



RADIO READING UNIT

RFU 35

Installation and service manual

APATOR METRA s.r.o.

Havlíčková 919/24

787 64 Šumperk

Czech Republic

tel.: +420 583 718 111

fax: +420 583 718 150

e-mail: prodej@metra-su.cz

www: <http://www.metra-su.cz>

CONTENT

1. INTRODUCTION.....	3
1.1. RFU 35 description.....	3
1.2. Technical specification.....	3
1.3. Contents of the package.....	4
2. CONTROL SOFTWARE INSTALLATION.....	5
2.1. RFU PC installation.....	5
2.2. Driver installation.....	8
2.2.1. <i>Windows XP</i>	8
2.2.2. <i>Windows 7</i>	14
3. HOW TO USE CONTROL SOFTWARE.....	20
3.1. First start.....	20
3.2. User interface description	21
3.3. Reading.....	22
3.4. Structure of the program folders.....	23
4. PLANNING OF THE READINGS.....	24
4.1. Reading Plan.....	24
4.1.1. <i>Plan Matrix P</i>	24
4.1.1.1. <i>Definition of matrix P elements</i>	24
4.1.1.2. <i>Meaning of matrix P zero-row</i>	24
4.1.1.3. <i>Meaning of matrix P columns</i>	25
4.1.2. <i>How to save reading plan into file</i>	25
4.1.2.1. <i>Plan matrix P – example</i>	25
4.2. Base of plan.....	26
4.2.1. <i>How to save base of plan</i>	26
4.3. Example of the reading plan.....	29
4.3.1. <i>How to save base of plan - example</i>	32
5. SOLUTION OF MOST COMMON PROBLEMS.....	34

1. INTRODUCTION

Radio reading unit RFU 35 is used for data reading from the electronic heat cost allocators E-ITN 30 and radio modules for water meters E-RM 30. This manual describes the operation and function of RFU 35 and also of control software RFU PC.

1.1. RFU 35 DESCRIPTION

The radio reading unit RFU 35 in its basic version is supplied with omni-directional antenna capable of receiving radio signal. CD with installation file for RFU PC software and RFU30.sts file with application number (licence file) are also included.

Directional panel antenna ZZ P-868 can be ordered as optional accessories. Antenna allows better signal receiving from heat cost allocators and radio modules for water meters.



Illustration 1: RFU 35



Illustration 2: Panel antenna ZZ P-868

For work with RFU 35 any computer with installed Microsoft Windows XP / Vista / 7 is required (notebook / netbook) (in the text refereed as "computer"). RFU 35 is connected via standard USB port.

Warning!

License file [.STS] is provided by manufacturer and intended for use in one installation of the RFU PC control software on one computer only.

Regular backup is recommended. The manufacturer assumes no liability for any loss of data.

1.2. TECHNICAL SPECIFICATION

Power supply	via UBS connector
PC connection	USB port 1.1 and higher
Antenna	omni-directional SMA antenna (1 dB) – included panel antenna ZZ P-868 (8,7 d Bi) – optional accessory
Supported OS	Windows XP, Windows Vista, Windows 7 (including Windows 7 Starter)

1.3. CONTENTS OF THE PACKAGE

The manufacturer thoroughly inspects and tests all RFU 35 units before shipping. After receiving please check their integrity and completeness. In case of units damage, contact manufacturer or transport company immediately.

Package includes::

- RFU 35 unit
- omni-directional 1 d Bi antenna
- CD with software and licence file

2. CONTROL SOFTWARE INSTALLATION

2.1. RFU PC INSTALLATION

Before starting work with RFU 35 unit, RFU PC application need to be installed. Installation data for RFU PC can be found on the CD in the folder:

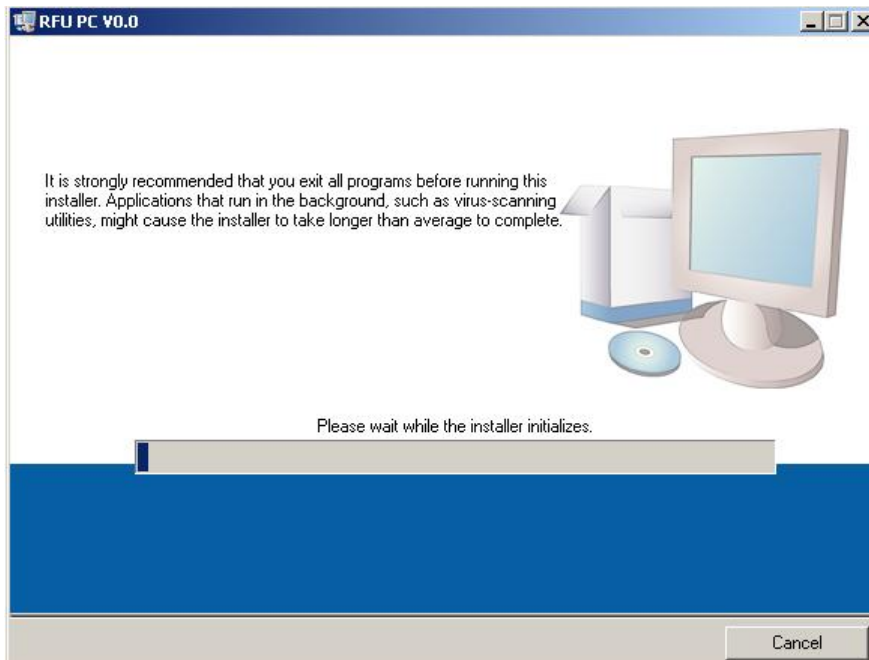
- **RFU PC V0.0 INSTALLER** – all Windows versions (XP, Vista, 7, Server) except W7 Starter
- **RFU PC V0.0 INSTALLER WINDOWS 7 STARTER** – Windows 7 Starter

(Illustration 3: RFU PC installer location on CD), authorized partners can download installation file from the manufacturer's website.

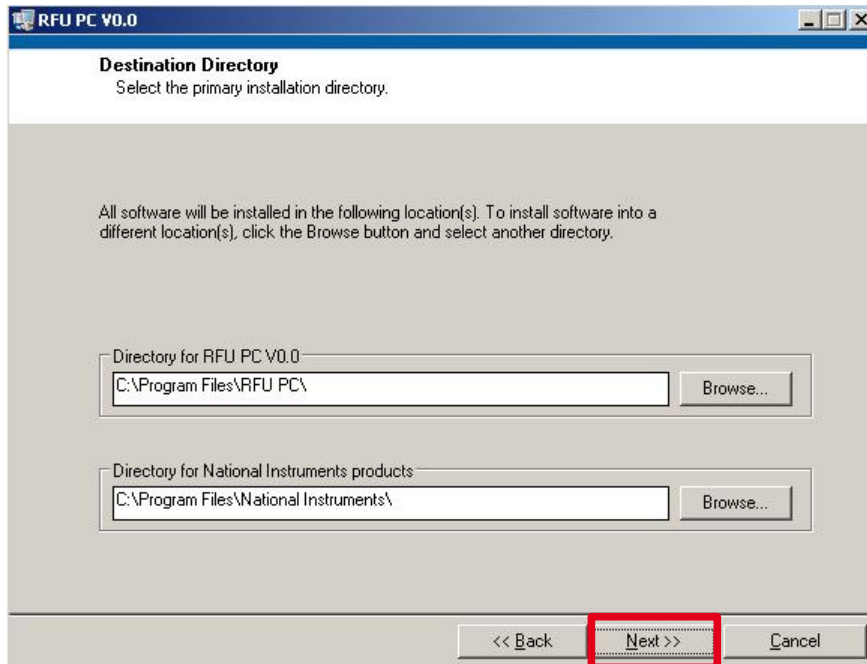


Illustration 3: RFU PC installer location on CD

1. Run executable file **setup.exe**. It performs setup initialization.

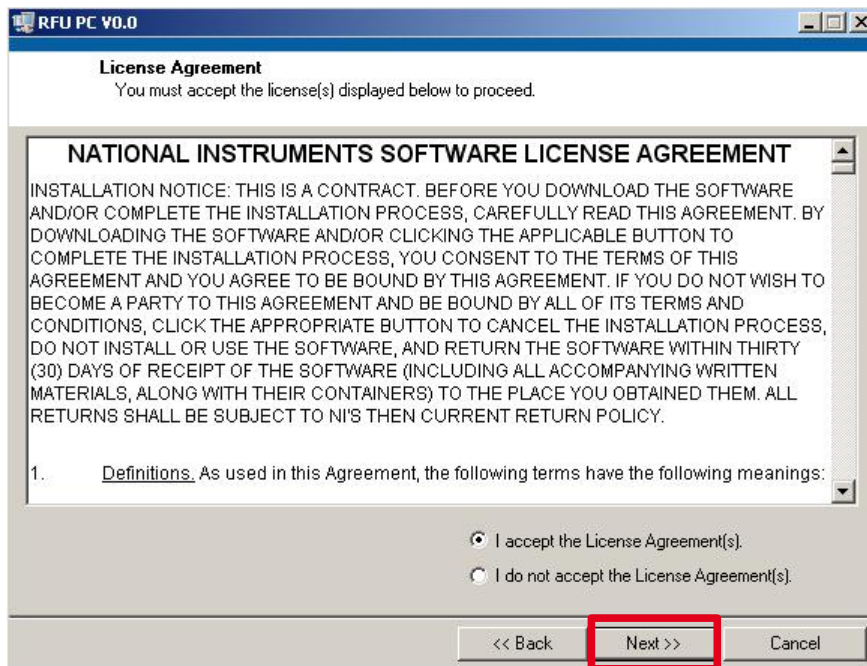


2. After a successful initialization, select installation folder.

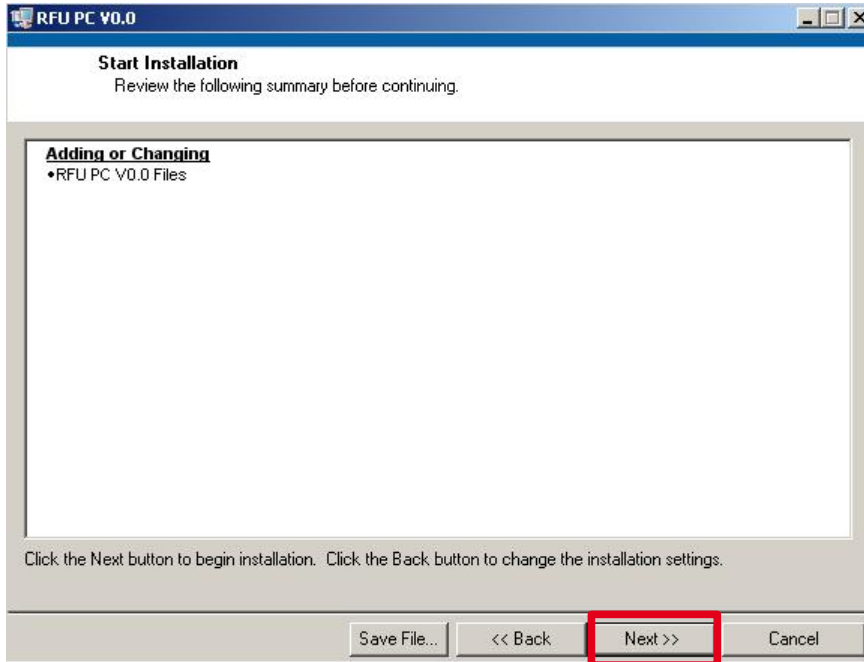


Warning!
Administrator rights are required for software installation. If unit will be operated by other user than administrator, we recommend in Windows Vista and higher, not to install the software to Program Files folder, but e.g. to C:\RFU. Program Files folder has high security level, that would make difficult to use RFU 35 unit (normal user does not have write permission).

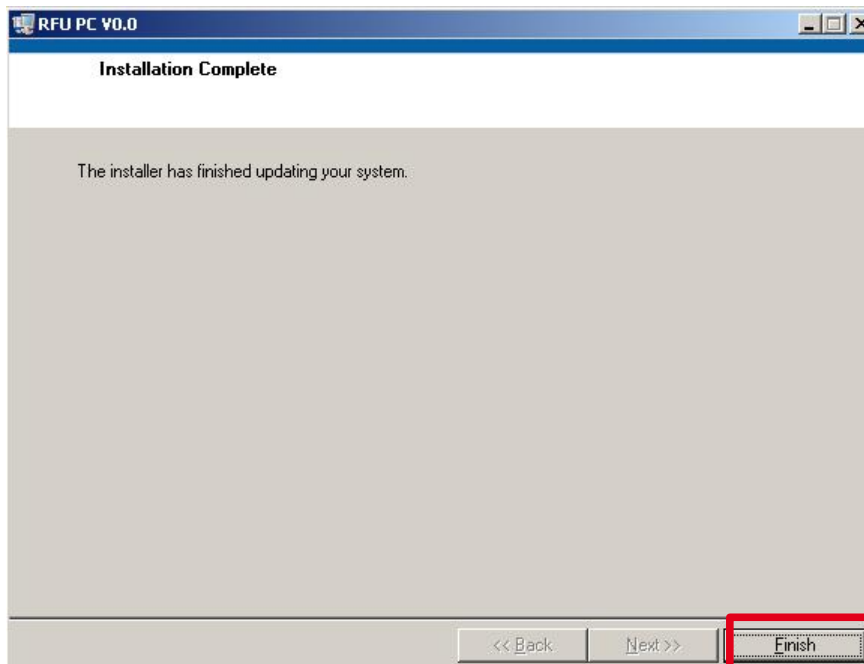
3. Select the option „I accept the License Agreement(s)“ in the License Agreement and confirm it by <Next>.



4. In the next window confirm the list of available components and click on <Next>.



5. Then you will be informed about the successful installation, confirm by <Finish> button.



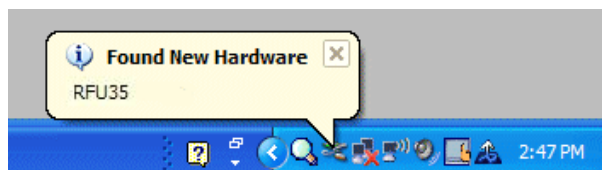
2.2. DRIVER INSTALLATION

A device driver is a program that controls a particular type of device that is attached to your computer. A device driver essentially converts the more general input/output instructions of the operating system to messages that the device type can understand and that is why RFU 35 driver need to be installed.

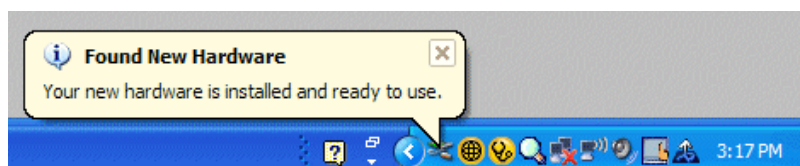
For device driver installation, administrator rights will be required.

2.2.1. Windows XP

1. Connect the RFU 35 unit to a USB port on your computer. Windows will automatically detect that you have plugged in a new device.



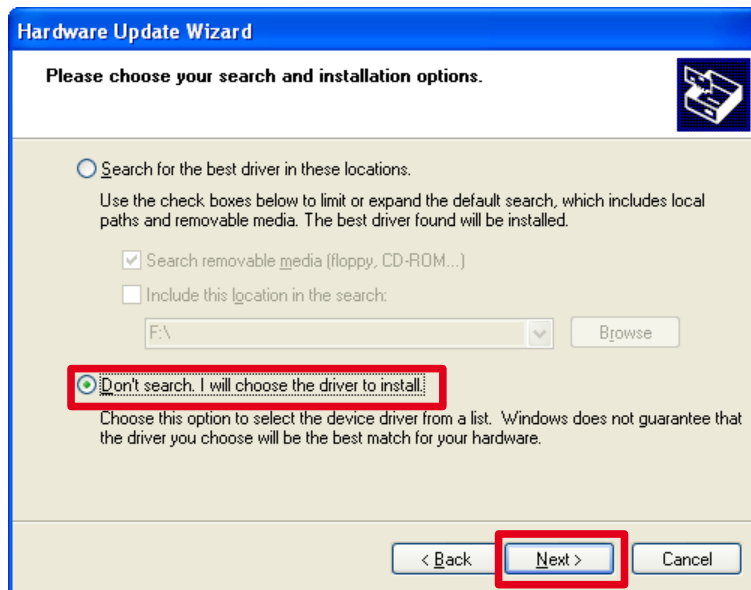
2. If connected to the Internet, you can choose “Yes, this time only” or “Yes, now and every time I connect a device” in “Found New Hardware Wizard” and click on <Next> button. Operation system will try to find the right driver.



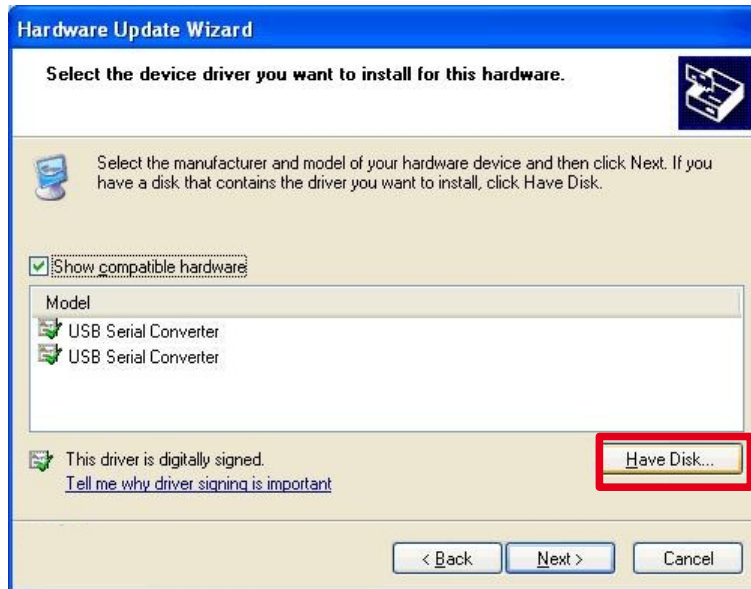
- If you do not have an Internet connection, install driver manually. Hardware wizard have to pop up automatically, if not click on the notification „New hardware found“ – 1. Select „No, not this time“ and click on <Next>.



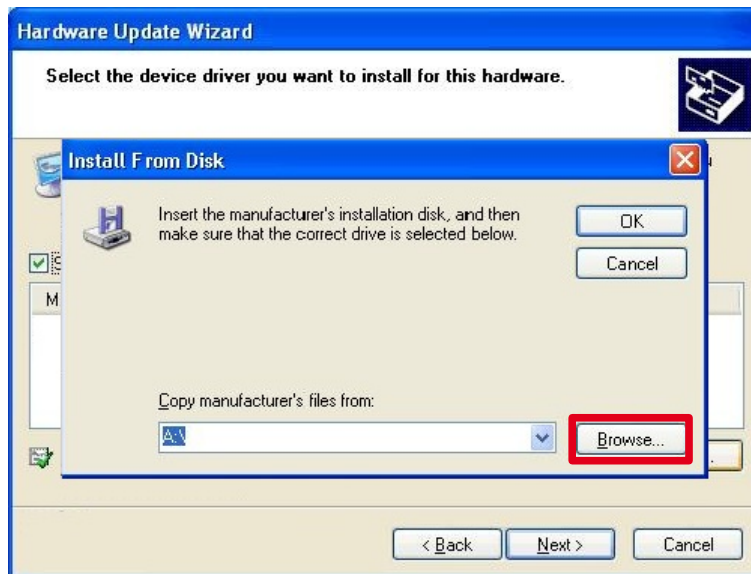
- Select „Don't search. I will choose the driver to install“ and click on <Next>.



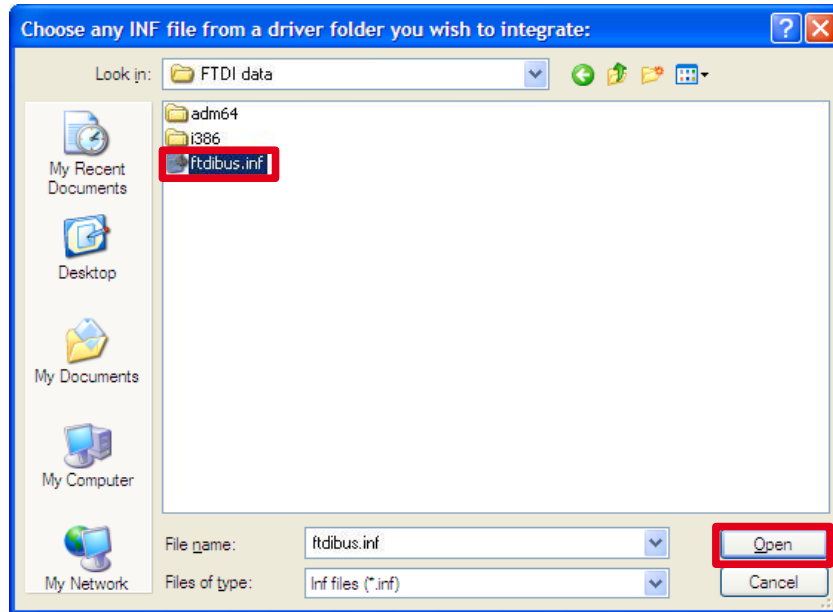
5. You have some drivers listed in this screen, but simply click <Have Disk> and continue with the next dialogue.



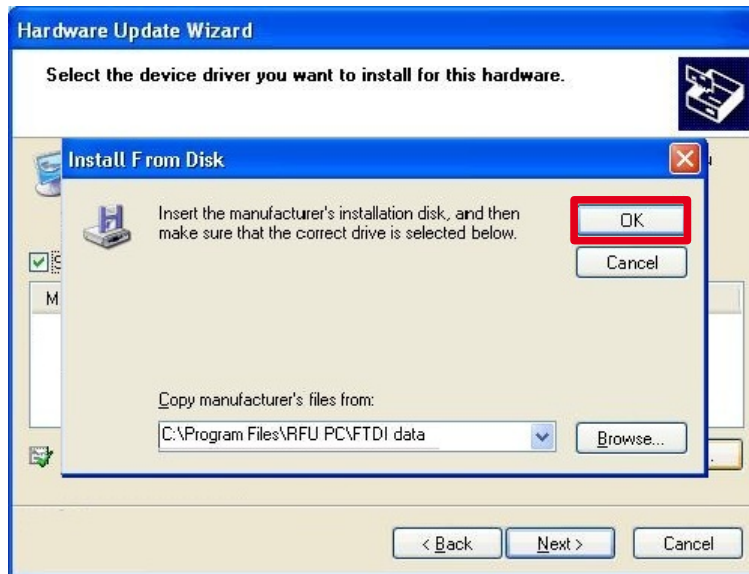
6. Click on <Browse>.



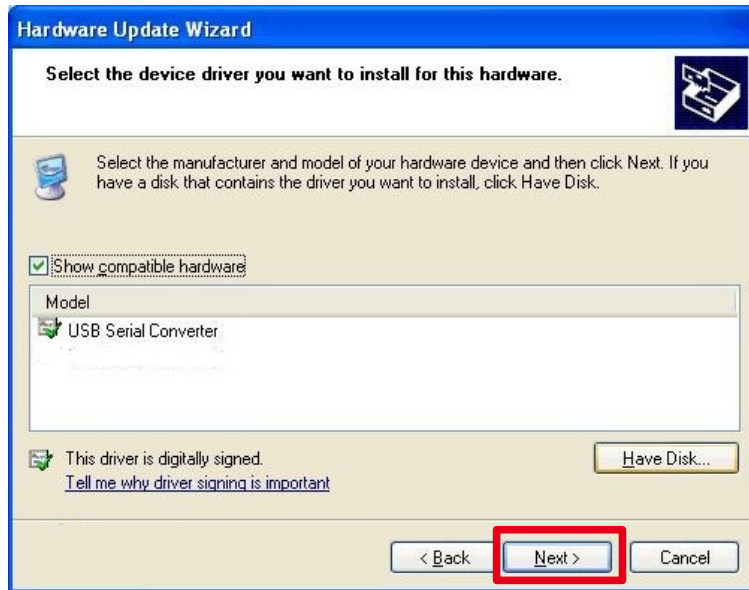
7. In folder where RFU PC is installed (Program Files\RFU PC\FTDI data by default) choose a file *ftdibus.inf* and click on <Open>.



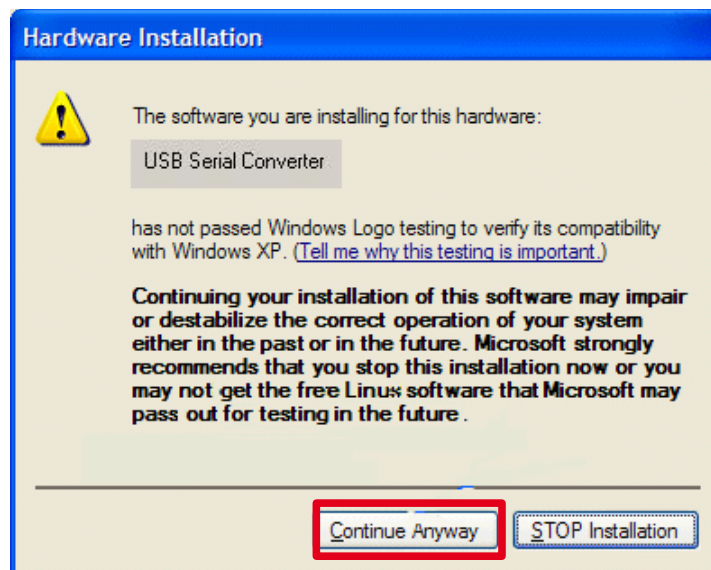
8. Select the driver file and confirm by <OK>.



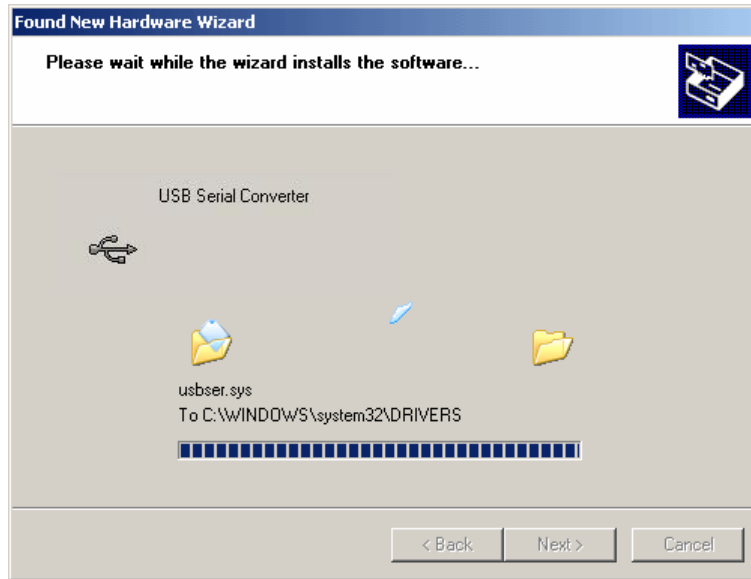
9. Now just click on <Next>.



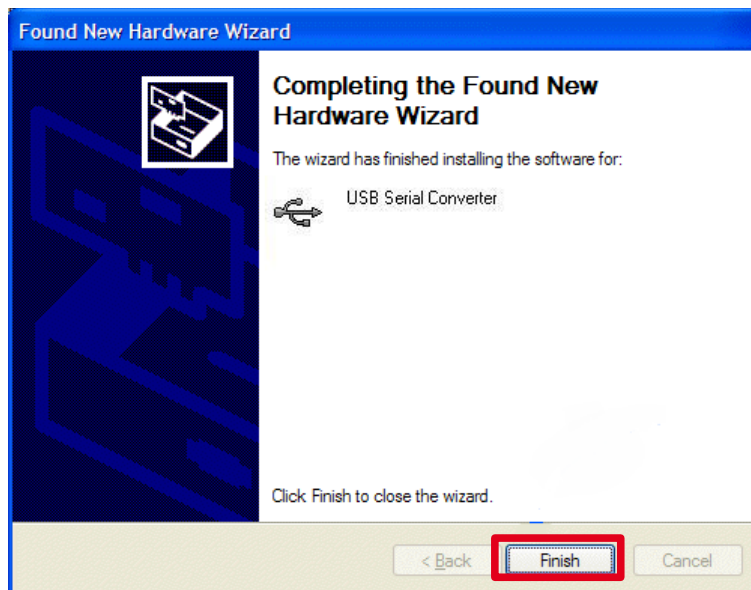
10. Windows XP will warn you that the driver is not certified, so click on <Continue anyway>.



11. Wait while Windows installs the driver.

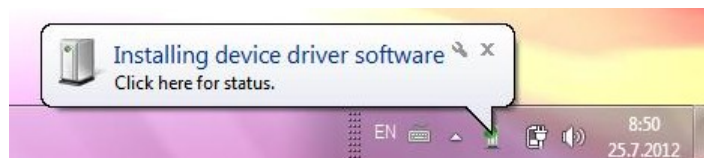


12. Confirm successful installation by <Finish>.

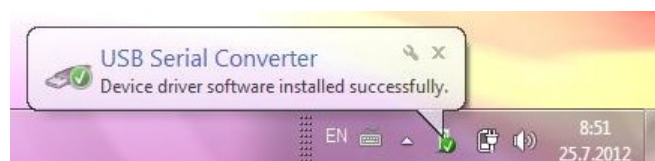


2.2.2. Windows 7

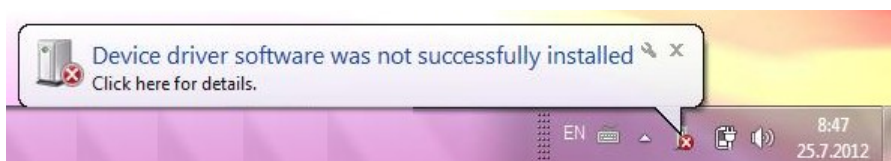
1. Connect the RFU 35 unit to a USB port on your computer. Windows will automatically detect that you plugged in a new device.



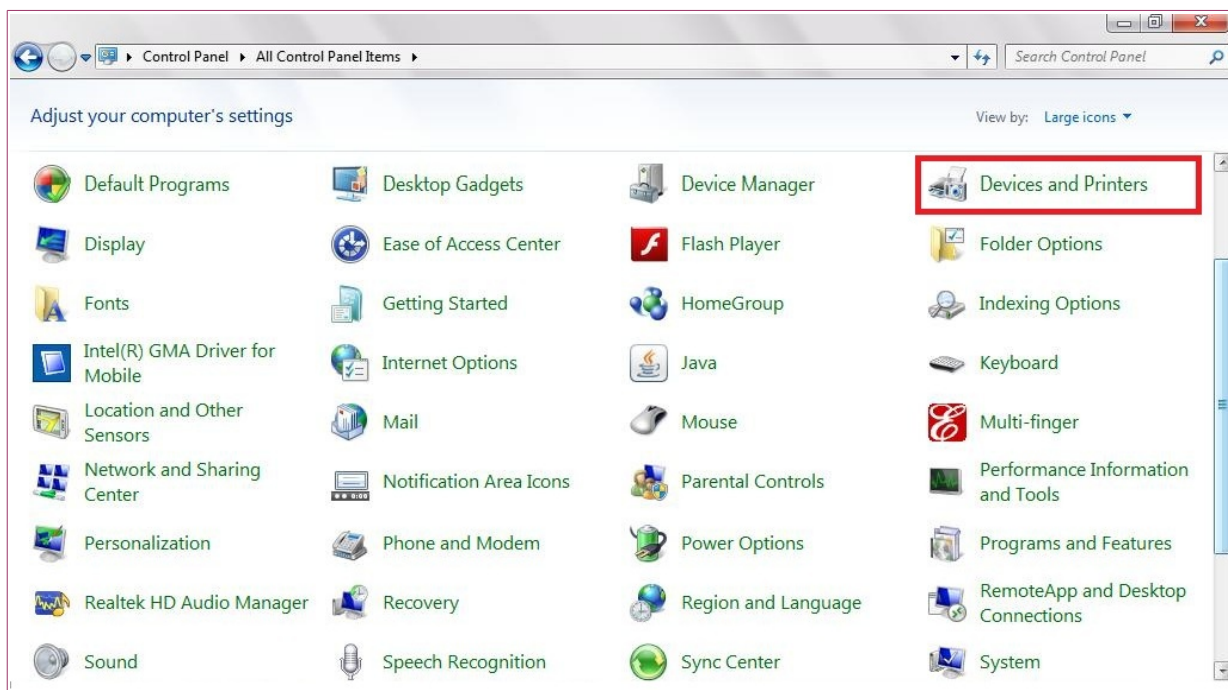
2. If you have internet connection and Windows Update is not switched off, system will install all required drivers automatically.



3. If internet connection and Windows Update is not available, installation error will be announced.



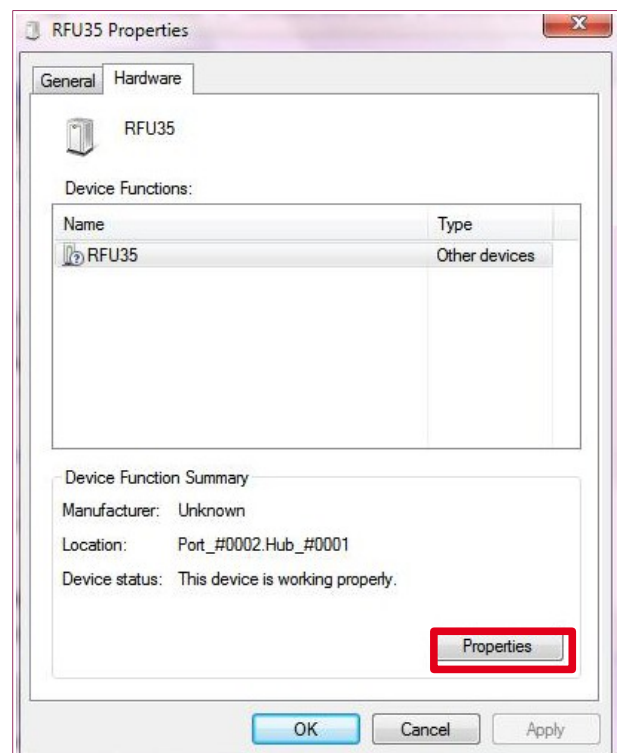
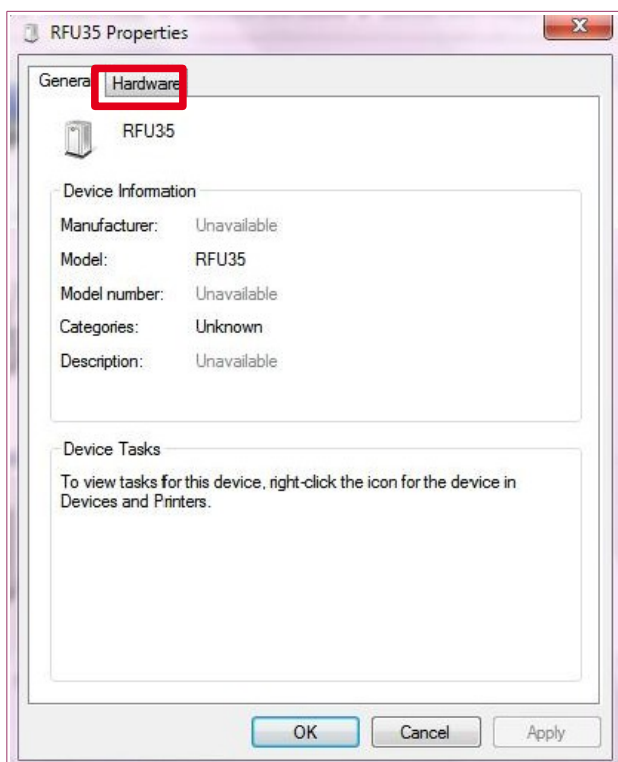
4. In this case you need to install driver manually. Click the Start button, and then click Control panel and select „Devices and Printers“.



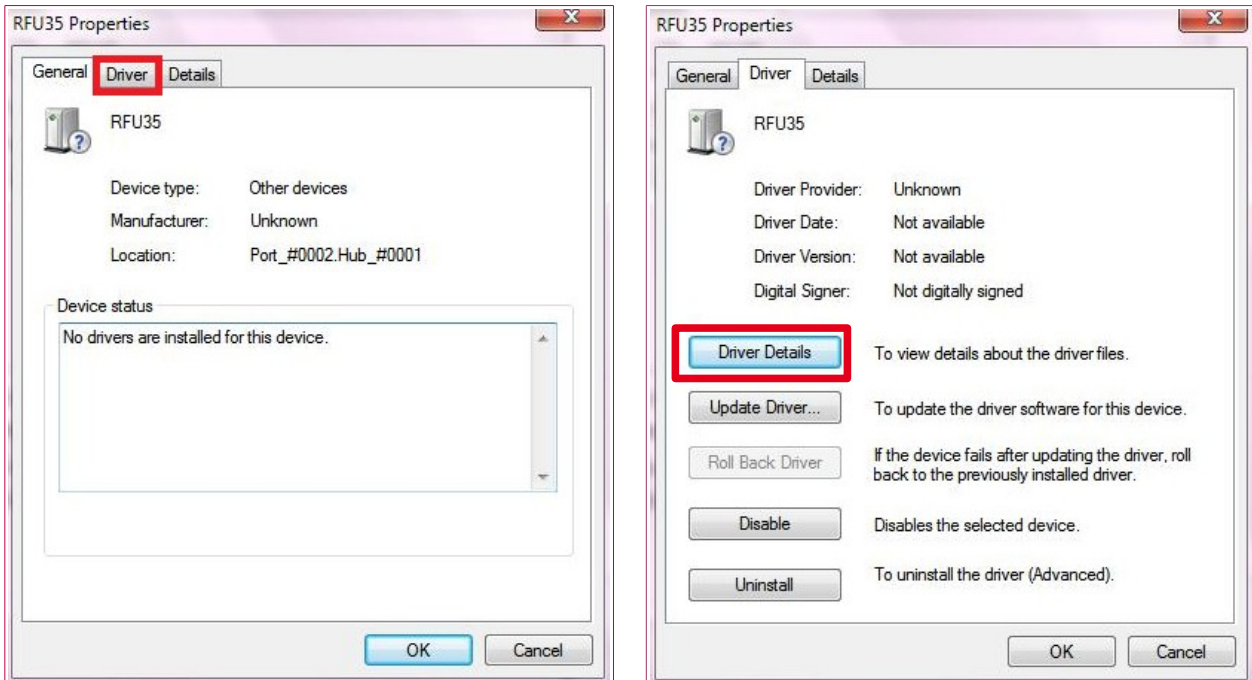
5. Click on „RFU35“.



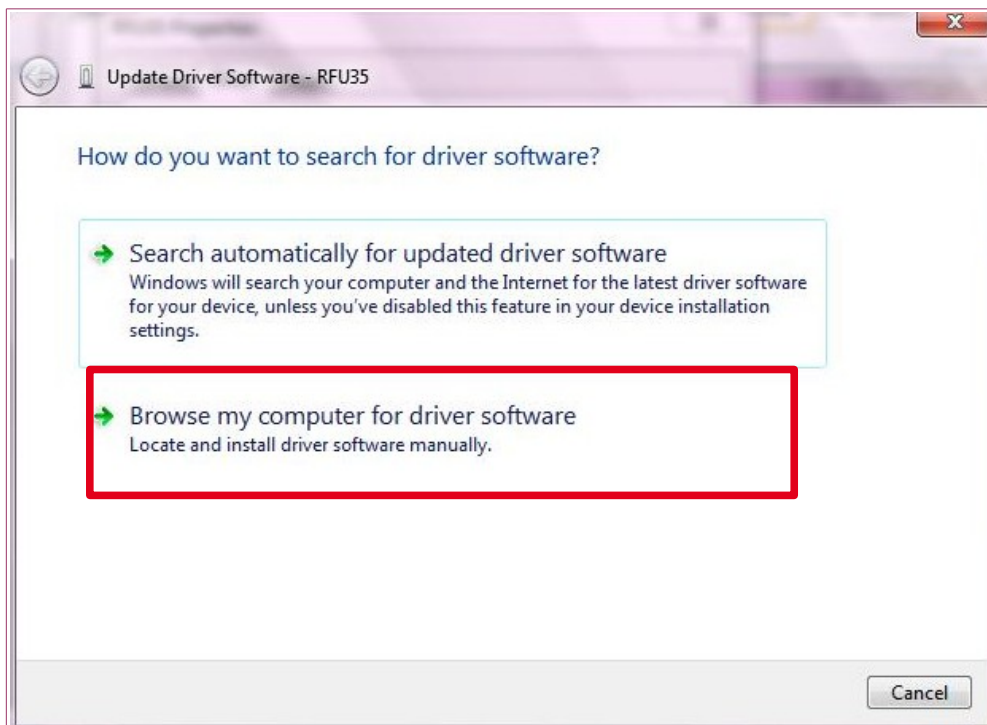
6. Window will pop up, click „Hardware“ and than <Properties>.



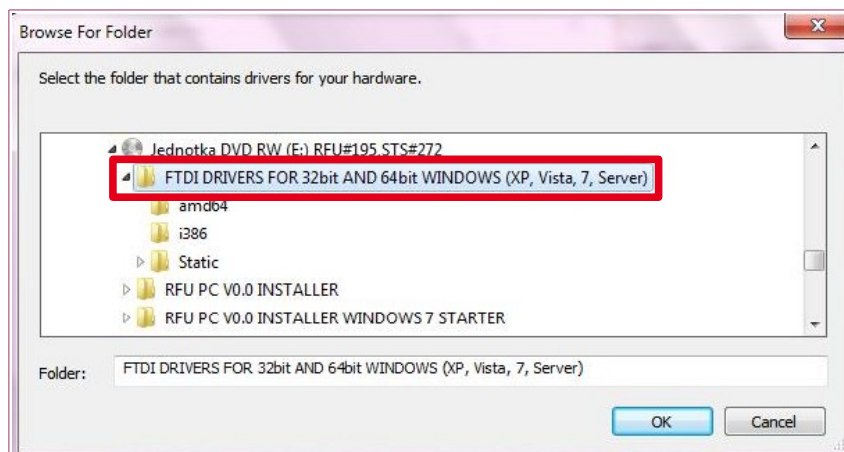
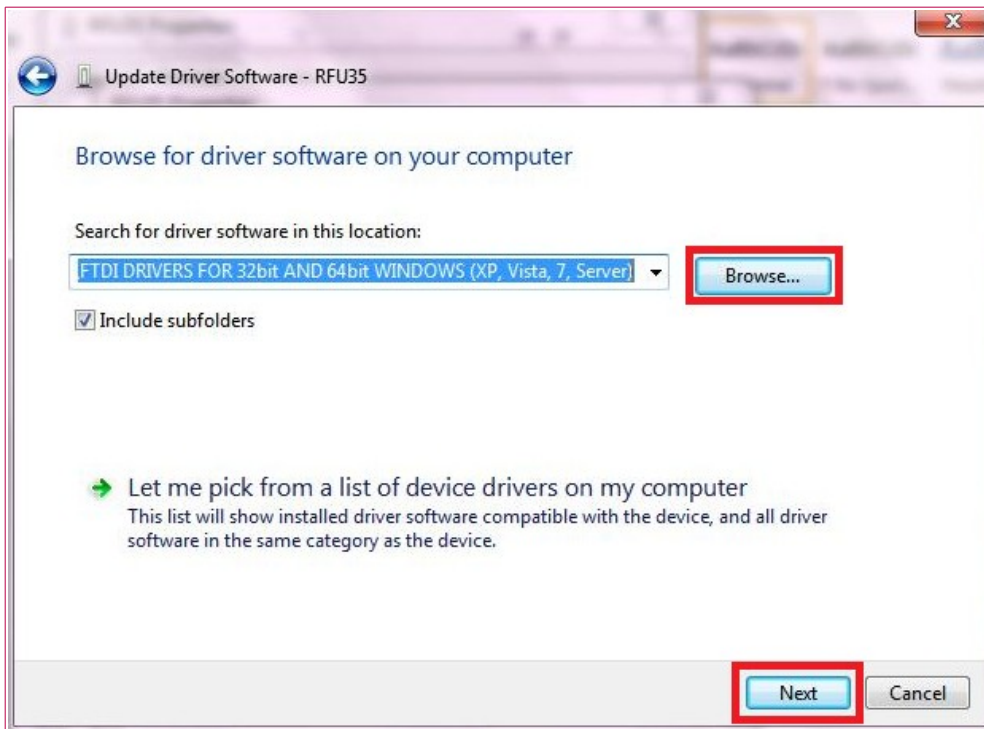
7. Choose "Driver". And in next window click <Update driver>.



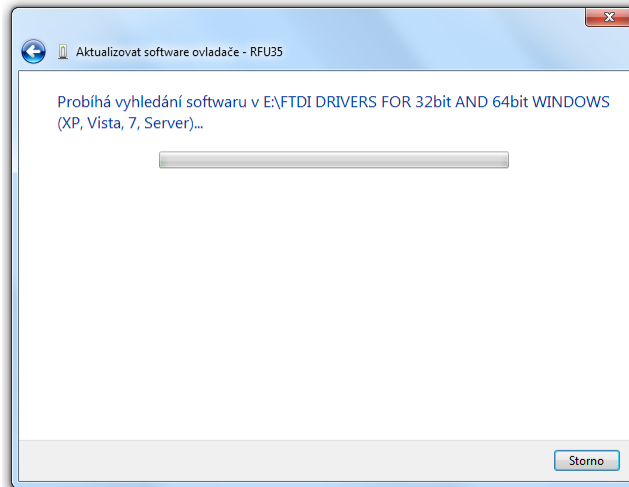
8. Than select „Browse my computer for driver software“ option.



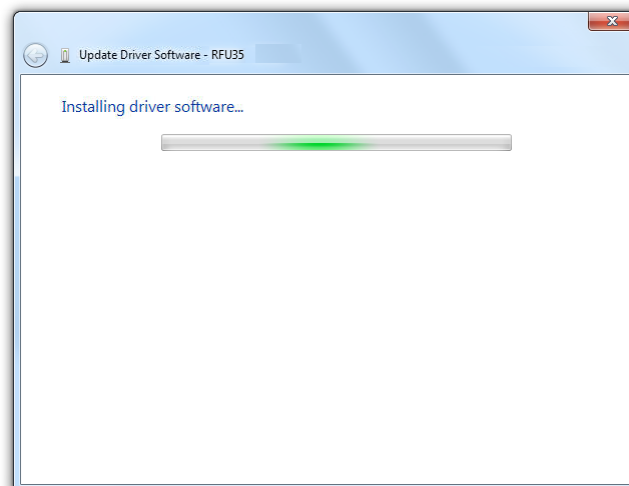
9. Click on <Browse>, and select folder „FTDI DRIVERS FOR 32bit AND 64bit WINDOWS (XP, Vista, 7, Server)“ located on manufacturer's CD in the window „Choose file“, confirm <OK> and click <Next> in the window „Update driver software – RFU 35“.



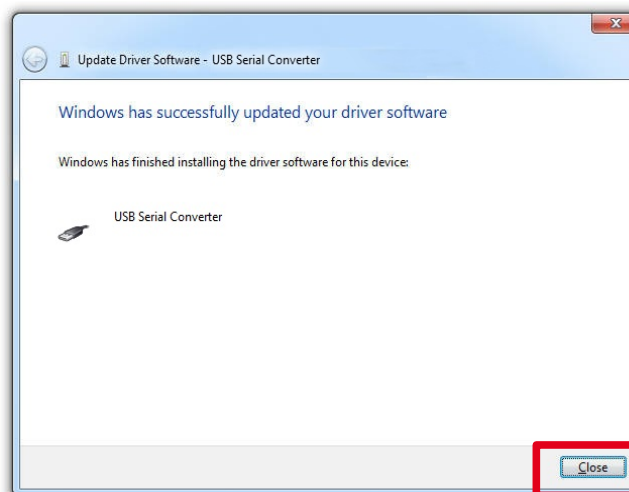
10. System will find necessary drivers.



11. And perform installation.



12. Close the window using button <Close>.



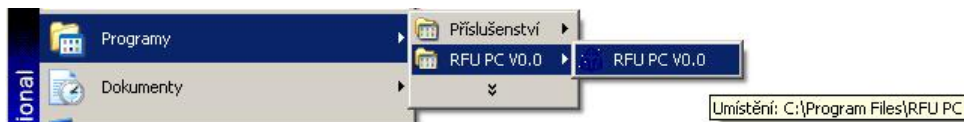
3. HOW TO USE CONTROL SOFTWARE

3.1. FIRST START

Copy the license file RFU30.STS before starting the program into the folder: [Your folder]\RFU30, e.g.: C:\RFU PC\RFU30. File is supplied on CD shipped with RFU 35 unit.

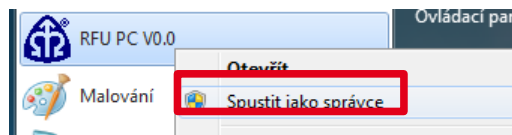
When starting RFU PC program, RFU35 unit must be connected with PC. Find folder RFU PC V0.0 in Start --> Programs. Click and run the RFU PC V0.0 program.

Note: The exact location of the link may vary depending on your operation system.

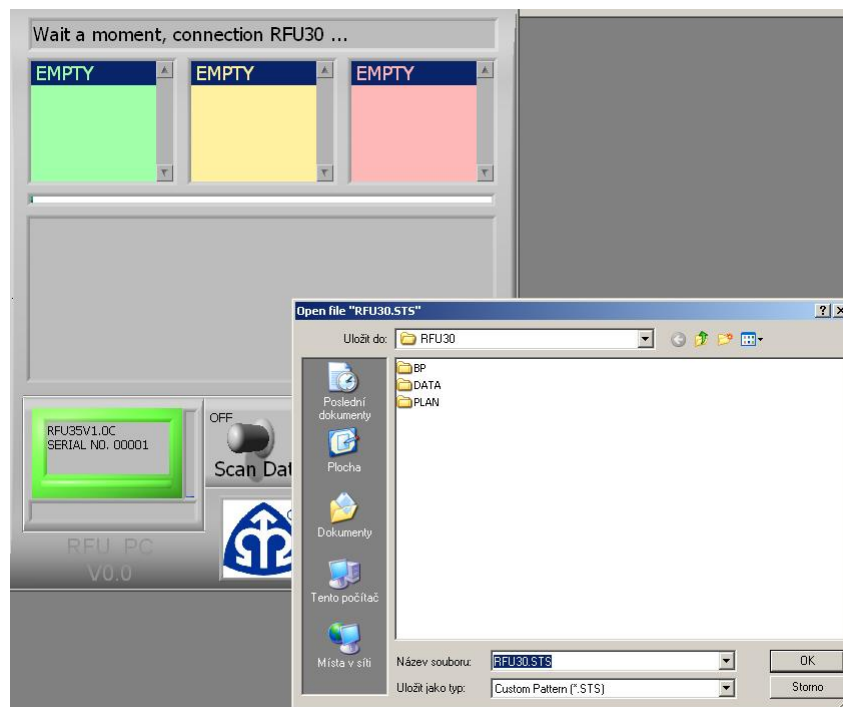


Warning!

If RFU PC application is installed in Program Files folder in operation systems Windows Vista and higher, you need to run a program as an Administrator (right click on the icon and choose „Run as administrator“). Only users with administrator rights can do this.



If you have not copied the license file RFU30.STS, application window will prompt you.



License file RFU30.sts can be found on attached CD together with installation files. Copy file first e.g. on Desktop. Then select the path to the file and press <OK>.

If the RFU 35 unit is not connected to USB port, error message is displayed. Try to reconnect RFU 35 unit and run the program again.

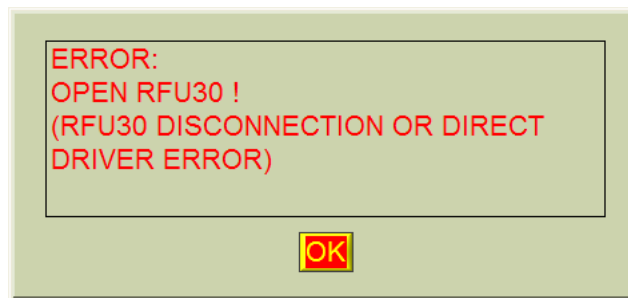


Illustration 4: Error message, RFU 35 unit is not connected to USB port

3.2. USER INTERFACE DESCRIPTION

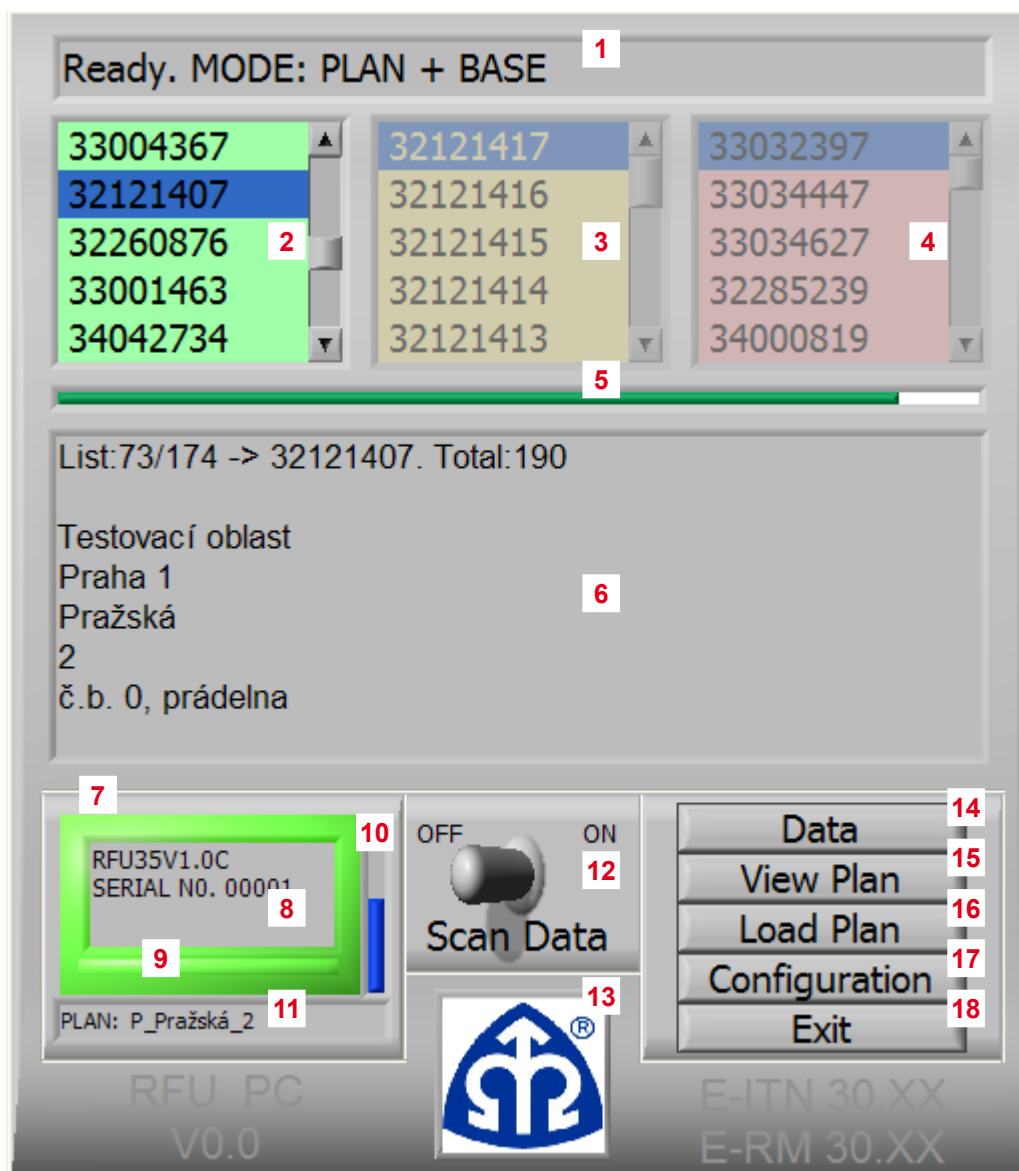


Illustration 5: Graphical user interface of RFU PC

1. Status bar informing about the status of the reading unit and receive data mode:
 - BASIC: Mode to receive data without reading plan and base of plan
 - PLAN: Mode to receive data with reading plan and without base of plan
 - PLAN + BASE: Mode to receive data with reading plan as well as with base of plan.
2. List of all properly received devices (eight-digit number E-ITN 30, nine-digit number E-RM 30). Switch among lists using the button (18).
3. List of devices waiting to be received (eight-digit number E-ITN 30, nine-digit number E-RM 30).
4. List of devices received incorrectly (incorrect CRC).
5. Graphic information about number of received devices from total number of devices in the reading plan.
6. Information window – displays informations about a particular read device (description belongs to the active field of the read device in one of the above lists), if PLAN + BASE option is selected..
7. Receiving unit status:
 - green – OK
 - red – failure
8. RFU 35 firmware version and serial number.
9. Last received packet status:
 - green – CRC is correct
 - red – CRC is incorrect.
10. Signal strength of the last received device.
11. Current loaded reading plan.
12. Start / stop data receiving.
13. Switching among the columns (2), (3), (4).
14. Inactive in current version.
15. Inactive in current version.
16. Load plan.
17. RFU 35 configuration.
18. Exit.

3.3. READING

1. Connect RFU 35 unit to USB port
2. Start the control software RFU PC. there is sign „Ready“ in the status bar (Illustration 5: Graphical user interface of RFU PC, item (1)).
3. Click on <Load Plan> (14), select desired plan (if you don't want to use a plan, select „NONE PLAN“).
4. Click on switch (12) and start reading – switch must be in „ON“ position.
5. Reading is finished when you click on Exit (18). You will be asked if you really want to close data file. (Illustration 6: End of data file). If you select <OK>, file is closed and the next time the data will be saved in a new file (in this case 70-114.RFU). If <Cancel> is selected, next time data will be saved into file with last saved data (in this case 70-113.RFU).

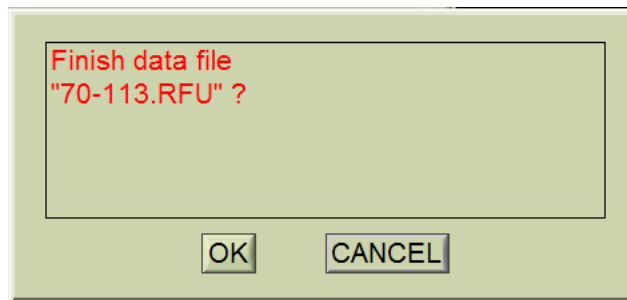


Illustration 6: End of data file

Reading unit save data from all available devices (heat cost allocators and water meter radio modules). Read data are immediately saved and coded into the .RFU file on the hard drive. For decoding use software EITN-10 (for more informations, see EITN-10 manual).

If you choose receiving mode with reading plan (with or without base of plan) – there is displayed MODE: PLAN or MODE: PLAN + BASE in status bar (1) – you can check if reading was successful for all units. So if there is no item displayed in the yellow column (3) , reading of all read devices was successful. At this time you can finish reading using switch (12).

3.4. STRUCTURE OF THE PROGRAM FOLDERS

Program is installed in selected folder (more in chapter 2.1. RFU PC installation) (standard C:\Program Files\RFU PC). This folder contains another folders with the following meanings:

- *[program folder]\RFU30\DATA*
 - contains data files with the readings in the format „X-Y.RFU“
 - “X“ – software identification number
 - “Y“ – order number of the data file
 - all read data must be decoded then using decoding software EITN-10 (see more in the appropriate manual).
- *[program folder]\RFU30\PLAN*
 - upload .PL files with reading plans
- *[program folder]\RFU30\BP\BPL*
 - upload .BPL files for 3 lower levels of the base of plan (level 3, 2, 1)
- *[program folder]\RFU30\BP\BPH*
 - upload .BPH files for 3 higher levels of the base of plan levels (level 6, 5, 4)

4. PLANNING OF THE READINGS

Radio reading unit saves data from all available devices (heat cost allocators and water meter radio modules) in the radio range. In order to make the work easier we recommend you to use reading plan and base of plan.

4.1. READING PLAN

The plan has a tree structure, which defines the path to individual read devices. This structure contains 6 levels, which can be used as needed. 1st level is the lowest one („closest“ to read device, tree branch), 6th level is the highest one („furthest“ from the read device, tree trunk) – see Illustration 7: Graphical presentation of the reading plan example.

Example of levels in the reading plan:

1. level – Room
2. level – Flat
3. level – House
4. level – Street
5. level – Part of tcity
6. level – City

4.1.1. Plan Matrix P

Plan matrix P defines a group of allocators chosen for reading (reading plan). Object numbers in six-level hierarchy are used for identification (see chapter 4.1.1.3. Meaning of matrix P columns).

p ₀₀	p ₀₁	p ₀₂	p ₀₃	p ₀₄	p ₀₅	p ₀₆	p ₀₇	.....	p _{0N}
p ₁₀	p ₁₁	p ₁₂	p ₁₃	p ₁₄	p ₁₅	p ₁₆	p ₁₇	.....	p _{1N}
p ₂₀	p ₂₁	p ₂₂	p ₂₃	p ₂₄	p ₂₅	p ₂₆	p ₂₇	.....	p _{2N}
p ₃₀	p ₃₁	p ₃₂	p ₃₃	p ₃₄	p ₃₅	p ₃₆	p ₃₇	.....	p _{3N}
p ₄₀	p ₄₁	p ₄₂	p ₄₃	p ₄₄	p ₄₅	p ₄₆	p ₄₇	.....	p _{4N}
p ₅₀	p ₅₁	p ₅₂	p ₅₃	p ₅₄	p ₅₅	p ₅₆	p ₅₇	.....	p _{5N}
p ₆₀	p ₆₁	p ₆₂	p ₆₃	p ₆₄	p ₆₅	p ₆₆	p ₆₇	.....	p _{6N}

Table 1: Structure of plan matrix P

Plan matrix P consists of elements p_{ij} i = 0, 1, 2, ... 6

j = 0, 1, 2, ... N, where (N+1) ∈ <1; 10000> is total number of the devices in plan (can be any number of plans).

4.1.1.1. Definition of matrix P elements

p_{0j} ∈ <02030001; 99999999> j = 0, 1, 2, ... N

p_{ij} ∈ <1; 255> i = 1, 2, 3, ... 6; j = 0, 1, 2, ... N

4.1.1.2. Meaning of matrix P zero-row

Zero-row values are serial numbers of read devices used in a reading plan:

p_{0j} = SN_j, j = 0, 1, 2, ... N, where SN_j is device serial number

In every matrix P the uniqueness of each individual serial number must be ensured:

p_{0j} ≠ p_{0k} for j ≠ k, k = 0, 1, 2, ... N

4.1.1.3. Meaning of matrix P columns

Elements of each matrix P column represent the sequence of the object numbers in the six-level hierarchy, belonging to given serial number. Each element on the sixth - highest level determines by its value 1 of 255 objects in this level and is unique.

$$p_{6j} \neq p_{6k} \text{ pro } j \neq k \quad j, k = 0, 1, 2, \dots N$$

$$p_{6j} \in \langle 1; 255 \rangle$$

Elements of the remaining levels (5, 4, 3, 2, 1) determine object numbers in given level, belonging to the object from his immediate higher level.

$$p_{ij} \rightarrow p_{(i+1)j}$$

To each object from level 1, any number of serial numbers (SN_j, j = 0, 1, 2, ... N) can be assigned.

p _{0j}	Serial number	32100207
p _{1j}	Object number in level 1	25
p _{2j}	Object number in level 2	126
p _{3j}	Object number in level 3	20
p _{4j}	Object number in level 4	3
p _{5j}	Object number in level 5	2
p _{6j}	Object number in level 6	4

Table 2: Example of one matrix P column, allocator with serial number 32100207

For example if each level will have a meaning as mentioned below:

- Level 6 = region
- Level 5 = city
- Level 4 = area (housing estates),
- Level 3 = street
- Level 2 = house,
- Level 1 = flat

then allocator with serial number 32100207 is placed in a flat with a number 25, in the house with the number 126, on the street with number 20, in area number 3, in a town number 2 and in area number 4.

4.1.2. How to save reading plan into file

Plan matrices P are saved into binary file with *.PL extension

- elements from the zero-row of plan matrix P (serial numbers) are represented as 4 byte value, the first is treated as a least significant byte (LSB),
- other elements of plan matrix are 1 byte values,
- plan matrix P_n is saved into the file sequentially by particular columns.

4.1.2.1. Plan matrix P – example

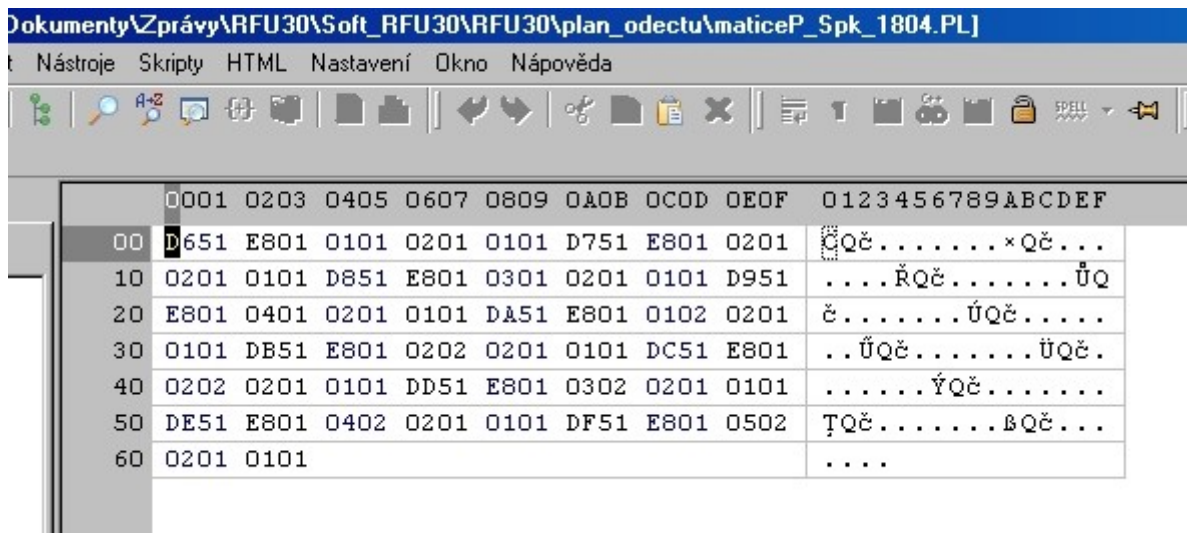
Have a plan matrix P (Šumperk, house 1804/6 only) defined in chapter 4.3. Example of the reading plan as:

32002518	32002519	32002520	32002521	32002522	32002523	32002524	32002525	32002526	32002527
1	2	3	4	1	2	2	3	4	5
1	1	1	1	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1

When zero-row of plan matrix P (serial number) is written as 4 Byte (the least important Byte is written as first), matrix will look as mentioned bellow (1 Byte values are written in hexadecimal):

D6	D7	D8	D9	DA	DB	DC	DD	DE	DF
51	51	51	51	51	51	51	51	51	51
E8	E8	E8	E8	E8	E8	E8	E8	E8	E8
01	01	01	01	01	01	01	01	01	01
01	02	03	04	01	02	02	03	04	05
01	01	01	01	02	02	02	02	02	02
02	02	02	02	02	02	02	02	02	02
01	01	01	01	01	01	01	01	01	01
01	01	01	01	01	01	01	01	01	01
01	01	01	01	01	01	01	01	01	01

1B values of matrix are saved sequentially by each column into binary file. The final binary file P_SPK_1804.PL will therefore contain (in hexadecimal):



Note: The final binary file has size exactly according the number of saved Bytes, i.e. 10B per each column of plan matrix P (one allocator). The above file P_SPK_1804.PL has a size 100B.

4.2. BASE OF PLAN

Alphanumeric description allowing better identification is assigned to the individual nodes in a tree with the base of plan. These names (descriptions) can be arbitrary. The meaning of each level can be also arbitrary.

Base of plan may be common for multiple reading plans if limits defined in chapter 4.1.1.1. Definition of matrix P elements are respected. It is therefore appropriate to prepare and use only one base of plan for all reading plans.

4.2.1. How to save base of plan

Base of plan, that assigns for each object number in matrix plan their names, is saved in two steps:

- the upper three levels (levels 6, 5, 4) are saved in binary files *.BPH, contain description of object numbers in these levels; file names must be identical with elements p_{6j} (object number is level 6) of plan matrix P (see chapter 4.1.1. Plan Matrix P),
- the lower three levels (levels 3, 2, 1) are saved in binary files *.BPL, contain description of object numbers in these levels; each file name must consist from object numbers in levels 6-5-4 immediately preceding the described level 3 and from the object number in this level 3. Object numbers are separated with dashes. See more in chapter 4.2.1. How to save base of plan.

Way how to save three upper and three lower levels of base of plan is identical.

When saving the base of plan, each level must be arranged into following structure (table):

	Y – number of columns					
X – number of rows	PO _{6j} (or PO _{3j})					
	PO _{5jk} (or PO _{2jk})	PO _{4jkl} (or PO _{1jkl})	PO _{4jk(l+1)} (or PO _{1jk(l+1)})	PO _{4jk(l+2)} (or PO _{1jk(l+2)})	PO _{4jk(l+3)} (or PO _{1jk(l+3)})	...
	PO _{5j(k+1)} (or PO _{2j(k+1)})	PO _{4j(k+1)l} (or PO _{1j(k+1)l})	PO _{4j(k+1)(l+1)} (or PO _{1j(k+1)(l+1)})	PO _{4j(k+1)(l+2)} (or PO _{1j(k+1)(l+2)})	PO _{4j(k+1)(l+3)} (or PO _{1j(k+1)(l+3)})	...
	PO _{5j(k+2)} (or PO _{2j(k+2)})	PO _{4j(k+2)l} (or PO _{1j(k+2)l})	PO _{4j(k+2)(l+1)} (or PO _{1j(k+2)(l+1)})	PO _{4j(k+2)(l+2)} (or PO _{1j(k+2)(l+2)})	PO _{4j(k+2)(l+3)} (or PO _{1j(k+2)(l+3)})	...
	PO _{5j(k+3)} (or PO _{2j(k+3)})	PO _{4j(k+3)l} (or PO _{1j(k+3)l})	PO _{4j(k+3)(l+1)} (or PO _{1j(k+3)(l+1)})	PO _{4j(k+3)(l+2)} (or PO _{1j(k+3)(l+2)})	PO _{4j(k+3)(l+3)} (or PO _{1j(k+3)(l+3)})	...

where:

- PO_{6j} (or PO_{3j}) is description of object *j* in level 6 (or 3),
- PO_{5jk} (or PO_{2jk}) are descriptions of objects *k* in level 5 (or 2) immediately subordinate to object *j* in level 6 (or 3), row index (the first row with description PO_{6j} (or PO_{3j}) has index 0) must match with described object numbers *k* (*k*+1, *k*+2, etc.)
- PO_{4jkl} (or PO_{1jkl}) are description of objects *l* in level 4 (or 1) immediately subordinate to object *k* in level 5 (or 2), row index (the first row with description PO_{6j} (or PO_{3j}), PO_{5jk} (or PO_{2jk}), etc. has index 0) must match with described object numbers *l* (*l*+1, *l*+2, etc.).

Base of plan is saved sequentially by each column into the binary file

- first written value is number of rows *X* (4 Byte)
- followed by number of columns *Y* (4 Byte), then followed by descriptions in rows
- each description is preceded with 4 Byte value that indicate the number of characters in the description
- descriptions are saved as a hexadecimal codes in particular code chart
- Note: if length of description is zero (description does not exist), record will contain only 4B description length (00 00 00 00 – displayed in hexadecimal)

Binary file describing base of plan looks like:

(X)_{1B} (X)_{2B} (X)_{3B} (X)_{4B} (Y)_{1B} (Y)_{2B} (Y)_{3B} (Y)_{4B} (L(N₁₁))_{1B} (L(N₁₁))_{2B} (L(N₁₁))_{3B} (L(N₁₁))_{4B} (KZ(N₁₁))_{NB} (L(N₁₂))_{1B} (L(N₁₂))_{2B} (L(N₁₂))_{3B} (L(N₁₂))_{4B} (KZ(N₁₂))_{NB} (L(N_{XY}))_{1B} (L(N_{XY}))_{2B} (L(N_{XY}))_{3B} (L(N_{XY}))_{4B} (KZ(N_{XY}))_{NB}

where:

- (X)_{1B} to (X)_{4B} are 4 Bytes indicating the number of rows
- (Y)_{1B} to (Y)_{4B} are 4 Bytes indicating the number of columns
- (L(N₁₁))_{1B} to (L(N₁₁))_{4B} are 4 Bytes indicating number of characters in description in the first row and first column (description PO_{6j} (or PO_{3j}))
- (KZ(N₁₁))_{NB} is *N* Bytes of character codes in description in the first row and first column
- (L(N₁₂))_{1B} to (L(N₁₂))_{4B} are 4 Bytes indicating the number of characters in description in the first row and second column
- (KZ(N₁₂))_{NB} is *N* Bytes of character codes in description in the first row and second column

to...

- $(L(N_{XY}))_{1B}$ to $(L(N_{XY}))_{4B}$ are 4 Bytes indicating the number of characters in description of X-th row and Y- th column
- $(KZ(N_{XY}))_{NB}$ is N Bytes of character codes in description of X-th row and Y-th column

4.3. EXAMPLE OF THE READING PLAN

For better understanding, example of reading plan is presented.

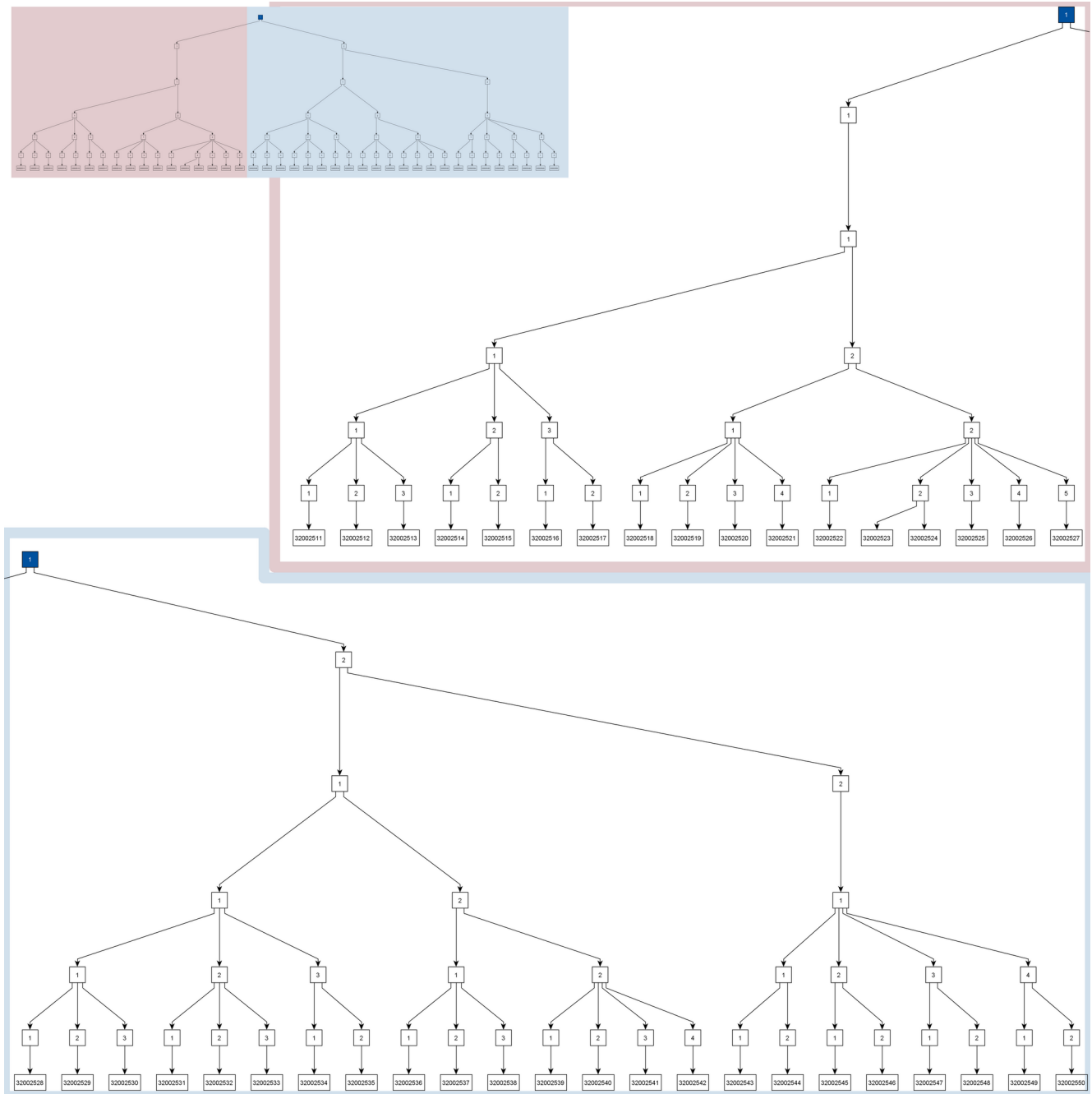


Illustration 7: Graphical presentation of the reading plan example

- Reading plan consist of 58 allocators with serial numbers 32002511 to 32002550 and 34013731 to 34013748.
- Meaning of individual levels was chosen as follows:
 1. level 6 = municipality
 2. level 5 = part of the municipality (housing estates)
 3. level 4 = street
 4. level 3 = house

5. level 2 = flat
6. level 1 = room

- The object numbers in each level was chosen arbitrarily, but conditions for ranges of values (see chapter 4.1.1.1. Definition of matrix P elements), uniqueness of the numbers of objects in the level 6 and serial numbers must be respected.
- Maximally 2 serial numbers are assigned in level 1 for simplicity, generally there is no limit (see chapter 4.1.1.3. Meaning of matrix P columns).
- In Zábřeh na Moravě city (object with number 2 on level 6) segmentation of municipality (housing estates) is not used. There is only one object with number 1 and without description in level 5 in the base of plan.

1 – Šumperk	1 – Česká čtvrť	1 – Blanická	1 – 2787/10	1 – Novákovi	1 – kitchen 2 – liv. room 3 – bedroom		
				2 – Bílkovi	1 – kitchen 2 – room		
				3 – Hrubá	1 – kitchen 2 – room		
			2 – 1804/6		1 – Plašilovi	1 – kitchen 2 – liv. room 3 – bedroom 4 – room 2	
					2 – Horváthovi	1 – kitchen 2 – liv. room 3 – bedroom 4 – corridor 5 – room 2	
	2 – Temenice	1 – Sokolská	1 – 1451/8	1 – Švecovi	1 – kitchen 2 – liv. room 3 – bedroom		
				2 – Novákovi	1 – kitchen 2 – liv. room 3 – bedroom		
				3 – Čech	1 – kitchen 2 – liv. room		
			2 – 2110/12		1 – Jánský	1 – kitchen 2 – liv. room 3 – bedroom	
					2 – Fojtovi	1 – kitchen 2 – liv. room 3 – bedroom 4 – bathroom	
			2 – Finská	1 – 2715/10		1 – Tuhá	1 – kitchen 2 – room
						2 – Malý	1 – kitchen 2 – room
						3 – Kutil	1 – kitchen 2 – room
4 – Snášel	1 – kitchen 2 – room						

2 – Zábřeh na Moravě	1 –	1 Sokolská	1 – 1853/10	1 – Chudobovi	1 – kitchen 2 – liv. room 3 – bedroom
				2 – Abrahám	1 – kitchen 2 – room
			2 – 1672/8	1 – Konečná	1 – kitchen 2 – room
				2 – Brzobohatý	1 – kitchen 2 – room
		2 Jiráskova	1 – 2805/14	1 – Tomáškovi	1 – kitchen 2 – liv. room 3 – bedroom
				2 – Ondráčkovi	1 – kitchen 2 – liv. room 3 – bedroom
2 – 2248/6	1 – Šebestovi		1 – kitchen 2 – liv. room 3 – bedroom		

Table 3: Example of reading plan

Serial No.	32002511	32002512	32002513	32002514	32002515	32002516	32002517	32002518	32002519	32002520
Level 1	1	2	3	1	2	1	2	1	2	3
Level 2	1	1	1	2	2	3	3	1	1	1
Level 3	1	1	1	1	1	1	1	2	2	2
Level 4	1	1	1	1	1	1	1	1	1	1
Level 5	1	1	1	1	1	1	1	1	1	1
Level 6	1	1	1	1	1	1	1	1	1	1

32002521	32002522	32002523	32002524	32002525	32002526	...	34013744	34013745	34013746	34013747	34013748
4	1	2	2	3	4	...	2	3	1	2	3
1	2	2	2	2	2	...	2	2	1	1	1
2	2	2	2	2	2	...	1	1	2	2	2
1	1	1	1	1	1	...	2	2	2	2	2
1	1	1	1	1	1	...	1	1	1	1	1
1	1	1	1	1	1	...	2	2	2	2	2

Table 4: Plan matrix for example of reading plan

Serial No.	32002518	32002519	32002520	32002521	32002522	32002523	32002524	32002525	32002526	32002527
Level 1	1	2	3	4	1	2	2	3	4	5
Level 2	1	1	1	1	2	2	2	2	2	2
Level 3	2	2	2	2	2	2	2	2	2	2
Level 4	1	1	1	1	1	1	1	1	1	1
Level 5	1	1	1	1	1	1	1	1	1	1
Level 6	1	1	1	1	1	1	1	1	1	1

Table 5: Plan matrix for house 1804/6 on Blanická street, Šumperk

4.3.1. How to save base of plan - example

Example of base of plan mentioned in chapter 4.3. Example of the reading plan , will be as follows:

- the upper three levels will consist of 2 files (there are 2 objects in level 6) :
 - 1.BPH – describing levels 6, 5, 4 of branch 1 (Šumperk)
 - 2.BPH – describing levels 6, 5, 4 of branch 2 (Zábřeh na Moravě)
- the lower three levels will consist of 9 files (there are 9 objects in level 3) :
 - 1-1-1-1.BPL – describing levels 3, 2, 1 of branch 1-1-1-1 (Šumperk-Česká čtvrť-Blanická-2787/10)
 - 1-1-1-2.BPL – describing levels 3, 2, 1 of branch 1-1-1-2 (Šumperk-Česká čtvrť-Blanická-1804/6)
 - 1-2-1-1.BPL – describing levels 3, 2, 1 of branch 1-2-1-1 (Šumperk-Temenice-Sokolská-1451/8)
 - 1-2-1-2.BPL – describing levels 2, 1 of branch 1-2-1-2 (Šumperk-Temenice-Sokolská-2110/12)
 - 1-2-2-1.BPL – describing levels 3, 2, 1 of branch 1-2-2-1 (Šumperk-Temenice-Finská-2715/10)
 - 2-1-1-1.BPL – describing levels 3, 2, 1 of branch 2-1-1-1 (Zábřeh na Moravě-not used-Sokolská-1853/10)
 - 2-1-1-2.BPL – describing levels 3, 2, 1 of branch 2-1-1-2 (Zábřeh na Moravě-not used-Sokolská-1672/8)
 - 2-1-2-1.BPL – describing levels 3, 2, 1 of branch 2-1-2-1 (Zábřeh na Moravě-not used-Jiráskova-2805/14)
 - 2-1-2-2.BPL – describing levels 3, 2, 1 of branch 2-1-2-2 (Zábřeh na Moravě-not used-Jiráskova-2248/6)

Part describing the upper three levels (levels 6, 5, 4) of Šumperk city (object number 1) will be as follows:

Šumperk		
Česká čtvrť	Blanická	
Temenice	Sokolská	Finská

The binary file will be named 1.BPH (Šumperk is description of object number 1 on level 6) and following values will be written to it (in hexadecimal):

- 00 00 00 03 – 4B number of rows,
- 00 00 00 03 – 4B number of table columns,
- 00 00 00 07 – 4B number of characters in the description "Šumperk",
- 8A 75 6D 70 65 72 6B – character codes Š u m p e r k,
- 00 00 00 00 – 4B length of an empty description (first row, second table column),
- 00 00 00 00 – 4B length of an empty description (first row, third table column),
- etc. by each row.

The resulting file 1.BPH will contain (in hexadecimal):

	0001	0203	0405	0607	0809	0A0B	0C0D	0E0F	0123456789ABCDEF
00	0000	0003	0000	0003	0000	0007	8A75	6D70	.....Šump
10	6572	6B00	0000	0000	0000	0000	0000	0BC8	erk.....Č
20	6573	6BE1	20E8	7476	729D	0000	0008	426C	eská čtvrť....Bl
30	616E	6963	6BE1	0000	0000	0000	0008	5465	anická.....Te
40	6D65	6E69	6365	0000	0008	536F	6B6F	6C73	menice....Sokols
50	6BE1	0000	0006	4669	6E73	6BE1			ká....Finská

Part describing the lower three levels (levels 3, 2, 1) describing house 1804/6 will be as follows:

1804/6					
Plašilovi	kitchen	liv. room	bedroom	room 2	
Horváthovi	kitchen	liv. room	bedroom	corridor	room2

The binary file will be named 1-1-1-2.BPL (1804/6 is description of object number 2 in level 3 belonging to the object number 1 in level 4, belonging to the object number 1 in level 5, belonging to the object number 1 in level 6) and values will be written the same way as to binary file 1.BPH describing the upper three levels.

The resulting file 1-1-1-2.BPL will contain (in hexadecimal)::

	0001	0203	0405	0607	0809	0A0B	0C0D	0E0F	0123456789ABCDEF
00	0000	0003	0000	0006	0000	0006	3138	3034	.....1804
10	2F36	0000	0000	0000	0000	0000	0000	0000	/6.....
20	0000	0000	0000	0000	0009	506C	619A	696C	.....Plašil
30	6F76	6900	0000	066B	7563	6879	F200	0000	ovi....kuchyň...
40	096F	622E	2070	6F6B	6F6A	0000	0007	6C6F	.ob. pokoj....lo
50	9E6E	6963	6500	0000	0770	6F6B	6F6A	2032	žnice....pokoj 2
60	0000	0000	0000	000A	486F	7276	E174	686F	.....Horvátho
70	7669	0000	0006	6B75	6368	79F2	0000	0009	vi....kuchyň....
80	6F62	2E20	706F	6B6F	6A00	0000	076C	6F9E	ob. pokoj....lož
90	6E69	6365	0000	0006	6368	6F64	6261	0000	nice....chodba..
A0	0007	706F	6B6F	6A20	32				..pokoj 2

5. SOLUTION OF MOST COMMON PROBLEMS

PROBLEM DESCRIPTION	RECOMMENDED SOLUTION
Individual records are not displayed in column (2), (3) or (4) (see Illustration 5: Graphical user interface of RFU PC)	<p>The error is caused by damaged RFU30.STS file - located where the program is installed, in folder „[installation folder]\RFU30\“.</p> <p>Overwrite RFU30.STS file with original RFU30.STS file. This file can be found on delivered CD or asked from the manufacturer.</p>
Individual records are not displayed in column (3) (see Illustration 5: Graphical user interface of RFU PC)	<p>Controlling software will display read devices (heat cost allocators and radio modules for water meters) from the plan at the moment when data from first planned device are read.</p> <p>Check if plan is loaded. If yes, verify if plan match with area, where reading is performed.</p>