

RaySafe i2 dose viewer

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INTRODUCTION

ABOUT THE RAYSAFE i2 SYSTEM



Figure 1. RaySafe i2 System overview

The RaySafe i2 System can contain the following components:

- dosimeter
- real time display
- dose viewer (computer software)
- dose manager (computer software)
- cradle (dock station used to connect dosimeters and computer)
- dosimeter rack (dosimeter storage)

HOW THE SYSTEM WORKS

The dosimeter measures and records X-ray exposure every second and transfers the data wirelessly, via radio, to the real time display.

The real time display shows real time dose exposure from up to eight dosimeters in range at a time. Color indication bars (green, yellow, red) represents the intensity of the currently received exposure. The accumulated dose per individual is displayed next to the color indication bars. By tapping a dosimeter name the user can look at historical data in separate views.

When the dosimeter is not in use, it should be stored in the dosimeter rack, away from the real time display.

More detailed historical dose information can be transferred from dosimeters via the cradle connected to a computer and viewed using the computer software (dose viewer and dose manager).

The dose viewer software is also used for administrating dosimeters, change dosimeter names, colors and reset dose history. The dose manager software is an advanced software for analyzing, reporting and archiving dose information. It handles multiple dosimeters and can retrieve the dose information from multiple real time displays through the hospital network or via USB storage.

ABOUT THIS USER MANUAL

This user manual are intended to assist users in the safe and effective operation of the product described.

Before attempting to operate the product, you must read these instructions for use, noting and strictly observing all WARNINGS and CAUTION notices.

WARNING *A WARNING alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the operator or patient.*

CAUTION *A CAUTION alerts you to where special care is necessary for the safe and effective use of the product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury, and/or cause environmental pollution.*

NOTE *Notes highlight unusual points as an aid to an operator.*

These Instructions for Use describe the most extensive configuration of the product, with the maximum number of options and accessories. Not every function described may be available on your product.

USING DOSE VIEWER

INTRODUCTION TO DOSE VIEWER

The dose viewer application lets you, for one dosimeter at a time, connected via cradle:

- View the dosimeters dose history.
- Change the dosimeter options, for example full name and displayed name.

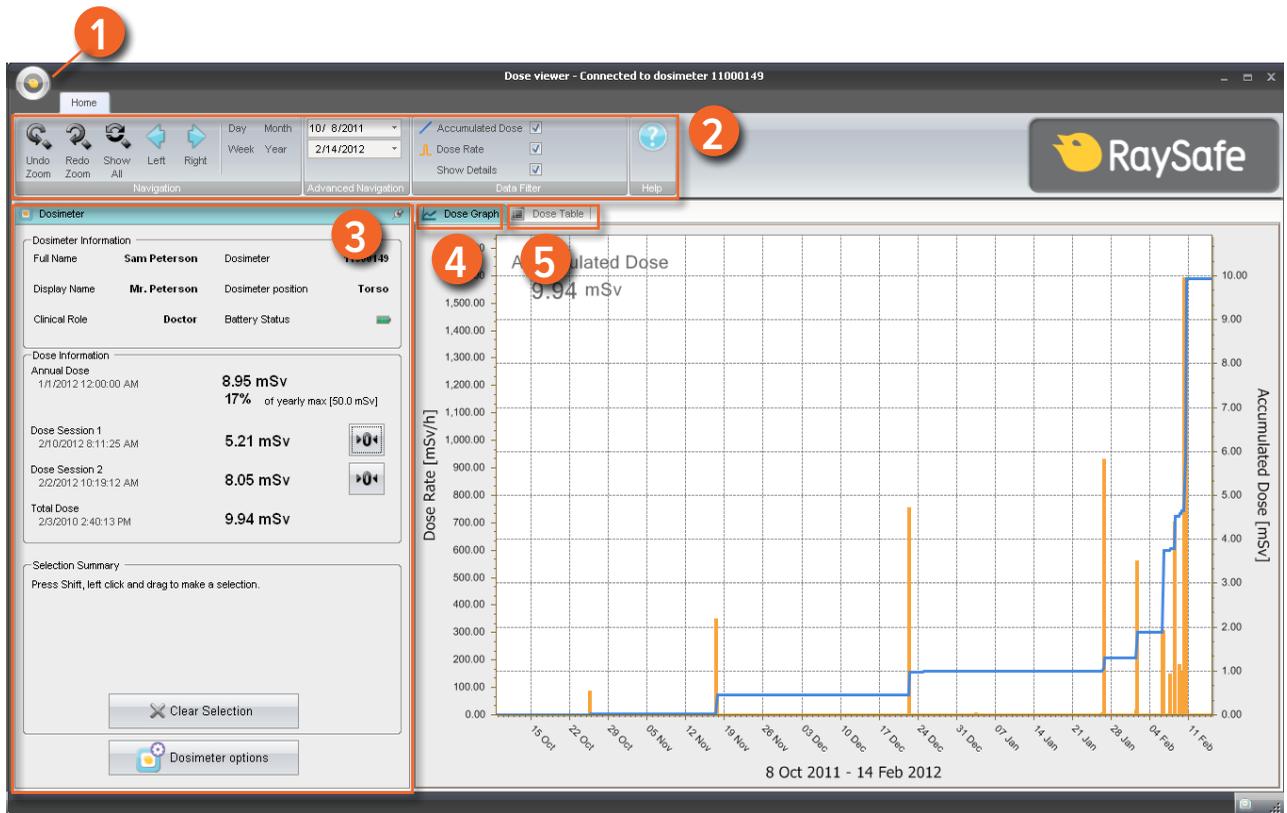


Figure 2. Dose viewer overview

The following items are available when you start dose viewer:

Table 1. Dose viewer information

ITEM	DESCRIPTION
1 Application menu	Access the dose viewer options dialog, see section “Specify password and language” on page 18.
2 Home tool bar	Access tools to navigate in dose graphs and dose tables, see section “Home tool bar overview” on page 8.
3 Dosimeter panel	Show and manage options for a dosimeter that is placed in a cradle. You can only access and change dosimeter options when the dosimeter is in a cradle, see section “Dosimeter panel” on page 10.

ITEM	DESCRIPTION
4 Dose graph	View the dose history as a graph, see section “View dose graph” on page 15.
5 Dose table	View the dose history as a table, see section “View dose table” on page 17.

GETTING STARTED WITH DOSE VIEWER

NOTE *Do not connect the cradle to the computer unless dose viewer and the cradle driver are installed on the computer.*

Follow the steps below to get started with dose viewer:

1. Start the dose viewer application.
2. Connect a cradle to your computer’s USB port.
3. Put a dosimeter in the cradle. Within a few seconds, dose viewer will detect the dosimeter. This is indicated at the top of the dose viewer window by a note “Connected to dosimeter 100001158”, where dosimeter 100001158 is an example of a dosimeter ID. Dose viewer will start loading the dosimeter dose history. This may take up to a few minutes. You can follow the progress on the progress bar at the bottom of the dose viewer window.

HOME TOOL BAR OVERVIEW



Figure 3. Home tool bar

The home tool bar is where you find tools to navigate in dose graphs and dose tables.

The following items are available in the home tool bar:

Table 2. Navigation group – access tools for dose history navigation

FUNCTION	DESCRIPTION
Undo zoom button	Move one step back in a sequence of zoom actions, showing the last selected time range.

FUNCTION	DESCRIPTION
Redo zoom button	Move one step forward in a sequence of zoom actions, showing the time range that was selected before the last undo zoom action.
Show all button	Show all available data for the selected dosimeter. The time range will start the first date any dosimeter begun to measure dose and stop the last date any dosimeter was synchronized.
Left button	Shift the time range one step backward. If you have selected year/month/week/day, the time range will move one year/month/ week/day backward. If you have selected another time range, the time range will move approximately 10% backward.
Right button	Shift the time range one step forward. If you have selected year/month/week/day, the time range will move one year/month/week/ day forward. If you have selected another time range, the time range will move approximately 10% forward.
Day button	View dose history for the current day.
Week button	View dose history for the current week.
Month button	View dose history for the current month.
Year button	View dose history for the current year.

Table 3. Advanced navigation group

FUNCTION	DESCRIPTION
Start time button	The viewed time range start day.
End time button	The viewed time range end day.

Table 4. Data filter group – select which information is visible in the graph

FUNCTION	DESCRIPTION
Accumulated dose check box	Show/hide the accumulated dose in the graph.

FUNCTION	DESCRIPTION
Dose rate check box	Show/hide the dose rate in the dose graph.
Show details check box	Checked: The graphs will display dose rate samples for every second, where such data is available. Unchecked: The graphs will display mean dose rate values per hour.

DOSIMETER PANEL

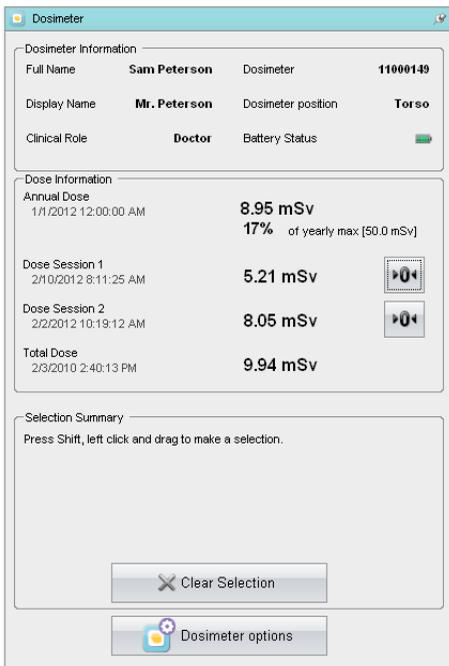


Figure 4. Dosimeter panel

DOSIMETER INFORMATION

The following information is visible when a dosimeter is placed in the cradle:

Table 5. Dosimeter information

ITEM	DESCRIPTION
Full name	Full name of the person using the dosimeter.

ITEM	DESCRIPTION
Displayed name	The name that is displayed in the real time display online view.
Clinical role	One of doctor, nurse, technician or other.
Dosimeter	A unique dosimeter serial number.
Dosimeter position	One of head, torso, hand, belly, leg or other.
Battery status	<p>The dosimeter’s battery status:</p> <ul style="list-style-type: none"> • Green: normal use. • Yellow: normal use. • Red: the dosimeter needs to be replaced in 4-6 months at normal use. • Crossed battery: there is no battery left. The dosimeter does not measure radiation and will not communicate with real time displays.

DOSE INFORMATION

Table 6. Dose information

ITEM	DESCRIPTION
Accumulated personal dose	<p>The dosimeter’s total dose measured this year or since last dose history reset, measured in Sv.</p> <p>Time of last reset.</p>
Percentage of annual dose	The dosimeter’s accumulated annual dose measured this year or since last manual dose history reset, measured in Sv.
Dose Session 1 and 2	<p>Trip meter for dose values. The accumulated dose for a session since last Dose Session reset, measured in Sv. You can also reset these values. See NOTE below.</p> <p>Time of last reset.</p>

ITEM	DESCRIPTION
Total personal dose	The total dose exposure for a dosimeter since last dose history reset. Time of last reset.

NOTE *Dose session reset done in dose viewer will not appear as an event in dose manager.*

SELECTION SUMMARY

View a summary of the dose data selection you might have done either in the dose table or in the dose graph (see section “View dose graph” on page 15 and section “View dose table” on page 17). You can also clear the contents of the selection summary field by clicking clear selection.

CHANGE DOSIMETER OPTIONS

Follow the instructions below to change dosimeter options:

1. Make sure that a cradle is connected to your computer’s USB port.
2. Insert a dosimeter in the cradle. The computer will detect the dosimeter automatically and the dosimeter information will appear in dose viewer.
3. Access the dosimeter options dialog by clicking the dosimeter options (see “Figure 4. Dosimeter panel” on page 10). The dosimeter options dialog consists of two tabs: Information tab and Settings tab as shown below.

NOTE *If a password has been set (see section “Specify password and language” on page 18), access to the dosimeter options dialog box will be password protected.*

DOSIMETER OPTIONS

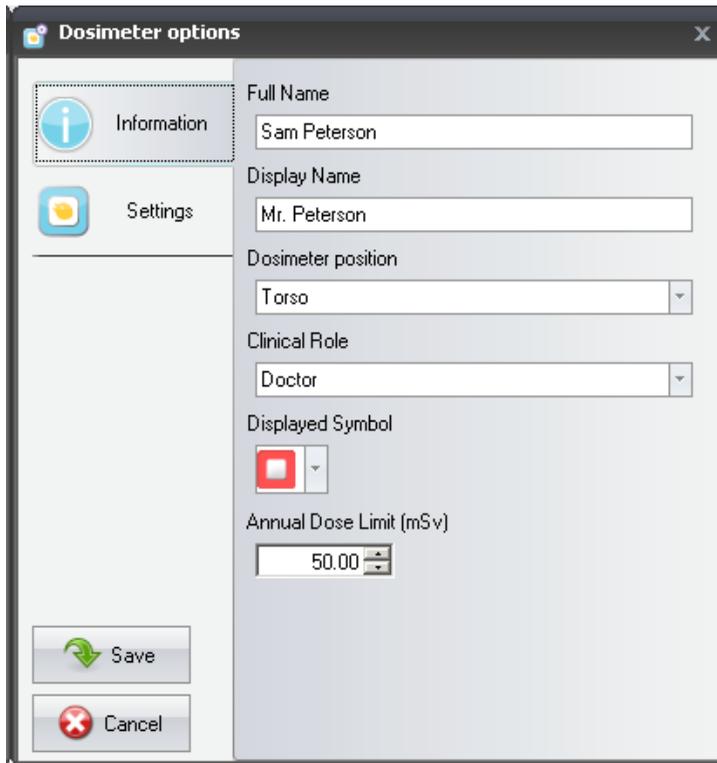


Figure 5. Dosimeter options, information tab

In the Information tab you can:

- Edit dosimeter information (full name, displayed name, dosimeter position, clinical role, and annual dose limit value) and select a displayed symbol, a color which is displayed in the real time display interface. The displayed name is used to identify a dosimeter in the real time display. The name is limited to 16 characters. However, in the real time display's online view, the displayed name may be truncated.

NOTE *The dose measurement for a dosimeter depends on factors such as where on the body the dosimeter is positioned and if X-ray protection devices (for example a lead apron) that shield the dosimeter measurements are used. These factors need to be considered for the annual dose limit.*

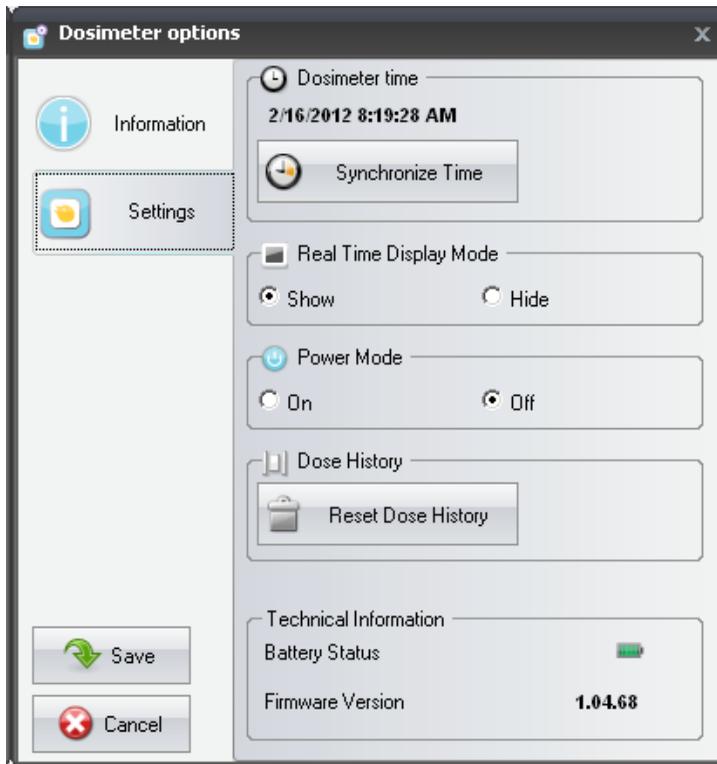


Figure 6. Dosimeter options, settings tab

In the Settings tab you can:

- View and synchronize the dosimeter's clock with the computer's clock.
- Set real time display mode to show/hide, which makes the dosimeter to be shown/not shown on a real time display.
- Turn power mode on/off, which puts the dosimeter in operating or power saving mode. In operating mode, communication with real time displays will take place and registration of dose data will occur. In power saving mode no communication with real time displays will take place and no registration of dose data will occur.
- Reset the dosimeter's dose history – *This will permanently delete the dosimeter's entire dose data.*
- View battery status and firmware version.

WARNING *Make sure that the computer's clock is correct, otherwise the dose history data will be shifted in time and therefore not accurate anymore.*

NOTE *If you need to change the hour digit, the dose history will have to be reset. This is done automatically; you just need to confirm the action. When you synchronize dosimeter's time the*

internal clock will be synchronized to the same time as the host PC, including the Windows time zone settings. If you are using multiple dosimeters, it is important to synchronize time for the dosimeters with the same PC, because they will have the same time reference.

NOTE *If you need to change the time backwards to where there is dose history stored, the dose history will have to be reset and all dose history will disappear. This is done automatically; you just need to confirm the action.*

NOTE *The synchronization takes immediate effect and you do not need to press the save button.*

VIEW DOSE GRAPH

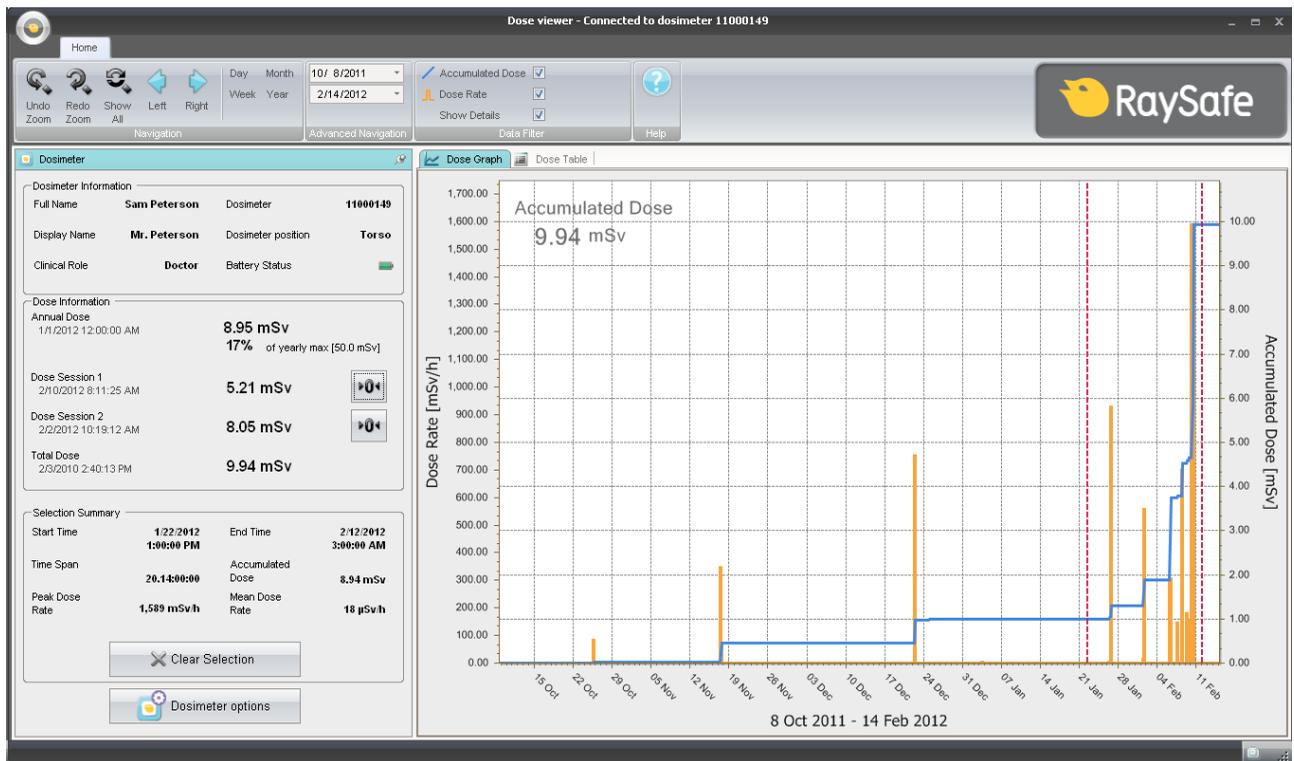


Figure 7. Dose graph with selection (vertical red dotted lines)

Use the data filter panel in the home menu tool bar to select which information to be visible in the graph:

- Accumulated dose graph, right axis – blue graph
- Dose rate graph, left axis – orange graph, displays dose rate samples for every second, where such data is available

- Show details:
Checked: The graphs will display dose rate samples for every second, where such data is available.
Unchecked: the graphs will display mean dose rate values per hour

The graphs are covering a time span that you choose, either:

- From the advanced navigation panel.
- From the navigation panel.
- Or by left-clicking and dragging in the graph (zooming).

SELECTION SUMMARY

You can also select a time span to be summarized in the selection summary field of the dosimeter panel. Make a selection by shift-left-clicking and dragging in the graph. Two red, dotted vertical lines in the graph will indicate the selected time span. The Selection Summary field will provide information about start time, end time, time span, accumulated dose, peak dose rate and mean dose rate.

VIEW DOSE TABLE

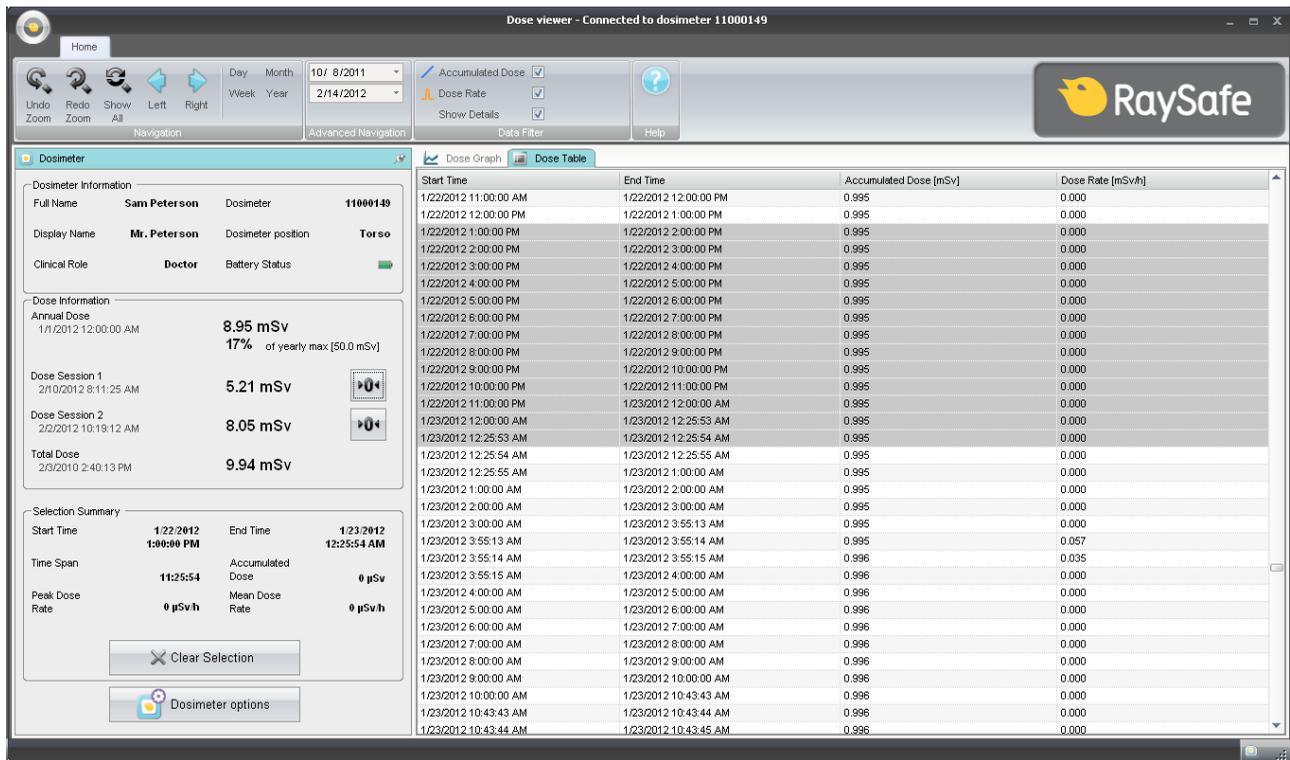


Figure 8. Dose table with selection

In the dose table tab you can view a table of:

- Accumulated dose values.
- Dose rate values.

The tables are covering a time span that you choose either from the:

- Navigation panel
- Advanced navigation panel.

SELECTION SUMMARY

You can also select one or several rows to be summarized in the selection summary field of the dosimeter panel. The selection summary field will provide information about start time, end time, time span, accumulated dose and mean dose rate.

With the show details (in data filter panel) check box checked, the table will list second data, where such data is available.

SPECIFY PASSWORD AND LANGUAGE

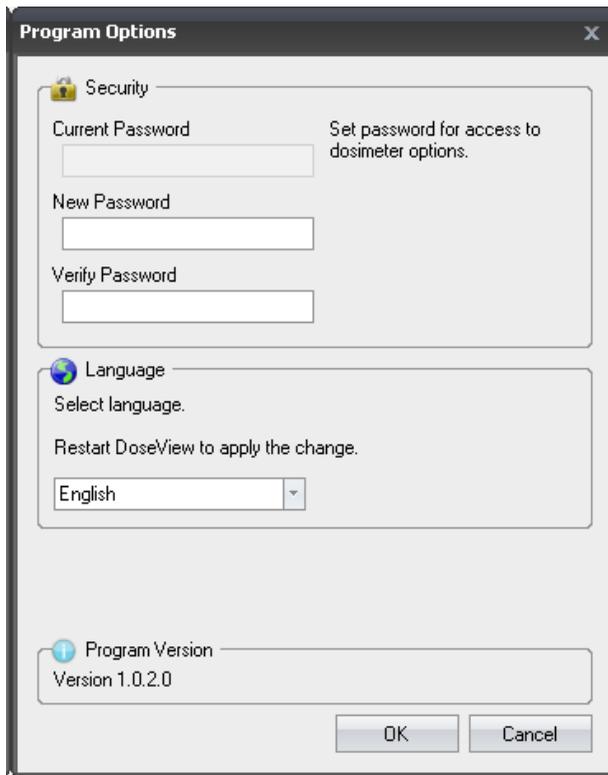


Figure 9. Program options dialog box

In the application menu (top left corner of the main window) -> Program options dialog box (see figure above) you can:

- Specify a password to protect the access to the dosimeter options dialog. The password is only used when you are making dosimeter options changes. Others can still view the dosimeter data.
- Change application language.
- View the dose viewer program version.

NOTE *Contact your local administrator for password guidelines.*

NOTE *If you have lost your password, contact your local administrator, who will have to reinstall the software.*

USING THE DOSIMETER

INTRODUCTION



Figure 10. The dosimeter

The dosimeter is an active dose meter designed for maintenance-free usage throughout its lifetime.

You can personalize the dosimeter's appearance by attaching one of the 8 inlays of different color, which are delivered together with the dosimeter. (Select which color to show on the real time display, using the dosimeter options dialog, see "Figure 5. Dosimeter options, information tab" on page 13.)

The dosimeter measures staff X-ray exposure. The optimal usage for the dosimeter to measure exposure is to use it unshielded from any X-ray protection garment.

GETTING STARTED

Follow the instructions below to start using your dosimeter:

1. Make sure that the dosimeter's power mode is set to on, see section "Change dosimeter options" on page 12.
2. Attach the dosimeter on your clothes using the clip, which is located on the back of the dosimeter, or the lanyard holder that is provided with the dosimeter.

The dosimeter now records dose values and transmits them to real time displays within range. You can also read out the recorded dose values by using dose viewer via the cradle (see section "Getting started with dose viewer" on page 8).

See the system manual to learn more about dosimeter memory and data transfer between dosimeter and real time displays.

USING THE CRADLE

INTRODUCTION



Figure 11. The cradle

The cradle is a dock station that lets you connect a dosimeter to a computer for data read out as well as dosimeter options writing into the dosimeter.

GETTING STARTED

NOTE *Do not connect the cradle to the computer unless dose viewer and the cradle driver are installed on the computer.*

1. Start the dose viewer application.
2. Connect a cradle to your computer's USB port.
3. Put a dosimeter in the cradle.

Within a few seconds, dose viewer will detect the dosimeter. This is indicated at the top of the dose viewer window by a note "Connected to dosimeter 100001158", where dosimeter 100001158 is an example of a dosimeter ID.

Dose viewer will start loading the dosimeter dose history. This may take up to a few minutes. You can follow the progress on the progress bar at the bottom of the dose viewer window.

TROUBLESHOOTING

DOSE VIEWER AND CRADLE

Table 7. Dose viewer and cradle troubleshooting

PROBLEM	SOLUTION
The dosimeter does not appear in dose viewer	Check that the dosimeter is correctly fitted into the cradle
Dose viewer does not detect the cradle	<ul style="list-style-type: none"> • Check the USB connection between the cradle and the computer. • Install the cradle driver manually. All the driver files are located on the installation CD in the folder “CradleDriver”. These files are also copied to the application installation folder when dose viewer is installed. When Windows detect a connected cradle and the dialog about driver installation is displayed, select to use the driver files located on the CD or in the application installation folder.
I have forgotten my password	Contact your local administrator, who will have to re-install the software

SYSTEM REQUIREMENTS

Dose viewer has the following system requirements:

- Operating systems: Windows 7, Windows Vista or Windows XP
- .NET 3.0
- At least one USB port available
- At least 1 GB of system memory available
- At least 1 GB of hard disk space available
- Recommended screen resolution at least 1024 x 768

OTHER USER MANUALS

- Dose manager is described in a separate user manual, which can be found from the Help menu in dose manager software.
- The dosimeters are described in a quick guide, delivered together with the dosimeter.
- The real time display is described in the system user manual.
- More information about installation and maintenance can be found in the service manual, delivered with the system.

TECHNICAL DATA

DOSIMETER AND REAL TIME DISPLAY/DOSE VIEWER MEMORIES

Dose rate samples that have been overwritten in the dosimeter’s dose rate memory may still be available in the real time display.

If there are no dose rate samples neither in the real time display, nor in the dosimeter dose rate memory, the real time display and dose viewer will instead display mean dose rate values based on accumulated dose values (see figure below).

Lack of dose rate samples in the real time display and/or dose viewer memories occurs when the:

- dosimeter is not within range of the real time display when it is exposed to radiation.
- dose rate samples in the dosimeter dose rate memory are overwritten.



Figure 12. Dose viewer chart. In lack of dose rate samples, the yellow curve displays mean dose rate values per hour calculated from the accumulated dose (blue curve).

NOTE *The same effect as illustrated in the figure above is also obtained by unchecking the Show details check box in the Data filter panel (see section “View dose graph” on page 15).*

TIME MANAGEMENT

The dosimeter logs dose history in local time with no daylight saving time adjustments. Daylight saving time adjustment is done in the real time display, dose viewer or dose manager when the dose history is presented.

The following happens when the daylight saving time is changed:

- When going to summertime, one extra hour with no dose data will be added to the dose log.
- When going to wintertime, two hours of dose data will be merged into one hour. This hour contains no dose rate details. When changing from summertime to wintertime, dose data details in the two merged hours will not be displayed.