kromek™
detect image identify

RayMon10™ User Guide

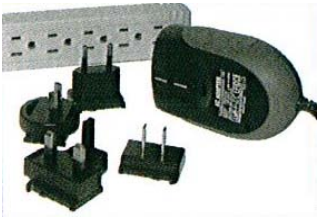
Contents

The screen shots in this manual are based on a system with the International English language option. Spellings of certain words may vary with other language options.

Section 1: Unpacking and Charging

1) Remove from packaging.

2) Select the appropriate outlet adapter for your AC wall outlet.



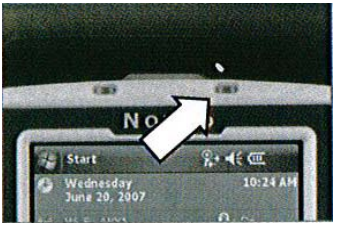
3) Connect the adapter to the charger.

4) Plug the charger into the wall outlet.

5) Plug the barrel end of the charger into the power port on the bottom of the RayMon10.

6) Charge battery fully until the battery LED is green before operating the unit.

This will take approx. 4.5 hours.



Section 2: Device Navigation

Front View Numeric Data Keypad

The “Stylus Pen”, located on the underside of the RayMon™ should be used when working with the touch screen display.

The RayMon™ can be navigated by tapping the on-screen buttons using the stylus.

Options provided on the bottom green bar of the screen can be selected either by tapping them on-screen or with the ‘application soft keys’ on the keyboard. This is useful if operating the device whilst wearing gloves

On-screen graphs:

- zoom by double tapping with the stylus.
- drag from side to change the viewed region on a zoomed graph.
- a single tap with the stylus will position the curser.
- zoom out by holding the stylus stationary on the graph for 1s or more and then release.

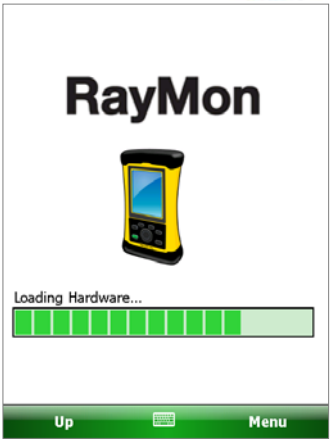
Section 3: Power Up and Shutting Down

1) Press the green “Power” button.

Pressing the “Power” button briefly once will turn the screen on or off.

Pressing and holding for two seconds will dim the screen if it was at full brightness. This will also restore it to full brightness if it was already dimmed.

2) The initialisation process will begin.



Once the initialisation process is complete, if no calibration data or stored background spectrum is present the user will be forced to complete the missing information.

If no device serial number is stored in the software the user will be asked to enter this information. The serial number can be found on the underside of the unit.

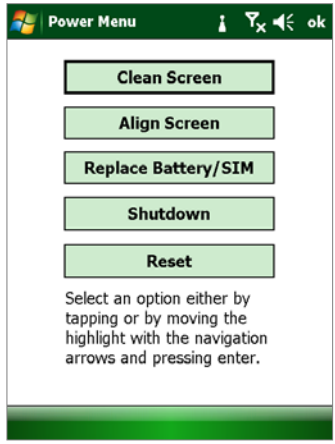
3) After initialisation the ‘Dose’ screen is displayed showing the live dose rate in either µSv/h or mrem/h and the counts per second (CPS).

The RayMon™ can be navigated by tapping the on-screen buttons using the stylus.

Options provided on the bottom green bar of the screen can be selected either by tapping them on-screen or with the ‘application soft keys’ on the keyboard.

4) To turn the device off, press and hold the green power button for five seconds to bring up the ‘Power Menu’ and press ‘Shutdown’.

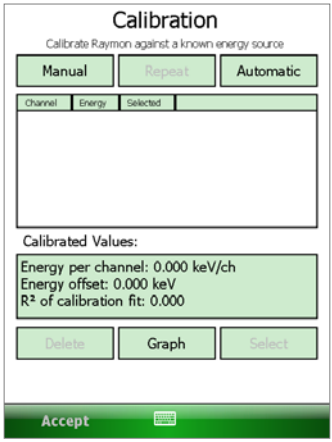
The device can be put in a sleep mode by briefly pressing the green power button. It can then quickly be awakened by another brief press of the green button.



Section 4: Energy Calibration

The calibration screen can be accessed from the front “Dose” screen by pressing “Setup” to access the “Dose Setup” screen and then by pressing “Calibrate”.

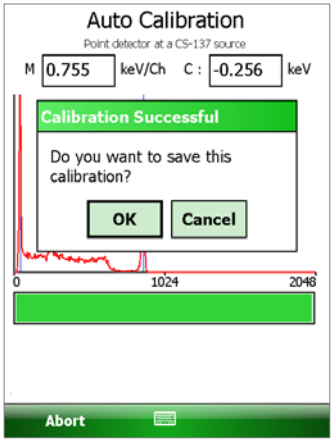
Two calibration methods are provided. “Auto calibration” requires a Cs-137 source and automatically finds the centroid of two lines to provide a calibration. Alternatively, a “manual” calibration can be performed using any available gamma ray sources.



Auto Calibration

1) Point the probe at a Cs-137 calibration source and press the ‘Automatic’ button.

Pressing ‘Automatic’ will clear all the existing points from the previous calibration.



2) After the acquisition has completed the operator will be given the option to use the calibrated values.

Press “ok” to apply the new calibration.

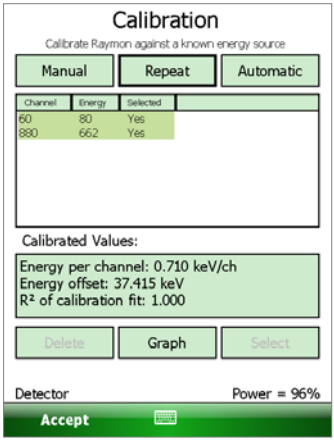
Manual Calibration

Calibrations are generally performed with sealed sources such as:

Source	Gamma-ray energy
^{241}Am	60 keV
^{137}Cs	662 keV

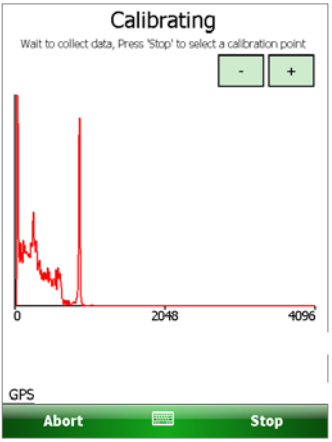
Other sources can be used or added if available. However, a minimum of two gamma rays must be used for an adequate calibration.

3) Place the source in front of the detector and press “Manual”.



4) Once sufficient data has been collected, press “Stop” to finish the acquisition and continue.

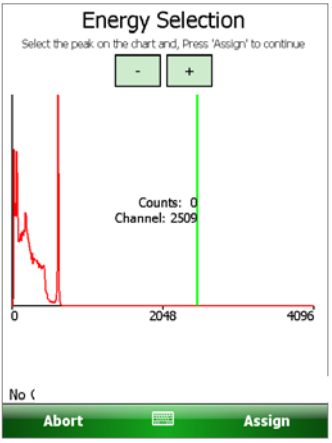
Note that the horizontal axis of the spectrum is in detector channel number.

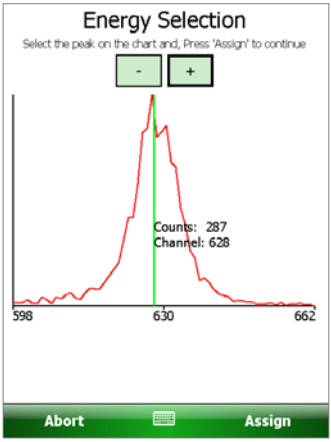


5) The “Energy Selection” screen will be displayed.

Move the cursor to the known peak position.

A single tap with the stylus will position the cursor. To drag the cursor, not the graph, hold the stylus stationary on the graph for 1s or more then move the cursor.



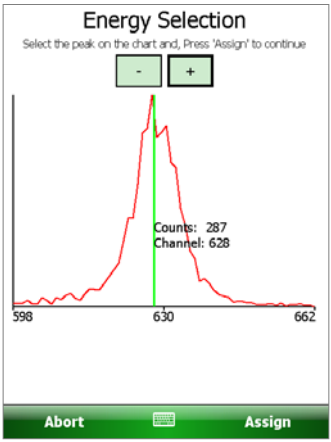


6) Use the + and – buttons to zoom in/out on the peak of interest. The peak can be centred on the screen by dragging with the stylus to the right or left.

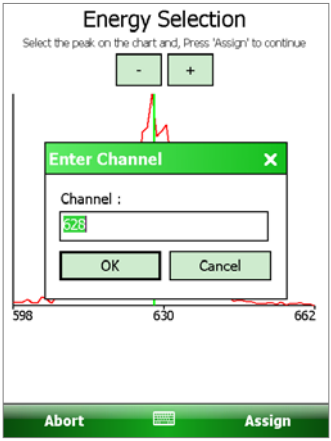
Zooming in can also be achieved by double tapping the graph.

Zooming out by holding the stylus stationary on the graph for 1s or more and then releasing.

The peak can also be moved by using a fast swipe with the stylus on the graph.

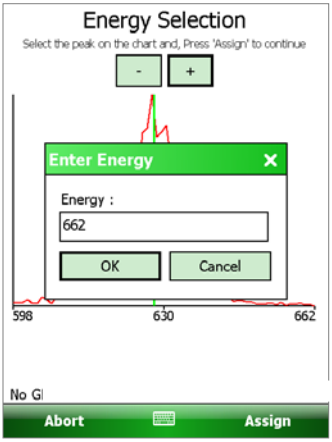


7) Place the green cursor line on the centroid of the peak relating to the source and press “Assign”.



8) The channel number for the cursor position will be displayed. If this is in the correct place select “OK”. If not, adjust the value until the centroid is found.

9) Enter the corresponding energy of the peak in keV, then press “OK”.

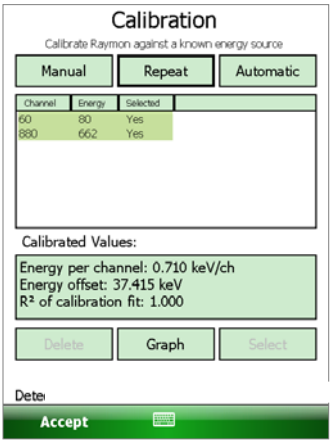


10) The “Calibration” screen will be displayed.

The ‘Repeat’ button allows multiple peaks from the same measurement to be used, or steps 6 to 12 can be repeated for a second source.

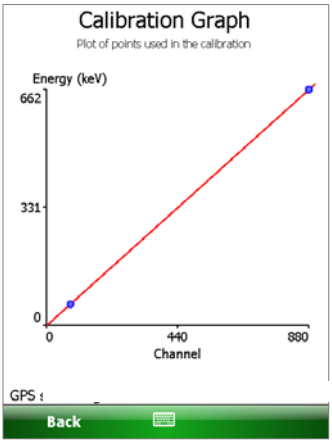
A straight line is fitted through the calibration points and the calibrated values used in the device are displayed in the lower box. The R^2 value measures the quality of the fit and should be close to 1 for a good calibration.

To remove any calibration values select them in the list and press the delete button.



11) Pressing “Graph” displays a graph of the calibration points and the straight line fit. This graph is useful for identifying errors in the calibration points.

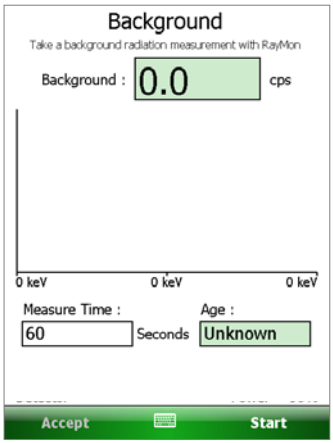
Pressing back returns to the calibration screen.



Section 5: Stored background

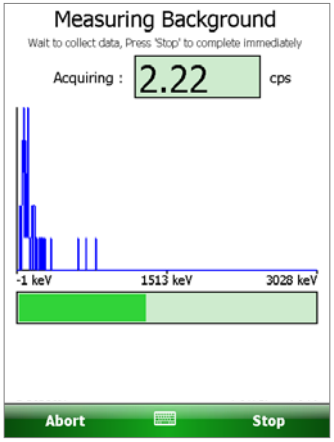
The device uses a stored background spectrum as a reference in some algorithms.The spectrum can be accessed from the front “Dose” screen by pressing “Setup” to access the “Dose Setup” screen and then by pressing “Background”.

Whenever the background spectrum is being used by the device the user is given the option to update the spectrum.



1) The measure time can be adjusted if desired.

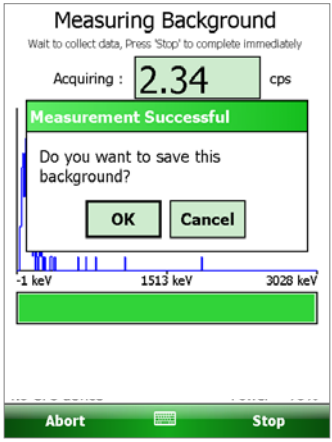
Press “Start” at the bottom of the screen to begin collecting



2) While the background is being measured the green bar at the bottom shows the progress.

To conclude the measurement early press ‘stop’.

‘Abort’ will abandon the measurement.

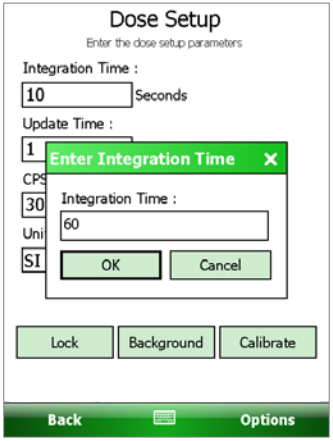


3) After the background has been acquired press ‘OK’ to accept the background.

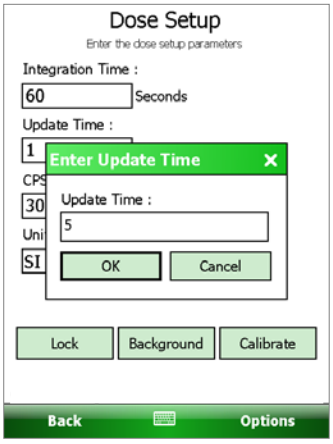
After pressing “Accept” the “Dose” screen will be displayed.

Section 6: Dose Setup and CPS Alarm

1) Press “Setup”.



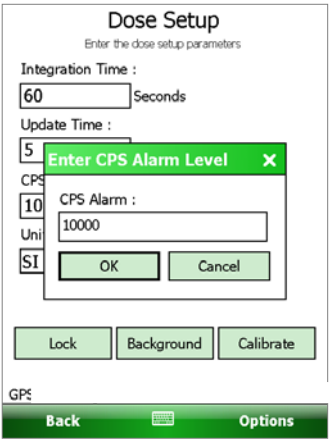
2) Enter the required “Integration Time” then press “OK”. The default value is 60 seconds.



3) Enter the required “Update Time” and press “OK”. The default value is 10 seconds.

Press “Back”.

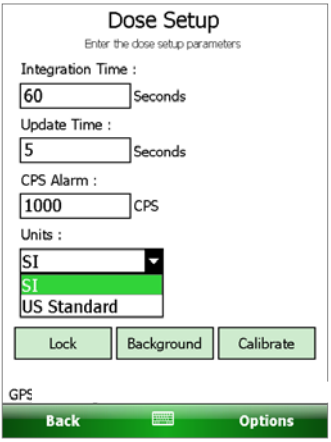
4) Enter the required Counts Per Second (CPS) alarm. The default value is 30,000.



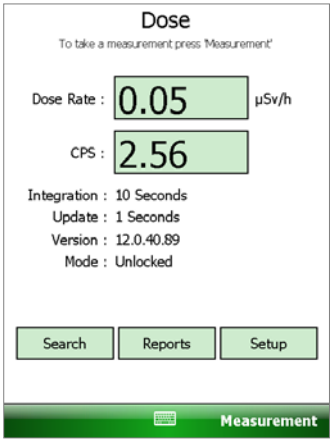
5) When the count rate exceeds the alarm value the background will turn red.

A log file of alarms is also written to the device. Please see the section on exporting data manually for how to access the log files

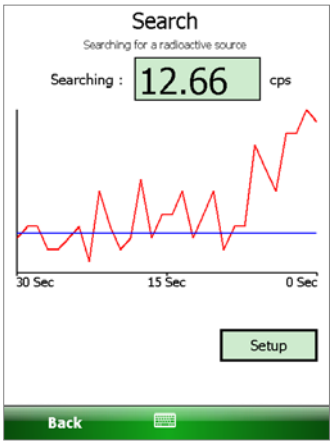
6) The units used by the RayMon10 can be configurated between SI (dose in µSv/h) or US Standard (dose in mrem/h) using the drop down box.



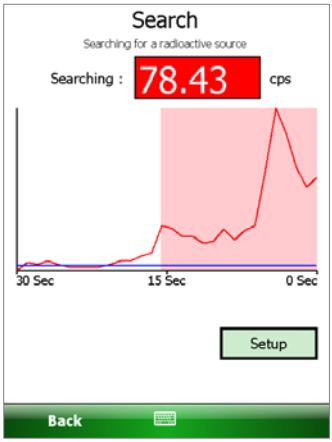
Section 7: Search Mode



1) From the front 'Dose' screen press "Search".



2) Search mode works by comparing the measured total counts from the detector in a fast response channel (red line) to a background level (blue line).



If the measured counts exceed the background level by a significant amount, the user is alerted to the presence of a radiation source by the count rate box becoming red and the graph being given a red shading.

3) Pressing ‘setup’ allows the search mode to be configured.

Fast Integration Time

This determines the integration time of the fast channel. By default this is 1 second.

Confidence Limit

This is the level above the background that results in the alarm being triggered. By default this is 99.999% which equates to less than 1 false alarm every 10 hours meeting the ANSI N42.48 standard.

Audible Alarm

Check this box to have an alarm sounded when a radiation source is detected.

4) If the background is set to ‘Auto-track’ in the setup, a slow rolling average of the counts is maintained.

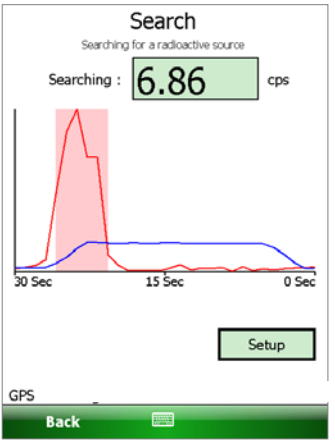
The background integration time should be long compared to the fast integration time.

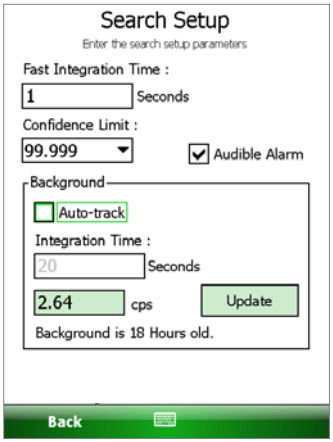
By default this is set at 60 seconds. It is not recommended to use values below 20 seconds

5) Note that when using an auto-tracked background the background counts are affected by the counts in the fast channel.

It may take time for the background to return to a realistic level after finding a source.

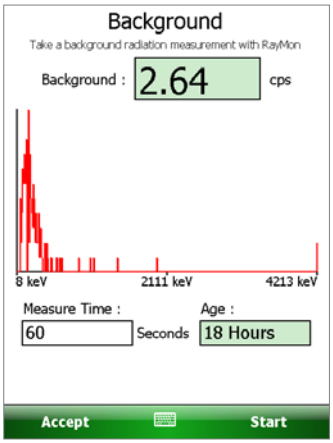
Longer background integration times are less susceptible to a short increase in count rate, although once they have been affected they take longer to return.





6) The alternative to an auto-tracked background is to record the background then use it as a constant reference level. Remove the tick from the auto-track check box.

The fixed background level in counts per second (cps) is displayed, along with how long ago the background was recorded. Press ‘update’ to record a new background level.

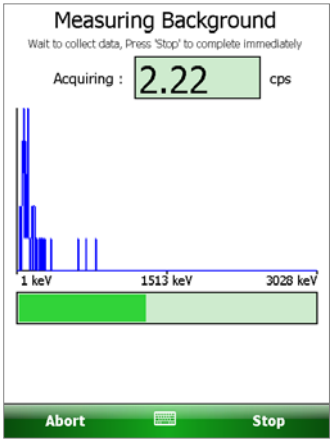


7) The existing background spectrum will be displayed.

The “measure time” can be adjusted to set the duration of the acquisition.

By default this is set to 60s.

Press ‘Start’ on the green bar to start a new acquisition.

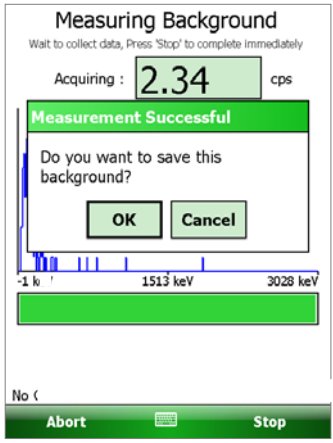


8) While the background is being measured the green bar at the bottom shows the progress.

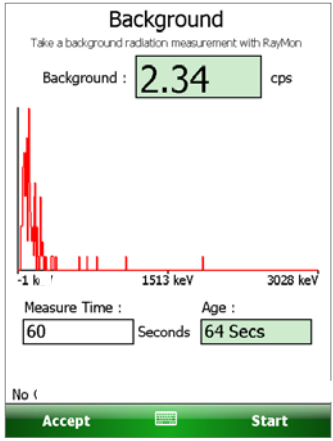
To conclude the measurement early press ‘stop’.

‘Abort’ will abandon the measurement.

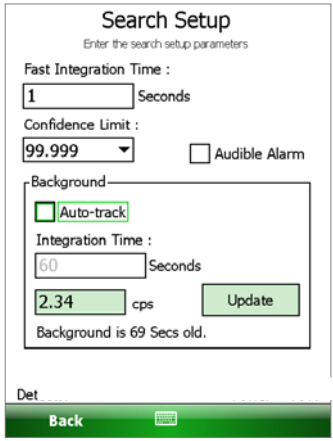
9) After the background has been acquired press ‘OK’ to accept the background



10) Press ‘Accept’ to return to the dynamic search screen.



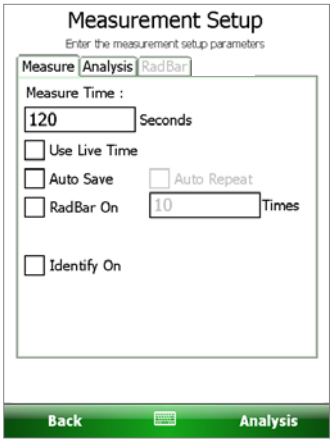
11) Press ‘back’ to return back to the Search.



Section 8: Measurement Setup

1) Press “Measurement”.

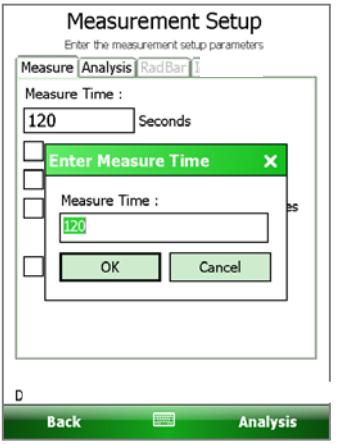
2) Press “Setup”.



3) the Measurement Setup screen will be displayed with the settings arranged on three tabs.

Note that the RadBar and Identify tabs are only available if the associated checkboxes are ticked on the measure tab.

4) Enter the required measurement time in seconds then press “OK”. If a measure time of 0s is entered the measurement will continue indefinitely until the user presses either ‘Finish’ or ‘Abort’.



The measurement time refers to real time unless live time is enabled by selecting the check box.

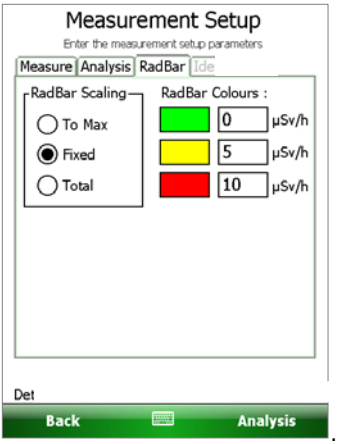
Real time is the total time of the measurement. Live time is the length of time that the pulse processing hardware has actually been active and able to detect pulses during the data acquisition. Therefore, live time is the real time reduced by the total time that the hardware has been inactive as a result of pulse processing activities.

5) The “RadBar On” check box determines whether a RadBar is available during and after a measurement.

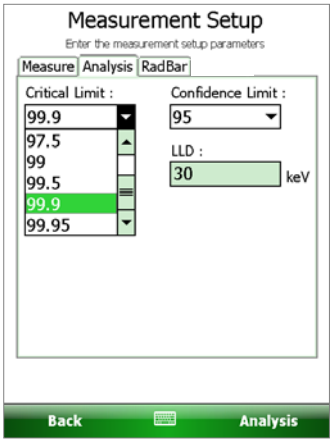
A RadBar shows the dose contribution from the incident gamma rays as coloured bins on an energy scale. It allows the dose contribution from different radionuclides to be identified.

6) The scaling of the RadBar can be configured by selecting one of the options in the RadBar tab:

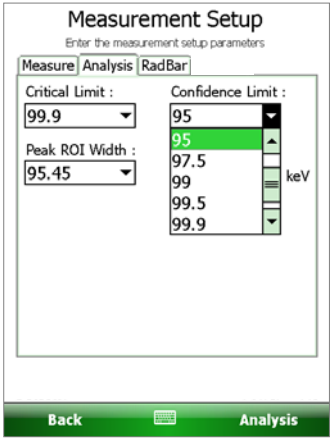
- “To Max” adjusts the scale so the highest value in any bin is at the top of the scale
- “Fixed ” applies a constant scale, configurable in dose units of µSv/hour or mrem/hour
- “Total” rescales the whole RadBar to the total dose rate



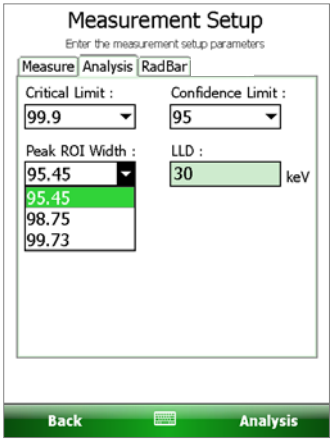
The colours used for “To Max” and “Fixed” scaling can be configured by selecting the colour box and choosing a colour and then entering the level where this colour should be used. Intermediate data points are represented by an interpolated colour.



7) The critical limit parameter is used to adjust the sensitivity with which peaks are detected when analysing the spectrum. Click on the critical limit box to change the value. The default value for this is 99.9%.

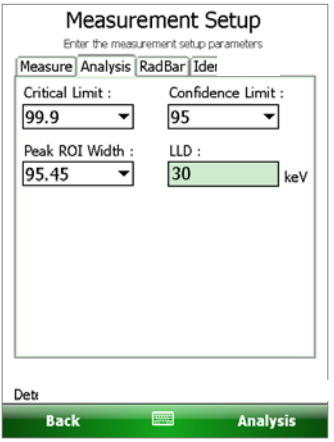


8) The Confidence Limit parameter is used when calculating the upper and lower bounds for net counts in a peak region. This confidence with which these values are calculated can be adjusted by clicking in the Confidence Limit box and altering the value. The default value is 95%.



9) The ROI width factor determines the width of the peak region used for analysis calculations. Reducing this percentage makes the peak region narrower and will affect the values shown in the results table, e.g. net counts. To change this value click the “ROI width factor” box and select a different value. The default value for this parameter is 95.45%.

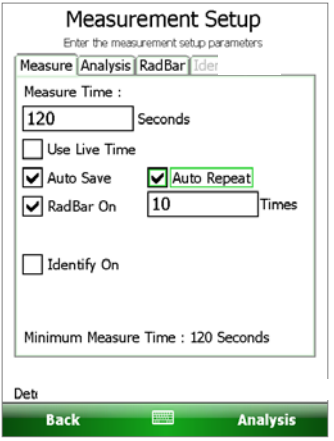
10) The Lower Level Discriminator (LLD) value cannot be altered. It is the threshold below which the detector's electronics cannot register a signal and is determined by the firmware on the detector.



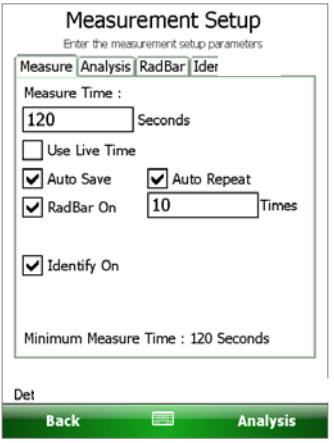
11) If "Auto Save" is ticked each measurement will automatically be saved and identified by the date and time of the measurement.

If "Auto Repeat" is enabled the measurement will be saved and the RayMon will then immediately begin acquiring a new measurement. This is performed a set number of times. If 0 is entered in the repeat number box the repetitions continue indefinitely until the user presses either "Finish" or "Abort".

Press the "Back" button to return to the "Measurement" Screen.



12) When 'Identify On' is checked automated radionuclide ID is available after a measurement has been completed.

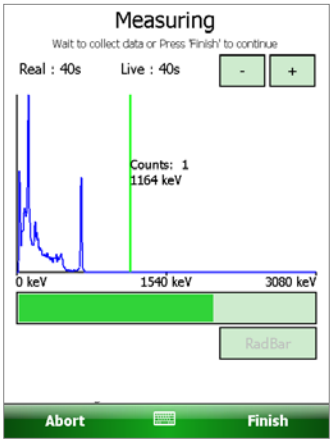


Section 9: Making a Measurement

1) Press “Measurement”.

2) The “Measurement” screen will be displayed.

Press “Start” to begin collecting data.



3) The data collection will continue until the preset time (either real or live as selected) is reached. Both the real and live time counters are displayed and a progress bar is shown at the bottom of the screen.

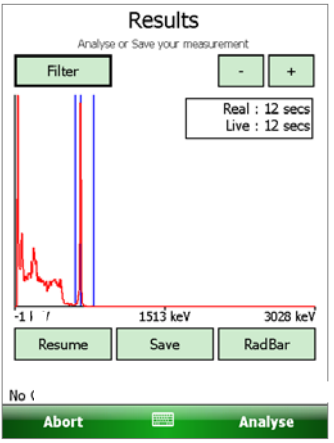
The measurement may be concluded before this by pressing “Finish”.

To abandon a measurement without saving, press “Abort”.

4) The “Results” screen will be displayed.

Pressing “Resume” allows further data to be collected and added to the spectrum.

Blue lines on the graph show the positions of emission lines from the analysis. See sections 9 and 10 for the analysis functions.

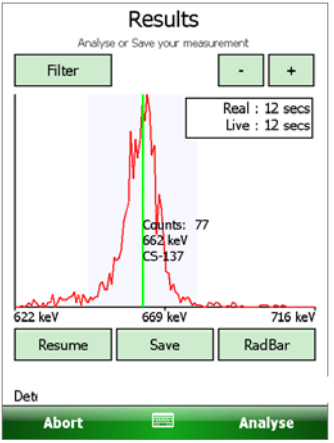


5) The + and – buttons can be used to zoom in/out on the peak of interest.

Zooming in can also be achieved by double tapping the graph.

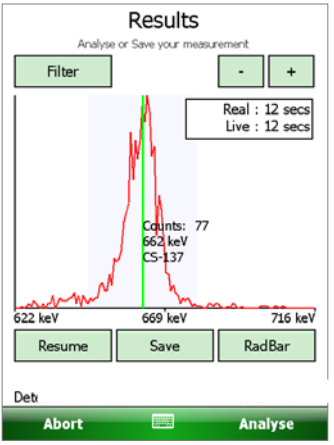
Zooming out by holding the stylus stationary on the graph for 1s or more and then releasing.

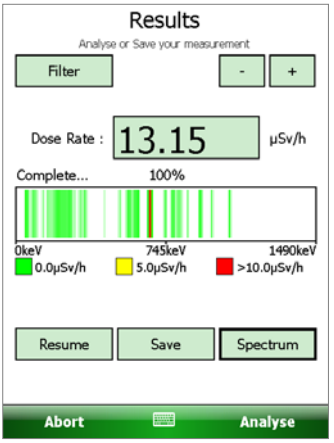
The peak can also be moved by using a fast swipe with the stylus on the graph.



6) The green cursor can be used to measure the counts in a specific channel. Use the stylus to move the cursor position.

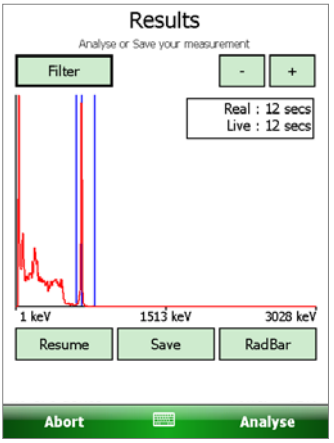
A single tap with the stylus will position the cursor. To drag the cursor, not the graph, hold the stylus stationary on the graph for 1s or more then move the cursor.





7) If RadBar has been enabled in the measurement settings, pressing the ‘RadBar’ button will display the RadBar of the measurement and the total dose rate measured. The RadBar can be zoomed and scrolled in the same way as the graphs. To return to the spectrum press the ‘Spectrum’ button.

The displayed dose units of µSv/h or mrem/h can be configured from the ‘Dose Setup’ screen.



8) Press “Save” to save the results.

9) The “Save Report” screen will be displayed.

From this screen, the user can add text, record location, and take a picture (if these features are available on the handset).

Reports are identified by their time and date stamp, any text is simply an additional description.

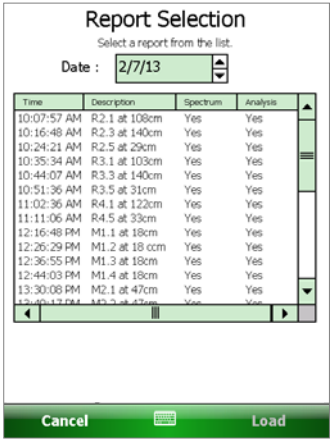
Please note: Updating the text will change the original report and not save a new copy.

The results can be emailed as a pdf report which contains all the raw data files as attachments within the pdf. This functionality requires the Windows Mobile “Messaging” app to be setup with a valid email account. This can be accessed after exiting the RayMon app by pressing the OK button on the keypad from the Windows start menu.

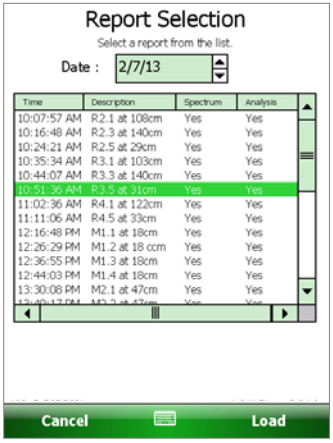
When a report is saved all settings, including Analysis Setup settings, are saved with the report. Therefore, changes to Analysis Setup options are not shared between different reports.

Section 10: Loading a Saved Measurement

1) From the front 'Dose' screen choose "Measurement" → "Load"

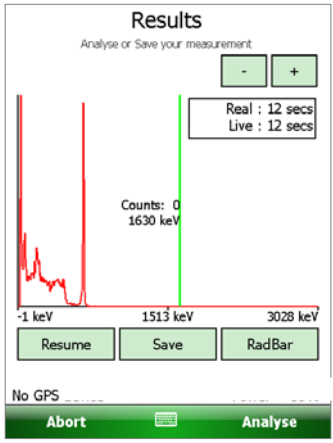


2) Measurements are sorted by date and time. Select the date of the measurement in the top box, and then individual measurement from the list provided



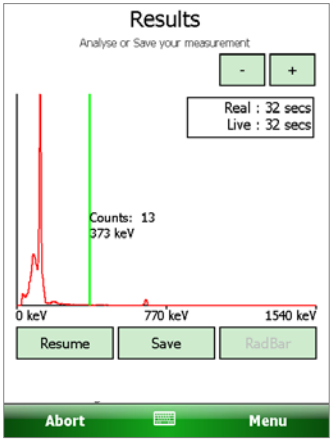
3) Press 'Load' to load the measurement.

4) The ‘Results’ screen will be displayed allowing the spectrum and RadBar to be viewed or the results analysed.

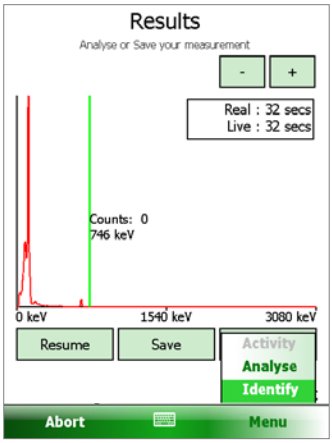


Section 11: Radionuclide ID

Note that ‘identify on’ must have been selected when setting up the measurement for these functions to be available.



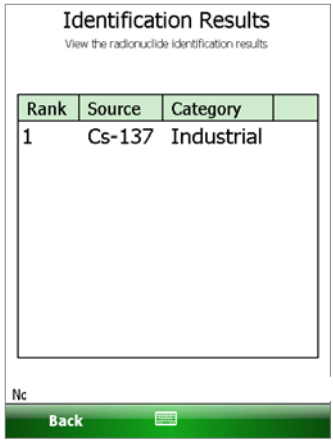
1) After making a measurement, or loading a saved measurement, the results screen will be displayed.



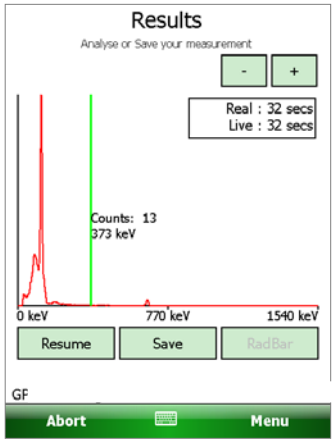
2) Press “Menu” on the bottom green bar to display the analysis options. Pressing ‘Identify’ runs the ID algorithm on the collected data.

3) The radionuclides identified are displayed and ranked.

“Unknown Radionuclide” is displayed if the radionuclide is not present in the algorithm library, or there is insufficient data for a confident identification.

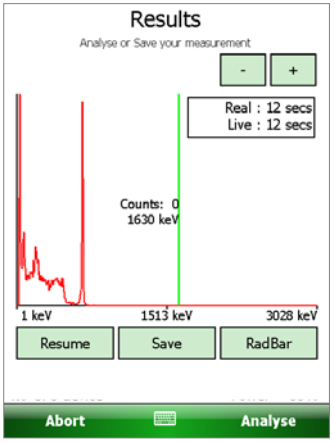


4) If more counts are required in the spectrum press ‘Resume’ to collect more data in the existing spectrum. The identification process can then be repeated from step 2.



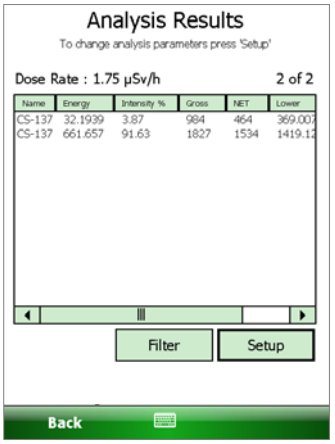
Section 12: Spectral Analysis for Advanced Users

After making a measurement or loading a previously saved measurement the spectrum can be analysed.



1) Press “Analyse” to display the analysis results.

If ‘identification’ is turned on a menu is positioned at the bottom right of the screen from which ‘Analyse’ can be accessed.



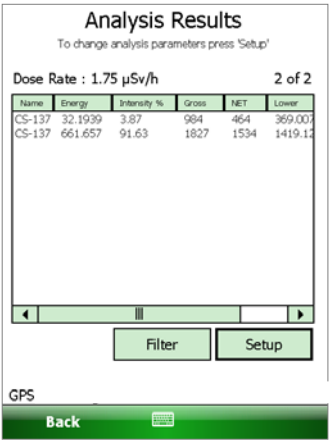
2) The “Analysis Results” screen will be displayed.

- Isotope name
- Energy (keV)
- Intensity (%)
- Gross counts
- Net counts
- Lower bound
- Upper bound

The displayed dose units of µSv/h or mrem/h can be configured from the ‘Dose Setup’ screen.

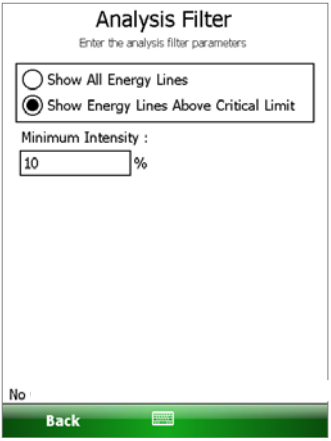
3) The results can be filtered to either include or exclude lines that did not meet the critical limit.

Press the “Filter” button



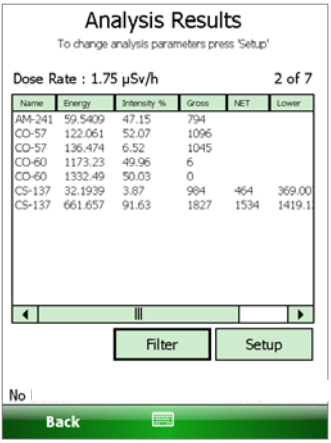
4) Select either “Show all energy lines” or “Show energy lines above critical limit”.

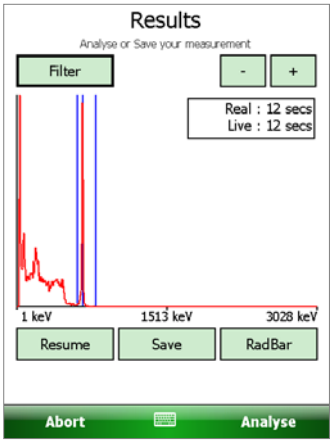
The Minimum Intensity allows only strong emission lines from a radionuclide to be shown where the relative intensity is greater than the value in the box.



5) Pressing “Back” returns to the “Analysis Results” screen.

If ‘show all energy lines’ was selected in the filter, the results for all the selected radionuclides in the analysis will be displayed even if they have not passed the critical limit test.





6) Pressing “Back” again displays the graph with the energies displayed in the results table identified by blue lines on the graph.

Section 13: Analysis Setup

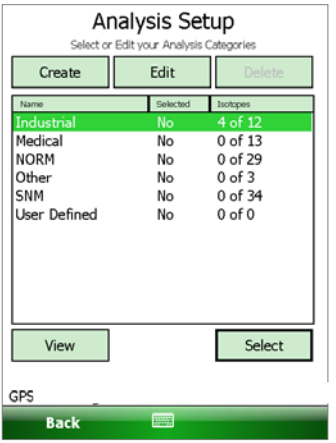
1) To change the default analysis setup applied to all future measurements, from the front “Dose” screen choose “Measurement” → “Setup” → “Analysis”

Alternatively, to change the analysis for only the current data, after the results are displayed choose “Analyse” → “Setup”

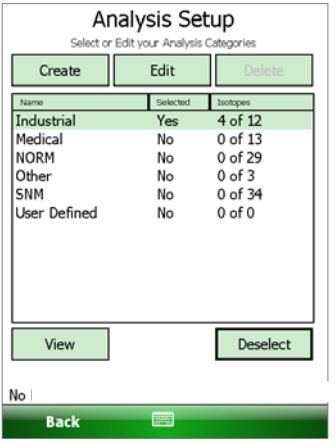
Both routes will display the “Analysis Setup” screen.

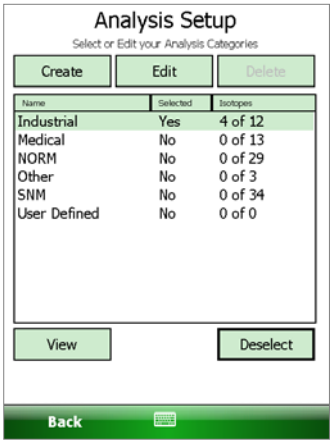
2) Highlight the categories for analysis.

Press “Select”.



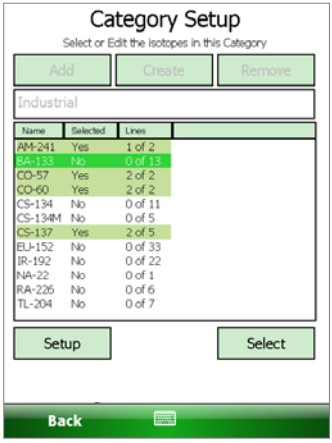
3) The selected categories for analysis will be displayed.





4) Press “Edit” to select the isotopes to be included in each category.

The Isotopes column indicates how many isotopes in that category are currently enabled.



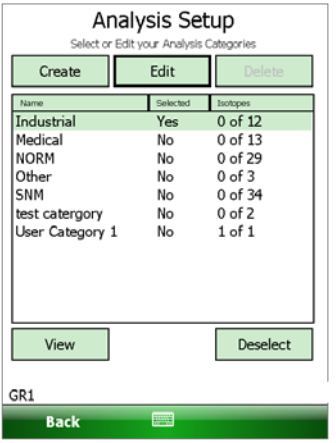
5) Highlight the isotopes to be included in each category and set the “Selected” flag to “Yes” by pressing “Select”.
Press “Back”.

6) If an isotope has multiple lines, these can be individually selected and enabled or disabled as required.

Highlight the isotope and press “Setup”. Highlight the line then press “Select” to set the flag to “Yes”.

Section 14: User Defined Categories and Nuclides

1) If required the user can define a customised category by pressing “Create”.

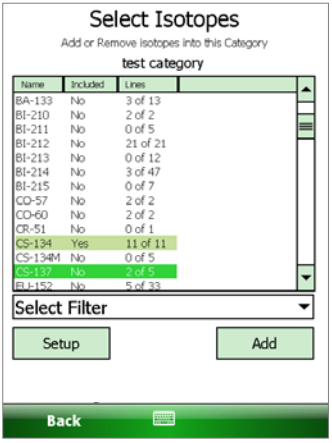


2) The “Category Setup” screen will be displayed.

Select the default “User Category 1” name.

3) Modify as required and press “OK”.

4) Press “Add”.



5) Highlight the required isotopes to be included, then press “Add”

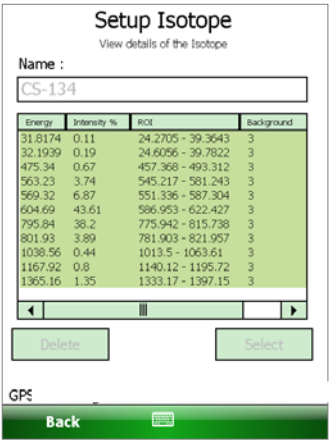
Press “Back”.

6) The user defined list will be displayed.

Press “Back”.

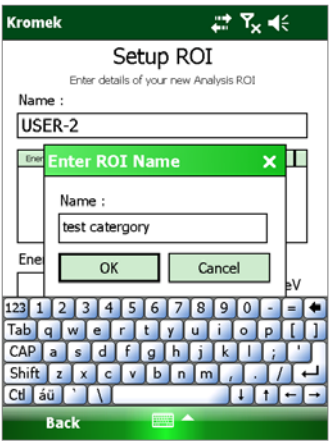
7) As with the default categories, individual lines within an isotope can be enabled or disabled as required.

Highlight the isotope and press “Setup”. Highlight the line then press “Select” to set the flag to “Yes”.

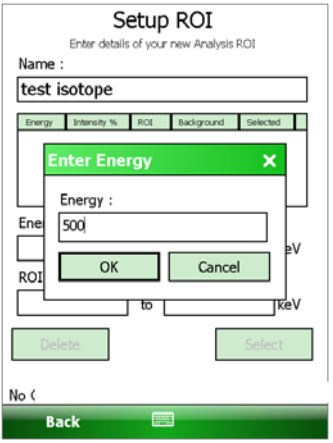


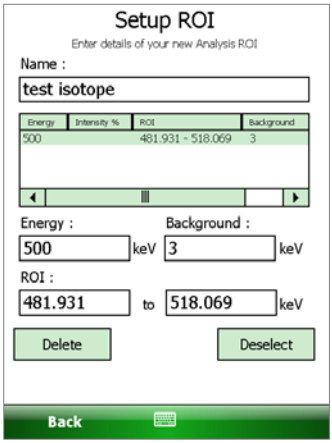
8) If an isotope is required that is not in the built in library, it can be added manually.
On the Category Setup screen press “Create”. This leads to the Setup ROI screen.

Tap the “Name” box and enter the name of the isotope, press “OK”.



9) Next tap the “Energy” box and enter the centroid energy of the line in keV, press “OK”.





10) This will auto-populate the other boxes which define the ROI. The default background window is 3 keV either side of the peak. This value can be changed by selecting the box and then entering the desired value in keV.

11) Press “Back” repeatedly to return to the “Measurement” screen

Section 15: Software Upgrade

Software upgrades are either provided on USB drives or, if downloaded from the internet, the downloaded .CAB file should be saved to the root of a USB pen drive.

Disconnect the probe and connect the USB drive to the RayMon.

1) From the front “Dose Screen” select “Setup” → “Options” →”Upgrade Software”

The RayMon will then install the new software and restart.

Do not force the RayMon to power down during this installation process.

Section 16: PIN Code Locking

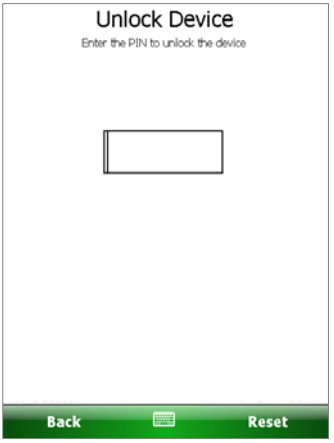
The RayMon can be in either locked or unlocked mode. This mode is displayed on the front “Dose” screen.

The functions allowed when the device is locked can be chosen by the user and can only be changed by entering a four digit PIN code.

When the device is unlocked all functions are enabled.

To unlock the device

1) From the front ‘Dose’ screen choose “Setup” → “Unlock”

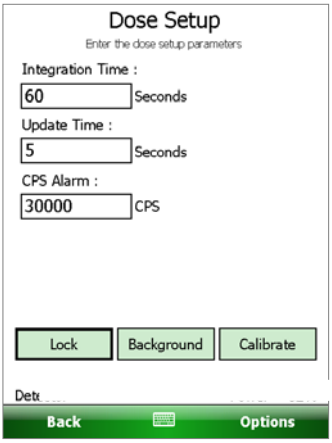


2) Enter the PIN code to unlock device. By default on new units this is 0000.

To lock the device

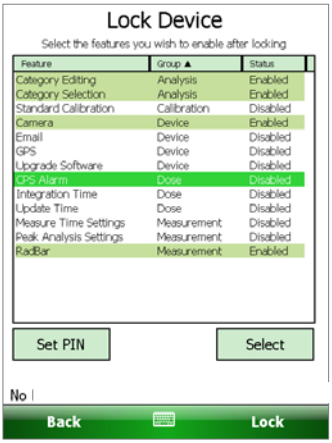
3) From the front ‘Dose’ screen choose

“Setup” → “Lock



4) Review the list of enabled and disabled features. What is selected in this list determines what functions are available.

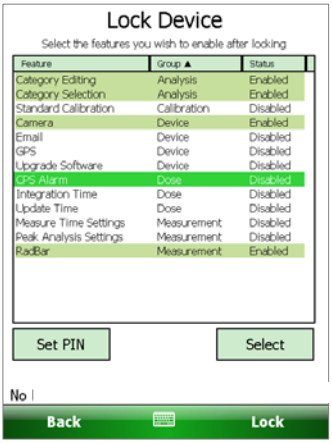
Press ‘lock’ to lock the RayMon and return to the ‘Dose Setup’ screen

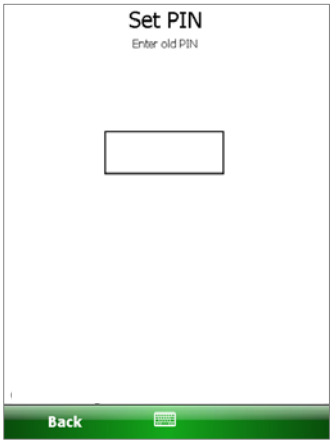


To change the PIN code

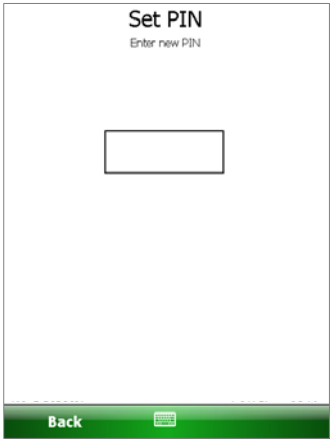
5) The RayMon must be unlocked to be able to change the PIN

Choose “Dose” → ”Dose Setup” → “Lock” → “Set Pin”

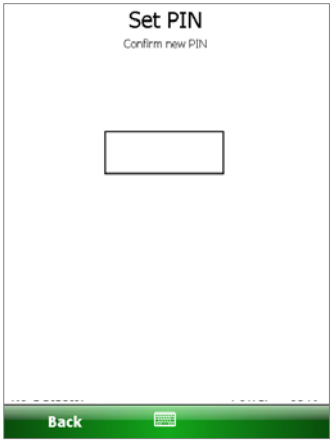




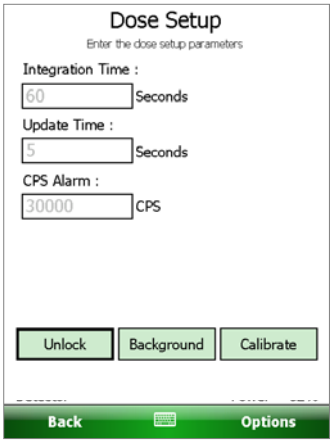
6) Enter the old PIN



7) Enter the new PIN



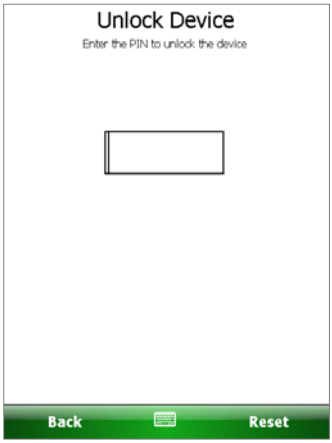
8) Re-enter the new PIN



If the PIN code is forgotten

The PIN can be reset by entering a password available by contacting Kromek.

9) Press “unlock”



10) When asked to enter the PIN code on unlocking the device press the “reset” button.

11) Enter the password to reset the PIN to 0000. This can be obtained by contacting Kromek.

Section 17: Exporting Data (ReachBack Communications)

Kromek's PC software ***MultiSpect Analysis*** [(1)] enables easy data synchronisation with your RayMon.

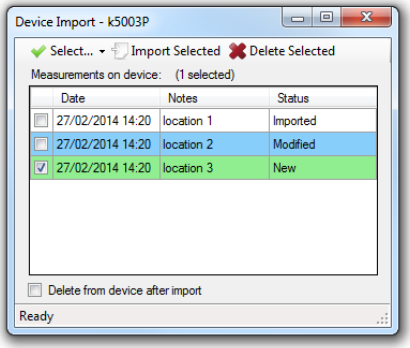
Connect the RayMon to the computer running ***MultiSpect Analysis*** using a mini USB 2.0 cable.

This cable must be connected to the mini-USB socket on the RayMon and not the full size USB socket which is used for the detector probe.

From within ***MultiSpect Analysis*** navigate to your measurements database and use the "import from device" functions.

You will then be able to take the measurements to your PC.

Please refer to the documentation within ***MultiSpect Analysis*** for specific instructions for the version of software you are running.



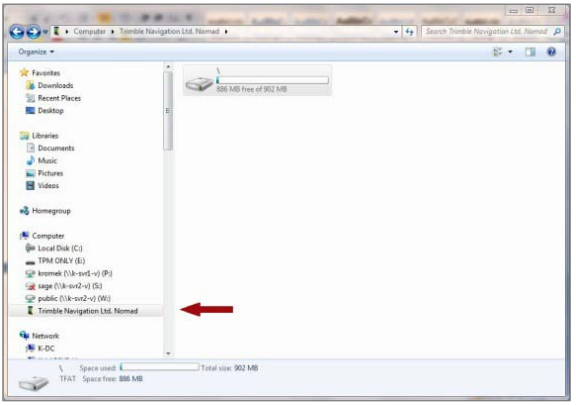
If you have not bought *MultiSpect Analysis* please see the section on exporting data manually.

[(1)] MultiSpect Analysis version 14.7.0.74 or later.

Section 18: Manual Data Export

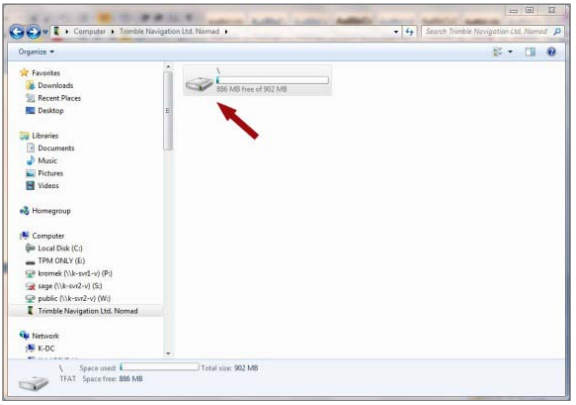
1) Data can be manually exported from the handheld device by email (see Section 7.9 for further details) or by connecting the device to a computer.

2) Connect the device to a computer using a mini USB 2.0 cable. Note that this cable must be connected to the mini-USB socket on the RayMon and not the full size USB socket which is used for the detector probe.



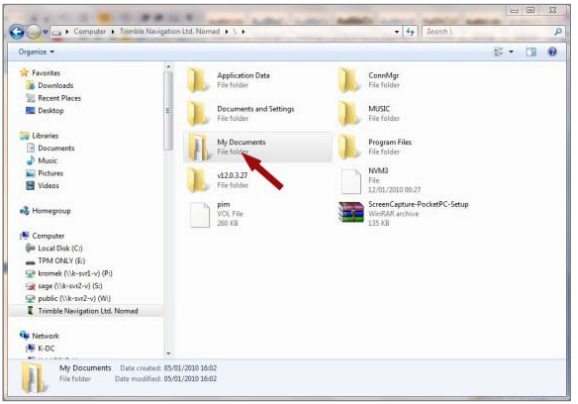
3) The device will appear as an external disk in the Windows Explorer menu.

It may take a few minutes for the RayMon to appear as Windows installs the USB drivers for the device.

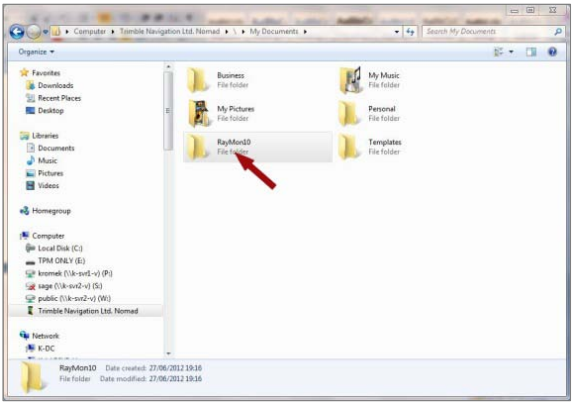


4) Double click on the disk icon to navigate into the drive.

5) Double click on the “My Documents” folder

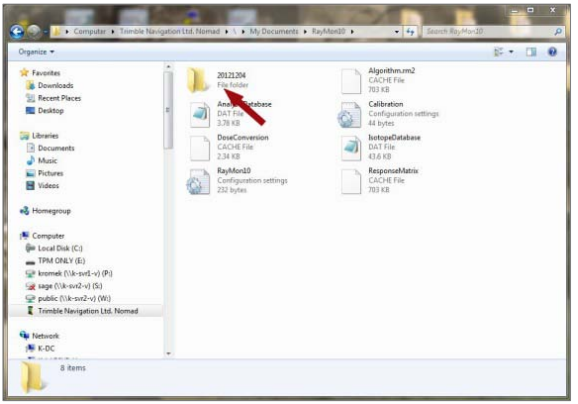


6) Double click on the “RayMon10” folder.

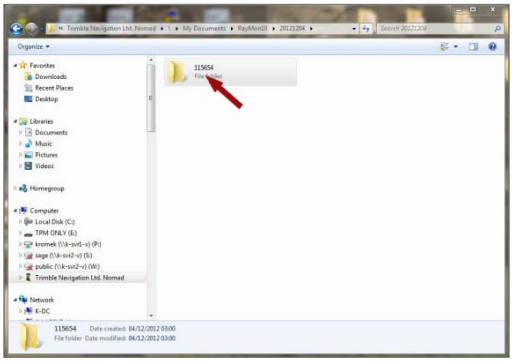


7) This directory will contain a folder for each date on which data has been collected. The folders are named in the format YYYYMMDD e.g. 20121204 for 04/12/2012.

There is also a ‘Logs’ folder where alarm logs are stored.

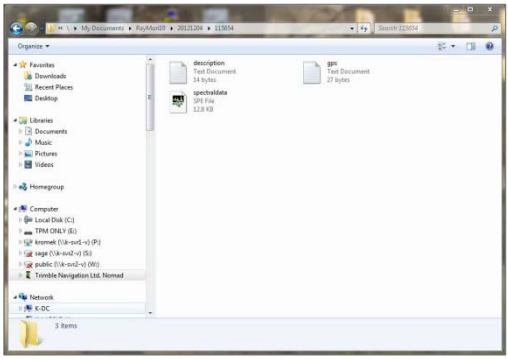


8) Double click on the folder with the appropriate date.



9) Within date folders are folders named by the timestamp at which the data was saved. These follow the format HHMMSS.

10) Double click on the folder with the appropriate timestamp.



11) Within this folder will be the files relating to the measurement.

RayMonReport.pdf is a report of the measurement containing all the raw data files as attachments within the pdf. These attachments are accessible from the paperclip icon in Adobe Reader. This single file can be copied as a convenient way of transferring all the data.

The files can now be copied onto another location on the computer.

Files can be copied directly to a memory stick, without the need for a computer. To do this, disconnect the probe and plug in the memory stick into the full size USB port on the bottom of the device.

Exit the RayMon app by pressing the OK button on the keypad. The memory stick will appear in the File Explorer app as “Hard Drive” and files can now be copied and pasted directly onto it. To access the copy and paste functions, press and hold the stylus on a filename or icon.

The saved spe file is compatible with Kromek’s MultiSpect program which performs offline gamma ray spectroscopy.

Section 19: Troubleshooting

Issue	Solution
The device needs to be reset or restarted.	Press and hold the green power button for 5 seconds to bring up the Power Menu. From this select shutdown or reset.
The screen appears dim	Press and hold the green power button for two seconds to return the screen to full brightness. This will also dim the screen if it was previously at full brightness.
Numeric keys are not functioning	Press the yellow shift button to turn off the arrow functionality.
Exited the app by accident / screen shows the Windows Mobile environment.	Restart the app by using the stylus click the windows symbol in the top left hand corner of the screen. Then select the RayMon app from the list.
Message reading: "No detector"	Disconnect the probe USB connector and then reconnect. If the problem persists, restart the device.
Message reading: "Locating satellites…"	The message is often seen when taking measurements inside a building. It should not interfere with data collection or analysis.
The date/ time on measurements in incorrect.	The system date and time can be set through Windows Mobile. Exit the RayMon app by pressing the 'ok' button on the keyboard. From the start menu select "Settings" → "System" → "Clock and Alarms" and set the correct date/time. Then relaunch the RayMon app from the start menu.
My measurements do not appear to be being saved.	If the date and time has been reset saved measurements can be saved in an unexpected order. Ensure the date and time settings are correct.
The PIN locking code has been forgotten	The PIN can be reset to 0000 by entering a password. Please contact Kromek for the password.

N.B. See diagram on page 5 for location of keys.

Appendix 1: Radionuclides in the library

The following nuclides are included in the RayMon10 nuclide library. Categorisations are taken from the standard ANSI N42.34 – 2006.

Additional nuclides have been added to each category that may be of use to the user.

Category	Nuclides Included
Industrial radionuclides	**ANSI:** Co-57†, Co-60†, Ba-133†, Cs-137†, Ir-192†, Tl-204, Ra-226, Am-241† **Additional:** Cs-134, Cs-134 (M), Eu-152†, Na-22†
Medical radionuclides	**ANSI:** Ga-67†, Cr-51, Se-75, Sr-89, Mo-99, Tc-99m†, In-111, I-123†, I-125, I-131†, Sm-153, Tl-201†, Xe-133
NORM (Naturally occurring radioactive materials)	**ANSI:** K-40†, Ra-224, Ra-226†, Ac-228, Th-234, Th-228, Th-230, Th-232†, Th-232D, Rn-220, Po-216, Pb-212, Pa-234, Pa-234m, U-234, U-238, U-238D, Rn-218, Rn-222, Bi-210, Bi-212, Bi-214, Po-214, Tl-206, Tl-208, Tl-210, Pb-210, Pb-214, Po-210, Po-218 **Additional:** Hg-206
SNM (Special nuclear materials)	**ANSI:** U-232, U-235†, Np-237, Pu-239†, Pu-240 **Additional**: O-19, Ar-41, Kr-87, Kr-88, Ac-225, Ac-227, At-215, At-217, Bi-211, Bi-213, Bi-215, Fr-221, Fr-223, Pa-231, Pa-233, Pb-211, Po-211, Po-213, Po-215, Ra-223, Rn-219, Th-227, Th-229, Th-231, Tl-207, Tl-209, Xe-133M, Xe-135M, Xe-138
Other radionuclides	Mn-54, Zn-65, U-232

D in equilibrium with daughter products *† included in automatic radionuclide identification*

For after-sales and customer service enquiries
please use the following contacts:

T: +44 (0) 1740 626060 F: +44 (0) 1740 626061
E: service@kromek.com W: www.kromek.com