Security Sensors
FM-60(24)
FM-84(24)

User manual
Document Part Number 4372-43071246-087

CE Certificate of compliance
No. PS.LVD.15.007

Declaration of conformity
ЕАЭС № RU Д-RU.ГР01.В.06594

2017

TABLE OF CONTENTS

1	Introduction	3
2	Purpose	4
3	Specifications	4
4	Sensor components	5
5	Operation	6
5.1	Principle of operation	6
6	Sensor construction	6
7	Safety measures	10
8	Mounting	10
8.1	Requirements for the protected site	10
8.2	Requirements for the protected building	11
8.3	Mounting on the perimeter site	11
8.4	Mounting on the wall	13
9	Preparation for the operation	13
10	Adjustment with a PC	15
11	Maintenance	27
12	Troubleshooting guide	28
13	Storage	29
14	Transportation	29
15	Acceptance certificate	29
16	Warranty	29

1. INTRODUCTION

The user manual contains the following information about the microwave monostatic security sensors FM-60(24) and FM-84(24) (below the sensor):

- purpose and sensor principle of operation;
- sensor components and possible delivery sets;
- sensor specifications and its components;
- operating and servicing rules.

There is the information about tare, packaging and conditions of the sensor transportation.

This document contains the required information for the correct operation, maintenance and storage of the sensor.

The manufacturer constantly improves the sensor and reserves the right to make changes to its construction, which does not worsen the sensor specifications.

2. PURPOSE

2.1. The purpose of the sensors FM-60(24) and FM-84(24) is to protect perimeter sites, open and closed grounds of different objects and to detect an intruder moving at his "full height" or "bent" in the detection zone. The sensors application on the perimeter sites having powerful sources of electromagnetic emission (radars, radio transmitting stations, etc.) is determined by the trial operation.

2.2 The sensor is intended for continuous round-the-clock outdoor operation at an ambient temperature from -40°C up to +80□C and relative humidity up to 98% at the temperature +35°C. The industrial version, the placement category not more than 1 (for outdoor operation) according to the state standard GOST 15150-69.

The enclosure protection degree IP55 according to the state standard GOST 14254-96.

2.3. The sensor distinctive feature is the detection zone consisting of 12 cross-cut subzones. They can be regulated directly with the controllers on the sensor or with a PC through USB interface (subzones disconnection, sensitivity adjustment of every subzone and etc.) or through RS485 interface.

3. SPECIFICATIONS

3.1. The operation frequencies range is 24,05…24,25 GHz.

3.2. The detection zone is a volumetric part of the protected sector, any intruder movement in which disturbs the field and generates an alarm.

The dimensions of the detection zone in the open area are given in Table 3.1.

The sensor has the lengths of the detection zone:

FM-60(24) – from 5 to 60 m;

FM-84(24) – from 7 to 84 m.

Table 3.1

Characteristic	**FM-60(24)**	**FM-84(24)**
Width, m	not more than 1	not more than 1
Height, m	not less than 8	not less than 8
Length, m	60 (12 crosscut subzones of 5 m)	84 (12 crosscut subzones of 7 m)

3.3. The sensor can be performed in one of 5 frequency letters L1, L2, L3, L4 and L5 to eliminate the overlapping during the mutual sensors operation. If it is necessary to divide the sensors into the frequency letters, please indicate it at your order.

3.4. The sensor generates an alarm when:

- an intruder (moving at his "full height" or "bent") crosses the detection zone at a speed from 0,3 up to 8 m/sec with the minimum detection probability 0,98;
- the absence of supply voltage.

The alarm is generated by breaking the actuating optoelectronic relay contacts for 3 sec minimum. This signal is transmitted by the yellow and pink wires.

3.5. The characteristics of the actuating optoelectronic relay are: the maximum switching current is 0,1 A; the maximum voltage is 50 V; the maximum resistance is 130 Ohm in the closed condition (with the lightning guard elements).

3.6. The sensor generates an alarm at the opening of the cover, under which there is USB connector. The contacts of the tamper button are open at the cover opening. Operating characteristics of the tamper contacts: the current is up to 0,2 A at the voltage up to 80 V.

3.7. The recovery time of the standby mode after an alarm is up to 5 sec.

3.8. The time of the technical availability after the supply voltage signal is up to 15 sec.

3.9. The sensor power supply: from 10 up to 30 VDC with the maximum pulsation of 0,03 V. The maximum power consumption is 1,5 W.

3.10. The sensor has the automatic and remote control.

3.11. The sensor doesn't generate an alarm at:

- rain, snow, fog;
- solar radiation;
- wind speed up to 20 m/sec;
- birds and small animals in the detection zone with the linear dimensions up to 0,3 m;
- irregularities up to $\pm$ 0,3 m on the protected site;
- snow cover up to 0,3m (without additional adjustment);
- grass up to 0,2 m;
- influence of ultra-short waves emissions of the range 433 MHz and mobile phones at the distance more than 0,5 m from the sensor.

3.12. The sensor is immune to electromagnetic interferences according to GOST R 50009-2000 (voltage impulses in supply circuits, breaks of mains supply, electrostatic discharges and electromagnetic fields).

3.13. Input circuits of the sensor are protected from electric pickup (including electric storms).

3.14. The sensor mean lifetime is 8 years.

3.15. Mean time between malfunctions is 60000 hours.

3.16. Maximum dimensions of the units without mounting kit and protective visor, mm: 210x135x75;

3.17. Maximum weight, kg: 0,5

4. SENSOR COMPONENTS

4.1. The sensor delivery set:

- transceiver – 1 pc
- mounting kit on a support (MK-1):
- bracket – 1 pc
- buckle – 2 pcs
- key S8x10 – 1 pc
- protective visor and 2 self-tapping screws 3,9x19 to fasten it

- user manual – 1 pc
- package

4.2. Optionally the sensor can be equipped with an automatic heat stabilizer to expand the temperature range from -60 till +80˚ C (marking contains the letter A). The heat stabilizer operates automatically and is activated when the ambient temperature decreases below -30˚ C. In this mode the power is supplied by the constant-voltage source (24±4 V), and the current consumption does not exceed 270 mA.

4.3. The following components can be supplied by order:
- USB cable A-B for connection with a PC
- interface converter RS485 (RS485-Com, RS485-USB)
- software*
- mounting kit for mounting on the wall (BRACKET-120, BRACKET-350, BRACKET-500)
- power supply unit PSU-U-15-0,15
- junction box JB-15 or JB-30
- SUPPORT-2 (SUPPORT-2,5, SUPPORT-3, SUPPORT-3,5)

*The software you can download on our website www.forteza-eu.com.

5. OPERATION

5.1. The principle of operation is based on the method of linear frequency modulation, where the generator operating frequency is changed linearly within small range. The super-high-frequency transmitter of the transceiver unit radiates electromagnetic oscillations in the direction of the protected area. The electromagnetic oscillations are reflected from the goal and surrounding objects, and get to the super-high-frequency receiver of the transceiver unit.
When an intruder moves in the detection zone, the changes in the received signal caused by the Doppler Effect are intensified and processed according to the algorithm. If these changes exceed the threshold value, the sensor generates an alarm.
The method of linear frequency modulation and 12 cross-cut subzones increase the sensor interference immunity and the mean time to failure.

6. SENSOR CONSTRUCTION

6.1. The sensor construction and its installation on the support are given in fig.6.1. The sensor construction is the following: the monoblock placed in the dust- and splash-proof enclosure. The bearing structure is the base 4. On the base 4 there are the microstrip antenna and the signal processing board, protected with the radio transparent cover 5. There are two bores in the lower part of the cover 5 for condensation prevention inside the unit. It is necessary to take off the cover 6 to get the access to the adjustment and indication elements. The sensor is connected to

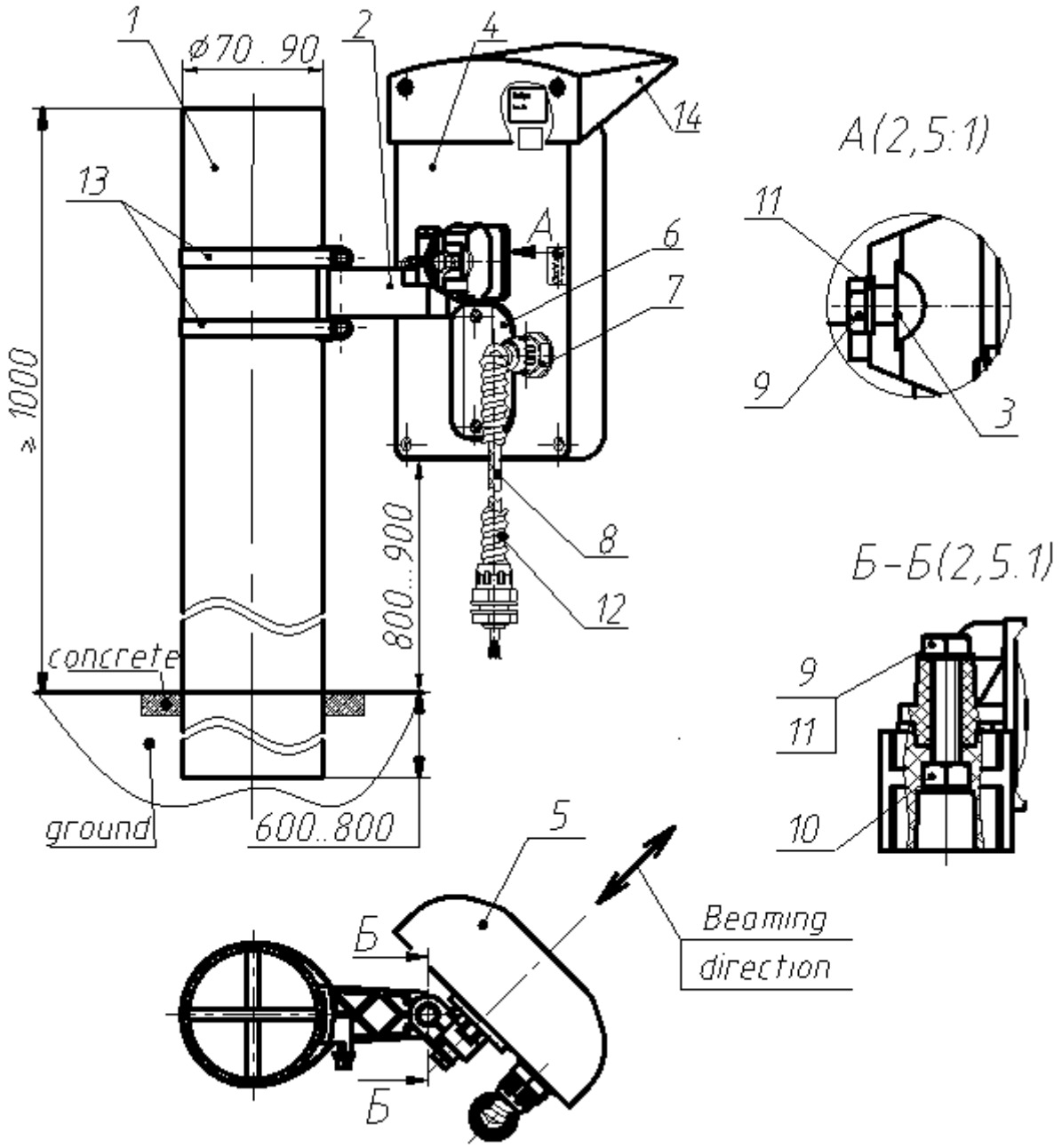
the receiving-control device with the cable 8 stretched through the cable gland 7 and the corrugated pipe 12.

6.2. The transceiver is mounted on the support 1 with the bracket and the buckles 13 as shown in fig. 6.1. The mounting kit ST-1 provides the unit turn on horizontal plane for 360 º, on vertical plane: up - 15º minimum, down - 40º minimum.

6.3. The transceiver is mounted on a vertical plane (wall, fence, etc.) with the bracket: bracket 2 as shown in fig.6.2. The rotation angles on the bracket on a horizontal plane are 90º, on a vertical plane ±45º, down 45º. There are 3 types of the bracket: indented from a wall at the distance of 120 mm, 350 mm and 500 mm. The type of the bracket depends on the sensor application.

Notes *- There is a variant of the sensor mounting on the support with the protective visor on fig. 6.1, on fig.6.2 – mounting on the wall, BRACKET-120, without any protective visor.*

6.4. The transceiver is mounted along to the wall and to other long surfaces with the brackets installed at 350 mm from the wall. It is necessary to do it because of absorption and reflection from the wall the sensor technical characteristics can worsen.



1- support (pipe)	-1 pc	8- cable	-1 pc
2- bracket	-1 pc	9- bolt M6x35	-1 pc
3- bushing	-1 pc	10- nut M6	-1 pc
4- base	-1 pc	11- washer 6	-2 pcs
5- case	-1 pc	12- corrugated pipe	
6- cover	-1 pc	13- buckle	-2 pcs
7- cable input	-1 pc	14- buckle	-2 pcs
		15- protective visor	-1 pc

Fig. 6.1 Mounting on a support

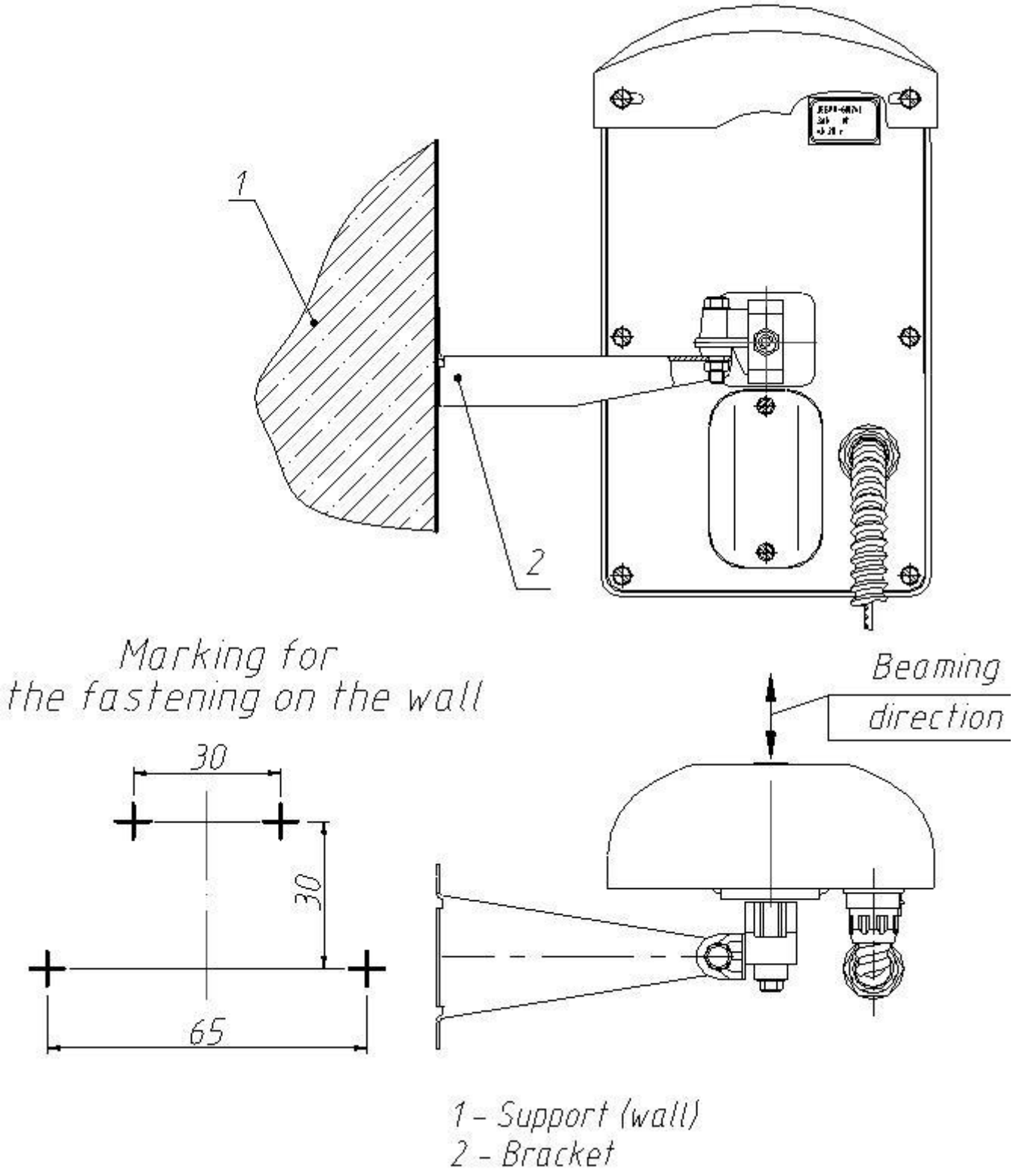


Fig. 6.2 Mounting on the wall with a bracket of 120 mm

Note. *Dear user! Manufacturer of the sensor FM-60(24) and FM-84(24) constantly upgrades its quality and reliability. That's why in some lots of sensors there can be design modifications unspecified in the documents delivered with the sensors. Nevertheless, the main specifications are valid.*

7. SAFETY MEASURES

7.1. The current safety standards for the operation with electrical facilities with the voltage up to 1000 V should be observed during mounting, preventive maintenance and repair of the sensor.
7.2. Cables should be laid, terminated and connected to the sockets only when the supply voltage is OFF.
7.3. The power of the super high frequency energy, beaming by the sensor satisfies the security standards and doesn't have any deleterious effect on human health.
7.4. It is prohibited to mount and maintain the sensor at thunderstorms.
7.5. Installation and maintenance of the sensor should be performed only by people, who underwent special safety trainings.
7.6. The breach of requirements of this user manual can provoke the sensor breakdown.

8. MOUNTING

8.1. Requirements to the protected site

The choice of the place and the correct sensor mounting on the protected sector or in the protected room are the basic factors, which provide its operational reliability.

Use the protective visor for the sensor outdoors application.

For that fix the visor on the sensor enclosure (see fig.6.1) with two self-driving screws 3,9×19 from the delivery kit.

Pass the output cable through the corrugated tube. Using the junction box install the cable gland in it and join the corrugated tube to it.

The protected sector should meet the following requirements:

a) height of irregularities – up to $\pm$0,3 m. If irregularities exceed $\pm$0,3 m, the sensor characteristics can worsen. Under these conditions the possibility of the sensor usage is defined by the trial operation;

b) on the sector there should not be high grass, bushes and tree branches at the distance of 5 m minimum from the detection zone border;

c) big objects moving in the wind (folds gates, tumbledown fences, etc.) should not be located in the sensor detection zone) and behind the detection zone border at the distance of 20 m minimum;

d) grass height up to 0,2 m;

e) snow height up to 0,3 m;

f) movement of people and animals are not permitted at the distance 5…10 m minimum from the detection zone borders;

g) it is recommended to enclose the detection zone with a fence (from 1 m height) to eliminate casual movements of people and animals;

h) gutter from the roof should not be near the sensor enclosure at sensor installation on an outside wall.

8.2. Requirements for the protected building

The protected building should meet the following requirements:

a) sensors should not be mounted on walls subjected to constant vibrations;

b) animals, birds, vibrating or moving objects (vent lights, doors, air-exhausters, etc.) should not be in the protected room;

c) if the sensor is installed in a room with a big square of glazing (shops, expo halls, offices, etc.) the area of 3 m minimum should be free of trees and moving transport;

d) the sensor should not be directed to windows and thin partitions between rooms.

8.3. Sensor mounting on the perimeter sector

8.3.1. For supports it is recommended to use metal or asbestos-cement tube of 70…90 mm diameter. For hard soils (argil, stone, etc.), the support should not be concreted and embedded in the soil of 600…800 mm. For light soils (sand, etc.) the concrete mat for the support should be 200 mm depth and 500 mm diameter.

In snowy regions (more than 1 m height), the support superstructure should not be less than 1500 mm. In not snowy regions the support superstructure should be up to 1300 mm.

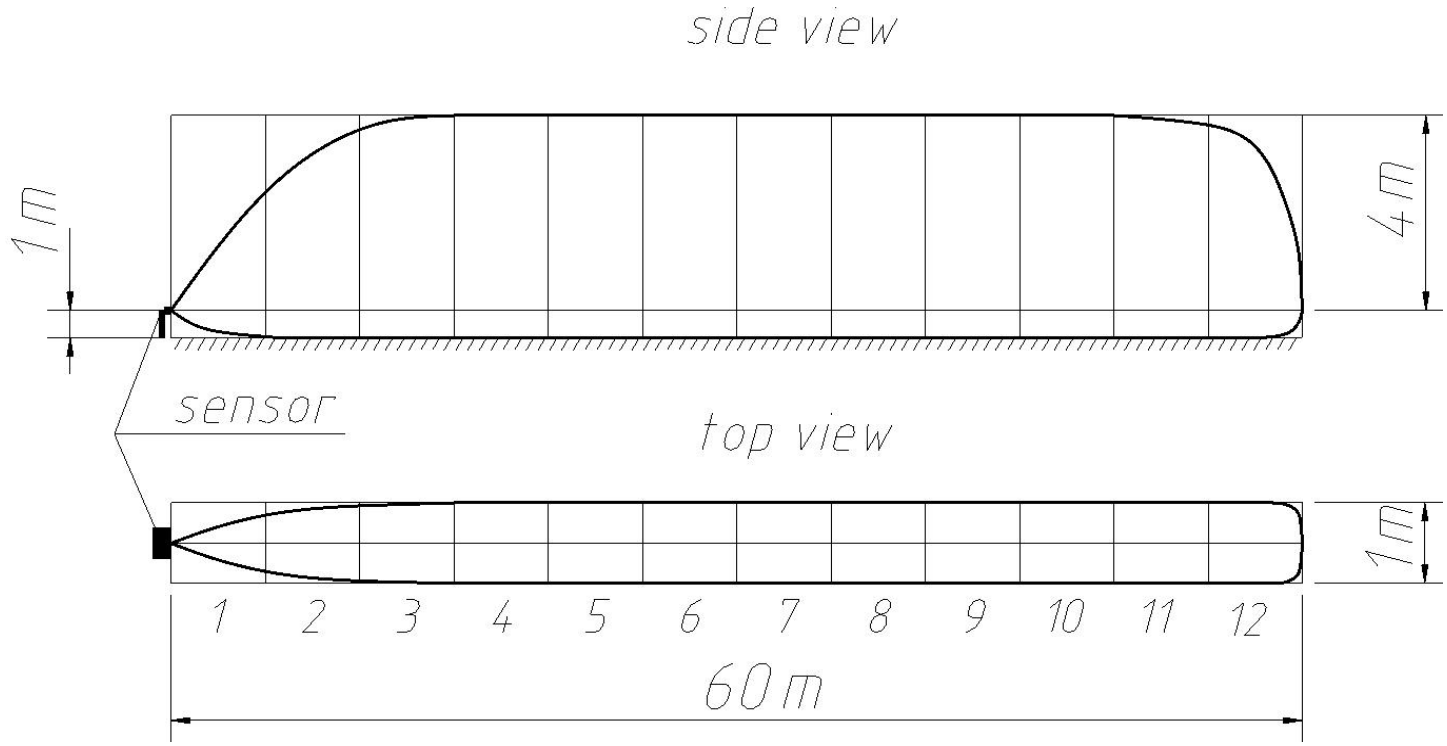
If the sensor is used to block the upper part of the fence, it is recommended to weld or to gear together the support and the fence for firmness. In this case the support should be situated above the fence at 300 mm minimum.

8.3.2. Lay the main cables according to the project of the security system. It is recommended to use multiple cables with the core screen or metal sheath. The cables laying may be performed in the ground or along the fence.

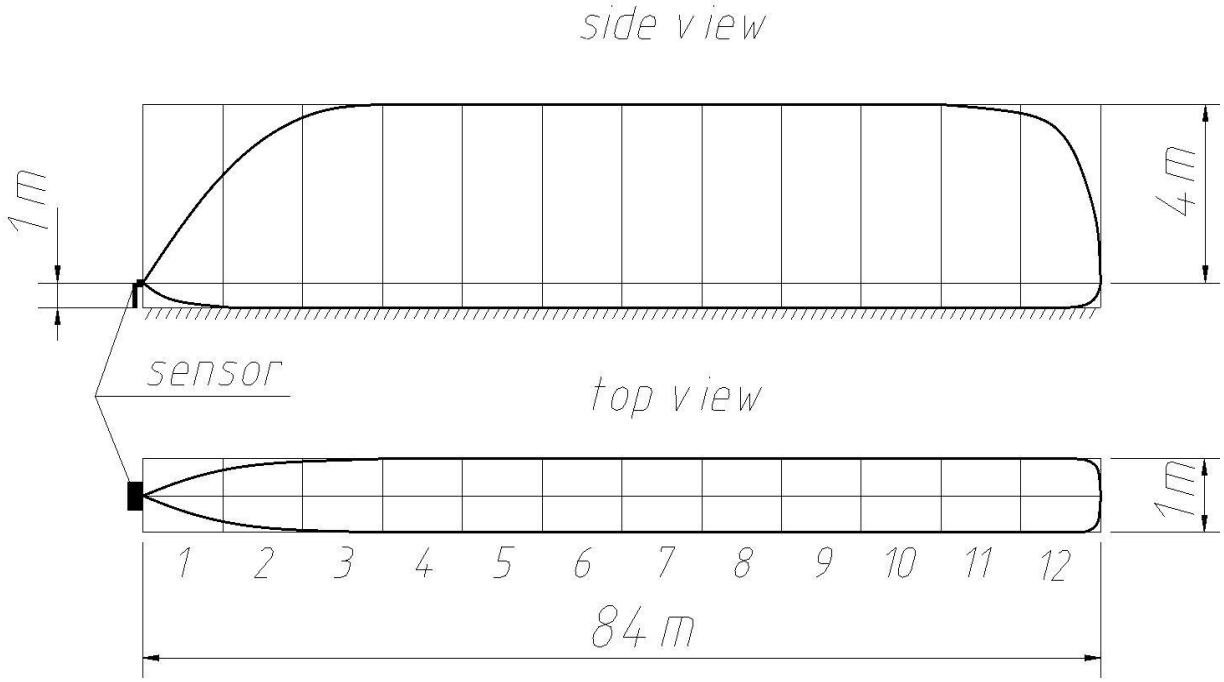
8.3.3. The mounting height is 0,8…1,0 m as shown in fig.6.1. To install the sensor on the round support, the mounting kit MK-1 is used. Install the bracket 2 on the support 1 with the buckles 13.

8.3.4. Install the transceiver on the bracket with the bolt 9 (with drainage bores downward). The bracket should be pointed on the support so that the cover surface of the sensor is directed to the protected sector.

8.3.5. Fix the sensor at a horizontal position (relative to the ground). The model of the detection zone form and its dimensions are shown in fig. 8.1.



a) FM-60(24)



b) FM-84(24)

Fig. 8.1 Detection zone parameters during the sensor mounting on the perimeter site

The given dimensions and the detection zone configurations (see fig.8.1) are intended for the ideal conditions of the perimeter area without taking into account the ambient conditions for the sensor mounting. Practically, the dimensions and the detection zone configurations can differ from the given ones because of ambient objects, reflecting surfaces and the detection sensitivity.

8.3.6. Take into account that the signal level reflecting from a moving intruder depends on his visibility (the reflection square). So, for example, the sensor watching from above the intruder's movement will generate an alarm less than the same sensor watching in front or side-on. That's why during the sensor installation when the angle between the detection zone axis and the ground surface is $\geq 45^{\circ}$, the signal level can be reduced when the intruder moves in the detection zone. To detect this intruder more exactly, it is necessary to reduce the operation threshold; it provides the interference decrease.

8.4. Sensor mounting on the wall

8.4.1. Make the marking in the chosen place as shown in fig.6.2. Fix the bracket 2 with the screws 6 on the wall 1. The brackets BRACKET-120 (the distance from the wall to the bracket is 120 mm), BRACKET-350 (the distance from the wall to the bracket is 350 mm), BRACKET-500 (the distance from the wall to the bracket is 500 mm) are used for the wall mounting and are ordered separately. Insert the bolt 12 in the slot of the ring 9 and fasten the transceiver on the bracket 2. Loosen the nut 10 and point the unit on the necessary direction turning it in a horizontal surface. Tighten the nut 10. Moving the transceiver in a vertical surface relative to the ring slot 9, align the unit in a vertical surface and tighten it with the bolt 12.

8.4.2. The sensor can be performed in one of 5 frequency letters L1, L2, L3, L4 and L5 to eliminate the overlapping during the mutual sensors operation.

CAUTION!

1. IT IS FORBIDDEN TO INSTALL THE SENSORS WITH THE IDENTICAL FREQUENCY LETTERS ON THE PROTECTED AREA.

Ordering the sensors with the different frequency letters, it is necessary to follow the project documentation of the object. If you use more than 5 sensors on your perimeter site, the possibility of their use is determined by trial operation.

2. If you install the sensor by other methods different from the User manual ones, the possibility of their use is determined by trial operation.

9. PREPARATIONS FOR THE OPERATION

9.1. Install the sensor according to the item 8 and connect supply and output circuits of the sensor according to the color marking of cables as shown in Table 9.1.

Table 9.1

Color marking of cables	Purpose
white	Supply plus(+)
brown	Supply minus (-)
yellow	Relay contacts (normally closed - NC)
pink	Relay contacts (normally closed - NC)
purple	Tamper circuit (TAMPER)
black	

green	Remote control
blue	RS485 B
red	RS485 A

The remote control cable “RC” can be brought out in addition to customer order.
The sensor connection diagram using the lightning guard unit LGU-4 and the power supply unit PSU-U-15-0,15 is shown in fig. 9.1. The tamper contacts are connected in series with the actuating relay contacts. In this case an alarm will be registered by one channel of the receiving-control device at the relay actuation or at the opening of the sensor cover.

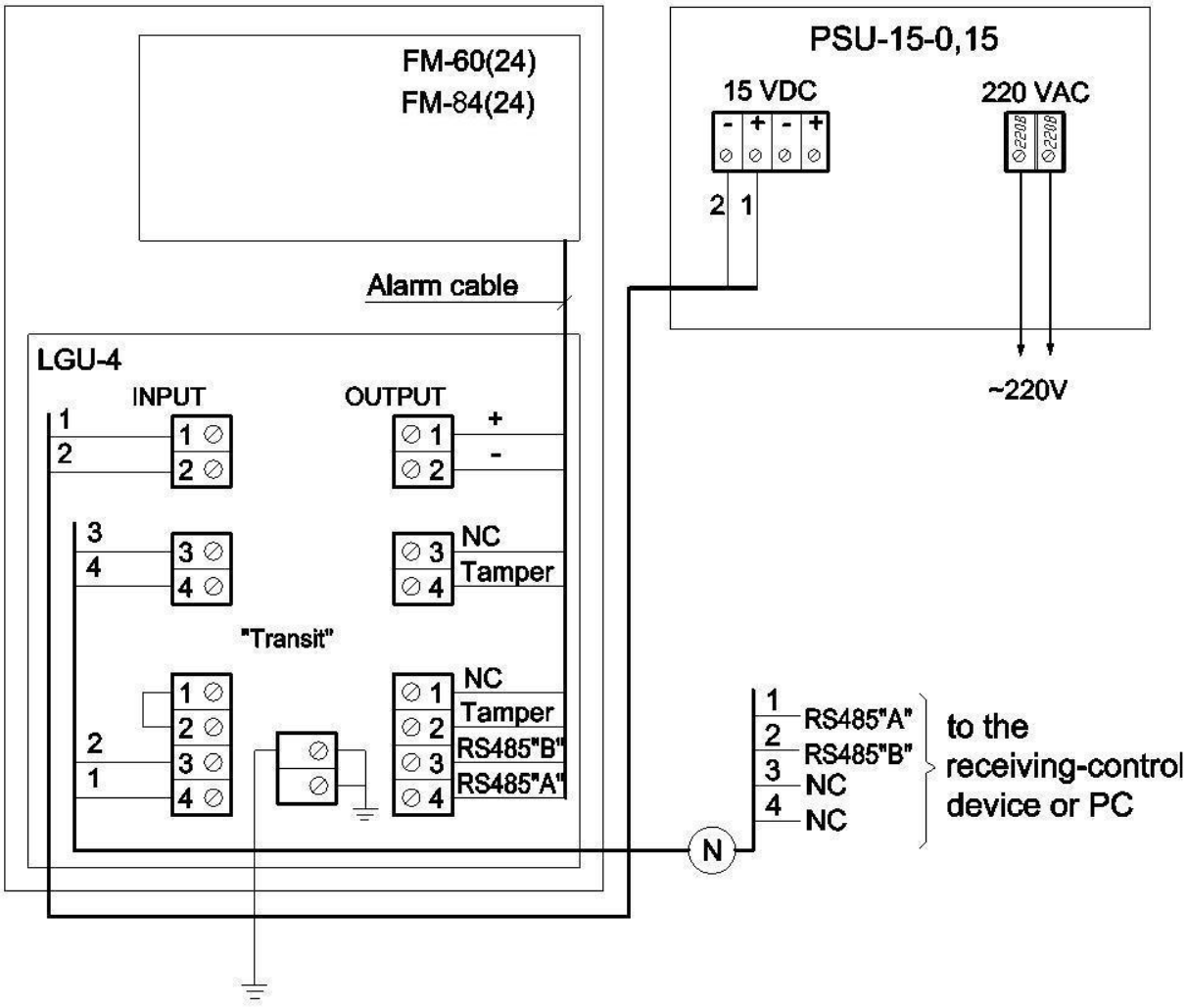


Fig. 9.1

The DETECTION ZONE LIMITATION or the “APPROVED PASSAGES”, i.e. the subzone disconnection is performed with a PC.
If the corresponding subzone is switched OFF, the sensor does not generate an alarm if the detection zone is crossed in this place.
CAUTION!
Avoid the adjustment of very high sensitivity to eliminate false alarms!

To reduce the quantity of false alarms, switch ON the subzones which are necessary for its application.

10. ADJUSTMENT WITH A PC

10.1.The sensor can be adjusted with a PC. It provides an opportunity to form a complex detection zone, set complex sensitivity and visually assess the level of noise and signal.
The sensor connection with a PC is realized with standard connective cable USB A-USB B.
To control the sensor with a computer, it is necessary to set up the software, which includes 2 stages: virtual COM-port installation and sensor control program installation.

10.2. COM-port installation
Put the disc (of the delivery kit) in the computer. Connect the sensor to the computer with the USB cable. Apply power to the sensor. The computer will identify the type of the USB device and will ask to install the driver. For that follow the fig. 10.1-10.4.

Fig.10.1

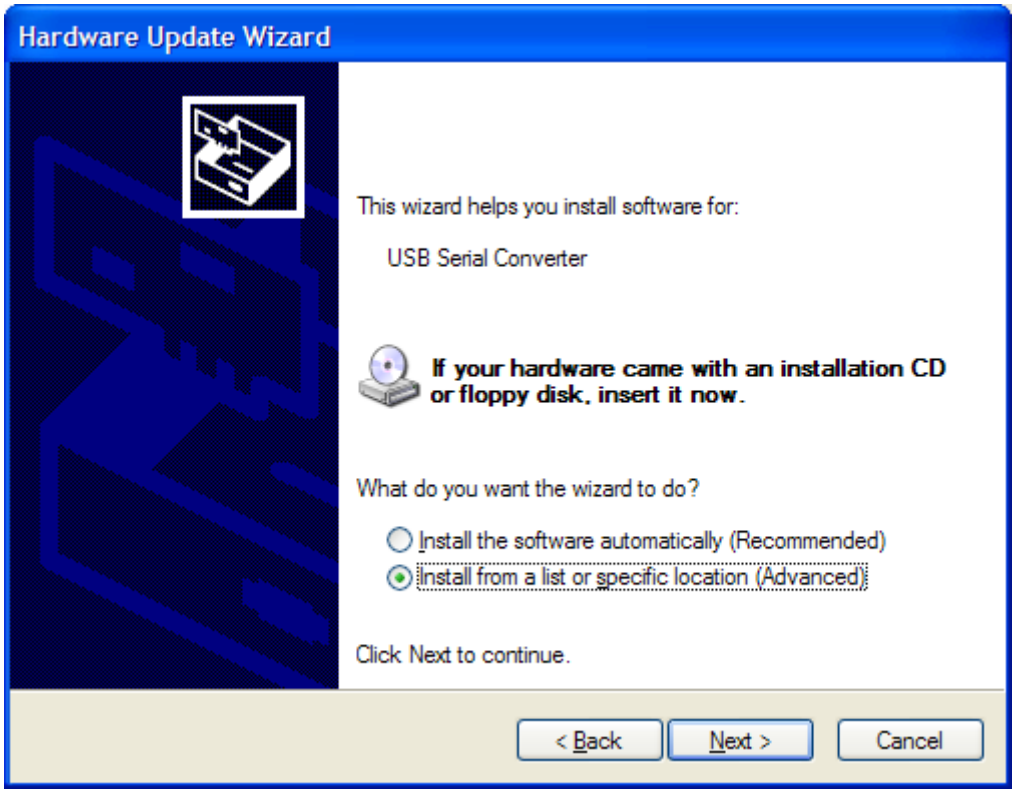


Fig.10.2

Choose the folder COM-PORT in window of Search and Installation Options

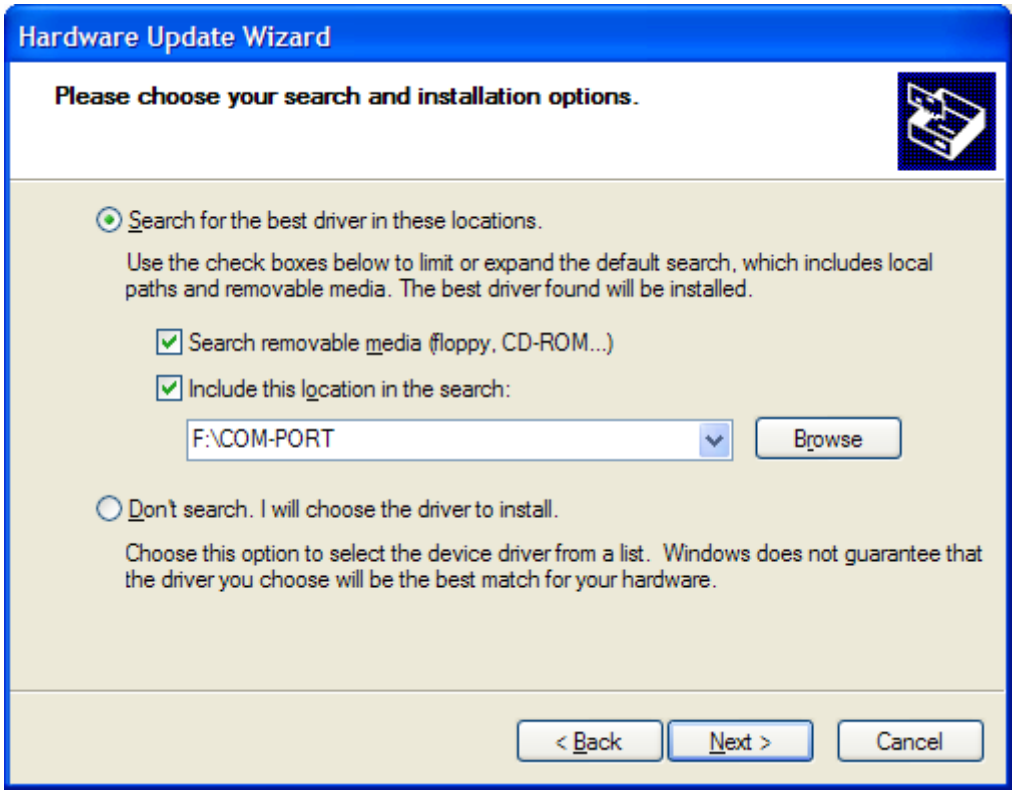


Fig.10.3

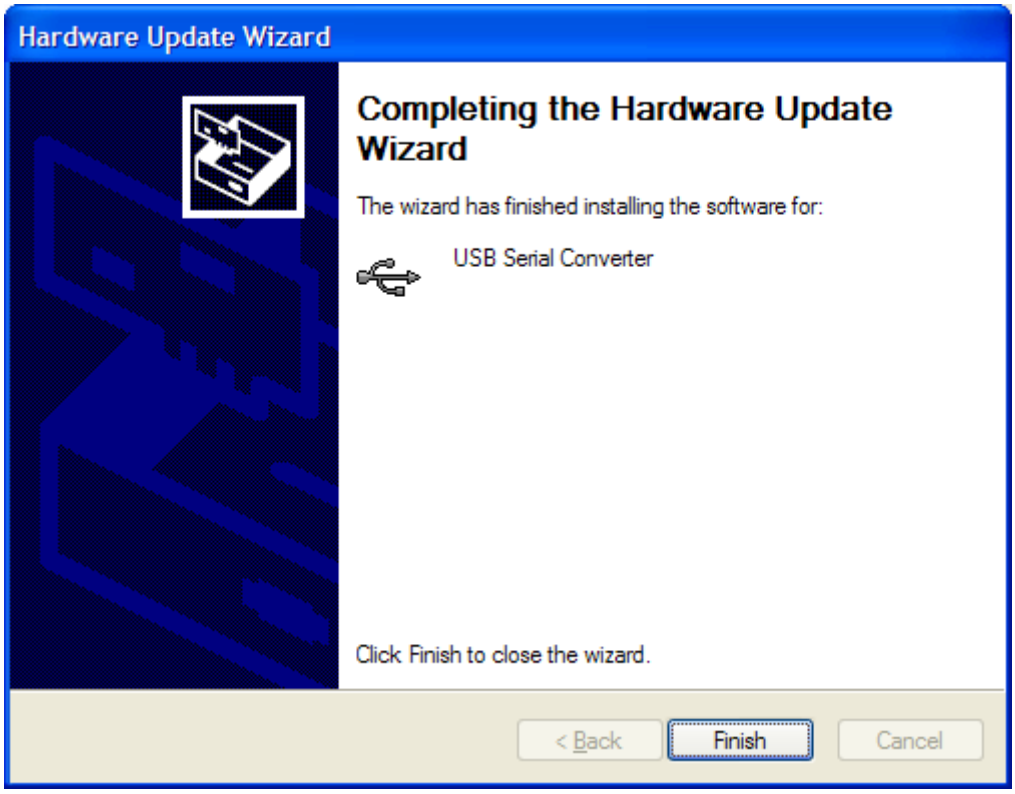


Fig.10.4

Click Finish and the sensor is ready for use.

After COM-PORT installation it is necessary to know its number. Please follow: START →OPTIONS→CONTROL PANEL→SYSTEM→DEVICE→DEVICES MANAGER→PORT (COM and LPT)→USB SERIAL PORT and remember the number.

10.3. Sensor Control Program installation

To install the program please start ConfigMaster_setup.exe.

After the file ConfigMaster_setup.exe has been started it will appear the following window


Setup - ConfigMaster
Welcome to the ConfigMaster Setup Wizard
This will install ConfigMaster version 1.4 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Fig. 10.5

Install the program following the instructions:

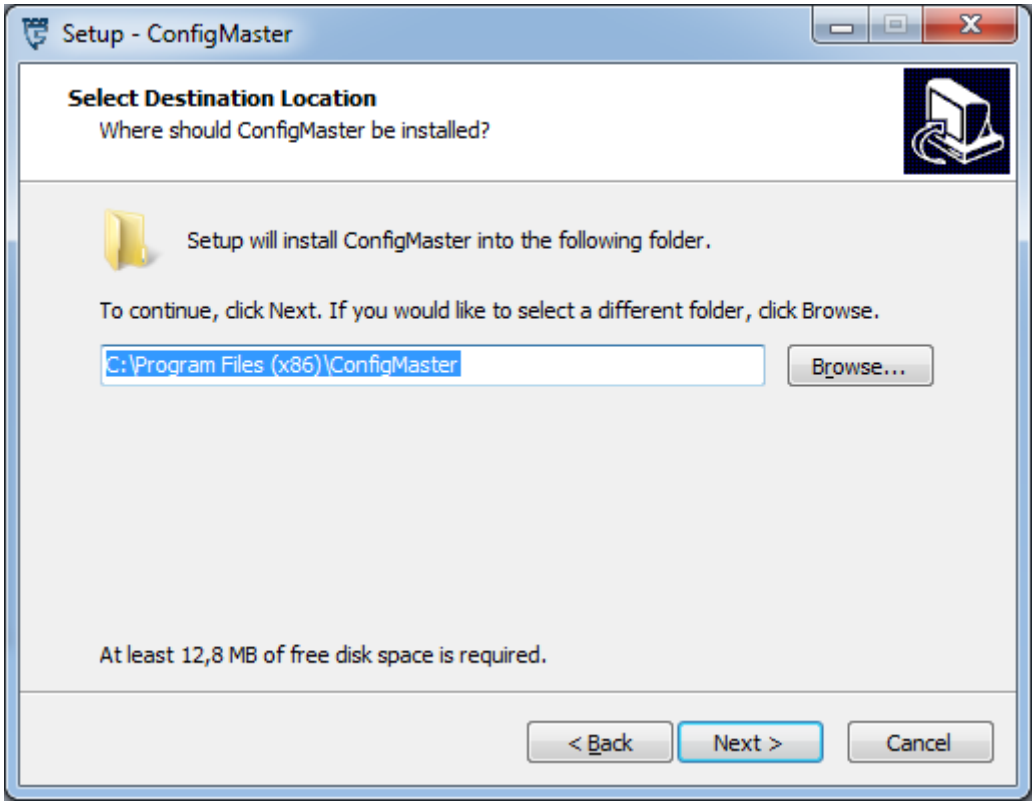


Fig. 10.6

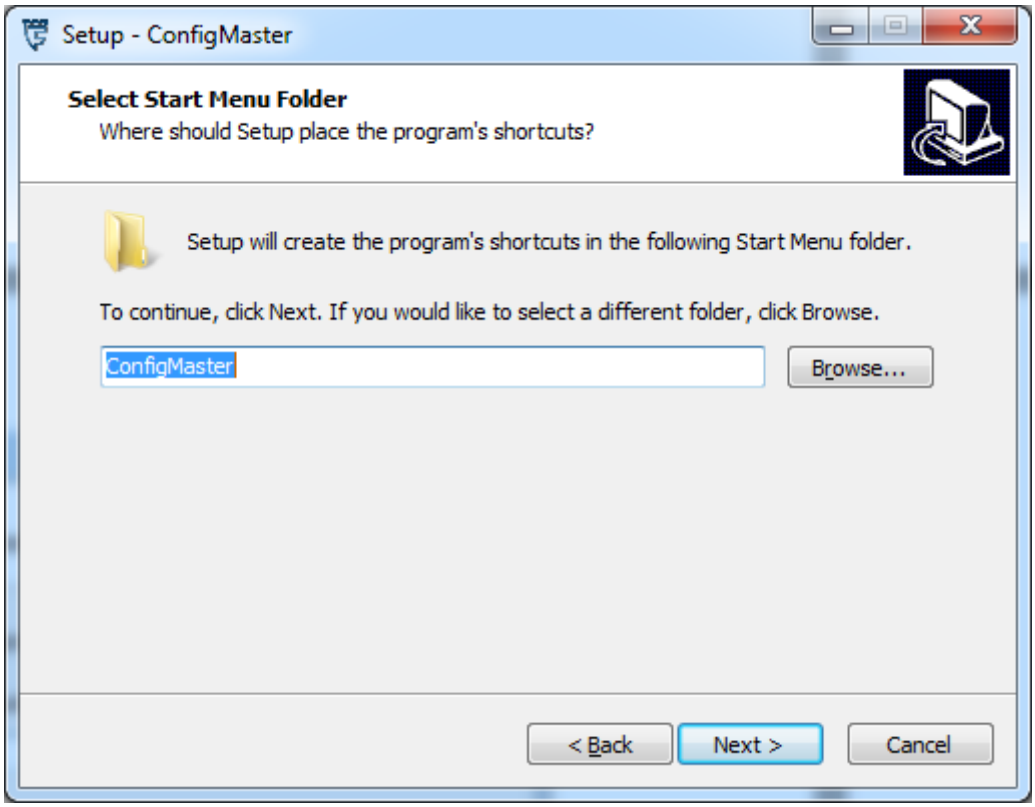


Fig. 10.7

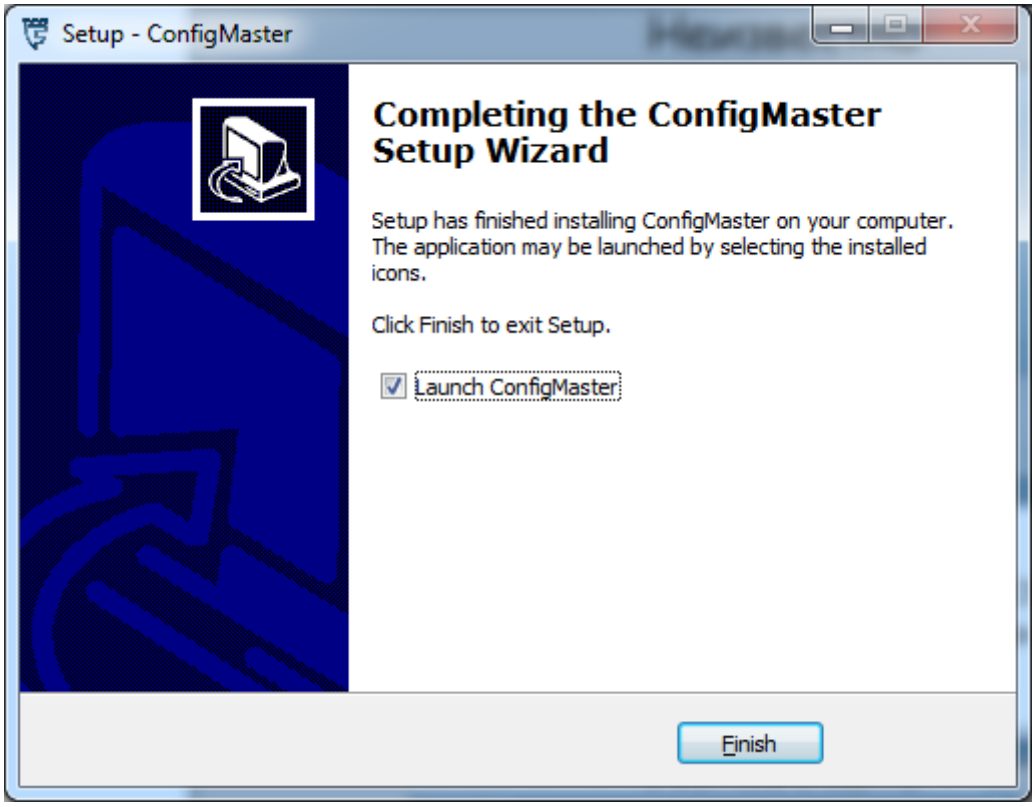


Fig. 10.8

The installation of ConfigMaster is finished.
Click on ConfigMaster with the right mouse button and choose PROPERTIES. Open the insert CONSISTENCY and make sure that you have checked the point «Run the program in the name of Administrator».

10.4. Computer-controlled operation.
Connect the sensor to the computer with the USB cable and apply power to the sensor. From the desktop run the program ConfigMaster. After the program has been started, it will appear the window shown in Fig. 10.9

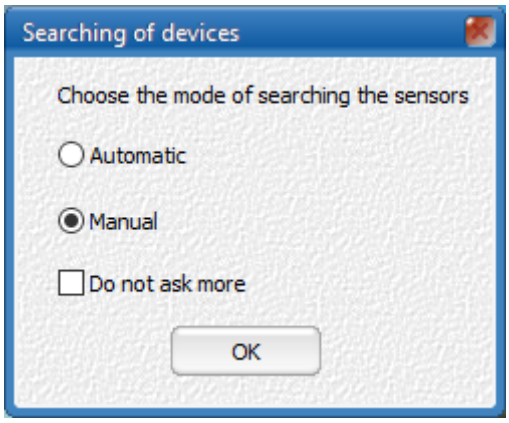


Fig. 10.9

If the manual search is selected, the window shown in Figure 10.10 will appear where you must specify the COM port number and network address by yourself.

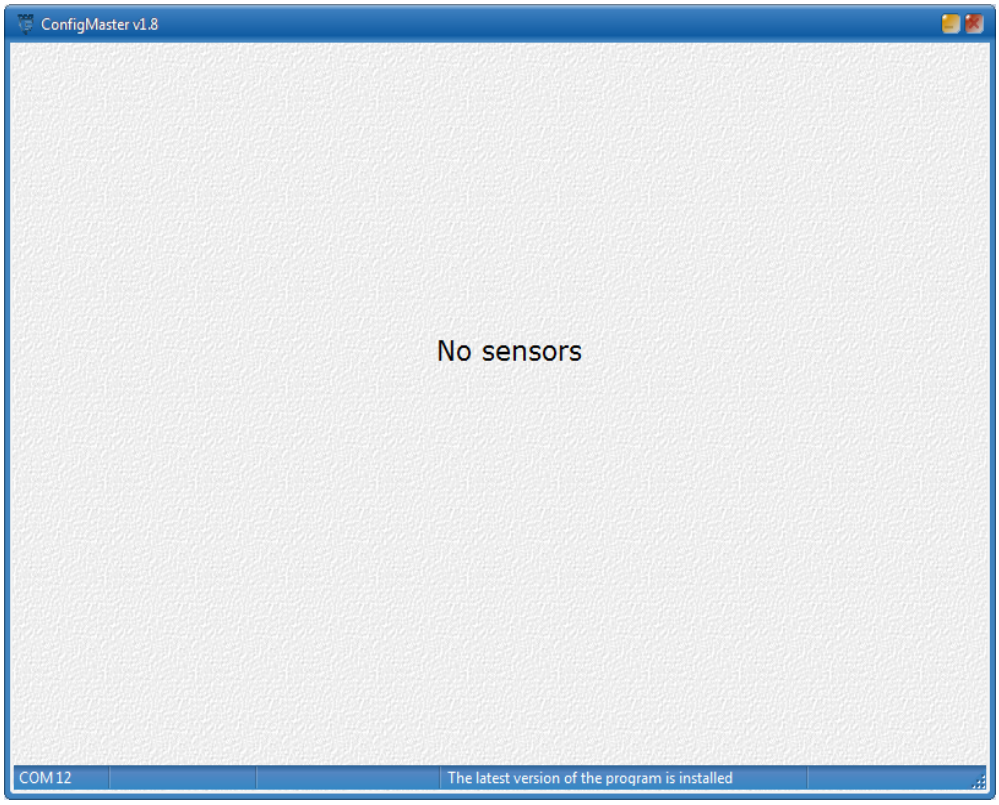


Fig. 10.10

If the automatic search is selected, the search starts immediately.
If the search fails, check the power supply and connect the detector to the PC.

If the sensor is found, it begins automatically the data exchange between the sensor and PC. The indicator «Status» changes from gray to green and the active window becomes like shown in Fig. 10.11.
If the «Exchange status» becomes red, it means no exchange between the sensor and PC. In this case check the connection of the USB-cable and power supply.

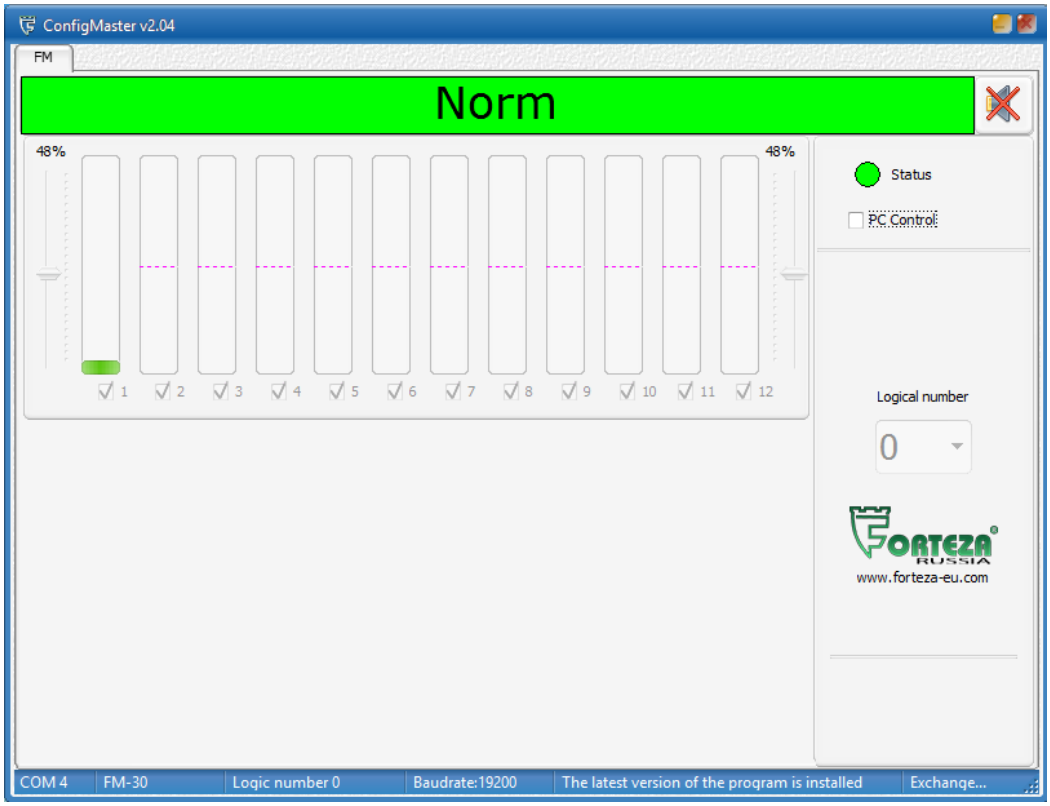


Fig. 10.11

If the «PC Control» not ticked, the program displays the state of control devices, signal and noise level in every sub-zone, and the sensor is managed with built-in control devices. This mode let control the sensors settings and its operation visually.

To control the sensor from the computer tick «PC Control» in the program window. The program window changes like shown in Fig. 10.12.

Managed by PC you can make a complex detection zone (approved passages, sensitivity in every subzone, noises control).

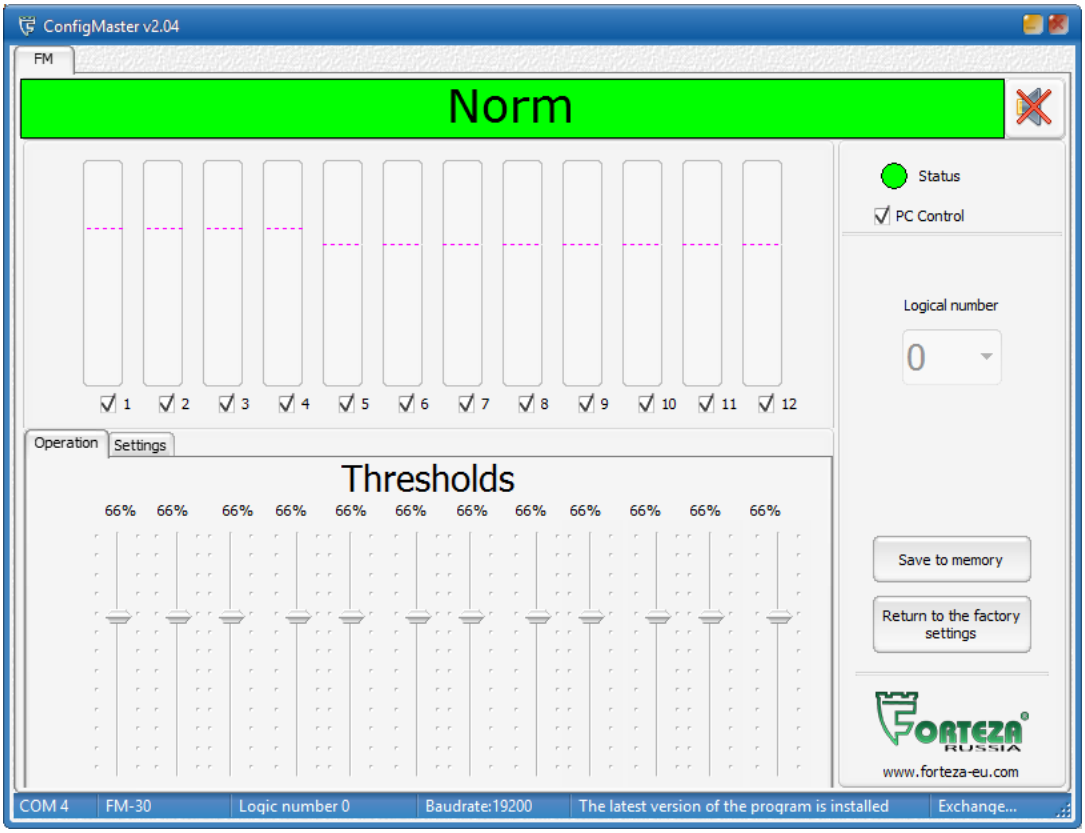


Fig. 10.12

The program window displays the signal levels in the subzones, 12 independent thresholds controllers in the subzones, the switch «Operation/Settings», the button «Save to Memory» and «Return to the factory settings». To switch ON or OFF the subzones, please tick under the signal strength indicators.

The button «Save to memory» saves all changes in the permanent memory, and «Return to the factory settings» brings the thresholds' value and signal gain to 50%. The field «Logic number» shows the number of the sensor connected to the computer. In the mode «Settings» you can set up the signal gain for every subzone like shown in Fig. 10.13.

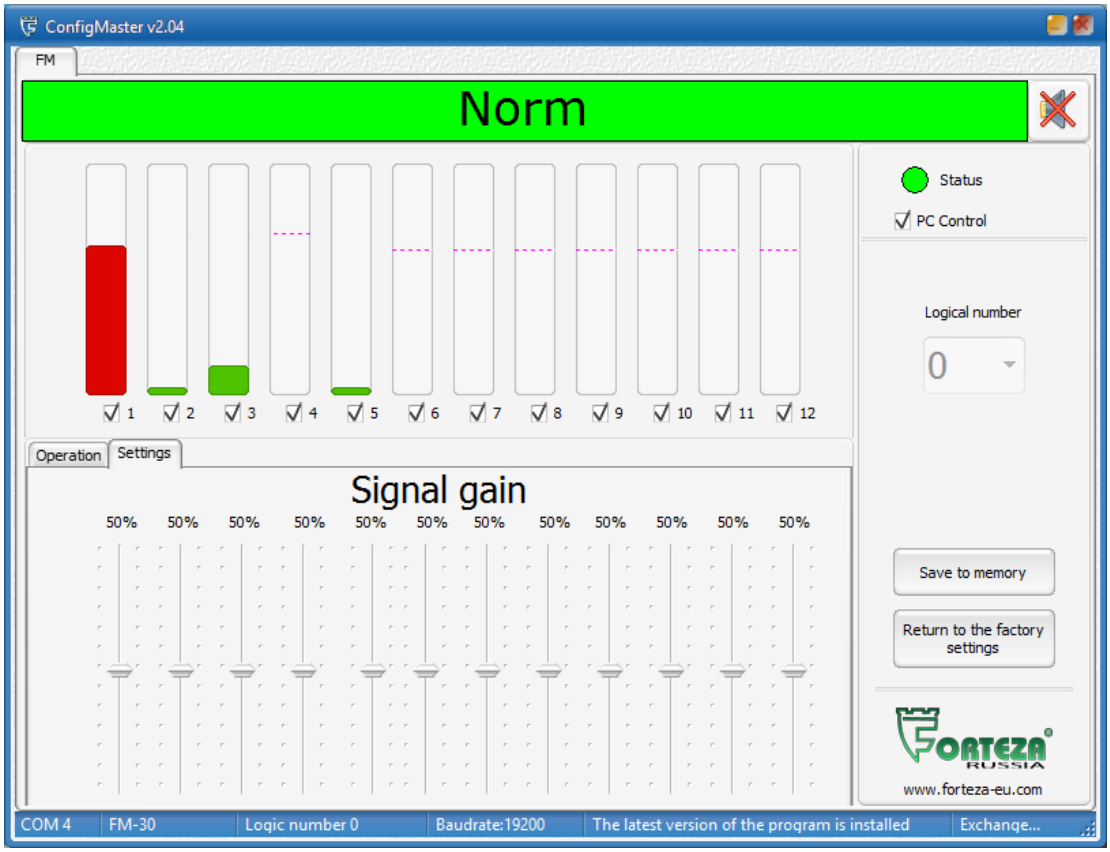


Fig. 10.13

In the status line you can see the information about connection (port number, logic number, port status), sensor and version of the software.

You can change the logic number (address) of the sensor if you need. Click the right mouse button in the main program window and choose the menu option «Change the logic address». After you have done it, it will appear a window shown in Fig. 10.14. If you enter a new logic number and click «OK», it will be given the sensor number and the program stores this number. Program restart is not required.

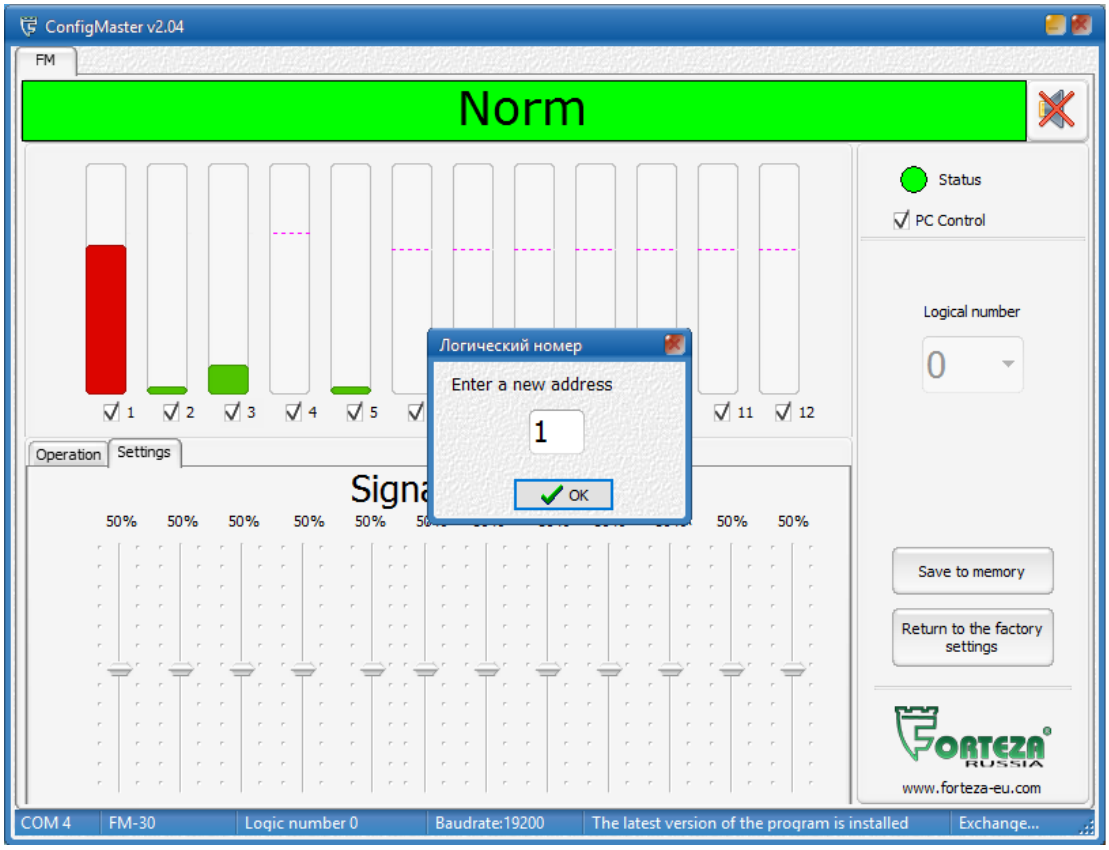


Fig. 10.14

Let us give an example how to work with the program configurating a complex detection zone.

Task: to configurate the detection zone 40 m long with approved passages in 4th and 5th subzones.
To set up a sensor two persons are needed.
Switch to the mode «PC Control» and tick the subzones you need and deactivate subzones from 9 to 12.
In the tabs «Operation/Settings» choose «Settings». The active window is shown in Fig. 10.13. In this mode you can set up the signal gain in each subzone.
The signal level in each subzone is in green color. By threshold crossing the color of signal becomes red. The factory threshold settings make up 50% of the full scale.
A signal in the subzones with no objects in the detection zone shows a noise level. The reason of noises can be high vegetation and other moving objects or a powerful electromagnetic radiation source and also mutual influence the sensors with the same frequency letters.
The noise level that exceeds 20% of the full scale can cause false alarms. In this case please eliminate factors causing an unacceptable level of interferences.
The first person makes control passages in every subzone, and the second one sets the equal signal level in every subzone (90% of the full scale) with the control devices. The control passages should be made in the second half of each subzone. The subzones, where it is physically impossible make control passages, are not configurated.

After you have set up the signal gain, the noise level should not be higher than 20% of the full scale.

To set up the thresholds in each subzone by means of control passages please go from the mode «Operation/Settings» to the mode «Operation». The optimal threshold is that which is 10…15% less than the maximum signal caused by a person.

The control passages are to make at the full height or bent over with the minimal and maximal speed (0,3…8 m/s).

At the final stage please set the approved passages switching off subzones 4 and 5.

A sample of such configuration is given in Fig. 10.15.

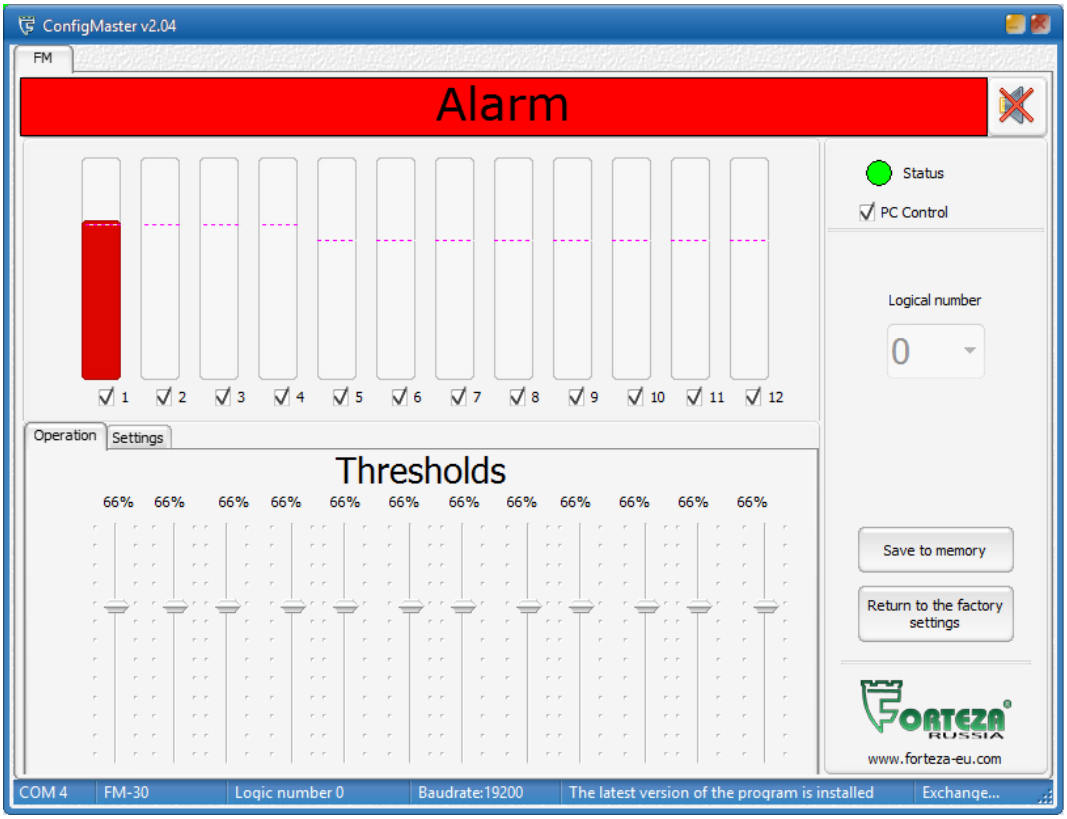


Fig. 10.15

Doing the control passages check the detection zone configuration.

When the checking and adjustment are over, click «Save to Memory» to save the configuration in the nonvolatile memory of the sensor and to switch OFF the computer.

In the mode «PC Control» the built-in indicator «Alarm» generates the short lights with duration of 0.25 sec and interval of 4 sec.

The remote control of the sensor implements by means of the interface RS-485. It is connected to the PC via interface converter which is delivered on request. The operation principle via RS-485 is equal to operation via USB-cable.

11. MAINTENANCE

11.1. The sensor maintenance should be conducted by people, who underwent special safety trainings.

11.2. During the sensor exploitation it is necessary to conduct check and preventive works.

11.2.1. Every month carry out visual examination of the sensor and the protected sector. It is necessary to check:

- the absence of dust, dirt, snow and ice on the transmitter-receiver unit; clean it if necessary;
- the sensor must meet requirements from the item 8.1.

11.2.2. Every quarter:

- carry out all monthly works;
- check the cables and cable connections;
- check the bracket fastening.

11.2.3. During seasonal works the height of the grass and snow is checked. If the grass height is over 0,2 m, the grass should be mown down.

If the snow height is over 0,3 m, false alarms or intrusions are possible because of the signal reduction at the input of the transmitter-receiver unit. In this case it is necessary to clean the snow or to change the height of the sensor installation.

After the height of the sensor installation is changed, it should be aligned, as described above.

12. TROUBLESHOOTING GUIDE

List of possible troubles is given in Table 12.1.

Table 12.1

Trouble	Possible Cause	Repair
1. The receiving-control device constantly generates an alarm.	1. Disconnection in actuating relay circuit.	Check the cable integrity and the accuracy of its connection.
	2. The supply voltage is absent or below the norm.	Provide the necessary supply voltage of the sensor.
	3. The protected area doesn't meet the necessary requirements.	Inspect the protected area according to the requirements of the issue 8 and remove the defects.
	4. The transmitter-receiver unit is out of order.	Replace the transmitter-receiver unit.
2. False alarms.	1. Moving objects in the detection zone.	Inspect the sector and remove interference factors.
	2. Animals movement in the sector.	
	3. Too high sensitivity.	Align the sensor according to the issue 10.
3. The sensor does not generate alarms when an intruder crosses the detection zone.	1. Too low sensitivity.	Align the sensor according to the issue 10.
	2. The transmitter-receiver unit is out of order.	Replace the transmitter-receiver unit.

13. STORAGE

The storage of the sensor in the package for the transportation must meet the requirements 3 of the storage in non-heated premises according to GOST 15150.
During storage the influence of hostile environment should be prevented.

14. TRANSPORTATION

Packaged sensors can be transported by any transport (if by air transport – in pressurized modules) if they are transported in covered cars, holds or covered bodies at the distance up to 10000 km.
The boxes should be carefully stowed in order to prevent their shifting or fall in the case of jolts.

15. ACCEPTANCE CERTIFICATE

The security sensor «FM-____(24)», №_____ meets the performance specifications of the Document Part Number 4372-062-43071246-2011 and is considered as operable.

Date of issue _____20___

Quality department

16. MANUFACTURER'S WARRANTIES

16.1. The manufacturer guarantees the conformity of the sensor specifications to the Document Part Number requirements 4372-062-43071246-2011 if a user meets the service conditions and operating rules specified by the Document Part Number 4372-43071246-070.
16.2. Warranty period is 3 years since the date of sale by the manufacturer.
16.3. Warranty does not cover sensors: with broken guarantee seals, with mechanical failures, sensors which are out of order because of natural disasters (lightning, fires or floods).
16.4. Mean lifetime is 8 years.

Manufacturer contact details:

Manufacturer:	OOO Okhrannaya technika (holder of the trademark Forteza)
Location:	Latitude 53°11'13.69"C, Longitude 45°12'18.51"B
Postal address:	442960, Russia, Zarechny, Penza region, P.O. box 45
Tel.:	+7 8412 655316
Fax:	+7 8412 655317
E-mail:	info@forteza-eu.com
Website:	www.FORTEZA-EU.com