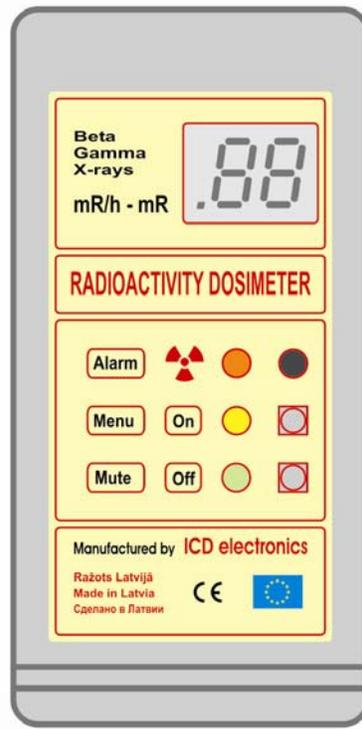


Radioactivity dosimeter RD01



User's Manual



2011

Contents

<i>Introduction</i>	2
<i>Technical specifications</i>	4
<i>How does RD01 work?</i>	5
<i>How to use RD01?</i>	7
<i>Power</i>	10
<i>How to carry out measures correctly?</i>	11
<i>Warranty</i>	12
<i>Precautions</i>	13
<i>Storage and transportation</i>	14

Introduction

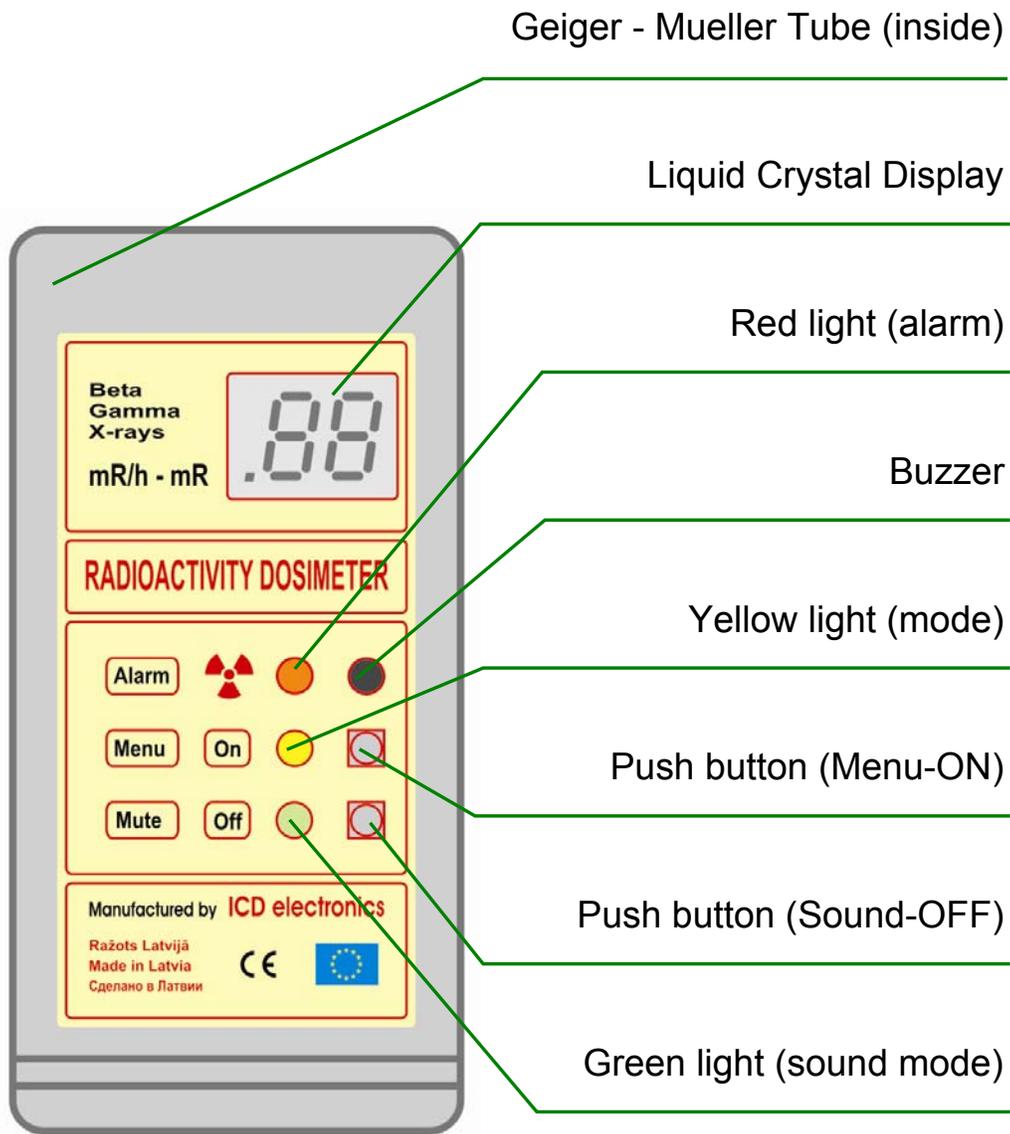
Purpose

Radiation dosimeter ICDE RD01 is designed for measuring the product radioactivity level, detecting objects contaminated with radioactive elements and gauging the accumulated radiation dose.

Base Kit

The base kit of radiation dosimeter RD01 consists of:

- ✦ Radiation dosimeter RD01 pcs
- ✦ 2 batteries (AAA size) 2 pcs
- ✦ Warranty coupon 1 pcs
- ✦ Rigid paperboard box 1 pcs



Technical specifications	
Sensitive to radiation	β , γ , & χ -rays
Detector	Geiger-Muller counter
Measurement units	$\mu\text{R/h}$ or mR/h
Range of indicated radiation level	to 100000 $\mu\text{R/h}$ (1000 $\mu\text{Sv/h}$)
Measurement basic relative errors	$\pm 20\%$
Alarm threshold (LED and sound alarm)	From 100 $\mu\text{R/h}$ (1 $\mu\text{Sv/h}$)
Time of measurement	4 seconds
Display format of indication	Continuously, numerical, 2 digit
Power supply	2 x AAA batteries
Power voltage range	2.0 - 3.5 V
Time of continuous work of the device	≥ 100 hours
Display	LCD – 2 digits, monochromatic
Dimension, max height x width x thickness	129 x 69 x 20 mm
Weight: (without batteries)	49 g
Operating temperature range	from -10 to $+60$ °C

How does RD01 work?

The RD01 unit utilizes the Geiger-Mueller (GM) tube to detect radiation (Beta, Gamma and X-Ray a.k.a. Roentgen rays). Radiation passes through the GM-tube and causes gas ionization to occur within the tube. When ionization has achieved a certain level, an electrical discharge takes place. Each of the discharges is detected electronically and registered within the RD01's microprocessor. Depending on the frequency of discharges, the level of radiation is calculated by the IC chip as a count during a certain period of time.

Units

Radiation levels are shown in micro-Roentgens/hour ($\mu\text{R/h}$) or milli-Roentgens/hour (mR/hr) where $1000 \mu\text{R/h} = 1 \text{ mR/h}$ and $1000 \text{ mR/h} = 1 \text{ R/h}$. The abbreviation mRtg is equivalent to mR .

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, where $100 \text{ Roentgen} = 1 \text{ Sievert}$, provided that only the biological effect of radiation is considered.

If you want to convert the units to Sieverts (SI derived unit), use this conversion chart:

Dis- played	Red light	Roentgens per hour	Sieverts per hour	Danger level after 1 hour
10	off	10 μ R/h	0.1 μ Sv/h	Background radiation
99	off	99 μ R/h	0.99 μ Sv/h	Low level radiation
.12	flashes	0.12 mR/h	1.2 μ Sv/h	Not recommended to stay here
1.0	flashes	1.0 mR/h	10 μ Sv/h	Daily human limit rate
10	flashes	10 mR/h	0.1 mSv/h	Do not stay here
99	flashes	100 mR/h	1 mSv/h	Substantial exposure
EE	flashes	1 R/h	10 mSv/h	Strong exposure
EE	flashes	10 R/h	100 mSv/h	Extreme danger
EE	flashes	100 R/h	1 Sv/h	50% chance of death

How to use RD01?

Beginning to use the device:

Install the power source, for more information how to install power source, please consult the paragraph Power. Turn the device on by pressing and holding the button ON down for one full second. The mode radiation power is on, whenever the RD01 unit is turned on, it performs calculations non-stop. Press and hold the OFF button down for 1 second to turn off the unit.

Display modes

There are two display modes available: Radiation power mode (or dose rate mode), which shows current radiation level; and Radiation dose mode, which shows total or accumulated radiation dose since the unit has been turned on. To switch between the display modes, press MENU (ON) button for less than 1 second. When radiation dose mode is on, a yellow light will turn on.

Alarms

If the radiation dose rate gets higher than around 100 $\mu\text{R}/\text{h}$, a red light will flash rapidly and an alarm will sound with a continuous ‘beeping’ sound. If the battery gets low the red light will flash once every 8 seconds. The alarm beeps can be turned on/off by changing into one of four different sound modes (see *Sound modes*). The red alarm light can not be switched off without switching off all device.

Sound modes

Each of the electrical discharges gives the user a ‘clicking’ sound. If the radiation dose rate gets higher than around 100 $\mu\text{R}/\text{h}$, an alarm will sound with a continuous ‘beeping’ sound. The clicks and alarm beeps can be turned on/off by changing into one of the four different sound modes. If the SOUND button is pushed for less than one second (when the unit is on), the sound modes are cycled through Modes 1-2-3-4-1-... These Modes will not affect measurements or display readings:

Mode	Clicks	Alarm	Green LED flashing
#1	on	on	off
#2	off	on	once every 2 seconds
#3	on	off	twice every 2 seconds
#4	off	off	twice every 2 seconds, the second light is longer

Reading current radiation in Power mode

In Power mode yellow light is off. If the decimal point is not shown and the red light is not flashing, unit is reading low radiation levels and shows it in $\mu\text{R/h}$ (e.g. '09' – 9 $\mu\text{R/h}$). If the decimal point is shown the unit shows radiation levels in mR/h (e.g. '.15' – 0.150 mR/h or 150 $\mu\text{R/h}$). If the decimal point is not shown but the red light is flashing radiation levels are shown in mR/h (e.g. '12' – 12 mR/h). In power mode readings are correct up to 25 mR/h . If dose rate exceeded the 100 mR/h , unit will show EE on the display.

Reading total radiation in Dose mode

Reading total radiation in Dose mode if yellow light is on. The radiation dose is shown always in mR . Dose mode measuring rate is up to 100 mR . If dose exceeded the 100 mR , unit will show EE on the display.

Power

AAA type batteries can be used to power the device. To install, remove or change the battery, undo the screw on the back of the unit, open the case and unplug the battery. Strictly observe polarity when you install power elements, otherwise the device may fail.

If the battery gets low the red light will flash once every 8 seconds – the readings are still accurate at this state. If the battery gets too low, the unit will turn itself off. 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 the unit is not used for extended periods of time to save the battery power it is recommended to remove it from the unit.

How to carry out measures correctly?

Measuring radiation background of objects:

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.

Warranty

The warranty period for the device is 12 months, the warranty period begins after the ultimate user receives the device. The manufacturer guarantees efficient operation of the device provided that the user observes the operating conditions, safety measures, and requirements to storage and transportation described in this manual. If any malfunctions are detected in the device, the warranty period shall be extended for time during which the device is under warranty repairs and the ultimate user is unable to use the device. Warranty repairs are done at the manufacturer's factory. This guarantee shall be void if:

- the serial number of the device is not the same as the number in the guarantee coupon;
- the guarantee coupon is not available or illegible because of damage, corrections or erasures;
- requirements to shipment, storage and operation described herein are violated;
- malfunction is caused by third party actions or a force majeure;
- the device or its component parts has signs of shock or other mechanical impact (scatches; cracks, chips, loose parts inside the case, color spots on the display, etc.);
- malfunctions are caused by foreign objects, liquids and insects inside the device;
- the user does or attempts to disassemble and repair the device.

The name of the device is written on the case. The serial number is written in the battery holder. The manufacturer does not seal the device. Please send all your comments to our e-mail addresses at our official website: www.icdelectronics.com

Precautions

- Do not drop the unit.
- Protect the unit from shock and other mechanical impacts that can damage it.
- Do not use the unit in conditions of high humidity, under or in contact with water.
- Do not leave the unit in intensive sun light or high temperatures.
- Do not leave the unit for a long time near devices that generate strong magnetic fields and where strong electrical magnetic signals are generated.
- Do not perform measurements close to cell phones and microwaves, this may affect the unit's readings
- Do not try to repair the device on your own.
- Strictly observe polarity when you install power elements, otherwise the device may overheat and fail.
- Prevent foreign objects from getting inside the device through the or perforation on the side of the device or during the removal or installation of batteries.

Maintenance

The unit's 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.

Storage and transportation

Protect unit from moisture and temperature above 40° C. The packed device can be shipped by any type of transport over any distance; the package ensures safety of the device during transportation and storage, provided normal climatic conditions. During shipment, the unit must be protected against humidity and overheat.

Until operation, the device must be stored in the factory package, in a warehouse with air temperatures from -5°C 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.

Made in the EU

Enjoy your new RD01!