Roger Access Control System

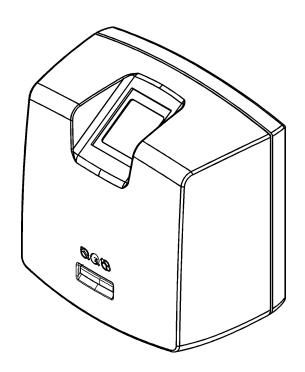# RFT1000 reader in RACS 5

User Manual

Firmware version: 1.4.4 or newer

Hardware version: 1.1

Document version: Rev. E

$C\epsilon$

Contents

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1. INTRODUCTION

This manual contains minimum information that is necessary to properly install and configure RFT1000 readers in RACS 5 access control system. Additional information on RACS 5 configuration can be found in the Application Note AN006 which is available at www.roger.pl. The application of RFT1000 reader in RACS 4 and third party systems is described in dedicated documents which are also available at www.roger.pl.

2. DESCRIPTION AND SPECIFICATION

RFT1000 biometric reader operates as access control terminal and/or Time&Attendance terminal in RACS 5 system. RFT1000 is equipped with fingerprint scanner and Mifare Ultraligth/Classic/Plus/ DESFire proximity card reader. Users can be identified by comparison of their fingerprints with fingerprint templates recorded in reader's memory (1:N mode) or by comparison of their fingerprints with fingerprint templates recorded in Mifare card memory (1:1 mode). The reader is not a standalone device and for the purpose of access control and T&A it must be connected to MC16 controller. The communication in LAN/WAN is encrypted with AES128 CBC method.

The reader in RFT1000-ADM version is installed on metal base and it is operated as administrator reader. Its configuration and management is the same as standard RFT1000 device. It is not necessary to connect it to MC16 access controller as for fingerprint scanning of users it is just enough to connect the reader to LAN.

Note: RFT1000 readers do not use or store full fingerprints. Based on the characteristic points of the fingerprint, the reader generates a certain string of characters using a classified algorithm. The string is then used in access control. It is not possible to recreate the actual fingerprint on the basis of this string and the data stored in the reader is understood only by the reader.

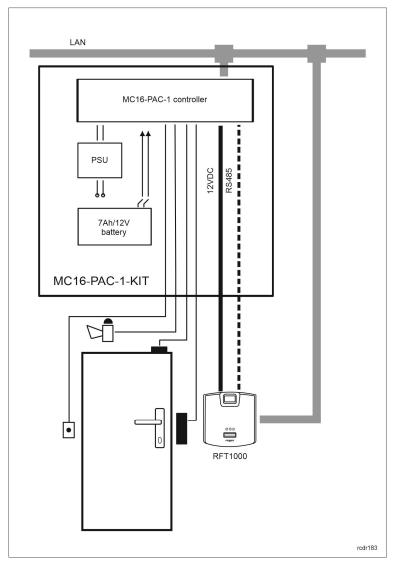| Table 1. Specification	
Maximum number of fingerprint templates	1900
Fingerprint identification modes	1:N mode – fingerprint templates are recorded in reader memory 1:1 mode – fingerprint templates are recorded on Mifare cards
EER (error rate)	< 0.1%
Identification time 1:1000	< 760ms
Proximity cards	Mifare Ultralight/Classic/Plus/DESFire
Supply voltage	Nominal 12VDC, min./max. range 10-15VDC
Avg. current consumption	130 mA for 12VDC
Inputs	Two (IN1,IN2) NO inputs, electrically biased to +12V via 15kΩ resistor, triggering level approx. 3.5V
Ethernet	10BASE-T 10/100Mb Ethernet communication port
Port RS485	RS485 communication port
Tamper	Isolated contact, NC type, 24V/50 mA rated
Environmental class (according to EN 50131-1)	Class I, indoor general conditions, temperature: +5°C to +40°C, relative humidity: 10 to 95% (no condensation)
IP code	IP41
Dimensions H x W x D	85mm x 85mm x 52mm
Weight	160g
Certificates	CE

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Fig. 1 The example of RFT1000 operation with MC16-PAC-1-KIT

3. INSTALLATION

3.1 Terminals and connection diagram

RFT1000

Fig. 2 RFT1000 terminals

Table 2. RFT1000 terminals	
Terminal	Description
12V	Positive power supply contact, 12VDC
GND	Negative power supply contact and reference potential for RS485 communication bus and input lines
TMP	Tamper switch, 24V/50mA
TMP	Tamper switch, 24V/50mA
IN1	IN1 input line
IN2	IN2 input line
CLK	RACS CLK/DTA bus – not applicable in RACS 5
DTA	RACS CLK/DTA bus – not applicable in RACS 5
A	RS485 communication bus (line A)
B	RS485 communication bus (line B)
1,2,3,4,5,6,7,8	Ethernet port terminal

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Fig. 3 Connection diagram for RFT1000 reader and MC16-PAC-1 access controller
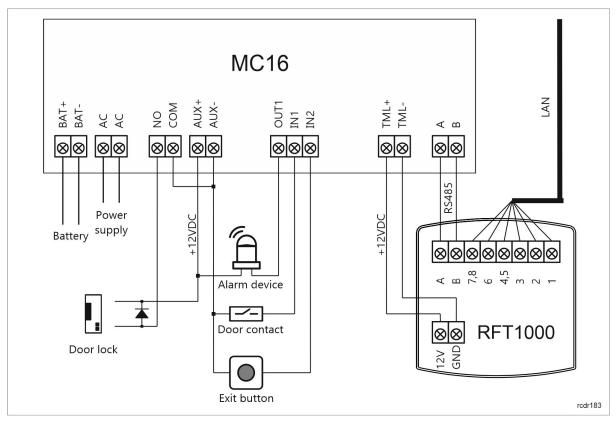
3.2 LED indicators

RFT1000 reader is equipped with three LED indicators on its enclosure which function according to table 3.

Symbol	Name	Colour	Description
Table 3. LED indicators			
🔄	STATUS	Red/Green	Armed/Disarmed mode of reader
🔄	OPEN	Green	Door unlocked
🔄	SYSTEM	Orange	Various signalling functions, e.g. microcontroller memory failure, configuration errors, etc.

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

3.3 Power supply

RFT1000 reader requires 12 VDC supply voltage. The supply must be connected to +12V terminal and GND terminal. The GND terminal is also reference potential for RS485 bus and IN1, IN2 input lines. All devices, which are connected to the same RS485 bus should have common ground (GND). In order to ensure this, all GND terminals of various power supply units in the system must be connected with each other using separate wire. Alternatively, the common negative pole (GND) of the entire system can be earthed, but only in single point.

3.4 Inputs

RFT1000 reader is equipped with two (IN1, IN2) inputs which can be configured as NO/NC with RogerVDM software. Inputs can be assigned with functions using RogerVDM software and VISO

software where they are operated in the same way as any other inputs of controller or peripheral devices. The configuration and application of inputs is optional.
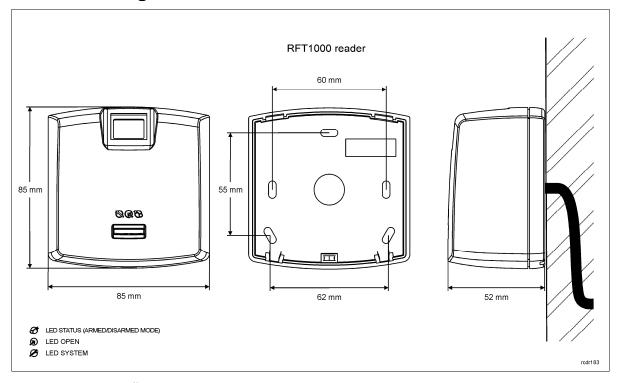
3.5 Wall mounting

Fig. 4 RFT1000 installation

3.6 Use/installation guidelines

- All electric cables must be connected to devices with disconnected power supply.
- If the range of card reading is significantly lower than specified in technical documentation then consider relocation of reader.
- After installation of RFT1000 reader, remove protector from fingerprint scanner. Otherwise it may hinder fingerprint scanning.
- In case of connection through Ethernet port, twisted pair cable should be uninsulated in the shortest possible distance and wires should remain twisted in the longest possible distance.
- It is required to install proximity card readers in minimal distance of 0.5m from each other.
- In order to ensure correct operation of the reader it is necessary to clean fingerprint scanner regularly by means of wet cloth and mild detergent. Do not clean by means of abrasive materials and strong cleaners like alcohols, solvents, etc. Damages to scanner surface are beyond the scope of warranty.
- RFT1000 reader should be installed in shaded and dry place, far from heat and moisture. It is necessary to avoid dust and abrupt temperature changes. The reader cannot be installed in places exposed to direct sunlight. In the event of exposure of the device to direct sunlight or strong artificial light it may operate improperly.
- Proper finger placing for the purpose of fingerprint reading is shown in fig. 5. In case of kids (small fingerprints) it is recommended to verify fingerprint reading prior to installation of RFT1000.
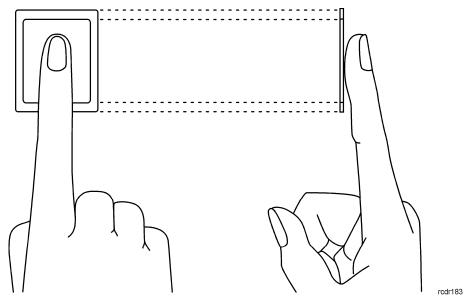
Fig. 5 Proper placing of finger on optical scanner

4. CONFIGURATION

4.1 Low level configuration (RogerVDM)

4.1.1 Configuration of communication parameters

RFT communication parameters which concerns Ethernet network and RS485 bus are configured with RogerVDM software. Factory default settings are as follows:

- IP address = 192.168.0.70
- Subnet mask = 255.255.255.0
- Port = 13544
- Communication is encrypted with default (empty) password

Connection and configuration procedure

1. Connect the reader to computer by means of Ethernet port.
2. Configure your computer's network parameters according to RFT1000 default settings. The IP address of the computer must be in the same subnet i.e. 192.168.0.xxx.
3. Install and start RogerVDM software.
4. In the opened window (fig.6) select *RFT1000 v1.0* device, firmware *v1.4* and *Ethernet* communication channel.
5. IP address and port of RFT1000 reader is automatically detected by RogerVDM software if the reader and PC with RogerVDM are in the same subnet and communication between them is not blocked.
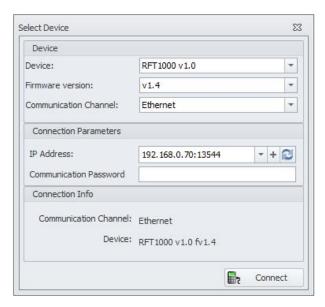6. Select *Connect* button.

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Fig. 6 Select device window in RogerVDM software

7. In the opened window which can also be accessed selecting *Configuration* command in top menu of RogerVDM software, enter such communication parameters as *IP address*, *IP Port*, *Default Gate* and *Subnet mask*.
8. Additionally define your communication password for securing and encrypting the communication with the reader.
9. Select the option *[2] RS485* in *Communication protocol* field and in the area *RS485 protocol settings* below in *Address* field assign unoccupied address to RFT1000 on RS485 bus of MC16 access controller in range of 100..115.
10. Upload settings to the reader with *Send to Device* button.

Note: For RFT1000-ADM it is recommended to set 0 for the parameter *RS485 communication timeout [s]*. In such case the reader which does not require connection to access controller will not signal lost communication with the controller by means of its LED indicators pulsing synchronically.

4.1.2 Recognition modes

In case of RFT1000 it is necessary to select one of following recognition modes:

- 1:N mode (templates in reader's memory) – in this mode, fingerprint templates are recorded in memory (database) of RFT1000 reader. Users are identified by comparison of their fingerprints with fingerprint templates recorded in reader memory.
- 1:1 mode (templates on Mifare cards) – in this mode, fingerprint templates are recorded only on Mifare cards and not in reader's memory. Users are identified by comparison of their fingerprints with fingerprint templates recorded in memory of Mifare card.

4.1.4 Inputs

RogerVDM software enables configuration of RFT1000 inputs. Related options are available in the area *Input lines*, which can be displayed by means of the command *Configuration* in the top menu of RogerVDM software. When RFT1000 reader is installed in RACS 5 system only the function *[5]: Card Reader Mode* is applicable. Other available functions are used beyond RACS systems. In general, input functions of Roger devices depending on assigned functions can be momentary or constant type. Therefore device may detect only activation of input (momentary type) or activation and deactivation of input (constant type).

Table 4. Input functions			
No.	Function	Type	Description
[0]	None	-	Input line is not used.

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[1]	LED STATUS	Constant	Not applicable in RACS 5
[2]	LED OPEN	Constant	Not applicable in RACS 5
[3]	LED SYSTEM	Constant	Not applicable in RACS 5
[4]	BUZZER	Constant	Not applicable in RACS 5
[5]	Card Reader Mode	Constant	Functioning of input line with function *[5]* depends on selected recognition mode. In case of 1:N recognition mode: • when the input is activated then RFT1000 can scan fingerprints and read proximity cards • when the input is deactivated then RFT1000 can only scan fingerprints In case of 1:1 recognition mode: • when the input is activated then fingerprint scanner is off and user can identify only by means of proximity card • when the input is deactivated then RFT1000 requires proximity card and then fingerprint scan

4.2 Communication with RFT1000 (VISO)

Preliminary high level configuration includes database creating with VISO software, configuration of RogerSVC services, controller detection and door creating in VISO software. All these steps are explained in the document AN006 RACS 5 Quick Start Guide. RFT1000 after connection to MC16 controller must be detected on RS485 bus. If the readers is operated in 1:N mode then it must be additionally configured in VISO software as follows:

1. Select the command *Configuration* in the top menu and then *Fingerprint Readers* icon.
2. In the opened window select *Add* button and enter communication parameters which were previously configured with RogerVDM including IP address, port and communication password.
3. Verify settings with *Test connection* button.

4.3 User enrolment in 1:N mode

In 1:N mode, user enrolment including fingerprint scanning and assignment of access rights is done in VISO software. It is recommended to use wizards for user management. In order to add new user select *Wizard* command in the top menu of VISO software, then *Add Person Online* wizard and proceed according to following guidelines:

1. In *Authentication Factors* window when new factor is added select *Fingerprint* in the field *Type* instead of default *40bit proximity card*.
2. Select finger for scanning and then *Read from Reader* button.
3. Select RFT1000 reader for scanning and then *Scan* button.
4. Proceed according to displayed messages.
5. Return to *Add Person Online wizard* and upload configuration to the controller in the last step.
6. When wizard is closed, additionally configure RFT1000 reader(s) right clicking *Networks* in the navigation tree of VISO software and then *Synchronise*.

4.4 User enrolment in 1:1 mode

In 1:1 mode Mifare cards can be programmed with fingerprint templates only within RogerVDM software according to following procedure:

1. After establishing connection with RFT1000 reader in the top menu of RogerVDM software select *Card Programmer* command and then *Card formatting* tab.
2. Click *Format* button and place Mifare card in vicinity of reader for approximately 10 sec. until *Card formatted successfully* message is displayed.

3. Select *Fingerprint template* tab and then *Save template* button in order to start wizard.
4. Proceed according to displayed messages.
5. In VISO software enrol user with Add Person Online wizard assigning card number with previously programmed fingerprint template.
6. Upload settings to controller.

Note: In 1:1 mode do not define RFT1000 reader in VISO software and do not assign users with any fingerprint templates in VISO software.

Table 5. Maximal number of fingerprint templates on Mifare cards	
Card	Max. number of templates
Ultralight	0
Classic 1k	1
Classic 4k	7
Plus S 2k, Plus X 2k	3
Plus S 4k, Plus X4k	7
DESfire 2k	4
DESfire 4k	9
DESfire 8k	10

4.4.1 Master Authorisation

In the last window of card programming wizard it is possible to select the option *User with Master Authorization*. The user with such card can does not have to scan fingerprint when identifying at readers with *Accept master authorization* option enabled (RogerVDM). This authorization is not related with *Master exemption* which can be assigned to user in VISO software.

Note: Mifare cards have different capacities. Mifare Classic 1k cards can store 1 fingerprint template, while Mifare Classic 4k card can store up to 7 fingerprint templates. Mifare Ultralight cards do not have enough memory to store any fingerprint template.

4.5 User identification

User identification by RFT1000 reader depends on selected recognition mode (section 4.2.1), input with function *[5]: Card Reader Mode* (section 4.1.4) and the option *Card reader mode* (RogerVDM). Input [5] is used for dynamic switching of user identification method. More information on application of the input with function [5] is given in table 6 below. The option *Card Reader Mode* is applicable only for 1:N recognition mode and it enables permanent activation of card reader in RFT1000. When this option is selected then user can identify by means of card or fingerprint templates as needed.
Options and functions of RogerVDM enable detailed and variant configuration of user identification method. But there can be distinguished following most often applied settings:

-   1:N recognition mode, [5] input is not used, *Card Reader Mode* option disabled – user is identified only by fingerprint templates recorded in RFT1000 memory
-   1:N recognition mode, [5] input is not used, *Card Reader Mode* option is enabled – user can identify by means of fingerprint template recorded in RFT1000 memory or by means of his Mifare card as needed
-   1:1 recognition mode, [5] input is not used, *Card Reader Mode* option is disabled – user must at first use his Mifare card with his fingerprint templates and then he must place his finger on RFT1000 scanner

Table 6. User identification by RFT1000 when input with function [5] is used.		
Recognition mode	Card Reader Mode	User identification
1:N	Input with the function [5] deactivated	Place finger on RFT1000 scanner.
1:N	Input with the function [5] activated	Place finger on RFT1000 scanner or read proximity card.
1:1	Input with the function [5] deactivated	Place your Mifare proximity card in vicinity of RFT1000 reader and when two beeps sound is made, place your finger on RFT1000 scanner. Users with Master authorization can use their cards and they do not have to scan their fingerprints in order to get access.
1:1	Input with the function [92] activated	Read proximity card.

4.6 Full memory reset

Full memory reset erases current settings, including users data base and restores factory default settings.

Reset procedure
1. Switch off power supply to RFT1000.
2. Remove connections to CLK and IN2 terminals.
3. Connect CLK terminal with IN2 terminal.
4. Switch on power supply to RFT1000. The reader shall generate continuous acoustic signal.
5. Disconnect CLK and IN2 terminals.

Communication parameters after reset:

- IP address = 192.168.0.70
- Subnet mask = 255.255.255.0
- Port = 13544
- Communication is encrypted with default (empty) password
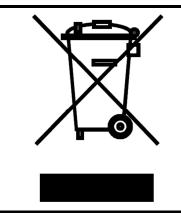
4.7 Firmware update

In order to update the firmware:

1. Establish connection with your RFT1000 using RogerVDM software
2. Select the command *File* in the top menu of RogerVDM software and then select *Send Configuration to File* in order to export current settings of your RFT1000
3. Select the command *Tools* in the top menu of RogerVDM software and then select *Update Firmware*.
4. In the opened window select RFT1000 firmware file (*.frg extension) by means of the button *Select file*
5. Select the button *Update* in order to upload the firmware to RFT1000
6. After firmware upload make full reset according to section 4.6
7. Establish connection with RFT1000 using RogerVDM software
8. Select the command *File* in the top menu of RogerVDM software and then *Read Configuration from File* in order to import previous settings.

5. ORDERING INFORMATION

Table 7 Ordering information	
Product	Description
RFT1000	Fingerprint and Mifare Ultralight/Classic proximity card reader.
MFC-2	13.56 MHz Mifare Classic ISO size thin PVC card, 1k bytes memory.
MFC-3	13.56 MHz Mifare Classic ISO size thin PVC card, 4k bytes memory.

6. PRODUCT HISTORY

Table 8 Product history		
Product version	Released	Description
1.0	06/2013	The first commercial version of the product
1.1	12/2013	Built-in antenna modifications

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