F7 Fingerprint Reader Integration in Roger Access Control System

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1.   Contents

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2.   Glossary and terms

False Acceptance Rate — FAR

A rate which measures how often an unauthorized user is improperly recognized as authorized and gets access to the system.

False Rejection Rate — FRR

A rate which measures how often an authorized user, who should get access to the system is rejected, because the system does not recognize him properly.

User

A person registered in a reader.

Enroller

User authorized to enroll new users in the system and to erase the existing ones.

Admin *Admin*

User authorized to perform advanced operations in the system except of registering users having administrative rights.

Supervisor

User authorized to perform all operations in the device and to modify all the options.

3.   Purpose of this document

This document is not supposed to explain all programming and functionality of the F7. This document is intended to explain an integration of the F7 fingerprint reader in the Roger Access Control System (RACS). If you want to get more information about various configuration options, refer to the original manufacture's manual delivered together with a F7 unit, or visit his web site.

4.   General description

F7 is an easy to use biometric device, which can work both in an standalone mode or as a slave device connected to the access controller. The F7 is equipped with an LCD display, a keypad and an optical fingerprint sensor. Reader can be programmed manually, using a built-in keypad or remotely from PC (through RS232, RS485 or Ethernet). Using Wiegand data output it can be interfaced as a slave reader to various access controllers including PRxx2 series as well.

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5.   Basic operation

Generally, in the RACS, the F7 is used for two purposes:

User enrollment during initial programming phase;

User identification during normal system operation.

Keypad

The keypad consists of the following keys:

OK — confirm key; confirming current operation, answering Yes.

C (Cancel) — canceling current operation, answering No.

M (menu) – display menu of available options.

Navigation keys:

▲ (up) — scrolling up;

▼ (down) — scrolling down;

☉ (Power) — switching a power on/off;

♫ (Bell) — Door Bell;

0…9 — numeric keys.

5.1.   User enrollment

Depending on the version, the reader is able to register 500,1000 or 1500 users. Each user has its ID number (ID= 00001.. 65534) and 1-10 fingerprints patterns. The user's ID corresponds to the position of the user in the F7 reader's users list and should be identical as the user's ID in the RACS system.

Note: Although the specific user identification requires enrolling only one fingerprint pattern, it is recommended to enroll at least 2 or 3 fingerprints for a single user. When the finger, which has been used for enrollment, is cut, the system will be able to identify the user using alternative (second or third) fingerprint pattern. The only disadvantage which arise from multiple fingerprints registered in a reader's memory is the increased time required for configuration of a unit.

During enrollment of a new user, a fingerprint is scanned three times. Once the reader verifies that these three fingerprints are the same, the new fingerprint pattern is stored in the reader's memory and can be later imported to the RACS system database.

5.1.1. User enrollment methods

There are three different methods of user enrollment:

- **Enroll FP** — only fingerprint of the user is enrolled;
  An enrollment mode which suits for most users who have good quality fingerprints.
- **Enroll FP & PWD** — fingerprint and password are enrolled;
  An enrollment mode which suits for those users for whom the fingerprints have been enrolled successfully, but there are problems with verification.
- **Enroll PWD** — only password is enrolled;

An enrollment mode which suits for the small group of users (usually not exceeding 1 percent of all the users) for whom the system can not read fingerprints.

From the RACS system perspective, the most important is the first mode of enrollment.

5.1.2. User programming

Note: The process of users enrollment in an empty system should start from enrollment the user having administrator rights (**Admin**, **Enroller** or **Supervisor**) This is especially important for security reasons. In case there is no administrator in the reader, every person having an access to a reader may enroll new users and delete existing ones.

Programming the Admin user

After a device is switched on, the *Welcome* message and a current date are displayed on the LCD display. In order to enroll a new **Admin**, perform the following operations:

1. Press **M** (menu).
2. Select **User Manage**. Press **OK**.
3. Select **Enroll Admin**. Press **OK**.
4. Select **Enroll FP**. Press **OK**.
5. The *Admin Accredit* message displays with inversed text box below. Use navigation keys (▼▲) for cycling between different administrative roles of the user enrolled (**Admin**, **Enroller**, **Supervisor**). Select **Admin** (or **Supervisor**) and press **OK**.
6. The *New Enroll?* message displays. Press **OK**.
7. System will ask for the user ID. In the **UserID** field enter admin's ID. In the empty system this defaults to *00001*. Set the number according to the main users list in the RACS system and press **OK** to confirm.
8. The *New Enroll xxxxx-0* message appears (where *xxxxx* is the user's ID, and *0* indicates the number of fingerprints currently enrolled in the reader for the specific user). After a while, the *Place Finger...* message appears.
9. Place finger on the sensor. When the reader reads it, the *Remove Finger* message appears, and then *Second Press*. At this moment you should place the same finger on the sensor again. If everything goes well also this time, the *Third Press* message appears. If the system does not recognize the fingerprint properly during the procedure, the *Please Try Again...*message appears. The procedure lasts until the system properly identifies three consecutive attempts of storing the fingerprint which belongs to the same finger.
10. The *New Enroll* message appears with the user's ID below and a number of the fingerprint being enrolled, eg.*00001-1* and a question *OK(Save)?.* Press **OK** in order to confirm the fingerprint of the new administrator.
11. The *New Enroll Continue?* message displays. In order to enroll the other fingerprint for the same administrator press **C** (then the system switches to the *Backup Enroll* mode). Press **OK** to continue the process of enrolling other administrators.

Note: It should be noted that when the procedure of enrollment a new **Admin** is initiated, and then you select **OK** in the step 10., the system will start the process of enrollment another administrator. This should be taken into account in order to avoid the situation, that the administrative rights are mistakenly assigned to ordinary user. The enrollment of ordinary users has been explained in the next sections of this manual.

12. The process of enrollment the other fingerprints is similar to the process of enrollment the first one (steps 7 – 10). The difference is that in case of enrollment backup fingerprints in the upper part of an LCD display, the *Backup Enroll* instead of *New Enroll* message appears. When the system asks *Backup Enroll Continue?*, then in order to enroll an another backup fingerprint for the same user, press **OK**.

Note: When somebody attempts to enroll the fingerprint, which had been enrolled earlier, the *FP Enrolled Already* message appears, and the system will refuse to enroll the fingerprint.

Programming Normal users

Only the user with administrator rights is allowed to enroll new users in the system. To enroll a new user perform the following steps:

1. Press **M** (menu). The *Admin Affirm* message appears. Place your finger on the sensor in order to perform verification. If the reader recognizes the finger as belonging to an administrator, the menu displays which allows for performing the other steps of programming (see below). Otherwise, the *Please Try Agn. Access Deny!* message displays meaning that the fingerprint read does not belong to the administrator and programming can not be continued.

Note: If after pressing **M** the system does not display *Admin Affirm* message, it means, that the administrator has not been defined. In such a case, you should enroll an administrator according to the procedure described in the previous section.

2. Select **User Manage**. Press **OK**.
3. Select **Enroll User**. Press **OK**.
4. Select **Enroll FP**. Press **OK**.
5. The *New Enroll?* message displays.
6. Press **OK**.
7. System will ask for the user ID. Enter user's ID in the **UserID** field. It defaults to the next available (unassigned) ID number in the system. Enter ID number and press **OK** to confirm.
8. The *New Enroll xxxxx-0* message appears, where *xxxxx* indicates the ID entered before and *0* is the number of fingerprints which have been stored in the system for the specific ID so far.. After a while, the *Place Finger...* message appears.
9. Ask the user for placing her(his) finger on the sensor. When the reader reads it, the *Remove Finger* message appears, and then *Second Press*. Ask the user for putting her(his) finger on the sensor again. If everything goes well also this

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time, the *Third Press* message appears. If the system does not recognize the fingerprint properly during the procedure, the *Please Try Again...*message appears. The procedure lasts until the system properly identifies three consecutive attempts of storing an fingerprint as belonging to the same finger.

10. The *New Enroll* message appears with the user's ID below and the number of the fingerprint being enrolled, e.g. *00002-1* and a question *OK(Save)?.* Press **OK** in order to confirm the fingerprint of the new user.

11. The New *Enroll Continue?* message displays. In order to enroll the other fingerprint for the same user, press **C** (then the system switches to the *Backup Enroll* mode). Press **OK** to continue the process of enrolling other users.

5.2.   User identification

The main function of the F7 fingerprint reader is verifying users identity based on her(his) fingerprint pattern. After scanning, the fingerprint is compared with patterns stored in the reader's memory, and when the verification is successful, the user's ID number is sent over Wiegand outputs (lines: D0 and D1) to the access controller.

When F7 reader is idle for specific time (10 minutes by default) it enters standby mode. In this state, the process of users identification can not be performed. The reader switches to the active mode after the user presses any key on the keypad. In the active mode there is the Welcome message and the current date and time displayed on the LCD display. In order to check his identity, the user should follow these steps:

1. Make sure that the device is in the active mode. If not, press any key on the keypad. The reader switches into the active mode.

2. Place your finger on the sensor's surface. The *FP Verify. Remove Finger*. message displays. If the check is successful, the *UserId xxxxx Verified!* message appears, where xxxxx is the ID number of the user in the system.

3. If the identification of the user fails, the *Please Try Again!* message appears Place your finger on the sensor's surface again. If several verification attempts fail, contact your system administrator and ask him for enrolling your fingerprint again.

6.   Using F7 reader in the RACS

Started from release 4.2, the RACS system is prepared for using a F7 Fingerprint reader. In order for the reader to properly operate in the RACS system, ID numbers of users defined in the reader's memory should be the same as in the database of the RACS system. F7 reader is used in the RACS for two main reasons:
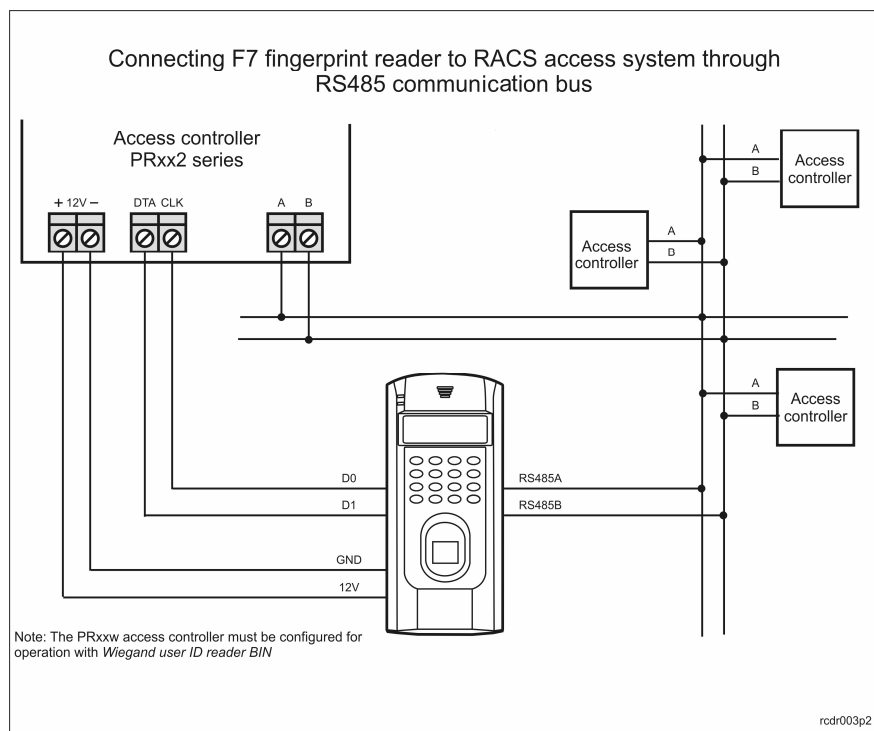
• Allows for enrollment of fingerprints patterns and storing them in the system's database (through importing).

• Allows for users verification based on their fingerprints.

The general scheme for cooperation the RACS system with the F7 reader is as follows:
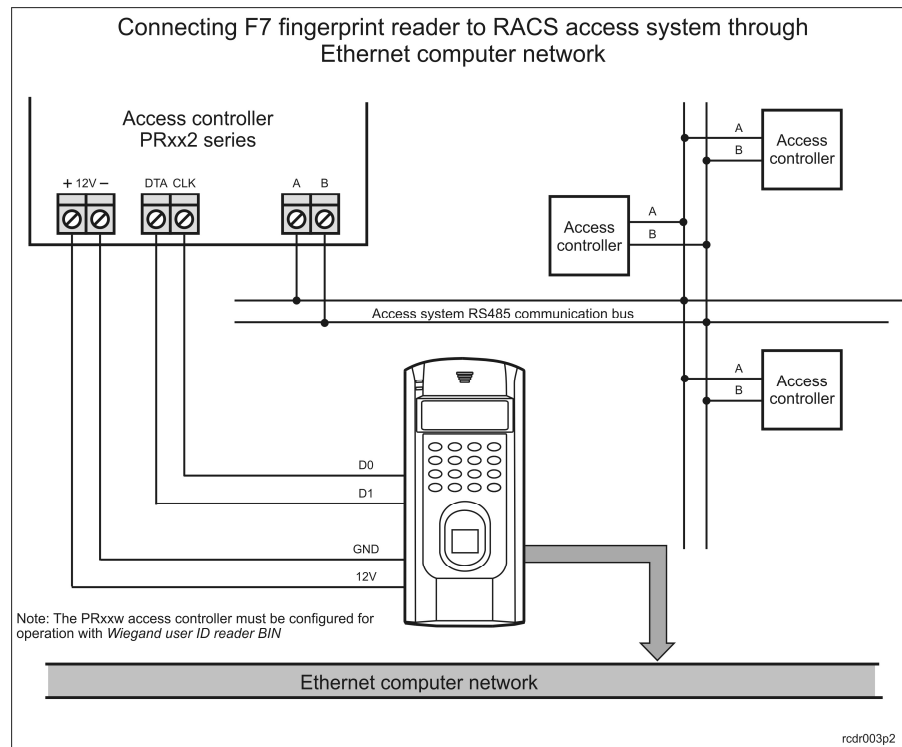
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1. Physical connection of the reader to the access controller through Wiegand lines.
2. Physical connection of the reader to the managing computer through RS485 or Ethernet.
3. Configuration of the F7 reader for operation with the RACS system.
4. Enrolling fingerprints into F7 reader. The ID numbers of users registered in F7 must be identical as those, which have been defined in the PR Master database.
5. Importing fingerprints patterns to the RACS database.
6. Exporting fingerprint patterns to the rest of F7s in the system.
7. Using the readers for user identification.

6.1. Physical connections of the reader

F7 reader should be connected to the access controller using Wiegand output lines (D0 and D1), also it should be connected either to RS485 or LAN communication bus. The Wiegand interface is used by a reader to output ID number of a user which was identified through fingerprint whereas RS485 or LAN is required for download/upload of the fingerprints patterns from/to the F7 reader.
The connection diagrams according to the specific transmission modes are presented in the following figures.

Connecting F7 fingerprint reader to RACS access system through RS485 communication bus

Note: The PRxxw access controller must be configured for operation with *Wiegand user ID reader BIN*

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Connecting F7 fingerprint reader to RACS access system through Ethernet computer network

6.2. Setting up the reader for operation with the RACS system

Before the F7 reader can work with the RACS system, it should be properly configured. Basically it covers setting up the communication options and the relevant data transfer parameters.

Note: For security reasons, the process of setting up the reader should start from enrolling its Supervisor. For instructions on how to enroll the Supervisor, refer to the **Programming the Admin user** section, in 5.1.2 section of this manual.

6.2.1. Setting the reader for connection to Ethernet network

In order to configure the reader for co-operation with the RACS through a computer network, you should set up the speed of the network and the IP address.
In order to configure the reader for connection through Ethernet, follow these steps:

1. Press **M** (menu).
2. Select **Options**. Press **OK**.
3. Select **Comm Opt**. Press **OK**.
4. Select **IP Addr**. Press **OK**.
5. Enter the IP address assigned to the device, eg. 192.168.0.201 (for proper IP address settings, contact your LAN administrator). Use navigation keys (▼▲) for moving between individual parts of the IP address. In order to confirm the address entered, press **OK**. The reader enters the communication options menu (*Comm Opt*).
6. Select **Net Speed** and press **OK**. Use navigation keys to select relevant network speed modes. There are *10M-F*, *100M-F* and *AUTO* options

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available. The *10M-F* option indicates the 10 MB/s network, the *100M-F* corresponds to the 100 Mb/s network, and the *AUTO* option allows for automatically adjusting of network speed. Select proper settings and press **OK**. The reader enters back the communication options menu (*Comm Opt*).

7. Select **Ethernet** and press **OK**. Using navigation keys select **Y** and press **OK**.

8. In the **COMM Key** field you can optionally enter communication key. It defaults to zero.

9. Press **C**. The *Comm Opt Save?* message displays. Press **OK** to save the settings.

10. To check that the reader can be seen in the network, you can use the PING command. In order to use it, open the command line window (*Start/Run/cmd)* or enter it directly in the *Run* dialog box:
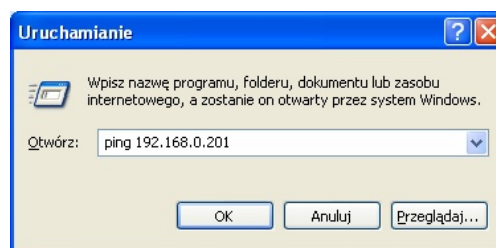
If the communication is OK, the system will display the following answer:
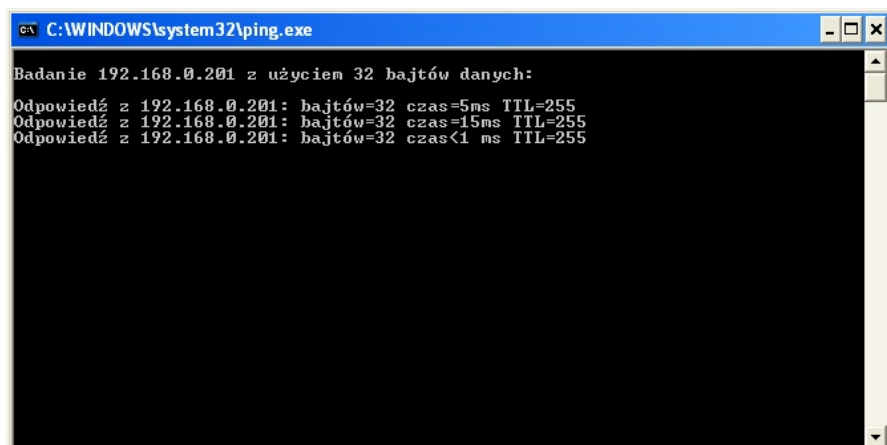
The message *Request timed out* indicates, that the reader can not be communicated. In such a case it is likely, that you have made a mistake in setting up the IP address, the network speed or the communication in the Ethernet has not been switched on. In such circumstances you should carefully follow the configuration procedure from the beginning.

After the reader is configured, the PR Master System should be properly set up. In order to do this, follow these steps:

1. Start the PR Master application.

2. From **Edit** menu select **F7 Fingerprint Readers**.
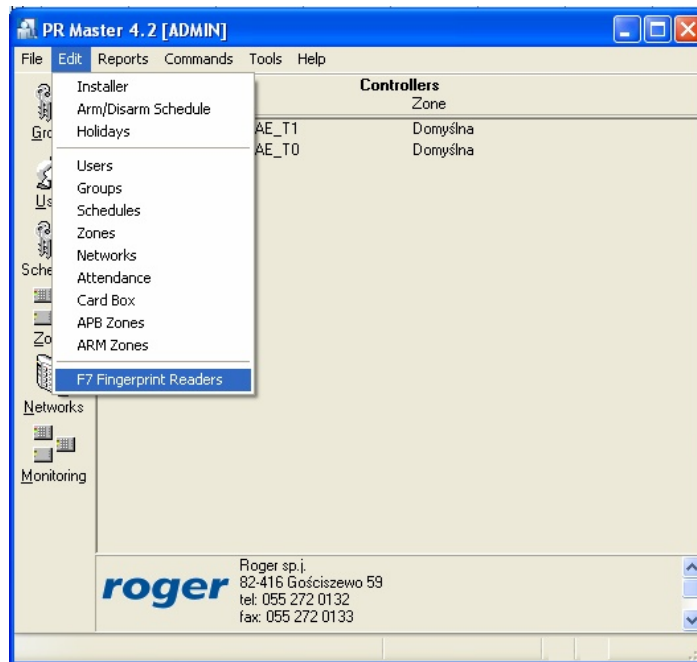
3.   The *F7 Fingerprint readers* dialog box appears*.*
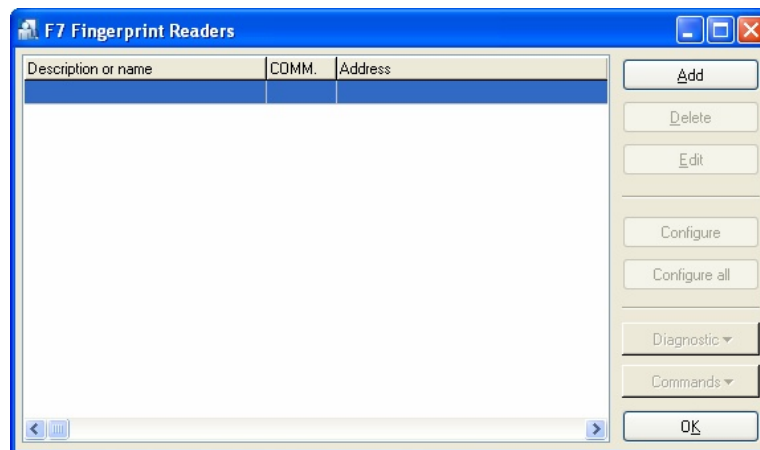
4.   To add a new fingerprint reader click **Add**. The *F7 Configuration* dialog box will display.
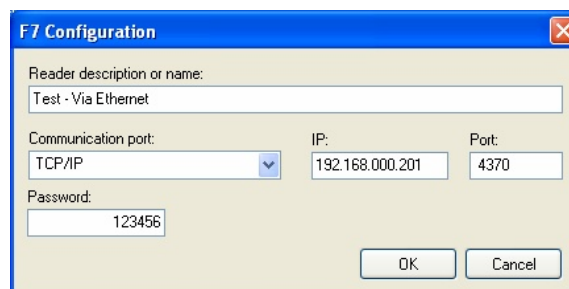
5.   In the **Reader description or name** field enter the name of the reader. In the **Communication port** list box select *TCP/IP*. In the **IP** field enter the IP Address of the device (the same you have set up in the reader). You need to take care that all the address group consisted of three digits. It is especially important when the specific group contains number consisting of less than three digits. For instance, instead of 192.168.0.11 you should enter 192.168.000.011. In the **Password** field enter the communication key (the same which you have entered in the reader using **COMM Key** option).

6. Click **OK**. A new F7 reader appears in the list of configured devices.
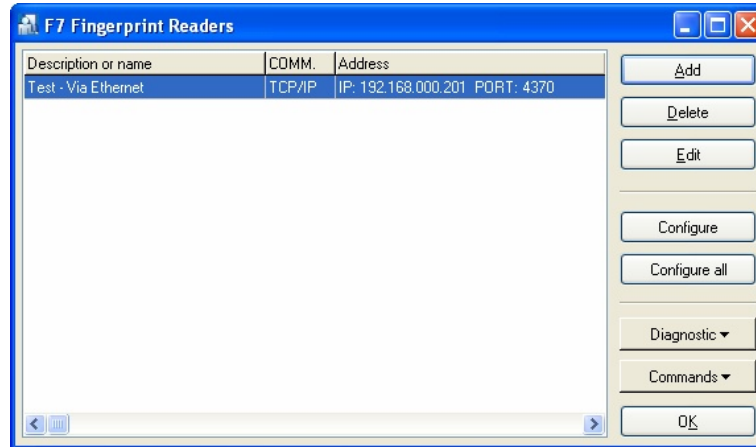
7. To test the connection you can use **Diagnostic** menu commands. Click **Diagnostic** and select any command, eg. **Read date and time**. If the configuration was successful, the following dialog box displays:

8. Click **OK** to close **F7 Fingerprint Readers** dialog box.

6.2.2. Setting the reader for connection to RS485

In order for the reader to co-operate with the RACS through RS 485 data bus, serial communication options (data transfer speed, device number) must be set and the RS232 and RS485 communication mode need to be switched on.

Note: For some reasons, in order to use communication in RS485 mode, the RS232 mode needs to be switched on as well. It should be taken into account when configuring the reader for communication via the RACS's system data bus.

In order to configure the reader for connection through the RS485 data bus, follow these steps:

1. Press **M** (menu).
2. Select **Options**. Press **OK**.
3. Select **Comm Opt**. Press **OK**.
4. Select **BaudRate**. Using navigation keys select *9600*. Press **OK**.
5. Select **Dev Num**. Using navigation keys or digit keys (0..9) enter the device number (the address of the device on the bus). Press **OK**.
6. Select **RS232**. Press **OK**. Select **Y** value and confirm it with the **OK** key.
7. Select **RS485**. Press **OK**. Select **Y** value and confirm it with the **OK** key.
8. In the **COMM Key** field you can optionally enter communication key. It defaults to zero.
9. Press **C**. The *Comm Opt Save?* message displays. Press **OK** to save the settings.

After the reader is configured, the PR Master System should be properly set up. In order to do this, follow these steps:

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1. Start the PR Master application.

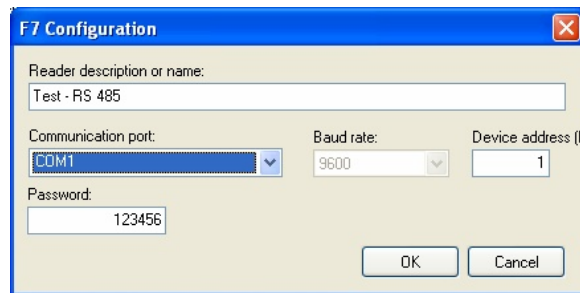2. From **Edit** menu select **F7 Fingerprint Readers**.
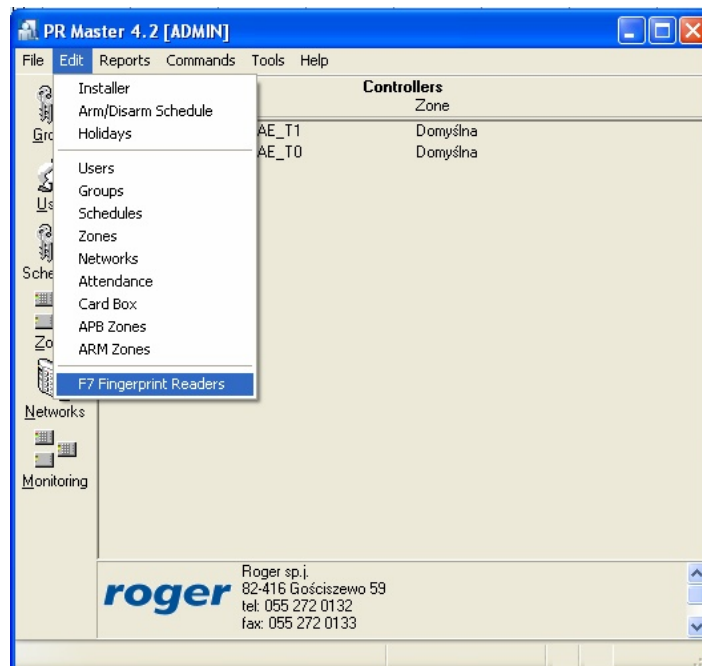
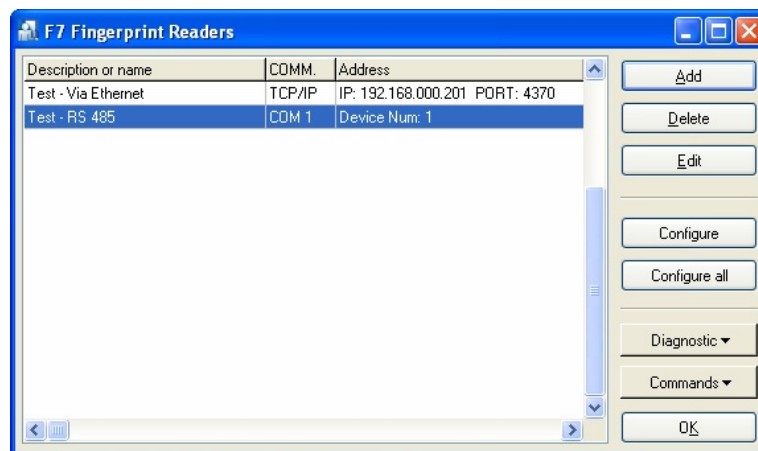3. The *F7 Fingerprint readers* dialog box appears.
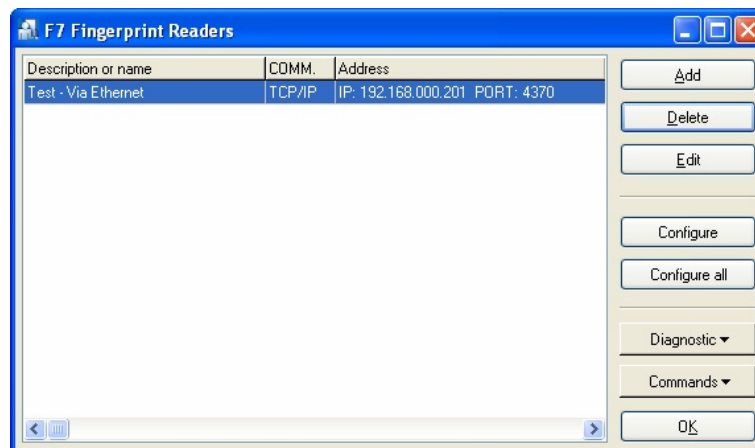
4. To add a new fingerprint reader click **Add**. The *F7 Configuration* dialog box will
   display.
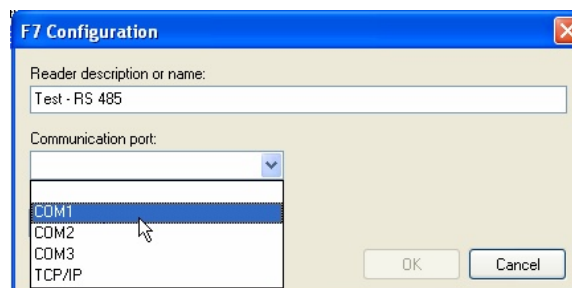
5. Enter the name of the reader. In the **Communication port** drop-down list
    select communication port the RACS system has been connected to. The
    Device address field displays.

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6. **Enter the device number (the same you have configured in the **Dev Num** field
    in the reader) and click **OK**.

7. **In the **Password** field enter communication key (the same you have set up in
    the **COMM Key** in the reader) and click **OK**.

8. Click **OK**. A new F7 reader appears in the list of configured devices.

9. To test the connection you can use **Diagnostic** menu commands. Click
    Diagnostic and select any command, e.g **Read date and time.** If the
    configuration was successful, the following dialog box displays:
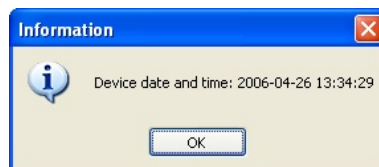
10. Click **OK** to close *F7 Fingerprint Readers* dialog box.

6.3.   Importing fingerprints from the reader

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After fingerprints of users have been enrolled in the F7 reader, they can be
imported to the RACS. Fingerprint patterns can be imported to the database of the
RACS using one of the two modes available:

- bulk mode;
- individual mode;

6.3.1. Importing multiple fingerprint patterns from the F7 reader

Import in the bulk mode is done through reading fingerprint patterns from the
reader for all the users for whom they have been enrolled. In order to do so,
perform the following steps in the PR Master application:

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1.   Select **Users** tab. The following dialog box appears:
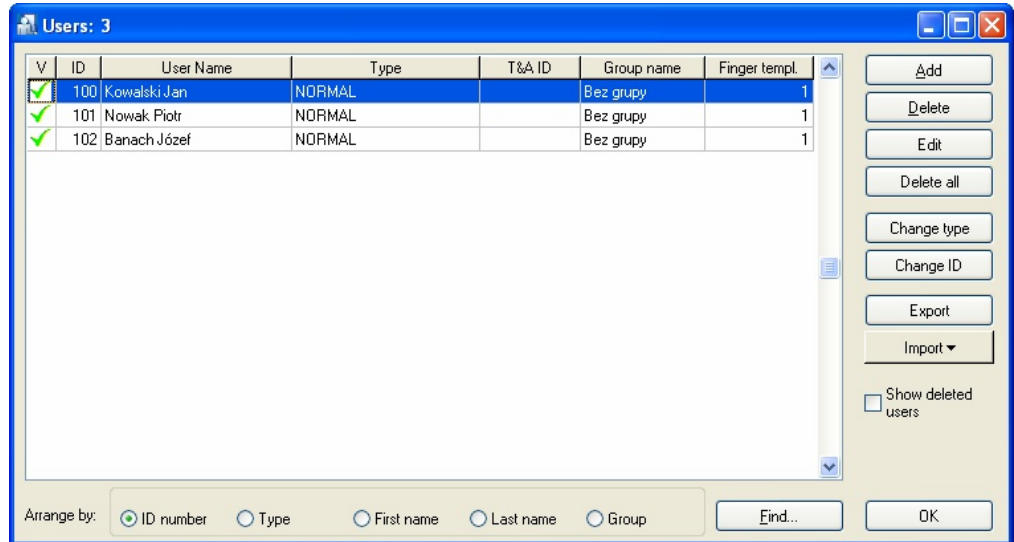
2.   Select command **Import/Read fingerprint templates from reader...** . The
      following dialog box appears:
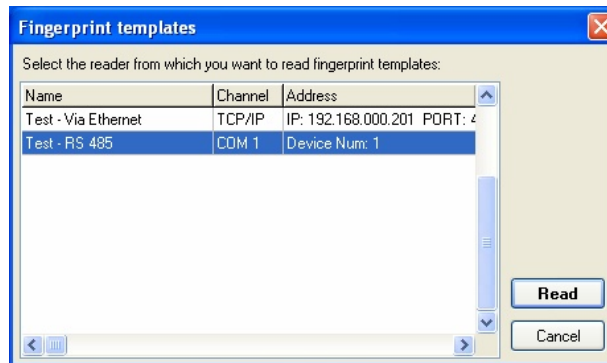
3.   Select reader from which you want to import fingerprint patterns. Click **Read**.
4.   The following window appears showing operation progress. Depending on the
      number of users for whom fingerprint patterns are being imported it can last
   from several seconds to several minutes.
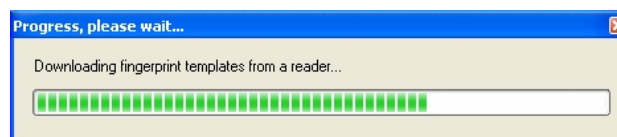
5.   After the operation is complete, in the **Finger templ** column in the **Users**
      window the number of fingerprint templates for the specific user is displayed.

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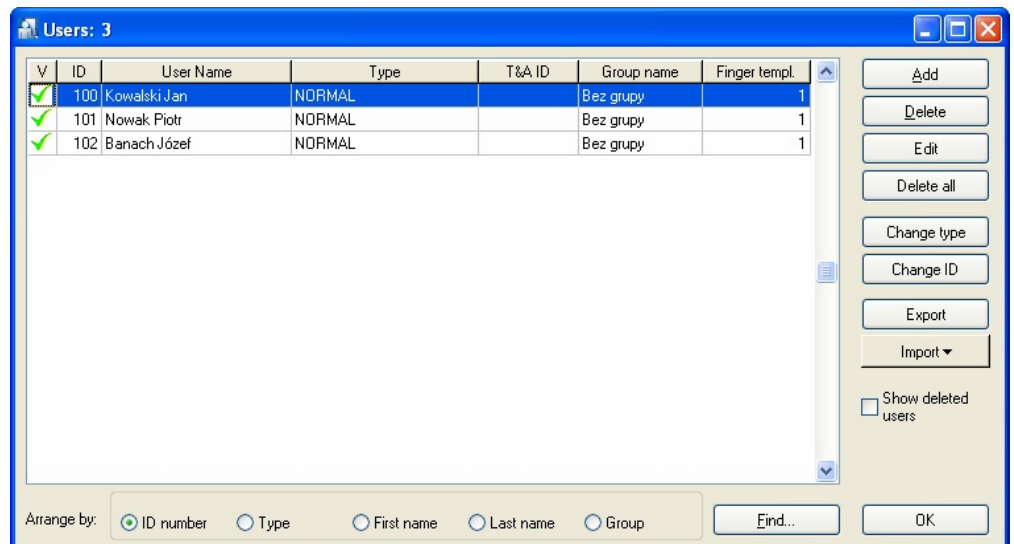
6.3.2. Importing fingerprint patterns for individual user
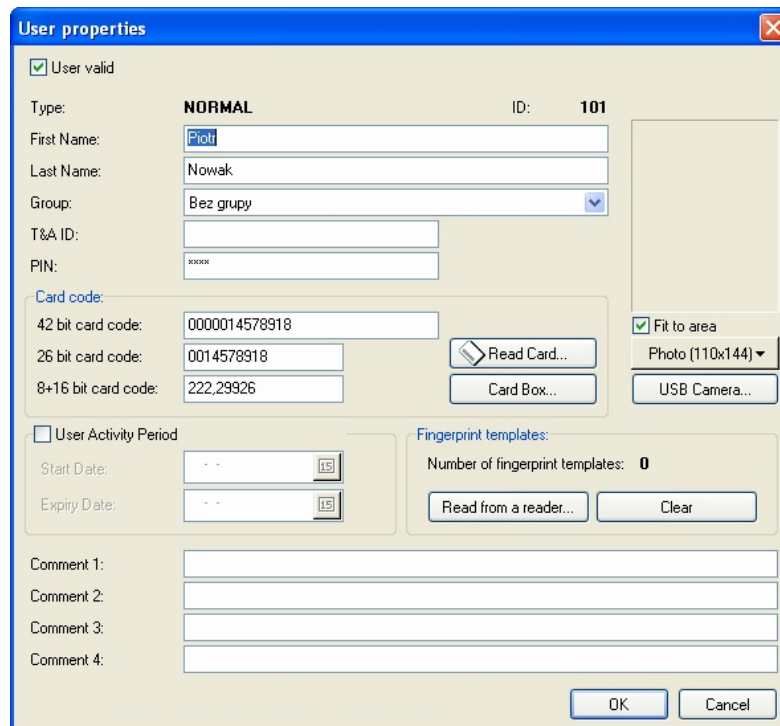
Importing fingerprint patterns can be also performed in the individual mode, i.e. during defining or editing properties of the specific user. In order to do so, follow these steps:

1. Select **Users** tab. The following dialog box appears:
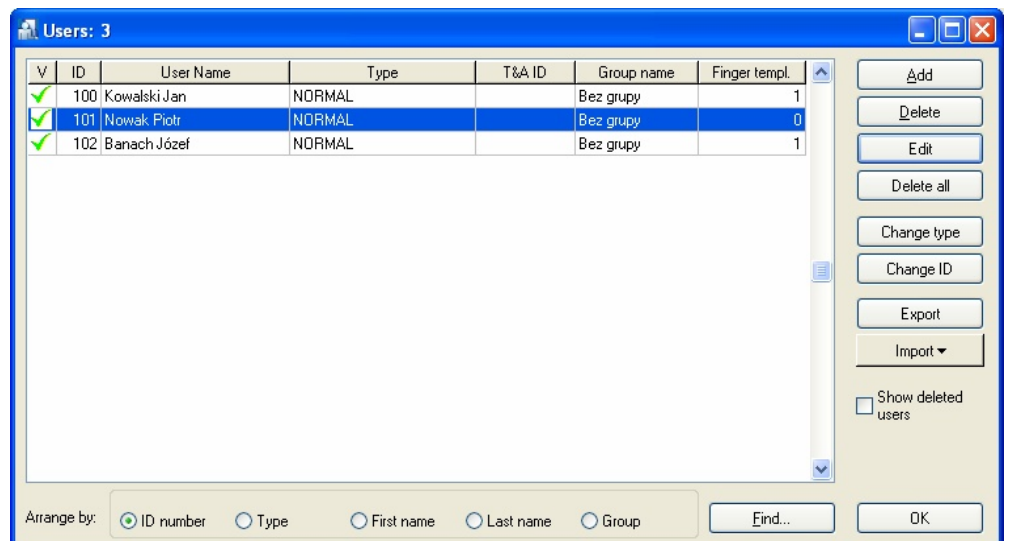
2. Select user, for whom you want to import the fingerprint pattern. Click **Edit**.
    The following dialog box appears:

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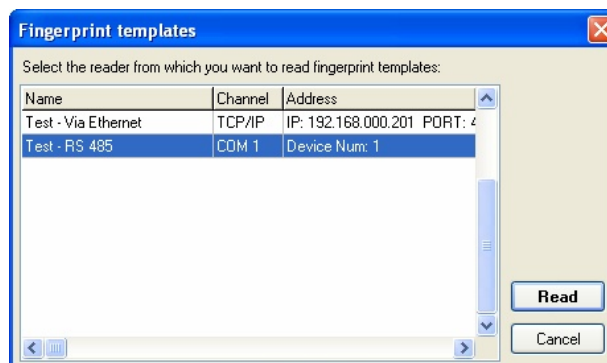
3. In the **Fingerprint templates** area click the **Read from the reader** button.
    The following dialog box appears:

4. Select reader from which you want to import fingerprint patterns. Click **Read**.
    If the system does not find the fingerprint pattern of the user selected in the
   reader chosen, the following error message will display:

    If it does find the fingerprint pattern we are looking for, after a while the
    number of fingerprint patterns read from the reader will appear in the **Number
    of fingerprint templates** field of the dialog box.

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5. Click **OK** to close **User properties** dialog box**.**
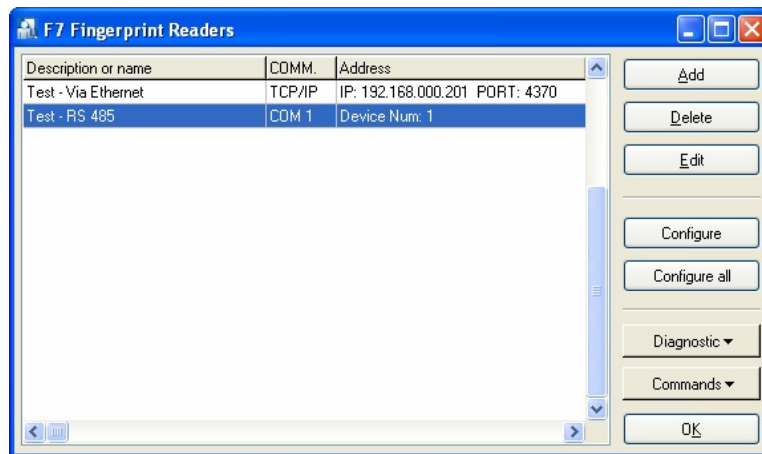
6.4. Uploading fingerprint patterns to F7 readers

Once the fingerprints patterns are enrolled into RACS database, they can be sent to all F7 readers in access system In order to do so, follow these steps:

1. From **Edit** menu select *F7 Fingerprint Readers*.
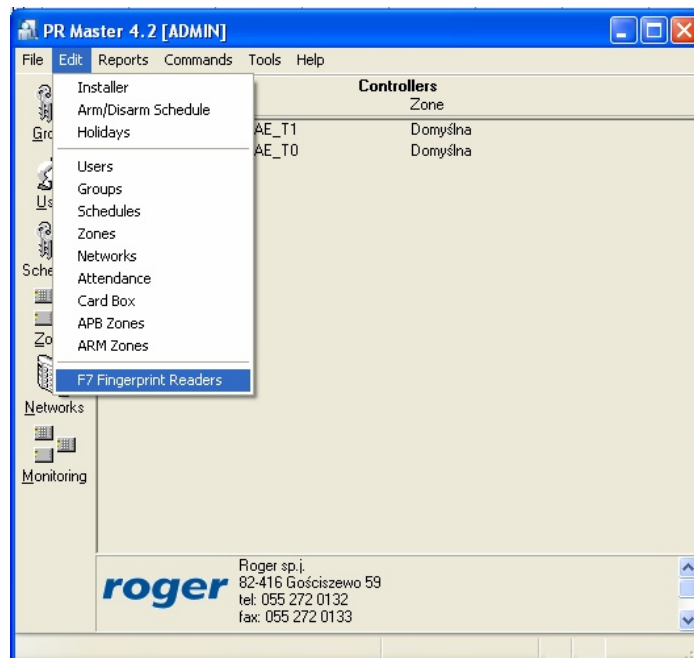
2. The *F7 Fingerprint readers* appears.

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3. Click **Configure all**. The following warning appears:

4. If you are sure, that the current content of the database contains proper data, click **Yes**. The process of sending settings to readers will begin. During this process, the following window indicating progress of the operation displays:
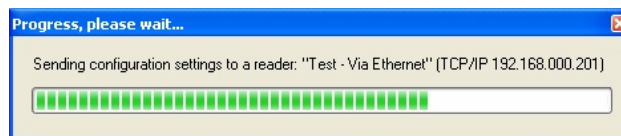
After the settings are successfully sent to all F7 readers, the following dialog box appears:
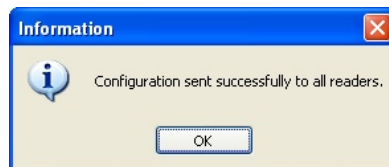
Note: After the configuration of the readers is complete, the system automatically assigns Supervisor rights to the MASTER user of the RACS. Because the MASTER user in the RACS has the ID =0, which does not exist in the F7, the MASTER user in F7's is assigned ID=5555 and the PIN code of the MASTER user as defined in the PR Master. Therefore it is especially important, that the MASTER user of RACS is defined before updating all the F7 readers. In case there is no such a user, there will not be any administrator defined in F7's. In such scenario each person approaching the reader can access the menu, enroll new users and delete existing ones.

## 6.5. Configuring access controller for operation with F7 reader

The last configuration step needed for integration a reader with RACS is to select a terminal type in the PR Master software. In order for F7 reader to properly identify

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users, a terminal type **Wiegand reader – User ID (BIN)** should be chosen in the properties of the PRxx2 controller. In order to do so, follow these steps:

1. In the PR Master application select **Networks** tab. The following dialog box containing the list of networks will appear:
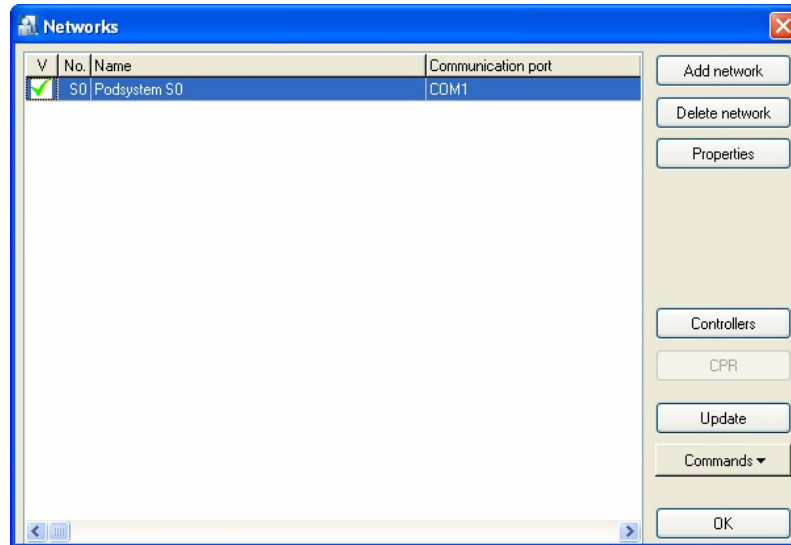

2. Select network the F7 reader has been connected to, and click **Controllers**.

    The *Controllers in network: Network XX* dialog box appears, where *XX* indicates the name of the network chosen.
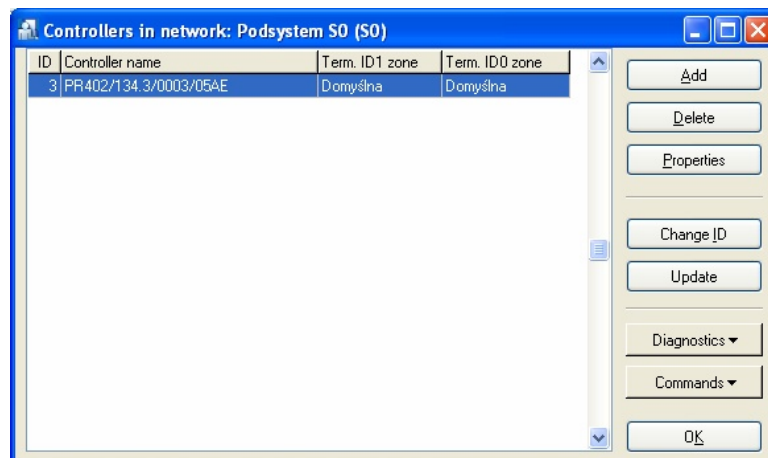

3. Select controller the F7 reader has been connected to and click **Properties**.

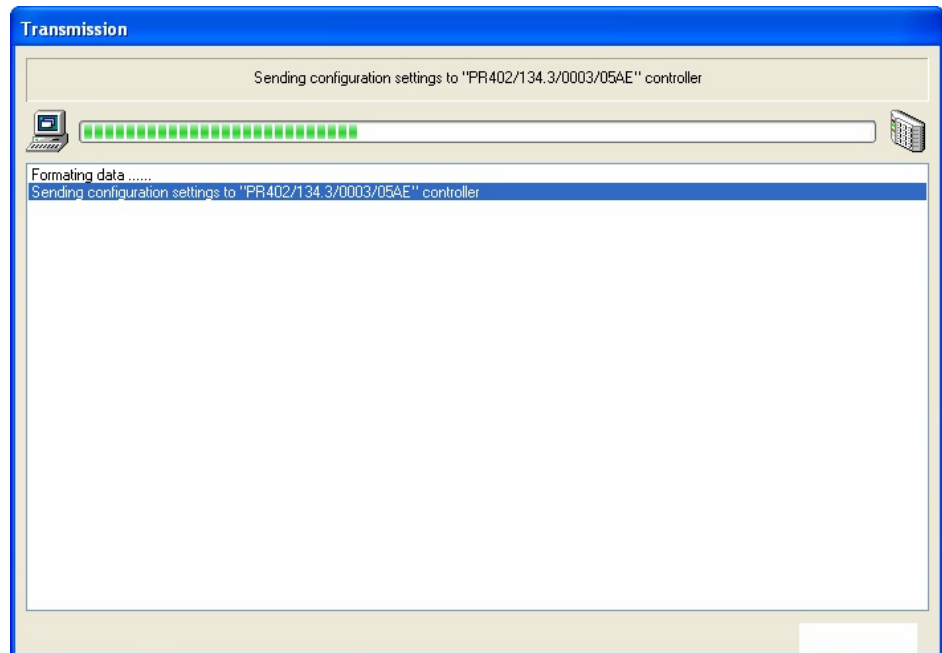   The *Controller properties* window appears:
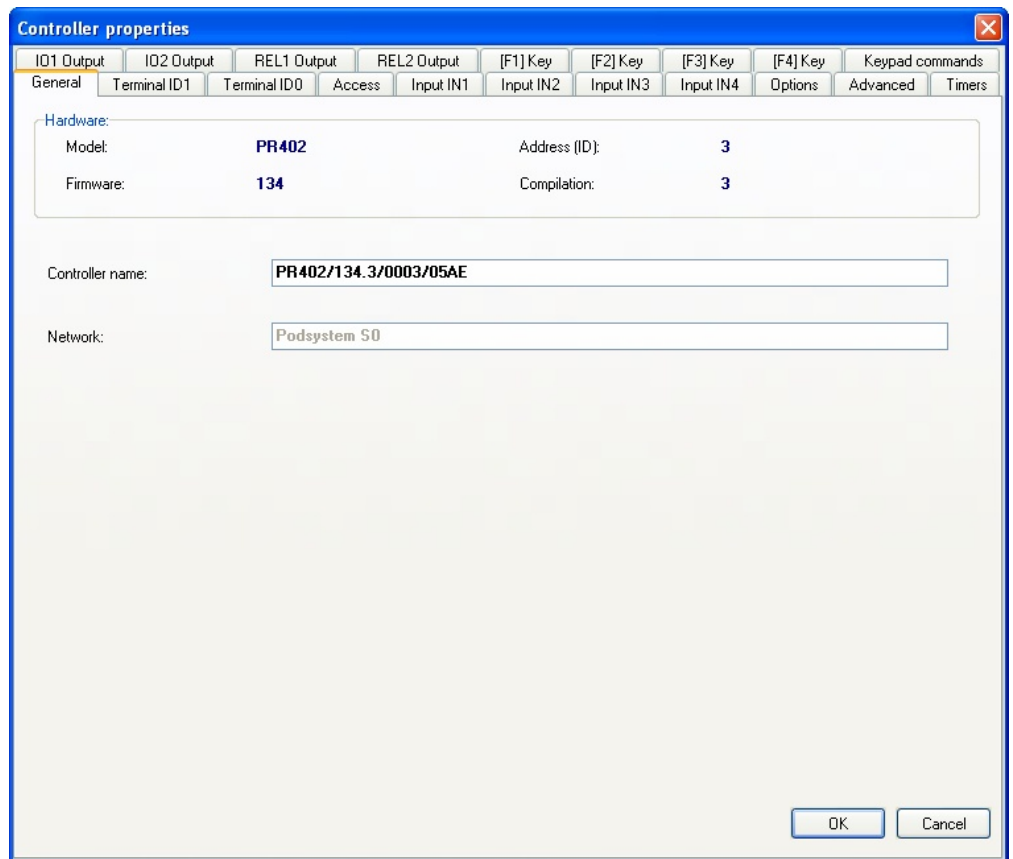
4. Select **TerminalID1** or **TerminalID0** tab depending on the number, the reader is operating in the system (ID1 or ID0). The following dialog box will appear:
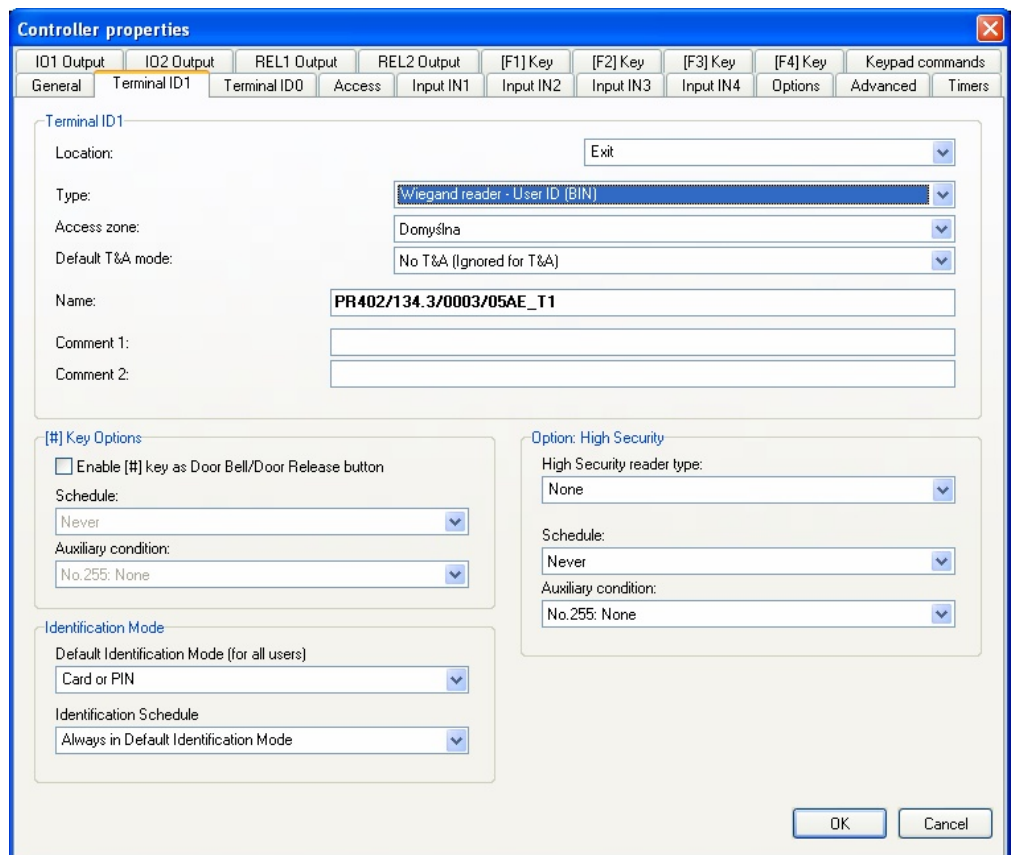
5. From the **Type** drop-down list select *Wiegand reader – UserId (BIN)*. Click **OK**.

6. When you close the window, the following dialog box appears:
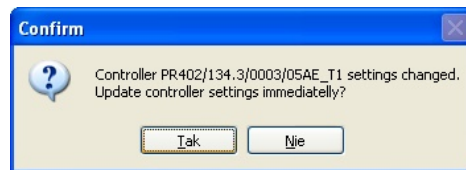
7. Click Yes. The process of transferring data to the controller will begin. While this process is being done, the following window showing progress of the operation is displayed:

8. After the data are successfully transferred to the controller, the following window appears:

In order to check if the system operates properly, you can start **Monitoring** window and observe if the authorized users may successfully use theirs fingers

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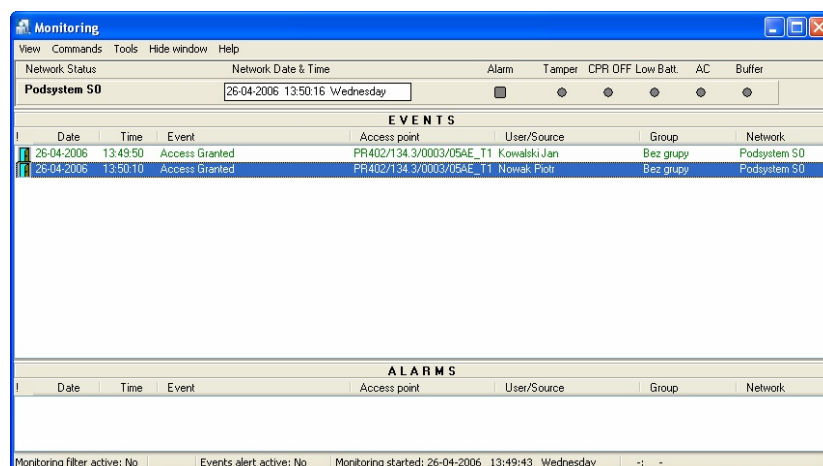
7.   Technical specification

Technical specification	
Input voltage	10 — 15 VDC
Current consumption	Standby mode: 50 mA Active mode: 400 mA
Outputs	Relay output 3A/12VDC.
Communication interfaces	TCP/IP, RS232 or RS485
Verification speed	max. 2 seconds
FRR (False Rejection Rate)	max. 1%
FAR (False Acceptance Rate)	max. 0.0001%
Operating temperature	0..45°C
Relative humidity	20..80 %
Dimensions	W82 x D35 x H180

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