

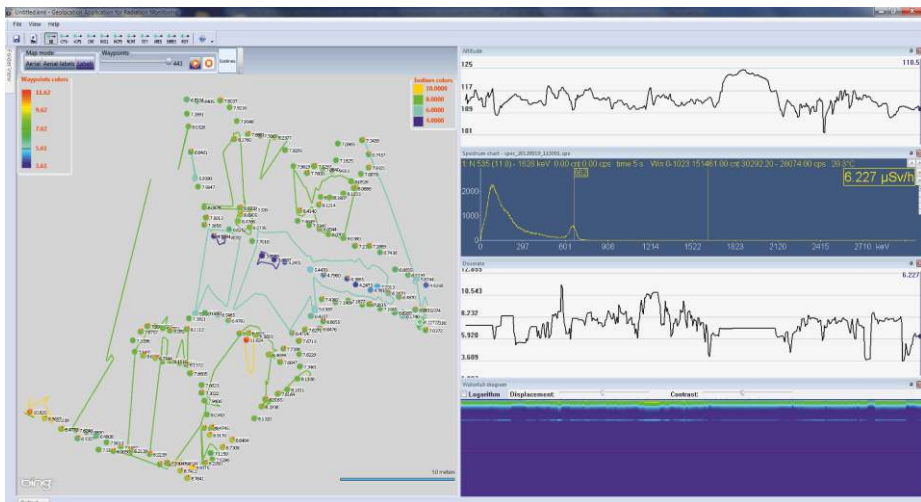
# AT6103 Mobile Radiation Scanning System



Mobile system is designed for ground radiation survey and search for gamma and neutron radiation sources with GPS-mapping.

The system can be mounted on a motor vehicle, marine vessel or aircraft carrier with no need for any special tools.

The system need no connection to on-board power of the carrier, though can be controlled and managed by operator as well.



System scalability in terms of monitors allows gamma and neutron radiation response control over a wide range.

## Application

- Identification and assessment of land and facility radiation environment from vehicle, helicopter, etc.
- Mapping of radiation levels and density of surface contamination by  $^{137}\text{Cs}$
- Search of lost radioactive sources
- Traffic control of radioactive substances and materials
- Public events radiation safety control
- Detection of radioactive anomalies
- Monitoring of nuclear incident consequences at Nuclear Power Plants
- Discover facts and effects of nuclear weapon testing or use

## Features

- User-selectable set of monitors and detection units
- High system scalability in terms of sensitivity to gamma and neutron radiation
- Automatic simultaneous gamma and neutron radiation scanning
- Search and detection of radioactive sources and real-time identification of its isotopic composition
- Automatic accommodation to change of radiation background level
- Simultaneous measurement of gamma radiation spectral distribution and dose rate
- Dosimetric scanning in wide dose rate range of gamma radiation (up to 10 Sv/h); readout conversion to  $^{137}\text{Cs}$  surface activity
- Scanning data are constantly recorded for further analysis
- Expert "GARM" software for data processing and analysis
- Built-in GPS receiver with connector for external GPS antenna
- Storage and operation in protective shock-resistant cases

## System configuration

- Set of monitors (1 ... 6)
- Tablet PC
- Accessories kit
- Software.

Each monitor has 1 ... 3 integrated detection units.

Number of monitors and detection units in each monitor can be selected by user.



**ATOMTEX**®

INSTRUMENTS AND TECHNOLOGIES FOR NUCLEAR MEASUREMENTS AND RADIATION MONITORING

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## System functions

- Measurement of gamma radiation energy distribution
- Measurement of gamma radiation dose rate and assessment of density of surface contamination by  $^{137}\text{Cs}$  ( $\text{kBq}/\text{m}^2$ ,  $\text{Ci}/\text{km}^2$ )
- Count rate measurement of neutron radiation impulses
- Consolidation of measurement information in a single data flow
- Detection of gamma and neutron radiation sources
- Radionuclide identification
- Logging of all measurement results and processing in application software
- Isoline contouring by selected parameter
- All data can be displayed on a terrain map

## Operation principle

The system operates in continuous radiation environment scan mode: continuous search, detection, localization and identification of gamma sources; search and discovery of neutron radiation.

The system is controlled by one rugged 10" tablet PC.

All monitors connect to tablet PC by BT-DU3 adapter using wireless channel.



When radioactive source is detected the system activates alarm and identifies its radionuclide composition.

Types of identified radionuclides are displayed on tablet PC screen and operator hears a corresponding voice message in a wireless headset.

Measurement results are continuously transmitted into tablet PC for subsequent processing by PC and can be plotted onto a map using "GARM" application software tools.

"ARMS" application software performs automatic data transfer to a remote server (Over FTP server and if PC has a 3G communication function or can be connected to a Wi-Fi network).

The system provides the user with uniform (consolidated) measurement data regardless of type and number of monitors: Uniform gamma radiation spectrum, uniform flow of instantaneous gamma radiation impulses for detection of radiation source, uniform gamma radiation dose rate and its statistical error.

## Main specifications of Mobile scanning system

|   |   |
|---|---|
| <b>Available monitors</b><br><b>(Each monitor can contain 1 ... 3 integrated detection units)</b><br><b>[System configuration can be selected by user]</b>        | <b>1) Gamma and neutron radiation monitor</b><br>[BDKG-11M and/or BDKG-19M – 1...3 units, BDKN-05 – 1...2 units, BDKG-04 – 1 unit]<br><b>2) High-sensitive neutron radiation monitor</b><br>[BDKN-05 ... 3 units]<br><b>3) Highly sensitive gamma radiation monitor</b><br>[BDKG-28 or BDKG-34 – 1...3 units]<br><b>4) Highly sensitive gamma radiation counting monitor</b><br>[BDRM-05 – 1...2 units] |
| Total maximum number of detection units in system   | 18  |
| Identified radionuclides:   | Medical, industrial and natural   |
| Optional:   | Library of identified radionuclides can be modified   |
| GPS   | GPS receiver is integrated into Tablet PC. Positioning accuracy is $\geq 3$ m   |
| Tablet PC-to-monitors connection  | Bluetooth / USB / RS232   |
| Power supply of detection units   | BT-DU3 adapter<br>(One adapter can receive up to 3 units)   |
| Charging the battery of BT-DU3 adapter and Tablet PC  | 1) 230 VAC, 50 Hz mains<br>2) External source of 12 VDC.<br>The system automatically monitors battery's charge level  |
| Continuous run time   | ~ 10 h (with lowest brightness of Tablet PC screen)   |
| Protection class  | IP65  |
| Mean operating life   | $\geq 15$ years   |
| Operation temperature range   | -20°C to +50°C  |
| Relative air humidity   | $\leq 95\%$ (Air temperature $\leq 35^\circ\text{C}$ without condensation)  |
| Mobile system meets safety standards of IEC 61010-1:2001 and electromagnetic compatibility requirements of: EN 55011:2009, IEC 61000-4-2:2008, IEC 61000-4-3:2008 |   |

**Specifications of gamma radiation detection units**

| Gamma radiation detection unit                                    | BDKG-11M<br>(Spectrometry & Dosimetry)                     | BDKG-19M<br>(Spectrometry & Dosimetry) | BDKG-28<br>(Spectrometry & Dosimetry) | BDKG-34<br>(Spectrometry & Dosimetry) | BDKG-04<br>(Dosimetry)           |                    |
|---|--|--|---------------------------------------|---------------------------------------|----------------------------------|--------------------|
| Detector  | NaI(Tl) scintillator, Ø63x63 mm                            | NaI(Tl) scintillator, Ø63x160 mm       | NaI(Tl) scintillator, 400x100x100 mm  | NaI(Tl) scintillator, 400x100x50 mm   | Scintillation plastic, Ø30x15 mm |                    |
| Energy range<br>In spectrometric mode<br>In Dosimetry mode        | 20 keV – 3 MeV<br>50 keV – 3 MeV                           | 20 keV – 3 MeV<br>50 keV – 3 MeV       | 50 keV – 3 MeV<br>50 keV – 3 MeV      | 50 keV – 3 MeV<br>50 keV – 3 MeV      | –<br>15 keV – 3 MeV              |                    |
| Measurement range of gamma radiation ambient dose equivalent rate | 0.03 – 150 µSv/h   | 0.03 – 50 µSv/h                        | 0.03 – 7 µSv/h                        | 0.03 – 10 µSv/h                       | 0.05 µSv/h – 10 Sv/h             |                    |
| Limit of intrinsic relative measurement error                     | ±20%   | ±20%                                   | ±20%                                  | ±20%                                  | ±20%                             |                    |
| Sensitivity to gamma radiation, (cps/µSv·h <sup>-1</sup> )        | <sup>241</sup> Am<br><sup>137</sup> Cs<br><sup>60</sup> Co | ≥13500<br>≥2200<br>≥1200               | ≥37000<br>≥6000<br>≥2500              | ≥130000<br>≥33000<br>≥19000           | ≥118000<br>≥26500<br>≥15500      | ≥370<br>≥70<br>≥40 |
| Response time for dose rate change from 0.1 to 1 µSv/h            | <2 s   | <2 s                                   | <2 s                                  | <2 s                                  | <3 s                             |                    |
| Typical energy resolution for 662 keV ( <sup>137</sup> Cs)        | 7.5%   | 8%                                     | 8.5%                                  | 8.5%                                  | –                                |                    |
| Integral nonlinearity   | ±1%  | ±1%                                    | ±1%                                   | ±1%                                   | –                                |                    |
| Number of ADC channels  | 1024   | 1024                                   | 1024                                  | 1024                                  | –                                |                    |
| Overall dimensions, weight  | Ø78x350 mm,<br>1.7 kg                                      | Ø76x422 mm,<br>3 kg                    | 710x108x108 mm,<br>19 kg              | 670x108x121 mm,<br>10.5 kg            | Ø61x205 mm,<br>0.5 kg            |                    |

| Gamma radiation counting detection unit                 | BDRM-05 (Radiometry)                                       |                            |
|---|--|----------------------------|
| Detector  | Scintillation plastic, 1000x100x50 mm                      |                            |
| Energy range  | 50 keV – 3 MeV   |                            |
| Indication range of gamma radiation impulse count rate  | 0 – 5·10 <sup>5</sup> s <sup>-1</sup>                      |                            |
| Sensitivity to gamma radiation, cps/µSv·h <sup>-1</sup> | <sup>241</sup> Am<br><sup>137</sup> Cs<br><sup>60</sup> Co | ≥30000<br>≥30000<br>≥15000 |
| Overall dimensions, weight                              | 1315x140x100 mm, 12 kg                                     |                            |

| The system in "Search" mode detects gamma radiation source containing <sup>137</sup> Cs radionuclide in less than 2 s in the following conditions | Detection unit                                 | BDKG-11M       | BDKG-19M     | BDKG-28     | BDKG-34     | BDRM-05     |
|---|--|----------------|--------------|-------------|-------------|-------------|
|   | Activity of <sup>137</sup> Cs source           | (450±10) kBq   | (300±10) kBq | (105±5) kBq | (105±5) kBq | (100±5) kBq |
|   | Distance from source to detection unit surface | (100.0±0.5) cm |              |             |             |             |
|   | Detection probability                          | 95%            |              |             |             |             |
|   | False alarm rate                               | ≤1 in 10 min   |              |             |             |             |

**Specifications of neutron radiation detection units**

| Neutron radiation detection units  | BDKN-05 (Radiometry)   |           |
|--|--|-----------|
| Detector   | Two <sup>3</sup> He-proportional neutron counters Ø30×360 mm in polyethylene moderator |           |
| Energy range   | 0.025 eV – 14 MeV  |           |
| Indication range of neutron radiation impulse count rate                         | 0 – 2.5·10 <sup>4</sup> s <sup>-1</sup>  |           |
| Sensitivity to neutron radiation, cps/neutrons·s <sup>-1</sup> ·cm <sup>-2</sup> | Pu-Be<br><sup>252</sup> Cf   | ≥8<br>≥20 |
| Overall dimensions, weight   | 105x115x380 mm, 3.5 kg   |           |

| The system in "Search" mode detects plutonium-beryllium source of neutron radiation in less than 3 s in the following conditions | Detection unit                                     | BDKN-05                               |
|--|--|---------------------------------------|
|  | Average neutron flux from source to solid angle 4π | (5.00±1.25)·10 <sup>4</sup> neutron/s |
|  | Distance from source to detection unit surface     | (125±1) cm                            |
|  | Detection probability                              | 95%                                   |
|  | False alarm rate                                   | ≤1 in 60 min                          |



# AT6103 Mobile Radiation Scanning System

## System configuration

### Tablet PC

- 1
  - Algiz 10X-PO1
  - Algiz 10X-PO2 [3G modem] (option)
 (Algiz 10X Tablet PC can be replaced by another Tablet PC with similar specifications)

### Gamma radiation and neutron radiation monitor (1 – 6 units)

- 2
  - BDKG-11M gamma radiation detection unit (1 – 3 units)
  - BDKG-19M gamma radiation detection unit (1 – 3 units)
  - BDKN-05 neutron radiation detection unit (1 – 2 units)
  - BDKG-04 gamma radiation detection unit (1 unit)
  - BT-DU3 adapter and cables
  - Operating case

### Highly sensitive neutron radiation monitor (1 - 5 units)

- 3
  - BDKN-05 neutron radiation detection unit (1 – 3 units)
  - BT-DU3 adapter and cables
  - Operating case

### Highly sensitive gamma radiation monitor (1 - 6 units)

- 4
  - BDKG-28 or BDKG-34 gamma radiation detection unit (1 – 3 units)
  - BT-DU3 adapter and cables
  - Operating case

### Highly sensitive gamma radiation counting monitor (1 - 6 units)

- 5
  - BDRM-05 gamma radiation counting detection unit (1 – 2 units)
  - BT-DU3 adapter and cables
  - Operating case

### Accessories (option)

- 6
  - AC adapter, check sample, USB cable, RS232 cable, wired headphone, wireless headphone, battery of increased capacity for Tablet PC, car charger, car holder, car dock station and external GPS antenna
  - Operating case

### Documentation / Software

- 7
  - User's manual
  - "AT6103" software with Software User's Manual
  - "GARM" software with Software User's Manual
  - "ARMS" software with Software User's Manual (option)

### Notes

- 1) Number and type of system's monitors has to be noted in order
- 2) The system may comprise only one BDKG-04 detection unit
- 3) The number of monitors cannot exceed 6 units

**Gamma radiation and neutron radiation monitor:**  
 BDKG-11M (1 unit)  
 BDKG-04 (1 unit)  
 BDKG-05 (1 unit)



**Accessories**



**Highly sensitive gamma radiation monitor:**  
 BDKG-28 (1 unit)



**Highly sensitive gamma radiation counting monitor:**  
 BDRM-05 (1 unit)