



RadiaCode

# RADIACODE

10X SERIES

Nuclear Radiation Detector  
and Spectrometer

WINDOWS PC USER MANUAL

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# Chapter

I

# 1 Introduction

The RadiaCode program is designed to control the RadiaCode-10X dosimeter under Windows. Using the program you can view the device event log, delete log entries, export the log to .html and .csv files, manage the device settings, view graphs of the scheduled measurement values, etc.

## 1.1 System requirements

Device software RadiaCode-10X works under the following operating systems:

Operating system	32-bit	64-bit
Windows XP	✓	
Windows Vista	✓	
Windows 7,8,10,11	✓	✓

## 1.2 Developer information

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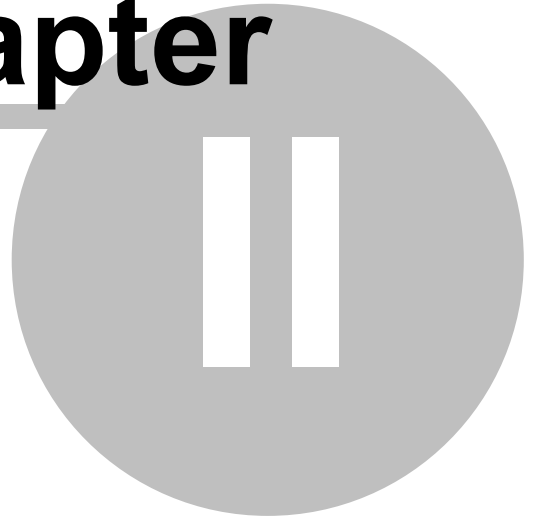
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# **Chapter**

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## 2 Graphical interface

This section contains the description of windows, menus and dialogs of the program RadiaCode.

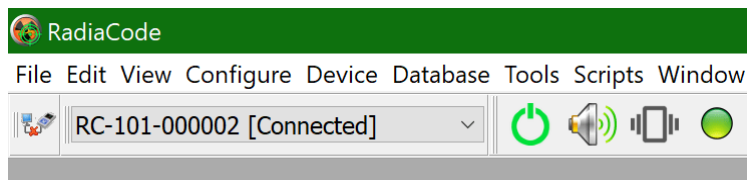
### Device status indicator

On the left on the control bar of the home window RadiaCode there is a status indicator of the device, which graphically shows its current state.

### 2.1 RadiaCode windows

In the main RadiaCode program window, there are windows that can be opened through the “View” home window menu item and with the buttons on the control bar.

There is a drop-down list on the left side of the control bar:



This drop-down list lists the serial numbers of the devices, the data of which is in the database. If more than one RadiaCode-10Xdevice is connected, then here you can select which device to work with.

Only the records of the device selected in this list are displayed in the log window.

Next to the serial number field there are buttons that control the device power on/off, sounds, vibration, and LEDs on the device body.

[“Event log” window](#)

[“Spectrum” window](#)

[“View Spectrum” window](#)

[Spectrogram window](#)

[“Current value graphs” window](#)

[“Message console” window](#)

[“Variables” window](#)

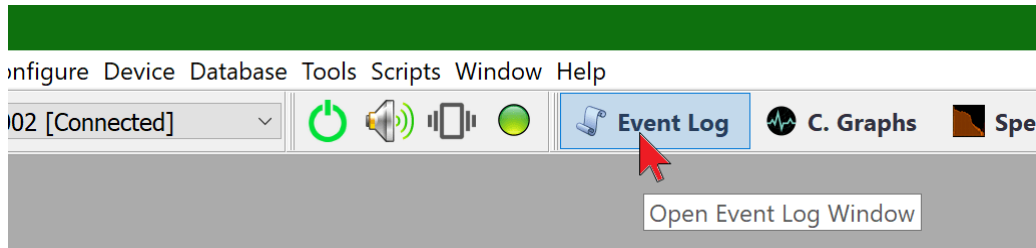
#### 2.1.1 “Event log” window

This window is designed to work with the device log database. Use this window to view and delete event and measurement records, perform searches, export measurement data, and perform other operations.

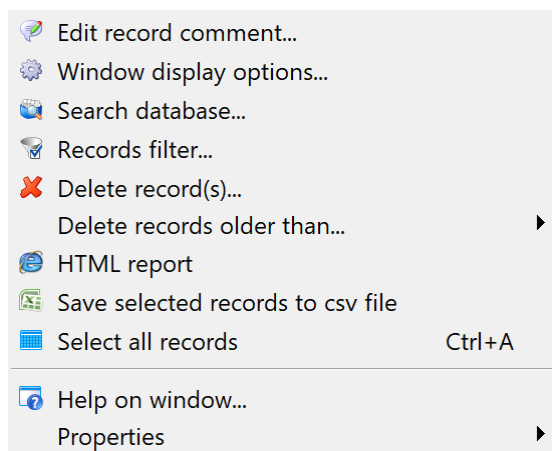
The list displays only the records of the device whose serial number is selected in the [drop down list](#) on the control bar of the home window RadiaCode. You should keep this in mind if you are working with more than one instance of RadiaCode-10X.

When the device is connected to the computer, the program automatically reads the accumulated log entries from the device, and they appear in the window. The records read from the device are deleted from the device.

To quickly switch to the Journal window, click its button on the control bar of the home window RadiaCode:



The most commonly used window-related commands can be executed using the buttons on the window control bar. You can get the full list of commands by invoking the local menu of the window by right-clicking in the window:



The information in the window is displayed as a table. The right panel displays the information associated with the line selected in the left panel.

To change the order of columns in a table, you can drag columns left to right behind the column title. The local menu command "Window display options" or the "Settings" button opens a dialog where you can select which columns to show in the window and in what order.

The information in the window is sorted by the contents of one of the columns. To change the column, the contents of which are being sorted, click on its title. Clicks again to reverse the sort order.

Some commands of the window let you work with several selected records. To select multiple entries, click on them while holding down the Ctrl or Shift key, as is common in the Windows interface. **You can use the Ctrl+A key combination to mark all entries.**

There is a quick search box on the left-hand control bar of the log window. If you click on this box and start entering text, the window will display a line containing this text in any of the columns:



Event Log			
Real time	Event	Pulses	
Dec 1, 2021 10:26:54:872	Current dose rate	342	
Dec 1, 2021 10:26:21:271	Current device parameters		
Dec 1, 2021 10:25:50:872	Current dose rate	295	
Dec 1, 2021 10:25:21:271	Current device parameters		
Dec 1, 2021 10:25:19:271	Device power on		
Dec 1, 2021 10:25:18:872	Current dose rate	338	
Nov 29, 2021 15:12:12:587	Device power off		
Nov 29, 2021 15:11:03:132	Current dose rate	313	
Nov 17, 2021 16:29:19:983	Current device parameters		

If the typed string is missing in all fields of the base, the background of the search field will become pink.

To the right of the Quick Search field is the field for selecting the serial number of the device, the records of which will be displayed in the window. This field can be used if the database has records from different instances of the RadiaCode-10X. You can choose to display both the records of one specific device and the display of all records of all devices.

### Window commands

[Edit record comment](#)

[Window display options](#)

[Search database](#)

[Records filter](#)

[Delete record\(s\)](#)

[Deleting records that are older than...](#)

[HTML report](#)

[Save selected records to Excel csv file](#)

#### 2.1.1.1 Edit record comment

Set or change a custom comment for the current entry or for all selected entries:

Event	Pulses	Count rate	Duration of d.a.	Duration of meas.	Dose rate	Err
:50:33:880	Current dose rate	279		0:00:20	27.9 uR/h	12
:50:21:272	Current device parameters					
:50:16:872	Current dose rate	216				
:50:12:872	Current dose rate	258				
:49:54:872	Current dose rate	274				
:49:21:272	Current device parameters					
:49:02:872	Current dose rate	400				
:48:21:272	Current device parameters					
:47:50:872	Current dose rate	590				
:47:21:272	Current device parameters					
:47:14:872	Current dose rate	695				
:47:06:872	Current dose rate	219				
:46:54:872	Current dose rate	186				
:46:21:272	Current device parameters					
:46:06:872	Current dose rate	349				
:45:21:272	Current device parameters					
:45:02:872	Current dose rate	314				
:44:21:272	Current device parameters					
:43:58:872	Current dose rate	364				
:43:21:272	Current device parameters					
:42:54:872	Current dose rate	288				
:42:21:272	Current device parameters					
:41:50:872	Current dose rate	308				

**Record Comment**

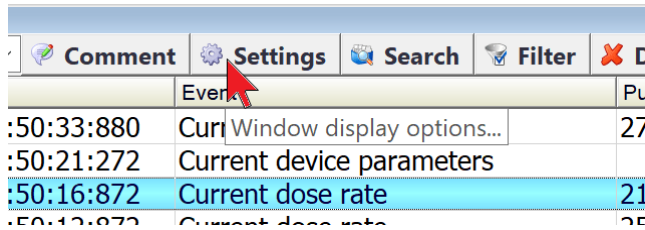
Apply this comment to all selected records. Attention! Comment of all selected records will be replaced with this one.

Comments are displayed in the log window in the “Comment” column, and are also output in .html and .csv files, which are created by the corresponding window commands.

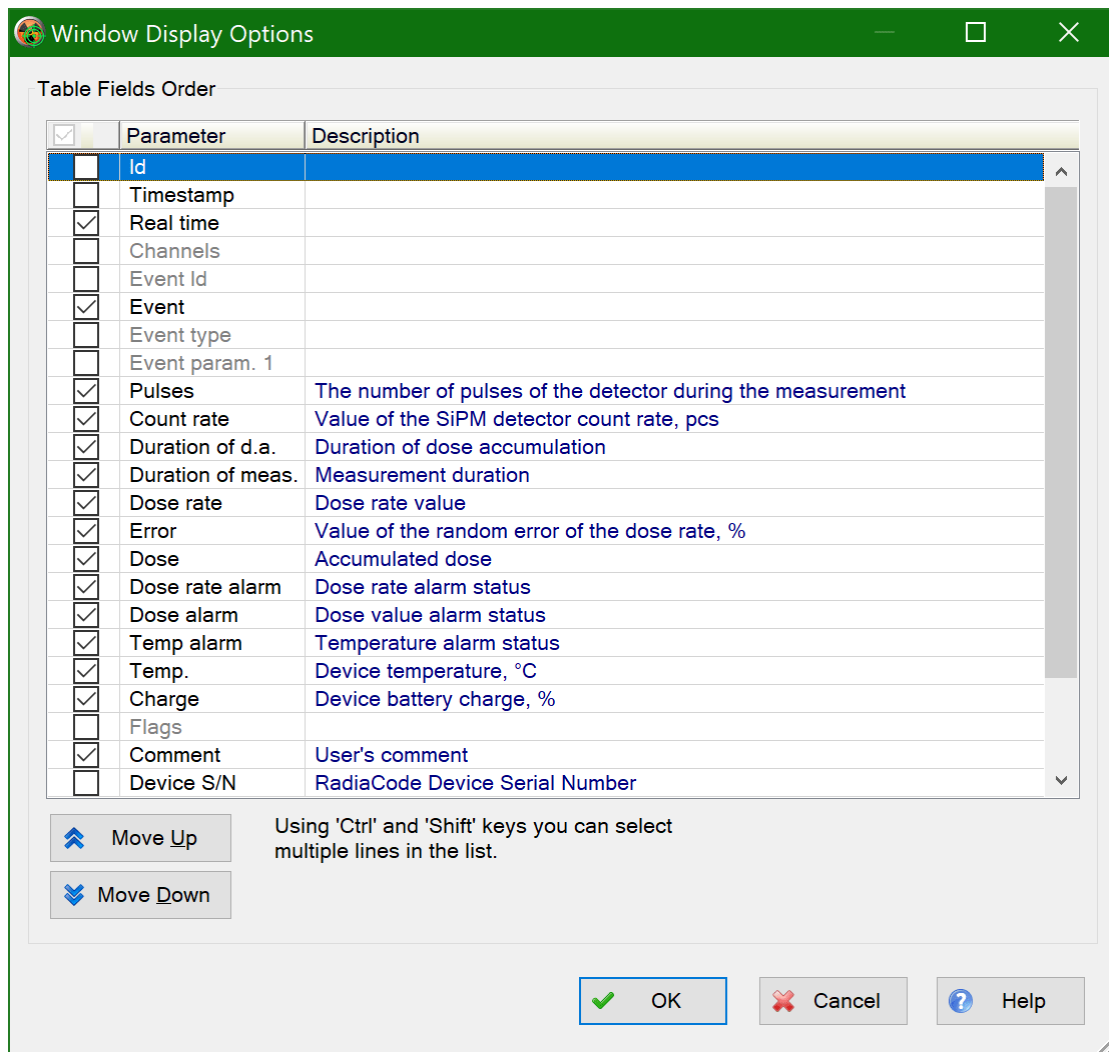
If more than one record is selected, the check mark at the bottom of the comment window indicates whether to set the comment for all selected records or just the current record.

### 2.1.1.2 Display settings

Using the “Settings” button on the window control bar, you can specify which fields should be displayed in the window and in what order:



The “Database window display options” dialog box opens:



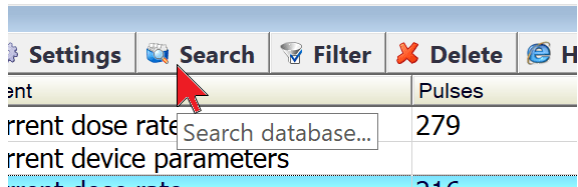
The fields marked with a checkmark in the list are displayed in the window. Using the “**Move up**” and “**Move down**” buttons one can control the order of the fields in the window: the higher the field

is in the list, the further to the left it will be in the window. Use the Ctrl and Shift keys to select more than one field at a time.

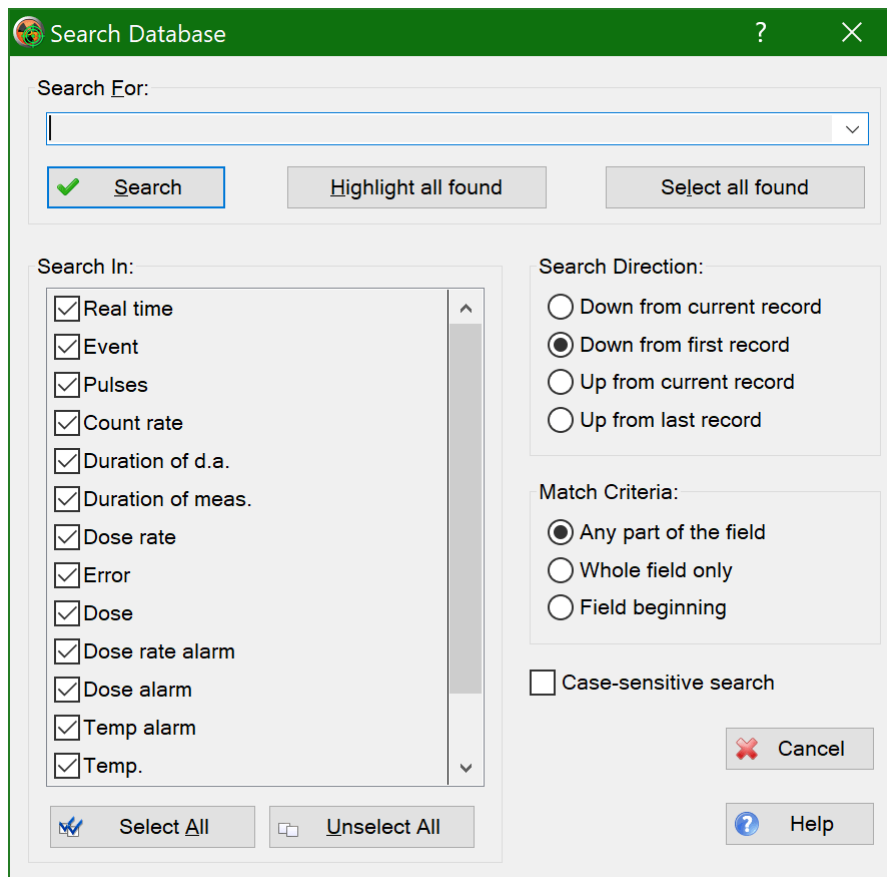
One can also change the order of the fields in the table directly in the window by dragging the field titles with the mouse.

### 2.1.1.3 Search database

Use this function to perform an advanced search for a data in the database. To search, click the “Search” button on the window control bar:



A dialog box opens where you can set the search conditions and the way the results are displayed:



- In the “**Search for**” field enter a substring to search for.
- In the “**Search in**” list mark where to search the entered row.
- In the “**Search direction**” list specify the direction of the search.
- In the “**Match criteria**” list select how the search string-argument should be compared to the contents of the field.
- If the “**Case-sensitive search**” option is enabled, large and small letters are considered different, when comparing.

To start a search, click the “**Search**”.

The “**Highlight all found**” searches and highlights all fields that satisfy the search condition with a green background:

The screenshot shows the 'Event Log' window with a search dialog box open. The search term is 'parameters'. The 'Highlight all found' button is highlighted with a red arrow. The search results in the background table are highlighted in green.

Real time	Event	Pulses	Count rate	Dose rate	Error	Dose	Dose rate alarm
Dec 1, 2021 18:52:05:052	Current device parameters					4.68 mR	None
Dec 1, 2021 18:51:05:056	Current device parameters					4.68 mR	None
Dec 1, 2021 18:50:57:076	Current dose rate	308					
Dec 1, 2021 18:50:05:061	Current device parameters						
Dec 1, 2021 18:49:53:081	Current dose rate	280					
Dec 1, 2021 18:49:05:065	Current device parameters						
Dec 1, 2021 18:48:49:086	Current dose rate	297					
Dec 1, 2021 18:48:05:069	Current device parameters						
Dec 1, 2021 18:47:45:089	Current dose rate	304					
Dec 1, 2021 18:47:05:075	Current device parameters						
Dec 1, 2021 18:46:41:095	Current dose rate	304					
Dec 1, 2021 18:46:05:079	Current device parameters						
Dec 1, 2021 18:45:37:099	Current dose rate	310					
Dec 1, 2021 18:45:05:086	Current device parameters						
Dec 1, 2021 18:44:33:106	Current dose rate	298					
Dec 1, 2021 18:44:05:090	Current device parameters						
Dec 1, 2021 18:43:29:110	Current dose rate	315					
Dec 1, 2021 18:43:05:093	Current device parameters						
Dec 1, 2021 18:42:25:113	Current dose rate	310					
Dec 1, 2021 18:42:05:097	Current device parameters						
Dec 1, 2021 18:41:21:117	Current dose rate	274					
Dec 1, 2021 18:41:05:101	Current device parameters						
Dec 1, 2021 18:40:17:122	Current dose rate	318					
Dec 1, 2021 18:39:13:127	Current dose rate	312					
Dec 1, 2021 18:39:11:571	Current device parameters						
Dec 1, 2021 18:39:05:111	Current device parameters						
Dec 1, 2021 18:39:01:079	Current device parameters						
Dec 1, 2021 18:38:09:131	Current dose rate	277					
Dec 1, 2021 18:38:05:110	Current device parameters					4.68 mR	None

The “**Select all found**” searches and marks all lines containing fields that satisfy the search condition:

The screenshot shows the 'Event Log' window with a search dialog box open. The search term is 'parameters'. The 'Select all found' button is highlighted with a red arrow. The search results in the background table are highlighted in blue.

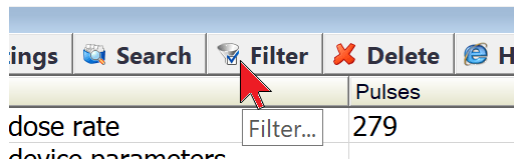
Real time	Event	Pulses	Count rate	Dose rate	Error	Dose	Dose rate alarm
Oct 20, 2020 12:48:51:002	Current dose rate	1	2	4.00 µR/h	10		Alarm 1
Oct 20, 2020 12:48:51:882	Current dose rate						
Oct 20, 2020 12:48:49:514	Current device parameters						
Oct 20, 2020 12:48:49:129	Current dose rate						
Oct 20, 2020 12:48:48:633	Current device parameters						
Oct 20, 2020 12:48:42:031	Current device parameters						
Oct 20, 2020 12:48:41:126	Current dose rate						
Oct 20, 2020 12:48:40:211	Current dose rate						
Oct 20, 2020 12:48:40:054	Current dose rate						
Oct 20, 2020 12:48:40:668	Current dose rate						
Oct 20, 2020 12:48:38:064	Current dose rate						
Oct 20, 2020 12:48:37:184	Current dose rate						
Oct 20, 2020 12:48:33:113	Current device parameters						
Oct 20, 2020 12:48:33:570	Current device parameters						
Oct 20, 2020 12:48:32:956	Current device parameters						
Oct 20, 2020 12:48:32:208	Current dose rate						
Oct 20, 2020 12:48:32:665	Current dose rate						
Oct 20, 2020 12:48:32:052	Current dose rate						
Oct 20, 2020 12:48:30:578	Current device parameters						
Oct 20, 2020 12:48:30:086	Current device parameters						
Oct 20, 2020 12:48:30:966	Current device parameters						
Oct 20, 2020 12:48:30:062	Current dose rate						
Oct 20, 2020 12:48:30:710	Current dose rate						
Oct 20, 2020 12:48:29:182	Current dose rate						
Oct 20, 2020 12:48:22:117	Current device parameters						
Oct 20, 2020 12:48:22:249	Current dose rate						
Oct 20, 2020 12:48:21:503	Current device parameters						
Oct 20, 2020 12:48:21:660	Current device parameters						

You can then perform a group operation with the marked entries, such as deleting them or saving them as a table in an HTML file.

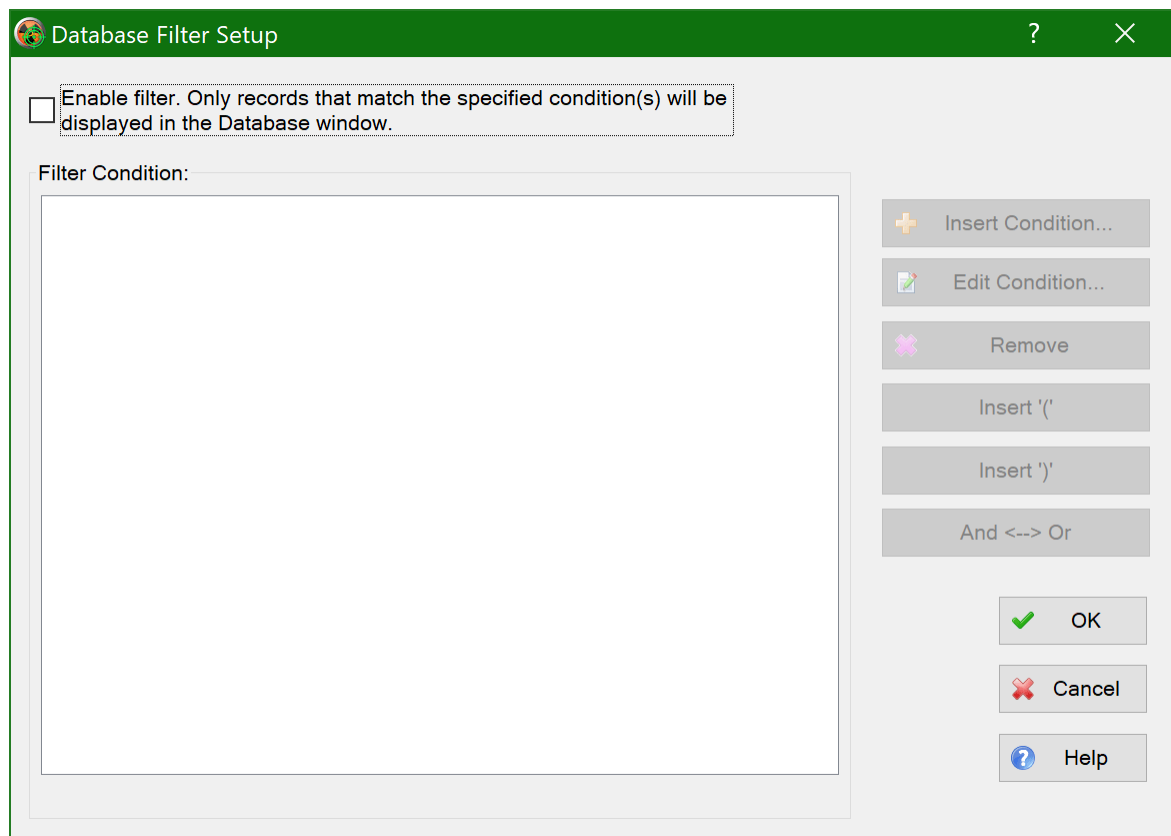
#### 2.1.1.4 Records filter

Record filter is an advanced function, which allows displaying in the window only those records, which meet the specified conditions. For example, you can set the filter so that only measurement records with alarms made between certain dates are displayed.

To set the filter conditions, click the “Filter” button on the window control bar:



The “Database filter settings” dialog box opens:



Enable the filter. The “Insert condition” and other buttons to the right of the “Filter condition” field will become available.

The “**Insert condition**” button opens a dialog box where one can set a filter condition:

Filter Condition

Display in window records where:

Event (Field to use for filtering)

contains in any part (Condition)

dose rate (Enter here value for comparison)

Case sensitive

OK Cancel Help

At the top, one can set the database record field to be filtered. To do this, click the arrow to the right of the field (only those fields that appear in the window will be listed. Configuration of the window view is described in the ["Display settings"](#)):

Filter Condition

Display in window records where:

Event (Field to use for filtering)

Real time (Condition)

Event (Enter here value for comparison)

Pulses

Count rate

Duration of d.a.

Duration of meas.

Dose rate

Error

Dose

Dose rate alarm

Dose alarm

Temp alarm

Temp.

Charge

Comment

Help

Cancel Help

Next, specify which condition will be used for filtering. The list of conditions depends on the field type: for text fields it will be as shown in the picture below, for numeric fields you can specify the value, for date - select the date and time.

Filter Condition

Display in window records where:

Event (Field to use for filtering)

contains in any part (Condition)

contains in any part (Enter here value for comparison)

is exactly

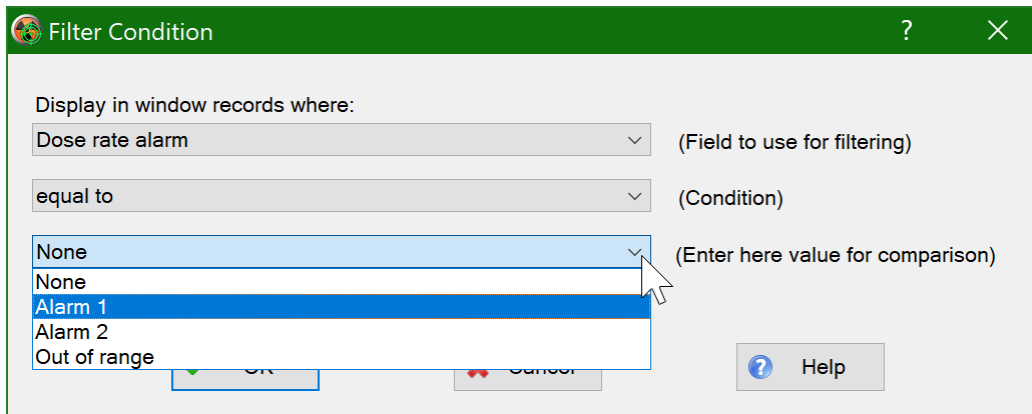
begins with

does not contain

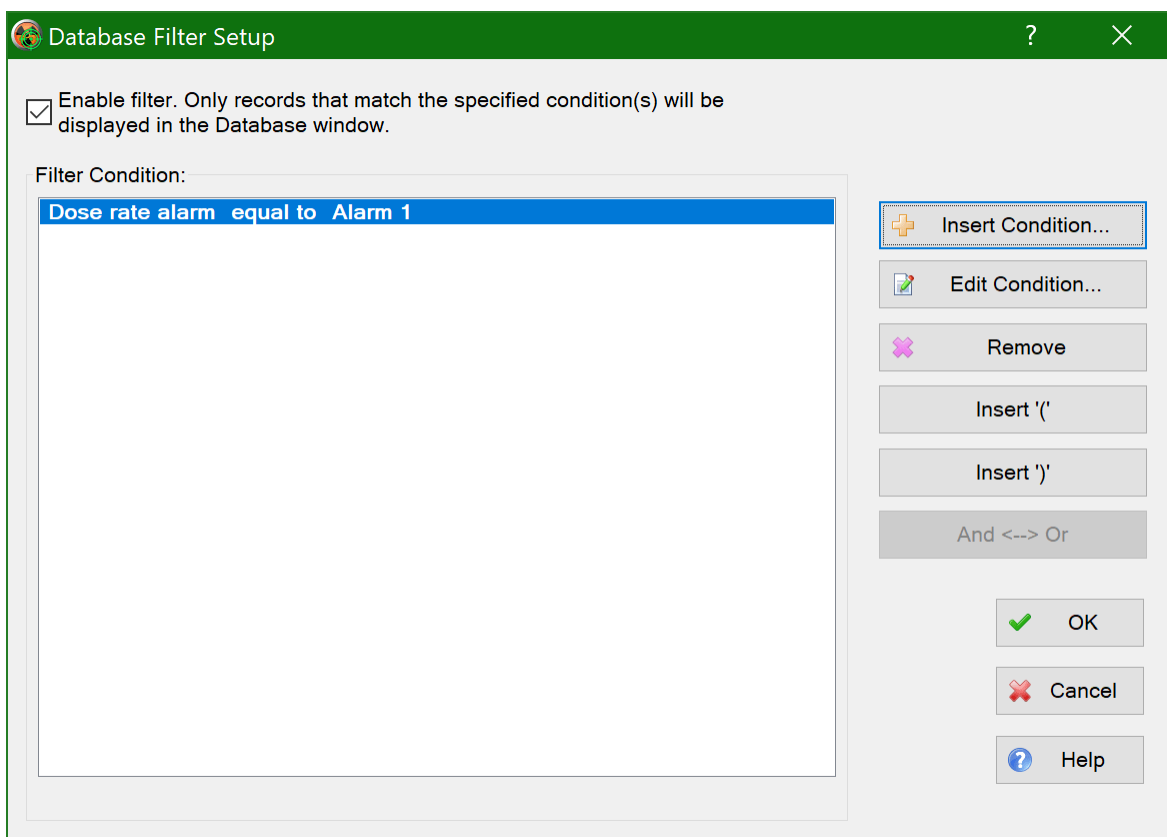
Case sensitive

OK Cancel Help

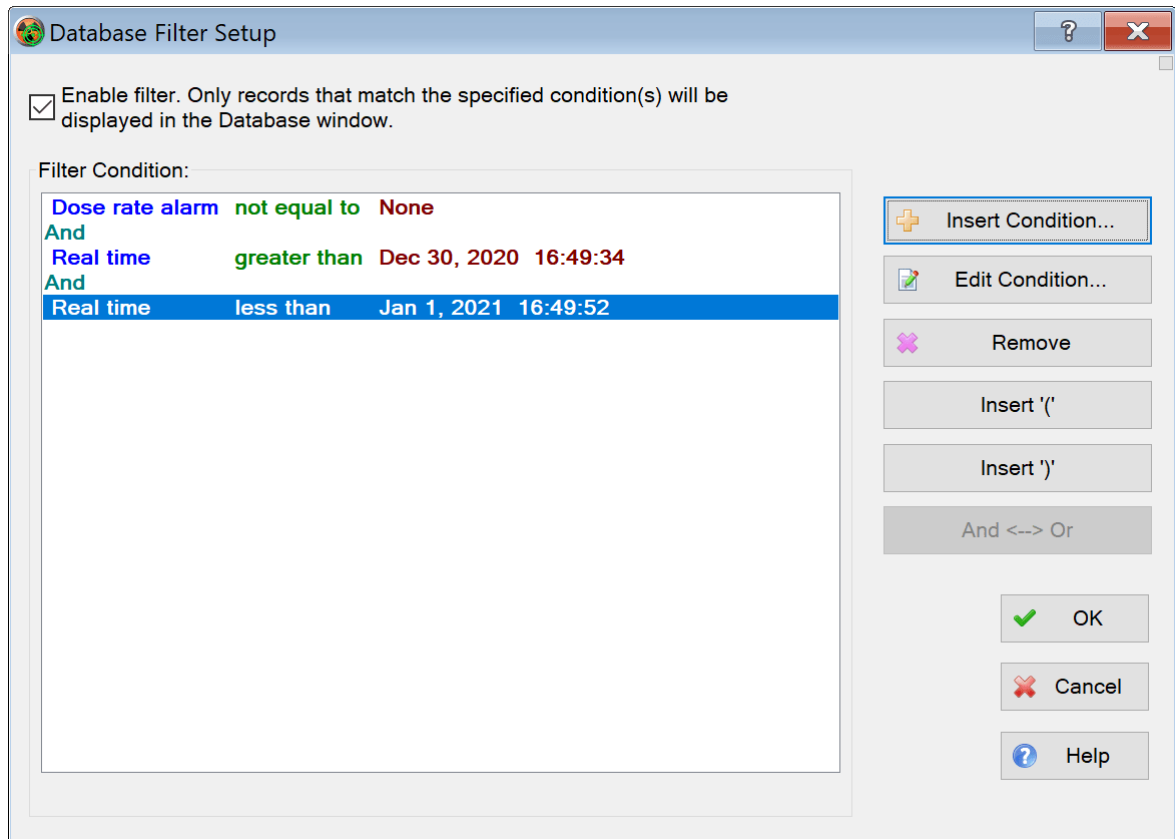
In the bottom entry field, which also depends on the type of database field selected for filtering, you shall enter or select from the suggested list what its contents are compared with:



Click the “OK” button. Condition will be added to the list of conditions:



If you add more conditions in a similar way, the list of conditions might look like this:



As you can easily guess, the three conditions entered are linked by “AND”, i.e. records that satisfy all three conditions at the same time will be displayed in the window. To change from “AND” to “OR”, click on the line with the letter “AND” in the list on the left, and then click on the “**AND**” <--> “**OR**”. Now the condition is that the window will display entries that satisfy the first and at least one of the second and third conditions.

If there are enough conditions, you may need to prioritize comparison operations. For this purpose the buttons “**Insert '()**” and “**Insert '())**”, which insert brackets in the conditions.

When the filter is enabled, all window entries are highlighted with a yellow background so that you don't forget that the filter is enabled. The filter condition is displayed in the window title:

Event Log [Filter: Dose rate alarm not equal to None And Real time greater than Dec 1, 2021 00:00:00 And Real time less than or equal to Dec 1, 2021 17:37:26]												
Real time	Event	Pulses	Count rate	Dose rate	Error	Dose	Dose rate alarm	Dose alarm	Temp alarm	Temp.	Charge	
Dec 1, 2021 10:52:23:868	Current dose rate	86	43	86.0 µR/h	21.3		Alarm 1	None	None			
Dec 1, 2021 10:52:23:372	Current dose rate	88	44	88.0 µR/h	21.3		Alarm 1	None	None			
Dec 1, 2021 10:52:22:376	Current dose rate	184	23	46.0 µR/h	12.8		Alarm 1	None	None			
Dec 1, 2021 10:52:21:272	Current device parameters					4.61 mR	Alarm 1	None	None	25.4	84	
Dec 1, 2021 10:52:18:872	Current dose rate	237	29.6	59.3 µR/h	12.8		Alarm 1	None	None			
Dec 1, 2021 10:52:12:876	Current dose rate	173	43.2	86.5 µR/h	15		Alarm 1	None	None			
Dec 1, 2021 10:52:11:372	Current dose rate	159	39.8	79.5 µR/h	15		Alarm 1	None	None			
Dec 1, 2021 10:52:01:872	Current dose rate	285	28.5	57.0 µR/h	12.7		Alarm 1	None	None			
Dec 1, 2021 10:51:38:866	Current dose rate	430	23.9	47.8 µR/h	9.5		Alarm 1	None	None			
Dec 1, 2021 10:51:25:372	Dose rate alarm 1			60.0 µR/h	25.5		Alarm 1	None	None			
Dec 1, 2021 10:51:23:122	Current dose rate	438	24.3	48.7 µR/h	9.5		Alarm 1	None	None			

### 2.1.1.5 Delete record(s)

To delete an entry, make it the current entry by selecting it in the window and clicking the “Delete” button on the window's control bar:



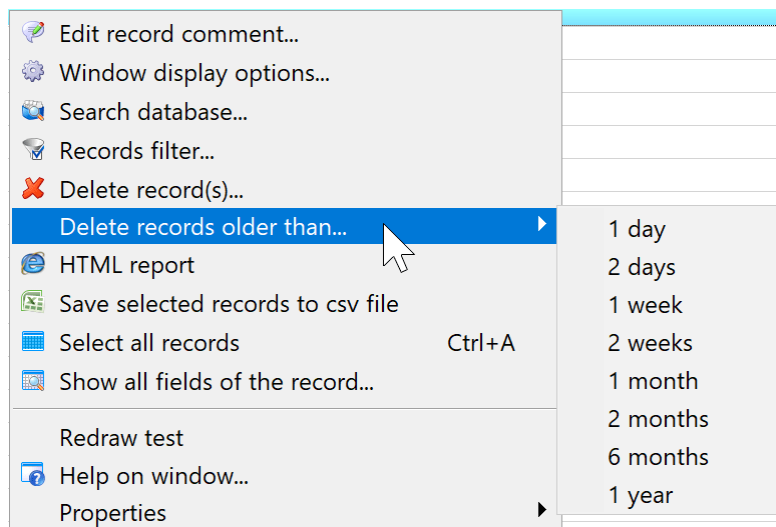
	Pulses	Count rate	Dose rate
dose rate	312	Delete record(s)...	9.75 $\mu$ R
device parameters			

A prompt is given to confirm the deletion.

Several marked entries can be deleted at the same time.

### 2.1.1.6 Delete records older than...

This command is available through the local menu of the window called by the right mouse button:



After confirmation, records, the date of which is older than the one selected in the list, are deleted from the database.

### 2.1.1.7 HTML report

Use this function to save the log as a table in an HTML file. The saved HTML file can then, for example, be downloaded to Microsoft Word or Excel for editing, printed or emailed.

To execute the command, click the “HTML” button on the window control bar:

	Pulses	Count rate	Dose rate	Error	Do
eters					4.0
eters					4.0

**If several records are selected in the window (records are selected with Ctrl and Shift), only they are saved. If nothing is selected, all logs are saved in the html file.**

Only those fields are saved and in the order they are displayed in the window at the time the command is called. Configuration of the window view is described in the [“Display settings”](#).

This will open a dialog where you need to specify the name of the HTML file to be saved. Example of a table in an HTML file:

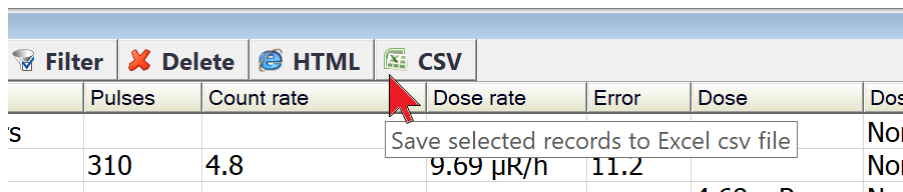
## Event Log

Real time	Event	Pulses	Count rate	Dose rate	Error	Dose	Dose rate alarm	Dose alarm	Temp alarm	Temp.	Charge	Comment	Device S/N
Dec 1, 2021 18:44:05:090	Current device parameters					4.68 mR	None	None	None	27.8	100		RC-101-000002
Dec 1, 2021 18:43:29:110	Current dose rate	315	4.9	9.84 µR/h	11.1		None	None	None				RC-101-000002
Dec 1, 2021 18:43:05:093	Current device parameters					4.68 mR	None	None	None	27.8	100		RC-101-000002
Dec 1, 2021 18:42:25:113	Current dose rate	310	4.8	9.69 µR/h	11.2		None	None	None				RC-101-000002
Dec 1, 2021 18:42:05:097	Current device parameters					4.68 mR	None	None	None	27.8	100		RC-101-000002
Dec 1, 2021 18:41:21:117	Current dose rate	274	4.3	8.56 µR/h	11.9		None	None	None				RC-101-000002
Dec 1, 2021 18:41:05:101	Current device parameters					4.68 mR	None	None	None	27.8	100		RC-101-000002
Dec 1, 2021 18:40:17:122	Current dose rate	318	5	9.94 µR/h	11.1		None	None	None				RC-101-000002
Dec 1, 2021 18:39:13:127	Current dose rate	312	4.9	9.75 µR/h	11.2		None	None	None				RC-101-000002
Dec 1, 2021 18:39:11:571	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:39:05:111	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:39:01:079	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:38:09:131	Current dose rate	277	4.3	8.66 µR/h	11.9		None	None	None				RC-101-000002
Dec 1, 2021 18:38:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:37:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:37:04:133	Current dose rate	280	4.4	8.75 µR/h	11.8		None	None	None				RC-101-000002
Dec 1, 2021 18:36:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:36:00:133	Current dose rate	291	4.5	9.09 µR/h	11.6		None	None	None				RC-101-000002
Dec 1, 2021 18:35:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:34:56:133	Current dose rate	321	5	10.0 µR/h	11		None	None	None				RC-101-000002
Dec 1, 2021 18:34:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:33:52:133	Current dose rate	285	4.5	8.91 µR/h	11.7		None	None	None				RC-101-000002
Dec 1, 2021 18:33:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:32:48:133	Current dose rate	290	4.5	9.06 µR/h	11.6		None	None	None				RC-101-000002
Dec 1, 2021 18:32:05:110	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002
Dec 1, 2021 18:31:44:133	Current dose rate	308	4.8	9.62 µR/h	11.2		None	None	None				RC-101-000002
Dec 1, 2021 18:31:05:110	Current device parameters					4.68 mR	None	None	None	28	100		RC-101-000002
Dec 1, 2021 18:30:40:133	Current dose rate	301	4.7	9.41 µR/h	11.4		None	None	None				RC-101-000002
Dec 1, 2021 18:30:05:154	Current device parameters					4.68 mR	None	None	None	27.9	100		RC-101-000002

## 2.1.1.8 Save selected records to Excel csv file

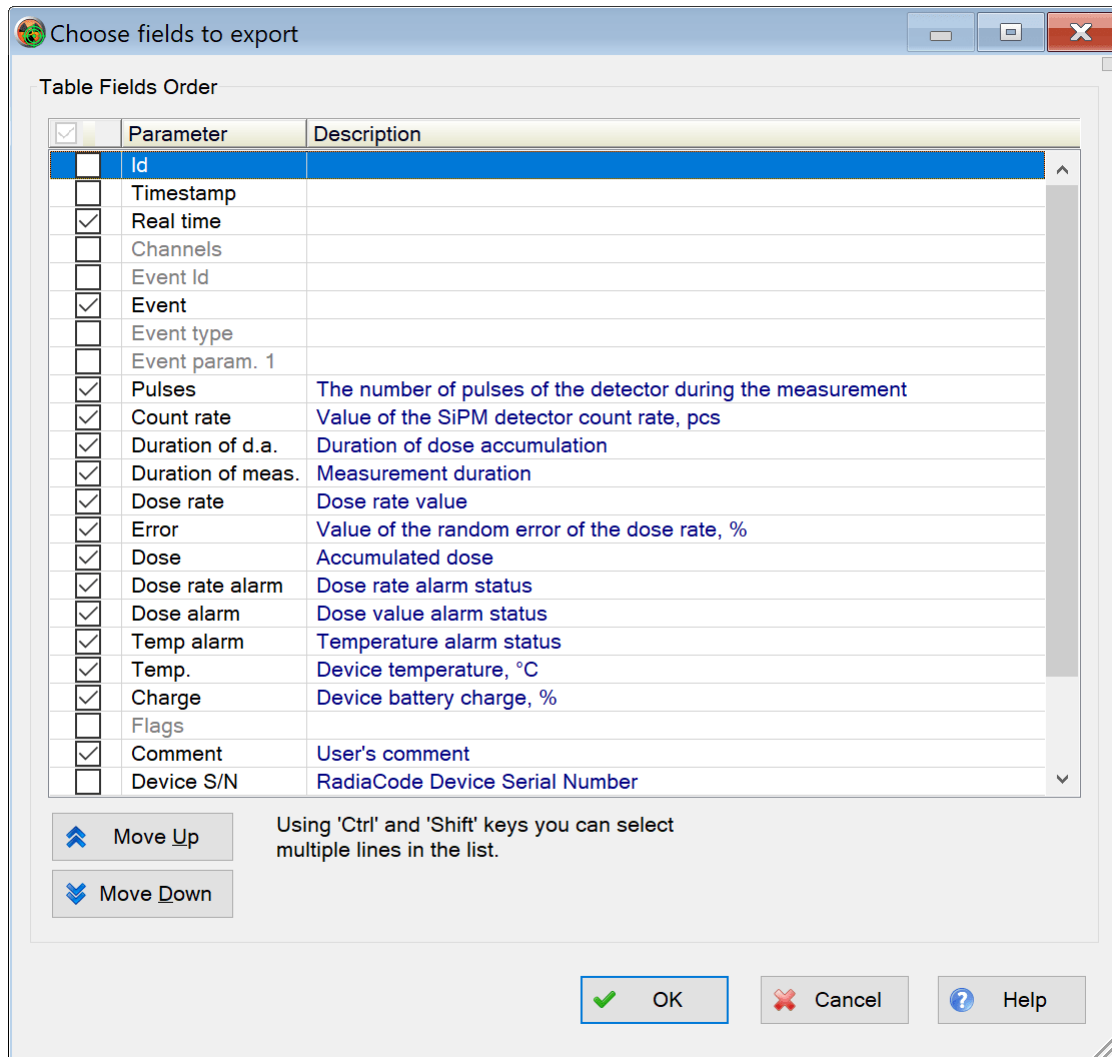
Use this function to save selected log entries in a .csv file for later analysis in Excel.

To execute the command, click the “CSV” button on the window control bar:



Only selected records are saved in the .csv file (records are selected with Ctrl and Shift). If nothing is selected, only the current entry is saved in the .csv file.

Before saving, one can select which table fields to save and in what order:



In addition to the visible table fields, the .csv file saves the measurement parameter values in “raw” format, i.e. in numerical format accepted in Excel. This makes it possible to analyze measurement results and build graphs using Excel tools.

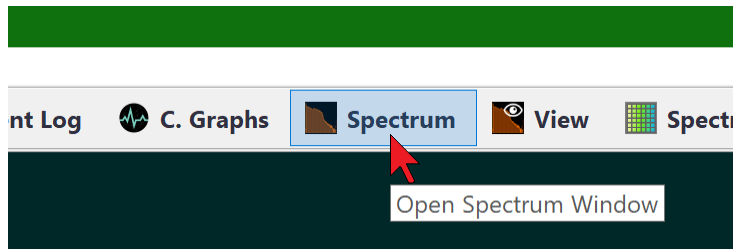
To simplify the search and selection of entries, one can use [a record filter](#).

### 2.1.2 “Spectrum” window

This window displays the energy spectrum of the photon (gamma and X-ray) radiation, typed by the device over a certain period of time. When you connect the device to the program, it reads the spectrum data from the device. Subsequently, the spectrum graph is updated either automatically at the interval specified in the settings, or manually.

Additionally, a background spectrum graph can be plotted on the spectrum graph.

To quickly switch to the Spectrum window, click its button on the control bar of the RadiaCode:

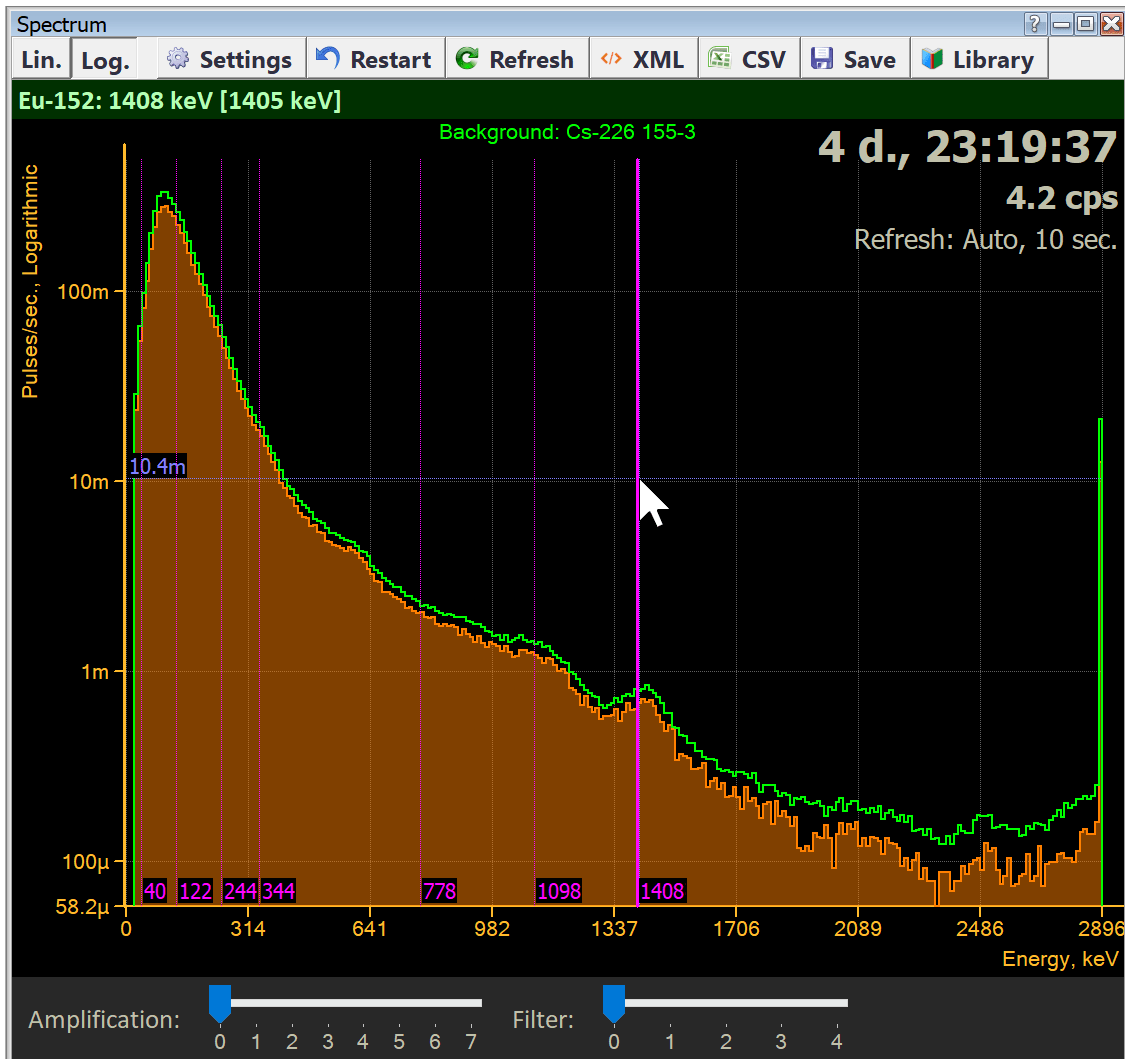


The graph is drawn as contiguous rectangles (histogram), each of which has a height corresponding to the number of pulses in the channel. The most recent channel includes not only the data of this channel itself, but also all the data outside the area displayed on the graph.

At the top right of the graph, the time for which the spectrum data was accumulated is displayed, in the format HH:MM:SS. Below is the average pulse count rate, i.e. the sum of the number of pulses for all channels, divided by the time of data accumulation. The method of updating the graph is displayed even lower.

Depending on the settings, the X-axis can display either channel numbers or photon energy. The Y-axis can display either the number of pulses or the count rate. The Y-axis scale can be linear or logarithmic.

When you move the pointer over the graph, the lines of the marker with the numbers that correspond to the values on the axes are displayed. In the above picture, channel number 57 corresponds to the number of pulses equal to 19.



Several settings control the graph display. The most commonly used settings are placed on the window control bar.

Buttons **Lin.** and **Log.** switch the display scale on the Y-axis between linear and logarithmic.

“Settings” **button** or the local menu command “Window display options” opens [the spectrum window settings dialog box](#).

“Restart” **button** or local menu command “Restart accumulation...” after confirmation resets the accumulated data and the accumulation process starts again.

“Refresh” **button** or local menu command “Refresh spectrum data” reads spectrum data from the device and refreshes the window. This button can also be used in the automatic spectrum data update mode for immediate updating.

XML **button** or the local menu command “Export spectrum data to .xml file...” allows you to save the spectrum, possibly with a background, in an XML file for later viewing in programs like Becquerel-Monitor. You are prompted to select where to save the file.

CSV **button** or the local menu command “Export spectrum data to .csv file...” allows you to save the spectrum in a simple text csv format. File name is generated by the program in the “YYYY-MM-DD hh-mm-ss\_Ns.csv” format, where “YYYY-MM-DD hh-mm-ss” is the current date/time and “N” is

the accumulation time in seconds at the time the file was saved. You are prompted to select the folder where to save the file.

“Save” **button** or "Save Spectrum to Library..." local menu command: save the spectrum in the database. In the future, the spectrum can be used as a background, exported, viewed, etc. If the “Set as current background” option is left enabled in the spectrum saving request dialog, the saved spectrum is selected as the background to be displayed together with the spectrum. The name of the background is displayed at the top of the graph.

“Library” **Button** or the "Open Spectrum Library" local menu command opens [spectra library](#).

### Amplification and filtering

At the bottom of the spectrum window there is a slider that controls “**enhancement**” of a histogram. A curve of the following type is superimposed on the graph:



This allows subtle peaks to appear on the graph. For each channel, the value is calculated by the formula  $V_n = V_n A_n F + 1$ , where:

n - channel number

$V_n$  - spectrum value (number of pulses or count rate) in channel n

$A_n$  - the value at the corresponding point of the amplifying curve

F - gain factor, which is set by the slider, from 0 to 5.

In amplification mode with  $F \geq 1$ , the digitization of the Y axis is not displayed.

**Filter Engine** applies a smoothing algorithm to the spectrum graph. The higher the filter value, the more the graph is smoothed.

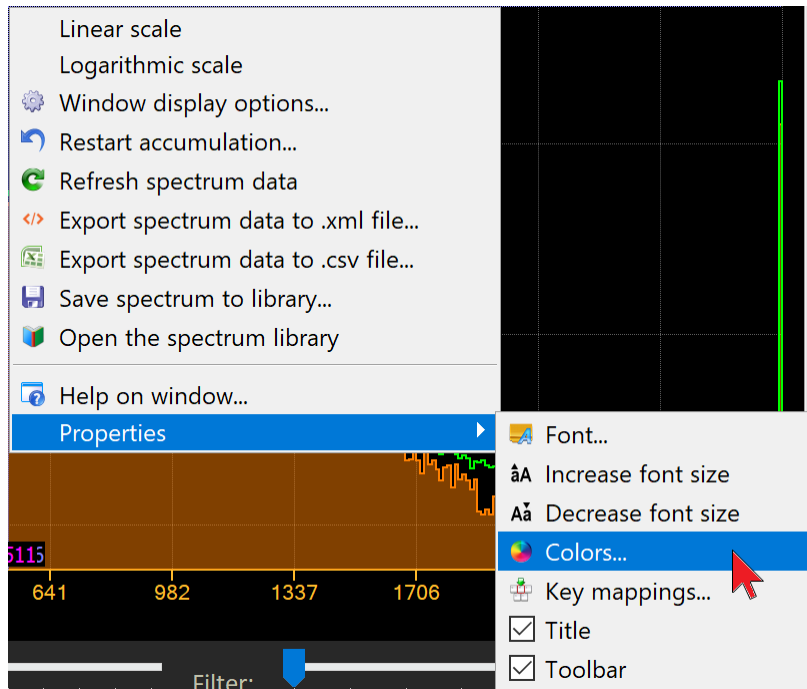
#### 2.1.2.1 “Spectrum window settings” dialog box.

In this dialog box you can select different display options for the [“Spectrum” window](#).

Dialog item	Description
<b>Y-axis scale</b>	Selects linear or logarithmic scale of the Y-axis.
<b>Y-axis units</b>	Select either the number of pulses or the count rate, i.e. the number of pulses divided by the spectrum data accumulation time, as the units of the Y-axis.
<b>X-axis units</b>	Select either the number of the spectrum channel or the energy of this channel as units of the X-axis.
<b>Spectrum and background overlay</b>	Display only spectrum or spectrum and background. On backgrounds, see <a href="#">Spectra library</a> .

<b>Drawing the spectrum/background</b>	Choose how to draw the graph: both fill with color and stroke with a line, or fill only or stroke only.
<b>Graph updating</b>	Choose how the graph is updated: either automatically at a specified interval (in seconds), or manually with the <b>button</b> button on the window control bar.
<b>Calibrating spectrum by emission energy</b>	<p>Here one can specify the coefficients <math>a_0</math>, <math>a_1</math>, <math>a_2</math> used to calibrate the spectrum by emission energy. When opening the dialog box, the coefficients read from the device are displayed.</p> <p>Spectrum calibration is performed to convert the number of the spectrum channel to the value of the emission energy in keV using a polynomial of the 2nd degree of the form:</p> $E = a_0 + a_1X + a_2X^2,$ <p>where  <math>x</math> - channel number;  <math>a_0</math>, <math>a_1</math>, <math>a_2</math> - calibration factors.</p>
<b>Reset to factory defaults</b>	Set the default values for the calibration coefficients.
<b>Isotope Library</b>	If you select "Embedded", the Spectrum and View Spectrum windows will use <a href="#">isotope library</a> , which is built into the program RadiaCode. If "Custom" is selected, the isotope information is taken from the specified file.
<b>Draw isotope lines</b>	Draw the pink energy lines of isotopes on the graph. Disabling this option does not disable the display of isotope information at the top of the window.
<b>Draw a polyline instead of a histogram</b>	Instead of rectangular bars (histogram), draw a polyline that connects the midpoints of the tops of the bars. The graph is not entirely "true", because the accumulation of the spectrum is still discrete for each channel.

Using the local menu command "Properties" -> "Colors" you can set the colors of the window graphs and panels:



### 2.1.2.2 Background Usage and Spectra Library

In the application RadiaCode it is possible to display on the graph not only the spectrum of accumulated emission, but also to compare the spectrum with the previously measured background spectrum. You can display spectrum and background graphs simultaneously in overlay mode.

To use a background, you first need to measure this background with the device over a period of time. Then you need to save the resulting spectrum to the spectrum library using the "Save" button on the window control bar or the "Save Spectrum to Library" local menu command.

When you save the spectrum, you will be prompted to name the spectrum. The spectrum will be displayed with this name in the library list. If you leave the "Set as Current Background" option enabled, then after saving the spectrum will be displayed on the graph as a background. You can also select the background from the spectra library in future.

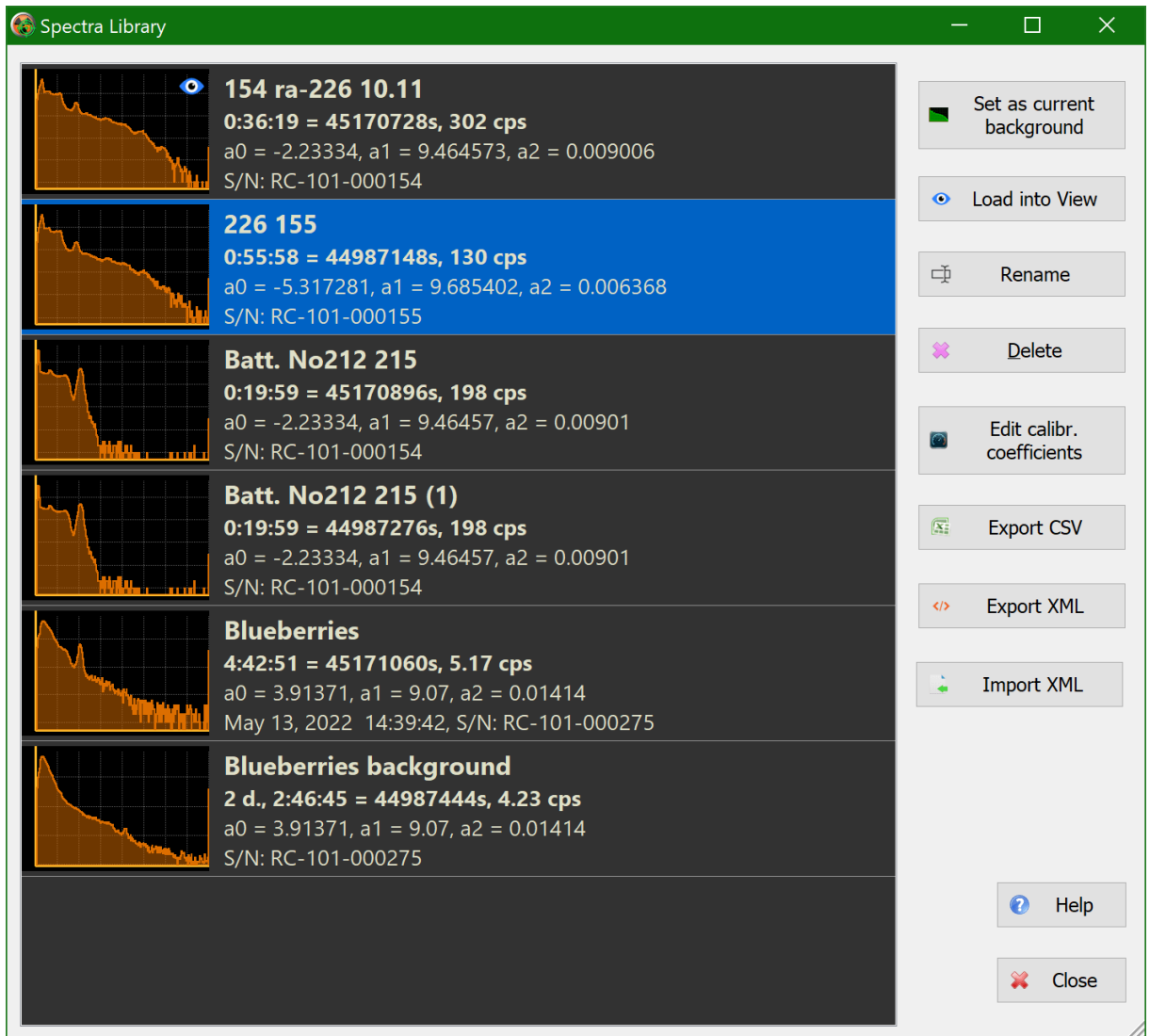
If using spectrum and background from different devices for superposition RadiaCode, it should be borne in mind that different devices have different calibration factors. When overlaying spectra graphs, the application compares them per channel (the first channel with the first channel, the second channel with the second channel, etc.). Different devices have different emission energies corresponding to the same spectral channels, therefore, when the graphs from different devices are superimposed, differences in the positions of the peaks corresponding to the same emission energy will appear.

If the program detects such a situation, then at the bottom of the window, in the engines panel will give the appropriate warning. Device RadiaCode is identified by its serial number.

### Spectra library

The library of spectra is called by the item "Spectra library" of the local menu of the window "Spectrum", the window "Spectra Viewer" or the command "Spectra library" of the menu "Tools" of the main application window. The list of saved spectra is displayed:





The graph of the spectrum selected for display is shown in green.

For each saved spectrum, its graph in logarithmic scale and information about spectrum parameters is displayed.

Dialog buttons perform actions on the selected spectrum or spectra in the list:

- **Set as current background:** Select the spectrum to display as a background in the Spectrum and View Spectrum windows.
- **Load to view:** Load the spectrum for viewing in the View Spectrum window.
- **Rename spectrum:** Set a new name for the spectrum.
- **Delete:** Delete the data of a spectrum or several selected spectra from the library.
- **Edit calibration factors:** A dialog window opens where you can set calibration factors  $a_0$ ,  $a_1$  and  $a_2$  for the selected spectrum or spectra. This can be useful if the device, with which the spectrum/spectra was/were taken, was recalibrated.

Spectrum calibration is performed to convert the number of the spectrum channel to the value of the emission energy in keV using a polynomial of the 2nd degree of the form:

$$E = a_0 + a_1X + a_2X^2,$$

where

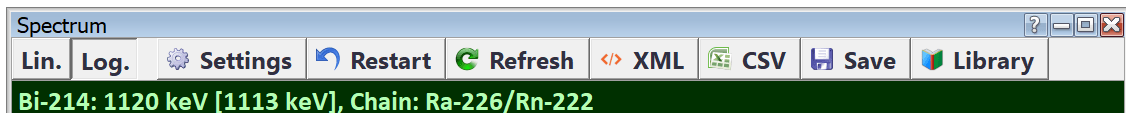
x - channel number;  
 $a_0$ ,  $a_1$ ,  $a_2$  - calibration factors.

- **CSV export:** [Save the spectrum](#) in a csv text file.
- **XML export:** [Save the spectrum](#) in an xml text file.
- **XML import:** Load into the library the spectrum/background from an XML file that was previously saved when exporting from the application RadiaCode or from an app RadiaCode on the smartphone.

See also: [Export and import of spectra](#)

### 2.1.2.3 Displaying isotope information

As you move the cursor along the graph, information about the radioactive isotope whose energy corresponds to the cursor position is displayed at the top of the graph:



The name of the isotope, its corresponding energy, the energy corresponding to the cursor line on the spectrum graph, and the name of the decay chain for the isotope are displayed in square brackets.

The thick pink line on the spectrum graph marks the position of the energy line of the isotope. If an isotope has accompanying lines, they are shown by thin pink lines.

If there are several isotopes with close energies, then information about that isotope is displayed, the energy line of which is closest to the value of the energy corresponding to the cursor.

In the spectrum settings, the display of isotope information can be turned off.

The RadiaCode has a built-in isotope library. In the spectrum settings, you can select your own isotope library file.

### Connecting an external isotope library

To make the application use an external isotope library instead of the built-in one, you need to create a text file with isotope information and select it in the spectrum settings.

Every time you start the application RadiaCode copies its internal isotope table to the file **AppIsotopes.csv** in the same folder as the program's executable file. The AppIsotopes.csv file can be used as a template for adding custom isotopes.

The library file with isotope information is in text format. One line in the file describes one isotope. Fields in a line are separated by semicolons. Example:

```
U-235;U-238;750,1001;190
Lu-176;;55,307;202
```

In Microsoft Excel, these lines look like this:

U-235	U-238	750,1001	190
Lu-176		55,307	202

- Field 1: Isotope name (required)
- Field 2: Isotope decay chain name (optional)
- Field 3: Energy of accompanying lines, separated by commas (optional)
- Field 4: Isotope line energy (required)

When loading a file, the application checks the correctness of the information and, in case of errors, displays the appropriate messages. Please note that empty fields must still end with a semicolon so that the number of fields is exactly 4.

#### 2.1.2.4 Export and import of spectra

Exporting a spectrum is saving its data to a csv or xml text file. To perform export there are corresponding commands in the local menus of the "Spectrum" and "View Spectrum" windows, as well as buttons in the dialog box "[Spectra library](#)".

Two formats are supported: xml and csv. Both formats are supported by the popular Becquerel Monitor software.

A file in xml format can simultaneously include a spectrum and a background and contains all information about them - names, number of channels, spectrum accumulation time, calibration factors and the serial number of the device on which the spectrum and background were taken. This format is self-sufficient and does not require the user to perform additional import steps.

A csv file is a text file with a .csv extension that can be used not only with the Becquerel monitor, but also with other applications due to the simplicity of its format. Only pairs of values "channel number, number of pulses" are written to the file. The file name is formed as "Spectrum\_<Current date/time>\_<Accumulation time in seconds>.csv", for example, [Spectrum\\_2021-05-12\\_13-53-55\\_1426s.csv](#).

For spectrum and background overlapping from different devices RadiaCode read [here](#).

#### Importing a spectrum to the library

You can import a spectrum into the spectrum library from an xml file that was previously saved by exporting from the application RadiaCode on your computer or smartphone.

#### 2.1.3 "View Spectrum" window

This window has the same functions as the [spectrum window](#), but it displays not the current spectrum of the instrument, but the spectrum from the [spectra library](#).

To load a spectrum for viewing, open the Spectrum Library, select the desired spectrum, and click the "Load to View" button in the Spectrum Library.

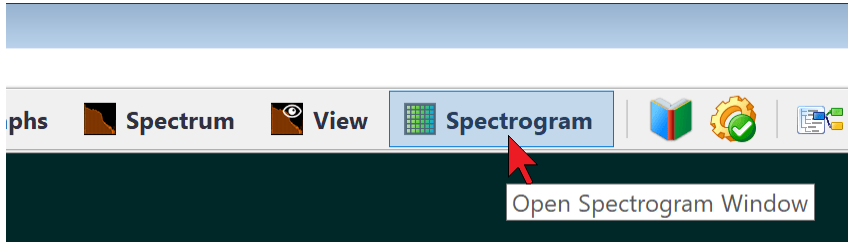
The spectrum view window has its own set of display settings. You can specify different settings for the spectrum window and the view window, except for the isotope library.

#### 2.1.4 Spectrogram window


This window displays the spectrogram of the registered radiation. A spectrogram is a visual representation of the energy spectrum of photon (gamma and X-ray) radiation varying with time. Displays a plot of either the spectrogram currently being recorded or the spectrogram loaded from

the Spectrogram Library. There is no separate window for viewing spectrograms, as there is for viewing spectra.

To quickly switch to the Spectrogram window, click its button on the control bar of the RadiaCode:

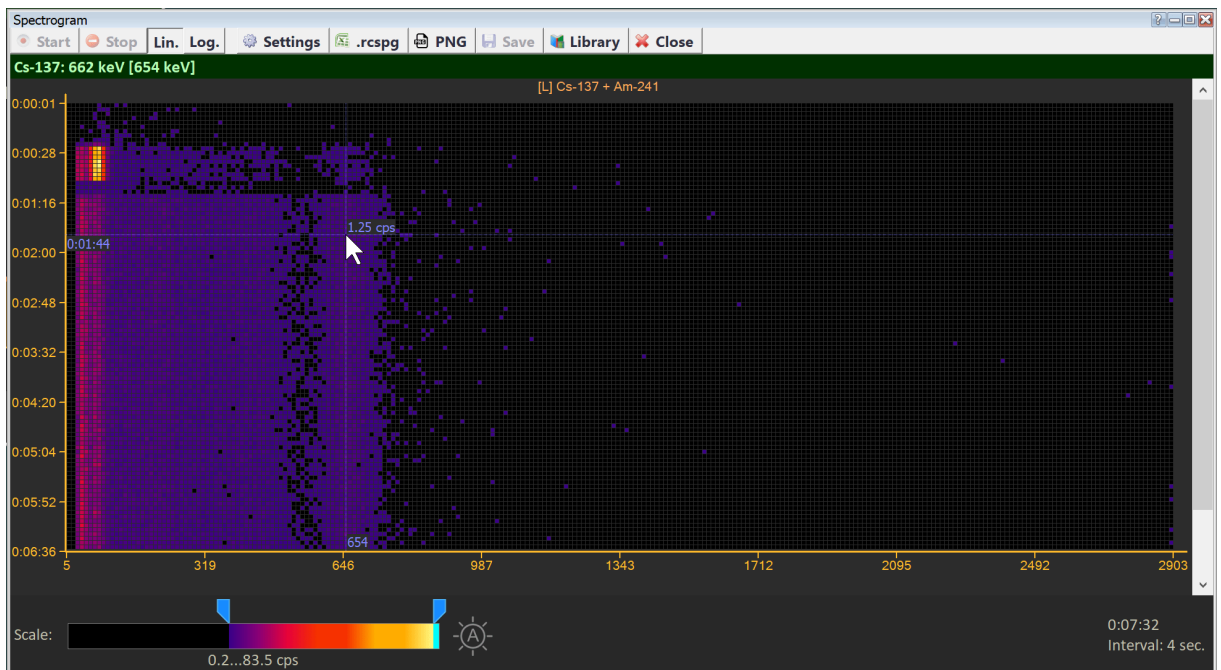


Each line on the vertical (Y scale) is a separate spectrum typed in the "Capture Interval". The size of the interval can be set in the settings. The horizontal (X scale) shows either spectrum channel numbers or photon energy calculated by analogy with the Spectrum window. The count rate in each individual channel (Z scale, similar to the Y scale in the Spectrum and View windows) is converted to a brightness or color scale, which can be zoomed using the sliders below the spectrogram. By

pressing the  the scale is automatically zoomed by the minimum and maximum values of the recorded or selected from the [library](#) of spectrogram.

The energy lines on the spectrogram will look like vertical bands. The appearance of new bands will indicate a change in the spectral composition of the registered radiation. The Y-axis can display calendar time, spectrogram accumulation time or countdown number.

The total spectrogram accumulation time and capture interval are displayed at the top left.




When you move the pointer over the graph, the lines of the marker with the numbers that correspond to the values on the axes are displayed. In the above picture, the energy of 654 keV corresponds to 1 pulse, and the spectrum was captured 1 minute 44 seconds after the spectrogram recording began.

The Record button on the control bar of the window starts recording the spectrogram. Recording continues until it is stopped with the Stop button. Once the recording has been stopped, it cannot

be resumed. Loading a spectrogram from the [library](#) does not stop the recording of the spectrogram, it continues in the background.

#### 2.1.4.1 “Spectrogram window settings” dialog box.

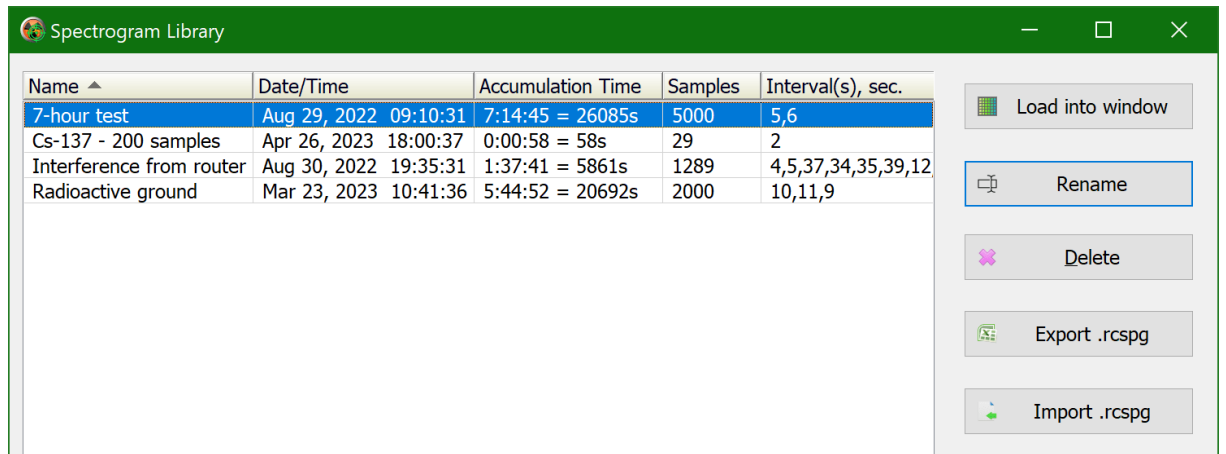
In this dialog box you can select different display options for the [spectrogram window](#).

Dialog item	Description
<b>Spectrum capture interval</b>	At what frequency the spectrum "snapshots" (counts) are taken. Each sample (spectrum) is shown on the plot by a number of horizontal squares. Acceptable values are from 1 to 600 seconds. Since the timer of the instrument is not synchronized exactly with the timer of the smartphone, the intervals of accumulation of spectra received from the instrument can have a scatter of $\pm 1$ second.
<b>Maximum number of samples</b>	Spectrogram buffer capacity. If the number of counts in the recorded spectrogram is equal to the specified value, the oldest count is deleted before adding a count. The maximum buffer capacity is 10,000 counts.
<b>Scope</b>	The count rate limits for the engine at the bottom of the window, which controls the brightness/palette of the plot. The squares of counts for which the count rate value is outside the specified values are displayed with border colors (start/end of the color scale). The minimum and maximum values of the scale can be automatically corrected by the application if the calculated values exceed the limits  specified in the settings when you press the Auto Brightness button.
<b>Scale</b>	If you select the logarithmic scale, the decimal logarithm is taken from the value of its count rate before calculating the brightness/color of the square. Quickly switch the scale with the "Lin." and "Log." icons on the control bar of the window.
<b>X-axis Units</b>	Select either the number of the spectrum channel or the energy of this channel as units of the X-axis.
<b>Y-axis Units</b>	You can select the calendar time (counted from the spectrogram recording start), spectrogram accumulation time (in hours:minutes:seconds) or count number (counts are numbered from zero).
<b>Palette</b>	When selecting the "Brightness" option, only grayscale is used to display the count rate on the plot. The other two options are a choice between color palettes.
<b>Draw isotope lines</b>	Draw the pink energy lines of isotopes on the graph. Disabling this option does not disable the display of isotope information at the top of the window.
<b>Isotope Library</b>	If you select "Built-in", the Spectrum and View Spectrum windows will use <a href="#">isotope library</a> , which is built into the program RadiaCode. If "Custom" is selected, the isotope information is taken from the specified file.

#### 2.1.4.2 Spectrogram Library

##### Spectrogram Library

The Spectrogram Library is called by the Spectrogram Library item of the Spectrogram local menu of the Spectrogram window or by the Spectrogram Library command of the Tools menu of the main application window. A list of saved spectrograms is displayed:



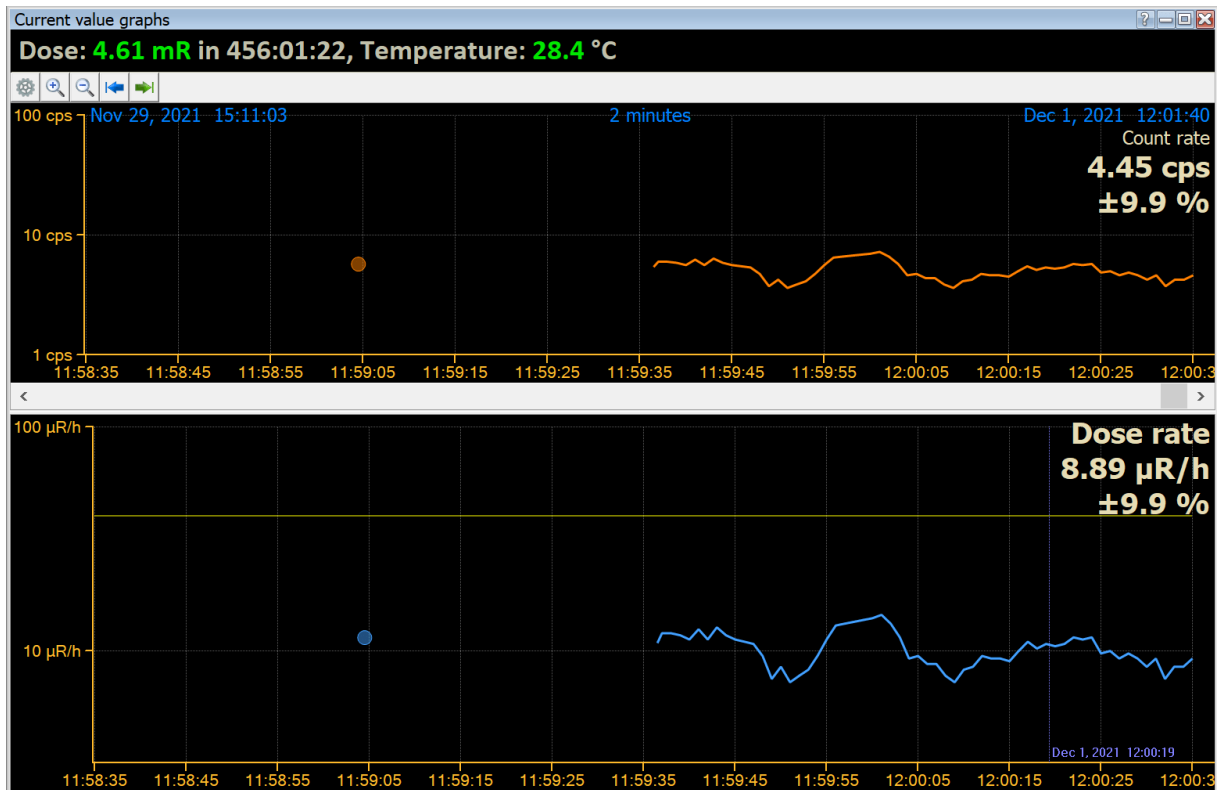
Dialog buttons perform actions on the selected spectrum or spectra in the list:

- **Load into window:** Load a spectrogram for viewing in the Spectrogram window. If a spectrogram is currently being recorded, it continues in the background. To return to the graph of the recorded spectrogram, click the Close button on the control bar of the Spectrogram window.
- **Rename:** Set a new name for the spectrogram.
- **Delete:** Delete the data of a spectrogram or several selected spectrograms from the library.
- **Export .rcspg:** Export spectrogram data to a text file with the .rcspg extension. .rcspg files can be exchanged between applications RadiaCode for Windows and Android.
- **Import .rcspg:** Import spectrogram data from a file with the .rcspg extension to the library.

### 2.1.5 “Current value graphs” window

The pulse count rate and dose rate graphs are displayed in this window. The data for the display is taken from the database and supplemented with real-time data from the device. The Y scale of the display is logarithmic.

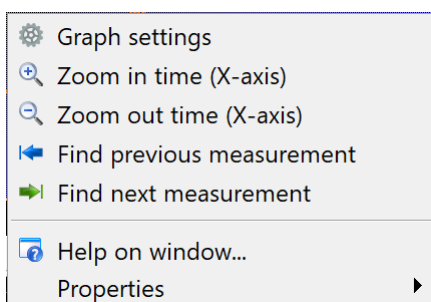
At the top of the window information about the accumulated radiation dose and time of its accumulation is displayed, as well as the device temperature.



At the top of the graph, the start and end date/time of the data section loaded into the application memory from the database are displayed in blue. This piece of data is available for display on graphs. At the top in the middle the time scale is displayed, in the picture it is 1 minute. I.e., the graph shows the data for 1 minute. You can change the scale using the magnifying glass icons on the window control bar.

You can specify in the program settings whether the program should always connect the points on the graph with a line. You can set the time interval in such a way that points on the graph that are spaced from each other in time by a value greater than the interval will not be connected by a line, but will be displayed with breaks. In the picture to the left, there are two circles that correspond to two single measurements.

The buttons on the window's control bar duplicate the commands of the local right-click menu:



Menu item	Description
Graph settings	Opens the graph settings dialog box.
Zoom in time (X-axis)	Stretch the image horizontally.

<b>Zoom out time (X-axis)</b>	Shrink the image horizontally.
<b>Find the previous measurement</b>	Search for the previous/next piece of data after a gap in time. If the “Always connect graph points with a line” option is selected in the graph settings, these commands just flip backward/forward on one page. If the option to connect the points with a line is selected, if they are separated by no more than the specified interval, there may be gaps in the data on the graph, and these commands move the graph to the previous/next data section.
<b>Find the next measurement</b>	

### 2.1.5.1 “Current value graph settings” dialog box

In this dialog box one can set the options for displaying [the graph window of current values](#).

Dialog item	Description
<b>Connect the graph points with a line</b>	<ul style="list-style-type: none"> <li>• <b>Always</b> - Connect neighboring points on the count rate and dose rate graphs with lines.</li> <li>• <b>Only if the time difference between the points is less than (hh:mm:ss)</b> - If two adjacent points on the graph are more than the specified time apart, they are not connected by a line and there will be a gap in the graph.</li> </ul>
<b>Graph line thickness</b>	You can select one of three values for the thickness of the graph line.
<b>Graph colors</b>	Click the black button with the horizontal color line to select the color of the corresponding graph.

### 2.1.6 “Message console” window

The “Message console” window displays RadiaCodeprogram messages that have been issued in the process. Error messages are displayed in red, information messages are displayed in black.

The “Message console” window saves the last 1024 messages, even when it is closed. You can open it at any time and see the messages and get help for each message.

The selected message is highlighted with the specified background color. To select another message, click it or use the cursor keys.

#### Local menu

Command	Description
<b>Clear window</b>	Deletes all messages from the window.
<b>Message help</b>	Opens the help window for the selected message.
<b>Dark window theme</b>	Toggle window colors between light (white background) and dark (black background) color themes.



### 2.1.7 “Variables” window

The “Variables” window allows viewing the values of [special function registers](#) (SFR) of the device, as well as change these values.

The “Variables” window you just opened contains a single tab called “Main”. You can add more tabs (with the “Add new page” local menu command) and you can also change the name of any of the existing ones. The tabs work independently of each other, each tab is equivalent to a separate “Variables” window. You can also open multiple “Variables” windows.

When you add a new register (“variable”) to this window, RadiaCode places it on the active tab of the active “Variables” window.

You can use Ins or the Ctrl+A hotkeys to add a variable to the “Variables” window.

The window will highlight the selected object in color. To select another object, click on it or use the cursor keys.

#### Display options

There are vertical and horizontal grids in the window, which can be enabled/disabled separately.



When the vertical grid is enabled, the data in the window is arranged in columns and each column has a title in the form of a button. Pressing **Name**, **Type** and **Address** buttons opens the “Display options” dialog box for the selected variable in the window. Pressing the **Value** button opens the “Change value” dialog box for the selected variable.

When the vertical grid is disabled, double-clicking on the line with the object opens the “Change value” dialog box for that variable.

To enable/disable the vertical or horizontal grid, use the corresponding checkbox in the “Fonts” tab (“Configuration” menu, “Environment” command).

#### Local menu

The local window menu contains the following commands, each command has a button on the window toolbar:

	Refresh window	
	Add watch...	Ins, Ctrl+A
	Delete watch	Del, Ctrl+D
	Delete All watches	Ctrl+Del, Ctrl+L
	Modify...	Enter, Ctrl+M
	Inspect	Ctrl+I
	Move watch up	Ctrl+Up
	Move watch down	Ctrl+Down
	Display options setup...	Ctrl+O
	*TabAdd new tab...	
	Help on window...	
	Properties	▶

Command	Description
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<b>Add variable/expression</b>	Adds one or more objects to the window. Opens the <b>Add a variable to the window</b> to select an object by name.
<b>Delete watch</b>	Removes the selected object from the window.
<b>Delete all watches</b>	Removes all objects from the window.
<b>Modify</b>	Opens the <b>“Modify”</b> dialog box, to set a new value for the selected variable. You can do the same thing by just starting to type a new value on the keyboard.
<b>Move watch up</b>	Moves the highlighted object in the list one line up.
<b>Move watch down</b>	Moves the highlighted object in the list one line down.
<b>Display options</b>	Opens <b>“Display options” dialog box</b> to change the display parameters of the selected object, as well as to add or remove tabs in the window.
<b>Add new page</b>	Operates in the same way as the <b>“Add page” button of the “Display options” dialog box</b> .
<b>Window help</b>	Calls this contextual help.
<b>Properties</b>	Controls window properties - font, colors, etc.

### 2.1.7.1 “Display options” dialog box

This dialog box controls the options for displaying the selected variable or expression in the **“Variables”** window, and adds or removes tabs in this window.

Dialog item	Description
<b>Variable name</b>	Contains the name of the selected variable.
<b>Display format</b>	Specifies the representation format for the selected variable: binary, hexadecimal, decimal, or ASCII.
<b>Pop-up description</b>	Enables pop-up descriptions for special purpose registers.
<b>Display bitmap</b>	Includes pop-up descriptions of special-purpose register bitmaps, if any.
<b>Display bit descriptions</b>	Enables pop-up descriptions for special purpose register bits, if any.
<b>Automatic name field size</b>	When this option is checked and the vertical grid is enabled (see note below), the window automatically adjusts the “Name” column <b>Name</b> to the longest record in the column.
<b>Pages</b>	List of tabs in the window.
<b>Add page</b>	Opens the <b>“Add new page to Variables window”</b> dialog box, to enter the name of a new tab. Window creates new tab by pressing <b>“OK”</b> .
<b>Delete page</b>	Deletes the tab highlighted in the <b>“Tabs” list</b> .
<b>Edit page</b>	Opens the <b>“Set page name”</b> dialog box, to edit the tab name.

**Note.**

To enable a vertical grid, use the [“Configuration”](#) menu, “Environment”, box, [“Font”](#) tab, checkbox in the “Grid”.

## 2.2 Main menu of RadiaCode

[“File” menu](#)

[“View” menu](#)

[“Configure” menu](#)

[“Tools” menu](#)

[“Window” menu](#)

[“Help” menu](#)

To open a menu, use the mouse or an “Alt+letter” **keyboard shortcut**, where “letter” is the underlined letter in the name of a menu item or command.


### 2.2.1 “File” menu

Menu item	Action
<b>New file</b>	Opens the Editor window without loading any file.
<b>Open...</b>	Opens the “Open file” dialog box. The file selected here will be opened in the “Editor” window.
<b>button</b>	Saves the file from the active “Editor” window to disk.
<b>Save as...</b>	Queries a new name for the file from the active “Editor” window and saves that file with the new name to disk.
<b>Print...</b>	Opens the default “Print” dialog box for the default printer. You can print the whole file or a selected text block.
<b>Properties...</b>	Opens the standard “Properties” dialog box for a file.
<b>Configuration files</b>	Opens a submenu for actions with <a href="#">configuration files</a> .
<b>Exit</b>	Closes the session RadiaCode. You may also use the Alt+F4 or Alt+X keys to finish your work.

### 2.2.1.1 Configuration files

At the end of the session, RadiaCode automatically saves its configuration parameters in several files. At the beginning of a new session, it opens these previously saved files. Also, at any time any of these files can be saved or loaded independently of each other through the “File” menu with the “Configuration files”. You can have several sets of configuration files with different settings of RadiaCode, and load them “on the fly”.

- Screen configuration file (**Desktop**) contains the on-screen display option values, location, sizes, colors, and fonts of all of the debugger specialized windows. The extension of this file is **.dsk**.
- Options file (**Options**) stores the settings of RadiaCode that are displayed, when the settings dialog box is called. The extension of this file is **.opt**.







These two files can be given arbitrary names. On completion of work, RadiaCode saves them to the folder, from which they were downloaded, or to which they were saved last time. These two configuration files can be individually loaded or saved using the “File”  **Configuration files**











In addition to these, RadiaCode uses the session file, which contains the session data and indicates which screen configuration file and options file to load at the beginning of the next session. This file can be loaded or saved with the “Load session” and “Save session” commands from the “Configuration files” submenu. The extension of this file is **.ses**.

## 2.2.2 “Edit” menu

Here are the commands for working with the text editor built into RadiaCode.

The commands in this menu apply to the currently active Editor window.

<u>The “Add file”</u>	<u>Command</u>	<u>Description</u>
	<b>Return</b>	Cancels the last text editing operation in this window. The number of steps that the Undo function covers is set in the “Configuration” menu in the <a href="#">“Editor options”</a> tab of the “Editor options”.
	<b>Copy block</b>	Copies the selected block to the clipboard. The format of the text in the buffer is standard, and this block is available to other programs.
	<b>Delete block</b>	Deletes the selected block and places it on the clipboard.
	<b>Insert block</b>	Copies a block from the clipboard starting with the cursor. If the block to be copied was placed on the clipboard from the RadiaCode program, the block type will not change (line, vertical, or streaming). Blocks from other applications, will be of the standard streaming type.
	<b>Clipboard history/Repository</b>	Opens the <a href="#">Clipboard history/Repository</a> .
	<b>Append block to clipboard</b>	Copies the selected block of text and adds it to the end of the current clipboard contents.

	<b>Delete block and append to clipboard</b>	Deletes the highlighted block and adds it to the end of the current clipboard contents.
	<b>Text search</b>	Opens the <a href="#">“Text search”</a> .
	<b>Repeat search</b>	Repeats the search with the same parameters that were set for the previous search.
	<b>“Find/Replace text” dialog box</b>	Opens the <a href="#">“Find/Replace text”</a> .
	<b>“Show search results by file”</b>	Repeatedly shows search results through multiple files in the <a href="#">“Show search results by file”</a> .
	<b>Go to the line with number</b>	Opens the <a href="#">“Display from a new line”</a> . The original text will be shown starting from the specified line.
	<b>Set tab</b>	Opens the <a href="#">“Set tab”</a> dialog box for local tabs
	<b>Restore tab</b>	Opens the <a href="#">“Restore tab”</a> dialog box for local tabs.
	<b>Condensed text mode</b>	Switches the <a href="#">Condensed text mode</a> .
	<b>Condensed mode setup</b>	Opens the <a href="#">“Condensed mode setup”</a> .
	<b>Find a pair for the bracket/comment</b>	Finds a paired bracket or comment tag for a bracket or tag at the cursor position. If a pair is found, the cursor will move to it.  The brackets can be: round ( <i>or</i> ), square [ <i>or</i> ] and curly { <i>or</i> }. Tags can be <i>/*</i> or <i>*/</i> .
	<b>Restore the editing context</b>	Activates the <b>“Editor”</b> window of the previous edit and sets the cursor at the place of the last edit. If this <b>“Editor”</b> window was already closed, then RadiaCode reopens it. RadiaCode During debugging, you usually need to switch between multiple files frequently. This command helps you to quickly jump to the location of the last edit.
	<b>User scripts</b>	Additional menu for accessing the text editing automation functions.

### 2.2.2.1 “Search for text” dialog box

The dialog box sets the search parameters for the text phrase in the files. The same parameters in this dialog box and the **“Find/Replace text” dialog box** are equivalent. You can specify file names with one or more wildcard characters. You can specify a path along with the file name. Also, you can search several files at once, using the options in the **“Multi-file search results” panel**.

Dialog item	Description
<b>Search line</b>	Specifies a fragment of text to search for (search line).
<b>Match case</b>	Enables letter case matching. Disabled by default.

<b>Whole words only</b>	Search only whole words: a line will be considered found only if it is between punctuation marks or delimiters (spaces, tabs, commas, quotation marks, etc.). Disabled by default.
<b>Regular expressions</b>	Indicates that the line you are looking for is the <a href="#">search expression</a> . Disabled by default.
<b>Entire area</b>	Search in the entire file. Enabled by default.
<b>Selected text only</b>	Search only through the selected text.
<b>From cursor position</b>	Search starting from the current cursor position
<b>Entire scope</b>	Search from the beginning or the end of the file (depending on the search direction). Enabled by default.
<b>Perform multi-file search and replace</b>	Enables searching through multiple project files (see notes below). If the checkbox is unchecked, the search will be performed only in the active "Editor" <b>window</b> .
<b>Search wildcards</b>	Contains a wildcard or wildcards of file names to search through. If there are several wildcards, they should be separated by semicolons. To specify long names as accepted by Windows, you do not need to put quotation marks. Example: *.txt;*.c;c:\prog\*.h.
<b>Search in subdirectories</b>	Search in subdirectories of all folders specified by wildcards.
<b>Initial path</b>	Start the search from the folder you specify here. This folder serves as a shared path and is convenient when you need to substitute several wildcards of the following kind:  <code>c:\prog\text\source\*.txt;c:\prog\text\source\*.doc</code> In this case, use wildcards (*.txt;*.doc) and shared path (c:\prog\text\source).

#### Notes

1. If you set a search in a file opened in the Editor window, **the search** will be performed in the window buffer, not in the file on disk.

#### 2.2.2.2 "Find/Replace text" dialog box

The dialog box sets the search parameters for the text phrase in the files. The same parameters in this dialog box and the "**Find/Replace text**" dialog box are equivalent. You can specify file names with one or more wildcard characters. You can specify a path along with the file name. Also, you can search several files at once, using the options in the "**Multi-file search results**" panel.

Dialog item	Description
<b>Search line</b>	Specifies a fragment of text to search for (search line).
<b>Replace with</b>	Sets the fragment of text to be substituted for the one found.

<b>Match case</b>	Enables letter case matching. Disabled by default.
<b>Whole words only</b>	Search only whole words: a line will be considered found only if it is between punctuation marks or delimiters (spaces, tabs, commas, quotation marks, etc.). Disabled by default.
<b>Regular expressions</b>	Indicates that the line you are looking for is the <a href="#">search expression</a> . Disabled by default.
<b>Confirm replacement</b>	Indicates to open the “ <a href="#">Confirm replacement</a> ” <a href="#">dialog box</a> to confirm the replacement of this found text fragment. Enabled by default.
<b>Entire area</b>	Search in the entire file. Enabled by default.
<b>Selected text only</b>	Search only through the selected text.
<b>From cursor position</b>	Search starting from the current cursor position
<b>Entire scope</b>	Search from the beginning or the end of the file (depending on the search direction). Enabled by default.
<b>Perform multi-file search and replace</b>	Enables searching through multiple project files (see notes below). If the checkbox is unchecked, the search will be performed only in the active “Editor” <b>window</b> .
<b>Search wildcards</b>	Contains a wildcard or wildcards of file names to search through. If there are several wildcards, they should be separated by semicolons. To specify long names as accepted by Windows, you do not need to put quotation marks. Example: <code>*.txt;*.c;c:\prog\*.h</code> .
<b>Search in subdirectories</b>	Search in subdirectories of all folders specified by wildcards.
<b>Initial path</b>	Start the search from the folder you specify here. This folder serves as a shared path and is convenient when you need to substitute several wildcards of the following kind: <code>c:\prog\text\source\*.txt;c:\prog\text\source\*.doc</code> In this case, use wildcards ( <code>*.txt;*.doc</code> ) and shared path ( <code>c:\prog\text\source</code> ).
<b>Search</b>	Replaces the first found instance of the line searched for.
<b>“Replace all”</b>	Replace all found instances of the searched line.

#### Notes

1. If you set a search in a file opened in the Editor window, **the search** will be performed in the window buffer, not in the file on disk.
2. If you search in several files, the “[Confirm replacement](#)” [dialog box opens at the end of the search](#).

#### 2.2.2.3 “Confirm replacement” dialog box

This dialog asks for confirmation to replace the found instance of the searched line. To enable or disable this dialog box, use the “**Confirm replacement**” checkbox in the [“Find/Replace text”](#).



The “Add file”	Function
<b>Yes</b>	Replace the given instance of the line you are looking for.
<b>No</b>	Do not replace. If the procedure was started with the “ <b>Replace all</b> ” button for all found lines in the search area, the search and replacement process will continue.
<b>Non-Stop</b>	From now on, replace all lines found in this file without asking for confirmation.
<b>Cancel</b>	Stops the search and replace process.
<b>Skip this file</b>	Stop searching through this file and go to the next file.
<b>Replace in all files</b>	Replace all lines found in all other files without asking for confirmation.
<b>Move cursor to the “Yes/No” buttons</b>	When this checkbox is checked, the cursor will automatically be set to the “Yes” button in each request to confirm the replacement, to make the work easier.

#### 2.2.2.4 “Multi-file search results” dialog box

This dialog box displays search results through multiple files. Learn more about searching through multiple files in the [chapter “Text search”](#).

**File list**, in which a line is found, contains all files where the line was found: the file name on the left and its folder on the right. The line with the green text directly below this list displays information about the file selected in the list. The entry “File in memory” means that the file is open in the “**Editor**”. If this line shows general data about the file (according to the file system), it means that this file is not loaded into memory. “**Line**” panel shows the line of the source file containing the fragment you are looking for.

The “**Sort files by**” **switch box** sets the sorting method. When the “**Consider directory**” checkbox is checked, the files in the list will be sorted according to their folders.

The “Add file” “**Edit**” button opens the selected file in a new “**Editor**” window and puts the cursor in the line with the found fragment. The found fragment will be marked with a background color. To check if there are other instances of the searched fragment in this file, click **Ctrl+R** or use the “**Editor**” menu, “**Repeat search**”.

The “Add file” “**Close**” button closes the dialog box, but the search results are not lost. To reopen this dialog box, use the “**Show search results by file**” button at the “**Editor**” toolbar, **Shift+F5** or the “**Editor**”. In this case, the files in the “File list” **File list, in which a line is found**, opened in the “**Editor**” windows are marked with an asterisk on the left.

#### 2.2.2.5 Regular expressions

The text editor supports so-called “regular expressions” that can be used for special text strings. Regular expressions contain control characters in the searched text string:

- ? Means one of any characters in that position. Example: if you set `?ell.` as the line you are looking for, the words “bell”, “tell”, “cell”, etc. will be found.
- % Denotes the beginning of a line. The characters following “%” shall start at position 1. Example: `%Counter`—find the word “Counter” that starts at the first position in the line.

\$	Line end. Characters preceded by "\$" shall be in the last positions in the line. Example: <code>Counter\$</code> —find the word "Counter" at the end of the lines.
@	Find a character directly; "@" allows setting control characters as regular letters. Example: <code>@?</code> —find the question mark.
\xNN	Hexadecimal value of the symbol. Example: <code>\xA7</code> —find a character with hexadecimal code A7.
+	Undefined number of units of the previous character. For example, if you specify <code>1T+2</code> , the editor will find lines containing "1" followed by "2", with any number of letters T in between.
[c1-c2]	Equals any character between c1 and c2. Example: <code>[A-Z]</code> means any letter from A to Z.
[~c1-c2]	Equals any character that does not lie between c1 and c2, i.e., 0 to c1-1 or from c2+1 to 255. Example: <code>[~A-Z]</code> means any character except uppercase letters.
text1 text2	The symbol " " indicates a logical OR and the editor will search <b>text1</b> or <b>text2</b> . Example: <code>LPT COM CON</code> —Find "LPT" or "COM" or "CON".

Don't forget that to use regular expressions, you have to check the corresponding checkbox in the dialog box.

#### 2.2.2.6 "Set tab/Restore tab" dialog boxes

Bookmarks are used to return to the marked cursor position in the source file at a later time. There are local and global tabs. Local tabs are valid within a single file. Global bookmarks store not only the cursor position but also the file name.

Up to 10 local bookmarks can be defined and used with these dialogs. Each local bookmark is assigned an individual button with a number.

To open the "Set bookmark" **dialog box**, press **Alt+]**. To open the "Restore bookmark" **dialog box**, press **Alt+]**. To set a bookmark or go to it, click its button with the number. The number of the line in which the bookmark is set, the bookmark position in the line (in brackets) and the text of the line are displayed to the right of the button.

Local bookmarks are stored in the configuration file, and you can return to them in the next session.

The "Add file" **button** opens the corresponding **dialog box** ["Set/Restore global bookmark"](#).

#### 2.2.2.7 "Set/Restore global tab" dialog boxes

Bookmarks are used to return to the marked cursor position in the source file at a later time. There are local and global tabs. Local tabs are valid within a single file. Global bookmarks store not only the cursor position but also the file name.

When you navigate to a global bookmark and the corresponding source file is not open in the "Editor", RadiaCode opens it and places the cursor in the position marked by the bookmark.

The "Add file" **Delete** removes the selected bookmark from the list.

Global bookmarks are stored in the configuration file and can be returned to in the next session.

#### 2.2.2.8 Condensed text mode

In Condensed text mode, only lines satisfying the specified criterion are displayed in the window. There are a total of two criteria:

- The string shall contain a specified fragment (sequence of characters).
- The first character in the line that is not a space shall be in the specified position.

Examples: (a) the first of the criteria and “counter” fragment is set, result- only lines with the word “counter” in them will be displayed; (b) the second criterion is set and position 4, result—only lines with text starting at position 4 will be displayed.

The condensed text mode “puts together” strings with a common attribute. For example, if you strictly adhere to the rule of starting data declarations at position 2, procedures—at position 3, and interrupt handlers.—at position 4, then the condensed text mode will really speed up the search for the desired ad. If you comment certain places in the text with the same character string and use the condensed text mode with the specified fragment, this style helps you to find the necessary parts of the text easily. In the condensed text mode you can move the cursor in the same way as in the normal mode.

#### How to control

The criterion for displaying lines is set in the “[Condensed text mode options](#)” [Condensed mode setup](#). To enable or disable condensed text mode, use the “**Editor**” menu command, or the “**Condensed text mode**” button at the “[editor](#)” toolbar, or F11 **Key**. To exit the condensed text mode, press **Esc**. In this case, when you exit this mode, the cursor goes back to where it was before this mode was enabled. To keep the cursor in the row where you placed it when you exit the mode while the mode was enabled, press “**Enter**” or start editing this line.

### 2.2.2.9 “Condensed mode setup” dialog box

This dialog box controls the condensed [text mode options](#) in the “**Editor**”.

“Display lines of text” **switch box** sets one of the two available criteria:

1. “**Containing string**” sets the display of lines with the text fragment specified in the text field. In addition, you may check the case of letters, search only for whole words, or use [regular expressions](#).
2. “**Where first non-blank column is...**” sets the display of lines, in which the text (the first character not equal to space) starts from the position specified in the “**Column**” field. Obligatory parameters additionally characterize the criterion:
  - “**Equal to**” the first character of the text shall be exactly in the specified position. For example, if the 2nd position is set, the window will display only the lines where the text starts from the 2nd position.
  - “**Not equal to**” the first character of the text shall be in any position other than the specified one. For example, if the 2nd position is set, the window will display only lines where the text starts NOT from the 2nd position.
  - “**Less than**” display only lines, where the text starts from a position lower than the specified one.
  - “**Greater than**” display only lines, where the text starts from a position greater than the specified one.

After clicking “**OK**”, the “**Editor**” window switches to the condensed text mode.

### 2.2.2.10 Clipboard history/Repository

Dialog item	Description
<b>Clipboard history</b>	List of records on the clipboard since the start of RadiaCode, records are collected regardless of the applications, from which they were copied. The clipboard history is lost after exiting RadiaCode.
<b>Paste</b>	Paste the selected text into the active “ <b>Editor</b> ” window.

<b>Max records in history:</b>	The maximum number of records that can be stored in the clipboard history. When the maximum number of records is reached, the oldest record is deleted.
<b>Do not memorize records more than:</b>	Sets the maximum size of a text block that can be written to the clipboard history. If the size of the block to be written exceeds the set size, the writing of that block will be ignored.
<b>Clipboard repository</b>	A clipboard repository is a persistent set of clipboard records (blocks of text) represented as a tree. You can add records to the repository for later use. Records can be arranged as “branches” (“folders”). Use “drag and drop” operations to organize “folders” and records.
<b>Paste</b>	Paste the text of the selected repository record into the active “Editor” window.
<b>Add branch</b>	Add a “branch” (“folder”) to the active repository record.
<b>Remove branch/item</b>	Delete the selected branch or record.
<b>Edit</b>	Edit the name of the selected branch.
<b>Move up</b>	Move the selected branch or record up the tree.
<b>Move down</b>	Move the selected branch or record down the tree.

### 2.2.2.11 “Editor” toolbar

At the “**Editor**” **toolbar**, there are buttons for the main editing operations, which correspond to the “Editor” **menu commands**. Almost all buttons are available only when the “Editor” window is **active**. Information messages sent by the editor are duplicated in the editor information panel.

The editor toolbar commands are represented by several icons (Copy Block, Find Text, Set Bookmark, etc.). You can adjust the commands to your convenience. After that, only the buttons you select will be visible.

To select the “Environment” **dialog box** you should right-click on the empty right side of the top panel. In the popup window, select **Customize...** You can access the “**Environment**” dialog box (via [the “Configure” menu](#)). In the right panel of the dialog box, you **can mark which buttons on the Editor toolbar** you need for your work.

### 2.2.3 “View” menu

You can use this menu to open [windows of RadiaCode](#). If a window of a certain type is already open, a second instance of the window is not opened and the already open window becomes active.

### 2.2.4 “Configure” menu

Command	Action
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Options of RadiaCode.	Opens the “Configuration” dialog box RadiaCode.
Environment...	Opens the “Environment” dialog box with the following tabs <a href="#">“Fonts”</a> , <a href="#">“Colors”</a> , <a href="#">“Key assignment”</a> , <a href="#">“Control bar”</a> and <a href="#">“Miscellaneous”</a> .

### 2.2.4.1 “RadiaCode options” dialog box

Various settings related to the device, measurement modes, schedules, etc.

#### 2.2.4.1.1 “Device” tab

Device settings. These settings are also accessible from the menu of the device itself. When you connect the device to the program, the settings are read from the device; when you click “OK” in the settings dialog box, all settings are written to the device.

Dialog item	Description
<b>Indication</b>	
<b>Enable sounds</b>	Allow the device to produce sounds. Different sounds can be controlled by individual options, see below. Disable “Enable sounds” option disables all device sounds regardless of the individual option settings.
<b>Enable vibration</b>	The device will vibrate for alarms as well as certain events. Vibration can be enabled or disabled individually for each alarm and event. Disabling the “Enable vibration” option disables device vibration regardless of the individual option settings.
<b>Enable light indication</b>	Allow the device to display lights using the LEDs built into the enclosure.
<b>Alarm thresholds</b>	
<b>Alarm thresholds</b>	Dose and dose rate values above which alarms are issued. Threshold values are specified in the units selected in the “Units of measure” group (Roentgens/Zyverts) in the “Program settings” tab. For each alarm, you can enable the sound and vibration of the device.
<b>Alarms mode</b>	Select the alarm sound mode: <ul style="list-style-type: none"> <li>• <b>Once</b> - the audio alarm sounds once when there is an alarm.</li> <li>• <b>Continuously</b> - the audio alarm sounds continuously when there is an alarm.</li> </ul>
<b>Signals</b>	
<b>When you click on the button,</b>	the device will acknowledge with sounds and/or vibrations, when the buttons on its body are pressed.
<b>When registering particles</b>	Output click sounds. The frequency of the clicks tells you the approximate registered radiation level.
<b>When connecting/disconnecting with an application</b>	Emit sounds when the device is connected to the application RadiaCode on your smartphone via Bluetooth and when disconnecting from it.

<b>When switching on/off</b>	Output sounds when switching on/off.
<b>Display backlight</b>	
<b>Disabled</b>	The device display backlight is never enabled.
<b>Enabled every time the button is pressed</b>	Pressing any button on the device body enables the backlight for the time defined in the “Disable” field.
<b>Enabled depending on the illumination</b>	Pressing any button on the device body enables the backlight for the time defined in the “Disable” field if the device considers it is in low light mode.
<b>Disabling</b>	The time after which the device screen will be disabled if no key is pressed on the device.
<b>Brightness</b>	Brightness level of the device display backlight, from 0 to 9.
<b>Miscellaneous</b>	
<b>Display rotation</b>	<ul style="list-style-type: none"> <li>• Automatically: the device itself selects the orientation of the display according to the built-in accelerometer.</li> <li>• Only normal orientation: Orient the device display to control the buttons with the right hand.</li> <li>• Only inverted orientation: Orient the device display to control the buttons with the left hand.</li> </ul>
<b>Device language</b>	You can select the language of the device interface.

## 2.2.4.1.2 “Program settings” tab

Dialog item	Description
<b>Unit of measure</b>	Choose in which units the information about registered radiation level (Roentgens/Zyverts) is displayed in the program.
<b>Database integrity test on startup</b>	Perform a database test, when the program starts. The test can take some time.
<b>Create log file</b>	Record device events in a text file on your computer disk in approximately the same form as they appear in the <a href="#">log window</a> .
<b>Log file mode</b>	Here you can choose whether to create the log file anew, when the program starts, or to attach new entries to the end of the log file if it already exists.
<b>Log file name</b>	Here you can specify the full path to the log file.
<b>How many days to keep backups of the base</b>	If since the last startup of RadiaCode more than 24 hours have passed, the program creates a <a href="#">backup database file</a> , so that the file could be restored manually if it fails. In this field you can specify how many backups to keep.

### 2.2.4.2 “Environment” dialog box

In tabs of this dialog box, one can adjust appearance of windows RadiaCode and other interface elements, as well as define “hotkeys” for quick access to commands of the main menu and RadiaCode windows.

[“Fonts” tab](#)

[“Colors” tab](#)

[“Key mappings” tab](#)

[“Toolbar” tab](#) [DisplayOptions](#) [Toolbar](#)

[“Misc” tab](#)

#### 2.2.4.2.1 “Fonts” tab

The **“Fonts”** tab of the “Environment” dialog box controls the fonts in the program windows RadiaCode.

The “Window” list contains all types of windows. To set parameters for a certain window type, select it in the list. The new settings apply to all windows of the selected type, including those already open.

Dialog item	Description
<b>The window has a title</b>	Includes a title bar for windows of this type. When the checkbox is unchecked, the windows are made smaller by the lack of a title. Also, see notes below.
<b>Window control bar</b>	Controls the position of the toolbar in the window of this type.
<b>Grid</b>	Enables the display of a vertical and horizontal grid in the window and allows column widths to be changed (if vertical grid is enabled).
<b>Line spacing</b>	Sets the line spacing, which will be added to the standard line spacing. The new value can be printed or selected from a list of recently used values.
<b>Select font</b>	Opens the “Font” dialog box. The selected font will take effect for all windows of that type.
<b>This font is for all windows</b>	Uses the font set for windows of this type for all windows in the program RadiaCode.

#### Notes

1. To move a window that has no title bar, place the mouse cursor on the portion of that window's toolbar that has no buttons, and then act as if the toolbar were a title bar. Also, one can access the window control functions through its system menu, by pressing the Alt+“gray minus” key combination.
2. Each window has a “Properties” item in the local menu. The “Window title” and “Control bar” items of the “Properties” submenu toggle the title bar and toolbar for that particular window.

#### 2.2.4.2.2 “Colors” tab

“Colors” **tab of the “Environment” dialog box** controls the color in the program windows RadiaCode.

Dialog item	Description
-------------	-------------

<b>Color scheme</b>	Specifies the name of the color scheme. It can be printed or selected a recently used one from the list with the button. The “Add file” <b>button</b> saves the scheme in use to the disk. The “Add file” <b>Delete</b> deletes it.
<b>Colors</b>	List of color group names. Each group consists of several colors.
<b>Inherit Windows color</b>	When the checkbox is checked, the selected color is taken from Windows. If you later change the Windows colors through the control panel, this color will change accordingly.
<b>Use inverted text/background color</b>	When the checkbox is checked, RadiaCode inverts the selected window colors (for text and background). For example, if in the “Variables” <b>window</b> the background color is white and the text color is black, then the line with the selected variable will be highlighted with a black background and white text.
<b>“Select...” button</b>	Opens the “Color”, if checkboxes <b>Inherit Windows color</b> and <b>Use inverted text/background color</b> are unchecked for windows of this type. “Color” <b>dialog box</b> also opens if you double-click on a color in the list <b>Colors</b> .
<b>“Default color(s)” button</b>	Sets the color selected in the list as the default color. If not a color, but a group of colors, such as “Database window”, is selected in the list, all window colors will be set to default values.
<b>“Set for all” button</b>	Specifies the use of this color in all windowsRadiaCode. This feature is useful for text and background colors. For example, if you select blue <b>background</b> and yellow text for the “Editor” window and then click the “Set for all”button, these colors will be set for the background and text in all windows.
<b>Font</b>	For some colors it is possible to set additional font attributes: “Bold” and “Italic”.

#### 2.2.4.2.3 “Key mappings” tab

The “**Key mappings**” tab of the “**Environment**” dialog box allows assigning keyboard shortcuts to any command in RadiaCode, including local window menus. Column “**Menu commands**” displays a tree-like command system. Columns **Key 1 (Key 2)** contain the corresponding key combinations assigned to the commands. All actions in this tab relate to the selected command.

<b>Dialog item</b>	<b>Description</b>
<b>Set key 1 Set key 2</b>	Opens the <b>Set key combination</b> . In the dialog box, press the key combination you are going to assign to the command, or press <b>Cancel</b> . Also, you can open this dialog box by double-clicking in the “cell” where the row of this command intersects the column <b>Key 1</b> or <b>Key 2</b> .



<b>Delete key 1</b>	Cancels the assigned keyboard shortcut for a given command. Also, to cancel the combination, you can right-click in the “cell” where the row of this command intersects the column <b>Key 1</b> or <b>Key 2</b> .
<b>Delete key 2</b>	

#### 2.2.4.2.4 “Toolbar” tab

“Colors” **tab of the “Environment” dialog box** includes window toolbar RadiaCode and their buttons.

Dialog item	Description
<b>Groups</b>	Contains a list of all program toolbarsRadiaCode. To enable/disable the toolbar, check its checkbox in the list.
<b>Buttons / Commands</b>	List of buttons for the toolbar highlighted in the list <b>GroupsTo</b> show/remove a panel button, check its checkbox in the list.
<b>Flat window control bars.</b>	Switches the appearance of the buttons between flat and quasi-3D for the toolbar of specialized windows in the program RadiaCode. Toolbar buttons of the window RadiaCode are always flat.
<b>Control bar settings are the same for all screen files</b>	Make the control bar settings “global”.

#### 2.2.4.2.5 “Misc” tab

The “**Misc**” tab of the “**Environment**” dialog box controls different window functions and message parameters in the RadiaCode. It is designed for comfortable work with RadiaCode.

Dialog item	Description
<b>Status bar of the home window</b>	Controls the presence and location of the status bar of the program window RadiaCode.
<b>Highlight the title of the active page in the windows</b>	Enables current tab highlighting (MS Windows style) in windows with tabs.
<b>Double-click on checkboxes and switch boxes in dialog boxes == single-click + “Ok” button</b>	Specifies the double-click function, which is equivalent to single-clicking the corresponding dialog item and pressing the “ <b>OK</b> ” button in this dialog box.
<b>Show “hotkeys” in popup descriptions</b>	Enables/disables the display of shortcut key combinations in the toolbar button tooltip.
<b>Do not display message dialogs if a console window is open</b>	Sends all messages to the “Message <a href="#">console</a> ” window if it is open. If closed, the message will be sent in a separate box.

<b>Always display message dialogs</b>	Displays all messages in separate boxes. “Message console” window also displays these messages.
<b>The cursor is positioned on the “OK” button</b>	If the checkbox is checked, then in every open message window the cursor is automatically placed on the “OK” button of this window. This function can be disabled if you prefer to press the “Enter” button, not click the “OK” button with the mouse.
<b>Sound notification for error messages</b>	Enables the sound for error messages. Information messages are always issued without sound.
<b>Write messages to the log file</b>	Sets the log file name. All messages are recorded in this file. The recording method is selected by a switch box that has the following positions:
<b>Start the log file from the beginning at every start</b>	Specifies to create a new file for each session and to delete the previous file if it exists.
<b>Write messages to the end of the file</b>	Specifies whether to add messages to the end of an existing file. With this the file size will grow indefinitely.

### 2.2.4.3 “Editor options” dialog box

#### 2.2.4.3.1 “Editor options” tab

The dialog box **Editor options** tab of the **Editor options** sets the options common to the open windows of the Editor (Editor window).

Dialog item	Description
<b>Backspace merges leading spaces</b>	Switches Backspace Unindent mode. Cm. <b>Note 2</b> .
<b>Leave end spaces</b>	When this checkbox is checked, it indicates whether spaces at the end of lines should be kept when copying the text to the buffer or saving it to disk. If the checkbox is unchecked, these spaces will be removed.
<b>Vertical blocks</b>	Enables vertical block mode for block actions.
<b>Constant blocks</b>	Enables Persistent Blocks mode for block actions.
<b>Creates a .BAK file.</b>	This checkbox indicates to create a *.BAK file each time you save a file in the “Editor”.
<b>Horizontal cursor</b>	The checkbox checked enables the display of the cursor as a horizontal line.
<b>CR/LF at the end of the file</b>	The checkbox checked enables adding a blank line to the end of the file when saving the file to disk, if there is no such line.
<b>Syntax highlighting in color</b>	The checkbox checked enables the syntax highlighting of language constructions.
<b>Highlight multiline comments</b>	This checkbox checked enables the highlighting of multiline comments. By default, the window highlights only single-line comments.

<b>Full path in the window title</b>	This checkbox checked enables displaying the full path of the opened file in the <b>“Editor”</b> .
<b>Clear clipboard before copying</b>	When unchecked, copying to the clipboard does not delete its previous contents.
<b>Convert keyboard input to OEM</b>	When this checkbox is checked, the <b>“Editor” window</b> converts the characters you enter in the window from MS Windows encoding to OEM (national) encoding corresponding to your national version of Windows. Cm. <b>Note 1</b> .
<b>Highlight the paired “(“ and “{” при вводе ”) и ”}”</b>	When this checkbox is checked, after entering the symbol “)” or “}”, the <b>Editor</b> automatically finds and highlights the text fragment from the entered bracket to the appropriate opening one.
<b>Autosave files every ... min</b>	Sets the time interval for saving the file automatically. Enter the value in minutes in the field on the right.
<b>Tab size</b>	Sets the tab width for displaying text. Valid values range from 1 to 32. If there are ASCII tab characters in the open file, they will be replaced by spaces according to the specified tab width.
<b>Return counter</b>	Sets the maximum available number of return steps (512 by default). If this is not enough, you can set the number of steps up to 10000. However, larger values require more memory for the editor.
<b>Auto indent</b>	Toggles the automatic indentation options for a new line created by pressing the <b>“Enter”</b> .
<b>If another application has modified the file</b>	Sets the behavior when another application changes the file opened in the <b>“Editor” window</b> .
<b>Tab size</b>	Sets the tab size in spaces.
<b>Return counter</b>	Sets the size of the return stack used in the <b>“Return” operation</b> of the Editor.
<b>Highlight Russian letters with color</b>	The checkbox checked enables the selection of Russian letters that are not inside comments or not enclosed in quotation marks.

**Note.**

1. Checkbox **Convert keyboard input to OEM** should be checked only if you are going to change the text of the file in the **Editor** in OEM encoding. If you only want to view such a file, set the Terminal font for the **“Editor”** window in the **“Fonts”** tab of the **“Environment”**. To do this, select the **“Editor”** item in the **“Window”** list and press the **“Select font”**.

2. The Backspace Unindent mode sets the result of Backspace key **pressing**:

**Backspace Unindent enabled****Backspace Unindent disabled****Insert mode**

All spaces to the left of the cursor are deleted.

Removes one space to the left of the cursor. The cursor and the rest of the line to the right of the cursor are moved one position to the left.

**Overwrite mode**

The cursor moves to the first position in the line. The text in the line stays where it is.

Only shifts the cursor one position to the left. The text in the line stays where it is.

### 2.2.4.3.2 “Key mappings” tab

With the “**Key mappings**” tab of the “Editor options” **dialog box** it is possible to manipulate the list of available editor commands: add new commands to the editor, delete them, assign and reassign keyboard shortcuts for new and built-in commands.

In the “**Command description**” window, the left column of the list contains command descriptions. The second column shows the command type (the word “*Command*” means a built-in command of RadiaCode; *Script XXX*. means the added custom command). The two columns to the right show the two key combinations for calling this command, if any. Both combinations are equal to each other.

Dialog item	Description
<b>Add</b>	Opens “ <b>Edit command</b> ” <a href="#">dialog box</a> to add a new command to the list and set its parameters.
<b>Delete</b>	Deletes the highlighted custom command from the list. Built-in commands cannot be deleted.
<b>Edit</b>	Opens the “ <b>Edit command</b> ” dialog box to adjust command parameters. For built-in commands, you can only reassign key combinations ( <b>Command description</b> and <b>Script name</b> fields will not be available).
<b>Edit script file</b>	Opens in the “ <b>Script text</b> ” window the source text file of the selected command

#### Creating a new command

To create a new command, you have to make a script file for it. In fact, a script, not a command, will be added to the editor. This means that a custom command is capable of much more complex and multistep action than a normal editor command. Moreover, you can tailor this action to your specific situation or a specific work task. Your scripts can take advantage of the functionality of the scripting language itself, its rich set of built-in functions and variables, text editing functions, and existing scripts.

The script source text file is an ASCII file. To execute the script, the editor compiles the script source file. Note that before you can use the script you have just edited, you shall first make sure to save the source file on the disk in order to recompile it with RadiaCode'a.

Script source files for new commands shall be stored only in the KEYCMD folder located in the root folder RadiaCode. Program package RadiaCode contains several files with example scripts. For more information about scripting, see the chapter “Script files and automation of the emulator”.

### 2.2.4.3.3 “Edit command” dialog box

This “Edit command” **dialog box** is designed to work with the parameters of a new or existing command.

Dialog item	Description
<b>Command description</b>	You can enter a command description here (not for built-in commands). The text of this field is displayed in the command list.
<b>Script name</b>	Name of the script file that executes this command

<b>Set key combination #1</b> <b>Set key combination #2</b>	Opens a specialized dialog box that senses the key combination you press in it and assigns/unassigns that combination to a given command. The buttons correspond to the first and second key combinations.
<b>Delete key combination #1</b>	Deletes key combination #1.
<b>Delete key combination #2</b>	Deletes key combination #2.

Script source files for commands shall only be stored in the KEYCMD subdirectory of the system directory RadiaCode. The file name should be specified without path or extension.

#### Notes

1. You cannot specify key combinations reserved in Windows (e.g, **Alt+-** or **Alt+Tab**).
2. It is not recommended to specify combinations already occupied in the editor and program RadiaCode, because in this case you will have fewer ways to use these commands. For example, the combinations that open the application menu, e.g, **Alt+F**, **Shift+F1**, **Ctrl+F7**, or keyboard shortcuts from the local menu of the editor window.
3. You can use more than one control key in combination. For example, it is possible to use not only **Ctrl+F**, but also **Ctrl+Shift+F** or **Ctrl+Alt+Shift+F**.
4. For some built-in commands, key combinations cannot be reassigned (e.g. cursor movement keys).

## 2.2.5 “Database” menu

Command	Action
<b>Choose database...</b>	<a href="#">Select database file</a> to work. By default, the shared <a href="#">shared database</a> .
<b>Copy database to...</b>	Copy the currently open <a href="#">database</a> to another location on the computer. This is usually a removable medium, such as a flash module. This command allows copying the database without knowing the location of its file on your computer. Only the destination folder or device name is requested.

### 2.2.5.1 “Choose database” dialog box

Dialog item	Description
<b>Use a shared database</b>	Use the shared database file to record and display the data <a href="#">in the log window</a> .
<b>Use the specified database file</b>	In the field below one can specify which database file to use to record the data and display it in the log window.
<b>History</b>	List of previously used database files.

## 2.2.6 “Tools” menu

Command	Action
Calculator	Opens the <a href="#">“Calculator” dialog box</a> .

### 2.2.6.1 “Calculator” dialog box

This dialog serves to calculate expressions and convert values from one number system to another. The result can be copied to the clipboard.

Dialog item	Description
Expression	Input field for an expression or number.
Copy as	Specifies the format in which the result will be copied to the clipboard.
Character values	Specifies that the result should be interpreted and displayed as a character value (valid only for decimal numbers).
Display nonsignificant zeros	Enables the display of leading zeros (in high digits) in binary and hexadecimal numbers.
Copy	Copies the calculation result to the clipboard in the format specified by the “Copy to” switch box.
Clr	Clears the “Expression” field.
Bs	Removes one character (number) to the left of the input point (Backspace).
0x	Inserts “0x”.
>>	Shifts the expression result to the right by the specified number of digits.
<<	Shifts the result to the left by the specified number of digits.
Mod	Calculates the remainder of a division by a given number.

While you are typing an expression in the “Expression” box, RadiaCode tries to calculate the result and immediately displays it in different formats in the “Result” panel. Also, a switch box and two checkboxes in this panel control the result format.

#### Examples of expressions:

`0x1234`

`-126`

`(2 + 2 * 2) - 33h`

`(float) (33000 / 4)`

### 2.2.7 “Scripts” menu

This menu is intended for starting [process scripts](#) to start device calibration. It is beyond the scope of this document to describe the script language and how to manipulate it.

### 2.2.8 “Window” menu

The commands on this menu control the arrangement of windows in the application. Also, at the bottom of the menu there is a list of currently open windows - this is the standard way to switch between them. When you select a window name in this list, it is activated on your computer screen. This method is useful for navigating to the window behind the others.

Command	Description
Tile	Resizes and positions the window without overlapping each other. In this case, the window sizes are about the same.
Tile horizontally	Places all windows horizontally, without overlapping each other. In this case, the window sizes are about the same.
Cascade	Arranges the windows with a ledge.
Arrange icons	Lines up icons of collapsed windows.
Close all	Closes all windows.

### 2.2.9 “Help” menu

The commands in this menu work with the on-line help system.

Command	Description
<b>Contents</b>	Opens the “Contents” tab of the help file.
<b>Search</b>	Opens the “Index” tab of the help file.
<b>Check for updates...</b>	Check if a new version of RadiaCode is available for downloading. This function works if the computer is connected to the Internet. Opens the “Check for updates” dialog box, where you can configure the automatic updates check and actually check for a new version.
<b>Send e-mail message to Scan-Electronics...</b>	Starts the mail client installed in the system and prepares the letter to Scan-Electronics.
<b>Generate error report...</b>	A dialog box is displayed where you can send a message to the developers. The message will automatically include trace files. Optionally, you can add your own attachments to the message.
<b>Visit Scan-Electronics website</b>	Launches the web-browser and navigates to the “Scan-Electronics” page.
<b>About RadiaCode</b>	Opens the <a href="#">“Information”</a> .

### 2.2.9.1 About RadiaCode

This dialog box shows:

Name	Description
<b>RadiaCode: version</b>	Version RadiaCode.
<b>Software build version</b>	Executable file version RadiaCode.
<b>Device</b>	Device name.
<b>Device bootloader version</b>	Device resident software version.
<b>Device firmware version</b>	Device replaceable software version. The replaceable software provides the basic functionality of the device and can be updated from version to version.
<b>Device serial number</b>	Device serial number string.
<b>Hardware identifier of the device</b>	Unique hardware identifier of the device.

### 2.2.9.2 “Update checking” dialog box

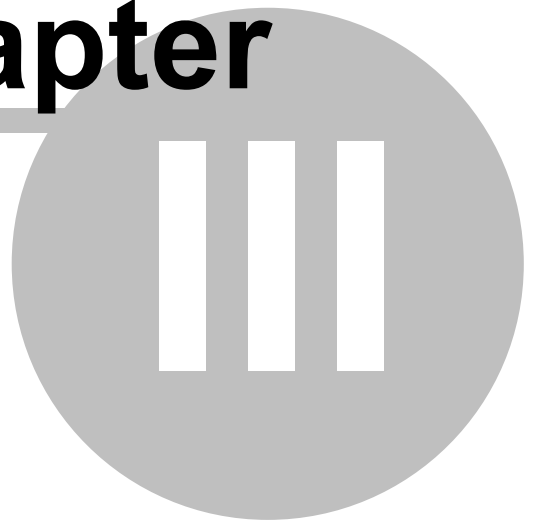
Here, one can set up the check for automatic updates of RadiaCode and actually check if there is a new version. This function works if the computer is connected to the Internet.

Dialog item	Description
<b>Enable automatic checking for new versions of RadiaCode</b>	Automatically checks for a new version of RadiaCode at startup. One can specify the frequency of checks below. If there are no new versions and no Internet connection, no message is displayed, when checking for updates. However, Windows may display a message that RadiaCode tries to establish an Internet connection.
<b>Checks for new versions:</b>	Select how often you want to check for updates.
<b>Check now</b>	Immediately checks for updates.



# Chapter

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## 3 Appendices

### 3.1 Database RadiaCode information

RadiaCodeThe database file RadiaCode has a default name RadiaCode.sql3. At the first start of the RadiaCode program on the computer, an empty database file is copied to the folder:

Under Windows XP:

**C:\Documents and Settings\\My Documents\RadiaCode**

Under Windows 7, 8, 10 and later versions of Windows:

**C:\Users\\Documents\RadiaCode**

This database file is used by the default program and is called the “shared database”. The shared database is not deleted when uninstalling a package RadiaCode and is not updated when new versions are installed. Thus, all versions of RadiaCode use the same database and require no adjustments, when installing new versions.

Note that a shared database is different for each user of the same computer.

Using the menu command of the home window RadiaCode “Tools” -> “Select database” one can select for work both the shared database, and the database file with an arbitrary name and location, which was, for example, transferred from another computer.

#### 3.1.1 Database backups

RadiaCode creates general database backups in a Backup Subfolder of the folder where the shared database file is located (see above). Backups can be used to restore a database that has been corrupted by some failure. Restoration should be done manually by copying the appropriate backup file to a shared database file. In this case, the program RadiaCode shall not be running.

One can configure the number of days over which the database backups are created in the [“RadiaCode settings” dialog box](#).

### 3.2 Special function registers of RadiaCode-10X

Special function registers (SFR) are intended primarily for use in script files that are executed in the RadiaCode. The scripts are used for process purposes and allow automating some setup, calibration and pre-sale preparation of devices. However, some of the SFRs may be useful for the users of RadiaCode-10X.

SFRs can be accessed through the [“Variables”](#). Listed below are the case names whose values can be viewed and modified in this window.

#### **Group of registers, which gives access to parameters of spectrum calibration by energy**

Spectrum calibration is performed to convert the number of the spectrum channel to the value of the emission energy in keV using a polynomial of the 2nd degree of the form:

$$E = a_0 + a_1X + a_2X^2,$$

where

x - channel number;

$a_0$ ,  $a_1$ ,  $a_2$  - calibration factors.

Register name	Access	Description
RC_VSFR_CHN_TO_keV_A0	read/write	Contains the current value of the coefficient $a_0$ .
RC_VSFR_CHN_TO_keV_A1	read/write	Contains the current value of the coefficient $a_1$ . Writing a value $\leq 0$ to this register restores the factory values of the calibration constants in the RC_VSFR_CHN_TO_keV_A0, RC_VSFR_CHN_TO_keV_A1 and RC_VSFR_CHN_TO_keV_A2 registers. If there are no factory values, these registers will be set to 0, 1, 0, respectively.
RC_VSFR_CHN_TO_keV_A2	read/write	Contains the current value of the coefficient $a_2$ .

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