Roger Access Control System

Operating Manual

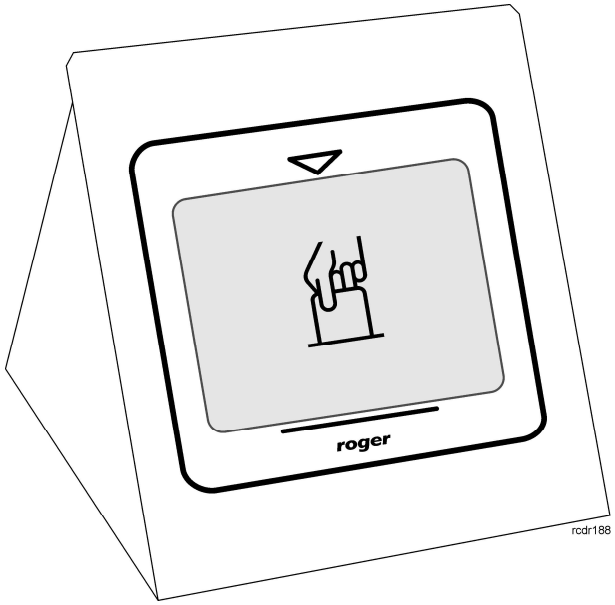
RUD-4 v1.0

RUD-4-DES v1.0

Firmware: v1.0.x

Hardware v1.0

Document version: Rev. B



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1. DESCRIPTION AND SPECIFICATION

1.1. General information

RUD-4 is a desktop reader and writer for 13.56MHz ISO/IEC 14443A MIFARE® Classic and allows to read a EM 125kHz standard proximity cards, it's supplied directly from serial USB port which is also used for communication with the PC. The device has a stable metal desktop stand with a card holder and is available in two versions, a basic RUD-4 v1 version dedicated for MIFARE® Classic and EM 125kHz cards and professional RUD-4-DES v1 with the same functionality as basic version plus MIFARE® DESFire support.
The RUD-4 can be used as card enroll reader for access control system or any other application which requires card reader. Card can be enrolled straight from the **PR Master** (version 4.4.6 or above is required), **VISO** 1.x or using dedicated **Roger MiniReader** application (version 1.2 or above required). RUD-4 can also provide a MIFARE® transponder programmer functionality, but in such cases **RogerVDM** (1.2.4 or above required) should be used. Roger company offers SDK programming package that enables a programmer to develop customized applications for a specific requirements.

1.2. Features

- MIFARE® Classic: Ultralight, 1k i 4k
- MIFARE® DESFire* EV1
- EM 125kHz: compatible with EM 4100/4102 standard
- Read number for MIFARE®: CSN, SSN, MSN, DESFire File*
- Write number for MIFARE®:: SSN, MSN, DESFire File*
- Read number for EM 125kHz: CSN
- Reading distance: up to 3 cm for MIFARE® Classic, up to 2 cm for MIFARE® DESFire*, up to 4 cm for EM 125kHz
- Communication interface: USB-HID
- Dual color LED bar indicator
- Acoustic transducer
- Relay 1A/30V
- Configuration from PC (RogerVDM software)
- USB cable
- Metal desktop stand with card holder
- For indoor use only
- SDK programming package
- CE

* RUD-4-DES v1 version only

1.3. Proximity Cards

RUD-4 is factory set for MIFARE® and EM 125kHz chip serial number (CSN – Chip Serial Number) reading. For higher security level MIFARE® reading rules can be changed to handle programmable secure sector numbers (PCN – Programmable Card Number) in such case a management tool **RogerVDM** must be used for configuration. MIFARE® configuration doesn't affect the EM 125KHz reading rules which are fixed.

1.4. MIFARE® card numbers

Reader MIFARE® Returned Card Number (RCN) is a combination of a Chip Serial Number (CSN) and Programmable Card Number (PCN) created on the basis of following formula, CSN number of bytes and PCN number length that results from flexible defined PCN first byte position (MSB) and PCN last byte position (LSB) can be adjusted according user requirements.

RCN	
CSN	PCN

Example:

Reader configuration:
CSN number of bytes: 4
PCN MSB: 8
PCN LSB: 10

Chip Serial Number CSN (HEX) – 7 bytes						
C1	C2	C3	C4	C5	C6	C7

Programmed Card Number PCN (HEX) – 16 bytes															
AA	BB	CC	DD	EE	FF	00	11	22	33	44	55	66	77	88	99

Returned Card Number RCN (HEX) – 7 bytes						
CSN				PCN		
C4	C5	C6	C7	22	33	44

Note:

1. If only CSN is required the reader configuration parameter **Card Type** must be set to [0] Non, **CSN number of bytes** can be set according user requirements

2. If only PCN is required the reader configuration parameter **Card Type** must be set to [1] SSN or [2] MAD, **CSN number of bytes** must be set to 0

3. RCN can't be longer than 16 bytes, if programmed combination CSN+PCN goes outside this value the reader will send RCN 16 last bytes only

2. WORKING WITH PC PROGRAMS

2.1. Roger MiniReader

The **Roger MiniReader 1.2** displays the list of available USB readers connected to the PC. In order to read a single card, you need to select the Read single card command, and then put a card close to the reader. When the code is read, it automatically appears in the Card codes window. The fact of card reading is signaled acoustically however this feature can be possibly disabled using relevant program's options (see: Options). If you use the Read multiple cards command, program will read cards in a loop and insert them to the Card codes window. In order to interrupt the reading process, you need to use the Stop reading command. The cards read can automatically be copied to the Clipboard (Tools > Options > Copy card code to clipboard). By using it, the card codes can be moved to other applications or saved to a text file (Tools > Options > Append card code to file).

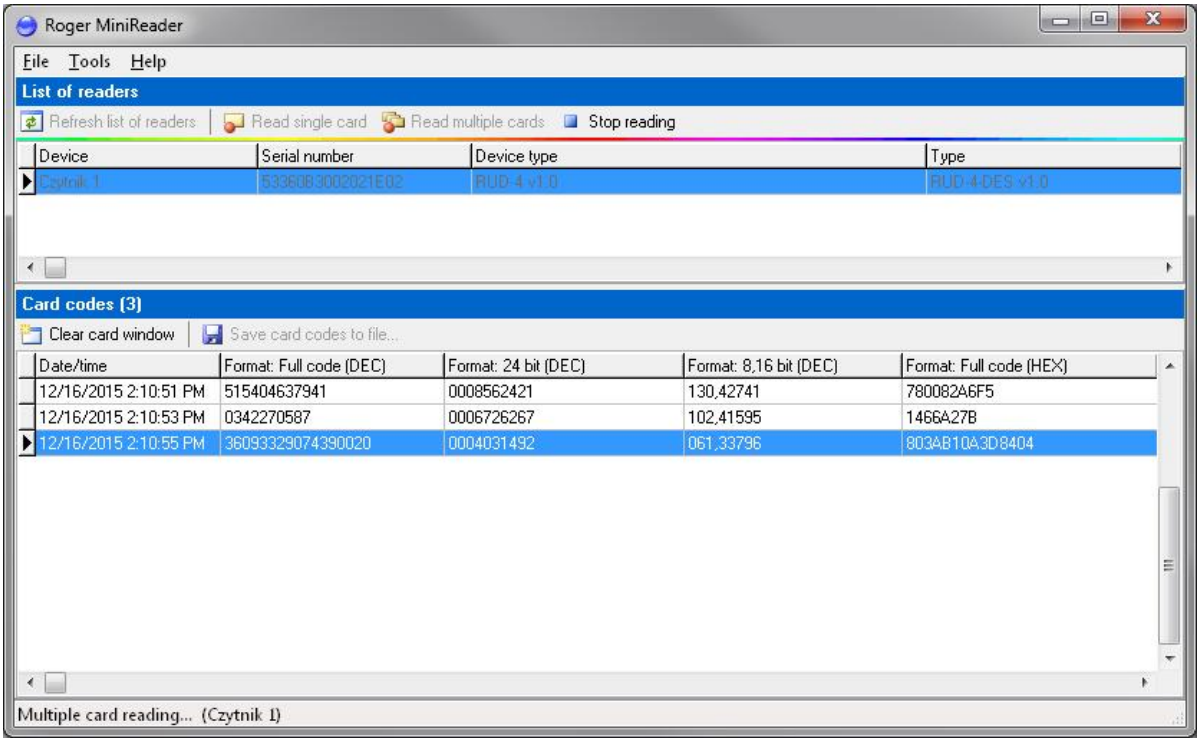


Fig. 1 Roger MiniReader main window.

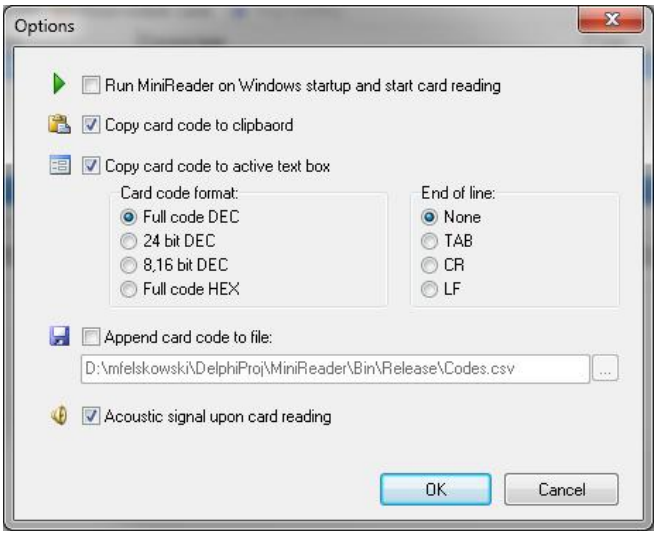


Fig. 2 Configuration window.

2.2. RACS4 PR Master and RACS5 VISO systems

RUD-4 is well suited for RACS systems and can be used as a administrator reader for entering new card numbers into access control applications. From the list of available readers for **PR Master 4.4.x** or **VISO 1.x** control program choose RUD-4 and follow application reading steps.

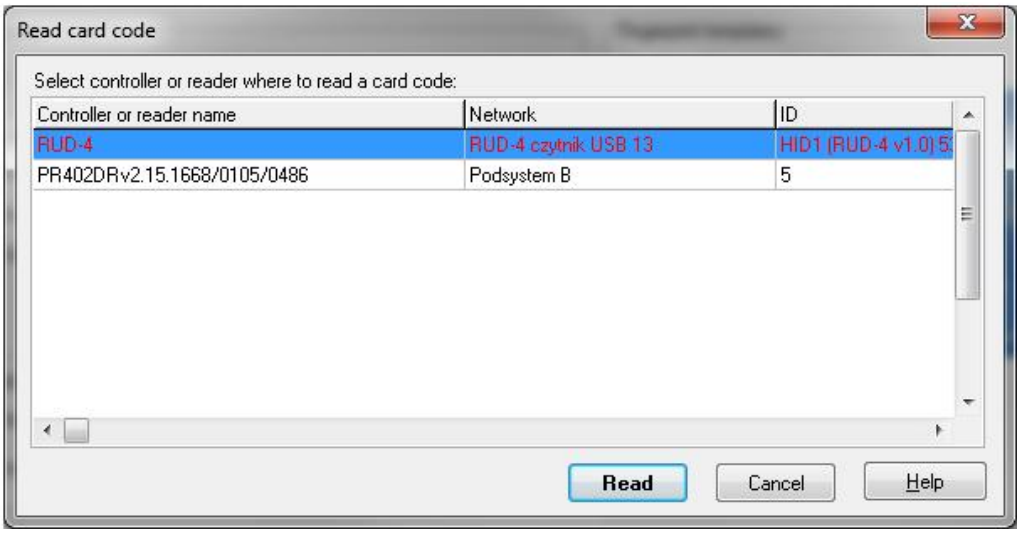


Fig. 3 PR Master reader selection.

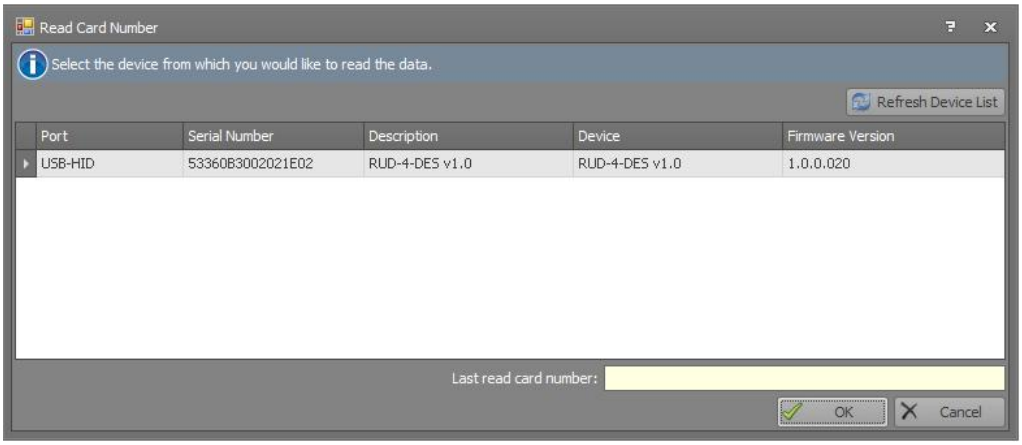


Fig. 4 VISO reader selection.

2.3. third-party software

Support for RUD-4 reader can also be implemented in other programs, in such case, the logic of reader handling depends completely on the program's author. For integration purposes a RUD-4 software SDK has been released which gives the abilities to read or write proximity transponders also to control device internal LED indicators, buzzer and relay. SDK package contains DLL files dedicated for USB HID class RUD-4 device, .NET software examples and programmer documentation.

3. DEVICE CONFIGURATION

MIFARE® card number read and write rules are configurable with **RogerVDM** (Windows) management tool that can be downloaded from Roger website www.roger.pl.

3.1. RogerVDM configuration tool

For device configuration connect it to PC USB port and run **RogerVDM** software.
From the top menu list select Device > New than choose Your reader version and set USB communication channel for USB-HID class device, finally press Connect button.

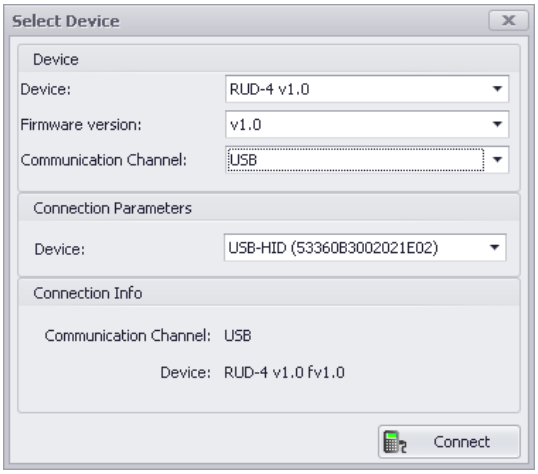


Fig. 5 Device select window.

RUD-4 will be initialized for communication, device configuration window will appear automatically:

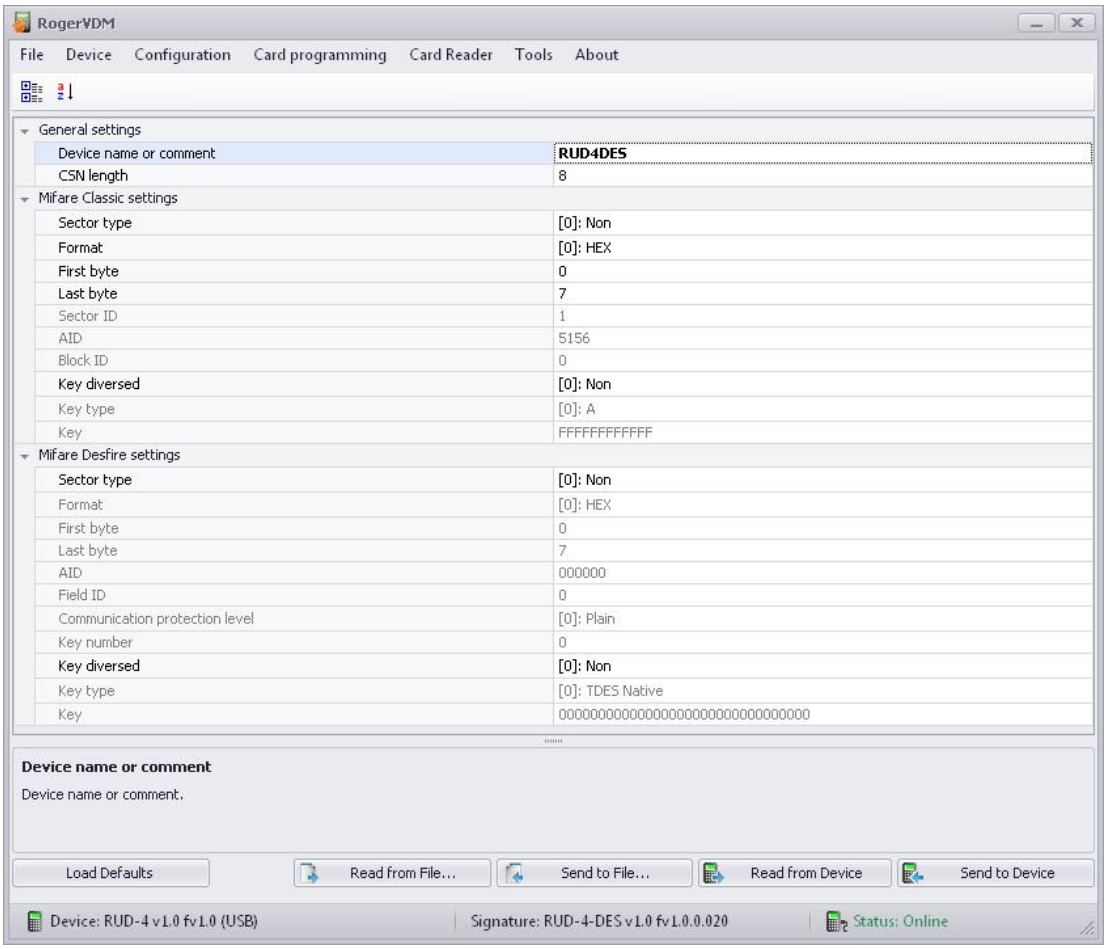


Fig.6 Device configuration window.

Above window contains list of device configuration parameters which are explained in Table1.

Note: reader parameter configuration applies to both write and read card number operation. Configuration modifications must be confirmed with Send to device button to take effect.

Table 1: Device configuration parameter list		
Parameter	**Value**	**Description**
General		
Device name	16 ASCII characters	Device description which can be filled with any comment by installer
CSN Number of Bytes	0..16	The parameter specifies how many bytes of read only Chip Serial Number (CSN) is used for Returned Card Number (RCN).
Mifare Classic Settings		
Card Type	0 – NONE 1 – SSN 2 – MAD	When NON is selected then RCN includes only CSN number. When SSN or MAD is selected then it is possible to use administrator defined RCN. It is also possible to define RCN consisting partially of CSN and SSN or MAD.
Format	0 – BIN 1 – HEX ASCII	Card number format. When BIN is selected then bytes from card correspond to RCN number. When HEX ASCII is selected then bytes from card correspond to RCN in ASCII hexadecimal format.
LSB	0..15	The location of SSN or MAD first byte.
MSB	0..15	The location of SSN or MAD last byte.
Sector ID	0..39	Sector number with SSN. For MAD this setting is disabled.
AID	0000 – FFFFF	AID number in MAD sector which defines sector with RCN. For SSN this setting is disabled. Default: 5156 (Roger AID).
Block ID	0..14	Block number in the sector with SSN or MAD. For sector 0..31 available block is 0..2, for sector 32..39 available block is 0..14.
Key Type	0 – A 1 – B 2 – Roger	Type of key used for reading SSN or MAD.
Key	000000000000 – FFFFFFFFFFFF	Six bytes key used for reading SSN or MAD.
Mifare DESFire Settings (RUD-4-DES v1 version only)		
Card Type	0 – NONE 1 – DESFire File	When NON is selected then RCN includes only CSN number. When DESFire File is selected then it is possible to use administrator defined RCN stored in DESFire File. It is also possible to define RCN consisting partially of CSN and DESFire File number.
Format	0 – BIN 1 – HEX ASCII	Card number format. When BIN is selected then bytes from card correspond to RCN number. When HEX ASCII is selected then bytes from card correspond to RCN in ASCII hexadecimal format.
LSB	0..15	The location of DESFire File number first byte.
MSB	0..15	The location of DESFire File number last byte.
AID	0000..FFFFF	Application ID number with DESFire File. Mifare DESFire card can handle up to 28 AID.

Field ID	0..32	Location of a DESFire File with PCN number: for DESFire EV0 available number 0 to 16 for DESFire EV1 available number 0 to 32
Communication Protection Level	0 – Plain 1 – Data Authentication by MAC 2 – Full Encryption	Specifies how to encrypt communication between the card and the reader.
Key Number	0..13	Application key number used for DESFire File access.
Key Type	0 – TDES Crypto DESFire Native Mode 1 – TDES Crypto Standard Mode 2 – 3KTDES Crypto 3 – AES128 Crypto	Crypto used for DESFire File access.
Key	00000000000000000000000000000000..FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	Access key for DESFire File: 3KTDES key 24 bytes TDES and AES key 16 bytes

3.2. Card number write and read operation

Card programming window is dedicated for PCN number programming operation according rules setup from program Configuration window. Required PCN must be entered in the appropriate data format DEC or HEX in the Card Code window box and confirmed with Save button, for MIFARE® Classic use Save Classic Card Code button and for MIFARE® DESFire use Save Desfire Card Code button.

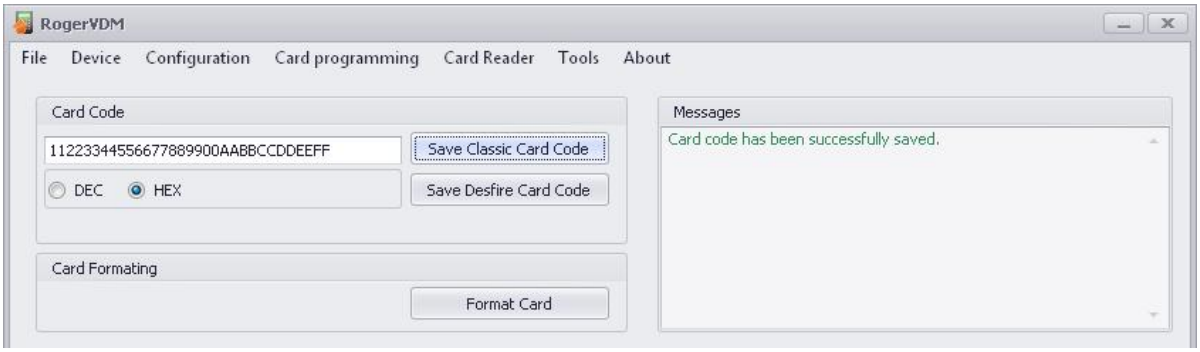


Fig. 7 Card programming window.

Write operation result will be confirmed with adequate message in the Message box. RCN numer can be read in Card Reader window.

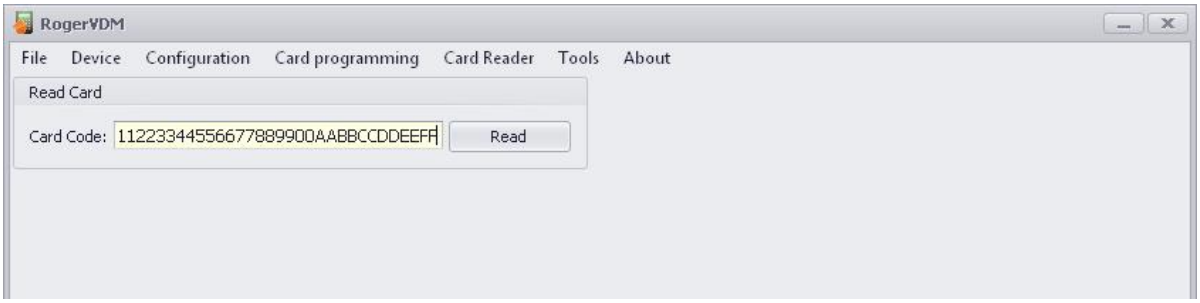


Fig. 8 Card reader window.

4. DEVICE INSTALLATION

RUD-4 is a USB-HID (Human Interface Device Class) device and it's supported by 32bit and 64bit versions of Windows 7, Windows VISTA and Windows XP. RUD-4 doesn't require dedicated drivers, it's handled by OS generic USB HID driver. You may connect the device directly to the PC USB port, driver installation will start automatically.

Note: You should not disconnect a reader while the software working with it is being run. Violating this rule usually causes that the application controlling the reader may hang up and you will have to terminate it by using Windows Task Manager.

Programs provided by Roger (**PR Master**, **VISO**, **Roger MiniReader** and **RogerVDM**) automatically detect that the RUD-4 reader and present it on the list of available devices.

The RUD-4 reader should be connected to the PCs USB port with delivered USB A-B cable, optionally it can be connected to computer by other USB cable of a length not exceeding 5 meters. However any modifications of original USB cables are prohibited. The only acceptable way of prolonging USB cables is by using original factory-made extension cables.

RUD-4 has a NO/NC relay which input terminals are located inside the reader, and can be accessed only after front panel removal based on disassembly principle shown in Fig 10. Relay wires should be carry through the case opening into the metal stand and connected according to relay parameters and user application requirements.

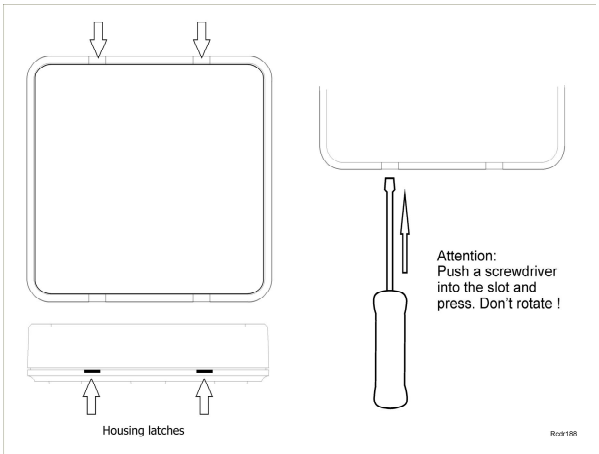


Fig. 9 Front panel disassembly principle.

5. FIRMWARE UPDATE

Firmware update can be performed with Roger firmware update tool **RogerISP** v4.3.6. Before beginning the firmware update process You need to download adequate for Your device firmware file from manufacturer's website www.roger.pl and save it to known disk location. Close all programs associated with updated reader and run **RogerISP** tool. Choose Your reader from the list and put appropriate location of the firmware *.bin file, then You can push the "Program" button to start update, follow the instructions to end this process correctly.

Warning: It is strongly recommended to act in accordance with program instructions, waiver of required actions connected with violations of the update rules can damage Your device. Note that firmware update process is done entirely at your own risk.

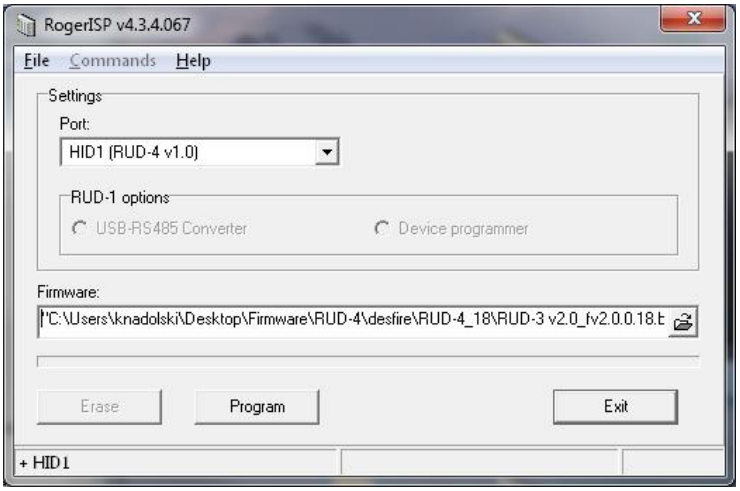


Fig. 10 Firmware update with RogerISP.

6. TECHNICAL DATA

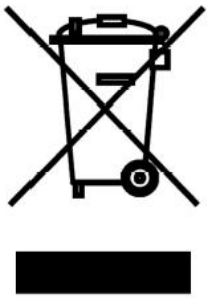
Table 3 Technical Data	
Power supply	5 VDC directly from the USB port
Average current consumption	80 mA
Cards	- 13.56MHz ISO/IEC 14443A MIFARE® Classic and DESFire* - EM 125kHz, EM 4100/4102 compatible
Reading distance	- up to 3 cm for MIFARE® Classic cards - up to 2 cm for MIFARE® DESFire* cards - up to 4 cm for EM 125kHz cards (while in an optimal relative location to the reader)
Reading time	~ 200 msec
Relay	1A/30V
Working temperature range	+5...+45º C
Relative humidity	0 – 95% (non-condensing)
Dimensions	11 x 10.5 x 14 mm
Weight	~ 640g
* RUD-4-DES v1 version only	

7. ORDERING INFORMATION

Table 4 Ordering information	
RUD-4 v1	The reader together with a USB cable
RUD-4-DES v1	The reader together with a USB cable

8. PRODUCT HISTORY

Table 5 Product history			
Product version	Firmware	Date	Description
RUD-4 v1	Fv 1.00	15/12/2015	First commercial product version.
RUD-4-DES v1	Fv 1.00	15/12/2015	First commercial product version.



Such symbol on the product or its package means that the product should not be thrown away together with other wastes, because it may cause negative effects to an environment and humans health. User is responsible for delivering used equipment to the alloted location for gathering used electrical and electronic devices. Detailed information on recycling can be found at relevant local authorities, in a disposing company or in a place, where the product was bought. Separate gathering and recycling of such wastes contributes to natural resources protection and is safe for humans health and for natural environment. The equipment's weight is shown in the guide.

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