FORTEZA®

MICROWAVE PERIMETER SECURITY DETECTOR FMC 24 PRO (50M, 100M, 200M, 300M)

OPERATION AND INSTALLATION MANUAL

1. GENERAL INFORMATION

This manual describes the operation of the FMC 24 Pro series of microwave perimeter protection detectors. It provides the information necessary for correct detector operation.

AVAILABLE MODELS:

FMC 24 Pro (50m);

FMC 24 Pro(100m);

FMC 24 Pro(200m);

FMC 24 Pro(300m);

The following abbreviations are used in this manual:

Tx – transmitter;

Rx – receiver;

1.1. FMC 24 PRO SET

- Transmitter;
- Receiver;
- Mounting kit;
- USB;

1.2 PURPOSE

The security detectors are designed to protect the perimeters of various objects when an intruder crosses the perimeter lines of the protected area. The detectors react to an intruder crossing the protected area in full height or bent over. The alarm signal is generated by interrupting the contact circuit of the receiver's actuating relay.

The detectors are designed to operate continuously outdoors, withstanding ambient temperatures ranging from −40℃ to +65℃ and relative humidity up to 98% at +35℃.

1.3 TECHNICAL CHARACTERISTICS

Specification	FMC 24 Pro (50)	FMC 24 Pro (100)	FMC 24 Pro (200)	FMC 24 Pro (300)
Operational frequency	24.050-24.250 Ghz			
Range	5...50 m	10...100 m	10...200 m	10...300 m
Width of the detection zone	< 1 m	< 1,5 m	< 1,9 m	< 2,1 m
Height of the detection zone	< 1,6 m	< 1,6 m	< 1,8 m	< 1,8 m
Supply voltage	9...30 V DC			
Current consumption	< 190 mA (TX 79 mA, RX 111 mA) (12 VDC)			
Detection probably	not less than 0,98			
Operational temperature	-40 ... +65 °C			
Housing protection level	IP - 55			
Alarm output	NO/NC relay contacts (100 ohm)			
Interfaces	RS-485/USB, RS-485/Bluetooth			
Dimensions	165x97x65 mm			
Channels	8 independet channels			
Certificates	CE; EN50131 (security grade 2, environmental class IV)			

Fig.1

- Relay Output Specifications:
  - Switching voltage up to 30V
  - Switching voltage up to 0,1A
- Alarm relay contact resistance up to 100 Ohms
- Blind zone length 2...4 meters
- Response time:
  - Power on: up to 30 seconds
- Power off: up to 1 second
- Tamper switch specifications:
  - voltage up to 30V
  - current consumption up to 0.1A

The shape and dimensions of the detection zone are shown in Figure 2 and Table 1.

Table. 1

Zone length, **L**, m	25	50	100	200	300
Detection zone width, **b**, m, max	0,7	1,0	1,5	1,9	2.1
Detection zone height, **h**, m, max	1,4	1,4	1,6	1,8	1,8

A volumetric detection zone field is created in the protected area. When this field is breached and the receiver registers movement, an alarm signal is generated.

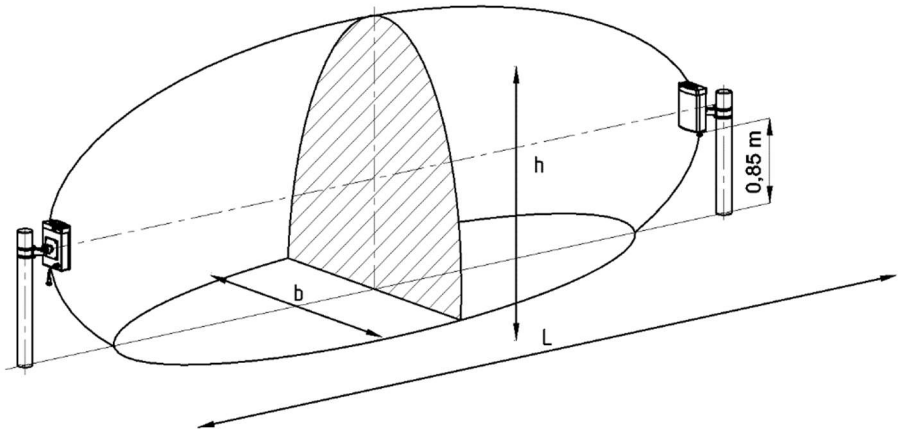

Fig.2 Detection zone

L – Section length; h – Detection zone height; b – Detection zone width;

The detection zone's height (h) and width (b) indicated in Figure 2 and Table 1 are measured at the midpoint of the protected area. These dimensions gradually decrease as you move towards the receiver or transmitter, depending on the receiver or transmitter position configuration.

The recommended distance between the detection zone axis and fences, building walls, and other stationary objects throughout the entire territory is:

80–200m from 1,1m.

25–80m from 0,8m.

10–25m from 0,4m.

1.3.1 DETECTOR GENERATES AN ALARM SIGNAL IF:

- an intruder crosses the detection zone of the protected area. The probability of intruder detection is 98% when the intruder crosses the detection zone at full height or bent over;
- an external electromagnetic field interferes with the receiver's operation. The alarm signal may not be activated, but in this case, the detector must maintain its operational characteristics;
- an intruder crosses the protection zone;
- there is no transmitter signal;
- there is no supply voltage or the voltage is lower than 8 V;
- the receiver or transmitter malfunctions;

The alarm signal is generated by interrupting (connecting) the contact circuit of the optoelectronic actuating relay (in standby mode) and lasts from 0.1 to 10 seconds. The alarm signal is transmitted via the RS-485 interface and via orange and brown wires ("NC" - normally closed or "NO" - normally open).

When the control panel cover is opened, the detector generates an alarm signal. At the same time, the TAMPER contacts also open. These alarm signals are transmitted from the transmitter and receiver by a separate pair of cables or a common pair of cables with alarm transmission (see diagram).

1.3.2 DETECTOR DOES NOT GENERATE AN ALARM SIGNAL IN THE PRESENCE OF:

- rain, snow, or thick fog;
- solar radiation;
- wind speeds up to 30 m/s;
- moving objects up to 0.2 m in height (birds or small animals);
- terrain irregularities up to ± 0.3 m;
- snowdrifts up to 0.5 m (without additional adjustment);
- grass height up to 0.3 m;
- Ultra-short waves if their frequency ranges from 150-175 MHz and the power reaches up to 40 W at a distance of up to 6 m.

The detector is resistant to electromagnetic interference (power supply voltage pulses, power outages, electrostatic discharge, and electromagnetic fields).

The detector housing is made of impact-resistant plastic that protects against UV radiation and temperature changes throughout the warranty period.

The average detector lifespan is 8 years.

Device dimensions:

- Transmitter - 165x97x65mm;

- Receiver - 165x97x65mm;

The weight of the kit (receiver and transmitter) is 1.7 kg

1.4 CASE CONSTRUCTION

The detector consists of separate transmitter and receiver system units, mounted in dust and water-resistant housings.

- There are holes on two vertical surfaces of the housing for attaching the brackets. The brackets can be attached from the right and left sides, depending on the needs. The FMC 24 Pro set includes screw plugs that ensure that moisture does not enter the housing;
- The design and bracket of the transmitter are the same as those of the receiver (see Fig.4). Only the internal elements differ: under the cover marked with the number 6, as shown in Fig.5 – the receiver, instead of the 8-wire cable, a 4-wire cable is used Fig.5 – the transmitter;
- The set of elements for mounting the transmitter and receiver to a support or wall consists of two brackets and four clamps;
- The design of the bracket allows the detector to be mounted on a pole (diameter from 40 to 100 mm) using the metal clips included in the set. Using the brackets included in the set, it is possible to mount the detectors on a flat surface (wall, fence). To install the brackets above the roof and fence, it is advisable to use brackets with protrusions of 250 – 500 mm (not included in the FMC 24 Pro set);

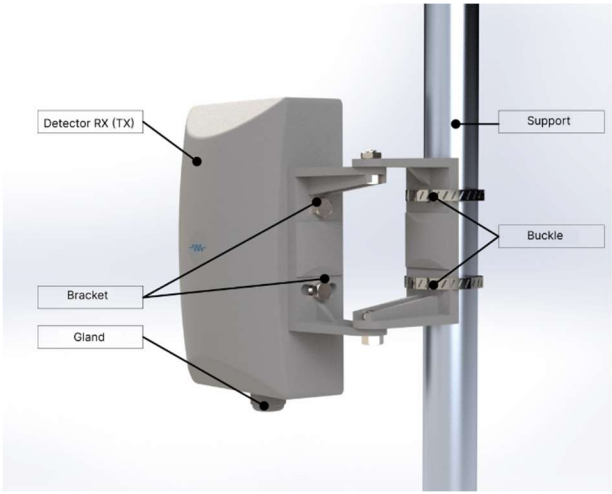

Fig.3

Fig.4

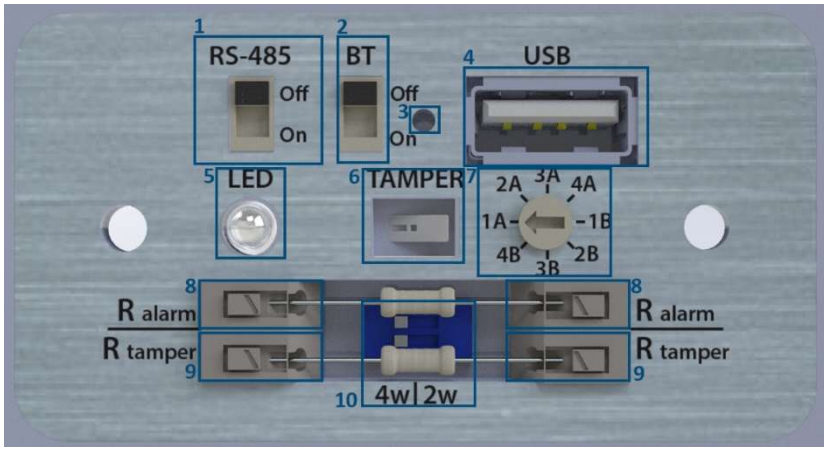

Fig.5 *Receiver Control Panel (RX)*

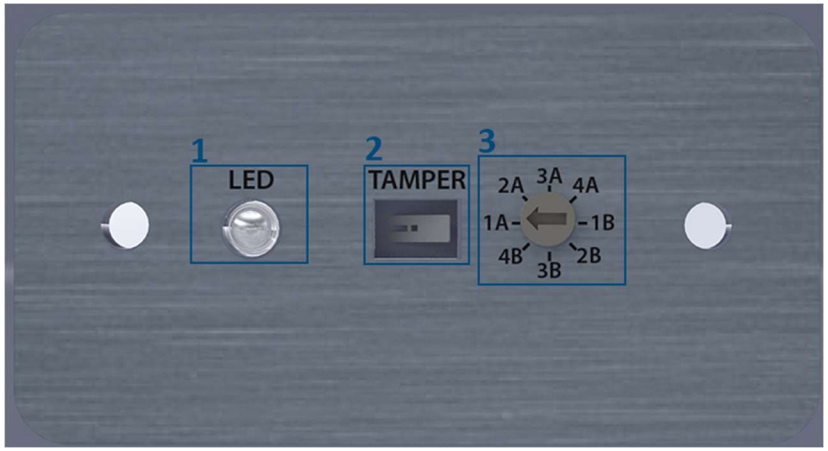

Fig.6 *Transmitter Control Panel (TX)*

Marking (RX)

1. “RS-485” interface switch;
2. “Bluetooth” interface switch;
3. “Bluetooth” interface indication;
4. USB connector;
5. LED indicator;
6. Tamper circuit;
7. Frequency channel selectors 1-8;
8. Actuation circuit termination resistor;
9. Tamper circuit resistor;
10. Alarm signal switching circuit switch;

Marking (TX):

1. LED indicator;
2. Tamper circuit;
3. Frequency channel selectors 1-8;

NOTE. DEAR CUSTOMER! THE DETECTOR MANUFACTURER IS CONSTANTLY INVESTING IN THE QUALITY AND RELIABILITY OF ITS PRODUCTS. FOR THIS REASON, IN SOME BATCHES, THE DESIGN OF THE DETECTORS MAY BE DIFFERENT FROM THAT SHOWN IN THE DOCUMENTS RECEIVED WITH THE DETECTORS. DESPITE CERTAIN DESIGN CHANGES, THE ESSENTIAL TECHNICAL PARAMETERS REMAIN THE SAME.

1.5 ADJUSTMENT, CONTROL AND INDICATION ELEMENTS

The channel switch responsible for switching frequency channels is integrated in the transmitter and receiver. The

same channels must be enabled in the transmitter and receiver during operation.

Detector adjustment and control are performed using the controller located on the receiver panel, as well as using IOS, Android and Windows software.

Manual adjustment: Tuning is possible without software, visually "by eye" only.

Capabilities using an IOS, Android or Windows device: Calibration visualization; Detection zone length selection; Automatic, Manual, or Special sensitivity adjustment modes.

To prevent unauthorized opening of the device cover (Fig. 4), a tamper switch is installed in the receiver. During operation, the switch contacts are closed. When the cover is opened, the contacts are broken, and the tamper switch contact circuit becomes open.

1.6 PRINCIPLE OF OPERATION

The detector is a two-position microwave device.

With the help of the detector, a volumetric, elliptical electromagnetic field is created in the space between the transmitter and the receiver. The receiver registers changes in the electromagnetic field and generates an alarm signal when an intruder crosses a section of the protected perimeter.

The intruder, by crossing a section of the protected perimeter, causes certain changes in the amplitude of the receiver signal. The signal travels through the amplifier and, according to the algorithm, is compared with a threshold limit value. If the received signal is greater than the set activation threshold, the receiver activates an alarm signal by interrupting (connecting) the contact of the actuating relay. The signal changes depend on the intruder's height and weight, the location of the crossed section of the protected perimeter, the terrain, and the speed of movement.

The received receiver signal can also change depending on the influence of other interferences: precipitation, vegetation, small animals, electromagnetic interference, moving tree branches or gates, movements in the detection zone that correspond to the movements of the intruder.

Other reasons, such as large structures located in or near the detection zone (fences, walls), terrain irregularities, and snow can affect the received receiver signal. In such cases, due to repeated reflections and resulting interference, the shape of the detection zone is deformed.

THE MULTI-THRESHOLD OPERATION ALGORITHM ENSURES A SMALLER NUMBER OF FALSE ALARMS. The security system, operating in conjunction with the RS-485 interface and controlled by relay contacts, is responsible for receiving alarm signals and their indication. When an alarm signal is activated, the normally closed contact (NC) circuit is broken, and if the normally open (NO) mode is set, the circuit is connected.

The operation of the detector can be adjusted and controlled by connecting to the detector via an Android, IOS, Windows device using the Bluetooth and USB interfaces integrated in the receiver, or the RS-485 interface (white and green wires).

2. INSTALLATION AND ADJUSTMENT

PREPARATORY WORK FOR DETECTOR OPERATION:

PREPARATION OF THE INTENDED PROTECTED PERIMETER SECTION:

- LAYING SIGNAL AND POWER CABLES;
- INSTALLATION OF TRANSMITTER AND RECEIVER;
- CONNECTION OF THE DETECTOR (CONNECTION OF POWER SUPPLY AND ALARM SIGNAL CLOSED CIRCUIT ABOUT THE INTRUDER);
- POSITIONING OF TRANSMITTER AND RECEIVER ANTENNAS;
- SETTING THE RECEIVER LIMIT VALUES;

2.1 REQUIREMENTS FOR THE PROTECTED PERIMETER SECTION

The protected perimeter section where the transmitter and receiver are installed must meet the following requirements:

a) The height of terrain irregularities cannot exceed +0.3m. If the irregularities of the protected perimeter surface exceed +0.3m, the technical operating characteristics of the detector may deteriorate. In this case, the issue of using the detector under the aforementioned conditions is resolved after a trial check of the device's operation.
b) The grass height cannot exceed 0.3 m;
c) The height of snowdrifts cannot exceed 0.5 m;

d) The maximum slope of the protected perimeter section is 40º;
e) Individual fixed objects (e.g., supports, trees without low branches) in the detection zone can be installed at least 0.5 m away from the axes;
f) The width of the section must comply with the requirements specified in paragraph 2.1.3.

WIND-MOVED OBJECTS: GATES, BUSHES, TREE BRANCHES, ETC., CANNOT BE LOCATED IN THE DETECTION ZONE, OR THEIR DISTANCE MUST BE:

More than 1.0 m from the detection zone axis if the perimeter length is from 50 to 100 m;

More than 1.5 m from the detection zone axis if the perimeter length is from 100 to 200 m;

More than 2.0 m from the detection zone axis if the perimeter length is from 200 to 300 m;

The width of the section must be no less than the width of the detection zone (see Table 1).

The detector can also be installed if the width of the section is smaller. In this case, the operating conditions of the detector are determined after a trial check.

The slope angle of the section cannot exceed 40 degrees.

Detectors set to operate on different channels can be installed in adjacent sections. After installing the detectors in the sections, the channel numbers must be checked sequentially from 1A to 4B, thus ensuring that detectors with the same number are as far apart as possible. Channel indication 1A-1 blinks once, 2A-2 blinks once, 3A-3 blinks once, 4A-4 blinks once, and 1B-5 blinks twice, 2B-6 blinks twice, 3B-7 blinks twice, 4B-8 blinks twice.

The height of the detection zone can be increased by positioning the detectors in two tiers. The detectors must have different channels; it is recommended to install two transmitters on one side of the protected area and two receivers on the other. THE LENGTHS OF THE SECTIONS DO NOT HAVE TO BE IDENTICAL.

The maximum intruder movement speed can be adjusted in the detector. The detectable intruder movement speed of these detectors can be changed from 2 m/s to 8 m/s, and the minimum intruder movement speed can be changed from 0.1 m/s to 0.4 m/s. The intruder movement speed can be adjusted by connecting to the detector using an IOS/Android device with the "Forteza soft" application. After changing the parameters, it is mandatory to re-establish the alarm signal sensitivity.

Example: Open perimeter section - high intruder movement speed (set min. 0.2 m/s, max 10 m/s);

Standard security section near the fence (set min. 0.2 m/s, max. 8 m/s) - medium intruder movement speed;

Detector mounted on top of the fence - low intruder movement speed (set min. 0.1 m/s, max. 8 m/s).

2.2 TRANSMITTER AND RECEIVER INSTALLATION

Mark the locations for the supports on the protected perimeter section. To ensure a continuous protective barrier, it is not recommended to install the transmitter and receiver next to each other. In adjacent protection zones (corners), it is recommended to install two transmitters or two receivers. To ensure a continuous protective barrier, the detection zones of the sections must overlap (see Fig.7 and Fig.8). Overlap is necessary to avoid shadow (unprotected) gaps in the protected perimeter.

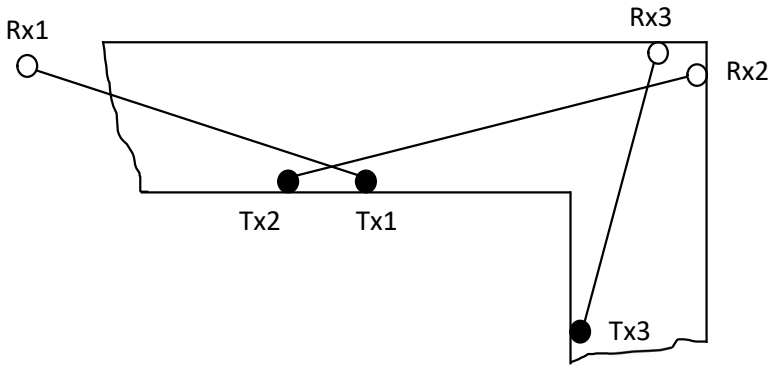

Fig.7

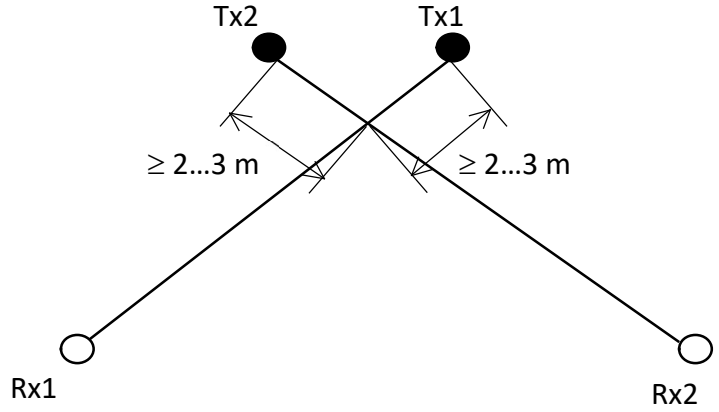

Fig.8

NOTE: To avoid mutual interference between nearby detectors, you must set different channels for them (do not forget to change the operating channels of the receiver and transmitter in the manner specified in the instructions).

NOTE: Avoid installing the device where reflected microwave signals (from metal fences and other metal objects or from wet surfaces after rain or snow) can cause interference and false alarms.

INSTALLATION OF SUPPORTS

It is recommended to use metal or asbestos-cement rods with a diameter ranging from 70 to 90 mm for the supports. The height of the support above the ground surface is indicated in Fig.9.

In snowy areas, the above-ground part of the support must be at least 1500 mm. When concreting the support, it is mandatory to insert dowels into it and make several holes for cable connections.

1. Support
2. Plastic dowel
3. Cable opening in the support
4. Opening for the main cable and detector cable
5. Opening for the main cable
6. Concrete (gravel)
7. Dowels preventing unauthorized removal of the support
8. Ground

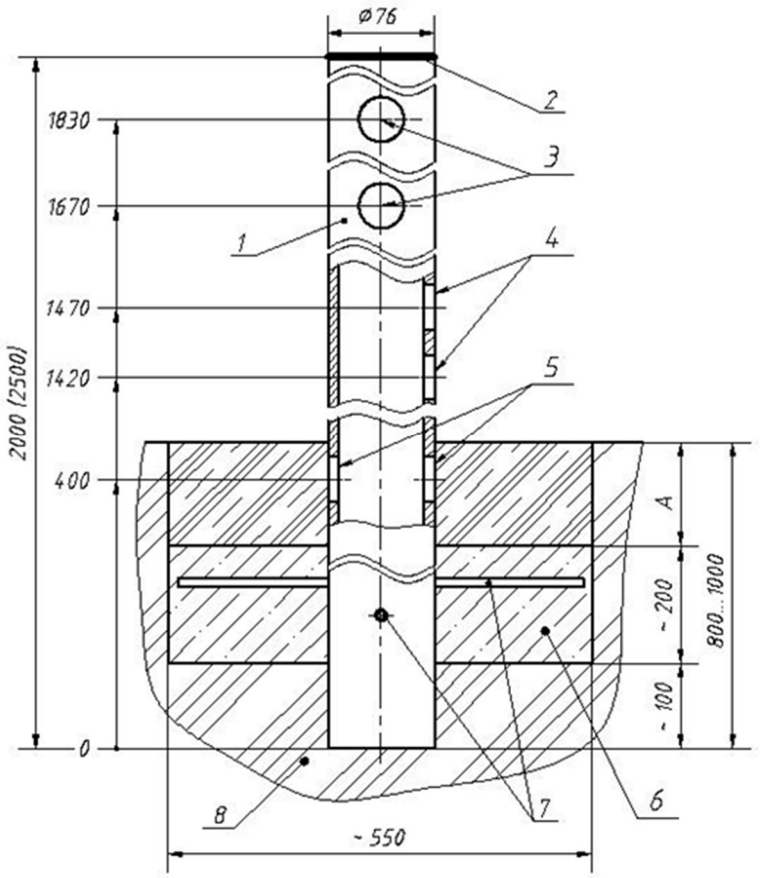

Fig.9

NOTE

1) After completing the installation work, the ground at the support installation site must be leveled.
2) The dimensions are given in millimeters (mm).

Depending on the chosen protection method, other detector mounting options are also possible (e.g., on a fence or wall). If the detector protects the top of the fence, it is recommended to attach the support to the fence with a strong mechanical or welded connection. When mounting the detectors above the fence or wall, the detection zone parameters change (see Table 2).

Table 2

Detector	Maximum detection zone length (L), m	Maximum detection zone width (b), m	Maximum detection zone height (h), m
FMC 24 Pro (50m)	30	0,5	0,5
FMC 24 Pro (100m)	60	1,0	1,0
FMC 24 Pro (200m)	120	1,5	1,5
FMC 24 Pro (300m)	160	1,5	1,5

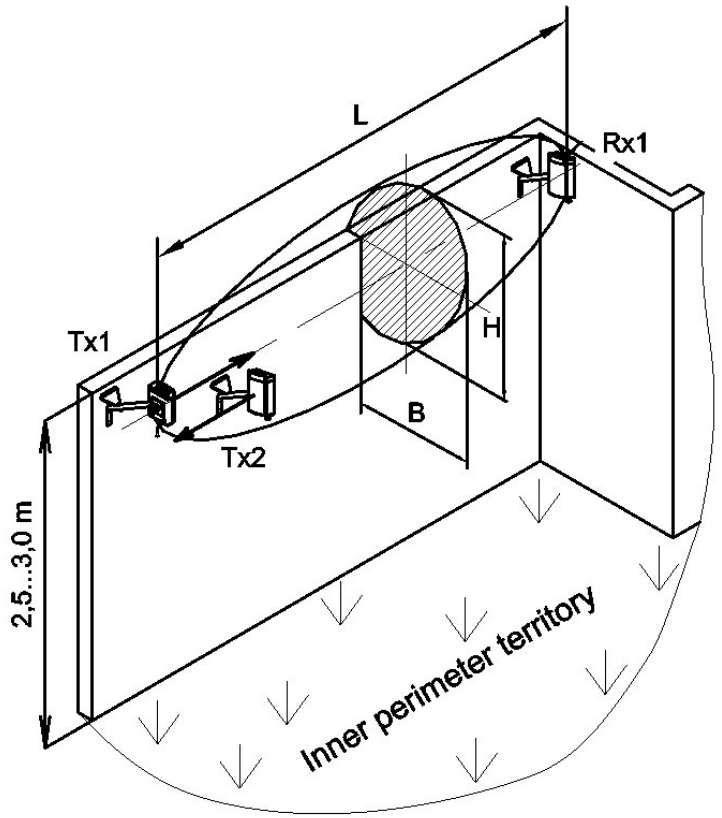

Fig.10

Lay the main cables in accordance with the security system project. It is recommended to use multi-core shielded cables or cables with a metal sheath. The cable cores must be chosen taking into account that the supply voltage of each detector unit is not less than 9 V. It is not recommended to lay the main

cables near sources that generate strong electromagnetic interference (power lines, antenna systems, etc.) and to use free cable cores for the transmission of pulse signals.

NOTE! To reduce the level of electromagnetic interference, it is recommended to install the power supply unit at a distance of up to 300 m from the location of the detectors.

A set of fasteners for mounting the detector on the fence can be provided at the customer's request if the customer wishes to protect the perimeter from an intruder who can climb over the fence or break in through a window. An example of detector installation with brackets (350, 500 mm) is shown in Fig.10. The dimensions of the detection zones are shown in Table 2. The detector unit can be tilted horizontally in the direction of a 180° angle at the brackets; vertically: up – at a 17° angle, down – at a 40° angle.

NOTE:

1. If the upper part of the fence is protected by a physical object security system, the recommended bracket dimensions are 500 mm. If the upper part of the fence does not have barbed wire, the recommended bracket dimensions are 350 mm;
2. The height of the receiver and transmitter systems intended for the protection of the upper part of the fence corresponds to the height of the fence with a permissible deviation of ±100 mm;
3. The dimensions and materials of the fence are not specified. Only the strength of the fence must be specified;
4. The dimensions b and h of the detection zone are specified to ensure proper detector alignment, taking into account the recommendations given in sections 2.4 and 2.5;
5. Note: To avoid mutual interference between nearby detectors, you can set different channels for them (do not forget to change the operating channels of the receiver and transmitter in the manner specified in the instructions);
6. Note: Avoid installing the device where reflected microwave signals (from metal fences and other metal objects or from wet surfaces after rain or snow) can cause interference and false alarms;

The set of elements for mounting the transmitter and receiver to a support consists of two brackets and four clamps. Mount the transmitter and receiver on the brackets using screws (Fig.4).

2.3 CONNECTION TO DETECTOR

Connect the necessary power, signal, and remote-control circuits. The receiver and transmitter units are connected using their own cables. The color coding of the conductor strands indicates their purpose.

Information about the conductor strand marking, color, and purpose is provided in Table 3.

Set the detector channel using the transmitter and receiver channel switches.

Table 3. (*RX*)

Color	Purpose	Marking
Blue	Power supply	« – »
Red		«+ »
Brown	Normally closed (NC) relay contacts	NC_1
Orange		NC_2
Black (Grey)	Tamper switch contacts	$Tamper_1$
Yellow		$Tamper_2$
White	For RS-485 connection	RS A
Green		RS B

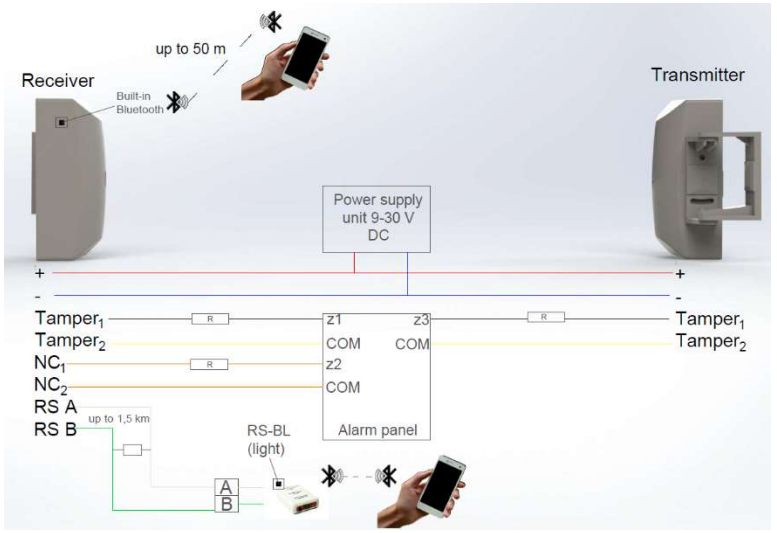

Fig.11

Table 4. *(TX)*

Color	Purpose	Marking
Blue	Power supply	« – »
Red		«+ »
Black (Grey)	Tamper switch contacts	$Tamper_1$
Yellow		$Tamper_2$

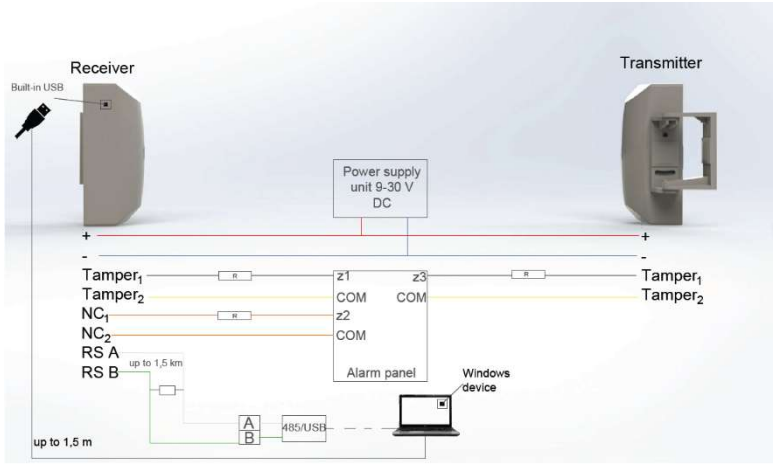

Fig.12

Warning: Do not open the detector housing, as this may damage the device!

NOTE: To avoid unexpected alarms, always use different cables for the power circuit than for the alarm circuit;

NOTE: THE ALARM CONTACT LOAD IS UP TO 30 V DC 0.1 A;

NOTE: All electrical work must be carried out only after disconnecting the power supply;

2.4 METHOD OF CONNECTING THE SYSTEM TO THE ALARM CONTROL PANEL

In the transmitter, the tamper circuit contacts ("TAMPER") must be connected to the control device with a separate closed circuit.

In the receiver, the tamper circuit contacts ("TAMPER") and the alarm circuit contacts can be connected to the control device (alarm panel) in two ways:

Option 1. Separate closed circuit.

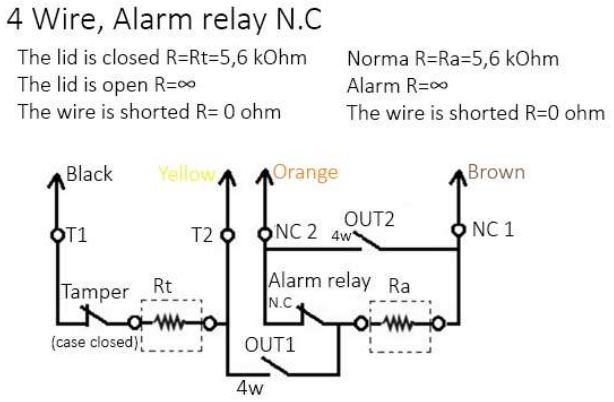

Fig.13

Option 2. The actuating TAMPER relay is connected in series with the actuating relay contacts.

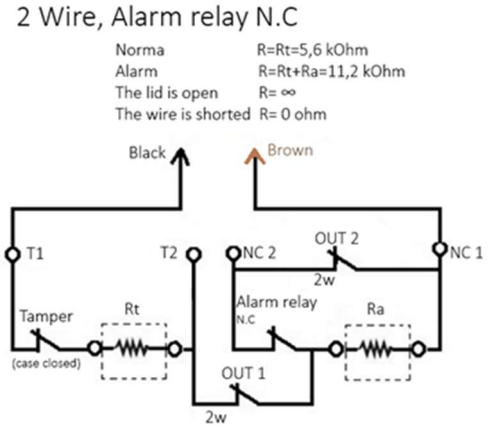

Fig.19

NOTE: To use option 1, set switches No. 10 (see Fig.5) to the 4w position. To use option 2, set switches No. 10 (see Fig.5) to the 2w position.

Factory settings: RTAMPER = RALARM = 5.6 kOhm.

2.5 DETECTOR ADJUSTMENT WITH INTEGRATED ADJUSTMENT, CONTROL, AND INDICATION ELEMENTS

Preliminary transmitter and receiver adjustment:

- Unscrew the transmitter and receiver bracket mounting screws (Fig.4);
- Aim the receiver and transmitter at each other;
- Tighten the receiver and transmitter bracket mounting screws;

Main transmitter and receiver adjustment:

- Open the receiver/transmitter cover (Fig.4);
- Channel setting. The receiver and transmitter must operate on the same channel. Different channels must be set for adjacent detection zones;
- Check the detector's power supply circuit and output circuit connection. Turn on the power supply;
- When power starts to be supplied to the detector (receiver and transmitter) units, the flashing LED indicates the set channel;

TRANSMITTER. After power is supplied, the LED will flash as many times as the set channel, then it will start to burn continuously green – this means that the power is supplied correctly and the transmitter is functioning normally.

RECEIVER. After power is supplied, the LED will flash as many times as the set channel, then it will start to burn continuously green, which means that::

- Power is supplied;
- Receiver synchronization with the transmitter has occurred;
- The signal level is in the appropriate range;
- The protected area is being monitored;

THE LED LIGHTING RED MEANS THAT THE DETECTOR IS IN THE "ACTIVATION" STATE BECAUSE:

- No signal is received from the transmitter;
- The received signal is too strong;
- Intrusion into the protected area;

If the LED flashes red, it means that the supply current is below the required **value of 9V.** ⚠

- ✓ A rare (once every 2 seconds) red flash indicates that the signal level is out of range.
- ✓ Continuous red light with periodic LED extinguishing (once every 4 seconds) means that the received signal level exceeds the permissible norm (>800 mV).
- ✓ A red flash means that an IOS, Android, or Windows device is connected to the receiver and tuning is in progress.

Positioning (calibration) is performed gradually. Calibration can only be started when the transmitter LED is continuously lit green, and the receiver is continuously lit green or flashing red. If the LED on the receiver is continuously lit red, calibration is not possible. Positioning work can be started from either the transmitter or the receiver. In manual mode, calibration is performed visually (by eye).

2.6 SENSITIVITY ADJUSTMENT

Set the sensitivity parameters according to the intruder's crossing tactics (standing or bent over) along the entire length of the zone. It is recommended to start such control passages from the middle of the protected area. After each passage, you must go beyond the detection zone limits at a distance of 2-4 m and wait for about 5-7 seconds. Otherwise, the results obtained during the previous passage may affect the results of the next passage.

Perform control passages also in problematic areas of the detection zone: depressions, hills, spaces near barriers, buildings, and trees located in the detection zone. If necessary, change the detector's sensitivity.

NOTE. If, with factory settings, the detector does not activate an alarm signal during a control passage, please adjust the sensitivity using the "Forteza soft" program.

After completing the adjustment work, close the receiver and transmitter terminal covers.

Leave the "BT" and "RS-485" switches in the off position if they are not used for remote setup.

After completing the detector adjustment work, we recommend performing a trial run of the detector for 2-3 days to identify and correct any installation and adjustment errors.

2.7 SOFTWARE INSTALLATION AND DETECTOR ADJUSTMENT WITH IOS/ANDROID/WINDOWS DEVICES

Using ISO/Android/Windows devices, with the help of the software, it is possible to check the signal strength, change the sensitivity settings, the length of the detection zone that creates the signal, and set other parameters that cannot be set during the preliminary adjustment stage.

3. INITIAL CONFIGURATION

Before starting to work with the FMC 24 Pro detector, it is necessary to download and install the "FORTEZA SOFT" application on the selected IOS/Android device.

When the application is launched, the connection configuration window opens (Fig.20).

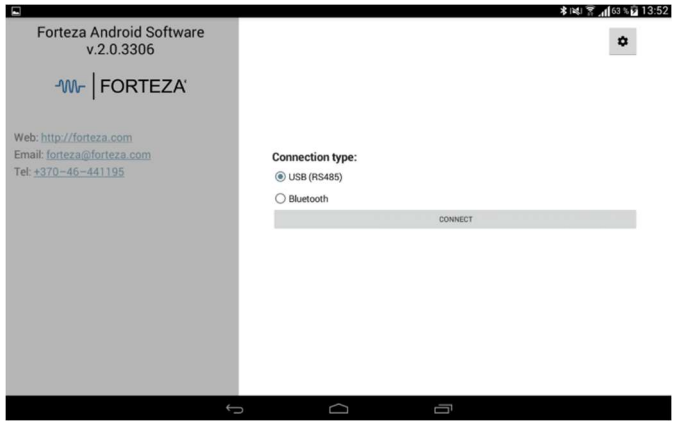

Fig.20

In this window, you must choose how to connect the IOS/Android device to the detector:

- "Bluetooth" wireless connection using the "Bluetooth" interface;
- Wired connection via the USB connector using any USB/RS-485 converter or FORTEZA RS-BL;

Each FMC 24 Pro detector has an internal (Network) address. When connected through a special socket in the FMC 24 Pro housing, the factory default internal address – 253 (unchangeable) is selected. When connected through the green and white wire, the factory default internal address - 1 is selected (after starting the program, if necessary, it can be changed from 1 to 250).

When selecting a "Bluetooth" connection, a selection line opens, which contains the last connection number (Fig.21), "e.g.: FMC 24 Pro 0000", "0000" i.e., the detector's serial number. The password is written on the inside of the cover.

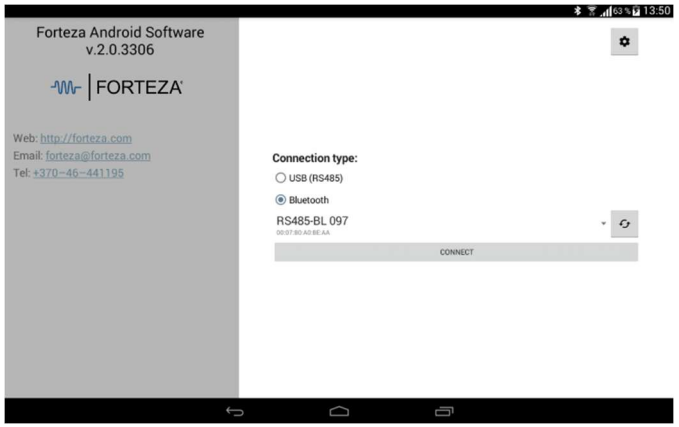

Fig.21

When you need to connect to another detector, press the button and select the desired detector number in the expanded list. If the required device is not in the list of devices, you should search by pressing the button. After completing the selection of the connection type and parameters, press "CONNECT". The process of establishing a

connection and receiving information about the detector status will begin.

When selecting the USB (RS485) connection and connecting the FMC 24 Pro to an ISO/Android device using a USB/RS-485 converter, follow the connection instructions on the IOS/Android device's screen.

4. APPLICATION LAUNCH, "GENERAL" TAB

After connecting the IOS/Android device to the detector, the main window opens with the active "GENERAL" tab (Fig.22), which displays the detector parameters and the status of the protection zone. It is possible to switch to the following modes - calibration, threshold adjustment, scan. It is also possible to change the setup method. Before starting work, it is recommended to open the "LOGS" tab and synchronize the date and time. This action is necessary for the information to be properly presented later in the "LOGS" journal.

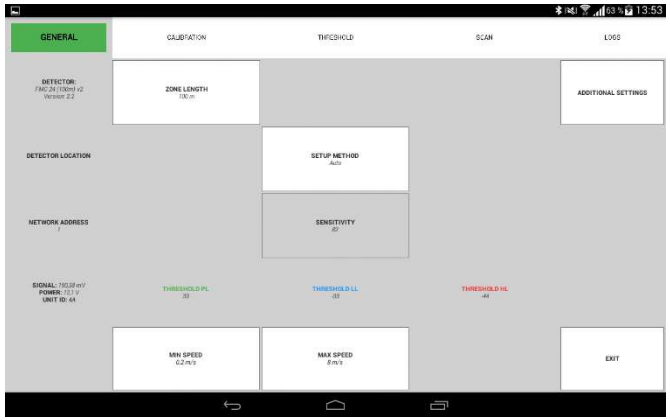

Fig.22

The zone status is indicated by the background color of the tab header at the top of the screen:

- Normal - Green;
- Activation - Red;

- Failure – Yellow (low incoming signal or low supply voltage).

After pressing the "ADDITIONAL SETTINGS" button (Fig.23), you can change information about the detector location ("DETECTOR LOCATION"), change its internal network address ("NETWORK ADDRESS"), change the type of output relay contacts ("ALARM TYPE") and the alarm signal duration ("ALARM TIME"), and turn on/off the audible signal ("ALARM SOUND"). The allowed number of characters and the range of numbers are provided in the pop-up window tips.

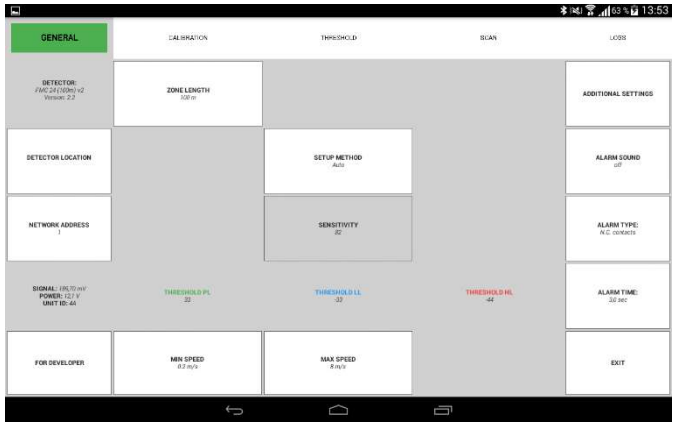

Fig.23

On the screen (Fig.23), you can see the selected setting parameters. Their values are shown below:

Detector: Information about FMC series models of detectors, operating frequency 24 (24.525 GHz), operating range

Version: Software version

Output type: Relay (normally closed contact)

Detector ID: Receiver channel. Transmitter and receiver channels (1A ~ 4B) must match. Frequency modulation channels can be changed using switches

Zone length: The selected operating distance of the detector. It is very important to choose the correct operating distance

Note: Only used for the AUTO setup method

Note: If the zone length is not the actual distance, the number of false alarms may be higher, or the detector sensitivity may decrease

Setup method: The selected setup method. You can choose from Auto (automatic), Manual (manual), SPECIAL 1 (special), or SPECIAL 2 (distance up to 100 meters) setup methods. The manual setup method allows you to change the sensitivity, and the automatic method allows you to change the zone length. In most cases, the automatic setup method is recommended

Sensitivity: Indicates the detection sensitivity. Sensitivity can be set for any mode except the Auto setup method. In most cases, sensitivity adjustment is not recommended

Speed: The intruder's movement speed range detectable by the detector

Note: Too large a speed range can cause more false alarms, but too small a speed range has low sensitivity.

Signal: Provides information about the signal between the transmitter and receiver.

Saving the number of alarms: With this function, you can count the alarms so that you can check the detector by performing control passages. You can reset the counter data with the reset button.

5. DETECTOR ADJUSTMENT WITH IOS/ANDROID PLATFORM DEVICES

- Connect the transmitter via the converter to the selected IOS/Android device with the FORTEZA soft application. (Point 9)
- Before making any changes to the settings, you must perform positioning (calibrate) the detector. You can do this by selecting the "Calibration" tab.
- First, you must calibrate (precisely select the position setting) the transmitter, and then the receiver unit.

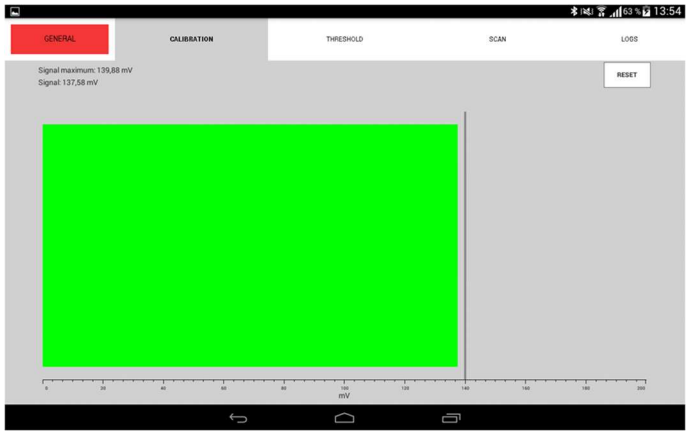

Fig.24

On the dynamically changing scale, you can see the signal received from the transmitter. The maximum value of the selected position is always indicated. If the value of the selected positioning approaches the maximum, the changing bar turns green. This means that the positioning has been done perfectly. If the bar is red, you must continue to look for a

suitable position, as you have not yet approached the maximum suitable one. Using the maximum value recovery button, you can reset the maximum value and look for another reference value.

NOTE: This is the same positioning that uses LED flashes and audible device signals.

NOTE: After selecting a position, it is always recommended to monitor whether the selected position remains close to the maximum value for at least a few minutes.

After completing the adjustment work, check the signal value. During the adjustment, the recommended range is from 50 mV to 800 mV;

NOTE: The minimum signal should reach 50 mV. The detector height is 95 cm. If you cannot reach it – change the position of the detectors (95 cm + 5 cm or 95 cm – 5 cm) or the operating distance;

⚠ **If, after calibration, the voltage exceeds 800 mV** (in short sectors) **– it is recommended to change the position of the receiver and transmitter, tilting them slightly upwards so that the value of 800 mV is not exceeded.**

NOTE: The receiver and transmitter cannot be aligned by pointing them downwards or sideways.

6. SETTING THE THRESHOLD (LIMIT VALUES) WITH IOS/ANDROID

After successfully completing the calibration, you can return to the settings menu. Now you can set the operating parameters of the detectors. The signal must be stable + 15 mV or –15 mV, if the signal fluctuates in intervals greater than + 15 mV or –15 mV, please check the detection zone, as there may be moving objects in it.

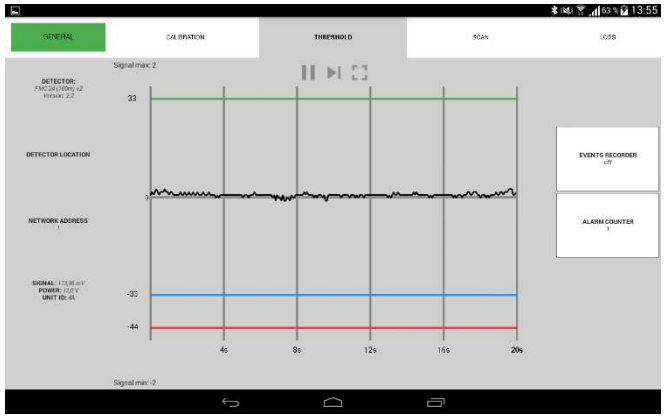

Fig.25

SETUP METHOD: AUTOMATIC

In most cases, the automatic mode and the default sensitivity value are recommended. The most important thing is to set the appropriate range length, taking into account the intended protected area, and the sensitivity value will be selected automatically. The selected parameters will be automatically sent to the receiver after the change.

Note: If the zone length is not the actual distance, the number of false alarms may be higher, or the detector sensitivity may decrease.

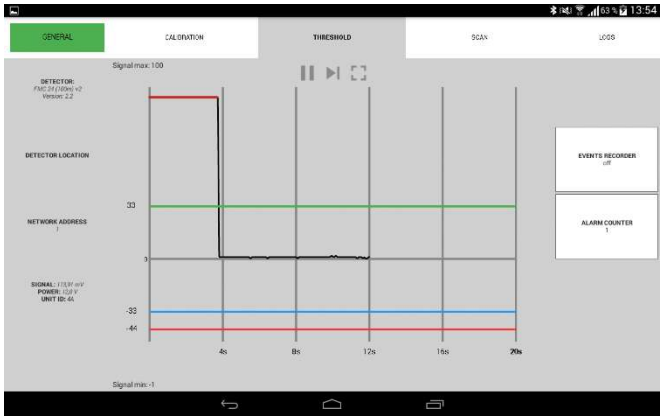

Fig.26

Perform control passages standing and bent over, choosing different distances from the transmitter and receiver. It is recommended to start such control passages from the middle of the protected area. After each passage, you must go beyond the detection zone limits at a distance of 1-2 m and wait for about 5-7 seconds. Otherwise, the results obtained during the previous passage may affect the results of the next passage.

Fig.27

The minimum detectable speed, measured in m/s (V min), and the maximum detectable speed, measured in m/s (Vmax), can be adjusted. You can confirm your settings by pressing the 'Apply' button.

⚠ NOTE: Too large a speed range can cause more false alarms, but too small a speed range has low sensitivity.

SETUP METHOD: MANUAL

The manual setup method allows you to change the sensitivity parameters. After the change, be sure to check if the intruder will be detected. However, in most cases, the automatic mode and the default sensitivity value are recommended.

ⓘ NOTE: THE BLACK LINE - SIGNAL BETWEEN THE TRANSMITTER AND RECEIVER

GREEN AND BLUE – section 1 alarm thresholds (the alarm will only trigger if the signal crosses both the green and blue thresholds within a specified period)

RED – section 2 zone alarm threshold (the alarm will trigger when the signal crosses the threshold)

Fig.28 Select method – Manua

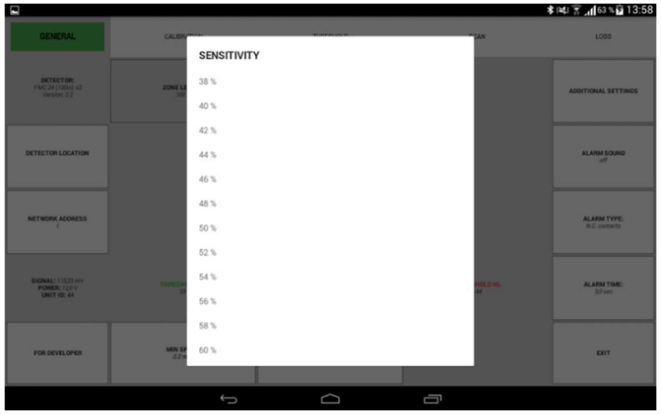

Fig.29 Sensitivity settings window

Fig.30 Detection Zone Check

SETUP METHOD: SPECIAL 2 (SPECIAL 2 HL)

This method is intended for use when the distance between the transmitter and receiver is less than 100 meters.

When this method is selected, the sensitivity is adjusted only by changing the position of the red threshold.

When using this method, be sure to perform sensitivity parameter adjustments*.

SETUP METHOD: SPECIAL 1 (SPECIAL 1 PL, LL, HL)

When this method is selected, the sensitivity is adjusted by changing the positions of all thresholds. This method is not the primary one, so it is recommended to use it in exceptional cases.

When using this method, be sure to perform sensitivity parameter adjustments*.

*Adjust the sensitivity parameters according to the control passages tactics in the protected areas (at full height or bent over), choosing different distances from the transmitter and receiver. It is recommended to start such control passages from the middle of the protected area. After each passage, you must go beyond the detection zone limits at a distance of 1-2 m and wait for about 5-7 seconds. Otherwise, the results obtained during the previous passage may affect the results of the next passage. If necessary, change the sensitivity settings.

7. SCANNING

To monitor the electromagnetic environment at the location where the detector receiver is installed and to assess the impact of neighboring detectors, select the SCAN tab. The window will display a histogram of signal levels for each of the eight frequency channels (Fig.31). If necessary, you can use the histogram scaling function (ZOOM).

The signal level of "your" transmitter must be at least 5 times higher than the background level. Otherwise, select a different frequency (channel) with a minimal background level.

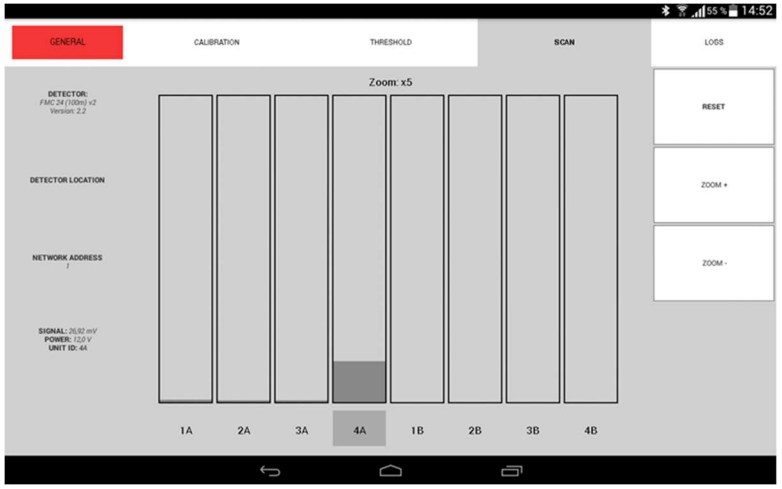

Fig.31

8. WORKING WITH LOGS

During operation, the detector records all occurring events and saves them to permanent memory. To view the event history, open the "LOGS" tab (Fig. 32), after which the information from the detector's memory will be transferred to the IOS/Android device.

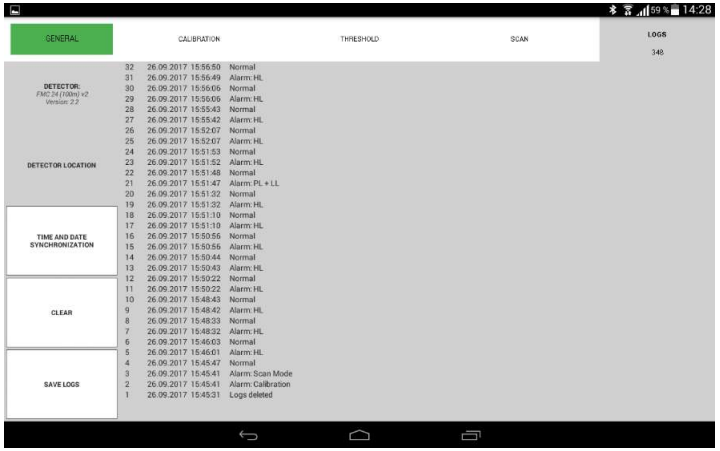

Fig.32

The "LOGS" contain a history of the detector's states (normal, alarm, failure, crossing the green and blue thresholds) and a history of the actions of the on-duty personnel (changes in the detector settings).

The log can be used for detailed analysis of events that occurred during operation.

When the detector is turned on, it is recommended to set the date and time. To do this, press the "TIME AND DATE SYNCHRONIZATION" button. The time and date are used to create records in the event log.

If the detector's power supply is interrupted, the date and time are not saved. Therefore, if the power goes out, the time and date should be reset.

Up to 1000 records can be stored in the detector's memory. When the 1001st event occurs, the oldest event is deleted. Thus, up to 1000 of the newest events can be stored in the detector's memory.

The log can be saved to a text file. To do this, press the "SAVE LOGS" button.

The log can be cleared by pressing the "CLEAR" button (Fig. 33).

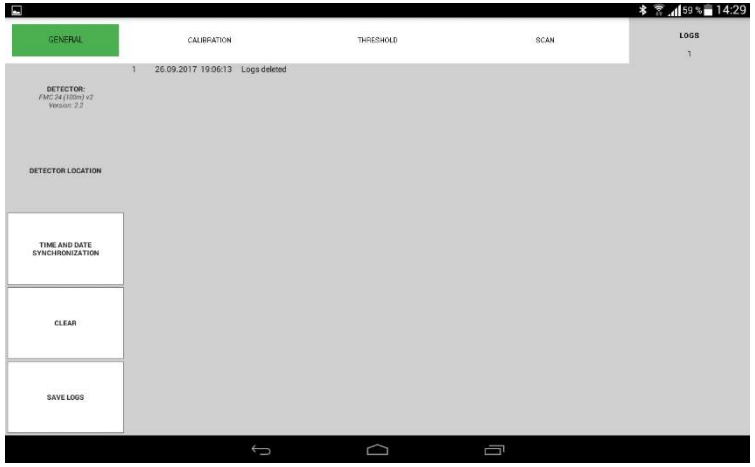

Fig.33

9. SOFTWARE INSTALLATION FOR MICROSOFT WINDOWS OPERATING SYSTEM

You can download the latest software installation version from our website at http://www.forteza.com → Support → Software.

The first time you run the program, you need to select the communication port (COM port).

CONNECTION TO A COMPUTER IS DONE IN TWO WAYS:

9.1 Using a USB/USB cable. In the Communication settings → Detector address tab of the main window, the address Jack (253) must be selected.

9.2 Connect the RS 485 programming converter to the communication network wires (RS A to white, RS B to green), located in the receiver's eight-wire cable. In the Communication settings → Detector address tab of the main window, the assigned number (from the factory – 1) must be selected.

⚠ ATTENTION!

The "TRIBO & FMC 24 PRO Software" program for computers implements the ability to perform a test to check the impact of the environment on the detector's protection zone and receive recommendations for selecting the levels of the used activation thresholds.

Sequence of actions when performing the test:

1. perform detector alignment (orient the transmitter and receiver towards each other);
2. select activation thresholds for intruder detection;
3. activate the test;

During the test:

- there should be no intruder in the detection zone;

- the possible environmental impact on the detection zone is simulated (movement of transport or people nearby, movement of branches of nearby bushes or trees due to wind, etc.);

Test duration:

- minimum - 15 seconds;

- maximum - until the "Next" button in the program window is activated;

After the test is completed, the following messages are possible:

- Noise immunity is good - means that the ratio of the interference level/activation threshold level is sufficient for stable operation of the detector;

- Noise immunity is bad - means that the ratio of the interference level/activation threshold level is insufficient for stable operation of the detector - it is critical. The recommended activation threshold levels are displayed on the screen for such interference;

-Very big interference – means that the ratio of the interference level/activation threshold level is unacceptable. Stable operation of the detector is impossible;

10. MAINTENANCE

- Operational Check

During operation, it is recommended to check the detector's operation once a week by violating the protected area and recording a notification about it.

- Technical Maintenance

Detector maintenance must be performed only by persons who have completed special security training;

During detector operation, it is mandatory to carry out inspection and preventive maintenance work;

A visual inspection of the detector units and the security sector must be carried out every month;

MANDATORY TO CHECK:

- whether there is dust, dirt, snow, and ice on the transmitter's signal transmitting and the receiver's signal receiving side; if necessary, clean the units;
- whether there are foreign objects in the protected area.

QUARTERLY:

- perform all monthly work;
- check cables and cable connections;
- maintain grass height. If the grass height exceeds 0.3 m, the grass must be mowed;
- when the snowdrift height changes, false alarms may be activated due to the weakening of the signal received by

the receiver. In this case, you must remove the snow or change the height of the transmitter and receiver antennas;

- after changing the height of the antennas, they must be aligned. The limit values (thresholds) must be aligned in accordance with the procedure described above;

11. SAFETY MEASURES

During the installation, preventive maintenance, and repair of detectors, it is mandatory to comply with the safety rules for the operation of electrical installations with a voltage of up to 1000 V.

- Detector supply voltage: 9 – 30 VDC. For this reason, before starting to operate the detector, it is mandatory to analyze the power source elements and the cable layout.
- Cables can be laid, disconnected, or connected to sockets only after disconnecting the power supply.
- Replace the power supply fuse only when the power is off.
- It is forbidden to install detectors and perform their maintenance work during a storm.
- Detector installation and maintenance work must be performed only by persons who have completed special safety training and are familiar with safety measures.

12. STORAGE

- The detectors must be packed and stored at an ambient temperature of + 5 to + 30 °C and a relative humidity of up to 85%;
- Avoid extreme weather conditions during storage;

13. TRANSPORTATION

Packed detectors can be transported by any means of transport (if the detectors are transported by air, the goods must be packed in airtight packages), if the goods are transported in covered vehicles, car compartments, in this case, the detectors can be transported up to a distance of 10,000 km;

During transportation, the boxes must be secured to prevent them from moving or falling;

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