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1. INTRODUCTION

This User Manual contains the necessary information on the components, internal design and operating principles of the **Explosives Detector C04** (hereinafter referred to as the device) and information necessary for its correct and long-term service.

2. DESCRIPTION AND OPERATION

2.1 Product designation

The device is designed to detect explosive vapors when examining various objects (personal belongings, baggage, mail, parcels, vehicles, premises, etc.), as well in search for trace amounts of explosive substances using a desorption chamber.

2.2 Device specifications

The main specifications of the device are given in Table 1.

Table 1. Main specifications.

Parameter	**Parameter value**	**Unit**
Threshold for TNT detection in ambient air (up to)	10^{-14}	g/cm^3
Vortex sampling distance	40-100	mm
Readiness time at 18 to 50 ºC at 5 to 18 ºC	 5-60 up to 600	sec
Analysis time (max)	2	sec
Battery life in vapor mode, always on (min) Battery life in trace mode, always on (min) Battery life in mixed mode: 5% in vapor mode, 5% in trace mode, 90% in stand-by mode	5 4 40	h
Dimensions, LxWxH (up to)	350x103x94	mm

Parameter	Parameter value	Unit
Weight (up to)	1.7	kg
Target substance detection signal indication	Sound, light	--
Target detectable explosive substances	Direct non-contact detection of TNT vapors and less volatile explosives, including RDX, HMX, as well as Nitroglycerin, Ethylene glycol dinitrate (EGDN), Pentaerythritol tetranitrate (PENT) and its compounds, Semtex, Cyclotriacetone tripperoxide, Ammonium nitrate, Dynamite and explosives, based on these explosive substances; * List of explosives, based on the detected explosive substances: 1. Trinitrotoluene (TNT) – Trotyl, Tol, British Amatol, Baratol, Amonal, Torpex, Minol, Tritonal, Explosive D, TH-50 (trotyl + hexogen), THA (trotyl + hexogen +aluminum). 2. Nitroglycerin – dynamite 3. Ethylene glycol dinitrate (EGDN) - Dinitroglycol, Glycoldinitrate, GOMA-2 4. Hexogen (RDX) - PVV-4 (plastic), Emulsion explosives, THA, Marine mixture, TH-50, C-4, plastic explosives 5. Octogen (HMX) – octol, okfol 6. Pentaerythritol tetranitrate (PENT) 7. Cyclotriacetone tripperoxide 8. Ammonium nitrate - BLU-82, Ammonal, Astrolite, AN-K, AN-S, AN-E 9. Semtex 10. Dynamite	

Permissible operating temperature: no limits	+5 … +40 up to +50	°C
Permissible relative humidity relative humidity range	15–85	%

2.3 Scope of supply

Figure 1. Appearance of components

The basic configuration of the device includes (see Figure 1):

1 explosive detector C04;
1 safety cover
2 battery units;
1 external charger for Li-Ion batteries 12,6 V, 5 A;
1 power cord;
1 simulation TNT vapor source;
1 evaporating chamber;
3 replacement filter grids;
1 filter grid replacing key;
1 user manual;

1 product certificate;
1 carrying/storage case;

2.4 Device design and operation

2.4.1 Principle of operation

Operation of the device is based on nonlinear dependence of ion mobility in an electric field on the density of the latter. The air entering the analysis and the calibrating reference channels of the device is ionized by the integrated ionizing radiation source. The formed ions are separated by high-frequency alternating and constant electric fields. This separation is a result of different dependence of the mobility of ions on the density of the electric field. At a certain type of superposition of alternating and constant electric fields for each type of ions, the average ion drift is compensated, which creates conditions for passage of a certain type of ions through the analysis slot. Ions fall on the electrometric amplifier, and thus their selection is carried out.

Ions not fulfilling the selection conditions recombine on the walls of the analysis channel.

Simulation explosive vapors are constantly added to the air entering the reference channel during the operation of the device. The spectrograms of the measuring and reference channels are compared, and the device detects the position of the peak corresponding to the mobility of ions of the simulation explosive depending on the environmental conditions. Based on the obtained data, the device is auto-calibrated with determination of the expected position of shifted peaks for the target substances recorded in the ionogram. After amplification and processing by the digital computing unit, the product emits a sound and light alarm signal with output of information on the type of the explosive.

2.4.2 Device description

The locations of the control buttons, light and sound indicators of the device are shown in Figure 2.

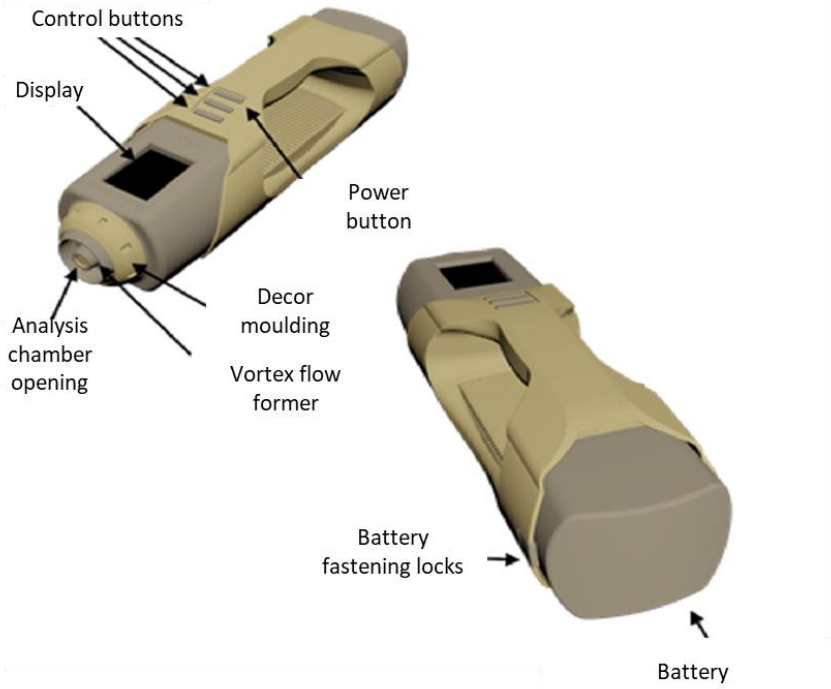


Figure 2. Location of control buttons and indicator

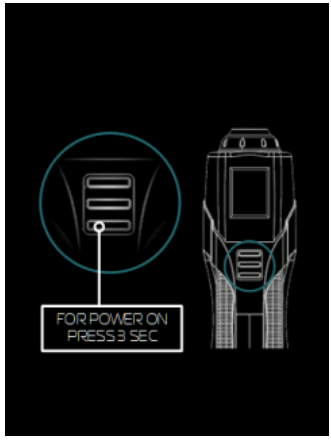


Figure 3. Turning-on instructions.

To turn on the device, hold BACK/ENTER button [⮌] for 3 seconds. Under this button, on the handle of the device, there is a corresponding "power on" ⏻ symbol. This activates the display (Figure 3), which shows a prompt to turn on the device.

The device is turned off in the same way: by holding the button ⮌ for 3 seconds.

After turning on the device, the device self-diagnostics system will start (Figure 4).

Explanation of text messages on the device display:

Running SPS - checking the operation of the secondary power source;

Running FAG - configuration of the parameters of separating electric field of the asymmetric voltage generator;

Calibr.analit.chan - calibration of the device measuring channel;

Calibr.ref.chan - calibration of the device reference channel;

Rectifying areas — configuration of explosives detection areas;

Testing pumps – checks pump operation.

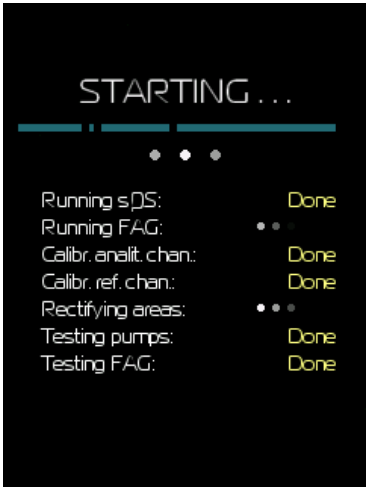
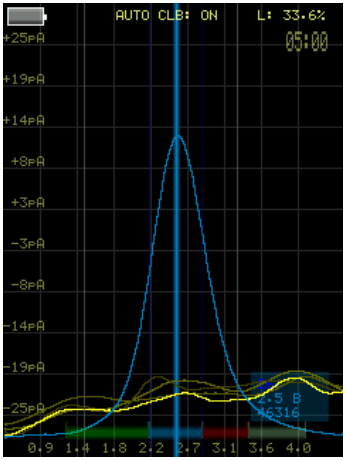


Figure 4. Self-diagnostics display.

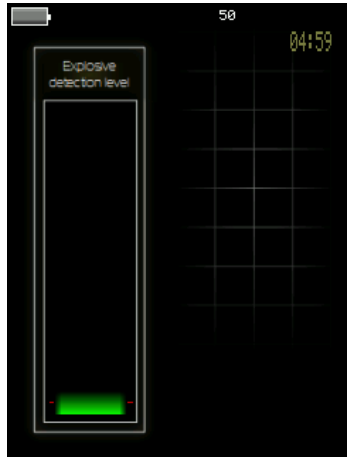
Testing FAG - checking the performance of the asymmetric voltage generator.

The time for self-diagnosis of the device depends on the ambient conditions and the internal temperature of the device, varies from 8 seconds to 10 minutes (at temperatures of less than 12°C)

The display of the device in ionogram mode is shown in Figure 5a. The yellow line corresponds to the spectrogram of the measuring channel. The blue graph on the display corresponds to the reference channel, which is used for continuous auto calibration. The horizontal scale shows the sweep for the compensating voltage. The vertical scale corresponds to the ion current recorded by electrometers in picoamperes. There are color bars at the bottom of the display, corresponding to the zones of confidence for explosives detection. If a peak is found to fall into a zone of confidence, an indication appears on the display indicating the type of explosive found



a)



b)

Figure 5. a) Display of the device in ionogram mode;
b) display of the device in the level scale mode.

Depending on the ambient conditions, the graph of the reference channel will be automatically adjusted so that the peak of the spectrogram is in the center of the display. At the same time, the detection zones are shifted for target substances. The detection zones are conventionally designated by bands of different colors at the bottom of the display. The settings provide searching for ten zones: TNT, RDX, HMX, PENT, and six zones defined by the user: SUB1 … SUB6. The ionogram displays five graphs of the measuring channel at the same time, corresponding to five consecutive updates of the display; the graphs have a decreasing intensity and are consistently updated.

2.4.3 Description of control buttons

The description of the device buttons is shown in Figure 6.

The BACK [⮌] button turns the device on or off when held. When pressed for a short time during operation, the product switches between ionogram and signal level gradient (Figure 5).

Pressing ⮌ while in menu results in returns to the previous sub-item of the menu or exit.

The FUNCTIONS [Fn] button is used to access menu functions, select its items and activate different modes.

While in menu, buttons ∧ and ∨ select the corresponding item. Buttons.change the value of the parameter < and >

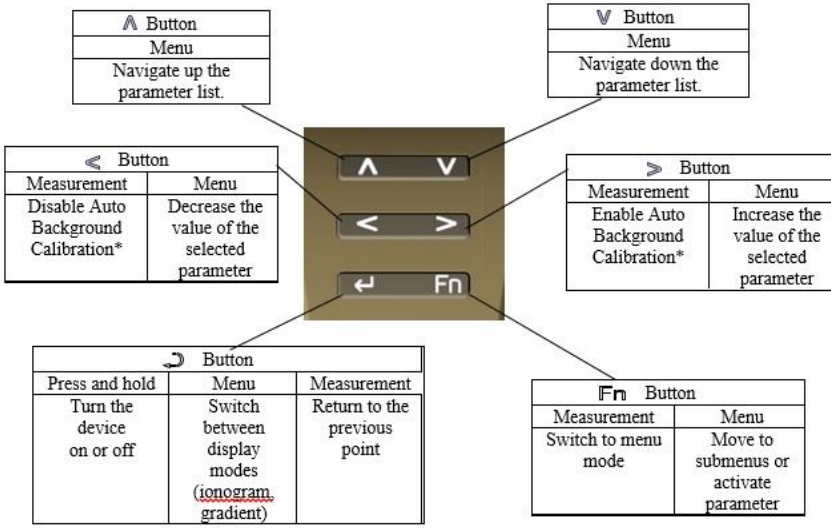


Figure 6. Description of the device buttons

2.4.4 Device menu description

When the FUNCTIONS [Fn] button is pressed, the main menu of the device is displayed. The appearance of the main menu is shown in Figure7.

Desorber on/off - the first item of the menu shows the function of turning the desorption chamber on and off. When the button is pressed, supply voltage is applied to the desorption chamber. The display switches into the ionogram mode, and the top of the display shows the word "Desorber" and the number of seconds (default is 30 seconds) until it is turned off (Figure 8).

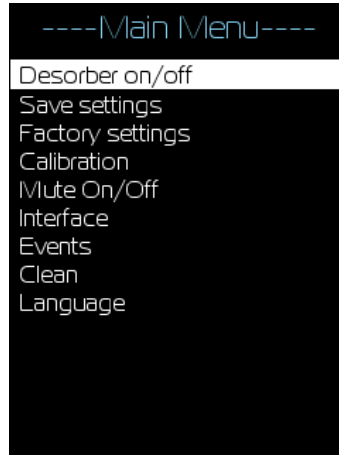


Figure 7. Main menu of the device

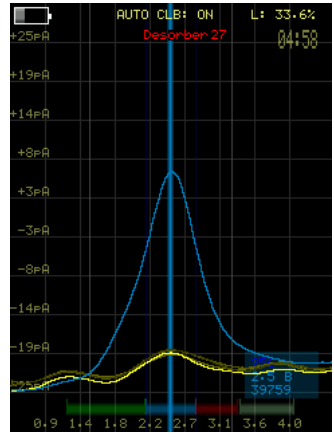


Figure 8. Desorber operation

Once the countdown ends, the operation of the piezo desorber stops.

Save settings - this menu item saves the changes made in the system settings in the device memory.

Calibration - the calibration mode is for fine-tuning of the device to detectable substances (Figure 9).

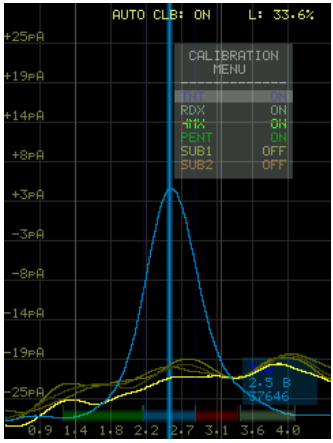


Figure 9. Detector calibration menu

Calibration must be carried out using test samples of detectable substances. There are four typical explosives recorded in the memory of the device, as well as six customizable user zones. It should be noted that the target detectable substances have similar properties, so that overlapping of the detection zones of confidence is possible. In this case, the display shows information about several substances that might have fallen into the detection range.

Using the calibration menu, the user can deactivate additional detection zones by pressing a key ⩽ in the corresponding menu line, and the color bar at the bottom of the display disappears, indicating that the detection of this substance is turned off. The detection zone can be activated by pressing the button ⩾. The first TNT line cannot be turned off, as this is the main type of substance detected by the detector. When a Fn button is pressed at the selected substance line, the detection zone settings are displayed. The following three changeable zone parameters become available (Figure 10):

WND - the confidence range of peak search on the spectrogram. Narrowing the range results in greater selectivity for the detected substance;

OFFSET – the shift of the confidence range relative to the reference peak. The setting is intended for adjustment of the position of the detection zone to the peak of the calibrated substance;

LEVEL – alarm triggering level for the selected type of substance. This option is used to set the detection threshold. When it is exceeded, a light and sound alarm is triggered.

A description of the procedure of calibration of the device is given in Appendix 1.

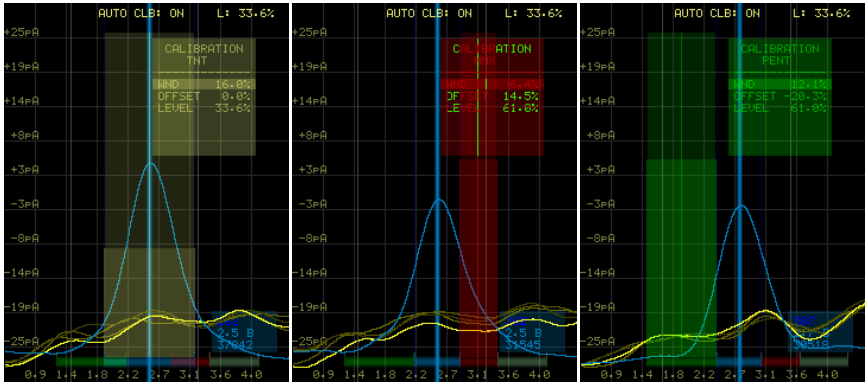


Figure 10. Examples of values of calibration parameters for identification of detectable explosive substances.

Sound settings – this menu item allows turning sound signaling on and off.

Interface - the interface menu provides options for displaying operational information on the display (Figure 11).

Figure 11. The interface menu of the device

Menu transp. – sets the transparency degree of the menu for displaying the spectrogram in the background when the menu settings change;

Info window - activates the display of information on the operating mode of the device (Figure 12);

Inf Lvl window – activates the displaying of tentative data on the peaks of substances approaching the detection threshold (Figure 13).

Show Model Info – shows the centerline of the range in order to search for the reference peak;

Power safe mode – enables timer to switch on/off prior to standby mode;

Cleaning, min – configures the self-cleaning time of the device;

The device automatically enters the standby mode after a certain period of inactivity, if no buttons of the device are pressed.

The countdown timer before going to the standby mode is displayed in the upper right corner of the display during the operation of the device (Figure 13). The automatic operation of the device continues, and the time until automatic turn-off is displayed on the screen (Figure 14). Power consumption of the device is decreased in standby mode.

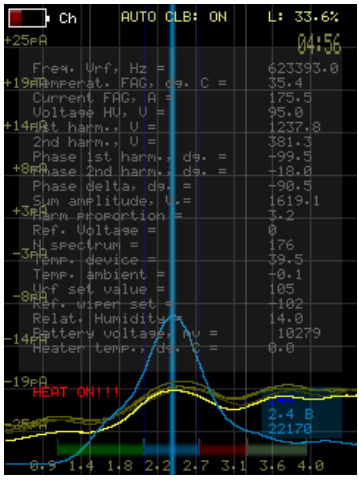


Figure 12. Displaying the information about the operating mode of the device

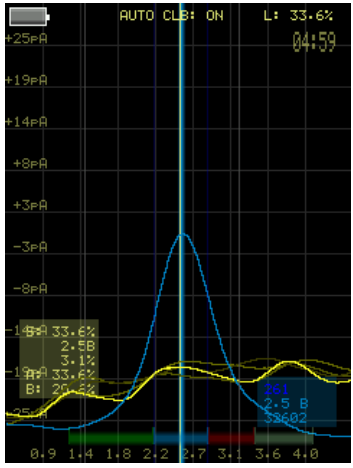


Figure 13. Displays the values of the expected peaks

Figure 14. Standby mode display of the device

Min to PS – sets the time of offline operation of the device before switching to standby mode;

Auto off – activates the automatic shutdown of the device at the end of standby mode;

Min to Off – set the time until the device automatically turns off in standby mode.

Key BL – setting the brightness of keyboard backlight

Events – this menu item allows preview the event log (switch on/off of the instrument, type of the detected substances) stating the time of the event.

Cleaning - this menu item provides self-cleaning of the device when the analysis channel is clogged (Figure 15). Activate it in a clean room without foreign odors, if a continuously detected peak appears on the ionogram of the measuring channel. First, try to replace the filter grid installed at the analyzing chamber inlet with a spare (see Appendix 1).

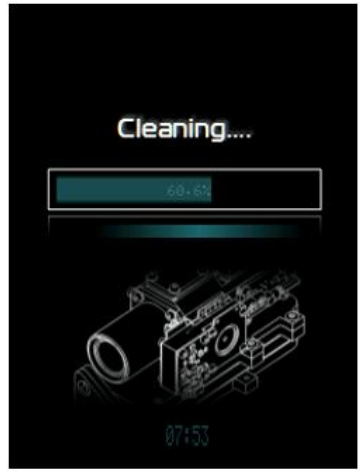


Figure 15. Self-cleaning mode display

The user can stop the self-cleaning device at any time by pressing the ⮌ button and confirming the action. The time of operation of the device in the self-cleaning mode is set in the interface settings menu (default value :
– 20 minutes). After completion of self-cleaning, the device returns to the operating state.

Language – this menu item allows the choice of the interface language. Two options are available: English (Английский), Russian (Русский).

Factory settings – in this menu item the factory setting are stored that are protected with the password from any changes. The user has limited access to this menu item.

System Settings – this menu item shows the system settings of the device, protected by a password from unauthorized changing (Figure 16). User access to the service settings menu is restricted. Changing parameter values without direct advice of the service is not recommended.

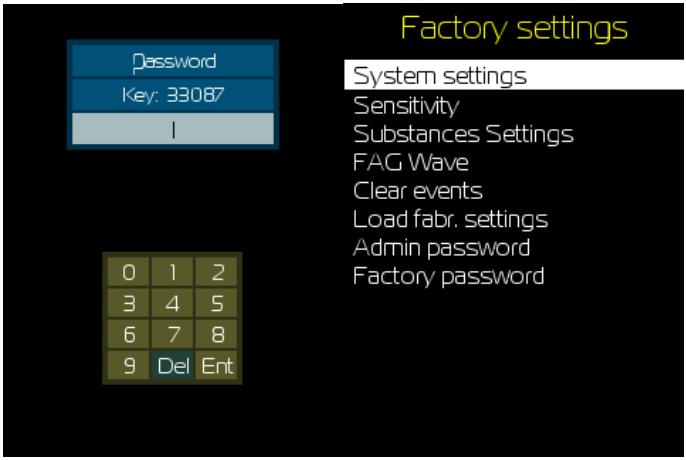


Figure 16. The system settings are protected with a password

Sensitivity (sensitivity configuration) - provides quick changing the detection threshold of explosives, depending on ambient conditions (Figure 17). The higher the set value of the background sensitivity factor (K of noise sensitivity), the lower the probability of false triggering and at the same time the higher the probability that the target explosive will not be detected.

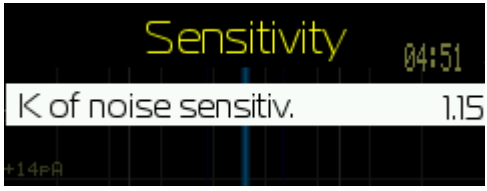


Figure 17. *Adjusting the sensitivity of the detector*

Substances Settings (configuration of substances detection) - this menu item makes it possible to quickly fill in the numerical values of calibration parameters (Figure 18).

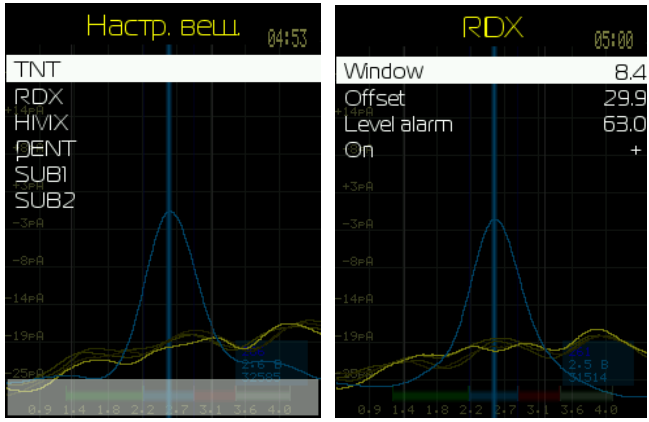


Figure 18. *Setup Menu of substance identification parameters*

FAG wave - this menu item displays the real signal received from high voltage electrodes (Figure 19).

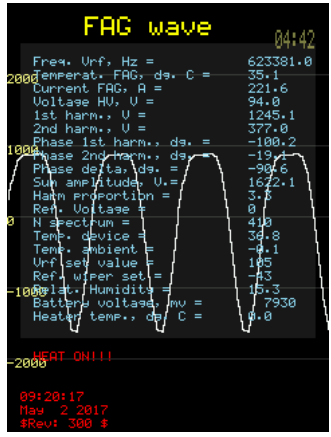


Figure 19. Oscillogram pattern of an asymmetric voltage generator with additional information on the operating mode of the device

This menu item is intended for service diagnostics of the device and is not user-defined.

Clear events – with activation of this menu item clearing the event log starts.

Load fabr.settings – with activation of this menu item all changes in the system settings of the device are reset to the factory values.

Admin password – change administrator password

Factory password – change factory settings pasword

2.5 Safety Precautions

The detector C04 contains two built-in sealed sources of beta radiation. When using the detector C04 in strict accordance with this manual, the device does not pose a danger to others.

According to SanPiN 2.6.1.3287-15 "Sanitary and epidemiological requirements for handling radioisotope devices and their design", the product falls into the 1st group in terms of the degree of radiation hazard.

The design of the device prevents access to radioactive sources without the use of a special tool and is impossible without damaging the factory seal.

The sealed radionuclide sources used in the product are located inside the analyzer's metal housing which is located inside the device. Their active surfaces are directed to the axis of the analyzer. The radioactivity of the sources does not exceed 50 MBq, the average energy of beta particles is 17.425 keV. In the case of a tritium source the radioactivity is 500 MBq, and the average energy of beta particles is 5.7 keV. The design of the analyzer housing ensures the absence of radioactive radiation caused by radionuclide sources outside the device.

3. INTENDED USE

WARNING! Operating or long-term storing is not allowed in conditions of moisture and humidity of the ambient air exceeding 90%.

3.1. Operability check

The check is carried out under normal operating conditions after starting the operating mode.

Please follow next to check the operability :

- make sure the room is clean, there should be no explosives, smoke or vapors of other chemicals;

- perform a visual inspection of the filter grid installed at the device inlet; If there are foreign particles, replace the filter grid in accordance with Appendix1;

- **WARNING!** If the filter grid is blinded, the air capacity of the air system falls, and therefore it leads to reduction in device sensitivity. In this case, the pump overheats and device with indication on overheating is switched off automatically. Replace the filter grid to eliminate overheating.

- Hold the button ⏻ for 3 seconds to turn on the device, then press the button Fn

- Wait a few seconds until the internal software download and the self-test of the device are completed;

- Make sure that there is a yellow line along the display bottom edge, and make sure in the presence of a reference peak (blue line), shifted to the center of the display (Figure 5);

- Place a TNT vapor imitator source (included in the delivery set) in front of the inlet of the product analytical chamber at a distance of 40-60 mm;

- Wait for 2-4 seconds;

- A yellow peak appears near the reference peak on the display, a light and sound indication of the detected explosive appears too (Figure 19)

- If you remove the TNT vapor source from the inlet of the product analytical chamber, the signal disappears; then the operability check is completed.

The device is considered operable subject to passing this test.

3.2. Explosives searching

Follow next to search for explosives using the detector:

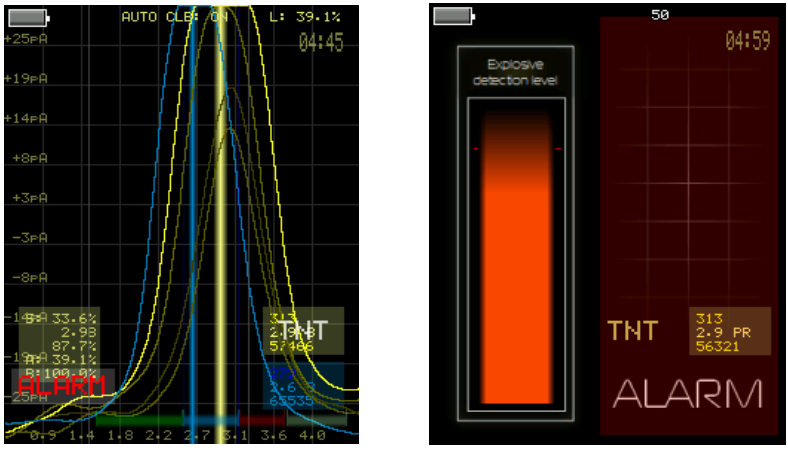
- While searching, smoothly bring the inlet of the device analytical chamber to investigated object with a distance from 20 to 100 mm;

- Wait for 2-4 seconds;

- When a detection signal appears, take the device from the investigated object and the signal disappears;

- Test the object several times.

The detection of the explosive is completed if the detection signal repeats as the object is near to the analytical chamber inlet and disappears at its removal. At the same time a peak (figure 20) will be displayed. Its vertically displayed value makes it possible to make an indirect conclusion about detected substance's vapor concentration.

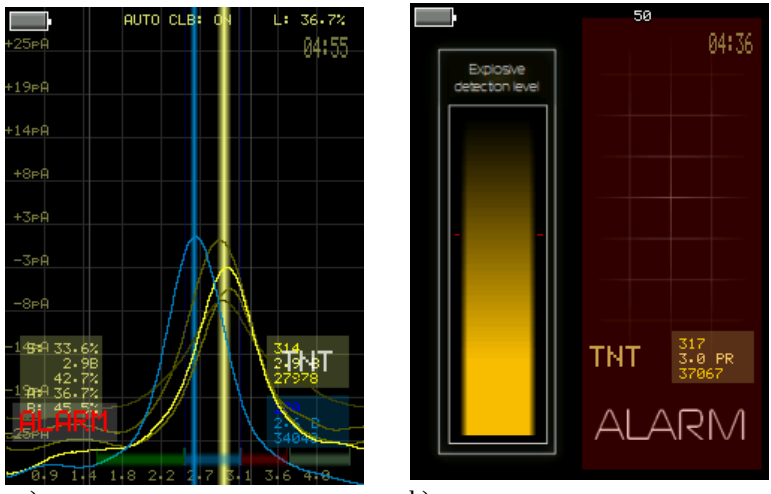


a) b)

Figure 20. Display layout with different modes of data on detected banned substance; a) ionogram for peak of TNT (yellow line in the center); b) the level scale - the level in the red zone for the indication of the explosive.

The display layout in different modes at the time of TNT detection is shown in Figure 20. If an explosive is detected, the device emits periodic beeps, and its keypad blinks. The display shows a caption"ALARM" with the type of detectable substance, the offset relative to the reference peak, the signal level and the detection threshold for a given type of substance.

The operator selects a convenient mode for information displayed on the screen. The peak height or scale level indirectly corresponds to the explosives vapors concentration in a given location. You can identify the signal amplification and find vapor source moving the device. Figure 21 shows a weak signal.



a) b)

Figure 21. Weak signal for explosive vapors.

In the case of a detected substance large concentration (the yellow peak is outside the screen, or the level is in the red zone, figure 20), the device is overloaded due to concentration data. If this occurs, remove the device from a source of vapor and wait for the air purge system to automatically clear presence of vapors inside the device.

The purge time can take from 5 to 30 seconds depending on the situation. If this time is significantly exceeded, it is recommended to replace the filter grid located at the device analytical chamber inlet and start the self-cleaning mode. Maintenance instructions are given in Annex 1.

3.3. False activation

The explosive detector C04 according to the pre-installed path of substances recognition can falsely react to substances at its molecular mass similar to the molecular mass of explosives. False activation can be caused by an elevated background due to the presence of vapors of perfumery, chemical reagents, exhausts of internal combustion engines, etc. The peaks of the ion current corresponding to these substances are located near the reference (blue) peak on the ionogram. It is necessary to choose inspection places without the presence of vapors of these substances in the air to eliminate the influence of constant background peaks.

There is an item **Sensitivity** (Figure 17) in the main menu. Use it if it is necessary to work in contaminated rooms in order to avoid false activation in the absence of vapors of the target substance. If this item is activated you can set the sensitivity factor threshold. This allows changing threshold settings quickly without calibration. The higher coefficient value, the greater concentration of the target substance is needed to detect prohibited substances.

In the event that false activation occurs due to background, it is necessary to increase the sensitivity coefficient value.

4. THE BATTERY BLOCK CHANGING AND CHARGING

One charged battery at 20 °C provides device operation up to 6 hours. The protection system is activated and the device turns off if the voltage in the battery drops below the permissible level.

The device battery charge level is displayed in the upper left corner of the device display. If the charge is low, the indicator flashes, and then it is recommended to connect the charger or change the battery to a charged one.

The device is charged with a network adapter included. Take the network adapter and power cord out of the package case, join them and connect with AC main with voltage of 130-230 V. Put an adapter plug in a connector positioned in the back part of the device over the battery.

When the power unit is connected, indicator turns red that indicates charging. When the battery stops charging, indicator turns green.

To replace the battery hold the device body in one hand, push on both latch locks on the sides with another hand, and take the battery out of the slot (Figure 22). Install the battery by pushing it in the battery slot following the directives till it latches up.

Full charge accumulation time of the battery unit with a turned off device makes up to three hours.

When operating in low temperatures conditions, battery working time may be decreased.

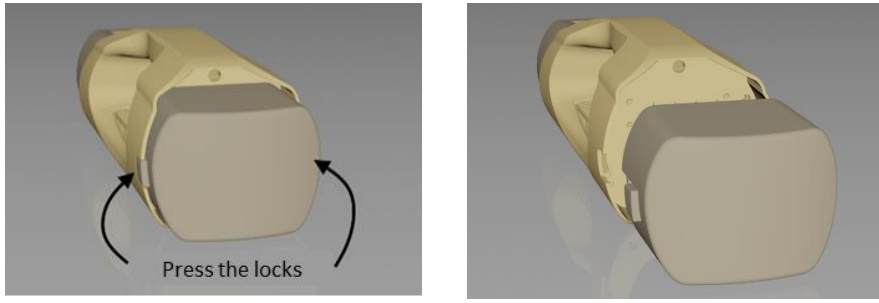


Figure 22. Battery unit replacement

5. DESORBER CHAMBER USE

For detecting traces of explosives in conditions not complying with operating features of the device (temperature below 5 and above 55 °C, smoke content in the room, suspended dust in the air, strong smells of solvents, perfumery etc.) samples are taken using tissues with further study in normal conditions. To prepare the device for operating together with desorber chamber, please do the following:

- unscrew decorative cap counter-clockwise as shown in Figure 23;

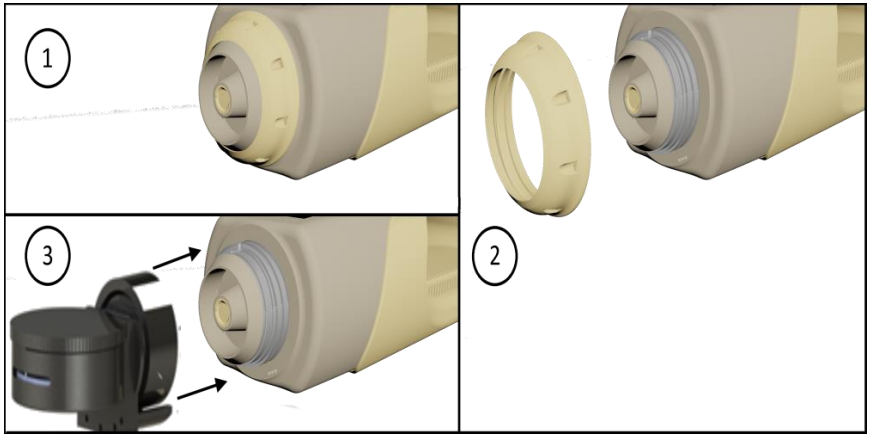


Figure 23. Desorber connection procedure

- take evaporating chamber out of the package case and connect it with the vortex system, take care of the key was matched with a key slot

- put the cap screw the thread on until tight to fix the chamber on the device, while the contact groups of the chamber will touch the contacts of the device;

- turn on the device pressing on ⏻ button for 3 seconds, wait till the software downloads and the device will be ready for operation;

- ensure that there is a yellow line near the bottom edge of the display and in reference peak imaging (blue line) located in the center of the display;

- turn the desorber on by pressing on Fn button for entering device menu; press Fn again to startup desorber (Figure 24);

- display of the device will return in ionogram display mode; the display will show countdown timer of desorber operating circle (30 seconds by default)

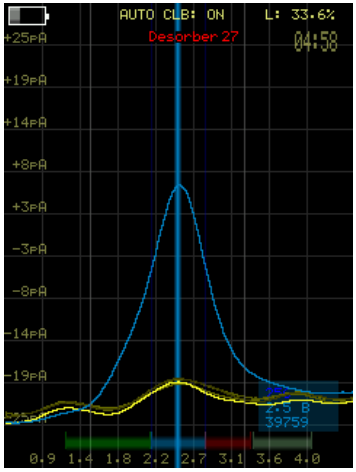


Figure 24 Countdown of the operation of the evaporation chamber desorber

- check if there are no background peaks on the displayed ionogram. If there are peaks when the chamber is connected, you should clean it (see Appendix1)

- after countdown is finished, desorber will turn off automatically;

- forced shutdown of the desorber is carried out in the same way as turning on: press Fn to enter the menu and press Fn again to turn off the desorber

- uncrew the cap of the chamber and carefully put the concerned tissue in the center on the support;

- close the cap; if targeted explosive was found, it is not necessary to turn on the desorber;

- if no explosives were found, turn on the desorber chamber by double press on Fn button;

- display of the device will return in ionogram display mode; the display will show countdown timer of piezo desorber operating circle (30 seconds by default)

- if concentration overload is occurred (Figure 20), turn off the desorber to avoid analysis channel being clogged with explosive vapors;

- after countdown is finished, desorber will turn off automatically;

- if the device persistently indicates on explosive, repeat the measurement circle 2-3 times to confirm presence of explosive traces on the tissue.

- The device is a detector; therefore, indication of explosives vapors detection means that it is necessary to continue to study the object, including other methods.

Desorber chamber operation lowers battery charge. Desorber startup at low charge can result in device shutdown.

6. TRANSPORTATION AND STORAGE

6.1. By the degree of radiation hazard the device belongs to 1st group; there are no specific requirements to storage and transportation conditions of the device related to presence of radioactive sources in it.

6.2. The device can be transported by any kinds of land, railway and air transport.

6.3. The device must be transported and stored in a package case.

6.4. The device should be stored in a closed heated place at a temperature from 5 to 35 °C. There should be no explosives in this place.

6.5. The device can be stored in any industrial facilities, such as safe boxes, cabinets etc, that ensure its safety and exclude its use by unauthorized persons.

6.6. If a cooled device is used in a place with a temperature drop, it is necessary to wait for 1.5 hours before turning it on to let condensation and evaporation finish

7. AFTER-SALES SERVICE

The manufacturer warrants that the device complies with all above mentioned features provided that the user follows the conditions and rules of operation, storage and transportation specified in the operation manual.

Operation warranty period of the device is 12 months.

This warranty does not apply to external power sources and batteries.

Manufacturer guarantees a replacement free of charge or repair of failed detector for user if this detector has been broken due to a fault of the manufacturer before expiration of the warranty period if the user respected conditions of storage, transportation and operation.

Appendix 1. Device maintenance

Cleaning the desorber chamber

If explosive detection alarm triggers when connecting empty chamber to the device, this indicates of contamination in the desorber chamber which shall be eliminated.

It is forbidden to use metal brush, water and strong organic solvents for cleaning (such as: acetone, White Spirit). It is recommended to use fiberless soft tissue soaked in isopropyl alcohol.

Desorber cleaning procedure:

- Wipe the exterior surface of desorber chamber;

- remove the tip and clean the interior surface of the tip and desorber chamber;

- Wait until solvent evaporates and put the tip back.

Change of filter grid

If the filter grid is contaminated with solid particles, the detector performance is deteriorated. Thus, when operating the device, it is recommended to clean the filter every 80 hours. When working in dusty environment or if there any other contamination factors, it is recommended to reduce the period of the detector operation.

To clean the mesh, unscrew the filter from vortex system with special spanner included in the delivery set (Figure 1). Wipe and wash the filter grid with alcohol. It is allowed to delicately blow the dismounted filter with compressed air. Wipe interior surface of the vortex system hopper with a tissue.

WARNING! It is not allowed to perform cleaning at operating device. Cleaning liquids shall not get inside the device.

Device calibration

To perform calibration, make primary preparation of the working place. Make sure that there are no foreign smells affecting the device indications. In this case, ionogram of the measuring channel (yellow line in spectrogram) shall be relatively smooth, with no sharp peaks. Prepare calibration compounds; make sure that, when checking them, ionogram changes on the display.

1. Open the device menu and select the "**Calibration**" entry.
2. Choose one of six lines corresponding to the calibrated compound.
3. Bring the calibrated compound to the inlet hole of the device analytic chamber at the 10-70 mm distance; check that appeared peak wouldn't do an off-scale reading of ionogram.
4. By changing the OFFSET parameter, match the middle of the confidence range and peak maximum point.
5. Track the change of the ionogram maximum position on horizontal axis in the course of time. By changing WND parameter, achieve state when the width of confidence range overlaps the random spread of the maximum point with small margin. Recommended value is 10%.

Another way to choose the confidence range width is to match it with the width of detected peak and half of height of this peak.

6. Take away the calibrated compound from the inlet hole and wait until device air system removes the remnants of the compound from analytical chamber.
7. Threshold (LEVEL) is set as minimal as possible, when false activation occurs less that once per 100 seconds at continuous measurement.
8. Make sure that, in the course of time and when the device is moved, no false activation occurs. If false activation occurs, increase the detection threshold (according to the section 7).
9. After that, bring the calibrated compound to the inlet of the device analytical chamber once again.
10. Make sure that the signal detection remains stable for some time.
11. Take the compound away from the device inlet. Make sure that the detection alarm doesn't trigger for less than 10 seconds.

12. Access the main menu and save the modified configuration via the corresponding entry.

13. If, after some period of time, false activation occurs caused by ambient background, increase the detection threshold (according to the section 7).

14. Repeat the calibration for next substance using the same procedure.

The device has preset calibrated parameters of compounds. To reset to defaults, activate the respective entry in the main menu ("**Load default settings**"). The device provides mode for deactivation of detection areas. It is not recommended to deactivate areas for all four detectable types of explosives.

Appendix 2. Common troubles and solutions

No.	**Trouble**	**Possible cause**	**Solution**
1.	Device doesn't turn on.	Accumulator battery is discharged or broken.	Replace the accumulator battery with charged one
2.	Power unit indicator light doesn't glow when connected to the AC supply.	No power in the AC supply.	Make sure that the supply voltage corresponds to the required values (130-230 V)
		Power block failure.	Replace the power block with the similar one.
3.	Device doesn't deactivate self-diagnostics mode.	FAG doesn't work.	Remove the accumulator battery, wait few seconds and put it back, than turn
		Measurement or reference channel doesn't tune.	Press the Fn button, access the menu and activate device self-cleaning mode.
4.	Device turns off despite the displayed battery charge level is above zero.	Battery failure.	Replace the accumulator battery with functioning one.

No.	Trouble	Possible cause	Solution
5.	Device doesn't detect explosives.	Asymmetric voltage generator setup error.	Access the menu entry "**FAG oscillogram**" and make sure it matches the Figure 12 If the oscillogram doesn't match Figure 12, reset the device.
6.	Device sensitivity deteriorated.	Vortex system doesn't create sufficient stream.	Check if the filter grid is clean and, if necessary, replace it with clean one from delivery set .Reset the device.
7.	No spectrum lines at display during operation.	Moisture condensation in the analytical channel.	Remove the accumulator battery, wait few seconds and put it back, than turn the device on.
			Switch the device into self-cleaning mode.
8.	Device constantly alarms.	Contamination of the device analytical chamber.	Perform cleaning in accordance with Annex 1.
			Set required detection threshold.

If the indicated troubleshooting methods do not help or are not listed, contact the service department.