

## WIDE RANGE GAMMA MONITOR TYPE: WR725I

### Technical Data



### FEATURES:

- Dose rate range covered 1mR/hr to 1000R/hr with 204 cc chamber.
- Dose rate range covered 10mR/hr to 1000R/hr with 17 cc chamber.
- Auto ranging & auto TC selection in the range of 16 sec to 1 sec depending upon dose rate.
- Large size 6x7 segment LED indication for dose rate is provided.
- Designed using a compact pressurized Ionization chamber having sensitivity of  $1.5 \times 10^{-10} \text{ A / R/hr}$  /  $1.2 \times 10^{-9} \text{ A/R/hr}$ .
- Large size WINDOWS for NORMAL & ACTIVE alarm condition.
- 4 to 20 mA current loop is available for remote indication .
- 16X2 LCD display dot-matrix display for visualization.
- IP65 Compliant Unit.
- Compliant to ANSI.N42.17A & IEC61000 standards.
- Seismically qualified as per IEEE 344-(2004) Standard.

**Wide Range Gamma Monitor** type **WR725I**, manufactured by NUCLEONIX SYSTEMS employs state-of-art micro- controller based design and is primarily meant to serve as a Gamma Zone Monitor to indicate dose rates and give alarm, visual and aural, once the dose rates exceed the preset level fixed by the user. Also relays will be activated on alarm.

This unit will be useful for monitoring Gamma dose rate levels in working areas of radioisotope laboratories, radiology departments, medical & industrial radiological installations apart from its usefulness in Atomic Power Stations and other active labs.

This unit indicates the dose rate digitally on a 6 x 7 segment LED display. Each of the annunciator windows for NORMAL and ACTIVE conditions has LED array. Once alarm triggers ACTIVE window starts blinking.

Unit can be programmed / configured using front panel keypad which can be deactivated after completion of programming. Configuring the unit namely setting preset level, setting reset mode - AUTO/MANUAL etc., are achieved by this keypad.

Unit also performs self-diagnostics for EHT failure, pulse processing electronics failure & detectors failure on power up.

Alarm acknowledge and reset pins are provided on the circular I/O connector for remote acknowledge & reset.

**SPECIFICATIONS**

**Radiation to be detected:** X-ray & Gamma Radiation.

**Range:**

**Option (A):** 17 cc chamber range: 10 mR/hr to 1000 R/hr or 100 µSv/hr to 1000mSv/hr **Option (B):** 204 cc chamber range: 1 mR/hr to 1000 R/hr or 10 µSv/hr to 1000mSv/hr.

Continued exposure to more than 10R/hr is tolerable.

**Detector: Option (A):**

Pressurized Ion Chamber with external energy compensating filter and sensitivity of  $1.5 \times 10^{-10}$  A / R/hr.

Sensitive volume: 17cc  
Probe Dimensions: 46mm dia x 246mm long.

**Option (B):** Pressurized Ion chamber with external energy compensating filter and sensitivity of  $1.2 \times 10^{-9}$  A / R/hr.

Sensitive volume = 204 cc  
Probe dimensions: 70mm dia x 275 mm long or lower..

**Energy Dependence:** Within +/- 25% with respect to Cs-137 in the range of 200 keV to 1.3 MeV for option A and +/-30% for option B..

**Accuracy:** +/- 10% with Co-60 above 10mR/h for Probe A and 1mRh for Probe B.

**EHT:** -400 V to -700 V DC adjustable (Typical -500V).

**Display:** Auto Ranging direct reading, 4 digit 7 segment LED display & 16x2 LCD display. 4x7 LED display is interfaced using multiplexed display driver. 4x7 segment display is used for display of dose-rate and hardware status indication & 16x2 LCD for visualization of preset alarm and other parameters.

**Display Resolution:** 1mR/hr (10 µSv/hr) for probe-1 and 0.1mR/hr (1µSv/hr) of probe-2.

**Overload:** Senses overload above 200% of fullscale and upto 1000R/h & indicates on display "OL"

**Over-range:** Senses if the radiation field being measured has exceeded the measurement range of the instrument and upto 200% of the instrument and displays "OFI"

**Recorder output:** 4 to 20 mA, with 600 ohm load with 16 bit resolution.

**Time Constant:** First reading on Power ON within 15 secs.

**Calibration Accuracy:** +/-10% throughout the range.

**Instrument "ON" Indication:** Large Area Green LED Lamp. This will indicate the Normal condition also. **Alarm range:** 10 mR/hr to 1000 R/hr for Probe A & 1 mR/hr to 1000 R/hr for Probe B .Range Extendable to 999 R/hr The alarm level setting will be carried out through front panel keypad / RS485 port using handheld configurator / PC with password protection. Front panel keypad is provided with DIP switch de-activation **Alarm Indication:**

- a) Red (LED) flashing large area window display
- b) Loud audio tone (dual frequency tone)

**Alarm annunciation scheme:** As tabulated below

Parameter Status	Visual indication (Red LED)	Audio
Normal	OFF	OFF
Abnormal	Flashing	ON
OnACK	Steady Red	OFF
Back to normal	Steady Red	OFF
Reset on abnormal	Steady Red	OFF
Reset on normal	OFF	OFF

**Instrument Controls:**

- a) Acknowledgement switch for muting audio
- b) Reset switch for resetting the Alarm indication and alarm relay.
- c) Power ON/OFF switch (This is inside the cabinet) with Power ON indication.

**Instrument Fault indication:**

- a) EHT failure: Visual alarm with flashing red LED indication & "Eht" message on display
- b) Detector failure: Visual alarm with flashing red LED & "d-FL" message on display.
- c) Microprocessor / microcontroller failure: Visual alarm with flashing green lamp.
- d) Fault indications shall be cleared automatically if normal status is resumed.

**Detector Housing:**

- The Pressurized Ion Chamber is located external to the Monitor.
- It is housed in a suitable, air-tight SS shell and is connected to the Electronic Unit through a suitable Cable assembly (Length could be extended upto a maximum of 50 mtrs)
- The instrument is provided with 50 mtr low noise cable between detector and the monitor.
- The detector housing will qualify minimum industrial protection Class IP-65.
- A separate bracket for wall mounting of the detector housing will be provided.

**Pre-amplifier:** The pre-amplifier circuit is contained in a air-tight housing inside the electronic unit and connects to the detector through suitable connectors and low noise cable assemblies. Additionally test mode wherein internally generated test signal can be used for pre-amplifier performance test is provided. Provision for zero and gain adjust are also available in this design.

**Monitor Enclosure:**

- Vapour-tight, rugged & elegant.
- The door is provided with lock and *key arrangement*
- The enclosure qualifies industrial protection Class IP-65.
- Decorative with visual aesthetics, prominent alarm display and good readability.

**Mounting:** Detector housing is mounted using clamps on top of the monitor. The monitor is wall mountable type. Brackets for the monitor & detector housing shall be supplied along with the equipment.

**Remote /External Console:**

- 4 - 20 mA linear proportional to full scale display output. Current output will be able to drive load of 600 ohms. (Output circuitry shall be able to drive 200 mtrs.of twisted pair of wires).
- Two sets of potential free contacts of Alarm relay (Change over). Contact rating 3 Amp at 250 VAC. The relay is energized on normal condition and de-energised under alarm condition.
- Remote alarm acknowledgement and reset signals for the field instruments (Normally open contact).
- Indication of instrument fault condition (detector, EHT and LV supplies), over range & overload conditions by up-scale 4-20 mA. (22.5 mA).
- All these signals are terminated on a 17 pin socket (Allied Connectors). The corresponding mating plug with 5 mtr cable shall be supplied with the monitor.

**Computer interface:** The monitor has a RS-485 Serial/ Ethernet Communication port for interfacing with a remote IBM PC-compatible computer. The features supported by Ethernet serial port are given below.

- The PC and the monitor operate in a host-slave configuration and the software protocol will be MODBUS-RTU/MODBUS-TCP.
- The PC as the host gives commands and send queries. The monitor will carry out various functions in response to the queries.
- The firmware of the monitor will be able to send the instrument data like instrument ID, instrument type, input range, display range, alarm settings,

alarm status, current reading, diagnostic status of EHT/GM tube etc. to the Host PC on demand.

- The firmware will be able to receive commands from Host PC and carry out the setting of different parameters like instrument ID, instrument type, input range, display range, alarm settings, Ack, Reset, instrument address etc.

**RS485 specifications:**

Type : RS485 multidrop serial communication port, half duplex Bi-directional communication.  
 Character Format : ASCII  
 Protocol : Modbus / RTU  
 Bit rate : User configurable to 9600 and 19200 bits per sec.  
 Address : User configurable from 0-255.  
 Connector : 9 pin D-type connector (2 connectors connected in parallel for daisy chaining a number of instruments). The mating connectors with cover shall be supplied.

**Ethernet:**

It shall comply Ethernet LAN standards IEEE 802.3  
 Data transmission speed : 10/100Mbps  
 Transmission protocol : Modbus / TCP  
 Connector : RJ-45  
 Transmission media : 10/100 Mbps T/TX Ethernet  
 10/100 Mbps LAN is on board.

**Self - Diagnostics :** The monitor has built-in self diagnostics. On being powered it performs tests to ensure that all components and sub systems are functioning properly. It also checks for the Power supply, High Voltage Supply, Detector and pulse processing electronics.

**Input Power:** 230VAC +/-10%, 50Hz, single phase supply. Power ON/OFF switch shall be provided with a neon indicator. Spike suppressor and line filter are also provided.

**Environment:** The instrument will be able to withstand temperature upto 60 deg C and relative humidity upto 90% in radiation areas. The instrument enclosure and detector assembly will comply with IP-54.

**Mechanical Enclosure:**

Size : 357H x 380W x 140D  
 Weight : 8.5kg approx

**Instrument Trolley:(offered separately)**

A suitable stand for fixing area monitor will be supplied optionally. This will be made of MS and will be provided with brackets for mounting the instrument. This stand will be designed to confirm to Seismic tests. One mains supply board with required sockets, indicators and switches shall be provided.

**Hand held configurator:(optional):**

The monitor will be supplied with a hand held configurator with RS485 port interface.

The configurator will be a full function LCD display terminal comprising a keyboard/navigating keys and a large alphanumeric LCD display. The configurator will be capable of fully configuring and monitoring of all functions of the wide range gamma monitor.

The configurator will not be instrument specific and will be able to work in conjunction with all wide range gamma monitors meeting the above specifications. It is designed to be held with a single hand.

It shall be operated on a rechargeable battery of long life and the battery charger is part of the supply.

The configuration settings are password protected and the password is user settable.

**Type test compliance:**

The instrument is compliant to ANSI.N42.17A & IEC61000 Standards.

Instrument is compliant to Seismic qualification as per IEEE:344 (2004) standard.