1st transponder.	
1+n+3	0x..	Reading antenna of the 1st tag: <ul style="list-style-type: none"> <li>0x01 -&gt; Antenna 1.</li> <li>0x02 -&gt; Antenna 2.</li> <li>0x03 -&gt; Antenna 3.</li> <li>0x04 -&gt; Antenna 4.</li> </ul>	
...	...		
...	0x..	Transponder m ID, 1st byte	ID = PC + EPC + CRC
...	0x..	Transponder m ID, j-th byte	$j < n$
...	0x..	Transponder m ID, n-th byte	$n = \text{ID length}$
...	0x..	The RSSI Q-Channel in dB of the m-th transponder.	
...	0x..	The RSSI I-Channel in dB of the m-th transponder.	
...	0x..	Reading antenna of the m-th tag: <ul style="list-style-type: none"> <li>0x01 -&gt; Antenna 1.</li> </ul>	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x02 -&gt; Antenna 2.</li> <li>0x03 -&gt; Antenna 3.</li> <li>0x04 -&gt; Antenna 4.</li> </ul>	
...	...		

b) case of absence of transponder:

Field	Value	Description	Notes
Cmd Code	0x0018	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.63 Program EPC of an ISO 18000-63 Transponder

This command is used to program the EPC on a known (ID) ISO 18000-63 tag.

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
n+1	0x..	Transponder access password, 1st byte	
n+j	0x..	Transponder access password, j-th byte	$j < 4$
n+4	0x..	Transponder access password, 4-th byte	
n+4+1	0x..	1st EPC data block, 1st byte.	Every data block is 2 bytes length.
n+4+2	0x..	1st EPC data block, 2nd byte.	
...	0x..	...	
...	0x..	m-th EPC data block, 1st byte.	
...	0x..	m-th EPC data block, 2nd byte.	
...	0x00		
...	...		
502	0x00		

If the command fails, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers with:

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001E	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.64 Read Data of an ISO 18000-63 Transponder

This command is used to get data blocks (data block → 2 consecutive bytes) of a known (IDISO 18000-63 tag).

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
n+1	0x..	Transponder access password, 1st byte	
n+j	0x..	Transponder access password, j-th byte	$j < 4$
n+4	0x..	Transponder access password, 4-th byte	
n+5	0x..	Memory bank: <ul style="list-style-type: none"> <li>0x00: Reserved.</li> <li>0x01: EPC.</li> <li>0x02: TID.</li> <li>0x03: User.</li> </ul>	



Byte	Value	Description	Notes
n+5+1	0x..	Memory address of the 1st byte of the 1st memory block to read, 1st byte.	
n+5+k	0x..	Memory address of the 1st byte of the 1st memory block to read, k-th byte.	k < 4
n+5+4	0x..	Memory address of the 1st byte of the 1st memory block to read, 4th byte.	
n+10	0x..	Number of blocks to read (1 ... 64).	
n+11	0x00		
...	...		
502	0x00		

If the command fails, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers with:

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	...	The response data length in bytes.	
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	1st data block, 1st byte.	Every data block is 2 bytes length.
3	0x..	1st data block, 2nd byte.	
...	0x..		
...	0x..	n-th data block, 1st byte.	
...	0x..	n-th data block, 2nd byte.	

Byte	Value	Description	Notes
...	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0019	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.65 Write Data of an ISO 18000-63 Transponder

This command is used to write data on a known (ID) ISO 18000-63 tag.

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	$j < 4$
...	0x..	Transponder access password, 4-th byte	
...	0x..	Memory bank: <ul style="list-style-type: none"> <li>0x00: Reserved.</li> <li>0x01: EPC.</li> <li>0x02: TID.</li> <li>0x03: User.</li> </ul>	

Byte	Value	Description	Notes
...	0x..	Memory address of the 1st byte of the 1st memory block to write, 1st byte.	
...	0x..	Memory address of the 1st byte of the 1st memory block to write, k-th byte.	k < 4
...	0x..	Memory address of the 1st byte of the 1st memory block to write, 4th byte.	
...	0x..	Number of blocks to write (1 ... 64).	
...	0x..	1st data block, 1st byte.	Every data block is 2 bytes length.
...	0x..	1st data block, 2nd byte.	
...			
...	0x..	m-th data block, 1st byte.	m = number of blocks to write
...	0x..	m-th data block, 2nd byte.	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001A	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

A variation of this command allows to write data on a known (ID) type C tag using the BlockWrite command as defined in the EPC Class-1 Generation-2 standard and not only as a loop of Write commands.

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	$j < 4$
...	0x..	Transponder access password, 4-th byte	
...	0x..	Memory bank: <ul style="list-style-type: none"> <li>0x00: Reserved.</li> <li>0x01: EPC.</li> <li>0x02: TID.</li> <li>0x03: User.</li> </ul>	
...	0x..	Memory address of the 1st byte of the 1st memory block to write, 1st byte.	

Byte	Value	Description	Notes
...	0x..	Memory address of the 1st byte of the 1st memory block to write, k-th byte.	k < 4
...	0x..	Memory address of the 1st byte of the 1st memory block to write, 4th byte.	
...	0x..	Number of blocks to write (1 ... 64).	
...	0x..	1st data block, 1st byte.	Every data block is 2 bytes length.
...	0x..	1st data block, 2nd byte.	
...			
...	0x..	m-th data block, 1st byte.	m = number of blocks to write
...	0x..	m-th data block, 2nd byte.	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		

Byte	Value	Description	Notes
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001D	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	



Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.66 Lock Data of an ISO 18000-63 Transponder

This command is used to lock individual password and/or individual memory banks on a known (ID) ISO 18000-63 tag.

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	$j < 4$
...	0x..	Transponder access password, 4-th byte	
...	0x..	Kill password lock property: <ul style="list-style-type: none"> <li>0x00: Accessible from all states;</li> <li>0x01: Permanently accessible from all states and may never be locked;</li> <li>0x02: Accessible only from the secured state;</li> </ul>	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x03: Not accessible from any state;</li> <li>0x04: No change.</li> </ul>	
...	0x..	Access password lock property: <ul style="list-style-type: none"> <li>0x00: Accessible from all states;</li> <li>0x01: Permanently accessible from all states and may never be locked;</li> <li>0x02: Accessible only from the secured state;</li> <li>0x03: Not accessible from any state;</li> <li>0x04: No change.</li> </ul>	
...	0x..	EPC memory bank lock property: <ul style="list-style-type: none"> <li>0x00: Writable from all states;</li> <li>0x01: Permanently writable from all states and may never be locked;</li> <li>0x02: Writable only from the secured state;</li> <li>0x03: Not writable from any state;</li> <li>0x04: No change.</li> </ul>	
...	0x..	TID memory bank lock property: <ul style="list-style-type: none"> <li>0x00: Writable from all states;</li> <li>0x01: Permanently writable from all states and may never be locked;</li> <li>0x02: Writable only from the secured state;</li> <li>0x03: Not writable from any state;</li> <li>0x04: No change.</li> </ul>	
...	0x..	User memory bank lock property: <ul style="list-style-type: none"> <li>0x00: Writable from all states;</li> <li>0x01: Permanently writable from all states and may never be locked;</li> <li>0x02: Writable only from the secured state;</li> <li>0x03: Not writable from any state;</li> <li>0x04: No change.</li> </ul>	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001B	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.67 'Kill' Command of an ISO 18000-63 Transponder

This command is used to kill a known (ID) ISO 18000-63 tag.

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	i < n

Byte	Value	Description	Notes
n	0x..	Transponder ID, n-th byte	n = ID length
...	0x..	Transponder kill password, 1st byte	
...	0x..	Transponder kill password, j-th byte	j < 4
...	0x..	Transponder kill password, 4-th byte	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x001C	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.68 'QT Read' Command of a Monza 4QT Transponder

This command allows to send a QT read command as described below to an **Impinj Monza 4QT** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	$j < 4$
...	0x..	Transponder access password, 4-th byte	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0003	The response data length in bytes.	3 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	QT control field to be written. MSB.	The QT control field is 2 bytes length
3	0x..	QT control field to be written. LSB.	
4	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		



c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0020	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.69 'QT Write' Command of a Monza 4QT Transponder

This command allows to send a QT write command as described below to an **Impinj Monza 4QT** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC

Byte	Value	Description	Notes
i	0x..	Transponder ID, i-th byte	$i < n$
n	0x..	Transponder ID, n-th byte	$n = \text{ID length}$
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	$j < 4$
...	0x..	Transponder access password, 4-th byte	
...	0x..	The persistence. Indicates whether the QT control is written to non volatile (NVM) or volatile memory: <ul style="list-style-type: none"> <li>0x00: Write to volatile memory.</li> <li>0x01: Write to NVM.</li> </ul>	
...	0x..	QT control field to be written. MSB.	The QT control field is 2 bytes length
...	0x..	QT control field to be written. LSB.	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x00		

Byte	Value	Description	Notes
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0021	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.70 'Read Sensor Code' Command of a Magnus Sx Transponder

This command allows to read the sensor code of an **RFMicron Magnus S2** and **S3** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	The chip code: <ul style="list-style-type: none"> <li>0x02: Magnus S2.</li> <li>0x03: Magnus S3.</li> </ul>	
2	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	i < n
1+n	0x..	Transponder ID, n-th byte	n = ID length
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	j < 4
...	0x..	Transponder access password, 4-th byte	
...	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0003	The response data length in bytes.	3 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	The sensor code read from tag. MSB.	The sensor code is 2 bytes length
3	0x..	The sensor code read from tag. LSB.	
4	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0022	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.71 'Read On-Chip RSSI' Command of a Magnus Sx Transponder

This command allows to read the on-chip RSSI of an **RFMicron Magnus S2** and **S3** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	

Field	Value	Description	Notes
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	The chip code: <ul style="list-style-type: none"> <li>0x02: Magnus S2.</li> <li>0x03: Magnus S3.</li> </ul>	
2	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	i < n
1+n	0x..	Transponder ID, n-th byte	n = ID length
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	j < 4
...	0x..	Transponder access password, 4-th byte	
...	0x..	The RSSI threshold match criteria: <ul style="list-style-type: none"> <li>0x00: Match if code is &lt;= threshold.</li> <li>0x01: Match if code is &gt; threshold</li> </ul>	
...	0x..	The RSSI threshold in the range 0 ... 31.	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	

Field	Value	Description	Notes
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
3	0x00		
...	...		
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		



c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0023	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	
2	0x00		
...	...		
502	0x00		

### 2.3.72 'Read Temperature Code' Command of a Magnus S3 Transponder

This command allows to read the temperature code of an **RFMicron Magnus S2** and **S3** transponder. For more details see the specific transponder data sheet.

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	...	The command data length in bytes.	
Cmd Data	...	The command data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x..	The chip code:	

Byte	Value	Description	Notes
		<ul style="list-style-type: none"> <li>0x03: Magnus S3.</li> </ul>	
2	0x..	Transponder ID, 1st byte	ID = PC + EPC + CRC
i	0x..	Transponder ID, i-th byte	i < n
1+n	0x..	Transponder ID, n-th byte	n = ID length
...	0x..	Transponder access password, 1st byte	
...	0x..	Transponder access password, j-th byte	j < 4
...	0x..	Transponder access password, 4-th byte	
...	0x00		
...	...		
502	0x00		

If the command is not successfully executed, the answer is given in short form through the 'reply ack' / 'reply nak' flags; otherwise, the **BLUEBOX** answers,

a) if a transponder is present and the command has been successfully executed:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0003	The response data length in bytes.	3 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x00	Status Ok	
2	0x..	The temperature code read from tag. MSB.	The temperature code is 2 bytes length
3	0x..	The temperature code read from tag. LSB.	
4	0x00		
...	...		

Byte	Value	Description	Notes
502	0x00		

b) if a transponder is present but errors occurred:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x02	Status transponder present with errors	
2	0x00		
...	...		
502	0x00		

c) if no transponder is present:

Field	Value	Description	Notes
Cmd Code	0x0024	The command code.	
Cmd Data Len	0x0001	The response data length in bytes.	1 byte
Cmd Data	...	The response data byte array.	

Where the 'Cmd Data' field is:

Byte	Value	Description	Notes
1	0x01	Status transponder not present	

Byte	Value	Description	Notes
2	0x00		
...	...		
502	0x00		

### 3 Document Revision History

Date	Revision	Description
15/09/17	1.00	Initial release.
08/02/18	1.01	Updated reader's firmware versions object of this manual. Added the PicoPass transponder 'Inventory' command. Updated the supported commands tables.
01/08/18	1.02	Updated reader's firmware versions object of this manual. Added the Tag Data content description in Register Map description. Added the RSSI Q and I channel info in 'Queue Data Request' command. Added the 'RF Sensitivity' Test, Read Reflected Power and Read RSSI Power commands. Added 'ISO 14443A-4 Transponder RATS Command' and 'ISO 14443A-4 Transponder Generic Command' commands. Added the 'QT Read' and 'QT Write' commands of an Impinj Monza 4QT transponder. Added the 'Read Sensor Code' and 'Read On-Chip RSSI' commands of an RFMicron Magnus S2 and S3 transponders. Added the 'Read Temperature Code' of an RFMicron Magnus S3.
04/05/20	1.03	Updated the company name/logo and <b>BLUEBOX</b> logo. Updated the reader's description object of this manual. Replaced ISO 18000-6C with ISO 18000-63. They are the same standard, 18000-6C became 18000-63 in 2012 due to ISO naming rules that do not allow letters in standards names. Format changes and document fixes in all sections.

## A. Supported Commands Table

	5222L-MB, 5232L-MB, 5242L-MB	5222H-MB, 5232H-MB, 5242H-MB	5222U-MB-S, 5238U-MB-S	5232U-MB
Device Reset	✓	✓	✓	✓
Read Date/Time	✓	✓	✓	✓
Write Date/Time	✓	✓	✓	✓
Write General Parameters	✓	✓	✓	✓
Write Configuration Parameters	✓	✓	✓	✓
Set Default Parameters	✓	✓	✓	✓
Read General Parameters	✓	✓	✓	✓
Read Configuration Parameters	✓	✓	✓	✓
'RF Reading' Test			✓	✓
'RF Power' Test			✓	✓
'RF Sensitivity' Test			✓	✓
Read Reflected Power			✓	✓
Read RSSI Power			✓	✓
Digital Output Activation	✓	✓	✓	✓
Read Device Status	✓	✓	✓	✓
RF Deactivation	✓	✓	✓	✓
RF Activation	✓	✓	✓	✓
Antennas Auto-Tuning				✓
Queue Data Request	✓	✓	✓	✓
Write Data to an EM4305 Transponder	✓			
Read ID Code of an EM4305 Transponder	✓			
Write Data to a T5557 Transponder	✓			
Read ID Code of a T5557 Transponder	✓			
Write Data to a Q5 Transponder	✓			
Read ID Code of a Q5 Transponder	✓			
Write Data to an HITAG S Transponder	✓			
Read ID Code of an HITAG 1 / HITAG S Transponder	✓			
Read a Page of an HITAG 1 / HITAG S Transponder	✓			
Write a Page of an HITAG 1 / HITAG S Transponder	✓			
Read ID Code of an HITAG 2 Transponder	✓			
Read a Page of an HITAG 2 Transponder	✓			
Write a Page of an HITAG 2 Transponder	✓			
'Reset' Command for a TITAN Transponder	✓			
'Login' Command for a TITAN Transponder	✓			

	5222L-MB, 5232L-MB, 5242L-MB	5222H-MB, 5232H-MB, 5242H-MB	5222U-MB-S, 5238U-MB-S	5232U-MB
'Write Password' Command for a TITAN Transponder	✓			
'Standard Read' Command for a TITAN Transponder	✓			
'Selective Read' Command for a TITAN Transponder	✓			
'Write Word' Command for a TITAN Transponder	✓			
'Write Several Words' Command for a TITAN Transponder	✓			
'Read After Write Word' Command for a TITAN Transponder	✓			
ISO 15693 Transponders 'Inventory' Command		✓		
Read a Data Block of an ISO 15693 Transponder		✓		
Write a Data Block of an ISO 15693 Transponder		✓		
Lock a Data Block of an ISO 15693 Transponder		✓		
ISO 15693 Transponder 'Get System Info' Command		✓		
ISO 15693 Transponder 'General Protocol' Command		✓		
ISO 14443A Transponders 'Inventory' Command		✓		
Read a Data Block of a MIFARE Mini/1k/4k (UID 4) Transponder		✓		
Write a Data Block of a MIFARE Mini/1k/4k (UID 4) Transponder		✓		
Read a Data Block of a MIFARE 1k/4k (UID 7) Transponder		✓		
Write a Data Block of a MIFARE 1k/4k (UID 7) Transponder		✓		
Read a Data Page of a MIFARE Ultralight Transponder		✓		
Write a Data Page of a MIFARE Ultralight Transponder		✓		
Read a Data Page of a NTAG213/215/216 Transponder		✓		
Write a Data Page of a NTAG213/215/216 Transponder		✓		
ISO 14443A-4 Transponder 'RATS' Command		✓		
ISO 14443A-4 Transponder 'General Protocol' Command		✓		
ISO 14443B Transponders 'Inventory' Command		✓		
Read a Data Block of a SR 176 Transponder		✓		
Write a Data Block of a SR176 Transponder		✓		
PicoPass Transponders 'Inventory' Command		✓		
ISO 18000-63 Transponder 'Inventory' Command			✓	✓
Program EPC of an ISO 18000-63 Transponder			✓	✓
Read Data of an ISO 18000-63 Transponder			✓	✓
Write Data of an ISO 18000-63 Transponder			✓	✓
Lock Data of an ISO 18000-63 Transponder			✓	✓
'Kill' Command of an ISO 18000-63 Transponder			✓	✓
'QT Read' Command of an Impinj Monza 4QT Transponder			✓	✓
'QT Write' Command of an Impinj Monza 4QT Transponder			✓	✓
'Read Sensor Code' Command of an RFMicron Magnus S2 / S3			✓	✓
'Read On-Chip RSSI' Command of an RFMicron Magnus S2 / S3			✓	✓

	5222L-MB, 5232L-MB, 5242L-MB	5222H-MB, 5232H-MB, 5242H-MB	5222U-MB-S, 5238U-MB-S	5232U-MB
'Read Temperature Code' Command of an RFMicron Magnus S3			✓	✓

**B.**