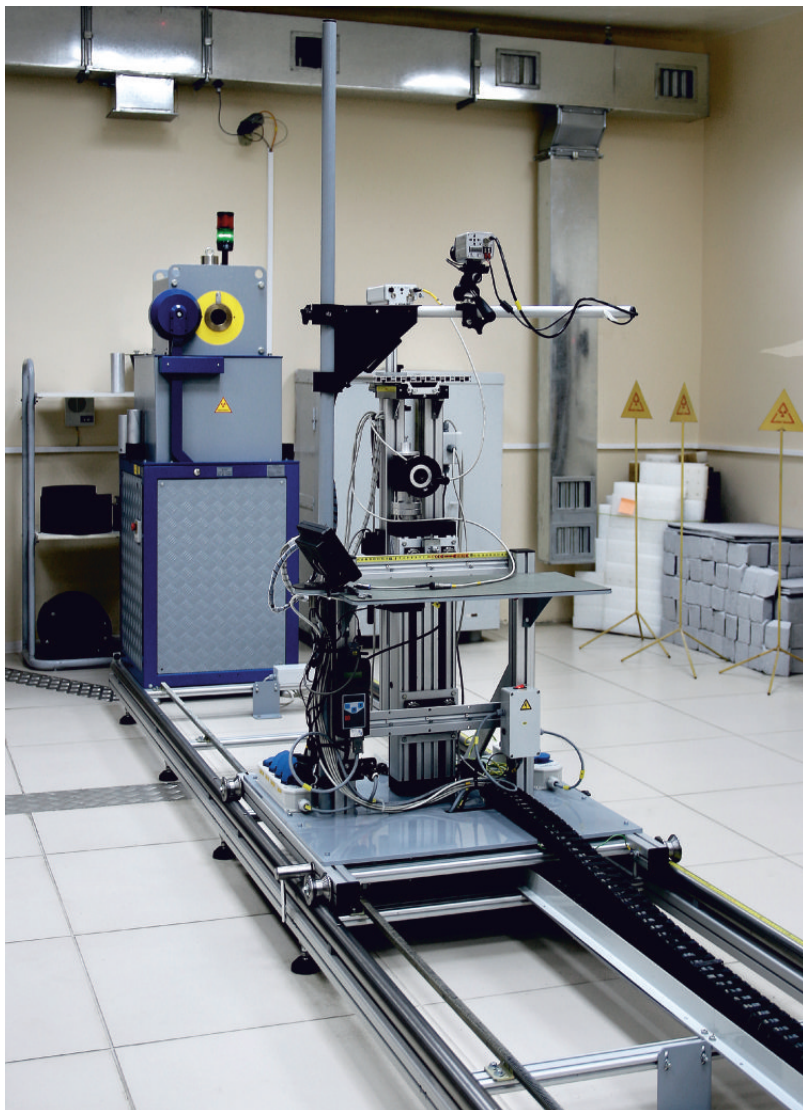


# AT130 Gamma Beam Irradiator with Calibration Bench



Reference gamma beam irradiator with calibration bench is designed to simulate and transmit air kerma, exposure dose, individual dose equivalent and dose equivalent units and their respective rates into working standards and measurement instruments during verification, calibration and test procedures.



## Application

Metrology support of gamma dosimetric measurements:

- Verification and calibration in metrology service facilities
- Calibration procedures in Secondary Standard Dosimeter Laboratories (SSDL)
- Calibration of measurement instruments in the process of development, manufacturing and production
- Applied metrology

## Features

- Typical collimating unit according to GOST 8.087.2000
- Revolving drum magazine with chambers for 6 sources
- Software control of sources travel from exposure position to storage position
- Programmable control of moving plate positioning in fully automatic or manual mode
- $\phi$  and Z servo motors are used for positioning sources inside irradiator, and servomotor X is used for actuation of moving platform
- Control system based on personal computer and operator panel with automatic calibration functions
- Lasers and calibrated gauge bars are used for detector centring in radiation beam
- Readouts are taken using video surveillance system or instrument interface
- Meteorological meter on moving platform
- Intercom system for operator communication in working chamber and control room
- Three power outlets (230 VAC, 50 Hz) with insulated neutral on moving platform for verified instruments
- Available alarm and interlocks system ensures safety
- Measurement of radiation environment in working chamber and adjacent rooms
- Video surveillance of room with working chamber
- Safe braking and trip limiting of moving platform
- Emergency power source is available
- Loading of sources into Facility using transfer device, transfer container and accessories
- Layout design and calculation of radiation parameters for client's premises

## Operating principle

The principle of facility operation is based on the use of  $^{137}\text{Cs}$  radionuclide sources and optional  $^{60}\text{Co}$  and  $^{241}\text{Am}$  radionuclide sources.

The facility implements irradiation scheme with fixed irradiator and calibration bench on linear travelling platform.

The range of gamma radiation dose rate values is achieved by use of  $^{137}\text{Cs}$  sources of different activities and varying the "source-detector" distance. Field shape can be changed by varying the distance between source and detector or diameter of collimator channel.

Automatic functions of irradiator and colibration bench are remotely controlled from operator room.



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INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR  
MEASUREMENTS AND RADIATION MONITORING

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## Specifications

<b>Gamma radiation sources, maximum activity</b>	$^{137}\text{Cs} - 9.6 \cdot 10^{13} \text{ Bq (2600 Ci)}$ $^{60}\text{Co} - 7.2 \cdot 10^9 \text{ Bq (0.2 Ci)}$ $^{241}\text{Am} - 1.6 \cdot 10^{10} \text{ Bq (0.4 Ci)}$
<b>Ranges</b> - Air kerma rate - Exposure dose rate - Ambient dose equivalent rate, Individual dose equivalent rate	0.36 $\mu\text{Gy/h}$ – 50 Gy/h 40 $\mu\text{R/h}$ – 5400 R/h 0.43 $\mu\text{Sv/h}$ – 58 Sv/h
<b>Intrinsic relative error</b> for certification as a working standard of 1-st category (2-nd category)	$\pm 2.5\%$ ( $\pm 5\%$ ) [Air kerma rate and exposure dose rate] $\pm 4.5\%$ ( $\pm 7\%$ ) [Ambient dose equivalent rate and individual dose equivalent rate]

*Actual range limits and error are determined by calibration.*

<b>Collimator channel</b>	$\varnothing 60 \text{ mm} / \varnothing 90 \text{ mm}$ , length 150 mm
<b>Radiation beam axis height from floor level</b>	(1500 $\pm$ 30) mm
<b>Working distances interval R</b>	0.3 – 7 m
<b>Diameter of uniform radiation field at R=1 m</b> (Non-uniformity $\pm 3\%$ ) - For $\varnothing 60 \text{ mm}$ collimator - For $\varnothing 90 \text{ mm}$ collimator	160 mm 260 mm
<b>Time of source transfer into operational position</b>	$\leq 20 \text{ s}$
<b>Radiation background at 1 m distance from irradiator</b> in storage position	$\leq 0.6 \mu\text{Sv/h}$
<b>Reproducibility of moving platform</b> position on X coordinate	$< 0.5 \text{ mm}$
<b>Absolute error of detector position in radiation field</b>	$\leq 0.002R$
<b>Speed of platform travel</b>	0.9 mm/s – 26 cm/s
<b>Travel range of platform workbench:</b> - Vertically from floor level - Horizontally - Along radiation beam axis Across radiation beam axis - About vertical axis with 15° steps	1140 – 1480 mm $\pm 50 \text{ mm}$ $\pm 140 \text{ mm}$ 360°
<b>Weight of equipment on:</b> - Workbench - Travelling platform	$\leq 35 \text{ kg}$ $\leq 75 \text{ kg}$
<b>Initialisation time</b>	$\leq 1 \text{ min}$
<b>Continuous run time</b>	$\geq 24 \text{ h}$
<b>Power supply</b>	(230 $\pm$ 23) V, (50 $\pm$ 1) Hz
<b>Power consumption</b> Facility Auxiliary equipment	$\leq 1000 \text{ VA}$ $\leq 400 \text{ VA}$
<b>Operation temperature range</b>	15°C – 35°C
<b>Relative air humidity</b>	$\leq 80\%$
<b>Dimensions and weight, maximum</b> Irradiator Base frame of calibration bench Moving platform Workbench Control equipment (Area, weight) Transfer device Transfer container	640x640x1950 mm; 1370 kg Up to 8000x860x220 mm; 35 kg 910x855x1820 mm; 70 kg 270x330 mm 3500x1500 mm; 150 kg 1250x765x1330 mm; 200 kg 270x409 mm; 200 kg
<b>Dimensions of working chamber room, minimum</b>	10x5x3.5 m

## Complete set

- Remotely-controlled irradiator:
  - Irradiator
  - Control unit, control panel
  - Accessories including source holders and tools for source holder assembling, transfer container and lift
- Calibration bench:
  - Base frame
  - Moving platform
  - Video surveillance system for measurements
  - Laser targeting system
  - Intercom system
  - Accessory set for unit performance monitoring
  - Accessory set with clamps for attaching instruments to working table and 300x300x150 mm phantom
- AC power adapter
- Uninterrupted power supply
- Alarm and interlock system
- Radiation monitoring service
- Video surveillance system
- Accessories kit
- Spare parts kit
- "UDG software solution"
- Desktop computer
- Transfer device
- User's manual
- Optional AT5350/1 standard dosimeter (Basic error not more than  $\pm 3\%$ ) can be included into delivery set

The facility complies with:  
GOST 8.087-2000, GOST 27451-87,  
Safety requirements of IEC 61010-1:2010,  
EMC requirements of EN 55011:2009,  
IEC 61000-4-2:2008, IEC 61000-4-3:2008,  
IEC 61000-4-4:2004, IEC 61000-4-5:2005,  
IEC 61000-4-6:2008, IEC 61000-4-11:2004

Design and specifications are subject to change without notice