Roger Access Control System

MCT68ME-IO Operating Manual

Product version: 2.0/2.1

Firmware version: 2.1.0.306 or newer

Document version: Rev.C

CE

roger

1. DESIGN AND APPLICATION

The MCT68ME-IO is an access terminal dedicated to RACS 5 system. The device enables identification of users by PINs and/or 13.56 MHz MIFARE® Ultralight/Classic and EM125kHz (UNIQUE) proximity cards.
The terminal is mainly used for Time&Attendance applications. The device is offered in two versions: MCT68ME-IO-I for indoor installation and MCT68ME-IO-O with ME-7 metal enclosure for outdoor installation. The terminal is connected to access controller through RS485 interface.

Characteristics

- RACS 5 system access terminal
- 13.56 MHz MIFARE Ultralight/Classic/ proximity cards
- EM125kHz (UNIQUE) proximity cards
- Alphanumeric LCD display
- 3 LED indicators
- Buzzer
- Silicone keypad with backlight
- 4 function keys
- 3 NO/NC inputs
- 2 transistor outputs
- 1 relay output
- 1 I/O line
- RS485 interface
- Tamper protection
- Outdoor environment*
- Screw terminals

* only MCT68ME-IO-O

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

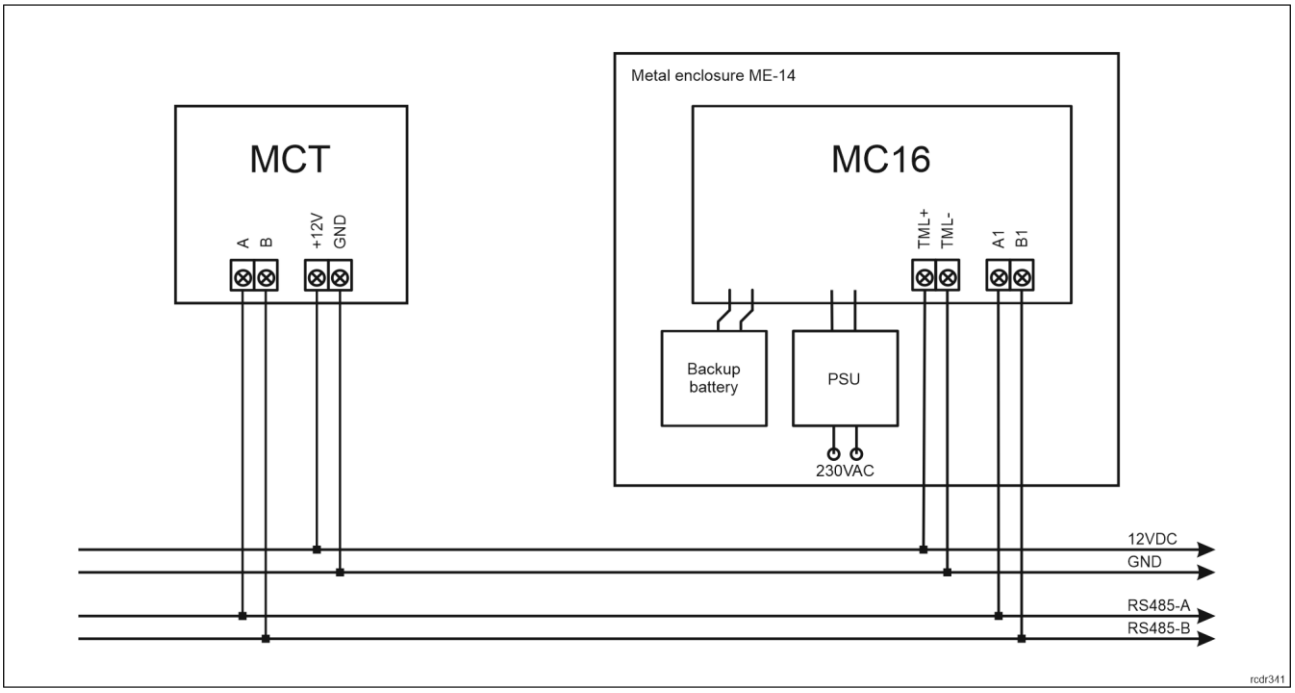


Fig. 1 MCT supply from MC16 access controller

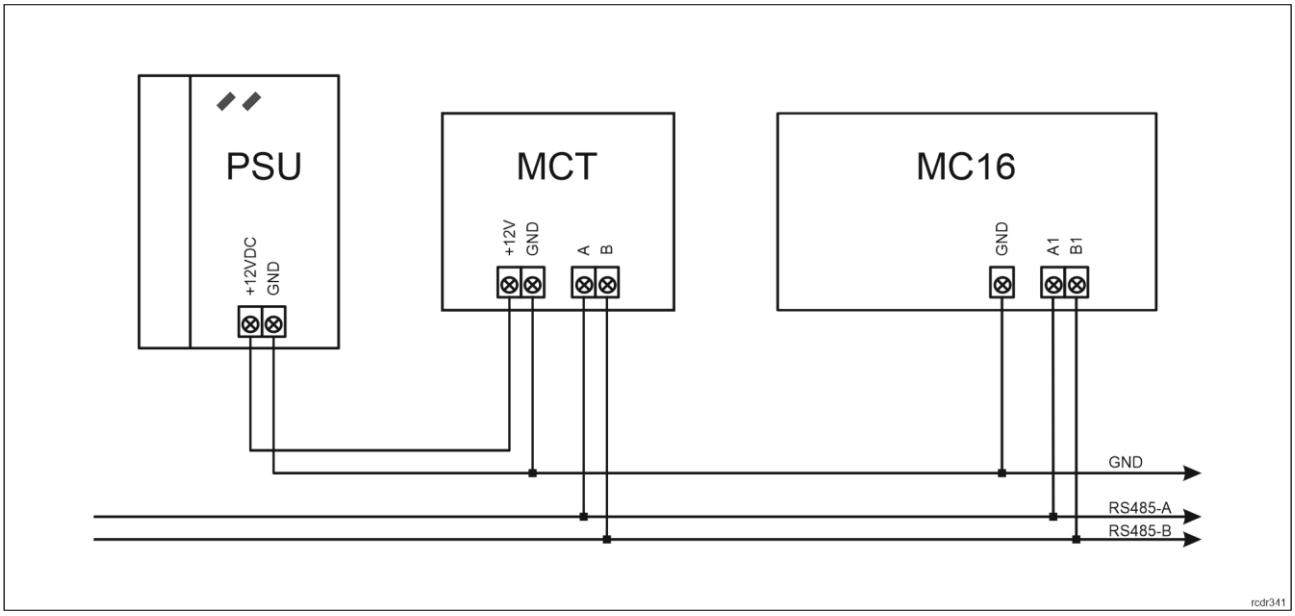


Fig. 2 MCT supply from dedicated power supply unit

RS485 bus

The communication method 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.

RACS CLK/DTA bus

RACS CLK/DTA bus is dedicated to communication with PRT series terminals. However in case of MCT68ME-IO with firmware 1.1.0.306 the communication with slave PRT terminal is disabled. The DTA line of the bus can be configured as NO/NC input or transistor output while CLK line of the bus is unused.

Display

The terminal is equipped with alphanumeric display (4 lines, 20 characters each). The display can be configured in regard of displayed information within high level configuration by means of *Display* command in VISO software navigation tree which is explained in AN011 application note.

Keypad

The terminal is equipped with numeric keypad and backlight. The keypad can be used for user identification with PIN and for various keypad commands. By default, the key [#] is used for PIN confirming.

Function keys

The terminal is equipped with four function keys [F1] – [F4]. Various functions can be assigned to these keys within high level configuration (VISO) e.g. door bell, Set T&A Mode, Register Guard Tour Event, Set Automation Node On, etc. 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 types of key press can be assigned with different function.
Numeric keypad includes [*] and [#] keys which can be configured as function keys.

LED indicators

The terminal is equipped with three LED indicators which are used to signal integral functions and they can be additionally programmed with other available functions within high level configuration (VISO).

Table 2. LED indicators

Indicator	Symbol	Colour	Integral functions
LED STATUS		Red / green	Default colour of the indicator is red. If the terminal is assigned to Alarm Zone then the LED indicates zone arming (red) or disarming (green).
LED OPEN		Green	LED indicates access granting.
LED SYSTEM		Orange	LED indicates card reading and can signal other system functions including device malfunction.

Note: Synchronic pulsing of LED indicators 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 IN1..IN3 inputs of NO/NC type. Additionally, DTA line can be configured as NO/NC input. Input types 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.

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 TMP screw terminals. It does not require low level configuration but it is necessary to connect it to controller with wires as in

example in fig. 3. It is also essential to mount front panel in such way as the tamper detector (fig. 4) would firmly press the back panel.
The input of controller for connection of tamper loop requires low level configuration in regard of NC type (VISO v2 or RogerVDM) and high level configuration consisting in assignment of the function *[133] Tamper Toggle o*n the level of a *Main Board* of a controller in VISO software navigation tree.

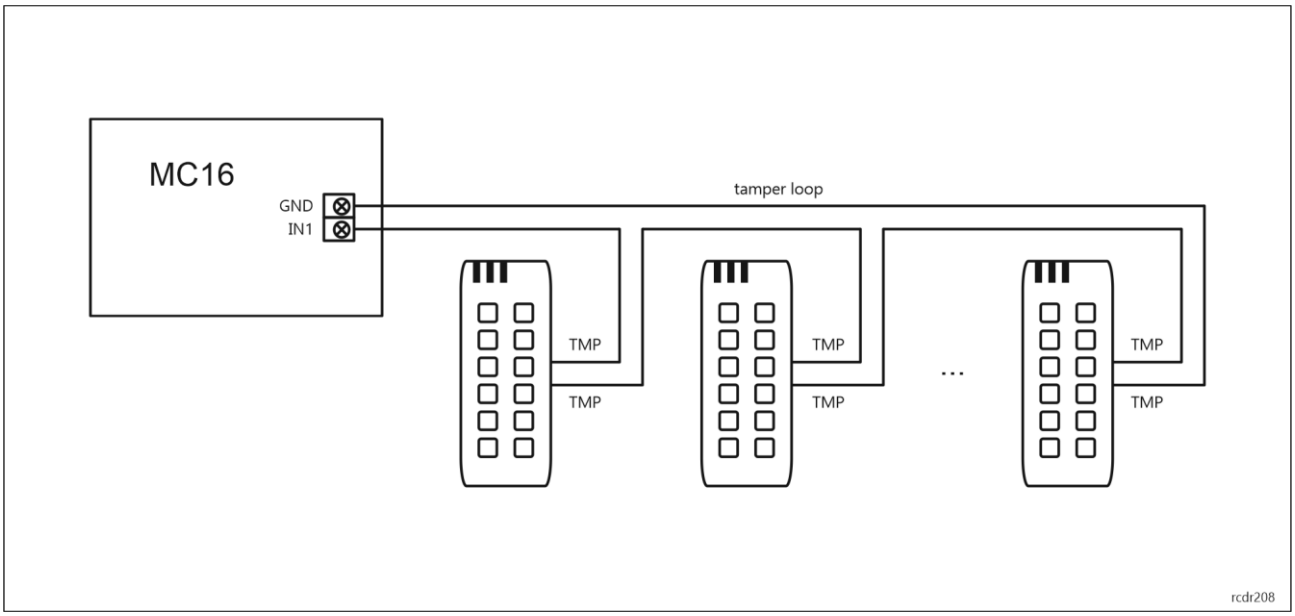


Fig. 3 Tamper loop example

Outputs

The terminal offers 2 transistor open collector type IO1..IO2 outputs (15V/150mA rated) and 1 relay output with NO/NC contacts (30V/1.5A DC/AC rated). Additionally, DTA line can be configured as open collector type output (15V/15mA 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

Following user identification methods are offered by the terminal:

- MIFARE Ultralight/Classic/Plus/DESFire proximity cards
- EM125kHz (UNIQUE) proximity cards
- PINs

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.

MIFARE and EM125kHz cards

The terminal enables concurrent reading of both proximity card standards. In case of MFARE the device cannot read card programmable number (PCN) but only card serial number (CSN).

PINs

Terminal accepts variable length PINs (by default 4-8 digits concluded with [#] key).

2. INSTALLATION

Table 3. Screw terminals	
Name	Description
12V	12VDC power supply
GND	Ground
IN1	IN1 input line
IN2	IN2 input line
IN3	IN3 input line
RS485 A	RS485 bus, line A
RS485 B	RS485 bus, line B
CLK	Not used
DTA	Input/output line
TMP	Tamper contact
TMP	Tamper contact
IO1	IO1 output line
IO2	IO2 output line
REL1-NC	REL1 relay normally closed contact
REL1-COM	REL1 relay common contact
REL1-NO	REL1 relay normally opened contact

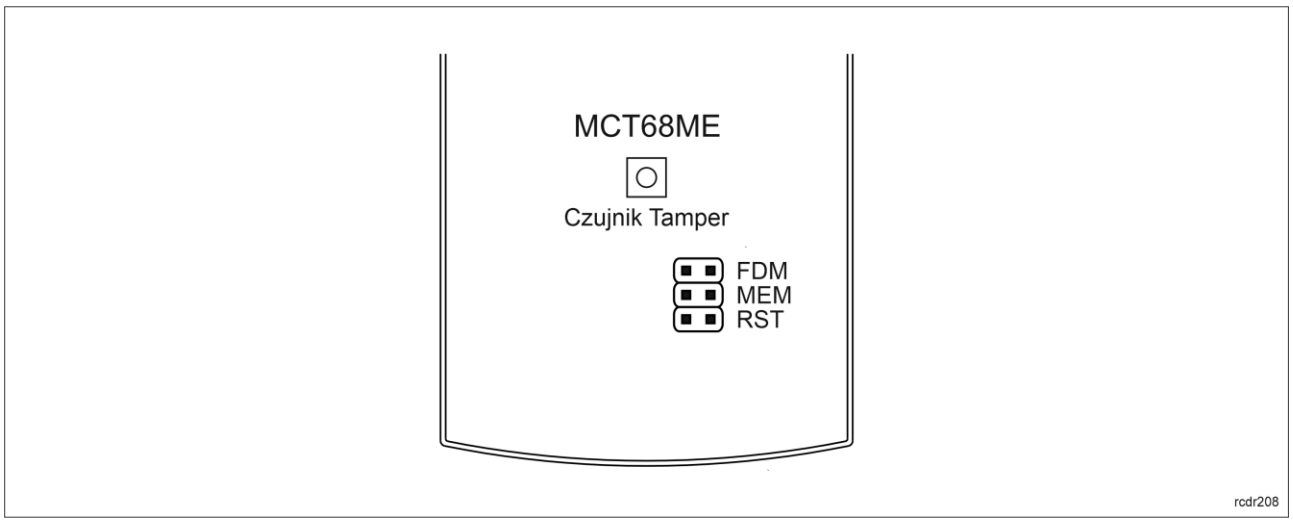


Fig. 4 Programming jumpers

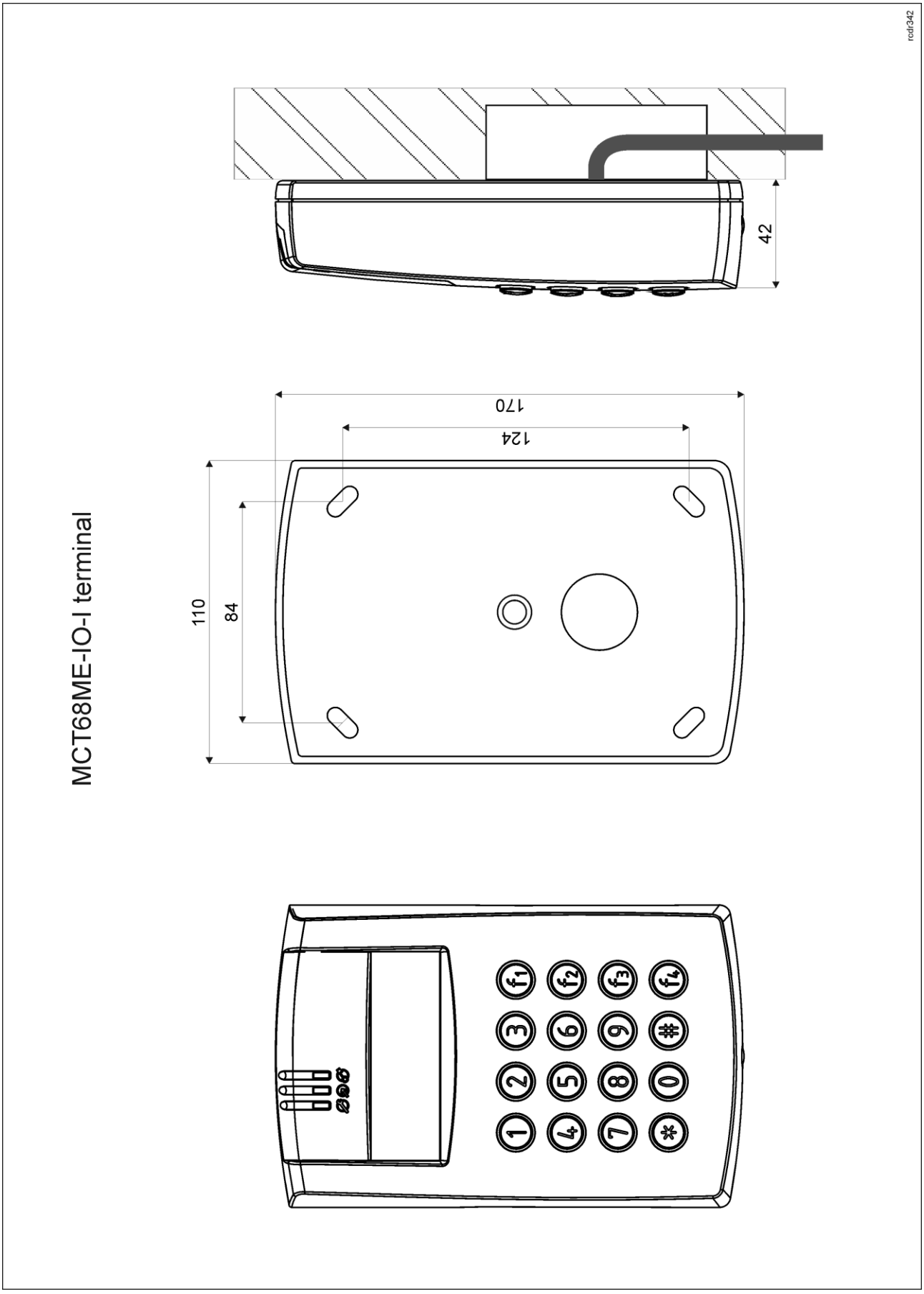


Fig. 5 MCT68ME-IO-I installation

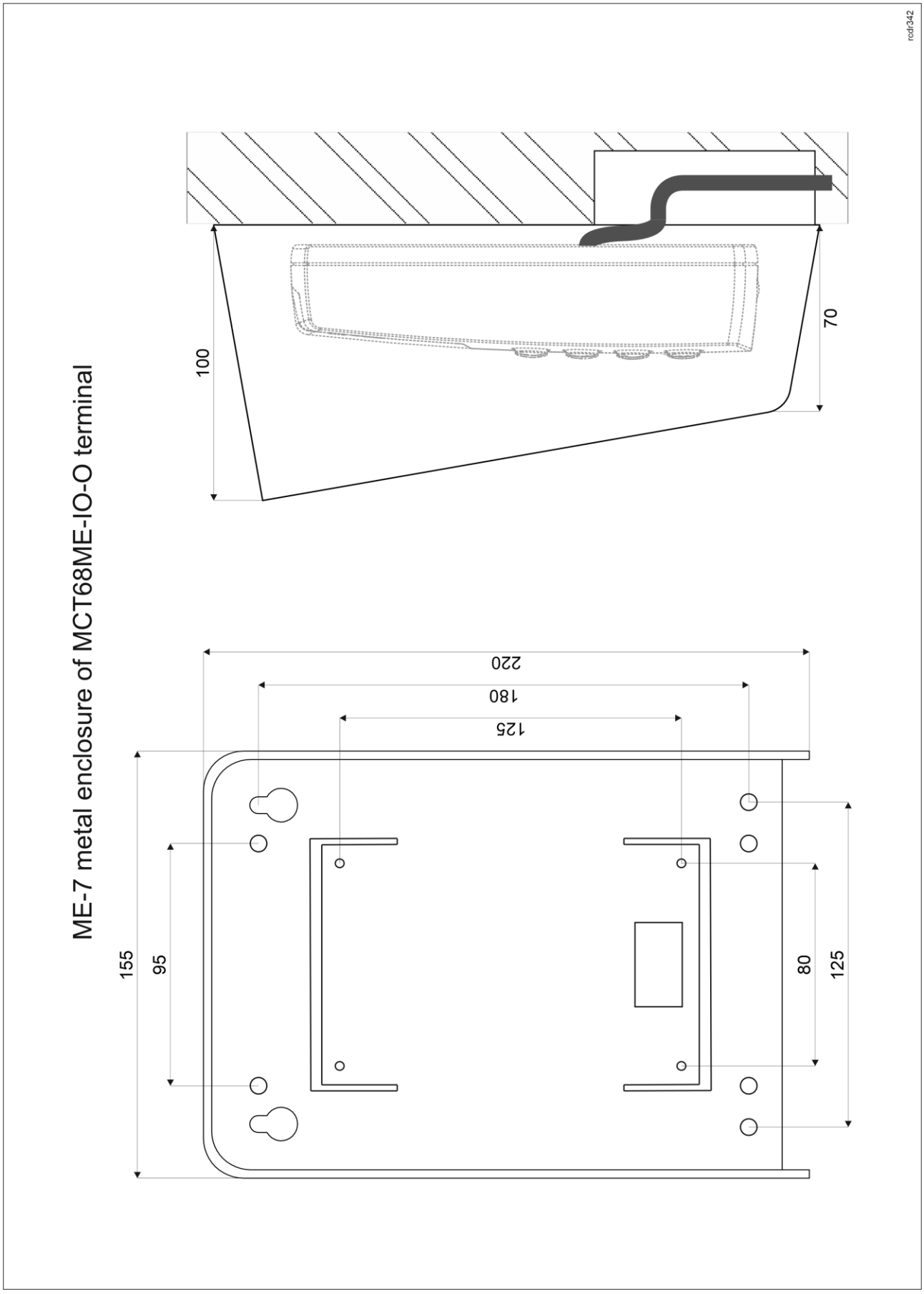


Fig. 6 MCT68ME-IO-O installation

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. 4) 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 SCENARIOS

The terminal when connected to MC16 access controller can be used for access control and particularly for Time&Attendance because it can present current T&A Mode on its display and it enables T&A Modes switching with its function keys. The example of connection diagram for such scenario is shown in fig. 7 where inputs and outputs from MC16 board are used and in fig. 8 where inputs and outputs from terminal are used. The terminal can also operate with MC16 controller using MCX2D/MCX4D expanders as in case of M16-PAC-KIT series. Various scenarios of operation with MC16 controllers are presented in AN002 application note.

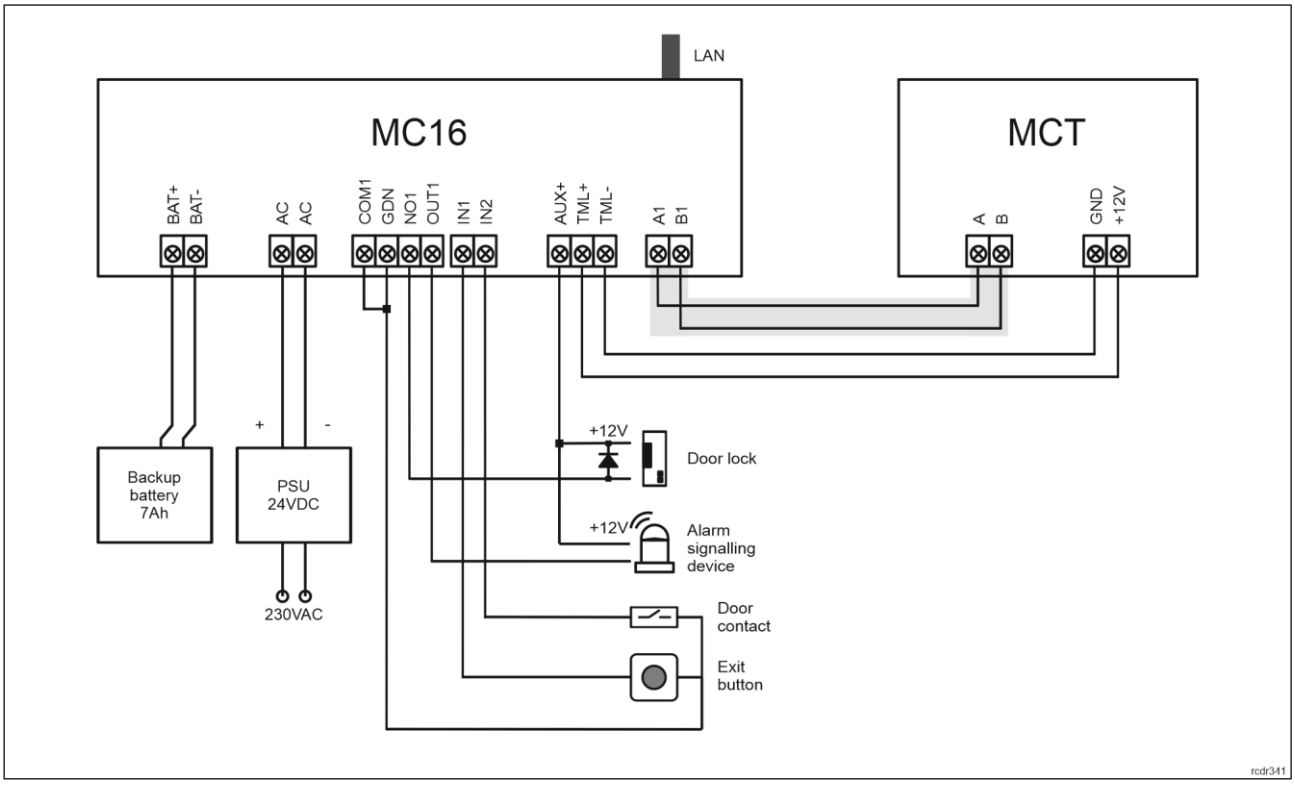


Fig. 7 Typical connection diagram for the terminal and MC16 access controller

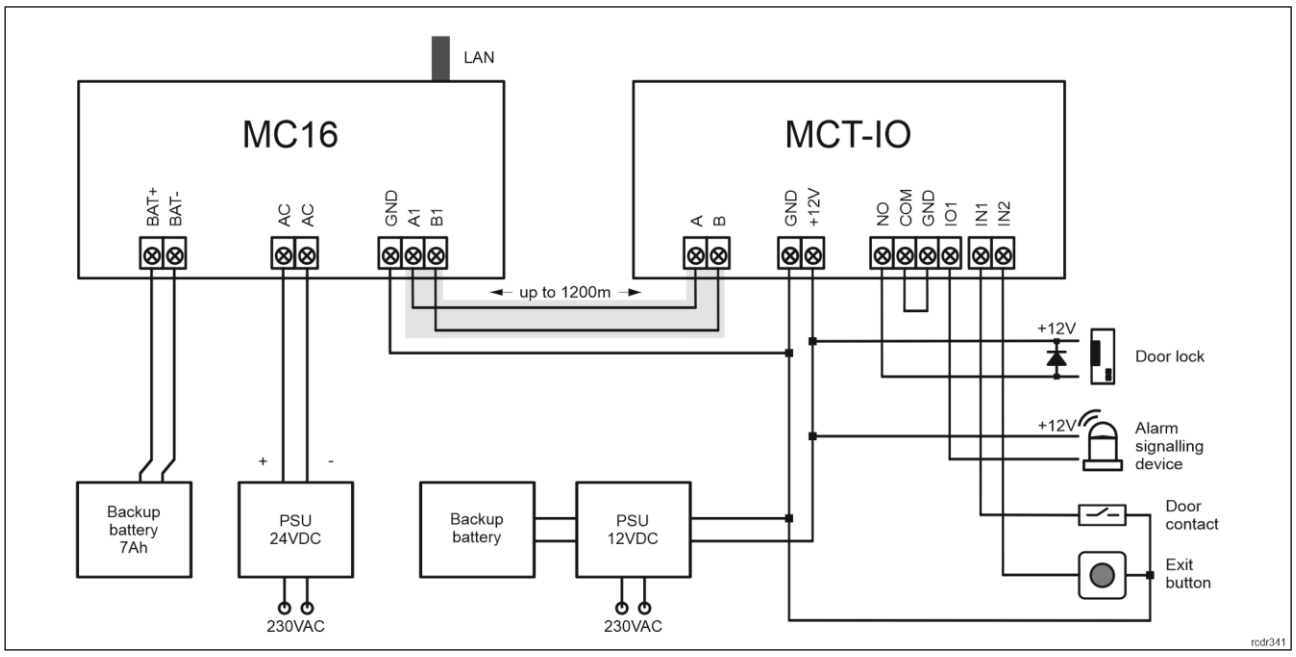


Fig. 8 Typical connection diagram for the terminal and MC16 access controller

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. 4) is not required.

Low level configuration (RogerVDM)

The purpose of low level configuration is to prepare device for operation in RACS 5 system.

Programming procedure with RogerVDM software:

1. Connect the device to RUD-1 interface (fig. 9) and connect the RUD-1 to computer's USB port.
2. Start RogerVDM program, select *MCT* device, firmware version, *RS485* communication channel and serial port with RUD-1 interface.
3. Click *Connect,* the program will establish connection and will automatically display *Configuration* tab.
4. Enter unoccupied RS485 address in range of 100-115 and other settings according to requirements of specific installation.
5. Click *Send to Device* to update the configuration of device.
6. Optionally make a backup by clicking *Send to File…* and saving settings to file on disk.
7. In the top menu select *Device->Disconnect.*
8. Disconnect device from RUD-1 interface.

Note: Do not read any cards nor press keypad when reader is configured with RogerVDM.

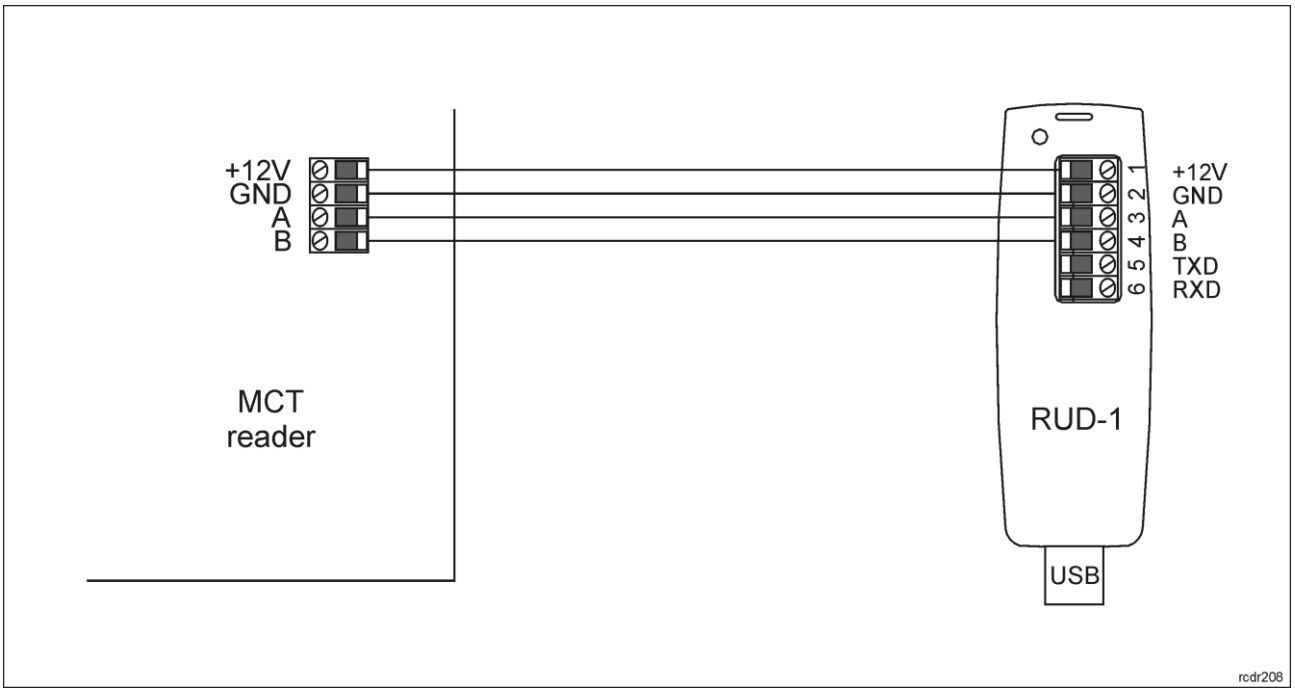


Fig. 9 Connection to RUD-1 interface (low level configuration)

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. 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.
General settings	
Card reading disabled	Parameter enables blocking of card reading in selected technology. The parameter is dedicated to terminals which support more than one card reading technology.
Reverse order of bytes	Parameter enables the terminal to send bytes of card number in reverse order.
Card reading synchronisation input	Parameter enables selection of reader input which will be used for synchronisation of magnetic field with another reader in vicinity to prevent interferences between both readers. Selected input must be connected to synchronisation output of another reader. When set to 0 then synchronisation is disabled. Typical numbering is 1 = IN1, 2 = IN2 and 3 = IN3. Range: 0-3. Default value: 0.
Card reading synchronisation output	Parameter enables selection of reader output which will be used for synchronisation of magnetic field with another reader in vicinity to prevent interferences between both readers. Selected output must be connected to synchronisation input of another reader. When set to 0 then synchronisation is disabled. Typical numbering is 1 = REL1, 2 = OUT1 and 3 = OUT2. Range: 0-3. Default value: 0.

Single key press	Parameter enables separate transmission of each pressed key to controller. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
Min. length of PIN	Parameter defines the minimal number of digits for PIN entered with keypad. If the number of entered digits is lower than this parameter then it cannot be sent to controller when concluded with [#] key. When set to 0 then PINs are disabled. Range: 4-8. Default value: 4.
Max. length of PIN	Parameter defines the maximal number of digits for PIN entered with keypad. If the number of entered digits reaches this parameter then PIN is automatically sent to controller and [#] key pressing is not necessary. When set to 0 then automatic PIN transmission is disabled. Range: 0-8. Default value: 8.
[*] key clears PIN buffer	Parameter defines if already entered digits of PIN can be deleted with [*] key. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
Time between keys in PIN [s]	Parameter defines max. time between two consecutive key pressings. Range: 0-64. Default value: 10.
PIN followed by [#] key	Parameter enables use of PINs with variable length. In such scenario PIN is concluded with [#] key. Range: [0]: No, [1]: Yes. Default value: [1]: Yes.
Long key press time [s]	Parameter defines long press time for such key types as [*], [#] and [F1] - [F4]. When set to 0 then long press is disabled. Range: 0-64. Default value: 2.
Key press options	Parameter defines key press type for [*], [#] and [F1] - [F4] keys. Range: [1]: Short press only, [2]: Long press only, [3]: Short and long press. Default value: [1]: Short press only.
Input types	
IN1, IN2, IN3	Parameter defines the type of input line. Range: [1]: NO, [2]: NC. Default value: [1]: NO.
Input comments	
IN1, IN2, IN3	Parameter defines any text or comment which corresponds to the object. It is later displayed in VISO program.
Output polarity	
REL1, IO1, IO2	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.
Output comments	
REL1, IO1, IO2	Parameter defines any text or comment which corresponds to the object. It is later displayed in VISO program.
Object comments	
DEV, LCD	Parameter defines any text or comment which corresponds to the device/object. It is later displayed in VISO program.
Internal Terminal ID1	
Terminal enabled	Parameter enables to activate/deactivate card reader.
Keypad enabled	Parameter enables to activate/deactivate keypad.
AF type	Parameter defines authentication factor returned by terminal ID1.
AF class	Parameter defines authentication factor class returned by terminal ID1.
KBD, CDI, BUZZER, LED OPEN,	Parameter defines any text or comment which corresponds to the

LED STATUS comment	object. It is later displayed in VISO program.
DTA settings	
Line type	Parameter defines type of DTA line.
Input type	Parameter defines the type of input line. Range: [1]: NO, [2]: NC. Default value: [1]: NO.
Output polarization	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.
DTA comment	Parameter defines any text or comment which corresponds to the object. It is later displayed in VISO program.

Manual addressing

Manual addressing can be done within memory reset procedure.

Memory reset procedure

Memory reset procedure enables configuration of RS485 address and resets all other settings to factory default ones.

Memory reset procedure:

1. Remove all connections from A and B lines.
2. Place jumper on MEM contacts (fig. 4)
3. Restart the reader (switch power supply off and on or short RST contacts for a moment).
4. When 'CONFIG RESET' is displayed by reader then remove jumper from MEM contacts.
5. When 'ID:' is displayed by reader then enter 3 digits of RS485 address in range of 100-115 with reader keypad.
6. When the third digit is defined then the reader will restart with the new address.

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 which is available at www.roger.pl.

5. FIRMWARE UPDATE

The update requires connection of reader to computer with RUD-1 interface (fig. 9) and starting RogerISP software. The latest firmware file is available at www.roger.pl.

Firmware update procedure:

1. Connect the reader to RUD-1 interface (fig. 9) and connect the RUD-1 to computer's USB port.
2. Place jumper on FDM contacts (fig. 4).
3. Restart the reader (switch power supply off and on or short RST contacts for a moment).
4. Start RogerISP program.
5. Select serial port with RUD-1 interface and *USB-RS485 Converter* option.
6. Specify path to firmware file (*.hex).
7. Click *Program* and proceed according to displayed messages.
8. Remove jumper from FDM contacts and restart the reader.

6. SPECIFICATION

Table 5. Specification	
Supply voltage	Nominal 12VDC, min./max. range 10-15VDC
Current consumption	~100 mA

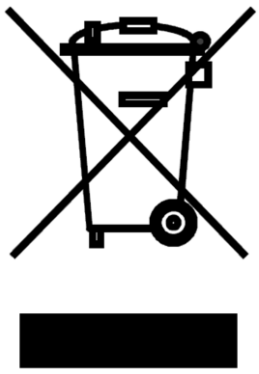
(average)	
Inputs	Three NO/NC inputs (IN1..IN3) internally connected to the power supply plus through a 15kΩ resistor, approx. 3.5V triggering level
Relay output	Relay output (REL1) with single NO/NC contact, 30V/1.5A DC/AC max. load
Transistor outputs	Two (IO1, IO2) open collector outputs, 15VDC/150mA max. load
DTA input/output	I/O line configured as NO/NC input or open collector output with 15VDC/15mA max. load
Tamper protection	Isolated 24V/50mA contacts, shorted when enclosure is closed
Proximity cards	EM 125 kHz UNIQUE according to EM4100/4102 and 13.56MHz according to ISO14443A and MIFARE
Reading range	Up to 10 cm for EM125kHz Up to 7 cm for MIFARE
Distance	1200m maximal cable length for RS485 bus between controller and reader
IP Code	MCT68ME-IO-I: IP30 MCT68ME-IO-O: IP54
Environmental class (according to EN 50133-1)	MCT68ME-IO-I: Class II, indoor general conditions, temperature: -10°C to +50°C, relative humidity: 10 to 95% (no condensation) MCT68ME-IO-O: Class IV, outdoor general conditions, temperature: -25°C to +60°C, relative humidity: 10 to 95% (no condensation)
Dimensions H x W x D	MCT68ME-IO-I: 170 x 110 x 42 mm MCT68ME-IO-O: 220 x 156 x 104 mm
Weight	MCT68ME-IO-I: ~410g MCT68ME-IO-O: ~1150g

7. ORDERING INFORMATION

Table 6. Ordering information	
MCT68ME-IO-I	EM 125 kHz and 13.56 MHz MIFARE (CSN) access terminal with keypad and display; on-board I/Os; indoor version
MCT68ME-IO-O	EM 125 kHz and 13.56 MHz MIFARE (CSN) access terminal with keypad and display; on-board I/Os; outdoor version with metal protection enclosure
RUD-1	Portable USB-RS485 communication interface dedicated to ROGER access control devices

8. PRODUCT HISTORY

Table 7. Product history		
Version	Date	Description
MCT68ME-IO-I v1.0	09/2016	The first commercial version of product
MCT68ME-IO-I v2.0	01/2018	Modifications of electronic components
MCT68ME-IO-O v1.0	09/2016	The first commercial version of product
MCT68ME-IO-O v2.0	01/2018	Modifications of electronic components
MCT68ME-IO-O v2.1	11/2019	Modification of ME-7 metal enclosure

	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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