thermoscientific

Operating Instructions   DB-074 E

RadEye GX
RadEye GX-L

Multi-Purpose Survey Meter
for external GM-Detectors

REVISIONS SHEET:

Rev.	Rev. state	Dept. resp.	Name	Rev. page	Cat. *)	Explanation
	04.05.09	RM&P-EH	Pijahn			
A	01.09.09	RM&SI-EH	Pijahn	2-3, 6-4, 8-2, 9-5	I	Chapter 9, 10, 11 added
B	13.11.09	RM&SI-EH	Pijahn	Cpl.	A	Peak-value in double size letters. Manual data log-ging. Sigma alarm threshold
C	04.05.10	RM&SI-EH	Pijahn	Cpl.	A	Improved overload detection. (Chapter 7). New firmware V1.62
D	19.09.11	RM&SI-EH	Pijahn	all 3-14 6-3 8-14 13-3	A	**V1.64** Scaler mean value Overload Probe configura-tion Technical data RadEye GX-L
E	06.07.15	RM&SI-EH	Pijahn	13-1	I	**ECN80229**
F	14.09.16	RM&SI-EH	Pijahn	all	I	**ECN80943**

*) Category   C: editorial correction
                      I: clearing improvement
                      A: substantial amendment

Explanations must be given, at least with Category A.

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SAFETY INSTRUCTIONS

Dose integration is performed only, if the instrument is in a dose rate measuring mode (R/h, Rem/h, Sv/h, Gy/h). In case the measuring range is exceeded, the value of the upper end of the dose rate measuring range is used for the dose integration.

The measuring value and range depends on the properties of the connected external detector. It is the responsibility of the user or supervisor to select the correct probe.
Extension of the probe specific default measuring range can be achieved by individual calibration and determination of the dead time behavior.

The RadEye GX, respectively the connected Geiger Mueller probes are not well suited for pulsed radiation. Depending on the sensitivity of the detector and the conditions of the pulsed field, there can be a significant under-response.

Do not use the unit if error messages appear on the screen.

The earphone connector at the bottom side of the instrument must be exclusively used by equipment that is specified for use with RadEye GX.

WEEE Compliance:

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific compliance with these Directives, the recyclers in your country, and information on Thermo Fisher Scientific products which may assist the detection of substances subject to the RoHS Directive are available at **www.thermo.com/WEEERoHS**

1.   Introduction

The RadEye GX is a modern compact multi-purpose meter for external Geiger Mueller tubes.

The last 1500 mean and maximum values of the count rate or dose rate are recorded internally and can be read out via serial interface. Additionally the RadEye GX logs the last 250 alarms, errors and changes of the configuration. All events can be read out via serial interface.

A real time clock is provided to add a time stamp to all buffer data. The characteristic feature of the RadEye GX is the use of sophisticated low power technology components and micro-processor based fully automatic self checks. No maintenance is required.

All or selected menu functions described in 3.1 can be con-figured to be invisible and inaccessible by the user.
Thus the instrument can be configured to both, an ex-tremely simple mode allowing just LCD-illumination and alarm acknowledgment to a very versatile mode for the more experienced user.

Alarm LED, showing radiation exceeding thresholds.

Key on top side to acknowledge alarms if worn in a holster

Rugged plastic enclosure

Powerful graphical display

Easy to use, four key, menu driven user interface

Earphone connector

2. Installation and start-up

2.1 Scope of delivery

The RadEye GX is delivered in a box together with two AAA cells and an operating manual.

Ordering information for accessories see 9:

2.2 Inserting the battery

The two AAA-Alkaline cells as delivered with the instrument allow about 500 h of normal operation.
AAA size rechargeable batteries can be used as well.

AAA size rechargeable batteries can be used as well. The batteries must be of the same type and the same charge level. Do not mix different types or new and partially discharged cells.

- Switch off the measuring instrument.

- Remove rubber sleeve.

- Open the cover of the battery compartment.
  Use of a coin is recommended.

- Exchange the batteries according to the shown polarity.

- Close the compartment cover, hooks first, care for the rubber seal being in its groove.

- Switch on the unit again. (see chapter 2.4)

The instrument continues working in the operating mode set last (see chapter 3.2).

The measured values in the history memory remain stored. The real time clock for time stamp of history values and logbook continue operation, if batteries are exchanged without delays. If Real Time Clock is set, actual time and date is displayed for 3 s (see chapter 2.4).
After selection of the counter tube the RadEye GX first display 0.00 cps. After the first detector pulse the measurement will be started.

If correct timing information of logbook and history is required, the Real Time Clock should be set by means of the PC-program.

To keep RTC running during battery exchange, batteries must be exchanged without delays.
RTC will always be reset, if instrument is stored without batteries for more than 10 seconds.
History data and measurement parameters are stored permanently, even if batteries are removed.

Even without RTC information the relative time information of logbook and history is corrected to the actual PC clock time during read out unless the batteries had not been removed between the event and the data read out.

2.3   Mounting of the protection sleeve

The rubber protection sleeve improves ruggedness to mechanical shocks.

For mounting of the sleeve first put the BNC connector into the hole at the top of the sleeve. Then pull lower edges of the sleeve, one after the other into the correct position.

First step

Second step

Third step

2.4   Switching the unit on

To switch on the RadEye GX, **keep** the ON button pressed for **at least one second**. The sound generator (beeper) is initiated. The start screen is displayed for two seconds.

RadEye
GX
Cal.: 2009-03-16
2,84V E1.38   43

Date of last instrument test

Battery voltage

Firmware version

Checksum of the firmware
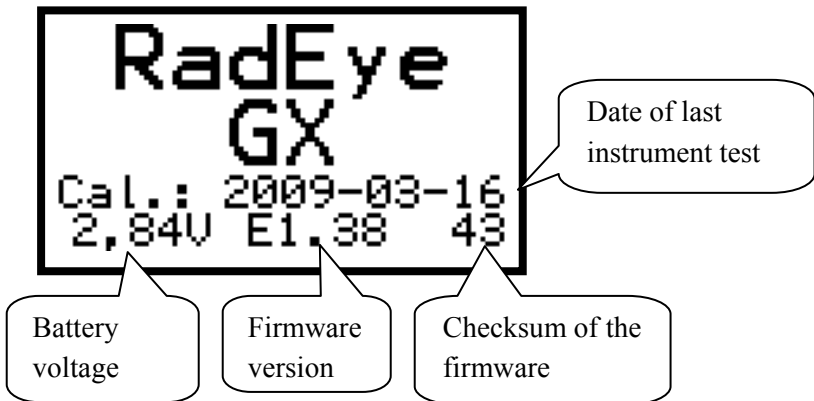
After switching the unit on, the user is requested to confirm the external probe that had been connected when the instrument had been used the last time. Alternatively he can change to another probe from the list of probes.

HP-360

Select   Change

If the real time clock is set, actual time and date is displayed for 3s.

```
2009-03-17 10:39
   HP-360
Select    Change
```

When the counter tube is selected the RadEye GX first displays 0.00 cps. After the first detector pulse the measurement will be started. The RadEye GX starts working with the parameters previously selected (operation mode, calibration factor, alarm thresholds etc.). The selected probe is displayed in the top line of the LCD.


```
■ ◆<HP-360>
0.15 cps
1   10  100  1k  10k100k
```
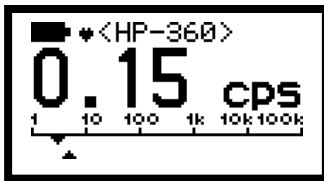
Unless otherwise specified by the customer when placing the order, the following values are set by the factory before delivery:

Alarm 1 for Count Rate	2 cps
Alarm 2 for Count Rate	10 cps
Alarm 1 for Activity	8 Bq
Alarm 2 for Activity	80 Bq
Alarm 1 for Dose Rate	0.5 µSv/h or 50 µR/h
Alarm 2 for Dose Rate	25.0 µSv/h or 2.5mR/h
Alarm 1 and 2 for the Dose	app. 16 Sv or 1600 R

Acoustic alarm (Sound)	active
LED alarm indication	active
Vibrator alarm indication	active
Acoustic count rate indication	Single Pulse
Autosend	off
History recording interval	120 s *)

*) These parameters can only be changed through the serial interface by means of the configuration software.

With the setting of the history recording interval of 120 s, the last 52 hours of operation will be stored in the history memory.

These parameters (except calibration parameters) can be changed with the help of RadEye buttons and the optional PC-program „RadEye.EXE", version 1.39.0 and greater, and the cable 42540/29 or 42540/26.

3. Configuration

3.1 Menu functions

To enter the operating menu, please press the "Menu" key. Scrolling through the single menu options is effected by the up / down arrow keys.

The display returns to its initial default setting in case no key has been activated for more than 10 seconds.

A "✓" to be found behind some menu options means that the respective function is active.

The menu consists of a main menu and several sub menus. Some menu options are disabled for some operation modes and display modes.

Using the PC-Software and an interface adapter, any of the functions can be hidden. This allows the user to be given only the functions necessary to accomplish his measurement duties, thus simplifying the handling considerably.

The Up- and Down arrow key are used to scroll through the menu.

To select a menu option, release the left key as the respective menu option has been reached.

The meaning of the Menu key may change with the selected menu. The meaning is shown on the bottom of the display.

`Change`: Edit values

`Off`, `On`: Switching a function on and off

`Select`: Select a default display mode

`Yes`: Confirmation of an action

`Exit`: Exit menu

In Change menu the Up-/Down arrow keys are used to change a digit of an alarm value.

3.1.1 Menu structure

MENU DISPLAY	SUBMENU DISPLAY	DESCRIPTION OF THE FUNCTION ACTIVATED BY THE LEFT KEY	MENU DISPLAY VISIBLE IN		
			COUNT RATE (CPS, CPM)	DOSE RATE (REM/H, R/H, SV/H)	ACTIVITY (BQ, DPS, DPM)
Switch off		RadEye is switched off. Time and stored data are maintained	✔	✔	✔
Background	Start measurement	Start background measurement	✔		✔
	Set parameter	Edit preset time and preset count for background measurement			
	Scaler netto	Scaler with background subtraction			
	Ratemeter netto	Ratemeter with background subtraction			
Select Probe		Displays the stored counter tubes	✔	✔	✔
Backlight		If selected the backlight is always on. Otherwise the backlight extinguishes after 10s	✔	✔	✔

Measuring unit	cps	Select Count rate (cps)	✔	✔	✔
	cpm	Select Count rate (cpm)			
	Bq	Select Activity (Bq)			
	dps	Select Activity (dps)			
	dpm	Select Activity (dpm)			
	rem/h	Select Dose rate (rem/h)			
	R/h	Select Dose rate (R/h)			
	Sv/h	Select Dose rate (Sv/h)			
	Gy/h	Select Dose rate (Gy/h)			
	Bq/cm^2	Select Activity (Bq/cm^2)			
Operation mode	Ratemeter ADF	Select Ratemeter ADF mode	✔	✔	✔
	Ratemeter Tau	Select Ratemeter Tau mode			
	Scaler	Select Scaler mode			
Scaler parameter	PresetTimeMode	Scaler mode with fixed time	✔	✔	✔
	PresetCountMode	Scaler mode with fixed count number			
	Set time/count	Edit preset time and preset count			
	Auto restart	Auto restart of scaler measurements			
Nuclide table		Displays the stored nuclides			✔
Alarm Count Rate		Allows setting of Alarm 1 and 2 for count rate mode (cps, cpm).	✔		

Alarm Activity		Allows setting of Alarm 1 and 2 for activity mode (Bq, dps, dpm).			✔
Alarm Dose Rate		Allows setting of Alarm 1 and 2 for dose rate mode (rem/h, R/h, Sv/h).		✔	
Alarm Dose		Allows setting of Alarm 1 and 2 for dose. This option is accessible only in dose rate mode (rem/h, R/h, Sv/h).		✔	
Clear Dose		Clears the accumulated dose. This option is accessible only in dose rate mode (rem/h, R/h, Sv/h).		✔	

Settings	Battery type	Selection of battery type: rechargeable or non-rechargeable batteries. Correct low battery warning depends on this setting.	✔	✔	✔
	Autosend	If activated, the instrument sends a data string periodically to the infrared port. This is used for radio transmission units.			
	Single Pulse	Enabling and disabling of single pulse indication. Activation is done by audio keys (right button and top button). Alternative to "Finder".			
	Finder	Enabling and disabling of audible radiation intensity. Activation is done by audio keys (right button and top button). Alternative to "Single Pulse".			
	Set Time/Date	Set time and date of the real time clock.			
	Set HV	Set the high voltage for the selected counter tube			
	Bluetooth	Enable / Disable the RadEye BTcom cover			
	Edit Tau	Set time constant for Ratemeter Tau.			
	Language	Set the menu language to English, German or French			
	Contrast	Adjusts the contrast of the LCD display			

Alarm indication	LED	Enabling and disabling of the optical alarm	✓	✓	✓
	Sound	Enabling and disabling of the acoustic alarm and the audible indication of key-strokes			
	Vibrator	Enabling and disabling of the vibration alarm			
	LCD LED	Enabling and disabling the Backlight LCD illumination in case of an alarm			
Show alarm		Display of alarms stored in alarm log.	✓	✓	✓
Text info		Displays the text stored in the RadEye	✓	✓	✓

3.1.2 Main menu

The main menu offers the following displays:

```
■ ⬛ <Main menu>    ■ ⬛ <Main menu>
Select Probe       Scaler Parameter
Switch off         Operation mode
Text Info          Measuring unit
Show alarm         Backlight
Yes    ↑↓   Exit   Select ↑↓   Exit
```

```
■ ⬛ <Main menu>    ■ ⬛ <Main menu>
Settings           Switch off
Clear Dose         Text Info
Alarm Dose         Show alarm
Alarm Dose Rate    Alarm indication
Yes    ↑↓   Exit   Select ↑↓   Exit
```
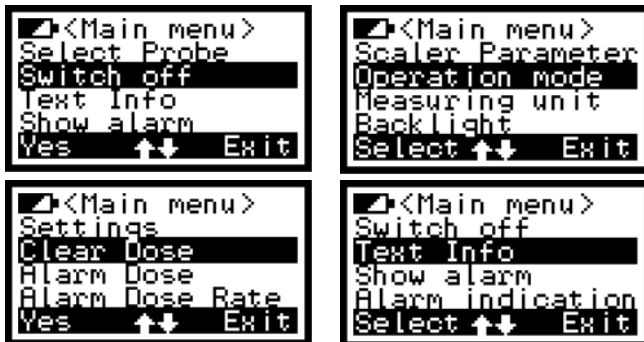
The above illustration depicts all menu options for the main menu possible for count rate mode. Some menu option may be different for dose rate and activity mode.

3.1.3 Background

```
■ ⬛ <Main menu>
Switch off
Text Info
Show alarm
Alarm indication
Select ↑↓   Exit
```

This submenu for background measurement is only available in count rate and activity mode. "Start Bgr.meas." starts the background measurement. "Set parameter" edit the preset time and count for background measurement. "Ratem.netto" enables the ratemeter mode with background subtraction. "Scaler netto" enables scaler mode with background subtraction.

3.1.4   Select Probe

```
■◢<Sel.Probe>
MC71A
EP15
HP270✓
HP190A
Select ↑↓   Exit
```
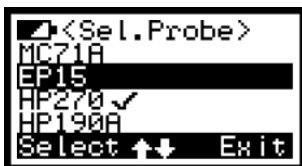
Here the right probe can be selected. This menu item is only visible, if more than one probe configured.
Be careful: if the preset voltage is too high for the attached probe, the counter tube can be damaged.

3.1.5   Measuring unit

```
■◢<Meas.unit>
cpm
cps✓
Gy/h
Bq/cm²
Select ↑↓   Exit
```
```
■◢<Meas.unit>
Sv/h
dpm
dps
Bq
Select ↑↓   Exit
```
```
■◢<Meas.unit>
Gy/h
Bq/cm²
rem/h
R/h
Select ↑↓   Exit
```

This submenu is used to select the measuring unit for ratemeter and scaler measurements.

3.1.6   Operation mode

```
■⏻<Op.mode>
Scaler
Ratemeter ADF ✓
Ratemeter Tau

Select ↑↓    Exit
```
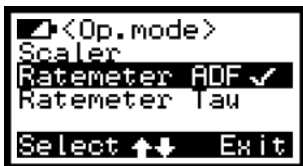
This submenu is used to select between ratemeter and scaler mode. A "✓" shows the active configuration.

3.1.7   Scaler parameter

```
■⏻<Scaler par.>      ■⏻<Scaler par.>
PresetCntMode         PresetTimeMode ✓
PresetTimeMode ✓      Accum. Counts
Accum. Counts         Auto restart
Auto restart          Set Time/Count
Select ↑↓    Exit     Select ↑↓    Exit
```

This submenu is used to set the parameters for scaler measurements. Preset TimeMode is used to measure a defined time. Preset CntMode is used to measure a defined number of counts. With "Auto restart" the RadEye GX restarts automatically the measurement. "Set Time/Count" edit the preset time and count.

3.1.8   Nuclide table

```
■⏻<Nuclidtable>
Cs-137
Am-241 ✓
C-14
Sr-90
Select ↑↓    Exit
```

The submenu Nuclide table is only available in activity mode (Bq, dps, dpm, Bq/cm^2). A "✓" shows the selected nuclide.

3.1.9 Settings

In this submenu it is possible to select between audible single pulse indication and finder mode. A "✓" shows the active configuration. With "Autosend" the RadEye sends a data string periodically to the infrared port. "Batt.type" is used to set the correct threshold for warning message "LOW BATT" for accumulators (NiMH) and primary cells (Alkaline). With "Alpha Sound" and "Alpha LED" activated each alpha pulse generates an audible resp. optical indication. With "Set Date/Time" the user can set the date of the real time clock. "Display αβ" shows the count rate inclusive α rate. With "Display β" the α rate is subtracted. "Set HV" result to another submenu where the high voltage can be set manually or via automated plateau measurement.

Edit Tau means the you may set a fixed time constant from 1..60s for operation mode "Ratemeter Tau".

"Language" is used to change the menu language of the RadEye between English, German and French.

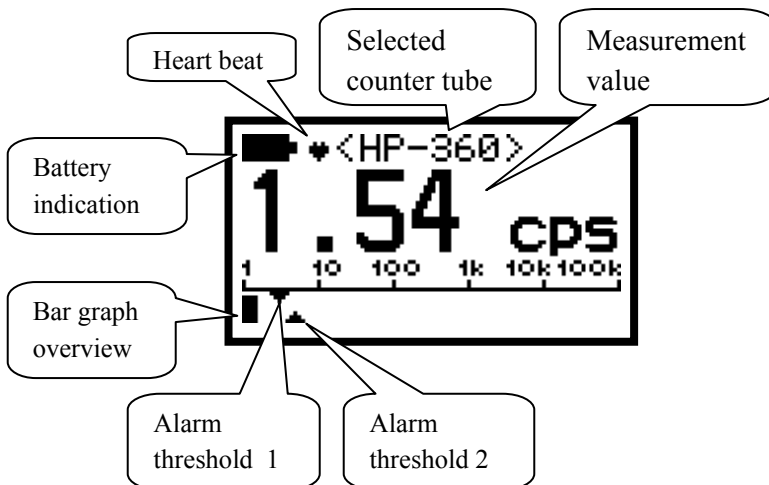Set the display contrast with menu item "Contrast".

3.1.10 Alarm indication

The submenu alarm indication is used to select the LED, sound and vibrator for alarming. A "✓" shows the active configuration.

3.2 Ratemeter

The standard display set by factory is indication of the actual count rate.

Pressing the ▲/dose – key shows upon the
- 1st click: the accumulated dose (rem, R or Sv) is shown only if dose rate mode (rem/h, R/h, or Sv/h) is active. It displays the accumulated dose and the remaining time until the dose alarm 1 is reached, assuming the current dose rate will persist.
- 2nd click: the mean value and max value ("Peak") of the measurement together with the elapsed time indicated since the last reset (hhh:mm:ss).
- 3rd click: standard display

After 10 seconds or after 3rd click standard display with normal rate indication is activated again.

1st click (only in dose rate mode)   2nd click

The RadEye supports two Ratemeter modes:

- **Ratemeter ADF**: Ratemeter with filter type: **A**dvanced **D**igital **F**ilter (ADF). This is a digital RC-Filter with time constant from 1s to 180s, depending on count rate and count rate changing.
- **Ratemeter Tau**: Ratemeter with linear filter. The time constant is settable via menu item "Edit Tau" (see chapter 4.17) from 1s to 60s

A long key press on the menu button resets the Ratemeter to the actual count rate.

3.2.1 Trend indication

A trend indication is given, if the measured dose rate is increasing or decreasing.
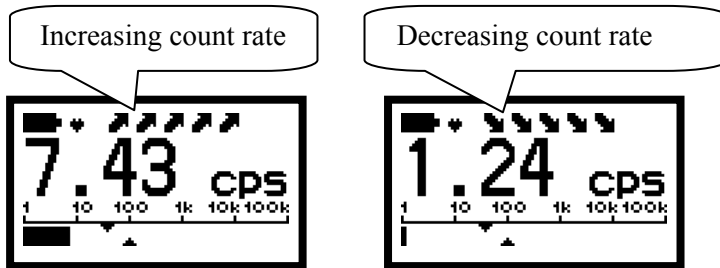
For accurate measurements, only readings without trend indication should be used.
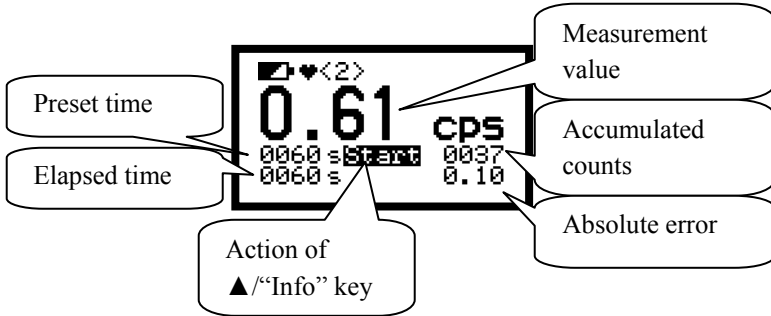A trend indication is not given at count rates of less than 1 cps.

3.3 Scaler mode

To enter the scaler mode select in the submenu "Operation mode" the option "Scaler".

3.3.1 Mean value

The scaler mode starts with the parameter set in submenu „Scaler Parameter".

Measurement value

Preset time

Elapsed time

Accumulated counts

Absolute error

Action of ▲/"Info" key

To start the measurement, press the "Info/▲" key. While the measurement is in progress "Stop" is blinking. Accumulated counts are limited to 65000 counts. "Accumulated counts" is not displayed with selected option "Scaler netto".
With option "Auto restart" enabled the RadEye starts a new measurement after 1s.

The absolute error is calculated as follows:

$$F = \sqrt{\frac{R_M}{t_M} + \frac{R_0}{t_0}}$$

F: absolute error in cps
R_M: measuring value in cps
t_M: Measuring time in s
R_0:   Background count rate *)
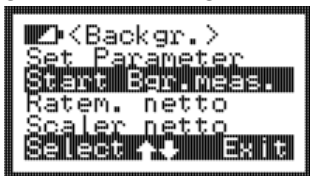t_0:   Background measuring time *)
*) Background count rate and background measuring time are only used in combination with "Scaler netto"
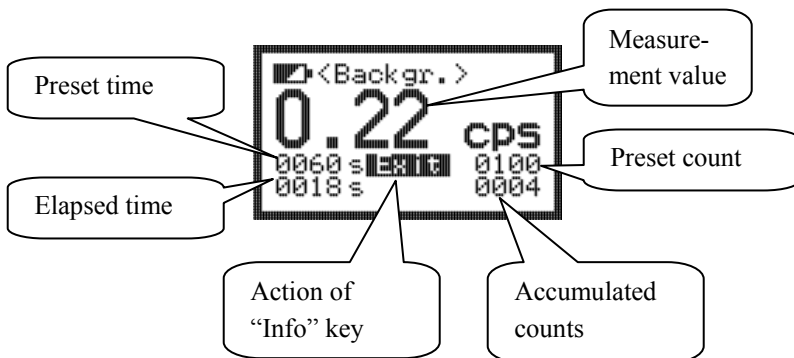
3.3.2 Accumulated counts

With accumulated counts selected via radeye.exe the RadEye show the collected counts within the measurement time in place of the mean value. This option is only available in combination with measurement unit "cps"
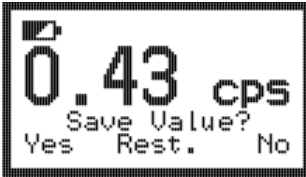
3.4 Background measurement

To enter background measurement select in submenu "Background" "Start Bgr.meas".


The background measurement starts with the parameter set in submenu option „Set parameter". To start the measurement press the up key. While the measurement is in progress "Exit" is blinking.

Preset time

Measurement value

Elapsed time

Preset count

Action of "Info" key

Accumulated counts

The measurement is finished if either the elapsed time arrived the preset time or the accumulated counts reached preset count.

The user is asked if he want to save this value („Yes"), discard his measurement ("No") or to start a new measurement ("Rest."). When menu option "Ratem. netto" or "Scaler netto" is selected this background value will be subtracted from the measurement.

background value
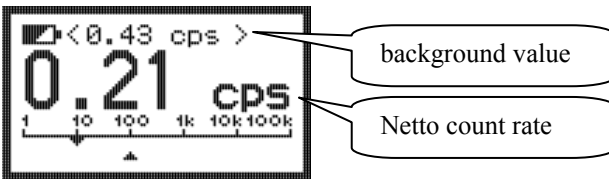
Netto count rate

3.5 Alarm thresholds

There are two alarm thresholds each allocated to count rate, activity dose rate and dose.

In order to avoid dose alarms while using the instrument exclusively as a rate meter, the dose alarms can be set to the maximum level.

Configuration of the alarms is possible via infrared interface (chapter 8.5) or via the menu.
As to the alarm activation, please also read chapter 4.2.

3.6 Alarm threshold based on the relative standard deviation (sigma threshold)

The alarm thresholds refer to the basic display set. If the sigma value set ranges between 2 and 9, the first alarm threshold is calculated from the count rate of the background ratemeter according to the following empirical equation:

$$As1 = Cnt + n * \frac{\sqrt{Cnt * T + Av}}{T}$$

where   As1:   Alarm threshold 1

Cnt: Count rate of the background ratemeter

n: sigma value set between 2 and 9

T: Average measuring time depending on back ground value

Av: Additional value (0 if linear ratemeter is enabled)

Count rate	Measuring time	Additional value	ADF	Linear ratemeter
0…<8 cps	20 s	80	x	
8…<32 cps	15s	80	x	
32… <256 cps	10s	80	x	
>256 cps	5s	80	x	
All count rates	Preset time constant (1..60s)	0		x

Thus the actual alarm threshold adjusts itself automatically to the existing background radiation level. The actual setting of the alarm threshold 1 can be observed at the bar graph threshold mark. At power on of the instrument, the background ratemeter starts with its preset maximum background value, reaching its final value after about 2 minutes.

Using the menu option `Alarm Count Rate`, the exact value of the alarm threshold currently valid at the respective background can be displayed.

On acknowledgment of an alarm, the background ratemeter is set to the actual count rate display. Accordingly the alarm threshold is increased.

This is useful, if an alarm occurs while entering a zone with higher background level (certain buildings, subway...).

There will be no further alarms at background conditions and normal sensitivity will be established again automatically after about two minutes.

Alarm 2 is always referring to the total count rate without consideration of any learned background.

Recommended Sigma values:

Sigma = 6 enables almost false alarm free searching in areas with a fairly constant radiation background.

For general use, especially in an urban environment the setting of a minimum count rate for the Alarm 1 via the PC-configuration program is recommended to avoid false alarms from certain natural materials. Frequently paving stone and plates made from granite contain substantial traces of Uranium and Thorium.

3.7 Setting alarm thresholds

The menu options `Alarm Count Rate`, `Alarm Activity`, `Alarm Dose Rate` and `Alarm Dose` allow the alarm thresholds to be modified. For this setting, the user has 255 seconds time. Changing the value is effected by pressing the left (Change) button if the corresponding "Alarm" is selected:

To increment the number, press the up/down arrow keys. To go on to the next digit or to quit the edit mode, menu use right/left arrow keys.

Once the last number has been set, quit the editing mode by pressing the "Exit"-key. Then, the value set is saved and after 10s the unit returns to the basic display.

Example:

The count rate alarm threshold must be changed.

Press "Menu" key, and up/down arrow keys until **Alarm Count Rate** is selected
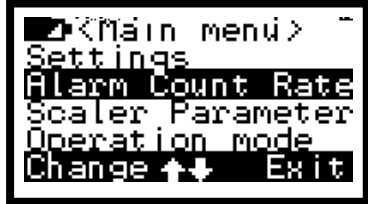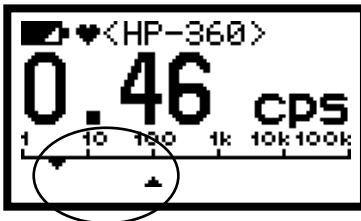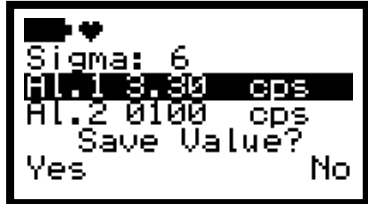
Then enter change menu by pressing "Change" key.

```
■◢<Main menu>
Settings
Alarm Count Rate
Scaler Parameter
Operation mode
Change ↑↓    Exit
```

Edit value by pressing up / down keys
select digit by left / right keys
Pre unit "k" may be chosen as well.

```
■◆
Sigma: 6
Al.1 3.27   cps
Al.2 5.00   cps

Exit   ↑↓        →
```
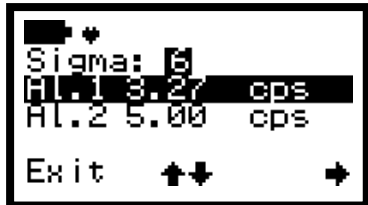
Leaving the last digit with the right arrow key:
Confirm storage of edited value pressing "yes"

```
■♥
Sigma: 6
Al.1 3.80   cps
Al.2 0100   cps
    Save Value?
Yes            No
```

```
■◢♥<HP-360>
0.46 cps
1  10  100  1k  10k100k
```

The set points of the actual dose rate alarm thresholds can be seen as triangles on the intensity bar scale. The upper mark shows alarm threshold 1, the lower mark shows alarm threshold 2.

4. Operation

4.1 Audible single pulse indication and finder mode

With the single pulse indication being selected, ◁⌐⌐ each pulse of
the detector generates a short audible signal emitted by the beep-
er.

An audible alarm signal caused by exceeding the alarm threshold is
not given while single pulse indication or finder mode is active.

The single pulse indication must be enabled in the menu.
It is activated and deactivated by two times pressing the right or top
button:

Indication of activated
single pulse indication
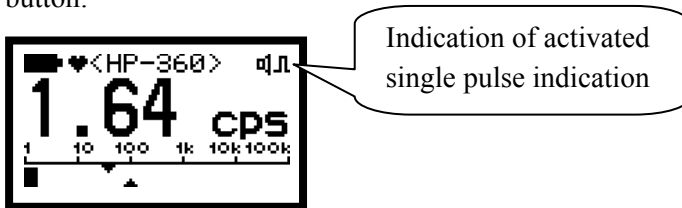
Finder mode:

In the Finder mode, the sound frequency depends on the pulse rate of the detector. The more detector pulses above the count rate that is present at the moment of the activation of the finder mode are captured by the detector, the higher the tone.

The finder mode must be enabled in the menu.
It is activated and deactivated by two times pressing the right or top button:

Indication of activated finder mode
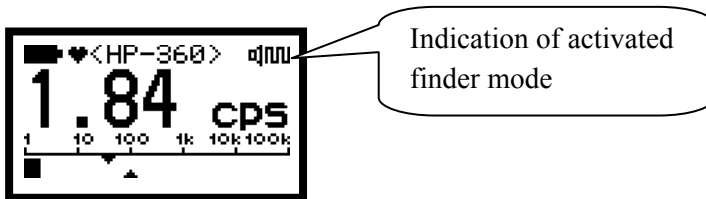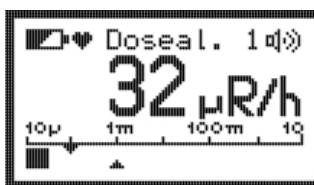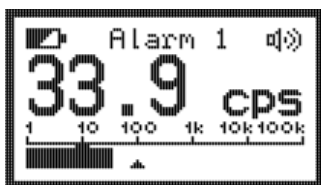
4.2 Alarm indication

Each time the first alarm threshold is exceeded, the alarm devices beeper, LED and the vibrator become active, if they are enabled.

Alarm 1: LED slowly blinking, two frequency alarm tone

Alarm 2: LED quick blinking, continuous alarm tone

Dose Alarm: LED constantly on, continuous alarm tone, vibrator slow.

The alarm tone and vibrator are acknowledged by a short key depression, the LED remains pulsing. The alarm is extinguished, when the first alarm threshold is remained under. Dose alarm is only active when rem/h, R/h or Sv/h is selected.
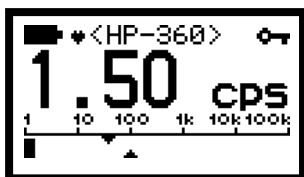

4.3 Additional information

In addition to the basic display, using the menu options, requests for further information can be started such as e.g. the setting of the enabling and disabling of the various alarm indicators.

4.4 Key Lock

Pressing the "on/▼" key for at least 3 seconds, locks the key pad:

It is recommended to lock the keys when wearing the unit in the holster. Thus reduced battery time because of additional power consumption by illumination of the LCD or other unintended operations is avoided.

Unlocking is performed according to the LCD instructions upon pressing any key:

Press left key first, then lower key and then right key.

4.5 Earphone

For alarming in noisy environments or for undercover investigations an earphone is available. See ordering information page 2-1.


The earphone is connected at the bottom of the instrument after opening the rubber protection seal.

4.6 Alarm latching

Via PC-program it is possible to configure a alarm latching. Alarm latching means the alarm is stored for the configured time from 0 s (= off) to 9999 s.
A latched alarm is indicated by a "M" near by the alarm indicator. When the alarm is acknowledged the RadEye returns to normal operations.

Latching indication
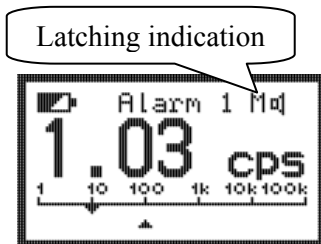
4.7 Show alarm

By selecting the menu point "show alarm" the alarms stored in the alarm log are displayed together with the time of alarm and the actual time.

Actual date and time of the Real Time Clock

Stored alarm

Date and time of the stored alarm
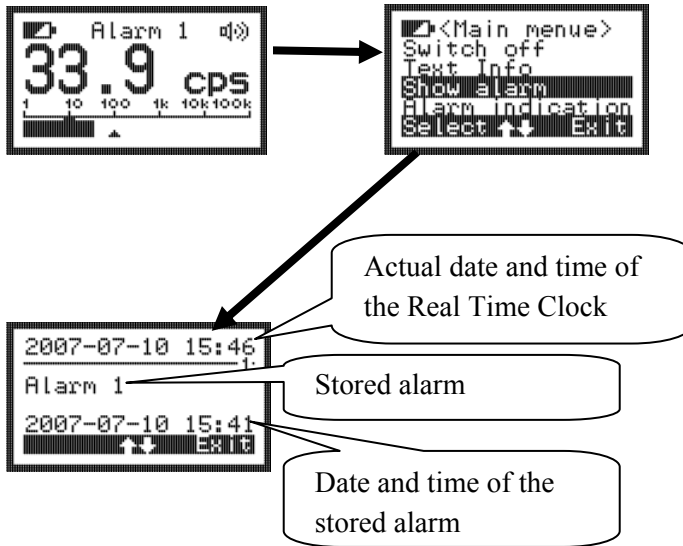
By pressing the up and down arrow keys you can scroll through the alarm log. By pressing the right button the display returns to the menu.

4.8   Text Info

Via PC program "RadEye.exe" it is possible to place a text information in the RadEye. This text information can be displayed with the menu function "Text Info".
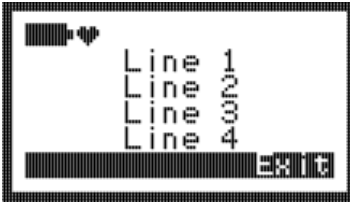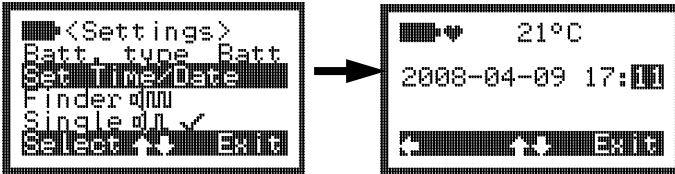

4.9   Display rotation

If enabled, a short press on the lower centre key (arrow down) flips the display. If the lower centre key is pressed again or if the menu button is pressed, the screen flips into the normal orientation.

4.10 Set Date and Time

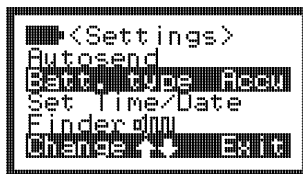Setting of date and time takes place via menu function Setting →
Set Date/Time.

The setting uses the format YYYY-MM-DD hh:mm. The fields
are selected with the keys right/left. With the keys up/down the
Year, month, day, hour or minute can be changed. After setting
the date and time the real time clock is set and is used for alarm
logbook and history.

4.11 Battery type

Selection of battery type: Rechargeable or non-rechargeable bat-
teries. It is needed for correct low battery warning. Type "Batt"
has a threshold of 2.3V. Type "Accu" has a threshold of 2.35V.
See also chapter 6.4.

Battery type "Battery"   Battery type "Accumulator"

4.12 Manual data logging

Measurement values in scaler mode are stored in with history with a record number. The record number is shown in the display.

Measurement values are stored under record number 26

When setting the history time interval to 0s the actual counting rate with a record number is stored in the history by a long press on ▲/Info key. The last saved record is shown in the display. In this mode dose rate display and peak/mean display is not available

Last record number

4.13 Graphic display

If enabled, one or more short presses on the "On/▼" key display a graphical view of the count rate. This display is only available in ratemeter mode.

Count rate

Maximum scale

4.14   Change menu language

Via menu item "Language" in submenu "Settings" the user may change the language of the RadEye menu.

## 4.15   Adjust display contrast

Here, the user can adjust the display contrast. This function is called in sub menu "Settings" "Contrast"


4.16   BTcom cover

For detailed installation and operation procedure refer to BTcom cover manual DB-076e which is delivered together with the Bluetooth battery lid.

The BTcom cover is applied to the RadEye switched off. After starting the RadEye an additional menu item "Bluetooth" appears in submenu "Settings". Here the user may switch on / off the BTcom cover.
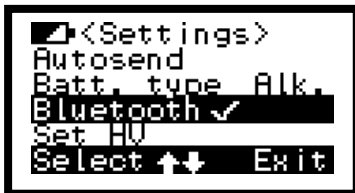
If the BTcom cover is active but not connected to any PC a Bluetooth symbol is flashing. If the BT-communication is established, the symbol is always on.

BTcom cover active
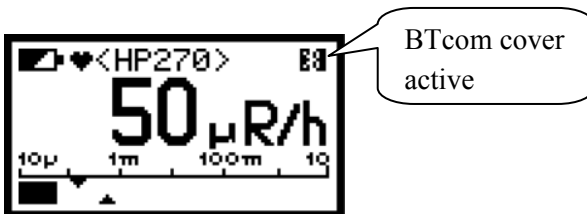
4.17   Edit Tau

The time constant for operation mode "Ratemeter Tau" can be set via the menu item "Edit Tau" in sub menu "Settings". This parameter can be set between 1.0s and 60.0s

5. Measurement units

5.1　General Count Rate Measurements (cps, cpm)

These are the most general measurement units (cps = counts per second; cpm = counts per minute). The displayed value is independent of any specific calibration factor which may not be available for a contamination with unknown nuclides. Either gross count measurements or net count measurements can be performed. The selection can be performed by the PC-settings or in the menu <Background> by tagging <Ratem. netto> and/or <Scaler netto>. The background count rate for these netto measurements can be determined via a background measurement in the menu <Background>. The derived background count rate can be stored and is used for all following net measurements. This value is always displayed in the top section of the LCD in order to remind the user that the measured value has been corrected by that particular count rate value.

5.2   Surface Contamination (Bq, dps, dpm, Bq/cm^2)

Up to 16 nuclides for each counter tube together with their related calibration factors can be stored in the RadEye GX. The name of isotopes, the number of available nuclides as well as their 4 Pi efficiency can be edited in the PC-software. Furthermore the reference area in respect to Bq/m^2 can be edited.

The user of the RadEye GX can select the required isotope in the menu <Nuclide>. This selected nuclide (e.g. Co-60) is displayed in the LCD (eventually alternating to the subtracted background activity in case of a net measurement).

If no nuclide is configured, the RadEye GX shows "###".

5.3   Dose Rate (Sv/h, R/h, Rem/h)

For each counter tube a calibration factor can be stored in the RadEye GX. If the calibration factor is set to "0" the RadEye GX displays "###"

6. Functional test

When the instrument is switched on, it will show zero count rate, dose rate or activity until the first detector pulse occurs.
The radiation meter performs continuous self-check routines. A timeout for the detector can be configured via the PC-software. A complete failure of the detector during operation will be indicated after the timeout on the LCD and be announced by the beeper. The same applies to the battery voltage.

6.1   Functional test

To carry out a simple test, shortly press any key. A short audible pulse has to be released and the LC display is illuminated for some seconds.

The heart symbol next to the battery indicator must be "beating". This indicates that the cyclic tasks as calculating measurement values, and checking for alarm thresholds are active.

6.2 Failure indication

In case of a failure the beeper generates a sharp single pulse every 32 s.

The corresponding failure message is displayed in the LCD:
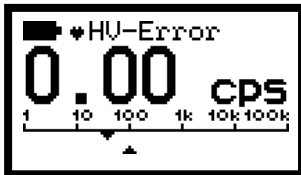
Error high voltage generation

No detector pulse within configured time

EEPROM with calibration data shows EEPROM Read or EEPROM Write error.

A Watchdog Error indicates that the micro controller has problems to work on its tasks in a given timeframe. Reasons are strong electromagnetic pulses, firmware errors or hardware issues.

6.3 Overload indication

If an overload is detected the following indication is given. The overload condition is described in chapter 1.
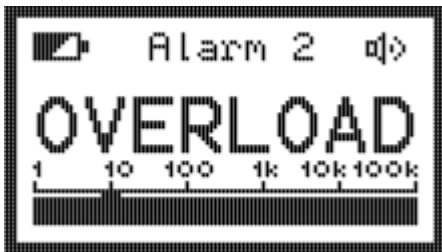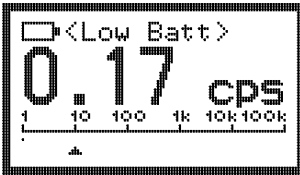
Overload indication

The dose value is marked with an overload indication, if a dose rate overload occurred since the last dose reset.

Overload indication in dose display

6.4   Low Battery warning

If the battery voltage is below the configured threshold (see chapter 4.11) the following warning appears:

The beeper generates a single pulse every 32s. This acoustic warning can be suppressed by pressing the alarm acknowledge key. After 8h this warning comes up again. The battery needs to be changed. However, the RadEye can still be operated for several hours.

If the battery voltage falls below 2V, the battery symbol starts flashing. An acoustic warning is generated every 8s and can't be acknowledged. The battery needs to be changed as soon as possible.

The battery needs to be changed as soon as possible. Dead batteries may leak. Remove them from the RadEye to prevent corrosion.
Battery life is significantly decreased at low temperatures. Cells which give a mid-scale voltage reading in a warm building may fail rapidly if the instrument is then operated under outdoors conditions in winter.

7. Overload

The overload can be triggered by measured values indicating that the probe may be subject to an excessive radiation field:

a) Count rate
Overload is triggered if the measured count rate (after dead time correction) exceeds the overload count rate as set for the selected external probe (see chapter 8-13, probe configuration).

b) Power consumption of high voltage generator
Overload is triggered if the measured power indicator exceeds the overload value as set for the selected external probe (see chapter 8-13, probe configuration). Thus overload is indicated as well e.g. for a short circuit in the cable or detector.

c) Signal pulse height
RadEye GX units with serial no. from #xxxx additionally monitor a degradation of the pulse height caused by excessive dose rate.

8. PC configuration

The configuration of the RadEye via Windows software requires optional Thermo Scientific hardware and software. Please refer also to chapter 9 for details.

8.1   Connection to a PC

A RadEye unit can be connected to a PC either by either serial interface, USB interface or by Bluetooth [TM] [1]
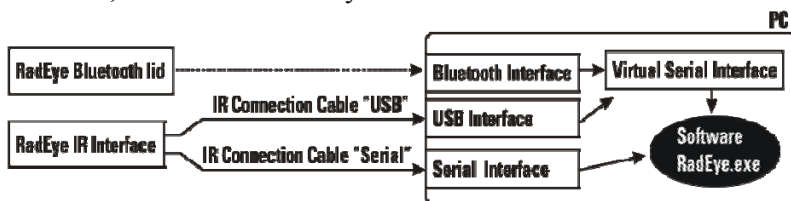
8.1.1   Wireless connection via Bluetooth

Details about the Bluetooth communication are provided through the manual db076e delivered with the optional Bluetooth battery cover. Please note that the connected PC must be equipped with a Bluetooth interface as well.
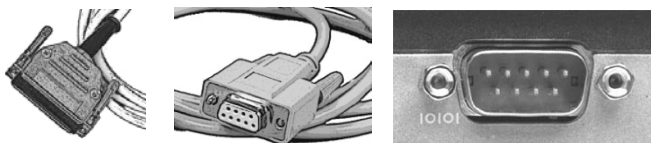
---

[1] Bluetooth is a trademark of Bluetooth SIG, Inc., Bellevue, Washington, U.S.A.

8.1.2 Cable connection

It is recommended to use the optional RadEye desktop holder to align the RadEye's IR window with the IR window of a connection cable.

The optional serial adapter cable is used to connect to a RS232 port of a PC.

This serial port is selected directly in the RadEye.EXE software.

Alternatively, the optional USB connection cable is used to connect to an USB port.

Using the USB connection requires the installation of driver software that will generate a virtual serial port that can be selected in the RadEye.EXE software. The driver is delivered on the RadEye.EXE software installation CD ROM.

Installation of a connection cable
Using the hardware provided and without exerting too much force attach the connections of the adapter cable to the PC and to the RadEye desktop holder.

8.2   Installation of the optional RadEye.EXE software

Open the file "Setup.EXE" on the optional RadEye.EXE Software installation CD Rom and follow the installation guideline. The installation generates a RadEye.EXE Icon on the desktop.

8.3   Starting RadEye.exe

Once the RadEye.EXE program has been started, device parameters are displayed on the screen.

8.4   Main menu

Once the RadEye.EXE program has been started, device parameters are displayed on the screen.

8.4.1 RadEye GX Device Parameters

The Frame "RadEye GX" contains the unit's serial number and version number of the software. Click on the Read button, the Parameters of RadEye GX will be read out from device and shown in the Frame.
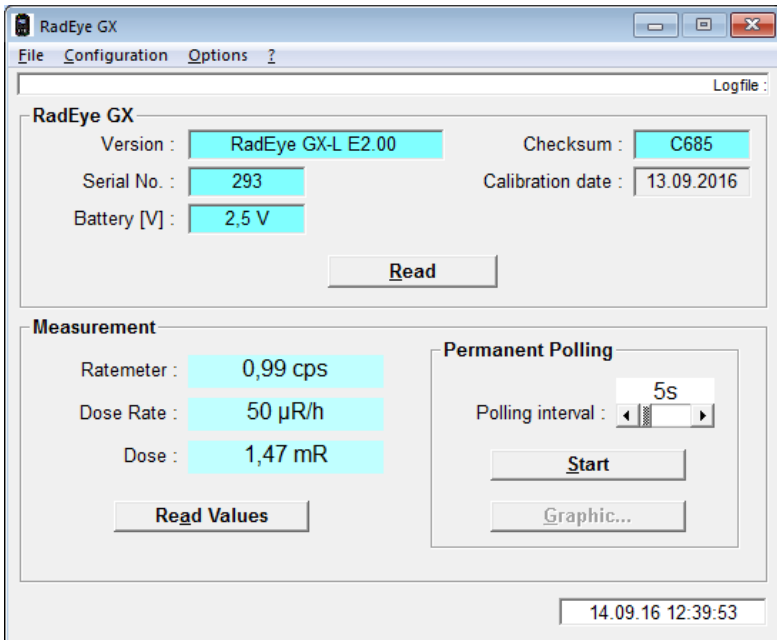

Figure 8-1: Main Window

8.4.2 Measurements

After pressing the button Read Values the current Count rate (cps) and the current selected measuring unit is displayed in this frame.

With button Start the measured value is read from the unit at a certain polling interval. Use the scroll bar to define the polling interval. You can select a value between 1 and 3600 seconds. The dose rate can be displayed numerically and graphically. Click on Graphics…. A diagram is displayed that gives a representation of the count rate values versus the time.

The current measured value is added at the right-hand side, and the diagram is shifted to the left. Up to 100 measured values can be represented. The graduation of the ordinate is automatically adjusted to the measured values supplied by the unit.
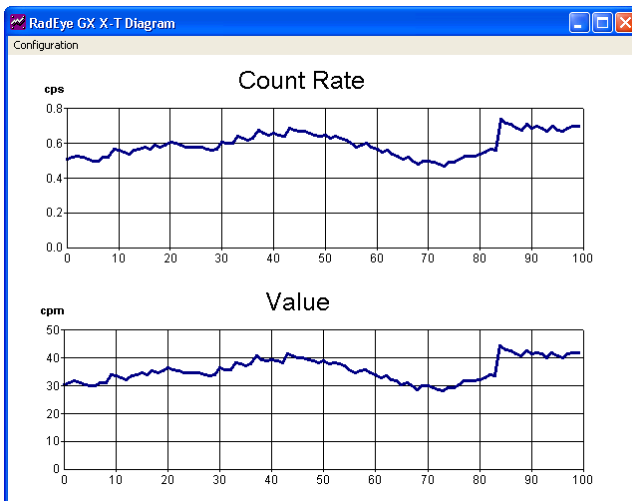

Figure 8-2: Measurement graphics

8.4.3   Creating a Measurement File

The actual measured values that are shown in the "Measurement" display field can be stored in a measurement file.

To do this, open the File menu, click on **Open Logfile...**, and enter path and name. The file is stored with the file name extension ".log".

If another file of the same name exists, the system asks whether that file shall be overwritten or the new measured data shall be appended to the existing data.

Once you have pressed OK to confirm the entries, the measurement logfile is created and the polling measured data is stored in the scan interval you have defined. An open measurement file is indicated by the name and the path of the measurement logfile that appears in the top right-hand corner of the window.

To terminate data storage, open the File menu and select the **Close Logfile** menu item. No further data is recorded.

Open the **File / View Logfile...** menu to view the measurement logfile.

For training and demonstration a prior recorded logfile can be replayed by opening **Replay logfile**.
With the buttons Start and Stop together with the polling interval the replay can be controlled.

Close Replay switches back to accessing measurement values via infrared interface.

The measurement logfile is an ANSI text file with columns that are separated by <TAB>. This enables this file to be read easily

into other programs (such as Excel) where the data can be processed.

The first line of the measurement logfile contains the unit name, the file name, and the path. Serial number and Device identification are specified on the second line.

Date and time of the measurement are specified in the columns under the field names "mm.dd.yy" and "hh:mm:ss". The time setting corresponds to the PC system time.

The "Counter" column contains the numerical value of the counter measurement. The "Unit" column informs about the unit.

8.4.4   Select serial interface

Via **Configuration / Com settings**... menu another window is opened from which you may select the corresponding interface. An error message is displayed if the interface is not available. "Read RadEye" is used to check if the right Com port is selected. With "Search RadEye" the program checks every available Com port for a RadEye.
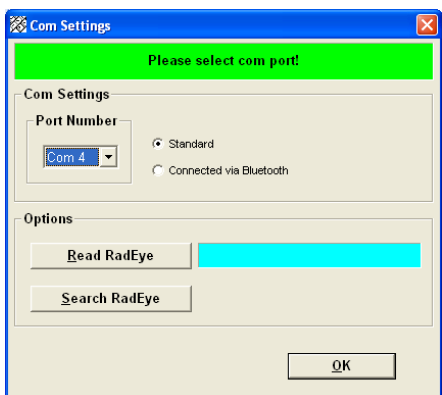
Figure 8-3: Select serial interface

If the connection shall be established with the optional Bluetooth battery cover, then this option must be activated. Please refer also the manual db076e delivered with the cover.

8.5   Configuration

On the **Configuration** / **RadEye GX…** menu, the following parameters can be modified:

8.5.1   Password protection

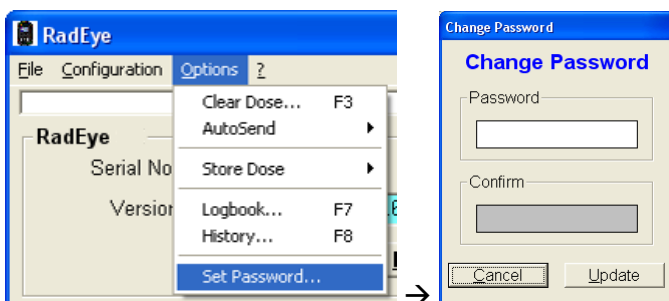The configuration of the RadEye can be protected with a password.

Figure 8-4: Password Setting

No password is set during the first installation of the software. A reminder window is activated, if the configuration window is opened.

Figure 8-5: Password reminder
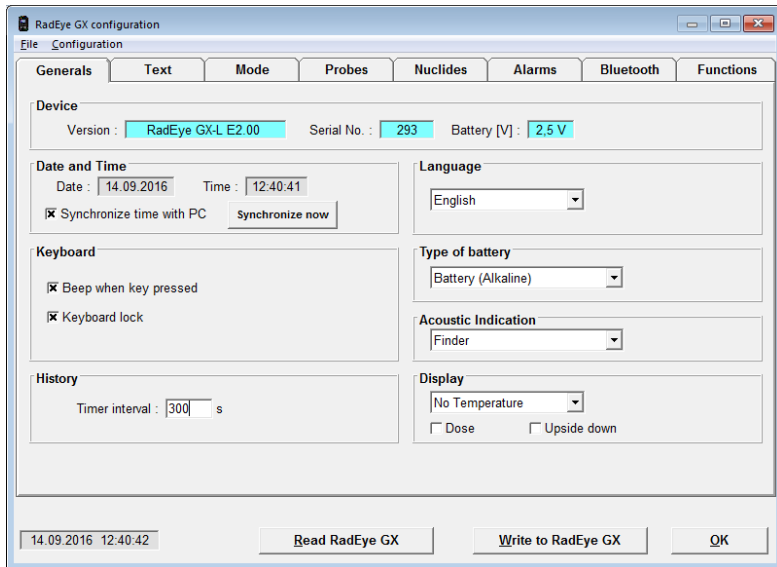
8.5.2 General configuration

Figure 8-6: General configuration

The device information in the RadEye are read only values. The number behind the RadEye type shows the firmware version of the unit. The RadEye may lose its date and time settings if the DC power supply is interrupted (batteries are taken out). The button "Synchronize now" sets the currently displayed RadEye time to the current PC time. If the function "Synchronize time with PC" is active, then the RadEye will be automatically synchronized if connected to the PC software. The language selection allows changing the RadEye's menu language.

The section "displays" allows selecting the temperature in °C or °F in the RadEye unit's top LCD screen line. An accumulated dose can be displayed through multiple pressing the "▲" button, if the item "show dose by Info key (DR only)" is enabled.

Also the user may set the time interval for the history memory (1...43200s), the kind of the acoustic rate indication (single pulse, finder 4.1) and type of battery
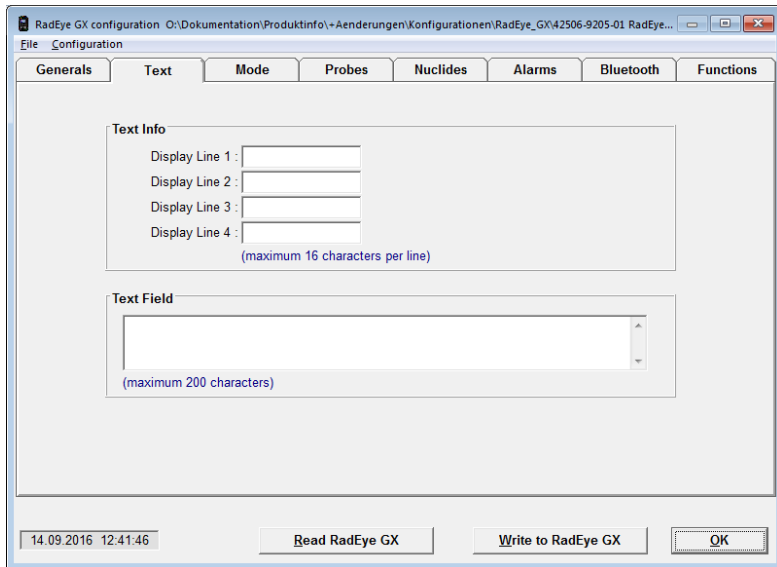
8.5.3 User defined text

Figure 8-7: User defined text

On the tab "Text" it is possible to store a text in the RadEye. In the field "Text Info" the user can define 4 lines text, which can be displayed on the LCD by the RadEye (see 4.10).
In the field "Text Field" it is possible to store a text with up to 200 characters in the RadEye. This text cannot be displayed by the RadEye.
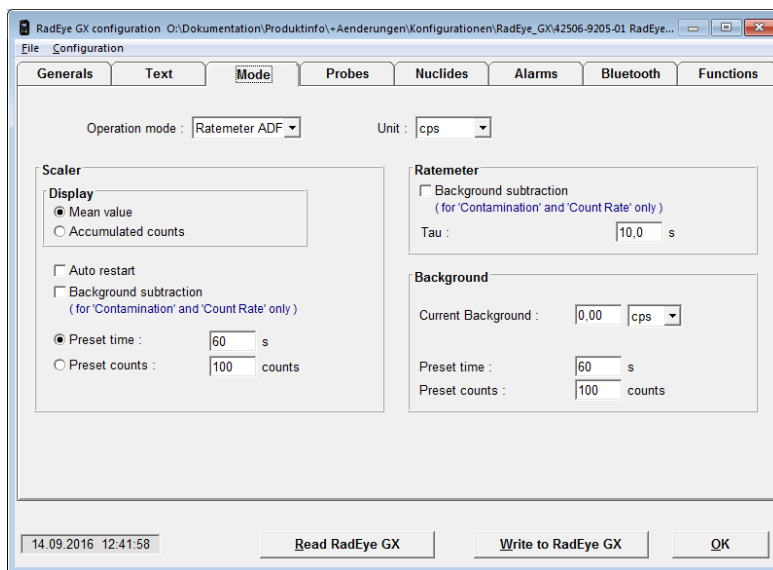
8.5.4   Mode setting

Figure 8-8: Mode setting

On the "Mode" tab, the user may set the operation mode, the physical unit, parameters for background measurement and parameters for scaler mode.
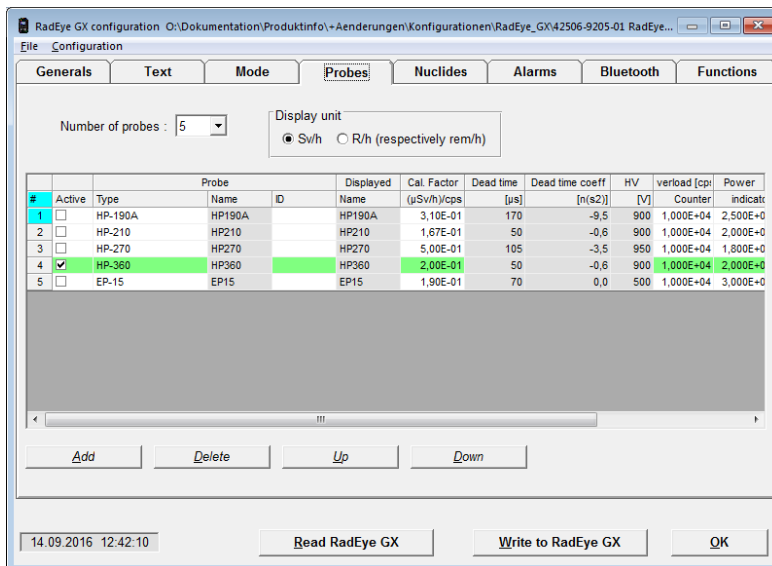
8.5.5　　　　Probe configuration

Figure 8-9: Probe information

Probe type: This field can be edited between customized and factory set probes. For factory set probes it is only possible to change the calibration factor. For user defined individual detectors every field can be edited

Name: this column is used to set a name for the probe. This name is displayed after start up the RadEye and in submenu "Select counter tube". It is highly recommended to include the serial number or other unique identification label.

Cal.Factor: Calibration factor for dose rate. If the calibration factor is not known, use calibration factor "0". In this case "###" is displayed in dose rate mode (see chapter 5.3).

Dead time: In these fields a dead time correction factor for each counter can be edited.

Dead time coefficient: Quadratic correction in ns².

$$CR = \frac{CRraw}{1 - CRraw * DT - CRraw^2 * (-DTc)}$$

CR: Count rate with dead time correction

CRraw: Raw count rate without dead time correction

DT: dead time in seconds

DTc: dead time coefficient in ns²

The denominator "1- CRraw*DT-CRraw²*DTc" is limited between 0.15 and 1.

The denominator "CRraw²*(-DTc)" is limited between 0 and 0.8

Overload: The columns "overload" is used for overload detection. More information can be found in chapter 7.

Area: This field is only valid for measuring unit "Bq/cm²". Supply this field with the probe area in cm².

Timeout: Here the maximal time between two pulses can be edited. If no detector pulse within configured time is detected "Detector error" is triggered.

Active: Here, the active probe can be selected.

Most GM detectors for contamination measurements do not require individual dead time correction or use of the quadratic term in order to achieve satisfactory linearity for the default measuring range of up to 10000 cps (600000 cpm).

On the other hand, GM-detectors used for dose rate measurements may need individual adjustment of these parameters. The quadratic term of the RadEye GX dead time correction formula results e.g. in a significantly improved dose rate linearity of the HP270 probe compared to survey meters using linear dead time

correction only. For individual calibration and linearity check of dose rate detectors, the PC-software CalRadEye.EXE should be used. Please note that the cable type and length have an influence on the calibration parameters.

Typical parameters

Detector	HP-270	HP-210	HP-190A	HP-360	EP-15
HV [V]	950	900	900	900	500
cal factor [μR/h/cps]	50	20	31	20	19
DT [μs]	95	50	170	50	70
QC [ns]	-3.1	-0.6	-9.5	-0.6	0
Over range [cps] *)	50,000	30,000	20,000	30,000	30,000
Over range power	180	2,000	250	2000	300
Area [cm²]	0	20	7	20	20
Timeout [s]	100	60	60	60	60

*) Over range [cps] for RadEye GX-L is limited to 10,000 cps.

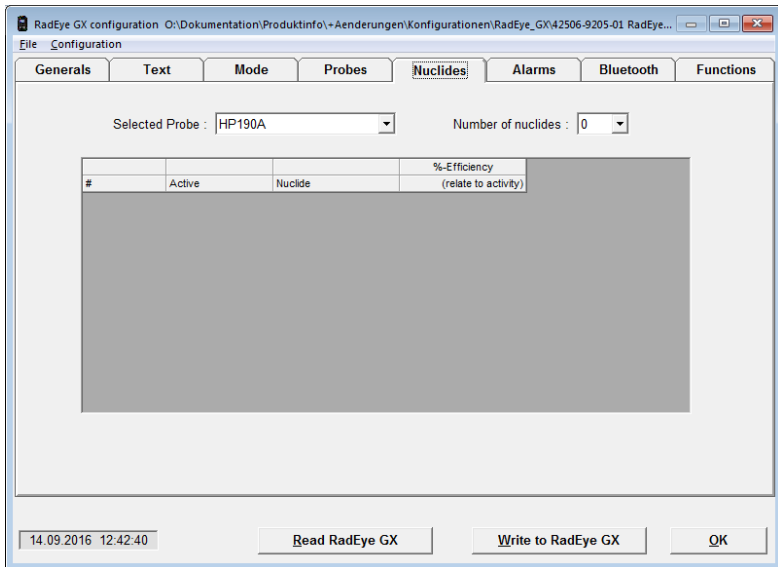### 8.5.6 Nuclide data (contamination detectors)

Figure 8-10: Nuclide information

On the tab „Nuclide", the user may edit a separate nuclide table for every probe.

The Activity is calculated as follow:

$$Act = CR * Eff$$

Act: Activity in Bq
CR: Count rate
Eff: Efficiency

The surface activity is calculated as follow

$$SurAct = \frac{Act}{Area}$$

SurAct: Surface activity in $\frac{Bq}{cm^2}$

Act: Activity in Bq

Area: Probe area in cm² as stated in the probe tab.

8.5.7 Alarm settings

Figure 8-11: Alarm setting

The „Alarm" tab offers the user the possibility of making the alarm settings for the single basic displays. Furthermore, the options on this tab allow beeper and additional alarm monitoring processes to be configured.

8.5.8 Bluetooth
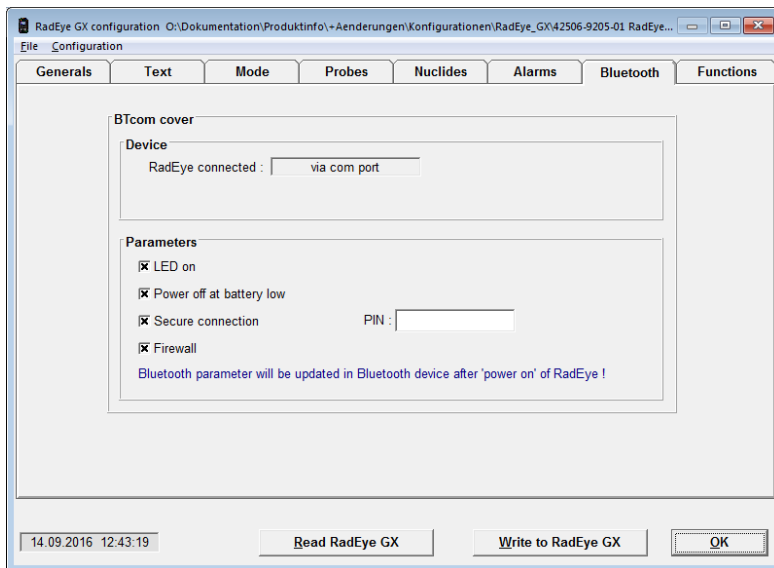
Figure 8-12: Bluetooth configuration

Here the user may configure the BTcom cover. The frame "Device" informs about firmware version, serial number and the physical address of the BTcom cover (not the RadEye GX). The Parameter LED on means the LED at the backside shows the connection status. With "Power off at battery low" the BTcom cover power down automatically if battery low status is detected to increase battery life. "Secure connection" uses the PIN code which can be edited in the right field. For more information please read the manual which is delivered together with the BTcom cover

8.5.9 Menu configuration
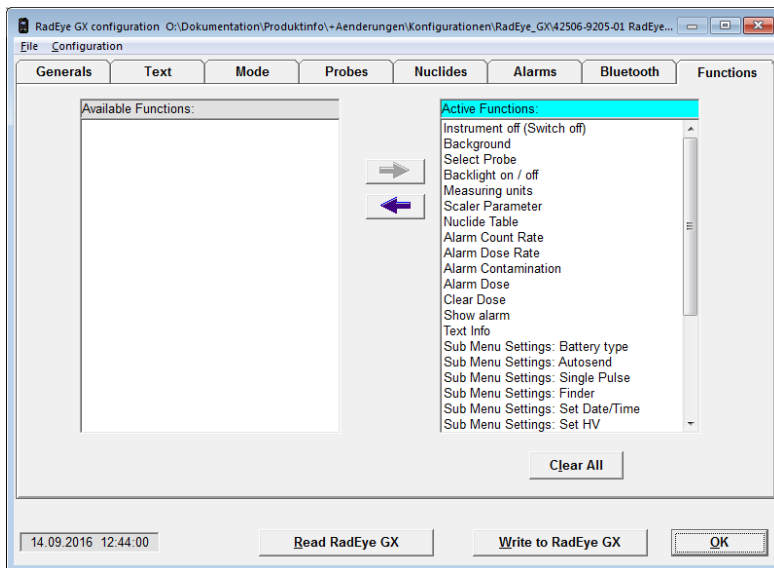
Figure 8-13: Menu selection

On the "Functions" tab, the menu functions available to the user can be selected to speed up access to frequently needed functions. For example, if LED alarm is always active and rate level indication is never used, these functions can be hidden for the user. Once the setting of the parameters is finished, these parameters have to be sent to the RadEye GX by clicking on the Write to RadEye GX button.

Parameters including the selected menu configuration can be saved with **File / Save as…** as parameter file (*.cfg). A saved configuration can be reloaded using the menu **File / Open…** and sent to RadEye GX.

8.6   History

Via the **Options** / **History** menu, the values stored in the RadEye GX data memory can be read out, represented in an x/t diagram and saved to the hard disk of the computer. These data subsequently can be read in and further processed in a spreadsheet program.

Time interval of History storing can be set from 1s to 43200 s (12 hours). 1500 measurement values can be stored.

The following figure depicts for example the curve of the count rate over the last two days at a time resolution of 120 s. Clearly various levels resulting from different locations and points with high peaks can be recognized.

In rate meter mode the blue line shows the mean values, the red line the maximum value within the time interval. In scaler mode the blue line shows the measurement and the red line the background of the last background measurement if background subtraction is selected.

If batteries are removed, the time reference is lost. In the diagram time information is only provided for history values with valid timing entries.
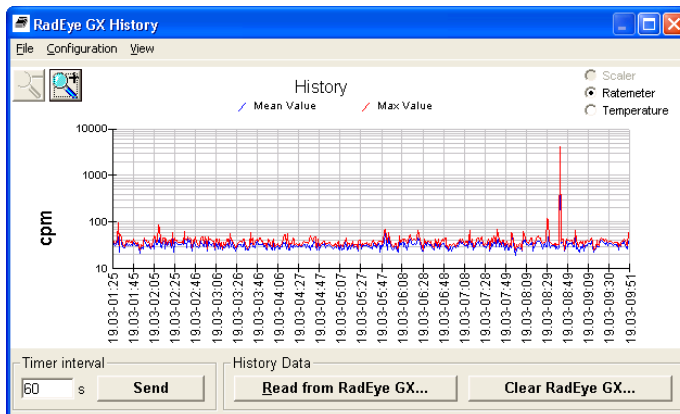
Figure 8-14: History read out
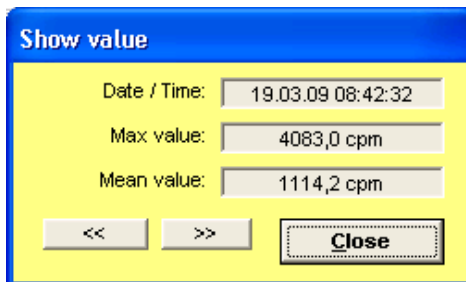
Figure 8-15: Single history value indication

Clicking at the graph, each individual, stored measured value can be displayed:

8.7   Logbook

Changes in configuration, occurring alarms and errors are logged in a buffer.

These saved events can be read out via **Options / Logbook…** .
The logbook is shown as a table, and can be saved to PC hard disc or printed.

The logbook has a maximum of 250 data sets. Several events at the same time are saved as one record. At the display every event is shown in one line for better overview. The date and time of the PC is used for time relation.
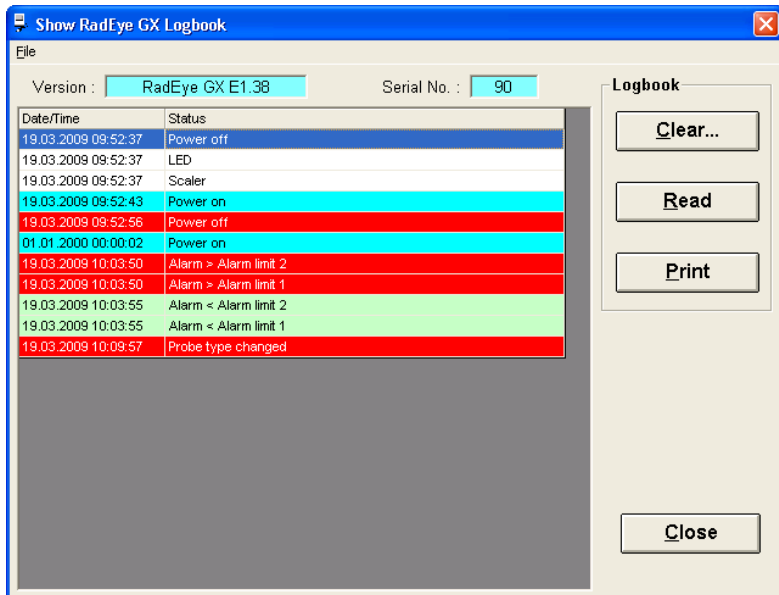
Figure 8-16: Logbook

9. Optional Accessories

9.1 Earphone for RadEye series (425067037)

The usage of the earphone is recommended, if the RadEye is switched into FINDER mode and disturbance through noisy environment shall be compensated.

The earphone is plugged into the RadEye's socket at bottom of the unit after removing the rubber seal. The cable length is 1.2m.

9.2 Desktop holder (425067060)

Alignment between the RadEye's IR data interface window and the IR interface of a PC connection cable is insured with the usage of the desktop holder. Please see chapter 8.1.2 for details.

9.3   IR connection cable serial (4254029)

The IR plug of the connection cable can be fixed easily by screws at the desktop holder. The PC connection plug is a 9 pin sub D type for serial COM ports.
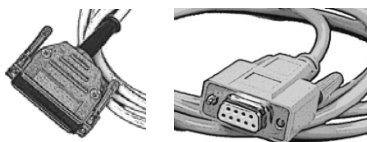
Please see chapter 8.1.2 for details. Cable length = 1.2 m

9.4   IR connection cable USB (4254026)

The IR plug of the connection cable can be fixed easily by screws at the desktop holder. The PC connection plug is a 9 pin sub D type for serial COM ports.
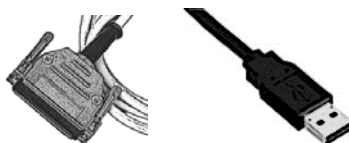
Please see chapter 8.1.2 for details. Cable length = 1.2 m

9.5   Bluetooth battery cover (425067087)

The standard battery lid is replaced with the Bluetooth battery cover. Please see chapter 8.1.1 for details.

9.6   RadEye inductive charger

The RadEye holder 42506/7065 serves as supporting device and, in combination with the special battery lid 42506/7034, power supply unit for the operation of a RadEye instrument in a vehicle. For convenient mounting to the dashboard one of the mechanical adaptors 42506/7061 … 64 is required.

Note: The charging function of this device requires the battery latch 42506/7034. Without the above mentioned part no charging will be achieved.

Safety instructions

1. Only use NiMH – accumulators, no primary batteries (Alkaline – manganese, zinc – carbon ...)
2. Only use two accumulators of the same type (manufacturer, rated capacity ...)
3. Only charge accumulators having the same discharging state
4. Never use defective accumulators (penetrating/emerging electrolyte, damaged housing...)
5. The bottom of the housing (aluminum heat sink) gets warm (50°C, 120°F max.).
6. Not for use in open convertibles.
7. Do not put cards with magnet stripes (i.e. credit cards, parking cards, phone cards, etc.) near the mounted warning symbol. The magnetic field could erase the data from your card.
8. Clearance of at least 50cm (20") between charger and car radio is recommended.

LED indicator

State	LED (green)
Voltage supply on	On
Voltage supply off	Off

9.7   Holder with vacuum cup and goose neck

Part No.: 42552/2005

10. Trouble Shooting

10.1 RadEye SX doesn't power on

10.1.1 Press "On" for at least one second

Keep the button "▼" pressed until the LED and the sound is active. If the button is pressed only shortly, then the start up routine is not activated. The LED may flash then only very shortly.

10.1.2 Check battery

If the RadEye SX does not respond to a long press (> 1s) of the "▼" button, then please use the following step by step procedure:

A) Remove the current batteries

B) Clean the battery contacts

C) Check the required orientation of the batteries according to the printed "+" symbols in the battery compartment.

D) Insert two -"AAA" with sufficient capacity: Rechargeable AAA batteries should be completely loaded, non rechargeable batteries should supply together at least 2.3 Volt under load.

E) Press the "▼" button for more than one second (see also 2.4)

10.2 Reading data from the start up screen

The start up screen shows important data like the last calibration, the current voltage and the firmware version.

This screen stays active as long as the "▼" button is kept pressed during the power-on of the RadEye device.

10.3 The RadEye doesn't show the menu items as described in the manual

The items available in the RadEye menu can be disabled or enabled via the RadEye.EXE software. The factory setting has all menu functions enabled. Please refer to chapter 8.5.9, menu settings. Next, please check the firmware version of your RadEye and compare your version number with the revision table chapter 15.4. The revision table shows the introduction of new functions together with the according firmware version.

10.4 The RadEye shows an error message in the display's top line

Please refer also to chapter 6.2. If one of the following failures is indicated, then the RadEye must be repaired by the Thermo Scientific bench repair team:

```
HV-Error
Detect Err*
EEPROM Err
Watchdog**
```

Please contact our Customer Service for more details.

*) Please check the high voltage cable connection between the RadEye and the probe first

**) Please see the failure description in the above referenced chapter. If the failure was related to a strong electromagnetic pulse scenario and the failure went away afterwards, then a repair may not be necessary. A diligent observation of the RadEye proper operation after the failure is strongly recommended.

10.5 The RadEye is not found in the software

If the connection between the RadEye and the computer can't be established with a selected serial port (COM port), then the program shows the bellow message first:
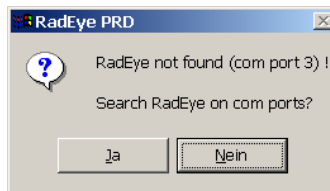
The RadEye.EXE software offers to search for a connection to the RadEye unit on other available serial ports.

If there is a faulty connection between the unit and the computer, the program shows the error message "Data transfer to instrument fails"
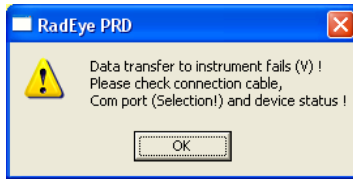
In this case, you must check whether:
- The RadEye has been positioned correctly in the desktop holder (with rubber boot) and the RadEye is turned on.
- The infrared transmission windows are clean
- The correct serial interface has been selected.

It is recommended to use the Windows system tools to determine the occupation of the currently active serial ports. Virtual serial ports are labeled accordingly for identification.
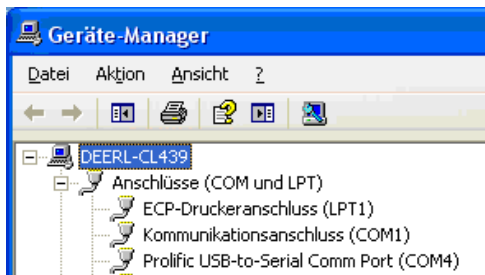
Device Manager showing the virtual driver
for USB „Prolific" at COM 4

Open next the serial interface step window in the RadEye.EXE software: **Configuration / Com settings...** menu. The used serial port has to be selected next.

10.6   RadEye lost date and time settings

The date and time information is lost, each time the batteries are removed or below the required voltage for operation. The simplest way to program the date and time is to use the "synchronize" function of the optional RadEye.EXE software. Please refer to chapter 8.5.2. Else the current date and time can be set also through the RadEye's menu "Settings" / "Set Date / Time"

10.7   RadEye's battery status is lower than expected

Please check if the correct battery type is selected under "settings" / "Batt. type" and change the type in case. Rechargeable batteries supply a voltage of 1.2V each, while Alkaline batteries provide 1.5V.

Rechargeable batteries offer also a more steep drop from acceptable battery voltage to "battery low" than Alkaline types.

10.8   History data shows the wrong time and date

See chapter 8.5.2.

11. Maintenance

11.1 Recommended maintenance

The RadEye GX is maintenance free

11.2 Cleaning the instrument

The RadEye shall be cleaned with a moist tissue (only water as cleaner). Do not use aggressive chemicals like organic solvents. The rubber boot should be removed and cleaned separately.

11.2.1 Remove batteries for storage

It is highly recommended to remove both AAA batteries from the battery compartment, if the RadEye unit is stored for a longer period (> 1 week) to avoid damage through battery leakage.

11.2.2 Check GX with a pulser

The RadEye GX can be tested with a pluser and a decoupling capacitor. For testing the voltage should be set to the lowest value (300V).

RadEye GX — Cable RG58 0.3m — 1.5pF/2000V — Cable RG58 0.8m — Pulse Generator / 50 Ohm termination / Pulse 5V
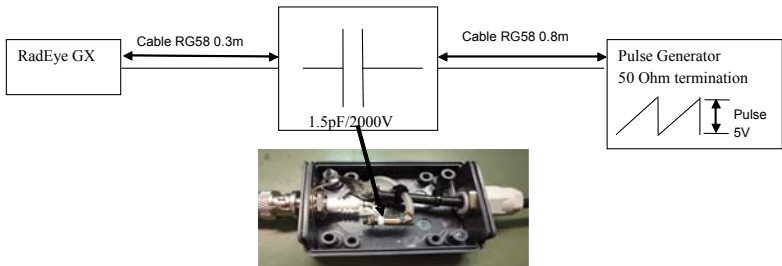
12. Spare Parts

Description	Part No.
Cover upper part assembled incl. Cylinder bolt, vibration gum and key button without front foil	42506/7055
Cover lower part complete	42506/9211
Front foil RadEye GX	42506/703092
Cylinder bolt 4x6mm and key button (pack=5ea)	42506/703010R
Battery cover assembled	42506/7033
PCB RadEye GX complete	42506/9210B

13. Detector cables

Description	Part No.
Cable MHV to MHV, 36 inches long (0,9 m)	CA-15-36
Cable MHV to MHV, 60 inches long (1,52 m)	CA-15-60
Cable MHV to MHV, 72 inches long (1,8 m)	CA-15-72
Cable BNC to MHV, 36 inches long (0,9 m)	CA-16-36
Cable BNC to MHV, 60 inches long (1,52 m)	CA-16-60
Cable MHV to PET, 1,5 m (59 inches) long	3211 A
Cable MHV to PET, 2 m (78 inches) long	3211 B72
Cable MHV to angular PET 0,15 m (6 inches) long	3204 A

14. GM Probes

Description	Part No.
Energy compensated beta-gamma GM probe, BNC connector	HP270
Energy compensated beta-gamma GM probe, MHV connector	HP270/MHV
Energy compensated beta-gamma GM probe with 2.3MΩ resistor, BNC connector	HP270S
Energy compensated beta-gamma GM probe with 2.3MΩ resistor, MHV connector	HP270S/MHV
Environmental range GM probe, MHV connector	MC71/MHV
Medium range GM probe, 0-5 mSv/h, MHV connector	MC10/MHV
Medium range GM probe, 0-1 mSv/h, MHV connector	MC20/MHV
High range GM probe, 0-100 mSv/h, MHV connector	MC30/MHV
Beta-gamma GM probe, 0-1 mSv/h, MHV connector	DA/MHV
Pancake GM probe, BNC connector	HP360
Pancake GM frisker probe, MHV connector	EP15FL/MHV
Pancake GM probe, thin mica end window GM tube 15.5 cm²	EP15/MHV

Pancake GM probe, thin mica end window GM tube 6.0 cm²	E/MHV
Pancake GM probe with aluminum shield, BNC connector	HP210AL
Pancake GM probe with aluminum shield, MHV connector	HP210AL/MHV
Sample holder, 2 inch diameter, for use with HP-210	SH4A

15. Technical data

15.1　RadEye GX

Measured quantities:	Count rate (cps, cpm) Surface contamination (Bq, dps, dpm, Bq/cm^2) Dose rate (R/h, Sv/h, rem/h, Gy/h)
Measuring range:	Default: 10,000 cps Largest indication Count rate: 9999 kcps, 9999 kcpm, Activity: 9999 kBq, 9999 kdps, 9999 kdpm, 　　　　　9999 kBq/cm² Dose rate: 9999 R/h, 9999 rem/h, 9999 Sv/h
Probe cables	RG 58, Max. 2 m – MHV connector,
High voltage range	350V…1100V
Output impedance	1MΩ
Maximum number of counter tube	16 counter tubes with adjustable high voltage, calibration factor, dead time correction, overload threshold, detector area and timeout for detector failure. Default values for HP-190A, HP-210, HP-270, HP-290,HP-360 and EP-15 are available
Alarm threshold:	Two alarm thresholds for count rate, activity, dose and dose rate each. Default setting: see chapter 2.4
Audible alarm intensity:	At least 80 dB(A) at a distance of 30 cm

Working temperature:	-20°C ... + 50°C
Storage temperature:	-25°C … + 50°C
Ambient air pressure:	700 hPa … 1100 hPa
Relative humidity:	10 ... 90 % at 35°C not condensing
Operating voltage:	1,8 ... 4 V, Battery low voltage starting from 2.3 V
Degree of protection:	IP 32 according to EN 60 529
EMC:	Disturbance emission : EN 61000-6-3 Immunity : EN 61000-6-2
Size:	110 mm x 67 mm x 62 mm With rubber protection, without cable
Weight:	around 150g including AAA cells and protection sleeve
Internal memory:	The last 1500 measured values are saved and can be read out via PC program. Max- and mean value of count rate and dose rate. The time interval is factory preset to 120s by default. Logbook with 250 entries for changes of configuration, occurring alarms and errors.
Averaging filters:	Ratemeter ADF (**A**dvanced **D**igital **F**ilter) Digital RC-Filter with time constant 1s.....180s, depending on dose rate and dose rate changing. Ratemeter Tau: Linear Ratemeter with adjustable time constant from 1s to 60s

Power consump-tion:	$\approx$ 1.4 mA: normal operation without alarm signals and LCD illumination. High voltage: 900V
	$\approx$ 27 mA with illuminated LC display
	$\approx$ 9 mA LED alarm
	$\approx$ 33 mA acoustic alarm
	$\approx$ 26 mA vibrator alarm
Battery service life:	$\approx$ 500h using two alkaline AAA cells depending on the operating mode
	$\approx$ 250h using 800mAh NiMH accumulator

15.2   RadEye GX-L

Measured quantities:	Count rate (cps, cpm)
	Surface contamination (Bq, dps, dpm, Bq/cm^2)
	Dose rate (R/h, Sv/h, rem/h, Gy/h)
Measuring range:	Max. 10,000 cps
	Largest indication
	Count rate: 10 kcps, 600 kcpm,
	Activity: 9999 kBq, 9999 kdps, 9999 kdpm, 9999 kBq/cm²
	Dose rate: 9999 R/h, 9999 rem/h, 9999 Sv/h
Probe cables	RG 58 or RG62, Max. 2 m – MHV connector,
High voltage range	350V…1100V
Output impedance	1MΩ

Maximum number of counter tube	16 counter tubes with adjustable high voltage, calibration factor, dead time correction, overload threshold, detector area and timeout for detector failure. Default values for HP-190A, HP-210, HP-270, HP-290,HP-360 and EP-15 are available
Alarm threshold:	Two alarm thresholds for count rate, activity, dose and dose rate each.
	Default setting: see chapter 2.4
Audible alarm intensity:	80 dB at a distance of 30 cm
Working temperature:	-20°C ... + 50°C
Storage temperature:	-25°C … + 50°C
Ambient air pressure:	700 hPa … 1100 hPa
Relative humidity:	10 ... 90 % at 35°C not condensing
Operating voltage:	1,8 ... 4 V,
	Battery low voltage starting from 2.3 V
Degree of protection:	IP 32 according to EN 60 529
EMC:	Disturbance emission : EN 61000-6-3
	Immunity : EN 61000-6-2
Size:	110 mm x 67 mm x 62 mm
	With rubber protection, without cable
Weight:	around 150g including AAA cells and pro-tection sleeve

Internal memory:	The last 1500 measured values are saved and can be read out via PC program. Max- and mean value of count rate and dose rate. The time interval is factory preset to 120s by default.
	Logbook with 250 entries for changes of configuration, occurring alarms and errors.
Averaging filters:	Ratemeter ADF (**A**dvanced **D**igital **F**ilter) Digital RC-Filter with time constant 1s.....180s, depending on dose rate and dose rate changing.
	Ratemeter Tau: Linear Ratemeter with adjustable time constant from 1s to 60s
Power consumption:	≈ 1.4 mA: normal operation without alarm signals and LCD illumination. High voltage: 900V
	≈ 27 mA with illuminated LC display
	≈ 9 mA LED alarm
	≈ 33 mA acoustic alarm
	≈ 26 mA vibrator alarm
Battery service life:	≈ 500h using two alkaline AAA cells depending on the operating mode
	≈ 250h using 800mAh NiMH accumulator

15.3 RadEye inductive charger:

Operating voltage	$11{,}5\ldots15V_{DC}$
Current consumption	150…200mA With supply from 14V, charging current 50mA
Accumulator charging current	40…52 mA
Charge time RadEye on, Backlight switched off *)	20…24h Accumulator 800mAh, discharged
Charge time RadEye switched off	18…20h Accumulator 800mAh, discharged
Ambient temperature	-20…+50°C Operation –40…+70°C Storage 0…40°C Accumulator charge
Ambient pressure	300…2000 hPa

*) During operation with backlit LCD, the battery charge is sustained only.

15.4   Firmware revisions

V1.50

First release

V1.52

- Driving the display improved
- Mean/Max display in double size letters without leading zeros.
- If only one counter tube is stored, it is not possible to change the counter tube
- Threshold for "LowBat" for alkaline changed from 2.1V to 2.3V
- Manual data logging
- Display of accumulated counts
- Sigma alarm threshold

V1.60

- New menu function "Accumulated Counts" in Submenu "Scaler Parameter"
- New menu function "Bluetooth" in Submenu "Settings.

V1.61

- Improved overload detection
- New dead time correction

V1.62

- Failure in displaying the submenu "select counter tube" if only one or two probes are configured

V1.63

- Submenu „alarm indication" is maskable
  Display of "Learning" is suppressed if sigma is set to zero

-

V1.64

- New type GX-L with overload cps limit of 10,000cps
  Indication of error during scaler measurements

V2.00

- Graphical count rate display
- New menu item Contrast
- New menu item Language
- New operation mode "Ratemeter Tau" with settable time constant
- New menu item "Edit Tau"
- New measuring unit Gy/h
- New menu item "LCD LED". Display illumination on during alarm
- Scaler beep and LED flash when Scaler measurement ended
- History dataset number is increased at measurement start

16. Service contact

To request repair or calibration services, please use the online
RGA (Return Goods Authorization)
process at:

http://www.thermoscientific.com/servicerepair