

SINGLE PHASE FOUR TARIFF WATT HOUR METER



Class	2 (IEC 62053-21)
Nominal current I_n	10 A
Maximal current I_{max}	60 A
Thermal current	1,2 I_{max}
Initiating current	$<0,025 I_n$ pri $\cos \varphi = 1$, za klasa 2
Nominal voltage	230 VAC
Voltage range	$0,8 U_n \dots 1,15 U_n$
Frequency	50 Hz ili 60 Hz
Power counter constant	800 imp/kWh
Working temperature	$-25^\circ\text{C} \dots +60^\circ\text{C}$
Extended temperature range	$-40^\circ\text{C} \dots +70^\circ\text{C}$
Storage temperature	$-40^\circ\text{C} \dots +80^\circ\text{C}$
Power consumption	$< 2\text{W}$
Internal real time clock	
Accuracy (on 25°C)	$\leq \pm 1$ s/day
Backup power supply	6 year
RTC	Quartz crystal 32,768 kHz
Optical port	
Optical port	IEC 62053-21
Impulse voltage	8 kV, 1,2/50 μs (IEC 62053-21 i IEC 62052-11)
Dimensions	($\text{ř} \times \text{v} \times \text{d}$) 119 x 180 x 59 mm
Weight	0,7 kg

Scheme for the connection

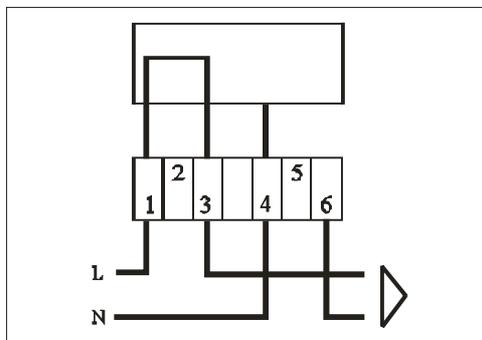


Table Of Contents

Raj-Tek Help

[Getting started](#)

[What is the purpose of this software?](#)

[What is the available command set?](#)

[Set time and date](#)

[Get serial number](#)

[Get parameter set \(ID\)](#)

[Tariff profile initialization - Upload](#)

[Tariff profile initialization - Program](#)

[Read event log](#)

[Delete event log](#)

[Meter Wake-up](#)

[Read meter full data-set](#)

[Load profile read-out](#)

[Season read-out](#)

[Read battery counter](#)

[Exiting programming mode](#)

[What else can I do?](#)

Getting started

Welcome to Raj-tek Communication Control Software.

This help file has been designed to help you quickly learn how to use this software.

Follow the links below to find the information you are looking for.

Getting started

[What is the purpose of this software?](#)

Find out why the need for such a software and which specifications it is based on.

[How to set up a communication?](#)

In this chapter you can learn how to set up a link with the power counter, how this link is maintained and how to properly disengage it.

[What is the available command set?](#)

Get introduced with all the available commands that enable the user to modify, read or program a power counter.

[What else can I do?](#)

Find out all about the additional features such as saving a project, viewing saved data or export to some of the well known formats.

What is the purpose of this software?

The development of this software has been closely related to the development of the Raj-Tek electric power smart meter. The communication to the meter is based on the IEC 62056-21 specification.

The amount of data and data manipulation that this meter can provide and the need for a user-friendly interface made it imperative the creation of such a software.

The Raj-Tek Comm Control Software provides an easy way to download, view, manipulate or export data from the meter, as well as program the meter itself.

Having a communication based on IEC-62056-21, theoretically it can function with any smart power meter based on the same specification. However, except for the Full Data Set command which is universal and does not require entering programming mode, all the rest of the commands have to be used with caution when connecting with power meters other than Raj-Tek. The reason is the possibility of the smart meter manufacturer to interpret some of the commands specification in a different manner, hence, a certain command may have very different meaning and effect on the meter than the user expected.

The development of Raj-Tek Comm Control Software is going to be in the direction of widening its range towards multi-channel read-out, as well as the increase of meter types it can communicate with.

How to set up a communication?

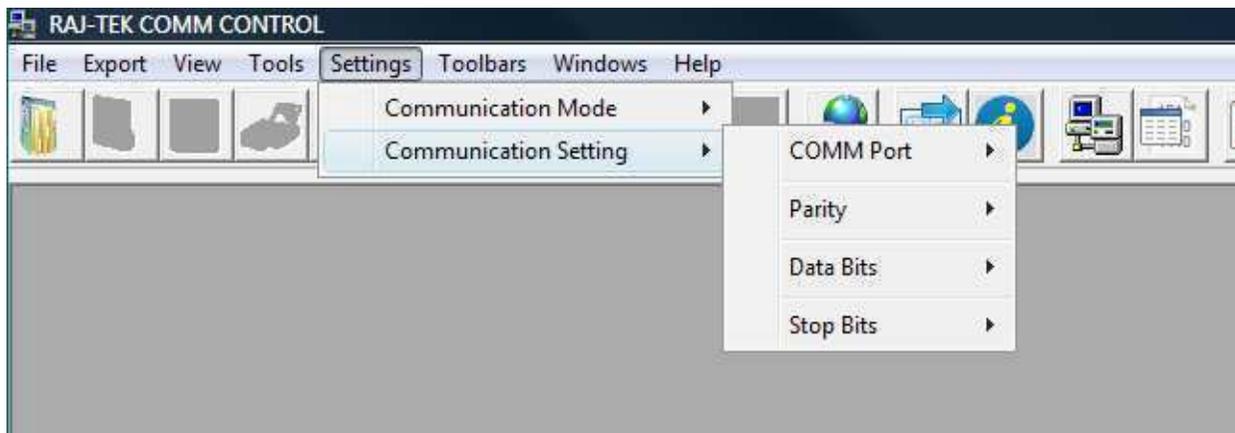
The communication between the Raj-Tek Comm Control Software with the meter is achieved through a RS-232 serial connection.

By default, the software sets the communication port properties to the ones required by the IEC 62056-21 standard. It is strongly recommended that properties such as Parity, Data Bits and Stop Bits should not be modified. The Baud Rate is a property that cannot be modified due to its given nature by the IEC 62056-21 standard. For more information refer to this standard.

Having this in mind, only information the user needs to supply when the software is run for the first time, is the communication port number. Every time the software runs, at start-up it collects information about the existing communication port numbers. If the communication port number exists it will be automatically chosen. In case there have been changes to the system and the specified port number does not longer exist, the software will prompt the user to select a different port number.

The communication port number can be changed in:

Settings>Communication Settings>COMM Port



What is the available command set?

Raj-Tek smart power meter has implemented possibility for programming fifteen different types of day definitions, fifteen week definitions and fifteen season definitions, as well as four tariffing schemes and one total.

The Raj-Tek Communication Control Software implements all of the commands needed in order to enable full meter functionality and programmability.

Following is a list of available commands. These commands can be found under the *Tools* menu or as buttons on the *Taskbar*.

Set Parameters:

- [Set Time and Date](#)

Get Parameters:

- [Serial Number](#)
- [Parameter Set \(ID\)](#)

Tariff Profile Initialization

- [Upload](#)
- [Program](#)

Event Log

- [Read](#)
- [Delete](#)

Read-out

- [Meter Wake Up](#)
- [Read Meter Full Data-Set](#)
- [Load Profile](#)
- [Season](#)
- [Baterly Counter](#)

Exiting Programming Mode

- [End Session](#)

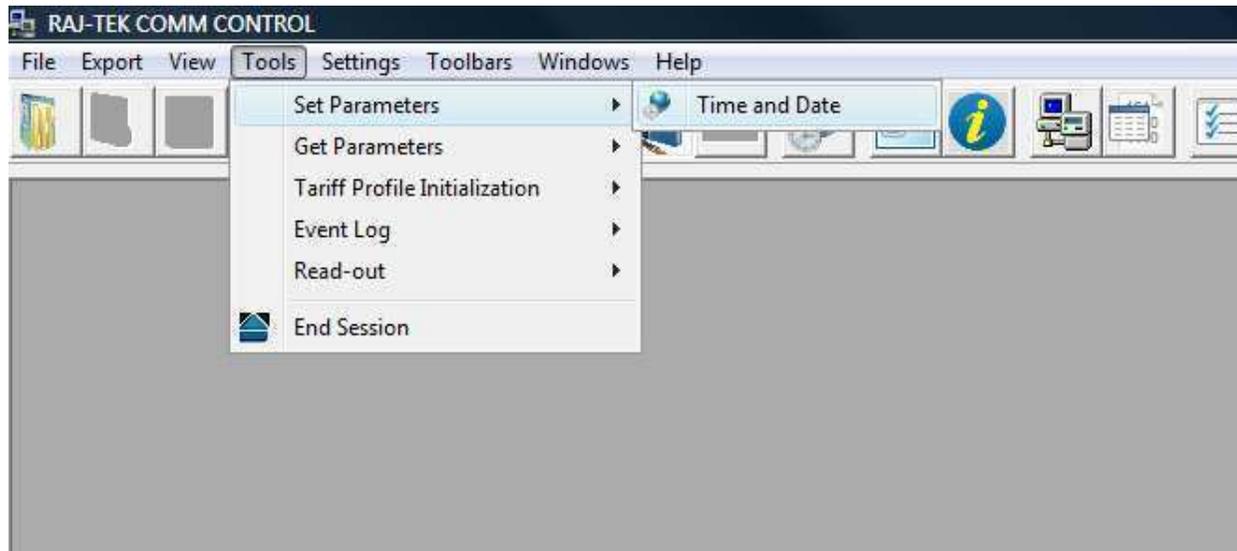
Set Time and Date

This command changes the current time and date of the electricity power counter.

Generally, the meter is going to require a password which has to be entered upon request. If the meter has been configured without password, just press enter (or tick button) when the password window appears.



This command can be selected from the toolbar, , or from the menu

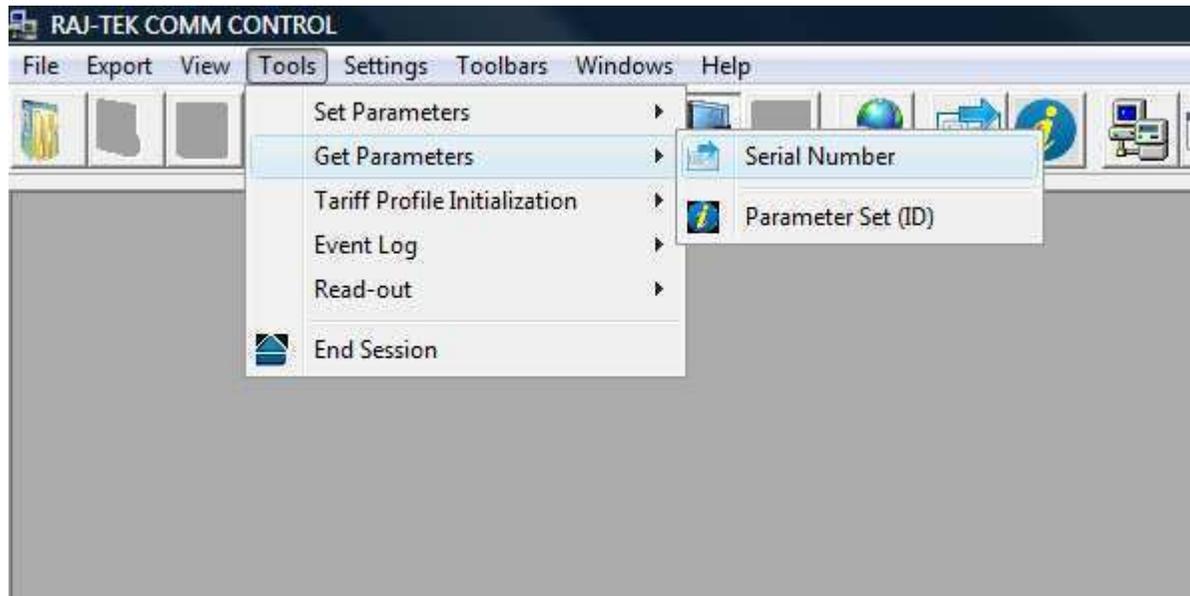


Get Serial Number

This command will retrieve the serial number of the meter. Using this command requires meter programming mode.

In order for the software to take care of the transmitted data and organize it accordingly, it is designed in such a way so that it issues *Get Serial Number* command whenever initiating a command that requires programming mode.

This command can be selected from the toolbar,  , or from the menu

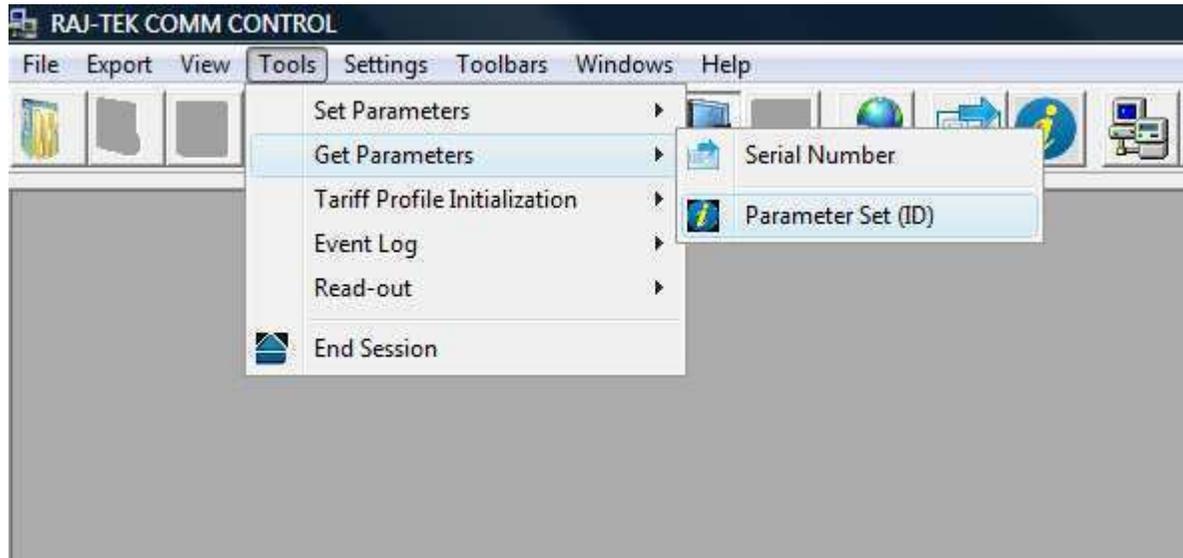


Get Parameter Set (ID)

This command retrieves the set of meter parameters, not modifiable by nature.



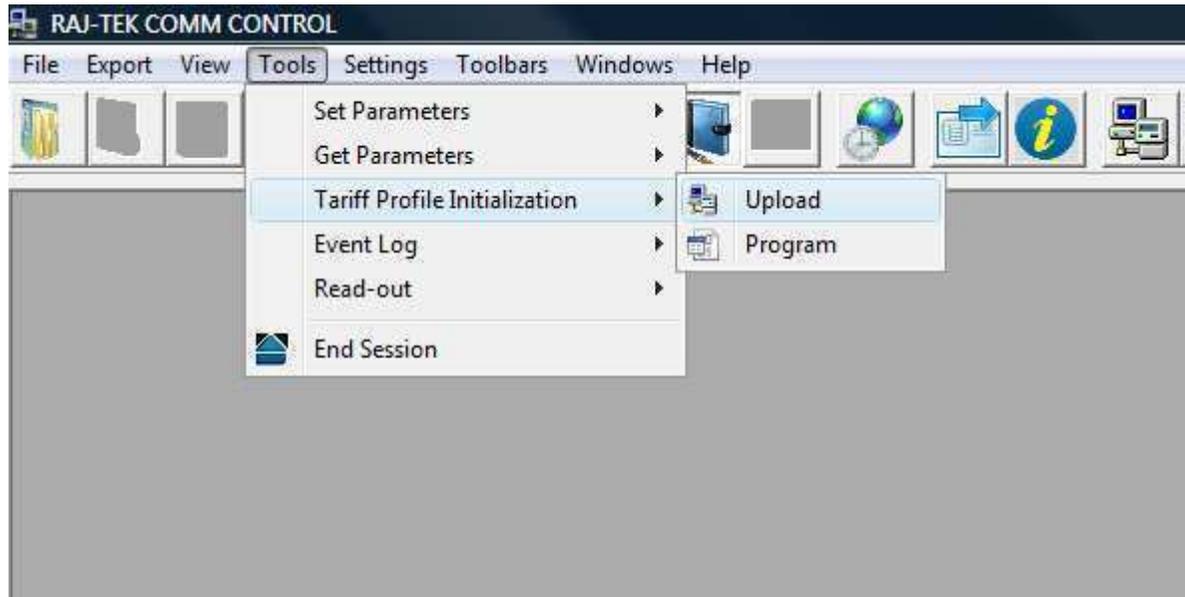
This command can be selected from the toolbar, , or from the menu



Tariff Profile Initialization - Upload

This command retrieves the active tariffing scheme of the meter. Using this command requires entering programming mode. The data are shown in a tabular form in raw format and at the same time in a separate window, as time graphs and formatted data.

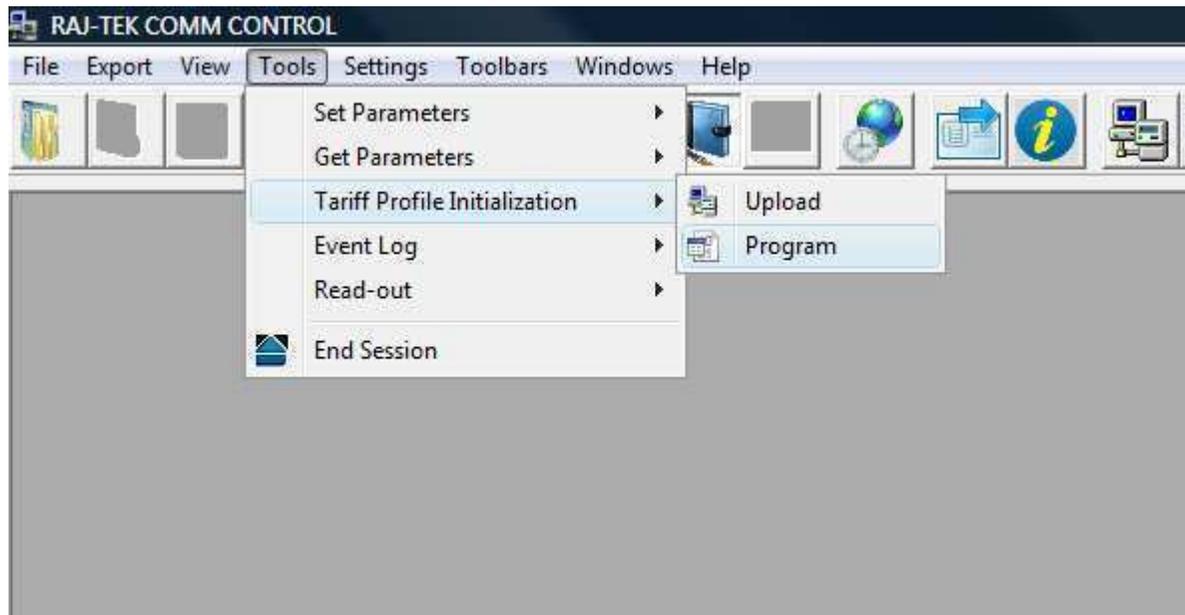
This command can be selected from the toolbar, , or from the menu



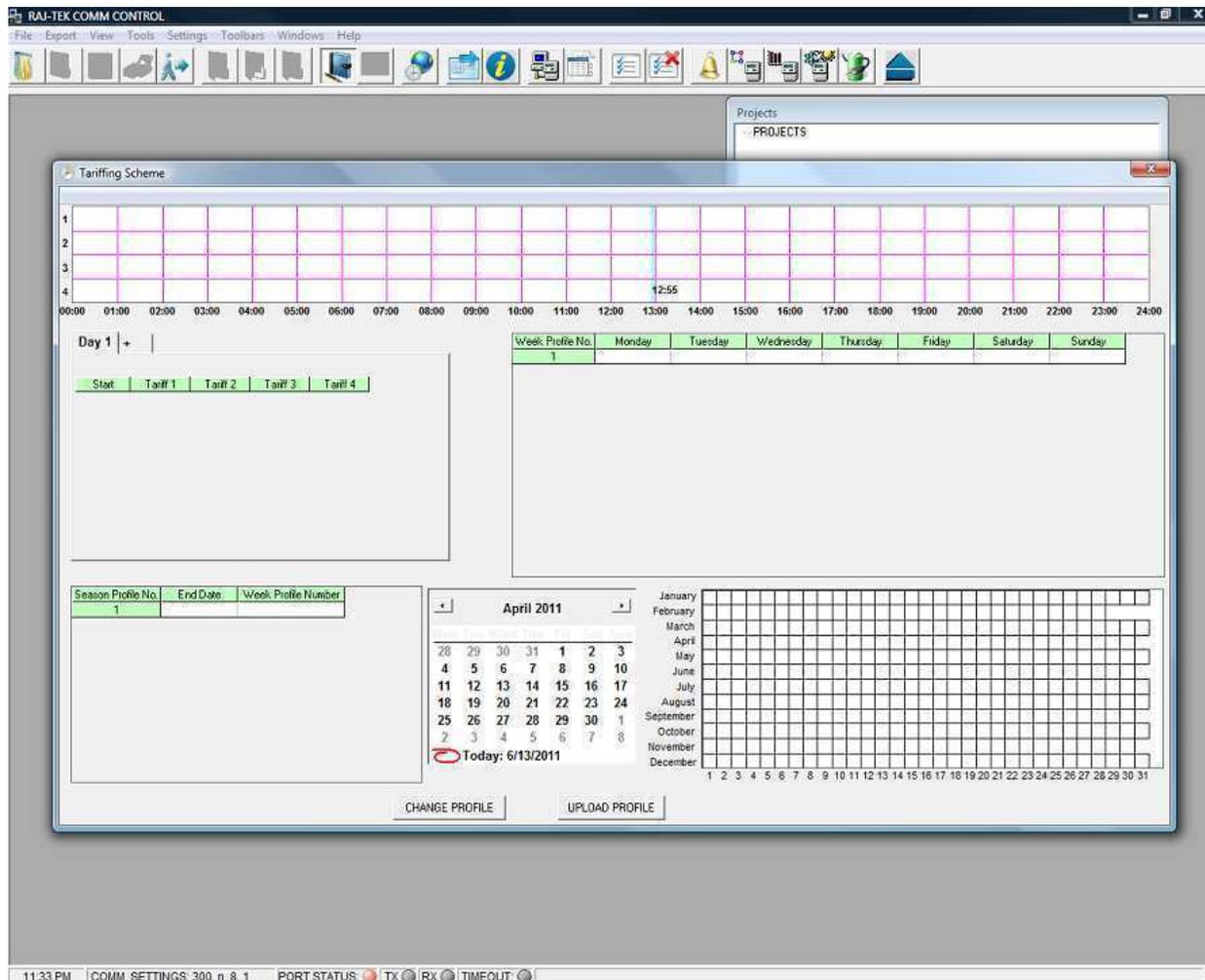
Tariff Profile Initialization - Programming

Using this command the user can change meter's tariffing scheme. This requires entering programming mode by supplying a password.

This command can be selected from the toolbar,  , or from the menu



After initiating this command the following window will appear:



Tariff time intervals can be selected graphically. If any changes are required, it can be done by directly writing in the table. Mouse left click selects a specific time, double left click erases the whole selection for a specific day and right click selects a time interval from the previous selection to the end (24 hours). As it can be seen on the graphical selection area of the screen, the selection (a day) starts from 00:00 and ends to 23:59.

Read Event Log

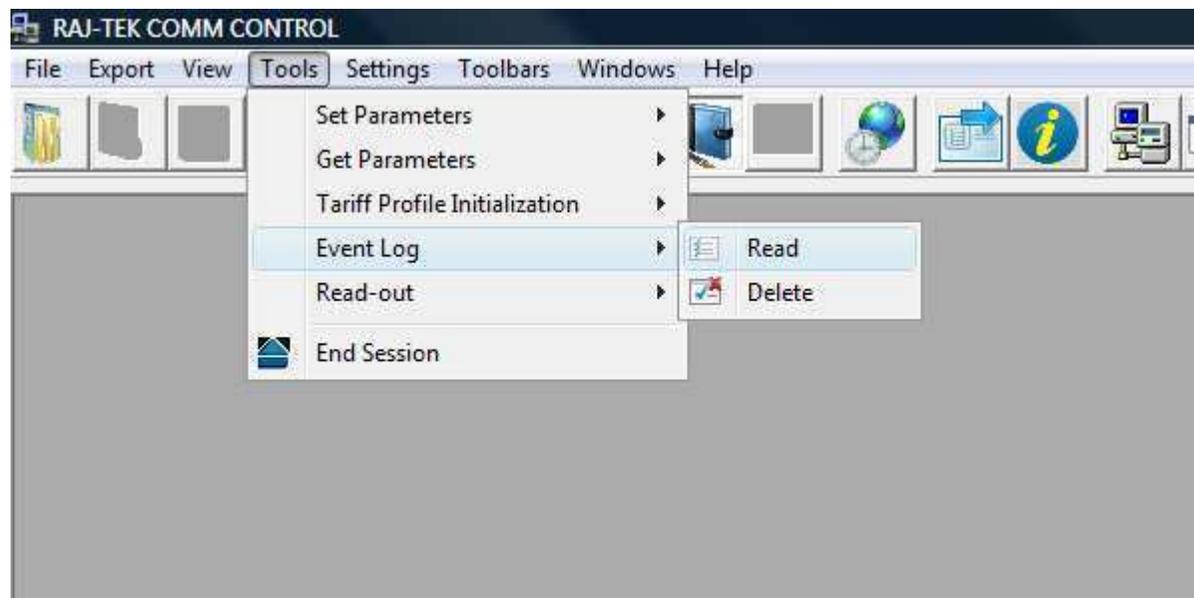
Initiating Read Event Log command enables the user to retrieve information about meter's status changes.

The available recorded status changes are:

- Main Cover
- Terminal Cover
- Phase (All three phases)
- Tariff Change (Tariff Re-programming)
- Last Readout (Last successful connection)
- Complete Log



This command can be activated from the toolbar, , or from the tools menu.



The user is given the possibility to choose which status change information should be required from the tariffing device and is presented with an option screen. After pressing the tick (OK) button the program will initiate communication and show the results in tabular form.



Delete Event Log

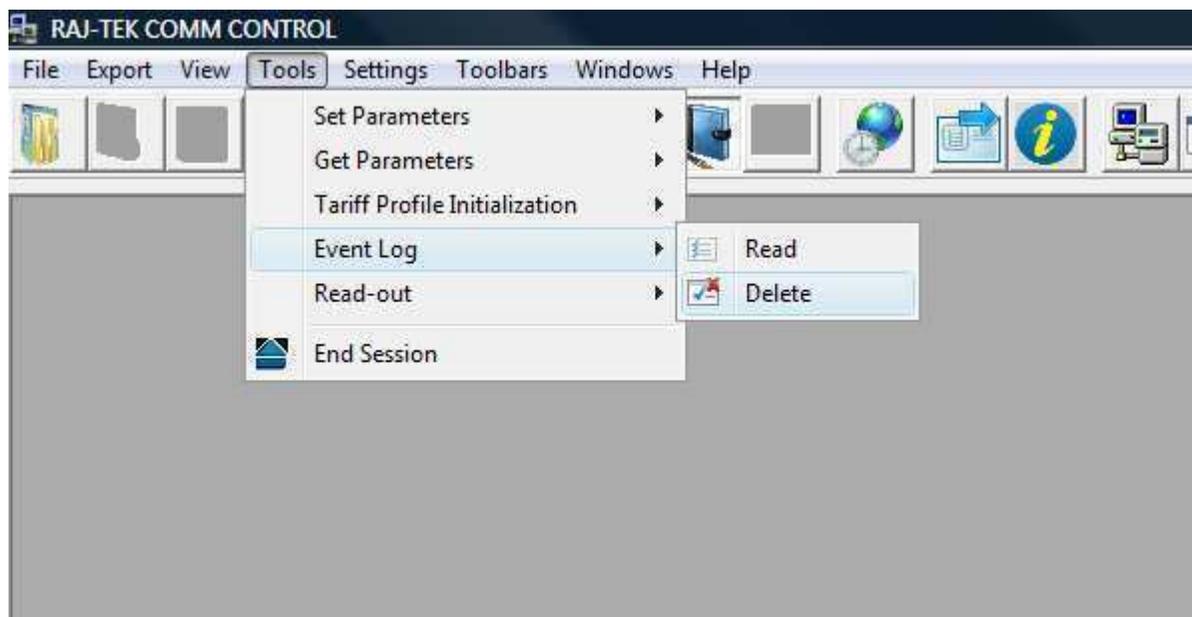
The Delete Event Log command directs the tariffing device to delete specific or all information about its status changes.

Just as it is the case with the [Read Event Log](#) command, the user is given the following options for deleting status information:

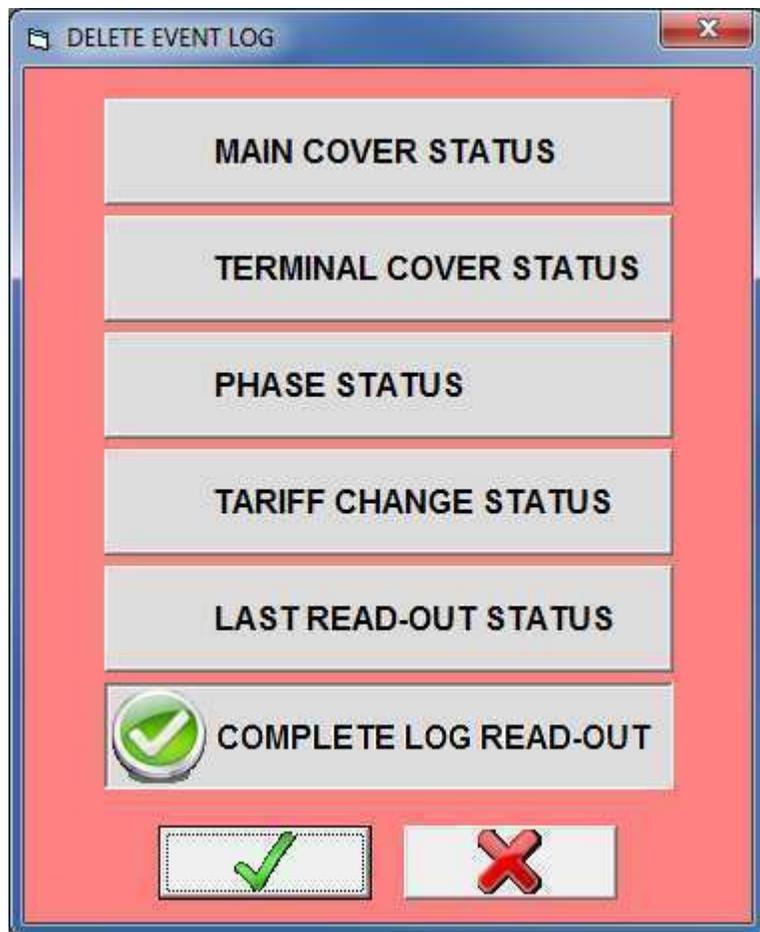
- Main Cover
- Terminal Cover
- Phase (All three phases)
- Tariff Change (Tariff Re-programming)
- Last Readout (Last successful connection)
- Complete Log



This command can be initiated from the toolbar, , or from the tools menu.



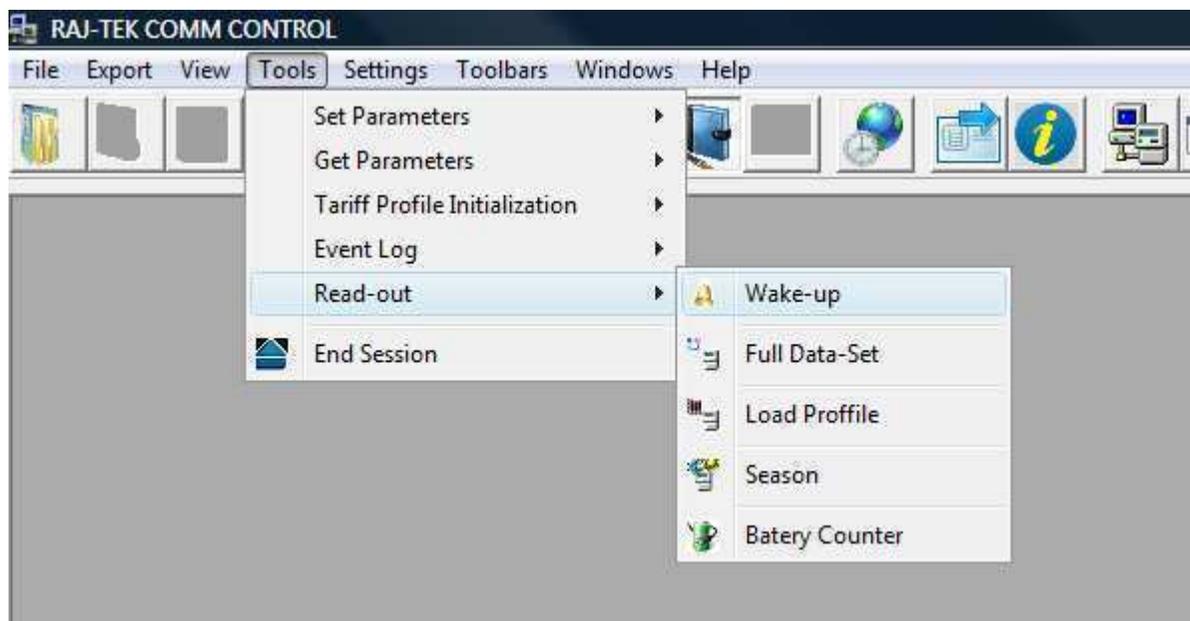
The user is given the possibility to choose which status change information should be deleted from the tariffing device and is presented with an option screen. After pressing the tick (OK) button the program will initiate communication and delete the required information from the tariffing device.



Meter Wake-Up

The Wake-Up command brings the tariffing device up from sleep mode in order to accept communication, as described in the IEC-62056-21 specification. The tariffing device enters sleep mode only when battery powered. After receiving the wake-up command the device does not respond to the call and is in a stand-by awaiting communication. The tariffing device is going to be in stand-by for thirty seconds. If communication is not initiated, it will return to sleep mode (different manufacturers use different stand-by intervals).

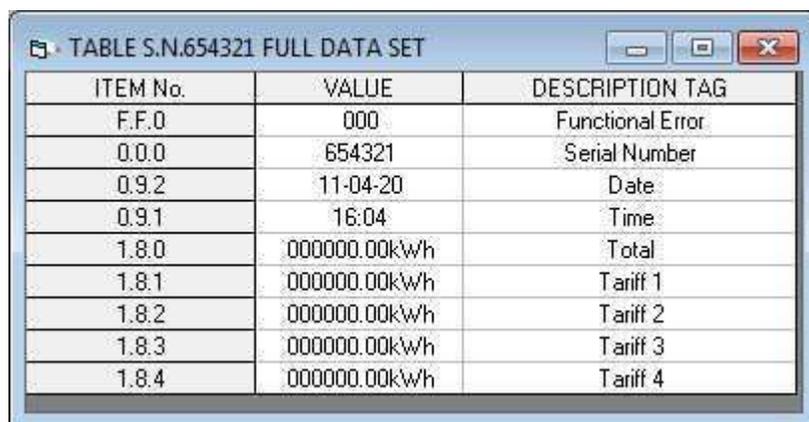
This command can be issued from the toolbar, , or from the tools menu.



Full Data-Set Command

The Full Data-Set command is the basic command in the IEC-62056-21 Mode C specification. Issuing this command does not require a password and the response of the tariffing device is a set of information that describes the current state of the meter. After the tariffing device responds the communication ends.

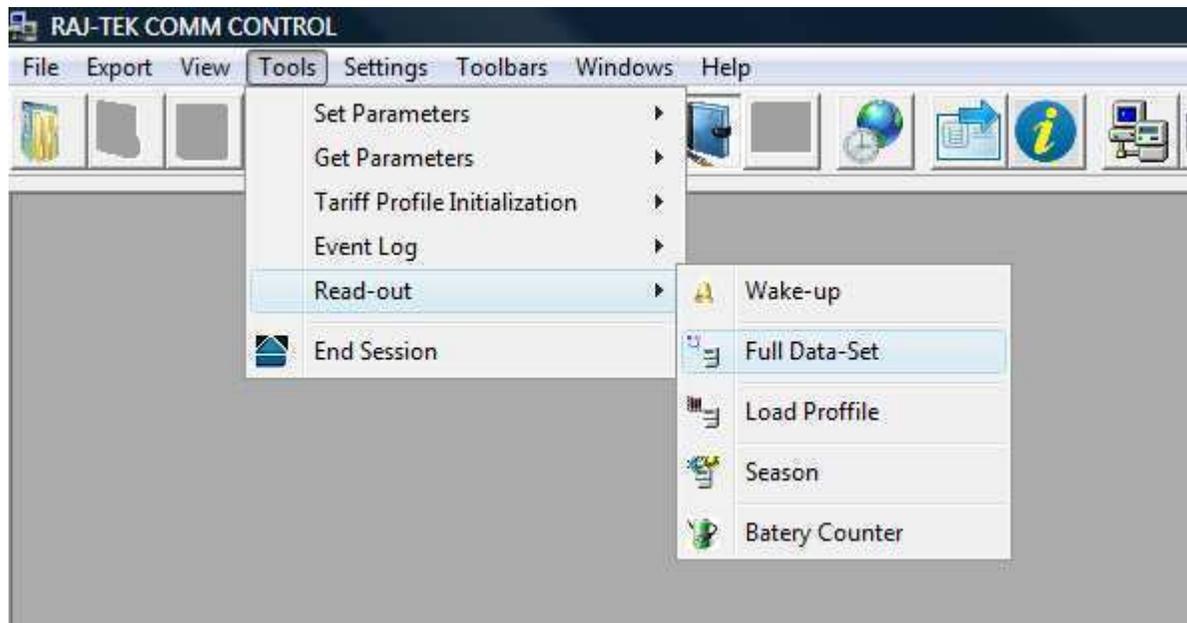
An example of Raj-tek electricity meter response information is shown in the following picture.



ITEM No.	VALUE	DESCRIPTION TAG
F.F.0	000	Functional Error
0.0.0	654321	Serial Number
0.9.2	11-04-20	Date
0.9.1	16:04	Time
1.8.0	000000.00kWh	Total
1.8.1	000000.00kWh	Tariff 1
1.8.2	000000.00kWh	Tariff 2
1.8.3	000000.00kWh	Tariff 3
1.8.4	000000.00kWh	Tariff 4

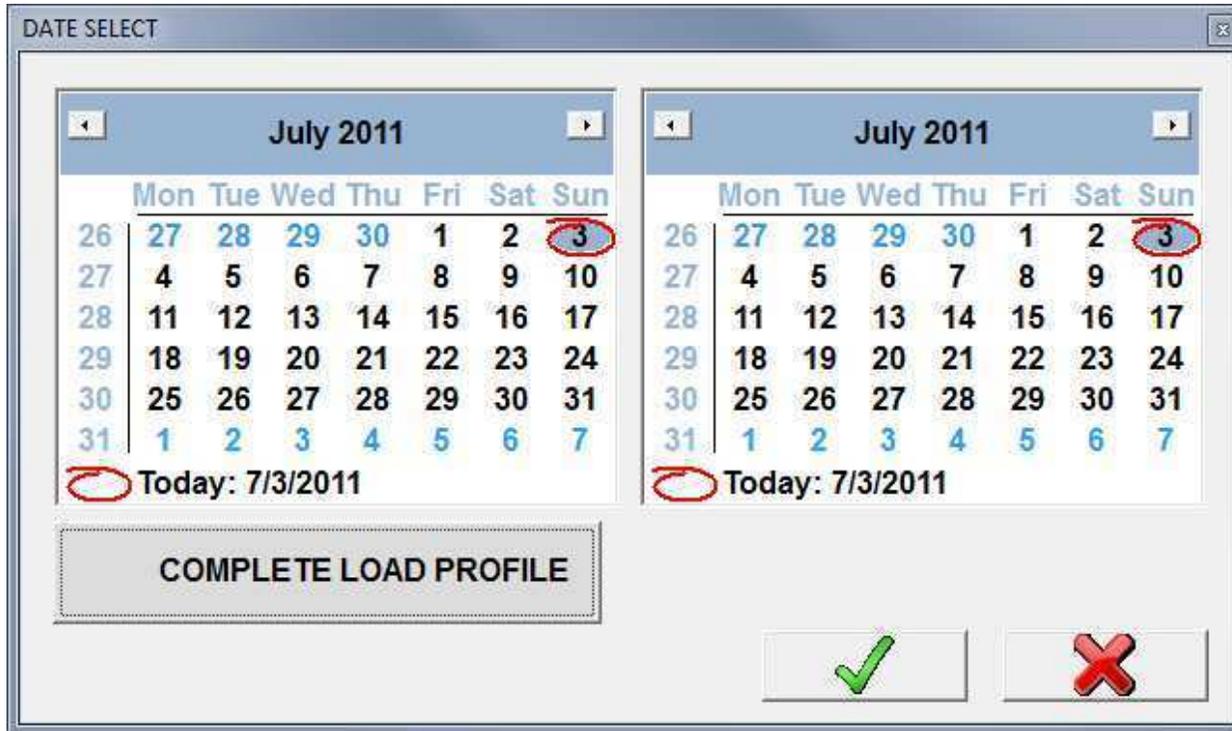
The first column shows the OBIS (Object Identification System) code of the entity, the second column its value and the third column shows its description.

This command can be issued from the toolbar, , or from the tools menu.



Load Profile Command

The Load Profile command requires from the tariffing device to send information about the measured consumption in the desired period of time. The user is first presented with a calendar to choose the time interval desired. Pressing the tick (OK) button the communication with the tariffing device starts.

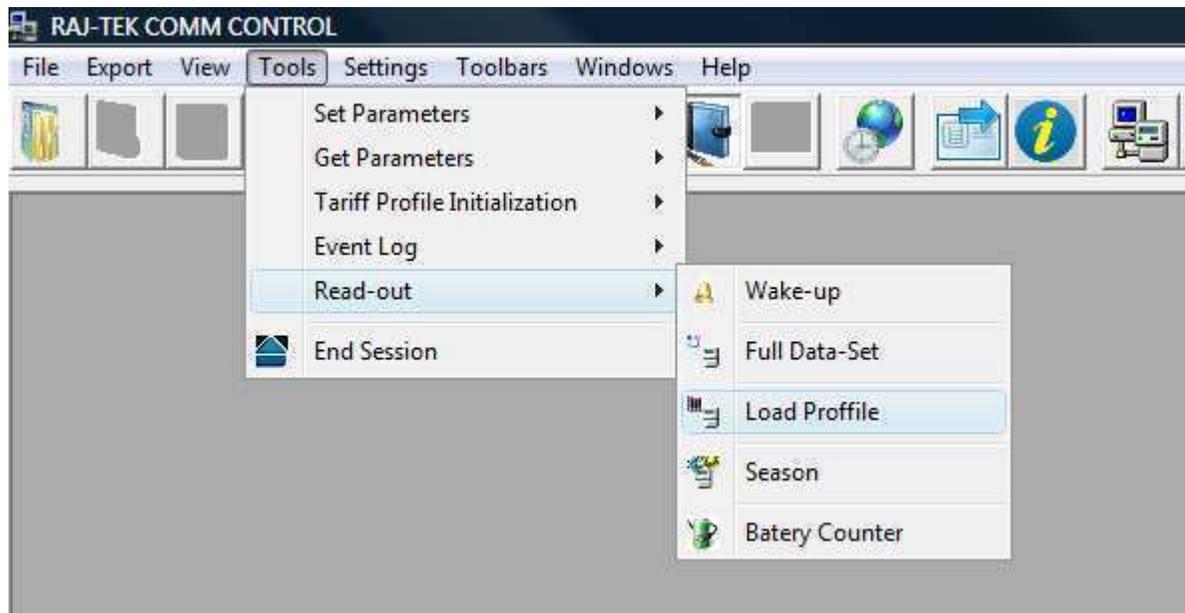


In case the time interval is out of the tariffing device range, it responds with negative acknowledgment (NAK).

Information received from the tariffing device is organized in a tabular form. Graphical representation of data is also available through the **Graph** command.



The Load Profile command is available as a button on the toolbar, , or from the tools menu.



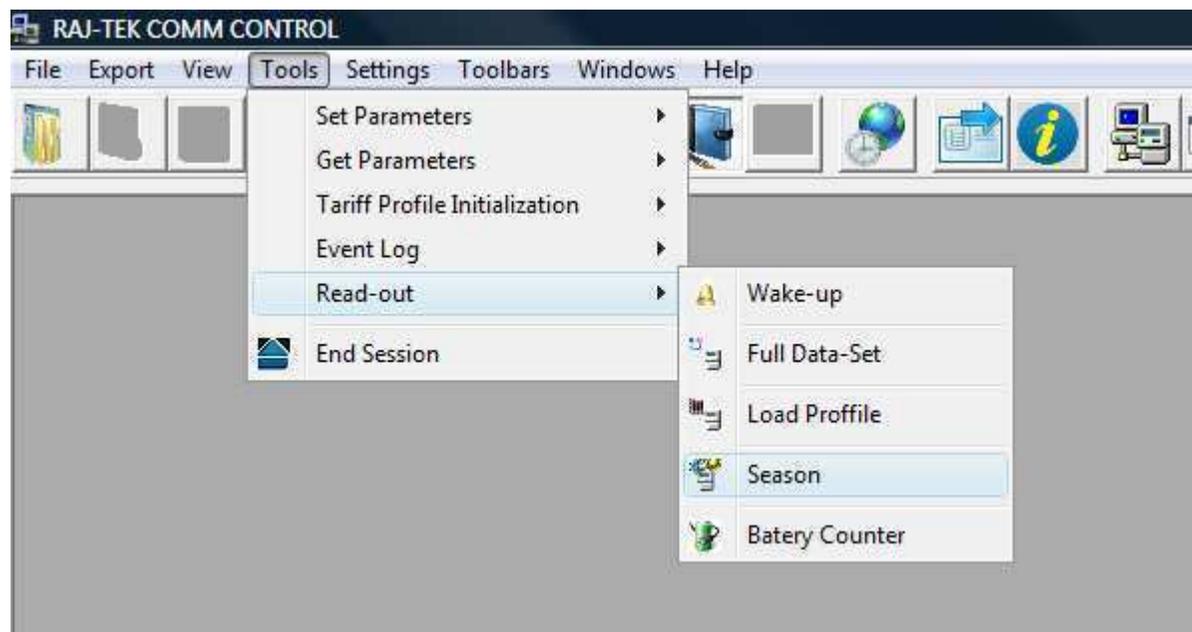
Read Seasons

The Season Profile Read-Out command is the same in nature as the [Load Profile](#) command.

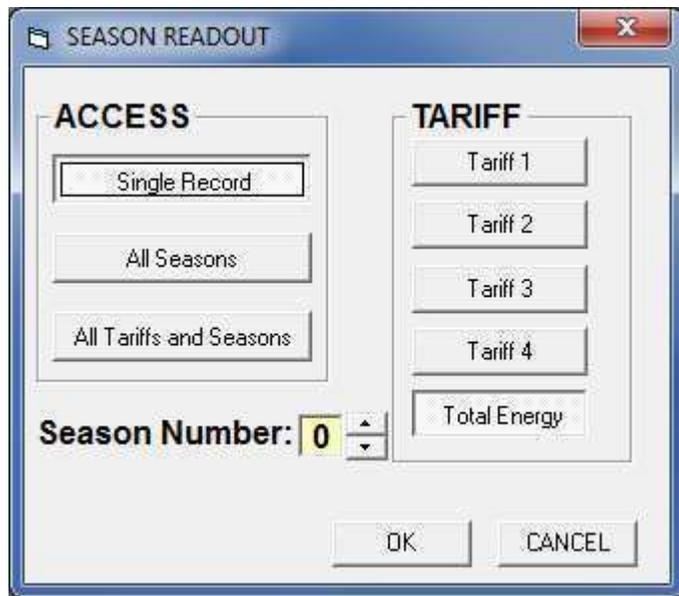
The only difference is that the consumption is not represented on a daily basis, but as a cumulative value by season. The number and length (in days) of a season is defined by the user (see [Tariff Profile Program](#) command).



Pressing the toolbar button, , or on the toolbar menu



the user is presented with a choice as to how the tariffing device should filter the results, as shown on the picture below.

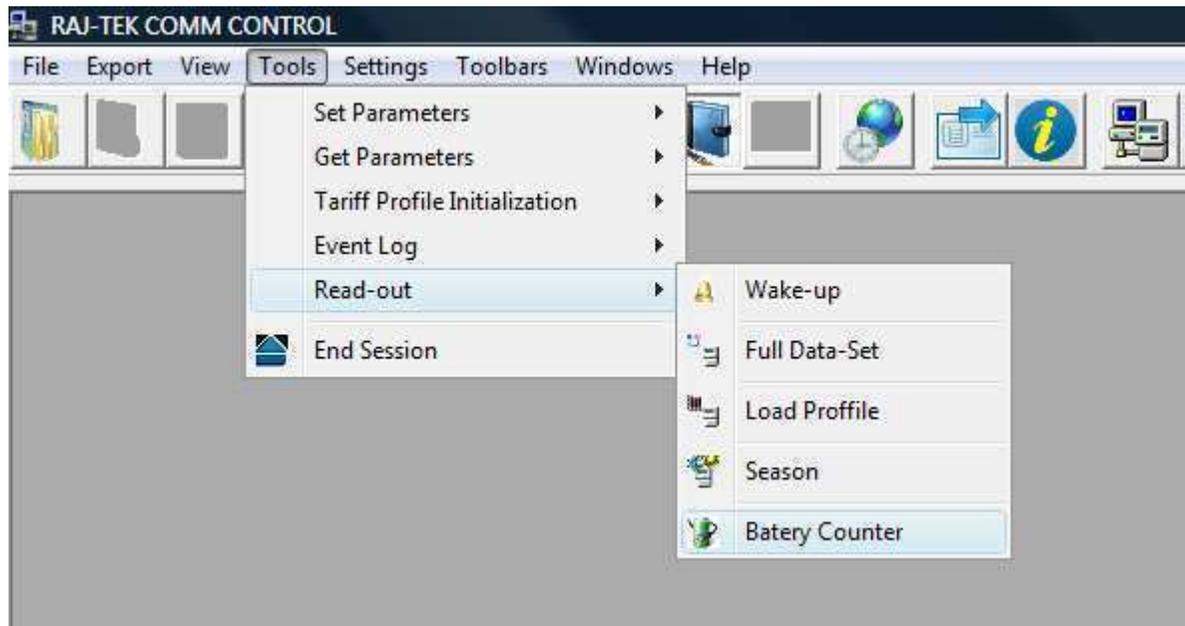


The results are initially represented in a tabular form, but they can also be represented in a **graphical** form.

Read Battery Counter Command

The battery counter command requires from the tariffing device to inform how long it has been working on battery power. This is a cumulative value.

This command can be issued from the toolbar,  , or from the tools menu.

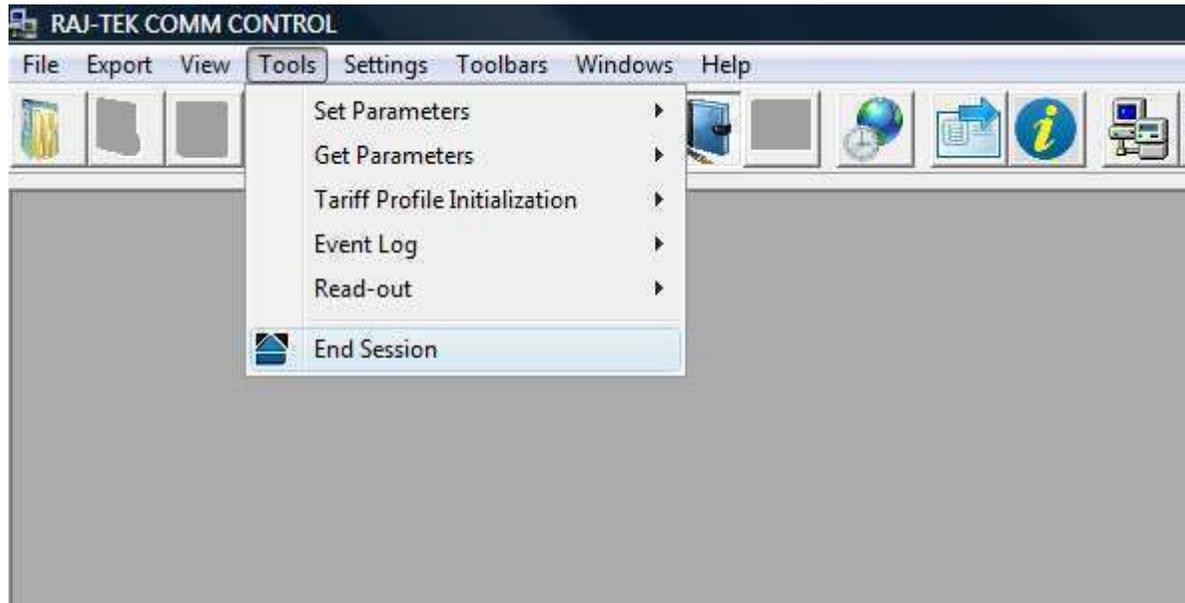


End Session Command - Exiting Programming Mode

This command informs the tariffing device to exit programming mode, after which it immediately (without additional response) sets the communication baud rate to 300bps, as prescribed by the IEC-62056-21 Mode C specification.



The End Session command is available as a button on the toolbar,  , or from the tools menu.



What else can I do?

In this section you can learn how the additional features of this software package can help you organize, save and view data that has been downloaded from the tariffing device.

PROJECTS

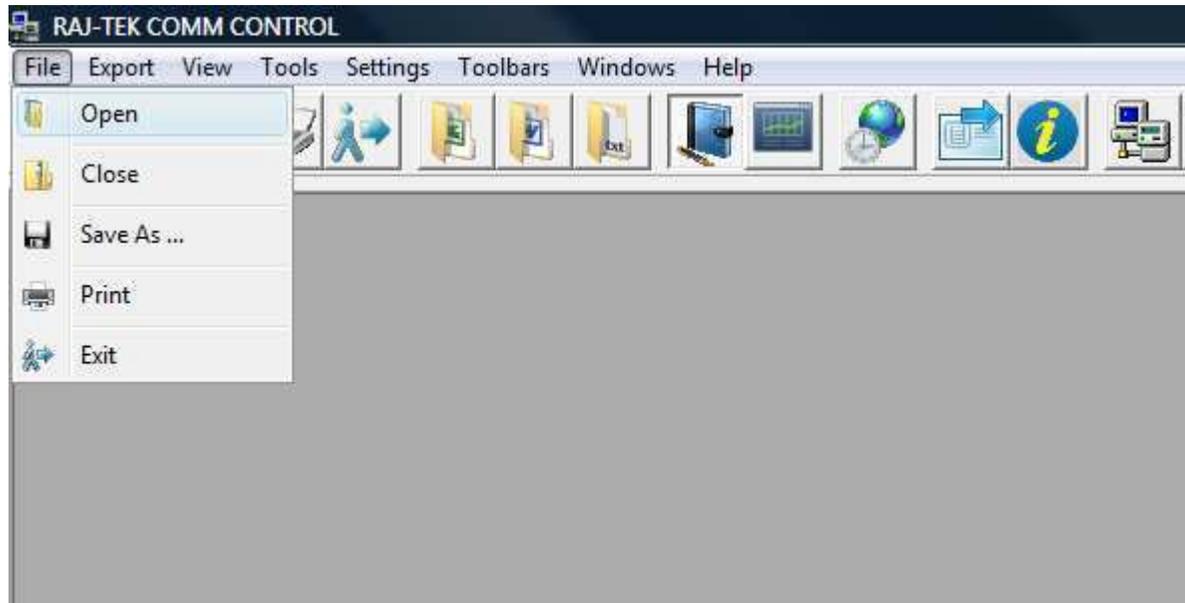
When a tariffing device is communicated through this software package, its serial number is automatically acquired and stored for as long as the software is running. Every data received from a tariffing device is connected to its specific serial number. This provides for data to be organized in projects with same serial numbers.

All of the active projects are shown in the **Projects** window in a tree-view form, as shown in the following picture.

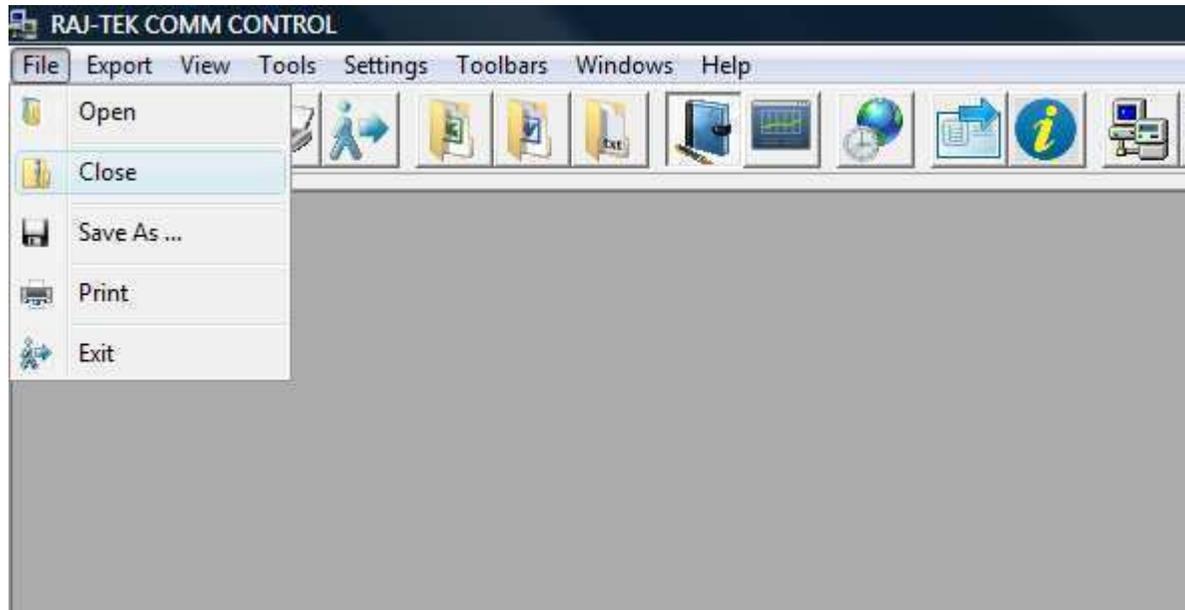
The screenshot shows the RAJ-TEK COMM CONTROL software interface. The main window displays a table of data with columns for ITEM No., VALUE, and DATA TAG. The Projects window on the right shows a tree view of projects, including MEANY TABLE TEST and various data sets. A Log Window at the bottom right shows the start of a log session.

ITEM No.	VALUE	DATA TAG
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20
1.8.0	000000.00kWh	11-04-20
1.8.1	000000.00kWh	11-04-20
1.8.2	000000.00kWh	11-04-20
1.8.3	000000.00kWh	11-04-20
1.8.4	000000.00kWh	11-04-20

To open a saved project click the  icon on the toolbar, or from the file menu.



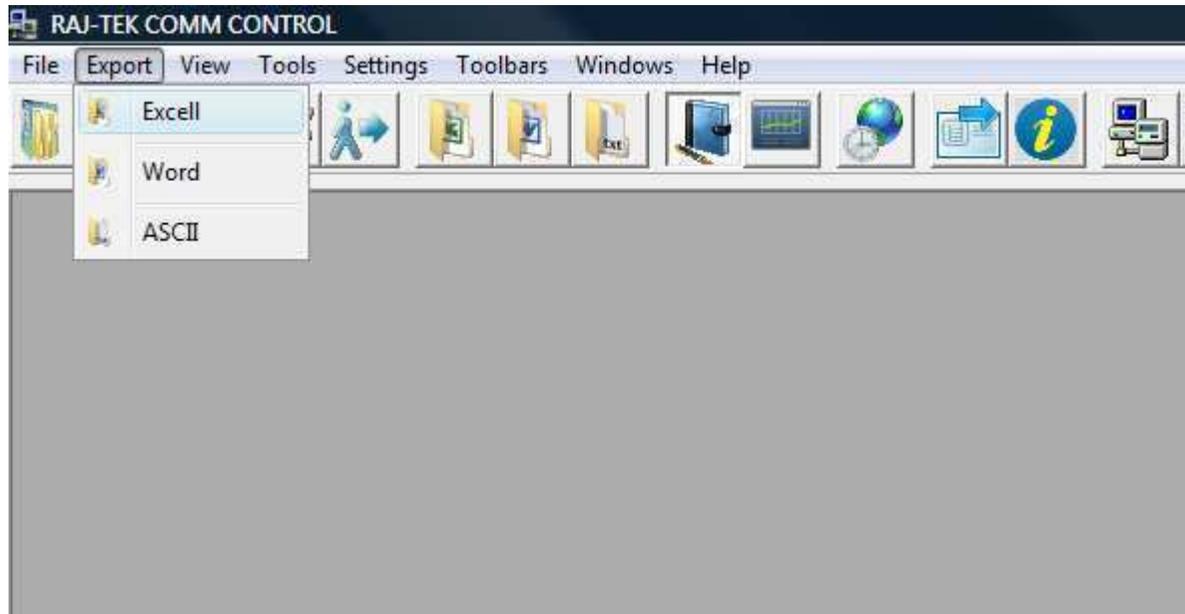
To close a project click the  icon on the toolbar, or from the file menu.



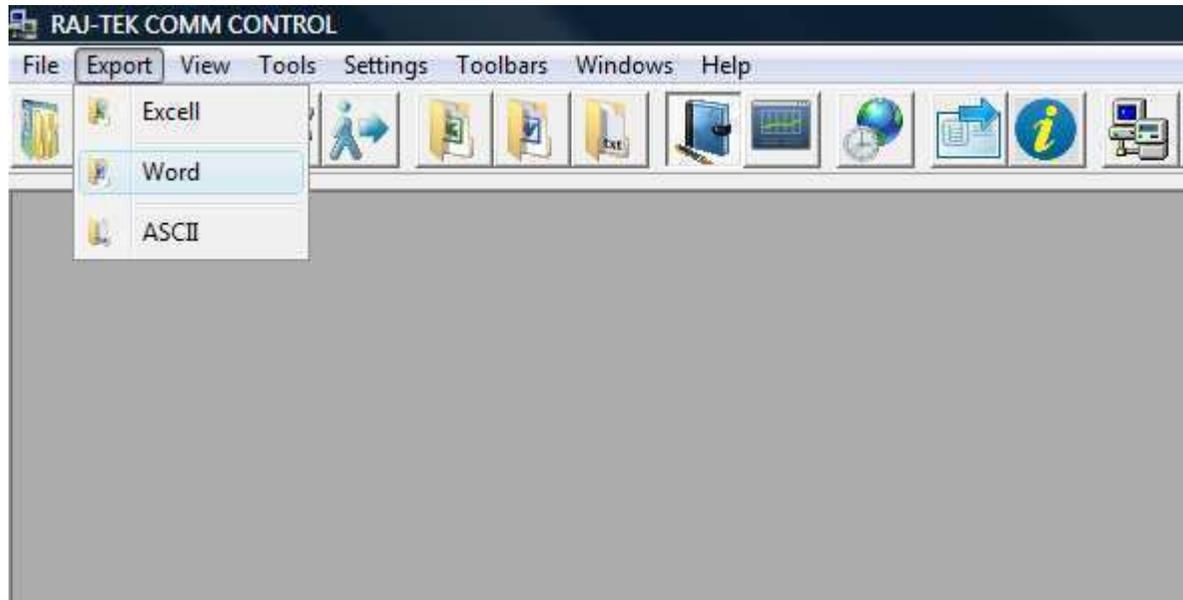
EXPORTING DATA

In order to provide the user with better freedom of data manipulation and analysis, this software package has the possibility to export data to some the most popular Microsoft file formats. This is possible only if the according Microsoft packages have been previously installed. Supported export file formats are Microsoft Excel and Word. In addition, data can be exported in a simple ASCII format. Data is always exported "table-by-table", which means you have to select a table first and then export the data. You can not export whole project.

To export data in Microsoft Excel format click the toolbar button with the  icon, or the equivalent icon on the export menu.



To export data in Microsoft Word format click the toolbar button with the  icon, or the equivalent icon on the export menu.



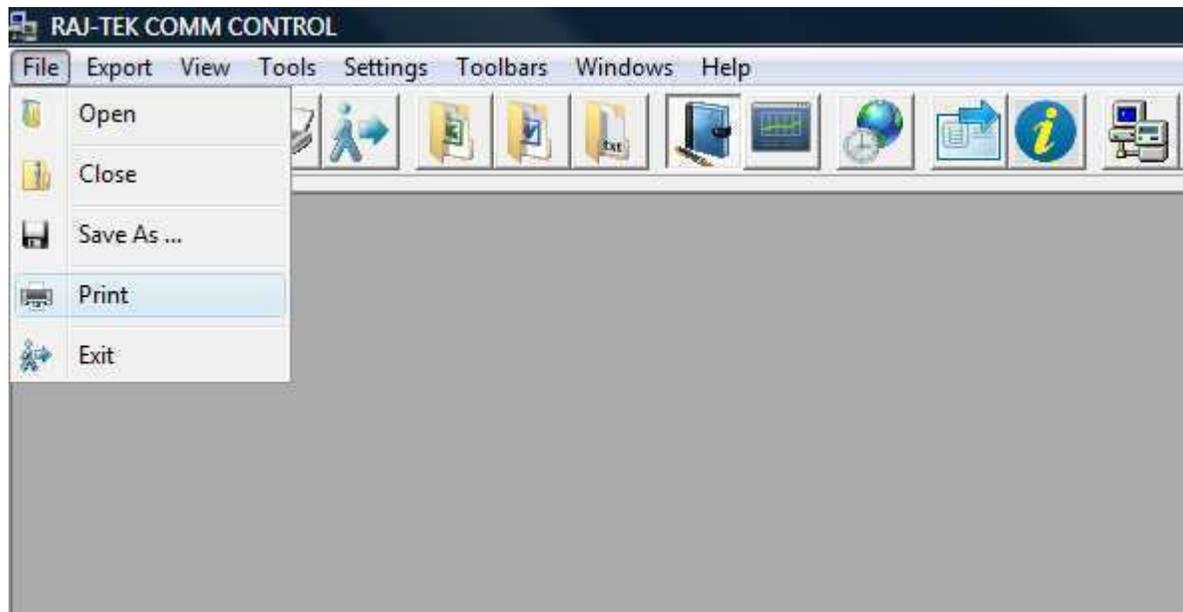
To export data in simple ASCII format click on the toolbar button with the  icon, or the equivalent icon on the export menu.



PRINTING

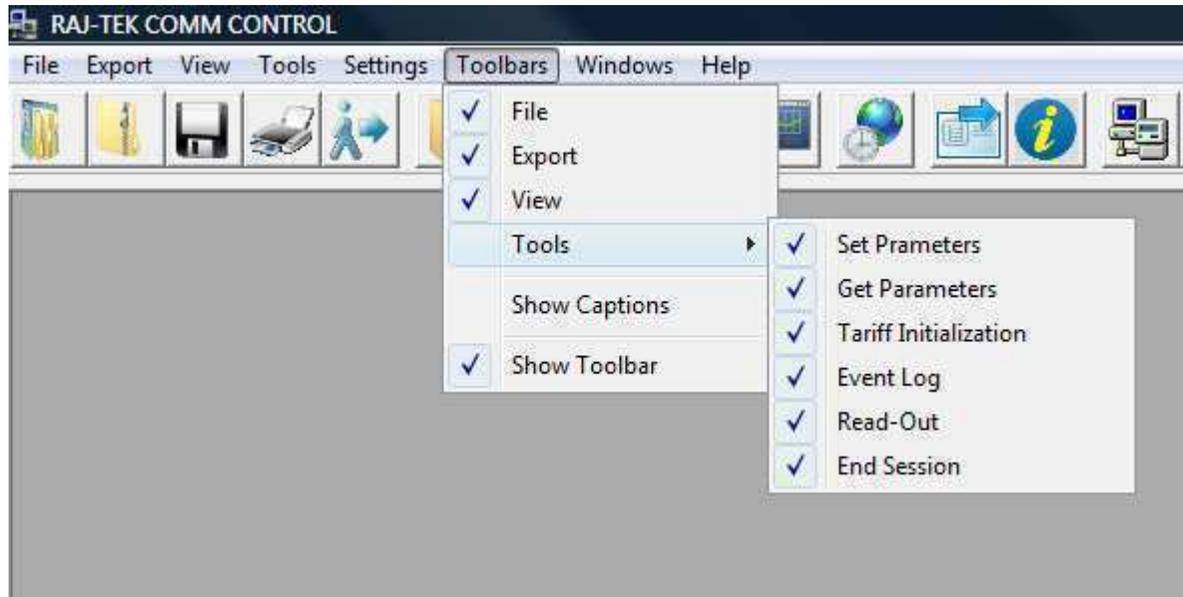
Just as exporting, at this moment, printing is only supported on "table-by-table" basis.

Tables can be printed by clicking the  icon, or on the file menu.



ARRANGING THE TOOLBAR

By default, all the toolbar buttons are shown on the toolbar. In case you want to hide or show some of them, you can do so by marking or unmarking the items in the ***Toolbars Menu***.



ARRANGING TABLES AND INFORMATION WINDOWS

The tables and other information windows visible in the program workspace can be arranged from the ***Windows Menu***, or by manual dragging and resizing.