

GATE MONITOR TYPE : GA72

- ❑ Microcontroller based design with extensive use of peripheral devices & serial bus interface has been employed.
- ❑ Dose rate range covered is (0 - 10000) $\mu\text{R/hr}$ by default, with option of selection of other three 'units' namely $\mu\text{Sv/hr}$, & CPM.
- ❑ Auto ranging & auto TC selection in the range of 30 sec to 0.5 sec depending upon detector count rate.
- ❑ 5" TFT display indication for dose rate & configuration is provided.
- ❑ Designed using LND GM tube type GM132E or its equivalent.
- ❑ Large size WINDOW indication on TFT display for NORMAL & ACTIVE alarm condition.

Gate monitor Type: GA727, manufactured & supplied by NUCLEONIX SYSTEMS is designed primarily to monitor low levels of gamma radiation. It uses state-of-art electronic devices (latest) including SBC running on WIN CE6 with associated peripheral devices and other discrete ICs & components. Use of these devices makes it compact & highly reliable. Powerful embedded code adds-up and enhances its performance and gives extra advantage from the angle of fault diagnostics, programmable features & measurement of dose rate & data communication under networked environment. This unit is primarily designed to indicate dose rates in the measuring unit selected & produces audio / visual alarms, if the dose rate exceeds preset value. By default the unit is set to be in mR/hr & the range is (0 -10000 $\mu\text{R/hr}$).

This Gate Monitor GA727 unit will be useful for monitoring Low Gamma dose rate levels in working areas of Radio Isotope Laboratories, Radiology departments, Medical & Industrial Radiological installations apart from its usefulness in Atomic Power Stations, radiochemical plants, waste immobilization plants etc.,

With power ON, initialization of SBC, peripheral devices, 5" TFT display / timers, counter etc, takes place. Followed by this, dose rate calculation takes place in the selected unit such as $\mu\text{R/hr}$. Additionally, hardware & fault diagnostic check will be carried out. Display updating will take place every 4 sec. Time constant (TC) for doserate will be computed depending upon the detector output count rate.

Gate monitor GA727 indicates dose rate digitally on TFT display. There are two visual annunciator GREEN & RED for NORMAL & ACTIVE conditions respectively are shown on TFT display. The ACTIVE window flashes once the dose rate alarm occurs and in normal condition the NORMAL window glows.

The user interface is through touch screen display. Reset mode (auto or manual) and other system settings. Fault diagnostic info is shown directly on touch screen.

For external detector arrangement, the detector probe can be connected to main Electronic unit by a multicore cable with both end connector arrangement upto a maximum of 50 meters.

SPECIFICATIONS

Radiation to be detected :
Gamma Radiation.

Range :
1 –10000 μ R/hr
0.01–100.00 μ Sv/hr
0- 50000 CPM
Range and Unit are configurable

Detector : High sensitivity energy compensated Halogen -quenched G. M. Tube GM132E or equivalent having a sensitivity of 160 cps / mR/ hr

Accuracy : +/- 10% Full scale.

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

Display : 5" TFT display is used for display of doserate information and hardware status information TFT display is also used for visualization of preset alarm and other parameters.

Overload : Senses overload above 200% of fullscale and upto 1 R/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.

Recorder output stability

- a. Non-linearity : Max = 0.025% of Span
- b. Offset current (Io=4mA) : Max = 0.0005% of Span / C
- c. Span Error (Io=20mA) :Max = 0.005% of Span / C

Time Constant : First reading on Power ON within 5 secs.
Normal (Slow) : 30 sec to 0.5 sec automatically varying inversely with the radiation level.
Abrupt detection : Update the current reading within 2 sec and return to normal mode.

Calibration Accuracy : +/- 10% through out the range.

Instrument "ON" Indication : Large Area Green LED Lamp. This will indicate the Normal condition also.

Alarm range :
1 μ R/Hr to 9999 μ R/hr.
0.01 μ Sv/Hr to 99.99 μ Sv/hr
1-50000 CPM

The alarm level setting will be carried out through front panel keypad / handheld configurator / PC. Front panel keypad is provided with DIP switch de-activation.

Alarm Indication :

- a) Red Mimic flashing large area on TFT display.
- b) Loud alternating audio tone (Dual frequency tone)

Alarm annunciation scheme :
As tabulated below :

Parameter Status	Visual indication (Red MIMIC)	Audio
Normal	OFF	OFF
Abnormal	Flashing	ON
On ACK	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 :
EHT failure : Visual alarm with flashing red MIMIC indication & "Eht" message on display
Detector failure : Visual alarm with flashing red MIMIC & "d-FL" message on display.
Fault indications shall be cleared automatically if normal status is resumed.

Detector Housing:

- a. The detector is located external to the Monitor.
- b. It is housed in a suitable, air-tight SS shell with built-in pre-amplifier to drive upto 50 mtrs long cable.
- c. The instrument is provided with 10 mtr cable between detector and the monitor.
- d. The detector housing qualify minimum industrial protection Class IP-54.
- e. The monitor have clamp on the top for fixing the detector assembly.
- f. A separate mounting bracket for detector housing is provided.
- g. Provision to connect the detector with short cable also is available.

Monitor Enclosure:

- a. Vapour-tight , rugged & elegant.
- b. The door is provided with lock and key arrangement.
- c. The enclosure qualify minimum industrial protection Class IP-54.
- d. 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 are supplied along with the equipment.

Remote /External Console:

- a. 4 - 20 mA linear proportional to full scale display output. Current output is able to drive load of 600 ohms. Output circuitry shall be able to drive 200 mtrs.of twisted pair of wires.
- b. 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.
- c. Remote alarm acknowledgement and reset signals for the field instruments (Normally open contact).
- d. Indication of instrument fault condition (detector, EHT and LV supplies failure), over range & overflow conditions by up-scale 4-20 mA. (22.5mA)
- e. All these signals are terminated on a 17 pin socket (Allied Connectors). The corresponding mating plug with 5 mtr cable is supplied with the monitor.
- f. RJ 45 connector for Ethernet port

- The firmware of the monitor shall 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 shall 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.
- Data transfer using socket programming for transfer of last 24 hr data is provided.

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 supplies, High Voltage Supply, Detector and Counting electronics.

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

Mechanical Enclosure:
 Size: 357H x 410W x 140D
 Weight: 8.5kg approx

Computer Interface : The monitor shall have a Ethernet 10/100 Mbps port for interfacing with a remote IBM PC-compatible computer. The features supported by Ethernet port are given below.

- The PC and the monitor shall operate in a host-slave configuration and the software protocol will be MODBUS/TCP.
- The PC as the host shall give commands and send queries. The monitor will carry out various functions in response to the queries.