Security Sensors
FORTEZA-300
FORTEZA-500

User Manual

Declaration of Conformity
ТС № RU Д-RU.AB24.B.00418

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Contents.

The sensors FORTEZA-300, FORTEZA-500 (referred to as the sensors) are intended for the protection of straight open sites, generation of the alarm signal in case of intrusion, transmission of the alarm signal to the control panel.

The particular feature of the sensors is the easy configuration and control: using the multimeter or the laptop in-field, using the PC in case of remote configuration. Special software Config Forteza Series assures easy visualized configuration and control of the sensors.

The sensors provide round the clock operation outdoors at the ambient temperature of minus 50^0C up to $+70^0$C and the relative humidity up to 98% at $+35^0$C.

The sensor corresponds to climatic modification for temporary cold climate, industrial version.

The present document contains the following abbreviations:

TX	- transmitter;
RX	- receiver;
MK	- mounting kit;
PSU	- power supply unit;
JB	- junction box;
NC contacts	- normally closed contacts;
TEST	- remote control signal;
TAMPER	- lock.

The references to sections and sub-sections are references to the sections and sub-sections of the present UM unless the contrary intention appears.

1. Description and Operation of the Sensor.

1.1. Purpose of the Sensor.

1.1.1. The sensors are intended for detection of the intruder crossing the detection zone at his full height or bent and generation of the alarm signal (alarm) by breaking the executive relay contacts and transmission of the alarm signal to the control panel.

1.1.2. The transmission of alarm signals and overhead information as well as the control of the sensors are made via the interface RS-485 in case of operation of the sensors as components of the security system adapted for operation with the sensors FORTEZA.

1.2. Technical Specifications.

1.2.1. The main technical specifications of the sensor:

Maximal range of the protected site, L:	
- for FORTEZA-300	from 10 up to 300 m
- for FORTEZA-500	from 10 up to 500 m
Height of the detection zone, h:	not less than 1,8 m*
Width of the detection zone, b:	
- for FORTEZA-300	up to 2,7 m**
- for FORTEZA-500	up to 3,5 m**
Speed of the intruder:	from 0,1 up to 10 m/s***
Quantity of frequency letters:	4
Supply voltage:	from 9 up to 30 V
Current consumption:	up to 45 mA
- transmitter:	up to 10 mA
- receiver:	up to 35 mA
Parameters of the executive relay:	
- maximal commutation voltage:	up to 50 V
- maximal commutation current:	up to 0,1 A
- resistance in closed state:	up to 110 Ohm

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* in the middle of the sector at the maximal range.

** in the middle of the sector; relation between the width of the detection zone in the middle of the sector and the range is given in Table 1.1.

*** the maximal speed of the intruder can be changed using the software Config Forteza Series (p. 2.5.5.2).

Operational frequency	24,15±0,1 GHz
Parameters of the remote control signal (TEST):	voltage from 5 up to 30 V at the time from 1 up to 3 s
Detection «dead zones»:	no
Technical readiness time:	
- at power-up:	up to 30 s
- at alarm signal:	up to 1 s
Housing protection:	IP55
Parameters of TAMPER button:	
- voltage:	up to 80 V
- current:	up to 0,2 A

Table 1.1.

Range, L, m	500	300	200	100	50
Zone width, b, m, up to	3,5	2,7	2,1	1,5	1,0
Zone height, h, m, up to	1,8	1,8	1,6	1,5	1,4

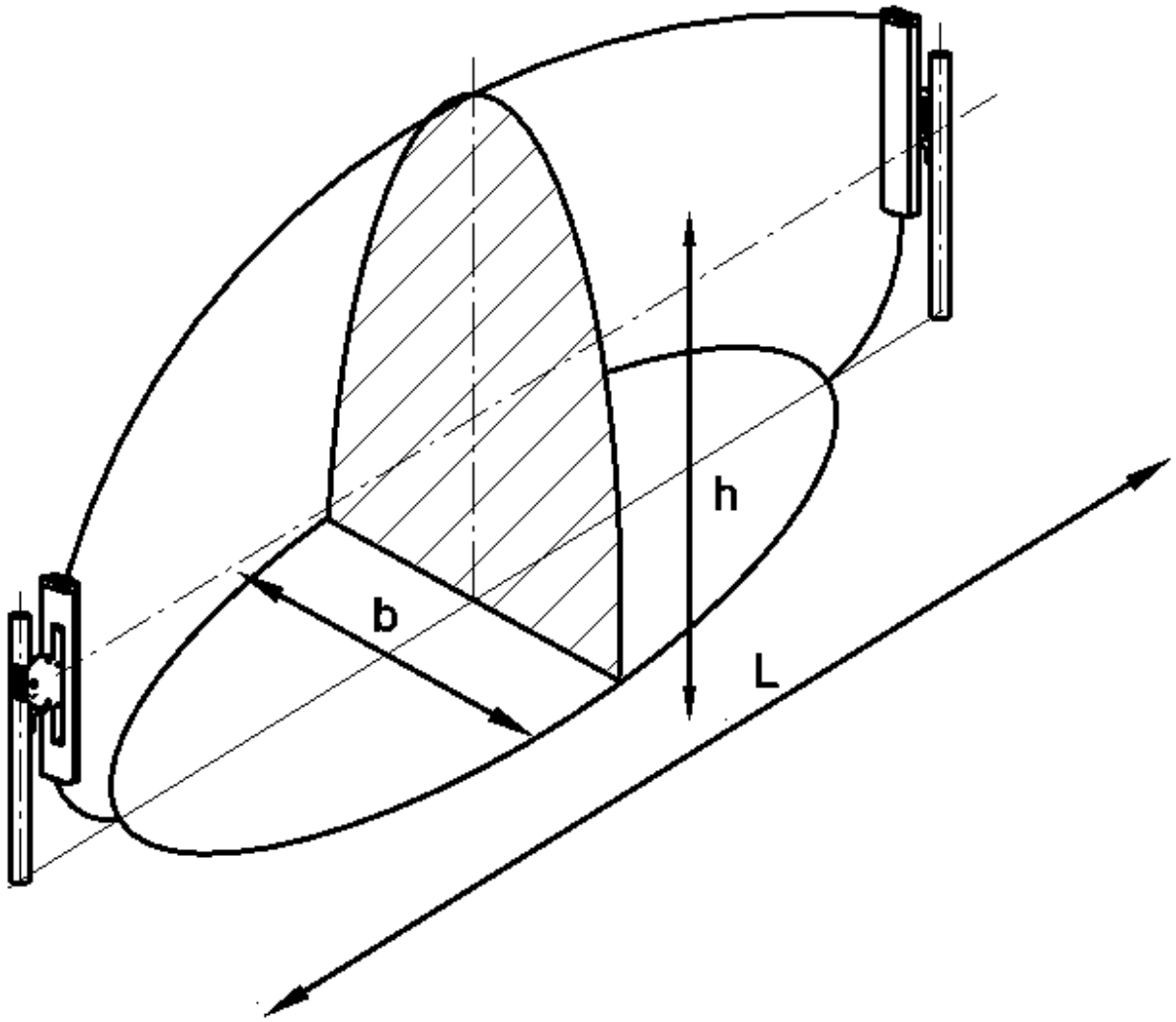


Figure 1.1 – Detection zone of the sensor.

1.2.2. The sensor does not have dead zones in detection.

1.2.3. The sensor generates the alarm:

- at the person crossing the detection zone. The intruder detection probability – not less than 0,98 in case of the person movement at full height or bent;
- at application of the remote control signal to the transmitter;
- at the action of the external electromagnetic field to the receiver for the purpose of its masking. No alarm is allowed, but he sensor should keep its performance;
- at the breakage of Tx TAMPER button.

For triggering we use normally closed (in stand-by mode) contacts of the executive relay of the receiver which are broken in case of alarm for the time of the intruder crossing of the detection zone but not less than 3 s. The alarm is duplicated via the interface RS-485.

1.2.4. The sensor generates the signal of failure:

- at no signal from the transmitter;
- at drop off or reduction of power supply less than 9 V;
- at failure of the transmitter or receiver.

In case of constant failure signal up to the malfunction repair the contacts of the executive relay are broken and the failure signal is transmitted via the interface RS-485.

1.2.5. In case of break of communication via the interface RS-485 the failure signal is generated by the security system.

1.2.6. The sensor has no «dead zones» in detection.

1.2.7. The sensor generates the signal of opening the receiver cover under which there are the configuration units. In case of opening the TAMPER contacts are broken. The signal is transmitted via separate pair of wires from the receiver.

1.2.8. It is possible to make the remote control of performance of the sensor by transmitting the check signal (TEST) to the remote control wire of the transmitter (voltage from 5 up to 30 V at the time of 103 s).

1.2.9. The sensor adapts to the changes of the environment and does not trigger at:

- rain, snow, thick fog;
- solar radiation;
- wind up to 30 m/s;
- moving of objects with linear dimensions up to 0,2 m in the detection zone (birds and small animals) also close to antenna;

- irregularities of the site up to ±0,3 m;
- snow cover without additional adjustment up to 0,9 m;
- grass cover up to 0,4 m;
- action of UHF radiation from 150 up to 175 MGz at 40 W at the distance not less than 6 m.

1.2.10. The sensor is immune to the action of electromagnetic interference as per GOST P 50009-2000 (voltage impulse in power supply circuits, interruption of mains supply, electrostatic discharge, electromagnetic field).

1.2.11. All the circuits of the transmitter and receiver are protected from short electric pickup (including thunderstorm) with amplitude up to 900 V. Use the lightning guard unit LGU-4 in case electric pickup more than 900 V is possible.

1.2.12. The sensor operation temperature band is from minus 50 to plus 70^0C.

1.2.13. The housing of the sensor is made of shock proof plastic immune to UV radiation and temperature fall in all the operational band.

1.2.14. Mean lifetime of the sensor is 8 years.

1.2.15. Dimensions of the units without MK, mm, up to:

- transmitter: 605x150x170;
- receiver: 605x150x170.

1.2.16. Weight of the units with MK, kg, up to:

- transmitter: 2,7;
- receiver: 2,7.

1.3. Contents of the Sensor.

1.3.1. The sensor delivery kit:

1) Receiver – 1 pc.
2) Transmitter – 1 pc.
3) Mounting kit (MK) containing of:
   - bracket – 2 pcs.;
   - buckle – 4 pcs.;
   - lock to the buckle – 4 pcs.
4) Kit of instruments containing of:
   - adapter to connect the multimeter.
5) User Manual.
6) Package.

1.3.2. At the separate order we deliver additional equipment produced by Okrannaya technika: power supply unit PSU-U-15-0,15 (PSU-R-15-0,15 PSU-U-24-0,7); junction box JB-15 (JB-30, JB-84); lightning guard unit LGU-4 (LGU-2DIN, LGU-485DIN); poles for mounting into the ground SUPPORT-2, SUPPORT-2,5; REFLECTOR-820, FORTEZA-CONVERTER RS-485/USB with isolation MOXA UPort 1130i, connecting cable for the PC USB 2.0 A-mini B, bigger bracket (for angle supports), bracket 1000/1250 (for wall mounting).

The software Config Forteza Series is available on the Website www.forteza-eu.com.

1.3.3. Specify the modification when ordering the sensor:
FORTEZA-300 – sector length from 10 to 300 m;
FORTEZA-500 – sector length from 10 to 500 m.

1.4. Principle of Operation of the Sensor.

1.4.1. The sensor is a bistatic microwave intrusion detection device. The principle of operation of the sensor is based on generation of the electromagnetic field between the transmitter and receiver forming the volumetric detection zone in the shape of a stretched ellipsoid of rotation and registration of the changes of this field in the receiver at the intruder's crossing the detection zone.

1.4.2. The intrusion of a person in the detection zone generates the change of the signal amplitude on the receiver input. The incoming signal crosses the amplifier and on its output becomes equal to the values of thresholds according to the given algorithms, with that the useful signal is separated from the noise. In case as follows from the analysis the change of signal on the input is caused by the person intrusion, the receiver generates the alarm. The change of signal depends on the height and weight of the person, speed of his movement, place of intrusion and the landscape.

1.4.3. At the receiver input the signal can be changed under influence of interference factors, for example: precipitations, vegetation, small animals, electromagnetic noise, moving trees bushes, doors located in the detection zone which can be comparable with the amplitude of the person intrusion.

Also the level of the receiver input signal can be influenced by other factors like: location within the detection zone or near long buildings or objects (fences, walls, etc), landscape irregularities, presence of snow or vegetation on the site. In this case due to reradiation and interference, the shape of the detection zone can be changed.

The multi-threshold operation algorithm of the sensor allows to set the optimal operation mode of the sensor and reduce the number of alarms caused by noise. **Strictly follow the recommendation of Subsection 2.1 with regard to the requirements to the site** while installing the sensor!

1.4.4. Receiving and indication of alarms is made by control panel, controlling the relay contacts as well as by security systems supporting the interface RS-485. The normally closed relay contacts are broken in case of alarm.

1.4.5. Use the multimeter as well as the PC for the configuration and control of the sensor operation. The security system via the interface RS-485 allows to configure the sensor and control its operation remotely.

1.5. Design of the Sensor.

1.5.1. The sensor contains separate units. The housing is made of dust waterproof material.

1.5.2. The sensor appearance and its location on the support are given on Figure 1.2.

The receiver has the form of a plastic housing inside which there is a parabolic antenna. In the antenna focus there is the feed element with the detection camera fixed to it. The housing is covered with covers from upper and lower sides. In the upper cover there is a V-neck (sight) assuring easy primary adjustment of the sensor.

The upper cover of the receiver also contains the processing board with control, configuration and indication units. Access to the control, configuration and indication units is assured by opening Cover 10 (Figure 1.2). Location and marking of the elements under the cover are given in Figure 1.3.

The receiver is connected to the junction box or the power supply unit using Cable 7 (Figure 1.2), going through the cable input. The receiver is fixed on the support using Unit bracket 2, Bracket 3 and Buckles 17. With that at first we fix the bracket and then to the bracket we fix the receiver with the unit bracket fixed to it using Cap screw 11 and Nut 15.

1.5.3. The design of the transmitter generally follows the design of the receiver. The differences are the following: on the feed element there is a microwave generator connected to the modulator board instead of the detector camera. The Modulator is located in the upper cover of the transmitter; under Cover 10 there is Switch of frequency letters 1 (Figure 1.4).

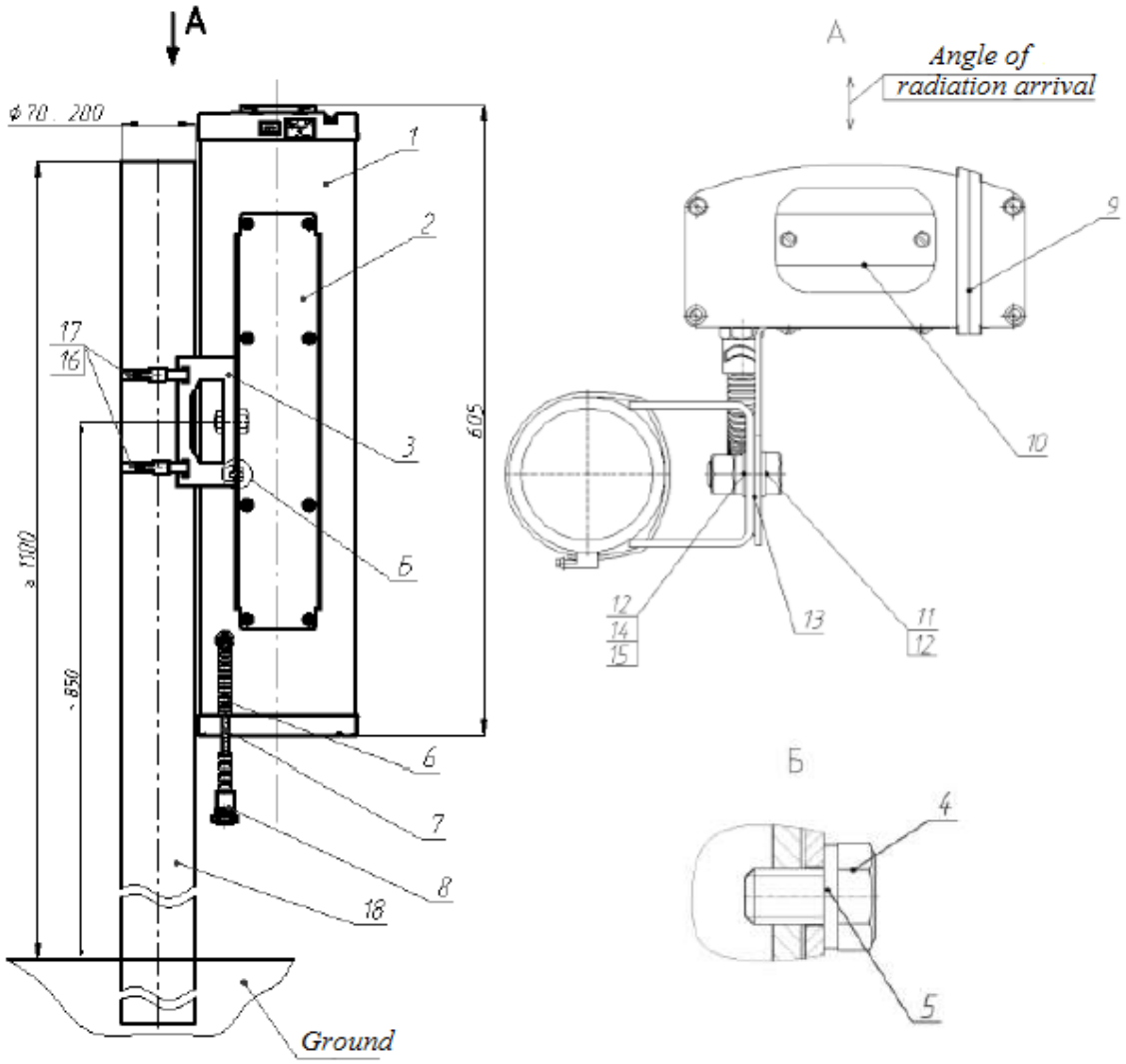
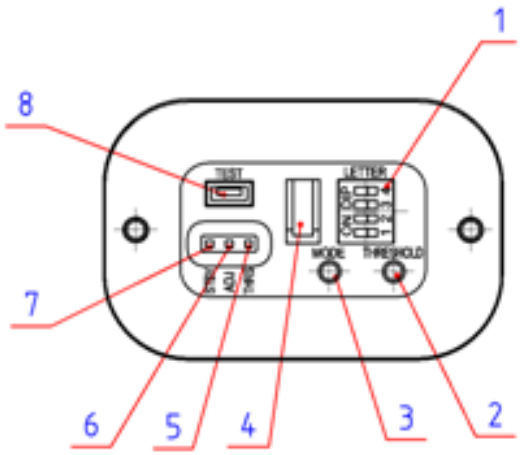


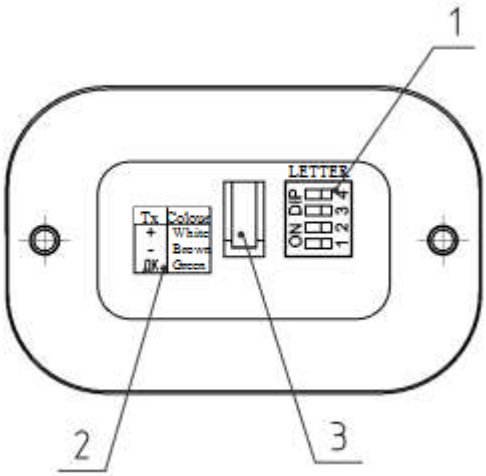
Figure 1.2

1 – Receiver (transmitter)	1 pc.;	10 – Cover	1 pc.;
2 – Unit Bracket	1 pc.;	11 – Cap screw M12	1 pc.;
3 – Bracket	1 pc.;	12 – Ring plate 12	2 pcs.;
4 – Cap screw M6	1 pc.;	13 – Plastic Ring plate	1 pc.;
5 – Ring plate M6	1 pc.;	14 – Split lock washer	1 pc.;
6 – Corrugated tube	1 pc.;	15 – Nut M12	1 pc.;
7 – Cable	1 pc.;	16 – Buckle lock	2 pcs.;
8 – Plug	1 pc.;	17 – Buckle	2 pcs.;
9 – Cover with sight	1 pc.;	18 – Round support (tube)	1 pc.



1 – switch of frequency letters;
2 – threshold change button;
3 – mode change button;
4 – TAMPER button;
5 – indicator of the threshold mode
6 – indicator of adjustment mode
7 – indicator of stand-by mode
8 – socket to connect the multimeter and laptop.

Figure 1.3



1 – switch of frequency letters;
2 – cable cores assignment;
3 – TAMPER button.

Figure 1.4

Note.
Dear Customer! The manufacturer is constantly upgrading the products. That is why some lots of sensors can have different design not recorded in the accompanying documents. The main specifications are kept.

1.6. Configuration, control and Indication Units.

1.6.1. On the transmitter and receiver there are micro switches LETTER assuring switching of pulsed frequencies of UHF radiation of the sensor. Only one of four switches with the same number on the transmitter and receiver should be ON.

ATTENTION! Ste the frequency at the power supply OFF of the transmitter and receiver!

In case you set the frequency while the power supply is ON, the letter will not be changed, but after the power supply OFF/ON the number will be changed.

1.6.2. Configuration, control and indication of the sensor operation are made using the control and indication units on the receiver and the multimeter or using the homonym units in the pop-up window of the software Config Forteza Series and the PC. Connect the multimeter or the PC to the socket TEST.

1.6.3. The button MODE changes the operation modes of the receiver indicated by LED indicators:

- stand-by mode (indicator STBY);
- adjustment mode (indicator ADJ);
- threshold mode (indicator THRS.

1.6.4. The button THRESHOLD sets the value of the receiver threshold which is responsible for triggering. It is possible to set 16 different threshold levels in the band from 2,5 V up to 1 V. One touch of button reduces the threshold value at 0,1 V. After the threshold value of 1 V the next value is 2,5 V.

1.6.5. In order to prevent not allowed opening of Cover 10 (Figure 1.2) the receiver contains TAMPER 4 (Figure 1.3) and 3 (Figure 1.4). In case of opening the cover the sensor triggers for 3 s. using the relay contacts or via the interface RS-485. In case of opening the cover the Rx circuit TAMPER connected by separate wires is broken.

1.6.6. In stand-by and threshold mode the alarm is indicated by switching OFF the LEDs STBY or THRS.

2. Installation and Configuration procedure.

Use the following procedure to activate the sensor:

- prepare the site;
- lay the signal and power supply cables;
- install the transmitter and receiver;
- connect the sensor (connect power supply and signal lines);
- adjust the transmitter and receiver antennas;
- set the threshold.

Rules and methods of the steps above are given in Sections 2.1-2.8.

2.1. Requirements to the Preparation of the Site and Installation of the Transmitter and the Receiver.

2.1.1. The site where the transmitter and receiver are to be installed (see Table 1.1, Figure 1.1) at the width b should meet the following requirements:

- height of landscape irregularities up to ±0,3 m. In case of irregularities more than ±0,3 m the sensor tactical specifications can go down. In this case the possibility of use of sensors in the given conditions is determined by trial operation;
- height of grass up to ±0,4 m;
- height of snow cover up to ±0,9 m, in case the range is less than 50 m – up to 1 m;

2.1.2. Separate immobile objects (poles, tree trunks without lower branches, etc.) are allowed at the distance of more than 0,5 m from the axis of the detection zone.

2.1.3. Movement of objects and moving objects including objects moving because of wind (doors, bushes, branches of tress, etc.) are nor allowed at:

- **±1,7 m** from the axis connecting the transmitter and receiver at the range **from 10 up to 50 m**;
- **±2,5 m** from the axis connecting the transmitter and receiver at the range **from 50 up to 300 m**;
- **±3,0 m** from the axis connecting the transmitter and receiver at the range **from 300 up to 500 m**.
- The movement of transport **is not allowed** closer than 4 m from the detection zone axis.

2.1.4. The width of the site should exceed the width of the detection zone (see Table 1.1).

It is allowed to install the sensor at the smaller width. In this case the possibility of use of sensor in the given conditions is determined by trial operation.

2.1.5. The site gradient is not specified.

2.1.6. Install sensors with different letter on adjacent sectors. When installing the sensors on sectors going one after another, sequentially change letter from 1 to 4 providing the maximal distance between the sensors with the same letters.

2.1.7. It is allowed to install the sensor in two rows in order to increase the height of the detection zone. Use the sensors with different letters, install two transmitters from one side and two receivers from the other side. The range of sites should be equal.

2.1.8. Bind the sensor logic number to the layout of the protected site when using RS-485 for configuration and control of the sensors. The sensor logic number can be set using the PC and the software Config Forteza Series before the installation of the sensor as we as during the sensor configuration.

2.1.9. It is possible to limit the maximal speed of the intruder in the sensor. Reduction of the maximal speed increases the sensor interference immunity. The manufacturer pre-set intruder maximal speed is 10 m/s (high). It is possible to decrease the intruder maximal speed to 4 m/s (average) and to 1 m/s (low)*. The speed is changed using the PC. After configuration of the speed, set again the triggering threshold (p. 2.4.3).

* Examples: open area – high speed; zone between the fence and the alert obstacle (the intruder cannot gather speed) – average speed; installation by the top of the fence – low speed.

2.2. Installation of the Sensor.

2.2.1. Mark the perimeter to determine places of installation of supports. In case of continued long perimeter **it is not allowed** to install the transmitter and receiver of adjacent sectors on one support. Correct installation – transmitter with transmitter, receiver with receiver.

2.2.2. Install the supports. Use metal or asbestos-cement tubes from 70 up to 200 mm in diameter for supports. As the sensor has no dead zones of detection, it is allowed to fix two transmitters (or two receivers) of adjacent sectors on one support.

It is possible to install the support with concreting. The example of installation the support is given in Figure 2.1. In regions with much snow the support above ground part should not be less than 1500 mm long.

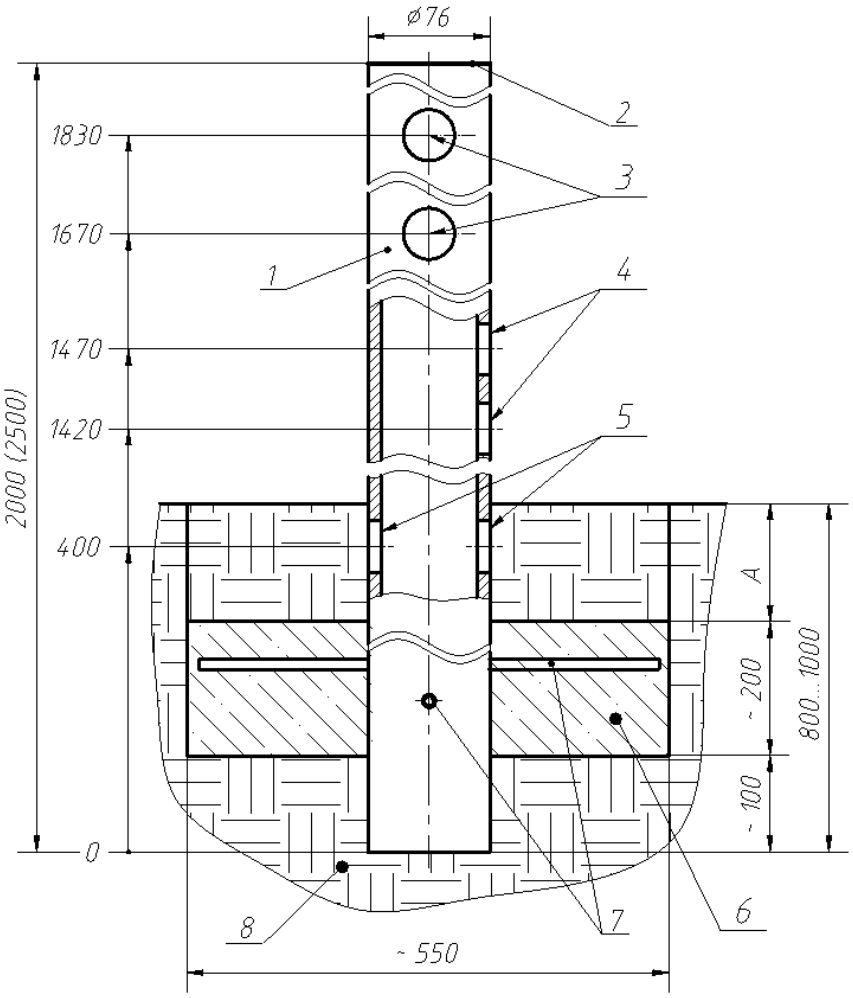
The poles SUPPORT-2 and SUPPORT 2,5 are delivered at the customer's order. The length is 2 m and 2,5 m thoroughly. The pole is made of steel tube 76 mm in diameter. The pole has dowel bars for fixing in concrete and holes for cables.

2.2.3. The customer can install the sensor on a wall, on a fence, etc. according to his security tactics. In case of protection along the top of the fence, it is recommended to connect the support to the fence with some solid mechanical (or welded) connection for more rigidity. The height of the support above the fence is not less than 600 mm.

2.2.4. Lay main cables according to the security system project. It is recommended to use shielded cables or with metal sheath.

Cable core section is chosen according supply voltage not less than 9 V (p. 1.2.1) on every sensor unit.

It is not recommended to lay main cables near sources of big electromagnetic noise (power supply cables, antenna systems, etc.) and use the cable spare cores for translation of pulse signals.



1 – SUPPORT-2 or SUPPORT-2,5;
2 – plastic cap;
3 – hole for inserting the sensor cable inside the support;
4 – hole for inserting the main cable and the sensor cable;
5 – hole for inserting the main cable;
6 – concrete (gravel);
7 – dowel bars for preventing the non allowed dismantling of the support;
8 – ground.

Notes.
1. Lay ground after mounting works are finished on Dimension A.
2. *Dimensions in mm.*

Figure 2.1

2.2.5. Install Brackets 3 (Figure 1.2) on Supports 18 using Buckles 17. Tighten the Lock buckles 16 to assure solid fixing of the bracket on the support. Cut excess of buckles.

2.2.6. Install the transmitter and receiver on the brackets.

Insert Cable 7 into Corrugated tube 6. **Installation of the corrugated tube is required**.

2.2.7. Install junction boxes and power supply units (if previewed by the project).

In case of boxes JB-30 and power supply units PSU-U-24-0,7, install them on supports together with the sensor units. In order to insert Cable 7 (Figure 1.2) protected by Corrugated tube 6 into the JB (or PSU-U), remove one of the cable glands PG9 and put Plug 8 with Corrugated tube 6 into the hole. It is recommended to use one PSU-U-24-0,7 to power two adjacent sensors. Note that PSU-U-24-0,7 has five spare terminal blocks (1-5), that is why it is allowed not to install the junction box on its support. The delivery kit of JB-30 and PSU-U-24-0,7 contains fixing elements.

ATTENTION! In order to decrease the level of electromagnetic noise to the power supply lines, install PSU-U at the distance up to 300 m from the sensors.

2.3. Power Supply Connection of the Sensor.

2.3.1. Connect the necessary power supply circuits, signal circuits, remote control circuits. The transmitter and receiver are connected using their own cables. The conductors assignment is determined by colours.

Table 2.1 contains information on colours and cable wires assignment.

ATTENTION! It is absolutely prohibited to ground directly the sensor circuits. Use external lightning guard unit LGU-4.

2.3.2. Set the sensor letters using the switches LETTER on the transmitter and receiver following the procedure given in p.p. 1.6.1, 2.1.6.

Table 2.1

Rx	
Wire colour	Assignment
white	power supply «+»
brown	power supply «-»
green	TAMPER contacts
grey	
yellow	Executive relay contact (NC)
pink	
red	A (RS-485)
blue	B (RS-485)

Tx	
Wire colour	Assignment
white	power supply «+»
brown	power supply «-»
green	Remote control (TEST) +5 … 30 V

2.3.3. The type and nominal of the end element (EE) of the intrusion detection system loop (resistor, condenser, diode) are determined by the control panel used. In most case this is the resistor. The resistor nominal resistance should consider the resistance of the executive relay contacts (~10 Ohm) of the lightning guard circuit limiting resistor (100 Ohm) and the resistance of the wires of the intrusion detection system loop (depends on the cable type and its length).

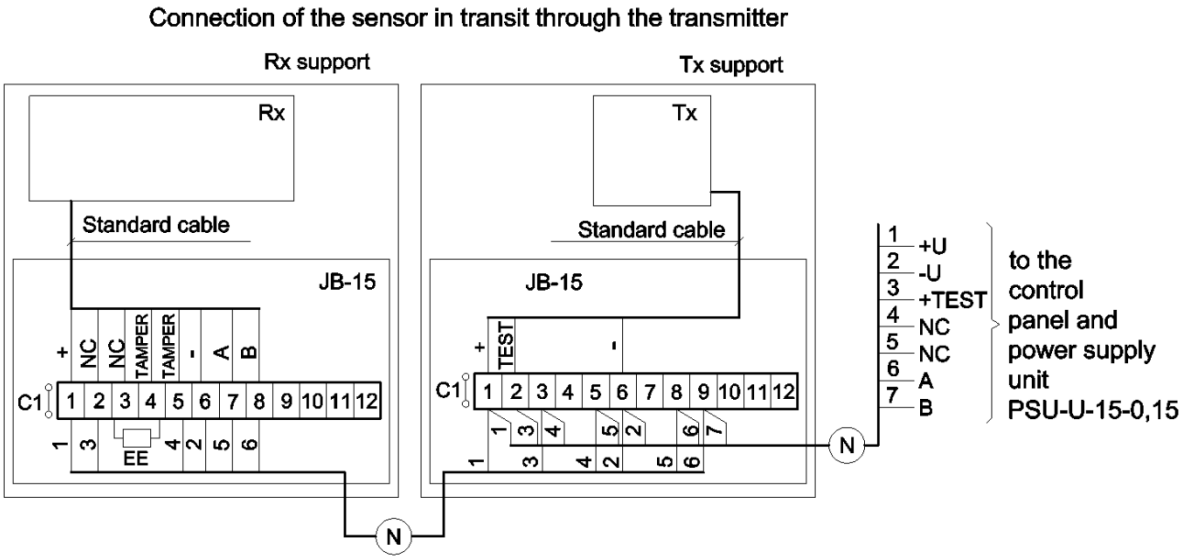
2.3.4. The receiver TAMPER contacts can be connected to the control panel by the separate loop. In this case the customer receives the information on opening the cover by separate signal. The other variant: TAMPER contacts are connected sequentially with the executive relay contacts. In this case the control panel will receive the alarm from the executive relay and TAMPER in one channel.

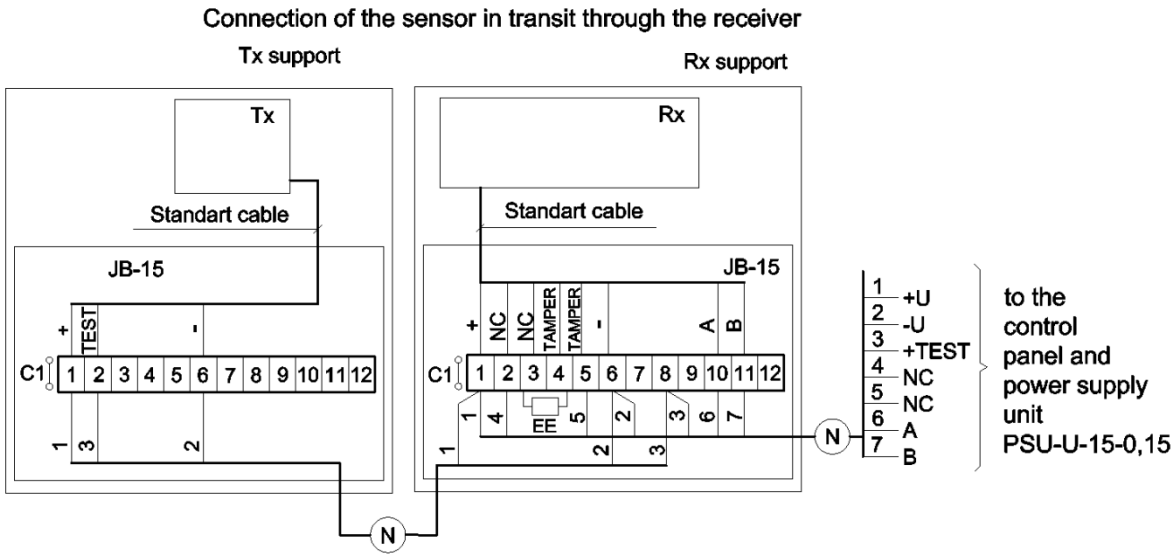
2.3.5. The blank diagram of connection the sensor using the junction box JB-15 is given in Figure 2.2. Install the additional button to give the signal of remote control (TEST) to the sensor from the guard room. It is allowed to install one button for several sensors. In this case the performance of several sensors will be checked by pressing one button.

The blank diagram of connection the sensor using the lightning guard unit LGU-4 is given in Figure 2.3. Install LGU-4 unit near the transmitter (receiver) units. It is allowed not to use the junction box in case there are less than 8 commutation circuits.

The blank diagram of connection the sensor to the power supply unit PSU-U-24-0,7 is given in Figure 2.4.

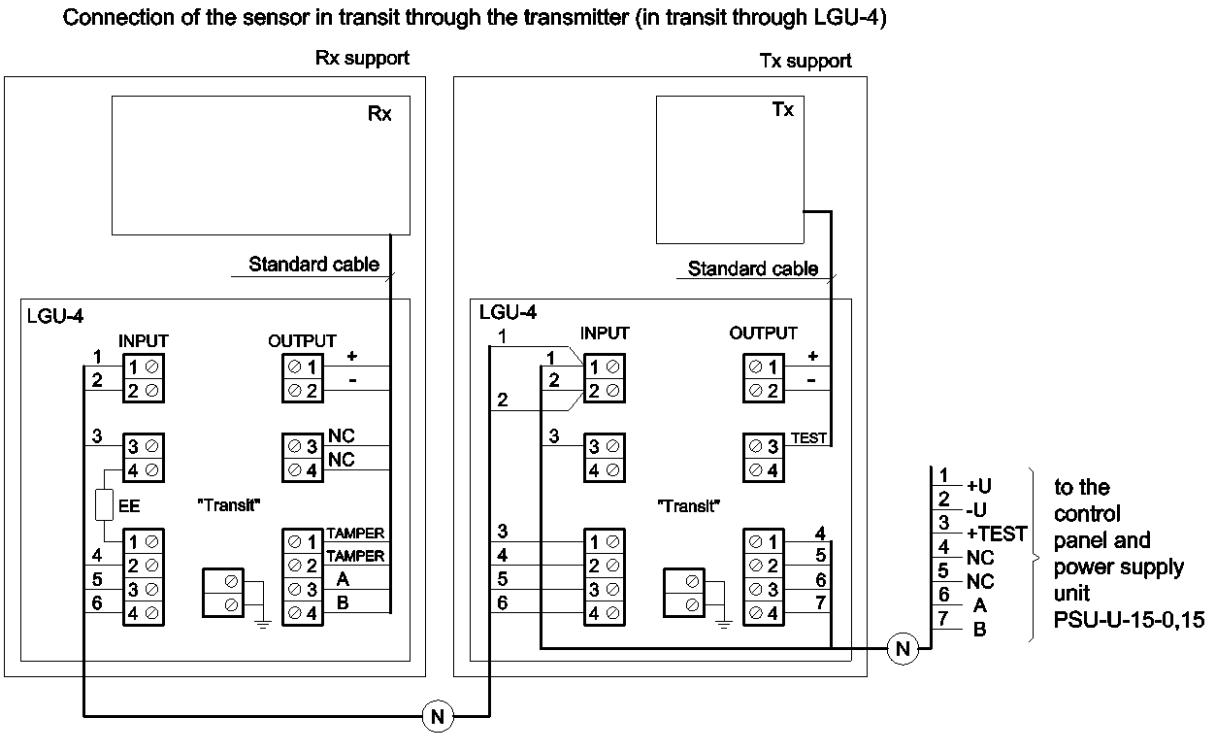
2.3.6. Use junction boxes JB-30 (30 circuits), JB-48 (48 circuits) or JB-84 (84 circuits) for commutation of site cables on long perimeters.





EE is the ending element of the control panel.

Figure 2.2



EE is the ending element of the control panel.

Figure 2.3

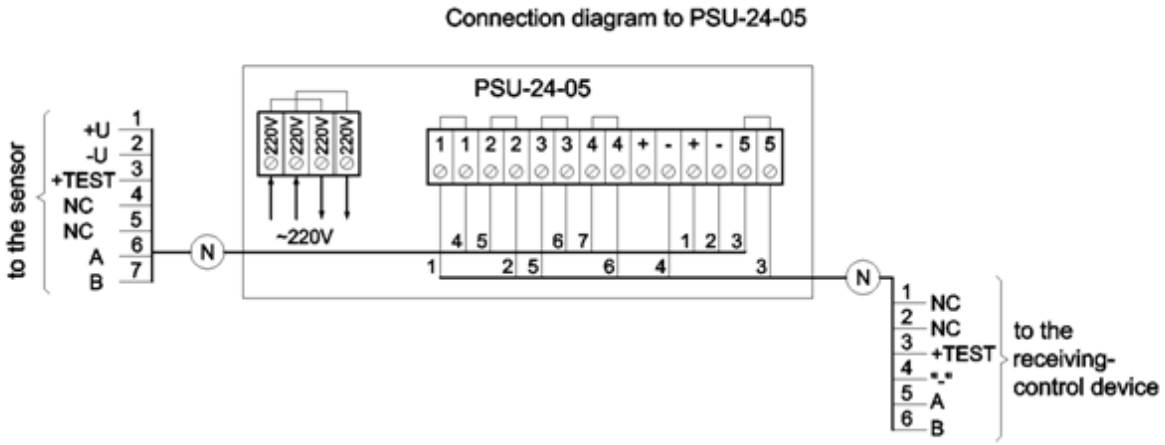


Figure 2.4

2.4. Configuration of the Sensor using the In-built Configuration, control and Indication Units.

2.4.1. Rough Adjustment of the Transmitter and the Receiver.

2.4.1.1. Loose Buckles 17 using Locks 16 and Cap screw 4 (Figure 1.2).

2.4.1.2. Turning the transmitter and receiver with brackets around the support and inclining them in vertical plane, direct them one to another. Use the V-neck (sight) of the upper cover of the units.

2.4.1.3. Tighten Buckles 17 using Locks 16.

Note – To make the adjustment easier insert the tube into the V-neck and fix it using the elastic ring and the cover margins (Figure 2.5).

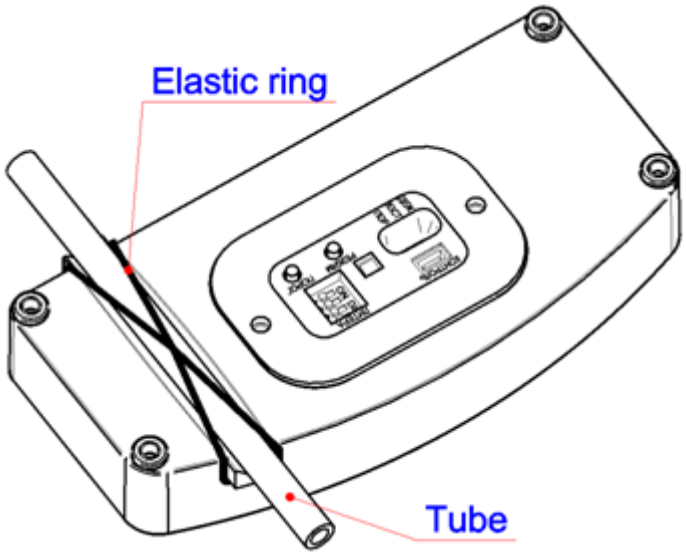


Figure 2.5

2.4.2. Exact Adjustment of the Transmitter and the Receiver.

2.4.2.1. Open Cover 10 of the receiver (Figure 1.2).

2.4.2.2. Connect the multimeter (mode of constant voltage measurement) to the socket TEST of the receiver using the core from the sensor kit. Power the sensor.

2.4.2.3. Pressing the button MODE take the sensor to the adjustment mode, the LED ADJ will switch ON.

2.4.2.4. Quietly turning by turns the transmitter and receiver in vertical and horizontal planes achieve the **maximal** value of the multimeter.

2.4.2.5. In case the signal value is less than 0,6 V, check the site for the requirements (p. 2.1.1-2.1.6).

2.4.2.6. In case the signal value is more than 2,7 V, misalign the transmitter and receiver upwards at a small angle so that the signal is from 2,6 to 2,7 V. It is not allowed to misalign the transmitter and receiver downwards and sidewards.

2.4.2.7. Tighten Cap screws 4 and 11.

Note.

Value 0,6 V corresponds to the signal level gain 18 dB. The sensor keeps performance at the adjustment signal from 0,1 to 2,9 V. The recommended band of signal from 0,6 to 2,7 V assures long term stable operation.

2.4.3. Configuration of the Triggering Threshold of the Sensor.

2.4.3.1. Pressing the button MODE choose THRESHOLD mode, the indicator THRS will switch ON. Pressing the button THRESHOLD, set the threshold maximal value (2,5 V).

2.4.3.2. Set the thresholds by making control crossing of the protected sector. Control crossing is made at full height or bent on different distances from the transmitter and receiver. Begin crossing in the middle of the sector. After the crossing go out of the detection zone on 1-2 m and make a pause of 5-6 s, otherwise the results of the previous crossing can influence the next crossing.

Make crossing at the speed of from 0,1 to 10 m/s perpendicular to the detection zone axis. The parameters of the operator crossing the sector should meet the parameters of a standard target: weight from 50 to 70 kg and height from 165 to 180 sm.

2.4.3.3. Make control crossing. The indicator THRS is switched OFF at not less than 3 s in case of alarm. If there is no alarm, decrease on one step the value of the detection threshold by pressing the button THRESHOLD and make another crossing.

Make control crossing at all the length of the detection zone , especially in problem places: in basins, on hills, near the fence, buildings, trunk of trees located in the detection zone, etc. Decrease the threshold if necessary.

Note. There is a risk of many false alarms caused by different noises in case of too reduced threshold. There is a risk of non detection of an intruder in case of too high threshold.

2.4.4. Estimation of the Noise Level in the Sensor Stand-by Mode.

2.4.4.1. Press MODE to go to the STAND-BY mode. This is the sensor operation mode. Control alarms looking to the STBY indicator. Use the multimeter to control the level of noises respectively to the threshold level.

It is important! In ideal conditions, in case of no noises, the signal value in STBY mode is zero. Action of an intruder or noises increases the signal, and after the threshold is achieved, the sensor triggers. Comparing the level of noises at the absence of the intruder and the threshold level set in p. 2.4.3.2 you can estimate the noise environment on the site.

Standard level of noises is from 0 to 0,3 V. In case the signal value in STBY mode achieves the half of the threshold value, take measures to reduce noises and, accordingly, to reduce the possibility of false alarms. Do the following:

- check if the site meets the requirements mentioned in Subsection 2.1 (branches, high grass, moving objects can be cause noises especially under the wind);
- estimate the influence of moving objects to the level of noises (cars, people, animals) near the detection zone;
- estimate the influence of the sensors FORTEZA-500, FORTEZA-300, FORTEZA-200, FORTEZA-100, FORTEZA-50 located nearby and having the same frequency letter which disconnect or close the «foreign» transmitter;
- estimate the electromagnetic environment in the detection zone (presence of powerful radio frequency radiators) which disconnect or close the «its own» transmitter in adjustment mode;

After you find out the reason of noises, take measures to remove them or eliminate the influence to the sensor.

2.4.4.2. Replace Cover 10 of the receiver.

Note. Estimate the value of the useful signal respectively to the triggering threshold level during control passages.

2.5. Configuration of the Sensor using the PC.

2.5.1. The PC allows to visually estimate the signal, thresholds and noises levels, produce sound alert in case of alarm and configure some parameters which cannot be configured using the multimeter.

The PC can be connected to the socket TEST on the receiver using the standard cable USB A-miniB or remotely via the interface RS-485 (outputs A and B of the receiver). It is allowed to connect the PC through the socket TEST while RS-485 is operating. In this case the communication via RS-485 can be interrupted. The control and indication units of the receiver keep performance in case of the PC connected.

The configuration is made using the software Config Forteza Series. The driver of the virtual COM-port is necessary for the software operation. The software is located on the Website www.forteza-eu.com. The sequence of actions and detailed recommendations are given in the program windows.

2.6. Remote Control of the Sensor Performance.

2.6.1. In order to check the sensor performance from the control and indicating device (control panel, monitoring system) energize with 5-30 V the transmitter input TEST respectively to the «minus» of electric power supply on 1-3 s. In this case the correct sensor should trigger.

2.7. Trial Operation of the Sensor.

2.7.1. Test the sensor for 2-3 days after the configuration in order to find out possible errors.

2.8. Recommendations for Connection of RS-485 Interface.

2.8.1. The example of connection of the sensors to the line RS-485 is given in Figure 2.6. You will need the three wire interface RS-485 and the converter with galvanic isolation.

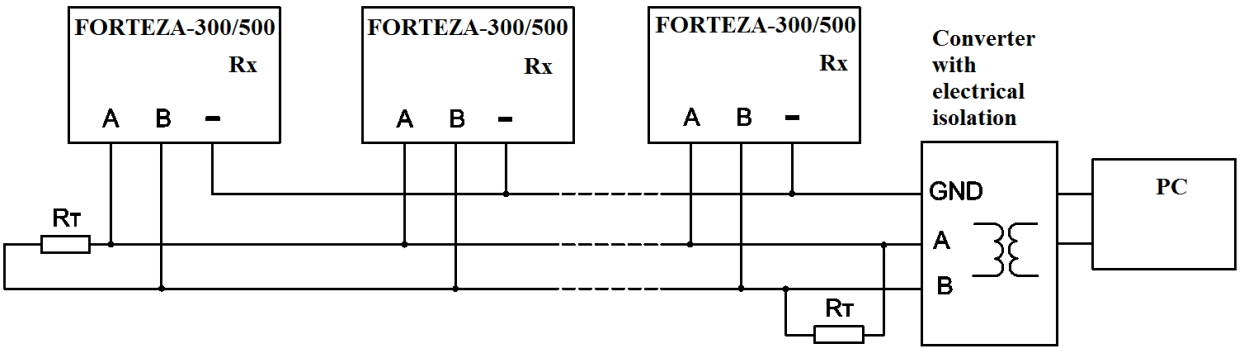


Figure 2.6.

2.8.2. The example of protection of the line RS-485 against lightning is given in Figure 2.7. The lightning guard unit LGU1 is recommended in all the cases. You need the lightning guard unit LGU2 in case the piece of the interface line from the sensor up to the next device is more than 500 m. In case of shorter length of the communication line, the protection against lightning is made by the sensor integrated elements.

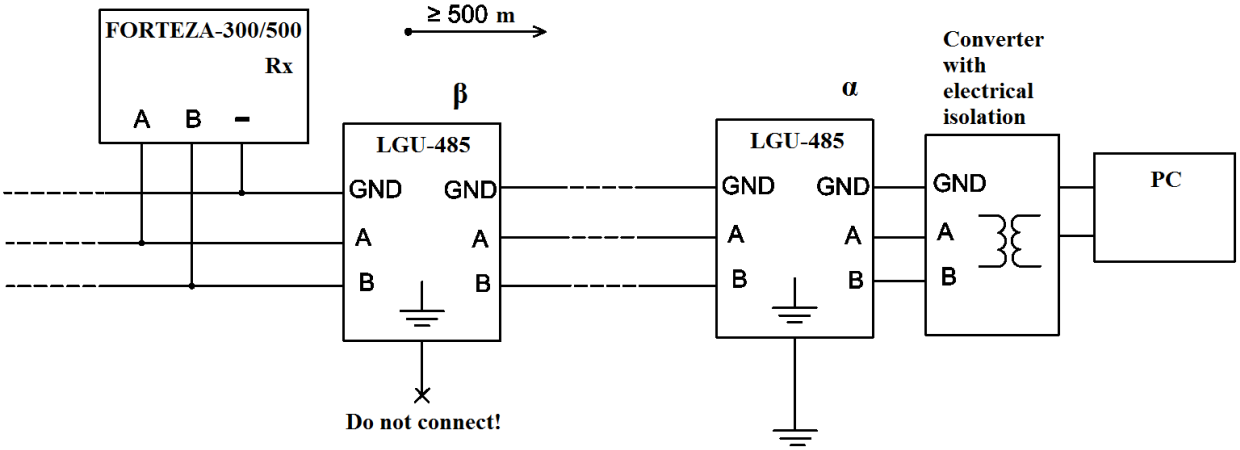


Figure 2.7

Important: only one lightning guard unit from all the units connected to the line should be connected to the ground. It is necessary to use special lightning guard units for interface lines, for example, LGU-485DIN produces by OOO Okhrannaya technika.

3. Operation of the Sensor with the Reflector.

3.1. In order to make the breaking of the sensor detection zone on difficult perimeter sites REFLECTOR-820. (Delivered at the customer's order with the necessary bracket.).

3.2. When operating with REFLECTOR -820 the total length of the detection zone L1+L2 (l1 – distance between Tx and the reflector, L2 – distance between the reflector and Rx, see Figure 3.1) should not exceed 70 m.

The shape of the detection zone, its width and height for the piece L1 (L2) are the same as for the sensor sector with the length L1 (L2).

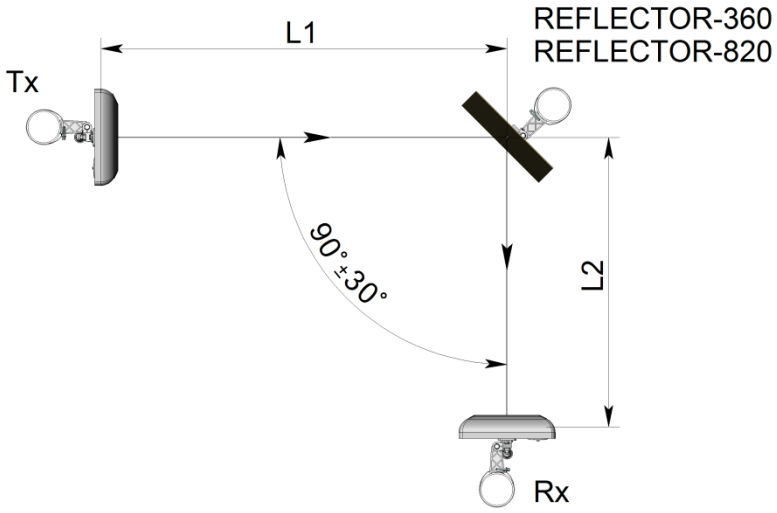


Figure 3.1

3.3. Configuration procedure.

3.3.1. Install the transmitter, receiver and reflector according to Section 3 of the present UM and Figure 3.1. Install the transmitter, receiver and reflector on the same height respectively to the ground (Figure 1.2).

3.3.2. Make rough adjustment of the transmitter and receiver to the direction of the reflector. Open the cover of the receiver and connect the multimeter or the PC using the core to the socket TEST. Power the sensor.

3.3.3. Changing the position of the reflector, transmitter and receiver achieve the signal on the socket TEST. Make exact adjustment and configuration of detection thresholds according to Subsection 2.4.2, 2.4.3.

Detailed description of operation with the reflector is given in User manual for REFLECTOR-820.

4. Maintenance of the Sensor.

4.1. Checking of the sensor performance.

4.1.1. During exploitation of the sensor it is recommended to make control passages or make remote checking of the sensor performance by transmitting the signal TEST 1-3 times a day.

4.2. Maintenance.

4.2.1. Maintenance of the sensor is made by the staff specially trained and instructed.

4.2.2. During exploitation of the sensor it is necessary to make monitoring and prevention works periodically.

4.2.2.1. Every month:

a). check the appearance of the transmitter and receiver units. It is necessary to check if there is no dust, dirt, snow and ice on the transmitter and receiver units from the side of radiation (receive) and clean them if necessary.

b). check the appearance of the site where the transmitter and receiver are installed if there is no foreign objects.

4.2.2.2. Every three months:

a). Make works given in p. 4.2.2.1.

b). Check the state of cables and cable connections.

4.2.2.3. During seasonal works control the height of grass. In case the grass is higher than 0,3 m it is necessary to remove it.

4.2.3. In case of change of height of snow cover on the site false alarms can appear because of reducing the input signal on the receiver. Remove the snow or change the height of installation of the transmitter and receiver.

After you change the height of installation of the transmitter and receiver, readjust and reconfigure the thresholds using the procedure above.

4.3. Safety Measures.

4.3.1. Follow the actual safety measures for exploitation of electric installations under voltage up to 1000 V when installing, maintaining and repairing the sensor.

4.3.2. The sensor is powered from the source of constant current with voltage from 9 to 30 V or from the 220 V AC main through the power supply unit PSU-U-15-0,15 (PSU-U-24-0,7). That is why before beginning the works study the location of elements and cables under high voltage inside the power supply unit.

4.3.3. Lay, prepare and connect the cables to the terminal blocks only when the power supply is OFF.

4.3.4. Replace the fuse in the PSU only when the power supply is OFF.

4.3.5. It is prohibited to install and maintain the sensor during lightning.

4.3.6. Installation, maintenance and repair of the sensor is made by the staff specially trained and instructed and passed the exam on safety measures.

5. Troubleshooting Guide.

The list of possible failures is given in Table 5.1.

Table 5.1.

Failure, External manifestation	Possible reason	Repair
1. Constant alarm on the control and indication device.	1. Communication or power supply line is damaged. 2. Different letters on Tx and Rx. 3. Incorrect sensor adjustment. 4. Transmitter failed. 5. Receiver failed.	Check the cable integrity and connection. Set the same letters, disconnect and connect the power supply. Make exact adjustment of the transmitter and receiver. Replace the transmitter. Replace the receiver.
2. False alarms of the sensor.	1. Influence of moving trees in the detection zone. 2. Influence of moving high grass in the detection zone. 3. Reduced input signal on the receiver caused by the change of snow cover higher than allowed. 4. Moving of animals in the detection zone. 5. Too low thresholds on the receiver.	Check the site and remove possible noise factors. Check if the thresholds of the receiver are set correctly.
3. No alarm after crossing the detection zone.	1. Too high thresholds on the receiver. 2. Incorrect sensor adjustment.	Check if the thresholds of the receiver are set correctly. Make exact adjustment of the transmitter and receiver.

6. Storage.

6.1. The sensor is stored packed in warehouses at the ambient temperature of +5 up to $+30^0$C and the relative humidity of 85%.

Action of aggressive environment is not allowed during storage.

7. Transportation.

7.1. The packed sensors can be transported by any means of transport (in pressurized modules of aircrafts) in closed carriages, holds or car bodies.

Put the boxes to avoid moving or falling in case of shocks.

Security Sensors
FORTEZA-300, FORTEZA-500
Passport

Declaration of Conformity
ТС № RU Д-RU.AB24.B.00418

The sensor purpose and technical specifications are given in appropriate sections of the User Manual.

1. Delivery kit.

The delivery kit includes:

- transmitter 1 pc.;
- receiver 1 pc.;
- mounting kit 1 kit;
- instrument and measurement kit 1 kit;
- user manual, passport 1 pc.

2. Acceptance certificate.

The sensor FORTEZA-_____ factory number _____ meets the technical regulations 4372-003-53714857-2013 and is considered ready for service.

Production date _____ 201

QD stamp

3. The manufacturer warranties.

3.1. The manufacturer guaranties the correspondence of the sensor specifications to the technical regulations 4372-003-53714857-2013 while meeting by the customer the regulations and the rules of exploitation given in the User Manual.

3.2. Warranty period is 3 years from the date of sale by the manufacturer.

3.3. The warranties do not cover the sensors with:

- damaged warranty seals;
- mechanical damages;

and failed because of natural disasters (lightning, fire, flood).

3.4. Mean lifetime is 8 years.

Date of sale _____201

Contact the manufacturer for warranty and post warranty maintenance.
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
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