

GI-06 Gamma Irradiator



The GI-06 gamma irradiator, fitted with suitable radionuclide sources, can serve as a source of a homogenous and collimated gamma radiation beam.

It is intended as a part of a calibration system for the gamma dose rate and dose meters.

Purpose

The GI-06 irradiator, fitted with suitable radionuclide sources, serves primarily as a reference source of a homogeneous and collimated gamma radiation beam in a very wide range, from tenths of $\mu\text{Gy/hr}$ up to units of Gy/hr . It is primarily used as a part of a calibration system for the gamma dose rate and dose meters.

The GI-06 irradiator enables complete control from a remote PC with the help of standard interfaces.

Description

The GI-06 irradiator consists of the following basic parts: a rotating horizontal carousel with nests for the sources, lead shielding, vertical transport piping with a source-lifting mechanism, a collimator, and a control switchboard with an integrated PLC.

The carousel is intended for five sealed radiation sources, as standard (maximum six sources). Each source is fixed inside a special holder before being placed in a nest of the carousel. The carousel can be rotated horizontally. Using carousel rotation, it is possible to set the desired source under the vertical transport piping. The lifting mechanism then ejects the source and moves it into the exposure position inside the collimator. The total source ejection time is less than two seconds.

The design of the irradiator's collimator meets the requirements of the ISO 4037 standard.

In the case of non-standard or emergency situations (including power failure), the source will automatically return to the shielded position by means of gravitation.

All positions are ensured by the gear stepping motors.

Specification

Basic data

Number of source nests	6
Suggested number of sources	max. 5
Maximum source dimension	$\phi 38 \times 67 \text{ mm}$
Collimator angle	$< 20^\circ$
Height of the beam axis	1 500 mm
Height positioning accuracy	$\pm 0.5 \text{ mm}$

Maximum sources activity*

^{137}Cs total max. activity	100 TBq
^{60}Co total max. activity	37 GBq

*Note: for a maximum surface dose rate of $10\mu\text{Sv/h}$

Standards and Certifications

ISO 4037-1: X and gamma reference radiation for calibrating dosimeters and dose rate meters and for determining their response as a function of photon energy -- Part 1: Radiation characteristics and production methods.

Description

The irradiator control system, consisting of the control switchboard RSIG-13 and basic control and visualization software S1325, provides the following functions:

- Information on the actual sources' position with the help of sensors
- Transporting the required source to the irradiation position and back
- Measuring of the time when the source was irradiating in the collimator
- Connection of the irradiator to the safety system
- Automatic source return into the safe position in case of safety system activation

Communication between the control switchboard and the host system is carried out through the standard interfaces CAN2B, RS-485 or Ethernet 10/100T Base.

Visual and acoustic signalisation of the equipment status is available too. Green indicates the equipment is in the basic safe position. Red indicates the equipment is not in the basic safe position. Acoustic signalisation indicates that the equipment will change or is changing the status.

GI-06 is also equipped with mechanical indicators, which serve for independent verification of the information provided by the sensors:

- Indicator of the carousel position – indicates which source holder (source) is in position under the vertical transport piping.
- Indicator of the source position in the transport piping – basic positions: in the carousel nest or in the collimator.

Usually, the irradiator is connected to the safety system so as to prevent any unacceptable personnel exposure. All the safety system components are hardwired i.e. the signals have higher priority than any signal from the control PC. The following interfaces are available for the safety system:

- one input for the immediate emergency return of the sources (by gravitation)
- two potential free contacts for status indication
- eight inputs for the connection of, for example, a door contact, an entry door opening push button, motion sensors (PIR), fire detector, emergency push buttons, etc. When activated, the source will correctly return to the basic position.
- eight inputs for the control of the auxiliary equipment, such as a visual signalisation repeater, door blocking, etc.

Delivery also includes an emergency shielding shutter, which can be mechanically mounted on the collimator front side.

Specifications

Weight	1450 kg
Irradiator height	2020 mm
Diameter without collimator /with collimator	530 mm /570 mm
Control switchboard dimensions	800 x 600 x 300 mm
Control switchboard weight	43 kg
Power supply	230 VAC / 0.5 A
Electrical protection	IP30

Models and Accessories

Type	Description
K1542	GI-06 Gamma Irradiator standard model
S1325	Basic Control Software
Related Products	
K0123	OG-8 Gamma Irradiator
K0539	IG-13 Gamma Irradiator
K141x	PGI-01 Panoramic Gamma Irradiator
K0124	CB-50 Calibration Bench
K1548	STC-01 Loading Container
K1501	Power Supply Switchboard



Emergency collimator shutter



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