



## **EASYEPD<sub>2</sub>**

EPD Mk2 Configuration Software

A Guide to using EasyEPD<sub>2</sub>

June 2012

DATE OF ISSUE: 14<sup>th</sup>. June, 2012

©Thermo Fisher Scientific Inc. 2012. All rights reserved.

The information contained herein is the property of Thermo Fisher Scientific Inc. and is supplied without liability for errors or omissions. No part may be reproduced or used except as authorised by contract or other written permission. The copyright and the forgoing restriction on reproduction or use extend to all the media in which this information may be embodied.

This manual was produced using *ComponentOne Doc-To-Help*.

# Contents

|   |           |
|---|-----------|
| <b>Getting Started</b>                            | <b>1</b>  |
| What is EasyEPD2? .....                           | 1         |
| Equipment Required to Run EasyEPD2 .....          | 1         |
| How to Install EasyEPD2 .....                     | 1         |
| How to Run EasyEPD2 .....                         | 2         |
| How EasyEPD2 Operates.....                        | 2         |
| EPD Types .....                                   | 2         |
| Help .....  | 4         |
| <b>Using EasyEPD2</b>                             | <b>5</b>  |
| The Main Window .....                             | 5         |
| Tool Bar.....                                     | 6         |
| The Menu Bar .....                                | 7         |
| The Status Bar .....                              | 7         |
| Data Representation .....                         | 8         |
| <b>Setting Up EasyEPD2</b>                        | <b>9</b>  |
| The Set Up Form.....                              | 9         |
| Access Control and Administration .....           | 13        |
| Access Administration.....                        | 14        |
| Example 1: Creating Access Control File .....     | 16        |
| Example 2: .....                                  | 18        |
| Date and Time.....                                | 26        |
| Numbers.....                                      | 26        |
| Communications Port.....                          | 27        |
| <b>Reading</b>                                    | <b>29</b> |
| How to read from an EPD .....                     | 29        |
| <b>Writing</b>                                    | <b>31</b> |
| How to write to an EPD .....                      | 31        |
| <b>Logging</b>                                    | <b>33</b> |
| Logging Description .....                         | 33        |
| <b>Wearer Dose and Alarms</b>                     | <b>35</b> |
| The Dose and Alarms Window .....                  | 35        |
| Wearer .....                                      | 36        |
| Dose and Rates .....                              | 36        |
| Counts Since.....                                 | 37        |
| Dose Quality.....                                 | 38        |
| Alarm Thresholds ( $\mu$ Sv or mrem or cGy) ..... | 39        |
| Clear.....  | 41        |
| EPD Control .....                                 | 42        |

|                                       |           |
|---------------------------------------|-----------|
| DoseOnAlarm (Responder) .....         | 43        |
| <b>Status</b>                         | <b>45</b> |
| The Status Window .....               | 45        |
| EPD State .....                       | 46        |
| EPD Configuration .....               | 47        |
| DoseOnAlarm (Responder) .....         | 47        |
| Voltages .....                        | 48        |
| Alarms .....                          | 48        |
| Clear Alarms Button .....             | 48        |
| Faults .....                          | 49        |
| Clear Faults Button .....             | 50        |
| ADS .....                             | 50        |
| History .....                         | 51        |
| <b>Dose Profile</b>                   | <b>53</b> |
| Dose Profile Textual Window .....     | 53        |
| Dose Profile Graphical Window .....   | 55        |
| Rate Text Window .....                | 56        |
| Rate Graph Window .....               | 56        |
| <b>Special Total Dose Store</b>       | <b>57</b> |
| Special Total Dose Store Window ..... | 57        |
| <b>Approved Dosimetry Service</b>     | <b>59</b> |
| What is an ADS? .....                 | 59        |
| The ADS Window .....                  | 60        |
| <b>Calibration</b>                    | <b>61</b> |
| What is EPD Calibration? .....        | 61        |
| The Calibration Window .....          | 61        |
| EPD-N2 Calibration .....              | 64        |
| Adjusting Gain Constants .....        | 64        |
| Restoring Factory Setting .....       | 65        |
| EPD-N2 Changing the Password .....    | 66        |
| Warning .....                         | 66        |
| % Adjust .....                        | 67        |
| <b>Scratch Pad</b>                    | <b>71</b> |
| The Scratch Pad Window .....          | 71        |
| <b>Set Up EPD</b>                     | <b>73</b> |
| Alarm Controls .....                  | 73        |
| Alarm Set Up .....                    | 74        |
| Alarm Test .....                      | 75        |
| Regulated Voltage .....               | 76        |
| Battery Voltages .....                | 76        |
| Display .....                         | 77        |
| Events .....                          | 80        |
| Dose Profile Events .....             | 80        |
| Other Events .....                    | 81        |
| Communications .....                  | 84        |
| Teledosimetry Controls .....          | 84        |
| Switch .....                          | 86        |

|                              |           |
|------------------------------|-----------|
| <b>Batch Write</b>           | <b>87</b> |
| The Batch Write Window ..... | 87        |
| <b>Error Handling</b>        | <b>88</b> |
| Communication Errors .....   | 88        |
| Errors .....                 | 88        |
| <b>Glossary of Terms</b>     | <b>89</b> |
| <b>Index</b>                 | <b>93</b> |

Blank Page

# Getting Started

---

## What is EasyEPD2?

EasyEPD2 is a program that reads and writes EPD data via an Infrared communications link and displays the data in a PC window.

EasyEPD2 can be set up to allow certain data to be logged to a text file.

EasyEPD2 can be used to batch write a set of EPDs into the same configuration.

---

## Equipment Required to Run EasyEPD2

### Computer

An IBM Compatible PC running Windows operating system. See the Readme file delivered with the application for details of what platforms EasyEPD2 has been tested on.

A minimum of 16Mb RAM

### Infra-red link

Any Ir adapter that can emulate a PC's Comm port. E.g. ACTiSYS IR Computer link ACT-IR220L

### Built-in Infrared ports

EasyEPD2 does not work with the internal infra-red port. You must have an external Ir port connected to a standard comm port or usb port.

### EPD

Electronic Personal Dosemeter.

---

## How to Install EasyEPD2

If you have a version of EasyEPD2 already installed then you will have to remove that program first using the Remove Programs option on your control panel.

EasyEPD2 is supplied on disk.

The file default.htm should start up automatically. Click on install and follow the instructions.

OR From your Windows Start menu select Settings – Control Panel – Add/Remove Programs and use the Install button or Browse button to select the EasyEPD2Setup.msi file on the installation disk. Follow the instructions, clicking 'Next' when you are happy with the settings selected.

To un-install EasyEPD2 run the installer again and select Remove option.

## How to Run EasyEPD2

The installation program will have created a program group. From your Tool Bar select Start – Programs – Thermo – EasyEPD.

You may wish to create a shortcut to EasyEPD2 on your computer desktop or your start menu.

## How EasyEPD2 Operates

EasyEPD2 detects an EPD when placed with its button facing towards and within range of the Ir adapter, automatically reads data from the EPD and displays it in a window. Once an EPD has been detected EasyEPD2 maintains the link with the EPD to ensure that the EPD does not time out and to check that the EPD is still present.

In order to ensure that EasyEPD2 operates in the most efficient manner only data required for open windows is read from the EPD. Each time a Window is opened the data for this window is read from the EPD (with the exception of the Dose Profile and Scratchpad Windows). Click the Read button at any time in order to read the present values from an EPD. Once a window is open then the data for that window will only be read if the Read button is clicked.

Writing to an EPD is performed on sets of data. When a value is changed on EasyEPD2 then all values in the appropriate set of data are marked as modified and are displayed in blue. Click the write button to write to the EPD all data marked as modified. EasyEPD2 automatically reads the EPD again after a write.

EasyEPD2 displays units in Sieverts, rems or centiGray where 1Sv = 100rem = 100cGy. The units displayed are determined by settings within the EPD being read.

Note: Some values of cGy are displayed in scientific notation. E.g.: 5E-6 cGy = 0.000005 cGy

## EPD Types

Different customers may have different types of EPD Mk2. EasyEPD2 displays data differently depending on the EPD being read at the time.

At the moment there are the following EPD Mk2 types in production:

- EPD-BG Measures dose equivalents Hp(10) and Hp(0.07) from Beta and Gamma sources.

 EasyEPD EPD-BG ID: 0000001 Mk2.30 Software Version 11

- EPD-G Measures dose equivalents Hp(10) and Hp(0.07) from Gamma sources.

 **EasyEPD EPD-G ID: 06001802 Mk2.**

- EPD-N2 Measures Hp(10) for photons and neutrons of all energies

 **EasyEPD EPD-N2 ID: 07111235 Mk2.10 Software Version 4**

Dose can be displayed in different units –

- $\mu\text{Sv}$ , mrem, cGy. (cGy is not currently available for neutron measurement using EPD-N2 because  $1\text{rem} \neq 1\text{cGy}$  for neutrons)

Dose can be referred to using different terms –

- Hp10, DDE, HpG
- Hp07, SDE, HpN

This manual is written primarily using Hp10, Hp07 and  $\mu\text{Sv}$  nomenclature, the appropriate term for the EPD being read will be used by EasyEPD2.

EPD-N2 EPDs can have certain calibration parameters adjustable by the user.

EPD-G, EPD-N2 EPDs and EPD-BG (software version 13 and above) do not store Special Total Dose values.

Different EPD Types have different counter designations.

- EPD-BG: HG, SG, FB, BC
- EPD-G: HG, SG
- EPD-N2: HG, SG, FN, AN.

### **DoseOnAlarm (Responder)**

The Beta/Gamma EPD (software version 12 and above) can be FACTORY configured to operate as a DoseOnAlarm EPD. This EPD accumulates dose after a dose rate alarm has occurred. The initial set of EPDs thus configured in a blue case with 'Responder' on the case.

### **ClearOnOn**

EPD-BG, EPD-G (software version 14) and EPD-N2 (software version 5) can be FACTORY configured to have the ClearOnOn option available.

An EPD configured for this option has additional controls on EasyEPD2 'Events Setup' page.

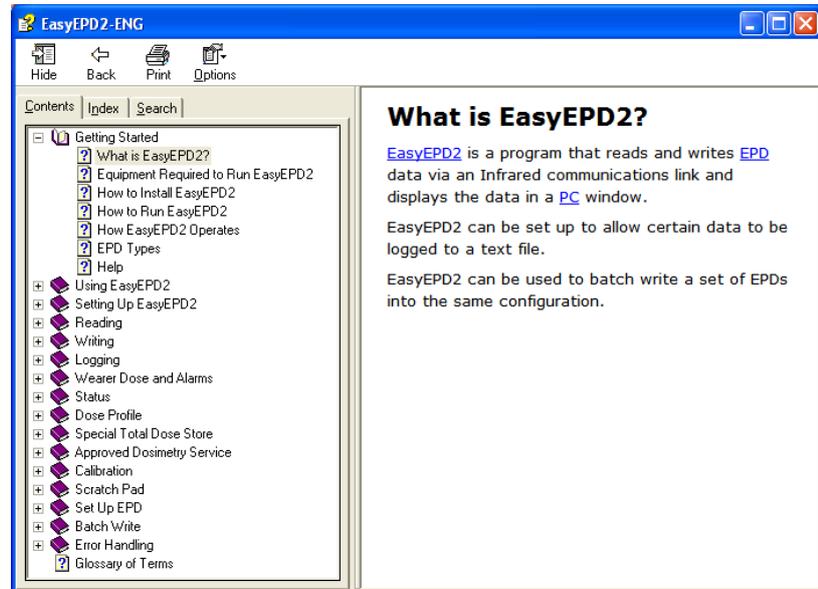
### **Pulsed Rate Response**

EPD-BG, EPD-G (software version 14) and EPD-N2 (software version 5) can be FACTORY configured to have the 'Pulsed Rate' option available.

An EPD configured for this option has additional controls on EasyEPD2 'Calibration' page.

# Help

Use the Menu Bar to select Help – Contents.



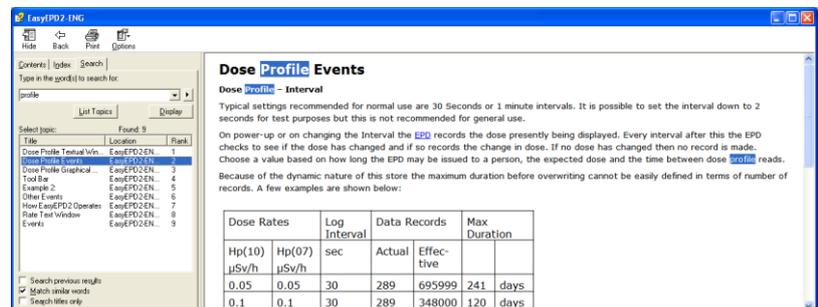
Click on an item to select it and read more details.

Use the 'Index' tab to find any item from the index.

Select the 'Search' tab if the word you are looking for does not occur in the index. Double Click on a topic to display that topic and all instances of the selected word will appear highlighted within the page for that topic.

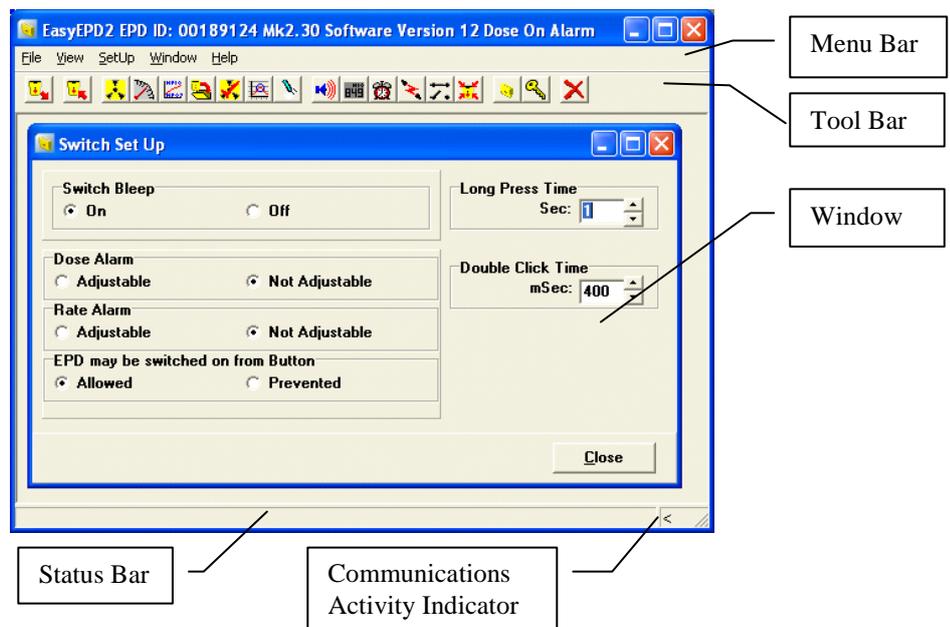
Example of a topic search:

Searching for 'profile' creates a list of topics, double clicking on one of them displays that topic:



# Using EasyEPD2

## The Main Window



The main window provides access to all EasyEPD2 operations via either the toolbar buttons or the menu selections. Further windows open within the main window.

## Tool Bar



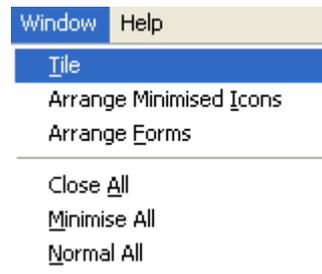
-  **Read EPD:** Reads data required to populate the windows that are open. If no window is open then the Dose and Alarms window is opened and that data read.
-  **Write EPD:** Writes data changed since the last read. An EPD must be present. The write is followed by a read.
-  **Dose and Alarms:** Display data associated with an Issue of an EPD to a person, including the dose status.
-  **Status:** Display the operational status of an EPD.
-  **Dose Profile:** Display the EPD dose profile.
-  **Special Total Dose Store:** Display the Total Doses as recorded in the EPD at specified times.
-  **ADS:** Display data associated with an ADS Issue of an EPD to a person, including the dose status.
-  **Calibration:** Display the Calibration parameters of the EPD. Configure rate response. Adjust calibration on 'unlocked' EPDs.
-  **Scratchpad:** Displays the data in the EPDs user writable non-volatile store.
-  **Alarms:** Display/Configure the Alarm controls for the EPD.
-  **Display:** Display/Configure the EPD display settings.
-  **Events:** Display/Configure EPD event timers.
-  **Comms:** Display/Configure EPD communications.
-  **Switch:** Display/Configure EPD switch settings.
-  **Configuration:** Display/Configure additional EPD settings.
-  **Batch:** Batch-write a set of parameters to EPDs.
-  **Set Up:** Set up EasyEPD2.
-  **Access Control:** Enter User Name and Password.

## The Menu Bar

The menu bar reproduces all the functionality of the toolbar. In addition it also provides the ability to close or re-organise the Windows and to display Help.

The menu items may be accessed either via the mouse or by using the keyboard <Alt> key together with the underlined letter on the Menu bar.

### Window Menu



Tile: arranges windows so that they are all the same size.

Arrange Minimised Icons: arranges the icons of minimised windows.

Arrange Forms: places the forms so that they do not overlap.

Close All: Closes all open windows.

Minimise All: minimise open windows.

Normal All: restores minimised windows.

### Help Menu



Version: Displays the present version number of EasyEPD2 and also displays the location, name, date and size of DLL the interface file used by EasyEPD2 to talk with the EPD.

Contents: Displays on-line help.

## The Status Bar

The status bar is used to give information about what EasyEPD2 is doing, in particular the state of the Ir interface with the EPD is shown by messages such as:

- EPD Removed... Waiting to detect an EPD.
- Waiting to detect an EPD.
- Reading EPD.
- An error occurred while reading the EPD.
- Writing to EPD.

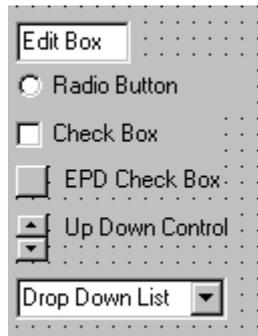
The communications activity indicator flickers twice a second when no communications activity is occurring and faster than that when there is activity.

---

## Data Representation

EasyEPD2 represents data in a variety of ways such as:

- Edit boxes
- Drop down lists
- Radio buttons
- Check boxes
- Up Down Controls



These items are blank when EasyEPD2 has no data associated with them.

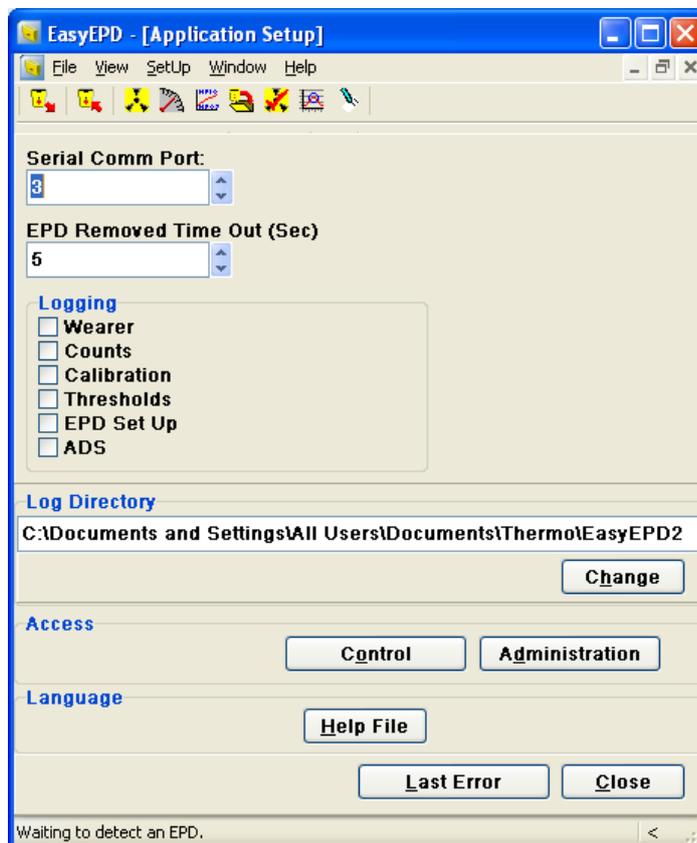
They are displayed in blue when changed by the user.

Note: Data is written to the EPD in groups. If one item in a group is changed then all items in that grouped are displayed in blue and will be written to the EPD together.

# Setting Up EasyEPD2

## The Set Up Form

From the main toolbar select Set Up Application: 



### Serial Communications Port

This is the PC port on which an Ir adapter is installed for communicating with an EPD. Any valid Comm port number may be entered. (Default = 1).

### EPD Removed Timeout

(Default = 5 seconds)

This is used to prevent unnecessary reads due to movement of an EPD out of the Ir range.

If an EPD is moved outside the Ir range and returned within this time then a read will not occur.

Note: A read will occur if a different EPD is in the field.

### **Logging**

Check the boxes if EasyEPD2 is to log data on detecting a new EPD and on Writing to an EPD.

Note: DO NOT ENABLE THIS FUNCTION unless you are sure you want logging as it causes EasyEPD2 to read all EPD parameters and thus slows down communications.

See section Logging Description for further details.

### **Log Directory**

This is the directory in which the data selected for Logging will be saved. You may set this directory to any existing directory on your computer or network. Click the 'Change' button to change the logging directory this opens a browser which allow you to select a folder to use for log files. Click on the directory you require. Cancel only cancels the last directory selected, if you have made a mistake you will need to re-select the directory you require.

Windows XP:

C:\Documents and Settings\All Users\Documents\Thermo\EasyEPD2

Windows Vista:

C:\Users\Public\Documents\Thermo\EasyEPD2

Windows 7:

C:\Users\Public\Documents\Thermo\EasyEPD2

---

Note: Virtualisation on Windows7 and Windows Vista:- ensure the folder chosen is writable by standard users, otherwise the files may be directed to a virtual folder for that user only and will not be available to other users.

---

### Language

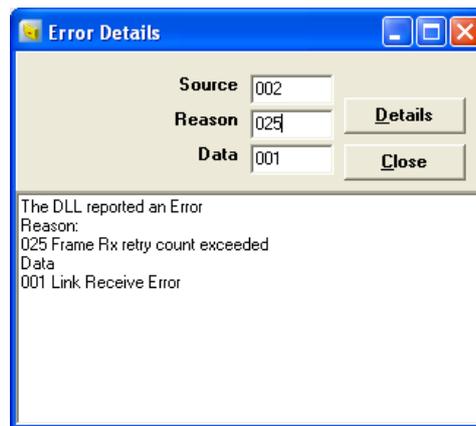
Please enquire at your local sales office if you require this application in another language.

At present the application can be run in English, French, German, Spanish, Russian and Chinese although the help is currently only available in English and German. On start up the application picks up the language based on the locale of the machine.

### Help File

Select the file you wish to open when help is selected. EasyEPD2-EN.chm is the English help file.

### Last Error



Errors such as communications problems, or EPD problems sometimes occur and error codes generated within the interface dll. These codes can be viewed and reasons displayed using the Error Details form, you can type in the numbers in the edit boxes. Clicking the Details button toggles the details box on and off.

If no error has occurred then the default source, reason and data values are 0 and no useful information is gained by looking at the details.

Source: indicates if the error was reported by the dll itself or by the EPD.

Reason: gives some indication of why the dll or EPD reported an error.

Data: Sometimes provides additional information such as the command being sent at the time or data received with the error message.

If you see an Error message like this you can type the first number in Source, the second number in Reason and the third number in Data to find out the cause of the fault.



This error was induced by removing the EPD before the dll had completed writing, causing the DLL to keep retrying transmitting (Tx) the command to the EPD until its has completed all its retries.

### Access Control and Administration

Access Control displays a User Name and Password Form. This only needs to be used if access control has been set up on this application.

Access Administration displays a form that allows the user to restrict access to the application. Fuller details may be found in the following section.

## Access Control and Administration

Note: You do not need to set up Access Control. EasyEPD2 will operate normally if no Users are added to the Access Administration form.

### Security

The access control is **not** intended to be secure but merely to provide a level of access limitation based on a user name. User names and passwords are clearly visible on the administration form and are stored in the configuration file in encrypted form.

### Removing Access Control

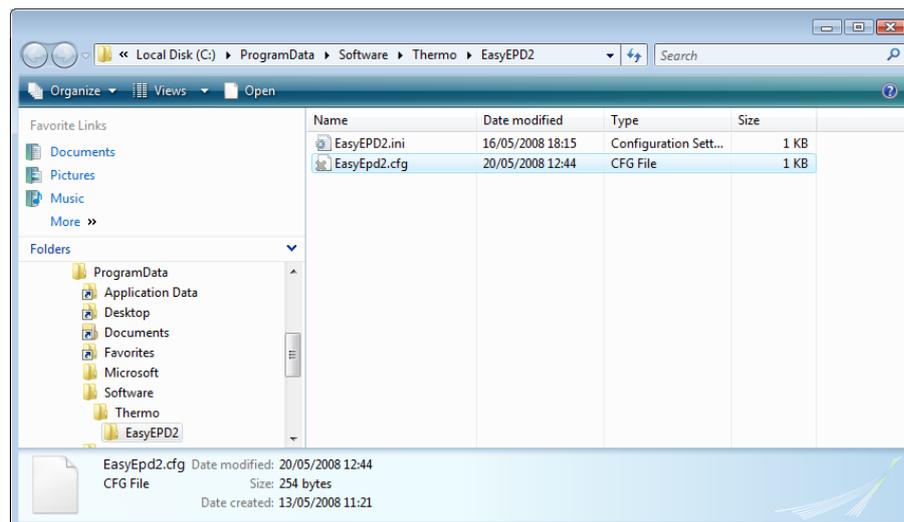
If you wish to delete password control all you have to do is to delete the files EasyEPD2.ini and EasyEPD2.cfg from your common files folder and add the ones from your application folder. Or you can de-install EasyEPD2 and re-install it.

Common files folder Depends on the operating system:

- Windows XP :-  
C:\Documents and Settings\All Users\Application Data\Thermo\EasyEPD2
- Windows Vista :-c:\ProgramData\Thermo\EasyEPD2
- Windows 7 :-c:\ProgramData\Thermo\EasyEPD2

The default applications folder is:-

C:\Program Files\thermo\EasyEPD2.



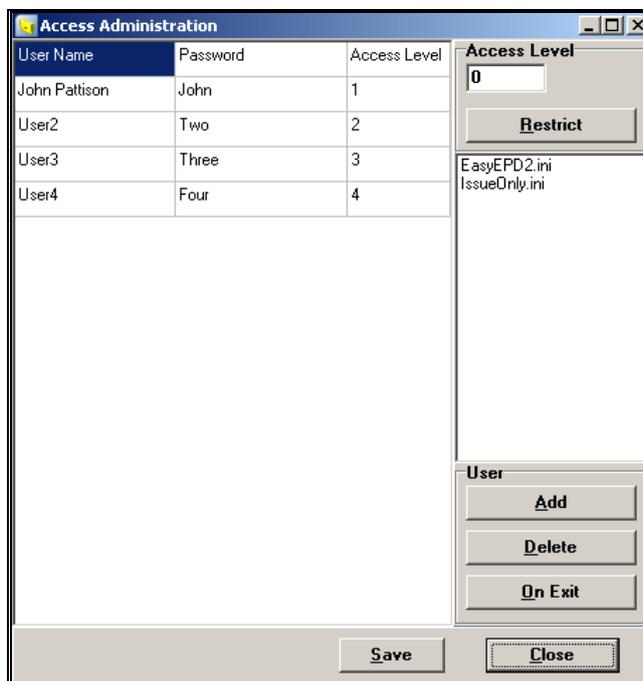
### Access Control Description

Access control operates on the basis that any user may access all features. If you wish to restrict access to any feature you may give that feature an 'Access Level' which means that a person with that Access Level privilege or lower number is allowed Access to that feature. A person with a higher number is not allowed access. (eg: if on the main form you give a task bar button access level 3 then anyone with access

levels 1 or 2 or 3 can press the button but anyone with access levels 4 and above cannot press the button).

When EasyEPD2 opens it looks for a file EasyEPD2.ini in the common users folder and uses that as the access control information.

## Access Administration



### Add an Administrator:

User – Add

Allocate an 'Administrator' and give them access level 1 (The highest). (Access Level 0 is not allowed).

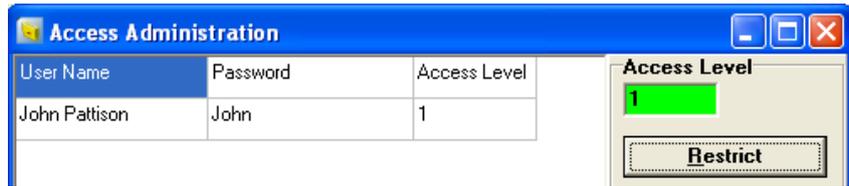
Exit EasyEPD2 and re-start. You will now be prompted for a User Name and Password.

### Setting up access:

You must be logged in as a person with Access Level 1.

You may either double click on one of the '.ini' files listed and save it as EasyEPD2.ini or you can set up your own file and then press the 'Save' button.

To create your own access control set. Decide the level you wish to create an access control set (eg: level 3 to allow Issue and Return only). Type that number in the **Access Level** box and press the '**Restrict**' button. The Access Level is highlighted in green to show you are in Access Control Setup mode.



The application is now in a mode where **right clicking** on Forms, Group Boxes, Edit Boxes or Buttons will add this level of restriction to the EasyEPD2.ini file. To restrict a radio-group item you have to click on the panel or group box that contains it.

**User – Add (or Edit):**

Enter a User Name, password and Access Level.

Note: A user with Access Level 3 has access to all level 3, 4, 5 etc. items. So to see the above example in operation you need to create a user with access level 4.

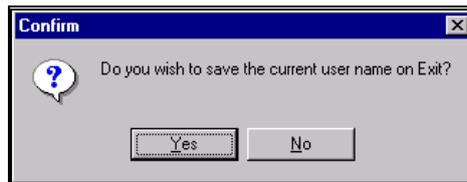
To Edit a User’s details click **Add** and then you can change user names passwords or access levels.

**User – Delete:**

Click on the user you wish to delete and then click the User Delete button.

**User – On Exit:**

Prompts you to decide if you want the Access Control form to be populated with the User Name of the last person to use EasyEPD2 or not.



**Save**

Saves your present settings prompting you for a file name for the .ini file.

---

**When You Have Finished Setting Access Levels:** Exit the EasyEPD2 application, re-open and check the operation is as expected.

---

### Example 1: Creating Access Control File

Start up EasyEPD2 and log on as an Access Control Administrator.

Open the Access Administration form and enter Access Level 3 in the Access Level box and press the 'Restrict Button'.

Whilst keeping the Access Administration form open:

Right click on any of the tool bar buttons you wish to restrict and they will go hashed (right click again and they will un-hash).

E.g.:



Open the Dose and Alarms form and right click on the Dose Alarm Thresholds and Rate Alarm Thresholds and Clear group boxes and on the Clear Total Button in order to set Access Level 3 on those items on that form.

Eg:

| Dose and Rates |             |              |               |               |                     |
|----------------|-------------|--------------|---------------|---------------|---------------------|
|                | Dose<br>uSv | Total<br>uSv | Rate<br>uSv/h | Peak<br>uSv/h | Peak Rate Time      |
| Hp10           | 3.88        | 3.88         | 0             | 13            | 02/03/2005 11:24:44 |
| Hp07           | 798.38      | 798.38       | 0             | 2720          | 02/03/2005 11:30:44 |

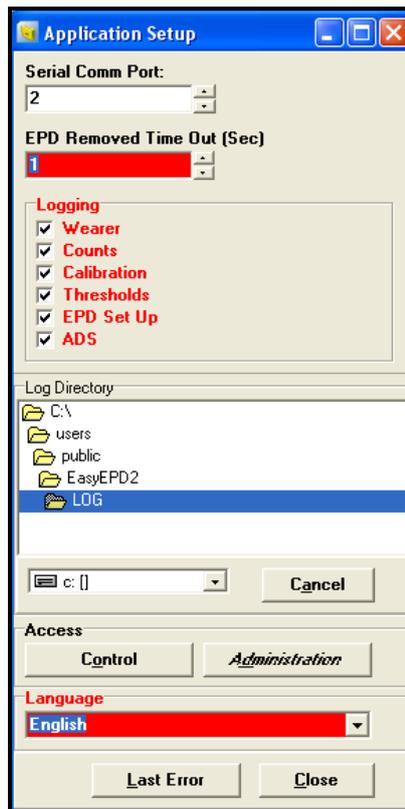
| Counts Since 02/03/2005 11:19:30 |     |      |     |
|----------------------------------|-----|------|-----|
| HG                               | SG  | FB   | BC  |
| 143                              | 845 | 4998 | 363 |

|          | Dose Alarm Thresholds |           | Rate Alarm Thresholds |           |
|----------|-----------------------|-----------|-----------------------|-----------|
|          | uSv                   | Off       | uSv/h                 | On        |
| Hp10 (1) | [Red Bar]             | [Red Bar] | [Red Bar]             | [Red Bar] |
| Hp10 (2) | [Red Bar]             | [Red Bar] | [Red Bar]             | [Red Bar] |
| Hp07     | [Red Bar]             | [Red Bar] | [Red Bar]             | [Red Bar] |

To restrict at another level return to the Administration form and enter Level 1 and press the restrict button. Then open the Application Setup Form and right click on the 'Administration' button the 'EPD Removed time out' and 'Language' Edit boxes and the 'Logging' Group box.

Eg:



Return to the Access Administration form and 'Save'. Give the file a file name (eg. MyExample.ini) and press OK.

To use this example you will need to overwrite EasyEPD2.ini with MyExample.

For security reasons the .ini file is encrypted and crc checked to prevent unauthorised changing of the file.

## **Example 2:**

### **Defining your system**

EasyEPD2 is designed to give open access to all EPD features and parameters. This is the normal operating condition of EasyEPD2.

If you wish to restrict access to some of these features then you FIRST need to plan your restriction regime.

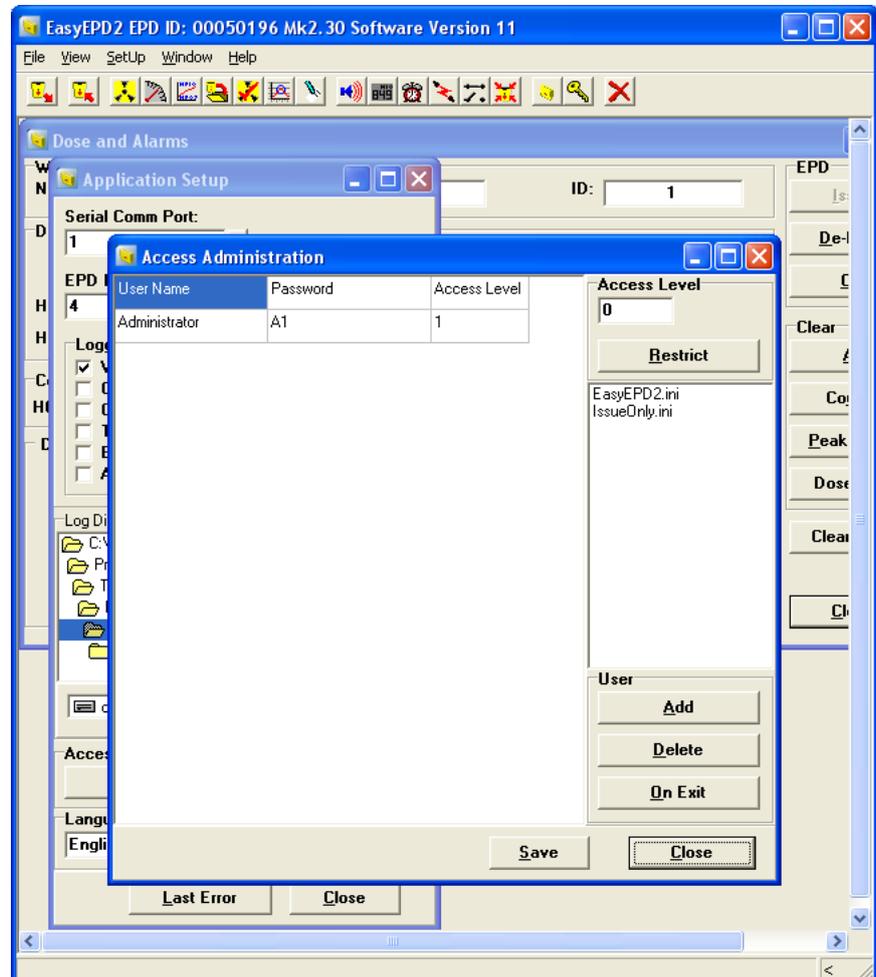
Example:

- a) The EasyEPD2 access control administrator(s) shall have full access to all features including setting up Access Control
- b) Shift Supervisors shall be allowed to set dose and rate alarm thresholds, press the 'Clear All' button, Issue an EPD, Return an EPD, turn off an EPD, Read the Status, Read the Dose Profile.
- c) Sailors may only Issue or Return an EPD.

### Creating an Access Control Administrator

Having decided this you then go into Access Administration and create an Access Control Administrator who will set up the Access control.

Administrators are Access Level 1 and you MUST have at least one access control Administrator.



Now close down EasyEPD2.

Restart EasyEPD2 and you will be prompted to enter a User Name and Password. Enter the Administrator name and Password you have just set up.

EasyEPD2 will run as normal with full control of all features only you now have to log in when the application starts.

### Setting up the First Level of Restrictions

You can now start setting up the restricted access you want:

(Note you must be logged in as Access Control Administrator to do this)

Open up the Access Control form

Set up the first set of restrictions as listed in section b) of the Example above.

Enter '1' in the Access Level to set up the first level of restrictions and press 'Restrict'.

Left click to bring up forms you wish to restrict and right click on the item you wish to restrict.

Example:

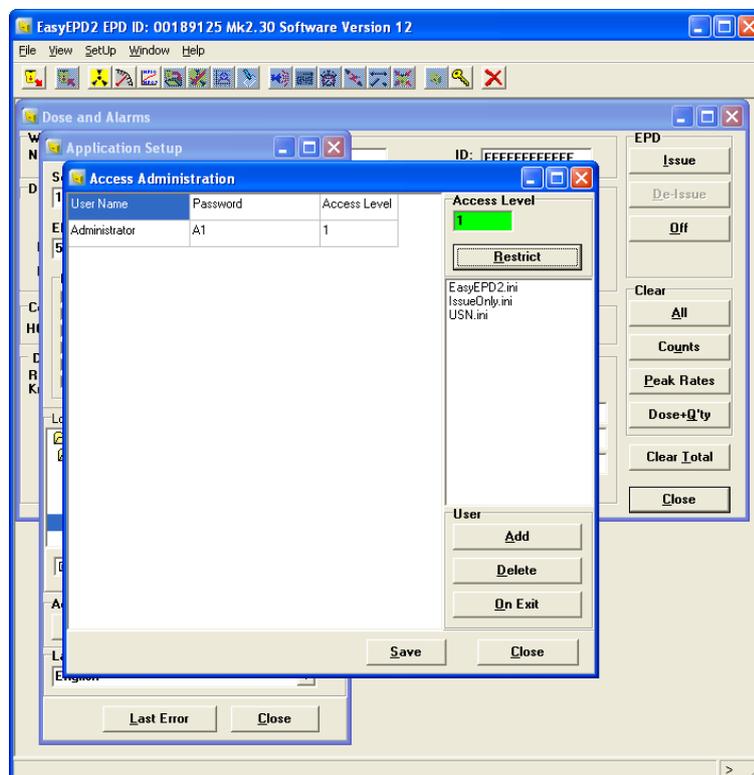
Right click on the main form on each of the tool bar buttons you wish to restrict:

(Right click again to de-select if you make a mistake).

Your menu bar will look something like this:



Your form will look something like this:



Next left click on the Dose and Alarms form (or View Dose + Alarms) and right click on the items you wish to restrict.

**Dose and Alarms**

Wearer Name: John Pattison ID: FFFFFFFFFF

| Dose and Rates | Dose uSv | Total uSv | Rate uSv/h | Peak uSv/h | Peak Rate Time      |
|----------------|----------|-----------|------------|------------|---------------------|
| Hp10           | 0.00     | 7.91      | 0          | 1          | 16/05/2008 00:17:39 |
| Hp07           | 0.00     | 8.02      | 0          | 0          | No Peak             |

Counts Since 15/05/2008 13:37:26  
HG 1043 SG 182 FB 61 BC 59

Dose Quality  
Reset Count = 1  
Knock Time = 2 sec

|          | Dose Alarm Thresholds |  | Rate Alarm Thresholds |          |
|----------|-----------------------|--|-----------------------|----------|
|          | uSv                   |  | Off uSv/h             | On uSv/h |
| Hp10 (1) | 5000.00               |  | 90                    | 100      |
| Hp10 (2) | 100000.00             |  | 1000000               | 1000000  |
| Hp07     | 1000000.00            |  | 1000000               | 1000000  |

Red = Restricted

Italics = Restricted

Once you are happy with your selections then

Left click on the Access Control and 'Save' and overwrite your existing EasyEPD2.ini file.

Now test your changes:

Create a Shift Supervisor and give them access level 2:

**EasyEPD2** EPD ID: 00050196 Mk2.30 Software Version 11

File View SetUp Window Help

**Access Administration**

| User Name        | Password | Access Level |
|------------------|----------|--------------|
| Administrator    | A1       | 1            |
| Shift Supervisor | S1       | 2            |

Access Level: 1

Restrict

EasyEPD2.ini  
IssueOnly.ini

User  
Add  
Delete  
On Exit

Save Close

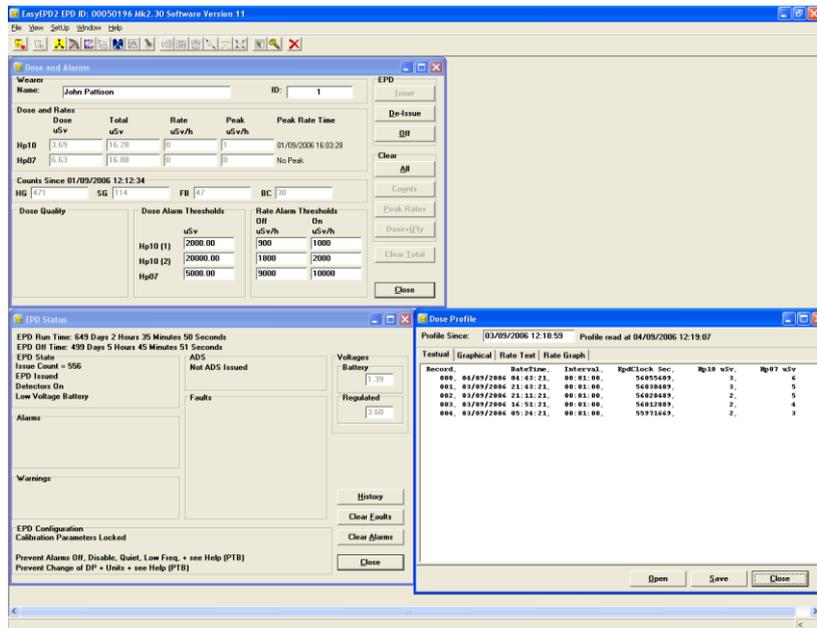
'Close' to save Users

'Save' to save Configuration

**IMPORTANT:** 'Close' the Access Administration form in order to save the Users.

Close EasyEPD2 and open again logging in as Shift Supervisor.

You will now only be able to do the things as listed in paragraph b) above.



### Setting up the Second Level of Restrictions

In this section we are going to set up the restrictions listed in paragraph c) in our Example.

Close EasyEPD2 and open it again logging in as access control Administrator.

Open the Access Control form and type in Access Level 2

Press 'Restrict'

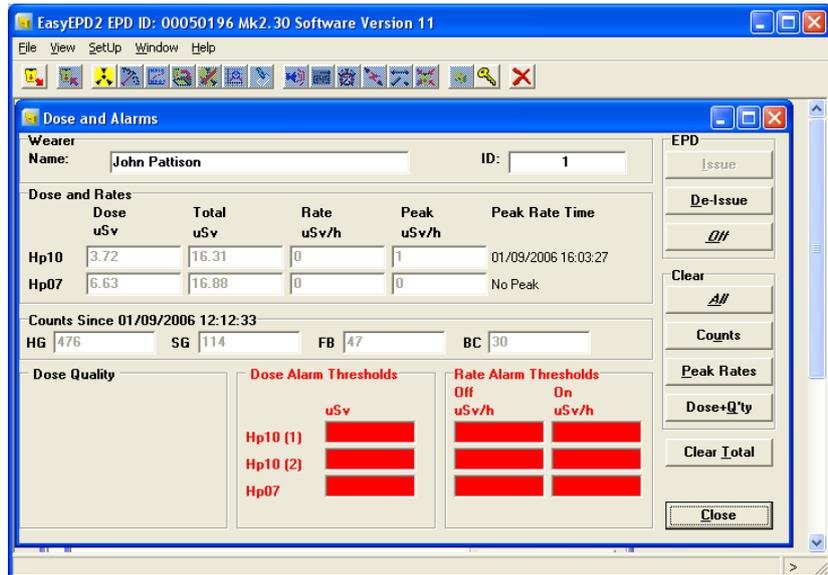
Left click on the Dose and Alarms Form

Right click on 'Clear All'; 'Off/On' buttons to turn them to italics.

Right click on the Dose Alarm Threshold Group Box to turn them all red.

Right click on the Rate Alarm Threshold Group Box to turn them all red.

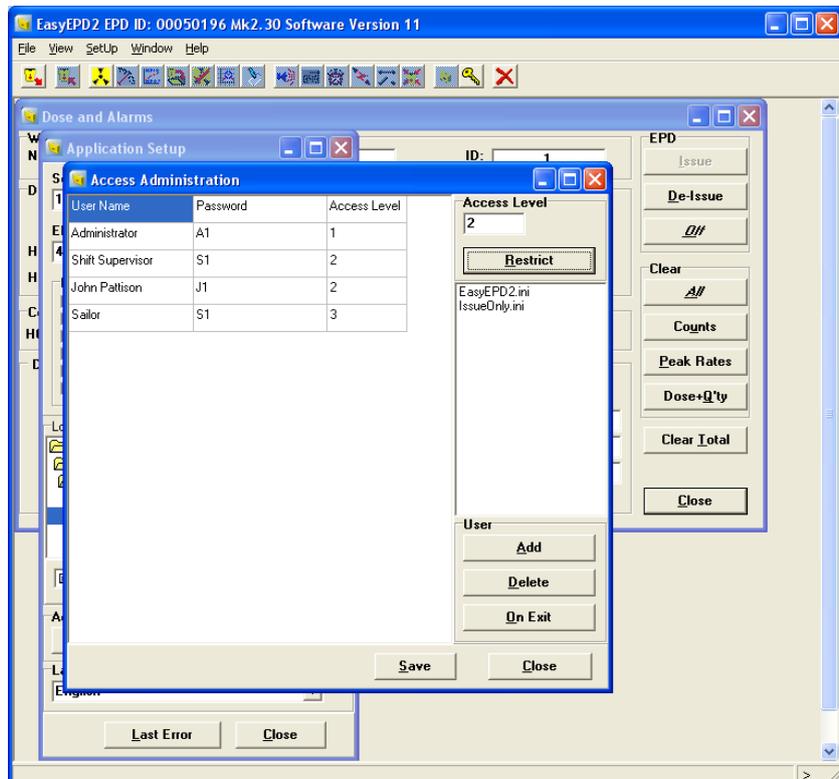
Right click on status and dose profile task bar buttons to set them to grey.



Left click on the Access Control form and then 'Save' overwriting the EasyEPD2.ini file.

Test your changes:

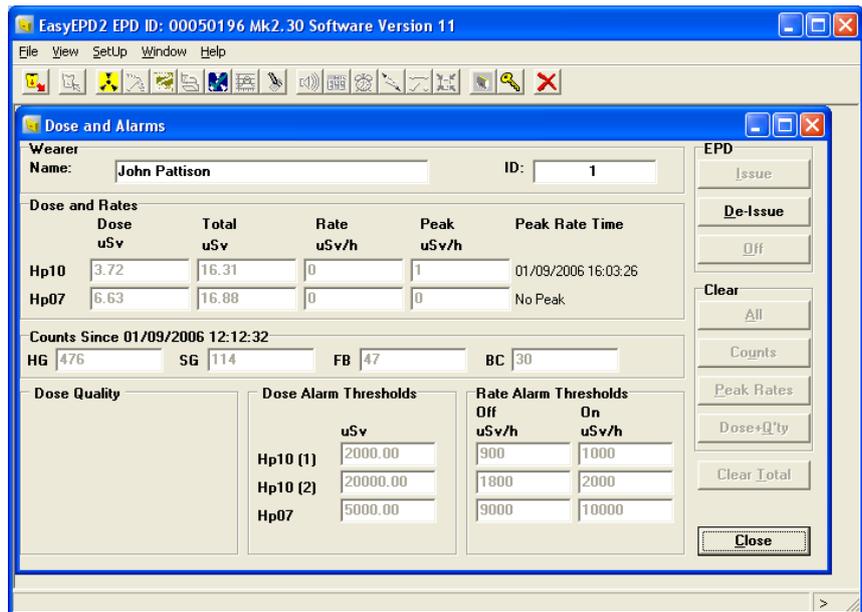
On the Access Control form create a new User with access level 3:



Then 'Close' the form to accept the new user.

Close EasyEPD2 and start it again, logging in as the new user.

This user should now be able to only issue and return an EPD:



### **Changing Settings.**

You can change settings by logging in as Administrator, opening the Access Control form, typing in the access Level you wish to change and pressing restrict. Each time you right click on an item it changes state. After you have set up your form you must then go back to the Access Control form and 'Save'.

Note: TAKE CARE when opening a form to change access restrictions as you are not shown the current restrictions so if you right click on an already restricted item then it changes state but you are unaware of it. Right click again on the same item and it will show you are now restricting it.

### **Conclusion**

Setting up Access control can be problematic but if performed in a measured and controlled manner EasyEPD2 can provide access control.

---

## Date and Time

EasyEPD2 uses the PC 'Short' Date time format for displaying date and time. If two digit year values are selected then you must be aware that the century being displayed may not be the current century.

It is recommended that you set your Windows Short Date Style to four-digit year e.g.: dd/MM/yyyy

This style can be found on your PC Regional Settings Window:

Start – Settings – Control Panel – Regional Settings – Date

The EPD has no concept of real time but maintains a counter which increments every second. EasyEPD2 calculates all dates and times from the PC Clock and adjusts by the appropriate number of seconds as read from the EPD.

On occasions where the PC clock has been changed (eg Daylight saving) EasyEPD2 simply reports dates and times as a number of seconds from NOW. When looking at Dose Profile or Event History the date times back to the change in clock will be accurate and the times prior to the change in clock will be 1 hour (Daylight saving time) out. Similarly times prior to inserting a battery will be inaccurate by up to the duration of battery removal.

You should regularly ensure that the PC clock is correct.

---

You may need administrator privilege to permanently set the Regional Settings.

---

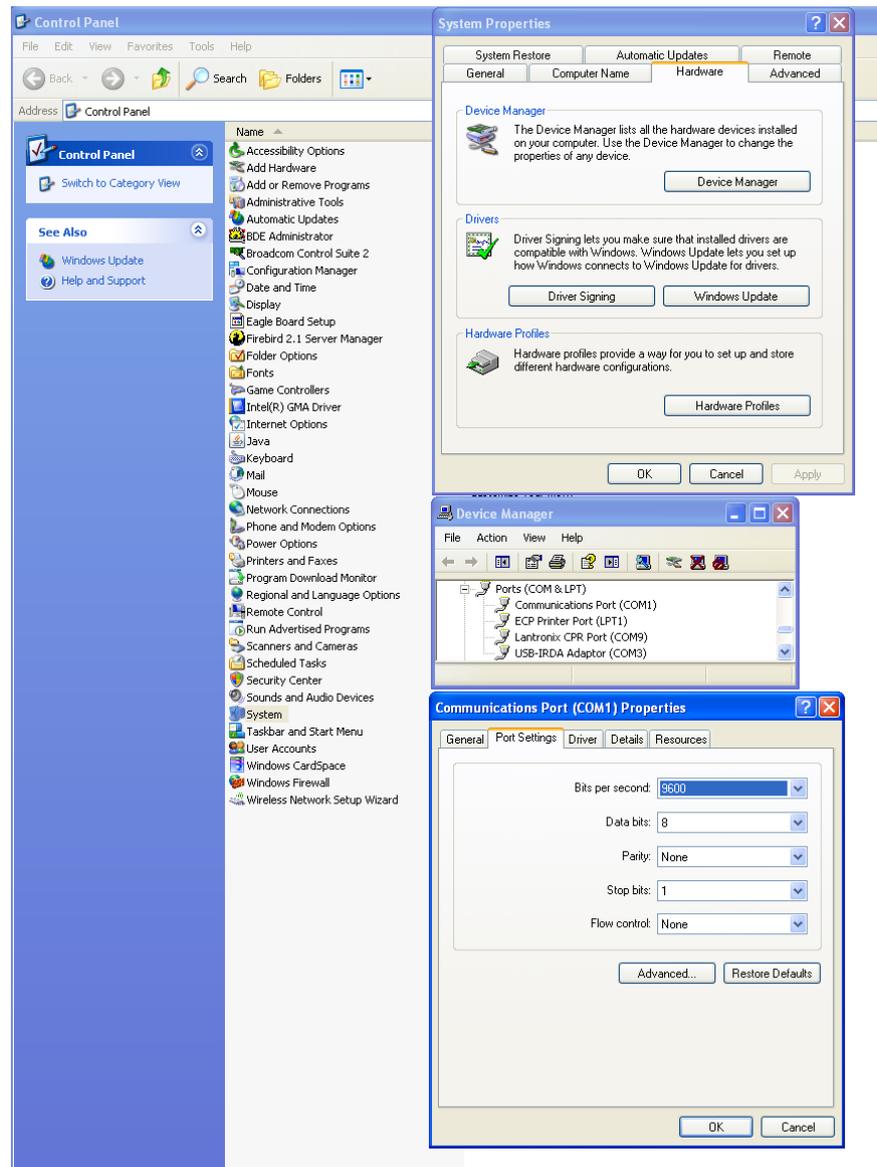
---

## Numbers

EasyEPD2 uses the PC Regional Settings Number format. Any files you save from within EasyEPD2 will use this format. When subsequently opening these files your PC should be set up to use these formats otherwise an error "... is not a valid floating point value" may occur.

# Communications Port

## Communications Ports



The above example is of an PC running Windows XP found under: Start – Control Panel – System – Device Manager - Ports

Where you are using a standard PC Comm port as the interface you will not normally have to perform any set up. EasyEPD2 allows you to select one of the Comm ports on your PC as the Interface.

Either RS232 or USB com ports can be used with appropriate Thermo EPD Readers. The USB reader is supplied with driver software which should be installed before connecting the USB reader to the PC. Integral PC IrDA ports cannot be used to communicate with an EPD.

Blank Page

# Reading

---

## How to read from an EPD

- Place the EPD with its pushbutton facing towards the Ir adapter.
- EasyEPD2 will detect the EPD and read and display data from this EPD in any open window. If no window is open then the Dose and Alarms window will open and data for that window will be read from the EPD.
- Open a window containing the data you wish to read. The data for that window will be read from the EPD when the window is first opened.
- If an EPD is present then the Read button  may be clicked at any time. This will cause a read of data from the EPD and overwrite any existing values currently displayed by EasyEPD2.

Blank Page

# Writing

---

## How to write to an EPD

- Place an EPD with its pushbutton face towards the Ir adapter.
- Read data from the EPD by opening a window that contains the data to be changed.
- Edit the value to be changed. The value will be displayed in blue along with associated values that will be written to the EPD.
- Click on the Write button  and the values will be written. EasyEPD2 follows the write with a read.

Blank Page

# Logging

---

## Logging Description

If logging has been set up as described in the section 'Setting Up EasyEPD2' then the data requested is placed in a semi-colon delimited text file. The results are placed in files named with the date plus units '.log' in a sub-directory 'Log'.

E.g.: 20080312mrem.log for March 12, 2008 with the dose and dose rate results in mrem units.

20080207 $\mu$ SvN2.log for EPD-N2 (2008 February 07<sup>th</sup> microSievert units)

Lines marked 'R' contain data Read when the EPD was first inserted.

Lines marked 'W' contain data when a write to an EPD is performed.

(French: L 'Lire', E 'écrire', German: L 'Lesen', S: 'schreiben', Spanish: L 'Leer', E 'Escribir', Russian: Чтение, Запись)

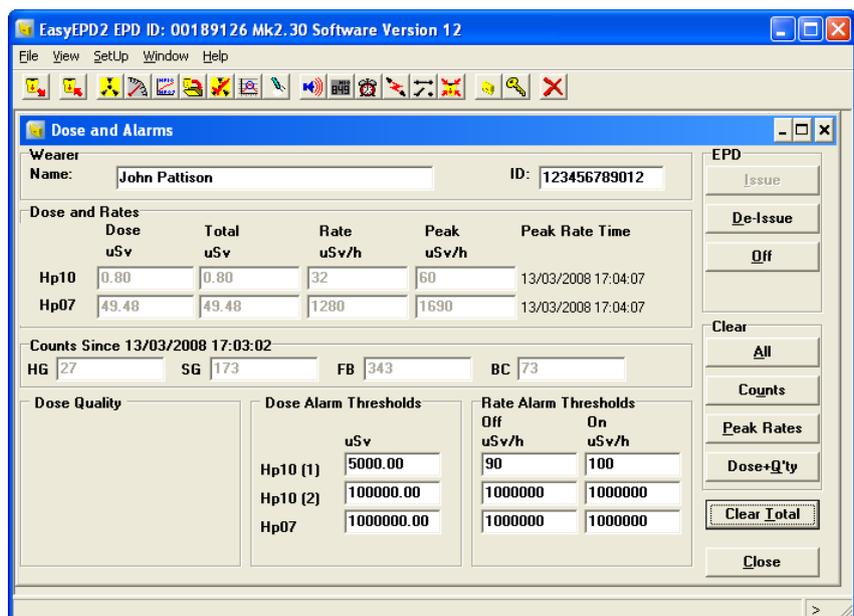
Note: Reads take longer when logging is enabled because all EPD data is read whenever a read occurs so that the data is available to log. You are advised NOT to enable logging if you do not require it.

If you add an item for logging then the data is logged but the header line is only updated when a new log file is created.

Blank Page

# Wearer Dose and Alarms

## The Dose and Alarms Window



This window displays data normally associated with an Issue of an EPD to a person, including the dose status.

## Wearer

|  |   |
|--|---|
| <b>Wearer</b>                                    |   |
| Name: <input type="text" value="John Pattison"/> | ID: <input type="text" value="123456789012"/> |

### Wearer Name

This is a string of up to 22 characters

UTF8 encoding is used so that non-ascii characters can be used. The store is actually 22 bytes and the data is adjusted to up to 22 bytes and truncated so as to fit a maximum of 22 bytes using whole characters.

|   |   |
|---|---|
| <b>Работник</b>                               |   |
| Имя: <input type="text" value="Джон Паттис"/> | ID: <input type="text" value="123456789012"/> |

### Wearer ID

An issued EPD should have a string of up to 12 decimal numbers. By convention an un-issued EPD wearer ID is all 'F's and this is the value set by the EPD when the Return button is pressed.

## Dose and Rates

| Dose and Rates |          |           |            |            |                     |
|----------------|----------|-----------|------------|------------|---------------------|
|                | Dose uSv | Total uSv | Rate uSv/h | Peak uSv/h | Peak Rate Time      |
| Hp10           | 7.98     | 7.98      | 0          | 2599       | 23/09/1998 09:15:00 |
| Hp07           | 39.28    | 39.28     | 1          | 2776       | 23/09/1998 09:15:00 |

| Dose and Rates |           |            |             |             |                     |
|----------------|-----------|------------|-------------|-------------|---------------------|
|                | Dose mrem | Total mrem | Rate mrem/h | Peak mrem/h | Peak Rate Time      |
| DDE            | 1.923     | 1.923      | 511.4       | 511.4       | 23/09/1998 10:22:32 |
| SDE            | 20.828    | 20.828     | 756.6       | 756.6       | 23/09/1998 10:22:32 |

| Dose and Rates |          |           |            |            |                   |
|----------------|----------|-----------|------------|------------|-------------------|
|                | Dose cGy | Total cGy | Rate cGy/h | Peak cGy/h | Peak Rate Time    |
| Hp10           | 0.000227 | 0.000684  | 0          | 0.013      | 08/09/00 09:22:07 |
| Hp07           | 0.015927 | 0.024602  | 0          | 0.879      | 08/09/00 09:22:07 |

Blue indicates special DoseOnAlarm configured EPD which is currently not accumulating dose and only accumulates dose after a dose rate alarm has occurred or the Dose Accumulation has been enabled.

| Dose and Rates |          |           |            |            |                |
|----------------|----------|-----------|------------|------------|----------------|
|                | Dose uSv | Total uSv | Rate uSv/h | Peak uSv/h | Peak Rate Time |
| Hp10           | 0.00     | 0.00      | 0          | 0          | No Peak        |
| Hp07           | 0.00     | 0.00      | 0          | 0          | No Peak        |

Yellow indicates special DoseOnAlarm configured EPD which is enabled for accumulation of dose.

|      | Dose uSv | Total uSv | Rate uSv/h | Peak uSv/h | Peak Rate Time      |
|------|----------|-----------|------------|------------|---------------------|
| Hp10 | 0.00     | 3.02      | 0          | 1          | 12/03/2008 10:56:08 |
| Hp07 | 0.00     | 3.67      | 0          | 0          | No Peak             |

EPD-N2:

| Dose and Rates |       |       |       |       |                     |
|----------------|-------|-------|-------|-------|---------------------|
|                | Dose  | Total | Rate  | Peak  | Peak Rate Time      |
| HpG+HpN        | uSv   | uSv   | uSv/h | uSv/h |                     |
| HpG            | 6.38  | 12.89 | 0     | 110   | 30/05/2002 16:43:01 |
| HpN            | 31.13 | 32.16 | 320   | 550   | 30/05/2002 16:43:13 |

**Hp10 (or DDE)**

This is the Personal, Penetrating or Deep Dose Equivalent at a depth of 10mm of soft tissue, Hp(10).

**Hp07 (or SDE)**

This is the Personal, Superficial, Shallow or Skin Dose Equivalent at a depth of 0.07mm of soft tissue, Hp(0.07).

**HpG and HpN**

These are the Gamma and Neutron components of Hp(10).

**Dose (µSv or mrem or cGy)**

The 'Dose' is regarded as a short-term record of dose received, usually associated with the 'Issue' of an EPD. This is the value that is compared with the dose alarm thresholds for raising dose alarms. The EPD records dose in units of 1/64 µSv and EasyEPD2 converts this to the nearest 0.01 µSv (0.001 mrem or 0.000001 cGy).

Note: Some values of cGy are displayed in scientific notation. Eg: 5E-6 cGy = 0.000005 cGy

**Total Dose (µSv or mrem or cGy)**

The 'Total Dose' is a store provided for long-term record of dose accumulated by an EPD.

**Rate (µSv/h or mrem/h or cGy/h)**

This is the dose rate calculated by the EPD at the time of the Read.

**Peak (µSv/h or mrem/h or cGy/h)**

This is the highest dose rate calculated by the EPD since this value was last cleared.

**Peak Rate Time**

This is the time at which the peak dose rate occurred. 'No Peak' is displayed if there has not been a peak recorded since the peak dose rate was last cleared.

Note: Date and time are calculated by taking the present PC clock date and time and subtracting the number of seconds that the EPD has been operating since the peak occurred. Thus this value will only be as accurate as your PC clock and assumes that the EPD has been powered (and not reset) for the entire time since the peak occurred.

---

## Counts Since

| Counts Since 23/09/1998 09:14:42 |     |     |    |  |
|----------------------------------|-----|-----|----|--|
| HG                               | SG  | FB  | BC |  |
| 691                              | 572 | 170 | 0  |  |

EPD-BG

|                                  |     |    |    |       |
|----------------------------------|-----|----|----|-------|
| Counts Since 22/04/2002 13:48:00 |     |    |    |       |
| HG                               | 264 | SG | 58 | NU 17 |
|                                  |     |    |    | NC 16 |

EPD-N

|                                  |      |    |      |         |
|----------------------------------|------|----|------|---------|
| Counts Since 22/04/2002 13:59:13 |      |    |      |         |
| HG                               | 9622 | SG | 6806 | FN 82   |
|                                  |      |    |      | AN 3521 |

EPD-N2

|                                  |       |
|----------------------------------|-------|
| Counts Since 10/09/2009 11:17:38 |       |
| HG                               | 34141 |
| SG                               | 8064  |

EPD-G

This displays the time at which the EPD counts were cleared and the counts accrued by the EPD since that time. (Note: counts are not actually cleared but a snap-shot (or baseline) taken. The value displayed here is the difference between the snapshot and the actual counter value.)

The EPD has four counters:

|        | 1  | 2  | 3        | 4        |
|--------|----|----|----------|----------|
| EPD    | HG | SG | FB       | BC       |
| EPD-G  | HG | SG | Not used | Not Used |
| EPD-N2 | HG | SG | FN       | AN.      |

The values on these counters are used in conjunction with the calibration constants to calculate the equivalent Doses and dose rates.

## Dose Quality

|  |
|--|
| <p><b>Dose Quality</b><br/> Reset Count<br/> KnockTime Secs<br/> Dose Over-range<br/> Rate Over-range<br/> Abuse Warning<br/> CRC Failure<br/> Counter Over-range<br/> Low Volts<br/> Detector Fault</p> |
|--|

This field is normally blank indicating that the dose values are OK. If one of the Dose Quality items is displayed then an assessment of the dose value should be made. This status belongs to the dose reading and is cleared using the Clear Dose+Q'ty button.

### Reset Count

This is a count of the number of times the EPD has been reset since the Dose Quality was last cleared.

### Knock Time Secs

This is the number of seconds that dose substitution has occurred because the EPD has been knocked or dropped.

### Dose Over-range

This indicates that the Dose has exceeded 1Sv (100 rem or cGy) (EPD-BG v12, EPD-N2 v4) or 10Sv (1rem or cGy) (EPD-BG v13+, EPD-N2

v5+). Dose continues to accumulate above this value to a maximum of 16777215 $\mu$ Sv (1677721.5 mrem or 1677.7215 cGy).

**Rate Over-range**

This indicates that the Dose Rate has exceeded 1Sv/h (100 rem/h or cGy/h). Dose Rate continues to be displayed above this value.

**Abuse Warning**

This indicates that the EPD has been knocked continuously for more than 15 seconds.

**CRC Failure**

This is an integrity check on a set of data, which indicates that the EPD detected a checksum error in the Dose data. Checksum failures are corrected by retrieving the last stored dose from secure store, which means that up to 15 minutes of dose may be lost.

**Counter Over-range**

Counts on at least one detector exceeded the maximum value expected. (This depends on the EPD Type but is of in the region of 300000 counts/second on the gamma counters and 26000 counts/second on the beta counters for the standard EPD Mk2)

**Low Volts**

Indicates that the voltage has dipped low since the dose quality factors were last cleared.

**Detector Fault**

Indicates that a detector fault has occurred since the dose quality factors were last cleared.

---

## Alarm Thresholds ( $\mu$ Sv or mrem or cGy)

| Dose Alarm Thresholds |          | Rate Alarm Thresholds |               |
|-----------------------|----------|-----------------------|---------------|
|                       | $\mu$ Sv | Off $\mu$ Sv/h        | On $\mu$ Sv/h |
| Hp10 (1)              | 3210.00  | 211                   | 234           |
| Hp10 (2)              | 6543.20  | 282                   | 305           |
| Hp07                  | 180.00   | 393                   | 426           |

| Dose Alarm Thresholds |        | Rate Alarm Thresholds |           |
|-----------------------|--------|-----------------------|-----------|
|                       | mrem   | Off mrem/h            | On mrem/h |
| DDE (1)               | 321    | 21.1                  | 23.4      |
| DDE (2)               | 654.32 | 28.2                  | 30.5      |
| SDE                   | 18     | 39.3                  | 42.6      |

| Dose Alarm Thresholds |          | Rate Alarm Thresholds |          |
|-----------------------|----------|-----------------------|----------|
|                       | cGy      | Off cGy/h             | On cGy/h |
| Hp10 (1)              | 0.321    | 0.0211                | 0.0234   |
| Hp10 (2)              | 0.654319 | 0.0282                | 0.0305   |
| Hp07                  | 0.018    | 0.0393                | 0.0426   |

EPD-N2:

| Dose Alarm Thresholds |       | Rate Alarm Thresholds |       |
|-----------------------|-------|-----------------------|-------|
| Red Indicates Alarm   |       | Off                   | On    |
|                       | uSv   | uSv/h                 | uSv/h |
| HpG (1)               | 5.00  | 900                   | 1000  |
| HpG (2)               |       | 1800                  | 2000  |
| HpN                   | 10.00 | 9000                  | 10000 |
| HpG+HpN               | 12.00 |                       |       |

When the 'Dose' equals or exceeds the Dose Alarm Threshold then the EPD will operate the appropriate alarm. (See section Alarm Controls for details of Alarm settings)

When the 'Dose Rate' equals or exceeds the Rate Alarm On Threshold then the EPD will operate the appropriate alarm.

| Rate Alarm Thresholds |         | Rate Alarm Thresholds |         |
|-----------------------|---------|-----------------------|---------|
| Off                   | On      | Off                   | On      |
| uSv/h                 | uSv/h   | uSv/h                 | uSv/h   |
| 63                    | 70      | 63                    | 70      |
| 1000000               | 1000000 | 1000000               | 1000000 |
| 1800                  | 2000    | 1800                  | 2000    |

Red Indicates Alarm

Red indicates that the Epd is currently in rate alarm.

Yellow indicates that the dose rate latched alarm status is set. This will remain yellow until the alarm condition is cleared from the EPD Status form 'Clear Alarms' button.

When the 'Dose Rate' is less than the Rate Alarm Off Threshold then the EPD will cease the appropriate alarm.

The Rate alarm Off Threshold may not exceed the On Threshold.

Note: Threshold (1) is normally set below threshold (2) because threshold (2) is a higher priority in the alarm structure, however there is no restriction on the alarm thresholds.

---

## Clear



### **Dose+Q'ty**

Clear the Dose values and clear the Dose Quality Factors. (Note: Does not clear the Total Dose values)

### **Peak Rates**

Clear the Peak dose rates.

### **Counts**

Make a record (baseline) of the four counter values (effectively clearing the counts).

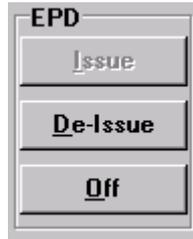
### **All**

Perform all of the above actions. (Note: Does not clear the Total Dose values)

### **Clear Total**

Clear the Total dose values.

## EPD Control



### Issue

Clicking this button causes the EPD to be issued performing the following:

- Clear Peaks
- Clear Dose (but not total dose)
- Clear counts
- Clear Latched alarms (see Clear Alarms Button section)
- Clear Fault Flags (see Clear Faults Button section)
- Write Dose and Rate Alarm Thresholds
- Write Wearer Name and Wearer Id

If the EPD is removed during this operation the EPD will alarm.

Note: The Wearer ID should be a valid number between 1 and 999999999999.

The EPD increments its Issue Count which EasyEPD2 displays in the Status Window.

The EPD issue process that occurs when the Issue button (on the Dose and Alarms form) is pressed has been modified in order to ensure that the EPD has switched on properly and that the Detectors are operating properly. EPDs should normally now be set to Issue Causes On = no and Issue causes Detector test = no because these functions are now initiated via comms commands during the Issue process described here.

A valid Wearer ID must be entered prior to pressing the issue button.

The status of the EPD is read and the EPD is switched on if it is off. The EPD is then instructed to display horizontal parallel bars and to run detector test. The status is again read to check that this test has been successful, if not the test is repeated once more. If the test was successful then the EPD is issued, otherwise an error message is displayed. The EPD is instructed to display its default display.

If the EPD is removed whilst the tests are in progress then the parallel bars remain displayed as a warning to the user.

NOTE: Issue Causes On and On Causes Detector Test are EPD states and do NOT influence the operation of the new issue process.

The new issue process takes approximately 8 seconds if no retries occur.

### Issuing an ADS Issued EPD

If the EPD is already ADS issued then the entered Wearer Name must be the same as the ADS Wearer Name. This ensures that the EPD is only issued to the person authorised by the ADS. (Wearer id and ADS wearer id do not have to be the same). EasyEPD2 does not compare

Wearer Names, but the EPD will return an error if you try to write an invalid Wearer Name to an ADS issued EPD.

**De-Issue**

Clicking this button causes the EPD to be De-Issued.

De-Issuing the EPD sets the Issued Flag to False and sets the WearerID to FFFFFFFFFF.

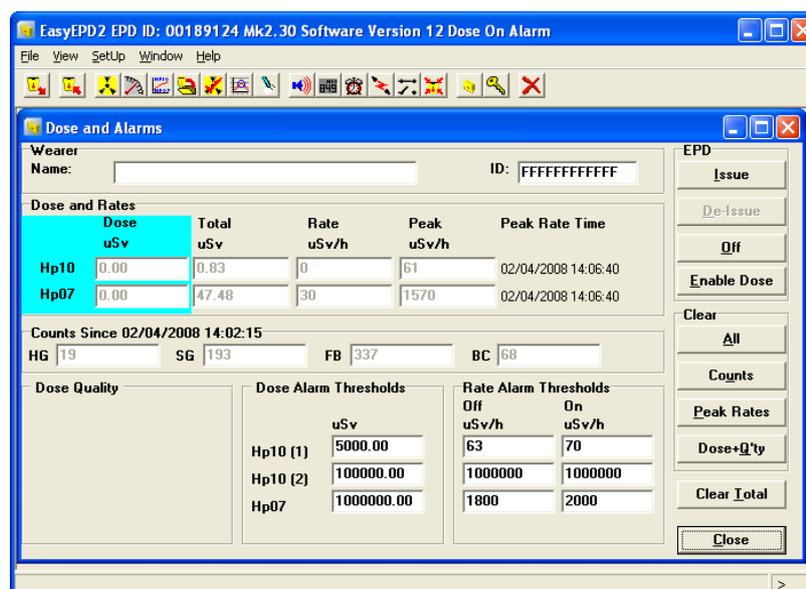
**On/Off**

The EPD has a power conservation mode in which the detectors are turned off. In this mode no dose is calculated.

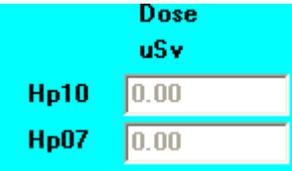
On – turns the EPD Detectors On

Off – turns the EPD Detectors Off

## DoseOnAlarm (Responder)



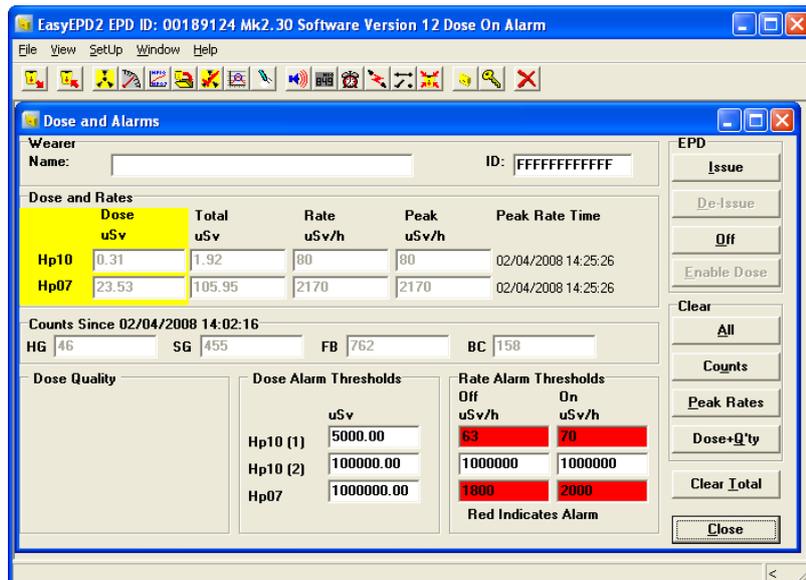
EasyEPD2 identifies an EPD that has been FACTORY configured as a DoseOnAlarm (Responder) EPD in three ways:

- Colour highlight of Dose 
- 'Enable Dose' Button 
- Caption bar 

The EPD continues to accumulate counts, Total Dose, and to calculate Dose Rates as normal. Dose is not accumulated until the dose rate alarm is exceeded or the 'Enable Dose' button is clicked.

Once dose accumulation is enabled EasyEPD2 indicates this in two ways:

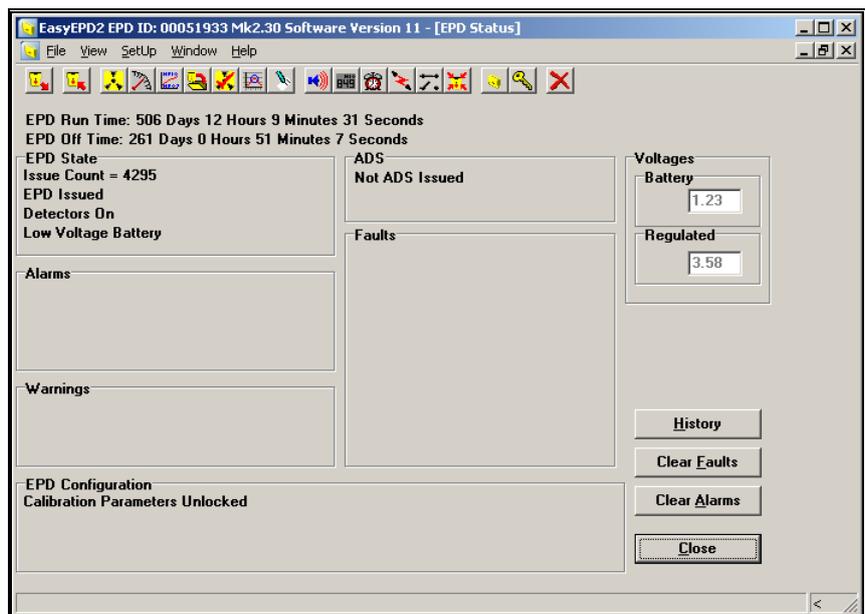
- Enable Dose Button is disabled 
- Colour Highlight of Dose is Yellow



Note: The Dose continues to accumulate even after the dose rate alarm has ceased. It will continue to accumulate until the EPD Dose and Quality is cleared, at which point you should also clear the latched alarms from the status form 'Clear Alarms' button.

# Status

## The Status Window



### EPD Run Time

The EPD Clock (seconds) converted into Days, Hours, Minutes, Seconds.

Note: When power is removed or a reset occurs then the EPD Clock reverts to a value up to 15 minutes prior to the value on power loss or reset.

### EPD Off Time

The number of seconds that the Detectors have been switched off (while the power has been present) converted into Days, Hours, Minutes, and Seconds.

## EPD State

```

EPD State
Issue Count
Issued
DetectorsOn
Calibration Parameters Locked
Converter On
    
```

From gamma/beta EPD version 11; EPD-N2 version 3:

```

EPD State
Issue Count = 44
EPD Issued
Detectors On
Calibration Parameters Unlocked
High Voltage Battery
    
```

### Issue Count

The number of times the EPD has been Issued.

### Issued

The present state of the EPD Issued flag, either EPD Issued or EPD NOT Issued.

### Detectors On

The present state of the EPDs power conservation mode. On or Off.

### Converter On

Converter On/Off indication occurs for EPD-N2 versions 1 and 2 and gamma/beta EPD software version 8 and 9. Other versions do not have this indicator.

The converter is used to ensure that sufficient voltage is available in the EPD for all situations and once on is only switched off when a battery load test has been completed and the voltage is above the levels required by the EPD.

Some of the conditions under which the converter will be on are: during battery load tests, during and after alarms, when using alkaline batteries and later in life for lithium batteries, ie you will only see this Off for new lithium batteries.

### Low Voltage Battery / High Voltage Battery

Available from gamma/beta EPD version 11+; EPD-N2 version 3.

This indicates that the battery voltage is either Lower or Higher than the Battery Type Discriminator voltage. (See Alarm Controls)

## EPD Configuration

|  |
|--|
| <p>EPD Configuration<br/> <b>Calibration Parameters Locked</b><br/> <b>Prevent Dose Clear From Switch</b><br/> <b>Prevent Alarms Off, Disable, Quiet, Low Freq. + see Help</b><br/> <b>Prevent Change of DP + Units + see Help</b><br/> <b>Dose On Alarm</b></p> |
|--|

### Calibration Parameters Locked

Some customers require the ability to change the EPD calibration factors. For those units the Calibration parameters are Unlocked.

### Prevent Dose Clear From Switch

Some customers require the ability to clear the Dose by using one of the display configurations and using the switch. EPDs can be factory configured to enable or disable this function.

### Prevent Alarms Off, Disable, Quiet, Low Freq, + see Help

This ensures that Alarm sound level is >85dB(A) at 30cm from the EPD.

EPDs can be configured such that the alarms may not be changed to off, disabled or set to quiet, or set to low frequency. The alarm times may not be less than 10 minutes (they may be 0 = continuous).

EPDs are factory configured to the required Alarm Configuration Settings and then set up such that any subsequent attempt to configure them off, disabled or quiet, low frequency or change the settings listed above, will NOT be allowed. EasyEPD2 gives the error message 2 28 if an attempt to write invalid values occurs. This configuration is required for PTB approved EPDs.

### Prevent Change of DP + Units + see Help

EPDs can be configured such that the settings for decimal places, dose units, off display, wearer display, overrange flashing, battery alarm levels and 1 minute logging, cannot be changed.

EPDs are factory configured to the required Display Settings and then 'locked' in that condition. This configuration is required for PTB approved EPDs.

The following features may not be changed from the factory configuration Display Set Up settings: Decimal Places, Units, Off display, Wearer Display, Overage Flashing.

The following features may not be changed from the factory configuration Alarm Control settings: Battery alarm level 1, Battery Alarm Level 2, Battery Type Discriminator, Regulated voltage alarm level.

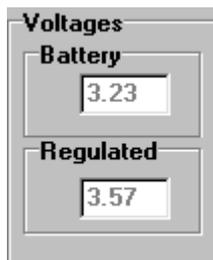
## DoseOnAlarm (Responder)

Some EPDs can be configured to operate such that they only accumulate dose after a dose rate alarm has occurred or after dose accumulation is enabled.

Dose accumulation ceases on these EPDs when dose is cleared. Accumulation bar shows on the EPD display (to the right of the heartbeat in the top right hand corner of the EPD display) and EasyEPD2 highlights the dose values in Blue when an EPD is not accumulating dose. The bar is not displayed when the EPD is accumulating dose normally and EasyEPD2 highlights the dose values in Yellow.

## Voltages

Available from gamma/beta EPD version 11; EPD-N2 version 3.



This indicates the internal voltage last measured by the EPD.

The EPD measures these to a resolution of 16mV and EasyEPD2 displays the voltage to 2 decimal places.

See section Alarm Controls for details of voltage alarm operation and hysteresis.

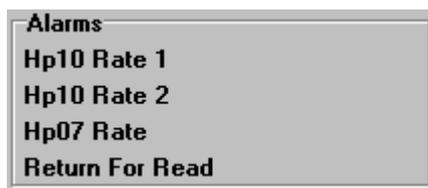
### Battery Voltage

This is the value that the EPD measured when the Battery Load Test was last successfully run. (Note: Battery load test is not run during comms).

### Regulated Voltage

This is the regulated internal voltage maintained within the EPD. This is measured by the EPD at least every 14 seconds and at least every 1 second under high processing conditions (such as during comms).

## Alarms



### Hp10 Rate 1

The dose rate has exceeded the dose rate alarm threshold Hp10(1) since the alarms were last cleared.

### Hp10 Rate 2

The dose rate has exceeded the dose rate alarm threshold Hp10(2) since the alarms were last cleared.

### Hp07 Rate

The dose rate has exceeded the dose rate alarm threshold Hp07 since the alarms were last cleared.

### Return For Read

The EPD clock has exceeded the Return for read time.

## Clear Alarms Button

Clears the alarm flags within the EPD.

Note: the alarms will only clear if the Alarm condition is no longer present.

## Faults



### Event Logged

An event (possibly but not necessarily a fault) has been logged in the EPDs event store. Reading the History clears this indicator.

### Connection Fail

Communications was terminated before all data was written. (The EPD will be displaying horizontal bars when in this condition).

### Cal Factors Bad

The EPD calibration factors have failed a CRC check and cannot be recovered from secure store.

### Eeprom Fail

An un-recoverable secure store failure has occurred. Typically this is caused by a worn out sector when all spare sectors have been re-allocated.

### Detector Test Fail

The detector test has been run and the number of counts received were less than expected.

### Detector Threshold Fail.

The detector thresholds failed to load successfully.

### Radio Fail

Reserved for future use

### Other Fault

A fault has occurred causing the EPD to reset. See the History for details.

### Disabled

The EPD is not calculating Dose.

### Bad Sectors

The number of bad secure store sectors. (There is a maximum of 9 spare sectors).

The EPD can happily operate with bad sectors.

## Clear Faults Button

Clears the fault flags within the EPD. (Note: The issue process also performs this function). This requests the EPD to clear the fault flags displayed in the Faults window of EasyEPD2 except for the Event Logged bit which is only cleared when the Event History is read.

## ADS



### ADS Issued

The EPD has been ADS issued by an ADS. The EPD may not be issued on the dose and alarms window unless the Wearer Name is the same as the ADS Wearer Name.

### EPD may be switched off

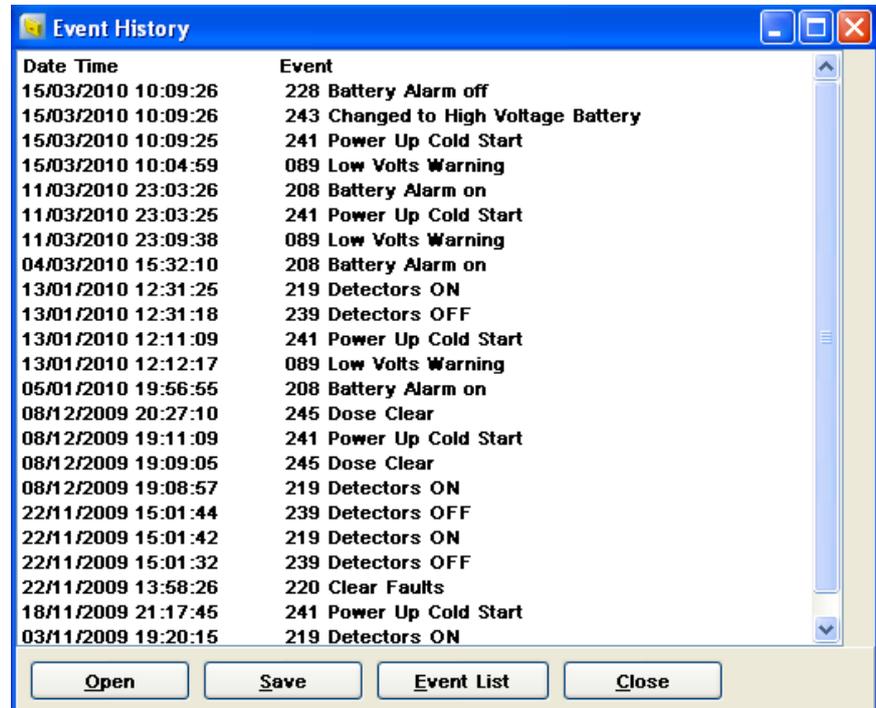
The EPD may or may not be switched 'Off' whilst ADS Issued.

## History

The EPD logs up to 23 Events in non-volatile store together with a time stamp.

This is only valid for approximately 194 days (16777215 seconds), after 194 days of EPD operation this store's time wraps. EasyEPD2 attempts to interpret event times in a descending order of time within these limitations.

'220 Clear Faults' event occurs every time the EPD receives a Clear Faults command, so 23 of these will effectively clear out the history store.



### Event List

Displays a List of Event codes and their meanings.

### Save

Allows the History to be saved to a file.

### Open

Allows a previously saved History file to be read.

Blank Page

# Dose Profile

## Dose Profile Textual Window

| Record | DateTime            | Interval | EpdClock Sec | Hp10 uSv | Hp07 uSv |
|--------|---------------------|----------|--------------|----------|----------|
| 000    | 02/03/2005 11:40:27 | 00:01:00 | 43830081     | 3        | 798      |
| 001    | 02/03/2005 11:39:27 | 00:01:00 | 43830021     | 3        | 776      |
| 002    | 02/03/2005 11:38:27 | 00:01:00 | 43829961     | 3        | 741      |
| 003    | 02/03/2005 11:37:27 | 00:01:00 | 43829901     | 3        | 700      |
| 004    | 02/03/2005 11:36:27 | 00:01:00 | 43829841     | 2        | 662      |
| 005    | 02/03/2005 11:35:27 | 00:01:00 | 43829781     | 2        | 621      |
| 006    | 02/03/2005 11:34:27 | 00:01:00 | 43829721     | 2        | 580      |
| 007    | 02/03/2005 11:33:27 | 00:01:00 | 43829661     | 2        | 543      |
| 008    | 02/03/2005 11:32:27 | 00:01:00 | 43829601     | 2        | 502      |
| 009    | 02/03/2005 11:31:27 | 00:01:00 | 43829541     | 2        | 458      |
| 010    | 02/03/2005 11:30:27 | 00:01:00 | 43829481     | 1        | 418      |
| 011    | 02/03/2005 11:29:27 | 00:01:00 | 43829421     | 1        | 373      |
| 012    | 02/03/2005 11:28:27 | 00:01:00 | 43829361     | 1        | 330      |
| 013    | 02/03/2005 11:27:27 | 00:01:00 | 43829301     | 1        | 291      |
| 014    | 02/03/2005 11:26:27 | 00:01:00 | 43829241     | 1        | 254      |
| 015    | 02/03/2005 11:25:27 | 00:01:00 | 43829181     | 1        | 218      |
| 016    | 02/03/2005 11:24:27 | 00:01:00 | 43829121     | 0        | 177      |
| 017    | 02/03/2005 11:23:27 | 00:01:00 | 43829061     | 0        | 134      |
| 018    | 02/03/2005 11:22:27 | 00:01:00 | 43829001     | 0        | 92       |
| 019    | 02/03/2005 11:21:27 | 00:01:00 | 43828941     | 0        | 50       |
| 020    | 02/03/2005 11:20:27 | 00:01:00 | 43828881     | 0        | 16       |
| 021    | 02/03/2005 10:46:19 | 00:01:00 | 43826833     | 0        | 0        |

The EPD stores changes in Hp10 and Hp07 dose in non-volatile storage so that a profile of the dose over time can be recreated. The interval between stores is set up on the 'Set up Events' window. The interval can be set between 2 seconds and 36 Hours in 2 second steps.

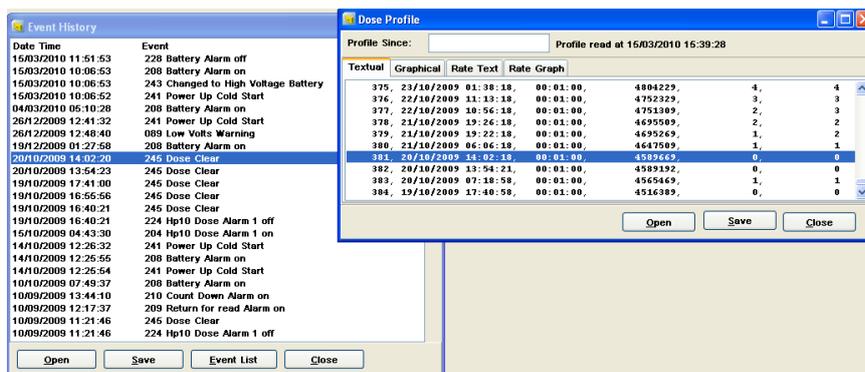
The Date Time is calculated based on the current PC clock and therefore is only as accurate as that clock. The Date Time is only valid if the EPD has been powered and not reset during the entire duration of the profile.

Note: Dose usually increases. A decrease in dose will be due to the Dose Clear command where the dose is set to 0 or due to an EPD reset where the dose will be reset to the value at the last log which could be up to 15 minutes previously.

### Additional Profile Points:

EPD-BG, EPD-G v14 and EPD-N2 v5 have additional dose profile points inserted on Dose Clear, EPD Off and De-Issue. This aids aligning dose profile with an Issue and Return dose control system times where a clear on issue and a read on de-issue are likely to occur and be recorded in the Issue and Return system database.

Also alignment of the Event History and the Dose Profile is made easier:



**Textual Tab**

Displays the data in tabular form.

**Graphical Tab**

Displays the dose profile graphically.

**Rate Text Tab**

Displays a calculation of the dose rate in tabular form. (Note: this is the average dose rate calculated from the points stored in the dose profile information and is NOT the rate displayed on the EPD.) The rate is calculated as the difference in dose between samples divided by the time between the samples, ignoring samples where the dose has not changed and reporting zero where dose has decreased.

**Rate Graph Tab**

Displays the calculated rate graphically.

**Profile Since**

Defaults to one day, you may enter any other valid date and time or blank if you want all the dose profile.

**Save**

Allows the dose profile text to be saved to a file.

**Open**

Allows a previously saved dose profile file to be opened and viewed.

**Additional features on the Graphical Tabs**



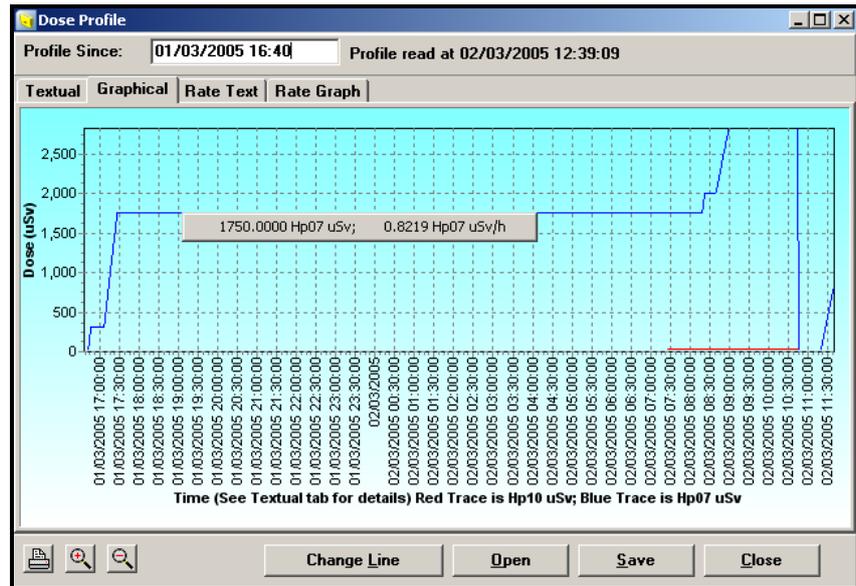
Print, Zoom In, Zoom Out.

Right click to centre. Left click on the line to see the Dose and Dose Rate of the previous point on the graph.



Cycles through Hp10, Hp07, both (see the x-axis caption for details of which is being displayed).

## Dose Profile Graphical Window



The graphical tab displays the same information as the textual tab. The red line is the Hp10 Dose (DDE) and the blue line is the Hp07 Dose (SDE).

Straight-line interpolation between points is used and so the textual information should be used for obtaining precise dose at specific times.

A full screen view can be obtained using the Maximise button on the caption bar. 

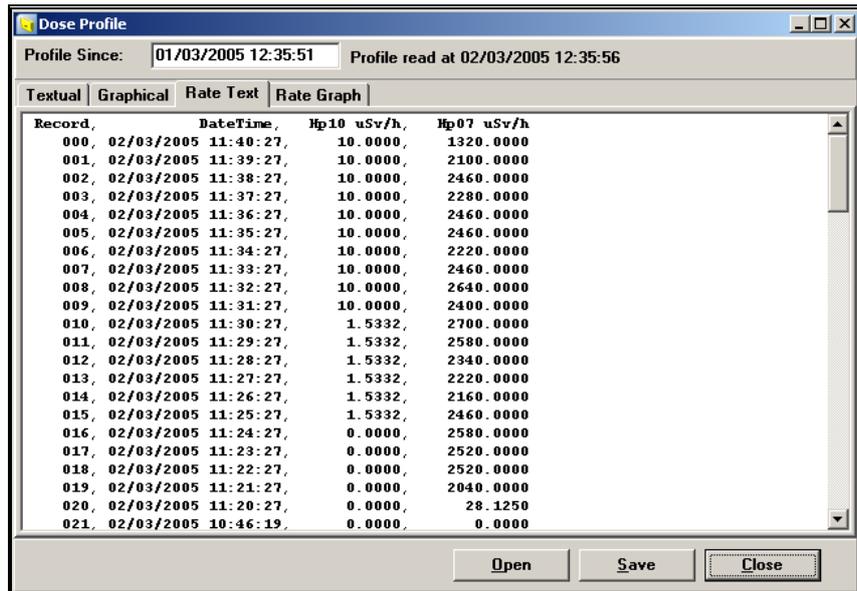
Zoom in on an area of a graph: click at the top left point of a rectangle describing the part of the graph required and drag to the bottom right corner of the rectangle.

Zoom out again by drawing a rectangle from bottom right to top left.

'Pan' by right clicking and moving the mouse in the direction you wish to view the graph details.

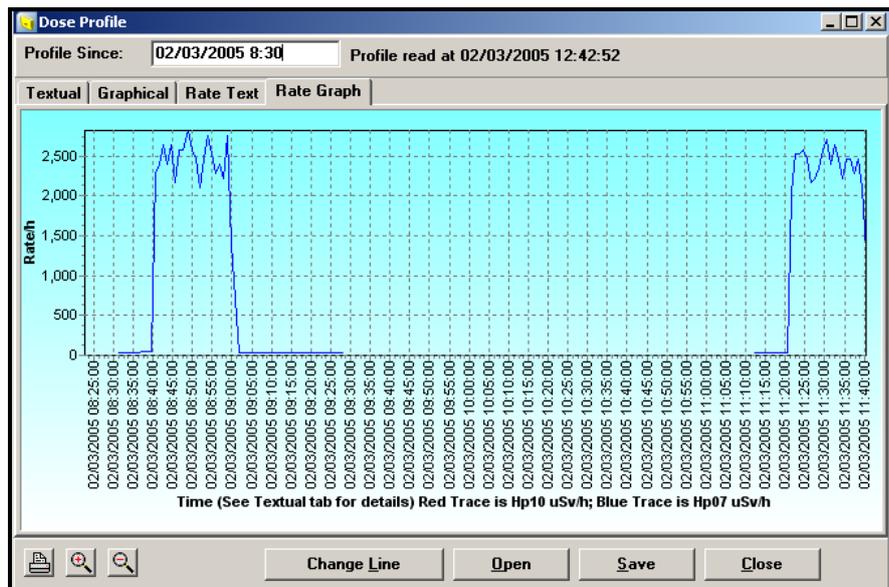
You may have to close the Dose Profile window and re-open it to restore the graph to normal after some panning operations.

## Rate Text Window



The values in this window are calculated from the Textual information. The rate is calculated as the dose change over the time since the dose last changed. Note that this is merely an indication of the average rate from the dose profile information, it is **NOT** the dose rate that the EPD displays. If the dose change is negative then the rate is reported as 0 (i.e. negative rates are not displayed).

## Rate Graph Window



The rate graph tab displays the same information as the rate text tab. The red line is the Hp10 Dose (DDE) and the blue line is the Hp07 Dose (SDE).

Straight-line interpolation between points is used and so the textual information should be used for obtaining precise dose rates at specific times.

# Special Total Dose Store

## Special Total Dose Store Window

| Date and Time       | Hp10 uSv | Hp07 uSv |
|---------------------|----------|----------|
| 02/03/2005 11:19:59 | 0        | 0        |
| 02/03/2005 11:20:59 | 0.22     | 35.47    |
| 02/03/2005 11:22:00 | 0.39     | 74.92    |
| 02/03/2005 11:23:00 | 0.56     | 114.63   |
| 02/03/2005 11:23:59 | 0.72     | 156.63   |
| 02/03/2005 11:25:00 | 0.94     | 200.23   |
| 02/03/2005 11:26:00 | 1.14     | 241.17   |
| 02/03/2005 11:26:59 | 1.31     | 276.45   |
| 02/03/2005 11:28:00 | 1.48     | 312.23   |
| 02/03/2005 11:29:59 | 1.83     | 399.95   |
| 02/03/2005 11:35:00 | 2.7      | 606.7    |
| 02/03/2005 11:39:59 | 3.64     | 796.97   |

Special Time: 02/03/2005 11:39:59 Close

The EPD contains 12 stores, which can be set up to record the dose values at any time in the future. Any store can be set to any time (the order is not restricted).

If the time is in the future then no dose value is displayed.

To change a time:

- Insert an EPD and open the Special Total Dose Store Window 
- Select one of the stores
- Select the 'Special Time' edit box
- Insert the time in your machine's date time format
- Repeat for as many stores as you want
- Write to the EPD 

**Note:**

The EPD-N2 version 5, EPD-G and EPD-BG version 14 onwards do **not** have a special total dose store so EasyEPD2 disables the access to special total dose store.

# Approved Dosimetry Service

---

## What is an ADS?

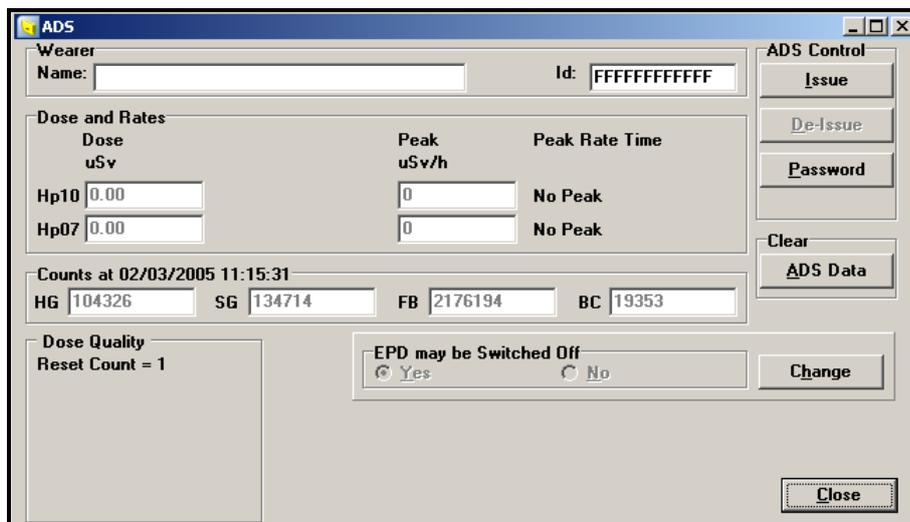
An Approved Dosimetry Service is an organisation that is legally responsible for the maintenance of Personal Dose Records.

An ADS can issue an EPD to an individual to wear for personal dose monitoring.

The EPD is designed to allow the wearer to use an ADS Issued EPD in a Dose Control situation where short-term issues and returns occur provided the Wearer Name is the same as the ADS Wearer Name. Clearing the short term 'Dose' does not effect the ADS dose so the EPD can be returned to the ADS and the Dose accrued for the ADS Issue period can be recorded.

No ADS dose is accrued if the EPD is not ADS issued, but the counters and dose quality values are updated.

## The ADS Window



### ADS Issue Process

This process writes the ADS wearer id (a 12-digit number) to the EPD and sets an ADS issued flag within the EPD status. It does not perform the EPD issue process described in section EPD Control on page 42.

Fields are the same as on the Dose and Alarms Window except for:

### Counts

These are the total counts accrued on each of the EPDs four counters.

### Password

To write any ADS data a password must be entered. An ADS will have a unique password for EPDs under their jurisdiction.

### EPD may be Switched Off

When set to 'No' then ADS Issued EPDs may not be switched off. This is a read-only status bit, to change the state of the EPD press the Change button.

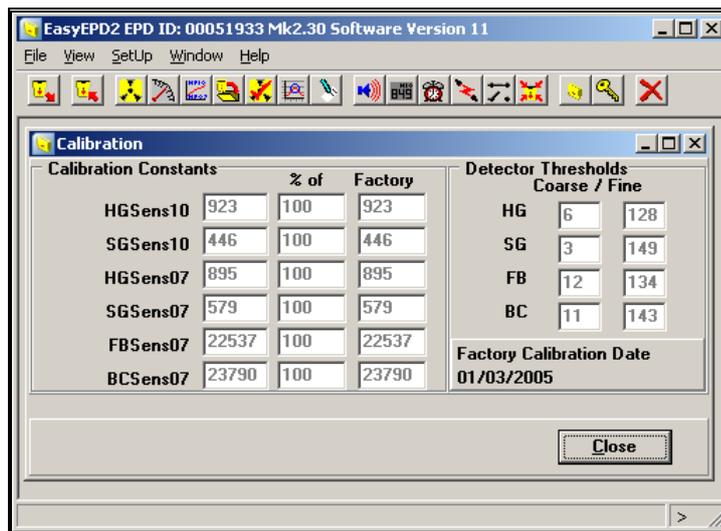
# Calibration

## What is EPD Calibration?

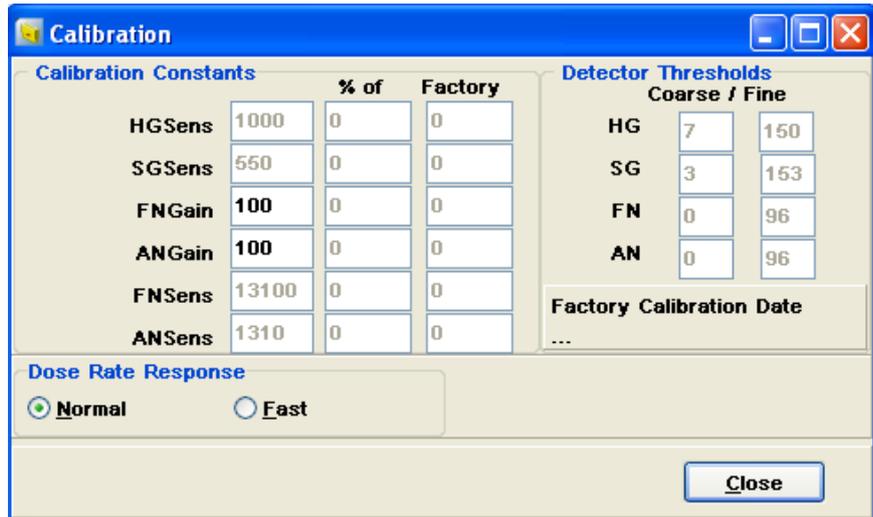
The EPD is a sensitive electronic instrument and each EPD requires individual characterising for response to different types of radiation source.

The calibration is performed on manufacture and is expected to be unchanged throughout the life of the EPD provided it remains undamaged.

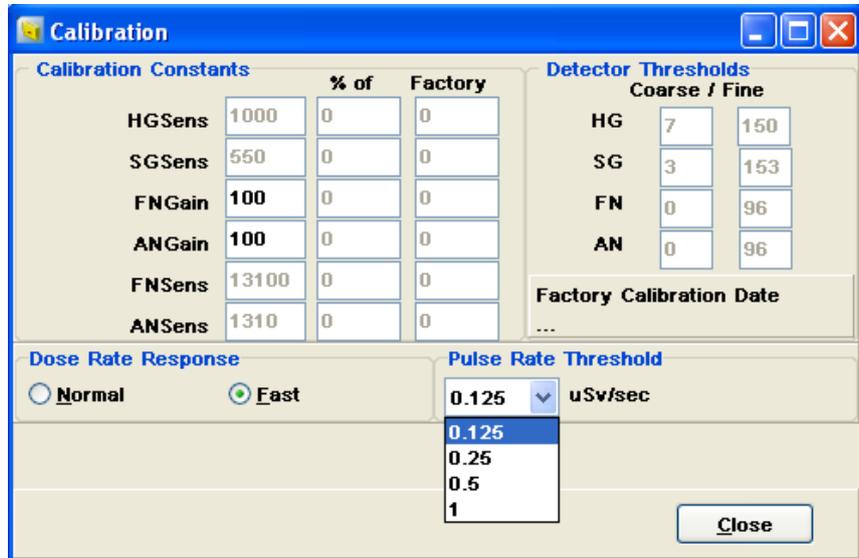
## The Calibration Window



EPD-BG V13 has the ability to select 'Fast' dose rate response (approx twice as fast as normal).



EPD-BG v14 has the ability to be factory configured for pulsed mode operation in which case the Fast rate response operates in this mode which includes a selectable Pulse Rate Threshold at which the pulse response begins. (See EPD handbook for details).



EPD Calibration Values are 'read only' to prevent unauthorised changing, customers with unlocked EPDs have customised software for changing the calibration parameters within limits.

Some EPDs contain a copy of the calibration factors as set in the Factory, together with a date and checksum. The calibration values are shown in the 'Factory' column and a calculation of what percentage of the factory values the current calibration values are is shown in the '% of' column.

Customers who have purchased 'unlocked' EPDs will also see a button '% Adjust' on this form.

### Calibration Constants

These are used to convert counts on the four detector channels into Dose Equivalents.

### Detector Thresholds

These are used to set internal comparator thresholds to discriminate between radiation pulses received by the EPDs detectors. The setting of these values is performed at calibration and may not be adjusted by the user.

The threshold values have changed from gamma/beta EPD version 11; EPD-N2 version 3.

| Calibration Constants |       |         | Detector Thresholds      |          |
|-----------------------|-------|---------|--------------------------|----------|
|                       | % of  | Factory | Coarse / Fine            |          |
| HGSens10              | 923   | 100     | HG                       | 6 / 128  |
| SGSens10              | 446   | 100     | SG                       | 3 / 149  |
| HGSens07              | 895   | 100     | FB                       | 12 / 134 |
| SGSens07              | 579   | 100     | BC                       | 11 / 143 |
| FBSens07              | 22537 | 100     | Factory Calibration Date |          |
| BCSens07              | 23790 | 100     | 01/03/2005               |          |

Coarse values range from 0 to 15 and Fine values range from 96 to 159.

## EPD-N2 Calibration

The EPD-N2 is a sensitive electronic instrument and each EPD requires individual characterising for response to different types of radiation source.

The calibration is performed at manufacture, but two calibration parameters, FNGain and ANGain, can be changed by users providing they have the correct access privilege (Calibration Parameters Unlocked displayed on the EPD State section of the Status form).

Access is protected by password held in the EPD. Customers supplied with unlocked EPDs should have been told the default password by their supplier.

| Calibration Constants |       |      | Detector Thresholds |                          |          |
|-----------------------|-------|------|---------------------|--------------------------|----------|
|                       |       | % of | Factory             | Coarse / Fine            |          |
| HGSens                | 929   | 100  | 929                 | HG                       | 5 / 151  |
| SGSens                | 561   | 100  | 561                 | SG                       | 4 / 152  |
| FNGain                | 100   | 100  | 100                 | FN                       | 13 / 151 |
| ANGain                | 100   | 100  | 100                 | AN                       | 7 / 152  |
| FNSens                | 13100 | 100  | 13100               | Factory Calibration Date |          |
| ANSens                | 1310  | 100  | 1310                | 15/02/2005               |          |

Calibration consists of setting factors that govern the sensitivity and responsiveness of the EPD-N2. The EPD is pre-calibrated to correctly indicate x-ray, gamma and typical neutron radiations. It is possible to change the sensitivity and response of the EPD-N2 to neutron by changing the FNGain and ANGain values. These are normally password protected to prevent unauthorised changes.

### Adjusting Gain Constants

- The settings are initially read-only. Adjustment can be made as follows,
- Click the Enable button, the password entry box will appear
- Enter the password code ( a numeric sequence)
- Click the OK button

The two Gain edit boxes may now be written to. New values can be calculated as described in the EPD-N2 Technical Manual and entered directly into the Calibration Constant boxes. Alternatively, adjustments may be made using the Neutron Gains Panel. When using the Neutron Gains panel the constants are calculated and updated on clicking the Recalculate button.

A 'Normal' or 'Fast' Neutron dose rate response may be selected. Resolution and statistical accuracy is described in the EPD-N2 Technical Manual. The absolute value of the response time varies with the indicated dose rate and value of Neutron Gain as well as the spectral composition of the neutron radiation.

Caution:

Changing the gains will affect the accuracy of the EPD. The EPD-N2 Technical Manual should be studied carefully before any changes are made.

Two alternative methods of setting the neutron sensitivity are available.

The neutron sensitivity can be set individually for each of the two neutron detectors to a known detector sensitivity (customer calibration) as follows,

Enter the known detector response in the Detector Response - Required box

Click the Recalculate button

New values appear in the Gain Constant boxes.

➤ Click on the Write button .

The neutron sensitivity can be set as a percentage of the current value as follows: (Note that the same percentage factor is applied to both neutron detectors)

Enter the required percentage of the present value in the Present Settings - Required box

Click the Recalculate button

New values appear in the Gain Constant boxes.

➤ Click on the Write button .

## Restoring Factory Setting

The Neutron response set at the factory can always be restored as follows,

- Enter 100 in the FNGain box
- Enter 100 in the ANGain box
- Click on the Write button .

---

## EPD-N2 Changing the Password

EPDs have internal passwords that protect certain sensitive communication commands. It has already been seen that the password protects changes to the calibration constants. This password may be changed by the user provided they know the existing one.

- Click the Change Password button. A password change dialogue box will appear.
- Enter the old password in the box entitled “Old Password”
- Enter the new password in the two boxes entitled “New Password” and “Confirm New Password”.
- Click OK.

This application will now request the EPD to change its password. If the old password is correct the new password will come into force.

### **Warning**

Remember the password.

You will have to return the EPDs to the supplier to set a default password if you forget the password and subsequently wish to change the EPD calibration factors.

## % Adjust

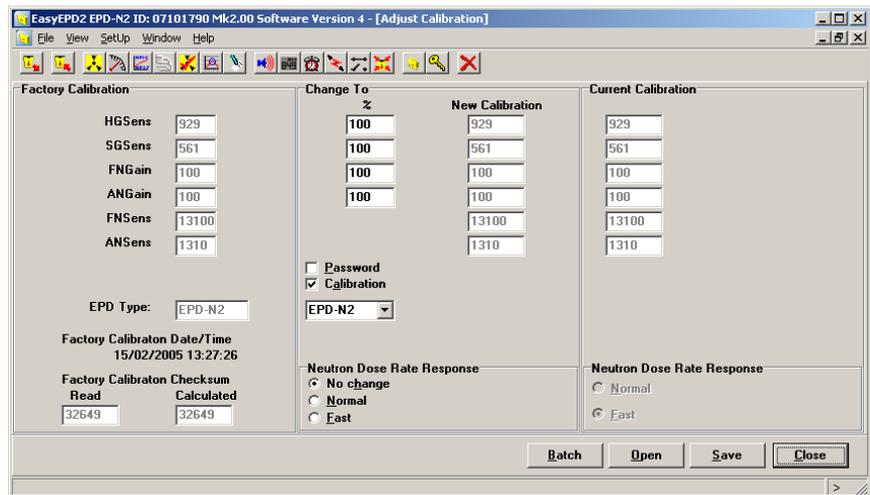
Some customers request 'unlocked' EPDs so that they may change the calibration factors on the EPD to enable them to alter the radiological characteristics of the EPD to their particular requirements.

When the '% Adjust' button is pressed the user is prompted to enter the password for the EPD in the Ir field. If the password is correct then the % Adjust form will be displayed:

EPD-BG:

EPD-G:

EPD-N2:



The left hand panel shows the values set in the factory. If these are invalid or not set then the EPD calibration cannot be adjusted by this method.

The right hand panel shows the values currently in the EPD.

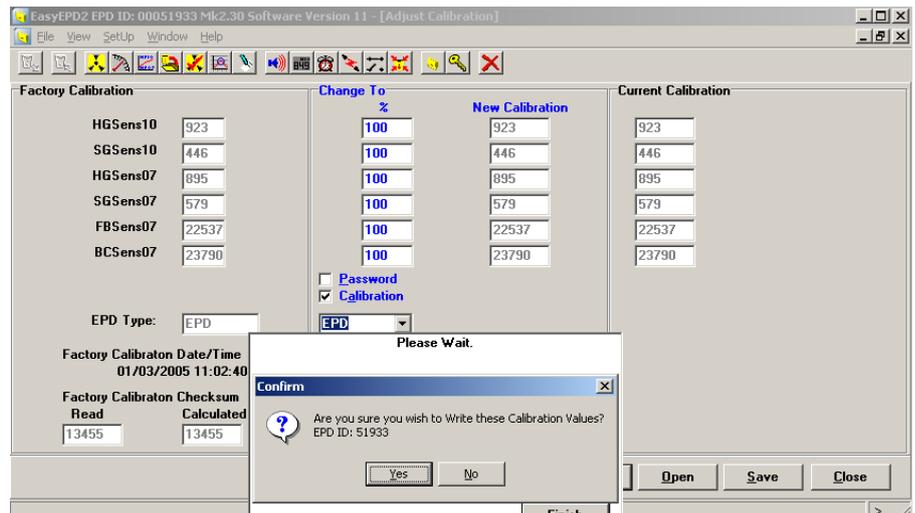
The centre panel provides a method of changing the Current Calibration values to a percentage of the Factory calibration values.

Set the percentage required then Click on the write button on the toolbar  to write to a single EPD or click on the 'Batch' button to write to a set of EPDs.

Several checks are made before the EPD is written and the EPD will not be written if:

| Reason   | Warning Message   |
|--|---|
| No EPD type has been selected in the combo box   | 'Please Select An EPD Type'   |
| The EPD is of the wrong EPD type   | 'EPD Types Do Not Match - No Write Done'  |
| The EPD is locked  | 'Calibration Parameters Locked'   |
| The factory calibration values checksum is incorrect or any of the calibration values are 0. | 'Factory values invalid'  |
| Any of the new calibration values are out of range.  | 'Calibration Value Out Of Range'<br>The out of range value(s) will be underlined. |

If all the conditions are passed then the user will be prompted to confirm that they wish to write to this EPD.



If the password checkbox is checked then the EPD calibration password is changed in the EPD.

In 'Batch' mode you should read the prompts on the top line of the Batch Write panel and only remove an EPD when prompted to do so. A set of EPDs can be inserted and the same percentage values of their Factory Calibration values will be written to the EPDs. These values are calculated for each individual EPD and displayed in the New Calibration edit boxes.

A set of calibration percentages for a specific EPD type can be stored in a file by pressing the 'Save' button. A file can be restored by pressing the 'Open' button.

### Warning

It is vital that you check EPDs after a batch write to ensure that all the parameters have been written correctly.

### Pulsed Rate Response

ONLY available on FACTORY specially configured EPDs from EPD-BG version 14; EPD-N2 version 5.

The pulsed Rate facility allows the EPD to be used as an alarming dosimeter when used in an environment where pulsed fields may be present. The EPD should be configured so that the rate alarm will occur should the wearer be unexpectedly in the pulsed field. The characteristics of the device causing the pulsed field would determine this setting and can also be used to estimate the actual dose accrued.

It is recommended that you consult with the manufacturer if you wish to use the EPD in this mode.

When the EPD is manufacturer configured to Pulsed Rate Mode then the Hp10 dose rate gives a faster dose rate response.

The EPD has to be configured in 'Fast' dose rate mode and one of the Pulsed rate thresholds (0.125; 0.25; 0.5 or 1 uSv/second ) selected.

In this mode, when the EPD recognises a dose rate above the selected threshold it immediately calculates the instantaneous dose rate based on the dose increment it has received assuming it was all received in the previous second. The EPD takes a dose sample in the succeeding second.

Rate Alarm:

The Hp10 (2) rate alarm operation is modified when the EPD is operating in Pulsed Rate Mode. The Hp10 Rate Alarm (2) will occur when the rate alarm on threshold is reached (as normal).

When the dose rate goes below the off threshold then the alarm sound/led will continue until User Acknowledged or timed out. The Hp/h display icon will extinguish but the whole display will flash over-range. This over-range condition can only be cleared by clearing the Latched Alarm Status. This can be achieved via comms or by ClearOnON Off to On transition if the EPD is so configured.

An EPD that is factory configured with Pulsed mode enabled can be identified from the status form:

**EPD Configuration**

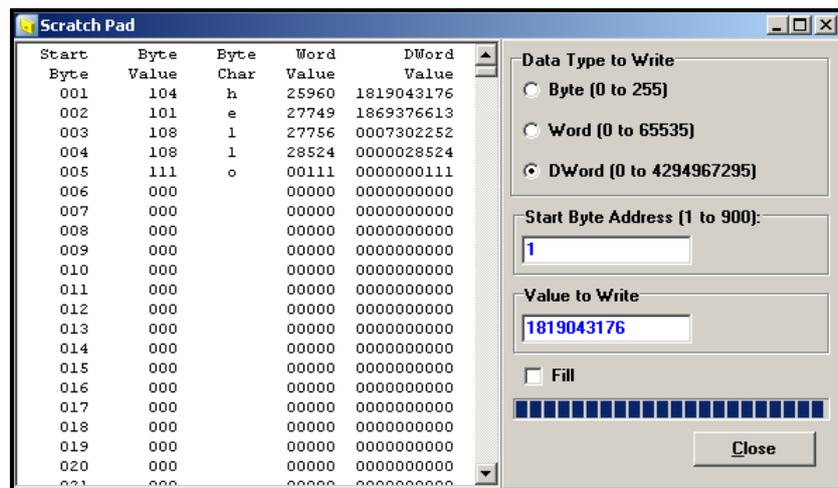
**Calibration Parameters Locked**

**Clear on ON available**

**Pulsed Rate Response when Fast**

# Scratch Pad

## The Scratch Pad Window



To read the Scratch Pad click the read button on the toolbar 

The EPD Scratch Pad is an area of non-volatile store in which users or systems may store data. There are 960 Bytes of data available. Bytes 901 to 960 are reserved for manufacturers use.

The Scratch Pad Window displays the data in Byte Word and Dword values and provides functions to write Byte, Word or Dword values to the Scratch Pad starting at a particular byte address.

To write to a byte in the Scratch Pad:

Select the Data Type to Write

Enter the Start Byte Address

Enter the Value to be Written

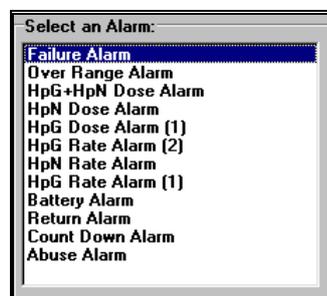
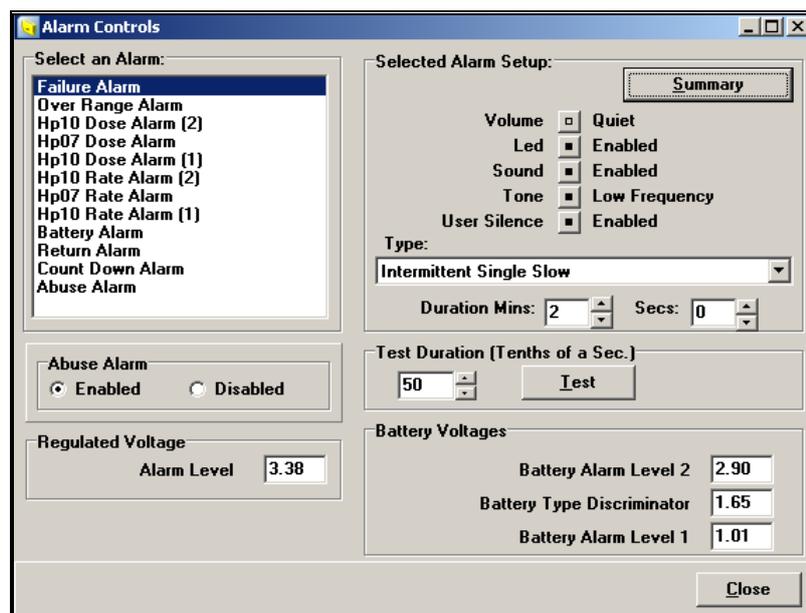
Check or uncheck the Fill box as required

Click on the write button on the toolbar 

Blank Page

# Set Up EPD

## Alarm Controls



### EPD-N2 Alarms

The EPD has twelve alarms as shown in the 'Select an Alarm' list. Each alarm can be configured to any combination of the Alarm Set-up conditions.

These alarms are prioritised within the EPD in the order shown on the Select an Alarm List with the Failure Alarm being highest priority and the Abuse Alarm lowest priority.

If an alarm of higher priority occurs then that overrides any lower priority alarm. Take care not to mask lower priority alarms by disabling Led or Sound of higher priority alarms (see note below).

---

Note: It is possible (but not recommended) to set an alarm with both Disabled Led and Disabled Sound. If you wish to disable an alarm then select the Alarm Type to be OFF. (effectively removing it from the priority list)

---

Alarms do not occur during communications.

## **Alarm Set Up**

### **Volume**

Loud / Quiet

### **Led**

Enabled / Disabled

### **Sound**

Enabled / Disabled

### **Tone**

High Frequency / Low Frequency

### **User Silence**

Enabled = User may silence an alarm by holding the EPD button down for greater than the long press time.

Disabled = User may not silence the alarm.

### **Type**

Off

Continuous single tone

Continuous dual slow

Continuous dual fast

Intermittent single slow

Intermittent single fast

Intermittent double beep slow

Intermittent double beep fast

### **Duration**

Alarm duration may be set to a maximum of 17 minutes to a resolution of 4 seconds. If the alarm has not been acknowledged by the user within this time then the alarm will stop and a beep occur every 30 seconds until the alarm is acknowledged or the alarm condition ceases. A duration of 0 means continuous until acknowledged or cleared, this alarm will not go into the 30 second power saving mode.

### **Summary**

Lists the Alarm settings in a table.

| Alarm Summary       | Volume | Led     | Sound   | Tone       | Silence | Type                     | Duration    |
|---------------------|--------|---------|---------|------------|---------|--------------------------|-------------|
| Failure Alarm       | Quiet  | Enabled | Enabled | Low Freq.  | Enabled | Intermittent Single Slow | 2 min 0 sec |
| Over Range Alarm    | Loud   | Enabled | Enabled | High Freq. | Enabled | Continuous Dual Fast     | 2 min 0 sec |
| Hp10 Dose Alarm [2] | Loud   | Enabled | Enabled | High Freq. | Enabled | Continuous Single Tone   | 2 min 0 sec |
| Hp07 Dose Alarm     | Loud   | Enabled | Enabled | High Freq. | Enabled | Continuous Single Tone   | 2 min 0 sec |
| Hp10 Dose Alarm (1) | Loud   | Enabled | Enabled | High Freq. | Enabled | Continuous Single Tone   | 2 min 0 sec |
| Hp10 Rate Alarm [2] | Loud   | Enabled | Enabled | High Freq. | Enabled | Intermittent Single Fast | 2 min 0 sec |
| Hp07 Rate Alarm     | Loud   | Enabled | Enabled | High Freq. | Enabled | Intermittent Single Fast | 2 min 0 sec |
| Hp10 Rate Alarm (1) | Loud   | Enabled | Enabled | High Freq. | Enabled | Intermittent Single Fast | 2 min 0 sec |
| Battery Alarm       | Quiet  | Enabled | Enabled | Low Freq.  | Enabled | Intermittent Single Slow | 2 min 0 sec |
| Return Alarm        | Quiet  | Enabled | Enabled | Low Freq.  | Enabled | Intermittent Single Slow | 2 min 0 sec |
| Count Down Alarm    | Loud   | Enabled | Enabled | High Freq. | Enabled | Continuous Single Tone   | 2 min 0 sec |
| Abuse Alarm         | Quiet  | Enabled | Enabled | Low Freq.  | Enabled | Intermittent Single Slow | 2 min 0 sec |

The Volume, Led, Sound, Tone and Silence values can be toggled by clicking on the value. Type and Duration must be changed from the Alarm Controls Panel.

## Alarm Test

Warning: Unnecessary exposure to the loud alarm should be avoided.

To demonstrate an alarm you must set up that alarm in the way you wish the alarm to be demonstrated.

Select an Alarm

Set up an Test Duration

Click the Test button

---

Note: Some EPDs are factory configured (by customer request) for loud alarms, duration of 10 minutes or longer LED enabled, prevent quiet alarms, prevent disabled Sound, prevent disabled LED, prevent alarms off, and prevent duration less than ten minutes (0 = continuous is allowed). EasyEPD2 still displays these options but if the user attempts to change these settings the whole command is rejected when a write to EPD is attempted.

---

## Regulated Voltage

Available from gamma/beta EPD version 11; EPD-N2 version 3.



The regulated voltage is the internal voltage maintained by the EPD to sustain internal circuit functions whilst the battery voltage fluctuates and decays.

The Alarm Level is the voltage below which the EPD will Reset. This level is checked at least every 14 seconds by the EPD and at least every 1 second under high processing conditions (such as during comms).

## Battery Voltages

Available from gamma/beta EPD version 11; EPD-N2 version 3.

The voltage levels are pre-configured for the manufacturer's recommended battery types.

The EPD can operate with a variety of batteries (See EPD specification for details). The Battery Type Discriminator is the value above which a high voltage battery is identified as being in use (e.g. a 3.6V Lithium) or below which a low voltage battery is being used (e.g. a 1.5V Alkaline). There are two Battery Warning Levels - Level 1 is used for low voltage batteries and Level 2 is used for high voltage batteries.

A Battery Alarm occurs only after a second consecutive battery load test that measures the voltage as less than the alarm level. Battery alarm is cleared when the battery voltage measured during a battery load test exceeds the alarm threshold by 128mV (for 1.5v batteries) or 256mV (for 3.6v batteries).

It is recommended that the battery be replaced with a good new battery as soon as possible after a battery low alarm is noticed, particularly if high dose rates and alarms are expected, or the time at which the alarm was first raised is unknown.

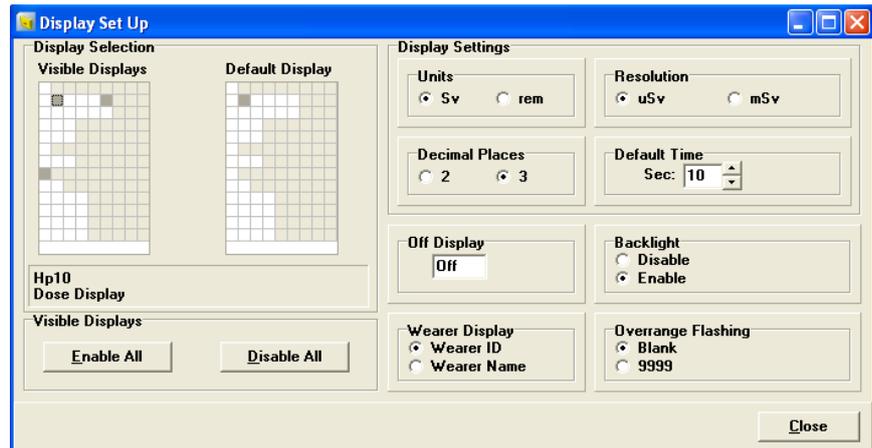
It is not advisable to use an EPD more than ten hours after the battery low was raised.

---

**NOTE:** Do NOT adjust the alarm level values except in consultation with the manufacturer. Typical values are: Battery Warning Level 1 (1.02), Battery Type Discriminator (1.65 or 1.79), Battery Warning Level 2 (2.90), Regulated Voltage alarm Level (3.39 or 2.98)

---

# Display



This window indicates what the user may show on the EPD display.

## Display Selection – Visible Displays

Shaded boxes indicate a display that the user can see on the EPD.

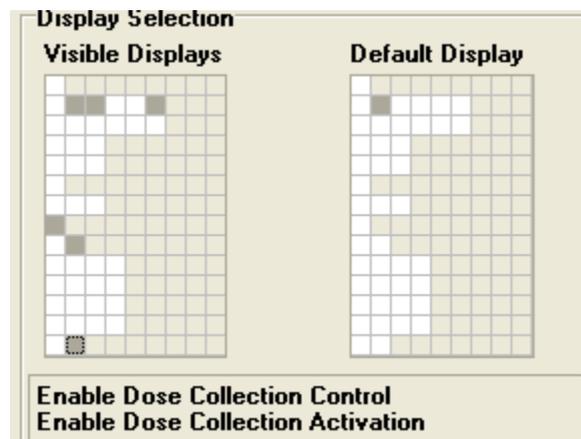
To see what a display is, click on the box and read the caption that appears in the box below. On the EPD a short press navigates across a row and a long press down the rows (modes)

To enable/disable a display use a mouse and double click in the appropriate box.

To enable/disable all displays use the Enable All or Disable All push buttons.

## DoseOnAlarm (Responder)

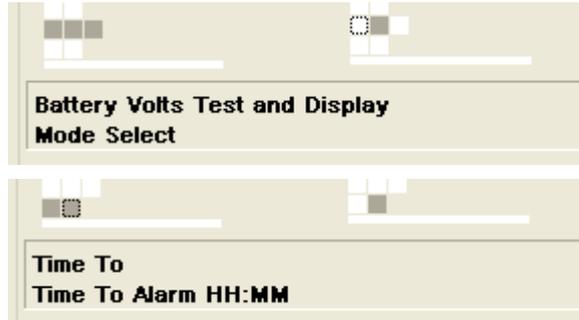
If the EPD is configured as a DoseOnAlarm EPD then two additional displays are available:



These controls appear on the lowest row on the Display Selection and are Enable Dose Collection Control Mode Select and Activation.



For EPDs where 'battery test' and 'Time to alarm' are available (EPD-BG v14, EPD-N2 v5) additional display enables appear at the bottom:



### Display Selection – Default Display

One Enabled Display should be selected as default

### Display Settings – Units

This displays the units of the EPD being read at the time and any alternative display units available.

### Display Settings – Decimal Places

This displays the number of decimal places that the EPD being read can display and any alternative setting available.

### Display Settings – Default Time

If the EPD switch is not pressed within this time then the display will revert to the default display.

On displays that can be locked on to then the colon appears on the EPD display for an additional 2 seconds prior to the display defaulting.

### Display Settings – Resolution

EPD software versions greater than version 8 allow Resolution to be restricted to rem or cGy on those EPDs with rem or cGy displays.

Note: This only affects the way the EPD displays the values, it does not effect the way EasyEPD2 displays values.

### Backlight

When Enabled the backlight will come on when the EPD switch is pressed and remain on until the display defaults.

---

Note: Some EPDs are factory configured (by customer request) to prevent units change and prevent decimal places change. EasyEPD2 still displays these options but if the user attempts to change these settings the whole command is rejected when a write to EPD is attempted.

---

### Off Display

Available from gamma/beta EPD version 11; EPD-N2 version 3.

This is for use by system software that sets a calibration date on the EPD display when in 'off' mode.

The EPD default condition is to display 'OFF ' on the display when the detectors are off. The value of 0 in this field causes the default 'OFF ' to be displayed.

Any other Hexadecimal value in this field will cause that value to be displayed instead of 'OFF '. This is to provide customers who wish to

have a Calibration date displayed when the EPD is off to do so. E.g. '2512' could mean calibrate on 25<sup>th</sup> December or '1225' could mean December 25<sup>th</sup>. Take care when using this field as it could easily be mistaken for the middle 4 digits of the Wearer ID.

**Wearer Display**

Available from gamma/beta EPD version 11; EPD-N2 version 3.

The EPD default condition is to display the 12 digit Wearer ID. The EPD can be configured to display the first 12 digits of the Wearer Name - but note that because the EPD display is a seven-segment display the character representations are not ideal. Any other character is represented by a blank display.

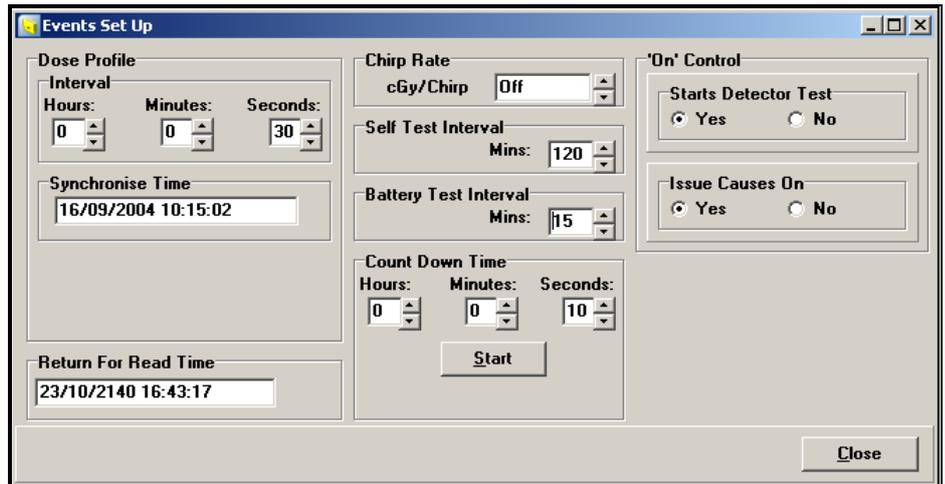
|     |   |     |   |     |   |     |   |     |   |     |   |
|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
| A a | A | B b | b | C c | C | D d | d | E e | E | F f | F |
| G g | g | H h | h | I i | i | J j | J | K k | K | L l | L |
| M m | M | N n | n | O o | o | P p | P | Q q | Q | R r | r |
| S s | S | T t | T | U u | u | V v | V | W w | W | X x | X |
| Y y | Y | Z z | Z |     |   |     |   |     |   |     |   |
| 0   | 0 | 1   | 1 | 2   | 2 | 3   | 3 | 4   | 4 | 5   | 5 |
| 6   | 6 | 7   | 7 | 8   | 8 | 9   | 9 |     |   |     |   |

**Overrange Flashing**

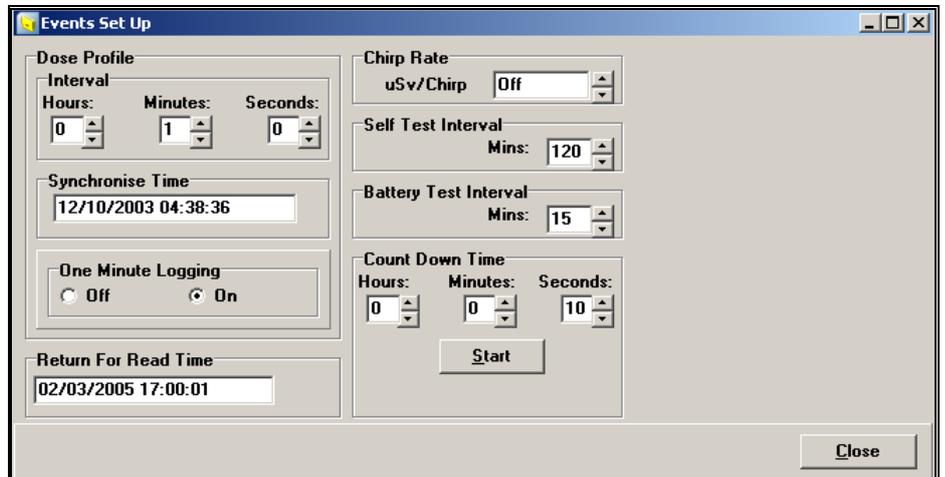
Available from gamma/beta EPD version 11; EPD-N2 version 3.

In over range the EPD default condition is to alternate 'blank' and the normal EPD display on the four display digits. The EPD can be configured to alternate '9999' and the normal EPD display on the four display digits.

# Events



Or from gamma/beta EPD version 11; EPD-N2 version 3:



EPD Events are things that occur at a particular EPD Clock value or on the occurrence of a particular event.

## Dose Profile Events

### Dose Profile – Interval

Typical settings recommended for normal use are 30 Seconds or 1 minute intervals. It is possible to set the interval down to 2 seconds for test purposes but this is not recommended for general use. The maximum time settable is 36 Hours 24 minutes 30 seconds.

On power-up or on changing the Interval the EPD records the dose presently being displayed. Every interval after this the EPD checks to see if the dose has changed and if so records the change in dose. If no dose has changed then no record is made. Choose a value based on how long the EPD may be issued to a person, the expected dose and the time between dose profile reads.

Because of the dynamic nature of this store the maximum duration before overwriting cannot be easily defined in terms of number of records. A few examples are shown below:

| Dose Rates      |                 | Log Interval | Data Records |           | Max Duration |       |
|-----------------|-----------------|--------------|--------------|-----------|--------------|-------|
| Hp(10)<br>μSv/h | Hp(07)<br>μSv/h | sec          | Actual       | Effective |              |       |
| 0.05            | 0.05            | 30           | 289          | 695999    | 241          | days  |
| 0.1             | 0.1             | 30           | 289          | 348000    | 120          | days  |
| 1               | 1               | 30           | 347          | 41760     | 14.5         | days  |
| 10              | 10              | 30           | 347          | 4176      | 1.4          | days  |
| 100             | 100             | 30           | 542          | 651       | 5.4          | hours |
| 1000            | 1000            | 30           | 578          | 578       | 4.8          | hours |
| 10000           | 10000           | 30           | 578          | 578       | 4.8          | hours |
| 100000          | 100000          | 30           | 347          | 347       | 2.9          | hours |
| 1               | 1               | 60           | 347          | 20880     | 14.5         | days  |
| 100             | 100             | 60           | 578          | 578       | 9.6          | hours |
| 1000            | 1000            | 60           | 578          | 578       | 9.6          | hours |
| 10000           | 10000           | 60           | 347          | 347       | 5.8          | hours |

**Dose Profile – Synchronise Time**

If you want the EPD profile to occur at a particular time of day, e.g. hourly on the hour, then set the Synchronise Time to the next occurrence of this time and write to the EPD. Note: this synchronisation is lost if the EPD is reset or re-powered. If synchronisation is not required then do not set this value.

The time is greyed out if the time is prior to now. This field only has any effect if the time is after now and its effect is to instruct the EPD to make a dose profile record at the specified time (if a dose increment has occurred) and then continue recording dose increments at the specified Interval.

**Other Events**

**Self Test Interval**

0 to 255 minutes. – The time between running internal self-test (stack, ram, detector test) (recommended value is 15 minutes). Note: No dose is accrued during detector test (a period of approximately 1mS).

**Battery Test Interval**

1 to 255 minutes – The time between running battery test. (Recommended value is 15 minutes)



EPD-BG, EPD-G v14+ and EPD-N2 v5 have the ability to run battery test on command. Press the Test button on

EasyEPD2 to run the test (battery voltage may be read on the status window).

**Count Down Time**

0 to 99minutes 59 Seconds - The value at which the count down timer starts

When the start button is pressed the EPD is instructed to start its count down timer immediately.

**Return For Read Time**

This is the time at which the Return for Read alarm will occur.

**Chirp Rate**

0.01 $\mu$ Sv to 100  $\mu$ Sv per chirp. (0.001 mrem or 0.000001 cGy to 10 mrem or .01 cGy per chirp) - The EPD will beep every time the Hp10 dose received increases by more than the specified value. 0 = Off.

Note: Chirp can also be adjusted by the user from the Chirp display. The following values can be set:

(0, 0.01, 0.05, 0.1, 0.5, 1, 5, 10, 50, 100  $\mu$ Sv/chirp)

(0, 0.001, 0.005, 0.01, 0.05, 0.1, 0.5, 1, 5,10 mrem/chirp)

(0, 0.000001, 0.000005, 0.00001, 0.00005, 0.0001, 0.0005, 0.001, 0.005, 0.01 cGy/chirp)

Note: On the EPD cGy unit itself the chirp display is in mcGy/chirp not cGy/chirp.

**On Control**

When used in dose control systems it is recommended that the following controls are set to OFF because the dose control systems themselves switch the EPD on and perform detector test on Issue.

**On Control – Starts Detector Tests**

Available up to gamma/beta EPD version 10; EPD-N2 version 2.

If the detectors have been switched off, switching the EPD on will cause detector test to run.

**On Control – Issue Causes On**

Available up to gamma/beta EPD version 10; EPD-N2 version 2.

If the detectors have been switched off, then Issuing the EPD will cause the detectors to switch on.

**One Minute Logging**

Available from gamma/beta EPD version 11; EPD-N2 version 3.

When 'Off' the EPD will log essential data to EEPROM at least once every 15 minutes.

When 'On' the EPD will log within 1 minute of a dose profile entry being made. Thus if you set the dose profile interval to 30 seconds, for example, you will guarantee that any dose increment (1  $\mu$ Sv) will be recorded in EEPROM within 1 minute 30 seconds of the increment occurring. A log will be made at least once every 15 minutes even if there has been no dose increment.

EPD-BG v13+, EPD-G v14+, EPD-N2 v5+: A one minute log will occur within a minute of a greater than 0.015625uSv dose increment occurring.

**ClearOnOn**

ONLY available on FACTORY specially configured EPDs from EPD-BG and EPD-G version 14; EPD-N2 version 5.

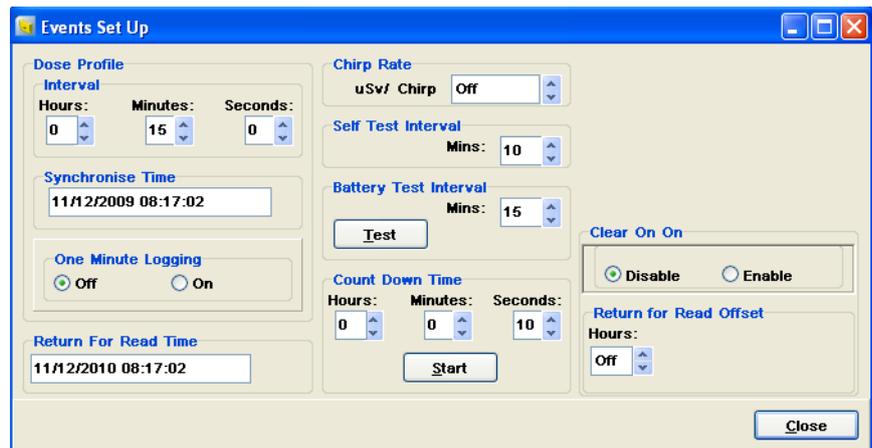
When the EPD is switched from OFF to ON (either by comms or by EPD switch) then

- The Dose will be cleared (Total Dose is not cleared)
- The Dose quality factors will be cleared
- The Peak dose rates and times are cleared
- EPD faults are cleared (they will recur if the fault is still present)
- EPD dose rate alarms are cleared.
- EPD counters are base-lined.

The Return for read time is set to now plus the number of hours (1 to 31) in the EPD Return for Read Offset. (0 = no change in Return for Read time).

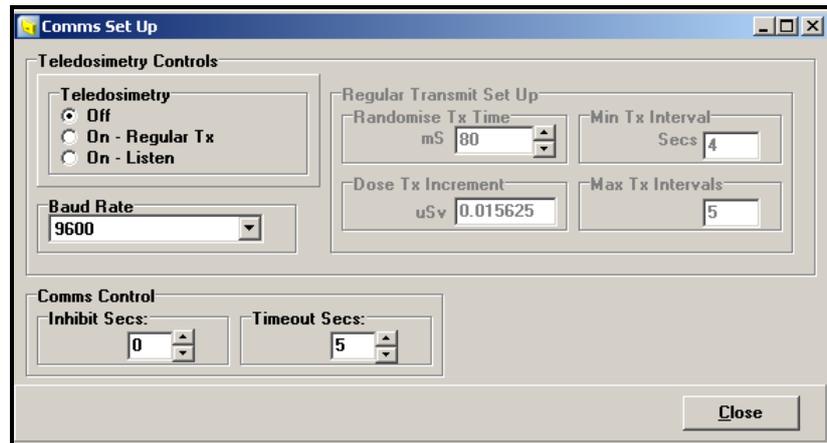
Note: The total dose is not cleared and no clear happens when the battery is removed and replaced.

If this feature is factory enabled then the user may Enable or Disable the feature from the Events Set Up page:



The return for read time can be set to between 0 and 31 hours. 0 is 'Off' ie no change in return for read time will be made. If the 'Return for Read Offset' is between 1 and 31 then when the EPD is switched from Off to ON this number of hours will be added to the current time and the 'Return For Read Time' set to this new value.

## Communications



### Comms Control – Inhibit Secs

0 to 255 Seconds - This is the time after comms has been terminated during which the EPD will not respond to communications requests. Used where multiple EPDs are expected to appear within range of an Ir adapter. (Recommended value = 0)

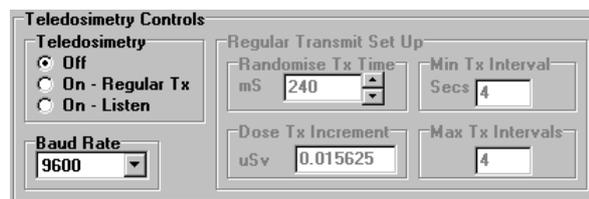
Do not set this value too high as you will be unable to communicate with the EPD for this time after comms and this may cause dose control systems to fail to issue or return the EPD.

### Comms Control – Timeout Secs

4 to 255 Seconds – The EPD will cease operating in communications mode if communications have not occurred during this time. (Recommended value = 5).

Note: Do NOT set this value too long as to do so will delay the communications warning that is issued by the EPD in certain circumstances if the EPD is removed from the reader prematurely.

## Teledosimetry Controls



### Teledosimetry

Default is Off

The EPD has two modes of operation for teledosimetry:

Regular Transmit – the EPD transmits dose data every Min Tx Interval provided that the Dose Tx Increment (resolution 1/64  $\mu$ Sv) has been exceeded, otherwise it will transmit anyway if (Max Tx Intervals \* Min Tx Interval) seconds have elapsed since the last transmission.

Note: Take care not to set Min Tx interval to 0 (Off) otherwise you will not get any Regular Transmit.

Listen – Wait for a message via the teledosimetry port.

**Baud Rate**

9600, 19200, 38400, 57600 Baud.

# Switch



This defines how the EPD switch works.

## Long Press Time

0.5 to 2 seconds in 0.25 second steps – The EPD long switch press is used to acknowledge (mute) alarms and to navigate through the display modes. (Recommended value = 1 Second)

## Double Click Time

50 to 400 mSeconds – The EPD has certain displays on which you can make a selection by double clicking. Two presses of the EPD switch within this time are a double click. (Recommended value = 400 mS)

## Switch Bleep

The EPD will beep every time the switch is pressed and if the switch has been held for longer than the Long Press Time.

## Dose Alarm

Dose alarm may be adjusted from the EPD Dose alarm display.

(10 $\mu$ , 50 $\mu$ , 100 $\mu$ , 500 $\mu$ , 1m, 5m, 10m, 50m, 100m, 500m, 1 Sv)

(1m, 5m, 10m, 50m, 100m, 500m, 1, 5, 10, 50, 100 rem )

(0.001, 0.005, 0.010, 0.05, 0.1, 0.5, 1, 5, 10, 50, 100 cGy)

## Rate Alarm

Rate alarm threshold may be adjusted from the EPD Rate alarm threshold display.

(10 $\mu$ , 50 $\mu$ , 100 $\mu$ , 500 $\mu$ , 1m, 5m, 10m, 50m, 100m, 500m, 1 Sv/h)

(1m, 5m, 10m, 50m, 100m, 500m, 1, 5, 10, 50, 100 rem/h)

(0.001, 0.005, 0.010, 0.050, 0.100, 0.500, 1, 5, 10, 50, 100 cGy/h)

## EPD may be switched on from button

(Introduced at version 7 EPD software) Used to prevent users switching EPDs on by a long button press.

Note: To prevent a user switching the unit off from the button, disable the Power On Off Selection from the Display set-up screen.

# Batch Write

---

## The Batch Write Window

### Creating a Batch Write File

The easiest way to create a batch write file is to

Set up one EPD with the settings required

Read it

Open the Batch Write Window

Check the boxes of the functions to be performed (only check the ADS Data if you know the ADS password)

Click the Create Batch button

Ensure the data is as required

Click the Save button and save the file

### Performing a Batch Write

Insert an EPD (This initialises the underlying values in EasyEPD2 )

Open the Batch Write Window

Create a Batch Write file or Open an Existing one

Click the Batch Write Button

Remove the EPD and re-insert it

Repeat for all the EPDs to be written waiting for the prompt 'Insert Next EPD'

Click Finish

Ensure that the EPDs are set up as required.

### Warning

It is vital that you check EPDs after a batch write to ensure that all the parameters have been written correctly.

Only use a batch file created with the current version of this application.

The best way to create a batch file is to set one EPD up as required and then create the batch file from the data in that EPD.

EPD writes and reads encompass several parameters which EasyEPD2 may display on more than one window. Batch write check boxes only select certain parameters so you must always check that the parameter you want written is in the Batch File. (For example in older versions of

EasyEPD2: The Comms set up check box does not add the General Control to the list and thus the Teledosimetry settings are not written. To write the Teledosimetry settings you would need to also check the Events Set-up check box as this includes General Control. Now corrected in EasyEPD version 2.2)

# Error Handling

---

## Communication Errors

Retries are built into the dll protocol, however should an error occur then a window will display the cause of the error.

Errors are grouped into three areas:

DLL errors – Primarily involved with the link to the EPD, the message protocols and the message lengths.

EPD errors – Where the EPD is unable to respond to the applications message for some reason. E.G.: Attempting to write an ADS value with an incorrect ADS password.

Other errors – Primarily internal errors or timeouts within the DLL

---

## Errors

Many fields have limits applied to them and if a value outside the limit is written in an edit box then the value is displayed in red.

# Glossary of Terms

## **ADS**

Approved Dosimetry Service.

## **AN.**

Albedo Neutron - The fraction of incident radiation reflected by the body.

## **Baseline**

A snapshot of the counter values. Used to calculate the counts received since the last counts clear by subtracting the snapshot from the present count values.

## **BC**

Beta Compensating

## **DDE**

Deep Dose Equivalent

## **DLL**

Dynamic Link Library

## **DoseOnAlarm (Responder)**

FACTORY configured EPD which accumulates does after a dose rate alarm has occurred. In the UK used by some First Line Responder Personnel (hence the name Responder).

## **EasyEPD2**

A program for reading and writing a single Electronic Personal Dosimeter.

## **EPD**

Electronic Personal Dosimeter.

## **EPD-BG**

A version of the EPD Mk2 which measures and displays Hp(10) and Hp(0.07) Dose Equivalents from Beta and Gamma sources.

## **EPD-G**

A version of the EPD Mk2 which measures and displays Hp(10) and Hp(0.07) Dose Equivalents from Gamma sources.

## **EPD-N2**

A version of the EPD Mk2 which measures and displays Gamma dose and Neutron Dose Equivalents (Fast Neutron and Albedo Neutron).

## **FB**

Full Beta

## **FN**

Fast Neutron

## **HG**

Hard Gamma

## **Hp07**

Personal Dose Equivalent at a depth of 0.07mm of soft tissue, Hp(0.07).

## **Hp10**

Personal Dose Equivalent at a depth of 10mm of soft tissue, Hp(10).

## **HpG**

Personal Dose Equivalent Hp(10) due to photons.

## **HpN**

Personal Dose Equivalent Hp(10) due to neutrons.

## **Ir**

Infra-red

## **IrDA**

Infrared Data Association

## **NC**

Neutron Compensating

## **NU**

Neutron

## **PC**

Personal Computer

## **PTB**

The Physikalisch-Technische Bundesanstalt (PTB), Braunschweig and Berlin, is the national institute of natural and engineering sciences and the highest technical authority for metrology and physical safety engineering of the Federal Republic of Germany.

## **SDE**

Shallow Dose Equivalent

## **SG**

Soft Gamma

Blank Page

# Index

- %
- % Adjust 67
- A**
- Abuse 38, 73
- Access Administration 9, 13, 14
- Access Control 6, 9, 13, 14
- Access Control and Administration 13
- Adjusting Gain Constants 64
- ADS 6, 42, 50, 59, 60
- Alarm Controls 73
- Alarm Set Up 74
- Alarm Test 75
- Alarms 6, 29, 36, 42, 46, 47, 48, 50, 60, 73, 74, 75, 76, 86
- B**
- Backlight 77
- Battery Voltages 76
- Baud Rate 84
- C**
- calibration 2, 6, 37, 47, 49, 61, 64, 66, 67, 77
- Chirp 81
- Clear 38, 41, 42, 47, 48, 50, 51, 53
- Clear Alarms Button 48
- Clear Faults Button 50
- ClearOnOn** 3, 83
- communications 1, 6, 7, 9, 27, 49, 73
- Communications 84
- Communications Port 27
- Configuration 1, 6, 47
- Count Down 81
- Counts 37, 38, 41, 42, 49, 60, 61
- Counts Since 37
- CRC 38, 49
- D**
- Data Representation 8
- Date 7, 26, 33, 36, 53, 57, 61, 77
- Date and Time 26
- DDE 2, 36, 55, 56
- Default 9, 42, 64, 66, 77, 84
- De-Issue 42
- detector 38, 42, 49, 61, 64, 81
- Display 4, 6, 7, 29, 42, 47, 77, 81, 86
- Dose 2, 6, 29, 35, 36, 37, 38, 41, 42, 47, 48, 49, 53, 55, 56, 57, 59, 60, 61, 64, 67, 76, 80, 81, 84, 86
- Dose and Rates 36
- Dose Profile Events 80
- Dose Profile Graphical Window 55
- Dose Profile Textual Window 53
- Dose Quality 38
- DoseOnAlarm** 3, 36, 43, 47, 77
- E**
- EPD Configuration 47
- EPD Control 42
- EPD State 46
- EPD Types 2
- EPD-N 2, 33, 36, 37, 46, 47, 48, 57, 61, 66, 67, 76, 77, 80, 81
- EPD-N2 2, 33, 36, 37, 46, 47, 48, 57, 61, 64, 66, 67, 73, 76, 77, 80, 81
- EPD-N2 Calibration 64
- Equipment Required to Run EasyEPD2 1
- Errors 88
- Events 6, 51, 53, 80, 81
- F**
- Faults 49
- H**
- Help 4
- History 51
- How EasyEPD2 Operates 2
- How to Install EasyEPD2 1
- How to read from an EPD 29
- How to Run EasyEPD2 2
- How to write to an EPD 31
- Hp07 2, 36, 48, 53, 56
- Hp10 2, 36, 48, 53, 56, 81
- I**
- Ir 1, 2, 7, 9, 29, 31, 67, 84
- Issue 6, 14, 35, 36, 42, 46, 50, 59, 60, 81, 84
- K**
- Knock 38
- L**
- Logging 9, 47, 81
- Logging Description 33

## **N**

Numbers 26

## **O**

Off Display 47, 77

On/Off 42, 46

One minute logging 81

Other Events 81

Over-range 38

## **P**

Password 6, 9, 13, 14, 60, 64, 66, 67

Peak 36, 41

Profile 2, 6, 53, 55, 56, 80, 81

**Pulsed Rate Response** 3, 69

## **Q**

Quality 38, 41, 59

## **R**

Rate 36, 38, 42, 48, 53, 56, 64, 67, 81, 84, 86

Rate Graph Window 56

Rate Text Window 56

Regulated Voltage 76

reset 36, 37, 38, 45, 49, 53, 76, 80

Responder 3, 43, 47, 77

Return 14, 36, 42, 48, 66, 81, 84

## **S**

Scratch Pad 71

SDE 2, 36, 55, 56

set up 1, 6, 9, 13, 14, 26, 27, 33, 47, 53, 57, 73,  
74, 75

Special Total Dose Store 6, 57

Special Total Dose Store Window 57

Status 6, 7, 35, 38, 42, 60

switch 6, 47, 77, 81

Switch 86

## **T**

Teledosimetry Controls 84

Test 42, 46, 48, 49, 75, 76, 80, 81

The ADS Window 60

The Batch Write Window 87

The Calibration Window 61

The Dose and Alarms Window 35

The Main Window 5

The Menu Bar 7

The Scratch Pad Window 71

The Set Up Form 9

The Status Bar 7

The Status Window 45

Thresholds 36, 42, 49, 61

Time 2, 9, 26, 29, 36, 37, 38, 45, 48, 51, 53, 55,  
56, 57, 64, 74, 76, 77, 80, 81, 84, 86

Tool Bar 2, 6

Total Dose 2, 6, 36, 41, 42, 57

## **V**

Voltages 48

## **W**

Warning 66

Wearer 36

Wearer Display 47, 77

Wearer Id 36, 42, 60, 77

Wearer Name 36, 42, 50, 59, 77

What is an ADS? 59

What is EasyEPD2? 1

What is EPD Calibration? 61

Write 1, 2, 6, 31, 33, 42, 47, 57, 60, 64, 67, 71,  
75, 77, 80, 87