

Instruction Manual

myOSLchip



Prepared by:

Freiberg Instruments GmbH
Delfter Str. 6
09599 Freiberg
GERMANY

Tel.: +49 3731 / 41 954 - 0
Fax: +49 3731 / 41 954 - 14

Germany

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1 Introduction

1.1 myOSLchip

The myOSLchip is a small, compact OSL reader for dose measurements of passive OSL dosimeters called myOSLchip dosimeters. It is developed in collaboration with Freiberg Instruments GmbH, Germany.

State-of-the-art components, modern design and a user-friendly operating interface provide excellent performance. The myOSLchip is designed to read the dose of each dosimeter without erasing the complete signal, allowing for multiple readouts. The remaining signal can be erased with the erasing function of the myOSLchip with an external light eraser.

myOSLchip is a single read out OSL unit (one-by-one).

1.2 Target Audience

This manual is addressed to the operator of the myOSLchip device. The operator should have the essential professional competence to run the measurement device and is obligated to read and completely understand this manual. The manual should be placed next or kept close to the equipment.

1.3 Intended Applications

The myOSLchip is intended for measurements in applications such as,

- Radiation protection
- Medical dosimetry
- Experimental physics
- Environmental research
- Personnel Dosimetry

1.4 Not Intended Application

All applications which are not listed in section 1.3.

1.5 Nomenclature

READ = sequence of operations

ParameterSet = measurement parameters

Dosimeter types:

Calibration = dosimeter for calibration of device and against a standard

Field = dosimeter for use in dosimetry

1.6 Technical Specification

HV Stability	±0.01 % during 8 h operation
Data output	LAN to PC, Touchscreen, USB
Signal processing	24-bit, full digital evaluation system
Power supply voltage	110 – 230 V, 50 - 60 Hz
Power consumption	max. 180 VA
Dimension	23.5 cm x 14.6 cm x 9 cm
Weight	5 kg
LEDs	460 nm

1.7 Safety Instructions

In general, handle the device with care as mentioned in this user manual. Improper usage may cause personal injury or damage to property.

Please observe the warning notices marked in red as “**Warning Notice**” in this user manual.

2 Basic Information and Advice

2.1 Preface

It's necessary to consider the warning notices. Failure to do so could cause damages to health and property.

It is highly recommended that repair or service of myOSLchip is carried out by a trained professional. Please check the local regulations for safe operation of the device.

2.2 Security warning

In order to avoid damaging the myOSLchip, please observe the proper insertion of the myOSLchip dosimeter. Do not try to move the transportation of the myOSLchip dosimeter by force.

2.3 Unpacking the myOSLchip

The myOSLchip is packed carefully to avoid damages during transport. Do not unpack the device unless requested by the manufacturer. Damages during transport should be reported immediately.

2.4 Shutting down the myOSLchip

Shutting down the myOSLchip device occurs by:

1. Shutting down the computer
2. Switching off the device
3. Disconnecting the device from the main supply

2.5 Storage

Only store the equipment in closed dust-free rooms.

Temperature should not fall below 5 °C or exceed 40 °C; relative humidity must not be higher than 80%.

Warning notice: Disconnect the myOSLchip from the power supply when it is not used for a longer period of time.

2.6 Power Supply



Figure 1: Connection of myOSLchip

2.7 Mechanics

Incorrect operation can cause property damage and injuries.

Note: External mechanical stress, pressure and vibrations should not be applied to the equipment.

For a better cooling of the equipment keep at least 20 cm of free space around the equipment.

2.8 Hazardous Material

An assignment of hazardous materials is not intended.

2.9 High temperatures

The equipment can be warmed up by electrical lost heat. It is not allowed to exceed temperature of 40 °C.

2.10 Spare parts

Spare parts list:

- Photomultiplier Tube (PMT)
- Fuse
- Stimulation unit
- Erasing unit
- Barcode Reader
- Display

3 General Device Information

3.1 Basic Construction

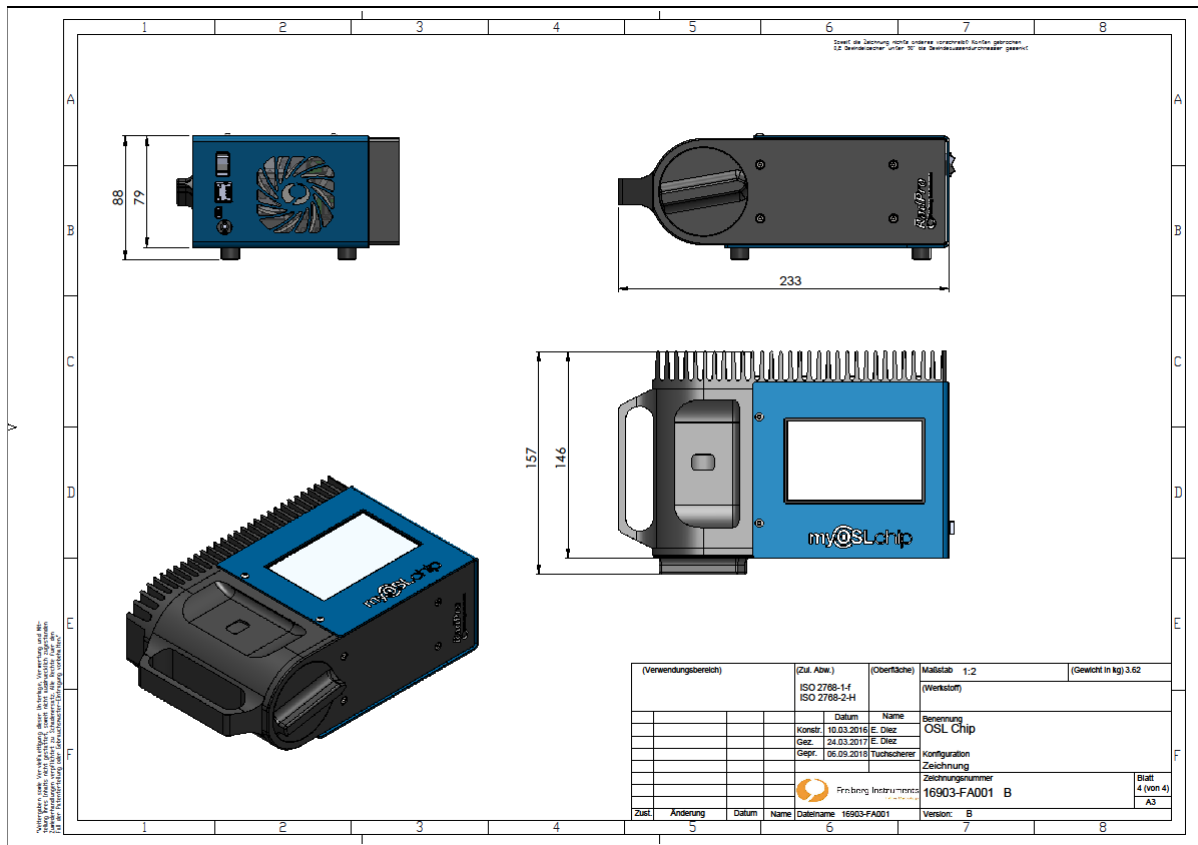
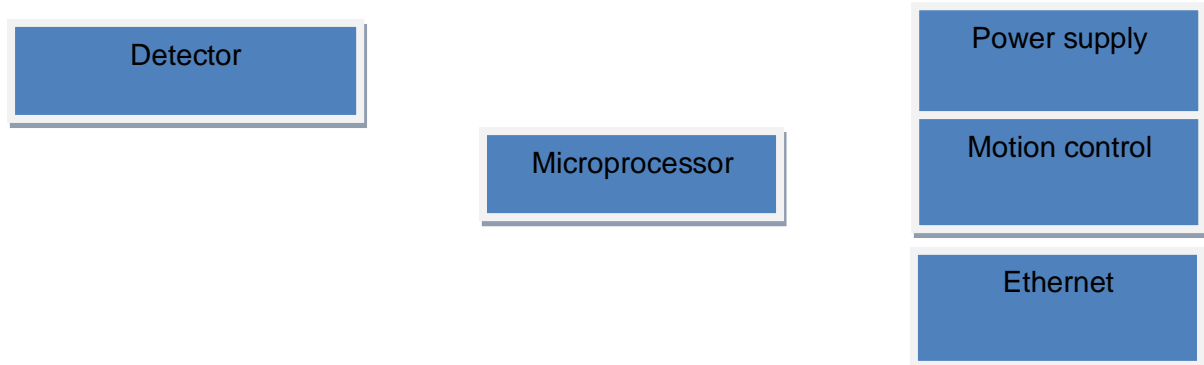


Figure 2: Technical Interface

3.2 Electronics



3.3 Sample Handling and Loading



Figure 3: Loading the device

- Step 1: Check if the PC or Laptop is connected to the device
- Step 2: Turn ON the power supply
- Step 3: Initialize the device in OSLDosimetry software.
- Step 4: Load the dosimeter as shown in the picture.

Now the device is ready for measuring the sample.

3.4 Measurement Chamber

The measurement chamber contains a PMT module, a 2-D code Reader, 1 Read LED for stimulation and 1 high power Erase LED, all with ca. 460 nm wavelength light. The LED stimulates the **entire** dosimeter at once.

3.5 Photosensor

- Module H10722-110
- Photosensor with integrated amplifier
- for standard applications in luminescence dating and dosimetry
- detection unit with super bi-alkaline cathode PMT (HAMAMATSU)
- sensitivity 230-700 nm
- peak sensitivity 400 nm
- dark counts typ. 10 cps

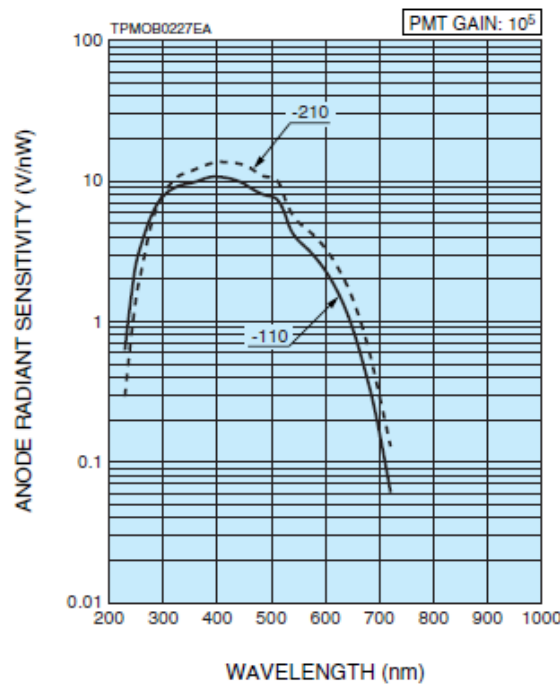


Figure 4: Typical spectral response

3.6 Filters

The myOSLchip is shipped with a BG39 and Hoya U340 Filter combination.

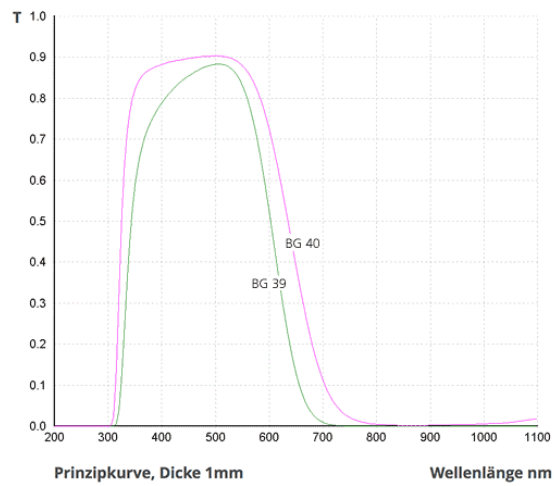


Figure 5: BG39 transmission curve

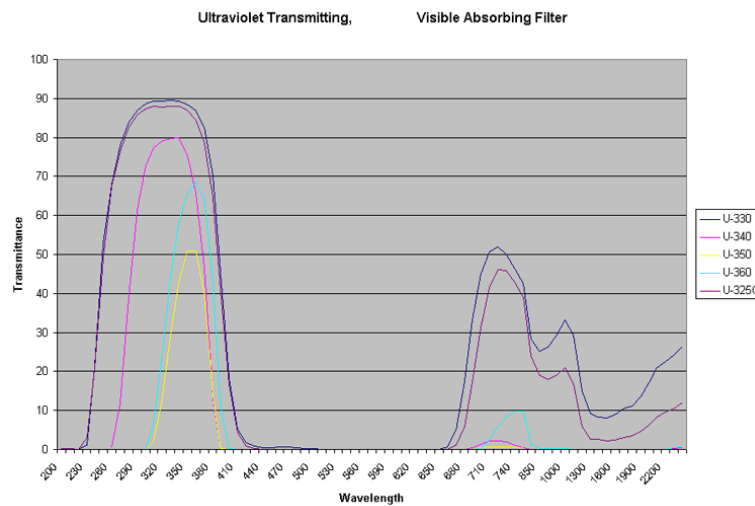


Figure 6: Hoya U340 transmission curve

3.7 Detector temperature

The detector is temperature stabilized with a Peltier element, which is set to 25°C.

4 Properties of dosimeters

4.1 myOSLchip dosimeters

The holder containing 1 BeO-element (dimensions 4.7 x 4.7 x 0.5 mm) and the sheath of myOSLchip dosimeters are made from ABS (Acrylnitril-Butadien-Styrol-Copolymer). A printed 2-D code on the sheath provides unique identification.

A delay between irradiation and measurement of at least 10 minutes is required to prevent measurement of unstable signals. This delay is not accounted for in the software.

4.2 Dosimetric properties

Coefficient of variation better than 1%.

The 0.5 s OSL measurement reduces the signal by ca. 5-10 %.

The bleaching time to obtain 0.1% signal for a 10 mSv dose is about 170 s.

The relative response due to non-linearity is < 1% up to at least 10 Sv (Figure 7)

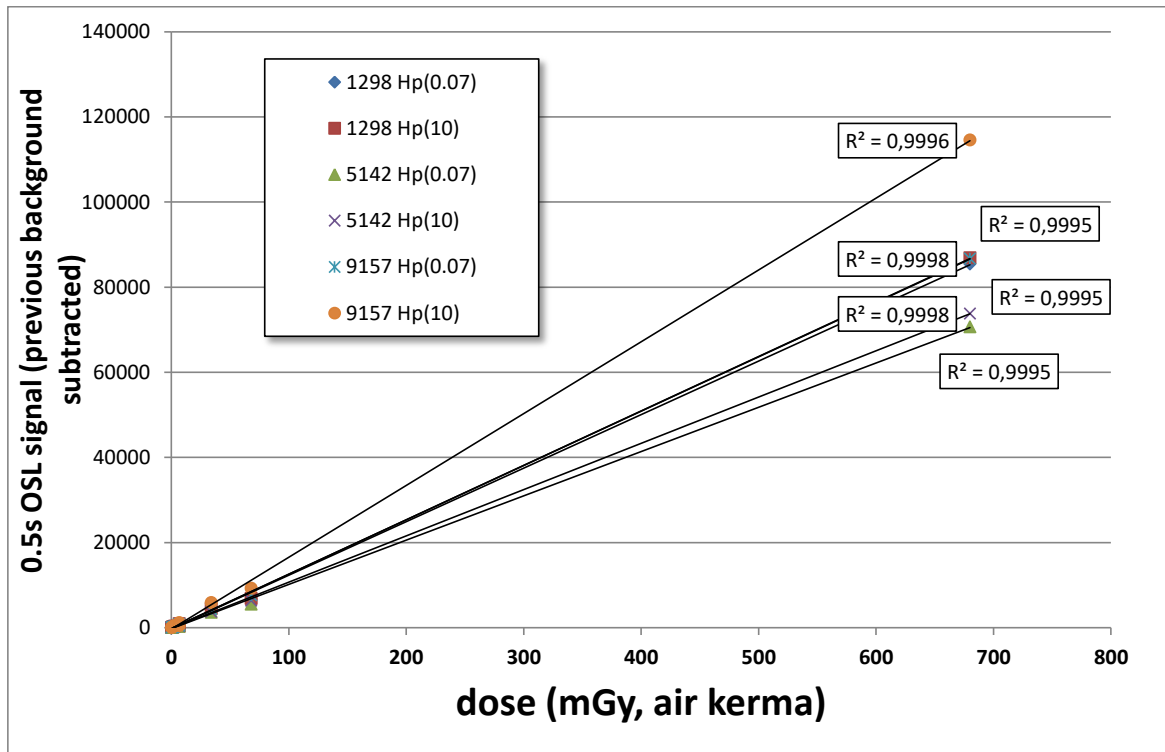


Figure 7: OSL Signal (with previous background subtracted) of 3 myOSL-dosimeters sequentially exposed to 10 increasing (0.3-680 mSv) doses with Sr-90

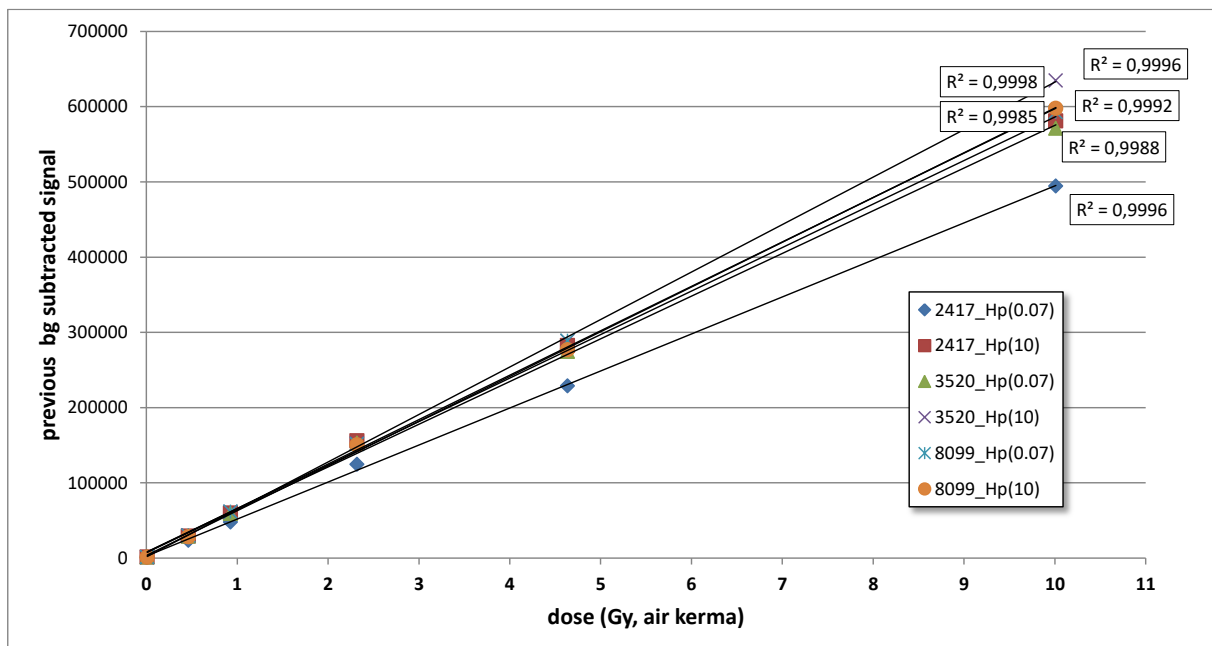


Figure 8: 0.5 s OSL Signal (with previous background subtracted) of 3 myOSL-dosimeters sequentially exposed to 6 increasing (0.01-10 Gy, air kerma) doses with Sr-90.

5 General System Work- and Dataflow

5.1 Workflow

The following general workflow describes the system. Following this sequence is mandatory to ensure functionality. The system is not fully functional unless a device and a system calibration have been performed.

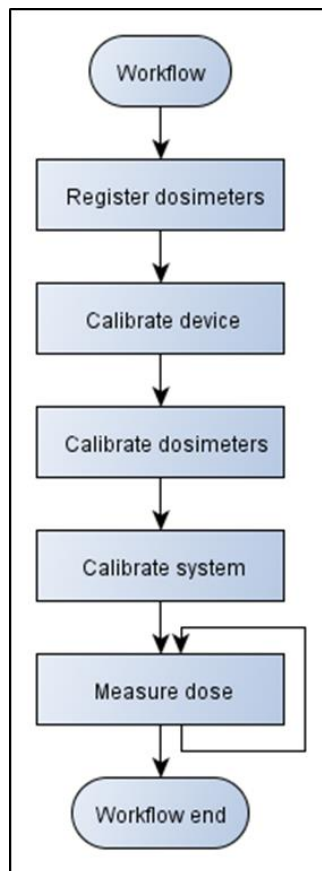


Figure 9: General workflow of the System

Any time the dosimeters have been externally erased, such as in an myOSLchip Eraser, the dosimeters must be read in the myOSLchip before further measurements are undertaken to determine an accurate background for the next set of measurements.

5.1.1 Registration

All dosimeters must first be registered, otherwise, no action except erase is possible. In the 'Register' tab, the READ type (i.e Read or Read-Erase-Read) and the dosimeter type must be defined. Registration involves an initial erase (recommended bleaching time ≥ 10 s) and measurement of the background of the BeO material itself, which is required to be subtracted

from the signal caused by subsequent irradiations. The READ type only affects how the dosimeter is processed during a normal measurement and not during calibration steps.

Dosimeters intended for use in 'Device Calibration' (see 5.1.2) and 'System Calibration' (see 5.1.4) must be registered as Calibration dosimeters before being irradiated or in before being sent to a calibration source in the case that none are locally available. Transport dosimeters to go along with sent dosimeters must also be registered as Calibration dosimeters.

Dosimeters intended for use in the field to monitor doses, should be registered as Field dosimeters.

5.1.2 Device Calibration

Device calibration is required to measure accurate doses using the myOSLchip by establishing a correlation between given dose and measured signal. This procedure ensures a verification of device stability and can be used on a frequent basis (e.g., monthly, quarterly, or every six month). No measurement action except erase is possible with the device before a 'Device Calibration' is performed.

Device calibration is independent of dose and is achieved by measurement of calibration dosimeters usually exposed to a locally available radiation source. In case no local radiation source is available, external exposure can be used and Transport Dosimeter should be added. Transport Dosimeters record the (environmental) dose during the transportation and the delay times of the calibration dosimeters but are not exposed to the calibration dose. The measurement results for the different dosimeter types (Calibration- or Transport-Dosimeter) are listed in different tabs and for each dosimeter type several dosimeters are usually used. The average signal measured by the transport dosimeters is subtracted from the signal of the calibration dosimeters. The exposure dose is recommended at ca. 1 mGy. The window 'Dosimeters' lists the dosimeters of the current device calibration. The calibration procedure can be interrupted and continued later until a new calibration is started. For each dosimeter the dimensionless local exposure value must be specified and confirmed with Enter before the measurement is started using the green arrow in the top right corner of the window. When all dosimeters for device calibration have been measured the calibration has to be saved and activated. The resulting device calibration values (average from the dosimeter measurements) are then displayed in the history window, which also lists all previous device calibration results.

During the first device calibration the dosimeters do not have an individual sensitivity calibration (see 5.1.3), an average value is used. Once the dosimeters are calibrated, the individual sensitivity factor is applied. Without sensitivity calibration it is important to always use the same Calibration Dosimeters and same quantity of dosimeters. But as well with sensitivity calibration the best results are obtained by using the same set of dosimeters.

Note: During device calibration, the dosimeters are erased internally which may cause a problem when using doses >40 mSv, see Section 5.1.5.

5.1.3 Dosimeter calibration

Each dosimeter requires an individual calibration before they can be used for dose measurements since each dosimeter element will have a slightly different sensitivity to dose, i.e., it will give a different number of counts per mGy. After registration, which includes an erase, the dosimeter must be exposed to a calibration dose (or value) and measured. This given dose must be specified in the software when performing the dosimeter calibration.

If field dosimeter shall be used specifically for certain energies, the individual calibration can be done in the different required energies. Then the field dosimeters should only be used with the energy they were calibrated with. Alternatively, the dosimeters can be calibrated with the same energy and an energy correction factor can be determined and applied for measurement of different energies.

In case different calibration energies are used, the calibration dose must be identical for the different energies.

Note: During dosimeter calibration, the dosimeters are erased internally which may cause a problem when using doses >40 mSv, see Section 5.1.5.

5.1.4 System Calibration

A device for personal dosimetry usually must be referenced to a primary or secondary standard dosimetry laboratory (SSDL). For this purpose, calibration dosimeters are exposed to a defined radiation dose at the SSDL and measured locally. This usually requires transport dosimeters. Users can redefine the type of dosimeter during system calibration according to its purpose as calibration or transport dosimeter.

A device in other applications might be calibrated against any local standard with an energy that is used in the intended application. If different energies are used an energy correction factor might be needed which can be added to the software later. The system allows only one valid calibration for a dosimeter type. It is not possible to reactive an older calibration after a new calibration was activated.

The calibration dosimeters given a dose and the exposure must be specified (units according to the user specifications, see 7.9) before these are sequentially measured. The measurement results are listed for each dosimeter. The calibration factor for the system correction will be calculated by the average signal of the calibration dosimeters.

Here again, the calibration procedure can be interrupted and when the new calibration is activated the history windows lists the current and previous system calibration values.

Note: During system calibration, the dosimeters are erased internally which may cause a problem when using doses >40 mSv, see Section 5.1.5.

5.1.5 Calibration with doses >40 mSv

When performing a calibration with doses above 40 mSv, it is important to first adjust the settings so as to avoid unnecessary erase times or errors. Before starting the calibration (device, dosimeter, or system), the user should first adjust the **Background maximum warn limit after erase [counts]** in the Settings to a suitably high level (approx. 30 counts/mSv) (see Section 7.7.8 for more details).

5.1.6 Measurement Workflow

To ensure consistent measurements, it is recommended to use the following workflow:

1. Erase
 - a. Internal erase in myOSLchip for low doses (< 10 mSv)
 - b. External erase for high doses (> 10 mSv) followed by 5 s internal erase in myOSLchip
2. Irradiation of dosimeter
3. Measurement in myOSLchip

The need for an internal erase between each irradiation cycle allows the use to avoid the application of the re-read factor determined during dosimeter calibration. It is not possible for the user to remove the application of the re-read factor or change it in settings. As the entire dosimeter is stimulated at once, rather than only a small part of the dosimeter, the signal will be reduced by each measurement according to the re-read factor. We do not recommend taking an average of several back-to-back measurements unless correcting for this loss of signal.

Erasing the dosimeter internally also establishes the new background to be used for the next measurement. If the dosimeter is externally erased and not given a short erase in the myOSLchip, the previous background from the last measurement (i.e. the signal left from the last irradiation) will be applied and overestimate the actual background.

5.2 Data flow

Figure 10 shows the data flow of myOSLdosimetry software. The shown *RawReadResult* is measured directly from the device. This signal is the result of the difference between measured signal and background signal, i.e.:

$$\text{RawReadResult} = \text{RawSignal} - \text{RawBackground}$$

Once the raw signal (*RawReadResult*) has been calculated, the '**Crystal Zero Dose**' (the signal left at the end of the last measurement), is then subtracted to get the '*RelativeSignalResult*'. The signal is then divided by the '**Device Sensitivity**' to calculate an exposure value which is then scaled by the '**Element Sensitivity**' to correct for the specific element's response to the local exposure ('*UncalibratedSignalResult*'). Finally, the local exposure value is multiplied by the '**System Calibration**' to obtain the dose, which is now comparable with the standard used.

A checksum is sent after every measurement to check whether the same measurement parameters are used.

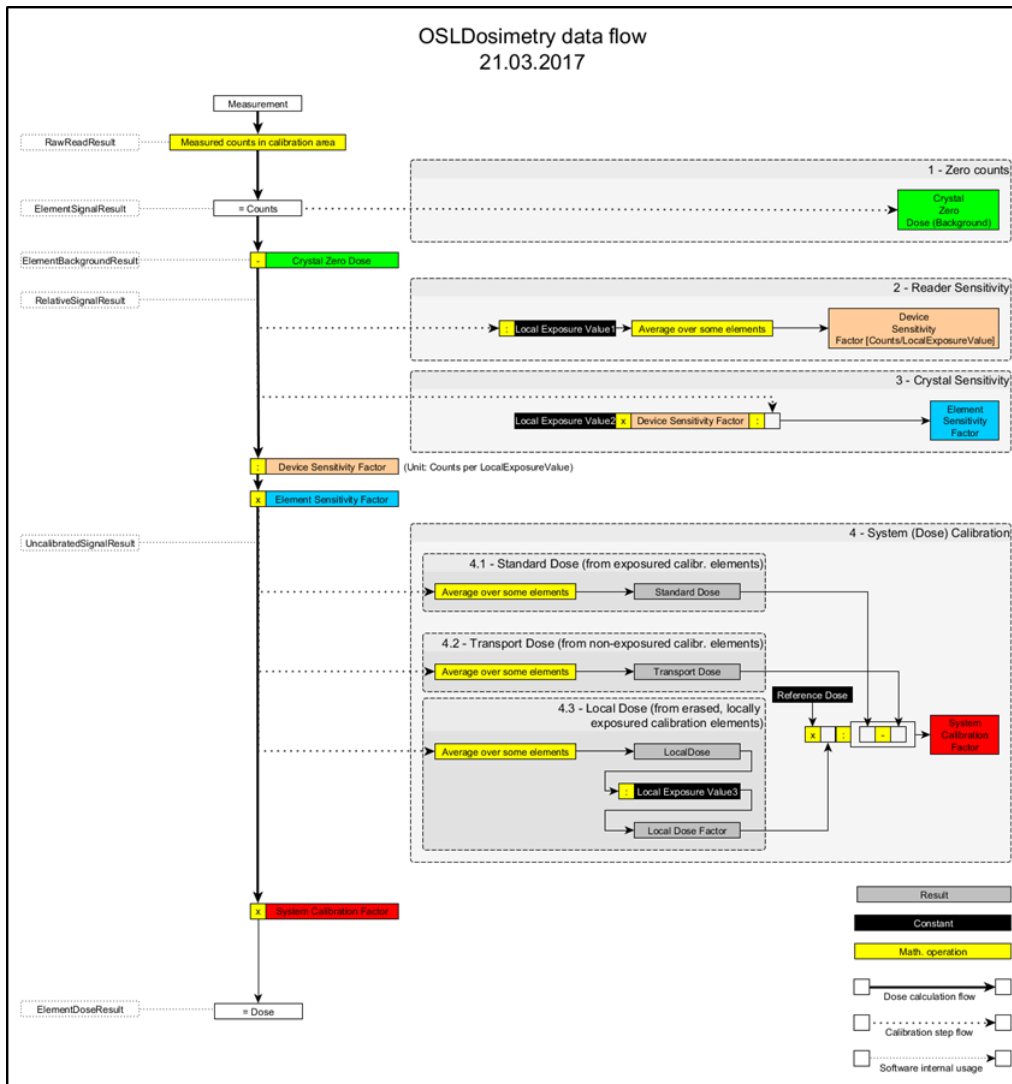


Figure 10: myOSLDosimetry Data Flow

6 Device Installation

The equipment is packed for shipment. A detailed description how to pack and unpack the equipment can be found in the "Quick installation guide" which is part of the delivery.

1. Position the myOSLchip device on a horizontal table which is qualified for >6 kg.
2. Connect power supply and Ethernet cable as shown in the section 2.6.

6.1 Prepare for Operation

Make sure the power supply is connected. See construction drawings (Figure 1) for a detailed overview where to find certain components or connections.

1. Switch on the master controller using the button at the side of the myOSLchip.
2. Start the connected personal computer or laptop.
3. Choose software settings as mentioned in section 7.7.1
4. See the software description about how to start a measurement.



7 Basics of OSLDosimetry

OSLDosimetry is a powerful piece of software, which can be used to operate myOSLchip. The software contains the complete workflow to measure and analyze dosimeters. It uses the PC operating system settings for decimal separator.

7.1 Installation

To install OSLDosimetry, run the file 'OSLDosimetry_Setup.exe' (Figure 11) and follow the installation process. The software needs at least 9.5 MB free disk space.

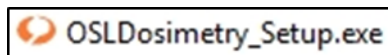


Figure 11: Software Setup file

7.2 Starting OSLDosimetry

After installation, the software can be started by clicking the desktop icon (Figure 12). Alternatively, the software can be started using the start menu and clicking on OSLDosimetry under 'Freiberg Instruments'.

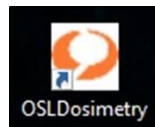


Figure 12: Desktop Icon

Once the software is started, the initialization screen (Figure 13) will be displayed and a simulated predefined myOSLchip device is selected as default. To change default device settings and IP address to correspond to the current device, log in (see Section 7.3) and switch to settings menu as described in section 7.9.

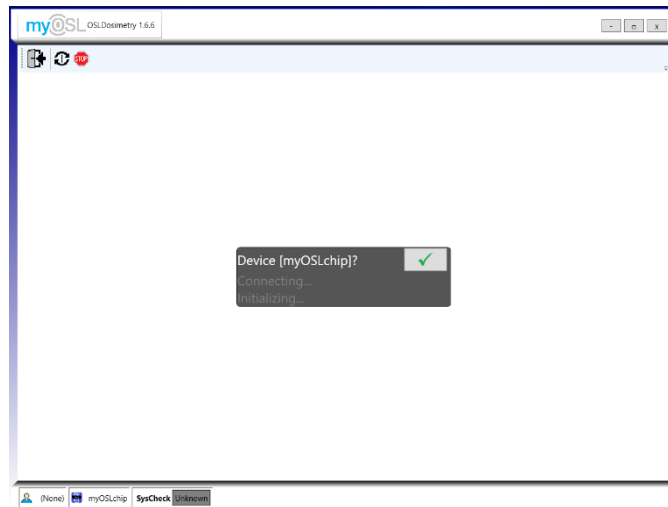



Figure 13: Initialization Screen

7.3 Software Login

After starting the software use this button  to switch to the login screen (Figure 14). Use the login button and type in your account information (Figure 15). When starting the software for the first time, use the supervisor account with full software access to customize the software and change the default settings.

Supervisor account:	Username: supervisor	Password: supervisor
---------------------	----------------------	----------------------

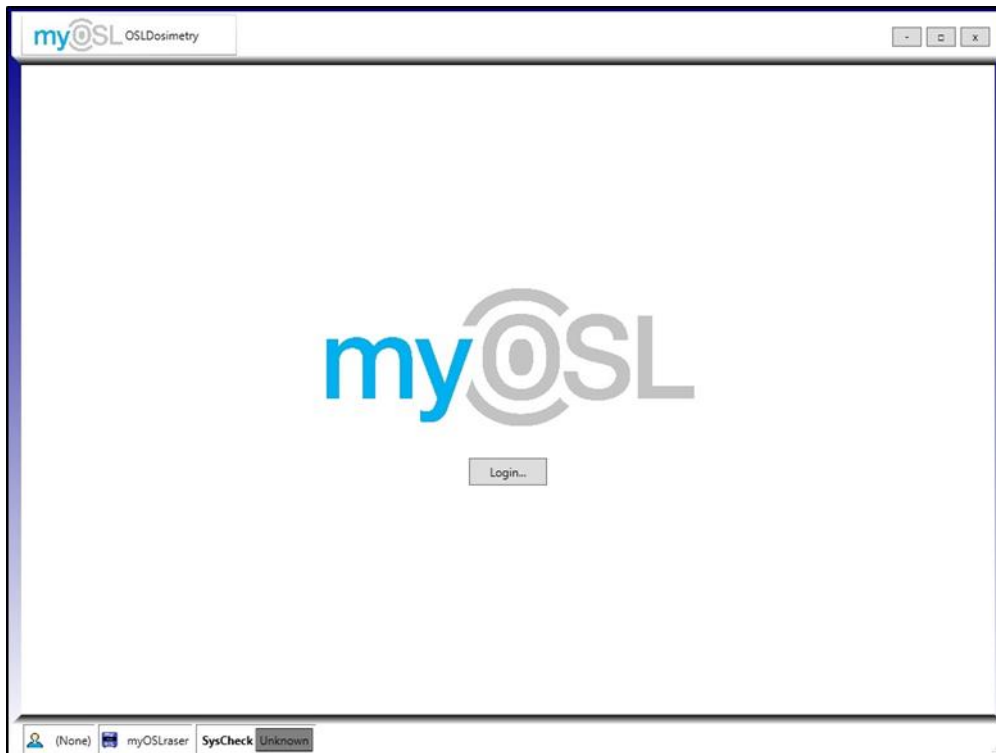


Figure 14: Login screen

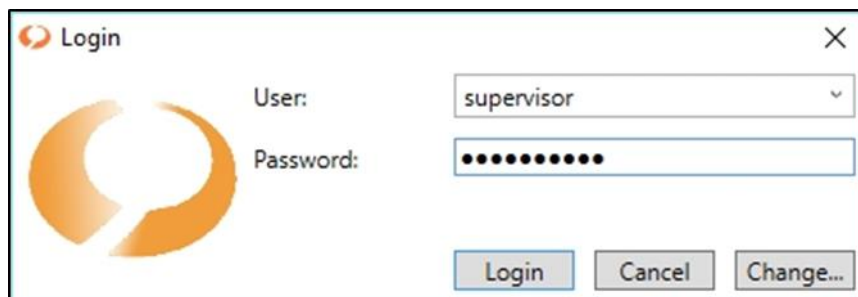


Figure 15: User Login

After the first login, you can add additional accounts in “User management” as described in section 7.8.

7.4 User management

Some OSLDosimetry functions are only accessible via special login. At first Start up, the “User management” is only accessible via Supervisor login.

7.4.1 How to enter User management

- 1.) Login as Supervisor as described in 7.3
- 2.) In the following menu use the button (Figure 16) to enter User management.



Figure 16: Button to access the user management.

Attention! Main menu is only accessible with Supervisor login!

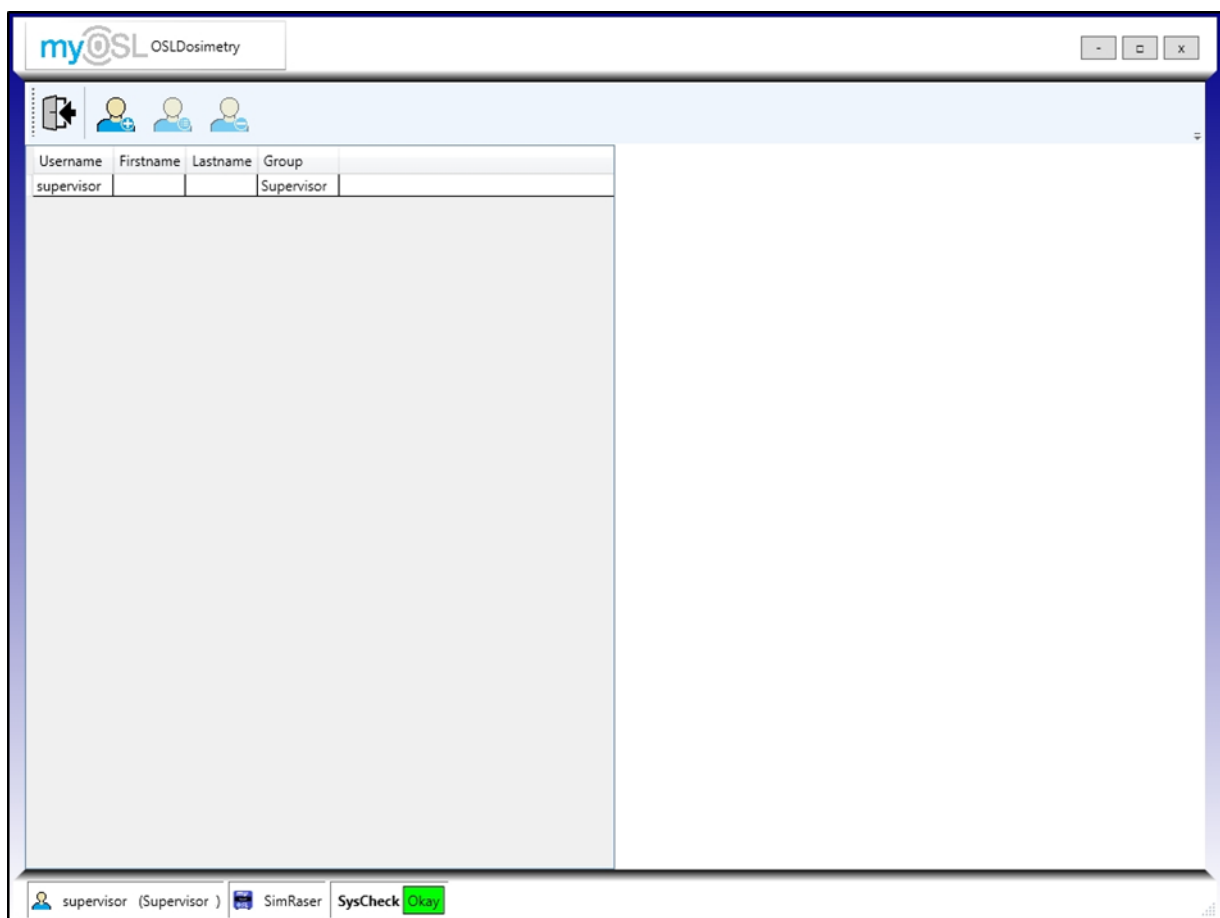


Figure 17: User management

Available user groups:

Operator	standard low-level user
Engineer	high level user
Supervisor	Administrator (can change parameters)
FI	Service by Freiberg Instruments/RadPro

Access levels for user groups:

	Operator	Engineer	Supervisor	FI
measurement	✓	✓	✓	✓
Register dosimeters / allocate reads		✓	✓	✓
Dosimeter calibration		✓	✓	✓
System calibration		✓	✓	✓
Device calibration		✓	✓	✓
Define reads				✓
Modify ParameterSet / set user rights			✓	✓

Table 1: Access levels for user groups

7.4.2 How to change default Accounts

- 1.) Click the account you want to change.
- 2.) Use "Change user details" button (Figure 18) to enter "User details" or double-click on the account to enter "User details" directly.



Figure 18: Change user details

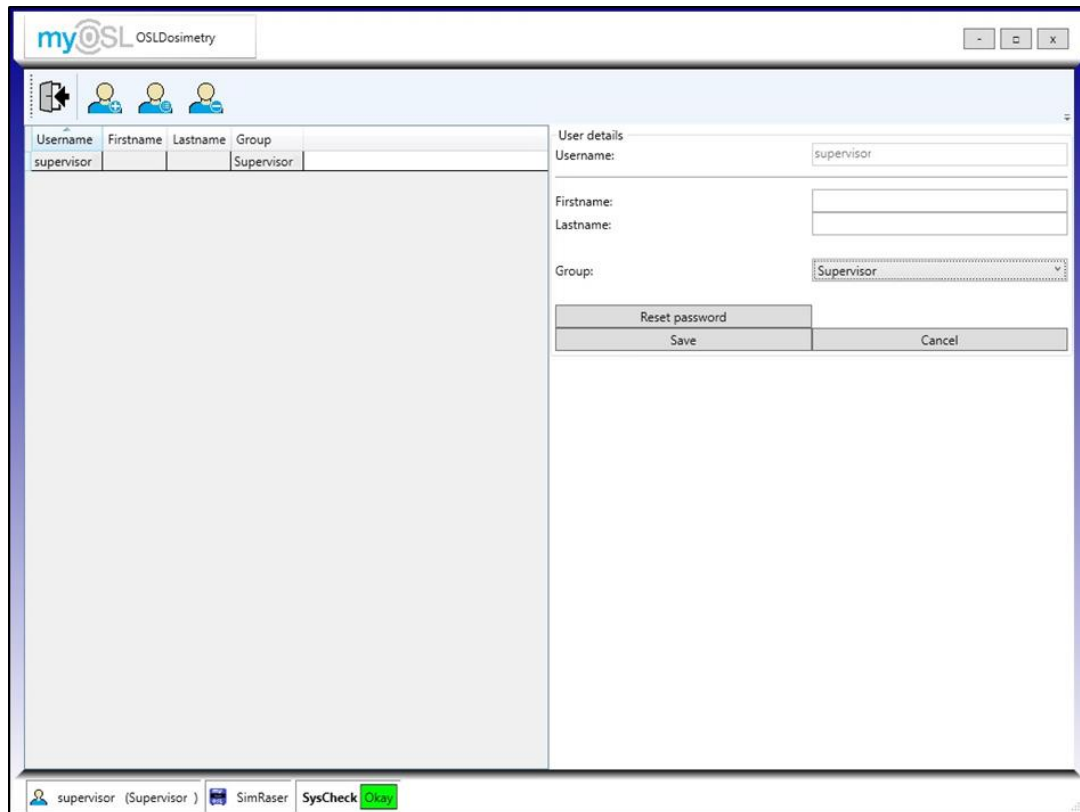


Figure 19: User details

- 3.) Assign First and Last name of the user to make a distinction between different users of the same group (additional)
- 4.) Change the group of the user by clicking on dropdown menu next to “Group” and choose one of the following suggestions.
 - a. Operator
 - b. Engineer
 - c. Supervisor
 - d. FI

Related access level for the groups is shown in Table 1.

- 5.) Confirm all changes with “Save” button.
- 6.) “Reset password” button resets the current password.

Attention! Only users in group “Supervisor” are authorized to reset passwords!

- 7.) If the logged in user is in group “Supervisor” the new password will be displayed in an additional window.
- 8.) Enter the login screen described in 7.3 and click “Change...” button.
- 9.) Use this password and you are allowed to add a new password (Figure 20)

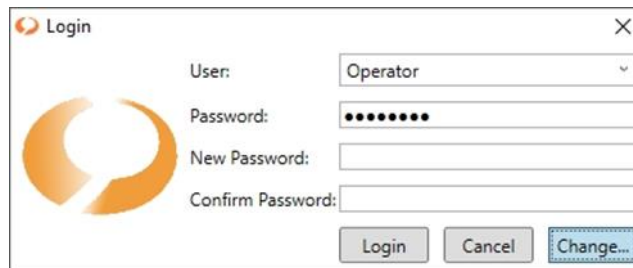


Figure 20: Changing password.

- 10.) Confirm the new password and click Login.
- 11.) Cancel button will abort your changing process.

7.4.3 How to add new users

- 1.) Click “Add user” button (Figure 21) to enter a blank user details window.



Figure 21: Add user.

- 2.) Choose your own username.
- 3.) Define First name and Last name of the user (additional)
- 4.) Choose one of the predefined groups.
- 5.) confirm your new user with “Save” button.

7.4.4 How to delete users

- 1.) select existing user in the list.
- 2.) click “Delete user” button (Figure 22: Delete user.)
- 3.) confirm deletion in following window.



Figure 22: Delete user.

7.5 Dosimeter setup

The dosimeter setup is accessible from the main menu. All dosimeter types used with the system must be defined in this setup prior to use.

Attention! Every dosimeter type must be created by an “engineer”, or from a higher-level account, as described in Table 1.

7.5.1 Dosimeter type

Before a dosimeter can be added to the ‘Identification Setup’ it must first be created under ‘Dosimeter Types’. Select ‘Add new...’ and enter a descriptive dosimeter name in the Description field. This name will be added to the pull-down menus of the software, where a dosimeter type must be selected.

Select an Element System and select the used detectors:

In the myOSLchip system the detector E1 is used. Please do not check the “Is single element” box, this is used for single elements which are mounted into cards.

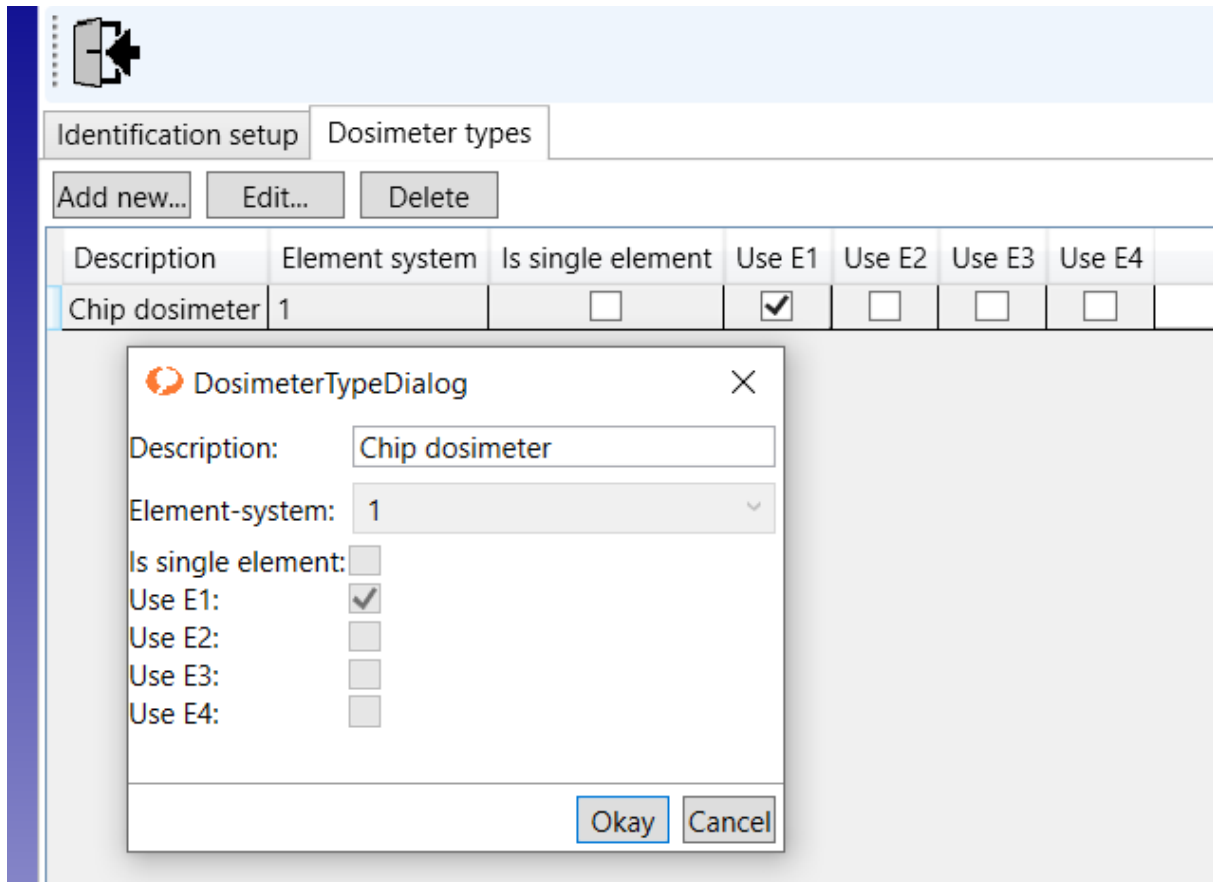


Figure 23: Dosimeter type

If a dosimeter type is marked, an energy correction can be chosen for the detectors of the selected dosimeter type. The possible energy correction factors can be entered in the table in the Section 7.7.11 Energy correction.

Typically, for myOSLchip the energy is not defined in this menu, but during the reading in the read menu (see 7.6.1). In section 7.7.11 is selected “individual per measurement”

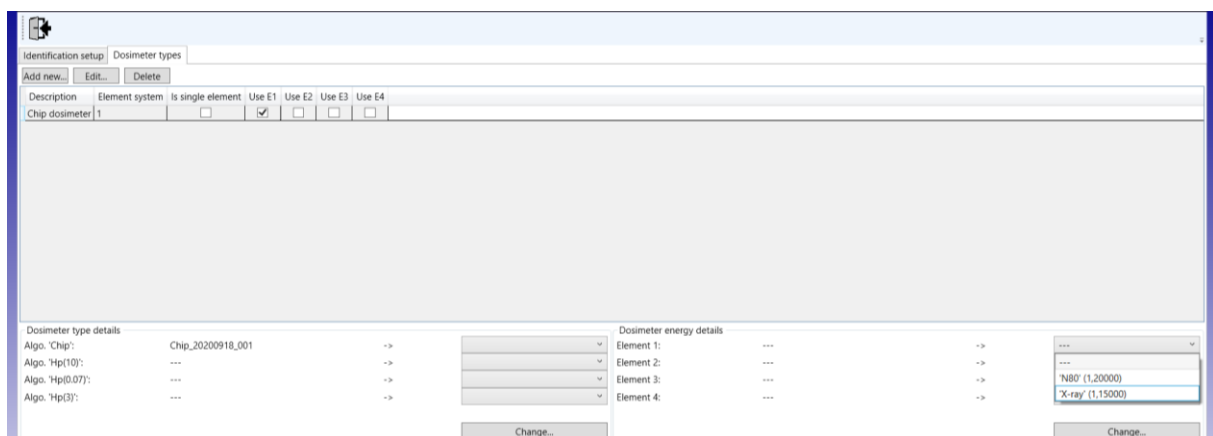


Figure 24: Energy details

7.5.2 Identification setup

Once a dosimeter type has been created, it must be confirmed for use in this setup.

Select 'Add new...' and enter the dosimeter name and select the related dosimeter type.

The Identification and Usage type fields can stay empty for the myOSLchip system, this is due to the myOSLchip dosimeters typically not being labelled with a specific identification (first letter of the ID code), instead the dosimeter type and usage type is selected manually by the user during Registration.

Check the "Is active" box and press okay.

The error message that the identifier is missing, can be confirmed with yes.

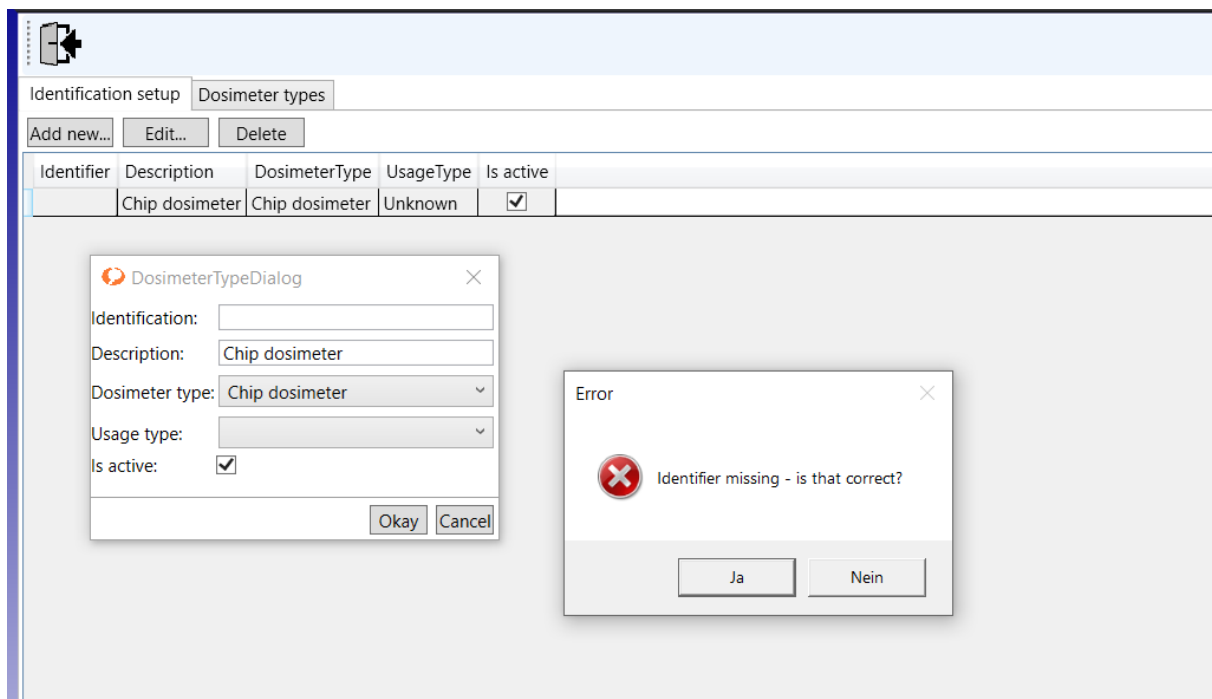


Figure 25: Identification setup

7.6 Start a Measurement

7.6.1 Measurements with "operator" login

The following steps show how an operator has to use the device.

Attention! Every dosimeter must be registered by an “engineer”, or from a higher-level account, as described in section 7.8, before use.

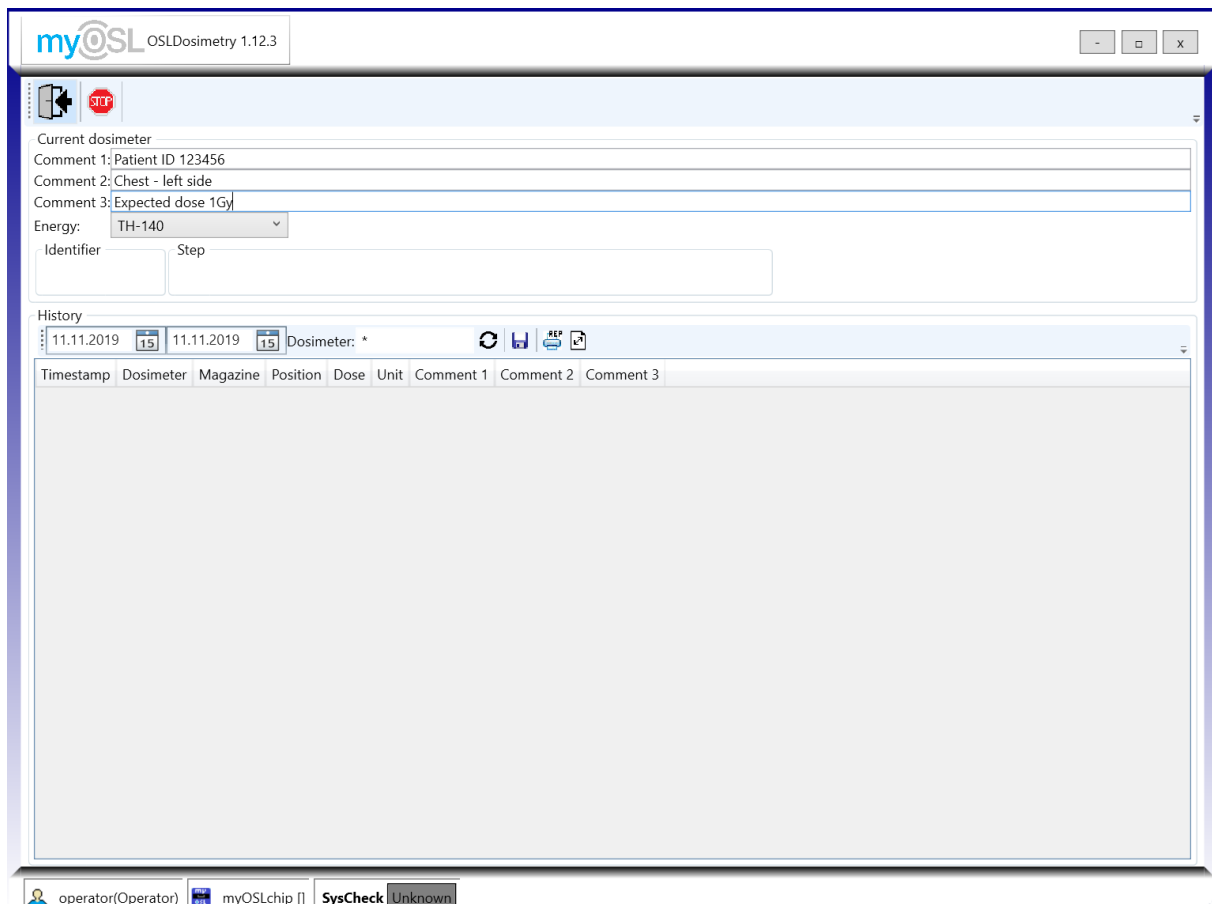


Figure 26: Measurement interface with operator login

- 1.) Initialize your device.
- 2.) Login with operator account. Figure 26 shows the measurement interface when logged in as operator.
- 3.) Type-in comments if required. These are shown in the History.
- 4.) Select an energy if applicable. Only energies can be selected that were defined in the settings.
- 5.) Use the button shown in Figure 27 to start the measurement. The device will execute the measurement steps automatically.



Figure 27: Start a measurement

- 6.) The “Identifier” (Figure 26) indicates the actual dosimeter number.

7.) The Measurement “Step” provides detailed measurement progress information like:

- WaitNextRepetition

8.) The “History” contains user-defined information about all measured dosimeters

7.6.2 Measurements with “engineer” login

7.6.2.1 Calibration

The calibration of the system and dosimeters is done in the “Register, Calibrate...” menu (Figure 28) which is chosen via the Main menu.

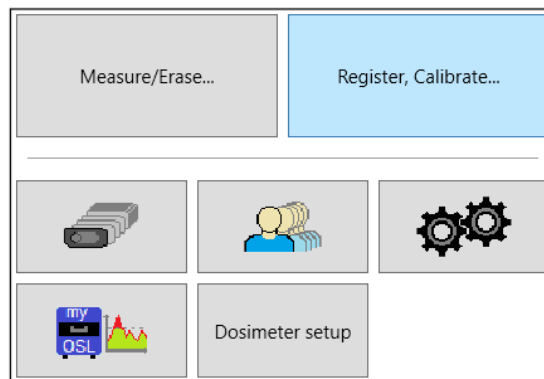


Figure 28: Main menu

The steps of registration and calibration is described below. A more detailed step-by-step description is available on request.

7.6.2.2 Register dosimeters.

In the following window (e.g., **Error! Reference source not found.**) switch to Tab “Register”.

- 1.) Before starting registration choose between two predefined READs
 - a. R1 - E1 - R1 (Read1 - Erase1 - Read1) – after the read the dosimeter is erased and read again to measure the new background, standard in personal dosimetry.
 - b. R1 (Read1) – the dosimeter is only read; any remaining signal is considered as background of the next reading, standard for myOSLchip in combination with the external myOSLchip eraser

Regardless of which option is chosen, the dosimeters will be erased as part of the registration process, a separate erase is not required.

Select predefined dosimeter types (Field, Calibration, Quality control, Dummy), for calibration of the system only calibration dosimeters can be used.

- 2.) Click “Start” button to register the dosimeter, this will bring up a warning that re-registering dosimeters will invalidate any current dosimeter calibration. To continue to registration process, click “Yes”.
- 3.) All registered dosimeters are displayed in the “History”.
- 4.) Verify that all detectors have a reasonable background by sorting the background columns up and down.

my@SL OSLDosimetry 1.17.28

1: Dosimeter: 2: State:

Register Calibrate device 1 Calibrate dosimeter Calibrate system

Read: R1
Dosimeter type: Chip dosimeter
Usage type: Calibration

History

08.01.2020 15 19.04.2023 15 Dosimeter: * [Refresh] [Save] [Print] [Export]

Timestamp	SerialNo	Dosimeter	Usage type	Read	Background
08.06.2020 11:34:21	280029	A0513	Calibration	R1	62
08.06.2020 11:35:18	280029	A0515	Calibration	R1	67
08.06.2020 11:36:11	280029	A0512	Calibration	R1	88
08.06.2020 11:37:01	280029	A0520	Calibration	R1	59
08.06.2020 11:37:39	280029	A0516	Calibration	R1	65
08.06.2020 11:41:49	280029	A0514	Calibration	R1	67
08.06.2020 11:44:12	280029	A0528	Field	R1	64
08.06.2020 11:44:54	280029	A0523	Field	R1	65
08.06.2020 11:45:38	280029	A0525	Field	R1	58
08.06.2020 11:46:10	280029	A0526	Field	R1	65

Figure 29: Registration screen

7.6.2.3 Device calibration

- 1.) Irradiate the erased dosimeters against a local source with a repeatable and reasonable dose (e.g., around 1 mGy), the irradiation dose can be defined by a dose value but also by any other repeatable value like time, movements, turns etc.
- 2.) Enter the device sensitivity calibration with the tab "Calibrate device" (Figure 30)

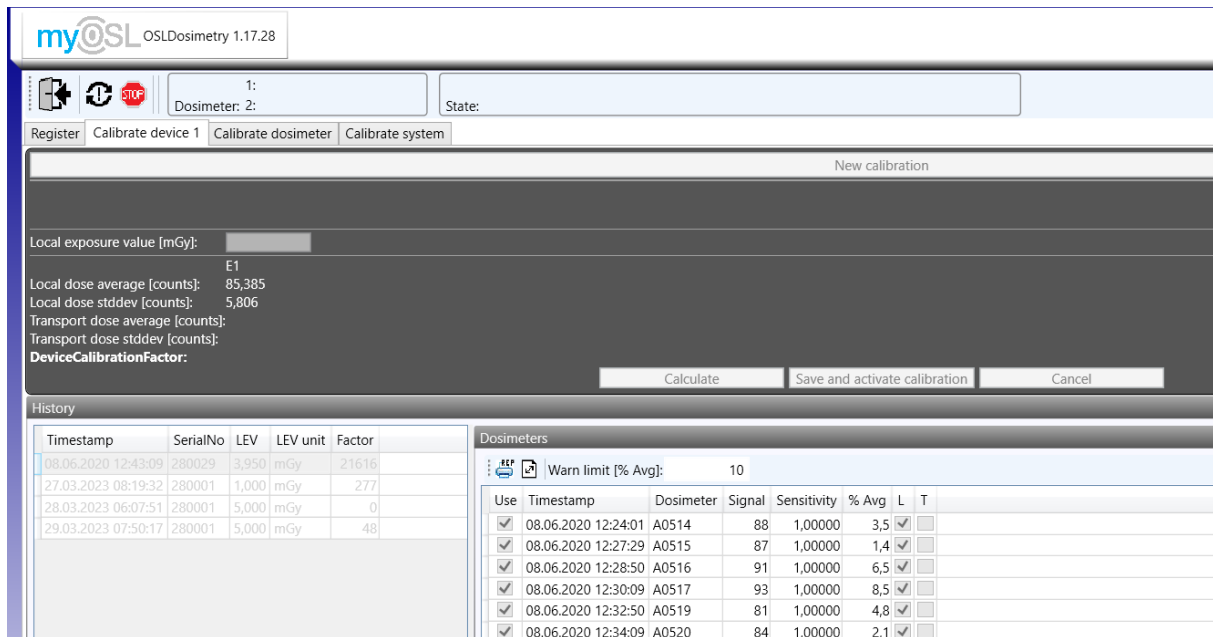


Figure 30 Calibrate device screen.

- 3.) Click "New calibration" button.
Type in the Local exposure value of the used dosimeter and confirm with Enter.
- 4.) Click "Start" button to start the calibration.
- 5.) Software determines "Signal average [counts]" and calculates the "Device Calibration Factor".
- 6.) The sensitivities are 1 for non-calibrated dosimeters, for calibrated dosimeters the calibrated crystal sensitivities are applied.
- 7.) Assign Dosimeters which have been exposed to local or external source in the "Dosimeters" table with "L" and Dosimeters which have been used as Transport Dosimeters with "T".
- 8.) Dosimeters with unacceptable values can be deselected by the Use button.
- 9.) Save and activate the new calibration.

Note: a re-calibration with the same conditions as before should result in a similar calibration factor. After the new calibration is saved, it is not possible to return to the former calibration.

10.) Calibrations for different readers can be done. The software will select automatically the latest and correct device calibration factor of the reader which is used. Several calibrated readers can be used in parallel.

7.6.2.4 Calibrate Dosimeter

- 1) Irradiate the erased dosimeters against a local source with a repeatable and reasonable dose (e.g., around 1 mGy), which is equivalent to the dose in the device calibration (section 7.6.2.3)
- 2) Calibrate the dosimeter sensitivity with the tab “Calibrate dosimeter” (Figure 31)

myOSL OSL Dosimetry 1.17.28

1:
Dosimeter: 2: State:

Register Calibrate device 1 Calibrate dosimeter Calibrate system

Start new calibration

History

09.01.2020 15 19.04.2023 15 Dosimeter: * [Refresh] [Save] [Print] [Export]

Timestamp	SerialNo	Dosimeter	Background	Signal	E1 signal 2	E1 DcCF	Signal (rel.)	Hp(10) tr. dose	Exp. val	Unit	Sensitivity
08.06.2020 12:55:51	280029	A0521	48	124			76		3,9500	mGy	1,12143
08.06.2020 12:57:19	280029	A0522	67	164			96		3,9500	mGy	0,88596
08.06.2020 12:58:35	280029	A0523	65	120			55		3,9500	mGy	1,55465
08.06.2020 13:00:07	280029	A0524	80	176			96		3,9500	mGy	0,88622
08.06.2020 13:01:30	280029	A0525	58	136			78		3,9500	mGy	1,09865
08.06.2020 13:03:30	280029	A0526	65	151			86		3,9500	mGy	0,98739
08.06.2020 13:04:59	280029	A0527	51	146			95		3,9500	mGy	0,89494
08.06.2020 13:06:19	280029	A0528	64	140			76		3,9500	mGy	1,11701
08.06.2020 13:07:30	280029	A0529	81	152			71		3,9500	mGy	1,20791

Figure 31 Calibrate dosimeter screen

- 3) After clicking “Start new calibration”, it must be selected, if transport dosimeters are used or not (Figure 32)

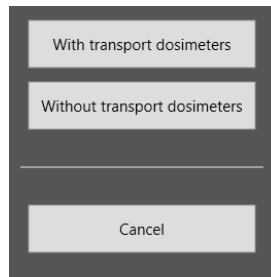


Figure 32 Select calibration with or without transport dosimeters

- 4) If the dosimeters are registered and irradiated for calibration on site, "Without transport dosimeters" is chosen. Type in the Local exposure value and confirm with enter and click "Start" button to start the calibration and confirm when all dosimeters are calibrated (Figure 33)

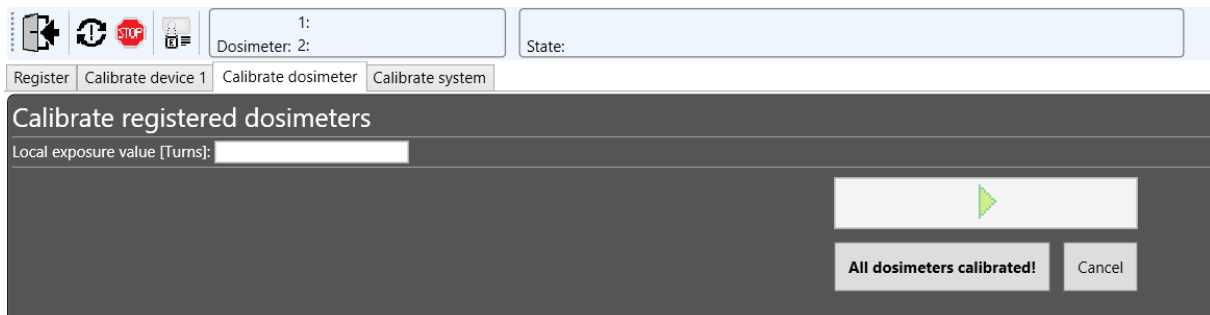


Figure 33 Calibrate registered dosimeter screen

- 5) If dosimeters are shipped irradiated together with transport dosimeters, "With transport dosimeters" is chosen. Click "Start" button to start the reading of the transport dosimeters and confirm when all transport dosimeters are measured (Figure 34).

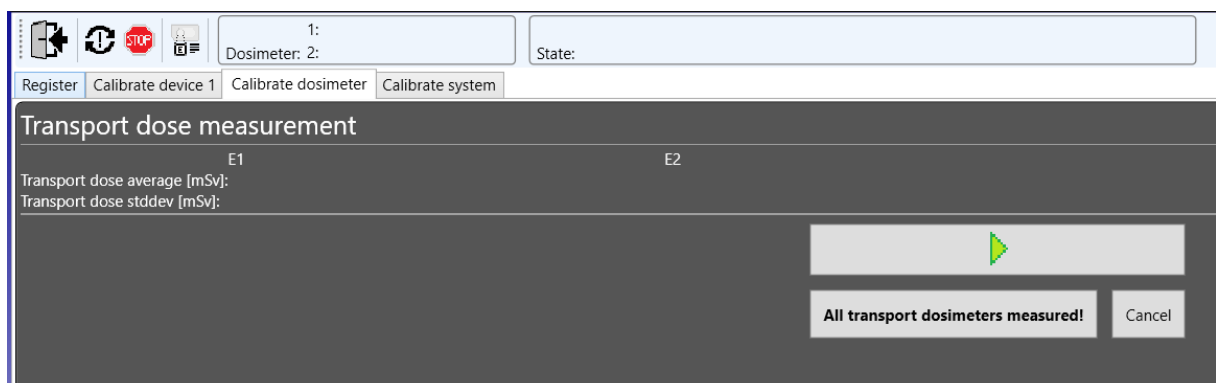


Figure 34 Transport dose measurement screen

- 6) Select if new unregistered dosimeters shall be calibrated or if dosimeters shall be calibrated which were registered (and calibrated) before (Figure 35)

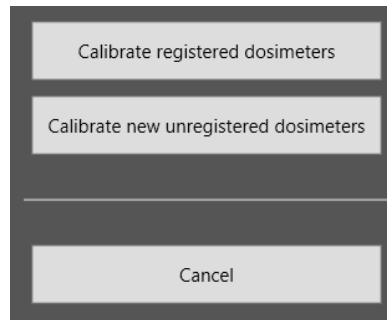


Figure 35

- 7) If “Calibrate registered dosimeters” is chosen, type in the Local exposure value of the irradiated dosimeters and confirm with enter and click “Start” button to start the calibration and confirm when all dosimeters are calibrated (Figure 33)
- 8) If “Calibrate new unregistered dosimeters” is chosen, type in the Local exposure value of the irradiated dosimeters and the other parameters according to 7.6.2.2 Register and confirm with enter, click “Start” button and confirm when all dosimeters are calibrated (Figure 36)

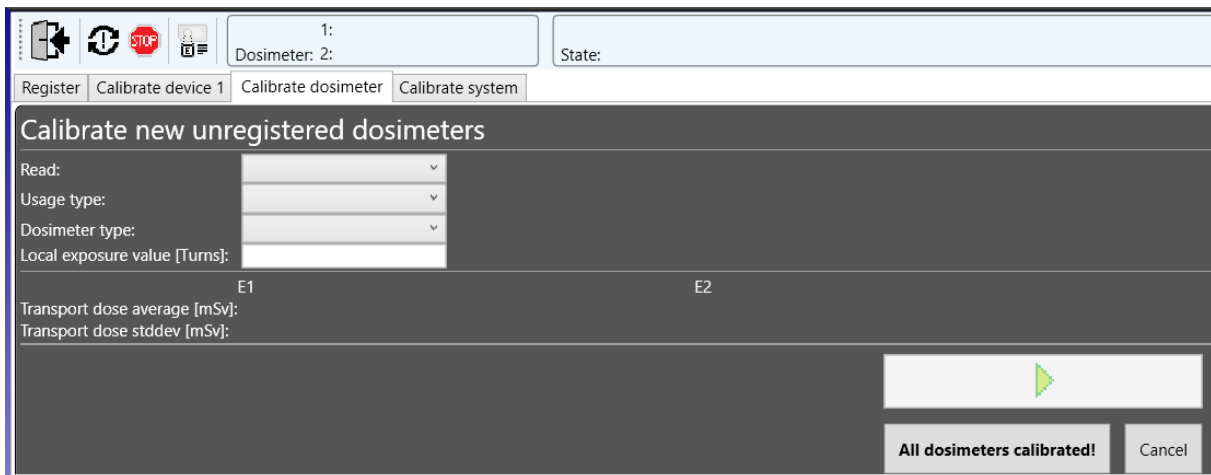


Figure 36 Calibrate new unregistered dosimeters screen

- 9) All calibrated dosimeters are displayed in the “History” list. For each dosimeter the sensitivity is calculated, the re-read factor DcCF is not calculated for myOSLchip dosimeters. For new dosimeters also the background (Figure 31) is measured.
- 10) The sensitivity of detectors typically varies around 1, in most cases between 0.7 and 1.5. But this depends on the batch sensitivity. The calibration can be checked by sorting the columns of these parameters up and down to verify that the results are reasonable.

7.6.2.5 Calibrate system.

- 1) Calibrate the dose response of the system against a standard with the tab “Calibrate system” (Figure 37)

myOSL OSLDosimetry 1.17.28

1: 2: State:

Register Calibrate device 1 Calibrate dosimeter Calibrate system

New calibration

Chip dosimeter

Reference/Std. dose [mGy]:

E1

Standard dose average [counts]: 4,856694
 Standard dose stddev [counts]: 0,138522
 Transport dose average [counts]: 0,000449
 Transport dose stddev [counts]: 0,000071

System calibration factor:

Calculate Save and activate calibration Cancel

History

Timestamp	Ref dose	Ref dose unit	Factor
26.06.2020 08:49:12	5000,000	mGy	1,02960
27.03.2023 08:22:57	1,000	mGy	0,00000
28.03.2023 06:19:40	4,000	mGy	0,00000

Dosimeters

Warn limit [% Avg]: 10

Use	Timestamp	Dosimeter	Signal (rel.)	Uncal. result	% Avg	L	S	T
<input checked="" type="checkbox"/>	26.06.2020 08:30:26	A0520	101857,001443	4,877682	0,4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:34:42	A0519	96804,388194	4,986032	2,7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:35:54	A0517	111627,301245	4,759643	2,0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:38:15	A0514	107661,216513	4,712963	3,0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:39:11	A0515	99617,372455	4,856783	0,0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:40:06	A0513	90787,039616	5,105579	5,1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	26.06.2020 08:41:06	A0516	108917,757479	4,698175	3,3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Figure 37 Calibrate system screen

- 2) Irradiate the complete erased dosimeters with the required dose (e.g. Hp(10) for personal dosimeters), use transport dosimeters if required.
- 3) Click "New calibration" button.
- 4) Type in the Reference/Std dose of the used dosimeter and confirm with Enter.
- 5) Click "Start" button to start the calibration.
- 6) The software calculates the "System Calibration Factor" which converts counts to dose.
- 7) Assign Dosimeters which have been exposed to the standard dose in the "Dosimeters" table with "S" and Dosimeters which have been used as Transport Dosimeters with "T".
- 8) Dosimeters with unacceptable values can be deselected by the Use button.
- 9) Save and activate the new calibration.

Note: a re-calibration with the same conditions as before should result in a similar calibration factor. After the new calibration is saved, it is not possible to return to the former calibration.

- 10) Calibrations for different dosimeter types can be done, the software selects automatically the correct and latest calibration factor for the measured dosimeter type. The system calibration factor is valid for all connected reader with device calibration for the same dosimeter type. Several calibrated readers can be used in parallel.

7.6.3 How to adjust column headers in “History” screen

In every Measurement or Calibration history the displayed columns are predefined to a default amount of information of the measurements. The user has the possibility to adjust these columns to show only the information they are interested in.

- 1.) Right click into the history table to get the drop-down menu shown in Figure 38

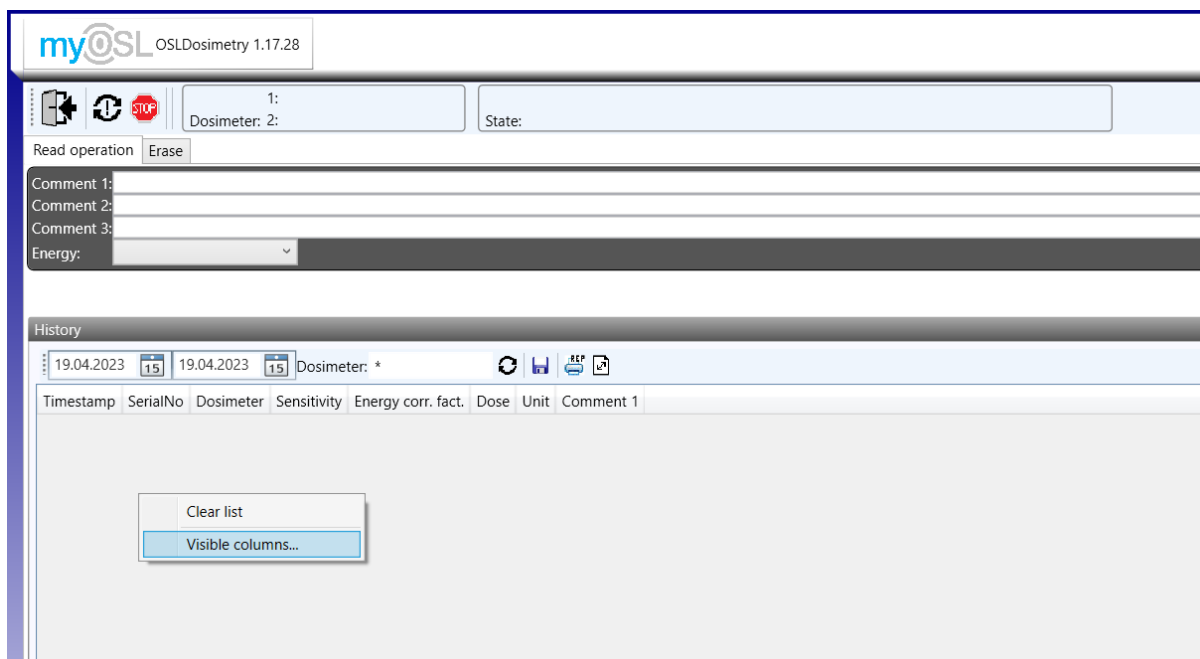
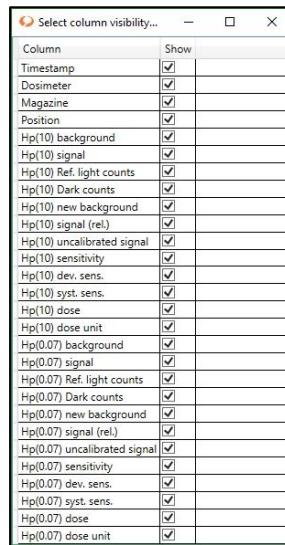


Figure 38: Drop-down menu

- 2.) Decide between “Clear list” or “Visible columns...”
 - a. Clear list → remove all the done measurements from “History” screen
 - b. Visible columns... → new window will be displayed (Figure 39)



Column	Show
Timestamp	<input checked="" type="checkbox"/>
Dosimeter	<input checked="" type="checkbox"/>
Magazine	<input checked="" type="checkbox"/>
Position	<input checked="" type="checkbox"/>
Hp(10) background	<input checked="" type="checkbox"/>
Hp(10) signal	<input checked="" type="checkbox"/>
Hp(10) Ref. light counts	<input checked="" type="checkbox"/>
Hp(10) Dark counts	<input checked="" type="checkbox"/>
Hp(10) new background	<input checked="" type="checkbox"/>
Hp(10) signal (rel.)	<input checked="" type="checkbox"/>
Hp(10) uncalibrated signal	<input checked="" type="checkbox"/>
Hp(10) sensitivity	<input checked="" type="checkbox"/>
Hp(10) dev. sens.	<input checked="" type="checkbox"/>
Hp(10) syst. sens.	<input checked="" type="checkbox"/>
Hp(10) dose	<input checked="" type="checkbox"/>
Hp(10) dose unit	<input checked="" type="checkbox"/>
Hp(0.07) background	<input checked="" type="checkbox"/>
Hp(0.07) signal	<input checked="" type="checkbox"/>
Hp(0.07) Ref. light counts	<input checked="" type="checkbox"/>
Hp(0.07) Dark counts	<input checked="" type="checkbox"/>
Hp(0.07) new background	<input checked="" type="checkbox"/>
Hp(0.07) signal (rel.)	<input checked="" type="checkbox"/>
Hp(0.07) uncalibrated signal	<input checked="" type="checkbox"/>
Hp(0.07) sensitivity	<input checked="" type="checkbox"/>
Hp(0.07) dev. sens.	<input checked="" type="checkbox"/>
Hp(0.07) syst. sens.	<input checked="" type="checkbox"/>
Hp(0.07) dose	<input checked="" type="checkbox"/>
Hp(0.07) dose unit	<input checked="" type="checkbox"/>

Figure 39: Available Column headers

- 3.) Check or uncheck the columns you want to display in “History” screen
- 4.) Close the window and your “History” contains only the checked column headers

7.7 Device settings

The device settings of OSLDosimetry defines the communication and allows the supervisor to adjust the parameters to meet their needs. The settings can be accessed via the Main menu (Figure 28) and selecting System Settings (Figure 40).


The availability of parameters in the settings depend on the selected system. All changes of parameters must be saved with the saving button 




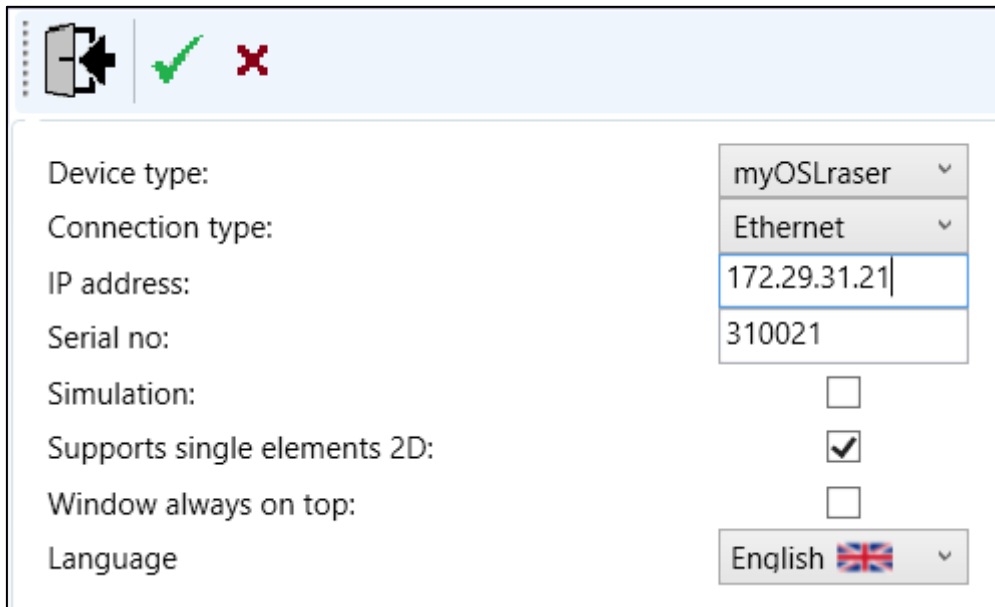
Figure 40 Button System settings

7.7.1 Device connection setup

OSLDosimetry communicates with the myOSLraser 2.0 via a TCP/IP network connection. The following settings must be taken in the system settings menu accessible via main menu:

- 1.) Specify via the dropdown menu whether the system is a myOSLraser or a myOSLirradiator and whether an automation is attached.

- 2.) As standard the IP address will have the format 172.29.xx,y. Change the last number of the IP address to match your device type and serial number, e.g., your device number is 31-0001 → your IP address is 172.29.31.1
- 3.) Simulation creates a virtual device and must be switched-off for operation.
- 4.) Support single elements 2D must be checked if extremity elements for rings or eye dosimeters are used with the system.
- 5.) Window always on top will keep OSLDosimetry in front of other applications
- 6.) Save your changes with 




Device type:	myOSLraser
Connection type:	Ethernet
IP address:	172.29.31.21
Serial no:	310021
Simulation:	<input type="checkbox"/>
Supports single elements 2D:	<input checked="" type="checkbox"/>
Window always on top:	<input type="checkbox"/>
Language	English 

Figure 41: System settings

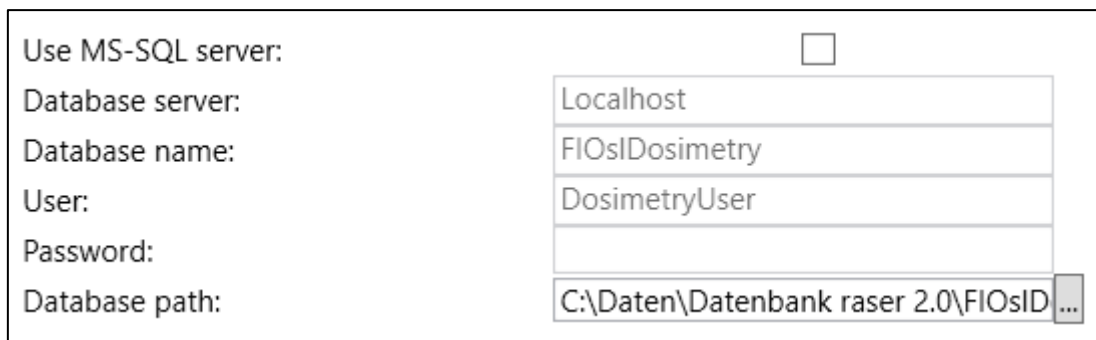
Attention: Changes of device type or IP address will require a restart of the OSLDosimetry software!

7.7.2 Database

The standard database is a file-based database that is installed automatically during installation of the software.

- 1) “Use MS-SQL server” offers the option of an alternative SQL database. It requires settings of server, name, user, and password.
- 2) The database path can be adjusted. It is recommended to save the database file at a place which provides highest data protection and real time copy. Default path is the

installation folder of OSLDosimetry. With the file-based database a cloud-based solution is not recommendable.



Use MS-SQL server:

Database server: localhost

Database name: FIOsIDosimetry

User: DosimetryUser

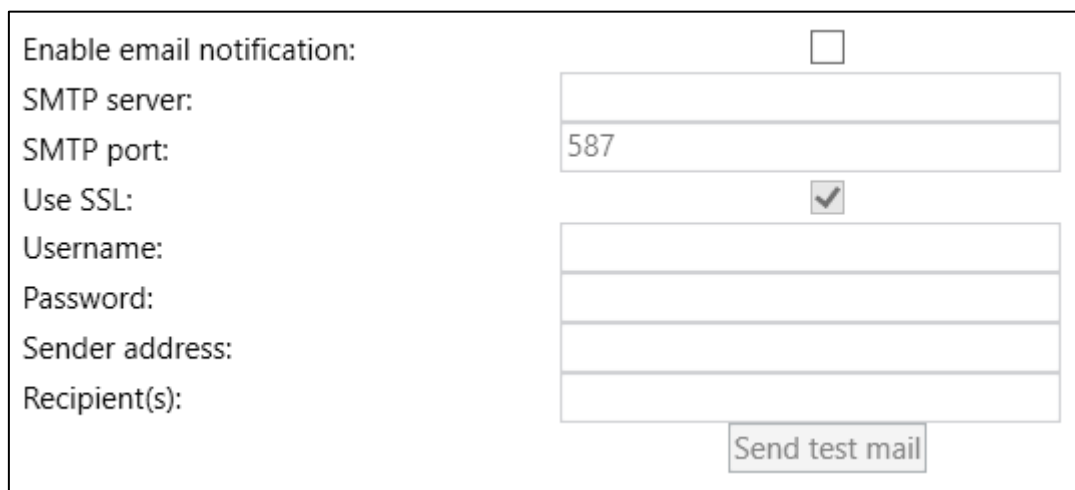
Password:

Database path: C:\Daten\Datenbank raser 2.0\FIOsID...

Figure 42 Database

7.7.3 Notification

If email notifications are enabled, error messages will be sent directly per email when they occur. The user needs to type in their email settings (SMTP server and Port) as well as the username and password for the server. Several recipients can be added.



Enable email notification:

SMTP server:

SMTP port: 587

Use SSL:

Username:

Password:

Sender address:

Recipient(s):

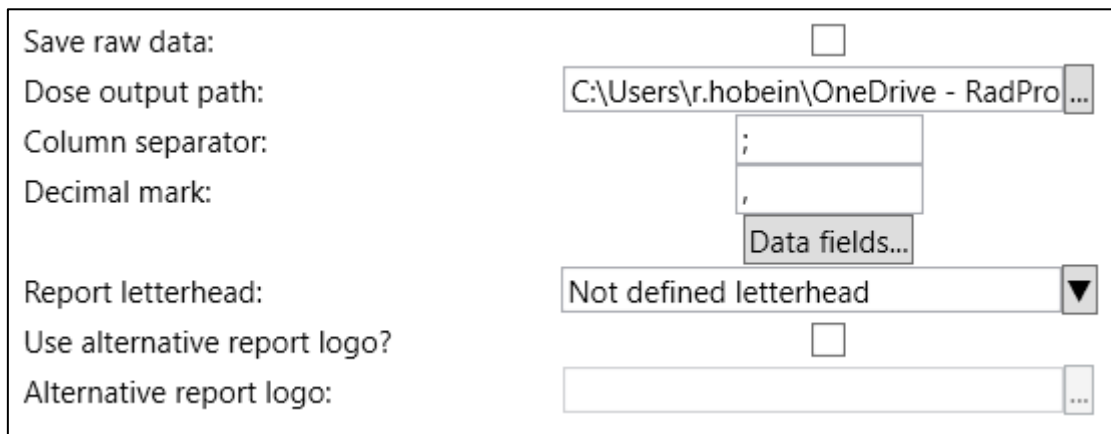
Send test mail

Figure 43 Notification

7.7.4 Data saving

- 1) Check the box next to “Save raw data” to record not only the averaged data, but individual data per recording channel.

- 2) **Dose output path:** the path where the software should save the export files of the measurements.
- 3) **Column separator:** this is for the automatic export (csv) file. Important for the local excel settings to identify the columns.
- 4) **Decimal mark:** this is for the export (csv) file and the correct decimal mark should be used. Otherwise, values will not be shown correctly in excel. If this is different from the decimal separator on the computer, it may lead to values being displayed incorrectly when importing the data to other programs.
- 5) **Data fields:** Selection of the measurement information which should be exported.
- 6) **Report letterhead:** adding text as report letterhead.
- 7) **Use alternative logo:** in case special company logo should be on the letterhead. Report logo can be upload under "Alternative report logo".



Save raw data:

Dose output path: C:\Users\r.hobein\OneDrive - RadPro ...

Column separator: ;

Decimal mark: ,

Data fields...

Report letterhead: Not defined letterhead ▼

Use alternative report logo?

Alternative report logo: ...

Figure 44 Data saving

7.7.5 Dose units

Units for dose can be specified as well as units for the local exposure, the latter of which can be dimensionless.

- 1) **Default dose unit prefix:** Dose unit which should be shown in the measurement window and report.
- 2) **Default dose SI unit:** dose unit like Sv, Gy, rem,... free selectable
- 3) **Local exposure unit prefix:** exposure unit which can be a dose unit like milli, micro or none.

- 4) **Local exposure SI unit:** dose unit like Sv, Gy, rem or even dimensionless in case local irradiator is not calibrated and exposure is selected as time or revolution.

Default dose unit prefix:	Milli
Default dose SI unit:	Sv
Local exposure unit prefix:	None
Local exposure SI unit:	Turns

Figure 45 Dose units

7.7.6 Dummy

Dummy dosimeters are used only with the myOSL 2.0 system

Dummy dosimeters	
Use automatic detection:	<input checked="" type="checkbox"/>
Dummy dosimeter identifier:	99999

Figure 46 Dummies

7.7.7 QC Dosimeters

QC dosimeters are not enabled as a standard but can be enabled by the user by checked the box under Quality control dosimeters. Here the user may also define the reading interval of the QC dosimeters, i.e., how many dosimeters can be read before a QC dosimeter must be read out, as well as define the accepted dose limits for each element in the QC dosimeter. These limits should be set so that they are centred on the dose given to the QC dosimeters.

Quality control dosimeters	
Enabled:	<input type="checkbox"/>
Read op. interval:	50
Accepted dose E1 [mSv] :	0,95 to 1,05
Accepted dose E2 [mSv] :	0,95 to 1,05
Accepted dose E3 [mSv] :	0,95 to 1,05
Accepted dose E4 [mSv] :	0,95 to 1,05

Figure 47 QC Dosimeters

7.7.8 System warning limits.

- 1) **Ref. light count limit:** definition of accepted range for the reference light value. It is recommended to check the reference light value multiple times within a single day, calculate an average and add the values $\pm 5\%$ from the average to define the accepted reference light range. Please note the reference light is an LED which has natural aging process. Brightness will decrease over time. Also, service on the optic and stimulation unit can have an influence on the reference light and it will probably be necessary to readjust the reference light value after servicing or longer time of use. Important is the stability within the process of dosimeter until next "Device Calibration"
- 2) **Dark count limit:** threshold for the light which is measured with closed shutter and stimulation and erase led in off mode. Recommended value is 30.
- 3) **Dose warn limit in mSv:** Warning message will appear if the adjusted dose level has been reached. Switched off = 0
- 4) **Dosimeter usage time [d]:** defined lifetime of each individual dosimeter. Recommended lifetime either minimum 10 years = 3650 days or switched off = 0
- 5) **Syst. cal. validity time [d]:** it is recommended to calibrate the OSL system against SSDL once a year. The supervisor can define the time of the valid duration and the operator get a message when the adjusted time expired. Dose measurements are still possible after this time, but a message will be shown every time the software is started.
- 6) **Dev. cal. validity time [d]:** it is recommended to perform the device calibration at least every 6 month or after each service. Dose measurements are still possible after this time, but a message will be shown every time the software is started.
- 7) **Dosimeter cal. validity time [d]:** it is recommended to review the dosimeter calibration at least after 10 years = 3650 days

Device 1	
Ref. light count limit:	950 to 1050
Dark count limit:	30
Common	
Dose warn limit in mSv :	0
Dosimeter usage time [d]:	0
Syst. cal. validity time [d]:	365
Dev. cal. validity time [d]:	200
Dosimeter cal. validity time [d]:	3650

Figure 48 System warn limits

7.7.9 System check interval

The frequency of the system QC checks can be specified by time and number of readings

- 1) **SystemCheck time interval:** frequency of the SystemCheck (Reference light and Dark Counts). Recommended value > 1 min if read operation interval has not been selected.
- 2) **SystemCheck read operation interval:** frequency of the SystemCheck (Reference light and DarkCounts). Value 1 = SystemCheck will be performed before each dosimeter measurement. Value 0 = off.

SystemCheck time interval:	00:01:00
SystemCheck read op. interval:	0

Figure 49 System check

7.7.10 Dosimeter limits

Different limits can be specified to ensure the performance of the system.

- 1) **Maximum accumulated read cycles:** for Read operation only. Defines the use cycles without erasing. Does not consider external erasing.
- 2) **Maximum accumulated erase duration [s]:** defines the accepted lifetime erase duration before the dosimeter will be rejected.
- 3) **Maximum singular dose [mSv]:** maximum single dose which a dosimeter can receive. Dosimeter with a single dose higher than specified will automatically be rejected.

- 4) **Maximum lifetime dose [mSv]:** Dosimeter with a lifetime dose higher than specified will automatically be rejected.
- 5) **Maximum dose for automatic erase [mSv]:** this defines a threshold for automatic erase. All dosimeter below the adjustment will be erased by the normal procedure. Dosimeter with dose above the adjustments are not erased and can be re-read to confirm the dose.
- 6) **Maximum accumulated dose since last dosimeter calibration:** the maximum amount of dose accumulated since last calibration can be defined to ensure recalibration of the dosimeter.
- 7) **Maximum duration for automatic erase [s]:** the myOSL system is designed for a high throughput. Influence on the proceeding time could be dosimeters with a dose of few mSv. Erasing time for ≤ 0.5 mSv is 5 s. The software is adding 5 s per each additional 0.5 mSv. This adjustment allows a maximum duration for a single erase duration. A message will be displayed that "The dosimeter should be erased manually" because the calculated time is above the adjusted value.
- 8) **Maximum erase iteration:** each dosimeter will be checked after the erasing step (e.g., background). In case the background is still higher than the adjusted accepted value, the software will start a new erase step and check the background again until the value is accepted, or the number of erase iterations has been reached.
- 9) **Waiting time after irradiation for auto calibration (for myOSL4000 only):** after the irradiation it should be waited at least 10 min to avoid influence of fading effects.
- 10) **Calibration erase duration:** the erasing time is calculated according to the dose. Of course, an uncalibrated system is not able to calculate the erasing time according to the dose. It is recommended to use an erasing time which is long enough to erase the remaining signal using following calculation: exposure dose/0.5 mSv*5 s plus 5 s. . Minimum 5 s erase will always be used.
- 11) **Registration erase duration:** Recommended value for new dosimeters is 10 s . Minimum 5 s erase will always be used.
- 12) **Background maximum warn limit after erase [counts]:** is the maximum accepted background of each individual dosimeter. Recommended value is 50.
- 13) **Re-read correction factor:** is used in personal dosimetry. It is needed for the second reading when the dosimeter has not been erased internally in the myOSLchip. The first measurement decreases the signal by ca. 2% compared to the second measurement. In such case it is recommended to use a re-read factor of 1.02. to get similar dose measured with the first measurement to confirm the first dose measurement. Since OSLDosimetry

v1.27.26 this factor is determined for each dosimeter during dosimeter calibration and will be used regardless of what is entered into this field.

- 14) **Use Hp(3) factor:** provides a possibility to calculate an estimation of the Hp(3) dose by applying a factor on of Hp(0.07).
- 15) **Rejection criteria (for myOSL4000 only):** allows to specify into which magazines rejected dosimeters are sorted.

Maximum accumulated read cycles:	4
Maximum accumulated erase duration [s]:	1000
Maximum singular dose [mSv] :	20
Maximum lifetime dose [mSv] :	100
Maximum dose for automatic erase [mSv] :	2
Maximum acc. dose since last dos. calibr. [mSv] :	100
Maximum duration for automatic erase [s]:	60
Maximum erase iterations:	2
Waiting time after irradiation for auto calibr. [m]:	10
Calibration erase duration:	00:00:10
Registration erase duration:	00:00:10
Background maximum warn limit after erase [counts]:	30
Re-Read correction factor:	1,1
Use Hp(3) factor:	<input type="checkbox"/>
Hp(3) factor:	1
Rejection criteria:	Rejection criteria...

Figure 50 Dosimeter limits

7.7.11 Energy correction

BeO is showing an under-response at energies below 300 keV (Figure 53). When the system is used with other energies than it has been calibrated against with, it is recommended to use a correction factor for the myOSLchip dosimeters.

Energy correction: there are 3 possibilities for the myOSLraser energy correction:

- 1) **None:** means no energy correction will be applied

- 2) **Default per dosimeter type:** correction factors can be added to the table (Figure 52), which can be applied to the dosimeter types in the dosimeter setup (section Figure 24: Energy details).
- 3) **Individual per measurement (myOSLchip only):** during the manual operation of myOSLchip the correction factor according to the table (Figure 52), can be selected in the read screen before each reading.

Energy correction:

None
 Default per dosimeter type
 Individual per measurement

Edit table...

Figure 51 Energy correction

Energy	Correction factor		
Mixed	1,2	*	
Cs-137	1		
x-ray	1,3	*	

Figure 52 Energy correction table

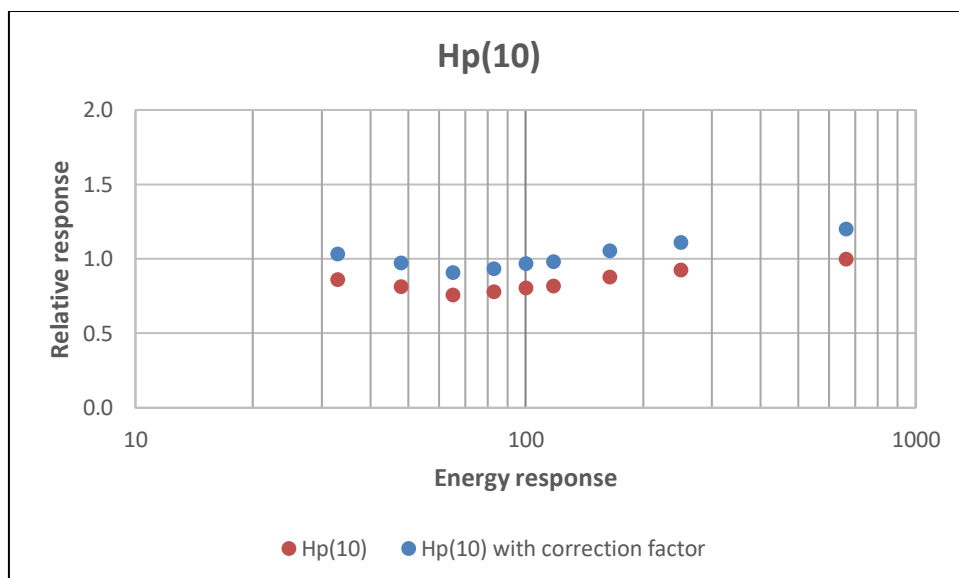


Figure 53 Energy response BeO

7.8 User management

Some OSLDosimetry functions are only accessible via special login. At first Start up, the “User management” is only accessible via Supervisor login.

7.8.1 How to enter User management

- 3.) Login as Supervisor as described in 7.3
- 4.) From the main menu, use the button shown in Figure 28 to enter ‘User management’.



Figure 54: Button to access the user management

Attention! User management is only accessible with Supervisor login.

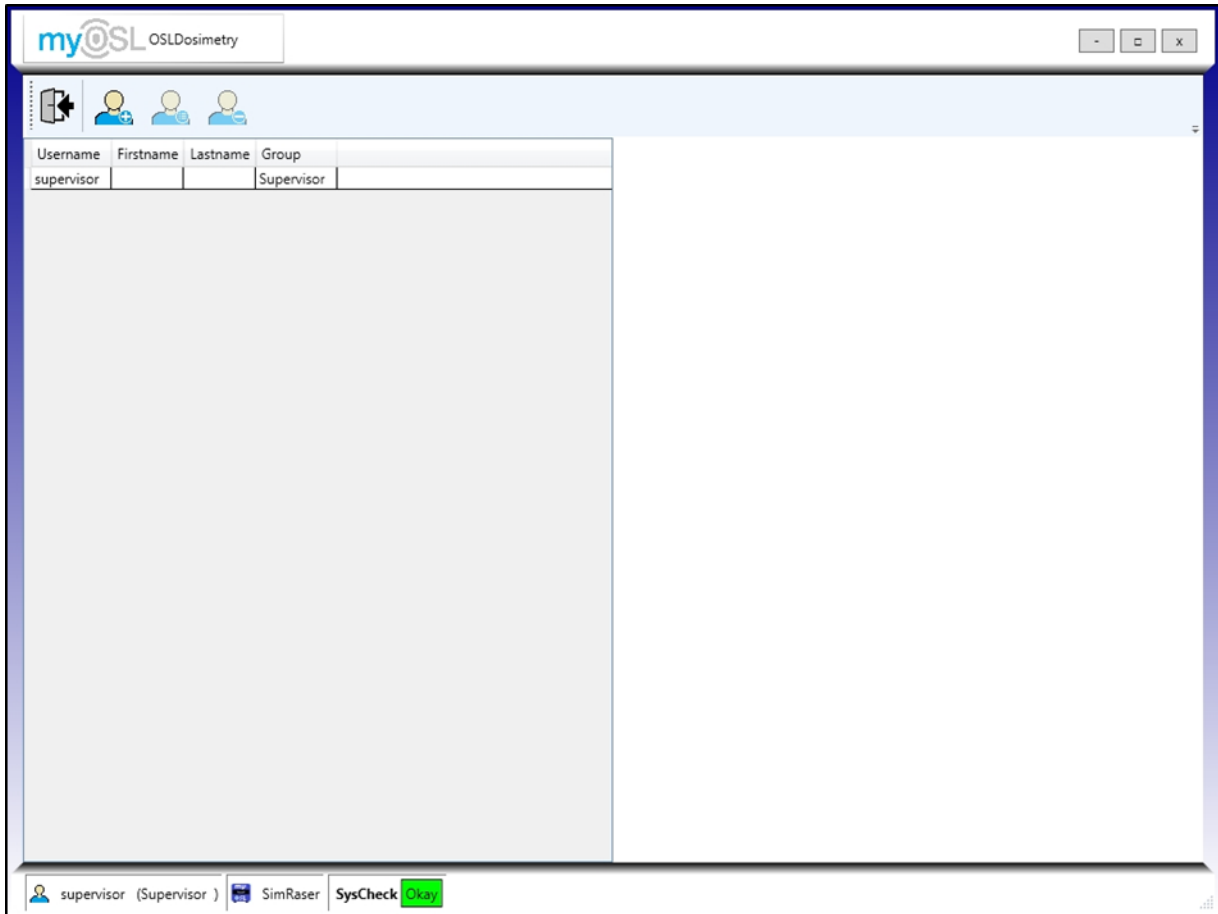


Figure 55: User management

Available user groups:

- Operator standard low-level user
- Engineer high-level user
- Supervisor Administrator (can change parameters)
- FI Service by Freiberg Instruments/RadPro

Access levels for user groups:

	Operator	Engineer	Supervisor	FI
measurement	ü	ü	ü	ü
Register dosimeters / allocate reads		ü	ü	ü
Dosimeter calibration		ü	ü	ü
System calibration		ü	ü	ü
Device calibration		ü	ü	ü

Define reads				ü
Modify ParameterSet / set user rights			ü	ü

Table 2: Access levels for user groups

7.8.2 How to change default Accounts

- 12.) Select the account you want to change
- 13.) Use “Change user details” button (Figure 56) to enter “User details” or double-click on the account to enter “User details” directly



Figure 56: Change user details

The screenshot shows the 'myOSL OSLDosimetry' application window. On the left, there is a table with columns: Username, Firstname, Lastname, and Group. The first row contains the text 'supervisor', followed by empty fields, and 'Supervisor' in the Group column. To the right of the table is a 'User details' form. This form has the following fields: 'Username:' with the value 'supervisor', 'Firstname:' with an empty text box, 'Lastname:' with an empty text box, and 'Group:' with a dropdown menu showing 'Supervisor'. Below these fields are three buttons: 'Reset password', 'Save', and 'Cancel'. At the bottom of the window, there is a status bar with icons for 'supervisor (Supervisor)', 'SimRaser', and 'SysCheck' with a green status indicator.

Figure 57: User details

- 14.) Assign First and Last name of the user to make a distinction between different users

- of the same group (optional)
- 15.) Change the group of the user by clicking on dropdown menu next to “Group” and choose one of the following suggestions
 - a. Operator
 - b. Engineer
 - c. Supervisor
 - d. FI (only available to Freiberg personnel)

Related access level for the groups is shown in Table 2.

- 16.) Confirm all changes with “Save” button
- 17.) “Reset password” button resets the current password

Attention! Only users in group “Supervisor” are authorized to reset passwords.

- 18.) If the logged in user is in group “Supervisor” the new password will be displayed in an additional window.
- 19.) Enter the login screen described in 7.3 and click “Change...” button
- 20.) Use this password and you are allowed to add a new password (Figure 58)

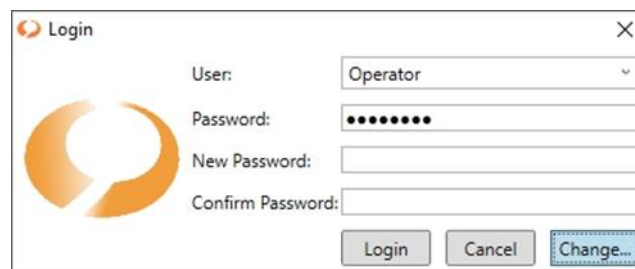


Figure 58: Changing password

- 21.) Confirm the new password and click Login
- 22.) Cancel button will abort your changing process

7.8.3 How to add new users

- 6.) Click the “Add user” button (Figure 59) to enter a blank user details window



Figure 59: Add user

- 7.) Choose your own username
- 8.) Define First name and Last name of the user (optional)
- 9.) Choose one of the predefined groups
- 10.) confirm your new user with “Save” button

7.8.4 How to delete users

- 4.) select an existing user in the list
- 5.) click "Delete user" button (Figure 60)
- 6.) confirm deletion in following window



Figure 60: Delete user

7.9 Device connection setup

OSLDosimetry communicates with the device via TCP/IP network connection or USB. The following settings must be changed in the system settings menu accessible via main menu:

- 7.) Log in with Supervisor login at first start up (section 7.3).
- 8.) Use System settings button (Figure 61) to enter System settings (Figure 62).
- 9.) If connecting to the myOSLchip using an Ethernet cable, select the correct connection type and change the last number of the IP address to your device number, E.g. your device number is 28-0001 → your IP address is 172.29.28.1



Figure 61: Button System settings

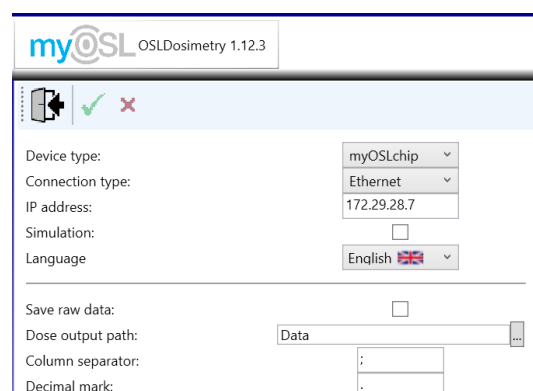



Figure 62: System settings

- 10.) Input the serial number of the connected myOSLchip without any additional characters, i.e., 28-0001 becomes 280001.

- 11.) Check the Checkbox next to “Save raw data” to record not only the averaged data, but individual data per recording channel
- 12.) Units for dose can be specified as well as units for the local exposure, the latter of which can be dimensionless.
- 13.) Limits for dark count as well as the reference light can be user specified.
- 14.) A special warning limit can be specified for a dose threshold not to be exceeded by any dosimeter.
- 15.) Confirm your changes with .

7.10 Dosimeter Management

In the section Dosimeter Management, all measurement data of each dosimeter in the database is tracked. This can only be accessed by “supervisor” or “engineer” login.



Figure 63: Dosimeter Management

Once in the dosimeter management, the user will have to select the dosimeters which should be displayed. This can be done by checking off various selection criteria on the left-hand side.

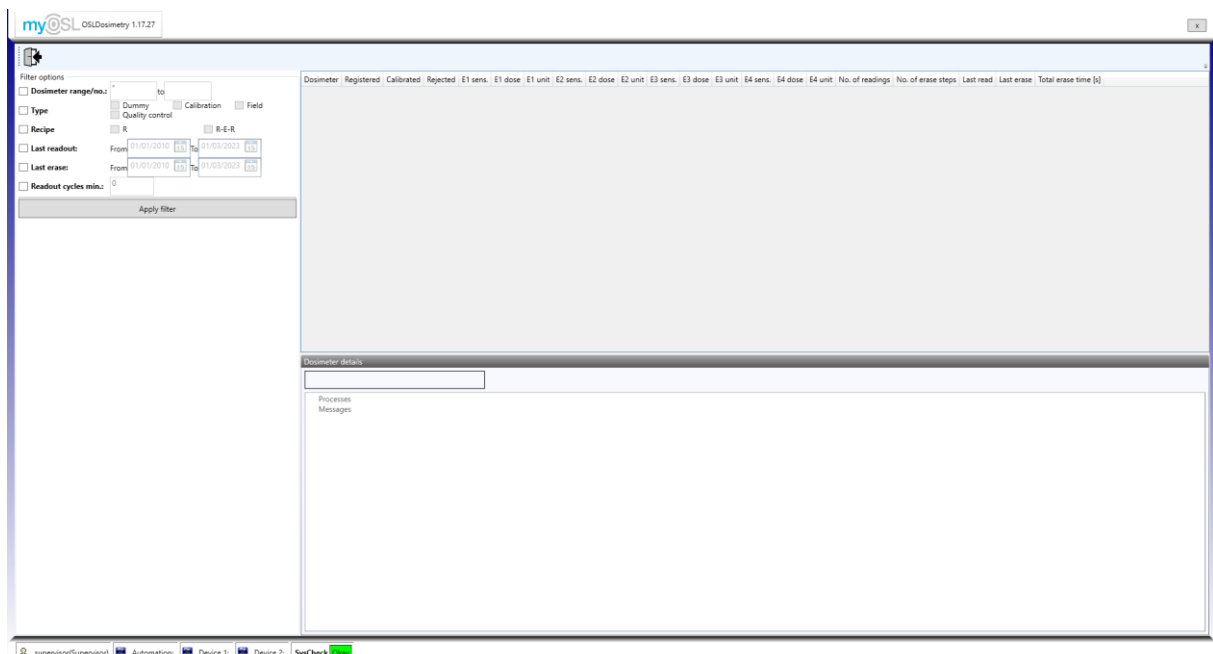


Figure 64: Dosimeter management overview

If a selection criterion is not checked, it will not be used for selecting dosimeters. The criteria are:

- Dosimeter range/no: The user can select anywhere from a single dosimeter (by only using the first box) to a range of dosimeter numbers (by using both boxes). The * can be used as a placeholder for digits appearing either preceding or proceeding the * marker. As an example, “WB001*” will give all dosimeters which start with WB001 (WB001000, WB0012000, etc.) but now “CWB0010”.
- Type: Allows the user to select dosimeters of a certain type only
- Recipe: Allows the user to select dosimeters which been registered as R-E-R or only R.
- Last readout/erase: These two options allows the user to show only dosimeters which have last been measured/erased within a certain time frame. If a dosimeter has last been measured/erased after this time, it will not show up even if it was measured/erased during the selected timeframe.
- Readout cycles min.: Allows the user to select dosimeters which have been readout at least X number of times.

At least one criterion must be selected. Once the desired criteria have been selected, clicking on “Apply Filters” will start the search through the database.

The screenshot displays the 'myOSL Dosimetry 1.17.27' application window. On the left, there are 'Filter options' including 'Dosimeter range/no.', 'Type', 'Recipe', 'Last readout', 'Last erase', and 'Readout cycles min.'. The main area shows a table of dosimeters with columns for 'Dosimeter', 'Registered', 'Calibrated', 'Rejected', 'E1 sens.', 'E1 dose', 'E1 unit', 'E2 sens.', 'E2 dose', 'E2 unit', 'E3 sens.', 'E3 dose', 'E3 unit', 'E4 sens.', 'E4 dose', 'E4 unit', 'No. of readings', 'No. of erase steps', 'Last read', 'Last erase', and 'Total erase time [s]'. A 'Dosimeter details' panel at the bottom shows information for dosimeter 88, including process logs for Registration, E1, and E2.

Dosimeter	Registered	Calibrated	Rejected	E1 sens.	E1 dose	E1 unit	E2 sens.	E2 dose	E2 unit	E3 sens.	E3 dose	E3 unit	E4 sens.	E4 dose	E4 unit	No. of readings	No. of erase steps	Last read	Last erase	Total erase time [s]
80	✓	✓	✓	0.845215			0.845200									0	2	30/08/2022 09:21:04	30/08/2022 09:21:04	60
81	✓	✓	✓	0.832317			0.847173									0	2	30/08/2022 09:21:56	30/08/2022 09:21:56	40
82	✓	✓	✓	0.849720			0.874698									0	2	30/08/2022 08:58:53	30/08/2022 08:58:53	40
83	✓	✓	✓	0.842170			1.008270									0	2	30/08/2022 07:54:10	30/08/2022 07:54:10	40
84	✓	✓	✓	1.091815			1.048569									0	2	30/08/2022 07:59:19	30/08/2022 07:59:19	55
85	✓	✓	✓	0.902136			0.998010									0	2	30/08/2022 08:23:13	30/08/2022 08:23:13	40
86	✓	✓	✓	1.014091			1.046383									0	2	30/08/2022 08:32:17	30/08/2022 08:32:17	55
87	✓	✓	✓	0.958396			1.044447									0	2	30/08/2022 08:52:49	30/08/2022 08:52:49	40
88	✓	✓	✓	0.828638			1.011237									0	2	30/08/2022 09:41:53	30/08/2022 09:41:53	40
89	✓	✓	✓	1.190624			1.204024									0	2	30/08/2022 09:33:34	30/08/2022 09:33:34	40
90	✓	✓	✓	0.849518			1.131477									0	2	30/08/2022 08:30:33	30/08/2022 08:30:33	40
91	✓	✓	✓	0.958670			1.068235									0	2	30/08/2022 08:46:50	30/08/2022 08:46:50	60
92	✓	✓	✓	0.825962			0.918344									0	2	30/08/2022 08:11:00	30/08/2022 08:11:00	55
93	✓	✓	✓	1.072654			0.983073									0	2	30/08/2022 08:45:08	30/08/2022 08:45:08	40
94	✓	✓	✓	0.878177			0.971481									0	3	30/08/2022 10:28:12	30/08/2022 10:28:12	50
95	✓	✓	✓	0.921141			1.034454									0	2	30/08/2022 09:44:45	30/08/2022 09:44:45	55
96	✓	✓	✓	0.904022			1.187884									0	2	30/08/2022 09:28:57	30/08/2022 09:28:57	40
97	✓	✓	✓	0.904146			1.130766									0	2	30/08/2022 09:11:44	30/08/2022 09:11:44	40
98	✓	✓	✓	1.373356			1.409532									0	2	30/08/2022 08:54:32	30/08/2022 08:54:32	40
99	✓	✓	✓	0.980266			0.820925									0	2	30/08/2022 08:51:58	30/08/2022 08:51:58	40
99	✓	✓	✓	1.004436			1.132336									0	2	30/08/2022 08:48:33	30/08/2022 08:48:33	40
99	✓	✓	✓	0.980358			0.874303									0	2	30/08/2022 09:18:32	30/08/2022 09:18:32	40

Figure 65: Dosimeter management selection

The user will be able to see all relevant information regarding each of the dosimeters which fulfill the selection criteria. By double clicking on a dosimeter, the history of the dosimeter will be shown in the window on the bottom of the screen.

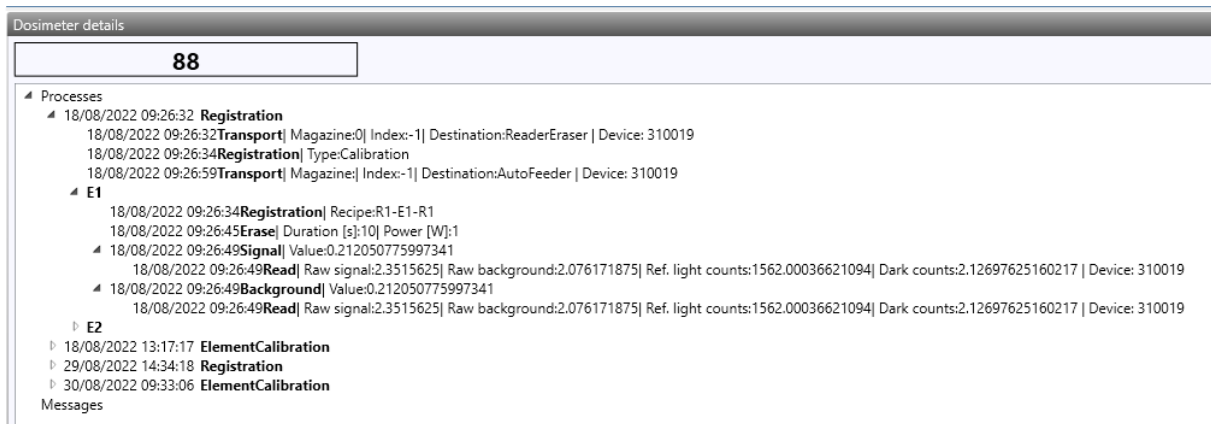


Figure 66: Dosimeter history

Here the user can see the exact counts, background, reference light counts, dark counts for each measurement as well as the device calibration, dosimeter calibration, and system calibration used for the measurement. These will not change even if a new calibration is performed.

7.10.1 Reset rejection state

If a dosimeter has been rejected, the rejection state can be reset in Dosimeter Management. To do so, select the rejected dosimeter and right-click on the dosimeter, this will bring up a menu.

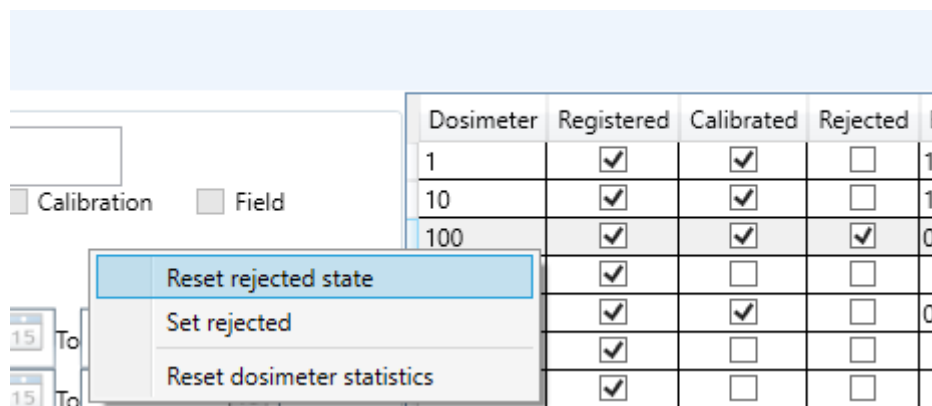


Figure 67: Reset rejected state

Selecting „Reset rejected state“ will allow the dosimeter to be read again. Note: this will not change the reason for the dosimeter being rejected, such as exceeding the life-time dose or the calibration being too old.

7.11 Device log

In device log section the system log files are accessible, which includes the time log of background and reference light, as well as device temperature. This data can be exported via the CSV button delimited ASCII data into a csv-file. Enter the Device log from main menu (Figure 69) with the button shown in Figure 68.



Figure 68: Button Device log

The screenshot shows the myOSL OSLdosimetry 1.12.3 software interface. At the top, there is a title bar with the logo and version number. Below the title bar is a toolbar with icons for home, date selection (11.11.2019), refresh, save, and print. The main area contains a table with the following data:

Timestamp	Device	SerialNo	Ref. light counts	Dark counts	Detector temp.	Ambient temp.
11.11.2019 14:59:43	myOSLchip	280007	14074	4	25,0	37,0
11.11.2019 15:03:57	myOSLchip	280007	14036	4	25,0	37,7
11.11.2019 15:05:51	myOSLchip	280007	14078	4	25,0	37,9

Figure 69: Device log

This section is useful for checking that your device is functioning properly. Information about reference light counts, dark counts, detector temperature is always recorded always with additional information of timestamp and serial number of the myOSLchip at each recording.

7.12 Messaging system

Errors, warnings, and related information will be logged into the tab “Messages”. The log files will also contain the errors, warnings, and related information. These can be found in the OSLDosimetry folder on your computer.

7.13 Software information

For service requests name and version of the used software is displayed in the top left corner of OSLDosimetry software Figure 70.

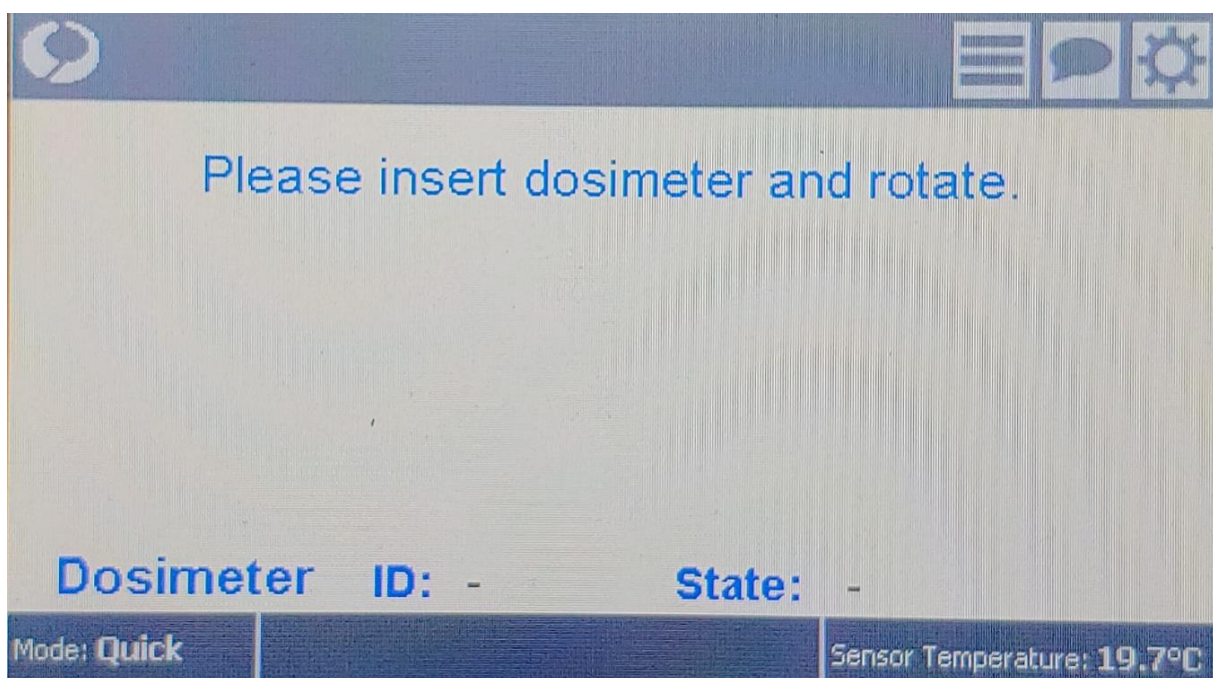


Figure 70: Software version number

8 Stand-alone operation

8.1 Start-up of stand-alone operation

myOSLchip can be operated in stand-alone mode using the build-in touchscreen when not connected to a PC. If no PC is connected or the PC is disconnected, myOSLchip automatically switches into stand-alone mode.



8.2 Functions in stand-alone mode

With the settings symbol, the operation mode can be selected.

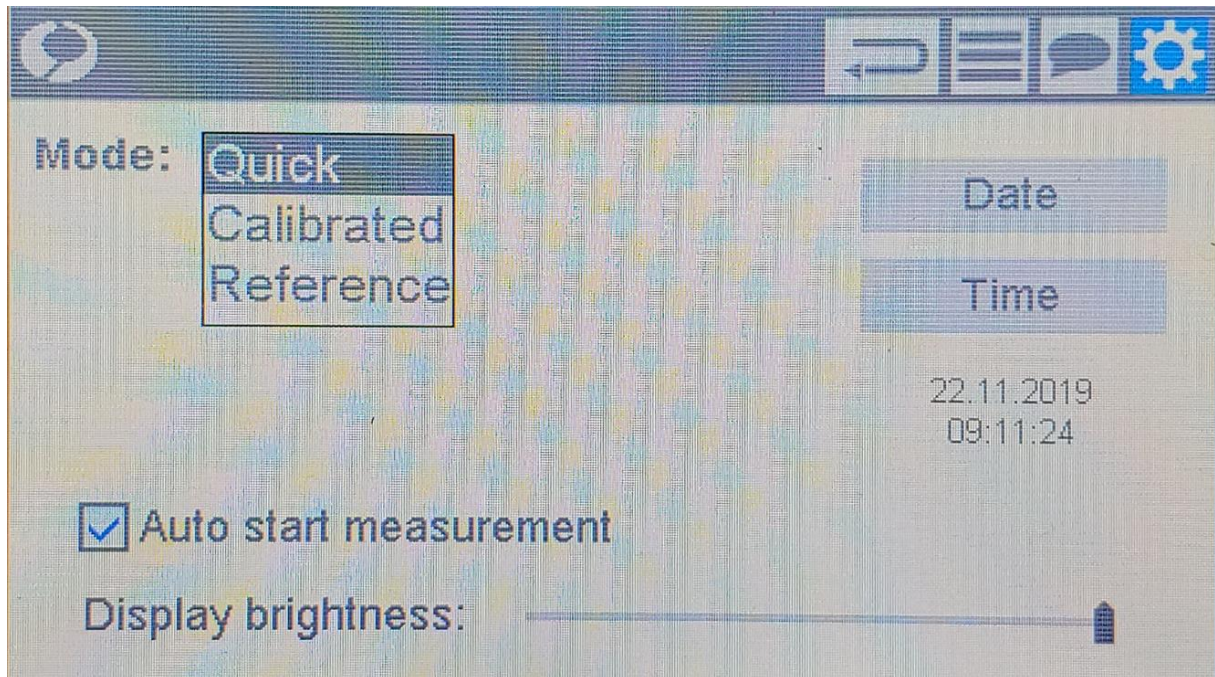


Quick: myOSLchip only measures the raw counts.

Reference: dosimeters can be calibrated against dose.

Calibrated: dosimeters calibrated before in the Reference mode are read here.

If Auto start is selected, myOSLchip starts the measurement automatically, when the knob is turned to the reading position. Otherwise, the measurement must be started manually



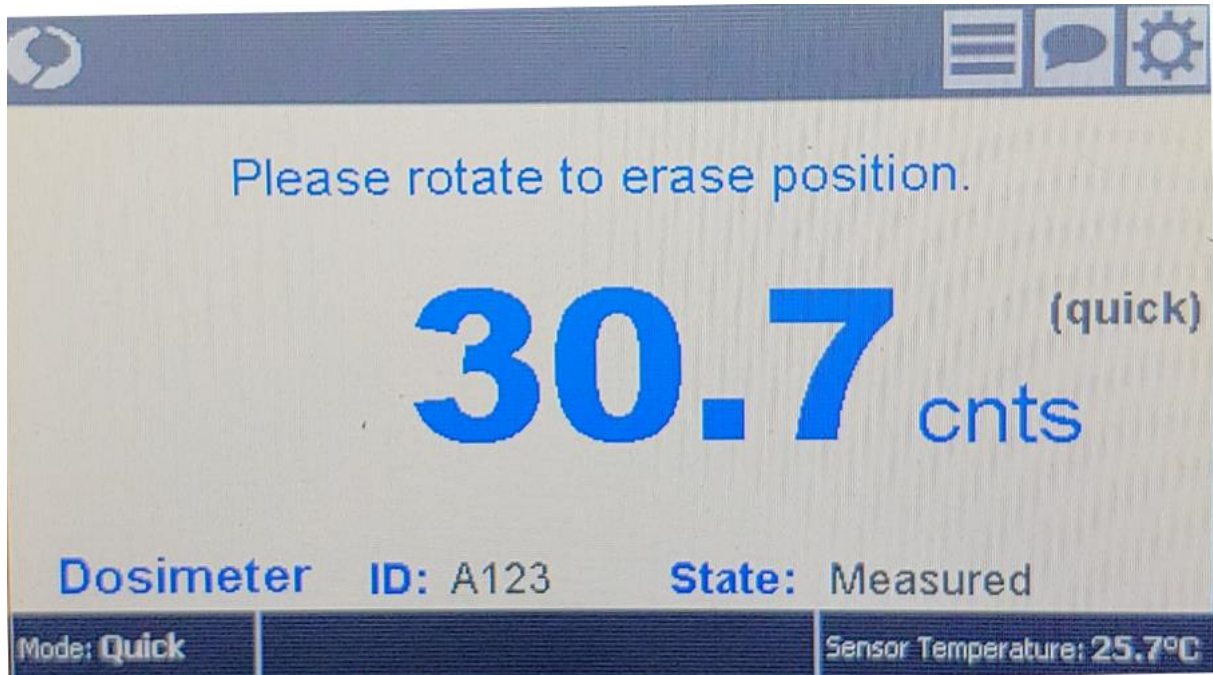
After selection of the operation mode, the selection must be confirmed with the return button



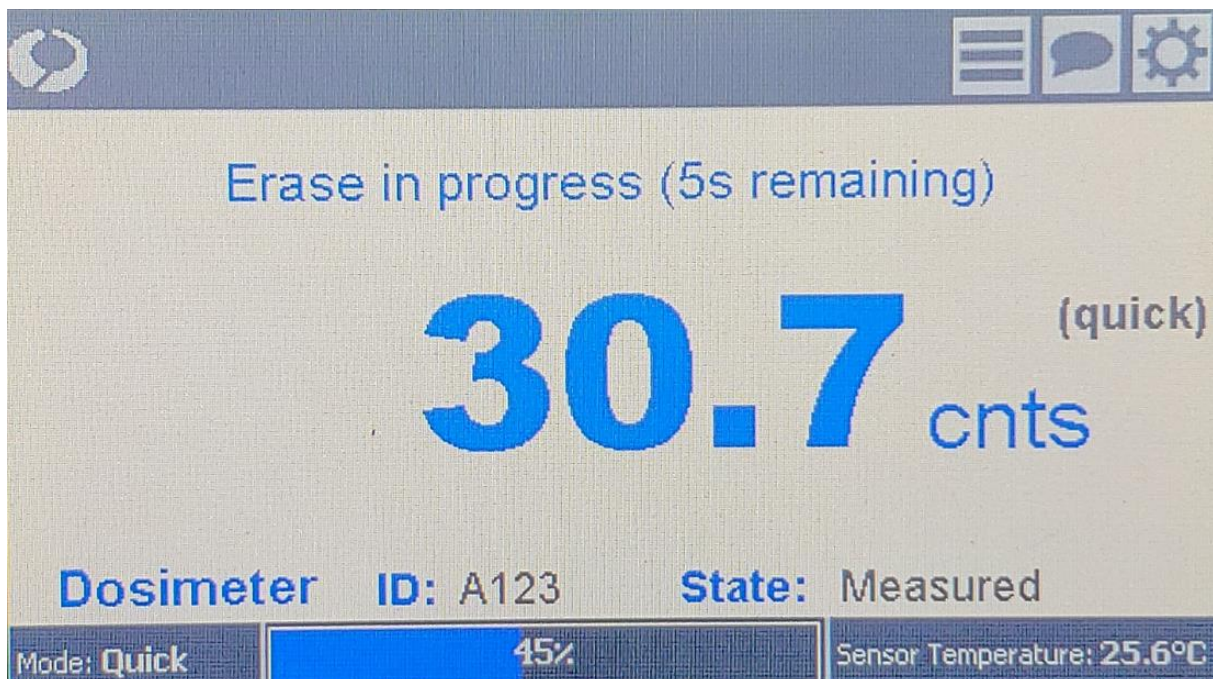
8.3 Quick Mode

When operated in Quick mode, the signal of the dosimeter is displayed as counts value. This value is the sum of background and signal.

The background is not subtracted but considered as 0.



Turning the knob to the Erase position will start erasing. Erasing time is set automatically.

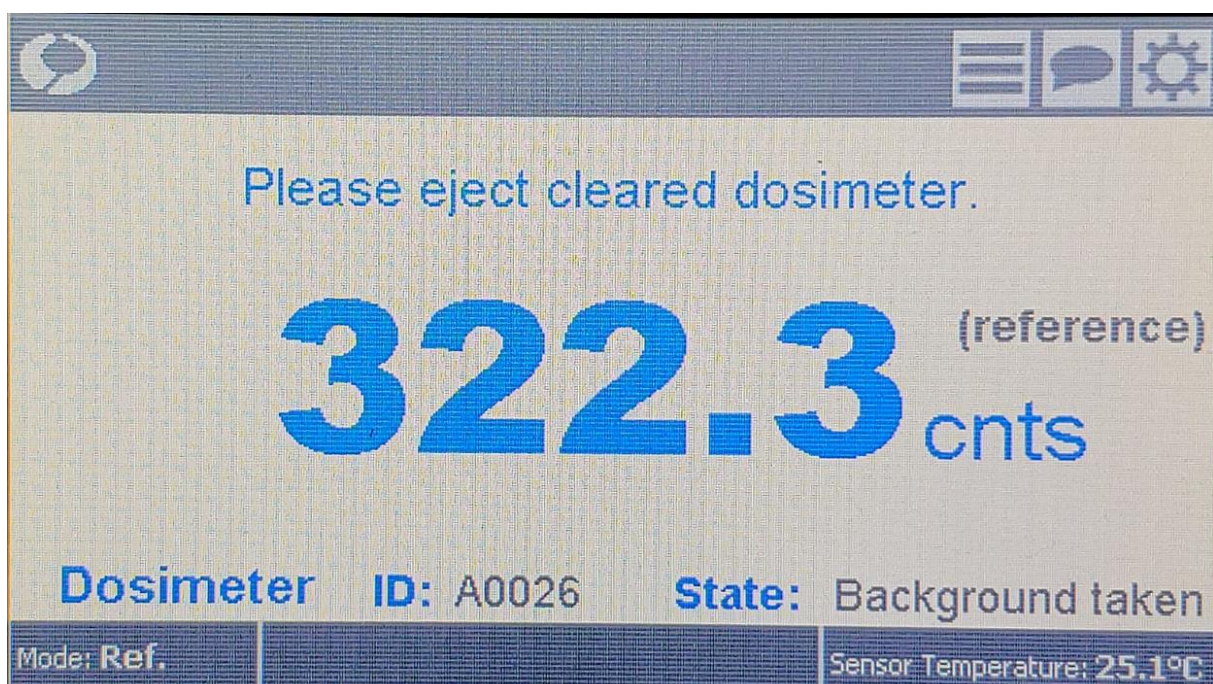
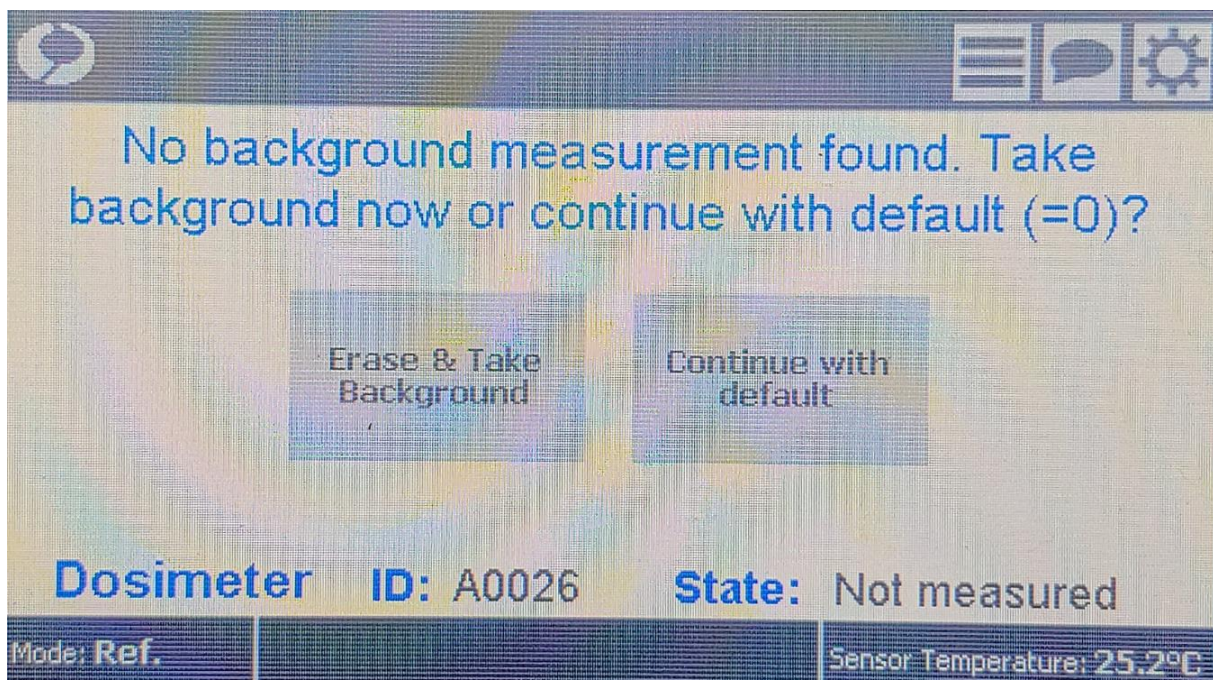


8.4 Reference Mode

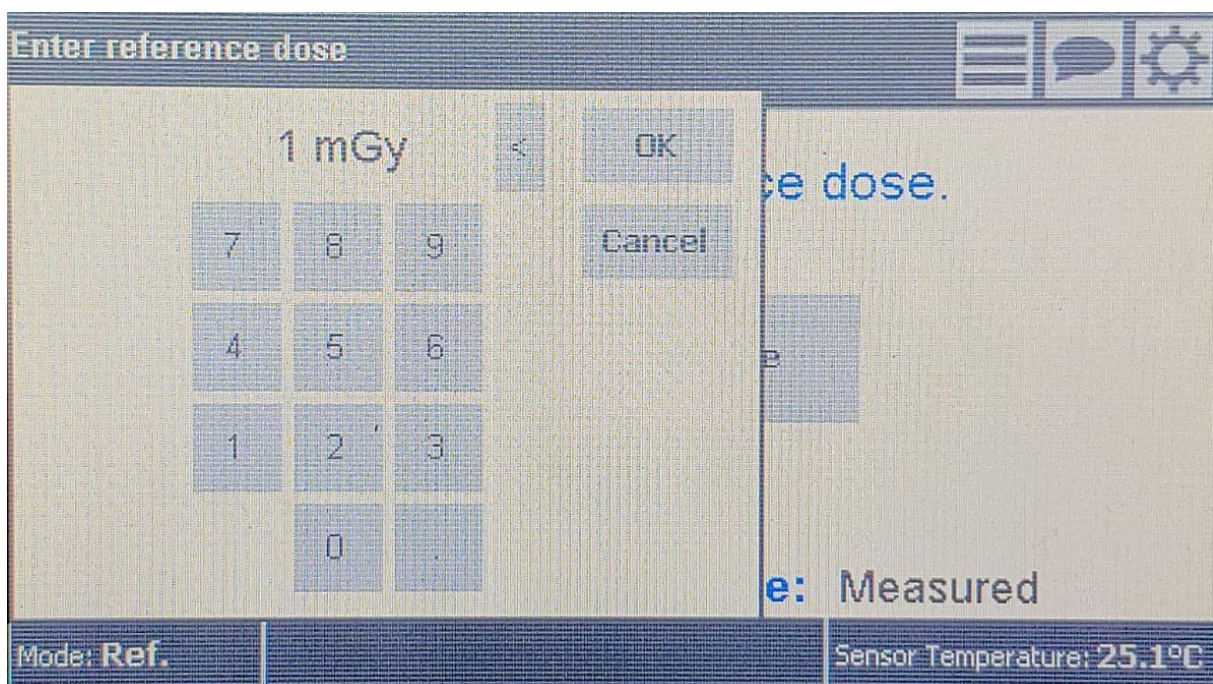
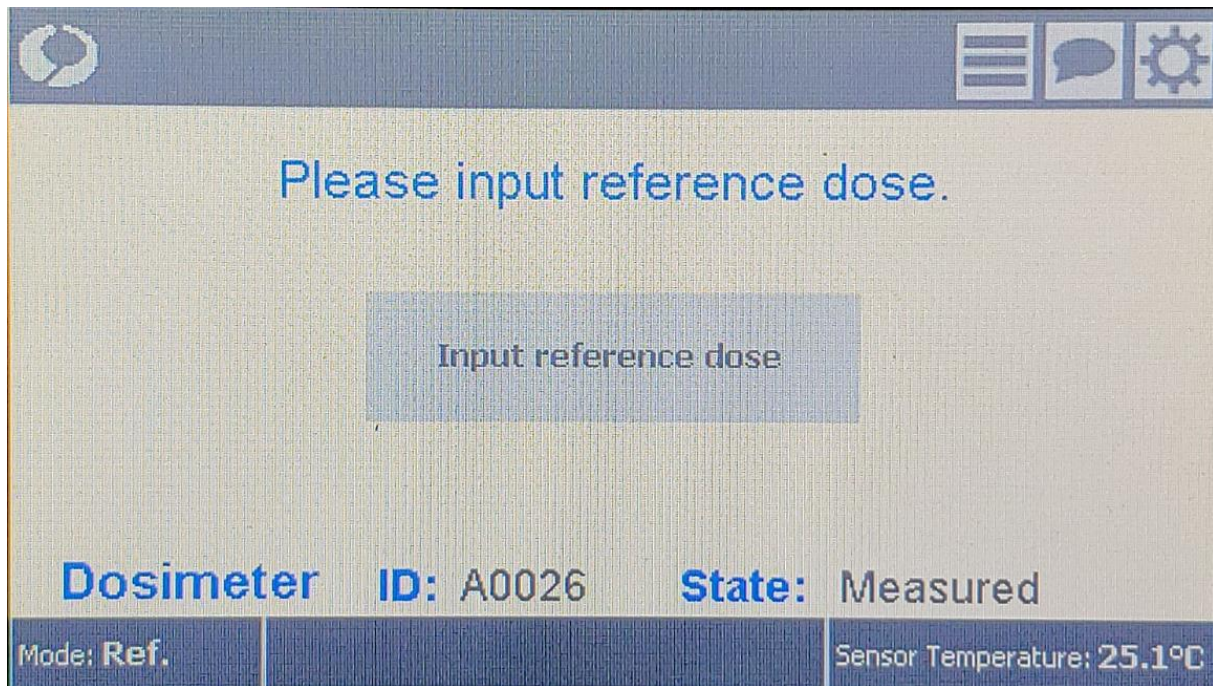
Calibration of the dosimeter in the Reference Mode consists of 2 steps.

1. The dosimeter is erased and afterwards measured to take the background.

Alternatively, the default background can be selected, when the dosimeter is already irradiated with the calibration dose. However, this will cause an error in the calibration and dose calculation when the real background is different from the default (which is typically the case).



2. In the second step the dosimeter is irradiated with a reference dose and measured. After the measurement, the reference dose must be entered.

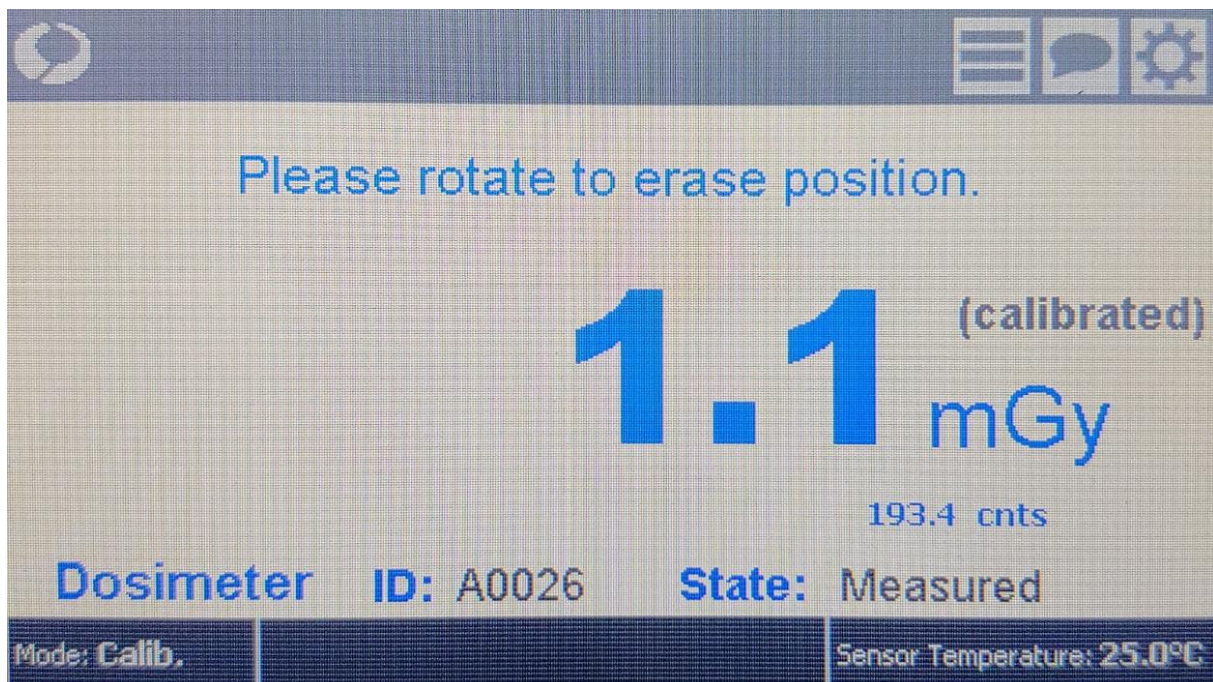


Now this dosimeter has a calibration factor for the used energy / beam quality. The sensitivity of this element is automatically considered in this calibration factor.

If the element is used in a different application, a new calibration might be required. Different dosimeters can be calibrated for different applications.

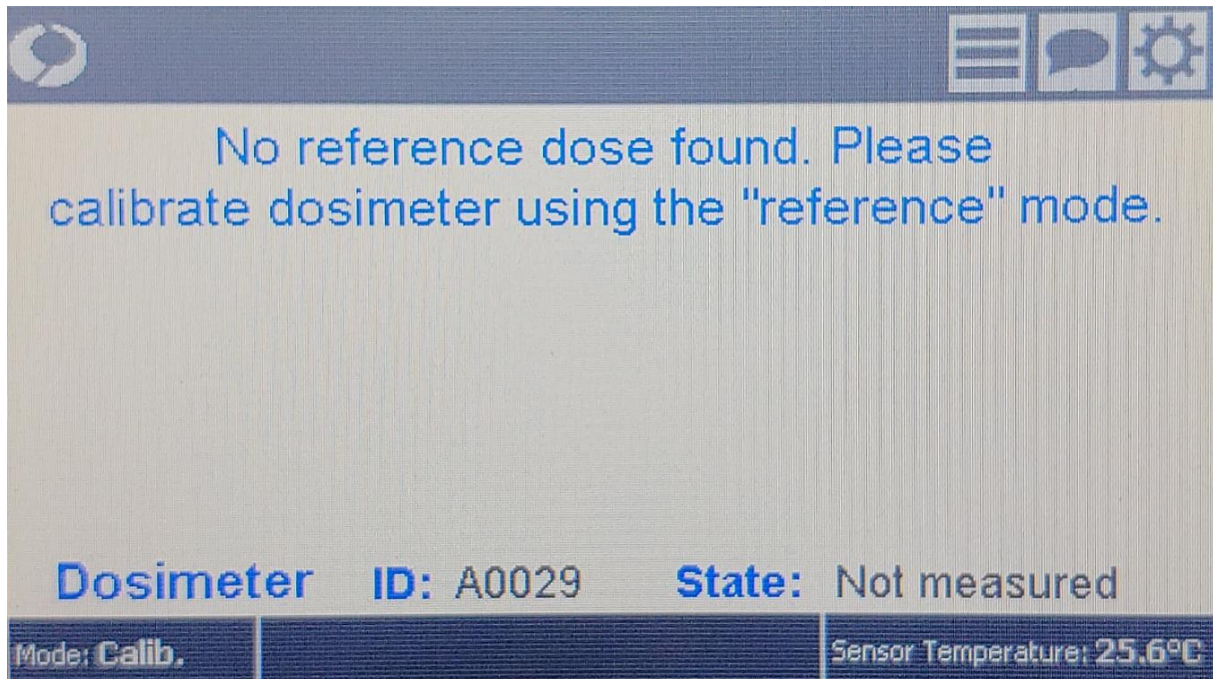
8.5 Calibrated Mode

Only dosimeter calibrated in the Reference Mode are read in Calibrated mode. The calibration factor and background information from the internal database are automatically applied. The result is displayed in the units, in which this dosimeter was calibrated.



Dosimeters without valid calibration in Reference mode will be rejected. The signal of the dosimeter is not read.

In case a reading of such an uncalibrated dosimeter is required, this can only be done in Quick mode with a manual calculation of the dose from the measured counts afterwards.



8.6 Data base

All results are stored in the internal database. The database is limited to 100 dosimeters and 500 data sets. The space of 500 data sets is commonly used for measurements and reference data.

The actual number of dosimeters and measurements is displayed in the database screen.

The database can be viewed with the database symbol.



All dosimeters and all measurements can be displayed. Column M is showing the mode in which the measurement was taken (Q: Quick, C: Calibrated, R: Reference, B: Background).

126 measurements with 63 dosimeters.

#	Timestamp	ID	Cnts	mGy	M	Annotation
0	2000-01-23 00:44:22	A0162	0.0	0.0	R	
1	2000-01-19 06:45:27	A0166	0.0	0.0	C	
2	2000-01-19 06:13:02	A0163	2261.2	20.0	R	
3	2000-01-19 08:33:29	A0164	744.9	10.3	C	
4	2000-01-19 06:20:30	A0164	1451.9	20.0	R	
5	2000-01-19 08:34:51	A0164	0.0	0.0	B	
6	2000-01-19 06:25:19	A0165	1331.8	20.0	R	
7	2000-01-19 06:34:53	A0165	0.0	0.0	B	
8	2000-01-19 06:35:19	A0166	1394.9	20.0	R	
9	2000-01-19 08:33:06	A0163	0.0	0.0	C	
10	2000-01-19 06:43:59	A0162	0.0	0.0	C	
11	2000-01-19 08:32:41	A0162	0.0	0.0	C	

Dosimeter

- 123
- <all>
- A0014
- A0025
- A0162
- A0163
- A0164
- A0165
- A0166
- A0461

If the database is full, the operator is notified.

It is possible to completely delete a dosimeter from the database by selecting it on the right-hand side of the screen and choosing "Delete Dosimeter".

Delete Dosimeter

#	Timestamp	ID	Cnts	mGy	M	Annotation
16	2019-12-05 12:56:46	A0164	186.9	186.9	Q	
17	2019-12-05 12:59:09	A0164	58.3	58.3	Q	
18	2019-12-05 13:02:11	A0164	55.6	55.6	Q	
19	2019-12-05 13:02:23	A0164	56.7	56.7	Q	
20	2019-12-05 13:02:36	A0164	52.8	52.8	Q	

Dosimeter

- <all>
- A0163
- A0164
- A0165

Alternatively, single measurements can be deleted, when selected.

Edit Annotation Delete Measurement

#	Timestamp	ID	Cnts	mGy	M	Annotation
9	2019-12-05 11:23:06	A0163	199.9	199.9	Q	
10	2019-12-05 11:48:40	A0163	60.7	60.7	Q	
11	2019-12-05 12:08:43	A0163	56.4	56.4	Q	
12	2019-12-05 12:13:50	A0163	58.5	58.5	Q	

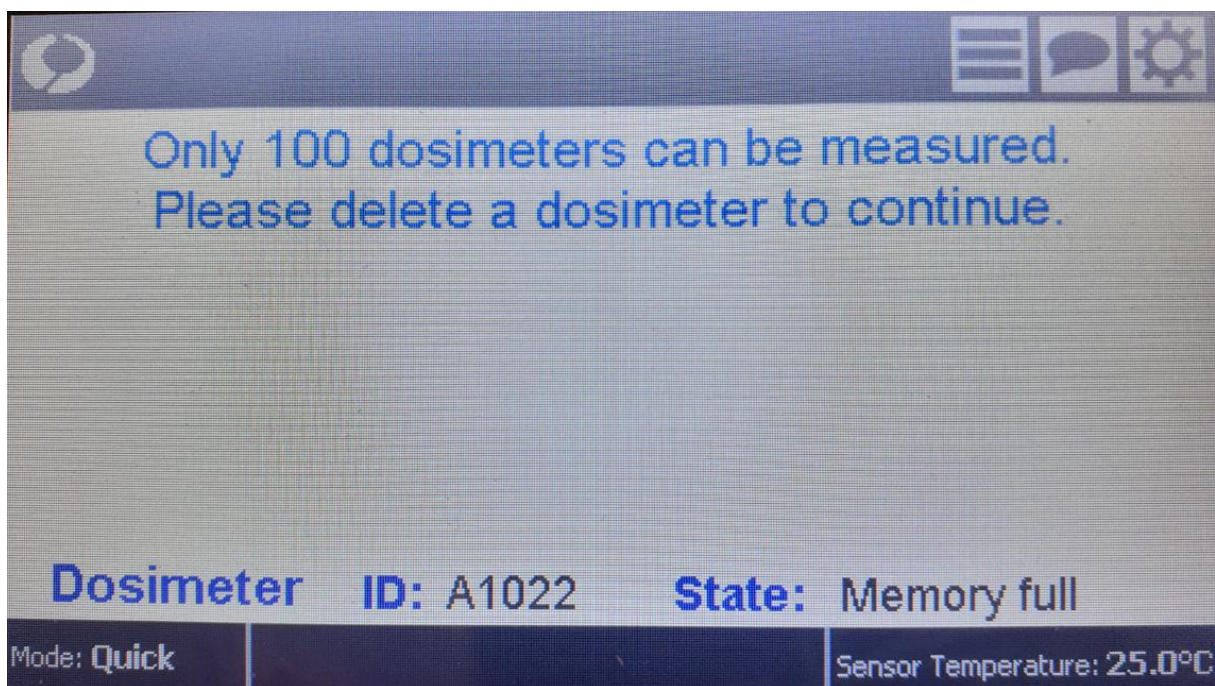
Dosimeter

- <all>
- A0163
- A0164
- A0165

When a measurement is selected, it is also possible to edit the annotation.

If the database is full of 500 measurements, but no data is deleted by the operator, the database overwrites the oldest measurements, which are not calibration or reference data.

If the database is full of 100 dosimeters, no new dosimeter can be read, without manual deletion of dosimeters.



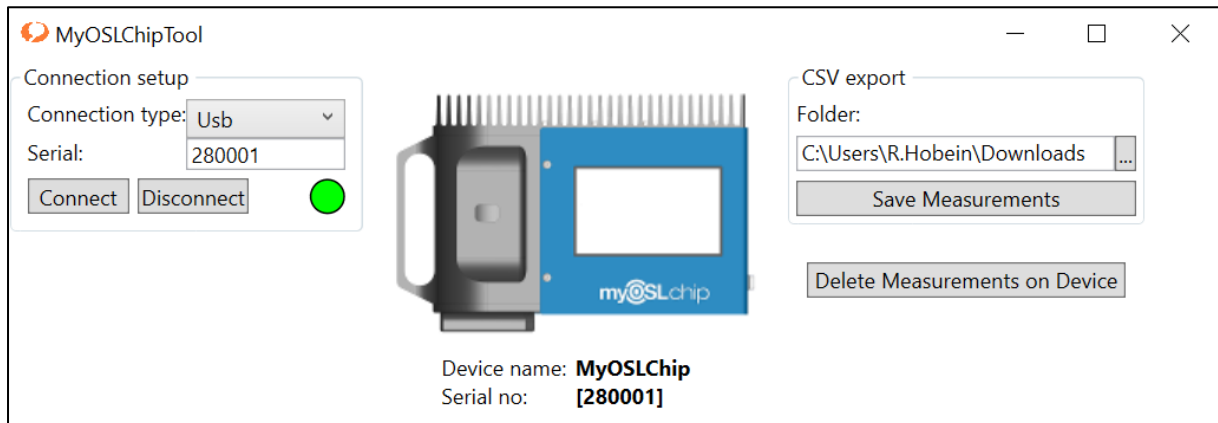
The message symbol displays system messages or error messages and allows the user to delete these messages.



8.7 Data transfer to the PC

Data from the internal database can be transferred to a PC.

The software myOSLchiptool allows the export of all data as csv file.



Export file:

ID	Timestamp	Cnts	mGy	Mode
A0021	25.11.2019 12:17	52,86699		Quick
A0021	25.11.2019 12:21	0	NaN	Calibrated
A0021	25.11.2019 12:30	301,77	2	Reference
A0021	25.11.2019 12:44	315,7961	2,092959	Calibrated
A0021	25.11.2019 12:44	0	0	Calibrated
A0021	25.11.2019 13:23	633,7747	4,200382	Calibrated
A0021	25.11.2019 13:32	0	0	Calibrated
A0021	25.11.2019 13:32	162,8477		Quick
A0021	25.11.2019 13:36	0	0	Calibrated
A0021	25.11.2019 13:36	51,36715	0	Background

Also, the myOSLchiptool allows the user to delete all data in the database. This includes the calibration data.

Note: a data transfer from the PC back to myOSLchip is not intended.

9.2 Measurement parameters

Measurement parameters for READ

Ontime	0.2 s
Offtime	0.03 s
NoPulses	1
Readout Interval	0.001 s
InitialBackgroundRead	0.01 s
Edge offset for On- & Offtime	0.015 s
ReadInterval	0.001 s
Stimulation power	100 mW
Erase power (each LED)	1 W

9.3 Definition of the duration of Erase procedures

Please refer to Table 3 for definitions.

- default 5 s, or in dependency of dose with 5 s per 0.5 mSv, but always at least 5 s in order to prevent too many short erase cycles which would unnecessarily blow up the database. The total allowed erase time can be user specified and the system will suggest discontinuation (rejection) of the dosimeter when the specified value is reached.
- criteria to proceed, otherwise go back to erase
 - $ElementSignalResult < 200 \mu Sv$
AND
 - For last dose < 2 mSv: $RelativeSignalResult - ElementBackgroundResult < 10 \mu Sv$
 - For last dose > 2 mSv: $RelativeSignalResult < 0.5\%$ of last $ElementSignalResult$
- Recipe „R“: accumulated dose (since last calibration) > 1 mSv or a single dose of > 0.5 mSv requires erasing
- For Registration default bleach and threshold of absolute signal $ElementSignalResult$ (no dose is available at that point): 100

9.4 Dosimeter rejection criteria

The following standard rejection criteria lead to the suggestion of discontinuation of the use of a dosimeter. These have to be fulfilled for either element position, but do not apply for device calibration.

- Maximum single dose: 20 mGy
- Maximum lifetime dose, excluding all calibration: 50 mGy

- Maximum repeats of sequential bleaches: 6
- Maximum accumulated bleaching time: 1000 s
- Max number of read cycles for recipe "R" before new calibration is required: 10

Highlighted values must be changed for High-Dose applications.

For example:

- Maximum single dose: 10,000 mGy
- Maximum lifetime dose, excluding all calibration: 5,000,000 mGy
- Maximum accumulated bleaching time: 10,000 s

9.5 Database

The data (final values as well as individual) are stored in a SQL database (Figure 71 and Figure 72). Every step for every dosimeter is recorded, which allows a full reconstruction of the history of every dosimeter, as well as a recalculation if required. Previous values are not deleted but rather the history with values is recorded.

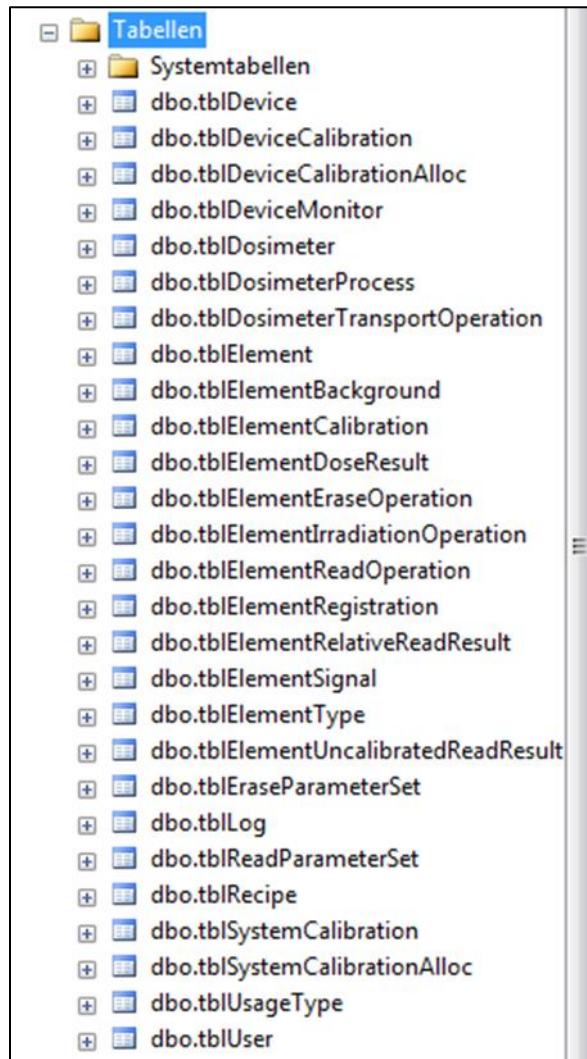


Figure 71: SQL database

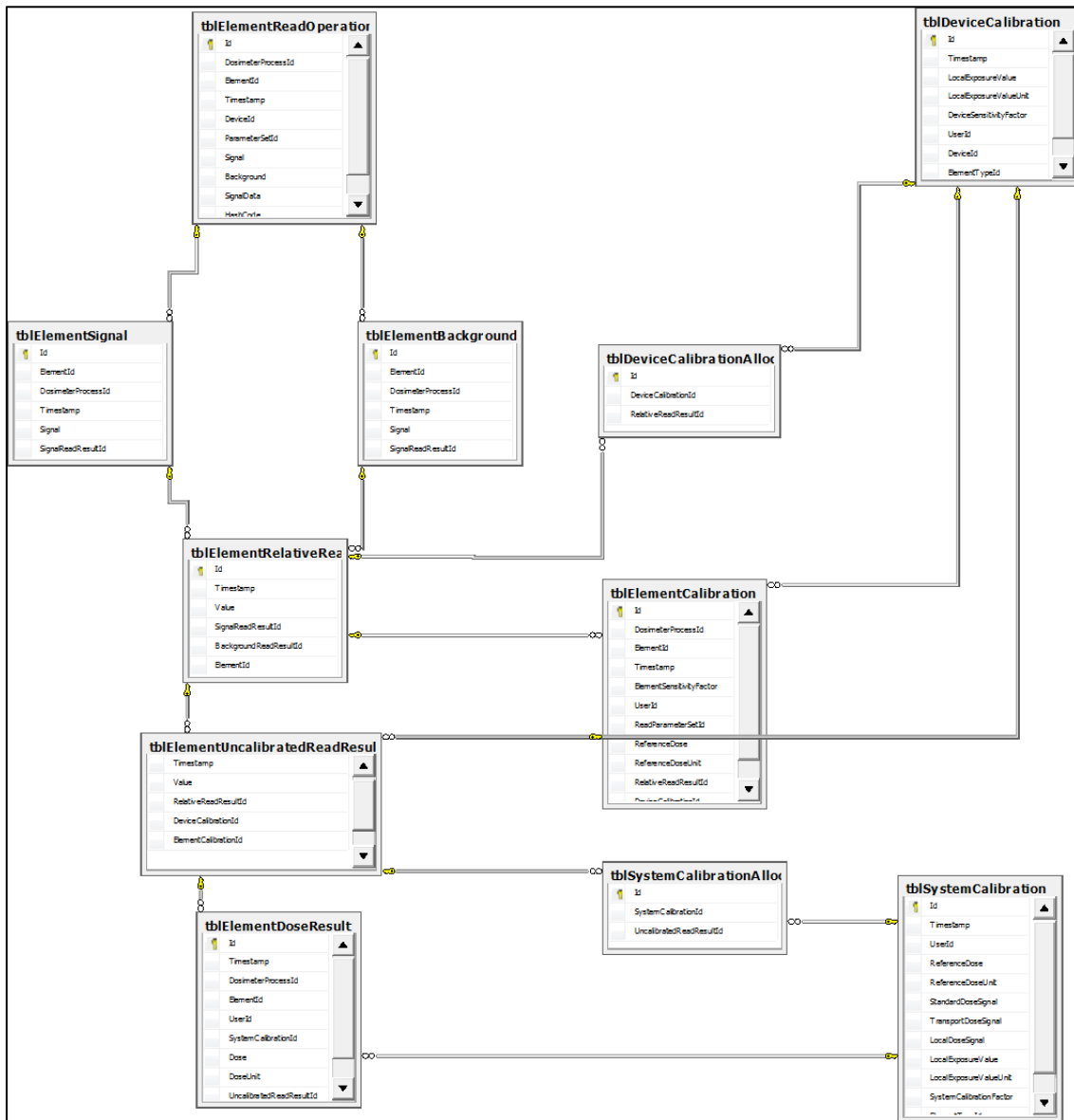


Figure 72: Structure of the relational database

9.5.1 Data and data export

The data can be exported as semicolon delimited ASCII (.csv) file by pressing the CSV button. All data is exported for the columns shown under the respective tab, even if these are not displayed. The exported data automatically includes the appropriate last background, e.g. for data export of 'read operation' the ElementBackgroundResult listed is the last measured background which is the appropriate background and has to be subtracted from the dose signal. See Table 3 for a full list and definitions of columns.

Data shown is the *ElementSignalResult* referring to the *Hp(10)* signal (or *Hp(0.07)*), which means the dark current before the signal measurement is subtracted. This is not the case if data is labelled as 'raw'.

9.5.2 History of individual procedures

The history of each step is recorded in the database in the following manner.

RegistrationHistory

Timestamp
Dosimeter
UsageType
Magazine
Position
Read
E1Background
E2...

CalibrationHistory

Timestamp
Dosimeter
Magazine
Position
E1Background
E1Signal
E1RelativeSignal
E1Sensitivity
E1Dose
E1DoseUnit
E2...

ReadOperationHistory

Timestamp
Dosimeter
Magazine
Position
E1Background = previous device independent background
E1Signal = device independent signal
E1BackgroundNew = device independent signal after erase for use as background of following signal measurement
E1RelativeSignal = device independent signal minus previous device independent background
E1UncalibratedResult
E1ElementSensitivity

E1DeviceSensitivity
E1SystemSensitivity
E1Dose
E1DoseUnit
E2...

EraseOperationHistory

Timestamp
Dosimeter
Magazine
Position
Duration
Power
E1Background
E2...

DeviceCalibrationHistory

Timestamp
DeviceSensitivityFactor
Type

SystemCalibrationFactor

Timestamp
SystemCalibrationFactor
Type

DosimeterIrradiationHistory

Table 3: Definitions of the columns as displayed and exported (csv). Identical columns are listed in the same line.

on screen column	definition	csv data column	definition
Timestamp	date & time of completion of process	Timestamp	date & time of completion of process
Dosimeter	dosimeter number	Dosimeter	Dosimeter number
Hp(10) signal	signal of myOSLchip dosimeter	ElementSignalResult	RawSignal minus RawBackground
Hp(0.07) signal	empty	ditto	ditto
Hp(10) dev. sens.	sensitivity factor of the myOSLchip dosimeter as determined by device calibration	DeviceSensitivityFactor	sensitivity factor for the individual device, which is initially based on a device normalization achieved at the company. This ensures comparability between devices.
Hp(0.07) dev. sens.	empty	ditto	ditto
Hp(10) sensitivity	sensitivity factor for myOSLchip dosimeter determined by dosimeter calibration	ElementSensitivityFactor	element sensitivity factor as determined with the dosimeter calibration
Hp(0.07) sensitivity	empty	ditto	ditto
Hp(10) syst. sens.	sensitivity factor of the system for myOSLchip dosimeter as determined by system calibration with dosimeters which have been irradiated in a reference field	SystemCalibrationFactor	system calibration factor as determined by the reference irradiated dosimeters
Hp(0.07) syst. Sens.	empty	ditto	ditto
Hp(10) dose	calculate dose for myOSLchip dosimeter (so far not including the energy response correction)	Dose	calculated dose (so far not including the energy response correction)
Hp(0.07) dose	empty	ditto	ditto
Hp(10) dose unit	dose unit as defined by user at the time of registration for myOSLchip dosimeter	DoseUnit	dose unit

on screen column	definition	csv data column	definition
Hp(0.07) dose unit	empty	ditto	ditto
Hp(10) Dark counts	dark current	DarkCounts	dark current
Hp(0.07) Dark counts	dark current before measurement	ditto	ditto
Hp(10) Ref. light counts	reference light signal	RefLightCounts	Reference LED-light level
Hp(0.07) Ref. light counts	reference light signal	ditto	ditto
Hp(10) background	last previous myOSLchip dosimeter background minus previous myOSLchip dosimeter Dark counts	ElementBackgroundResult	previous ElementSignalResult (can be after erase)
Hp(0.07) background	empty	ditto	ditto
Hp(10) new background	signal after erase minus myOSLchip dosimeter Dark counts (to be used as background of the following measurement)	n.a.	n.a.
Hp(0.07) new background	empty	n.a.	n.a.
Hp(10) signal (rel.)	myOSLchip dosimeter signal minus myOSLchip dosimeter background	RelativeSignalResult	ElementSignalResult minus ElementBackgroundResult
Hp(0.07) signal (rel.)	empty	ditto	ditto
Hp(10) uncalibrated signal	intermediate myOSLchip dosimeter result before system calibration is applied (allows recalculation with new system calibration if required)	UncalibratedSignalResult	intermediate result before system calibration is applied (allows recalculation with new system calibration if required)



on screen column	definition	csv data column	definition
Hp(0.07) uncalibrated signal	empty	ditto	ditto
Magazine	n.a.	n.a.	n.a.
Position	n.a.	n.a.	n.a.
n.a.	n.a.	Username	name specified for user
n.a.	n.a.	Device	specifies if MyOSLchip or MyOSLirradiator and number
n.a.	n.a.	Data	data per channel (if selected under parameters in software)
n.a.	n.a.	usage type	type of dosimeter (Field, Calibration, Dummy)
n.a.	n.a.	Process	sequential unique identifier for each process
n.a.	n.a.	Purpose	1 = registration; 2 = ElementCalibration; 3 = DoseRead; 4 = Irradiation; 5 = Erase; 6 = DeviceCalibration; 7 = SystemCalibration
n.a.	n.a.	ElementType	Specifies if Hp(10) or Hp(0.07)
n.a.	n.a.	ReadParameterSet	specifies protocol (R-E-R or R) and measurement parameters accordingly
n.a.	n.a.	RawSignal	raw signal counts, including dark current and background of element itself
n.a.	n.a.	RawBackground	background when stimulation light is off