HOME RADIATION MONITOR

Operating Manual
BICT.468382.064-01 HE

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This operating manual (OM) is intended to inform the user about the principle of operation of the “Home Radiation Monitor” system (hereinafter – HRM), the procedure for working with it, and all information necessary for its proper operation and full implementation of its technical possibilities.

HRM belongs to the class of household products and is not a tool for official (professional) measurements.

The main components of the HRM are the control unit of the Home radiation monitor, and the BDBG-20 detecting unit of gamma radiation.

The BDBG-20 detecting unit of gamma radiation (hereinafter – the detecting unit) is calibrated with reference sources of ionizing radiation after manufacture and is not subject to verification.

The OM contains the following abbreviations:

DER - ambient dose equivalent rate of gamma radiation;

PC - personal computer.

1 DESCRIPTION AND OPERATION

1.1 Purpose of use

The HRM is designed for continuous monitoring of radiation gamma background in the environment by measuring the ambient dose equivalent rate (hereinafter – DER) of gamma radiation, as well as for sound and light signaling in case of an increase in the level of radiation above the established threshold levels.

The HRM is used for Home purposes: to monitor radiation purity of the surrounding area, provided that its detecting unit is located on the facade of the house, as well as residential premises, buildings and structures, if its detecting unit is located inside the building.

Due to the built-in WiFi unit and the integrated web interface, the HRM can be used to construct an independent radiation monitoring network.

1.2 Technical specifications

1.2.1 Key data and specifications of the HRM are presented in Table 1.1.

Table 1.1- Key data and specifications

Specification	Unit of measure	Standardized values according to the specifications
1 Measurement range of gamma radiation DER	μSv/hour	$0.01 – 10^4$
2 Main relative permissible error limit of gamma radiation DER measurement at ^{137}Cs calibration with confidence probability of 0.95	%	$15+2/\dot{H}^*(10)$, where $\dot{H}^*(10)$ – is a numeric value of gamma radiation DER, equivalent to μSv/hour
3 Energy range of detected gamma radiation	MeV	0.05 – 3.00
4 Energy dependence of the detecting unit's measurement results during gamma radiation DER measurement in the energy range of 0.05 MeV to 1.25 MeV	%	±25

Table 1.1 (continued)

Specification	Unit of measure	Standardized values according to the specifications
5 Time of operating mode setting and measurement time of the BDBG-20 detecting unit, not more than	min	3
6 Additional relative permissible error limit caused by a change in the ambient temperature from minus 25 ºC to +55 ºC	%	5 per each 10 ºC of deviation from 20 ºC
7 Ingress protection rating of: - the detecting unit - the control unit		 IP67 IP20
8 Dimensions of the detecting unit: - hermetic housing without fasteners and a cable - length of the connecting cable	 mm m	 27×27×165 3
9 Weight of the detecting unit (with the connecting cable) without fasteners, not more than	kg	0.3
10 Operating temperature range of: - the detecting unit - the control unit	°C	 from minus 25 to +55 from 0 to +50
11 Supply voltage of the control unit	V	5
12 Useful current, not more than	A	1
13 Dimensions of the control unit, not more than	mm	68×130×20
14 Weight of the control unit without fasteners, not more than	kg	0.15
15 Supported WiFi networks		802.11 b/g/n

1.2.2 The control unit allows programming two threshold levels in the range from 0.01 μSv/h to 9.99 mSv/h with a discreteness of 0.01 μSv/h and generation of an audible alarm about exceeding the threshold levels with a different sound for each of the threshold levels and a visual alarm – the display backlight flashes red.

1.2.3 The measured DER of gamma radiation is displayed continuously with a one-second update interval.

1.2.4 The detecting unit has a function to control the performance of the built-in counter with generation of check information.

1.2.5 Information on the precious materials content in the HRM

The HRM contains no precious materials.

1.2.6 Electromagnetic compatibility

The HRM complies with DSTU EN 61326-1:2014 standards regarding electromagnetic compatibility.

1.2.7 Safety measures

The HRM meets the technical safety requirements established in DSTU EN 61010-1:2014 standard.

1.3 Delivery kit of the HRM

1.3.1 The HRM delivery kit consists of the units and maintenance documentation provided in Table 1.2.

Table 1.2- Delivery kit

Designation	Name	Q-ty	Note
BICT.412118.042-01	Control unit of the Home radiation monitor	1	
	USB type C - type A power cable	1	
BICT.418266.071-01	BDBG-20 detecting unit of gamma radiation	1	With a bracket
BICT.468382.064-01 HE	Operating Manual	1	
BICT.468931.003	Installation kit (IK) *	1	
BICT.468936.007-01	Package	1	

* The IK is supplied as follows:

- dowel FIX-K-06 KOELNER (6 mm × 30 mm) – 2 pcs., multipurpose screw with a semicircular head (3.5 mm × 25 mm) – 2 pcs. (for mounting the control unit);

- dowel FIX-K-08 KOELNER (8 mm × 40 mm), multipurpose screw with a semicircular head (4.5 mm × 50 mm) – 2 pcs., washer 5 A2 DIN 125 – 2 pcs., washer 5 A2 DIN 127 – 2 pcs. (for mounting the detecting unit).

Products from the IK are used by the consumer to secure the control unit and the detecting unit at the installation site

1.4 Design of the HRM

The HRM system consists of the control unit (1) and the detecting unit (2).

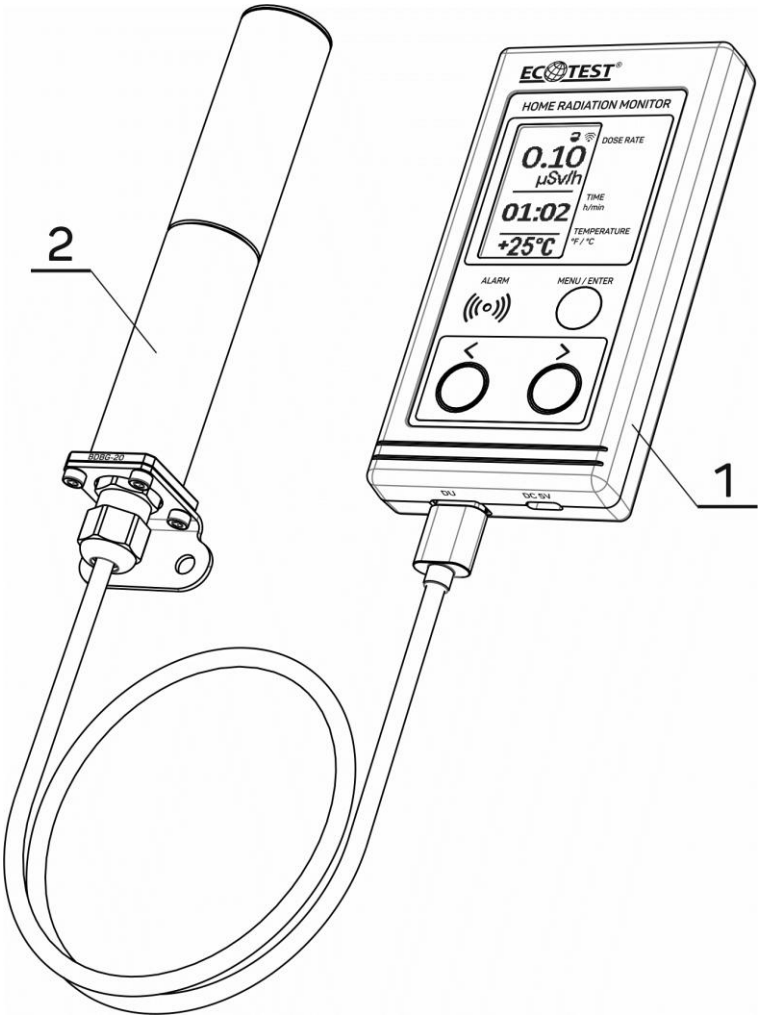


Figure 1 – Design of the HRM system

1.4.1 Design and operation principle of the detecting unit

The detecting unit is built based on a Geiger-Muller counter and has a steel case (1). The case has a mark (2) of the counter's center. The cable (3) cannot be removed. There is a USB type A connector (4) at the end of the cable. The detecting unit is attached to the wall using a special bracket (5).

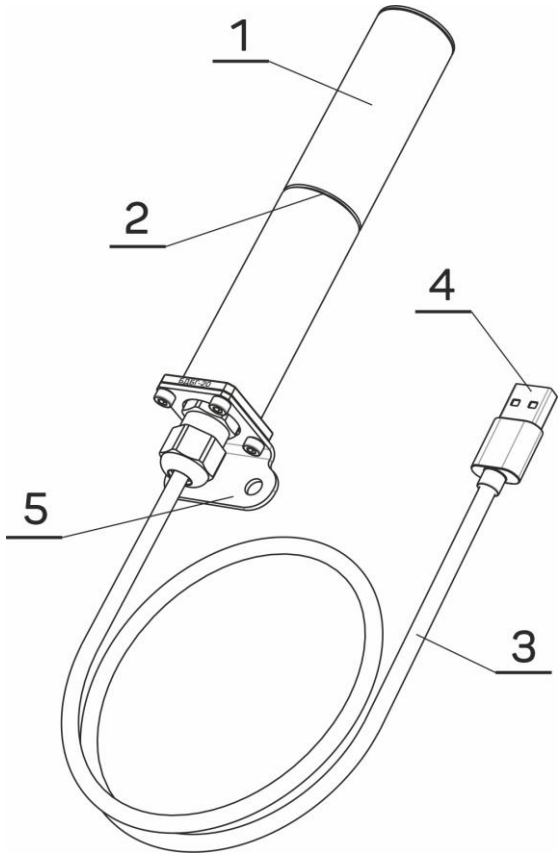


Figure 2 – Design of the detecting unit

The detecting unit measures gamma radiation DER and ambient temperature. The cable (3) is used to power the detecting unit and transmit the measured values to the control unit using the RS-485 interface.

1.4.2 Design of the control unit

The HRM's control unit consists of a front cover (1) with a display (2), a loudspeaker (3) and buttons MENU/ENTER (4), "<" (5) and ">" (6). Holes for mounting (8) are cut out on the back cover of the case (7). Below are DU connectors (9) for connecting the detecting unit and "DC 5V" (10) for connecting to the power supply.

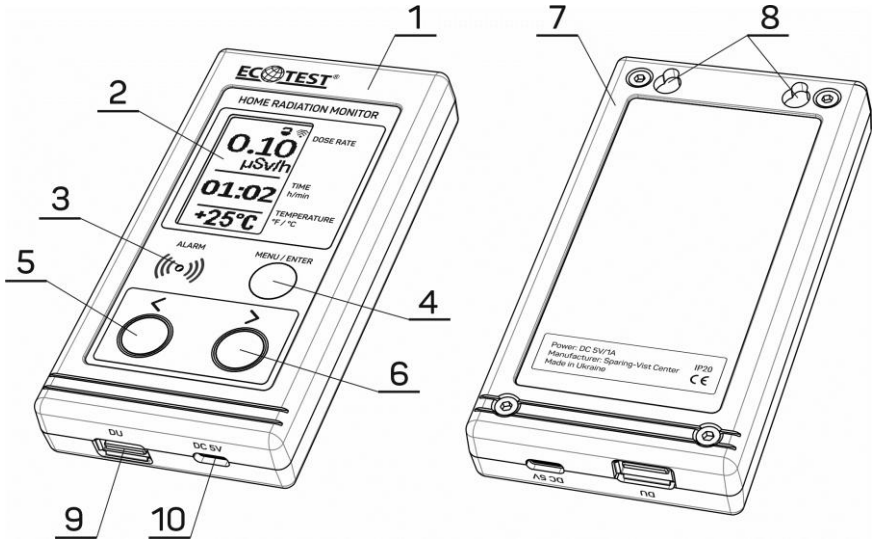


Figure 3 - Design of the control unit

The control unit polls the detecting unit with a one-second interval. The obtained measurement results are shown on the display. The control unit also compares the measurement results of gamma radiation DER with the programmed threshold levels. When one of the threshold levels is exceeded, the control unit emits a sound signal, and the display backlight flashes red.

1.5 Labeling and sealing

1.5.1 The name, information inscriptions and trademark are printed on the front panel of the control unit.

1.5.2 The factory number and the date of manufacture are printed on the back wall of the control unit’s case.

1.5.3 The control unit is sealed with mastic in the recesses for the control unit 's fastening elements.

1.5.4 The detecting unit is sealed with a seal on a wire loop.

1.5.5 Removal of seals and repeated sealing is carried out by the manufacturer after repair.

1.6 Package

1.6.1 The control unit, the detecting unit with a bracket, the installation kit and operating documentation for the HRM are placed in a special packing box.

2 PROPER USE

2.1 Operating limitations

Operating limitations for the HRM system are given in Table 2.1.

Table 2.1 - Operating limitations

Operating limitation	Limitation parameters
1 Ambient air temperature for: control unit detecting unit	 below 0 °C and above +50 °C below -25 °C and above +55 °C
2 Relative humidity	up to 95 % at a temperature of 35 °C, non-condensing
3 Photon ionizing radiation influence	DER up to 1 Sv/h during 5 min

Note. The control unit and the detecting unit must work under conditions that do not exceed the application conditions specified in 1.2 of the OM.

2.2 Preparation of the HRM for operation

2.2.1 Scope and order of external examination

2.2.1.1 Before using the HRM system, unpack it and check if the delivery kit is complete. Examine for mechanical damage.

2.2.2 Rules and procedure for checking the control unit's readiness for work

2.2.2.1 Please carefully read this manual, as well as learn the location and purpose of the control buttons before starting work.

2.2.2.2 Connect the detecting unit to the DU connector of the control unit. Connect the power cable to the "DC 5V" connector of the control unit and feed +5 V power supply. The control unit should turn on within 5 seconds.

2.2.3 Installation of the HRM system

2.2.3.1 Mounting of the control unit and the detecting unit to the concrete and brick walls of the room is carried out using fasteners included in the installation kit.

2.2.3.2 The detecting unit must be attached to a vertical wall on the exterior (facade) side of the building or indoors. There are two holes in the bracket for mounting.

Note. For correct temperature readings, the detecting unit must be placed in the shade.

2.2.4 List of possible troubles and troubleshooting

2.2.4.1 The list of possible troubles and troubleshooting is presented in the Table 2.2.

Table 2.2 – List of possible troubles and troubleshooting

Trouble	Probable cause	Troubleshooting
The control unit does not turn on	1 No power supply 2 Break in the power cable	1 Connect the power cable to the +5 V power mains 2 Repair the break in the power cable
“Error 1” message on the control unit	1 The detecting unit is not connected to the control unit 2 The connecting cable between the control unit and the detecting unit is damaged 3 The detecting unit has failed	1 Connect the detecting unit to the control unit 2 Eliminate damage in the cable 3 Replace the detecting unit
“Error 2” message on the control unit	The counter of the detecting unit has failed	Replace the detecting unit
“No saved events” message in the web interface	No event records saved	Disconnect the detecting unit, wait 1 minute and connect it again. The event “No answer from BDBG-20” will be created
“No saved logs” message in the web interface	No log records saved	Wait 5-10 minutes and try to read the logs again
“Need WebSocket connection with device!” message in the web interface	The WebSocket connection was closed	After receiving the message, wait 10 seconds and repeat the action that caused the message again, or reload the web interface page

2.2.4.2 If you fail to eliminate the troubles presented in the Table 2.2, or more complicated faults occur, the HRM shall be handed over to the manufacturer for repair.

2.3 Use of the HRM

2.3.1 Preparing the detecting unit for operation and its use

2.3.1.1 There are no external parts in the detecting unit that could attract life-threatening voltages.

2.3.1.2 When working with sources of ionizing radiation during the calibration of the detecting units, the radiation safety requirements set forth in the current regulatory documents NRBU-97 and OSPU-2005 must be followed.

2.3.1.3 Securely fix the detecting unit in the place of its regular use.

2.3.2 Preparing the control unit for operation

2.3.2.1 Measurement of gamma radiation DER.

After applying the power to the control unit, the detecting unit automatically starts measuring gamma radiation DER no later than in 30 s.

Probable (an error within the equipment certificate) information about measured gamma radiation DER level will appear on the outlet of the detecting unit maximum in 3 minutes after the beginning of measurement when DER levels are near-background.

2.3.3 Operating modes of the control unit

The control unit has the following operating modes:

- display of measured gamma radiation DER, temperature and current time;
- viewing threshold levels;
- the mode of changing the threshold level values;
- display of settings.

2.3.4 Procedure for working with the control unit

After switching on, the control unit displays the inscription “Ecotest®” and the software version (see Fig. 4) and starts working in the mode of displaying the measured gamma radiation DERs (see Fig. 5).

Figure 4 – “Ecotest” inscription

Figure 5 - Display mode of measured gamma radiation DER

At the top, Figure 5 shows a status bar, where:

- - active access point of the control unit,
- - the control unit is connected to an available WiFi network,
- - protection against accidental settings is disabled,
- - protection against accidental settings is enabled.

If there is no communication with the detecting unit, the error “Error 1” will be displayed on the control unit’s screen (see Fig. 6).

Figure 6 – Displaying a message about the lack of communication with the detecting unit

2.3.4.1 **Viewing threshold levels and mode of changing the threshold level values.**

To switch to threshold level viewing mode, press the “<” or “>” button briefly.

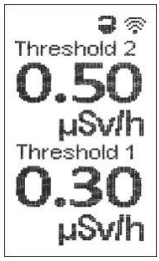


Figure 7 - Mode of threshold level viewing

To switch to the mode of changing the threshold level values, briefly press the MENU/ENTER button in the mode of viewing the threshold levels.

Figure 8 - Mode of changing the threshold levels values

A short press of the MENU/ENTER button changes the cursor position (_), and a short press of the "<" or ">" button allows you to change the value of the digit the cursor is pointing to.

Exit and saving of the threshold levels will be done automatically in 5 seconds if no buttons are pressed, and the control unit will return to viewing threshold levels.

Note. The following threshold levels are set when the control unit is turned on for the first time:

threshold 1 – 0.3 µSv/h,

threshold 2 – 0.5 µSv/h.

To return to the display mode of the measured DERs of gamma radiation, it is necessary to briefly press the "<" or ">" button.

2.3.4.2 **The mode of control unit settings display.**

To switch to the mode of the settings display in the mode of the measured gamma radiation DERs display, it is necessary to briefly press the MENU/ENTER button.

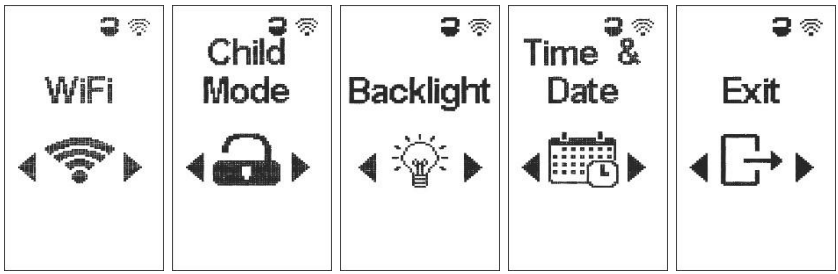
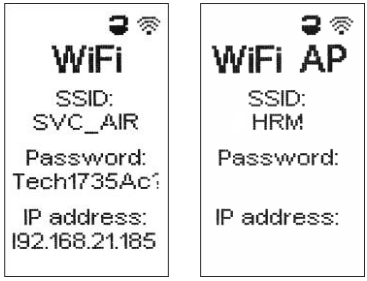


Figure 9 - All items of the settings display mode

To display WiFi information, use the “<” or “>” buttons to select the “WiFi” settings item (see Fig. 9) and briefly press the MENU/ENTER button to go to WiFi information. When viewing WiFi information, a short press of the “<” or “>” button will show the access point information. A short press of the MENU/ENTER button will return the control unit to the settings display mode. If you do not press the buttons for 10 seconds, the control unit will return to the mode of displaying the measured DERs of gamma radiation.



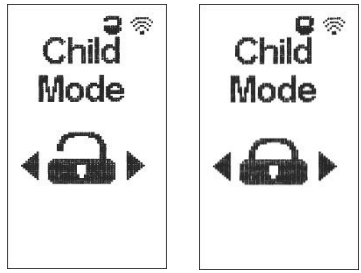
(a) (b)

Figure 10 – Information about WiFi
(a) data of an existing WiFi network, (b) data of an access point created by the control unit

Important! Figure 10 (a) shows, for example, that when the control unit is turned on, it will try to connect to the open WiFi network of the “SVC_AIR” router (since the Password field is empty). If it succeeds, the WiFi status will be displayed, and the address will be in the “IP address” field. If the connection fails, the control unit will create an access point (WiFi network) with the data shown in Figure 10 (b).

In order to enable protection against accidental presses, use the “<” and “>” buttons to select the “Child Mode” settings item (see Fig. 9) and, by briefly pressing the MENU/ENTER button, activate/deactivate it (see Fig. 11).

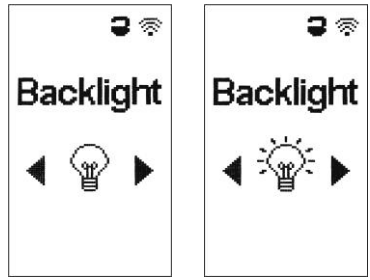
Important!!! If the protection against accidental presses is active, the control unit is in the mode of displaying the measured DERs of gamma radiation and does not respond to button presses. In order to deactivate the protection against accidental presses, simultaneously hold down the “<” and “>” buttons for 20 seconds in the mode of displaying the measured DERs of gamma radiation.



(a) (b)

Figure 11 - Protection against accidental presses
(a) deactivated, (b) active

In order to turn on/off the backlight using the "<" or ">" buttons, select the "Backlight" settings item (see Fig. 9) and, by briefly pressing MENU/ENTER, turn it on/off (see Fig. 12).



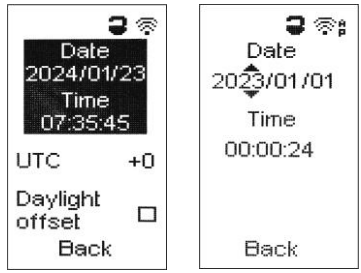
(a) (b)

Figure 12 – Backlight
(a) On, (b) Off

To display the time and date settings, use the "<" or ">" buttons to select the "Time & Date" settings item (see Fig. 9) and, by briefly pressing MENU/ENTER, enter this settings item.

You can switch between menu items by briefly pressing the "<" or ">" buttons.

To change the time and date, select the item that displays the date and time and activate the cursor (_) by briefly pressing the MENU/ENTER button. A short press of the MENU/ENTER button changes the cursor position, and a short press of the "<" or ">" button allows you to change the value of the digit the cursor is pointing to.

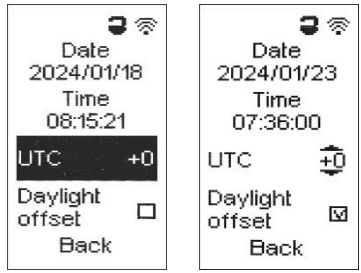


(a) (b)

Figure 13
(a) selected item with date and time,
(b) activated cursor for editing date and time

Important! If there is access to the NTP server, the uploaded time has a higher priority and setting the time by the user is unavailable.

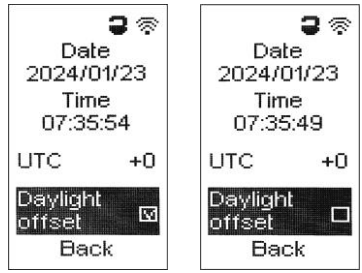
To change the time zone, select "UTC" and briefly press the MENU/ENTER button to activate the cursor (_). When the cursor is active, a short press of the "<" or ">" buttons selects the desired time zone. A short press of the MENU/ENTER button, when the cursor is active, deactivates it and saves the selected time zone.



(a) (b)

Figure 14
(a) The "UTC" item is selected,
(b) the cursor for editing the time zone is activated

To turn on/off the transition to daylight saving time, you need to select the “Daylight offset” item and briefly press the MENU/ENTER button.



(a) (b)

Figure 15
(a) “Daylight offset” item is enabled, (b) “Daylight offset” item is disabled

You can exit the settings display mode if you do not press the buttons for 10 seconds or by briefly pressing MENU/ENTER when the “Exit” settings item is active (Figure 9).

2.3.4.3 **Web interface.**

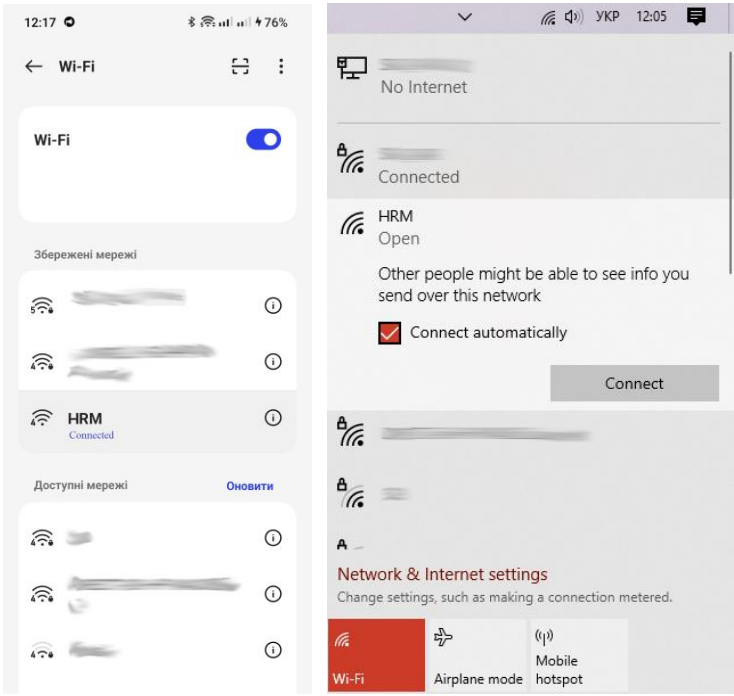
2.3.4.3.1 **Connecting the control unit to the user's router (first power-on)**

When first turned on or if connecting to a saved WiFi network is impossible, the control unit creates its own access point, which is indicated by the icon .

Data about the control unit’s own access point are in the WiFi information, namely WiFi AP ((see Fig. 10(b)), where:

- SSID is the name of the control unit’s access point;
- Password is the password to the access point of the control unit;
- IP address is the address at which the web interface can be opened.

According to the user's operating system, it is necessary to connect to the WiFi whose "SSID" is indicated in the WiFi information (see Fig. 16).



(a) (b)

Figure 16 - The process of connecting to an access point on an Android device (a), a Windows 10 device (b)

Note. The message "WiFi network is not connected to the Internet" and an offer to switch to another network may appear on the phone. This proposal must be rejected.

In the address bar of the browser (Chrome, Edge, Firefox, Opera ...), you need to enter the data to open the web interface ("IP address" field, Figure 10(b)). The main window of the web interface will open (see Fig. 19 (a)).

In order for the control unit to be able to connect to an already existing WiFi network, it is necessary to go to the WiFi settings (see Fig. 25(a)) and enter the data of your WiFi network such as “Network name” and “Network password” ((see Fig. 17). After that, press the “Save & Connect” button and wait for the status 📶 to appear, which indicates a successful connection to the existing WiFi network.

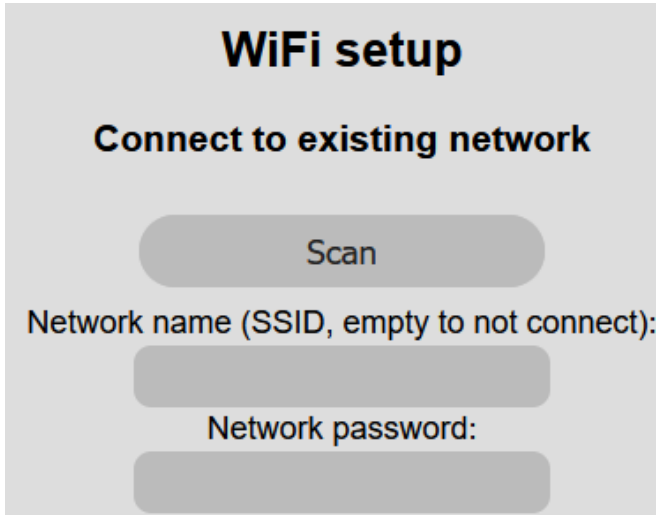


Figure 17 - Fields for entering user WiFi network data

If the device is connected to an existing WiFi network, the “IP address” field of “WiFi AP” (see Fig. 10(b)) is empty, and the “IP address” field with “WiFi” (see Fig. 10(a)) indicates the new IP address issued by the DHCP server or the one specified in the settings.

2.3.4.3.2 **Working with the web interface**

To start working with the web interface of the control unit, you need to connect to an open WiFi network – HRM (as configured) [1]. After connecting in the address bar of the browser (Chrome, Edge, Firefox, Opera ...) you need to enter the domain name hrm.local or the IP address 192.168.1.1 (as configured) (see Fig. 18).

[1] **Important!** If the user's access point is unavailable or the connection has been lost, the control unit creates its own access point, the parameters of which are set (section 2.3.4.3.3)

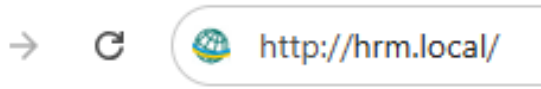
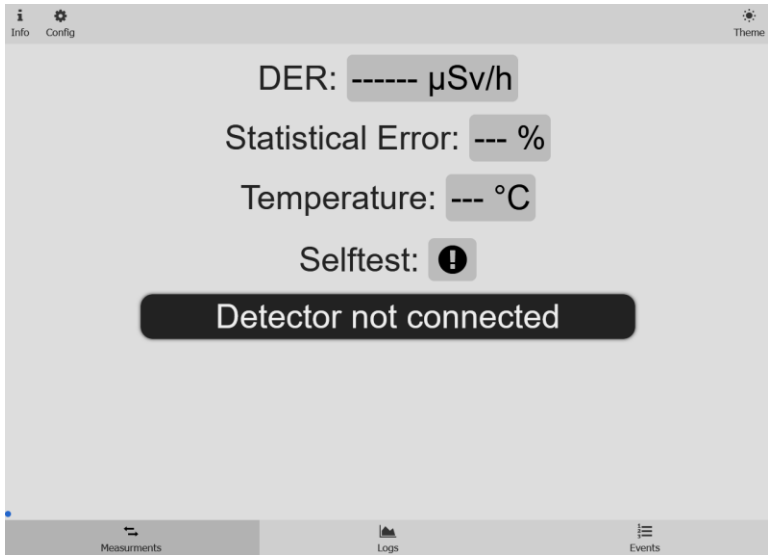
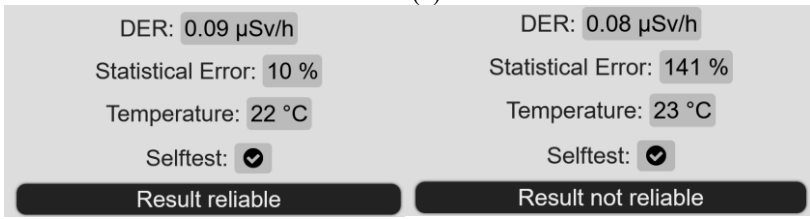


Figure 18 - Browser address bar

After loading the page, measurements will be automatically read from the control unit (see Fig. 19). A short press on the icon or icon will display detailed information. Click on the corresponding icon again to close it.



(a)



(b) (c)

Figure 19 - Image of the main window with a disconnected detecting unit (a); with a connected detecting unit (b) and a reliable result; with a connected detecting unit and an unreliable result (c)

A short press of the “Info” button will open detailed information about the control unit.

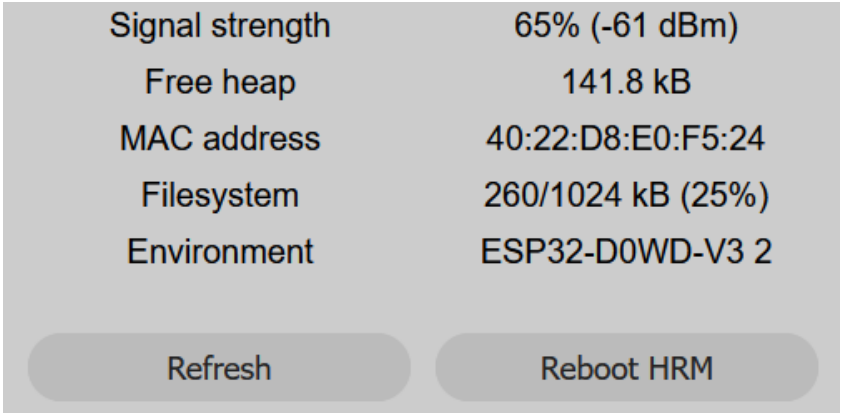


Figure 20 - Information in the Info section

A short press of the “Theme” button allows you to set a theme for the web interface.

To read logs and events from the control unit, open the “Logs”/”Events” tab and click the “Load events & logs” button (see Fig. 21). A WebSocket connection is required for reading, if it has not been established, the control unit’s web interface tries to establish it.

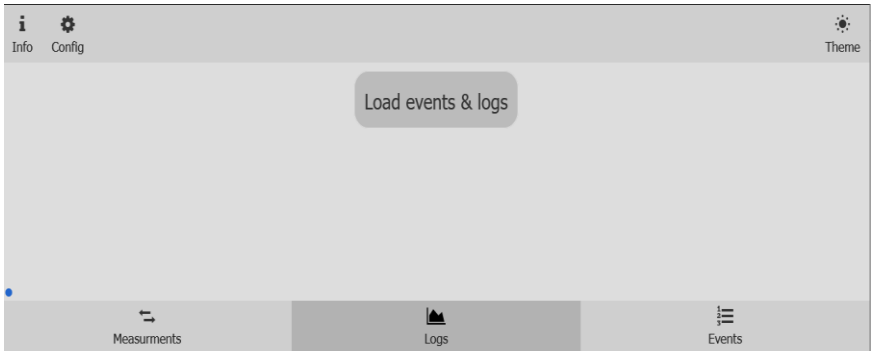
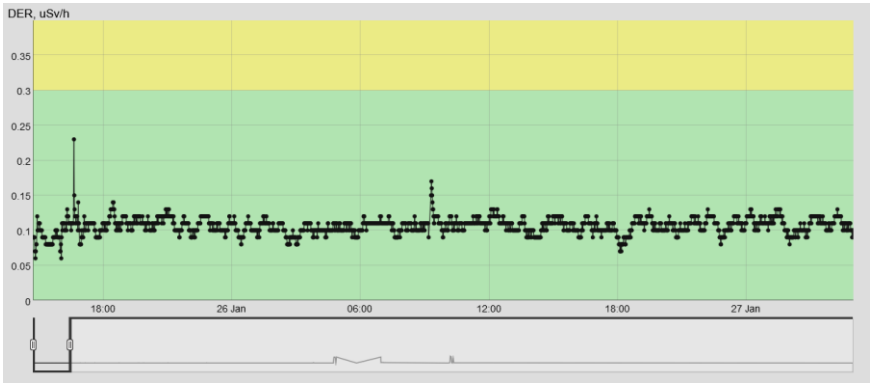
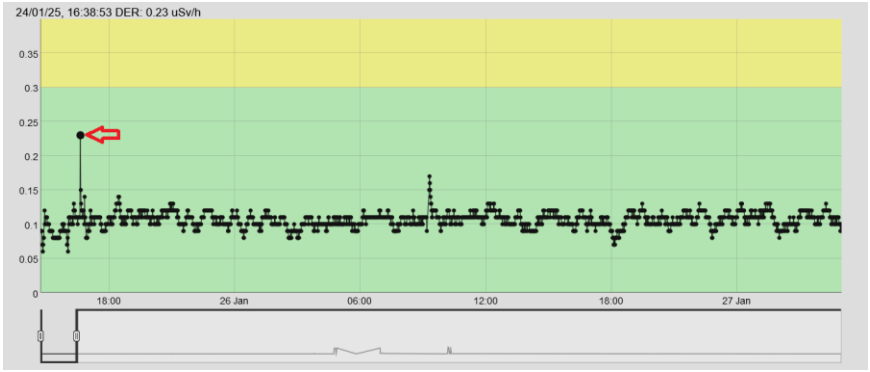


Figure 21 – “Logs” window

Downloaded logs are displayed on the diagram (see Fig. 22(a)). Zooming in and selection of the desired sections of the diagram is carried out using the left mouse button, the mouse wheel, as well as the projection of the diagram from below and the buttons above the diagram. When hovering over a point on the diagram (see Fig. 22(b)) information will be displayed in the upper left corner: 24/01/25, 16:38:53 DER: 0.23 µSv/h.



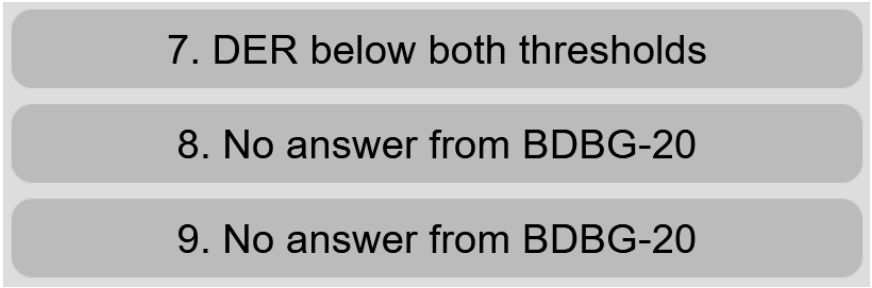
(a)



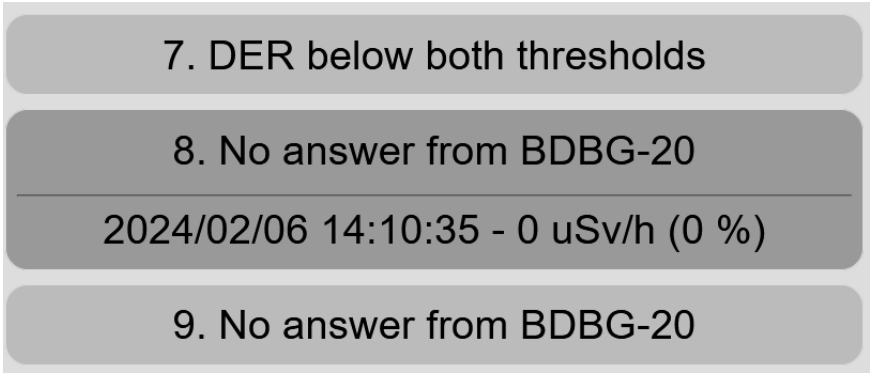
(b)

Figure 22 - Downloaded logs

Events are displayed as a list (see Fig. 23(a)). When clicking on an event, information about the time when the event occurred and the level of DER will appear (see Fig. 23(b)).



(a)



(b)

Figure 23 - Downloaded events
(a) collapsed event, (b) expanded event.

2.3.4.3.3 **Working with settings in the web interface.**

To open the settings menu, you need to click the “Config” button on the main window. In the settings menu there are “WiFi Setup” “Other settings” “Back”.

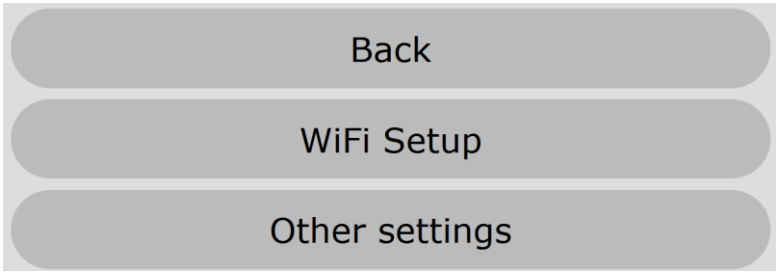
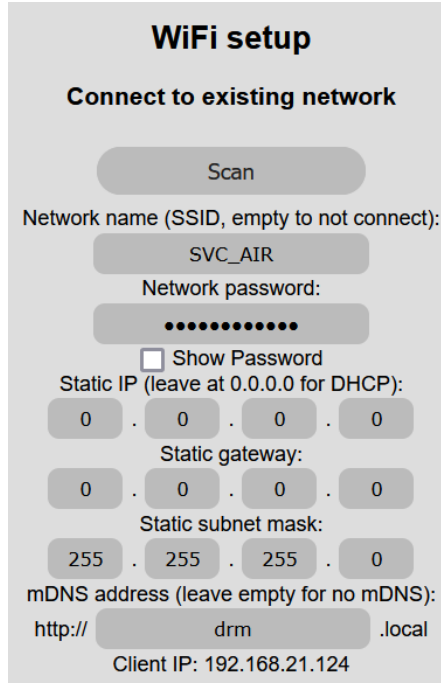


Figure 24 – Settings menu

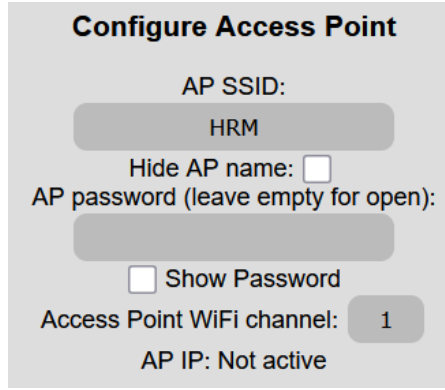
Clicking on “WiFi Setup” will open a web interface where you can specify the data of the user’s WiFi access point, control unit’s access point[2] and others. To save the new settings, click the “Save & Connect” button, after which the control unit will connect to a new access point or create its own, depending on the settings.

Important! After the control unit connects to the installed access point, the user must also connect to this access point and enter the domain name or IP address of the control unit set in the settings to access the web interface.

[2] **Important!** If the user's access point is unavailable or the connection has been lost, the control unit creates its own access point, the parameters of which are set (section 2.3.4.3.3)



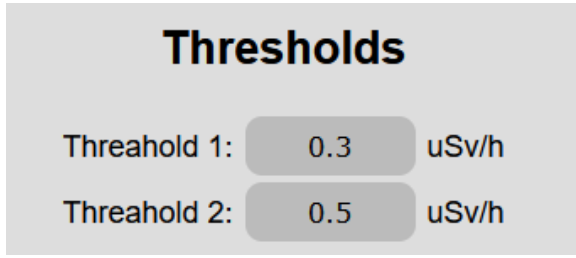
(a)



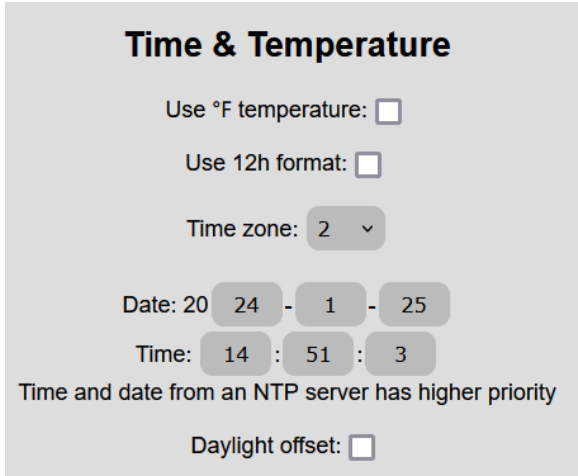
(b)

Figure 25 - Web interface of control unit's WiFi network settings

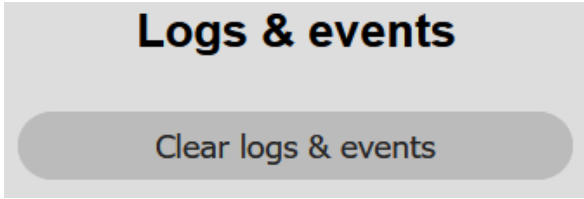
By clicking on “Other settings”, a web interface will open, where there are the settings “Thresholds” (Figure 26(a)), “Time & Temperature” (Figure 26(b)), “Logs & events” (Figure 26(c)) are located and “Security & Update” (Figure 26(d)). It is necessary to set the desired settings and press the “Save” button.



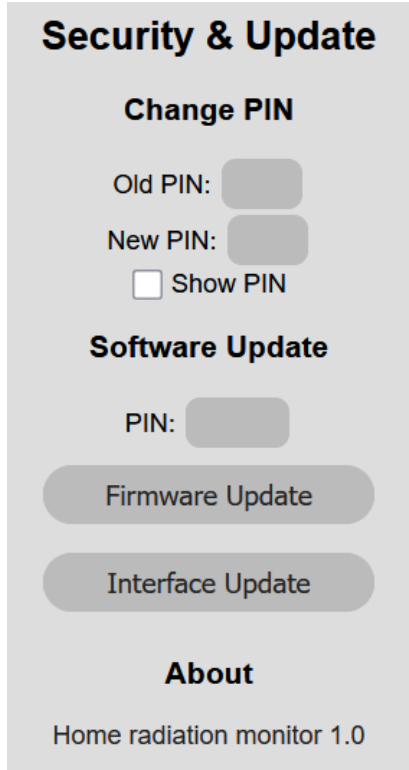
(a)



(b)



(c)

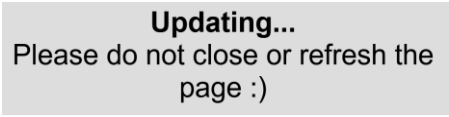


(d)

Figure 26 - General settings: (a) setting thresholds,
(b) time settings, (c) clearing logs and events, (d) security settings and updates

To update the software in the control unit, you must enter the current PIN code. After that, press the “Firmware update” button (Figure 26(c)). If the PIN code is correct, the “Firmware update” page opens (Figure 27(a)). Next, you need to click the “Choose File” button and select the file with the firmware. Click the button “Update!” to start the update process (Figure 27(b)). Upon completion, a message will be displayed about a successful firmware update process (Figure 27(c)). The process of updating the interface is similar to the process of updating the firmware.

(a)



(b)

(c)

Figure 27 - The update process: (a) file selection, (b) file transfer to the control unit, (c) the end of the update process

4 CERTIFICATE OF ACCEPTANCE

The Home Radiation Monitor of BICT.468382.064-01 type with _____ serial number with components of the delivery kit, is accepted for use.

Date of manufacture _____

QCD representative: _____

Stamp here signature

5 PACKING CERTIFICATE

The Home Radiation Monitor of BICT.468382.064-01 type with _____ serial number with components of the delivery kit, is packed at the Private Enterprise “SPPE “Sparing-Vist Center” in accordance with the requirements provided for in this OM.

Date of packing _____

Stamp here

Packed by _____

signature

6 WARRANTY

6.1 The manufacturer guarantees the conformity of the HRM with the technical requirements, provided that the user observes the guidelines on its use, transportation and storage conditions outlined in the BICT.468382.064-01 HE operating manual.

6.2 The warranty period of the HRM shall terminate and be of no further effect in 24 months after the date of putting it into operation or after the warranty period of storage terminates.

6.3 The warranty period of storage is 6 months after the manufacture date.

6.4 The warranty period of use is prolonged for the time of the warranty repair.

6.5 After the warranty period terminates, the repair of the HRM is performed under separate contracts.

6.6 Warranty and post-warranty repair is done only by the manufacturer.

6.7 In case of mechanical damage or removal of seals, the repair is done at the user’s expense.

7 REPAIR

7.1 In case of failure or troubles during the warranty period of the HRM, the user should contact the producer enterprise by e-mail (see below) to receive the address of the nearest service center:

PE "SPPE "Sparing-Vist Center"

Tel.: (+38032) 242 15 15, fax: (+38032) 242 20 15

E-mail: sales@ecotest.ua.

7.2 All claims are registered in Table 7.1.

Table 7.1

Date of failure	Claim summary	Action taken	Note

7.3 Warranty and post-warranty repairs are carried out only by the manufacturer.

8 STORAGE

8.1 HRMs should be stored in packaging in heated and ventilated warehouses with air conditioning at ambient air temperatures from +5 ^{O}C to +40 ^{O}C and relative humidity of 80% at +25 ^{O}C, non-condensing. The storage room should be free of acids, alkalis, corrosive gases, and vapors of organic solvents.

8.2 The placement of HRMs in storage rooms should ensure their free movement and access to them.

8.3 HRMs should be stored on racks.

8.4 The distance between the walls, the floor of the storage room and the HRM should be at least 1 m.

8.5 The distance between the heating devices of storage room and the HRMs should be at least 0.5 m.

9 TRANSPORATION

9.1 HRMs in package are allowed to be transported in any type of closed transport and sealed compartments of the planes according to the rules and regulations in force for each type of transport.

9.2 HRMs in the transport container must be placed and fixed in the vehicle in such a way as to ensure their stable position and avoid shocks with each other, as well as the walls of the vehicle.

9.3 HRM in a transport container can withstand:

- influence of air temperature from minus 25 ^{O}C to +50 ^{O}C;
- influence of relative air humidity (95±3)% at a temperature of 35 ^{O}C.

9.4 Canting of the HRM is not allowed.

10 DISPOSAL

Disposal of HRM should be carried out in accordance with the Laws of Ukraine “On Environmental Protection” and “On Waste” – metals are recycled or melted, and plastic parts are dumped.

Disposal of HRMs is not dangerous for the service personnel and is environmentally friendly.

NOTES