Instruments for Geophysics & Environment **SatisGeo**

GS-512i
PORTABLE GAMMA RAY SPECTROMETER

The **GS-512i Gamma Ray Spectrometer** is the portable instrument designed for field survey, especially for determination of contents of elements K, U, Th and total gamma-ray activity.

FEATURES

- 512 channels
- 8 Regions of Interest (ROI) set from the panel
- Internal memory for up to 7500 complete spectra
- Pile-Up rejector to detect and discard double peaks
- Automatic spectrum stabilization using typically ^{137}Cs or ^{133}Ba isotopes
- PC program for transfer and processing data
- Control from PC
- Assay mode – K, U, Th in % or ppm
- Dose rate in nG/h
- Test Pad calibration
- Detector NaI 3"x3"
- Large LCD graphical display
- GPS connection via Bluetooth

GENERAL

The **GS-512i Spectrometer** offers the user a range of features. Immediately after the end of measurement the contents of K[%], U[ppm], Th[ppm] or the count rates in relevant areas can be displayed.

The GS-512i enables the user to check the shape of complete spectrum and flexibly set the peak areas. The microcomputer can compute the precise position of the reference peak from the multichannel spectrum and therefore stabilize reference peak position through gain control. Simplicity in changing the reference channel allows to use different reference isotopes. The no-volatile memory serves to storing the measured data and to holding the measuring parameters and calibration constants.

Standard Set of GS-512i Spectrometer:

* GS-512i Spectrometer Console
* GSP-3 Detection Probe with crystal NaI(Tl) 3"x3"
* Cable (Detection Probe – Spectrometer Console)
* Reference Radiation Source EG1 ^{137}Cs (10 kBq)
* CD with calibration and communication program
* Shoulder Strap
* Instruction Manual
* Transportation Padded Case
* Screwdriver
* 6 pcs of NiMH Accumulators
* Charger
* USB Cable

GS-512i Optional Accessories:

* GSP-2 Hand Carry Detection Probe (NaI(Tl) crystal 2"x2")
* GSP-4 Hand Carry Detection Probe (NaI(Tl) crystal 4"x4")

GS-512i SPECTROMETER CONSOLE

Display: graphical LCD, screen resolution 240 x 128 dots
Keyboard: 20 push-buttons membrane-type, dust resistant, water-tight, waterproof.
Audio indication: piezoelectric buzzer, frequency 4 kHz
Power supply: internal: 6 LR6 AA Alkaline cells or 6 NiMH accu.
external: 8 - 15 V/400 mA

Interface: USB, Bluetooth
Battery life: minimum 12 hours at ambient temp. + 20°C
Dimensions: 228 x 83 x 110 mm
Weight: 1.5 kg with batteries
Temperature range: operating: –10 to +55°C
storage: –20 to +70°C

Input Amplifier

Input signal: 0 - 3 V from detection probe output
Pulse shaping: semi-Gaussian, 1 µs time constant with pole zero cancellation, Active base line restoration, Pile-Up rejector
Gain: automatic digital control over a range ±25 %

Analog-to-Digital Converter

Type: Successive Approximation, 16Bit, 1.33 MSPS
Zero drift: 2 mV/10°C
Conversion time: 0.8 µs
Channel width: 5 mV
Input voltage range: 50 mV to 2.5 V
Differential non-linearity: max. 1 % (range 50 mV to 2.5 V)
Integral non-linearity: max. 0.3 % (range 50 mV to 2.5 V)
Maximum input count rate: 50 000 counts per second with a peak displacement, due to zero shift, inferior to 1%

Internal Data Memory

Memory capacity: 16 MB, independent on batteries state

Channel Analyzer

Mean access time from ADC: 0.2 µs
Number of channels: 512
Maximum counts per channel: 2^{32}- 1
Dead time correction: measurement in live time
Sample period: 00:00:05 - 23:59:59 (hh:mm:ss)
Number of energy windows: 8 (ROIs)
ROI setting range: 1 - 511 channel, optional

Digital Spectrum Stabilizer

Reference peak setting: within the range of channels 40/500
Control mode: gain control of shaping amplifier
Control range: ± 25 %
Stabilisation sensitivity: 0.5 % (10^{-1} channel)
Period of control adjustment: selectable
Reference source: ^{137}Cs 662 keV reference peak setting in the channel 110.0 corresponds to energy calibration 6 keV/ch
The Automatic Spectrum Stabilisation can be switched off.

HAND CARRY DETECTION PROBES

	GSP-2	GSP-3	GSP-4
Crystal size:	ø 51 x 51 mm (103 cm^3)	ø 76 x 76 mm (346 cm^3)	ø 101 x 101 mm (824 cm^3)
Energy resolution:	FWHM for the energy 662 keV ^{137}Cs		
	Better than 7.5 %	Better than 7.5 %	Better than 8.5 %
Dimensions:	ø 90 x 393 mm	ø 120 x 410 mm	ø 190 x 460 mm
Weight:	1.6 kg	4.6 kg	6.8 kg
High voltage:	Stabilised high voltage power supply for the photomultiplier, range 800 - 1000 V adjustable inside detection probe after its opening		
Pulse rise/fall time:	0.5 µs / 22 µs		
Max. output voltage:	+ 3 V		
Gain setting:	10-turn potentiometer, accessible after detection probe housing removal. Recommended setting 0.5 V ±5 % for the energy 662 keV		
Output impedance:	100 Ω		
Probe housing:	Aluminium, with water resistant seals and thermal insulation		
Reference source:	^{137}Cs, activity 10 kBq (0.28 microcurie) removable, accessible in an external mount at the base of the detection probe		
Temp. range: operating:	0°C to +40°C		
storage:	–10°C to +50°C		
Detector:	Sodium iodide, thallium activated NaI(Tl) scintillation crystal and photo-multiplier as a monoline scintiblock		