RADIATION COUNTING SYSTEM WITH ACCSSORIES FOR BETA SAMPLE COUNTING

RADIATION COUNTING SYSTEM
TYPE: RC 605A

Technical Data

FEATURES :

- Manufactured confirming toANSI N 42.17.
- Complies to IS -9000 part III & V, for climatic tests.
- Complies to Interference test as per IEC61000 or equ.
- State of art microcontroller based design.
- 20 x 2 LCD dot-matrix display for counts, elapsed time and HV.
- Counts capacity 999999, preset time 9999 sec.
- Variable HV (0-1500V), 0.5mA
- Built-in parallel port for direct data printing.
- Built-in RS 232C/RS485 serial port for data transfer to PC.
- Programmability for label assignment for a sample.
- Facilitates connection to End window GM detector or Beta scintillation probe for sample counting.
- Measures gross Beta activity / contamination in water and other environmental samples. Including Air, Water, Soil, Vegetation & Biological samples. Suggested products for Environmental Survey labs.

Radiation Counting system, type **RC605A** manufactured by NUCLEONIX is a versatile state of art integral counting system designed around eight bit microcontroller chip for using with a variety of detector probes such as Alpha / Beta / Gamma scintillator detector probe or End window G.M detector probe. The system is suitable for counting Alpha, Beta and Gamma sample counting with appropriate detector probes. This system essentially works as a Beta sample counting system with any one of the probes GM125/SBP-2 connected to it.

Radiation Counting System essentially has a processor card and other electronic circuits to generate continuously variable HV upto 1500V to be applied to scintillation detector Probes (α, β, γ) or End window G.M.Tube, amplify the detector output and convert them to digital pulses for counting and displaying the recorded counts for a preset time. Microcontroller design facilitates programmability for background, standard and sample counting. The data can be downloaded into PC or printed directly onto a printer. System facilitates counting of samples either on planchets or filter paper.

Applications: This system will find applications for counting of air activity, wipe, environmental samples, including air, water (river, lake, pond, ground & sea waters), soil, vegetation & biological sample.System can be used by testing labs, Environmental survey labs at Nuclear Plants, in normal or in a Nuclear disaster scenario.

SPECIFICATIONS

P.M. Input (From α, β, γ scintillation detector probe) :
(a) Polarity : Negative
(b) Amplitude : -100 mV (min)

G.M. Input (From G.M.Counter) :
(a) Polarity : Negative
(b) Amplitude : -500 mV (min)
(c) Built-in load resistor : 330K & 3.3M

HV Output :
HV (0-1500V)@1mA continuously variable through front panel ten turn heliport & dial. Ripple & noise less than 25mv.Pulse height discriminator(internal trimpot settable from 200 mV to 5V)

HV indication :
On LCD dot-matrix provided.

Display: 20x2 LCD dot-matrix display has been provided to indicate data counts, Elapsed Time and HV.

Counts Capacity :999999 counts

Preset time :1sec to 39999 sec

Preset cycles / Iterations :1 to 99

Command Buttons: START, STOP, PROG, STORE, INC & DEC command buttons have been provided on the front panel key pad.

Paralysis Time :
A choice of three paralysis times 250, 350 and 550 micro sec plus OFF position selected through PROG key.

Programmability :
Includes selection of Preset Time, Storing / Recalling of data, starting and stopping of acquisition, label assignment for data counts BG (Background), ST (Standard) & SP (sample) etc,.

RTC: Built in RTC provides real time clock information which is stamped in the activity report when printed. Built in Real time clock facilitates the user to generate sample analysis reports with RTC stamping. Both date month & time in hrs and minutes are printed.

Scintillation detector probe socket: This is a MHV socket for connecting to α, γ scintillation Probe. UHF

G.M. Socket: MHV connector for connecting to G.M. Detector.

Printer Port: Built-in centronics port facilitates connection to a printer for direct data printing selectively.

Serial Port : Built-in USB serial port facilitates data down loading into PC.

Data Communication Software : (Optional at extra cost) Can be provided for serial transfer of data readings into PC.

Power: Unit is powered works on 230V, AC, 50Hz through power / adapter which delivers +12V input to unit.

Operating Temperature:0 to 50^{o}C

Relative Humidity : Upto 90%

Instrument will meet all requirements applicable to :

- ❑ Manufactured confirming to ANSI N 42.17.
- ❑ Complies to IS -9000 part III & V, for climatic test.
- ❑ Complies to Interference test as per IEC61000 or equ.

Mechanical Dimensions :
250mm(W) X135mm(H)X325mm(D) Approx.

TYPICAL ALPHA / BETA / GAMMA SAMPLE COUNTING REPORT

BGD CPM	:	0000	PTIME (BG)	:	0300
CPM OF STD	:	00092	PTIME (ST)	:	0300
DPM OF STD	:	00265	PTIME (SP)	:	0300
EFF. OF STD	:	034.7			
*FLOW RATE	:	01.00 (lit/min)			

SL.NO	LABEL	RTC	COUNTS	P.TIME	VOL( )	Bq/VOL	iter
0001	BG	11:43 06-09	0000CPM	000180	---	----	---
0002	STD	11:52 06/09	000160CPM	000060	0010dps	26.56% Eff	
0003	SP1	11:47 06/09	000196	000060	0000 ml--	0000.00Bq/ml--	01
0004	SP2	11:48 06/09	000180	000060	0001ml--	0009.03Bq/ml--	01
0005	SP3	11:50 06-09	000187	000060	0010ml--	0000.93Bq/ml--	01

APPLICATIONS:

This system can be used for counting **α, β or γ** samples on a 25mm dia planchet or 47/50mm dia filter paper obtained from air samplers, or continuous air monitors in a Nuclear facility. System can also used for wipe sample counting in nuclear counting lab of a Nuclear power plant or similar facility. Also this system can be used in a University for teaching lab experiments in a physics department.

BETA PROBE ASSEMBLY/ACCESSORIES FOR BETA SAMPLE COUNTING SYSTEM

Technical Data

(i) LEAD CASTLE TYPE : LS 240

This is essentially an integration of the following units.

i. Lead Castle LS 240
ii. G.M. Stand SG 200
iii. G.M. Detector GM 125
iv. Plastic Scintillation Detector (SBP2)
v. Stand for pancake detector SG201
vi. Planchets (AL & SS)
vii Optional Accessories

The Lead Castle Type : LS 240 is designed to shield the G.M.Counters from background radiation. Lead Castle type LS 240 can house G.M. counters mounted on Geiger tube stand of NUCLEONIX make. The shield is of 45 mm thickness and is built up of six interlocking rings. The top and bottom are covered by similar interlocking discs. A door is fitted in the bottom ring with 150 degree opening to facilitate easy access to the sample holding tray of G.M. Stand. The door is fitted with heavy duty hinges and the inside of the lead shield is lined with thin aluminium sheet to minimize scattering.

Dimensions

a. External : 200mm dia x 370mm height (approx)
b. Internal : 120mm dia x 300mm height
c. Weight : Approx. 96 Kgs.

(ii) STAND FOR G.M. DETECTOR TYPE : SG 200

Stand for G.M. tube type SG 200 has been designed to hold end window G.M. tubes. This stand can be housed inside the lead shielding if required. It has both sample and absorber trays. The position of these trays can be adjusted from the end window of the detector. The stand made up of acrylic sheet is precisely milled for sliding-in of sample and absorber trays.

Sample tray is made up of SS material designed to hold planchets or disc type radioactive standard source (Beta or Gamma).Aluminium absorber discs can be interposed between the source and the detector for attenuating the radiation as seen by the detector.

This stand is an essential accessory for connecting end window G.M. tube to any of the G.M. counting systems or Radiation Counting System manufactured by NUCLEONIX.

(iii) END WINDOW G.M. DETECTOR TYPE : GM 125

GM 125 is a Halogen Quenched, wide End Window GM Detector, supplied by NUCLEONIX. It is highly recommended for swipe sample counting of Beta samples by health Physics labs. Its operating voltage is approximately 500V. It has good plateau length and plateau slope. Its operating voltage is approximately 500V.
It is enclosed in a PVC cylindrical enclosure for protection & supplied. An MHV socket provided on one side of the PVC enclosure facilitates one to connect to detector socket on rear panel of the counting system.

SPECIFICATIONS

Application : Suitable for Beta sample Counting

Operating Voltage : Range : 450 - 750 V

Tube Dimensions: Max. over all length 1.93 inches.

Gamma Sensitivity : 50 cps / mR/hr with Co-60

Background with 40mm lead shielding :≤ 350 counts/1000secs

Efficiency at (1 cm) : (typical) (a) Sr-90 +Y-90 ≥ 15% (with protected mesh)

MDL (as measured with Background in Hyderabad at our works):0.0000099377µCi (0.367666Bq)

NOTE: MDL vary in your place depending upon the background at your place.

Max. Diameter : 1.13 inches

Gas filled : Ne + Hal

End Window : mica 2.0 mg/cm sq. density

(iv) BETA SCINTILLATION PROBE (PLASTIC SCINTILLATION BASED) TYPE : SBP-2

Beta probe assembly type SBP-2 is a plastic scintillator based assembly consisting of '2' Dia scintillator coupled to '2' PMT. This plastic scintillator is of density 1.02 g/cc, serves as the detector material. This is covered by thin aluminized foil, which serves as Beta entrance window. It is primarily designed to serve as a Beta Probe when connected to a Radiation Counting System.

PMT used : 2" dia of Hamamatsu make

Plastic scintillator density : 1.02 g/cc

Operating Voltage Range : 900–1000V

Background (typical) with 40 mm lead shielding :≤ 370counts/1000secs

Efficiency for Sr-90 (typical) at 1 cm :≥ 40%

MDL (as measured with Background in Hyderabad at our works):0.00000382452µCi (0.1415075Bq)

NOTE: MDL vary in your place depending upon the background at your place.

(v) STAND FOR PANCAKE DETECTOR TYPE:SG201

Note: G.M. detector stand if required for mounting pancake detector will be offered, as per the requirement.

(d) Stand for Pan cake detector :Stand for Pancake detector, is fabricated using precisely nulled Black PVC parts. The detector holder is made of Aluminium with Cylindrical depression, to hold the detector. It is additionally provided with sample & absorber trays. Sample tray facilitates one to place 25mm dia planchets for sample counting.

This is a pan cake detector sensitive to Beta radiation and with window closed can be used for gamma doserate measurements also. Has large surface window area of 16 sq.cm.

Application :
Beta-gamma Contamination monitoring and also for gamma doserate measurements

This Detector is a part of Beta/gamma pan cake contamination probe which is used with Contamination Monitor, portable as well as with Bench Model. This detector is equivalent toLND7311.

General :

Gas filling	:	Ne + Halogen
Cathode Material	:	446 SS
Maximum Length	:	3.0 Inches
Effective Depth	:	0.5 Inches
Maximum Dia	:	2.11 Inches
Effective Dia	:	0.61 Inches
Connector	:	Grid Cap

Operating temperature range : -55 to +75^{o}c

Window :

Areal Density	:	2.0 mg/cm^{2}
Effective Dia	:	1.75 Inches
Material	:	Mica

Gamma Sensitivity :
60 CPS / mR/hr (Co^{60})

Operating Characteristics :
Max. Starting Voltage : 750V
Recommended Operating voltage : 900V
Operating voltage range : 850-1000V

(vi) PLANCHETS (AL & SS)

SS and aluminium planchets are required to place the prepared environmental samples for counting. These planchets are of 25mm dia & have a depth of 2mm. These are designed to fit into the sample / source holder / drawer of the detector assembly.

(vii) OPTIONAL ACCESSORIES

(a) **Count Net** - RS485 based networking software (for multiple systems network).

(b) **Data communication software:** for data downloading from a single system.

(c) **Dot Matrix Printer:**Radiation Counting System has a built-in centronics printer port, it can be directly connected to a printer. Data readings stored in the unit can be downloaded onto the printer (Care should be taken while choosing the printers not all printers are compatible. Please consult Nucleonix systems for choosing your printer).