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JCS

Nuclear Solutions

GMS310

API Core Gamma Logger

User Guide

Issue 3.1



Welcome to the GMS310 Core Gamma Logger

This document contains all instructions for the use of the GMS310 Core Gamma Logger and is supported by the GMS310 Core Analyser Data Manager Software user guide.



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EC Declaration of Conformity

European EMC Directive 2004/108/EC for radiated emissions and susceptibility.

We, John Caunt Scientific Ltd. of Unit 12 Limefield House, Limefield Brow, Bury, Lancashire, BL96QS

in accordance with the following standard(s):

*EN55022 Class B emissions
EN61000-4-2 electrostatic discharge
EN61000-4-3 radiation immunity*

hereby declare that:

*GMS310 Core Gamma Logger
Model number GMS310
Serial Number 101*

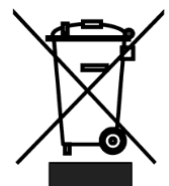
is in conformity with the applicable requirements.

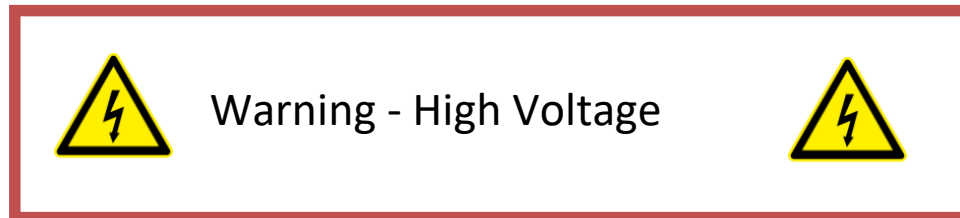
*Name: Oliver Caunt
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Bury, Lancashire
On 5th October 2011*



WEEE

John Caunt Scientific Ltd is complying with the Waste Electrical and Electrical Equipment (Amendment) (No. 2) Regulations 2009 through the registered Compliance Scheme, Budget Pack No. WEE/UP3838PL/SCH





The GMS310 contains high voltages and must only be opened by a suitably qualified and experienced engineer.

Glossary

CPS	Counts Per Second
CD	Compact Disc
KeV	Kilo-Electron Volt (1000 electron Volts)
MCA	Multi-Channel Analyser
NiMH	Nickel Metal Hydride
OS	Operating System
PC	Personal Computer
ROI	Region of Interest
NaI (TI)	Sodium Iodide (Thallium Activated)
USB	Universal Serial Bus
ppm	Parts per million



1. Introduction

1.1 Scope

This document is a hardware user manual which describes the use of the GMS310 API Core Gamma Logger. Also, some of the GMS310 Core Analyser Data Manager functions are described but not at length and the user should consult that software manual for full instrument instructions.



1.2 Overview

The GMS310 Core Gamma Logger is a hand-held Gamma Spectrometer designed to detect naturally occurring gamma radiation (NORM).

The GMS310 is used to monitor gamma radiation over a user defined period and display the results in four predefined Regions of Interest (ROI). The predefined ROI are Uranium, Potassium, Thorium and a total gamma (total spectrum counts). There are a further three user defined ROI in addition to the predefined channels available on the instrument.

The GMS310 also displays the concentrations of Uranium (ppm), Potassium (%) and Thorium (ppm) and the API units.

Survey results are saved manually or automatically to the internal memory of the instrument, so that they may be downloaded and analysed on a PC via the GMS310 Core Analyser Data Manager Application software. Each survey is saved in a single file.

The GMS310 Core Analyser Data Manager Application Software and GMS310 Core Analyser Data Manager Software user guide are provided with the GMS310 on the accompanying CD.

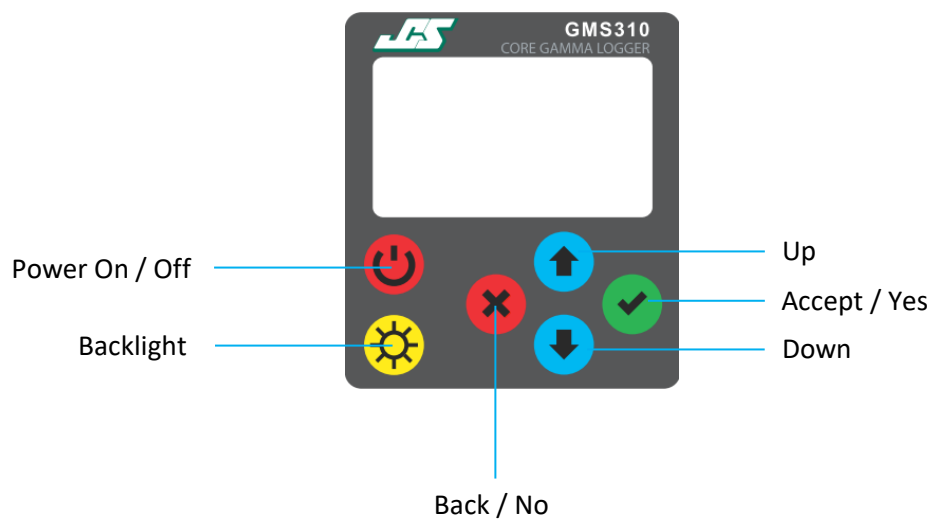




2. The GMS310 Instrument

2.1 Instrument Controls

There are 6 user keys on the instrument control panel that are used to:

- Power on/off
- Start and stop samples
- Step through menus
- Change settings
- Backlight



The GMS310 is switched on by momentarily pressing the  button once. To switch off again, press and hold the  button for 3 to 4 seconds. The battery state is indicated at all times on the display and as the battery voltage drops the battery symbol will empty.



2.2 Power

The GMS310 is powered by 2x 'C' size NiMH rechargeable batteries. These can be charged in approximately 10 hours by using the external charger supplied. After a full charge, with the backlight used occasionally the GMS310 will operate for approximately 12 hours at 20°C. The battery charging socket is located on the rear of the instrument under the dust plate as shown below. Batteries can be accessed by unscrewing the cap anticlockwise. When refitting batteries, ensure correct polarity by inserting the batteries such that the positive pip of the battery is showing. Incorrect fitting of batteries will result in damage to the GMS310.

The GMS310 is supplied with 4000mA NiMH batteries. Fitting batteries with a lower capacity may affect the performance. **It is not recommended to use any other type of battery.**



2.3 Display

The GMS310 utilizes a 128 x 64 pixel transfective LCD display that can be viewed in bright daylight, and at night the white LED backlight provides excellent illumination.

The backlight is operated by pressing using the Backlight button. The backlight will illuminate for a fixed period of time and extinguish automatically. Use of the backlight will not significantly affect battery life. See section 4.3 for further information on backlight settings.

2.4 Detector

The detector is a custom designed 51mm x 51mm NaI(Tl) scintillator with a rugged photo multiplier tube.



2.5 Regions of Interest & API Measurement

API Measurement

The API measurement comprises Uranium (ppm), Thorium (ppm), Potassium (%) concentrations and API units.

API functions may not be adjusted by the user.

Regions of Interest

Select and Manage ROIs from the menu by using the UP and DOWN buttons then ACCEPT. Each of the 7 ROIs may be viewed by pressing the BACK-NO button. ROIs 1 to 6 may be edited for the user preference.

To change the ROI name press the ACCEPT button then using UP and DOWN buttons select either upper or lower case letters, numbers, a space or a '-' symbol. After 10 characters have been selected the cursor will move directly onto the lower threshold value of the ROI and then onto the upper threshold value as each digit is selected. Values between 90keV and 2700keV will only be accepted. The default ROIs are:

Energy Window	Name	Description	Lower Limit (keV)	Upper Limit (keV)
1	Uranium	Uranium Peak (1760keV)	1596keV	2024keV
2	Potassium	Thorium Peak (580keV)	493keV	667keV
3	Thorium	Potassium Peak (1460keV)	1241keV	1596keV
4	(Blank)	(Blank)	(Blank)	(Blank)
5	(Blank)	(Blank)	(Blank)	(Blank)
6	(Blank)	(Blank)	(Blank)	(Blank)
7	Spectrum	Spectrum Total	90keV	2700keV

2.6 PC Connection

The saved data may be accessed via a PC with Microsoft™ OS Windows 10, 8, XP, Vista or Seven and suitable USB type A to B cable. No device drivers are required as the PC will see the GMS310 as a mass storage device. Please refer to the GMS310 Data Manager Software user guide for details of extracting and managing saved data from the GMS310.



3. GMS310 Operation

3.1 Power On

When powered on the GMS310 will display the following screen for several seconds during which the instrument performs a self-test and starts up all circuitry.


```
JCS
GMS310-B
Core Gamma Logger
Serial No. 0100
V4.2.5
```

```
Self test
Memory: OK
Circuit: OK
```

Should a fault be detected, then a memory fault or circuit fault will be displayed.

```
Self test
Memory: Fault
Circuit: OK

Continue?
```

Pressing the  button will shut down the GMS310. The GMS310 should be returned for service.

After the self-test, the time and date are displayed along with a choice of whether to enter the menu options or start the measurement process.

```
01 Nov 2018
15:29:38

>Go to menu
Use Job details
No job details
```






3.2 Job details and settings

The Job Details are information about the survey such as operator name, well identification number etc. and can be saved to the GMS310 via the GMS310 Core Analyser Data Manager software, go to Menu Options and Job details to view job details. Note that job details cannot be set on GMS310.

The GMS310 functional settings and parameters may be viewed and set in the Sampling – logging menu option, described in detail in section 4.

Before a survey is started the user has the option of whether to use the job details or not. In either case, the stored settings functions and parameters will be always be used. Once a survey has been started, no changes to the GMS310 settings can be made.


Use the  and  buttons to select the job details option and press the  button to start the survey.

3.3 Measurement interval

The GMS310 can make measurements with a pre-set interval depth. A start depth can also be also be set, and as each measurement is saved a new depth value is incremented by the interval depth. The recorded data is saved along with the depth.

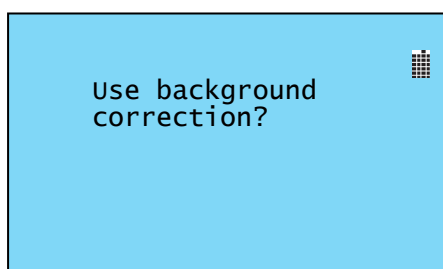
The interval may be set to **Off**, in which case, no depth value is recoded and each measurement is recorded with an individual sample number.


3.4 Background correction

Measurements may or may not be background corrected. Pressing the  button will skip the background process and bring the GMS310 to the start of the core measurement process.

If background correction has been selected, then this measurement is performed first, with all subsequent core measurements automatically corrected for background. The background measurements are made over a predetermined range; for metric depth values the first measurement is made between 0 to 1m, 1 to 2m, 2m to 3m.....and so on. It is up to the user to determine where best to make the measurement, but 0.5, 1.5, 2.5m intervals is recommended.

In the case where no interval has been set, then a single measurement is made for the whole survey.

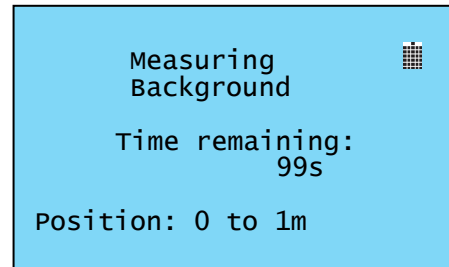
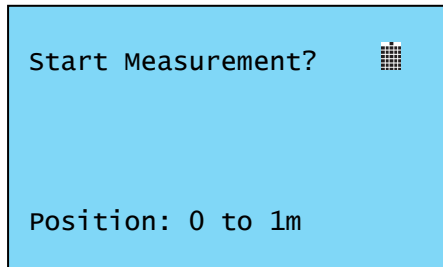



Pressing the  button will put the GMS310 in the background mode.





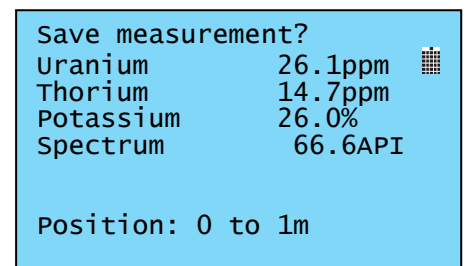
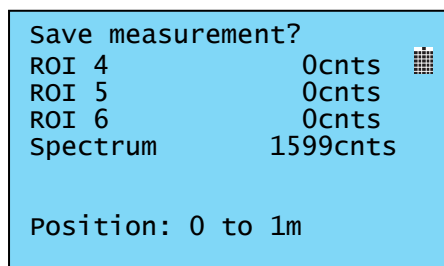
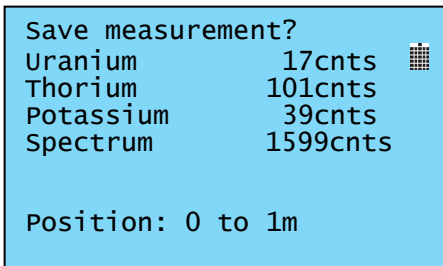
3.5 Background with interval



Once in the background measurement mode the user will be prompted to start the measurement. It is recommended that the measurement be made on a dummy core or as close as possible the where the core will be surveyed.

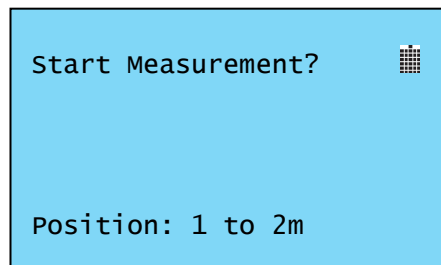



Press the  button will start the measurement.

When complete the measurement data will be displayed. Use the  and  buttons to scroll through measurement results.



Pressing the  button will reset the data the measurement at this position will need to be repeated.
Pressing the  button will save the location data and set a new position.




Pressing the  button will exit the background measurement function.

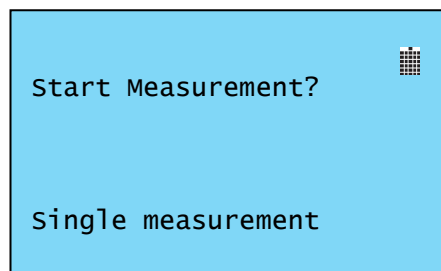




3.6 Background without interval

The background measurement with the interval set to off in the setup menu, will make only single measurement. It is recommended that the measurement be made on a dummy core or as close as possible to where the core will be surveyed.

If the  button is pressed before a measurement being made the background measurement will be skipped.

Once the background measurement is complete the following screen will be displayed.



Pressing the  button will cancel the readings and return the user to the start of the background measurement. Pressing the  button will save the background data and put the GMS310 into the core measurement process.

3.7 Previously stored background data

If a background measurement has already been made and the GMS310 has not been powered down or settings changed, then the background measurement may be used for core measurement process. If the background function is selected, then the user will be asked whether to use previously stored data.



3.8 Core measurement with interval

```

Start measurement?
Uranium      0cnts
Thorium      0cnts
Potassium    0cnts
Spectrum     0cnts
Samples:     0
Depth:       0.000m
CS: 1 M:900
    
```

The core measurement function screen displays:

- Samples:** the number of sample taken
- Depth:** the start depth entered in the setup, the default is zero
- CS:** core section currently being measuring
- M:** number of memory samples remaining
- B:** indicates that background correction is being used

As each measurement is completed and saved, the depth will increment by the interval value set in the Sampling – logging menu. When the user reaches the end of a core section, the core section value can be incremented. It is important to use the core section function to ensure correct background correction is being performed.

To start making a measurement press the button.

```

Time:      87s
Uranium    1cnts
Thorium    0cnts
Potassium  3cnts
Spectrum   12cnts
Samples:   0
Depth:     0.000m
CS: 1 M:900
    
```

```

Save sample data?
Uranium    8cnts
Thorium    2cnts
Potassium  18cnts
Spectrum   58cnts
Samples:   0
Depth:     0.000m
CS: 1 M:900
    
```

The time remaining is displayed at the top of the screen. When the measurement is complete the user will be prompted to save the data.



Dependant on the mode of operation the data may be saved by pressing the button or if the data is to be discarded by pressing the button. If the data is to be discarded, then the measurement at that particular depth will need to be repeated. Note that in the auto save mode, the measurement data is always saved and there is no option the delete it.

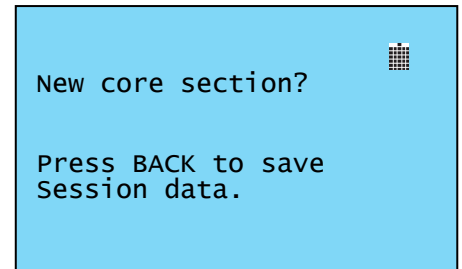
```


Start measurement?
Uranium    8cnts
Thorium    2cnts
Potassium  18cnts
Spectrum   58cnts
Samples:   1
Depth:     0.100m
CS: 1 M:899
    
```

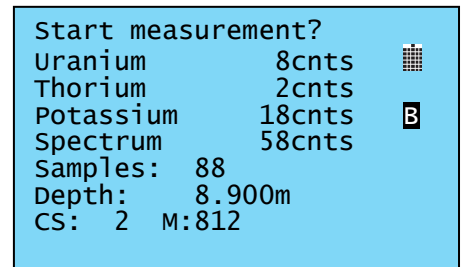
Once data is saved then the number of samples is incremented by one, the depth changes to the new depth position on the core section and the number memory locations decreases by one.




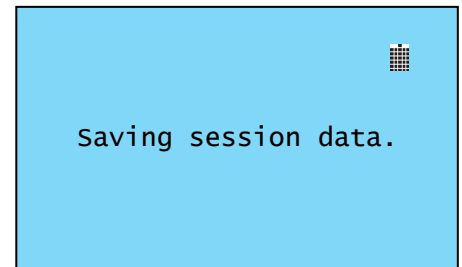
Pressing the  button will start the next measurement. If the survey is complete or a new core section is to be surveyed, then pressing the  button will bring up the screen below.



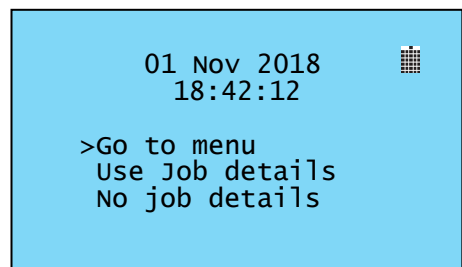
Pressing the  button will increment the core section number and return the user to the measurement screen.



If the survey is complete, then pressing the  button will save the survey data and the user will be returned to the initial menu screen.




If many sample points have been taken, then saving the data may take some time to complete.

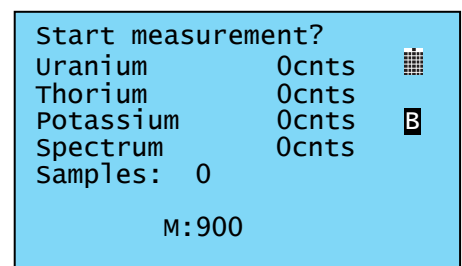


3.9 Core measurement without interval

When no interval is set then no depth data or number of core sections is recorded. The sample number will increment with each new measurement and the number of memory locations will decrease.

All other functions perform as described in section 3.8.





When the survey is complete, pressing the  button will save the survey data and the user will be returned to the initial menu screen.








4. Menus

4.1 Menu Options





The menu options may be accessed by pressing the  button when 'Go to menu?' is indicated. The menu options can be accessed by pressing the  and  buttons to highlight the required option followed by the  button.

```
>Sampling - logging<
Display settings
Manage ROI's
Calibration
Set time and date
USB Connection
Default settings
Job details
```

4.2 Sampling and Logging Functions

Pressing the  and  buttons will move the cursors up and down the menu options. To exit the menu press the  button and the user will be returned to the initial menu options.

```
>Units:m
Manual start+stop
Sample time: 60s
Background :100s
Core size: 67mm
Interval: 100mm
ESAM:Off
Start: 0.000m
```

Pressing the  button allows the option to be adjusted. For example, the Units can now be set since the cursor has changed to '*' symbols. Using the  and  buttons will scroll through the options. All parameters may be set this way, except the start depth value which is described below. When the required option or value is displayed then the pressing the  button will save the value and the cursors will return.

```
*Units:m
Manual start+stop
Sample time: 60s
Background :100s
Core size: 67mm
Interval: 100mm
ESAM:Off
Start: 0.000m
```




Units may be set as metric (0.000m), imperial (0ft 0in) and US tenths (0ft 0th).

```
>Units:ft <
Manual start+stop
Sample time: 60s
Background :100s
Core size:2 5/8 in
Interval: 4in
ESAM:Off
Start: 0ft 0in
```

```
>Units:ft-tenths <
Manual start+stop
Sample time: 60s
Background :100s
Core size:2 5/8 in
Interval: 4th
ESAM:Off
Start: 0ft 0th
```

The method of starting a measurement and saving the data can be set to one of three options:

- **Manual start+save** – Each measurement requires a button press to start the measurement and to save a data.
- **M.start+auto save** – Each measurement requires a button press to start but the data is automatically saved at the end of the measurement.
- **Auto start+save** – Once the survey has started the data will be saved at the end of the measurement and then the next measurement will start automatically.

The sample time can be set to; 10, 20, 30,60,100,120,180,240, 300, 600 and 900 seconds. This is the time to perform the measurement on the core section.

The background times are set independently to that of the sample time, though the range of values is the same. In both cases the minimum time set should 100 seconds.

The core sample size refers to the diameter of the core section. It is important to have the correct size when using the API data. The unit of the core size is set by the instrument units at the top of the menu. The core size values are:

- **Metric** – 67, 76, 83, 89, 102, 121, 135, 152mm
- **Imperial or US units** - 2⁵/₈, 3, 3¹/₄, 3¹/₂, 4, 4³/₄, 5¹/₄, 6inches

Where the core size is not known or provided, the follow can be set:

- **NG** – no core size value given
- **NK** – Core size not known
- **FL** – flat surface

In each of these cases the core size value used to determine concentrations will assume a flat surface.




The interval of each measurement along the core section as follows:

- **Metric** – 25mm to 1000mm in 25 steps
- **Imperial** – in 1 inch steps from 1 to 26 inches
- **US tenths** – in one tenth steps from 1 to 30 tenths

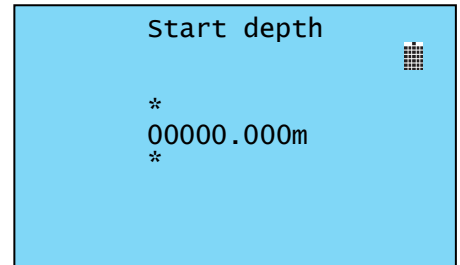
Where no interval and depth data is required, the interval may be set to **Off**.



The ESAM setting is an enhanced mode for determining the API concentrations. Where sufficient counts are available, the ESAM mode uses additional algorithms to subtract the effects of multiple gamma peaks over the whole gamma spectrum. The ESAM mode should only be used when the core section activity is significantly greater than that of the background.




The start depth is set by using the  and  buttons to adjust each digit indicated by the '*' symbols. When the digit has been set, pressing the  button will accept the new digit value and move on the next digit.


The maximum value that can be set is 99999.999m, 99999ft 11in or 99999ft 9th.

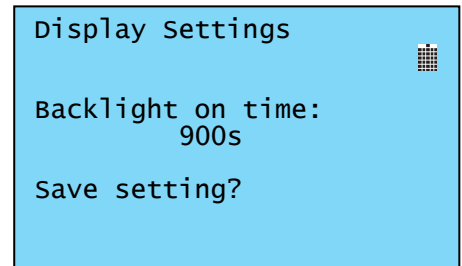
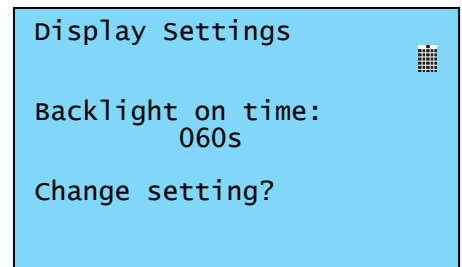


4.3 Display Settings

In this menu the backlight on time may be set.

Pressing the  button allows the user to scroll through the timing options. The backlight on time can be set between 10 and 900s. The time is set by using the  and  buttons. The time is incremented in 10s steps from 10s to 100s and 100s steps thereafter up to 900s.

Pressing the  button will accept the new setting.





4.4 Manage ROIs

There are 7 ROIs of which 6 may be edited by the user for their own preferences. The default ROI ranges are legacy values used in all of the GMS Core Logger models, and were provided by industry specialists. JCS takes no responsibility for the determination of the default values and the user is not obliged to use them.

The default ROIs are:

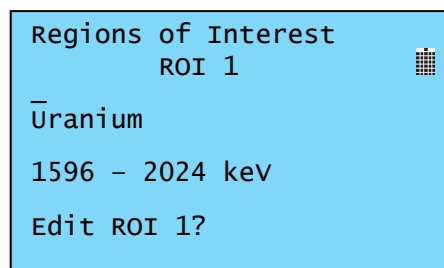
ROI 1 Uranium 1596 to 2024KeV


ROI 2 Thorium 493 to 667keV




ROI 3 Potassium 1241 to 1596KeV

ROIs 4 to 6 are blank.

ROI 7 shows the whole spectrum of counts from 90keV to 2700keV and cannot be edited.



Press the  button to move to the next ROI without editing.

To edit an ROI press the  button. The ROI name is edited first followed the energy range. Use the  and  buttons to select either upper or lower case letters, numbers, a space or a '-' symbol. After 10 characters have been selected the cursor will move directly onto the lower threshold value of the ROI and then onto the upper threshold value as each digit is selected. Values between 90keV and 2100keV will only be accepted.



4.5 Calibration

As standard, the GMS310 will be supplied and calibrated using a 'Test before first use' procedure.

We recommend that the GMS310 is calibrated at least once a year to ensure optimal performance of the detector. The GMS310 has smart calibration function which requires the operator to have knowledge of handling a radionuclide¹.

For API functions, to obtain the best performance a calibration before use is recommended.

Calibration is performed with a Cs-137 gamma source, ideally with an activity in the range 18.5kBq to 370kBq. The calibration process is automatic but some user interaction is required at the beginning to ensure the source is placed in the optimum position. The calibration process is split into 5 steps that initially determine the source activity and then a series of detector bias voltage adjustments to set the Cs-137 full energy peak at 662keV.





When starting the calibration place the source in front of the detector ensuring there is no shielding between the source and detector. The distance between the source and detector face will be dependent on the source activity. An 18.5kBq source at the detector face will give a count rate of approximately 1500 counts per second and a 370kBq source at 100mm should give approximately the same result. If the source is placed too close to or too far away from the detector the user will be prompted to move the source accordingly.

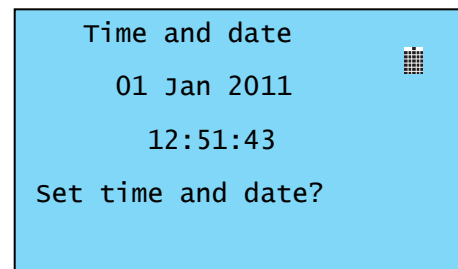
Depending on the count rate, the calibration should take from just a few minutes up to 10 minutes. Once the calibration is complete the new settings can be saved.


If not saved the GMS310 settings will revert to the original settings.

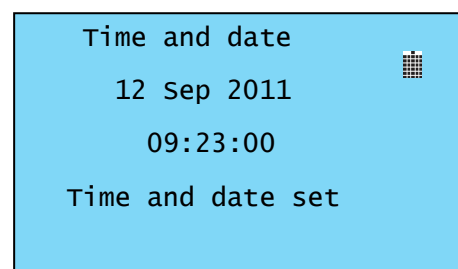
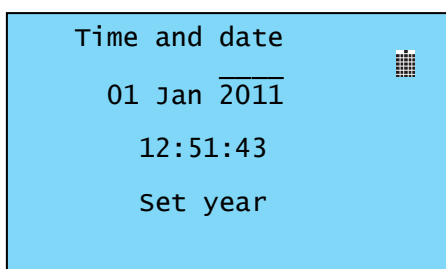
4.6 Set Time and Date

The current time and date is displayed as:

Press the  button to edit the time and date. Note that the clock stops updating. Using the  and  buttons to change the year, month, day, hours, minutes and seconds. Pressing the  button will advance to the next field.



The time will be set when the  button is pressed while in the set seconds mode.





4.7 USB Connection

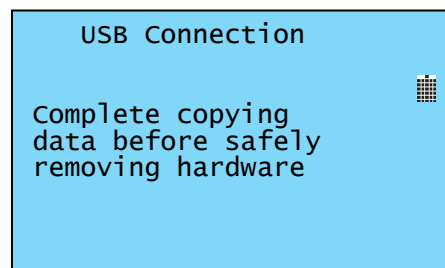
First Time Connection to a PC

Before Installing the GMS310 software:

1. Switch on the GMS310 and select the USB Connection option in the menu.
2. Connect the USB lead between the PC and the GMS310.
3. The PC will indicate that it has found new hardware and automatically find a driver.
4. The GMS310 will be identified as a Mass Storage Device and a generic Windows driver will be used.
5. The PC will then indicate that the hardware is ready to use.
6. The GMS310 will appear as an additional external drive e.g. E:

Should the PC not find new hardware or no drives appear, disconnect the USB lead, switch off the GMS310 and repeat the above procedures.

It is possible to access the data files stored on the GMS310 without using the GMS310 Core Analyser Data Manager Utility. To access files stored on the GMS310 select USB Connection on the main menu. Please note that it is not recommended that files are opened by the user. The files are in an xml format and any changes to the data could lead to the whole file being corrupted.

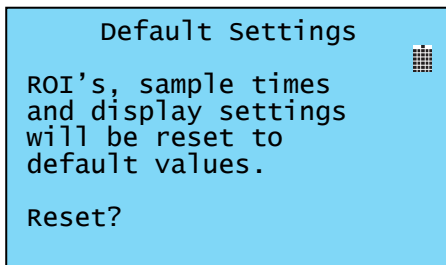


With the provided USB Cable, plug the GMS310 into the PC's USB Port. The GMS310 will appear as new hardware named JCS Mass Storage.





4.8 Default Settings

The GMS310 can be reset the default factory settings.



Default values:

- ROI 1 Uranium 1596 to 2024KeV
- ROI 2 Thorium 493 to 667keV
- ROI 3 Potassium 1241 to 1596KeV
- ROIs 4 to 6 are blank.
- ROI 7 shows the total counts from 90keV to 2700keV spectrum and cannot be edited.
- Sample time 30s
- Background sample time 100s
- Backlight on time 60s

Press the  button will skip the reset and move to the update firmware function. Again, pressing the  button will skip this function and return the user to the initial menu screen.

The User may update the GMS310 firmware when new versions become available or for special versions. The user requires the GMS310 Updater and is supplied as zip file. The file should unzipped and placed on to the PC desktop. A manual 'GMS310 updater instructions' in pdf form are provided in the unzipped folder.

4.9 Job Details

The job details of the survey are displayed, though they may not be changed on the GMS310. This must be performed using GMS Core Analyser Data Manager software application.

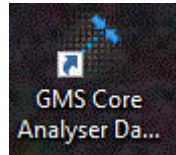


5. Importing settings & job details

5.1 Setup

Only the Create Setup File function is described here in detail, please refer the application user manual for other functions

Start up the GMS Core Analyser Data Manager application by double clicking the icon.



Select Create Setup File once the application is open.

It is important to set the Instrument Model to GMS310 from the dropdown menu, otherwise the setup file will be incorrectly named and the GMS310 instrument will not recognise it.

The application sets the mode to Static automatically for the GMS310 instrument.

The screenshot shows the 'Create Instrument Setup File' dialog box. It includes the following fields and settings:

- Instrument Model: GMS310 (dropdown)
- Mode: Static (dropdown)
- Units: Metric (dropdown)
- Core Id: 1234 (text)
- Job Number: L-1234 (text)
- Operator Name: John Smith (text)
- Country: UK (text)
- Core Size: 67 mm (dropdown)
- Oil Field: Forties (text)
- Well Id: ABCD-1234 (text)
- Start Depth: (empty) m (empty) cm (empty)
- Interval: (empty) mm (empty) Record Depth
- Target Speed: (empty) mm/s (dropdown)
- Sample Time: 30 second(s) (dropdown)
- Background Sample Time: 100 second(s) (dropdown)

The ROI settings section is a table with 7 columns:

	1	2	3	4	5	6	7
Name:	Uranium	Thorium	Potassium	ROI 4	ROI 5	ROI 6	Spectrum
Lower:	1596 keV	493 keV	1241 keV	90 keV	90 keV	90 keV	90 keV
Upper:	2024 keV	667 keV	1596 keV	90 keV	90 keV	90 keV	2700 keV

A 'Create' button is located at the bottom right of the dialog.

Once the instrument mode has been set, there are dropdown menus for Units, Sample time, Background time and Core size. Set the required units before moving on to the other parameters.

On start up the application leaves the Record Depth box unticked. This leaves the depth and interval panes greyed out. To use a start depth and interval check the box.


Note that the ROI settings cannot be changed in this function.



5.2 Save to GMS310

On the GMS310 instrument select 'Go to Menu' then select USB connection. Connect the GMS310 to the PC using the appropriate USB lead.

Click the Create button on the application the file will saved to the GMS310.

Click OK to continue. Safely eject the GMS310 from the PC using Hardware Eject function. Press the  button to exit the USB connection mode. The setup data on the file will then setup the GMS310.

If there are connection issues, either the GMS310 drive has not been recognised or the lead not connected, then a failed attempt will be displayed.



6. Care

6.1 The Detector

The custom built detector is a Sodium Iodide (Thallium Activated) (NaI/Tl) crystal. The detector will operate reliably between -5°C and 45°C, provided the rate of temperature change does not exceed 5°C / hour. NaI/Tl is susceptible to thermal shock

It is recommended to store the GMS310 in its transit case to help provide thermal protection during transit. Should the instrument be subject to changes in temperature greater than 5°C / hour, it is recommended that it is left in its transit case for a precautionary period of 4 hours prior to operation.

As standard, the GMS310 is provided with a rubber end-cap to further protect the detector superficial contact.

6.2 Batteries

WARNING! Please ensure batteries are fitted correctly. Batteries should be fitted with the positive pip facing outwards.

The cap should be screwed on to the battery holder with firm pressure.

Incorrect fitment of batteries may result in damage to the GMS310.

Do not attempt to charge the GMS310 without batteries fitted.



Batteries should be removed prior to long periods of non-operation or air transit. The GMS310 is supplied with 3000mA NiMH batteries. Fitting batteries with a lower capacity may affect the performance. It is not recommended to use any other type of battery.

Charging is complete when the green 'Ready' LED is illuminated. It must be noted that even if the lead is left connected no further charging will take place. Battery life after a full charge is up to 12hrs.

The GMS310 should be recharged regularly, about twice per week to maintain the battery charge.

If the GMS310 is to be stored or not used for some time, please remove the batteries.

6.3 Cleaning

The GMS310 should be cleaned with a mild detergent and a damp cloth only

6.4 Storage

The GMS310 should be stored in its transit case in room temperature conditions



7. Specification

Display	128 x 64 pixel Transflective LCD with white LED backlight
User controls	6 buttons: POWER ON-OFF BACKLIGHT BACK-NO ACCEPT UP DOWN
User connections	Charger input USB type B for connection to a PC
Detector	51 x 51mm NaI(Tl)
Energy range	90keV to 3000keV
Power	2 off NiMH 4000mA 'C' size batteries (minimum capacity)
Charger	Input supply 110 to 240V ac, supplied with world-wide connectors
Environmental	
Temperature	Operating range -10°C to 50°C
IP Rating	IP54
Dimensions	330mm long, 150mm high, 90mm wide
Weight	1.9kg
Transport case	(transport case details may vary)
Dimensions	520mm long, 220mm high, 440mm wide
Weight	7.5kg with GMS310 and accessories



JCS has manufactured radiological instrumentation for over 40 years

We are proud of the products we build and in delivering the exact detection & measurement solutions that our customers require.

Since 1975 JCS have recognised that understanding our customers' needs and having the agility as an SME, to realise their developments is core to what we offer as a company.

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All our equipment is built to last in the UK where it has earned us our reputation for quality and reliability.

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