

DENSITY GAUGE

Model SS200



Nucleonic Density
Measurement of
Slurries, Sewerage Sludge
And Liquids

- Fully digital operation
- Automatic gain stabilisation
- Low source activity
- Scintillation detector
- Rugged construction
- IP67
- Repeatability 0.0001 SG



SIStec

WHY THE SS200 HAS THE HIGHEST ACHIEVABLE STABILITY

For the highest achievable stability, three main areas need to be addressed.

1. Decay compensation

2. Dead Time correction

3. Gain Stabilisation

DECAY COMPENSATION

Decay compensation is the system built into the gauge to allow for the decay of the radioactive source. Each day the time elapsed between the last calibration and today's date is used to calculate a correction factor.

DEADTIME CORRECTION

In order to achieve accuracy, the count rate period selected must be as high as possible for the accumulation of counts in the required period of time. The electronics used in nuclear density gauges has a finite response time when analysing each pulse as it arrives. When the pulses arrive close together some are not analysed because earlier pulses are still being analysed. The time during which the electronics is unable to analyse pulses is called the deadtime.

For a nucleonic density gauge to be accurate the software has to add in the missing counts caused by the deadtime in the system. This is generally by using a well known statistical correction formula. However, what is not generally understood and allowed for in nucleonic density gauges is the fact that for the formula to work properly over the complete temperature range of the instrument, the deadtime must be extremely tightly controlled.

The SIStec Model SS200 eliminates this source of error by maintaining the deadtime very precisely over the temperature range of the instrument, in fact to a precision of +/- 10 nanoseconds.

GAIN STABILISATION

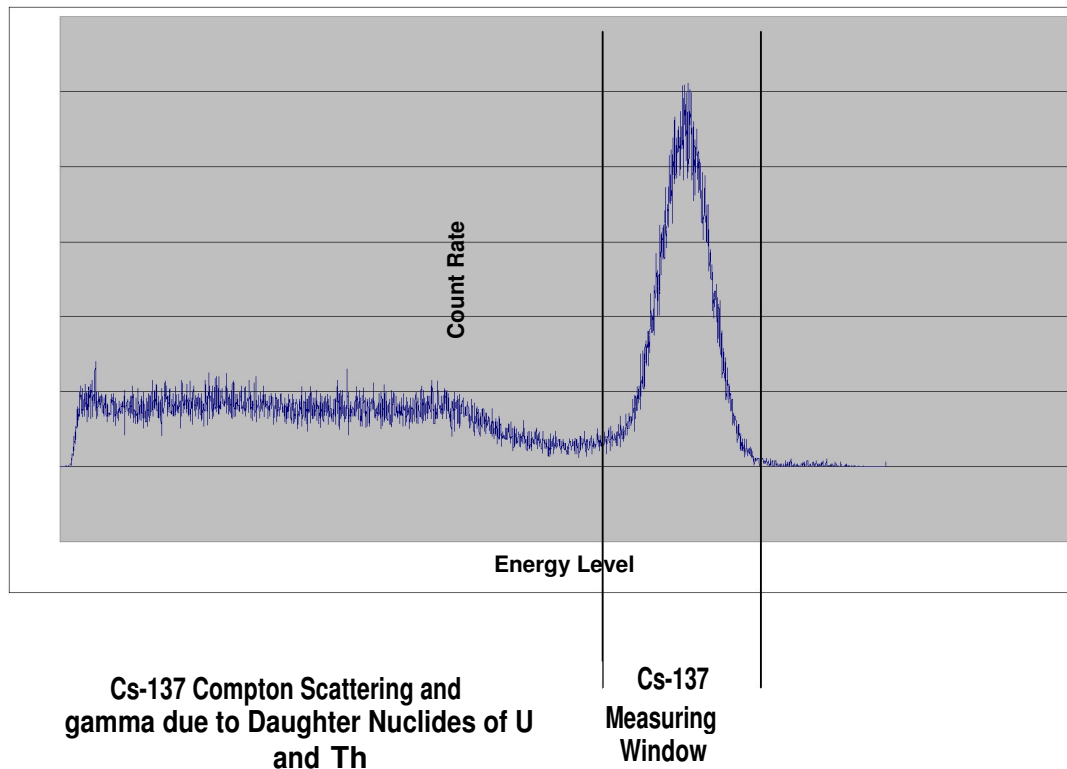
The SS200 employs a sophisticated control technique which monitors the count rate and compares it to a statistical model of the radiation and automatically adjusts the gain of the detector system accordingly, in effect an automatic gain control.

SG ERRORS IN URANIUM AND MINERAL SANDS MINING APPLICATIONS

In Uranium mining, unless precautionary steps are taken, gamma radiation in the slurries due to the Daughter Nuclides can introduce large errors in SG measurement. This can also happen in Mineral Sands mining when Monazite is concentrated by the process due to the presence of the same Nuclide progeny. In order to overcome this problem a new Digital Detector Card has been developed which is able to reduce this interference to negligible levels.

Reduction of Count Rate Errors Caused by U-238 and Th-232

The new SIStec improved SS200 Digital Detector Card, employs a digital Spectrum Energy Analyser to separate the main Cs-137 peak from other gamma which would otherwise cause errors. In the region of the Cs137 Compton Scatter, the gamma due to the Daughter Nuclides of U-238, U-235 and Th-232 will also be present. Thus by careful selection of the gamma window, their detection is greatly reduced so reducing Count Rate errors.



SPECIFICATIONS

Principle Components

Source Holder	Lead filled sealed ductile steel or 316 Stainless Steel Shielding meets or exceeds internationally accepted safety standards Rotary shutter with standardising absorber incorporated
Radioisotope	Double encapsulated Cs 137 or Co 60
Detector Housing	IP67 Rugged steel enclosure or 316 Stainless Steel Connects to Control Unit with instrumentation cable
Scintillation Detector	Sodium Iodide with integral photo-multiplier
Control Unit	IP 66 316 Stainless Steel housing Switch mode power supply 88 to 264 Vac or 24Vdc No loss of data with power off Decay clock continues with power off Data transmitted by RS422 link May be up to 1000 metres from detector module Isolated 4-20ma current output loops (1.5KV) Comms options: Modbus RTU, Profibus DP Device Net, Hart Protocol, Foundation Fieldbus

Operation

Temperature Drift	r 0.00003 SG units per degree Celsius
Repeatability	r 0.0001 SG units typical r 0.0002 SG units maximum
Operating Temperature	0 to 60 °C
Vibration	2g at 100 Hz
Humidity	5-95 % RH, non condensing
Inputs	4-20ma from volume flow gauge or temperature sensor
Outputs	Two 4-20ma current loops for SG, per cent solids, mass flow or temperature corrected SG. Mass flow integrator with potential free make contacts one pulse per tonne
Mass (Kg)	Source Holder - 34 Kg Detector Unit - 20 Kg Control Unit - 6 Kg