GAMMA RAY SPECTROMETER (INTEGRAL)

TYPE : GR 612



FEATURES:

- Ideal choice for university teaching / research labs in physics stream.
- Because of Integral design it conserves bench space and also significant savings in cost is achieved because of optimal design.
- Uses Microcontroller based Counter/Timer with advanced features for data acquisition & data outputting.
- Along with Scintillation Detector one can use it as a Gamma ray spectrometer or as a gamma counting system.
- ☐ Highly regulated variable HV from (0 to 1500V) @ 1mA, low ripple 25 mV (rms).
- Built-in linear amplifier with adj gain but with fixed shaping time.
- Built-in SCA facilitates operation in Integral, differential or window modes of counting.

Gamma Ray Spectrometer GR612, developed & manufactured by Nucleonix Systems is a low cost integral model specially designed to serve the requirements of P.G. Colleges & Universities both for teaching & Research labs. Considerable cost saving is achieved because of optional design & Integral construction, without any degradation in performance. It is designed around microcontroller which is used basically to derive timer, counter functions & also to set required HV for the detector, along with support pheripherals chips.

SPECIFICATIONS

LOW VOLTAGE SUPPLY: +15V, -15V, +24V & 5V are generated in LV PCB, to power-up all the circuits.

HIGH VOLTAGE SUPPLY:

(0 to 1500V) @ 1mA HV is adjustable by a ten turn helipot & dial.

- a. HV Output : Positive polarities
- b. Ripple & noise : Less than 10mV(rms)
- c. Regulation : Better than 0.5%

LINEAR AMPLIFIER PCB:

- a. Input Polarity : Positive or Negative
- b. Total Gain (Typical) : 600(Approx.)
- c. Output (Bipolar) : 0V to 8V (usable recommended Linear range) d. Max. Output : 12V (Saturation Level) e. Shaping : 1µsec
- SINGLE CHANNEL ANALYSER : a. Input : Unipolar or Bipolar witha +ve leading edge 0 to 10V b. Output Pulse Polarity: Positive Pulse Amplitude : +5V Pulse Width : 0.5 micro sec c. LLD output pulse amplitude : +5V Output pulse width : 0.5 micro sec Base line variable by : 10 turn helipot / dial Base line variation : 0 to 10V by helical potentiometer d. Window width continuously variable by helical potentiometer / Dial Window : 0 -1V in WINDOW mode ULD range : 0.10V in NORMAL mode e. LLD, ULD & MODE switch, controls have been provided on front panel

FILE_NAME : NSPL/DOC/ DS / GR612 / 01

VER_20170717

File: Datasheet_Edu

a. Display	: 20x2 LCD Dotmatrix display has been provided to indicate data counts & Elapsed time			
b. Preset time	: 0-9999 seconds			
c. Command Buttons	: START, STOP, PROG, STORE, INC & DEC command buttons have been provided on the front panel key board			
d. Modes of Data Acquistion: a. Counts for a presettime b. CPS				
e Preset Time Selectio	n: Programmable through switch control buttons			
f. Data storage	: Upto 1000 readings			
g. Programmability	: includes selection of preset time			
	storing / recalling of data, starting and stopping of acquisition, lable assignment for data counts such as BG (back ground), ST (standard) and SP (sample).			
h. Serial port	: This module additionally has built- in RS232C serial port for down loading the data into PC.			

COUNTER TIMER :

APPLICATIONS : The system finds wide range of applications in nuclear research and academic fields which include Identification of unknown isotopes and their relative abundance Measures the strength of Radioactivity of sample Useful in radio tracer techniques. System is highly recommended to carry out number of Gamma Ray Spectrometer experiments in a teaching lab.

SCINTILLATION DETECTOR:

Scintillation detector with flat type Nal crystal of 1"X1" or 2" X 2" flat or well type detector of 2" X 2" or 3" X 3" of NUCLEONIX make or its equivalent is compatible to GR612. The output (taken from preamplifier) is POSITIVE for all Nucleonix make Scintillation detectors. Hence the input polarity of the amplifier in GR612 is to be selected for POSITIVE. The LV supply of -12 V required for the Scintillation Detector Pre-amplifier is drawn from the GR612 rear panel. So also, the HV bias supply for the PMT of the detector assembly is also drawn from GR612 rear panel. Preamplifier of the scintillation detector is a charge integrating type of preamplifier.

SERIAL PORT (RS232C) (Optional):

Built-in serial port facilitates stored data transfer under PC programme control. This transferred data can be further processed if required by the user inPC.

ACCESSORIES FOR GAMMA RAY SPECTROMETER SYSTEM

Technical Data

Nucleonix Systems offers wide range of Nal Scintillation Detectors of different sizes both with flat & well type crystals, to meet the requirements of wide range of users for Gamma ray spectrometry measurements.

Scintillation detectors offered include 1"x1" & 2"x2" & 3"x3" Nal integral assemblies with built-in pre-amplifiers. These detector assemblies give excellent stability, superior performance & good resolution in the range of 8.0 to 9.5% for Cs-137.For teaching labs, we recommend 1"x1" or 2"x2" & 3"x3" Nal detector with this integral model.

SCINTILLATION DETECTORS



Important Specifications	Detector Type			
1. Flat/Well type Nalcrystal	SD 151	SD152F / SD152W		
2. Crystal Sizes	1" x 1"	2" x 2"		
3. Well Size (applicable for SD 152 W & Sd 153 W only	-	0.656" dia x 1.546" deep		
4. Resolution (Betterthan)	8.5 %	8.5%		
5. Photo multiplier	R6095 of	EMI 9857 or 9266 or its equivalent		
	Hamamatsu or			
	its equivalent			
6. Pre-amplifier	Built – in	Built – in		
7. Gain (Approx.)	25	25		
8. Noise (RMS. referred to input)	Less than 50 μV	Less than 50 μ V		
9. Operating Voltage	600 to 900 V	700 to 900V		
10. Out put	Positive Tail	Positive Tail Pulse		
	Pulse			
11. Output impedance	90 Ohms	90 Ohms		
12. Power Requirement (Typical)	-12V @ 12 mĀ	-12V @ 12 mA		

Important Note: All Nal Scintillation Detectors manufactured & supplied by Nucleonix systems, use integral assemblies of Saint Gobain who are world leaders.

GAMMA REFERENENCCE STANDARDSET

TYPE: GS 290

Gamma Reference Standard Set Type: GS290 consists of a set of FIVE Gamma sources evaporated and sealed on 25mm dia x 5mm plastic discs ranging from 100KeV upto 1.33MeV energies with activity in the range of 2 to 5 micro curie. A reference chart for this is given below. The accuracy of these sources is in the range of +/-10%. All these disc sources are enclosed in a neatly polished wooden box.

lsotope	Energy MeV	Nominal	Half
Co-57	0.123	2-5 ci	273 Days
Ba-133	0.36 (Main)	2-5 ci	7.5 Years
Na-22	0.511; 1.280	2-5 ci	2.6 Years
Cs-137	0.662	2-5 ci	30 Years
Co-60	1.17; 1.33	2-5 ci	5.3 Years



LEAD CASTLES FOR SCINTILLATION DETECTOR - LS 249, LS 250, LS251.

This consists of 40mm thick lead shielding cylindrical rings assembled according to the detector. There is a provision in the bottom ring through which system connections are given to the detector, which is placed inside the lead shield.



For 1"X1" detector (8 lead assembling parts)





For 2"X2" detector (9 lead assembly parts)

LS 250



For 3"X3" detector (10 lead assembly parts)

LS 251

The top ring has a holding knob through which sample can be loaded on to the scintillation detector, and this closes the lead castle from top side.

Head of the Dept.

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Approved By

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