Linear Intrusion Sensors «FORTEZA-FONAR»

User Manual

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CONTENTS

1. INTRODUCTION

1.1. The user manual contains the information about the operating principle and operating rules of the intrusion sensors «FORTEZA-FONAR».

1.2. The following abbreviations are used in the user manual:

Tx – transmitting unit;
Rx – receiving unit;
DZ – detection zone;
RC – remote control signal;
MK – mounting kit;
TAK – tools and accessories kit.

2. SENSOR PURPOSE

2.1. The sensors «FORTEZA-FONAR» are bistatic intrusion sensors. The Tx and Rx units of the sensor are made in the form of park lamps.
The sensor purpose is to form concealed long protected boundaries and at the same time to light the territory.

2.2. The sensors are intended for continuous round-the-clock outdoor operation at the ambient temperature from – 40^{o} up to + 65°C and relative humidity up to 98% at the temperature + 35°C.

3. SPECIFICATIONS

3.1. Detection zone dimensions (DZ) are given in Table 3.1 and in Fig. 3.1.

Table 3.1

Dimensions, m	**L, m**						
	10	**20**	**30**	**40**	**50**	**60**	**75**
b	0,5	0,8	1,1	1,3	1,6	1,8	2,0
h	1,1	1,2	1,3	1,4	1,5	1,6	1,7

L – detection zone length;
b – detection zone width;
h – detection zone height;

Note– The given dimensions are actual if the sensor is adjusted according to the procedure of the item 9.2.

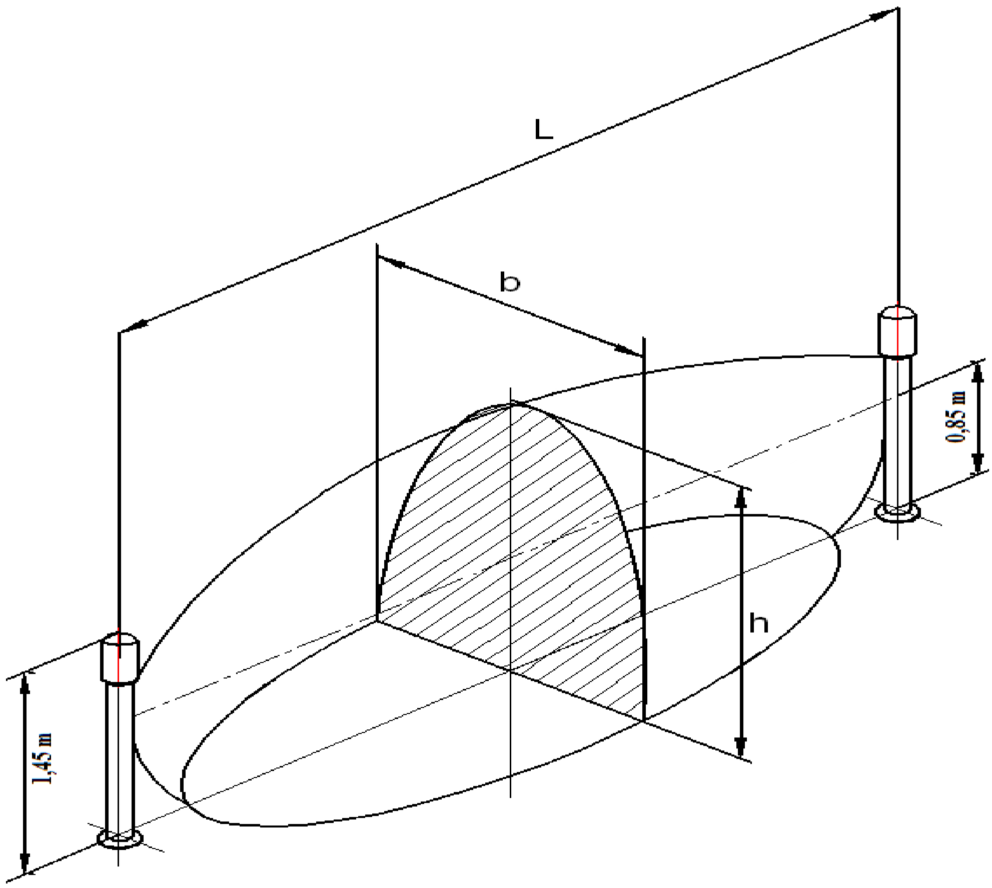


Fig. 3.1 – Detection zone of the sensors «FORTEZA-FONAR»

3.2. The sensor generates the alarm signal:

- when an intruder crosses the detection zone at a speed of 0,1…6 m/sec. with the detection probability 0,98 minimum;
- when there is no signal from Tx;
- when there is no supply voltage;
- at an attempt to demount the sensor;
- at an attempt to put the sensor out of action by sabotage lighting;
- when the Tx and Rx units are out of order;
- when the remote control signal is transmitted to Tx.

The alarm signal is generated by breaking the actuating optoelectronic relay contacts (normally closed (NC) contacts) for 3 sec. minimum.

3.3. Actuating relay characteristics («FORTEZA-FONAR»):

- maximum switching current is 0,1 A;
- maximum switching voltage is 50 V;
- resistance in the closed condition is up to 110 Ohm.

3.4. The sensor is supplied by an AC line of 160 ÷ 240 V 50 Hz.

3.5. Power consumption of a sensor unit with an energy-saving light bulb of 20 W is up to 30 W.

3.6. The sensors can be controlled remotely by biasing 5…30 VDC at the terminal blocks «+RC», «-RC» of the Tx switching board for 2…4 sec.The current consumption of the RC circuit is up to 2 mA. The remote control of the lower and upper sectors is done simultaneously.

3.7. The sensor units have the built-in photorelay for the automatic switching ON/OFF the lighting at sunset/sunrise. There is also the option of the manual lighting control across the two-wire line with the following characteristics:

- insulation resistance ≥ 20 kOhm;
- cable core resistance ≤ 2 kOhm.

The two-wire line allows to control several units for the simultaneous switching ON/OFF the lighting.

3.8. The sensor is immune to electromagnetic interferences (voltage impulses in the supply circuits, line supply drops, electrostatic discharges, electromagnetic fields).

3.9. The sensor does not generate the alarm signal at:

- movements of animals up to 20 kg in the detection zone;
- operation of cell phones;
- rain and snow;
- wind speed up to 10 m/sec;
- grass height up to 0,3 m;
- snow height up to 0,5 m.

3.10. Input circuits are protected from short overvoltages up to 900 V in the case of electric pickups or storm discharges.

3.11. Operating frequency, MHz – 9375±70.

3.12. Pulse radiated power of Tx is up to 10 mW, medium radiated power together with the pulse ratio is up to 0,5 mW.

3.13. According to the method of people protection from electric injuries the sensor corresponds to the 0I protection class.

3.14. Protection class – IP43.

3.15. Dimensions without MK, mm, up to:

Tx – 1450×∅160;

Rx – 1450×∅160.

3.16. Weight, kg, up to:

Tx – 5;

Rx – 5.

3.17. Mean lifetime – 8 years.

4 SENSOR COMPONENTS

4.1. Delivery kit of the sensor «FORTEZA-FONAR»:

1. Middle Tx unit (2 Tx)	– at order.
2. Outermost Tx unit (1 Tx)	– at order.
3. Middle Rx unit (2 Rx-NC)	– at order.
4. Outermost Rx unit (1 Rx-NC)	– at order.
5. Mounting kit (MK):	
– anchor	– 3 pcs. for one Tx or Rx unit;
– nut M10	– 6 pcs. for one Tx or Rx unit;
– washer M10	– 6 pcs. for one Tx or Rx unit;
– pattern	– 1 pcs. for one Tx or Rx unit.
6. Tools and accessories kit (TAK):	
– safety fuse	– 1 pcs. for one Tx or Rx unit;
– harness for the voltmeter connection	– 1 pcs.;
– wrench S14×17	– 1 pcs.;
– box wrench 10	– 2 pcs.;
7. User manual	– 1 pcs.
8. Packing.	

It is possible to order «FORTEZA-FONAR» without any electronics only for the lighting function.

5. CONSTRUCTION AND OPERATION

5.1. Operating principle

5.1.1. The sensor is a bistatic intrusion detector. The sensor principle of operation is to generate the electromagnetic field between Tx and Rx.

When an intruder crosses the detection zone, the sensor registers electromagnetic field changes. Then the sensor generates the alarm signal according to the algorithm.

5.1.2. Tx has two transmitters and Rx has two receivers.

Transmitters and receivers can be synchronized on one of four frequency characters.

The method of the protected sectors forming is shown in Fig. 5.1.

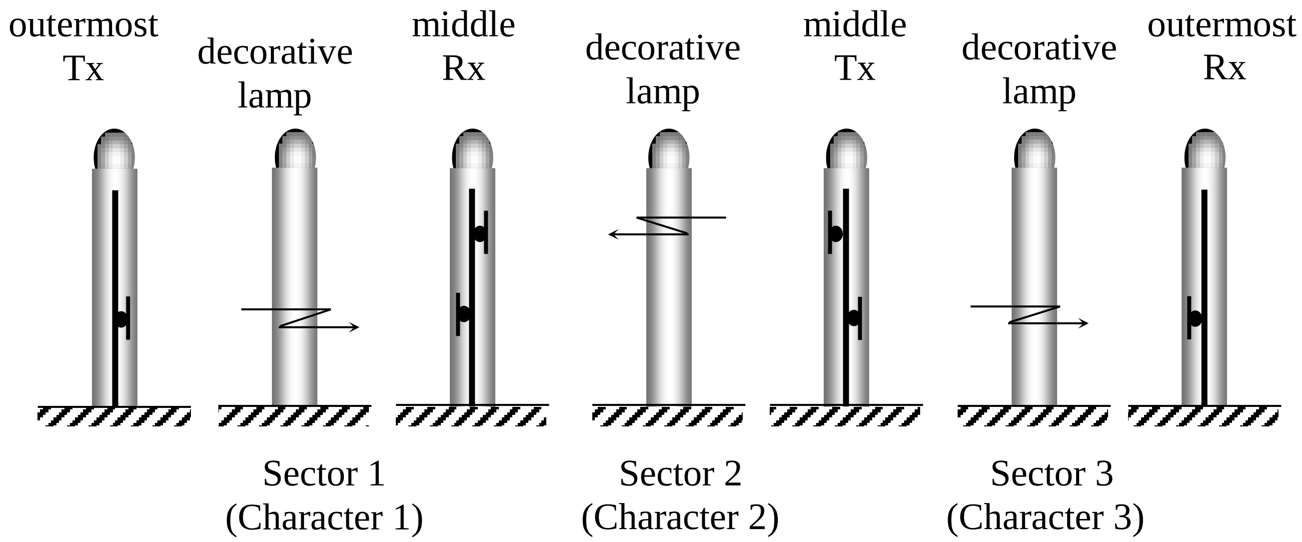


Fig. 5.1

Note – A decorative lamp «FORTEZA-FONAR» is a lighting unit which outwardly does not differ from Tx and Rx units. Installation and connection of a decorative «FORTEZA-FONAR» are done by analogy with the Tx and Rx installation. The decorative lamps «FORTEZA-FONAR» are used optionally if a customer wants to light the long perimeter sectors or to mask the security system. The lamps are delivered at the customer's order.

5.1.3. The protected sector can be of any form and configuration. It is provided by the rotation of the upper Tx and Rx units on the angle of azimuth relative to the lower units within the angle of 250°. The example of the forming of a closed perimeter with 4 sectors is shown in Fig. 5.2.

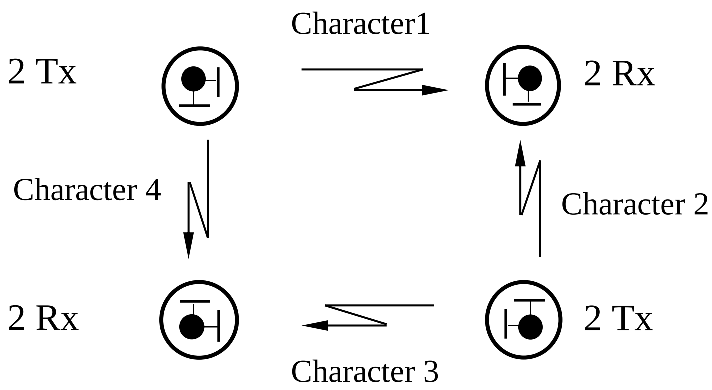


Fig 5.2

5.1.4. When an intruder crosses the detection zone, the Rx unit generates the alarm signal one time by breaking the actuating relay contacts.

If the cause of the alarm signal generation is not eliminated, the sensor generates the alarm signals repeatedly.

5.1.5. In the lower part of the Tx and Rx units there is the switching board with the mounted power supply unit for the powering of low-voltage electronics. The power supply unit has a safety fuse of 0,5 A 250 V. The switching board provides the connection of external and internal (through) circuits. It also indicates the switching-on the power supply. On the switching board there is a photorelay for the switching ON/OFF the lighting at sunset/sunrise.

5.2. Controllers and indicators

5.2.1. Controllers and indicators of Tx

The setting of the sensor frequency characters is done with the four-position thumb-actuated switches on the common board.

For the upper transmitter the characters are set by the upper switch, for the lower one – by the lower switch.

Attention! The frequency characters are set by switching the chosen switch to the position «ON» when the board power supply is OFF. It is possible to switch off the power supply by disconnecting the white wire of the switching board.

The LED indicator switching-on means that the chosen character is switched on correctly. The LED indicators glow repeatedly for a short time. The quantity of LED glows corresponds with the number of the chosen frequency character.

Note – If no frequency character is chosen, the corresponding transmitters are switched off (the corresponding LED indicator does not glow).

5.2.2. Controllers and indicators of Rx

The setting of the sensor frequency characters is done with the four-position thumb-actuated switches on the data boards (upper or lower).

Attention! The frequency characters are set by switching the chosen switch to the position «ON» when the board power supply is OFF. It is possible to switch off the power supply by disconnecting the white wire of the switching board.

The button «MODE» on the data boards is intended for switching the sensor operating modes («OPERATION» («OPR.») /«ADJUSTMENT» («ADJ.»)) by a single pressing. The reverse switching is done by the repeated pressing.

The input signal value in the «ADJUSTMENT» mode is controlled with a voltmeter, which is connected through a harness to the socket «VOLTMETER» on the data board. The signal value is controlled in the «ADJ.» mode. The more the voltage on the terminals «COM» and «MW» is, the more the input signal is and vice versa. The sensor is operable at the voltage of 0,1…4,8 V.

Attention! It is prohibited to connect a PC or other USB devices to the socket «VOLTMETER».

The button «THRESHOLDS» on the data boards is intended for the discrete changing of the alarm. Every pressing of the button reduces the threshold value at one point. When the value is minimum, the next button pressing turns the threshold value to the maximum.

The threshold values are controlled with a «VOLTMETER» connected to the socket «VOLTMETER» on the data board. The threshold values are controlled in the «OPR.» mode. The threshold value range is from 5 up to 0, 31 V, 16 points.

Attention! The minimum threshold value of 0,31 V corresponds to the maximum sensor sensitivity. The maximum threshold value of 5,0 V corresponds to the minimum sensor sensitivity.

Note 1. When the button «THRESHOLDS» is pressed, the corresponding channel generates the alarm signal.

Note 2. The sensor operates in the «OPR.» mode when the power supply is switched ON.

The indicator «TP» on the data board of the corresponding sector indicates the following operation mode:

a) series of 1-4 short glows indicates the sensor operation mode and the chosen frequency character;
b) indicator switching-on for 3 sec. min. – generation of the alarm signal;
c) indicator blinking 1 time per 1 sec. – the sensor adjustment mode;
d) constant glowing of the indicator with two short goings out – loss of the synchronization with Tx;
e) constant glowing of the indicator with one short going out – drops of power supply.

5.3. Sensor operation

5.3.1. The preparation for the sensor operation is the following:

- preparation of the protected sector;
- laying of signal and power supply cables;
- Tx and Rx mounting;
- sensor connection (connection of power supply and alarm loops);
- synchronization of Tx and Rx;
- adjustment of Tx and Rx;
- Rx thresholds adjustment.

The description of these procedures is given in the items 8-9.

5.3.2. The sensor has the following operating modes:

- standby mode – actuating relay contacts are closed, the «TP» indicator is off;
- alarm mode – actuating relay contacts are broken, the «TP» indicator is on for 3 sec. minimum.

5.3.3. The receiving-control devices and systems, which control the sensor output circuits (contacts breaking), receive and indicate the alarm signals.

5.3.4. It is necessary to check the sensor technical state and perform the maintenance. These procedures are described in the item 10.

6. SENSOR CONSTRUCTION

6.1. Rx construction

6.1.1. The design of the middle Rx unit is shown in Fig. 6.1

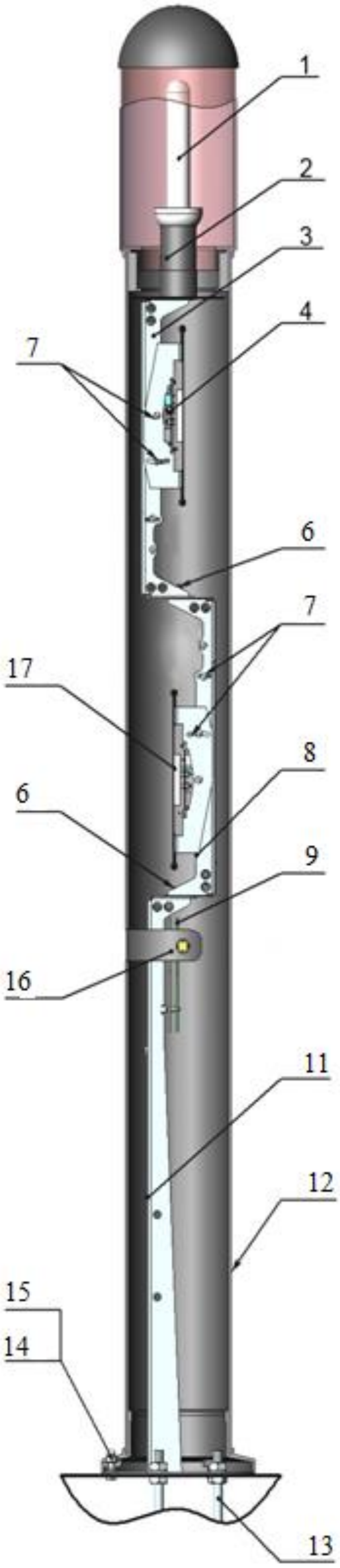
6.1.2. The bearing structure of Rx is three brackets: lower bracket 11, middle bracket 8 and upper bracket 3. The brackets are fastened together in a movable way with the rotators 6. The lower bracket 11 is fastened to the anchors 13 with the adjusting nuts 19 and washers 20 (from the mounting kit).

6.1.3. The enclosure 12 is made of unshockproof plastic. The lamp holder 2 for the lamp 1 is fastened on the upper bracket. The antenna of the upper Rx unit and the data board 4 are fastened on the upper bracket. The antenna of the lower Rx unit and the data board 17 are fastened on the middle bracket. If it is necessary to turn the upper or middle bracket in horizontal plane, loosen a nut of the rotators 6 (with a wrench from TAK). If it is necessary to turn the Rx antennas in vertical plane, loosen the fixing drivescrews 7.

6.1.4. The switching board 9 provides the electric connections of the upper and lower Rx, the lamp and other external connections. On the board there is the photorelay, which switches ON/OFF the lamp if the illumination level is changed.

6.1.5. The fastening of the anchors 13 is shown in Fig. 6.2. The anchors are fastened with concreting. The pattern from the mounting kit is used to direct correctly the anchors on the sectors between the lower Tx and Rx units (Fig. 8.1) and to concrete the anchors. Before the fastening of the sensor units the patter should be removed.

On the Rx data boards there are the sensor controllers and indicators (Fig. 6.3).



1 – energy saving lamp – 1 pcs.
2 – lamp holder E2 – 1 pcs.
3 – upper bracket – 1 pcs.
4 – antenna of the upper Rx with the data board – 1 pcs.
6 – rotator – 2 pcs.
7 – fixing drivescrew – 8 pcs.
8 – middle bracket – 1 pcs.
9 – switching board – 1 pcs.
11 – lower bracket – 1 pcs.
12 – enclosurec – 1 pcs.
13 – anchor – 3 pcs.
14 – washer ∅6 – 3 pcs.
15 – box nut M6 – 3 pcs.
16 – photorelay eye – 1 pcs.
17 – microwave antenna of the lower Rx with the data board – 1 pcs.

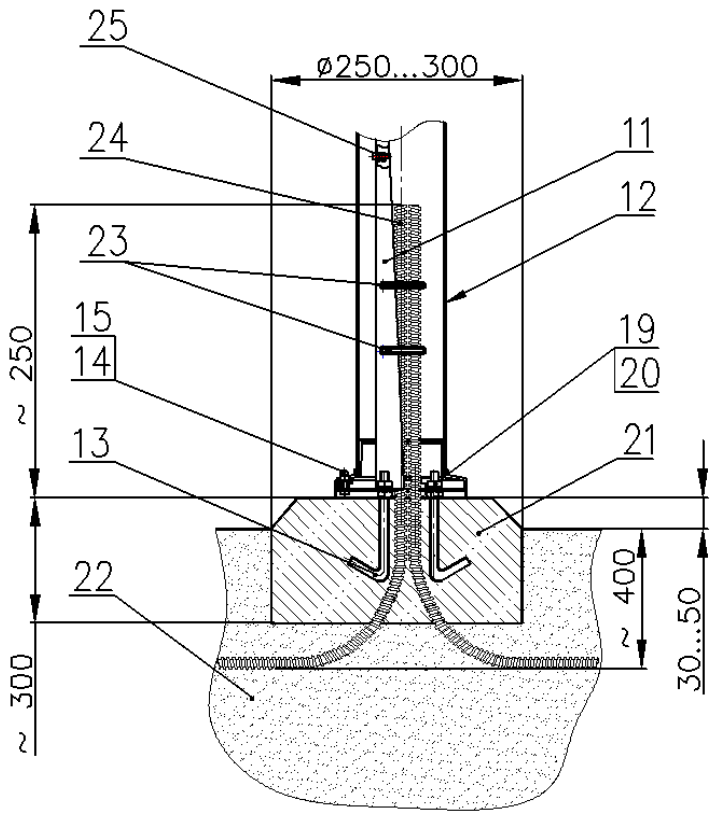
Fig. 6.1

6.1.6. The Rx unit is fastened with the help of the lower bracket 11 to the anchor bolts 13 with the foundation nuts 19 and washers 20. The anchors have the thread segment, which should remain above the concrete 21. Three nuts 19 are used as foundation ones (the lower Rx bracket are fastened to them), the other three nuts are used as union ones. The enclosure 12 is fastened to the lower bracket with the box nut 15 with the washers 14 and can be taken off with the aim to adjust the sensor or connect wires.

6.1.7. Supply and data lines placed in the metal hoses 24 (for the line inputs it is necessary!) are stretched through the central hole of the lower bracket 11.

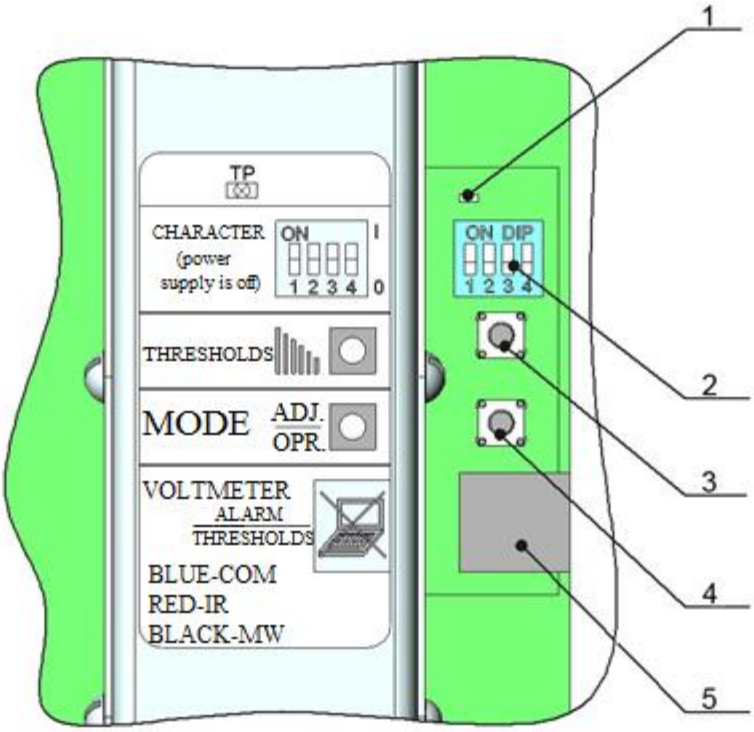
6.1.8. On the lower bracket 11 there is a contact 25 for the connection of the grounding wire.

6.1.9. The outermost Rx has one beaming receiver.



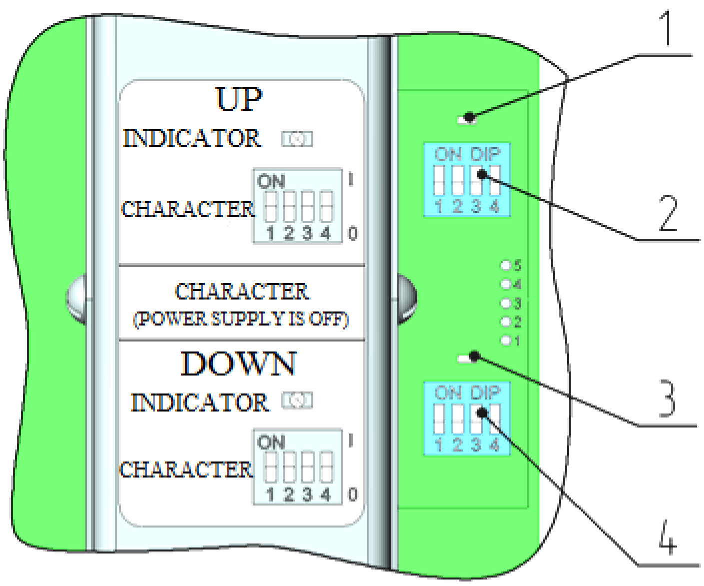
11 – lower bracket	–	1 pcs.	20 – washer ∅10	–	3 pcs.
12 – enclosure	–	1 pcs.	21 – concrete		
13 – anchor	–	3 pcs.	22 – ground		
14 – washer ∅6	–	3 pcs.	23 – tension buckle	–	2 pcs.
15 – box nut M6	–	3 pcs.	24 – metal hose	–	2 pcs.
19 – foundation nuts M10	–	6 pcs.	25 – grounding contact	–	1 pcs.

Fig 6.2



1 – indicator «TP»;
2 – frequency character switch;
3 – button for the thresholds adjustment;
4 – switch of modes;
5 – socket for the voltmeter connection.

Fig. 6.3



1 – indicator of the chosen character of the upper sector;
2 – frequency character switch of the upper sector;
3 –indicator of the chosen character of the lower sector;
4 – frequency character switch of the lower sector.

Fig. 6.4

6.2. Tx construction

6.2.1. Tx construction differs from the Rx construction only in the following way: instead of the beaming receiver there are transmitters. The controllers and indicators are placed on the modulator board (see Fig. 6.4).

7. SAFETY MEASURES

7.1. Installation and maintenance of the sensor must be performed only by people, who underwent special safety trainings on the operation with electrical facilities with the voltage up to1000 V.

7.2. It is prohibited to mount and maintain the sensor at thunderstorms.

7.3. It is prohibited to mount the sensor and replace the safety fuse when the power supply is ON.

7.4. It is prohibited to use the sensor without the protective grounding.

8. MOUNTING PROCEDURE

8.1. Requirements for the protected sector and operating conditions

8.1.1. The following requirements should be fulfilled:

a) there must be <u>the line of sight</u> between Tx and Rx;

b) bushes, tree branches, high grass, snowdrifts should not be located in the sensor detection zone (see Table 3.1., Fig. 3.1);

c) long barriers (fences, walls and etc.) located in the detection zone may reduce the received signal level and the detection probability;

d) large objects (cars, gates and etc.) in the detection zone may reduce the signal level and cause false alarms;

e) decorative lamps «FORTEZA-FONAR», tree trunks (without branches) and other motionless objects can be located in the detection zone if the requirements of the item a) is fulfilled. It is also necessary to reduce the sector length at 10 % (for one object) from the maximum length;

8.2. Sensor adjustment

8.2.1. Define the places where the Rx and Tx units will be installed. Lay power supply and communication lines. It is necessary to take into account the orientation of the pattern in accordance with the direction of the lower receiver (transmitter) (see Fig. 8.1).

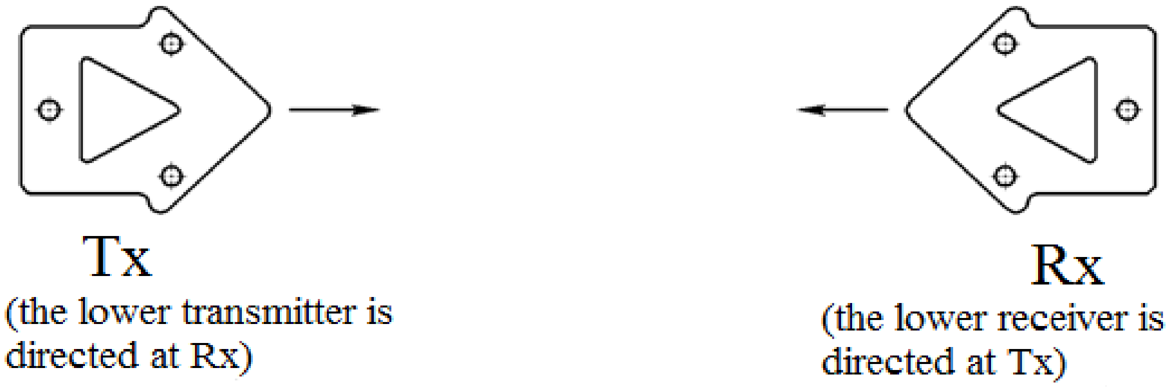


Fig. 8.1

8.2.2. Power supply lines of 220 V should be placed in separate metal hoses or should be made of armored cable. It is necessary to use three-wire cable «L», «N», «PE».

8.2.3. Lay the power supply and communication lines in a trench.

8.2.4. Stretch the power supply and communication lines in metal hoses through the center of the pattern. Mount the anchors with concreting in that way the thread segment remains above the concrete as shown in Fig. 6.2.

8.2.5. Mount Tx and Rx and fasten them vertically with nuts and washers M10 of the mounting kit. Fasten the power supply and communication lines with the buckle 19 (see Fig. 6.2).

8.3. Sensor connection

8.3.1. Connect the necessary supply and signal circuits. The switching elements on the switching board and their purpose are shown in Fig. 8.2.

8.3.2. Terminal blocks provide the screwed connection for wires with the cross section of 2,5 mm^2 max.

8.3.3. The terminal blocks on the upper part of the switching board are intended for the connection of the upper and lower beaming receivers to the switching board. These connections are done by the manufacturer.

8.3.4. The signal circuits are connected to the terminal blocks on the right and left sides of the terminal board. «NC1» - output relay contacts of the lower beaming receiver. The terminal resistor of this alarm loop is connected to the terminal block «TE1». «NC2» and «TE2» are intended for the connection of the upper beaming receiver. The switching boards of Tx and Rx are standard and, consequently, these terminal blocks are not mounted into Tx. Terminal blocks TB1, TB2 are intended for the connection and transit of the two-wire line of lighting control.

8.3.5. Terminal blocks «+RC», «-RC» are intended for the connection of the remote control line. The RC signal characteristics are given in the item 3.9.

8.3.6. For the manual lighting control connect all units (two-wire line) with a switch taking account the polarity (TB1, TB2) as shown in Fig. 8.3 (requirements to the line are given in the item 3.10). The photorelay of each unit must be switched off (take off the jumper «PH» on the terminal boards.)

The lighting is switched on by breaking the switch contacts, switched off by closing the contacts.

For the automatic lighting control at sunset/sunrise use the built-in photorelay. Up to 10 units can be connected to one photorelay with a two-wire line with the aim to synchronize the lightning control of the sensors. Choose the unit, which are placed in the place, convenient for the photorelay operation (unshaded and etc.). Install the jumper «PH». In the other units take off this jumper.

The photorelay adjustment is done with a controller on the switching board. The turn of the controller clockwise means the later lighting switching-on, counterclockwise – the earlier lighting switching-on. The delay of the switching-on/off for 5…10 sec. is intended to eliminate the lighting interferences influence on the photorelay operation.

Note – It is possible to combine different lighting control options. The closing of the control line results in the forced switching-off the lighting. The connection of the control line to a DC source of 12 V results in the forced switching-on the lighting.

If all the units are not connected with a two-wire line, the lighting will be switched ON/OFF individually for every unit after the corresponding photorelay is activated (jumpers «PH» should be put on in every unit) (see Fig. 8.4).

8.3.7. In the lower part of the switching board there are terminal blocks for the connection and transit of the power supply – «L/N». The lighting lamp is connected to the terminal boards «LGH» by the manufacturer. The protective insulation panels are installed on the terminal blocks. The wire «PE» of the power supply cable is connected to the contact «ground» on the lower sensor bracket with the aim to provide the protective grounding.

8.3.8. There is a safety fuse of 0,5 A – 250 V on the switching board to protect the sensor from overvoltages.

ATTENTION!

1. **It is prohibited to switch the «L/N» and «LGH» circuits and to change the safety fuse if the power supply is ON.**
2. **It is prohibited to use the sensors without the protective grounding.**
3. **It is prohibited to use the sensor without protective insulation panels on the terminal blocks and the safety fuse.**

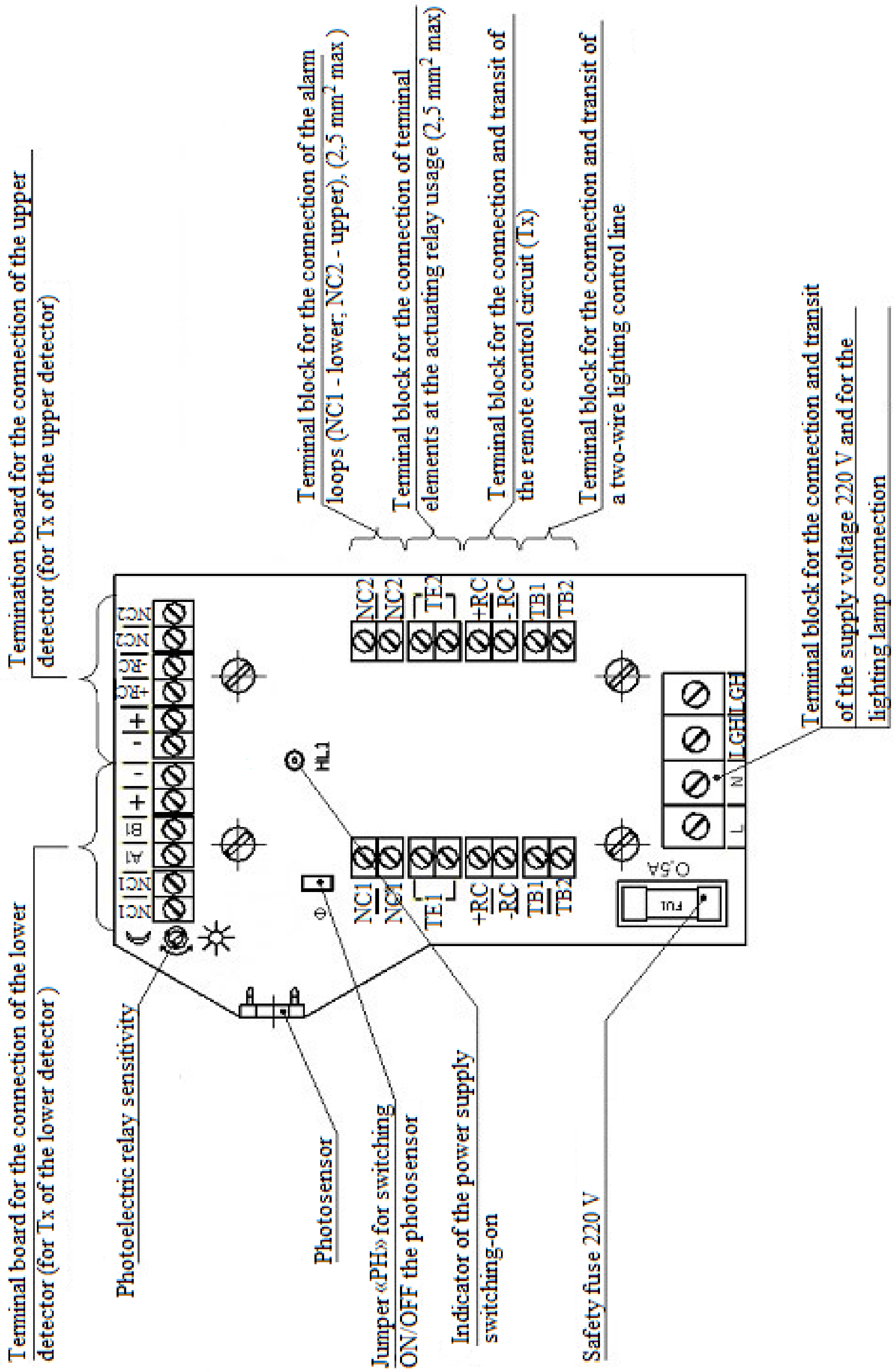


Fig. 8.4 – The example of the sector connection with individual lighting control.

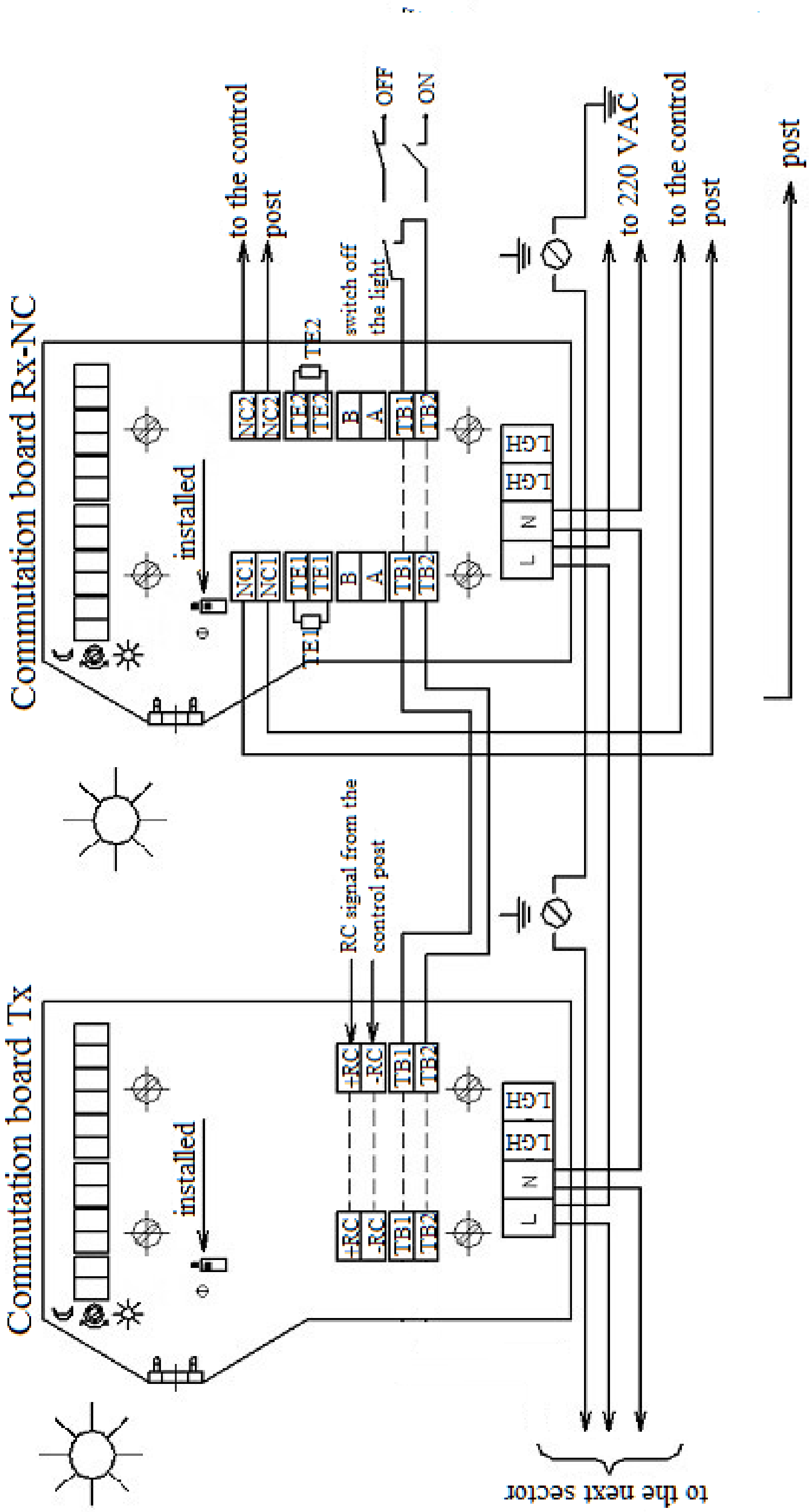


Fig. 8.3 – The example of the sector connection with the manual lighting control.

9. PREPARATION FOR THE SENSOR OPERATION AND ITS ALIGNMENT

9.1. Preparation for the sensor operation

9.1.1. Check the correctness of the power supply and signal circuits connections.
9.1.2. Switch ON the sensor power supply.

9.2. Sensor alignment

9.2.1. Tx and Rx syncronization

General information

Tx and Rx synchronization on a sector is necessary to eliminate the mutual influence of the adjusted sectors on each other and to eliminate the sensor masking.

9.2.1.1. The same frequency characters must be chosen on Tx and Rx (see the item 5.2.) to synchronize the sector.

Attention! The units with the same frequency characters must be installed along the protected perimeter as far from each other as possible with the aim to eliminate their mutual influence.

9.2.1.2. If the Rx unit of the synchronized sector operates in the standby mode, it means that the synchronization is successful.

9.2.2. Alignment

General information

The alignment is done with the aim to generate the correct detection zone form by aligning Tx and Rx antennas.

9.2.2.1. The sensor is aligned by two people: one of them stays near Rx, the other – near Tx.

9.2.2.2. The alignment procedure is the following:

– connect a voltmeter to the socket «VOLTMETER» on the data board of the aligned sector with the harness from the delivery kit using the terminals «COM» and «MW»;
– loosen the fixing drivescrews of the units and rotators 6;
– press and release the button «MODE» on the data board of the aligned sector. The indicator MW should begin blinking (1 time per 1 second) and the voltmeter should display the input signal level;
– turning the beaming transmitter and receiver of the MW channel in vertical and horizontal planes, <u>achieve the maximum voltage on the voltmeter (within the range 1,0…4,5 V);</u>

Notes:

1. *If the voltage is more than 4,5 V, it is necessary to disalign the sensor turning it upwards. <u>It is prohibited to disalign the sensor downwards or aside.</u>*
2. *If the voltage is less than 1,0 V, it is necessary to repeat the alignment in vertical plane for more accurate alignment. Such situation may take place, if the sensor detection zone axis is near long barriers (see the item 8.1.1. c))*
3. *The sensors are operable at the MW signal voltage of 0,1…4,8 V. The limit values of 1,0 and 4,5 V during the alignment are recommended as there should be the signal level margin to provide the long-term steady operation.*

- tighten the fixing drivescrews and rotators 6;
- press and release the button «MODE». The indicator «TP» must display the standby mode and the voltmeter must display the thresholds level;
- if there is no need in further alignment, disconnect the harness.

9.2.3. Rx thresholds alignment

General information

The thresholds alignment is intended for the optimal sensitivity adjustment of every protected sector. It is necessary to take into account that the maximum thresholds correspond to the minimum sensitivity. The minimum thresholds correspond to the maximum sensitivity.

The thresholds should be aligned very attentively as «underrating» of the thresholds might provoke a lot of false alarms; «overrating» of the thresholds might provoke failures in the sensor operation.

9.2.3.1. The alignment procedure is the following:

- connect the voltmeter to the socket «VOLTMETER» on the data board of the aligned sector with the harness from the delivery kit using the terminals «COM» and «MW». The voltmeter should display the threshold value within the range 0,31…5,0 V.

Notes

1. *The value of 5,0 V corresponds to the maximum thresholds (minimum sensitivity).*
2. *The value of 0,31 V corresponds to the minimum thresholds (maximum sensitivity).*

- pressing the button «THRESHOLDS» set the maximum thresholds of 5,0 V;
- do some control passages uniformly crossing the protected sector beginning with its middle. After every passage go out the detection zone at 1-2 m for Rx

calming (otherwise the results of the previous passage will influence on the following one).

The indicator «TP» is switched on for 3 sec. minimum at the alarm signal. The next passage is done when the Rx unit switches to the standby mode.

If the sensor does not generate the alarm signal at a control passage, it is necessary to lower the thresholds at one point (press the button «THRESHOLDS» on the data board). Then do a check passage again.

Notes:

1. *The threshold range has 16 points.*
2. *The sensor generates the alarm signal for 3 sec. at pressing the button «THRESHOLDS».*
3. *The threshold are lowered very quickly up to the maximum value 5,0 V if the button «THRESHOLDS» is pressed and held.*

– do some check passages in «problem» places of the detection zone: hollows, hills, near tree trunks. Regulate the thresholds if necessary.

Note: If check passages are done at a medium speed, the threshold values allow to detect an intruder moving at a speed from 0,3 up to 10 m/sec. To expand the speed range up to 0,1…10 m/sec you should conduct additional alignment crossing the sector at a speed of 0,1 m/sec.

– disconnect the harness.

9.2.4. When the sensor is aligned, install carefully (with the aim not to upset the alignment) the sensor enclosure. <u>Match the photorelay eye with the sensitive photorelay element</u> on the switching board. If necessary take off the enclosure and adjust the photorelay again.

9.2.5. When the alignment is done, it is recommended to test the sensors for 2-3 days with the aim to detect possible errors in mounting and alignment.

10. CHECK OF THE TECHNICAL STATE

10.1. Check of the sensor operation

10.1.1. It is recommended to test the sensor operability by transmitting the remote control signal. The periodicity of this testing is defined by a customer.

10.2. Maintenance

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

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

Every month carry out visual examination of the sensor units and the protected sector.

It is necessary to check:

- the absence of dust, dirt, snow and ice from the side of antennas and clean them if necessary;
- the absence of foreign objects in the protected sector;
- the state of the protected sector according to the item 8.1.

Every quarter:

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

10.2.3. The grass height is controlled during seasonal works. If the grass height is over 0,3 m, the grass should be mown down. The snow height in the detection zone must be up to 0,5 m.

11. TROUBLESHOOTING GUIDE

11.1. List of possible troubles is given in Table 11.1.

Table 11.1

Trouble	Possible Cause	Repair
1. The sensor generates constantly the alarm signal.	The commutation or power supply lines are out of order (contacts oxidation).	Check the cables integrity and the accuracy of their connections. Restore the communication lines (dress contacts).
	The sensor alignment is out of order.	Align the Tx and Rx units.
	There is no power supply or it is low.	Provide the necessary power supply.
	The protected sector does not meet the necessary	Inspect the protected area according to the requirements of the issue 8.1 and eliminate

	requirements.	the defects.
	Tx or Rx is out of order.	Replace the defective unit.
2. False alarms	Moving objects in the detection zone (tree branches, bushes, high grass).	Inspect the protected sector and eliminate the interference sources.

Table 11.1

Trouble	Possible Cause	Repair
2. False alarms	Low Rx input signal because of the changed environment.	Align the sensor according to the item 9.2.2.
	Animals, moving in the detection zone.	Eliminate the interference sources.
3. The sensor does not generate alarms when an intruder crosses the detection zone.	The Rx thresholds are too high.	Align the sensor according to the item 9.2.3.
4. The lighting lamp is out of order.	The remote control line is out of order (TB1, TB2).	Check the integrity and characteristics of the line.
	The lamp is defective.	Replace the lamp.
	Malfunctioning of the photorelay.	Align the photorelay.

12. STORAGE

12.1. The sensors should be warehoused in the package at an ambient temperature from +5°C up to +50 °C and relative humidity up to 85%.

12.2. During storage the influence of hostile environment should be prevented.

13. TRANSPORTATION

13.1. 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 10 000 km.

13.2. The boxes should be carefully stowed in order to prevent their shifting or fall in the case of jolts.

Linear Intrusion Sensor
«FORTEZA-FONAR»

Certificate
4372-43071246-076-02

The sensor purpose and its specification are given in the Document Part Number 4372-43071246-076-02.

1. DELIVERY KIT

1.1. The sensor delivery kit is given in Table 1.1.

Table 1.1

<table>
<tr><th>№</th><th>Name</th><th colspan="4"></th><th>Quantity</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Middle transmitting unit (2 Tx)</td><td>Serial №</td><td></td><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>Serial №</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Outermost transmitting unit (1 Rx)</td><td>Serial №</td><td></td><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>Serial №</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Middle receiving unit (2 Rx-NC)</td><td>Serial №</td><td></td><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>Serial №</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Outermost receiving unit (1 Rx-NC)</td><td>Serial №</td><td></td><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>Serial №</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>Mounting kit (MK)</td><td colspan="4">1 kit for one Tx or Rx unit</td><td></td></tr>
<tr><td>6</td><td>Tools and accessories kit (TAK)</td><td colspan="4">1 kit for one delivery kit</td><td></td></tr>
<tr><td>7</td><td>User manual and certificate</td><td colspan="4">1 pcs. for one delivery kit</td><td></td></tr>
<tr><td>8</td><td>Packing</td><td colspan="4"></td><td></td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Decorative «FORTEZA-FONAR»</td><td>Serial №</td><td></td><td></td><td></td><td rowspan="2"></td></tr>
<tr><td>Serial №</td><td></td><td></td><td></td></tr>
</table>

2. ACCEPTANCE CERTIFICATE

2.1. The sensor kit given in Table 1 meets the performance specifications of the Document Part Number 4372-43071246-076-02 and is considered as operable.

Date of issue _________20___

Quality department

3. WARRANTY

3.1. The manufacturer guarantees the conformity of the sensor specifications to the Document Part Number requirements 4372-43071246-076-02 if a user meets the service conditions and operating rules specified by the Document Part Number 4372-43071246-076-02.

3.2 Warranty period is 2 years since the date of sale by the manufacturer.

3.3. Warranty does not cover sensors and enclosures:

- with mechanical failures;
- which are out of order because of natural disasters (lightning, fires or floods);
- if the requirements of the Document Part Number 4372-43071246-076-02 are not fulfilled.

3.4. Mean lifetime is 8 years.

For warranty and post-warranty service you can contact:

European Office:
JCS “Forteza”
Tilzes str. 38
91112 Klaipeda
Lithuania
Phone+370 46 411353; +370 46 441195
Fax+370 46 412231
E-mail forteza@forteza.com