RADIATION PORTAL MONITOR FOR VEHICLES AND RAILWAY WEIGHTING STATIONS

GALILEO Series

MAIN FEATURES

- Large, high sensitivity plastic scintillators for gamma radiation detection
- Configurable for best compliance to layout and vehicles specifications
- High performance proprietary software capable of actively evaluate the environmental background
- Efficiency referred to Cs-137: 150 kcps/µSv/h (per detector)
- False alarm rate: 1:10'000
- Pass-through speed control
- Automatic e-mail sending of the measurement report in pdf
- Connectable to vehicle plate readers or cameras for picture acquisition
- Digital outputs available for external devices connection (interlock, alarm indicators…)

DESCRIPTION

The GALILEO radiation portal monitor is designed to automatically scan the load of vehicles (trucks or rail wagons on weighting stations) passing through its structure, and to detect any radioactive contamination due to the presence of gamma emitting radionuclide. The count rates acquired by the detectors are continuously compared to the pre-set alarm thresholds; if a threshold is exceeded, the system immediately gives a warning to the operator through acoustic and luminous indications.

The standard system is composed of: 2 detectors, an electronic desktop rack and a PC control console. The detectors are installed in a portal configuration: the two mechanical structures are installed one at each side of the passageway. The number of detectors can be adapted to the expected vehicle type or measurement geometry. Each detector is composed of a high-efficiency plastic scintillator facing the passageway, coupled with a PMT and the electronics for HV and signal processing. The detectors are properly shielded to lower the environmental background contribution. A set of transit sensors detects the vehicle’s transit and calculates its speed.

Example of 4UV configuration
CONFIGURATION

GALILEO radiation portal monitor can be arranged and configured, basically changing the detector number and their installation geometry.

Please note that this data sheet will refer to the standard 2UV version (1 detector at each side of the passageway). However, all technical data are valid for the other versions as well.

- **Mechanical structure**: for large-surface plastic scintillators and transit sensors. It is built for outdoor installations, with IP65 protection grade. Thanks to its design, maintenance operations of the internal elements can be easily carried out. The height of the support column is defined according to the installation site and the type of vehicles (trucks of different dimensions, wagons, etc.).

- **Electronic desktop rack**: contains the power supply, acquisition and counting electronics, as well as the relays for status management towards the digital outputs, and the control console connection interface. The connection distance from the PC control console can be up to 1 km. Upon request, an alarm beacon with siren can be installed near the control console or at a distance. Up to 5 24V digital outputs are available to command external devices, e.g. barriers or traffic lights.

- **PC control console**: it includes the processing and management software GALILEO. It allows to control the system.
• **Typical configurations:** 2UV with 2 detectors (one at each side), 4UV with 4 detectors (2 at each side), 2UL and 4UL with 2 or 4 detectors installed in a “L” configuration.

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**GALILEO SOFTWARE**

The radiation portal monitor detects and measures the radiations coming from the vehicle passing through and, if the alarm thresholds are trespassed, it gives an optical and acoustic signal. The pre-alarm and alarm thresholds are indicated in sigma units (number of standard deviations) over the background value.

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The software controls the trend of environmental background every 100 ms. Values too high or too low are considered as bad functioning. While the vehicle is passing through, the program is capable of consider the shielding effects of the load and uses its evaluation to calculate the background values to be subtracted from the measurement.

The algorithm is able to adapt itself to differences in type of load, speed and dimensions of the vehicles passing through; furthermore it applies proper filters for spurious events, in order to prevent false alarms and to achieve the best sensitivity. Finally, the software warns the operator if the transit sensors are abnormally engaged.

The results of the measurements are saved in the internal archive, and printable reports are available to the user. The system can automatically convert each report in a pdf file and send it to a defined e-mail address.

The warranty includes a remote assistance service: the monitoring activity can be remotely controlled, using the Ethernet-LAN door of the control console, and the operator can contact ELSE NUCLEAR personnel for on-line service. After the expiry of the warranty, this service is available upon request.
TECHNICAL SPECIFICATIONS

Measurement features
- False alarms rate: <1/10'000
- Efficiency referred to Cs-137: 150 kcps/µSv/h (per detector)
- Energy range: 35 keV ÷ 2 MeV
- Maximum transit speed: Settable by the user, up to 10 km/h (recommended)

Detection unit
- Detector type: Plastic scintillator
- Number of units: From 2 to 4 (custom configuration upon request)
- Volume of each unit: 25 l
- Surface of each unit: 5000 cm²
- Depth: 5 cm
- Transit sensors: 2 (3 in 4UV version)

Detector lodging
- Maximum dimensions (WxHxD): 734 x 1483 x 222 mm
- Material: Stainless steel, with plexiglass windows
- Protection grade: IP65
- PMMA window: 5 mm
- Lead shielding on external sides: 10 mm
- Total weight (each): 171 kg

Support column
- Weight and dimensions: variable among versions; example: H = 140 cm → weight = 52 kg

Electronic desktop rack
- Statuses management: 5 relays NO for digital outputs

ACCESSORIES AVAILABLE UPON REQUEST
1. Cs-137 point source, activity < 10 kBq, for periodical quality controls
2. Source holder for test and quality controls
3. Plate detection kit: infrared illuminated camera for plate digital reading and archiving
4. Vehicle identification kit: camera and software for vehicle images archiving
5. ALU alarm unit for status signaling
6. Traffic light: additional status indicator
7. Neutron detection sub-system
8. Warranty extension from 12 months to 24 months