Roger Access Control System

MCT86M-IO-HR-CH Operating Manual

Product version: 1.0

Firmware version: 1.1.18 or newer

Document version: Rev.D

CE

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1. DESIGN AND APPLICATION

The MCT86M-IO-CH-HR is an access terminal with card holder dedicated to RACS 5 system. The device enables identification of users by 13,56 MHz MIFARE® Ultralight/Classic/Plus/DESFire proximity cards and it is generally dedicated to hotel applications. The main function of the terminal is to disable electric supply of the room when guest is absent and to control such hotel signalisations as Luggage Service, Make Up Room, Cafeteria and Do Not Disturb by means of touch function keys. The device is connected to access controller through RS485 interface.

Note: The application of RACS 5 system in hotels is explained in AN033 application note which is available at www.roger.pl.

Characteristics

- RACS 5 system access terminal with card holder
- 13.56 MHz MIFARE Ultralight/Classic/Plus/DESFire proximity cards
- LED indicator
- Buzzer
- 4 function keys with LED indicators
- 3 parametric (EOL) inputs
- 2 transistor outputs
- 1 relay output
- RS485 interface
- Tamper protection
- Screw terminals

Power supply

The terminal requires power supply voltage in range of 11-15VDC. It can be supplied from MCX2D/MCX4D expander of MC16-PAC-KIT, from MC16 access controller (e.g. TML output) or from dedicated power supply unit. The supply wire diameter must be selected in such way that the voltage drop between supply output and the device would be lower than 1V. The proper wire diameter is especially critical when device is located in long distance from the supply source. In such a case the use of dedicated power supply unit located close to the device should be considered. When separate power supply unit is used then its minus should be connected to controller's GND by means of signal wire with any diameter. It is recommended to use UTP cable for connection of device to controller. The table below shows maximal UTP cable lengths in relation to the number of wires used for power supply.

Table 1. Power supply cabling

Number of UTP wire pairs for power supply	Maximal length of power supply cable
1	150m
2	300m
3	450m
4	600m

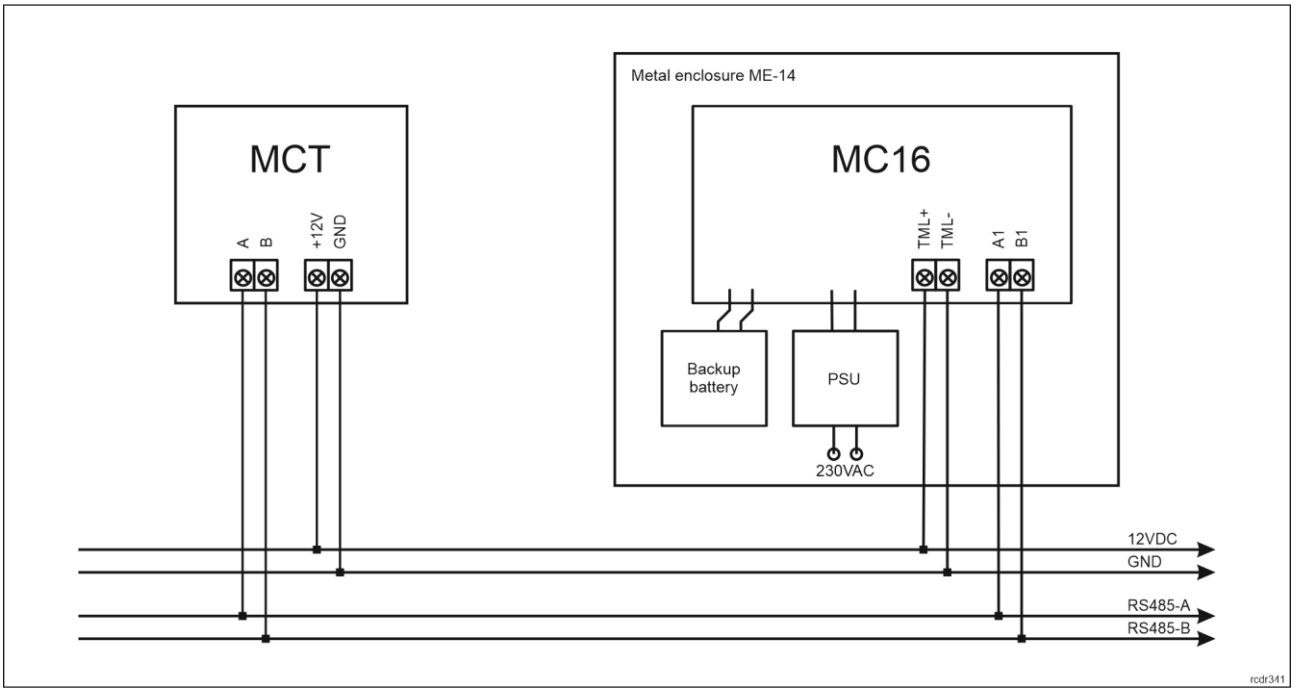


Fig. 1 MCT supply from MC16 access controller

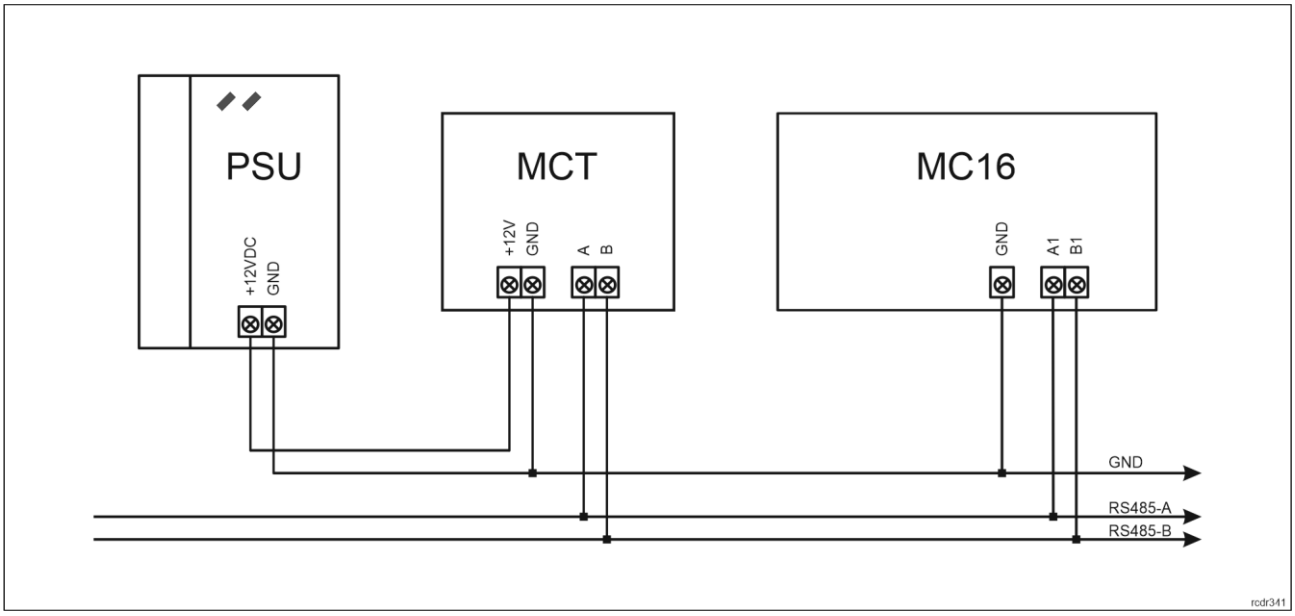


Fig. 2 MCT supply from dedicated power supply unit

RS485 bus

The communication with MC16 access controller is provided with RS485 bus which can encompass up to 16 devices of RACS 5 system, each with unique address in range of 100-115. The bus topology can be freely arranged as star, tree or any combination of them except for loop. The matching resistors (terminators) connected at the ends of transmitting lines are not required. In most cases communication works with any cable type (standard telephone cable, shielded or unshielded twisted pair etc.) but the recommended cable is unshielded twisted pair (U/UTP cat.5). Shielded cables should be limited to installations subject to strong electromagnetic interferences. The RS485 communication standard used in the RACS 5 system guarantees proper communication in a distance of up to 1200 meters as well as high resistance to interferences.

Note: Do not use more than single pair in UTP cable for RS485 communication bus.

Function keys

The terminal is equipped with four touch function keys. They are mainly dedicated to control such hotel signalisations as Luggage Service, Make Up Room, Cafeteria, Do Not Disturb but they can be alternatively assigned with other functions within high level configuration (VISO). Within low level configuration (VISO v2 or RogerVDM) of the terminal it is possible configure if terminal distinguishes short and long key pressings. Consequently each type of key press can be assigned with different function.

LED indicators

The terminal is equipped with bicolour (red/green) LED indicator which is used to signal presence of authorised card in card holder and it can be additionally programmed with other available functions within high level configuration (VISO). The indicator includes two sets of LEDs which are represented in VISO management software as two individual outputs: LED CARD ABSENT (red) and LED CARD PRESENT (green).
The terminal is also equipped with four red LED indicators at four function keys. These four LED indicators can be used to confirm key pressing and they are programmed within high level configuration (VISO) on the level of Access Point in the same way as other RACS 5 outputs.

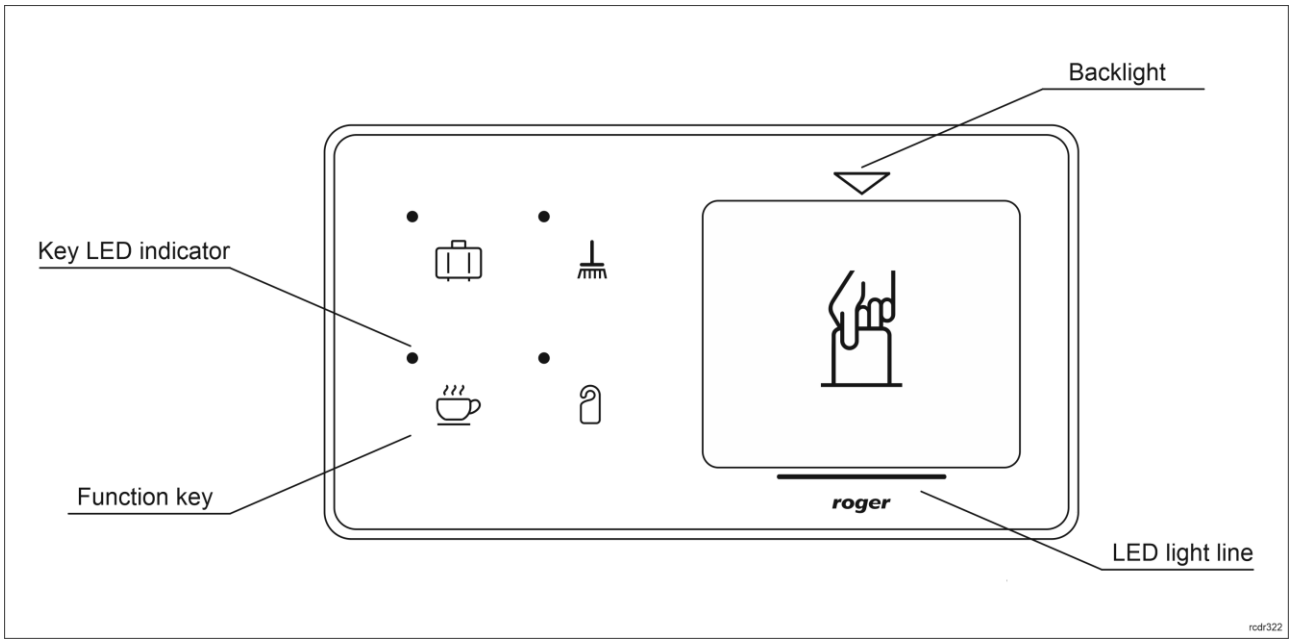


Fig. 3 Indicators LED line

Note: Synchronic pulsing of LED indicator signifies lost communication with MC16 controller.

Buzzer

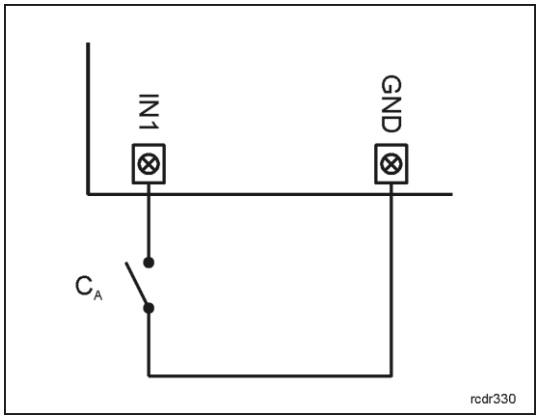
The terminal is equipped with buzzer which is used to signal integral functions and it can be additionally programmed with other available functions within high level configuration (VISO).

Inputs

The terminal offers 3 general purpose parametric inputs of NO, NC, 3EOL/DW/NO and 3EOL/DW/NC type and 1 input internally connected to tamper contact. Input types and electric parameters such as response time and parametric resistors are defined within low level configuration (VISO v2 or RogerVDM). Input functions are assigned within high level configuration (VISO). Multiple functions can be assigned to the same input at the same time.

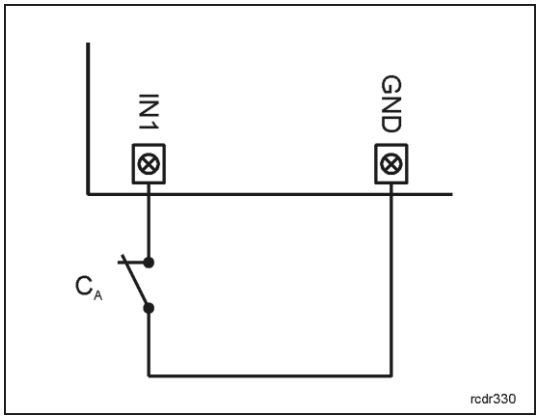
Table 1. Input types

NO input



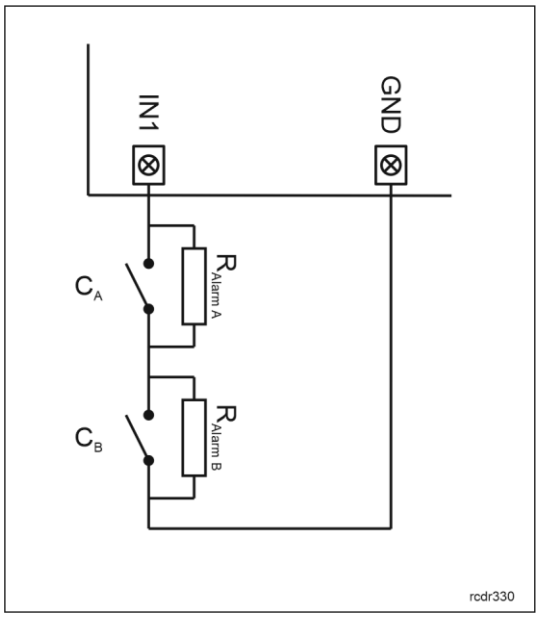
NO input can be in normal or in triggered state. In normal state C_A contacts are opened. Input triggering is caused by C_A contacts closing.

NC input



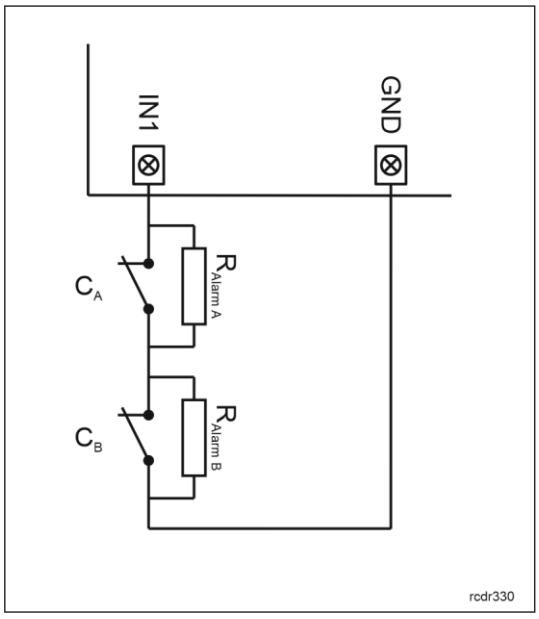
NC input can be in normal or in triggered state. In normal state C_A contacts are closed. Input triggering is caused by C_A contacts opening.

3EOL/DW/NO input



3EOL/DW/NO input is operated in such way that C_A contacts closing is interpreted as triggering of the first input while C_B closing is interpreted as triggering of the second input. In VISO software DW input type is represented by two independent inputs. Each can be used for different purpose and assigned with different function.

3EOL/DW/NC input



3EOL/DW/NC input is operated in such way that C_A contacts opening is interpreted as triggering of the first input while C_B opening is interpreted as triggering of the second input. In VISO software DW input type is represented by two independent inputs. Each can be used for different purpose and assigned with different function.

Parametric resistors

The same values of parametric resistors are used for all inputs i.e. 1kΩ; 1,2kΩ; 1,5kΩ; 1,8kΩ; 2,2kΩ; 2,7kΩ; 3,3kΩ; 3,9kΩ; 4,7kΩ; 5,6kΩ; 6,8kΩ; 8,2kΩ; 10kΩ; 12kΩ. In case of 3EOL/DW (Double Wiring) input type, Alarm A resistor defines a value of resistor used to detect triggering of the first input while Alarm B resistor defines a value of resistor used to detect triggering of the second input. Alarm A resistor value must differ from value of Alarm B resistor at least by three positions in the list above. Total resistance of wire used to connect contacts to input should not exceed 100 Ω. Default values of parametric resistors:

- Alarm A = 2,2 kΩ
- Alarm B = 5,6 kΩ

Response time

Response time parameter defines minimal impulse time on the input which triggers the input. Each input can be configured individually in range of 50 to 5000 ms within low level configuration (VISO v2 or RogerVDM).

Tamper detector

Built-in tamper (sabotage) detector enables detection of unauthorized opening of device's enclosure as well as detachment of the enclosure from wall. The detector is internally connected to the terminal's input. It does not require low level configuration (VISO v2 or RogerVDM) or any additional installation arrangements but it is essential to mount front panel in such way as the tamper detector (fig. 5) would firmly press the back panel. The detector requires high level configuration which consists in assignment of the function *[133] Tamper Toggle o*n the level of a *Main Board* of a controller in VISO software navigation tree.

Outputs

The terminal offers 2 transistor open collector type outputs (15V/150mA rated) and 1 relay output with NO/NC contacts (30V/1.5A DC/AC rated). Electric parameters such as polarity are configured within low level configuration (VISO v2 or RogerVDM). Function are assigned to outputs within high level configuration (VISO). Multiple functions with different priorities can be assigned to the same output at the same time.

Identification

By default the terminal reads serial numbers (CSN) of MIFARE cards but it is possible to program cards with own numbers (PCN) in selected and encrypted sectors of card memory. The use of PCN prevents card cloning and consequently it significantly increases security in the system. More information on MIFARE card programming is given in AN024 application note which is available at www.roger.pl.

The technical characteristics of the device are guaranteed for RFID cards supplied by Roger. Cards from other sources may be used, but they are not covered by the manufactures warranty. Before deciding to use specific Roger products with third-party contactless cards, it is recommended to conduct tests that will confirm satisfactory operation with the specific Roger device and software in which it operates.

2. INSTALLATION

Table 3. Screw terminals

Name	Description
IO2	OUT2 output line
IO1	OUT1 output line
IN3	IN3 input line
IN2	IN2 input line
IN1	IN1 input line
NO	REL1 relay normally opened contact
NC	REL1 relay normally closed contact
COM	REL1 relay common contact
B	RS485 bus, line B
A	RS485 bus, line A
GND	Ground
+12V	12VDC power supply

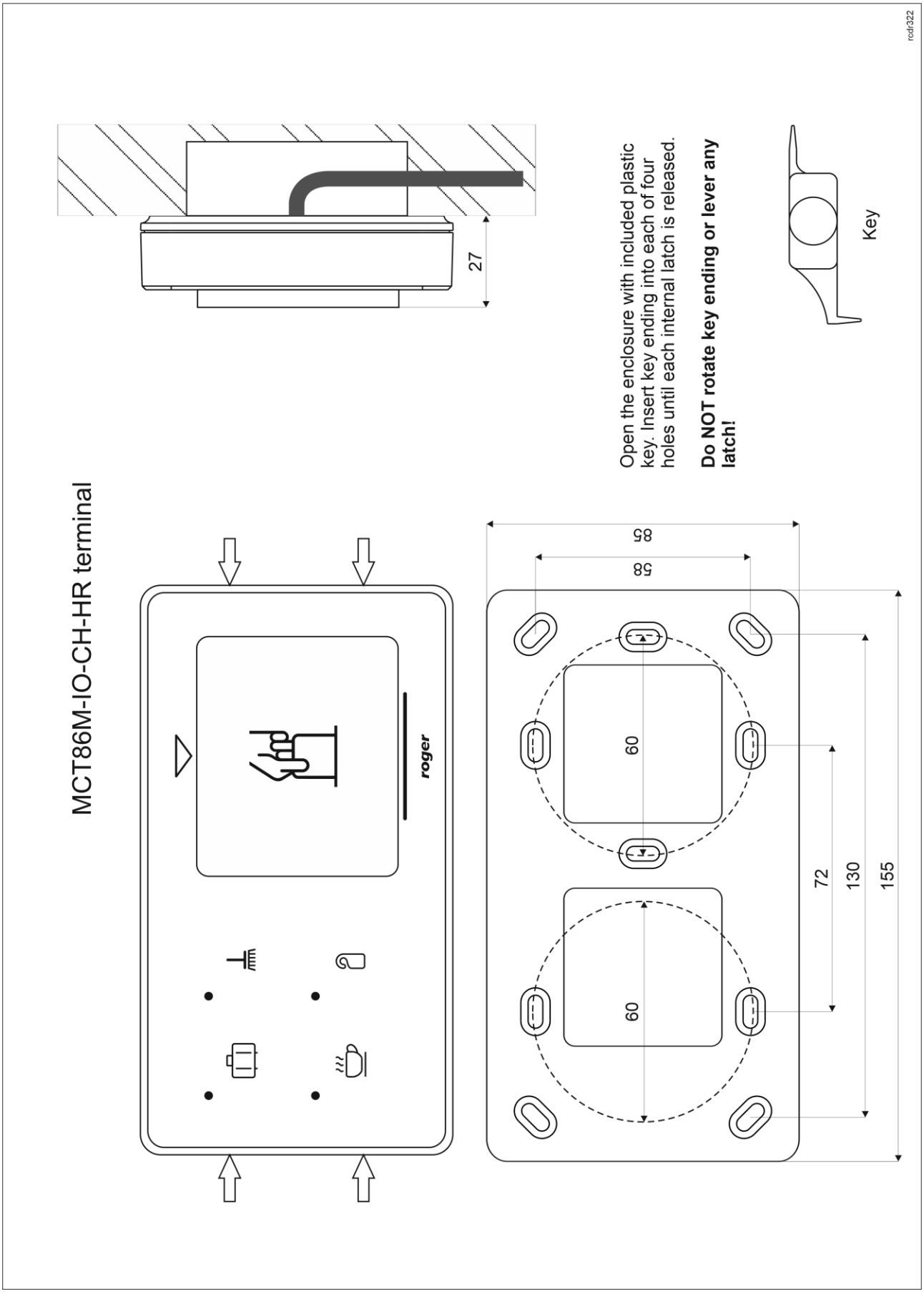


Fig. 4 MCT86-IO-CH-HR installation

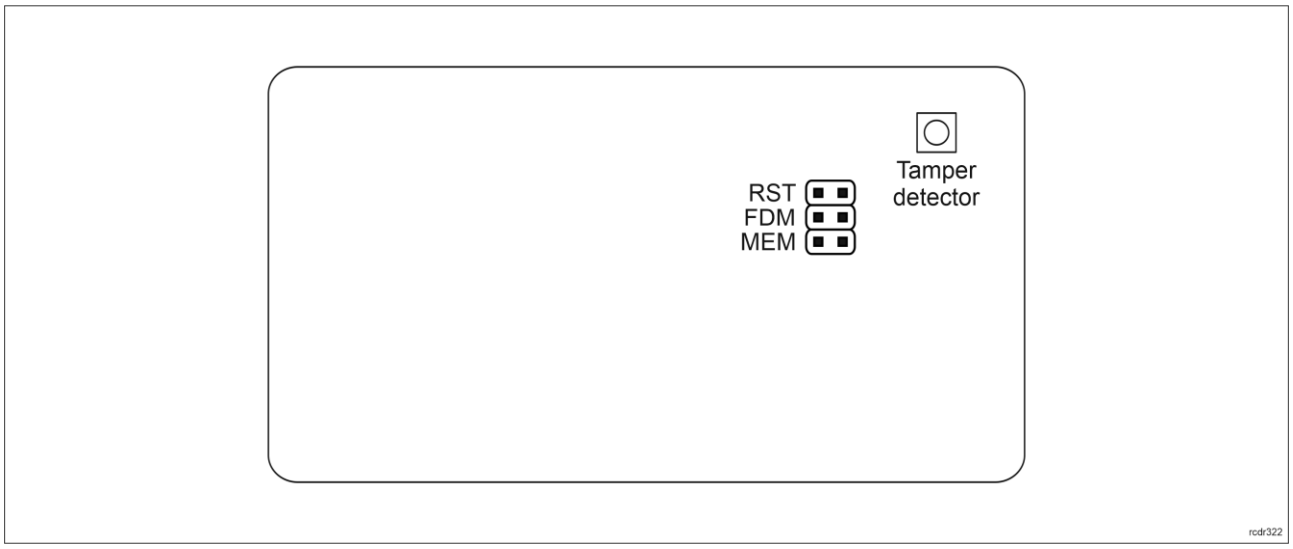


Fig. 5 Programming jumpers

Installation guidelines

- The terminal should be mounted on a vertical structure (wall) away from sources of heat and moisture.
- Front panel should be attached in such way as the tamper detector (fig. 5) would firmly press the back panel.
- All electrical connections should be done with disconnected power supply.
- If the terminal and controller are not supplied from the same PSU then GND terminals of both devices must be connected with any wire.
- Device can be cleaned by means of wet cloth and mild detergent without abrasive components. In particular do not clean with alcohols, solvents, petrol, disinfectants, acids, rust removers, etc. Damages resulting from improper maintenance and usage are not covered by manufacturer warranty.

3. OPERATION SCENARIO

The terminal when connected to MC16 access controller can be used for hotel automation including room power supply control based on card presence in the holder. The example of connection diagram for such scenario is shown in fig. 6 where the power supply is controlled by MC16 output and additional external 230VAC relay. Such relay can also be connected to other available output also on the MCT86M-IO-CH-HR terminal or MCX series expander connected to the controller

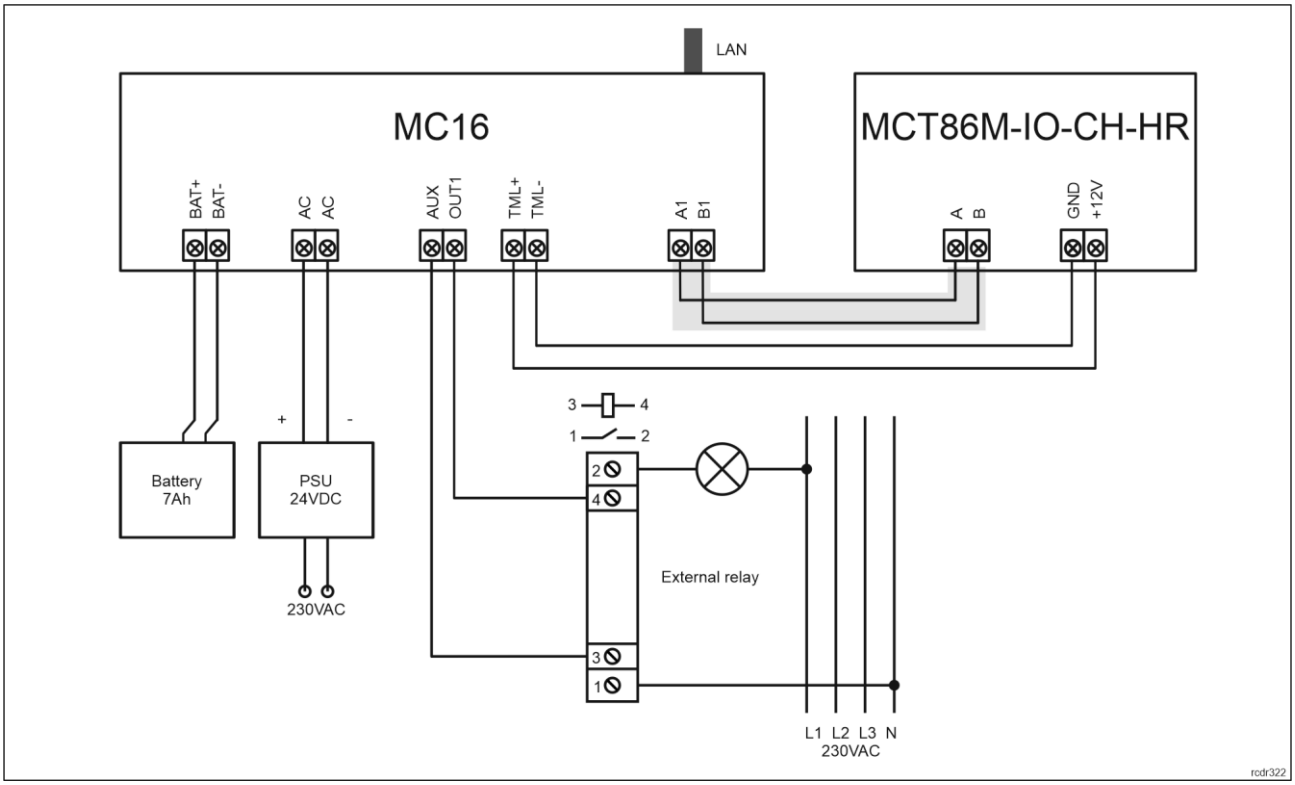


Fig. 6 Typical connection diagram for the terminal and MC16 access controller

4. CONFIGURATION

The purpose of low level configuration is to prepare device for operation in RACS 5 system. In case of RACS 5 v1 system the address of device must be configured by means of RogerVDM software or by manual addressing before connection to MC16 controller. While in RACS v2 system, low level configuration and addressing can be done with VISO v2 software during final configuration of the system. Therefore in RACS 5 v2 system the configuration from RogerVDM software and manual addressing are optional and during installation it is only necessary to properly connect the device to MC16 access controller.

Low level configuration (VISO v2)

In RACS 5 v2 system the reader can be installed at site without previous configuration. According to AN006 application note, its address and other settings can be configured from VISO v2 management software and during such configuration the access to its service contacts (fig. 6) is not required.

Low level configuration (RogerVDM)

Programming procedure with RogerVDM software (firmware 1.1.30.266 or newer):

1. Connect the device to RUD-1 interface (fig. 7) and connect the RUD-1 to computer's USB port.
2. Remove jumper from MEM contacts (fig. 5) if it is placed there.
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and orange LED SYSTEM will pulsate. Then within 5 seconds place jumper on MEM contacts.
4. Start RogerVDM program, select *MCT* device, firmware version, *RS485* communication channel and serial port with RUD-1 interface.
5. Click *Connect,* the program will establish connection and will automatically display *Configuration* tab.
6. Enter unoccupied RS485 address in range of 100-115 and other settings according to requirements of specific installation.
7. Click *Send to Device* to update the configuration of device.
8. Optionally make a backup by clicking *Send to File…* and saving settings to file on disk.
9. Disconnect from RUD-1 interface and leave jumper on MEM contacts to enable further configuration of device from VISO v2 software or remove jumper from MEM contacts to block such remote configuration.

Programming procedure with RogerVDM software (firmware older than 1.1.30.266):

1. Connect the device to RUD-1 interface (fig. 7) and connect the RUD-1 to computer's USB port.
2. Place jumper on MEM contacts (fig. 5).
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and LED indicator will pulsate.
4. Start RogerVDM program, select *MCT* device, firmware version, *RS485* communication channel and serial port with RUD-1 interface.
5. Click *Connect,* the program will establish connection and will automatically display *Configuration* tab.
6. Enter unoccupied RS485 address in range of 100-115 and other settings according to requirements of specific installation.
7. Click *Send to Device* to update the configuration of device.
8. Optionally make a backup by clicking *Send to File…* and saving settings to file on disk.
9. Remove jumper from MEM contacts and disconnect the device from RUD-1 interface.

Note: Do not read any cards when the device is configured with RogerVDM.

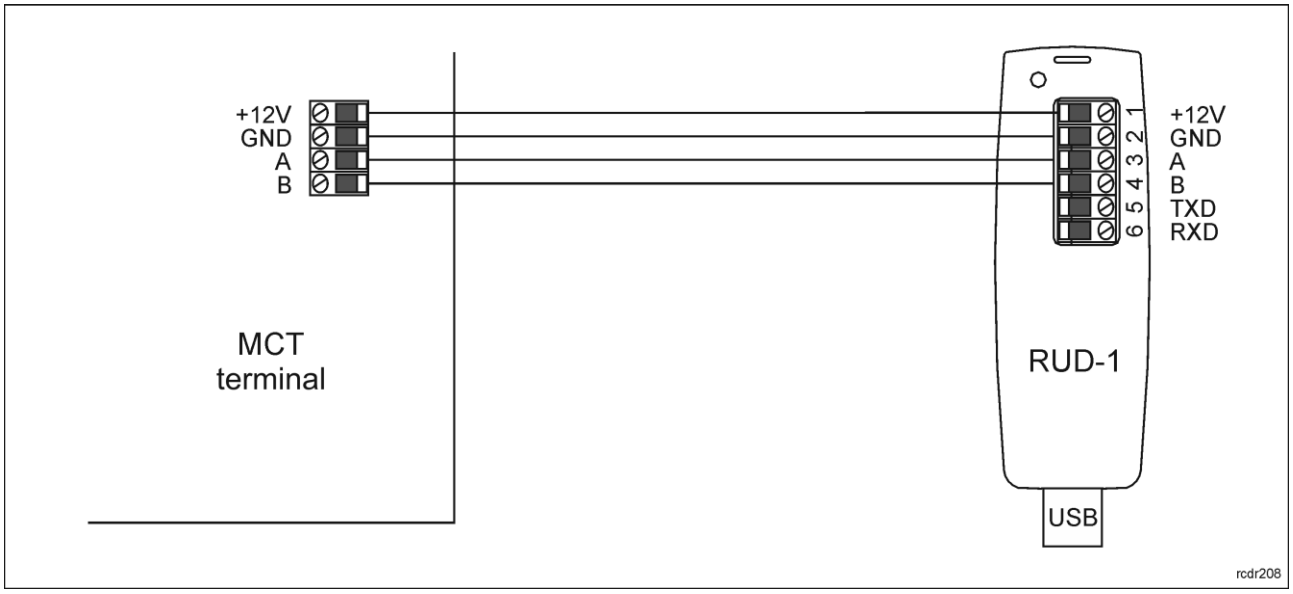


Fig. 7 Connection of MCT terminal to RUD-1 interface (low level configuration)

Table 4. List of low level parameters	
Communication settings	
RS485 address	Parameter defines device address on RS485 bus. Range: 100-115. Default value: 100.
RS485 communication timeout [s]	Parameter defines delay after which device will signal lost communication with controller by means of its LED indicators. When set to 0 then signaling is disabled. Range: 0-64s. Default value: 20s.
RS485 encryption	Parameter enables encryption at RS485 bus. Range: [0]: No, [1]: Yes. Default value: [0]: No.
RS485 encryption key	Parameter defines key for encryption of communication at RS485 bus. Range: 4-16 ASCII characters.
Optical signalisation	
Backlight level [%]	Parameter defines backlight level. When set to 0 then backlight is disabled. Range: 0-100. Default value: 100.
Backlight switching off when no activity	Parameter enables backlight switching off after 20 s from the latest card reading or key pressing. The backlight is restored again when card or key is used. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
Acoustic signalisation	

Buzzer loudness level [%]	Parameter defines buzzer loudness level. When set to 0 then buzzer is disabled Range: 0-100. Default value: 100.
Short sound after card read	Parameter enables short sound (beep) generating by buzzer when card is read. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
Keypad settings	
Keypad activated	Parameter enables deactivation of keypad. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
[F1], [F2], [F3, [F4] key press options	Parameter defines key press type for [F1], [F2], [F3], [F4] function key. Range: [1]: Short press only, [2]: Long press only, [3]: Short and long press. Default value: [1]: Short press only.
Advanced settings	
Stop card/PIN reading when buffer full	Parameter enables to reject card/PIN reading by device till previous card/PIN is transmitted to controller. Range: [0]: No, [1]: Yes. Default value: [0]: No.
Card/PIN buffer timeout [s]	Parameter defines time for card/PIN storing in device buffer. When the time elapses the buffer is cleared even if card/PIN is not transmitted to controller. Range: 0-64. Default value: 10.
AF type	Parameter defines authentication factor type returned by terminal. Default value: [16]: Number 40 bits.
Input types	
IN1, IN2, IN3	Parameter defines input type. Range: [1]: NO, [2]: NC, [3]: EOL/NO, [4]: EOL/NC, [5]: 2EOL/NO, [6]: 2EOL/NC, [7]: 3EOL/NO, [8]: 3EOL/NC, [9]: 3EOL/DW/NO, [10]: 3EOL/DW/NC. Default value: [1]: NO.
Input response times	
IN1, IN2, IN3 [ms]	Parameter defines minimal duration of pulse which is required to trigger the input. Range: 50-5000. Default value: 50.
Parametric (EOL) input resistances	
Tamper, Alarm A, Alarm B [Ohm]	Parameter defines resistor for parametric (EOL) inputs.
Output polarity	
OUT1, OUT2, REL1	Parameter defines polarity of output. Normal polarity means that the output by default is switched off while Reversed polarity means that the output by default is switched on. Range: [0]: Normal polarity, [1]: Reversed polarity. Default value: [0]: Normal polarity.
Comments	
DEV, CDI, IN1, IN2, IN3, IN4 (Tamper), OUT1, OUT2, REL1,	Parameter defines any text or comment which corresponds to the object. It is later displayed in VISO program.
Serial card number (CSN) settings	
Serial number length (CSNL) [B]	Parameter defines the number of bytes from serial card number (CSN) which will be used to generate returned card number (RCN). RCN is the actual card number read by reader and it is created as sum of serial card number (CSN) and programmable card number (PCN).
Programmable card number (PCN) settings for Mifare Classic	
Sector type	Parameter defines sector type with programmable number (PCN). If the option [0]:None is selected then card returned number (RCN) will include only CSN and PCN will be discarded. Range: [0]: None, [1]: SSN, [2]: MAD. Default value: [0]: None.

Format	Parameter defines format of PCN. Range: [0]: BIN, [1]: ASCII HEX. Default value: [0]: BIN.
First byte position (FBP)	Parameter defines the position of the first byte for PCN in data block on card. Range: 0-15. Default value: 0.
Last byte position (LBP)	Parameter defines the position of the last byte for PCN in data block on card. Range: 0-15. Default value: 7.
Sector ID	Parameter defines sector number where PCN is stored. Range: 0-39. Default value: 1.
Application ID (AID)	Parameter defines application ID number (AID) which indicates sector where PCN number is stored. Range: 0-9999. Default value: 5156.
Block ID	Parameter defines block number where PCN is stored. Range: 0-2 to for sectors 0-31 and 0-14 for sectors 32-39. Default value: 0.
Key type	Parameter defines key type used to access sector with PCN. Range: [0]: A, [1]: B, [2]: Roger. Default value: [0]: A.
Key	Parameter defines 6 bytes (12 HEX digits) key for accessing sector where PCN is stored.
Programmable card number (PCN) settings for Mifare Plus	
Sector type	Parameter defines sector type with programmable number (PCN). If the option [0]:None is selected then card returned number (RCN) will include only CSN and PCN will be discarded. Range: [0]: None, [1]: SSN, [2]: MAD. Default value: [0]: None.
Format	Parameter defines format of PCN. Range: [0]: BIN, [1]: ASCII HEX. Default value: [0]: BIN.
First byte position (FBP)	Parameter defines the position of the first byte for PCN in data block on card. Range: 0-15. Default value: 0.
Last byte position (LBP)	Parameter defines the position of the last byte for PCN in data block on card. Range: 0-15. Default value: 7.
Sector ID	Parameter defines sector number where PCN is stored. Range: 0-39. Default value: 1.
Application ID (AID)	Parameter defines application ID number (AID) which indicates sector where PCN number is stored. Range: 0-9999. Default value: 5156.
Block ID	Parameter defines block number where PCN is stored. Range: 0-2 to for sectors 0-31 and 0-14 for sectors 32-39. Default value: 0.
Key type	Parameter defines key type used to access sector with PCN. Range: [0]: A, [1]: B. Default value: [0]: A.
Programmable card number (PCN) settings for Mifare Desfire	
Sector type	Parameter defines sector type with programmable number (PCN). If the option [0]:None is selected then card returned number (RCN) will include only CSN and PCN will be discarded. Range: [0]: None, [1]: Desfire file. Default value: [0]: None.
Format	Parameter defines format of PCN. Range: [0]: BIN, [1]: ASCII HEX. Default value: [0]: BIN.
First byte position (FBP)	Parameter defines the position of the first byte for PCN in data block on card. Range: 0-15. Default value: 0.
Last byte position (LBP)	Parameter defines the position of the last byte for PCN in data block on card. Range: 0-15. Default value: 7.
Application ID (AID)	Parameter defines application ID number (AID) which indicates sector

	where PCN number is stored. Range: 0-9999. Default value: F51560.
File ID (FID)	Parameter defines file identifier in AID. Range: 0-32 for Desfire EV1 and 0-16 for Desfire EV0. Default value: 0.
Communication protection level	Parameter defines encryption method for communication between card and reader. Range: [0]: Plain, [1]: Data authentication by MAC, [2]: Full encryption. Default value: [0]: Plain.
Key number	Parameter defines application key number used for file read. Range: 0-13. Default value: 0.
Key type	Parameter defines encryption key type for Desfire file. Range: [0]: TDES Native, [1]: TDES Standard, [2]: 3-KTDES, [3]: AES128. Default value: [0]: TDES Native.
Key	Parameter defines access key for Desfire file with PCN. 3-KTDES key is 24 bytes (48 HEX digits), TDES and AES keys are 16 bytes (32 HEX digits).

Manual addressing

Manual addressing procedure enables configuration of new RS485 address with all other settings unchanged.

Manual addressing procedure (firmware 1.1.30.266 or newer):

1. Remove all connections from A and B lines.
2. Remove jumper from MEM contacts (fig. 5) if it is placed there.
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and orange LED SYSTEM will pulsate. Then within 5 seconds place jumper on MEM contacts.
4. Enter 3 digits of RS485 address in range of 100-115 with any MIFARE card.
5. Leave jumper on MEM contacts to enable further configuration of device from VISO v2 software or remove jumper from MEM contacts to block such remote configuration.
6. Restart the device.

Manual addressing procedure (firmware older than 1.1.30.266):

1. Remove all connections from A and B lines.
2. Place jumper on MEM contacts (fig. 5).
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and LED indicator will pulsate.
4. Enter 3 digits of RS485 address in range of 100-115 with any MIFARE card.
5. Wait till device confirms addressing with continuous sound.
6. Remove jumper from MEM contacts and restart the device.

Terminals without keypad can be addressed with multiple card readings where the N number of readings emulates digit of the address. Three series of readings with any MIFARE proximity card are necessary to set the address. After each series wait for two beeps and proceed with the next digit. Zero digit is emulated with 10 readings.

Example:
Programming of ID=101 address with card readings:

1. Read card 1 time and wait for two beeps.
2. Read card 10 times and wait for two beeps.
3. Read card 1 time and wait for two beeps.
4. Wait till reader is restarted with the new address.

Memory reset

Memory reset procedure resets all settings to factory default ones including ID=100 address.

Memory reset procedure (firmware 1.1.30.266 or newer):

1. Remove all connections from A and B lines.
2. Remove jumper from MEM contacts (fig. 5) if it is placed there.
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and orange LED SYSTEM will pulsate. Then within 5 seconds place jumper on MEM contacts.
4. Read any MIFARE card 11 times.
5. Wait till device confirms reset with long acoustic signal.
6. Leave jumper on MEM contacts to enable further configuration of device from VISO software and disconnect device from RUD-1 interface.
7. Restart the device.

Memory reset procedure (firmware older than 1.1.30.266):

1. Remove all connections from A and B lines.
2. Place jumper on MEM contacts (fig. 5).
3. Restart the device (switch power supply off and on or short RST contacts for a moment) and LED indicator will pulsate.
4. Read any MIFARE card 11 times.
5. Wait till device confirms reset with continuous sound.
6. Remove jumper from MEM contacts and restart the device.

High level configuration (VISO)

The purpose of high level configuration is to define logical functioning of the terminal which communicates with the MC16 access controller and it depends on applied scenario of operation. The example of access control system configuration is given in AN006 application note while hotel system configuration is explained in AN033 application note. Both notes are available at www.roger.pl.

5. FIRMWARE UPDATE

The firmware of device can be changed to newer or older version. The update requires connection to computer with RUD-1 interface and starting RogerVDM software. The latest firmware file is available at www.roger.pl.

Firmware update procedure:

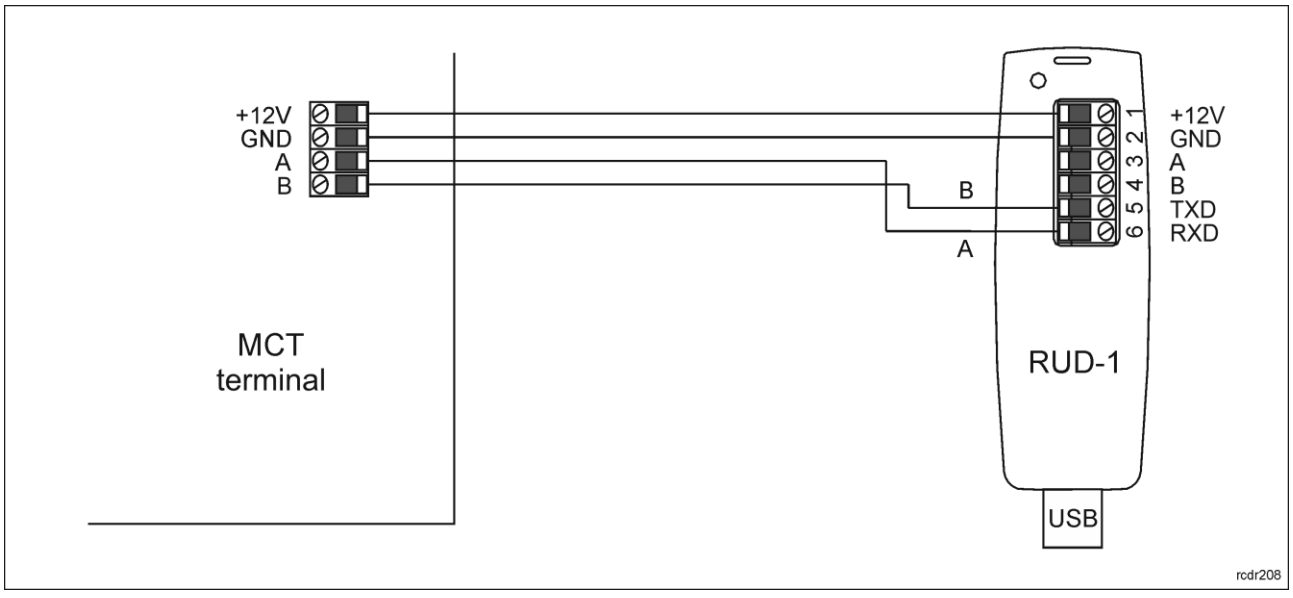


Fig. 8 Connection of MCT terminal to RUD-1 interface (firmware update)

1. Connect the device to RUD-1 interface (fig. 8) and connect the RUD-1 to computer's USB port.
2. Place jumper on FDM contacts (fig. 5).
3. Restart the device (switch power supply off and on or short RST contacts for a moment).
4. Start RogerVDM program and in the top menu select *Tools* and then *Update firmware*.
5. In the opened window select device type, serial port with RUD-1 interface and paths to main firmware file (*.frg) and additional firmware file (*.cyacd).

6. Click *Update* to start firmware upload with progress bar in the bottom.
7. When the update is finished, remove FDM jumper and restart the device.

6. SPECIFICATION

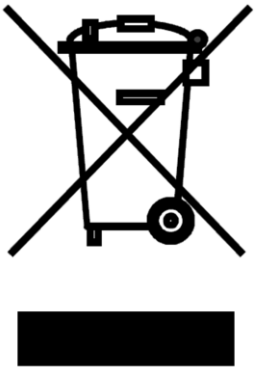
Table 5. Specification	
Supply voltage	Nominal 12VDC, min./max. range 10-15VDC
Current consumption (average)	~60 mA
Inputs	Three parametric inputs (IN1..IN3) internally connected to the power supply plus through a 5.6kΩ resistor. Approx. 3.5V triggering level for NO and NC inputs.
Relay output	Relay output (REL1) with single NO/NC contact, 30V/1A DC/AC max. load
Transistor outputs	Two (IO1, IO2) open collector outputs, 15VDC/150mA max. load
Tamper protection	Enclosure opening reported to access controller
Proximity cards	13.56MHz MIFARE Ultralight, Classic, DESFire EV1 and Plus
Reading range	Up to 7 cm for MIFARE Ultralight, Classic Up to 4 cm for MIFARE DESFire EV1, Plus
Distance	1200m maximal cable length for RS485 bus between controller and terminal
IP Code	IP30
Environmental class (according to EN 50133-1)	Class II, indoor general conditions, temperature: -10°C to +50°C, relative humidity: 10 to 95% (no condensation)
Dimensions H x W x D	155 x 85 x 22 mm
Weight	~180g
Certificates	CE

7. ORDERING INFORMATION

Table 6. Ordering information	
MCT86M-IO-CH-HR	MIFARE DESFire/Plus access terminal with card holder; on-board I/Os; hotel signalling function key panel.
RUD-1	Portable USB-RS485 communication interface dedicated to ROGER access control devices.

8. PRODUCT HISTORY

Table 7. Product history		
Version	Date	Description
MCT86M-IO-CH-HR v1.0	06/2018	The first commercial version of product

	This symbol placed on a product or packaging indicates that the product should not be disposed of with other wastes as this may have a negative impact on the environment and health. The user is obliged to deliver equipment to the designated collection points of electric and electronic waste. For detailed information on recycling, contact your local authorities, waste disposal company or point of purchase. Separate collection and recycling of this type of waste contributes to the protection of the natural resources and is safe to health and the environment. Weight of the equipment is specified in the document.

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