

CONTAMINATION MONITOR (Bench Model) TYPE: CM 712

Technical Data

Contamination Monitor Type : CM 712 manufactured & supplied by Nucleonix systems essentially serves as a frisker and is primarily designed to measure Alpha, Beta & Gamma contamination, on work benches, clothing, hands etc., in Radiochemical plants, Nuclear Power plants and other similar installations. It is designed to be table top model or it can be mounted on a mobile stand with castors. It operates on AC mains 230V, 50 Hz. This unit has a wide choice of contamination probes for Alpha & Beta-gamma contamination measurement.



Features

- Manufactured confirming to ANSI N 42.17, to performance specifications
- Complies to IS -9000 part III & V
- Interference test as per IEC61000 or equ.
- State of art electronics, uses microcontroller
- Compact, light weight & elegant
- Choice of Beta / Alpha contamination probes
- Counting accuracy +/-15% with contamination probes
- Alpha/Beta contamination in CPS / CPM with auto ranging
- Time Constants : LO, MED, HI
- Modes : CPS / CPM / Preset Scalar
- Built-in serial port & parallel port



Specifications

Detector assembly : The instrument can be supplied with three detector probes, two detectors for Beta gamma and one for alpha, with the specifications given below.

Beta gamma detector : Side window probe with Halogen quenched GM detector, thin walled (25 / 30) mg/sq. cm. in a protective housing with a rotatable shutter for cutting off beta particles. This will be used for measuring beta as well as gamma contamination.

End window probe consisting of an End window Halogen quenched GM detector 30 mm dia, 3-4 mg/cm² thickness mica window housed in a suitable protective cover with handle. The end-window is provided with a removable cover.

▮ Detection Efficiency : Greater than 2-2.5% for side shutter type probe & Greater than 15% for End window type for Sr-90 Beta particles.

Instrument Fault indication : EHT failure: Visual alarm with flashing red LED indication & "Eht" message on LCD display
 Detector failure: Visual alarm with flashing red LED & "d-FI" message on LCD display.

Microprocessor / microcontroller failure : Visual alarm with flashing green lamp
 Fault indications are cleared automatically if normal status is resumed.

Audio Visual Alarm system

- ▮ Alarm setting range : 0 to full scale of the range selected
- ▮ Alarm setting accuracy & stability. : Better than + /- 10% over a period of six months .
- ▮ Alarms are indicated by Red (LED) large area window display and loud audio alarm
- ▮ Distinctive EHT/Detector failure alarm
- ▮ Large Area instrument "ON" indication.
- ▮ Provision for display of alarm set point on demand through

1 Probe Construction : Hand-held type; viewing side is provided with a removable cover.

Alpha Detector : ZnS (Ag) scintillator, approximately 20 mg/cm² on perspex; covered by 1 mg/cm² aluminised, pin-hole free, light-resistant mylar film, protected by a suitable thin metallic grill.

The scintillator is optically coupled to a suitable photomultiplier tube along with an appropriate low noise pre-amplifier etc.

1 Detection Efficiency : Greater than 25% at centre and uniform within 5% for plutonium alphas over complete detector area.

1 Probe Construction : Hand-held type; viewing side is provided with a removable cover

1 Sensitive Area. : 100 sq. cm.

Electronic Unit : The electronic Unit shall comprise of Low voltage power supplies, EHT supply unit, count-rate meter based on Intel family/microcontroller, and an audio visual alarm system. The unit is provided with two UHF connectors, one for Alpha detector and other for Beta gamma detector along with the corresponding input circuit. At a time only one detector can be used.

Low Voltage power supply : The low voltage power supply unit will supply the DC power supplies required for the operation of the electronic module. It has very good line voltage and load regulation. It is fitted with Mains line filters to avoid line interferences.

EHT Supply : It provides EHT voltage for the working of the GM / scintillation detectors. Its output is continuously variable from +300V to +1500V. Output can be adjustable through front panel keypad and EHT should be displayed on the display.

Count-rate meter :

1 Ranges : 0- 50, 0-500, 0-5000 and 0- 50,000 counts per minute The range selection is automatic depending upon current countrate.

1 Time Constant : Varies inversely in the range of 1 sec to 10 sec.

1 Display : 16x2 LCD display is provided for display of countrate and for textual message indication

The instrument also displays the reading in a calibrated LCD Bar graph display with the shape of an analog meter scale.

1 Audio indication : Chirping audio is provided to indicate the contamination of the object being monitored. The audio will be one chirp per pulse.

1 Overflow : > 50000 CPM

1 Over load : > 99999 CPM

1 Accuracy : +/- 5% Full scale.

keypad

1 Alarm set-point is adjustable continuously by the front panel keypad / hand held configurator or from Remote PC with password protection.

1 Alarm annunciation scheme : The audio and visual alarm will go off automatically when the reading falls below the alarm set point.

Housing : All the electronic sub-systems are housed in a single enclosure. All the controls and display are on the front panel. The cabinet is Vapour-tight , rugged & elegant.

Remote /External Console :

1 4 - 20 mA full scale output. Output circuitry shall be able to drive 200 mtrs. of twisted pair of wires.

1 Two sets of potential free contacts of Alarm relay (Change over). Contact rating 3 Amps at 250 VAC.

1 9 pin D connector for RS485 communication.

1 All these signals are terminated on a suitable connector (Allied Connectors). The corresponding unwired mating plug will be supplied with the monitor.

RS-485 Specification :

Type : Isolated Multi-drop serial communication port, half duplex bi-directional communication

Address : User configurable from 0 to 255

Protocol : MODBUS RTU

Bit Rate : user 19200

Connector : 9 Pin D Type Connector

Self Diagnostics :

The monitor has built-in self diagnostics. On being powered it will perform tests to ensure that all components and sub systems are functioning properly . It will check for the Power supply, High Voltage Supply, Detector, Counting and measuring circuits, Alarm Systems and Display Systems.

The firmware will not halt monitoring / data acquisition function any time. The firmware is designed for high reliability and availability.

Test points are provided for checking the EHT voltage and jumpers are provided for connecting external input pulse signals.

Input Power : 230VAC +/-10%, 50Hz, single phase supply. Power ON/OFF indication is provided with Neon indicator. Spike suppressor and line filter are provided.

Environment : The instrument shall be able to withstand temperature upto 50o C and relative humidity upto 90% in radiation areas.

Instrument Trolley : The instrument is provided with trolley as an accessory to house all the hardware like detector

1 Calibration Accuracy : +/- 5% Over the full range.
1 Calibration Stability : Better than +/- 5% over a period of six months.
1 Testing Facilities : Provision to inject a suitable pulse generator signal for routine testing of Alpha / Beta Count rate sections is provided on the rear panel.
Additionally a test pulse mode through software for checking count-rate meter is provided.

probes, Electronic unit etc. The Instrument trolley is made of M.S. with castor wheels.

Environmental EMI / RFI & performance Compliance: This instrument is designed to comply to IEC 60325 for its radiation performance, environmental & EMI / RFI compliance. For EMI / RFI compliance, test specifications specified by IEC 61000 standards are applicable.

ACCESSORIES

Beta - Gamma Contamination Probe

(a) G.M. Detector : (BCP-1) (thin walled) Thin walled GM detector housed in S.S.envelope having handle and sliding window for Beta radiation discrimination.
Cable length : One Meter
Operating Voltage : 500V
Cathode wall thickness : 40-60 mg/cm²
Probe dimension: 210L x 32D in mm
Gamma sensitivity : 45 c/s / mR/hr.



b) End window G.M. Detector Probe : (BCP-2)

Uses GM detector with 1" end window thickness 1.5 - 2 mg/cm². End cap is to be removed for Beta Contamination measurement. For Gamma radiation measurement, end cap is to be retained.



(c)Beta - Gamma Contamination Probe (BCP-3) : This also serves as a clothing probe, for Beta-Gamma hand, foot & clothing monitor or as a Contamination probe for bench model Contamination Monitor. This uses a thin walled GM tube which is housed in a cylindrical shell made of Aluminum. Detector side of the cable has a cable gland arrangement with cable length being 1.0 meters. There is a rotating shutter arrangement made of SS shell, which is kept open for Beta measurement.

Detector : Thin wall Beta-Gamma detector
Detector Probe : 35cm L x 3.2cm Dia
Operating Voltage : +900V
Cable Length : 1.0 meter



(d) Alpha Contamination Probe type ACP-2 of Nucleonix make serves as a Alpha Contamination Probe with a viewing area of approx. 20 sq.cm (2" dia). It is designed to work with Nucleonix make Contamination Monitor (Bench Model) CM712 or its equivalent.

Alpha Scintillator Screen: Circular Scintillator ZnS screen covered with aluminized

mylar foil of 25mm dia will be used.

PMT : 2" PMT.

Viewing area : 20 sq.cm Approx

Operating Voltage Range : 800V to 900V

Efficiency : Better than 25%

Cable length : One meter (by default)

Application: Recommended for use where viewing area of the order of 2" dia is adequate.



(e) Pan Cake Detector Probe type PCP-1, manufactured & supplied by NUCLEONIX SYSTEMS is an ideal choice for Contamination Monitor both with bench model & portable type of units. It has a wide circular viewing area of 1.75" dia window to allow Beta. Detector body is enclosed in a thin SS enclosure having a lid which is closed for gamma dose rate measurements. This probe measures gamma dose rates upto 500mR/hr & Beta contamination both CPS & CPM. Probe has a nice handle to hold made in black nylon.

Detector Type : Pan Cake-1

Gamma Sensitivity : C/S/mR/hr (Co-60) : 60

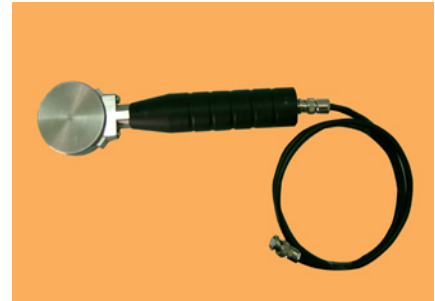
Dimensions (Detector) :

Length : 3.0 Inches

Effective Depth : 0.5 Inches

Maximum Dia : 2.11 Inches

Application: This is offered both for Beta / Gamma Contamination Monitors.



(f) Pan Cake Detector Probe type PCP-2, manufactured & supplied by NUCLEONIX SYSTEMS is an ideal choice for Contamination Monitor both with bench model & portable type of units. Probe has a nice handle to hold made in black nylon.

Detector Type : 2 no.s of Pan Cake detectors.

Probe size : 6.5 X 11.5 cm

Active area : 75 sq.cm (approx)

Gamma Sensitivity C/S/mR/hr (Co60) : 60 per detector

Dimensions (Detector) :

Length : 4.72 Inches

Effective Depth : 0.90 Inches

Maximum Dia : 1.96 Inches

Application: This is offered both for Beta / Gamma Contamination Monitors.



(g) Alpha Contamination Probe : (ACP1)

Alpha Contamination Probe type ACP1 of Nucleonix make serves as a large area (Approx. 100 sq.cm) alpha contamination probe. It is designed to work with Nucleonix make contamination monitor CM712 or its equivalent.

Alpha Scintillator : ZnS (Ag) Scintillation film covered with aluminized mylar foil for light tightness is used as the detector.

PMT : 2" PMT.

Viewing area : 100 sq.cm Approx

(A ZnS Scintillator screen of 10x100mm will be used) with a conical light guide for 2" PMT.

Operating Voltage Range : 950V to 1050V.



Efficiency : Better than 25%

Cable length : One Meter (by default)

(h) Mobile Stand (MS-1) : Mobile stand with a base plate fitted with lockable caster wheels & an SS cylindrical column to support the top base plate & the instrument has been designed & made available as an accessory to the bench model contamination monitor.

Top base plate onto which instrument is mounted can be tilted slightly so that viewing angular face of the instrument is convenient to the user. This top base plate can accommodate contamination probe also. Mains supply board with required sockets and switches are provided on the trrolley.

Mobile Stand Material: Fabricated in SS

Base Plate Size: 52 cm Length x 43cm Depth

SS column

a) Height : 101 cm

b) Diameter : 16 cm

Top plate size : 43.5 L x 29 D cm

Adjustable Angle: 200

