Calibration System with IG-13 Gamma Irradiator

The IG-13 Gamma Irradiator is primary component of a calibration system for gamma dose / dose rate meters. With a calibration bench, safety system (interlocks), radiation monitoring system, and respective software, it constitutes integrated calibration system.

Purpose

Integrated system with the IG-13 Gamma Irradiator is primarily intended for calibration of dosemeters and dose rate meters. Besides, the calibration system consists of a calibration bench, radiation monitoring system, and software for remote control of calibration system.

Into the IG-13 irradiator up to three sources of ionizing radiation can be inserted. The radiation source in working position generates collimated beam with a 20 degree angle and an axis height of 1.0 m.

Description

The IG-13 irradiator consists of the following main parts: shielded container with a rotating carrousel for sources storage, mechanism which allows source movement to exposure position, collimator, and control and power supply switchboard. The irradiator carrousel has 3 positions for the sealed radionuclide sources placement; their maximum summary activity is 2.6 TBq (70.27 Ci) of ^{137}Cs equivalent. The carrousel transports the selected source to the collimator by rotating while other sources are placed in the shielded position. The carrousel is driven by a stepping motor. The basic shielding material is lead.

Control of the IG-13 irradiator is performed by a micro-processor controller which is placed in the control switchboard cabinet.

Communication between the cabinet and the remote control PC is ensured via Ethernet interface. The operator can check the status of the irradiator through the local visual and acoustic unit, which is part of the irradiator, and through the remote screen of the control PC.

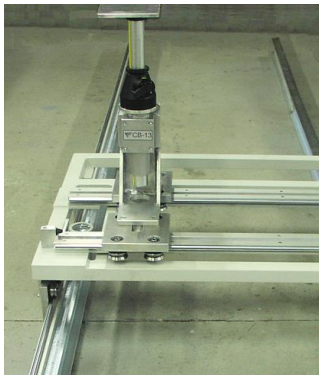
The calibration bench enables precise 3-axis linear positioning of the meters being tested. The calibration bench consists of a trolley with a calibration platform and a trolley on steel rails. The rails are assembled parallel with the beam axis of the irradiator.

Main Advantages

- Simple design, operation and maintenance
- Able to provide a homogenous and collimated dose rate beam of up to app. 1 Gy/h
- Able to use up to 3 different radiation sources
- Completely automated operation controlled from control system
- Provision of safety interlock

Standards and Certification

Type approval of the IG-13 Gamma Irradiator No. 1190/2008, issued by State Office for Nuclear Safety (SÚJB), Czech Republic



CB-13 Calibration Bench: detail of 3-axes mechanical movement

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Description

Safety and radiation monitoring system

The calibration system is provided with basic safety interlocks necessary for safe operation and to prevent any unacceptable exposure of personnel. Typically, the main components are an electromagnetic door lock, sensors indicating the status of the irradiation room entry door, active motion sensors (PIR) inside the irradiation room, visual and acoustic signalization unit(s), emergency STOP buttons, and a small radiation monitoring system (dose rate measurement in the irradiator room and operator room connected to the data display unit, alarm unit).

In case of any emergency (for example, motion in the exposed area indicated by motion sensors, power failure, STOP button press, opened doors), the source cannot be ejected to the operating position; if it is ejected the source will automatically be inserted into the basic safe position. For further safety improvements, it is possible to install a video monitoring system. The safety interlocks configuration is finalized and specified in the design documentation.

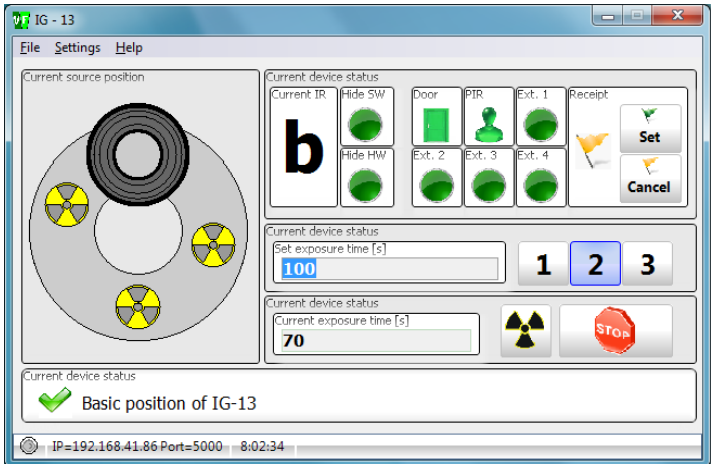
Set of sealed radionuclide sources

As a standard set, the three ^{137}Cs sources with differing activity are installed (370 MBq - 37 GBq - 2.5 TBq /0.01 - 1 - 67.6 Ci/). Other activity and nuclides can be provided on request.

Control software, remote PC

Basic control software allows:

- Selection of source
- Set-up of exposure time period (& indication of elapsed time)
- Inserting the source into working position (Start & Stop)
- Indication of the safety interlocks status



Control software – basic screen

Specification

IG-13 Gamma Irradiator

Number of sources	up to 3
Total maximum activity	2.6 TBq (70.27 Ci) of ^{137}Cs or 9.2 GBq (0.25 Ci) of ^{60}Co
Collimator angle	20°
Axis of the beam	1 m (39 in) above ground
Time of source relocation	within 3 s
Power supply	110 / 230 VAC
Communication interface	Ethernet
Weight	app. 1200 kg (2650 lb)

CB-13 Calibration Bench

Distance source - detector	0.3 ~ 7 m (1 ~ 23 ft)
Maximum meter weight	10 kg (22 lb)
Accuracy of the position adjustment	±1 mm (0.04 in)

Models and Accessories

Type	Description
K0539	IG-13 Gamma Irradiator
S2608	Basic Control Software for IG-13
K0542	CB-13 Calibration Bench (manual movement)
Optional Accessories	
	▪ Ionizing radiation sources ▪ Safety interlocks ▪ Radiation monitoring system ▪ Laser indicator of beam axis ▪ Accessories for calibrated instruments – standardized phantoms – fixtures
Related products	
K0123	OG-8 Irradiator
K0124	CB-50 Calibration Bench (electric movement, remote control)

Flexible solutions

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