



# GAMMA-SCOUT®

*Measures Radioactivity Easily and Reliably.*



Information on GAMMA-SCOUT®,  
instructions for TOOLBOX software  
(processes GAMMA-SCOUT® data) and  
technical support available at

**gamma-scout.com**

***Radiation Detector  
with USB port***

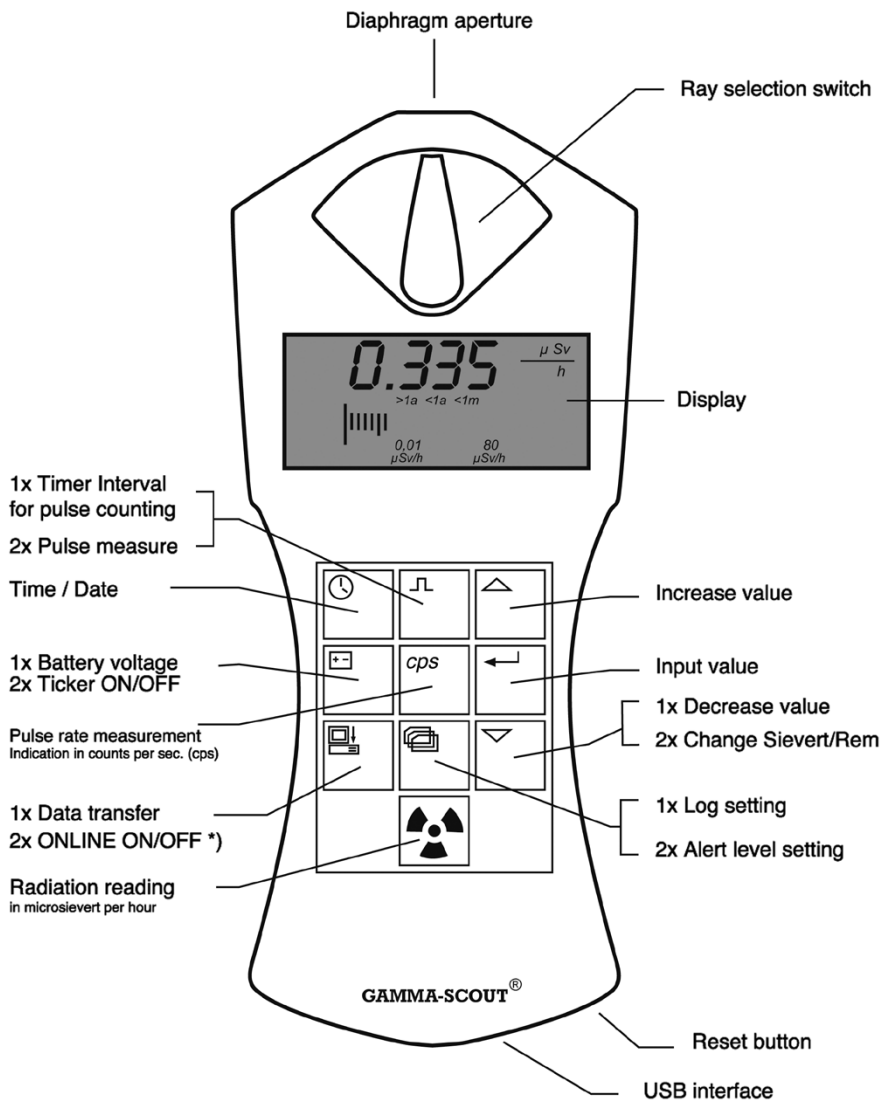
A product of GAMMA-SCOUT GmbH & Co. KG

**TÜV FCC-15**

complies with FCC standards, a USA institution



GAMMA-SCOUT® is a user-friendly device. The following design is an introduction to GAMMA-SCOUT's different features.




\*) For ONLINE model only

"1x" = press button once, "2x" = press button twice

<b>Summary</b>	<b>2</b>
Introduction to GAMMA-SCOUT®: Radiation Detector, Features, Offered Models	
<b>Summary</b>	<b>3-4</b>
Operating Conditions, Technical Notes, Working with Radioactivity, Legal Limits, Information on CD and Manual - <a href="http://www.gamma-scout.com">www.gamma-scout.com</a>	
<b>Alpha, Beta, Gamma Radiation</b>	<b>5</b>
Optional Blocking of Alpha and Beta Radiation	
<b>Radiation Measurement</b>	<b>6</b>
Operation Modes: Display Current Radiation, 24h Average, Automatic Alarm Threshold (w/ALERT version only), About microsievert	
<b>Limits, Rechargeable Battery Operation</b>	<b>7</b>
Common Input and Legal Limits, Range of GAMMA-SCOUT®, Display, Rechargeable Model Powered via USB (automatically) or Wall Power Supply, Charge Control	
<b>Pulse Counting</b>	<b>8</b>
GAMMA-SCOUT® used as a Geiger Counter, Shift from Dose Rate Mode to Pulse Counting Mode and Reverse	
<b>Pulse Rate Measuring</b>	<b>9</b>
Ongoing Pulse Count, Display Pulse Rate (over time)	
<b>Time and Date</b>	<b>10</b>
Integrated Quartz Clock, Time Display, Time/Date for Accurate Logging, Adjust Time/Date	
<b>Battery and Power Supply</b>	<b>11</b>
Battery Type, Display Voltage, Change Battery, Reset Button, Power Consumption Due to Frequent Ticker Use	
<b>w/ALERT - Alarm Threshold</b>	<b>12</b>
Exceeding Dose Rate Threshold, Individual Setup of Dose Rate Threshold	
<b>Counting the (cumulative) Dose</b>	<b>13</b>
Display and Reset Dose Counter, User Programming of Alarm Threshold for the (cumulative) Dose	
<b>Log Setup, Clearing the Memory</b>	<b>14</b>
Automatic Logging, Internal Memory, Log Setup, Deleting Content	
<b>Data Reading and Display (TOOLBOX Software)</b>	<b>15-16</b>
System Requirements, Accessories, Driver Installation and TOOLBOX Software, Data Readout	
<b>GAMMA-SCOUT® (ONLINE Model / REAL TIME)</b>	<b>17</b>
Requirements, Use	
<b>Technical Data, Calibration, Support</b>	<b>18-19</b>
<b>Becquerel &lt; &gt; µSv/h</b>	<b>20-21</b>
<b>Keywords</b>	<b>22</b>



## Functions and Features (all models)

- **Easy Reading:** In measuring mode (  button), the display shows the current radiation measurement reading every 2 sec. The display also temporarily shows the average H of the last day (24h, 12 am to 12 am).
- **Large Scale:** GAMMA-SCOUT® is calibrated to measure across a wide scale (0.01 up to 5,000.00  $\mu\text{Sv/h}$ ).
- **Tested Calibration:** Each GAMMA-SCOUT® radiation meter is subjected to a final test. This test is supervised by the Institute of Radiation Protection; a state university for applied technology. The tested device must be within a confidence interval of 5% against a master, which in turn, is adjusted to a gauged reference Cs-137 emitter.
- **Dose Rate and Dose:** GAMMA-SCOUT® can be used as a dose meter (cumulative radiation).
- **Flexible display:** The dose rate may be displayed in sievert or Rem.
- **Energy-Saving Constant Operation:** The GAMMA-SCOUT® monitors radiation day and night and logs data for later download. Due to sophisticated electronics, its battery lasts for years. The "RECHARGEABLE" model works with a rechargeable battery.
- **Data Storage:** GAMMA-SCOUT® stores all registered pulses in its internal memory and keeps them ready for you to use when desired. 32,000 readings: For constant monitoring, storage of environmental data is set at an interval of one value per week, which equates to 600 years of memory capacity. The user can set smaller intervals (page 14), which fills the memory capacity sooner. See below for deletion options.
- **Certification:** GAMMA-SCOUT® meets all European CE standards as well as the American "FCC 15 standard". GAMMA-SCOUT® may be carried on aircraft.



## GAMMA-SCOUT® w/ALERT (basic functions plus alert and ticker)

- **Dose Rate Threshold:** This model features an acoustic alert when radiation level exceeds a user programmed threshold.
- **Threshold for (cumulative) Dose:** GAMMA-SCOUT® w/ALERT offers an acoustic alarm when a user-programmed threshold for cumulative dose is exceeded.
- **Ticker:** The user can set an acoustic ticker which activates with each gamma pulse detected. To save battery resources, the signal shuts down after ten minutes and must be restarted. On devices with rechargeable batteries (see GAMMA-SCOUT® RECHARGEABLE) the ticker will not shut down.



## GAMMA-SCOUT® ONLINE / REAL TIME (with the functions of the ALERT-model)

- **Used in Measurement Stations:** GAMMA-SCOUT® sends detected pulses in real time and at specific time intervals, adjustable within certain limits, via USB port to the connected PC.



## GAMMA-SCOUT® RECHARGEABLE (with the functions of the ALERT-model)

- **Rechargeable** power supply, charged via USB (power supply unit or PC).





## Operating Conditions, Technical Notes, Working with Radioactivity, Legal Limits

This device complies with part 15 of the FCC rules (US authorities) and carries the CE seal (TÜV tested).

Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must withstand any incoming interference, including signals that may cause unintended malfunction.
- In order to measure all gamma radiation, the sensor is not shielded.

Please take all necessary precautions in working with radioactivity and observe radiation protection regulations.

Gamma-Scout USB drivers are available directly on the internet as plug-and-play drivers through Microsoft Windows Driver Distribution. Detailed information on installation is available in the manual on page 15 or on our homepage [www.gamma-scout.com](http://www.gamma-scout.com) ("Downloads/driver installation Gamma-Scout devices")



Windows hardware certification report: Approved

Submission ID:	1615550
Submission date:	10/21/2013
Hardware certification completion date:	10/21/2013
Company:	Gamma-Scout GmbH & Co KG
Product name:	Gamma-Scout abc radiation measuring instrument
Category:	Device
Product type:	Other Device
Qualification level:	Signature Only - Microsoft Windows 2000 family Signature Only - Microsoft Windows XP family, x86 Signature Only - Microsoft Windows Server 2003 family, x86 Signature Only - Microsoft Windows Server 2003 family, x64 Signature Only - Microsoft Windows XP family, x64 Signature Only - Microsoft Windows Vista family, x86 Signature Only - Microsoft Windows Vista family, x64 Signature Only - Windows Server 2008 family, x86 Signature Only - Windows Server 2008 family, x64 Signature Only - Device - Compatible with Windows 7 Signature Only - Device - Compatible with Windows 7 x64 Signature Only - Device - Compatible with Windows 8 Signature Only - Device - Compatible with Windows 8 x64
Marketing names:	N/A
Additional information:	
Firmware version:	2.08.30



## Information on CD and Manual

This manual is regularly updated, but there may be a time lag between website and print form.  
The latest version can also be downloaded as a pdf file from our website (Download → User Manual):

- ○ ○ **[www.gamma-scout.com](http://www.gamma-scout.com)**

Enclosed is a CD-ROM which also contains data-conversion software:

### **GAMMA-SCOUT® TOOLBOX Version 4**

- For © Windows operated Personal Computers (VISTA, WIN 7 and 8/8.1, 32 and 64 Bit)
- Available in German and English version
- USB-driver
- Necessary installation advice
- Software for Apple iMac and MacBook users in preparation (to follow shortly)

For more, developer-specific information, go to **[www.gamma-scout.com](http://www.gamma-scout.com)** and click on DOWNLOAD.

#### **Notes:**

- The disposal agreement according to packaging regulations was concluded with Susa Solutions GmbH
- For revocation clause according to distance-selling regulations, see **[www.gamma-scout.com](http://www.gamma-scout.com)**, German version, AGB (legal notes)

Your GAMMA-SCOUT® is equipped with a Geiger-Müller counter tube enabling you to detect not only gamma radiation, but alpha and beta radiation as well.



## Choose to Exclude Alpha and Beta Radiation

You can use the radiation selection switch to limit the types of radiation you want to measure:

- Set the selection to center position ( $\gamma$  symbol) if you want to detect gamma radiation only. With the switch in this position, an aluminum shield screens the counter tube window against alpha and beta radiation.
- Turn the switch to the left ( $\beta + \gamma$  symbols), if you want to measure gamma and beta radiation, but no alpha radiation. Now an aluminum foil screens the counter tube window against alpha radiation.
- Turn the switch to the right ( $\alpha + \beta + \gamma$  symbols), if you want to measure all three radiation types. The counter tube window is now open and can be accessed by all three radiation types.




For normal measuring, place the radiation selection switch at center position. Alpha and beta radiation are limited in range to a few centimeters or meters, so can only be detected when very close to the radiation source.

This also explains why it makes little sense to keep the radiation selection switch constantly open – an added reason being that the counter tube window may be damaged in this exposed position, for example, when poked by a sharp object (such as a pen).









## Display Current Radiation

- Pressing the  button puts GAMMA-SCOUT® into standard mode, and its display shows you the present radiation in microsievert per hour - not only as a value, but also in the form of a bar chart. Note that for a small radiation value, this bar chart appears only as a single line. In order to visualize the volume of detected radiation, there are symbols beneath the bar chart such as >1a (more than 1 year), <1m (less than 1 month), etc.
- To switch from  $\mu\text{Sv/h}$  to  $\mu\text{Rem/h}$  and back, start from “measure radiation” mode. Press the  button and confirm the suggested units with the  button. All data will be displayed in the selected units.

## Calculate Average Over the Past Day (12:00 am to 12:00 am)

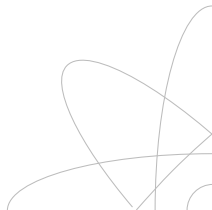
- Pressing the  button a second time displays the average radiation over the last day (midnight to midnight - taken from the GAMMA-SCOUT® clock) for a few seconds, again in microsievert per hour. The  symbol in the display will blink. Note that this function is not available for up to 48 hours after first operating the device, or after a resetting.

## Automatic Alert Level (w/ALERT version)

- When exceeding the user programmed alert level, GAMMA-SCOUT® generates an acoustic alert and displays the blinking  icon. This icon continues blinking until the user shuts it off by pressing the  button twice.

### ○ ○ What is a “microsievert”?

In physics, three types of radioactive radiation are known: alpha, beta and gamma radiation. They differ, not only in their physical characteristics, but also in their effects on humans. To make these three radiation types comparable in their effects on humans, a value has been created which defines the biological effects of radiation: it is referred to as the equivalent dose and its unit of measurement is the sievert. The older unit was called REM. 1 REM = 0.01 Sievert (Sv). Based on the radiation pulses counted, the different components of a radiation mix are converted into a common measure of biological effect. The basis is Cs-137. Conversion into the equivalent dose refers to the gamma quantum of the Cs-137 radionuclide with quantum energy of 662 keV. The conversion takes place due to physical reasons with different factors dependent upon the amount of impulses per time; in the environmental field, the factor 150 impulses per minute = 1.0 microsievert per hour.





### ○ ○ Normal Values of Exposure to Radiation, Limit Values

For individuals with professional exposure to radioactive sources in the EU, there are two legal upper limits:




- Dose rate limit is 6 mSv p.a. = 3  $\mu\text{Sv/h}$  (assuming 2,000 working hours per year), Category B
- Dose rate limit is 20 mSv p.a. = 10  $\mu\text{Sv/h}$  (assuming 2,000 working hours per year), Category A

(An exclusion zone exists starting at 3 mSv/h)

The natural environment in Heidelberg, Germany has a radiation level of about 0.1 - 0.2 micro-Sv/h


Below the digits showing the measured value is a bar chart illustrating the detected dose is illustrated. The symbols state that one can be exposed to this radiation for longer than 1 year (>1a) before the legal maximum of 20 mSv p.a. is reached. Higher radiation shortens this time of exposure.

### ○ ○ Operating Range

GAMMA-SCOUT® has been conceived for monitoring (constant monitoring with log) normal working and environmental locations. Very strong gamma radiation loads, above 1000  $\mu\text{Sv/h}$  (5,000 times normal radiation in Heidelberg), cannot be measured with this technology. Should this occur, "Overflow" and an alarm symbol  will appear in the display. Data above the measurement limits is marked with (\*) in the download table. Reset  icon by pressing  button twice.

### ○ ○ Device with Rechargeable Batteries ("RECHARGEABLE")

For customers using the GAMMA-SCOUT® above 10  $\mu\text{Sv/h}$  in a laboratory (or preferring a rechargeable power supply), we constructed the RECHARGEABLE model. This model needs a different power supply, and is therefore equipped with a rechargeable battery. Charging starts automatically when the GAMMA-SCOUT® is connected to a PC via a USB port (or with the power supply unit included).

Charging time with the power supply unit is ca. 8 hours. An internal charging circuit prevents overcharging. The charge status is displayed by pressing the  button.  
Full charge = 4.0 V. Models Standard and w/ALERT show about 3.6 V.



## When and Why?











GAMMA-SCOUT® can also be used as a normal Geiger counter. In this case, it simply counts the number of pulses received without converting them into sieverts.

The type of isotope is not relevant for converting the pulses per time into dose rate. It is relevant for conversion into activity (Becquerel) (see p. 44-45).

GAMMA-SCOUT® stores the received pulses in its internal memory.



## • ○ ○ Pulse Count with GAMMA-SCOUT®

- Press the  button to switch GAMMA-SCOUT® to the "pulse count" mode. The display will show the pulse symbol. Counting has not yet begun. Pressing the  button a second time will start counting without pre-setting the measuring time.
- Press the button  if you want to set a measuring time:
  - For the measuring time to count in seconds, press the button  once.
  - For the measuring time to count in minutes, press the button  twice.
  - For measuring time to count in hours, press the button  three times.
- Now set the exact value of the desired measuring time using the  and  buttons.
- Start measuring by pressing the button  a second time. The pulse symbol flashes in the display during the measuring time.
- If a measuring time was set, the pulse symbol flashes until the end of the measuring time, then becomes steady again. The display now shows the number of pulses counted for the programmed interval.
- You can stop measuring in two ways:
  - By pressing the button  once again, the measuring result remains visible in the display.
  - By choosing another operating mode, the measuring result disappears.



In the “pulse rate” measuring mode, the pulses registered by the counting tube are continuously measured and converted into a pulse rate. The unit of this pulse rate is cps (counts per second).

**Note:** What is being calculated is the rate of ionization per second recorded in the counter tube. This is not identical to the activity of the isotope, which is defined in Becquerel.



## Displaying the Pulse Rate

- Press the button to switch to the pulse rate measuring mode. The symbol will flash during measurement. After measuring, the symbol becomes steady again.

Pulse rate measurement gives the average number of pulses per second. Since radiation intensity may strongly fluctuate extensively over a brief period, this average will, of course, be more exact over a longer measurement period.

GAMMA-SCOUT® provides you with a first result within a few seconds. Then it automatically prolongs the measuring time to a maximum of 4096 seconds in order to reach as precise an average figure as possible.

For example, 1024 pulses after 4096 seconds = 0.25 pulses / second. After pressing the button, the measuring intervals always start again after 2 seconds.





**Note:** Pressing the button displays the number of measured impulses (i.e. ionized molecules) per second. Of course, this is not the activity of the source (Becquerel).
















GAMMA-SCOUT® has an integrated quartz clock (pushbutton display). Time and date are required to ensure that the measured radiation is accurately logged. Using a function in the data read-out program of the TOOLBOX software, the GAMMA-SCOUT® date and time can be synchronized to a PC. Choose the menu “Set any time” to set your choice of date and time (e.g. different time zones) on the GAMMA-SCOUT®.




## Displaying Time and Date



- Press the  button to view the time. The display shows the set time and the  symbol.
- Press the  button a second time to view the date. The display shows the set date as well as the  symbol.

## Setting the time

- First, view the time by pressing the  button. Then press the  button to set the hours. Both hour digits flash in the display. Use the  and  buttons to set the hour forward or backward as desired. Confirm the set value with the  button and move on to set the minutes.
- Press the  button a second time to set the minutes. Both minute digits flash in the display. Use the  and  buttons to set the minutes forward or backward as desired. Confirm the set value with the  button and move on to set the seconds.
- If you wish to set the seconds as well, press the  button a third time. The display shows the two minute digits together with the flashing digits for the seconds. Use the  and  buttons to set the seconds forward or backward as desired. Confirm the set value with the  button.

## Setting the Date

- Press the  button twice to view the date display. Then follow the description for “setting the time”.


You can stop setting the clock at any time by pressing the  button. To stop setting the year, press the  button a fourth time.



GAMMA-SCOUT® is powered by a 2.7 - 3.7 V lithium thionyl chloride cell. The device will continue functioning until the cell voltage is down to 2.8. When the voltage drops below this value, the battery symbol will appear in the display. The data will be retained, even following a total loss of voltage. The RECHARGEABLE model has a rechargeable battery, which can be recharged via USB (or the power supply unit included with delivery).




## Displaying the Battery Voltage

- Press the button  to display the current battery voltage. The display shows the remaining voltage available minus the load drawn by the built-in electronics.



## Displaying the Software Version

- Press the button  while the battery voltage is displayed, the display briefly shows the software version.



## Changing the Battery

The battery is permanently fixed to the circuit board (because of our extremely low currents of approximately 10 microampere, plug-in batteries would constantly lead to current interruptions due to oxidation on the contacts). Should the user want to solder in a new battery, the initial settings can be restored by pressing the reset button. However, please be aware:

Opening GAMMA-SCOUT® cancels the warranty.






## Reset button

The device can be restarted by pressing the reset button (next to the opening for the USB interface, flat on the circuit board). This changes time and date back to factory settings.



## Ticker (not in the basic model)




- A double click of the  button will display the word “on” – which means that the ticker can now be switched on. Pressing the  button will switch on the ticker and a “speaker” symbol appears in the display. If the ticker was already on, the word “off” would appear in the display and pressing the  button would switch it off. The “speaker” symbol would then disappear.

With the ticker is switched on, GAMMA-SCOUT® emits a tone with each pulse. Increasing radiation will cause single tones to become a cascade. The tones use 500 times more power than normal measurement does under environmental conditions. Therefore, the ticker switches off automatically after 10 minutes. If the ticker is used once per day, the power consumption remains within the acceptable service life of the battery. If the ticker is used more often, the battery will last for a shorter period. In this case, a maintenance fee will be charged for a battery change. Number and duration of ticker use is logged internally. On rechargeable devices, the timer does not switch off automatically.







## Exceeding Dose Rate Alert Threshold (w/ALERT version)

Gamma-Scout also provides information on the cumulative dose received by the device, measured on the time axis. As described below, users can stop summation, restart from an old level or delete and restart from zero. Because of this and other reasons, the accumulated dose cannot be used as a certified "personal dose meter."

GAMMA-SCOUT® w/ALERT features an acoustic signal that sounds when the dose rate exceeds a specified level. The default alert level is 5  $\mu\text{Sv/h}$ . If this value is exceeded by measurement of radioactivity, this will be shown with an additional  symbol in the display. The  symbol in the display can be erased by pressing the  button twice.

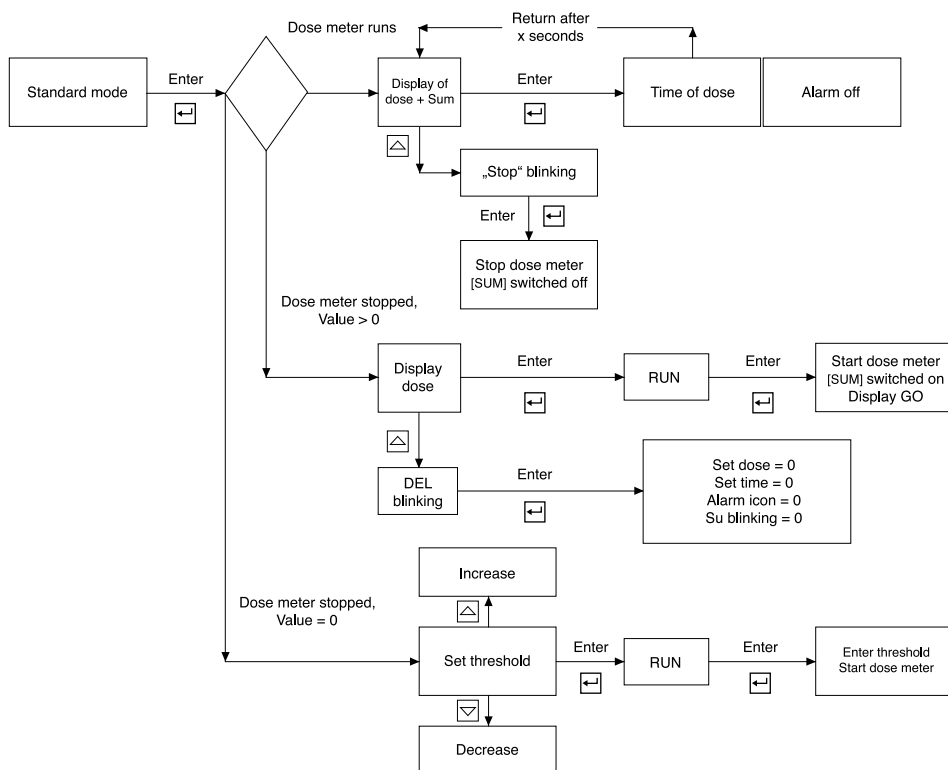


## Individual Programming of Dose Rate Alert Level

Press the  button once to switch to the "log frequency" mode (see page 12). Pressing the button a second time switches the device to "alert level" mode. The set level shows in the display. Press the  or the  button to increase or decrease the threshold respectively. The new value appears blinking in the display. The lowest possible threshold setting is 0.1  $\mu\text{Sv/h}$ , the maximum is 2 mSv/h. The step change is 0.1  $\mu\text{Sv/h}$  at the lower level, becoming wider higher up the range (try this). If the AOFF setting is selected, the dose rate alarm is disabled. Press the  button to enter (save) the new threshold value.

## Displaying and Resetting the Dose Meter (cumulative dose)

When the dose meter is running, the  $\Sigma$  symbol shows in the display. The dose is displayed in X.XX mSv format. Values of less than 0.01 mSv show as 0.00 mSv. To start, stop, restart, and reset the dose display and to mark the alarm threshold, follow the chart below (automatic return to standard mode at the end of each branch).



GAMMA-SCOUT® automatically logs the number of pulses measured, and stores this data in its internal memory. This data can be read and processed quickly and conveniently on a PC using the TOOLBOX software (for exact instructions, go to [www.gamma-scout.com](http://www.gamma-scout.com) ).






The factory settings for the logging process mean that GAMMA-SCOUT® will accumulate the pulses for each week and store them as weekly values. On this basis, the memory capacity is sufficient to log weekly values for 600 years.

As the following table demonstrates, you can also set shorter logging intervals, with corresponding reductions in the storage capacity. Logging stops when the storage capacity is full. So far, we have not had a single request for an overwrite.

Logging interval	Display	Storage capacity	Logging interval	Display	Storage capacity
1 week	Pr. 7d	approx. 615 years	10 minutes	Pr. 10min	approx. 7.3 month
3 days	Pr. 3d	approx. 263 years	5 minutes	Pr. 5min	approx. 3.7 month
1 day	Pr. 1d	approx. 88 years	2 minutes	Pr. 2min	approx. 1.5 month
12 hours	Pr. 12h	approx. 44 years	1 minute	Pr. 1min	approx. 20 days
2 hours	Pr. 2h	approx. 7.3 years	30 seconds	Pr. 30s	approx. 10 days
1 hour	Pr. 1h	approx. 3.7 years	10 seconds	Pr. 10s	approx. 3 days
30 minutes	Pr. 30min	approx. 1.8 years			
Clear log	PdEL	Clear data			







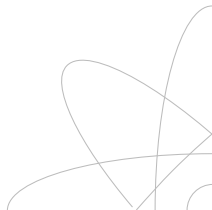
## Setting the Log

- Press the  button to switch to “log” mode. The display shows the log symbol . The bar chart will also appear briefly, indicating how much log memory is currently being used. Each bar equals 1,000 measured values, so 32,000 values would use up ca. 3% of memory.
- By pressing the  button, you select more frequent logging and, consequently, shorter logging intervals.
- By pressing the  button, you select less frequent logging and, consequently, longer logging intervals.
- By pressing the  button, you enter the logging interval just selected.
- You can transfer the logged data to a personal computer at any time, and then clear the GAMMA-SCOUT® memory for fresh use.

GAMMA-SCOUT® automatically prolongs the logging interval to one week when there are only 256 bytes (of 65,280 bytes) of memory capacity remaining. You can set shorter logging intervals only once storage has been cleared.

## Clearing the Memory

- To clearing the memory use the following key sequence: Key , then  or , scroll until “Pdel” appears, then press the  key.





The GAMMA-SCOUT® TOOLBOX software enables you to read out the data gathered and stored<sup>1</sup> by GAMMA-SCOUT®. The data is provided in list format. Connect your GAMMA-SCOUT® to a computer USB port. The data is then automatically read out and displayed.

To avoid overloading this manual, we are providing only a brief description of the procedure. You will find full details under the "TOOLBOX Handling" link on our website [www.gamma-scout.com](http://www.gamma-scout.com) (under → DOWNLOAD).



### System Requirements

The GAMMA-SCOUT® TOOLBOX software requires an ©MS Windows PC (Vista, WIN 7 or WIN 8/8.1; 32 and 64 Bit version) with USB interface, a valid OS license on your computer, a functioning internet connection and the administrative rights to the computer. The GAMMA-SCOUT® TOOLBOX for MAC users will follow shortly.



### Accessories: Data Download Cable

The cable between the USB-PC-interface and the USB-Port of the GAMMA-SCOUT® is included with the device.



### Installing the Program and the Necessary Drivers

#### Initial installation of the USB drivers (& TOOLBOX)

The GAMMA-SCOUT® is an external device (such as a printer, camera or USB stick). The connection between the GAMMA-SCOUT® and the computer therefore needs so-called driver software before the TOOLBOX can be installed and used. Since 10/22/2013, the GAMMA-SCOUT® USB drivers have been available in the internet directly from Microsoft via ©Microsoft Windows Driver Distribution. This has greatly simplified the installation of the USB drivers (and the TOOLBOX). The instructions for driver installation are available from our website [www.gamma-scout.com](http://www.gamma-scout.com) (under → DOWNLOAD).

Depending on the current performance and status of your PC, the installation could take several minutes, please do not interrupt the process.

#### Installing the TOOLBOX (following successful driver installation)

In order to be able to install the TOOLBOX for the first time, as well as transfer the data to your computer and read it out, the driver software (technically two drivers) must be downloaded to your hard drive from the internet. Once this has been completed, the TOOLBOX can then be installed and run.

Detailed instructions for installing and using the TOOLBOX program can also be found on our website [www.gamma-scout.com](http://www.gamma-scout.com) (under → DOWNLOAD).

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<sup>1</sup> Applies to all GAMMA-SCOUT® models. To use GAMMA-SCOUT® ONLINE (REAL TIME) see also page 17.



## Reading the Data

Requirement: The device software (TOOLBOX) must be installed on your hard drive.

### 1. Connect your GAMMA-SCOUT® with your PC

- Connect GAMMA-SCOUT® with PC using the USB cable supplied.

### 2. Download the data

- Start the program from your PC using "GAMMA-SCOUT® TOOLBOX" (Start/All Programs/GAMMA-SCOUT®TOOLBOX). For new devices, manual program start is no longer necessary.
- The data transfer starts automatically (ca. 30 seconds delay).  
The following data table must appear (possibly via the menu command "notification area")

Neueste Version 3.0.0

Gamma-Scout Toolbox

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## ONLINE / REAL TIME Model

The ONLINE model is designed to transfer data at regular intervals between the GAMMA-SCOUT® and a connected PC (in real time). The power supply when connected directly to the PC (online) is via the PC's USB interface.

**Requirements:** REAL TIME data transfer is possible only with the GAMMA-SCOUT® ONLINE model. To activate the REAL TIME display on your computer, the TOOLBOX read-out software must already be installed on your computer (see page 15).



## Use

Connect the GAMMA-SCOUT® ONLINE to your computer and start the TOOLBOX.

You will have to wait for approximately 30 seconds for data transfer to begin automatically. Once this happens, confirm it in the selection menu on the left, under the "Online" command (see photo 1).

Now set the preferred interval timing (see photo 2) and choose between further functions, such as dose rate display or cumulative dose (see photos 3 + 4).

**1** Screenshot of the 'GAMMA-Scout Toolbox' main menu. The 'Online' option is highlighted in the left sidebar.

**2** Screenshot of the 'Online' configuration window. The 'Interval (s)' is set to 30. The 'Intervall Umschalten' button is visible.

Zeitenpunkt	Rohdaten	Intervallänge	Impulse
15.12.2013 14:43:13	0000000000	2	0
15.12.2013 14:43:15	0000000001	2	1
15.12.2013 14:43:17	0000000000	2	0
15.12.2013 14:43:19	0000000000	2	0
15.12.2013 14:43:21	0000000000	2	0
15.12.2013 14:43:23	0000000001	2	1
15.12.2013 14:43:25	0000000001	2	1
15.12.2013 14:43:27	0000000001	2	1
15.12.2013 14:43:33	00000000000001	4/10	1
15.12.2013 14:43:37	0000000002	10	2
15.12.2013 14:43:47	0000000003	10	3

**3** Screenshot of the 'Anzeige der Dosisrate in µSv/h' window showing a reading of 0,14 µSv/h.

**4** Screenshot of the 'Dosis - Nach längerer Beladung' window showing a cumulative dose of 1,674 µSv.

For detailed information on using the REAL TIME program, please go to [www.gamma-scout.com](http://www.gamma-scout.com) and click on the DOWNLOAD link.

<b>Display</b>	Liquid-crystal display (LCD), 4-digit, numeric with description, quasi-analogue logarithmic bar chart Operating mode indicators	
<b>Radiation Detector</b>	End-window counting tube to the Geiger-Müller principle Stainless steel housing Measuring length 38.1 mm, measuring diameter 9.1 mm Mica window 1.5 to 2 mg/cm <sup>2</sup>  Zero rate <10 pulses per minute with screening by 3mm Al and 50 mm Pb operating temperature -20 to +60°C, operating voltage approx. 450 V calibrated scale 0.01 $\mu$ Sv/h to 5,000.00 $\mu$ Sv/h (above and below this, we refer to as the “display area”)	
<b>Radiation Types</b>	$\alpha$	from 4 MeV
	$\beta$	from 0.2 MeV
	$\gamma$	from 30 keV
<b>Selection shield</b> (for point radiation)	$\alpha + \beta + \gamma$	without shielding
	$\beta + \gamma$	Al foil approx. 0.1 mm, shields $\alpha$ completely
	$\gamma$	Al shield approx. 3 mm, shields $\alpha$ completely and $\beta$ to 2 MeV, weakens $\gamma$ by less than 7% based on Cs-137
<b>Recycling</b>	Devices can be returned free-of-charge and we will pass them on for recycling	
<b>Power Consumption</b>	Less than 10 microamperes under environmental radiation	
<b>Memory</b>	256,000 byte (100,000 data sets)	
<b>Housing</b>	Impact-resistant plastic	
<b>Dimensions</b>	Length 163 mm x width 72 mm x height 30 mm	
<b>Interference Protection</b>	European CE standard, US FCC-15 standard Data-reset is not a malfunction	
<b>Service</b>	GAMMA-SCOUT GmbH & Co. KG Abtsweg 15, D-69198 Schriesheim, GERMANY Fax: +49 (0) 62 20 / 66 40 email: drmirow@gamma-scout.com	
<b>Media enquiries</b> <b>IT-Support</b>	GAMMA-SCOUT GmbH & Co. KG Abtsweg 15, D-69198 Schriesheim, GERMANY Fax: +49 (0) 62 20 / 66 40 email: e.mirow@gamma-scout.com	
<b>Last Revised</b>	See back cover (Rights of modification reserved)	

Scientific definitions see „www.hpa.org.uk/radiation/glossary“



Physical Parameter	Si unit	Old unit	Relation
<b>Activity</b>	Becquerel (Bq) 1 Bq = 1/s	Curie (Ci)	1 Ci = $3.7 \cdot 10^{10}$ Bq 1 Bq = $2.7 \cdot 10^{-11}$ Ci = 27 pCi
<b>Ion dose I</b>	Coulomb / kg	Röntgen (R)	1 R = $2.58 \cdot 10^{-4}$ C/kg 1 C/kg = 3876 R
<b>Energy dose D</b>	Gray (Gy)	Rad (rd)	1 rd = 0.01 Gy 1 Gy = 100 rd
<b>Equivalent dose H</b>	sievert (Sv)	Rem (rem)	1 rem = 0.01 Sv 1 Sv = 100 rem
<b>Effective Dose H<sub>E</sub></b>	sievert (Sv) 1 Sv = 1 J / kg		Calculated value / radiation protection

For relationship between Becquerel and sievert see pages 20-21.

For further information on Becquerel, see **Gamma FAQ** on [www.gamma-scout.com](http://www.gamma-scout.com)



## Calibration

Under environmental radiation, the counter tube is not subject to fatigue and, therefore, will not require re-calibration. However, if the user holds ISO certification, periodical calibration is mandatory. For this purpose, we offer the following service:

Testing is sub-contracted to an assembly operation, which tests it for 72 hours against a master. The master is calibrated against a gauged reference source (Cs-137). A data log is then generated. To the best of our knowledge, this record is accepted as compliant by ISO auditors without exception.

Currently, this costs 50 Euro before sales taxes.



## IT-Support

In order of problems by installing the product drivers or TOOLBOX software, do not hesitate to contact us:

GAMMA-SCOUT GmbH & Co. KG  
Abtsweg 15  
D-69198 Schriesheim  
Germany  
Fax: +49 (0) 6220 / 6640  
E-Mail: [e.mirow@gamma-scout.com](mailto:e.mirow@gamma-scout.com)



## Conversion of Becquerel (activity) into $\mu\text{Sv/h}$ (dose rate)

The relationship between Becquerel (activity, i.e. the measure of the decay in the atom) and microsievert per hour (dose rate, i.e. the measure of the radiation at the device):

→ The values apply to a point source at a distance of 1m from the device

### Cs-137 at a distance of 1m with shield open

1 GBq	86 $\mu\text{Sv/h}$	100 $\mu\text{Sv/h}$	1.17 GBq
100 MBq	8.6 $\mu\text{Sv/h}$	10 $\mu\text{Sv/h}$	117 MBq
10 MBq	0.86 $\mu\text{Sv/h}$	1 $\mu\text{Sv/h}$	11.7 MBq

### Cs-137 at a distance of 1m with shield closed

1 GBq	81 $\mu\text{Sv/h}$	100 $\mu\text{Sv/h}$	1.24 GBq
100 MBq	8,1 $\mu\text{Sv/h}$	10 $\mu\text{Sv/h}$	124 MBq
10 MBq	0.81 $\mu\text{Sv/h}$	1 $\mu\text{Sv/h}$	12.4 MBq

### Co-60 at a distance of 1m with shield open

1 GBq	372 $\mu\text{Sv/h}$	100 $\mu\text{Sv/h}$	0.27 GBq
100 MBq	37.2 $\mu\text{Sv/h}$	10 $\mu\text{Sv/h}$	27 MBq
10 MBq	3.72 $\mu\text{Sv/h}$	1 $\mu\text{Sv/h}$	2,7 MBq

### Co-60 at a distance of 1m with shield closed

1 GBq	339 $\mu\text{Sv/h}$	100 $\mu\text{Sv/h}$	0.30 GBq
100 MBq	33.9 $\mu\text{Sv/h}$	10 $\mu\text{Sv/h}$	30 MBq
10 MBq	3.39 $\mu\text{Sv/h}$	1 $\mu\text{Sv/h}$	3.0 MBq

### Tc-99m at a distance of 1m with the shield open

1 GBq	13 $\mu\text{Sv/h}$	100 $\mu\text{Sv/h}$	7.96 GBq
100 MBq	1.3 $\mu\text{Sv/h}$	10 $\mu\text{Sv/h}$	796 MBq
10 MBq	0.13 $\mu\text{Sv/h}$	1 $\mu\text{Sv/h}$	79.6 MBq

### Tc-99m at a distance of 1m with the shield closed

Measurement not possible, dose rate too low

f-18 at a distance of 1m with the shield open			
1 GBq	154 µSv/h	100 µSv/h	0.65 GBq
100 MBq	15.4 µSv/h	10 µSv/h	65 MBq
10 MBq	1.54 µSv/h	1 µSv/h	6.5 MBq

f-18 at a distance of 1m with the shield closed			
1 GBq	147 µSv/h	100 µSv/h	0.68 GBq
100 MBq	14.7 µSv/h	10 µSv/h	68 MBq
10 MBq	1.47 µSv/h	1 µSv/h	6.8 MBq

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# GAMMA-SCOUT®

*Measures Radioactivity Easily and Reliably.*



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