QUARTA

RADIATION MONITOR

RADEX RD1503 +

OPERATING MANUAL

10.KP.01.00.00.000РЭ

Thank you for buying the product of the trademark RADEX

Radiation monitor RADEX RD1503+, 10.KP.01.00.00.000-50 is destined for detection and evaluation of the level of ionizing radiation.

The device is a new release of radiation monitor RADEX RD1503, 10. KP.01.00.00.000. which has additional user's features:

- Graduated change of a threshold signal;
- Evaluation of a dose rate on an open air, further of background;
- Displaying the value of a background dose rate;
- Displaying the difference of a dose rate between the average indication and background;
- Vibra-call signal is the additional alarming function;
- Animation of the pressed button (the icon on display starts blinking).

The monitor is used for evaluation of the radiation level afield, indoors and for evaluation of contamination level of materials and products.

The device is designed and manufactured pursuant to «Provision on the metrology status, order of development, allowance to production and inspection of radiometric instruments and radiometric devices for the public», «Method of development and allowance of the goods to production on ГОСТ(All-Union state standard) 15.001-88», ГОСТ 15.009-91, and design documentation 10. KP.01.00.00.000-50. Operating conditions: at the temperature of environment from a minus 20 °C up to +50 °C and a relative humidity no more than 80 % at the temperature of +25 °C.

The device has the Certificate of Conformity N°0000883 of 25.11.2003 and registered in the List of System of certification of measurement instrumentation under N°030080149. The certificate is issued by Federal State Unitary Enterprise «VNIIFTRI» of the State Standard of Russian Federation. The Certificate is valid till 24.11.2008.

The results obtained with this device can not be used for official statement on radiation environment and degree of pollution.

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Safety Precautions

Read the safety instructions carefully before using the device. Follow the applicable safety instructions listed below. Heed all warning.

- Do not leave the device for a long time under the impact of a direct solar light or height temperature, for example on an instrument board or in a trunk. The impact of the sunlight or temperature can lead to electrolyte leakage from power supply, their overheating or explosion and therefore to arson, burn and other injuries. High temperature can also cause malformation of the device's frame.
- Do not leave the device in damp and dusty places. It can cause arson, electrical shock and other damages.
- Protect the unit from shocks and heavy mechanical stress that can cause damages of the device.
- The unit is an accurate device. Avoid its fall and other mechanical stresses.
- The body of the device is not waterproof; therefore it can't be exposed to raining or water. If the device comes in touch with water, it is necessary to switch it off and apply to QUARTA-RAD Ltd. In case a small amount of water gets on the device or salty air, wipe it with a soft tissue, place it in a warm and dry premise and wait until a complete dehumidification from the interior of the unit.
- Keep the unit away from devices such as electric or magnetic motors, which generate strong magnetic fields. Do not use and put the monitor close to areas where high electromagnetic signals are generated, such as transmitting tower. Superhigh frequencies can lead to malfunctioning.

- Do not attempt yourself to dismantle or to fix the device.
- Do not place the unit in a microwave and do not carry out any monitoring with ionizers and ozonizers turned on.
- Do not let particles penetrate through a perforated hole inside the unit.
- Do not touch electrical links of a battery block. It can cause corrosion of links and affect normal functioning.
- Condensate can occur on internal parts of device in case of a rapid temperature difference from higher to lower level. To prevent it place the device inside a plastic bag. Keep it there till its temperature reaches one of the environment.
- In order to prevent damages to the unit do not use it if a condensate has appeared. In this case extract power batteries from unit and wait for a while till a condensate evaporates. It is possible to use the device only after a complete vaporization of a condensate.
- Extract power batteries if the device is not being used for a long time and keep the unit in dry and cool conditions.
- It is not recommended to keep the unit in places like labs where chemical agents potentially may cause corrosion.

It is necessary to check working capacity of the unit before usage if it was kept in stowage for a long time.

Precautionary measures for the LCD.

- LCD posses a high-precision technology. Nevertheless one disabled pixel can be displayed on LCD, in the form of a permanent black dot on it, and it is not considered as a malfunction and does not impact on the image.
- Do not hit and press on the LCD as it can cause fractures and damages of the display.
- In case of LCD surface contamination switch off the devise and wipe gingerly the LCD with a soft tissue that does not scratch it.
- Do not leave the device for a long time under the impact of direct solar and fluorescent light.
- Do not let deleterious chemical substances, such as acids, alkali, and solvents etc. fall on the display and do not keep it in places where these substances are located.
- Response time of the LCD increases at low temperatures and display can darken at high temperatures. Standard features of display will restore at room temperature.

Precautionary measures for the power supply.

- Keep power supplies out of reach of children. Its chemical agents represent danger in case of casual swallowing. In this case apply to a doctor immediately.
- Do not hold a power supply with metallic tools such as pliers for it can cause a short circuit.
- Do not heat or dismantle a power supply for it can stop functioning.

Physical configuration

The unit is designed as a portable and handheld device with a self-contained power supply.

Button «**OFF**» and its icon

LCD

Button «**MENU**» and its icon

Button «**CURSOR**» and its icon
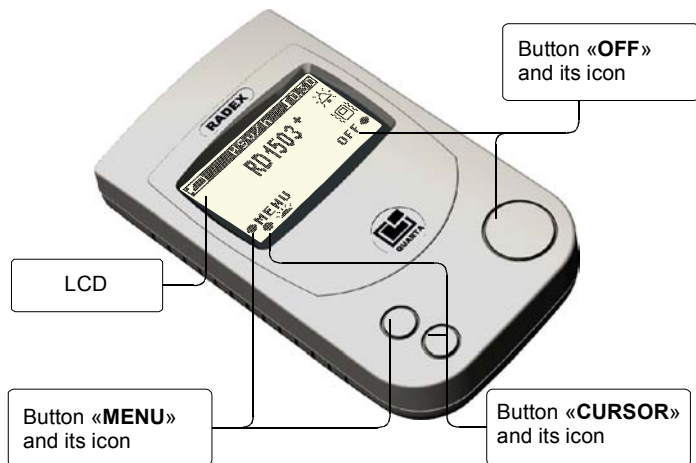
Button «**MENU**» responds to four functions:
«MENU»   responses in Monitoring mode
«SELECT» responses in Menu section
«CHANGE»   responses in Menu section
«START» responses in Menu section

Button «**CURSOR**» responds to two functions:
« ☼ » - switches on LCD backlight in Monitoring and Background modes
« ▼ » - moves cursor in the MENU section

Button « **OFF »** has four functions:
switches on the device,
« RETURN »- send you one level back in MENU section
« EXIT »   - is made to transfer you from MENU section
                to Monitoring and Background modes
« OFF »   - switches off the devise in Monitoring mode
« END »   - stops evaluation of the Background in
                Background mode

   The icons suggest to user the functions of buttons making it easier to operate. Further in the text only icons of buttons will be pointed out. Instruction to push the button with a corresponding icon means clicking the applicable button of the device.
   The pressed button of the unit has animation, meaning that clicking any active button leads to temporary altering the shape of an icon on display from « ◖ » to « ◌ » and restores to position « ◖ ». In all displays shown below the animation of pressed buttons is not depicted

   The cover for a battery bay is disposed on the backside of the unit.

cover for a
battery bay

battery bay

Power supply
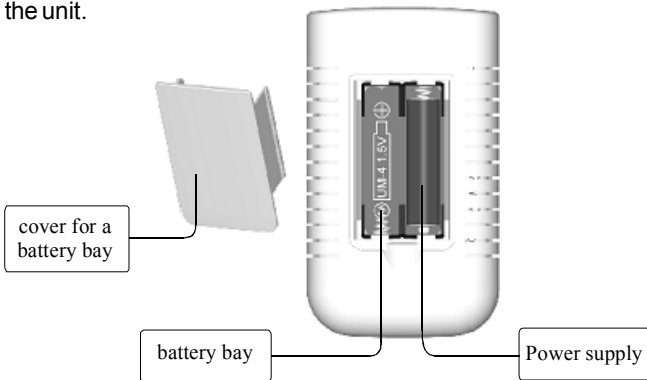
Display format in monitoring and background modes

After activation the unit displays a screen of RD1503+ with button icons and individual or manufacture settings.

Location of 13 fields on display and a possible appearance of icons within these fields are shown below.
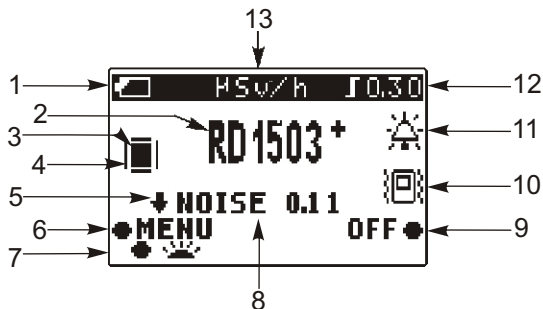
1. Icon of battery condition:
« ▨ »- Complete charge of battery;
« ▯ »- Discharged battery;
« ▯ »- Discharged below allowed level battery, a replacement is needed.

2. Conventional symbol of the unit.

« ▮ »- 3. Icon of quantum registration.

4. Icon in a shape of two parallel lines (short cycle equal to 10 s of observation) or a side of a square (complete cycle equal to 40 s of observation) displays the amount of implemented observations

« " ▢ »- equal to the first short cycle of monitoring (10 s of observations);

« ᴵᴵ ▢ »- equal to the second short cycle of monitoring (20 s of observations);

« ‖ ▢ »- equal to the third short cycle of monitoring (30 s of observations);

« ▍▢ »- equal to one complete cycle of monitoring (40 s of observations);

« ▍▬ »- equal to two complete cycles of monitoring (80 s of observations);

« ▍▭▍ »- equal to three complete cycles of monitoring (120 s of observations);

« ▐▆▏ »- equal to four complete cycles of monitoring (160 s of observations).

« ✛ »- 5. Icon warning that value of a dose rate is less than of a background. Therefore a value «0,00» is displayed.

6. « **MENU** » icon of the button (page 8). This field contains four icons referring to following functions:

« MENU »
« SELECT »
« CHANGE» or
« START »

7. «**CURSOR**»icon of the button (page 8). This field contains following icons:

« ⛯ »- switching on a backlight in Monitoring and Background modes;

« ▼ »- moving cursor and altering a threshold in «MENU» section.

8. A value of a background dose rate - «NOISE XXX», where XXX is a value of a dose rate of background in µSv/h or µRem/h;

9. Icon of the button «**OFF**» (page 9). This field contains following icons:

«RETURN» in MENU section.
«EXIT» in transfering from MENU section to Monitoring and Background modes.
«BACKGROUND» in MENU section.
«OFF» in Monitoring mode.

10. Icon of a vibra-call:
« 〖回〗 »- vibra-call is on. When the vibra-call is off the icon is lacking;

11. Icon of a bell:
« ☆ »- the bell is on. When the bell is off the icon is lacking;

12. Icon of a threshold signal: threshold signal can be set in a range from 0.10 to 0.90 µSv/h for µSv/h dimension (microSievert per hour), for example
« 0.30 » - 0,30 µSv/h
threshold signal can be set in a range from 10 to 90 µRem/h for µRem/h dimension (microRoentgen per hour), for example
« 30 »- 30 µRem/h or
« OFF »- for a turned off threshold signal.

13. Icon of units:
« µSv/h »- microSievert per hour
« µRem/h »- microRoentgen per hour.

Operating mode

There are there three operating modes in the unit: «MONITORING», «BACKGROUND» and «MENU».

The «MONITORING» mode is set automatically at start of units functioning. This mode gives estimation of a dose rate and indications output to the LCD.

The button «**CURSOR»** in a «MONITORING» mode (page 8), fulfill the function of turning on/off a backlight of display. A short-term click on it switches on a backlight for 2 s It allows seeing indications in a twilight or darkness. The importance of a backlight is not remarkable during a bright illumination.

Note. It is important to remember that a frequent switching of a backlight shortens strongly the time of continuous operation of the device.

The «BACKGROUND» mode (page 30) switches on in «BACKGROUND» section (page 20) in «MENU» mode. Just as in «MONITORING» mode this mode performs estimation of a dose rate but it gives out two indications simultaneously: a difference between a dose rate of an average indication and of background, i.e. the exceeding of a dose rate above a dose rate of background and additionally a value of a dose rate of background. This mode is convenient for examining premises, when it is important to know the difference between indications indoors and those on an open air and how determine correctly a value of a dose rate outdoors.

«MENU» mode turns on by clicking a button «**MENU»** (page 8) in case altering of a factory set up is needed. In a «MENU» mode the estimation of a rate dose is not conducting.

Monitoring mode

This mode gives a value of a dose rate displaying indications on the LCD. Every registered quantum is displayed on LCD as « ■ » icon. Blinking frequency of « ■ » icon is proportional to the strength of a radiation dose rate.

A short cycle of observation is introduced in order to reduce a waiting time of the first reading. The indications of a short cycle and its icon of two parallel lines « "■ » (page 10, paragraph 4) are displayed within 10 s, but have a rough value and are updated during the next three subsequent short cycles. The readings of a short cycle are effective as initial estimation of a radiation dose rate

Within 40 s after activation the device gives the first indication which is presented on display as side of a square « |■ » and shows a number of performed observations.

These icons (page 10, paragraph 4) allow determining visually the number of averaging cycles. They are extremely useful for detection of a strong variation in a radiation dose rate (for example in case of a local/domestic radioactive contamination) as in such circumstances the icon « |■ » will be changed to « |■ » and that it is quite easy to note. At the same time the estimation of a dose rate starts all over again from the first cycle, so averaging indication of the previous cycles are not taking into account.

Menu mode

In «MENU» mode one can alter unit measures, arrange a magnitude of a threshold signal, turn on/off alarm and a vibracall, enable a «BACKGROUND» mode and also receive reference information.

Switch to a «MENU» mode ceases monitoring of a radiation dose rate.

In order to switch from «OBSERVATION» mode to a «MENU» mode press and release a «**MENU**» button (page 8). A main menu displays on the screen.
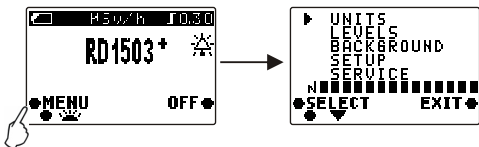
At start the icon « ▶ » is always situated on the upper line of the menu, like in case of «UNIT» section.

Note. On figure a pointer « ☝ » demonstrates what button is necessary to click in order to switch from the present screen to the following one.

«**CURSOR**» button shown as « ▼ » on the screen moves the pointer in a «MENU» mode. Clicking the button « ▼ » moves the cursor down only. After reaching the lowest position it transfers to the upper line.

Choosing the section needed of the menu is implemented by a «**SELECT**» button. To return to the previous section press a «**RETURN**» button.

Switching from «MENU» to «MONITORING» modes is implemented by clicking an «**EXIT**» button. Such switching to a «MONITORING» mode causes the estimation of a radiation dose rate to start from the first cycle.

All individual settings are saved after turning off as well.

Units

Unit measures are set in this section. They could be either µSv/h or µRem/h.

Switch from a «MONITORING» mode to a «MENU» mode (page 15) in order to alter unit measures.

Press the «**SELECT»** button. Screen 2 will appear.
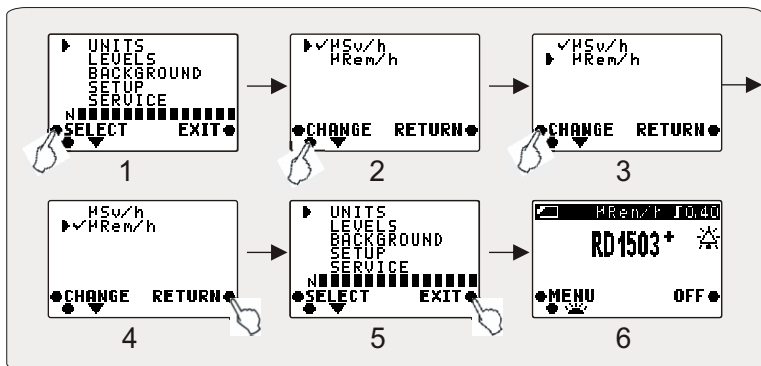
Press « ▼ » button and a cursor « ▶ » moves one line down to µRem/h unit measure (screen 3).

Press a «**CHANGE**» button and an « ✔ » icon is set opposite to a selected unit measure (screen 4).

Press a «**RETURN**» button to return to the main menu screen. Screen 5 will appear on display.

Press an «**EXIT**» button to switch to a «MONITORING» mode. A screen «RD1503+ » will appear with new units, i.e. « ▉Rem/h▉ » (screen 6). From that moment starts functioning a «MONITORING» mode and all the reading are presented in µRem/h.

Levels

Exceeding of a threshold dose rate which can be set in «LEVELS» section provokes to alarm signal actuation.

A threshold signal is made for situations when alarm or vibra signals are needed only in case of a fixed radiation dose rate exceeding. User himself sets a value of a threshold signal (range from 0,10 up to 0,90 μSv/h and discreteness of 0,1 μSv/h). Choosing a type of a signal (audio or vibra signal) is carried out in a «SETUP» section (page 26). Thus, if a dose rate registered during one observation exceeds the installed threshold level than in conformity with « ✔ » icon situated opposite to «AUDIO» and/or to «VIBRA-CALL» (page 26) one of the two or both signal methods can be selected:

a) audio signal activates when each and every quantum is captured;

b) vibra signal is on all the time till the end of a cycle of «MONITORING».

When a threshold signal is off audio signal actuates with every registered quantum and a vibra-call does not function at all.

The dimension of thresholds in «LEVELS» corresponds to unit measures set in «UNITS» section (page 16).

Example of changing the level of a threshold signal from 0,30 µSv/h to 0,40 µSv/h is shown below.

To change a level of a threshold switch from «MONITORING» to «MENU» mode (page 15). The main menu is displayed on the screen.
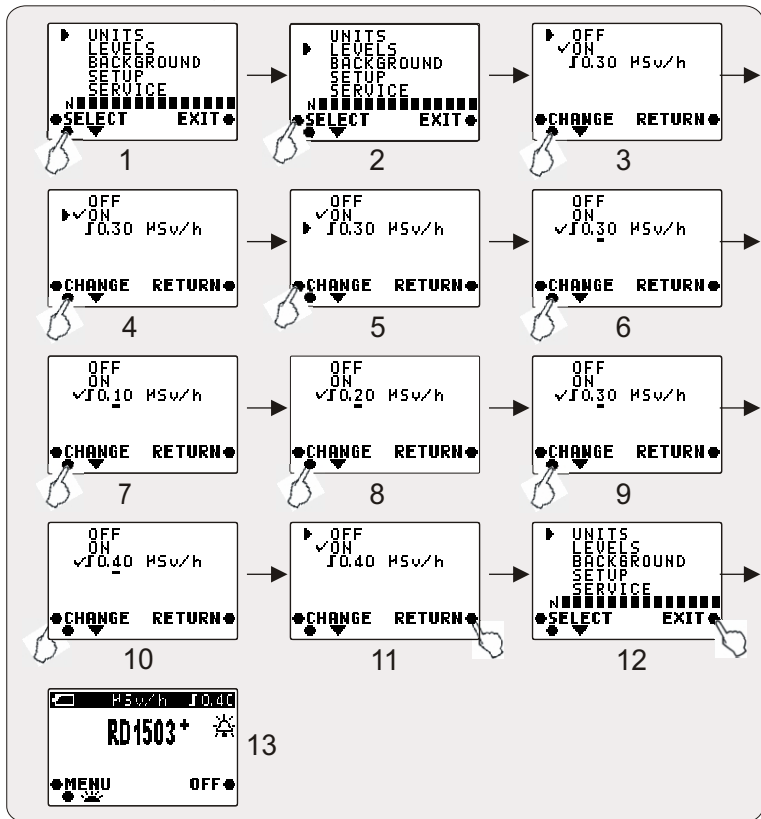
Press a «▼» button and the cursor «▶» moves to«LEVELS" section (screen 2).

Press a «**SELECT**» button and the screen 3 will appear.

A double-click on a «▼» button (screens 4 and 5) moves the cursor «▶» to « 0,30 µSv/h ».

Press a «**CHANGE**» button and the icon «✓» will be placed opposite to « 0,30 µSv/h », and a digit 3 becomes underlined (screen 6);

Press shortly four times a «▼» button and a required value of « 0,40 µSv/h » will be set (screens 7, 8, 9 and 10). A short clicking on a «**CURSOR**» button «▼» leads to a single step changes. The values flash by if the button is pressed for a longer time.

Press a «**CHANGE**» button thus the icon «✓» will be placed opposite to «ON» and icon «▶» opposite to «OFF» (screen 11).

To returning to the main menu screen press «**RETURN**» button (screen 12).

Pressing «**EXIT**» button returns you to "MONITORING" mode. The screen «RD1503+» appears and the icon of the new selected threshold « ▮0.40 » will be in a right upper angle. And «MONITORING» mode stars functioning.

The installed threshold signal is not activated if «✓» icon stands opposite to «OFF» and the device operates in accordance with settings which are in «SETUP" section (page 26). For example, the audio beep signals with every registered quantum if the icon «✓» is placed opposite to «AUDIO». If the icon«✓» is placed opposite to «VIBRA-CALL » only, a vibra signal will not actuate because a vibra-call responds with a turned on threshold level only.

Background

«BACKGROUND» mode can be turned on in this section. An average value of a background dose rate can be easily calculated with an algorithm approximate to methodical instructions of State   Sanitary Epidemic Inspectors in Ministry of Health of The Russian Federation. МУ 2.6.1.715-98 «Conducting a radiationally-hygienic inspection of inhabited and public buildings»

To actuation of a «BACKGROUND» mode switch from a "MONITORING" mode to a «MENU» mode (page 15). A main menu displays (screen 1).

Press «▼» button two times and cursor « ▶ » places opposite to «BACKGROUND» (screen 2, 3).

Press «**SELECT**» button and screen 4 appears.

Double-click on button «▼» and cursor « ▶ » is placed opposite to "BACKGROUND" (screen 5,6).

Press «**CHANGE**» button. A screen 7 appears where digits «1», «2», «3», «4», «5» determine a number of sighting points, which are necessary to conduct evaluation of a background radiation.

Select the first sighting point as it shown on page 37. Press «**START**» button and a screen 8 appears on display and a cycle of estimation of a background starts. Within 160 s the cycle of a background estimation in the first sighting point ends that is shown with « ▤| » icon on display (screen 9). A screen 10 with indications in the first line which stand for a background dose rate in the first sighting point appears on display.

Note. A cycle of estimation of a background can be interrupted. To do so press "**RETURN**" button, thus a cycle of estimation will be interrupted and a screen 4 revealed.

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3

4

5

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9

10

Displace the unit to the second sighting point.

Press «**START**» button and wait till completion of a cycle of a «BACKGROUND» estimation (screen 12). A number in the second line is the evaluation of a dose rate in the second sighting point (screen 13). In order to receive accurate estimation of a background it is necessary to conduct similar observations in 5 sighting points (screen 14).

Note. A number of sighting points can be reduced by clicking «**END**» button without waiting for ending of the fifth cycle of estimation. But it reduces integrity of the reading.

After 5 indications have been made press an «**END**» button a screen 15 will appear. The icon «✔» placed opposite to «ON» means that after exiting a «MENU» mode the device switches to a «BACKGROUND» mode (page 30) and two indications will be displayed:

1) difference of a dose rate between the average indication and background;
2) background dose rate.

To return to the main menu screen press a «**RETURN**» button, a screen 16 appears.

Press «**EXIT**» button. A screen «RD1503+ » reveals, where a «BACKGROUND" and a value of a background dose rate are placed beneath «RD1503+» (screen 17). «BACKGROUND» mode starts functioning (page 30).

1 0.12
2
3
4
5
START   END

10

BACKGROUND

RETURN

11

BACKGROUND
0.12

RETURN

12

1 0.12
2 0.13
3
4
5
START   END

13

1 0.12
2 0.13
3 0.12
4 0.14
5 0.10
START   END

14

OFF
ON
BACKGROUND
CHANGE   RETURN

15

UNITS
LEVELS
BACKGROUND
SETUP
SERVICE
N ████████████████
SELECT   EXIT

16

µSv/h   0.30
RD1503+
NOISE 0.10
MENU   OFF
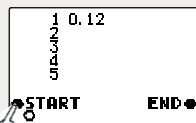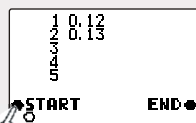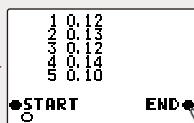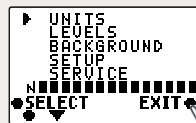
17

To turn off the «BACKGROUND»mode and to switch to the «MONITORING» mode start the «MENU» mode (screen 2) and select «BACKGROUND» (screens 3, 4), than in the «BACKGROUND» section place an icon «✓» opposite to«OFF» (screen 6).

To return to the main menu screen press «**RETURN**» button, screen 7 will appear.

Press «**EXIT**» button. The main screen «RD1503+ » will appear. The «MONITORING» mode starts operating.

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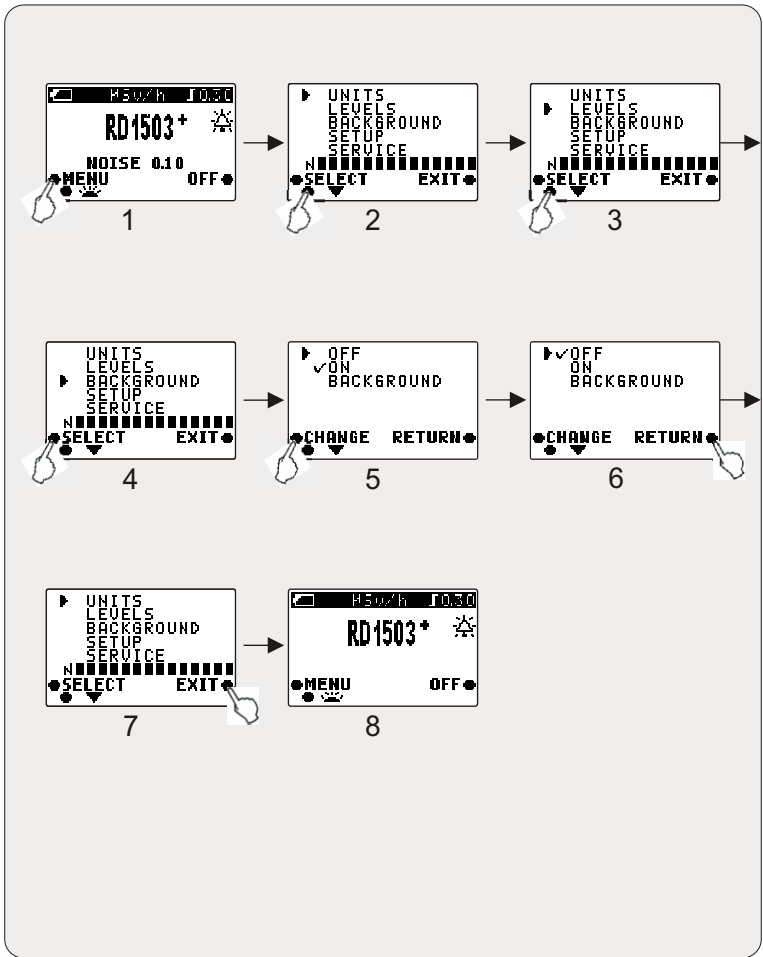
Setup

Two types of signal can be chosen in the «SETUP» section: «AUDIO» and «VIBRA-CALL» which can be turnd on/off by setting an icon « ✓ »opposite to a correspondent choice.

Example of activating a vibra signal instead of an audio one is demonstrated below.

To activate a vibra signal switch from the «MONITORING» mode to the «MENU» mode (page 15).

Press « ▼ » button 3 times, the cursor « ▶ » will be displaced opposite to the «SETUP» section (screen 1).

Press «**SELECT**» button, the screen 2 will appear.

Press «**CHANGE**» button, the «✓» icon opposite to «AUDIO» will disappear (screen 3).

Press « ▼ » button, the cursor « ▶ » will be displaced opposite to the «VIBRA-CALL» (screen 4).

Press «**CHANGE»** button, the icon «✓» opposite to «VIBRA-CALL» will appear, meaning activation of a vibra signal (screen 5).

In order to return to the main menu screen press «**RETURN**» button, the screen 6 will appear.

To start the «MONITORING» mode press «**EXIT**» button. The « 📳 » and « 🔔 » icons will be lacking on the main screen «RD1503+».
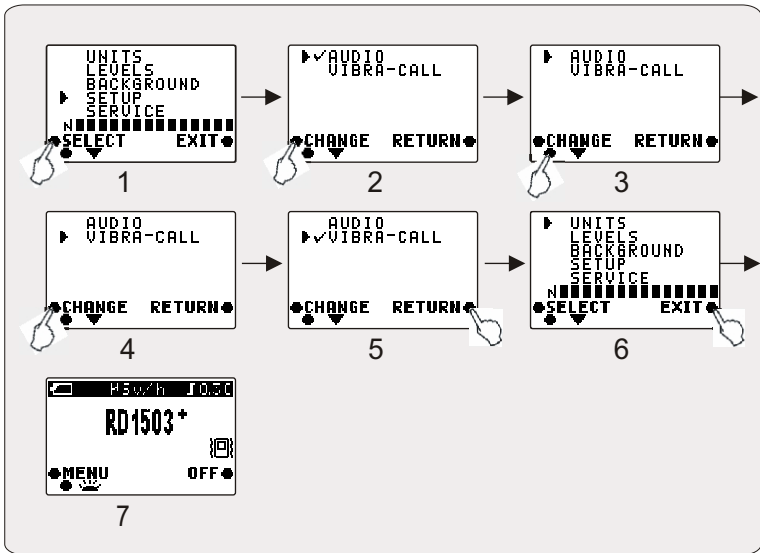
From this moment a vibra signal turns on if the value of a dose rate exceeds the installed threshold of alert (of course only if a threshold is not turned off, page 17). A vibra signal works (in a pulse-mode) periodically till the end of an observation cycle. This algorithm is repeated in other subsequent cycles. A vibra signal is the effective method for alarming the user about the excess of the installed dose rate threshold. It is necessary to note that the usage of a vibra call shortens sharply the device's non stop operating time.

Setting an audio signal is similar to modifying a vibra call.

In the «MONITORING» mode the installed setting are revealed with icons on the main screen «RD1503+ »:

« ☼ » - audio signal is on,

« ▯ » - vibra call is on.

When audio and/or vibra signals are off bell the icons are lacking.

Note:
1. A sound signal is usually used in noisy premises or on the street.
2. In quiet places such as offices and flats we recommend to use a vibra call or a sound alarm with a threshold installed.

Service

In the «SERVICE» section the following is mentioned:

telephone number of an organization where a radiation monitor RADEX RD1503+ can be acquired,

telephone number of the QUARTA-RAD Ltd. Company, which sell wholesale a radiation monitor RADEX RD1503+;

internet address www.quarta-rad.ru, where you can read news about a radioactive situation in Russia, get acquainted with radioactivity safety norms and other normative documents;

Place a pointer « ▶ » opposite to «SERVICE» with the «**CURSOR**» button. Press «**SELECT**».

To return to the main menu press «**RETURN**». Pressing «**EXIT**» transfers to the «MONITORING» mode.

Background mode

This mode is made for examining inside the buildings.

In the «BACKGROUND» mode the estimation of the radiation dose rate is similar to one in the «MONITORING» mode (page 14), yet the display gives not just one but two indications. One stands for the difference of a dose rate between the average indication and background, the second is for a background dose rate. This mode is convenient for examining inside buildings, when it is necessary to know how indications indoors differ from the ones outdoors.

The actuation of the «BACKGROUND» mode and setting a background dose rate are given in the «BACKGROUND» section (page 20). In the «BACKGROUND» mode the value of a background dose rate (in the given example it is 0,10µSv/h) is displayed on the LCD just below the title «RD1503+».

The difference of a dose rate between the indication (in the given example it is 0,05µSv/h)and background (in the given example it is 0,10µSv/h) is displayed after the end of a cycle. Thus the value of an averaged indication is 0,15 µSv/h.
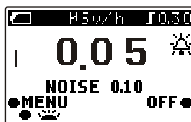
When the value of indicated dose rate is less than of a background the value «0,00» and the icon « ✚ » is displayed.

```
┌──────────────────────────┐
│ ▭  HSv/h  ┌0.30          │
│                          │
│  ▯  0.00            ☼     │
│                          │
│  ↓NOISE 0.10             │
│ ●MENU          OFF●      │
│  ● ⌣                     │
└──────────────────────────┘
```

Switch from the «BACKGROUND» to the «MONITORING» modes is carried out in the «BACKGROUND» section in menu (page 20) by placing « ✔ » icon opposite to «OFF».

The rules and sequence of defining the average value of a background dose rate are covered in section «**Radiation control in quarters and public buildings**»(page 37).

Preparations for using

Before actuating the device read the operation manual and functions of operating controls carefully (page 8).

Installation of power elements
1. Take off the cover of battery compartment;
2. Install into the battery compartment one or two power elements size «AAA» abiding polarity of contacts.
3. Install the cover of battery compartment.

When conducting a long-term examination we recommend to install two power elements, for a short-term just one for it's possible to use one power element.

Do not mix the old and new power elements.

We recommend altering individual settings before conducting the evaluation (page 26).

Recommendations on examining the objects.

Remember that the ionizing radiation has a static random character therefore indications of the monitor in identical conditions will not remain strict. For a precise definition of a dose rate it is necessary to conduct not less than 4 cycles of monitoring without turning off the device (until « |▊| » icon shows up).

Defining radioactivity of the food, household items etc. approximate the monitor to the object of examination on a distance from 5 to 10 mm with it's left lateral side (with slits) and to turn it on.

Defining radioactivity of fluids, the examination of a dose rate is conducted above the unclosed surface of a fluid. For the device protection it is recommended to use a polyethylene package, but no more, than in one layer. Do not let the moisture to get inside the device.

The estimation output exceeding the natural background that is ordinary for the given location is the evidence of the radioactive impurity of the inspected object. The«BACKGROUND» mode is presented for convenience of defining such objects (page 30).

Detecting the location of an ionizing radiation source it is necessary to move a working device above the surface of examined object, being oriented on frequency increase of a sound signal (in menu settings: levels - off, audio - on). Remember, that the frequency of signals as approaching the source will increase sharply, and in accordance with moving away will decrease in the same manner.

Device using

Switching on the device

To switch on the device press the «**OFF**» button (page 8) and the screen «RD1503+» will be displayed.

The sequence of survey

After switching on the device the examination of the radioactive environment starts. During the time of observations each registered quantum of radiation is accompanied by a displayed presentation of the icon« ▓ » (page 10) and a short audible signal, if the sound is switched on and the threshold is off. The frequency of occurrence of the icon on display is proportional to a dose rate. 10 seconds after switching on the unit, the first result of a short cycle and its icon are displayed:

" ▓ - equal to the first short cycle of monitoring;

" ▓ - equal to the second short cycle of monitoring;

‖ ▓ - equal to the third short cycle of monitoring.

The second and third short cycles of observation average over automatically.

* The short cycle of observation is equal to 10 s and made for prompting the deriving of preliminary results. The first reliable result is displayed after 40 seconds of observation and designated by the icon « |▉ » .

The icon « |▉ » in the form of side of a square designates the number of executed observations:

|▉ - equal to four cycles of monitoring (160 s of observations).

|▊ - equal to two cycles of monitoring (80 s of observations);

|▉| - equal to three cycles of monitoring (120 s of observations);

|▉| - equal to four cycles of monitoring (160 s of observations).

The first result of observation is displayed as an average value of four short cycles, the second - as average value of the two cycles of observation, the third - as average value of three cycles of observation and further each following result - it's average value of four previous observations.

The device analyzes a diversion of current value regarding a result of the previous observation and averages it. If the difference exceeds a defined value, the current result is displayed instead of the average one. For example, as results of three observations the average result is 0,20 µSv/h, and the current value 0,80 µSv/h is registered in the fourth cycle, than the result of the fourth observation will not be averaged and we shall see 0,80 µSv/h and the icon « |■ ». This function of the article allows detecting sharp changes of dose rate.

If you want to find a source of radiation turn off a threshold, switch on audio signal and pay attention not to digital readouts only but a sound frequency and frequency of appearances of the icon « |■| » . Its appearance frequency is proportional to a dose rate thus the higher the frequency the closer you are to a source.

Switching off the device.

To switch off the device press the button «**OFF**» (page 8) and hold it till disappearance of the messages from the display.

Radiation control in quarters and public buildings

According to «Norms of radiation standards (НРБ-99) » the defensive measures in inhabitant buildings should be conducted if a dose rate of a gamma radiation inside the building exceeds a dose rate outside for more than 0,2 μSv/h.

The estimation of a dose rate outside (background) is carried out near to the inspected building not less than in 5 sighting points standing from 30 to 100 m apart from buildings and structures and not closer than 20 m from each other. The sighting points of an estimation should be selected on location with a natural soil without any man-caused modifications (road metal, sand, asphalt) and radiocontamination. The unit should be at 1 m high above the earth surface.

The total time of estimation of a background dose rate will make 20 - 30 mines but if you want to receive authentic results it is necessary to conduct a complete term examination.

For your convenience the «BACKGROUND» mode (page 30) is supplemented to the device which makes easier to conduct examination.

Normative documents

«Ionizing radiating, radiation standards. Norms of radiation safety (НРБ-99).Sanitary rules of СП 2.6.1.758-99 ».

«The basic sanitary rules of a radiation safety securing (ОСПОРБ-99) СП2.6.1.799-99 ».

«Conducting a radiationally-hygienic inspection of inhabited and public buildings. The methodical instructions МУ 2.6.2.715-98». Ministry of Health of The Russian Federation.

Marking and sealing

On the frame of the device are marked:
- trade mark of the manufacturer;
- trade mark - RADEX.

Conventional designation of the monitor- RD1503+ appears on display at its turning on.

The assembly number of the device is on the main menu screen. The device is not sealed up by the manufacturer.

Packing

Packing ensures the safety of the device during the transportation.

The packing of device must be carried out in closed aerated premises at the temperature from +15 to +40°C and humidity up to 80 %, and without aggressive admixtures and dash in environment.

Transportation and storage

The device in the manufacturer's packaging may be transported by any transport on any distance.

At transportation of the device it is necessary to ensure its protection from the atmospheric precipitates.

The conditions of transportation of the device in the package must correspond to:

temperature span,............................ from -20 to +40 °C
relative humidity at +25 °C, no more than.................80%

Before putting the device into operation it should be kept in the warehouse in a package of the manufacturer at temperature of from +5 to +40 °C and RH up to 80 % at temperature of +25 °C. It is not allowed to keep the device without packing.

The device at temperature below 0 °C before opening and putting into operation should be kept for an hour in the premise at a room temperature.

Technical service

The maintenance of the unit involves:

1) dusting off the unit from an outboard surface;

2) power elements should be replaced if the message « ☐ » displays;

3) power elements should be expelled from battery compartment in case of a long term of interruption (more than one month);

4) wipe the display only with a soft tissue. During cleaning the device should be off.

Do not let smaller articles penetrate the device through a perforation.

Maintenance and updating

All repairs of the unit are made at the manufacturer's premises QUARTA-RAD Ltd. Company. Address:

Russia, 115409, Moscow, Kashirskoe shosse, house 31, building 44-A
phone/fax (495) 324 5462.
phone   (495) 323-9114 local 9114
E-mail: quarta@quarta-rad.ru
http: // www.quarta-rad.ru

Troubleshooting

Possible malfunction	Possible cause of malfunction	Way of clearance
There is no information on display after turning on.	The power elements are not installed or the power elements are installed disregarding the polarity.	Install the power elements in accordance with the polarity
The message « ▯ » is on display.	The power elements are discharged below the possible level.	Replace the power elements.

Actions in extreme conditions

CAUTION!

IF THE ITEM HAS DISPLAYED A DOSE RATE MORE THAN 1.20 µSV/H IT IS NECESSARY TO LEAVE THIS ZONE URGENTLY AND TO APPLY TO A STATE SANITARY - EPIDEMIOLOGICAL OFFICE FOR CONDUCTING A DETAILED RADIATIVE EXAMINATION

Performance data

The radioactivity monitor RADEX RD1503+, 10.KP.01.00.00.000-50, evaluates radiation environment by the magnitude of the ambient equivalent of dose rate of gamma radiation (further - a dose rate) with taking into account the pollution of objects by sources of beta particles or by the magnitude of exposure dose rate of gamma radiation (further - exposure dose rate) with taking into account the pollution of objects by sources of beta particles.

The device evaluates radiation environment by the magnitude of the ambient equivalent of dose rate of gamma radiation (further - a dose rate) with taking into account X-ray emissions *.

Individual settings

- Two unit measures of a physical quantity: µSv/h (basic)
  µRem/h (exogenous)
- Switching on/off a sound signal;
- Switching on/off a vibra signal;
- Setting a level of a signal threshold, at it's excess a sound signal activates or vibra signal switches on;
- Calculating the value of a background dose rate;
- Displaying the value of a background dose rate;
- Displaying the difference of a dose rate between the average indication and background;
- Animation of the pressed button (the icon of the pressed button blinks)

* The additional characteristics are obtained as a result of studies held by a metrology center of Ionizing Radiations of a State scientific and metrological center «VNIIFTRI» during 1-8 December 2005 and are affirmed by the protocols dated 14.12.2005.

Range of X- radiation energy, MeV..........from 0,03 to 3,0
Range of beta-radiation energy, MeV......from 0,25 to 3,5

Technical Characteristics

Range of dose rate indications, µSv/h...................0.05 to 9.99
Range of exposure dose rate indications,

µRem/h......................5 to 999
Range of gamma radiation energy, MeV.................0.1 to 1.25
Reproducibility of indications
   (at confidential probability 0.95), %........................$15+6/P$
   where P Is a doze rate in µSv/h
Threshold levels (alarm rate),
   µSv/h.........0.10;0.20;0.30;0.40;0.50;0.60;0.70; 0.80;0.90
   µRem/h................................10,20,30,40,50,60,70,80,90
Time of calculation, s...40±0.5*
Time of indication...continuously
Power elements, size "AAA"....................................one or two
Time of continuous work of the device,
   not less than, hours...550**
Overall dimensions,
   height × breadth × depth, mm,
   no more than...105×60×26
Weight (without power elements), kg,
 no more than..0,09

* The increase in the number of performed cycles improves the reliability of indications.
**Two batteries with a capacity of 1350 mAh at a level of a natural background no more than 0,3 µSv/h and manufacture's settings. These elements has the following abbreviation 24 AU

Manufactures settings:

      Units –…………………………………µSv/h
      Threshold –……………………0,30 µSv/h
      Background level –…………………..OFF
      Settings: audio signal –……………ON
                   vibra signal –…………..OFF