

# EPSO Communication Protocol

*Firmware v77.5*

## Introduction

The EPSO protocol is a set of communication functions used to control the special versions of access controllers through the RS485 communication bus. This protocol has been designed to allow for direct control of controller's hardware through external commands called "Functions". The access controllers programmed with EPSO firmware act as pure "terminals", it means they strictly follow commands received from a Host.

Note: The access control logic and rules must be provided by the Host which controls the EPSO controller.

The following access controllers from Roger can be delivered with the special, EPSO firmware:

- PR301
- PR201
- PR311
- PR311-BK

Every unit programmed with this specific firmware is marked with additional "E" character added to the original controller type (e.g. PR311E). The PR controllers programmed with EPSO firmware have the same hardware as its standard (non EPSO) versions.

Note: For technical specification of the EPSO controllers refer to original documentation (manuals) provided with the standard versions of relevant controllers.

## Protocol Description

### **FRAME's FORMAT:**

HEADER					DATA			CHECK	
SOH	PT	ID1	ID2	FC1	FC2	STX	DATA	ETX	BCC
01	Identify	Controller ID		Function code		02	Data	03	Checksum

- SOH, STX, ETX are the control bytes and defined as: SOH=01H, STX=02H, ETX=03H.
- PT (Packet Type) is used to identify the message, "S" means it comes from a Host, and "s" means it comes from the controller.
- ID1 and ID2 specify the address (ID number) of the controller, the range is from "00" to "99" (ASCII coded). The factory new controller is delivered with

address ID=01. Whenever required the factory preprogrammed address can be restored by means of **Memory Reset**.

- FC1 and FC2 are function codes, and are related to the DATA, please see the further part of description.
- BCC is the checksum, from SOH to ETX do “xor” and finally do “or” with 20H.
- Baud rate is fixed: 9600, N, 8, 1.
- Controller answers with min. 2ms delay and only to those frames which are addressed to it.
- There can appear the synchronization's chars (06h) between frames. They have no meanings.

**FUNCTIONS**

Function Code	Procedure
A1	Send back the last read card code
A2	Send back the last PIN code entered
A3	Send the last card read or PIN entered
B0	Switch Buzzer Off
B1	Switch Buzzer On
C0	Switch Output 1 Off
C1	Switch Output 1 On
D0	Switch Output 2 Off
D1	Switch Output 2 On
D4	Switch Output 3 Off
D5	Switch Output 3 On
E0	Send back the primary I/O status
E1	Send back the software version
E3	Set (change) the controller's ID number (address)
E8	Set LEDs
E9	Send back the secondary I/O status

Notes:

“DATA” means message send from the Host to the Controller

“data” means message send from the Controller to the Host

**Function A1: Send back the last card code**

DATA: 1–255 (no meanings)

data: Card code

Host:

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

Controller:

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

After card is read, its code is kept in controller's buffer during next 2 sec. period. After this period buffer is cleared and card code is erased. When the controller has not any card read yet it sends back the STX+ETX message, but without "data". When the controller has read the card, it sends back the message with the card code on "data" position. As soon as "data" is sent back to Host the buffer is cleared and controller returns to reading of the cards.

The "data" consist of the type of a card (1 byte) + card code (16 bytes). The type of the card: "R"- card read on the controller itself, "T"- card read on the external reader connected to the controller. Digits in the card number are: "0" – "9", "A" – "F", e.g. "00000000003EA88F". For **Unique** type cards – first 6 digits are always 0.

Note: The PRxx1 controller can operate with any PRT series reader connected to it through Clock and Data lines. The additional PRT reader must be configured to **RACS Online Mode** address ID=0. The PRT series readers are manufactured by Roger and consist of several various models (for more information about PRT family vis [www.roger.pl](http://www.roger.pl) ).

Example:

Host: SOH + "S12A1" + STX + "42" + ETX + "&amp;".

Controller: SOH + "s12A1" + STX + ETX + 20H, means that no keypad code has been entered yet.

or

Controller: SOH + "s12A1" + STX + "T000000000123456" + ETX + 'u' means that card was read on additional reader connected to controller and the card code is: "000000000123456".

**Function A2: Send back the last PIN**

DATA: 1–255 (no meanings)

data: PIN code (6 bytes max)

Host:

SOH	'S'	ID1	ID2	'A'	'2'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

Controller:

SOH	's'	ID1	ID2	'A'	'2'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

After PIN code is entered, it is kept in the buffer during next 2 sec. period. After this period buffer is cleared and PIN code is erased. If no PIN code is entered yet, controller sends back the STX+ETX message, but not including "data". If the PIN code is entered, controller sends back the message with the PIN code on the "data" position. As soon as the PIN code is sent to Controller, buffer is erased and controller returns to normal procedures.

The code may consist of digits: '0' to '9', 'A'..'F', the key '\*', and must be followed with a '#' char which is interpreted as the end of a PIN code.

Coding:

```

Key [0]      = '0'
Key [1]      = '1'
..
..
..
Key [9]      = '9'
Key [*]      = 'A'
Key [F1]     = 'C'
Key [F2]     = 'D'
    
```

If the empty PIN code is entered (only '#' key is pressed), controller returns 'FFFFFF'. The PIN code buffer is a circular type for 8 chars, but the PIN code maximum length is 6 chars. If more keys are pressed, chars 7 and 8 are ignored and the next keys pressed overlap the first 6 chars.

Example:

Host: SOH + "S02A2" + STX + "30" + ETX + "!".

Controller: SOH + "s02A2" + STX + ETX + 22H means that no PIN code has been entered yet.

Controller: SOH + "s02A2" + STX + "1234" + ETX + "&" means that the PIN code "1234#" has been entered.

**Function A3: Send the last card or PIN code**

DATA: "1" – "255" (ignored)

data: Card code or PIN code

Host:

SOH	'S'	ID1	ID2	'A'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

Controller:

SOH	's'	ID1	ID2	'A'	'3'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

This function combines the "A1" and "A2" functions, so it can returns PIN or Card code. For details see description for commands A1 and A2.

**Function B0: Switch Buzzer OFF**

DATA: None (ignored, do not send)

data: None

Host:

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

Controller:

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

Example:

Host:: SOH + "S08B0" + STX + ETX + ")".

Controller: SOH + "s08B0" + STX + ETX + "(" The buzzer is cleared.

**Function B1: Switch Buzzer ON**

DATA: "1" – "255"

data: "1" – "255"

Host:

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

Controller:

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

"DATA" could not be "0", otherwise it will be ignored. The range of "DATA" is "1" – "255" ("255" means the buzzer is on, till receive the function "B0"). Value of "DATA" is 0.125 sec. per one unit, for example "24" is  $24 \times 0.125 = 3$  sec. The message of "data" is same as "DATA".

Example:

Host: SOH + "S07B1" + STX + "12" + ETX + "\$" where DATA= "12" means the buzzer will be triggered for 1.5 sec. ( $12 \times 0.125 = 1.5$  sec.).

Controller: SOH + "s07B1" + STX + "12" + ETX + "\$". Buzzer is set for 1.5 sek. period

**Function C0: Switch Output 1 off**

DATA: None (ignored, do not send)

data: None

Host:

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

Controller:

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

Example:

Host: SOH + "S08C0" + STX + ETX + "(".

Controller: SOH + "s08C0" + STX + ETX + ")" switches off the Output1.

**Function C": Switch Output 1 on**

DATA: "1" – "255"

data: "1" – "255"

Host:

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

Controller:

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

"DATA" would not be "0", otherwise it will be ignored. The range of "DATA" is "1" – "255" ("255" means it would be on, till moment when controller receives the new

command which will alter the output). Value of "DATA" is 0.125 sec., per one unit, for example "32" is 32 X 0.125 = 4 sec. The message of "data" is same as "DATA".

Example:

Host: SOH + "S07C1" + STX + "12" + ETX + "%" where DATA="12" means the output will be activated for 1.5 sec. (12 X 0,125 = 1.5 sec.).

Controller: SOH + "s07C1" + STX + "12" + ETX + "%" means that Output 1 has been activated for 1.5 sec.

**Function D0: Switch Output 2 off**

DATA: None (ignored, do not send)

data: None

Host:

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

Controller:

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

Example:

Host: SOH + "S08D0" + STX + ETX + "/" clears the Output 2.

Controller: SOH + "s08D0" + STX + ETX + "/" means that Output 2 has been cleared.

**Function D1: Switch Output 2 on**

DATA : "1" – "255"

data : "1" – "255"

Host:

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

Controller:

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

"DATA" would not be "0" otherwise it will be ignored. The range of "DATA" is "1" – "255" ("255" triggers Output 2 for unlimited time, till moment when controller receives the new command which will alter the output). Value of "DATA" is 0.125 sec., per one unit, e.g. "16" is 16 X 0.125 = 2 sec. The message of "data" is same as "DATA".

Example:

Host: SOH + "S07D1" + STX + "12" + ETX + 22H activate the Output 2 for 1.5 sec. (12 X 0.125 + 1.5 sec.).

Controller: SOH + "s07D1" + STX + "12" + ETX + 22H means: that Output 2 has been activated for 1.5 seconds.

**Function D4: Switch Output 3 off**

DATA: None (ignored, do not send)

data : None

Host:

SOH	'S'	ID1	ID2	'D'	'4'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

Controller:

SOH	's'	ID1	ID2	'D'	'4'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----

**Function D5: Switch Output 3 on**

DATA : "1" – "255"

data : "1" – "255"

Host:

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

Controller:

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

"DATA" would not be "0" otherwise it will be ignored. The range of "DATA" is "1" – "255" ("255" triggers Output 2 for unlimited time, till moment when controller receive the new command which will alter the output). Value of "DATA" is 0.125 sec., per one unit, e.g. "16" is 16 X 0.125 = 2 sec. The message of "data" is same as "DATA".

**Function E0: Send back the primary I/O status**

DATA: None (ignored do not send)

data: I/O Status

Host:

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

Controller:

SOH	's'	ID1	ID2	'E'	'0'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

There are two inputs: Input, Input 2 and there outputs: Buzzer, Output 1, Output 2. The first byte of "data" represents the status of inputs while the second byte represents a status of outputs.

<b>Primary I/O status (two bytes)</b>				
<b>Input status:</b>	<b>First byte</b>	<b>Reserved</b>	<b>Input 1</b>	<b>Input 2</b>
	0	Ignored	OFF	OFF
	1	Ignored	OFF	OFF
	2	Ignored	ON	OFF
	3	Ignored	ON	OFF
	4	Ignored	OFF	ON
	5	Ignored	OFF	ON
	6	Ignored	ON	ON
	7	Ignored	ON	ON

Input status:	Second byte	Buzzer	Output 1	Output 2
	0	OFF	OFF	OFF
	1	ON	OFF	OFF
	2	OFF	ON	OFF
	3	ON	ON	OFF
	4	OFF	OFF	ON
	5	ON	OFF	ON
	6	OFF	ON	ON
	7	ON	ON	ON

Example:

Host: SOH + "S07E0" + STX + ETX + " ! ".

Controller: SOH + "s07E0" + STX + "25" + ETX + " & " means that Input 1 is on (triggered), BUZZER and Output 2 are also ON (both set active).

**Function E1: Send back the controller's version**

DATA: None (ignored, do not send)

data: Version

Host:

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

Controller:

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

Use this function order to receive the version of the access controller.

Example:

Host: SOH + "S07E1" + STX + ETX + " "

Controller: SOH + "s07E1" + STX + "11" + ETX + " x " what means that the software version is 1.1.

**Function E3: Set the controller's ID number (address)**

DATA: ID (2 bytes)

data: ID (2 bytes)

Host:

SOH	'S'	ID1	ID2	'E'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

Controller:

SOH	's'	ID1	ID2	'E'	'3'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

Use this function to set the new reader ID. DATA is 2 byte: '00' to '99'. The new ID is DATA: '00' to '99' Controller responses (answers) the message with ID1 and ID2 which are the new ID

Example:

Host: SOH + "S07E3" + STX + "02" + ETX + BCC



Controller: SOH + "s02E3" + STX + "02" + ETX + BCC

**Function E8: Set LEDs**

DATA: ID (1 byte)

data: ID (1 byte)





Host:

SOH	'S'	ID1	ID2	'E'	'8'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----





Controller:

SOH	's'	ID1	ID2	'E'	'8'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

By default all three LEDs have predefined functions listed below:

- LED ARMED  (red): *Power On*
- LED DISARMED  (green): *No default functions*
- LED OPEN  (green): *Communication with a Host is OK*
- LED SYSTEM  (orange): *Card or PIN entered*

With the first E8 control command send from a host they became controlled externally by the Host. There are following parameters available for E8 command:

DATA	LED DISARMED  Green	LED SYSTEM  Orange	LED OPEN  Green	LED ARMED  Red
'0'	OFF	OFF	OFF	OFF
'1'	OFF	ON	OFF	OFF
'2'	OFF	OFF	ON	OFF
'3'	OFF	ON	ON	OFF
'4'	OFF	OFF	OFF	ON
'5'	OFF	ON	OFF	ON
'6'	OFF	OFF	ON	ON
'7'	OFF	ON	ON	ON
'8'	ON	OFF	OFF	OFF
'9'	ON	ON	OFF	OFF
'10'	ON	OFF	ON	OFF
'11'	ON	ON	ON	OFF
'12'	ON	OFF	OFF	ON
'13'	ON	ON	OFF	ON
'14'	ON	OFF	ON	ON
'15'	ON	ON	ON	ON
16 – 255	<i>The values between 16-255 switch LEDs to default functions</i>			



Note: In the PR301/201 the LEDs: ARMED and DIARMED are realized on a single, dual color LED which may lit in red, green or orange when both LEDs are set on. In the PR311/PR311-BK LED ARMED and LED DISARMED are implemented separately by individual LEDs.

**Function E9: Send back the secondary I/O status**

DATA: None (ignored, do not send)

data: I/O Status

Host:

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

Controller:

SOH	's'	ID1	ID2	'E'	'0'	STX	data	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	------	-----	-----

The first byte of “data” represents the status of inputs while the second byte represents the status of outputs.

<b>Secondary I/O status (two bytes)</b>		
<b>Input status</b>	<b>The first byte</b>	<b>INPUT 3</b>
	0	OFF
	1	ON
<b>Output status</b>	<b>The second byte</b>	<b>OUTPUT 3</b>
	0	OFF
	1	ON

## Restoring Factory Default ID Address – Memory Reset

As mentioned earlier the **Memory Reset** procedure resets current contents of controller's memory and restores factory defaults settings. In PR access controllers which are programmed with EPSO firmware the **Memory Rest** is used only to set controller's address to ID=01.

### **Memory Reset Procedure**

In order to perform **Memory Reset** execute following steps:

- Power down the unit
- Connect CLK (Clock) to DTA (data) lines
- Restore power, controller will generate a continues sound
- Remove connection between CLK and DTA lines
- End

After last step controller will restore address ID=01 and is ready for operation.

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