

JCS

Nuclear Solutions



ED3 - Active Extremity Dosimeter

ED3 User
Guide
(Issue: 2.3)

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WEEE

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EC Declaration of Conformity

European EMC Directive 2004/108/EC for radiated emissions and susceptibility.

ED3 Extremity Dosimeter
Model number ED3
Serial Number 101

We, John Caunt Scientific Ltd. of the Europa House, Barcroft Street, Bury, Lancashire, UK, BL9 5BT in accordance with the following standard(s):

is in conformity with the applicable requirements.

Name: Oliver Caunt
Position: Managing Director
Bury, Lancashire
On 5th October 2011

EN55022 Class B emissions
EN61000-4-2 electrostatic discharge
EN61000-4-3 radiation immunity



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2. The ED3 Overview

The ED3 Active Extremity Dosimeter is the latest in a line of personal extremity dosimeters, designed for monitoring the exposure of radiation to the user in the Nuclear, Industrial and Medical fields.

2.1 Hardware

The ED3 case dimensions are; length 100mm, width 60mm and depth 35mm. Mass: 245g.

The LCD screen displays the current accumulated dose or dose rate on the top LCD line, with the measurement units and alarm status on the bottom line.

The ED3 displays the current accumulated dose or dose rate on the top line of a two line LCD display on the front of the unit with the measurement units and alarm status on the bottom line.

This data is also logged by the ED3 so that the information may be later transferred to the PC application for storage and further study.

The internal memory is accessed by connecting the instrument to a computer and accessing it via the ED3 Data Manager PC software.

2.2 ED3 Detectors

The ED3 makes use of the latest in solid state detector technology to measure the radiation using 1 or 2 detachable detectors. The instrument logs instantaneous Dose rate and accumulated dose data to internal memory and will sound an alarm if pre-set levels are exceeded.

These are compensated Hp(0.07) detectors of two designs; the first functions over the range of 60keV up to 1.25MeV and meet the energy response requirements of IEC 61526, the second has a response that does not meet IEC 61526 but has a response down to 33 keV. Lower energies are possible, but response variability may increase.

The accumulated dose should be reset when the probe type (D1 or D4) is changed. If this is not done, then the reading may be invalid.

D1 Detector – for standard HP(0.07) measurements: 60 keV-1.25 meV.

D4 Detector – for HP(0.07) measurements of low energy photons: 33 keV – 60 keV and high energy betas.

Note - Precautions to minimise the effects of RF interference:

The ED3 works by detecting photon radiation, which is a very high frequency electromagnetic wave. It is therefore not possible to completely eliminate the possibility of RF interference, particularly from high power RF sources such as mobile phones. Precautions have been taken to minimise the effects of RF interference however, when taking measurements with the ED3, the user should avoid making or receiving calls while holding a phone, which should preferably be switched to "airplane" mode or not carried.

Other wireless communication devices, such as walkie-talkies should be considered in this category as a potential interference device.

WIFI signals work at much lower power levels and should not be a problem.

2.3 Connecting the Detectors

Either one or two detectors (of the same type) need to be attached to the ED3 instrument before the unit is switched on. The unit automatically recognises the detector type (D1 or D4).

Note: Always add & remove a detector by holding the metal connector. Pulling the lead to remove a detector may cause damage. See Figure 1 on page 6.

3. Getting Started

3.1 Best Practice

Before using the ED3 we recommend the battery is fully charged.

- Always add & remove a detector by holding the metal connector. *Pulling the lead to remove a detector may cause damage.*
- When taking measurements with the ED3, the user should avoid making or receiving calls while holding a phone, which should preferably be switched to “airplane” mode or not carried. WIFI signals work at much lower power levels and should not be a problem. *See note on page 5*
- Wear the ED3 under your lab coat, in a convenient pocket (this may differ for a single or dual detector set up) or in the supplied pouch.
- Run the detector lead under the sleeve of the coat and secure the detector to the preferred area on the finger with a finger cot.

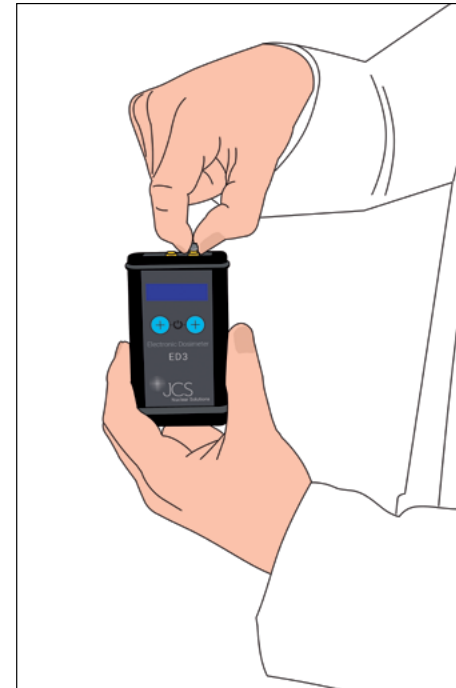


Figure 1 Adding & Removing The Detector

- Do not use any attachment mechanisms or tape that will add radiation attenuation to the detectors or cause damage to the detectors when removed from the extremity.
- Put the ED3 into standby for everyday on/off functions by long-pressing both buttons on the front panel until “Standby” is displayed on screen. This does not affect its battery life and is ergonomically preferable for the user. Long-press both buttons to bring the ED3 out of standby.

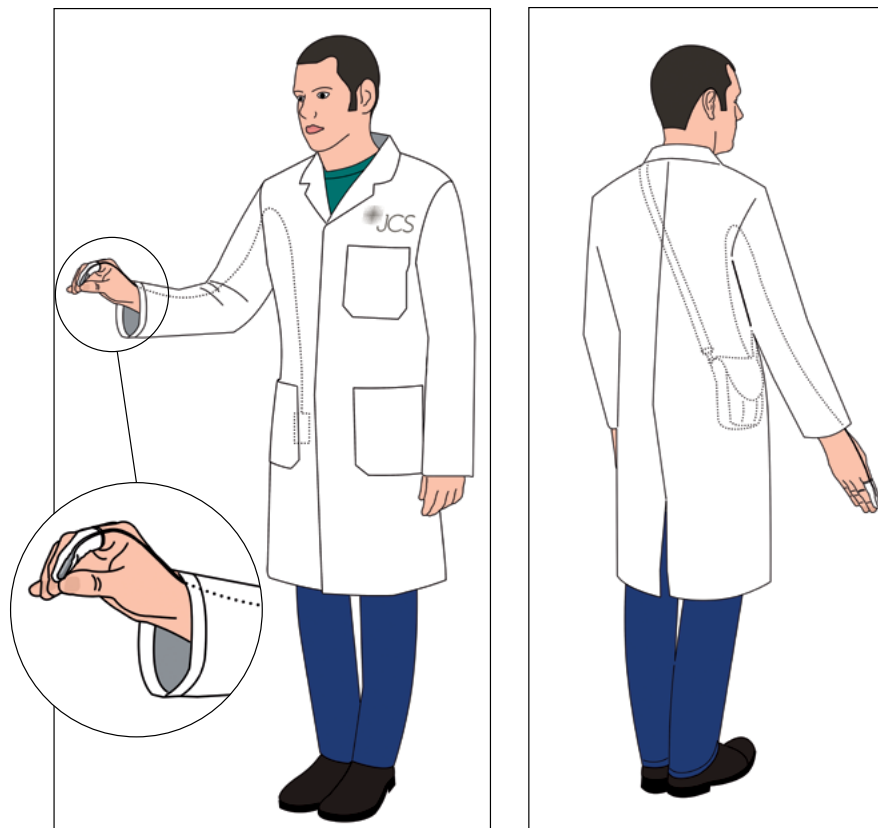


Figure 2 Wearing The Detector

3.2 Instrument Controls

Figure 3 shows a picture of the ED3 instrument, the top panel and the communications compartment.

Two front panel buttons enable operation of the display backlight, to move between the dose and dose rate function and for a soft on/off (standby) function.

There is an On/Off switch that is accessible via a latching flap in the base of the instrument.

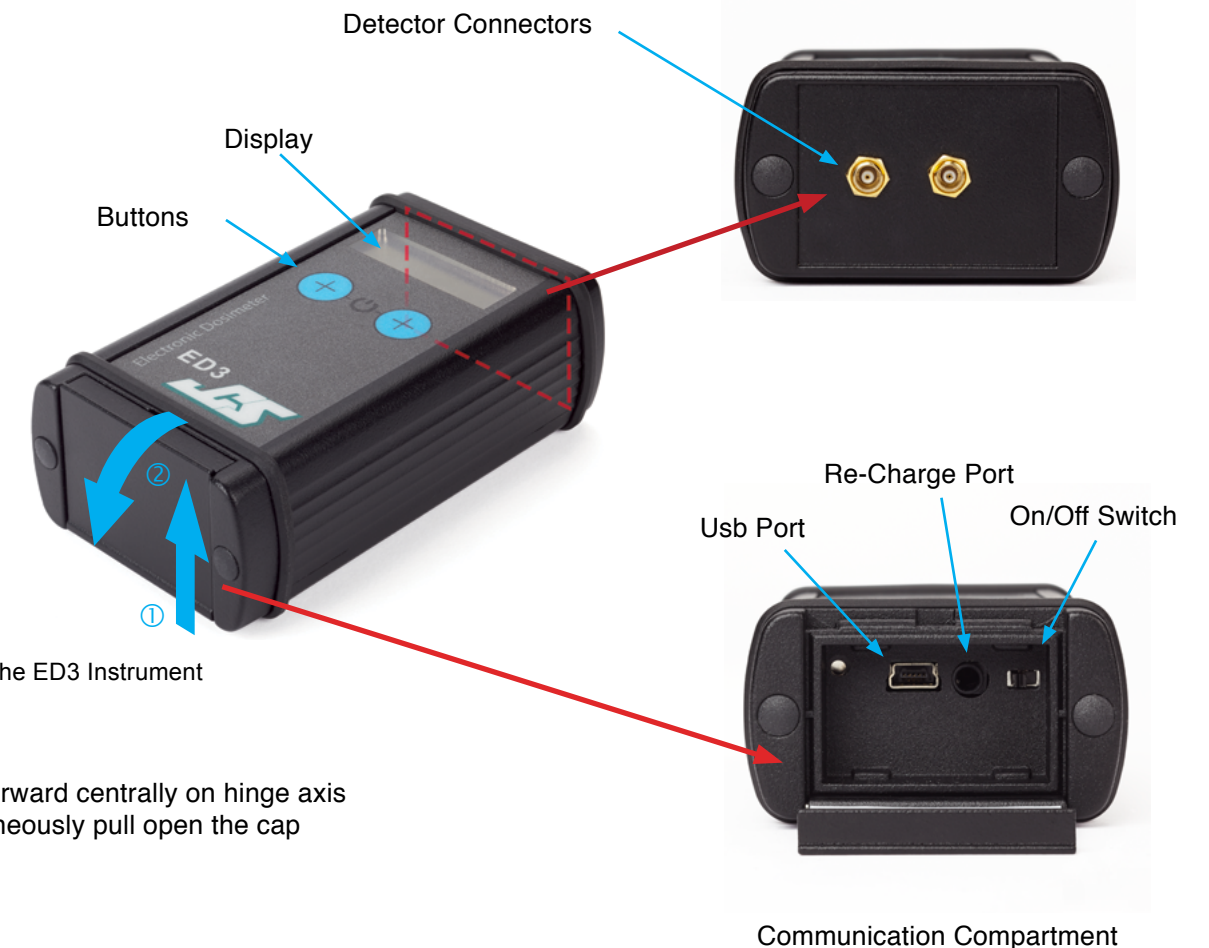
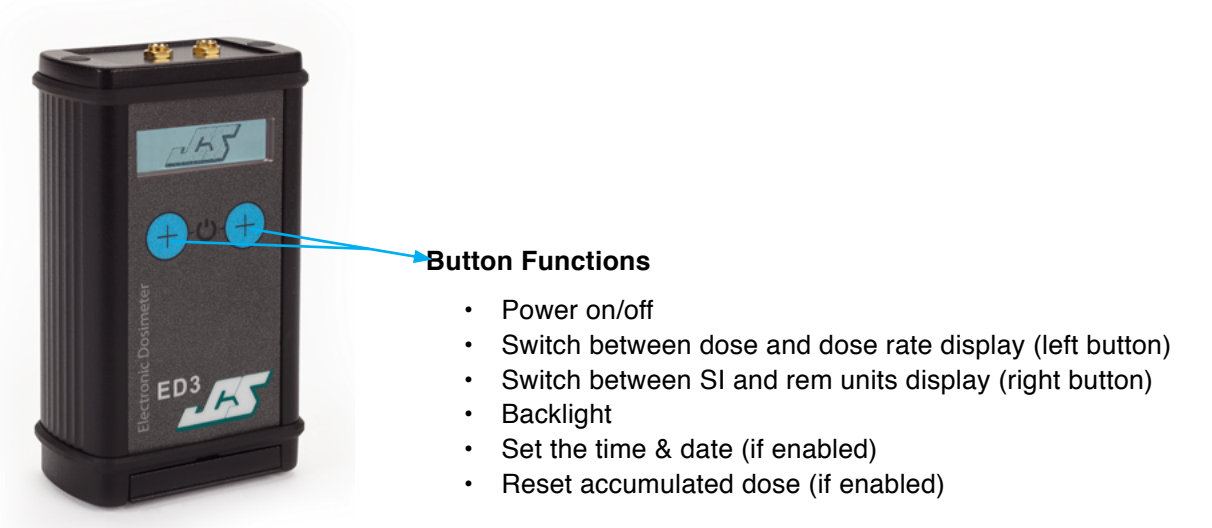


Figure 3 The ED3 Instrument

- To Open:
1. Press forward centrally on hinge axis
 2. Simultaneously pull open the cap

Communication Compartment

3.3 Batteries & Power

The ED3 is fitted with rechargeable batteries which are charged by an external battery charger. With the default ED3 setup the battery life should be around 80 hours after a full charge.

The battery charger is supplied with the ED3 and comes with various international adaptors.

Note the ED3 cannot be operated whilst being charged.

CAUTION:

- **ONLY THE SUPPLIED BATTERY CHARGER TYPE SHOULD BE USED.**
- **THE BATTERY IN THE ED3 IS NOT USER REPLACEABLE.**
- **RISK OF AN EXPLOSION IF BATTERIES ARE REPLACED BY AN INCORRECT TYPE.**
- **DISPOSE OF THE ED3 ACCORDING TO LOCAL RULES.**

When a low battery condition is reached low battery symbol is indicated accompanied by an audible alarm. The audible alarm is a short beep once every two seconds. **The ED3 will continue to operate for a further 8 hours.**

3.4 Charging The ED3 Instrument

Ensure that the ED3 is turned off, plug in the battery charger and connect it to the ED3 instrument (the battery charging socket is shown in Figure 10). When the battery charger's status light turns green, this shows that the battery is fully charged.

Full charging time for a depleted battery is approximately **2-3** hours.

To use the instrument, disconnect it from the battery charger, attach the detectors as necessary and switch the instrument on.

3.5 Switching The ED3 On And Off

The On/Off switch is located within the power/communications bay under the lid at the base of the ED3.

To Open the Power & Communications Bay:

1. Press centrally on hinge axis
2. Simultaneously pull open cap

See Section Figure 3 The ED3 Instrument on page 7

3.6 Putting The ED3 Into Standby Mode

To conserve battery life when not in use, put the unit into standby mode. In standby mode the unit is put to sleep and no data is monitored or logged.

The instrument is put into standby mode by pressing both buttons on the front of the ED3 for 2 seconds. After 2 seconds the unit will display a 'Standby' message and go into standby mode. The ED3 can be brought out of standby by pressing and holding both buttons. When the buttons are released the unit will come out of standby.

When not to be used for prolonged periods, switch the instrument off using the On/Off switch.

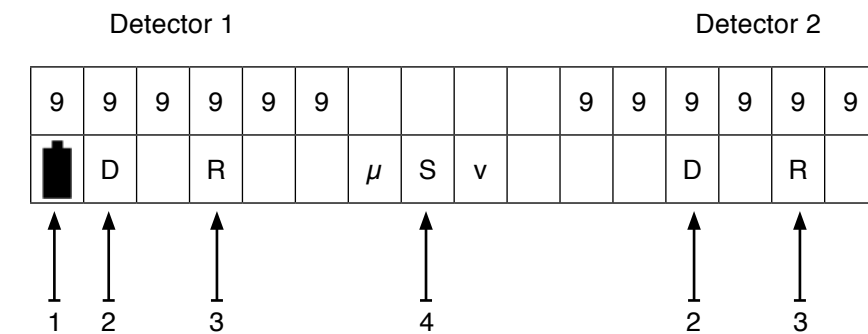
3.7 The Display

The display is a 16 x 2 character LCD that indicates the 2 channels of data and alarms. There is a back light function that operates when one of the two front panel switches is pressed.

The displayed dose range is from 0.0 to 999999 μSv , though practically the effective dose range can be considered to be from 1.0 μSv . At 674 μSv the dose display will only show whole units.

The displayed dose rate range is from 0.0 to 99999 $\mu\text{Sv h}^{-1}$. At 924 $\mu\text{Sv h}^{-1}$ the display drops the decimal place and only displays whole units.

3.8 Screen Display Modes



1	Battery Status	
2	Flashing	Dose Alarm
	Solid	Dose Overload
3	Flashing	Rate Alarm
	Solid	Rate Overload
4	Units:	
	Dose Display Mode	μSv or mrem
	Dose Rate Display	$\mu\text{Sv/h}$ or mrem/h

3.9 Configuring The ED3 For First Use

Before the ED3 can be used, the instrument must be first configured using the Data & Configuration Wizard software.

The Data & Configuration Wizard allows the user to:

- Set up the instrument, by setting the logging sample rate, alarm levels and other options
- Uploading logged data from the instrument (that needs to be kept) to the PC applications database
- Clearing any previous logged data from internal memory
- Reset the displayed accumulated dose

On running the Data & Configuration Wizard, the application will analyse the internal ED3 memory and advise the user if data is present that hasn't be uploaded, so that data is not overwritten or deleted without warning the user first.

See Section 6. The Data & Configuration Wizard on page 15

3.10 Viewing Data Collected By The ED3

Data collected by the ED3 instrument, must be transferred (uploaded) to the PC before the individual samples and trends of a session may be viewed. **See Section 6.5 Analysing Data Collected By The ED3 on page 16.**

Once the data has been uploaded into the Data Manager database, the session data can be viewed from the Data Manager application in either textual or graphical forms as shown in **See Figure 4** and **See Figure 5** below.

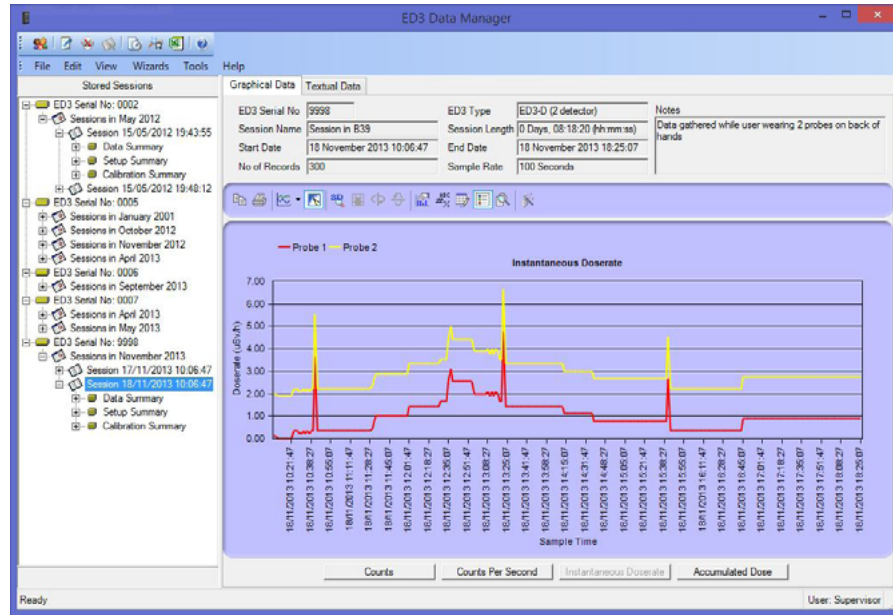


Figure 4 Data Manager Session Data Graphical View

Data from many sessions are organised in the application, grouped by ED3 serial number. Under each ED3 serial number heading, sessions are grouped by the month and year in which the data was recorded. Individual sessions are then listed for that month. Each session is named after the date and time of the first record logged in a session.

Clicking on an individual session name (in the tree view), causes the textual and graphical views to be updated with the information contained in that session. Under the session heading, further information about the session is displayed, including session summary information, calibration information and the instrument setup for that session.

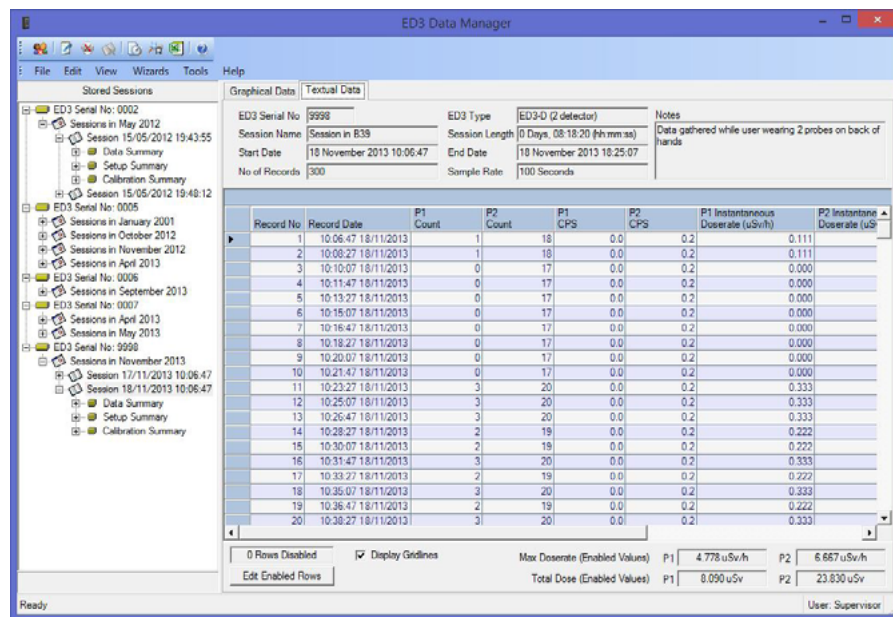


Figure 5 Data Manager Session Data Textual View

3.11 Exporting Session Data

Session data may be exported from the application using the Report Wizard. This exports the data to a comma separated values (CSV) file format, which is supported by Microsoft Excel™ and other spread sheet programs.

This enables the user to calculate further information based on the data collected, or only to take certain periods of data for further analysis.

To export the data from the session manager application, select the session in the tree view panel (so that the details are displayed in the graphical or textual data windows), and from the 'Wizards' menu, select 'Export Session data to a csv file'. Follow the prompts by the wizard to create a CSV file of the sessions data.

See Section 8. Report Wizard on page 40

3.12 Setting The Time On The ED3

The date and time can only be set on the ED3 via the instrument's front buttons after switching the unit on.

Allowing the user to change the ED3 date and time is a configurable item when the ED3 is initialised and may be disabled.

To enable this feature set the 'Allow user to set time' option in the ED3 Data & Configuration Wizard settings screen.

3.13 Clearing the Accumulated Dose Readings On The ED3

This can either be done via USB using the Data & Configuration Wizard or by the user, via the instrument's front panel buttons after switching the unit on.

Allowing the user to clear the accumulated dose is a configurable item when the ED3 is initialised and may be disabled.

To enable this feature set the 'Allow user to clear accum. dose' option in the ED3 Data & Configuration Wizard settings screen.

4. ED3 Software

The ED3 Application Interface software is responsible for configuring and managing the ED3 settings and internal memory and retrieval of logged data for storing and analysing on a PC.

The application is divided into three distinct parts, which are:

- The Data & Configuration Wizard
- The ED3 Data Manager
- The Report Wizard

4.1 Data & Configuration Wizard

The Data & Configuration Wizard is started from the Data Manager, and is responsible for:

- Initialisation, setup and configuration of the ED3 instrument
- Analysis of the ED3 instrument for logged session data
- Uploading of session data from the instrument to the Data Manager database
- Setting instrument calibration information

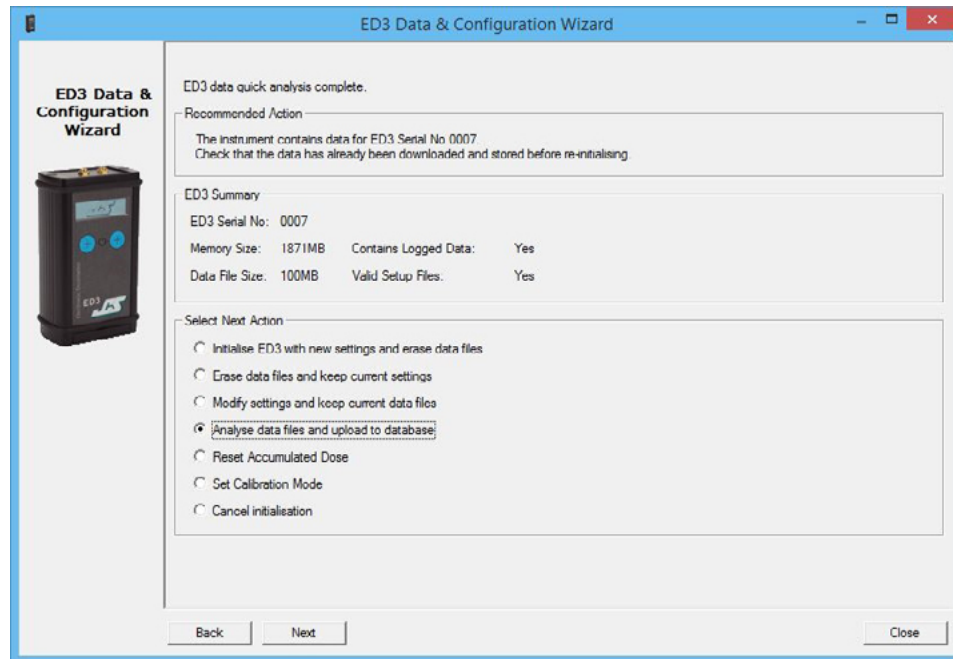


Figure 6 Data & Configuration Wizard

See Section 6. The Data & Configuration Wizard on page 15

4.2 ED3 Data Manager Application

The ED3 Data Manager is the application started when the user clicks on the ED3 icon.

It is responsible for:

- Organisation of data uploaded from multiple ED3's
- Display of previous session data and configuration set-ups
- Starting the Report Wizard application
- Starting the Data & Configuration Wizard application
- Storage of all uploaded session data

Image below shows a typical Data Manager window.

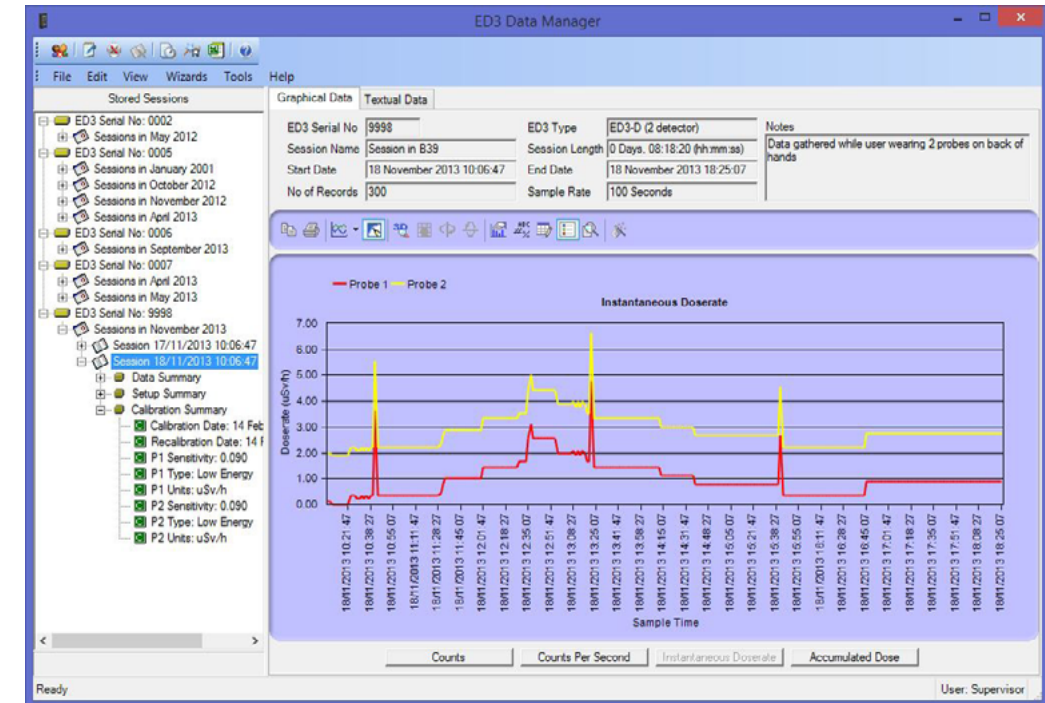


Figure 7 - Data Manager Application

See Section 7. The Data Manager Application on page 28

4.3 Report Wizard

The Report Wizard is started from the ED3 Data Manager application, and is responsible for producing session data reports which can be exported into spread sheet applications for further analysis.

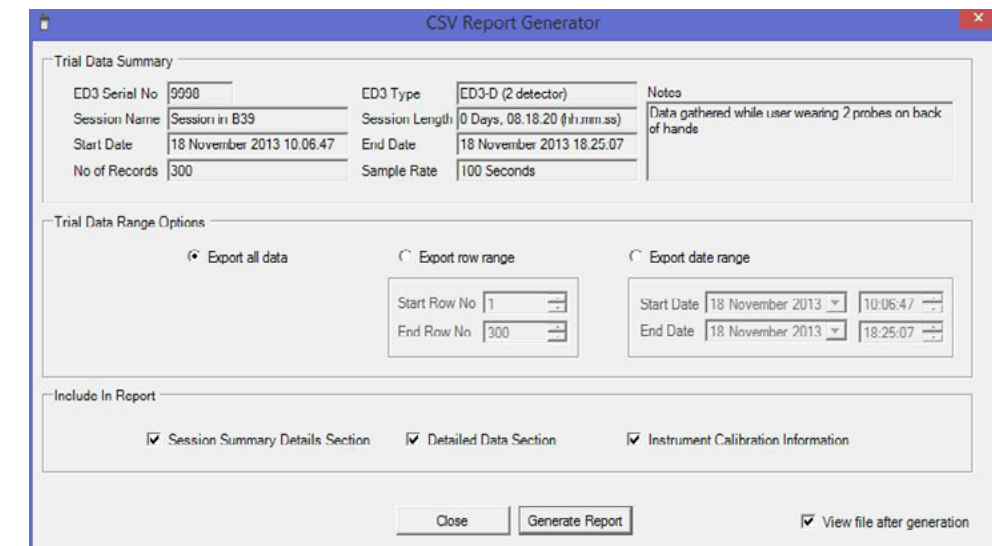


Figure 8 Report Wizard

See Section 8. Report Wizard on page 40

5. Software Installation

5.1 Software Installation Overview

This section describes the process to install the ED3 Data Manager software on a computer from the installation CD.

As part of the installation process, Supervisor Access to the ED3 Software will be required - **See Section 7.3 Supervisor Access & Passwords on page 28.**

5.2 Removing Previous Versions Of the Software

Before installing the ED3 software, it is advisable to remove any previous versions of the ED3 software. This can be achieved (on Windows 7 for example) by opening the Windows Control Panel and selecting Add or Remove Programs. Browse through the list of programs until you find the name "ED3", highlight the name and click the remove button. Windows will now remove the installed version of this application.

When the application is removed the database files of any uploaded data will remain on the computer so that they can be imported into a newer version of the application if required.

5.3 Saving/Restoring ED3 Data from Previous Installations

Session data from previous installations of the ED3 software application are not deleted when the application is removed and are automatically imported into any new versions database.

5.4 Automatic Software Installation

If the computer on which you are installing the software has Auto CD turned on, then after a few seconds of inserting the CD in the drive the Setup program to start automatically.

If the Setup program doesn't appear after 15 seconds (assuming that Auto CD start is turned off), open My Computer and click on the CD drive icon. Locate the file 'Setup' and double click on it to start the installation.

Upon starting, the program will check for any necessary support files required for the application (Microsoft dotNet framework V2 and Windows Installer 3.1) and install them automatically before the setup wizard is displayed.

Follow the on screen prompts in the setup wizard to complete the installation.

5.5 Starting The ED3 Data Manager Software

To run the ED3 Data Manager software, double click the desktop icon ED3 Data Manager, or from the Start menu, select Start-All Programs – JCS – ED3 – ED3 Data Manager.

5.6 System Software Requirements

The ED3 software program is designed to be run on the Microsoft Windows operating system using Microsoft's dotNet Framework v2.

It is recommended that the software should be run on Windows 7,8 or 10, however the software can be installed on a Windows XP PC. The software will run on any computer hardware that supports the Windows XP, 7,8 or 10 operating systems.

6. The Data & Configuration Wizard

6.1 Before Starting The Wizard

Before starting the Data & Configuration Wizard, connect the instrument to the PC using a USB A to USB mini B cable. The ED3 instrument will switch to USB drive mode and be recognised as a removable drive by the PC (assigned a letter as a removable drive). The ED3 is now ready to be used by the Data & Configuration Wizard.

WARNING: DO NOT DELETE FILES DIRECTLY FROM THE ED3 AS A REMOVABLE DRIVE AS THIS MAY CAUSE THE ED3 TO BECOME UNUSABLE AND REQUIRE RECONFIGURATION!

6.2 Data & Configuration Wizard Overview

The Data & Configuration Wizard is started from the Data Manager, and is responsible for:

- Initialisation, setup and configuration of the ED3 instrument
- Analysis of the ED3 instrument for logged session data
- Uploading of session data from the instrument to the Data Manager database
- Setting instrument calibration information

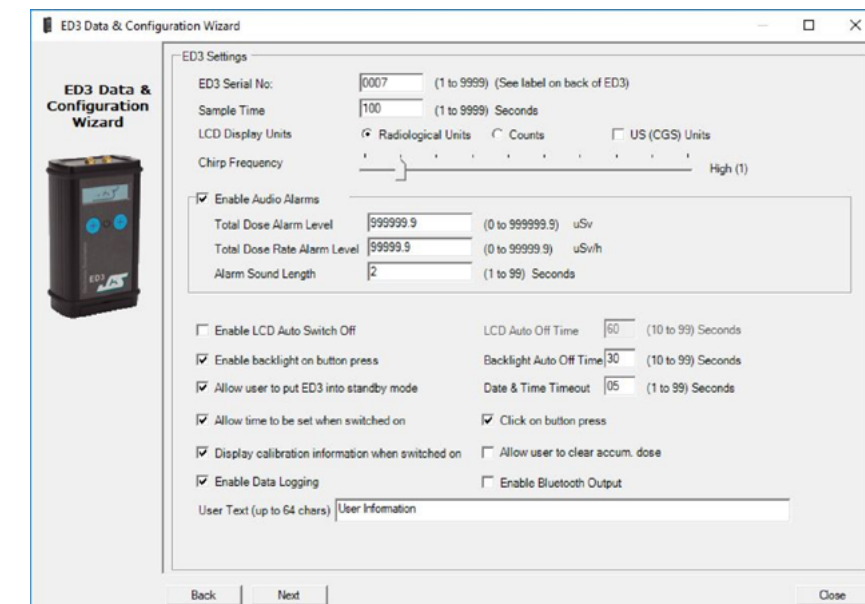


Figure 9 Data & Configuration Wizard Page

6.3 Starting The Ed3 Data & Configuration Wizard

To start the Data & Configuration Wizard, start the main ED3 Data Manager, and then from the main menu, select 'Wizards', 'Data & Configuration Wizard'.

Access to the Data & Configuration Wizard requires Supervisor Access. **See Section 7.3 Supervisor Access & Passwords on page 28**

6.4 The Data & Configuration Wizard Steps

The wizard takes the user through a number of predefined steps when an ED3 is connected to the PC via a USB cable. The path taken through the wizard is determined after analysis of the data within the instrument and the action the user wants to perform.

After the instrument has undergone a quick analysis, the wizard will advise the user of the current status, and recommend the action to take. The status of the instrument determines which options are available to the user, and so some options may be greyed out. The user may override the recommended action of the wizard to perform a custom action if required, and will be alerted if they are about to erase valid data from the instrument.

The steps which are available in the wizard are as follows:

- USB Drive Selection Screen
- Quick Analysis Screen
- Change Settings Screen
- Initialise Data File Screen
- Generate Instrument Files Screen
- Reset Accumulated Dose Screen
- Set Calibration Mode Screen
- Data Analysis and Upload Screen

The first three screens are always shown in the following order when the Data and Configuration Wizard is started:

- Welcome Screen
- ED3 USB Drive Letter Selection Screen
- Quick Analysis Screen

The order in which the following screens appear (if at all) is dependent on the action chosen in the Quick Analysis screen.

See Section 6.8 Quick Analysis Screen on page 18

6.5 Analysing Data Collected By The ED3

All the data logged by the ED3 is stored internally to memory and is logged into separate sessions each time the ED3 instrument is switched on or taken out of standby.

The sessions stored in the ED3 can be viewed using the Data & Configuration Wizard software.

If the ED3 contains logged data, the wizard will identify this and recommend that the instruments data files be analysed. The analysis screen will show all the data sessions contained within the instrument and whether they have already been uploaded into the session manager applications database.

Individual sessions may then be uploaded to the session manager database, so that the data collected may be viewed in the session manager application (once the wizard has been closed).

Data uploaded to the session manager database is stored permanently on the PC. (i.e. it may be erased from the instrument once it has been uploaded to the PC).

Following uploading of data from the instrument, it is worth running the Data & Configuration Wizard again so that the instrument can be re-initialised with a new empty data file (i.e. to remove all previous data sessions).

6.6 Welcome Screen

The welcome screen is the first screen shown when the Data Card Wizard is started.

If not done so already, connect the ED3 to the PC via a USB cable.

The ED3 instrument will switch to USB drive mode and be assigned a drive letter by Windows.

Once the ED3 is in USB drive mode, start the Data & Configuration wizard, the Welcome screen will appear (**See Figure 10**).

Click the 'Next' button. This will take you to the ED3 USB Drive Selection screen.

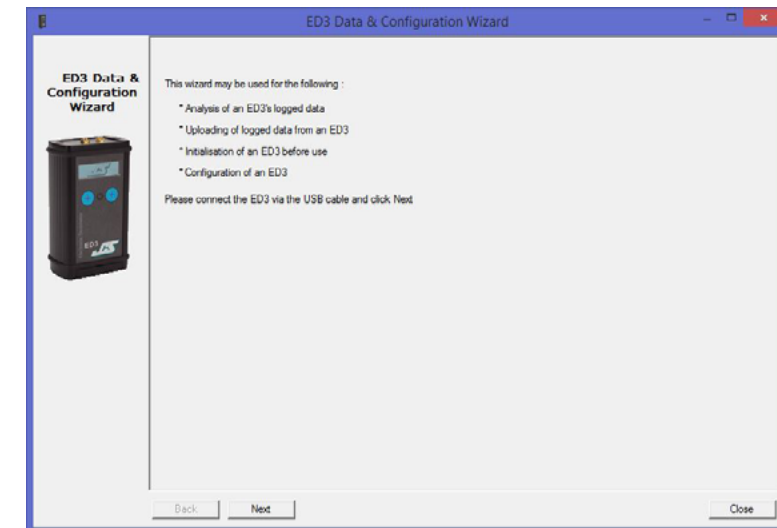


Figure 10 Data & Configuration Wizard Welcome Screen

6.7 USB Drive Selection Screen

The USB drive selection screen displays the list of removable drives that are connected to the PC.

Select the drive letter which represents the ED3 instrument from the drop down list.

Note: Do not select a non ED3 USB drive or data on the USB device may be lost.

If the ED3 instrument is not connected or switched on, then connect them and click the 'Refresh Drive List' button.

If no instrument is found, the wizard will not allow you to go to the next stage. Once the ED3 drive has been selected, click the 'Next' button. This will take you to the Quick Analysis screen.

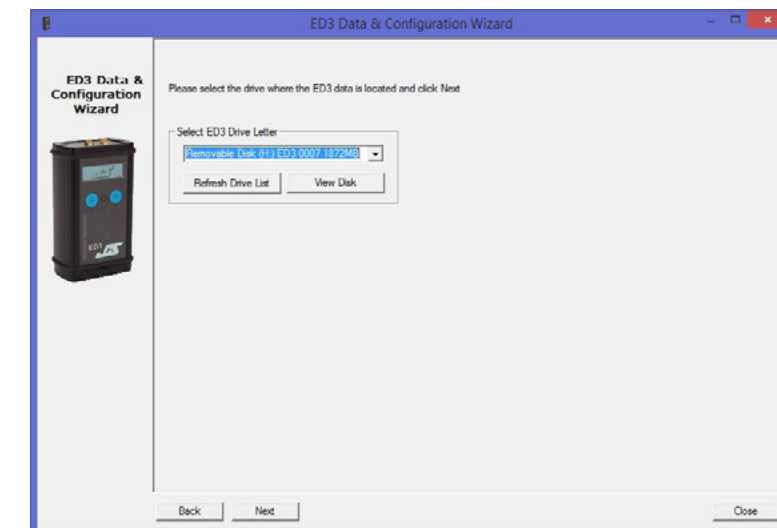


Figure 11 Data & Configuration Wizard USB Drive Selection Screen

6.8 Quick Analysis Screen

The quick analysis screen displays the recommended action to perform after the ED3 has been scanned. The analysis is based on the state of the data files present on the instrument.

The result of the scan, determines which options are available and the recommended action for the next step. Although a specific action is recommended, the user may select a different action if required.

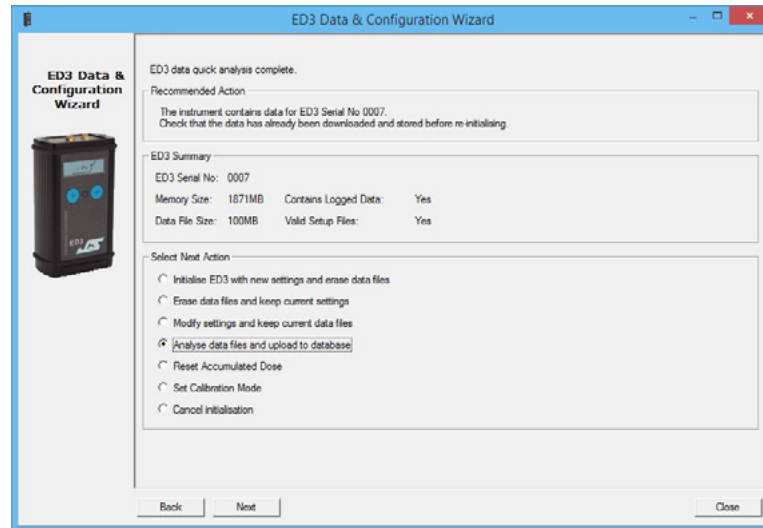


Figure 12 Data & Configuration Wizard ED3 Quick Analysis Results Screen

The screen displayed when the 'Next' button is pressed is dependent on which of the seven 'Next Action' items are selected.

The seven actions are:

- Initialise ED3 with new settings and erase data files
- Erase data files and keep current settings
- Modify settings and keep current data files
- Analyse data files and upload to database
- Reset Accumulated Dose
- Set calibration mode for instrument calibration
- Cancel initialisation

6.9 Quick Analysis: Create New Settings & Erase Data Files

This option will allow the user to create completely new settings for an ED3 instrument and erase all the logged data from the ED3 Memory.

The wizard steps following this choice are:

- Change Settings Screen
- Initialise Data File Screen
- Generate Instrument Files Screen
- Finish Screen

6.10 Quick Analysis: Erase data files & keep current settings

This option will allow the user to keep the current settings for an ED3 instrument and erase all the logged data from the instrument.

The wizard steps following this choice are:

- Initialise Data File Screen
- Generate Instrument Files Screen
- Finish Screen

6.11 Quick Analysis: Modify Settings & Keep Current Data Files

This option will allow the user to create completely new settings for an ED3 instrument and keep the currently logged data in the ED3 memory.

This will keep the accumulated dose already acquired for the instrument.

The wizard steps following this choice are:

- Change Settings Screen
- Generate Instrument Files Screen
- Finish Screen

6.12 Quick Analysis: Analyse Data Files & Upload To Database

This option will allow the user to look at the number of sets of session data on the ED3 and give the option of uploading this data to the Data Manager database.

Uploading the data to the Data Manager database does not erase the data from the ED3. Once data has been uploaded, it is up to the user to run the Data Card Wizard again and reinitialise the ED3.

The wizard steps following this choice are:

- Data Analysis and Upload Screen
- Finish Screen

6.13 Quick Analysis: Reset Accumulated Dose Screen

This option will allow the user to reset the accumulated dose in the instrument.

6.14 Quick Analysis: Set Calibration Mode Screen

This option will prepare the instrument for calibration, by setting the instrument to switch to calibration mode on next power up. Calibration mode disables the normal functionality of the instrument and displays raw counts from the detectors.

The calibrate option is password protected with Calibrator Access and the Calibrator password is required.

This password has been supplied separately with the original ED3 instrument delivery. This password is held by the manufacturer of the instrument and cannot be changed by the user. Please contact JCS or your local distributor for more information.

The wizard steps following this choice are:

- Set Calibration Mode Screen
- Initialise Data Files Screen
- Generate Card Files Screen
- Finish Screen

6.15 Quick Analysis: Cancel Initialisation

This option cancels all action on the ED3 and leaves the ED3 in an unchanged state.

The wizard step following this choice is:

- Finish Screen

6.16 Changing The ED3 Settings

To change the settings on the ED3 requires that instruments settings be reinitialised. This is achieved using the Data & Configuration Wizard. The settings may be changed without re-initialising the data file (i.e without erasing any previous log).

See Section 6.9 Quick Analysis: Create New Settings & Erase Data Files on page 18

6.17 Change Settings Screen

The change settings screen allows the user to customise the way the ED3 instrument works. The following parameters are available for customisation:

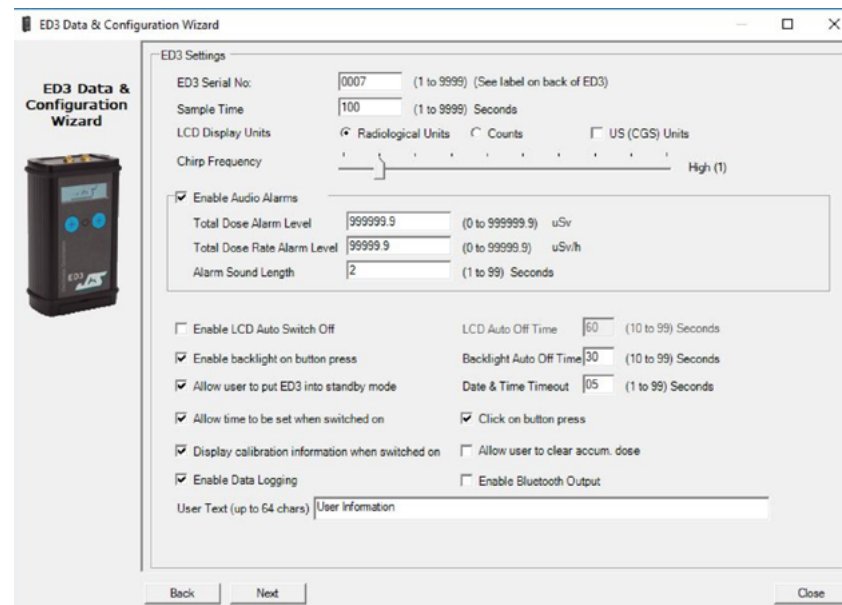


Figure 13 Data & Configuration Wizard Settings Screen

Serial No

The serial number typed in this box, needs to match the serial number on the back of the ED3 instrument. If the incorrect serial number is entered, the error message “Wrong Serial No.” is displayed. This is to check that the correct instrument data is being used on a site where multiple instruments have been deployed.

Sample Time

This sets how often the instrument saves the measured value to the data card in seconds. (Note this doesn't affect the response of alarms or the speed at which readings are taken (approx. 16 times per second).

LCD Display Units

This sets the measurement units displayed on the ED3 LCD screen and can be either SI - Sieverts (Sv), Counts or rem. The counts display is mainly for use during calibration.

Chirp Frequency

The chirp frequency value determines how often an audible beep is emitted when the ED3 measured counts go above a pre-set value. The values range from Off to Low to Medium to High. At a High value (1) a 'chirp' will be emitted every time the count measured changes by 2.

Note: The chirp function is independent of the alarm settings.

Enable Audio Alarms

This enables the audio alarms associated with dose and dose rate. **See Section 9. Audio Alarms on page 42.**

Total Dose Alarm Level

When the accumulated dose exceeds this value in this box, the audible alert will be sounded and 'Alarm' flashed on the LCD screen. Once this alarm has occurred and has been accepted, it will not sound again until the accumulated dose value is reset.

Total Dose Rate Alarm Level

When the instantaneous Dose Rate exceeds this value in this box, the audible alert will be sounded and 'Alarm' flashed on the LCD screen. The alarm will deactivate after the time specified in the setup file when the rate subsides below the alarm level. **See Section 9. Audio Alarms on page 42.**

Enable LCD Auto Switch Off

Selecting this option, enables the LCD screen to turn off after the number of seconds defined in the LCD Auto Off Time, since the buttons on the ED3 were last pressed.

LCD Auto Off Time

This specifies the time in seconds that the LCD screen will stay on after the last button press.

Enable Back-light on Button Press

Selecting this option enables the back-light to turn on when the user presses a button on the ED3.

Back-light Auto Off Time

This specifies the time in seconds that the back-light will stay on after the last button press. This also determines the time for which Dose rate is displayed when selected.

Date & Time Time-out

This specifies the time in seconds that the date and time will be displayed upon switch the ED3 on.

Allow User To Put ED3 into Standby Mode

Selecting this option will allow the user to put the ED3 into standby mode by pressing and holding both ED3 buttons.

Allow Time To Be Set When Switched On

Selecting this option allows the user to set the time on the ED3 instrument when it is powered on. This is currently the only supported method for changing the time on the ED3.

Click On Button Press

Selecting this option causes the ED3 to emit a beep when the user presses one of the buttons.

Display Calibration Information When Switched On

Selecting this option displays the calibration and re-calibration dates when the instrument is first powered on.

Allow user to clear accum. dose

Selecting this option allows the user to clear the accumulated dose values stored in memory on the ED3 instrument when it is powered on.

User Text

This input box allows the user to store up 64 characters of text (All upper/lower case, numbers and special characters are accepted) to be stored in the instrument, this will be stored with the data when uploaded into the Data Manager database.

Clicking “Next” will take you to the next stage of the wizard. This will depend on the action chosen in the Quick Analysis screen.

6.18 Initialise Data File Screen

The initialise data files screen defines the size of the data file to be used on the ED3 data card.

The size of this file determines how much session data can be stored in the instrument.

By default a 100MB file is specified, as this gives the best compromise between the amount of data that can be logged to the card and the time it takes to create the file. A 100MB file will take around 60 seconds to create in the next stage of the wizard.

The amount of data that can be stored in a file is determined by the sample rate used, the instrument stores 2 records per kilobyte. A summary of example file sizes and the number of hours of data that can be stored are displayed on the Data File screen.

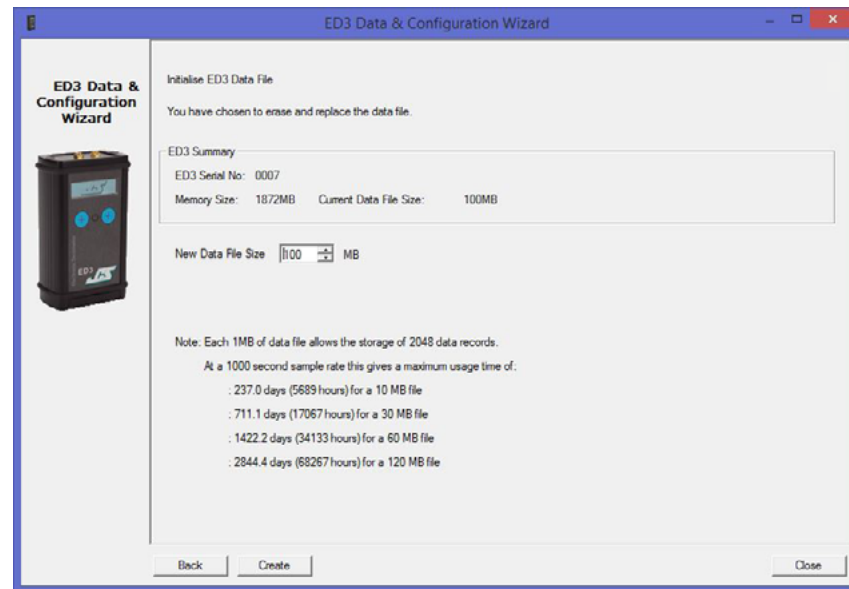


Figure 14 Data & Configuration Data File Screen

Clicking “Create” will take you to the next stage of the wizard, which will be the Generate Instrument Files screen.

6.19 Generate Instrument Files Screen

The generate instrument files screen creates the files with the selected options from the previous screens. This can include a setup file, a calibration file and a data file.

WARNING: DO NOT DELETE THESE FILES AS THIS MAY REMOVE THE CALIBRATION FROM THE ED3!

Note: Even though a calibration file is created, this does not mean that the ED3 will be calibrated or set to calibration mode. This is because a dummy calibration file containing the instrument’s serial number must be present for the instrument to work.

If the data files have been erased and a new one is to be created, the operation may take some time.

When the operation is complete a success or failure message will be displayed.

Clicking “Next” will take you to the Finish screen of the wizard.

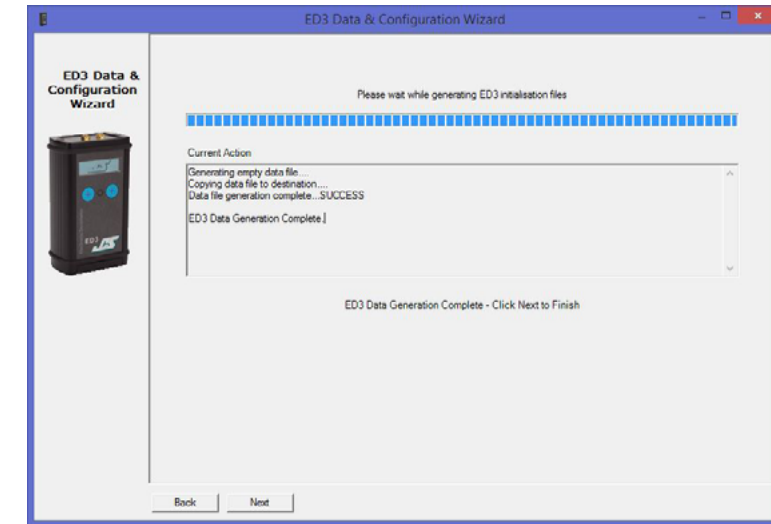


Figure 15 Data & Configuration Wizard File Generation Screen

6.20 Set Calibration Mode Screen

The Set Calibration Mode screen allows an authorised user to set the instrument into Calibration Mode (upon next power on).

Note: When set to Calibration mode normal functionality of the instrument is disabled and the instrument displays raw counts from the detectors.

To enable calibration mode, click the ‘Enable Calibration’ check box. This will request that the calibration password is entered. This password is known only by the Supervisor or Calibration Authority and has been supplied separately with the original ED3 instrument delivery. Please contact JCS or your distributor for more information.

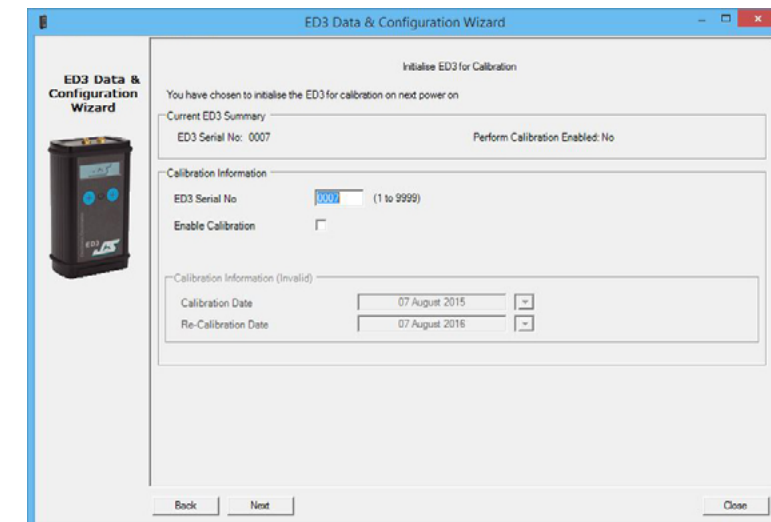


Figure 16 Data & Configuration Set Calibration Mode Screen

Once authorised this enables the ‘Reset Accumulated Dose’ check box and calibration date selectors.

Clicking “Next” will take you to the Generate Instrument Files screen of the wizard. **See Figure 20 & See Figure 21 on page 26**

Note: After calibration mode has been used with the instrument, the calibrator will be required to re-run the wizard to set the ED3 instrument back to normal mode.

6.21 Data Analysis & Upload Screen

The data analysis screen shows the sessions contained in the ED3 instrument and allows the user to upload the selected data.

While the Wizard is reading the ED3 memory, the upload buttons and display are greyed out, and an indication of progress is shown at the top of the screen.

After reading the ED3 memory, the sessions contained on the ED3 are displayed in the list view, along with an indication of whether this data has already been uploaded into the Data Manager database.

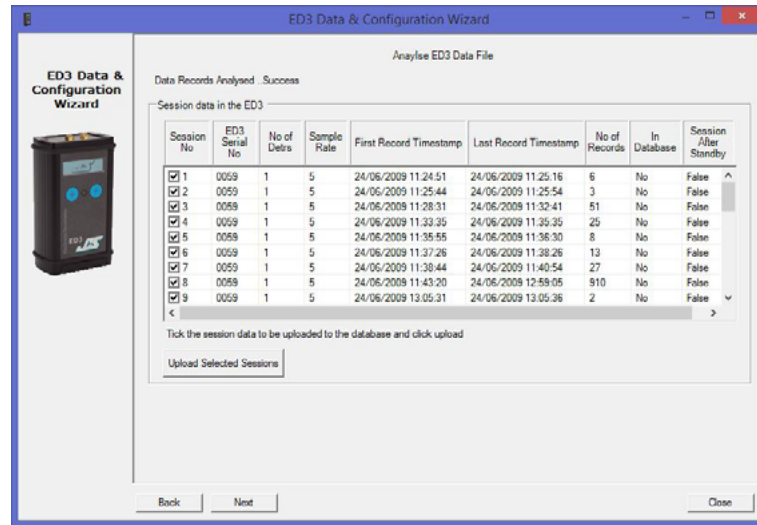


Figure 17 Data & Configuration Analysis and Upload Screen

To select a session for uploading, ensure that the Session No is selected in the list view and click the Upload Selected Sessions button. By default all sessions not currently in the Data Manager database are selected.

Uploading of data does not erase the data from the ED3, it is left to the user to run the Data Card Wizard again and to erase the data by initialising the ED3 (erasing all data sessions).

The uploading of data may take a few minutes, depending on the size of the data to be uploaded. An indication of the progress is displayed next to the Upload button. After the upload is complete the list view column 'In Database' will be updated to display which sessions are now in the database (See Figure 18 on page 24).

Clicking "Next" will take you to the Final stage of the wizard.

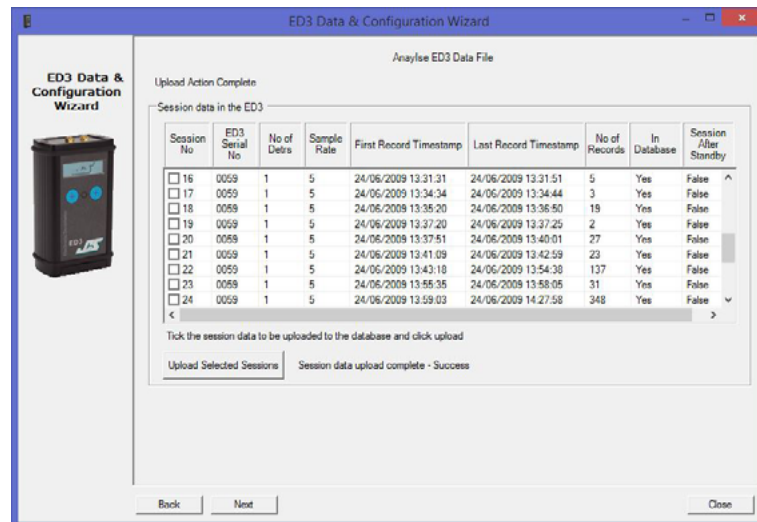


Figure 18 Data & Configuration Analysis and Upload Screen – After Upload

6.22 Resetting Accumulated Dose

The accumulated dose value displayed on the ED3 displays the total dose accumulated by the instrument since the total was last reset.

To reset the Accumulated Dose, start the ED3 Data & Configuration Wizard and select 'Reset Accumulated Dose' when presented with the instrument options.

If the option has been selected in the Data and Configuration wizard, then the accumulated dose may also be reset using the pushbuttons when the instrument is turned on.

NOTE: The accumulated dose should be reset using one of the above methods when the probe type (D1 or D4) is changed. If this is not done, then the reading may be invalid.

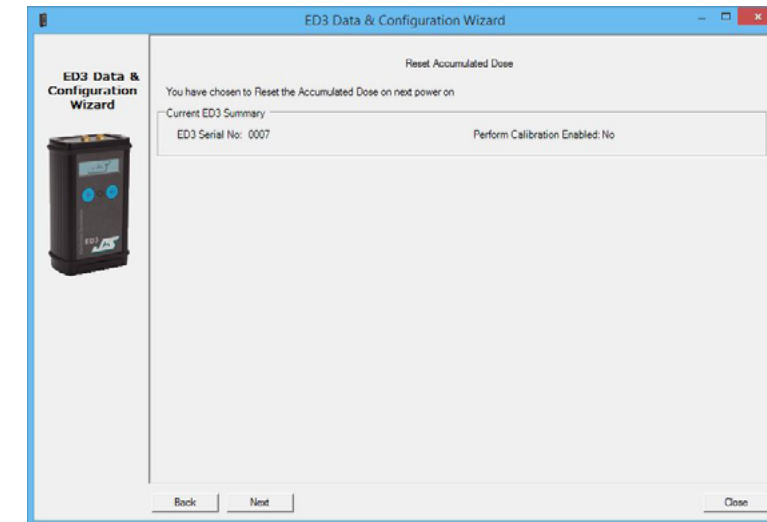


Figure 19 Data & Configuration Generation Complete Screen

Click 'Next' to confirm

Once the accumulated dose has been reset with confirmation as follows "ED3 Data Generation Complete".

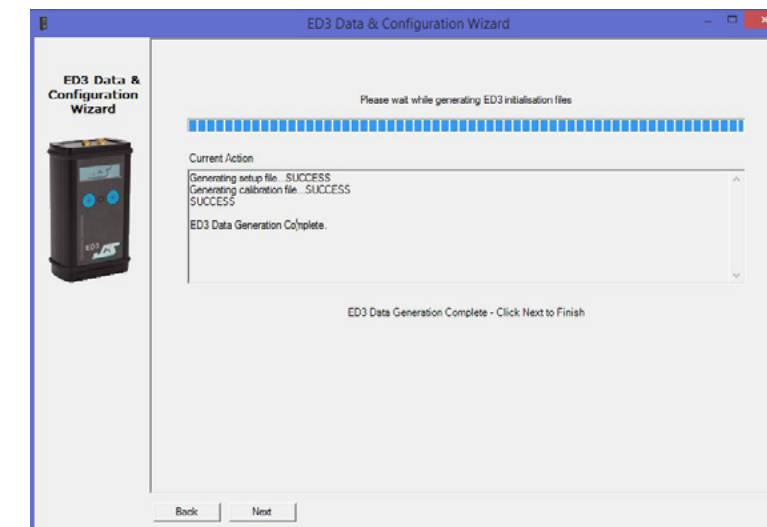


Figure 20 Data & Configuration Generation Complete Screen

Click next to take you to the Action Summary screen, and click “Finish”.

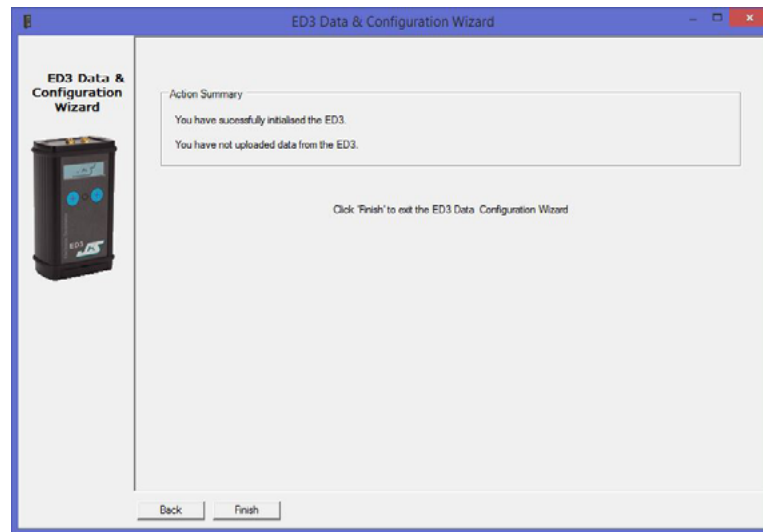


Figure 21 Data & Configuration Action Summary Screen

Upon clicking “Finish” the Action Summary Screen you can now remove the USB connector from the ED3 instrument.

The ED3 instrument will now display the following messages in order:

- USB Drive Mode
- (Remove the USB Cable from the ED3)
- Screen Flashes twice to show “reboot”
- JCS ED3 Ver.2.5 (or later)
- Calibration Mode
- Accumulated Dose Reset
- Screen Flashes twice to show “reboot”
- JCS ED3 Ver.2.5 (or later) to switch on

In ED3 Firmware Ver.2.5 (or later) after the accumulated dose has been reset, the instrument will then revert back to standard mode (leaving calibrator mode).

6.23 Finish Screen

When the instrument has been successfully initialised or data uploaded a finish screen will be displayed with a summary of completed actions, similar to that shown below.

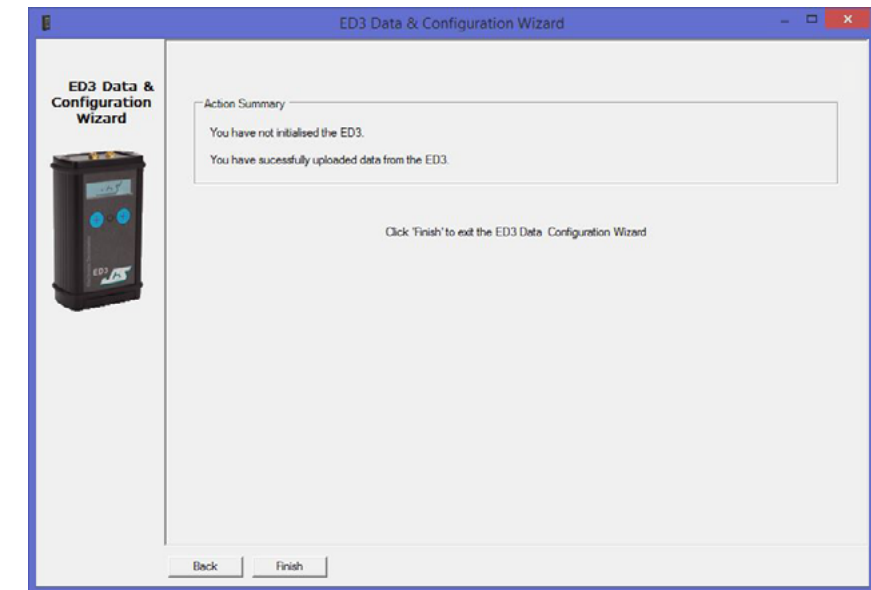


Figure 22 Data & Configuration Wizard Finish Screen

On clicking the Finish button the Wizard will close and the user will be returned to the Data Manager.

7. The Data Manager Application

7.1 ED3 Data Manager Application Overview

The Data Manager is the program started when the user clicks on the ED3 Data Manager icon. It is responsible for:

- Organisation of session data uploaded from multiple ED3's
- Display of previous session data and configuration setup
- Starting the Report Wizard
- Starting the Data & Configuration Wizard application

7.2 Starting The ED3 Data Manager Application

To run the ED3 software, double click the desktop icon ED3 Manager, or from the Start menu, select Start-All Programs – JCS – ED3 – ED3 Data Manager.

This starts the Data Manager application which allows the user to view the data sessions previously uploaded to the applications database.

7.3 Supervisor Access & Passwords

Certain parts of the ED3 Data Manager software are password protected.

Three levels of user access are defined in the application, which are

- User
- Supervisor
- Calibrator

User Access

Any user may view session data and create reports without entering a password. However a normal user cannot use the Data & Configuration Wizard or edit or delete session data from the Session Manager database.

Supervisor Access

Any operation involving the initialising, configuring or deleting data from an ED3 instrument or editing of session data in the Session Manager database is password protected and requires the Supervisor password.

The Supervisor password on first installation is 'ed3'.

It is recommended that this password is changed on the first run of the application. The password can be changed from the Data Manager using the following procedure.

From the main menu, select 'Login as Supervisor' and enter the password.

From the File menu select 'Supervisor Settings', 'Change Password'. You will be required to enter the password again to confirm access, and then the change password dialogue will be displayed.

Enter the new password and confirm your selection.

Note: The password can consist of any combination of upper/lower case letters, numbers & special characters and be up to 16 characters in length.

The new password has now been set for the Supervisor Access.

If you forget the Supervisor password, please contact JCS or your local distributor for instructions.

Calibrator Access

To calibrate an ED3 the Calibrator password is required. This has been supplied separately with the original ED3 instrument delivery. This password is held by the manufacturer of the instrument and cannot be changed by the user. Please contact JCS or your distributor for more information.

Auto Logout Timer

If the application is not used for a pre-set period, the Supervisor access will automatically log off. By default this time out is set at 15 minutes. This cannot be disabled. The maximum number of minutes allowed for the Supervisor Auto Logout Timer is 999999. If you try to enter a higher number, a warning message is displayed telling the operator to enter a number in the range 0 to 999999 minutes.

7.4 Data Manager Main Window

The data manager application allows the user to view data that has been stored in the session database. Session data is uploaded to the data manager from the instrument via a USB connection using the Data & Configuration Wizard.

The data manager window consists of three parts, which are:

- the list of stored sessions section
- the session details summary section
- the session data sections (textual and graphical)

The session manager displays the data from all sessions uploaded to the PC, organised by ED3 serial number. Under each ED3 serial number heading, sessions are grouped by the month and year in which the data was recorded. Individual sessions are then listed for that month. Each session is named after the date and time of the first record logged in a session.

Clicking on an individual session name causes the textual and graphical views to be updated with the information contained in that session. Under the session heading, further information about the session is displayed, including session summary information, calibration information and the instrument setup for that session.

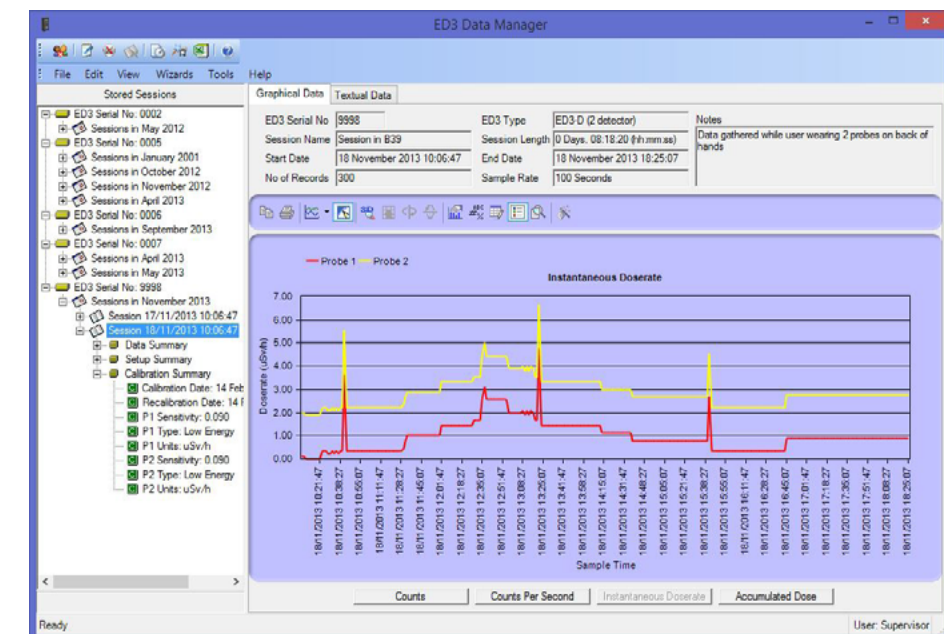


Figure 23 shows the applications data manager main window.

7.5 Stored Sessions Section

The stored session section lists all sessions that have been uploaded to the data manager database. The sessions are grouped by ED3 serial number and listed chronologically.

Clicking on one of the session names in the list causes the session details data section to be filled in with the collected information.

Clicking on the '+' sign next to a session name, or clicking on the session title, causes the session data and configuration for the session to be displayed.

Under each session name in the list, there are three further subcategories, which detail the session data summary, the ED3 settings used for the session and the calibration information.

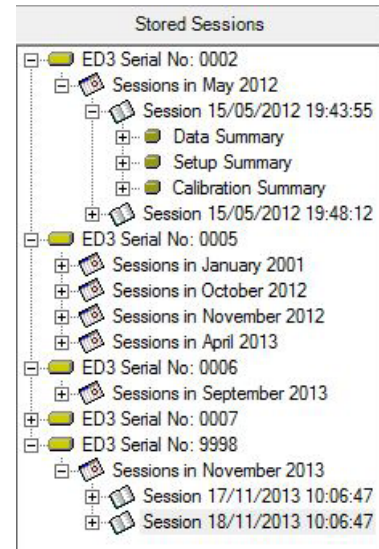


Figure 24 Stored Session View

7.6 Session Details Section

The session details section displays summary data for the selected session as shown below.

Graphical Data		Textual Data		Notes
ED3 Serial No	9998	ED3 Type	ED3-D (2 detector)	Data gathered while user wearing 2 probes on back of hands
Session Name	Session in 839	Session Length	0 Days, 08:18:20 (hh:mm:ss)	
Start Date	18 November 2013 10:06:47	End Date	18 November 2013 18:26:07	
No of Records	300	Sample Rate	100 Seconds	

Figure 25 Session Details View

7.7 Session Data Section

The session data section displays the data collected during a session in one of two formats:

- Textual View
- Graphical View

The graphical view shows a graph of all the session data.

The textual view shows the values that were collected during a session.

If the session data is from two detectors (P1 & P2), then two graph lines will be displayed, one for each detector. The textual view will also show columns for P1 and P2 values. If data is only for one detector, then the P2 columns will be hidden.

Note: Both the values used for the graph and the textual view may be enabled or disabled for display in the graph or for inclusion in the accumulated dose value. This is to enable spurious results to be excluded from any results. The enabling and disabling function is under supervisor control on the textual view.

By default all values are enabled after being uploaded using the Data & Configuration Wizard.

7.8 Textual View

The textual view displays the data in a tabular format as shown below (for a single detector).

Record No	Record Date	P1 Count	P1 CPS	P1 Instantaneous Doserate (uSv/h)	P1 Accumulated Dose (uSv)	Enabled
1	10:06:47 18/11/2013	1	0.0	0.111	0.003	<input checked="" type="checkbox"/>
2	10:08:27 18/11/2013	1	0.0	0.111	0.006	<input checked="" type="checkbox"/>
3	10:10:07 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
4	10:11:47 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
5	10:13:27 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
6	10:15:07 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
7	10:16:47 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
8	10:18:27 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
9	10:20:07 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
10	10:21:47 18/11/2013	0	0.0	0.000	0.006	<input checked="" type="checkbox"/>
11	10:23:27 18/11/2013	3	0.0	0.333	0.015	<input checked="" type="checkbox"/>
12	10:25:07 18/11/2013	3	0.0	0.333	0.025	<input checked="" type="checkbox"/>

0 Rows Disabled Display Gridlines Max Doserate (Enabled Values) P1 | 4.778 uSv/h
 Edit Enabled Rows Total Dose (Enabled Values) P1 | 8.090 uSv

Figure 26 Session Data Textual View (1 Detector)

The textual view displays the records collected during a session in the order they were collected (i.e. sorted by Record No Ascending).

The columns displayed are:

- **Record No:** a unique number to identify the record
- **Record Date:** the time and date the sample was taken
- **P1 Count:** the Count read at the sample time
- **P1 CPS:** the counts per second at the sample time (the counts / the sample rate)
- **P1 Instantaneous Dose rate HP(0.07):** the instantaneous Dose rate, calculated from the CPS and the detectors sensitivity. The value displayed is in $\mu\text{Sv/h}$
- **P1 Accumulated Dose rate HP(0.07):** the accumulated Dose rate from the beginning of the session for all enabled records
- **Enabled:** whether the record is included in the Accumulated Dose, Maximum Dose rate and Total Dose calculations

In addition to the tabular data, the textual view also displays the Maximum Dose Rate and Total Accumulated Dose for all the enabled session data records at the bottom right of the window.

If two detector detectors were used during the session the above data will also be available for the second detector. The figure below shows the textual window for a two detector session.

Record No	Record Date	P1 Count	P2 Count	P1 CPS	P2 CPS	P1 Instantaneous Doserate (uSv/h)	P2 Instantaneous Doserate (uSv/h)	P1 Accumulated Dose (uSv)
1	10:06:47 18/11/2013	1	18	0.0	0.2	0.111	2.000	0.003
2	10:08:27 18/11/2013	1	18	0.0	0.2	0.111	2.000	0.006
3	10:10:07 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
4	10:11:47 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
5	10:13:27 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
6	10:15:07 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
7	10:16:47 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
8	10:18:27 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
9	10:20:07 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
10	10:21:47 18/11/2013	0	17	0.0	0.2	0.000	1.889	0.006
11	10:23:27 18/11/2013	3	20	0.0	0.2	0.333	2.222	0.015

0 Rows Disabled Display Gridlines Max Doserate (Enabled Values) P1 | 4.778 uSv/h P2 | 6.667 uSv/h
 Edit Enabled Rows Total Dose (Enabled Values) P1 | 8.090 uSv P2 | 23.830 uSv

Figure 27 Session Data Textual View (2 Detectors)

The total number of rows disabled in the current session data calculations are displayed at the bottom left of the window. Individual rows may be identified as enabled or disabled by the presence of a check mark in the Enabled column and if disabled the row will be greyed out.

Note: If the row is disabled the value from this row will not be included in the graphical view. To Enable or Disable rows used for the graphical and textual view calculations (so that spurious records may be excluded) requires Supervisor Access and is password protected. To select records to be Enabled/Disabled press the 'Edit Enabled Rows' button.

If not currently logged in as Supervisor, you will be prompted for a password. See Editing Enabled Rows for more information.

Any column in the textual view may be sorted in either ascending or descending value, by clicking on the column header. By default the records are sorted by ascending Record No. If another column header is clicked, the records will be sorted by ascending /descending values in this column. The current sorted column can be identified by the presence of a small triangle next to the column name (as shown below for descending P1 Instantaneous Dose rate). To restore to the default sort, click on the 'Record No' header.

The sorting of values in the textual view does not affect the graphical or reporting value orders, which are always in Ascending 'Record No' order.

Record No	Record Date	P1 Count	P1 CPS	P1 Instantaneous Doserate (uSv/h)	P1 Accumulated Dose (uSv)	Enabled
118	13:21:47 18/11/2013	43	0.4	4.778	3.679	<input checked="" type="checkbox"/>
22	10:41:47 18/11/2013	33	0.3	3.667	0.198	<input checked="" type="checkbox"/>
91	12:36:47 18/11/2013	26	0.3	3.111	1.940	<input checked="" type="checkbox"/>
202	15:41:47 18/11/2013	24	0.2	2.667	6.241	<input checked="" type="checkbox"/>
90	12:35:07 18/11/2013	23	0.2	2.556	1.861	<input checked="" type="checkbox"/>
92	12:38:27 18/11/2013	23	0.2	2.556	2.019	<input checked="" type="checkbox"/>
93	12:40:07 18/11/2013	23	0.2	2.556	2.090	<input checked="" type="checkbox"/>
94	12:41:47 18/11/2013	23	0.2	2.556	2.160	<input checked="" type="checkbox"/>
95	12:43:27 18/11/2013	23	0.2	2.556	2.231	<input checked="" type="checkbox"/>
96	12:45:07 18/11/2013	23	0.2	2.556	2.302	<input checked="" type="checkbox"/>
97	12:46:47 18/11/2013	23	0.2	2.556	2.373	<input checked="" type="checkbox"/>
98	12:48:27 18/11/2013	23	0.2	2.556	2.444	<input checked="" type="checkbox"/>

0 Rows Disabled Display Gridlines Max Doserate (Enabled Values) P1 4.778 uSv/h
 Edit Enabled Rows Total Dose (Enabled Values) P1 8.090 uSv

Figure 28 Session Data Sorted for Descending P1 Instantaneous Does rate

7.9 Graphical View

The graphical view displays the data in a graph format as shown in Figure 17 and Figure 18 below.

The graphical view can be changed using the buttons below the graph to display the session data in either counts, counts per second (cps) instantaneous Dose rate or accumulated dose.

Note: The graphical view only shows those values marked as enabled in the textual view. This is to enable erroneous/spurious results to be removed from the graph. By default all values are enabled when data is uploaded using the Wizard and can only be disabled using the password protected Supervisor access. See the Textual View section for further details.



Figure 29 Accumulated Dose Graphical View

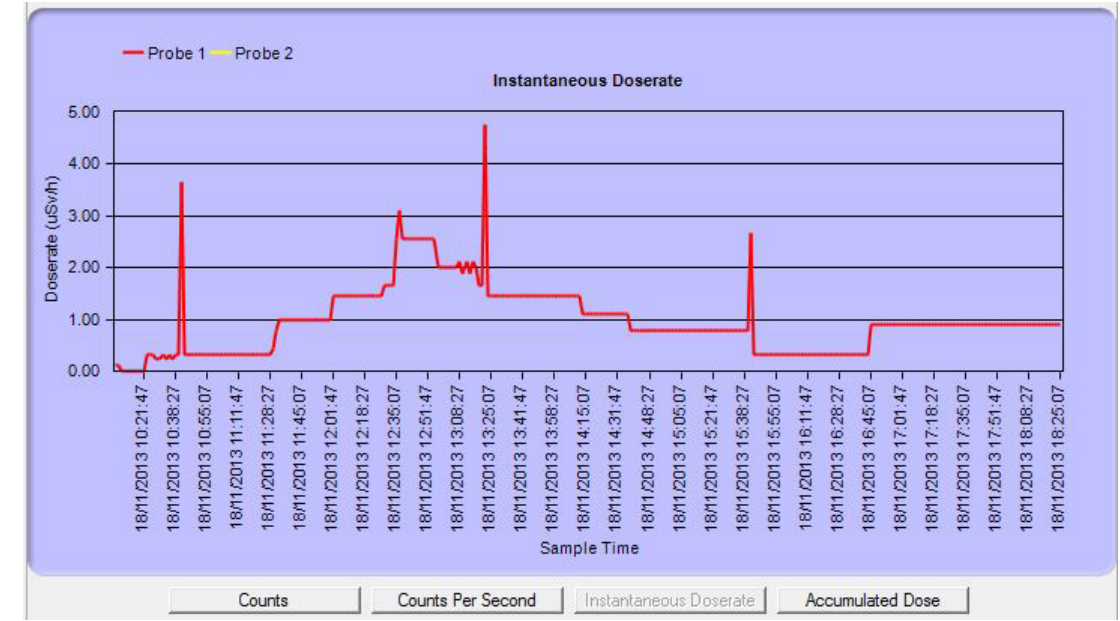


Figure 30 The Instantaneous Dose Rate View For The Same Data.

7.10 Editing Enabled Rows

To Enable or Disable rows used for the graphical and textual view calculations (so that spurious records may be excluded) requires Supervisor Access and is password protected. To select records to be Enabled/Disabled press the 'Edit Enabled Rows' button in the Textual Data View.

If not currently logged in as Supervisor, you will be prompted for a password.

On selecting to Edit Enabled Data Rows, the window shown in "Editing Session Data Window" on page 34 will be displayed, filled with the currently selected session data.

Individual rows may be enabled or disabled, by clicking on the tick in the Enabled column.

Note: On a two detector session, disabling a value for D1 will also disable the value for D2.

When a row is disabled, the row is not check marked and the value removed from the Total Accumulated Dose and Maximum Dose rate calculations for that detector.

Figure 32 on page 34 shows the Editing Session Data Window result when all data values above 3µSv/h have been disabled (assuming the values above this are spurious). "Graphical View After Disabling Records" on page 35 shows the graphical view after modification (See Figure 30 for the pre disabled view).

If a large number of rows need to be enabled or disabled, then a number of filtering options are provided to enable/disable groups of records quickly.

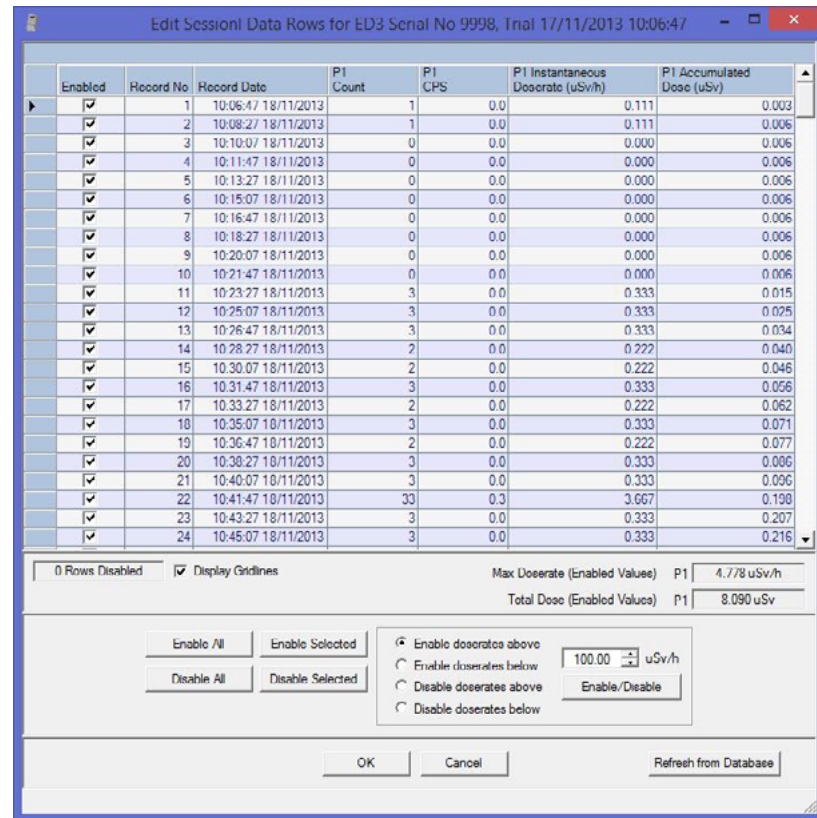


Figure 31 Editing Session Data Window

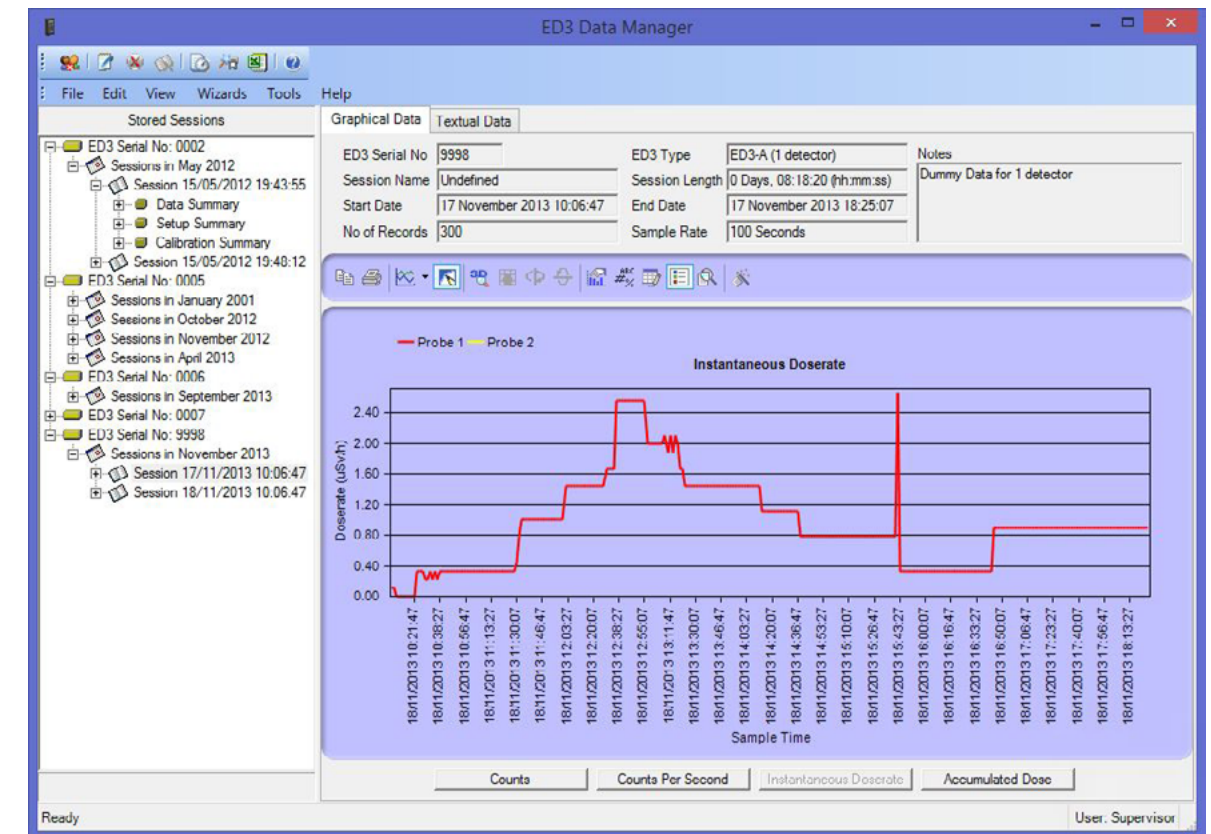


Figure 33 Graphical View After Disabling Records

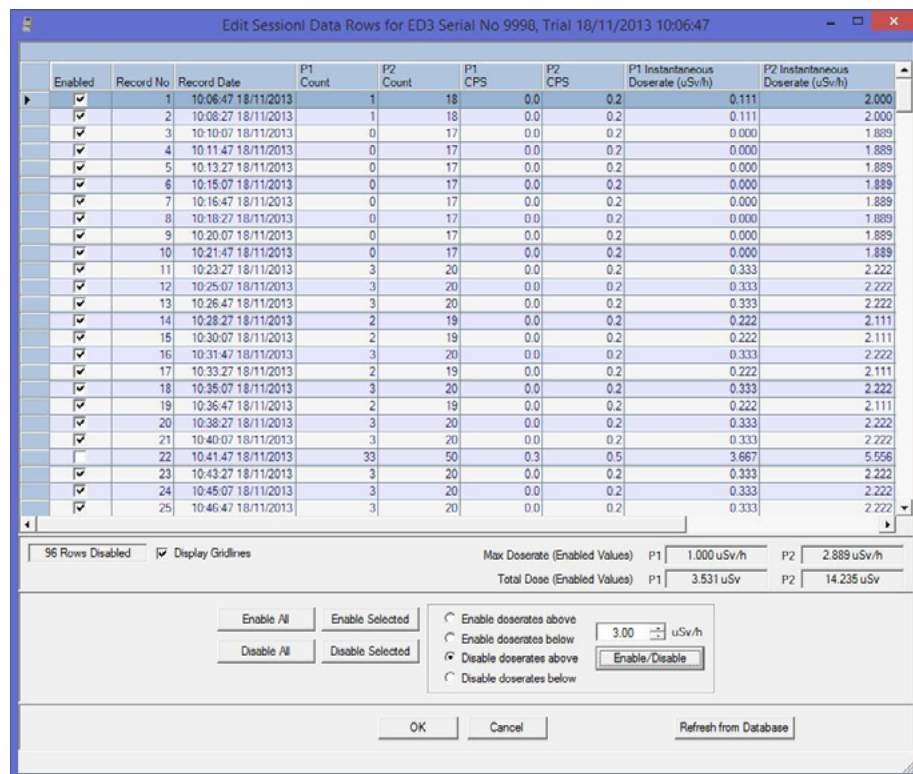


Figure 32 Disable Session Data Record

- **Enable/Disable All** - these buttons enable/disable all rows in the textual view
- **Enable/Disable Selected** - these buttons enable/disable the rows selected by the user in the data grid. Multiple rows can be selected by clicking and dragging the mouse over the left most column of the data grid
- **Enable/Disable Dose rates Above/Below** - this button enables/disables the values above/below the Dose rate value in the numeric value box

After making changes to the enabled status, to keep the changes press the OK button, to undo the changes and end the edit press the Cancel button.

If the OK button is pressed the changes are stored back to the database so that they are kept between application starts. The storing of the changed records for session data of more than 8000 rows may take a few minutes.

When the window is closed, the changes will be reflected in the textual and graphical views.

7.11 Modify Session Name & Notes

To modify the notes associated with a session, highlight a session name in the Stored Sessions list and select Modify Session Name & Notes from either the Edit menu or the right click context menu as shown below.

The access to the Modify Session Name and Notes requires Supervisor Access.

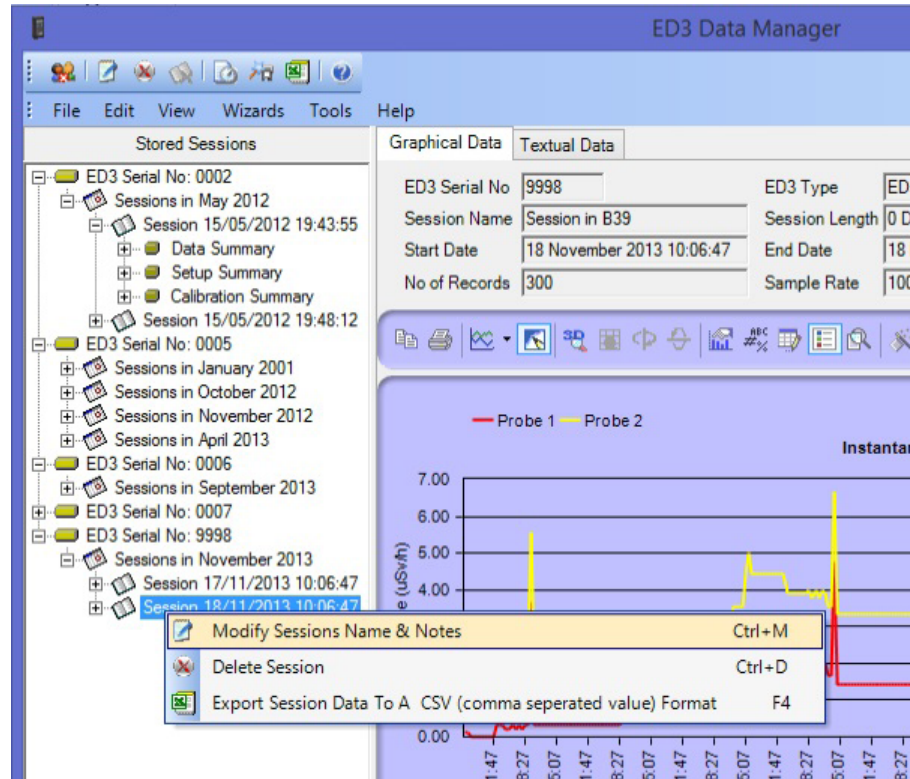


Figure 34 Modify Session Name & Notes

Enter up to 250 characters for the session notes and up to 60 characters for the session and click OK to save the notes and name before returning to the Data Manager.

The session name and notes will be displayed in the tree view and in the Session Summary sections.

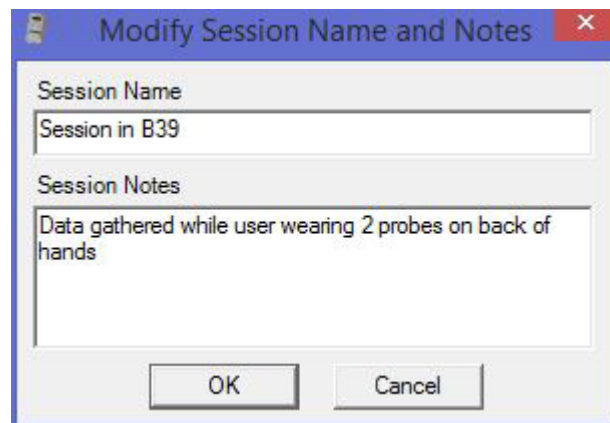


Figure 35 Session Name & Notes Dialogue Box

7.12 Deleting Session Data

The deletion of any session data, requires that the user is logged is as Supervisor.

7.13 Deleting A Single Session's Data

Deleting a single sessions data removes all data and session information for that single session from the Data Manager database. Once deleted the session information cannot be recovered.

To delete all data associated with a session, highlight a session name in the Stored Sessions list and select Delete Session from either the Edit menu or the right click context menu.

The following confirmation dialogue will be shown:

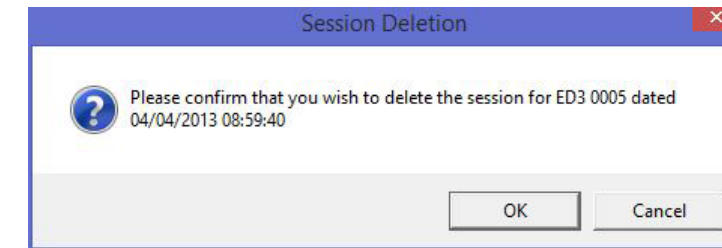


Figure 36 Session Deletion Confirmation Dialogue Box

On clicking OK the Data Manager permanently deletes the sessions data.

7.14 Deleting a Group Of Session Data

Deleting a group of sessions data removes all data and session information for all sessions under that group from the Data Manager database. Once deleted the session information cannot be recovered.

To delete all data associated with a group of sessions, highlight the session group in the Stored Sessions list and select Delete Session from either the Edit menu or the right click context menu.

Note: Sessions can be grouped by day, month or year for each ED3 serial number, by selecting 'Group Sessions' from the Edit menu.

The following confirmation dialogue will be shown:

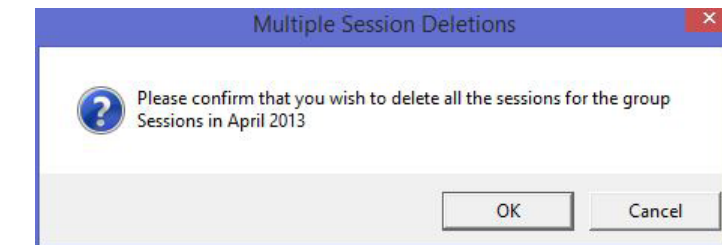


Figure 37 Session Group Deletion Confirmation Dialogue

On clicking OK the Data Manager permanently deletes the sessions data.

7.15 Deleting All Session Data

Deleting all sessions removes **all** the session data from the Data Manager database. Once deleted the session information cannot be recovered.

To delete all session data, from the Edit menu, select Delete All Sessions.

The following confirmation dialogue will be shown:

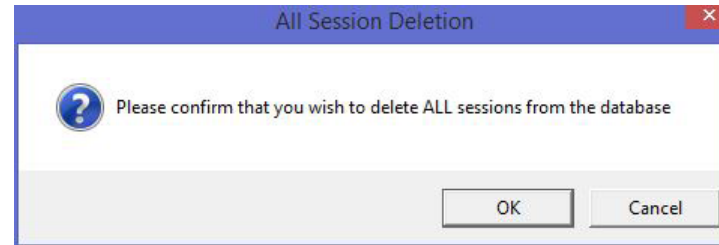


Figure 38 Delete All Confirmation Dialogue

On clicking OK the final warning dialogue is displayed

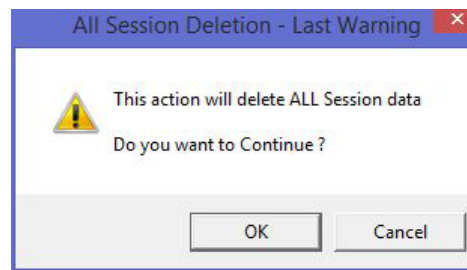


Figure 39 Delete All Final Confirmation

On clicking OK, all sessions data is permanently deleted.

7.16 Exporting Session Data

Session data may be exported from the application using the Report Wizard. This exports the data to a CSV file, ready to be imported into a spread sheet program like Microsoft Excel.

See Section 8. Report Wizard on page 40

8. Report Wizard

Session data may be transferred from the application to a comma separated file format (CSV), supported by Microsoft Excel and other spread sheet programs.

This enables the user to calculate further information based on the data collected, or only to take certain periods of data for further analysis.

To export the data from the Data Manager Application, select the session in the Stored Sessions list so that the details are displayed in the graphical or textual data windows, and from the 'Wizards' menu, select 'Export data to a csv file' or right click over the session name and select it from the context menu.

The following dialogue will be displayed.

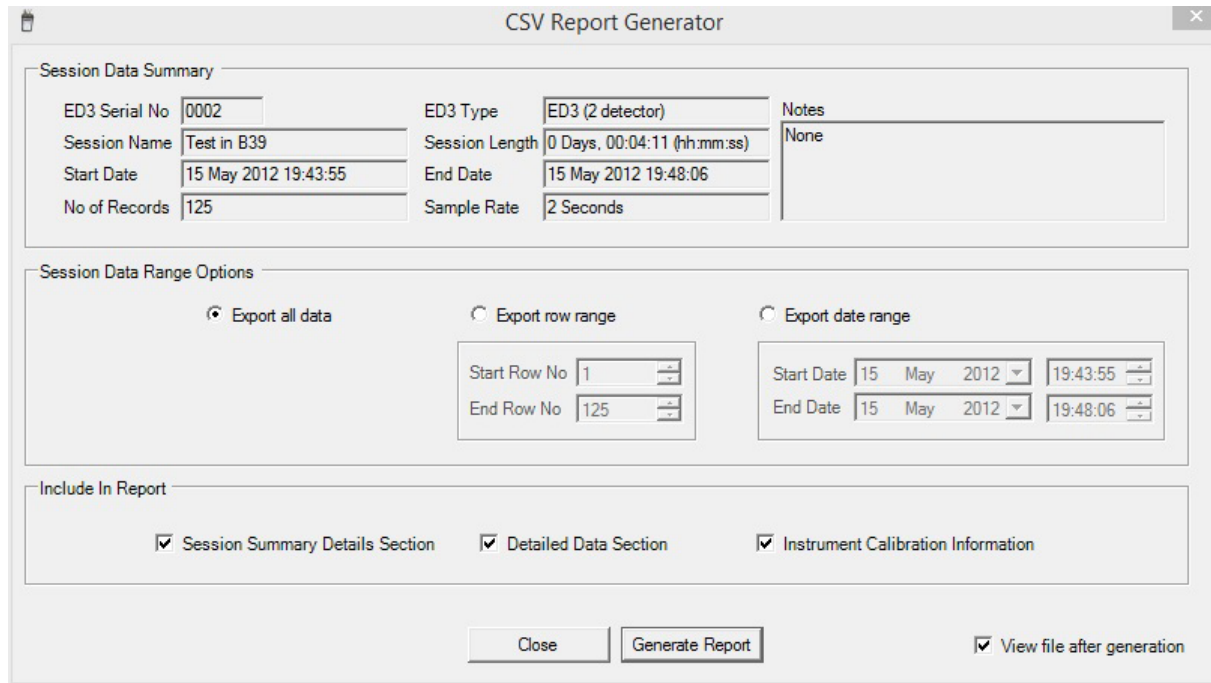


Figure 40 CSV Report Generator Dialogue Box

When exporting session data to a CSV file, the following options may be selected:

- **Export All Data:** this will export all data for the session selected (this is the default)
- **Export Row Range:** this will export those records between the start and end row numbers entered for the session selected. The row numbers refer to the Record No column in the Textual View
- **Export Date Range:** this will export those records between the start and end dates entered for the session selected

Once the data range has been selected, press the 'Generate Report' button to create the CSV file which may be read by a spreadsheet program or external database. The user will be prompted for a file name and location to store the data before the file data is exported.

Note: If the session data consists of more than 64000 rows of data, then the output file will be split into multiple files, as most spread sheet programs will not open files greater than this size.

If the view file after generation button is ticked, then the application will attempt to open the file with the computers default CSV file reader (i.e. Microsoft Excel, if installed).

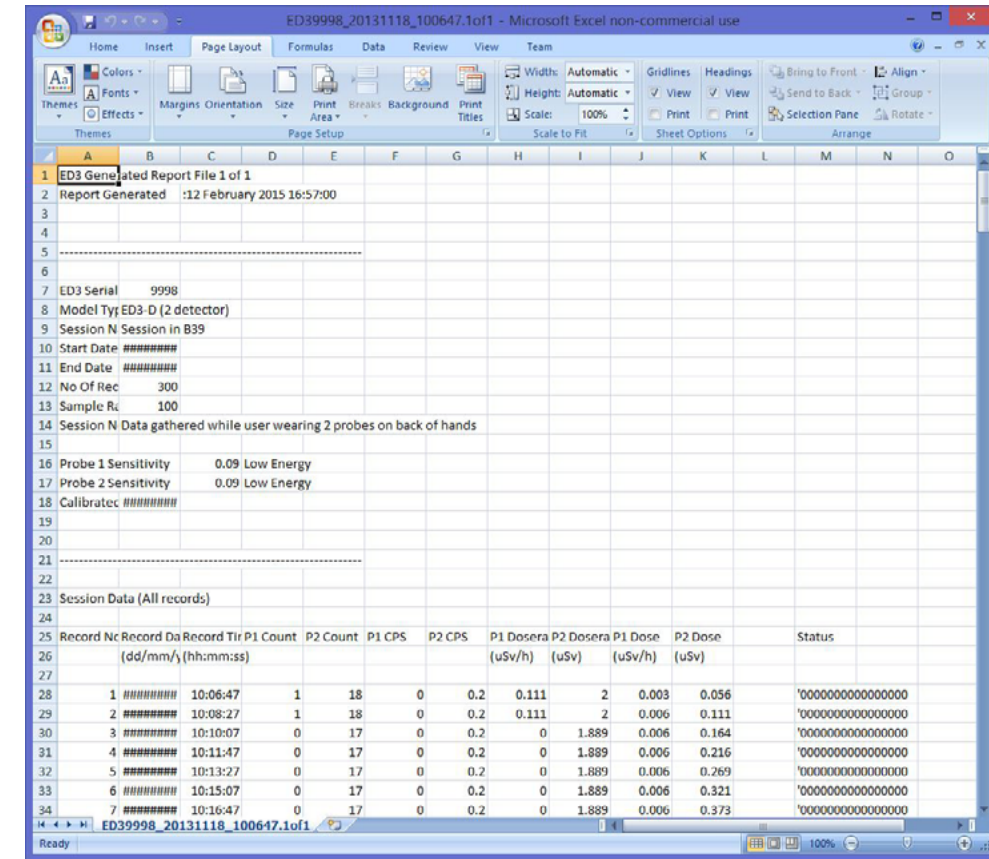


Figure 41 CSV File Imported into Microsoft Excel

The status field indicates the status of the ED3 at the time the record was recorded. Each character in the status word can be either a 1 or 0 and have the following meaning (from left to right):

- 1000000000000000 - First record since the ED3 was brought out of standby
- 0100000000000000 - Accumulated dose reset on instrument display
- 0010000000000000 - Dose alarm occurred
- 0001000000000000 - Dose rate alarm occurred
- 0000100000000000 - Dose alarm accepted by user
- 0000010000000000 - Dose rate alarm accepted by user
- 0000001000000000 - Dose overload occurred
- 0000000100000000 - Dose rate overload occurred
- 0000000010000000 - Low battery warning issued (suspect readings)
- 000000000XXXXXXX - Not currently used, will always be 0

9. Audio Alarms

The following audio alerts are available on the ED3. All alerts are configurable (through the Data & Configuration wizard), apart from the low battery and hardware alarm.

Alarm	Description	Tone	Clearing Alarm
Standard Chirp	Set to high value a 'chirp' will be emitted every time the count measured changes by 2	Pulse Width. 5 milliseconds.	See Chirp Frequency in " Change Settings Screen " on page 20
Dose Alarm	When a dose alarm is reached the display will indicate a flashing 'D' under the relevant detector dose/dose rate reading. An intermittent audible alarm will also sound.	Intermittent tone: 0.5 seconds on 0.5 seconds off	This can only be cleared by a Supervisor. See Section 6.22 on page 25
Dose Rate Alarm.	When a dose rate alarm is reached the display will indicate a flashing 'R' under the relevant detector dose/dose rate reading. An intermittent audible alarm will also sound.	Intermittent tone: 0.5 seconds on 0.5 seconds off	The alarm can't be silenced but will deactivate after the amount of time specified in the setup file when the rate subsides below the alarm level. See Section 6.17 on page 20
Dose Rate Overload	When the dose rate overload is reached, the display will indicate an 'R' under the relevant detector dose/dose rate reading. If the dose rate display is selected then the display will indicate 99999. An intermittent audible alarm will sound.	Intermittent tone: 0.25 seconds on 0.25 seconds off	Move away from the radioactive source.
Dose Over Range	When the dose over range is reached, the displayed dose rate will remain at 999999 and will flash intermittently with 'Overload' at the same location on the display. An intermittent audible alarm will also sound. A 'D' will also be indicated under the relevant detector dose/dose rate reading	Intermittent tone: 0.25 seconds on 0.25 seconds off	This can only be cleared by a Supervisor. See Section 6.22 on page 25
Missing Detector	If the ED3 be switched on without a detector fitted an alarm will sound, producing an intermittent beep. The display will indicate 'No Detectors Found Switch off & Retry'. The instrument must be switched off and a detector fitted. Should a detector be removed during use again an alarm is raised, but if the detector is refitted while switched on the alarm condition will remain. The ED3 will need to be switched off.	Intermittent tone: 1 second on 1 second off	Switch the instrument off. Connect a detector and switch on again. See Section 2.3 on page 5
Low Battery	When a low battery condition is reached low battery symbol is indicated accompanied by an audible alarm. The audible alarm is a short beep once every two seconds. The ED3 will continue to operate for a further 8 hours.	Intermittent tone: 0.25 seconds on 1.75 seconds off	Charge the battery. See Section 3.4 on page 8
Memory Full	The ED3 display will read "Data File Full".		Transfer data from ED3 to PC. See Section 6.21 on page 24

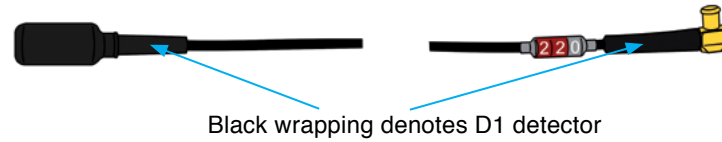
10. Glossary

ED3	Extremity Dosimeter
Hp(0.07)	Personal dose equivalent used for skin dose
GPG	Good Practice Guide NPL National Physical Laboratory
SI	International System of Units
Sv	Sievert, SI unit of dose equivalence
μSv	Sub unit, one millionth of one Sv
Sv h-1	Sievert per hour, unit of dose equivalent rate
μSv h-1	Sub unit, one millionth of one Sv h-1
rem	Personal dose equivalent units as used in North America
mrem,	Sub unit one thousandth of one rem
rad	Absorbed dose as use in North America
mrاد	Sub unit, one thousandth one rad
CPS	Counts Per Second
CSV	Comma Separated Values
CD	Compact Disc
keV	Kilo-Electron Volt (1000 electron Volts)
NiMH	Nickel Metal Hydride
OS	Operating System
PC	Personal Computer
Si	Silicone
USB	Universal Serial Bus

11. Specification

11.1 D1 Detector Specification

D1 Detector: for standard HP(0.07) photon measurements 60keV-1.25MeV



Detector	2x Silicon diodes
Radiation Measured	Standard HP(0.07) photon measurements 60keV-1.25MeV
Uses	Suitable for most Hp(0.07) photon extremity dose equivalent requirements
Dose Range	0.0 μSv to 1 Sv Hp(0.07) [0.00 mrem to 100 rem]
Dose Accuracy	$\pm 20\%$ ^{137}Cs
Dose Rate Range	0.0 $\mu\text{Sv h}^{-1}$ to 100 mSv h^{-1} Hp(0.07) [0.00 mrem h^{-1} to 10 rem h^{-1}]
Dose Rate Accuracy	$\pm 20\%$ ^{137}Cs
Energy Response	typical $\pm 30\%$ 60 keV to 1.25 MeV
Response Time	16 seconds < 735 $\mu\text{Sv h}^{-1}$ and 2 seconds > 735 $\mu\text{Sv h}^{-1}$ Hp(0.07)
Linearity	$\pm 20\%$
Angular Response	$\pm 30\%$
Energy Compensation	Tin/lead filter
Active area of detectors	7.0 mm^2
Dose Temperature Stability	$\pm 20\%$ from 0°C to 40°C
EMC	European EMC Directive 2004/108/EC for radiated emissions and susceptibility.
Maintenance	Annual calibration & physical checks
Lead length	1.4m

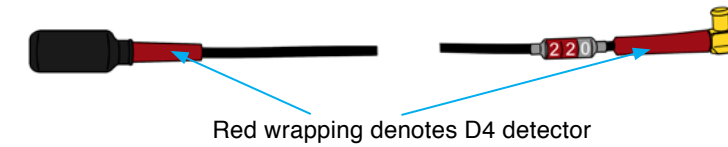
Energy response has been determined from the use of an X-ray generator and gamma sources ^{241}Am , ^{137}Cs and ^{60}Co with the probe mounted on to an ISO rod phantom. Energy response is shown in below, where the upper and lower limits refer to the IEC 61526 requirements.

Note: The requirements of IEC 61526 are only met down to 60keV.

The reference sensitivity of the D1 detector is 0.068 cps / $\mu\text{Sv h}^{-1}$.

11.2 D4 Detector Specification

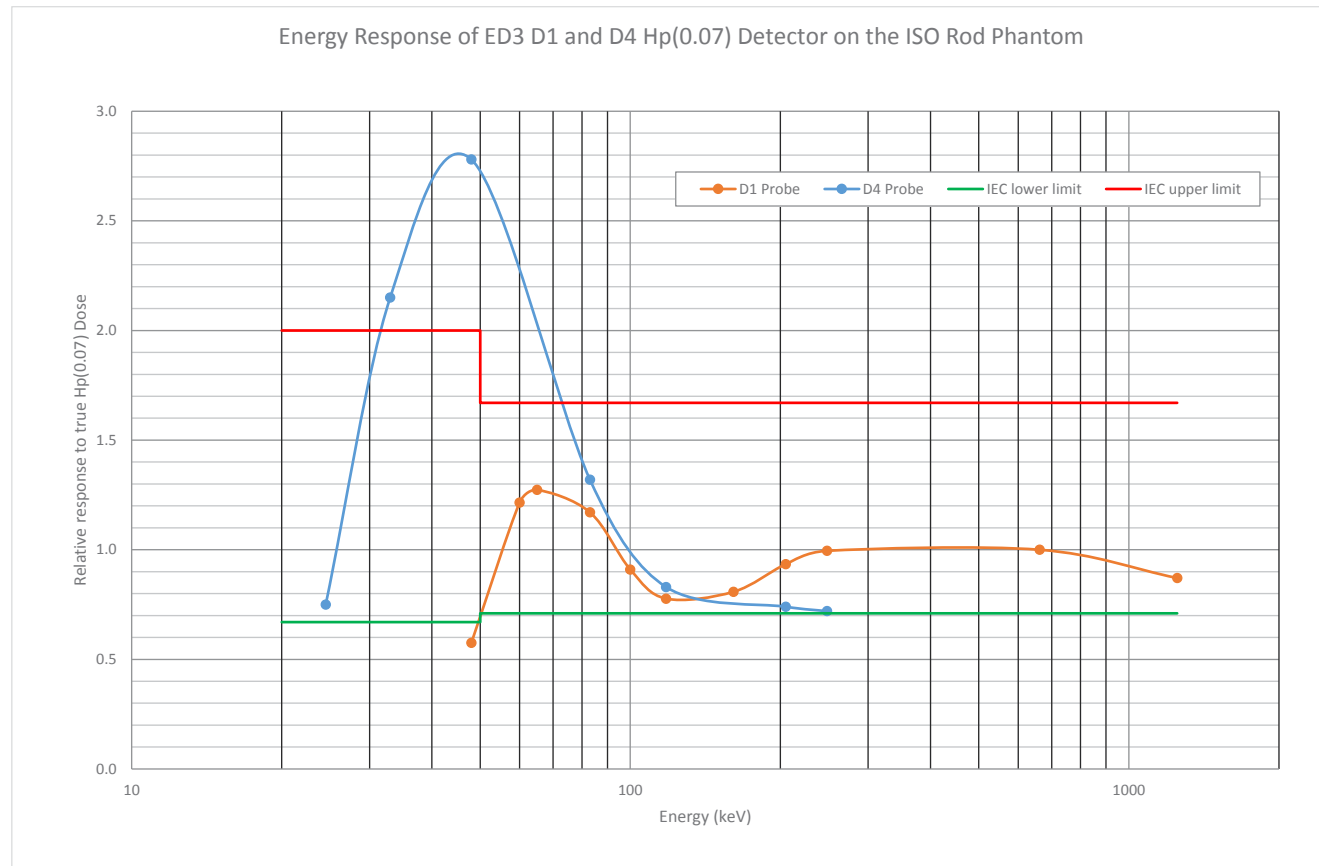
D4 Detector: for low energy HP(0.07) measurements of X-rays - 33keV to 248keV & high energy betas.



Detector	2x Silicon diodes
Radiation Measured	Photons (Gamma & X-ray) and beta
Uses	Suitable for low energy photons & high energy beta Hp(0.07) extremity dose equivalent requirements
Dose Range	0.0 μSv to 1Sv Hp(0.07) [0.00 mrem to 100 rem]
Dose Rate Range	0.3 $\mu\text{Sv h}^{-1}$ to 100 mSv h^{-1} Hp(0.07) [0.0 mrem h^{-1} to 10 rem h^{-1}]
Energy Response	X-rays - 33keV to 248keV
Response Time	16 seconds < 346 $\mu\text{Sv h}^{-1}$ and 2 seconds > 346 $\mu\text{Sv h}^{-1}$ Hp(0.07)
Linearity	$\pm 20\%$
Angular Response	$\pm 30\%$
90Sr + 90Y Beta response	0.31 of true beta dose Hp(0.07)
Active area of detectors	7.0 mm^2
Dose Temperature Stability	$\pm 20\%$ from 0°C to 40°C
EMC	European EMC Directive 2004/108/EC for radiated emissions and susceptibility.
Maintenance	Annual calibration & physical checks
Lead length	1.4m

It should be noted that the energy response of the D4 detector does continue up to 1.25MeV but it is recommended that the D1 detector be used where betas or low energy X-rays are not expected.

11.3 Energy Response Curve for D1 & D4 Detectors



11.4 Mechanical Specifications

ED3 Instrument Dimensions	Case 100 x 57 x 32mm.
Weight	225gm.

11.5 Environmental Specification

Operating Temperature	0°C to +40°C
Humidity	20% to 80% RH non condensing
Protection	IP55
EMI/EMC: Emissions	EN 61326:1998 calling for tests to EN 55022 Class B
Immunity	EN 61326:1998 light industrial standards calling for tests
	ESD: EN 61000-4-2:1996 for light industrial up to 4kVolts
Radiated Immunity	EN 610003-3 25 MHz to 1000MHz to 3V/M

12. ED3 Calibration

The ED3 is a highly sensitive electronic instrument that requires individual calibration of the detector against known radiation sources.

The calibration of the ED3 is initially performed when the unit is manufactured and should be generally re-calibrated every year by a qualified calibration facility.

The date of calibration and date of next calibration is briefly displayed on the ED3 upon switching the instrument on.

Note: This item is configurable and may be disabled in the settings.

Due to the complex nature of the calibration and the need for known radiation sources, the instrument should be returned to a qualified calibration facility for the calibration.



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