



RUD's EPSO2 commands

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1. Requirements

To use EPSO2 command protocol with .NET technology it is required to import following libraries into .NET application:

- RogerUsbHid.dll library - API for communications with a USB HID (Human Interface Devices) devices
- RogerRud3 library - API for t communication with the Roger RUD's readers

For sector Mifare reading and writing functionalities RUD-3 and RUD-4 devices must be previously configured with RogerVDM tool (to download from www.roger.pl) in accordance with user application requirements.

2. Describes

This document describes some of the EPSO2 commands supported by:

- RUD-2 v 2.0
- RUD-3 v 1.0
- RUD-3 v 2.0
- RUD-4 v 1.0

1.1. RUD-2 v 2.0 supported command

- Function A1. Read card buffer
- Function E1. Read signature

1.2. RUD-3 v 1.0 supported command

- Function A1. Read card buffer
- Function E1. Read signature

1.3. RUD-3 v 2.0 supported command

- Function 51. Write Card Code
- Function 52. Card format
- Function A1. Read card buffer
- Function E1. Read signature

1.4. RUD-4 v 1.0 supported command

- Function 51. Write Card Code
- Function 52. Card format
- Function A1. Read card buffer
- Function A7. Read Mifare Card buffer
- Function A8. Reading the EM Card buffer

- Function B0. Buzzer OFF
- Function B1. Buzzer ON
- Function C0. Switch Relay OFF
- Function C1. Switch Relay ON
- Function D0. Switch LED Red OFF
- Function D1. Switch LED Red ON
- Function D2. Switch LED Green OFF
- Function D3. Switch LED Green ON
- Function E1. Read signature

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3. Function 51. Write Card Code

Terminal writes the card code into the Mifare card sector. Maximum card code length is 16 bytes and it can be written to:

- the block in sector of the Mifare Classic card (configured as SSN or MSN)
- the file in application of the Mifare DESFire card (only for DESFire reader versions)

3.1. Function 51 - frames

Host:

SOH	'S'	ID1	ID2	'5'	'1'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- '5' and '1' – function code
- DATA – card code in ascii hex format
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'5'	'1'	STX	'O'	'K'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- '5' and '1' – function code,
- 'O' and 'K' – card code write correct
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

3.2. Function 51 – example

- **HOST** - SOH+'S'+ "01" + "51"+STX + "112233445566778899001122334455"+ETX+BCC
TERMINAL - SOH+'s'+ "01" + "51"+STX + "OK"+ETX+BCC - means terminal writes card code to configured block on sector (Mifare Classic card) or file on application (Mifare DESFire card)

3.3. Function 51 – supports

- RUD-3 v 2.0
- RUD-4 v1.0

4. Function 52. Card format

Terminal formats the Mifare card using keys and others settings from devices configuration (device must be configured with RogerVDM tool).

4.1. Function 52 - frames

Host:

SOH	'S'	ID1	ID2	'5'	'2'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- '5' and '2' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'5'	'2'	STX	'O'	'K'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- '5' and '2' – function code,
- 'O' and 'K' – card code write correct
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

4.2. Function 52 – example

- **HOST** - SOH+'S'+ "01" + "52"+STX +ETX+BCC
TERMINAL - SOH+'s'+ "01" + "52"+STX + "OK"+ETX+BCC - means terminal formatted Mifare card correctly

4.3. Function 52 – supports

- RUD-3 v 2.0
- RUD-4 v1.0

5. Function A1. Read card buffer

After card read operation (Mifare Card or EM Card) the card code is kept in a buffer for a 2 seconds, card code buffer is automatically cleared when the time expires.

The terminal sends back the card code in the "DATA" section, the buffer is cleared after read operation. When the terminal can't read the card correctly or the buffer is empty it sends back an empty "DATA" section (STX + ETX message).

"DATA" Section – the first byte is "R" the next bytes are card numbers (Mifare Card number of bytes count according device configuration, EM Card 6 bytes)

5.1. Function A1 - frames

Host:

SOH	'S'	ID1	ID2	'A'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'A' and '1' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'A'	'1'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'A' and '1' – function code,
- DATA – card code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

5.2. Function A1 – example

- **HOST** - SOH+'S'+ "01" + „A1"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + „A1"+STX + "R0000003EA88F" + ETX+BCC - means that card is in card buffer. Card code is „0000003EA88F".
- **HOST** - SOH+'S'+ "01" + „A1"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + „A1"+STX + ETX+BCC - means that no card has been read or the card code buffer is empty

5.3. Function A1 – supports

- RUD-2 v 2.0
- RUD-3 v 1.0

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- RUD-3 v 2.0
- RUD-4 v 1.0

6. Function A7. Read Mifare Card buffer

Mifare card code is kept continuously in the buffer as long as the card is present in the terminal card reading range.

The terminal sends back the Mifare code in *"DATA" section*. When the terminal can't read the data correctly, the device sends back an empty *"DATA" section* (STX + ETX message).

"DATA" Section – the first byte is "R" the next bytes are card numbers (number of bytes as configured) in ASCII HEX format (e.g. „R00000003EA88F")

6.1. Function A7 - frames

Host:

SOH	'S'	ID1	ID2	'A'	'7'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'A' and '7' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'A'	'7'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'A' and '7' – function code,
- DATA – card code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

6.2. Function A7 – example

- **HOST** - SOH+'S'+ "01" + "A7"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "A7"+STX + "R00000000003EA88F" + ETX+BCC means that Mifare card is in reading range. Card code is "00000000003EA88F"
- **HOST** - SOH+'S'+ "01" + "A7"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "A7"+STX ETX+BCC - means that there is no Mifare card in terminal reading range

6.3. Function A7 – supports

- RUD-4 v 1.0

7. Function A8. Reading the EM Card buffer

EM card code is kept continuously in the buffer as long as the card is present in the terminal card reading range.

The terminal sends back the EM code in *"DATA" section*. When the terminal can't read the card correctly, the device sends back an empty *"DATA" section* (STX + ETX message).

"DATA" Section – the first byte is *"R"* and the next 6 bytes are card numbers in ASCII HEX format (e.g. „R0000003EA88F“)

7.1. Function A6 - frames

Host:

SOH	'S'	ID1	ID2	'A'	'8'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'A' and '8' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'A'	'8'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'A' and '8' – function code,
- DATA – card code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

7.2. Function A8 – example

- **HOST** - SOH+'S'+ "01" + "A8"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "A8"+STX + "R0000003EA88F" + ETX+BCC - means that EM card is in reading range. Card code is "0000003EA88F".
- **HOST** - SOH+'S'+ "01" + "A8"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "A8"+STX+ ETX+BCC - means there is no EM card in terminal reading range

7.3. Function A8 – supports

- RUD-4 v 1.0

8. Function B0. Buzzer OFF

Terminal sets the buzzer OFF ("DATA" section must be empty).

Terminal Buzzer OFF command disables devices internal sound and LED indication functions while the buzzer control is switched to EPSO2 protocol until devices restart.

8.1. Function B0 - frames

Host:

SOH	'S'	ID1	ID2	'B'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'B' and '0' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'B'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'B' and '0' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

8.2. Function B0 – example

- **HOST** - SOH+'S'+ "01" + "B0"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "B0"+STX + ETX+BCC - means the buzzer was switched to OFF mode and LED's and buzzer control is switched to the EPSO2 protocol

8.3. Function B0 – supports

- RUD-4 v 1.0

9. Function B1. Buzzer ON

Terminal sets the buzzer ON after correct frame format received from Host ("DATA" section must be "255" otherwise it will be ignored – terminal will send back error frame).

Terminal Buzzer ON command disables devices internal sound and LED indication functions while the buzzer control is switched to EPSO2 protocol until devices restart.

9.1. Function B1 - frames

Host:

SOH	'S'	ID1	ID2	'B'	'1'	STX	'2'	'5'	'5'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'B' and '1' – function code
- "DATA" – must be "255"
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'B'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'B' and '1' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

9.2. Function B1 – example

- **HOST** - SOH+'S'+ "01" + "B1"+STX + "255" + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "B1"+STX + "255" + ETX+BCC - means the buzzer was switched to ON mode and LED's and buzzer control is switched to the EPSO2 protocol

9.3. Function B1 – supports

- RUD-4 v 1.0

10.Function C0. Switch Relay OFF

Terminal sets the Relay OFF ("DATA" section must be empty).

10.1. Function C0 - frames

Host:

SOH	'S'	ID1	ID2	'C'	'O'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'C' and 'O' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'C'	'O'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'C' and 'O' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

10.2. Function C0 – example

- **HOST** - SOH+'S'+''01'' + ''C0''+STX + ETX+BCC
TERMINAL - SOH+'s'+''01'' + ''C0''+STX + ETX+BCC - means the Relay was switched OFF

10.3. Function C0 – supports

- RUD-4 v 1.0

11.Function C1. Switch Relay ON

Terminal sets the Relay ON after correct frame format received from Host ("DATA" section must be "255" otherwise it will be ignored – terminal will send back error frame).

11.1. Function C1 - frames

Host:

SOH	'S'	ID1	ID2	'C'	'1'	STX	'2'	'5'	'5'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'C' and '1' – function code
- "DATA" – must be "255"
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'C'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID'1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'C' and '1' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

11.2. Function C1 – example

- **HOST** - SOH+'S'+ "01" + "C1"+STX + "255"+ ETX+BCC
TERMINAL - SOH+'s'+ "01" + "C1"+STX + "255" + ETX+BCC - means the Relay was switched ON

11.3. Function C1 – supports

- RUD-4 v 1.0

12.Function D0. Switch LED Red OFF

Terminal sets LED Red OFF ("DATA" section must be empty).

Terminal LED Red OFF command disables devices internal sound and LED indication functions while the LED control is switched to EPSO2 protocol until devices restart.

12.1. Function D0 - frames

Host:

SOH	'S'	ID1	ID2	'D'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'D' and '0' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'D'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'D' and '0' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

12.2. Function D0 – example

- **HOST** - SOH+'S'+''01'' + ''D0''+STX + ETX+BCC
TERMINAL - SOH+'s'+''01'' + ''D0''+STX + ETX+BCC - means the LED Red was switched to OFF mode and LED's and buzzer control is switched to the EPSO2 protocol

12.3. Function D0 – supports

- RUD-4 v 1.0

13.Function D1. Switch LED Red ON

Terminal sets the LED Red ON after correct frame format received from Host ("DATA" section must be "255" otherwise it will be ignored – terminal will send back error frame).

Terminal LED Red ON command disables devices internal sound and LED indication functions while the LED control is switched to EPSO2 protocol until devices restart.

13.1. Function D1 - frames

Host:

SOH	'S'	ID1	ID2	'D'	'1'	STX	'2'	'5'	'5'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'D' and '1' – function code
- "DATA" – must be "255"
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'D'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID'1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'D' and '1' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

13.2. Function D1 – example

- **HOST** - SOH+'S'+ "01" + "D1"+STX + "255"+ ETX+BCC
TERMINAL - SOH+'s'+ "01" + "D1"+STX + "255" + ETX+BCC - means the LED Red was switched to ON mode and LED's and buzzer control is switched to the EPSO2 protocol

13.3. Function D1 – supports

- RUD-4 v 1.0

14.Function D2. Switch LED Green OFF

Terminal sets LED Green OFF ("DATA" section must be empty).

Terminal LED Green OFF command disables devices internal sound and LED indication functions while the LED control is switched to EPSO2 protocol until devices restart.

14.1. Function D2 - frames

Host:

SOH	'S'	ID1	ID2	'D'	'2'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'D' and '2' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'D'	'2'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'D' and '2' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

14.2. Function D2 – example

- **HOST** - SOH+'S'+ "01" + "D2"+STX + ETX+BCC
TERMINAL - SOH+'s'+ "01" + "D2"+STX + ETX+BCC - means the LED Green was switched to OFF mode and LED's and buzzer control is switched to the EPSO2 protocol

14.3. Function D2 – supports

- RUD-4 v 1.0

15.Function D3. Switch LED Green ON

Terminal sets the LED Green ON after correct frame format received from Host ("DATA" section must be "255" otherwise it will be ignored – terminal will send back error frame).

Terminal LED Green ON command disables devices internal sound and LED indication functions while the LED control is switched to EPSO2 protocol until devices restart.

15.1. Function D3 - frames

Host:

SOH	'S'	ID1	ID2	'D'	'3'	STX	'2'	'5'	'5'	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'D' and '3' – function code
- "DATA" – must be "255"
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'D'	'3'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'D' and '3' – function code,
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

15.2. Function D3 – example

- **HOST** - SOH+'S'+ "01" + "D3"+STX + "255"+ ETX+BCC
TERMINAL - SOH+'s'+ "01" + "D3"+STX + "255" + ETX+BCC - means the LED Green was switched to ON mode and LED's and buzzer control is switched to the EPSO2 protocol

15.3. Function D3 – supports

- RUD-4 v 1.0

16.Function E1. Read signature

The terminal sends back devices signature in the "DATA" section. Signature includes device name and firmware version.

16.1. Function E1 - frames

Host:

SOH	'S'	ID1	ID2	'E'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 'S' – packet type identify the message that comes from the host,
- ID1 = '0' and ID2 = '1' – Terminal ID number (RUD-4 default ID is '01')
- 'E' and '1' – function code
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20)

Terminal (RUD-4 reader example) :

SOH	's'	ID1	ID2	'E'	'1'	DATA	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	------	-----	-----	-----

- SOH = 0x01, STX = 0x02 and ETX = 0x03 – frame control bytes,
- 's' – packet type identify the message that comes from the terminal,
- ID'1 = '0' and ID2 = '1' Terminal ID number (RUD-4 default ID is '01')
- 'E' and '1' – function code,
- DATA – device signature
- BCC – to calculate the frame checksum, take the XOR operation from SOH to ETX and finally take the "OR" operation with 0x20

16.2. Function E1 – example

- **HOST** - SOH+'S'+ "01" + "D3"+STX + "255"+ ETX+BCC
TERMINAL - SOH+'s'+ "01" + "D3"+STX + "RUD-4 v1.0 fv1.0.0.001" + ETX+BCC - device name RUD-4 v1.0 and firmware version fv1.0.0.001

16.3. Function E1 – supports

- RUD-2 v 2.0
- RUD-3 v 1.0
- RUD-3 v 2.0
- RUD-4 v 1.0