RADIATION MONITOR

RADEX RD1503

OPERATING MANUAL

10.КР.01.00.00.000РЭ

Thank you for buying the product of the trademark RADEX

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

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

The device estimates radiation environment in magnitude of ambient equivalent power of gamma radiation dose (further - dose rate) taking into account pollution of objects by beta sources or in magnitude of exposure dose rate of gamma radiation (further - exposure dose rate) taking into account pollution of objects by beta sources.

The device is designed and manufactured pursuant to "Provision on the metrology status, order of development, allowance to production and inspection of radiac 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. КР.01.00.00.000.

Operating conditions: at the temperature of environment from a minus 20 °С up to +50 °С and relative humidity no more than 80 % at the temperature of +25 °С.

The device has the Certificate of Conformity № 0000883 of 25.11.2003г. and registered in the List of System of certification of measurement instrumentation under №030080149. The certificate is issued by Federal State Unitary Enterprise "VNIIFTRY" of the State Standard of Russian Federation. The Certificate is valid till 24.11.2008.

The device obtained with this article, can not be used for official opinion on radiation environment and degree of pollution.

RADEX and РАДЭКС are the registered brands of the firm QUARTA-RAD Ltd.

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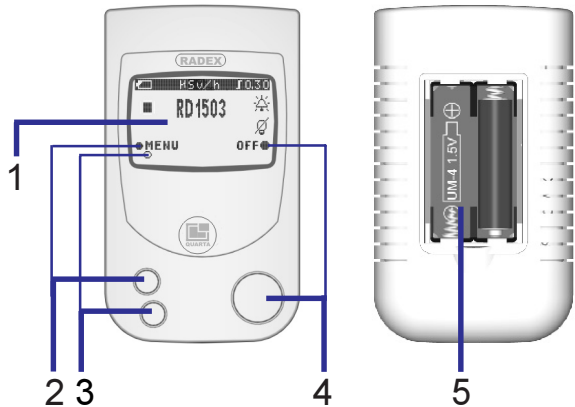
Safety Precaution.

- The body of the device is not waterproof, therefore article cannot be used under a rain or to place it in water. If the water comes into the device, it is necessary to switch it off, wipe it by soft tissue, place in a warm dry premise and dry it up before complete dehumidification from the interior of the device.
- Preserve the device against shocks, dust and dampness.
- Do not let deleterious chemical substances, such as acids, alkali, solvents etc. drop on the display and do not keep it in places, where these substances are present.
- Do not wipe the display by abrasives.
- It is not allowed to place the article in the superhigh frequency furnaces and conduct examinations ionizers and ozonizers of air switched on.
- Do not leave the device for a long time under the impact of direct solar and fluorescent light.
- Do not let foreign objects come inside the device through perforation.
- If you do not expect the device to be used for a long time, extract batteries from a battery compartment.

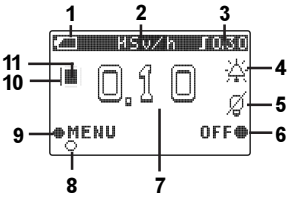
Physical configuration of the device.



1. LCD display (→page 6).
2. Button “MENU” and its icon on the display. The button has three functions: “MENU”, “SELECT”, “CHANGE”.
3. Button “CURSOR” and its icon on the display. The button will be used in the menu for moving cursor.
4. Button “OFF” and its icon on the display. The button has four functions: switch on the device, switch on backlight of LCD display, back in menu, switch off the device.
5. Battery compartment.

The icons prompts the function of buttons to the user, thereby facilitating the usage of the device. Further in the text the icons of buttons are specified. The instruction to press the button with this or that icon means clicking the relevant button on the body of the device.

LCD display



1. Icon of battery condition:

 -Complete charge of battery;

 -Discharged battery;

 -The discharged below allowed level, the replacement is needed.

2. Units:

 - microSievert per hour.

 - microRoentgen per hour.

3. Icon of a threshold of audible signal.
For unit of a μSv/h:

 - 0,30 μSv/h;

 - 0,60 μSv/h;

 - 1,20 μSv/h.

For unit of a μRem/h:

 - 30 μRem/h;

 - 60 μRem/h;

 - 120 μRem/h.

or

 - at the switched off threshold.

4. Icon of setup of a audio:

 - The sound is set “UP” or “DOWN”;

 - The sound is switched off.

5. Icon of setup of backlight:

 - the backlight is switched on;

 - the backlight is switched off.

6. Function of the button “OFF” (→page 5)

7. Result of observations (in μSv/h or μRem/h).

8. Function of the button “CURSOR” (→page 5).

9. Function of the button “«MENU” (→page 5).

10. The icon designates the number of the executed cycles of observation.

 - Corresponds to the first short cycle of observation;

 - Corresponds to the second short cycle of observation;

 - Corresponds to the third short cycle of observation;

 - Corresponds to one cycle of observation;

 - Corresponds to two cycles of observation;

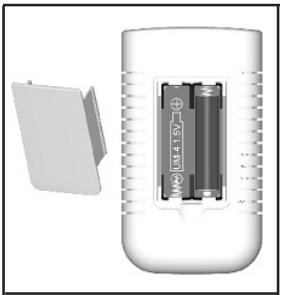
 - Corresponds to three cycles of observation;

 - Corresponds to four and more cycles of observation.

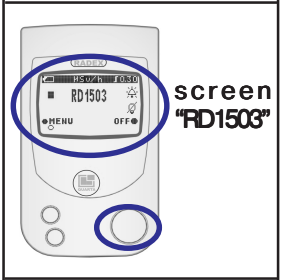
11. Indication of registered particle.

Compendium.

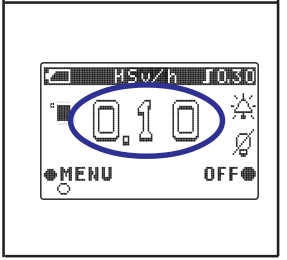
1 **Install batteries.**
Install into the battery compartment two (or one) power elements size “AAA”, the polarity of contacts is indicated in the battery compartment.



2 **Switch on the device.**
Push the big button, then the screen “RD1503” is displayed. The examination of the radiation environment starts.



3 **Result.**
The result of observation (dose rate) will be displayed in 10 seconds. (→page 17)



4

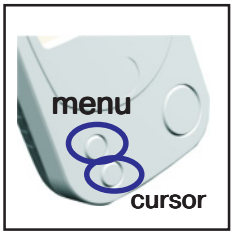
Entering the menu.

For entering the menu and changing the properties push the button “MENU” . The contents of the menu appear. By default the following properties are set:
units –μSv/h,
level–0.30 μSv/h,
sound – down,
backlight – on.

5

Motion through the menu

The motion through the points of menu is carried out with the button “CURSOR”. The selection of the point and its change is carried out with the button “MENU”.

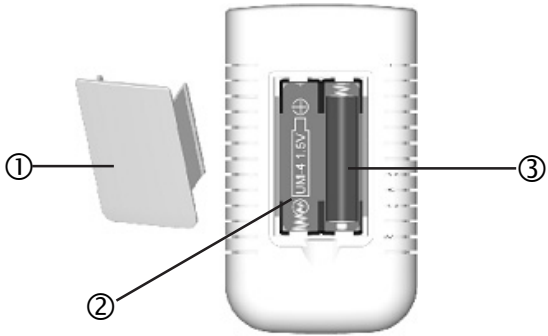


6

Exit the menu. Switching off.

Exit the menu is carried out through the button “OFF”.
The switching off the device is carried out by continuous (till disappearance of the messages on the display) clicking of the button “OFF”.

Installation of power elements.



1. Take off the cover of battery compartment ①;

2. Install into the battery compartment ② two (or one) power elements “size AAA” ③, the polarity of contacts is indicated in the battery compartment.

3. Install the cover of battery compartment ① on the body of device.

Notes:

1. When carrying out the long-term examination, we recommend to install two power elements, for the short-term one – it’s possible to use one power element.

2. Don’t mix the old and new power elements.

3. If you do not expect the device to be used for a long time, extract batteries from a battery compartment.

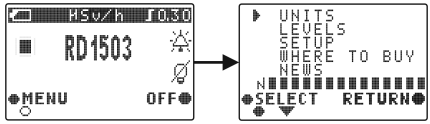
Switching on and switching off of the device.

To switch on the device one should push the big button after it the message" RD1503" appears on the display.

To switch off the device one should long push the button "OFF"

Operations in the menu.

The menu allows the user to make necessary settings for each case. At start and operation in the menu the observations are stopped and restored after escaping menu.



Screen RD1503 Main menu

To enter the main menu push the button "MENU" (→ page 5, point 2). Menu and N■■■■■■■■■■■■■■■■ - assembly number of the device will come up.

To motion cursor on points and select values the button "CURSOR" (→page 5, point 3) is used.

To select the point the button "SELECT" is used.

To change values the button "CHANGE" is used.

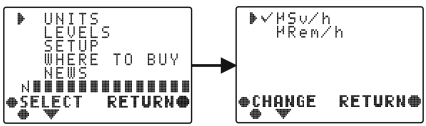
To escape points and escape menu the button "RETURN" is used.

All individual settings made in menu, are saved after switching off the article.

MONITOR MENU

Units

In section “UNITS” change of dimensionality of units is carried out: μSv/h or μRem/h.



1 2

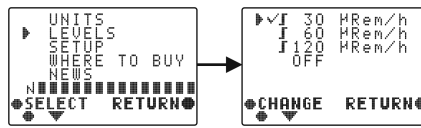
1. Place the cursor on the word “UNITS”. Push the button “SELECT”. Screen 2 will be displayed.

2. Select unit with the help of the button “CURSOR” and icons « ▶ ». The installation of value is carried out with the help of the button “CHANGE”, on the display the icon « ✓ » is placed near to selected dimensionality.

3. To go back to the main menu push the button “RETURN”.

Levels.

In section “LEVELS” change of one of three levels of the threshold is carried out. If the rate level of a dose exceeds level value, at registration of each following quantum « ▩ » the audible signal sounds. Unit corresponds to the unit set earlier (page 12).



1 2

1. Push the button “CURSOR”, « ▩ » place it near to inscription “LEVELS”. Push the button “SELECT”. Screen 2 will be displayed.
2. . With the help of the button “CURSOR” move « ▩ » to the selected threshold. Push the button “CHANGE” to fix the selected value, thus « ▩ » is placed nearby.
3. . For recovery to the main menu push the button “RETURN”.

At the switched off threshold the audible signal sounds at registration of each quantum, that it is useful to use this searching for a source of radiation.

Setup.

In section “SETUP” the change of tuning up of the device is carried out: backlight and audio.

Setup of backlight:

1 2 3

1. With the help of the button “CURSOR” place « ▶ » on inscription “SETUP”. Push the button “SELECT”, screen 2 will be displayed.

2 Cursors « ▶ » is placed near the inscription “BACKLIGHT”. Push the button “SELECT”. Screen 3 will be displayed.

3. By the button “CURSOR” move « ▶ » on the inscription “ON”, if you want to allow function of lightning, or on an inscription “OFF”, if you want to switch off function of lightning. Push the button “CHANGE”, « ✓ » will be placed near the selected inscription.

4. To go back to the main menu push the button “RETURN” twice.

The lightning of the display is switched on by clicking of the big button, if the function “BACKLIGHT” is allowed, i.e. it is set “ON”. The backlight of the display is switched on approximately for 3 sec. For prolongation of backlight it is necessary to press the big button repeatedly.

The backlight allows to see the registrations of the device in twilights and darkness. At bright illumination, the influence of backlight is insignificant.

Please remember, that usage of backlight reduces time of continuous operation of the device considerably.

Setup of a audio:

1 2 3

1. With the help of the button “CURSOR” establish « » on the inscription “SETUP”. Push the button “SELECT”.

2 the button “«CURSOR”, move « » on the inscription “AUDIO”. Push the button “SELECT”.

3. By clicking the button “CURSOR” place « » near to the inscription “UP”, “DOWN” or “OFF”. Push the button “CHANGE”, « » will be placed near to selected inscription.

4. To go back to the main menu push the button “RETURN” twice.

Where to buy.

In section « WHERE TO BUY » the telephone of organization is specified, where it is possible to acquire a radiation monitor RADEX RD1503.

1. . With the help of the button “CURSOR” place «  » on an inscription «WHERE TO BUY». Push the button “SELECT”.

2 To go back to the main menu push the button “RETURN”.

News.

In section “NEWS” the reference to the site www.quarta-rad.ru is made, where it is possible to get the information on radiation environment in Russia.

1. With the help of the button “CURSOR” place «  » on the inscription “NEWS”. Push the button “SELECT”.

2 To go back to the main menu push the button “RETURN”.

Use of the device

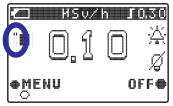
Switching on the device.

To switch on the article it is necessary to press the big button, then the screen “РД1503” will be displayed.

The order of survey.

After switching on the article the examination of the radioactive environment starts. During time of observations each registered quantum of radiation is accompanied by a display presentation of the icon « ■ » and short audible signal, if the sound is switched on and the threshold is switched off. The frequency of occurrence of the icon on the display is proportional to dose rate.

10 seconds after switching on the article, the first result of short cycle and icon are displayed:



" - Corresponds to the first short cycle of observation;

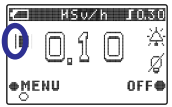
" - Corresponds to the second short cycle of observation;

‖ - Corresponds to the third short cycle of observation.

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

* The short cycle of observation is equal to 10 sec. and intended for prompt deriving of preliminary results. The most reliable result is displayed after the first 40 seconds cycle of observation and designated by the icon « | ».

40 seconds after switching on the article the first result and icon in form of side of a square will be displayed, which displays amount of the executed observations:



| - corresponds to one cycle of observation;
| - corresponds to two cycles of observation;
| - corresponds to three cycles of observation;
| - corresponds to four and more cycles of observation.

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

At result averaging the article analyzes a diversion of current value concerning result of the previous observation. If the odds exceeds a defined value, current result is displayed instead of average one. For example, by 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, then the result of the fourth observation will not be averaged and on the display we shall see 0,80 μSv/h, and icon «| ». This function of the article allows to detect sharp changes of dose rate.

Switching off the device.

To switch off the device, press the button "OFF" (page 5, point 4) and hold it till disappearance of the messages from the display.

How to conduct the examination correctly.

At an examination of the radiological situation it is necessary to remember, that the ionizing radiation has static random character, therefore the indications of the monitor in identical conditions will not remain strict stationary values. For more precise definition of a power level of a dose it is necessary to conduct from 3 up to 5 cycles of inventory, not turning off the device.

At the definition of the radioactive pollution of the food stuff, household items etc. it is necessary to approximate the monitor to the object of examination on distance from 5 up to 10 mm by the left lateral side (with slits) and to turn it on.

At definition radioactive pollution of fluids, the examination of dose rate is conducted above the unclosed surface of a fluid. The hit of fluids on a surface and inside the device is not allowed. For the device protection in similar cases it is recommended to use a polyethylene package, but no more, than in one layer.

For detection of 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 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.

Marking and sealing

On the front side of the monitor there are marked:

1. trade mark of the manufacturing plant;
2. trade mark – RADEX.

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

The assembly number of the device is in the main menu.

The device is not sealed up by the plant - manufacturer, as the body of the article is nonseparable and the repair is carried out only at the plant.

Packing

The 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 of air from +15 up to +40 ^{0}C and RH up to 80 %, if there are no aggressive admixtures and dash in environment.

Transportation and keeping custody.

The device in the package of the manufacturer may be transported by any mode of 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 up to +40 ^{0}C

RH at temperature +25 ^{0}C, no more than……..80 %

It is not allowed to keep the device without packing.

Before the putting into operation, the device should be kept to the warehouse in package of the manufacturer plant at temperature of air from +5 up to +40 ^{0}C and RH up to 80 % at temperature of +25 ^{0}C.

The device kept at temperature below 0 C should be put for an hour to the premise with room temperature before opening and putting into operation.

Possible malfunctions and ways of its clearance

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  on display.	The power elements are discharged below the possible level.	Replace the power elements.

Performance attributes

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

Range of exposure dose rate indications,mRem/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

Chime levels (alarm rate),
μSv/h.....0.30, 0.60, 1.20
μRem/h.....30, 60, 120

Time of calculation, sec.....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 x breadth x depth, mm, no more than.....105x60x26

Weight (without power elements), kg, no more than.....0,09

NOTES:

1. The increase in cycles of calculation conducts to increase of reliability of indications.
2. Two batteries with a capacity 1350 mAh, at a level of a natural background no more than 0,3 μSv/h and factory settings.