СОЭКС

индикатор радиоактивности

CONTENTS

Radioactivity detector Soeks-01M

Purpose

Radioactivity detector SOEKS-01M is designed for assessing the product radioactivity level and detecting objects, food or construction materials contaminated with radioactive elements.

Radioactivity detector can easily assess the level of radioactivity according to the power level of ion radiation (gamma radiation and beta particles stream) with taking into account x-ray radiation.

Base kit

Radioactivity detector SOEKS-01M has the following items included in the base kit:

Radioactivity detector Soeks-01M	1 pcs
Passport	1 pcs
2 batteries (AAA size)	2 pcs
Rigid paperboard box	1 pcs

Battery charger, power cord, rechargeable batteries and other accessories and supplies are purchased separately.

A Geiger-Muller counter is used as ion radiation senser in our SOEKS-01M radioactivity detector.

The manufacturer reserves the right to add new features to the device. Please follow new code modifications on the official website: **www.soeks.ru**. The device's code can be modified only in the manufacturer's service centers.

Specification

Range of indicated background radiation level, mcSv/h	from 0,03 to 1000
Range of indicated background radiation level, mcR/h	from 3 to 100000
Registered gamma radiation energy	from 0,1
Levels, mcSv/h	from 0,3 to 100
Levels, mcR/h	from 30 to 10000
Time of measurement, seconds	up to 20
Display format of indication	Constantly, number and graphical
Power elements	AAA size batteries rechargeable or non-rechargeable
Power voltage range, V	1,9 - 3,5
Time of continuous work of the device, hours at least**	10
Overall dimensions height x width x thickness, max, mm	105x43x18
Weight (without power elements), max, grams	57
Battery charging current, max, mA	300
Current consumption from charger or USB not more than	500
Output charger voltage	from 4,5 to 5,5
Display	Color TFT, 128x160
Operating temperature range, °C	from -20 to +60

Comment:

* Increasing the number of measurements shall improve the reliability of readings.

** The time of continuous work of the device is up to 10 hours, with default settings and two batteries of capacity 1,350mAh.

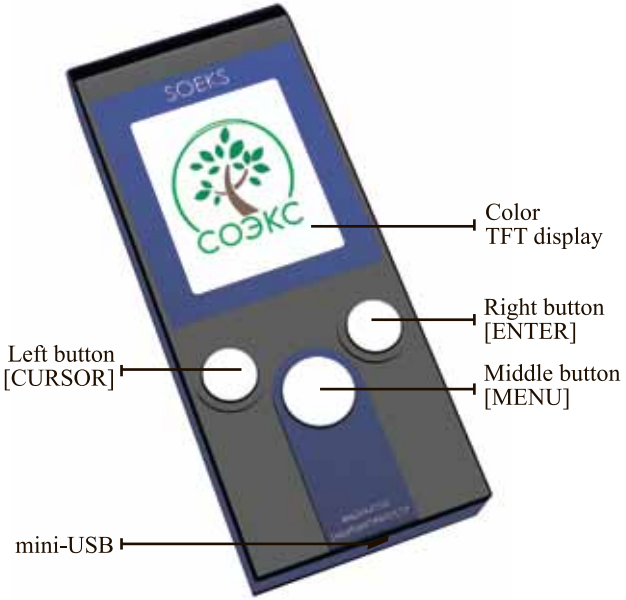
*** Default settings: measuring units– mcSv/h, alarm level - 120, color theme - green, sound – on.

Precautions

Before using the product, please read carefully the safety measures below and strictly observe them when using the product. Violation of these rules may cause malfunction or cause total failure of the product. The manufacturer's guarantee shall be void if the safety measures stated below are violated.

• Protect the product from shock and other mechanical impacts that can damage it.
• Do not use the product in conditions of high humidity, under or in contact with water: the product is not waterproof.
• Do not leave the product in places with intensive sun light or high temperatures for a long time, this can cause electrolyte leakage from power elements, failure of the product, and injuries.
• Do not leave the product for a long time near devices that generate strong magnetic fields, such as magnets or electric motors, and where strong electrical magnetic signals are generated, such as transmitter towers.
• Do not perform measurements close to cell phones and microwaves, this may affect the instrument's readings.
• Do not disassemble and do not try to repair the device on your own.
• Do not connect the device to a PC or socket while it has regular batteries installed.
• Strictly observe polarity when you install power elements, otherwise the device may overheat and fail.

Appearance of the Device



Controls

Left button [CURSOR]- scroll down the list. After you reach the lowest (last) position on the list you return to the topmost (first) position.

Right button [ENTER]- confirm selection.

Middle button [MENU] – turn the device on/of, return to root menu.

Power

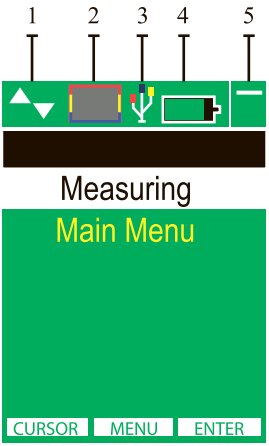
At the back side of the device there is the cover of the battery section. AAA type batteries or accumulators can be used to power the device. The bottom of the battery section shows the manufacturer's trademark - SOEKS - and board model.

The front side of the device has a mini-USB port that can be used to recharge batteries from a computer via a USB-mini-USB cable or from the power mains. If connected to a PC or electric mains, the device can work without power elements.

How to install power elements

• Strictly observe polarity when you install power elements, otherwise the device may fail.
• The type of power elements installed must match the parameters preset in the 'Power' menu item (page 33).
• When the device is turned off, you can leave the power elements installed – the batteries and accumulators are not spent if the device is in standby mode.
• If you expect not to use the device for a long time, it is recommended to remove the power elements after the device is turned off.

Screen Indicators



1. List indicators – appear if the list exceeds the screen.

 - the list exceeds the bottom limit of the screen

 - the list exceeds the top limit of the screen

 - the list exceeds both the top and bottom limits of the screen

2. Diagram
Shows radioactivity during the previous minute. The diagram keeps moving from right to left, and the bar height shows the level of background radiation: the higher the background, the taller the bar. The bar may be blue, yellow and red.

3. USB indicator

 - USB cable connected

 - batteries are charging

 - charging completed

4. Battery charge status indicator:

 - normal power level

 - running down

 - low power level

 - replace or recharge the batteries

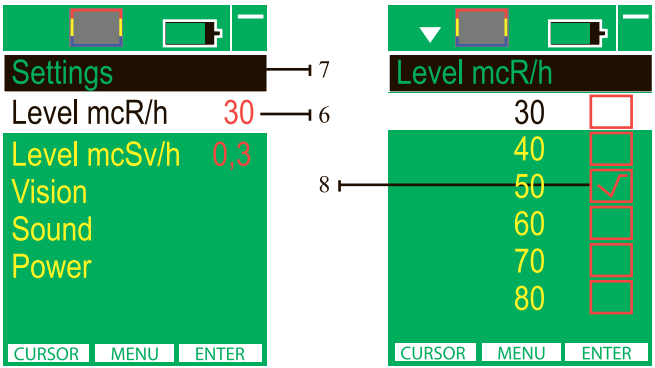
5. Active status indicator
The continuously moving element in the upper right corner of the screen indicates the device's active status.
When buttons are pressed, icons in this area show which button has been pressed.


- the [CURSOR] button was pressed


- the [ENTER] button was pressed

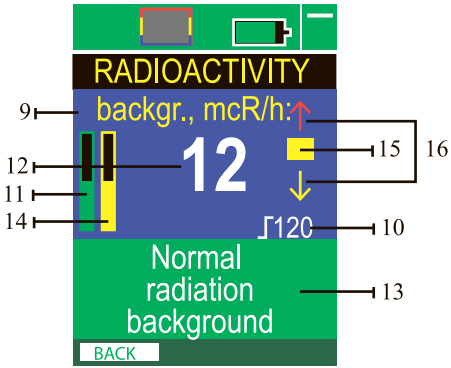

- the [MENU] button was pressed

Menu indication and navigation



6. The current (selected) line is highlighted with color.
7. Inside a selected menu item, the upper line on the list indicates the parent menu item.
8. As the device is being set up, the current parameter value is flagged with a tick mark.

Indicators in the «Measuring» mode
A screen with the following elements appears in the measure mode:



9. Units: mcR/h or mcSv/h

10. Level in preset units

11. Indicator of measured results: filled up within 10 sec. If the background radiation is high the result may be available much sooner.

12. Radiation level. Shown as large digits in the screen center. The first measurement also shows the word «MEASURING»

13. The message about radiation bagkground:
- if the measured background radiation is less than 40 mcR/h, a «NORMAL RADIATION BACKGROUND» indication appears on a green background.
- if measured background radiation is 40-120 mcR/h, caption «HIGH RADIATION BACKGROUND» appears on a yellow background.
- if the measured background radiation is greater than 120 mcR/h, caption «DANGEROUS RADIATION BACKGROUND» appears on a red background.

14. The indicator of measurement accuracy – with increasing of accuracy fills in with yellow colour. With each measurement (it takes 10 sec.) the column of the indicator of measurement accuracy grows till complete fulfillment. The complete fulfillment takes about 2 minutes (12 measurements). If during the measurement some sharp changes of the radiation are defined (more than three times increasing or ten times decreasing), than the indicator of measurement accuracy zeroes. Thanks to this fact, the defining of sharp changes of radiation background with reflection of exact data takes no more than 10-20 seconds.

15. The indicator of defining radiation fractions: If the fractions follow often, than the indicator blinks with yellow and red, if the fractions are rare – the indicator is yellow.

16. The indicators of radiation background changes:
- One red up arrow appears when increasing of radiation background is more than 30% of average.
- One red down arrow appears when decreasing of radiation background is more than 30% of average.
- Two red up arrows appear when the increasing of the radiation background is considerable.
- Two green or yellow down arrows appear when decreasing of radiation background is considerable.

The device's menu consists of 2 items:
- measuring – enter the measurement mode
- main menu – device settings

Main menu

- **Units**

In this item you select units to measure the radiation background: mcR/h or mcSv/h.

There are many different units to measure radiating doses.

Roentgen – in use since 1928 to measure generated radiation or exposure dose.
Sievert – in use since 1979, named after Rolf Sievert – a Swedish scientist. 100 Roentgen = 1 Sievert, provided that only the biological effect of radiation is considered.

By dividing 1 Sievert by 1000 we receive a millisievert. 1 mSv is one thousandth of one Sievert. Millisievert is often used as a measure unit in diagnostic procedures (X-raying, X-ray computed tomography etc.)

Microsievert – 1 mcSv – is one thousandth part of a millisievert or one millionth part of one Sievert. Film photofluorography equals 500-800 mcSv, digital is 60 mcSv. Computed skull tomography on a step-by-step tomograph ensures 1,000-15,000 mcSv, a modern spiral tomograph gives 400-500 mcSv, and a maxillofacial tomograph with two-dimensional sensor ensures 45-60 mcSv.

If radiation background exceeds 0.4 mcSv/h., you need to look for the reasons of this exceeding.
If radiation background exceeds 1.2 mcSv/h., it is not recommended to stay in this place, it may be dangerous.

Natural radiation background in Russia is 0.05-0.20 mcSv/h. (5-20 mcR/h.).

● **Language**
In this item you can select the interface language. This device has only two options: English and Russian.

Attention! After the [MENU] button is pressed the screen will display the root menu in the selected language. If you made an error and selected the unfamiliar language, press the following sequence of buttons to return to the language selection menu: **middle-left-right-left-right.** Then select the language you need.

Settings

In this section you can preset the parameters for the device and the interface.

Items of the Settings menu:

● **Level in mcR/h.**
● **Level in mcSv/h.**
These items are related: when one is changed, the other also changes.

You can select the threshold value from 16 preset values on the list.

mcR/h.	mcSv/h.
30	0,3
40	0,4
50	0,5
60	0,6
70	0,7
80	0,8
90	0,9
100	1
120	1,2
150	1,5
200	2
500	5
1000	10
2000	20
5000	50
10000	100

If the measured background radiation exceeds the preset level, alarm sound appears.

Alarm sound switching off:

settings > sound > alarm sound

● Vision

In this item you can adjust screen settings: brightness, display time, and color pattern.

● Brightness

Select low, medium or high brightness level of the screen.

To save power and help the batteries last longer it is recommended to use the low or medium brightness level of the screen.

● MinutesOn.

Set the time of display backlight in standby mode. You can select from 1 to 15 minutes in the options list.

● AlwaysOn

yes – cancels the MinutesOn parameter. Backlight is always on while the device is in use.

no –the screen's backlight works as preset in the MinutesOn function.

● Theme

Select from 4 possible combinations of background and font color: green, gray, blue and white.

● Sound

In this item you can adjust the sound parameters.

● Sound on (yes/no)

● Sound tone

Select one of the 4 available sound tones.

● Keypad tone (yes/no)

To save power and make the batteries last, it is recommended to turn the sound off.

● Alarm sound (yes/no)

Sound indication of level of radiation background exceeding.

● Volume (low/medium/high)

Default is the average volume.

●Power

In this item you can adjust parameters of the power elements used in the device.

● Accumulators

Select ‘yes’ if the device has rechargeable accumulators installed and ‘no’ if regular batteries are used. Incorrectly selected parameter of the installed power supply type may cause incorrect indication of power charge.

If ‘yes’ parameter is selected the accumulators will recharge while connected to a PC or charger via a mini-USB slot.

Attention! Never connect the device to a charger or a PC if it has batteries installed. This can overheat the power elements, cause their failure and electrolyte leakage, damage the case and break the device.

● Sleep

Set the time in minutes after which the device shall automatically shut down.

● AlwaysOn

yes – cancels the value of the Sleep parameter. The device will work until turned off with the [MENU] button.

no – the device automatically shuts down according to the set Sleep parameter.

Power control of the device

1. To turn the device on, press and hold the [MENU] button until the display turns on (the screen backlight is on) then release the [MENU] button.
- When the device is on, an animated screen with the company's logo appears. To skip this screen press the [ENTER] button.
- After the splash screen the display will indicate the model (code modification version) of the device for 3 seconds.

2. To turn the device off press and hold the [MENU] button until the display shows an animated screen with falling autumn leaves. Then release the [MENU] button.
Pressing and holding the [MENU] button will turn the device off in any mode.

3. While connected to a USB, the device will be on, even without power elements installed. If the device automatically turned on while connected to USB; disconnecting the device from the USB slot will shut down the device.

When the device is off, you can leave the power elements installed – batteries and accumulators are not spent if the device is in standby mode. If you expect not to use the device for a long time, it is recommended to remove power elements after the device is turned off.

Beginning to Use the Device

1. Install the power source (page 25,33)
2. Turn the device on (page 34)
3. Before you begin measurements, we recommend that you tune up the device (page 31)
4. Select the 'Measuring' menu item.

After you enter the 'Measuring' mode, the unit begins to examine the radioactive situation. In 10 seconds approximately you will see the first readings on the display, and the next measuring cycle will begin. Be sure that at least 4 or 5 cycles run to achieve accurate results.

If the readings are higher than the natural radiation background typical for the locale, this means that the examined object is contaminated by radiation.

Results obtained using the device can not be used for official conclusions regarding the radiological situation.

Measuring radiation background of objects

To measure radiation background of foodstuffs, building materials and other things do this sequence:

1. Measure the level of radiation background several meters away from the target.
2. Move the device directly to the target and measure radiation background as close as possible to the target.
3. Compare the resulting data with the radiation background level measured in step 1.

The difference of readings in step 1 and step 2 will represent the radiation background of the target.

To evaluate radioactive contamination of liquids, the unit must be placed above open surface of the liquid. To protect the unit from contact with the liquid, it is recommended that the unit should be wrapped in a polyethylene bag, but ensuring that the wrapping is one layer of plastic only.

- In the measuring mode, press any button to return to the root menu.
- If the screen goes blank, press any button to reactivate it.

Marking and sealing

The name of the device is written on the case. The serial number and date of manufacturing are written in the battery section under the accumulator. The manufacturer does not seal the device.

Package

The package ensures safety of the device during transportation and storage, provided normal climatic conditions.

Transportation and storage

The packed device can by shipped by any type of transport over any distance.

During shipment, the device must be protected against humidity.

Shipping conditions of the packed device must meet the following requirements:

- environment temperatures from -40° to +60°C.
- relative humidity max 90% at +25°C.

Until operation, the device must be stored in the factory package, in a warehouse with air temperatures from -5° to +40° C and maximum relative air humidity 80% (at temperature +25°C). The device may not be stored without the package. If the device remained at below-zero temperatures for a long time, it must be left indoors for 2 hours before use.

Maintenance

Maintenance includes:

- removal of dust from the outer surface of the device;
- timely changing or charging the power elements;
- if the device is not used for a long time (more than 2 weeks), power elements must be uninstalled;
- clean the display with soft cloth only.

Prevent foreign objects from getting inside the device through the accumulator section or perforation on the back side of the device.

В заключение приведём значения предельно допустимых доз и некоторые официальные данные о последствиях облучения для человека.
20 мЗв - предельно допустимая доза (ПДД) - наибольшее значение индивидуальной эквивалентной дозы для персонала объектов атомной промышленности, непосредственно работающего с ИИИ (категория А облучаемых лиц) за календарный год. При такой годовой дозе равномерное облучение в течение 50 лет не может вызвать в состоянии здоровья неблагоприятных изменений, обнаруживаемых современными методами. Эта доза эквивалентна тому, что человек постоянно в течение 50 лет находится (живёт) в условиях фона в 570ч650 мкР/час.
5 мЗв - предел дозы (ПД) - допустимая индивидуальная эквивалентная доза облучения населения, проживающего в санитарно-защитных зонах, зонах наблюдения объектов атомной промышленности (категория Б облучаемых лиц) за календарный год. При такой годовой дозе равномерное облучение в течение 70 лет не вызывает изменений в состоянии здоровья, обнаруживаемых современными методами диагностики. Исходя из этой дозы, допустимый безопасный фон 55ч65 мкР/час (0,6 мкЗв/час).
0,5 мЗв - по существовавшим ранее нормам годовая предельно допустимая индивидуальная эквивалентная доза для внешнего и внутреннего облучения всего населения. В настоящее время эта доза не регламентируется. Ей соответствует фон в 5-7 мкР/час (0,06 мкЗв/час).
0,1 Зв - в течение года - не наблюдается каких-либо заметных изменений в тканях и органах.
0,75 Зв - незначительные изменения в крови.
1Зв - нижний предел начала лучевой болезни.
3-5 Зв - тяжёлая степень лучевой болезни, погибают 50% облучённых.

To conclude description, here are values of maximum permissible doses and certain official information about consequences of radiation exposure for humans.
20 mSv – maximum permissible dose (MPD) – annual highest value of individual equivalent dose for nuclear sector personnel who work directly with sources of ionizing radiation (category A). Such annual dose of homogeneous irradiation for 50 years cannot trigger adverse changes in health detectable by modern methods. This dose is the equivalent of a lifetime of 50 years against a background of 570x650mR/h.
5 mSv – permissible dose (PD) – annual permissible individual equivalent dose for a person living in sanitary protection zones or radiation-control nuclear industry areas (category B). Such annual dose of regular irradiation for 70 years cannot cause negative changes in health detectable by modern methods of diagnostics. For this dose the permissible safe background is 55x65 mR/h (0.6 ЯSv/h).
0.5 mSv – previously accepted annual maximum permissible individual equivalent dose of external and internal irradiation for all population. Currently this dose is not regulated. It equals a background of 5-7 mR/hac (0.06 ЯSv/h).
0.1 Sv during 1 year – no perceptible changes detected in tissues and organs.
0.75 Sv - minor changes in the blood.
1 Sv - lower threshold of the radiation sickness.
3-5 Sv - grave radiation sickness, 50% of irradiated persons die.

Корешок талона на гарантийный ремонт/ Warranty coupon stub

Талон изъят/ Coupon received (date) _____ 20___ г.

Талон на гарантийный ремонт/ Warranty coupon

ИНДИКАТОР РАДИОАКТИВНОСТИ SOEKS 01M/
RADIOACTIVITY DETEKTOR SOEKS 01M

заводской номер/ serial number

Продан магазином/ Sold by

_____

наименование предприятия торговли/ name of the retailing organization

Дата продажи/ Date of sale_____/_____201___г.

Выполнены работы/ Works performed_____

_____

_____

_____

_____

_____

Исполнитель/ By_____

_____

Владелец/ Owner_____

_____

_____

_____

фамилия, имя, отчество/ full name подпись/ signature

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