



INTRUSION LOCAL WIRE-WAVE DETECTOR

RELIEF
Patent RU 2273884
Operating Manual
4372 – 43071246 – 028 PЭ

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The present operating manual contains information about the intrusion detector “Relief”, patent RU 2273884, hereinafter referred to as the detector. In the manual you can find information about:

- the purpose and the principle of operation of the detector;
- structure and possible delivery sets of the detector;
- the detector specifications and its components;
- operating rules and maintenance.

In the document you can also find information about the container, package and conditions of the detector transportation.

The information is given within the scope necessary for the correct operation, maintenance and routine repairs of the detector.

The following abbreviations are used in the document:

- ДК (RC) – remote control
- ППК (RCD) – receiving and control device
- ППМ (Rx) – receiver
- ППД (Tx) – transmitter
- ЗО (DZ) – detection zone
- ЛЧ (LP) – wire local part
- НП (LW) – lower wire
- БП (UW) – upper wire

The manufacturer constantly improves the detector and can modify its construction which does not worsen the detector specifications.

1. Description & Operation

1.1. The Detector Purpose

1.1.1. The purpose of the detector is to protect perimeters of different sites with the difficult relief with some over falls of height and some turns of the horizontal plane. Snow and grass up to 1m at the “surface” application if UW is located at the height of 1, 8 m.

1.1.2. The purpose of the detector is to detect an intruder entering a detection zone to his full height or having bent during “near –the –ground”, stile, “visor” use. A detection zone is generated between an upper wire (UW) and a lower wire (LW) of the wire local part.

1.1.3. The detector is intended to operate with receiving-control devices (RCD) detecting breaking the contacts of the detector output relay.

1.1.4. The detector keeps operating when it is influenced by:

- the temperature $-40^{\circ} \dots +65^{\circ} \text{C}$;
- relative humidity up to 98% at the temperature $+35^{\circ} \text{C}$.;
- precipitations such as rain, fog and snow;
- solar radiation;
- wind at the speed of 20 m/sec, blast –of 30 m/sec.

1.2. Specifications

1.2.1. Detection probability of an intruder is 0, 98 minimum.

1.2.2. They form a protective boundary 25...250m long in case of visor application or they form a protective boundary 25...200 m long in case of surface application.

1.2.3. The distance between LP wires in case of visor application is 0, 7m...1 m, in case of surface application is 1, 2 m...1, 8 m.

1.2.4. Time of the detector availability for operation after supply is ON – 60 sec maximum.

1.2.5. The detector generates “ALARM” (“ТРЕВОГА”) signal when an intruder entering detection zone to his full height or having bent of “near –the –ground” application at the speed 0, 1 m/sec...10 m/sec or stile through the obstacle between the LP wires of “visor” use.

1.2.6. Duration of “ALARM” (“ТРЕВОГА”) signal (open contacts of the output relay) is 3...6 sec.

1.2.7. Time of the detector availability for operation after “ALARM” (“ТРЕВОГА”) signal generated is 10 sec maximum.

1.2.8. The detector does not generate ALARM signal (ТРЕВОГА signal):

- when a group of people circulates at the distance of 1,5m minimum from LP;
- when cars (e.g. UAZ) circulate at the distance of 2m minimum from LP;
- when small animals (e.g. a cat, a dog 0,5m high and up to 20 kg) circulate in a detection zone.

1.2.9. Supply voltage is 10...30 V on Rx; Tx supply is provided from Rx through LP wires.

Consumption current of the detector is 50 mill amperes maximum.

1.2.10. Parameters of load on the output relay:

- voltage is 50 V maximum;
- current via the contacts is 0, 1 A.

Resistance of normal closed relay contacts is $125 \pm 25 \text{ Ohm}$.

1.2.11. The detector provides the possibility of remote test of the operation by signal injection of the remote control with voltage 10...30 V.

Duration of the remote control signal is 3...10 sec. Current of the remote control is 5 mill ampere.

1.2.12. The detector generates “НЕИСПРАВНОСТЬ” signal (a failure signal) in the form of constantly open contacts of the output relay:

- when any of LP wires is broken;
- in case of short circuit of LP wires between each other;
- deficient level of hyper frequency signal;
- differential level of hyper frequency signal for the operation;
- in case of supply voltage fall;
- in training mode.

1.2.13. All external circuits of the detector are protected with built-in lightning guard.

1.2.14. Detector weight is 2 kg maximum.

1.3. Detector Structure

1.3.1. The detector structure is given in table 1.1.

Table 1.1.

Detector structure			
Name	Symbols	Q-ty	Notes
Receiver ПРМ (Rx)	ЮККО 28.01.000	1	
Transmitter ПРД (Tx)	ЮККО 28.02.000	1	
Mounting kit for Rx and Tx:			
Bracket		2	
Screw to fix a bracket		4	
Male screw M4×55 of Tx and Rx		4	
Nut M4		4	
Washer	ЮККО 28.06.000	8	
Operating manual	4372-43071246-028РЭ	1	
Package		1	
Connector of LP (non-detachable)	ЮККО 28.03.010		Kit-4 items; For LP recreation during defects
Connector of LP (separable)	ЮККО 28.03.000		Kit-4 items; For LP recreation during defects. For the organization of temporal passages in LP with the following reconstruction.
Grounding conductor	АНВЯ.442314.005-A		Kit-2 items
Supply unit БПУ-24-0,5 (BPU-24-0,5)	ЮККО 26		
Junction box Barrier-JB	ЮККО 21.03.000		
Linear mounting kit-1: bracket-1 kit; dielectric console (wooden) 1m-1 item; splint-2 items, screw-2items, nut-2 items; washer-4 items; screw nail-2 items.	ЮККО 28.06.030		Mounting kit quality depends on the LP length
Linear mounting kit-2: Bracket-1item; dielectric console (wooden) 1,8 m-1 item; splint- 1item; screw-3 items; nut-3 items; washer-6 items.	ЮККО 28.06.040		Mounting kit quality depends on the LP length
Linear mounting kit-ST1: Bracket-1 item; dielectric console (glass fiber plastic) 0,9m-1 item; splint-2 items; screw-2 items; nut-2 items; washer-4 items; screw nail-2 items.	ЮККО 28.06.010		Mounting kit quality depends on the LP length
Linear mounting kit-ST2: Bracket-1 item; dielectric console (glass fiber plastic) 1,8 m-1 item; splint-1 item; screw-2 items; nut-2 items; washer-4 items.	ЮККО 28.06.020		Mounting kit quality depends on the LP length
Wire of the field connection П-274М (P-274 M) for the LP making			Length of a wire is fixed in the order

1.4 Arrangement & Operation

1.4.1 The principle of the detector operation is the following. A detection zone (DZ) is generated between the wires UW and LW which form wire local part. Tx is connected to the one end of LP and it generates an impulse high frequency signal. Rx is connected to the other end and it constantly controls the parameters of an impulse high frequency signal. An intruder entering a detection zone causes the change of an impulse high frequency signal. This change is processed in Rx and as a result an alarm signal (TPEBOΓA signal) is generated.

1.4.2 ATTENTION! The parameters of an impulse high-frequency signal can be changed under other influences, such as the shift of the wires about each other caused by their deflection exceeding the accepted value; swinging branches of trees, bushes, grass above 1,0 m and flocks of birds in the detection zone; the influence of powerful external electromagnetic interference. All these influences are considered to be interferences and they must be reduced to the minimum to prevent false alarms generated by the detector.

1.4.3. The following measures provide the reduction of interference influences on the detector operation:

- the corresponding algorithm of information processing in Rx;
- the fulfillment of instructions related to the detector correct installation;
- timely maintenance of the detector.

1.4.4 Operation algorithm of the detector assumes its tailoring to the specific type of a protected boundary and operation conditions. For this purpose during the first connection the detector is trained by simulating the intrusion or by intruding into a protected sector by a tester.

The training mode is switched on/off by switching the “P/O” wire of an output cable. Operating in the training mode the detector studies the noise level and the level of a signal from the tester and depending on these factors the sensitivity is set.

If power supply is OFF, the detector settings are stored in the nonvolatile memory. When power supply is ON, the detector is switched to the operating mode automatically.

1.4.5 The LED is provided in the detector for operability. The LED is switched on only in the training mode and it gives information about the following (see table 1.2.):

Table 1.2.

Indicator reading	Detector's condition	Detector's mode for Operation	Note
1. Alternate blinking of red and blue color	Operable	Training mode	
2. Impulse blinking of the blue color only	Faulty	Training mode. The excess of the permissible level of an impulse high-frequency signal.	The repair of possible malfunctions is given in table 2.1.
3. Constant glow of the blue color	Faulty	Training mode. Insufficient level of an impulse high-frequency signal	The repair of possible malfunctions is given in table 2.1.
4. Impulse glow of the red color	Faulty	Training mode. Closing of LP wires	The repair of possible malfunctions is given in table 2.1.
5. Constant glow of the red color	Faulty	Training mode. LP broken wires	The repair of possible malfunctions is given in table 2.1.

1.4.6 Remote control is provided in the detector to control its running order and operability. Remote control is provided by giving a RC signal through PC or separate switching unit for 3 sec minimum. The remote control signal must be given on the wire “RC” (“ДК”) of the outside RX cable. The RC signal can be given from separate power supply too but the “-“units must be integrated. The operable detector giving RC must generate the ALARM (“TPEBOΓA”) signal.

1.4.7 Rx and Tx units are designed in the form of short consoles mounted on the opposite ends of a protective boundary.

1.4.8. Intermediate consoles of detector local part are made of dielectric material and used for mechanical fixation of the wires along the protective boundary.

1.4.9 Power supply of the detector is carried out from a secondary power supply with 10...30 V dc voltages (БПУ (BPU)-24-0, 5). Power supply from the source is given to Rx; Tx power supply is given over the LP wires from Rx.

1.4.10. A long protective boundary consisting of several sectors is formed according to fig. 1.1. The beginning and the end of the line must be realized by any electronic unit Rx or Tx.

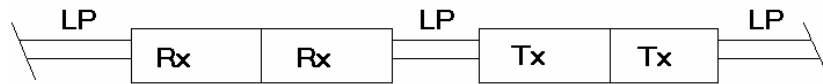


Fig. 1.1 How to Form a Long Protective Boundary

ATTENTION! It is necessary to install two Rx or two Tx. It is forbidden to install Rx next to Tx of adjacent sectors for the reason of false alarms generation.

1.4.11. Mounting of Tx or Rx of the adjoining protective boundaries related to each other, on the obstacle of brick, reinforced concrete, zinc-plated welded array or in case of the surface application (fig. 1.2). Distance between the units must be 0, 2...0, 3 m.

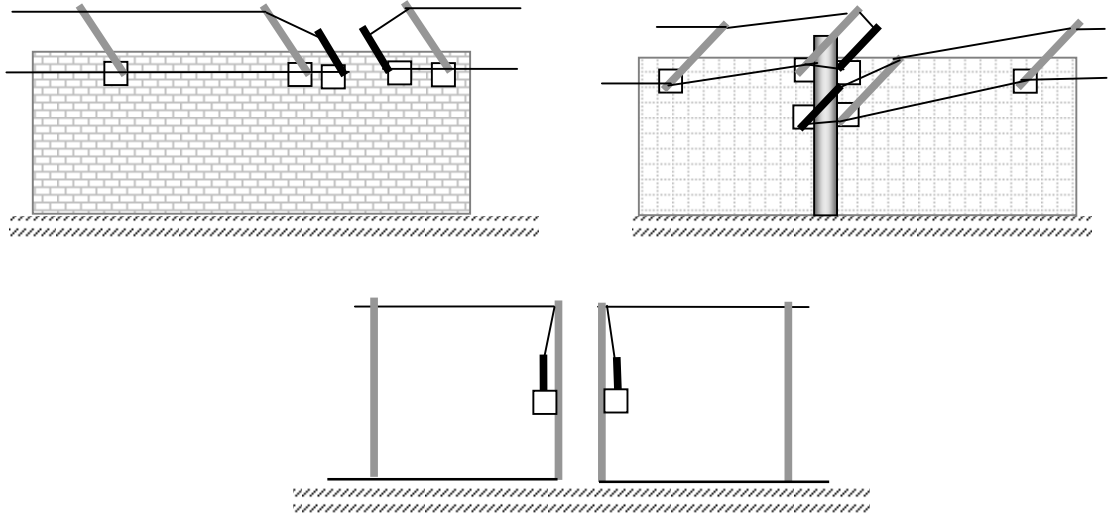
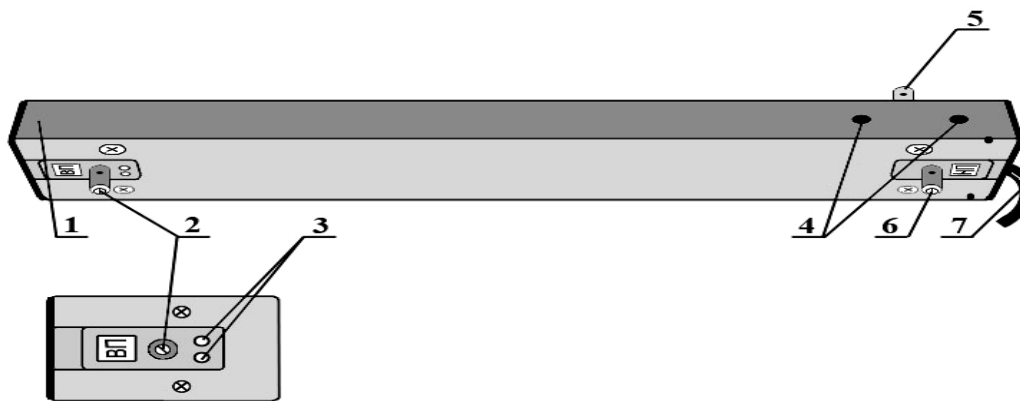


Fig. 1.2 Tx or Rx Installation of the Adjoining Protective Sectors related to each other on the Fence and in the Surface Application of the Detector

1.5 Construction Description

1.5.1 Rx construction is given in fig. 1.3.



- 1 – case; 2 – UW contact; 3 – dichromatic LED;
- 4 – holes to fix the unit to the bracket;
- 5 – bonding point; 6 – LW contact; 7 – output cable.

Fig. 1.3 Rx Construction

Rx is placed in the metal case (pos.1); on the sides there are holes to fix the unit to the bracket (pos.4). On the side surface of Rx there is a hole of the manual control sensitivity “S” (“Ч”) closed by plug. On the Rx upper side there is a bonding point (pos.5). On the Rx under side there are contacts to connect UW and LW of LP (pos.2 and 6 correspondingly) and a dichromatic LED (pos. 3). On the Rx end side there is an output cable (pos. 7).

1.5.2. Tx construction is similar to Rx one but in Tx there is not a dichromatic LED and an output cable. Tx is equipped with an auxiliary contact indicated as “UW1” (BII1) and intended for the UW connection in case of the excess of the impulse signal permissible level at the LP little length.

1.6 Marking

1.6.1 Tx and Rx are equipped with the plates indicating their designation, serial number and date of production.

1.6.2 The name and the trade mark of the manufacturer, a PCT symbol (знак PCT), name, number of specifications, serial number and date of production of the detector are marked on the consumer package.

1.7 Package

1.7.1 Tx and Rx are packed in the consumer package (corrugated board boxes or cases).

1.7.2 In the consumer containers Tx, Rx and a mounting kit are wrapped in the wrapping paper. User's documentation is packed in the polyethylene case.

In the boxes the measures are taken to prevent shifting the detector components during transportation.

2. Intended Use

2.1. Safety Measures

2.1.1. The detector must be mounted according to the requirements of the present operating manual.

2.1.2. Setting-up procedures and the detector maintenance must be carried out observing the requirements of norms on safety measures.

2.1.3. The staff must have the leave for work with electrical facilities up to 1000V voltage.

2.1.4. LP wires are mounted and connected only when supply voltage is OFF.

2.1.5. It is prohibited to operate with the detector during thunderstorm or before it.

2.2. Preparation for the Use

2.2.1. Unpack the detector. Carry out the external examination of the detector components. On the outer surface there must not be any defects resulted from the transportation and unpacking.

2.2.2. Check the complete kit of the detector according to table 1.1.

2.3. Requirements to the Place of Mounting

2.3.1. The minimum distance between the protective boundary and branches of trees, bushes and other moving objects related to LP must be 2 m.

2.3.2. The fence where the detector is mounted must be fixed and it must not move under the influence of wind.

2.3.3. If there are high-voltage power transmission lines near the protective boundary, the distance between the wires of the detector local part and the wires of high-voltage power transmission lines must be 8 m minimum.

If it is necessary to cross high-voltage power transmission lines, LP detector must cross LP at 90°.

2.3.4. The detector local part is an antenna that is why powerful radio signal sources (e.g. broadcasting stations, locators and similar equipment) can cause malfunctions or failure of the detector.

The matter of the detector use in such situations is solved by trial operation.

2.3.5. The protective boundary can swivel at the angle of 90° in the horizontal plane and at the angle of 40° in the vertical plane. Each angle of swivel at 90° reduces the maximum length of a protective boundary at 10 – 15 m.

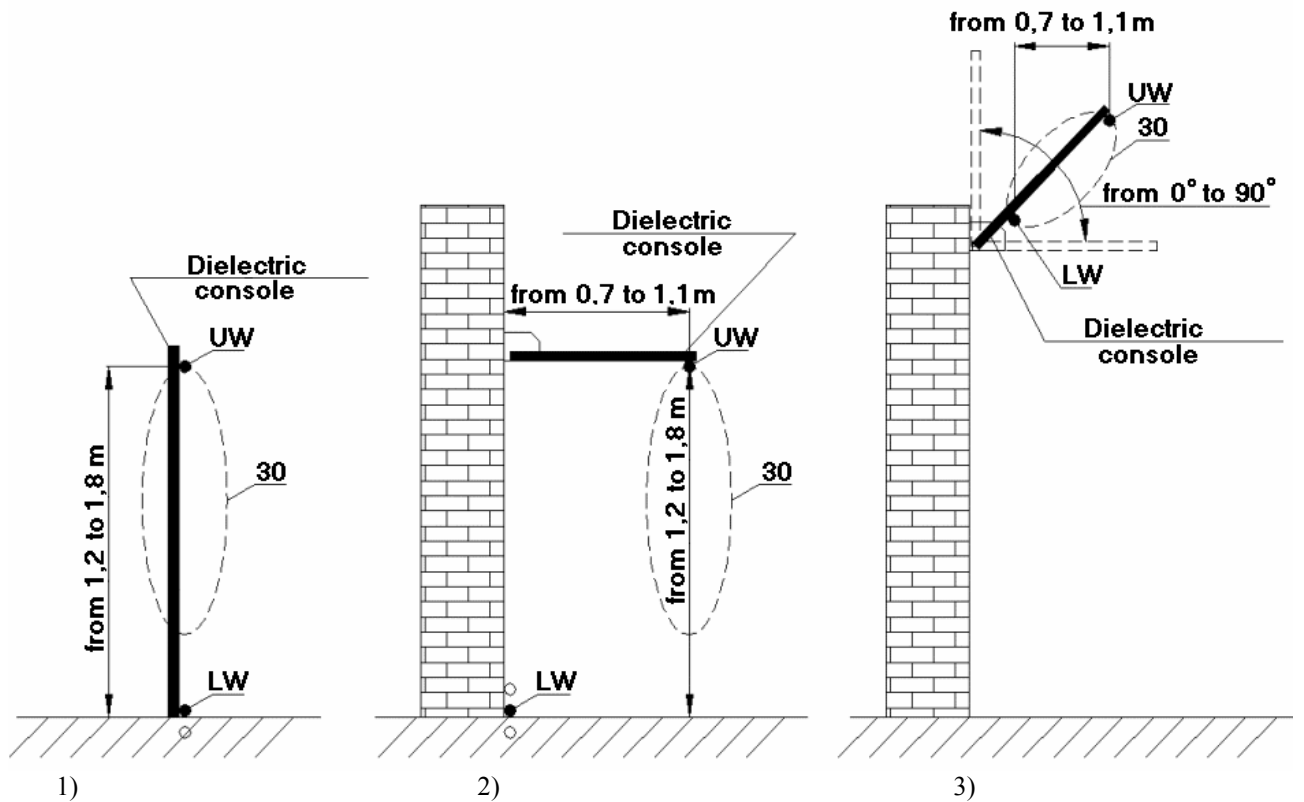
The number of turns at the 90° angle in the protective boundaries should not exceed four.

2.4 Mounting Procedure

2.4.1. LP mounting

2.4.1.1. LP of the detector is mounted:

- on the ground ("near-the-ground" installation; see fig.2.1.1) with MK-2 (the linear mounting kit), MK-ST2 use;
- on the fences, walls ("near-the-ground" installation; see fig.2.1.2) with MK-1 (the linear mounting kit), MK-ST1 use;
- on the fences, walls, roofs and cornices of buildings in the form of the visor application (see fig.2.1.3) with MK-1 (the linear mounting kit), MK-ST1 use.



Note: 1. Detector DZ is shown with a dotted line. DZ sizes depend on the set sensitivity of the detector.
 2. As for the “near-the-ground” use, it is recommended to fill up LW (HII) in the ground or to fix the wire on the barrage. It is prohibited to impair the LW isolation.

Fig. 2.1 LP allocation

2.4.1.2. LP is made of the conductors of field communication wire II-274M (it is a twisted pair). Therewith, UW must be made of one conductor; LW can be a twisted pair. As for LW II-274M can be not developed.

2.4.1.3. Making LP it is recommended to fix the wires to dielectric consoles according to fig.2.2.

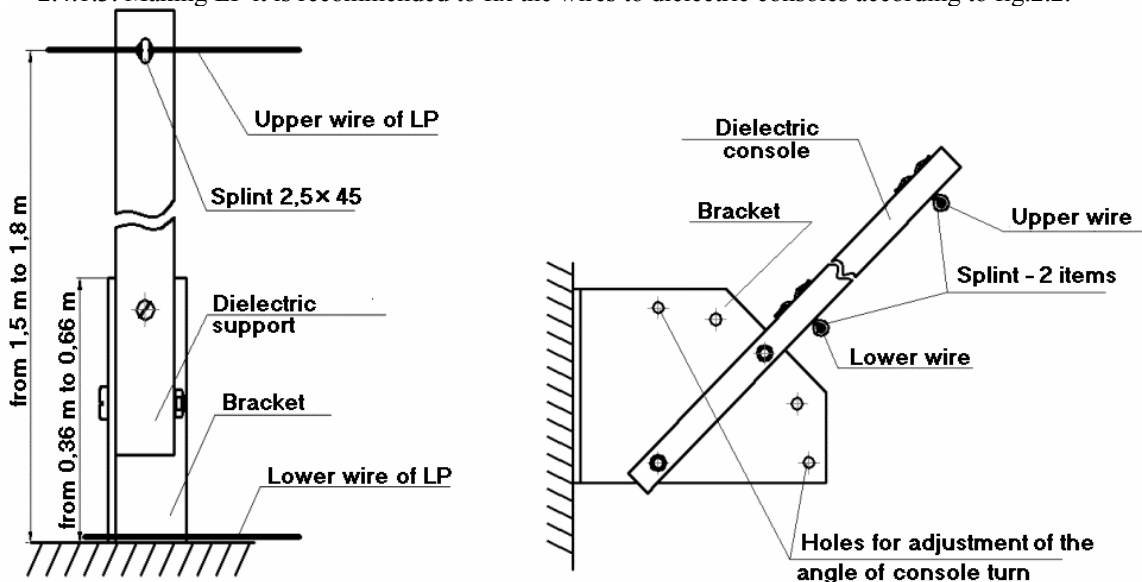


Fig.2.2. Wires fixing of LP detector

2.4.1.4. It is forbidden to store up UW wrapping it on the dielectric consoles or Rx, Tx.

2.4.1.5. Linear MK (mounting kit of the detector) is installed in the distance 3...9.m each from other.

Power and frequency of possible wind influences determine the distance between the linear MK in the place of the detector operation. The distance recommended between the linear MK is from 4 to 6 m. If the wind is hard and frequent, it is necessary to decrease the linear MK. If the wind is low and rare, it is necessary to increase the distance between the linear MK.

2.4.1.6. The brackets are fixed to the fence, the support or the console with screw nails included in the linear MK.

The brackets can be fixed with bolts, welding or other means providing their safe mounting.

2.4.1.7. Dielectric consoles are fixed to the brackets with screws included in the linear MK.

2.4.1.8. LP wires are fixed on the dielectric consoles with splints included in the linear MK. Not to fix LP wires and not to bite their isolation, the splint is mounted in the dielectric console.

Free displacement of the wires in the splints provides their proportional pulling along to all LP length.

For the ground variant LW is not fixed to the dielectric console but it is laid along the ground. LW can be buried of the depth 0, 1m maximum or fixed above ground on the fence or the consoles. Not to injure the wire isolation during its mounting or its operation, it is necessary to fix this wire.

2.4.1.9. If LP turns, the linear MK is fixed on the inside or outside angles of the fence according to 2.3.

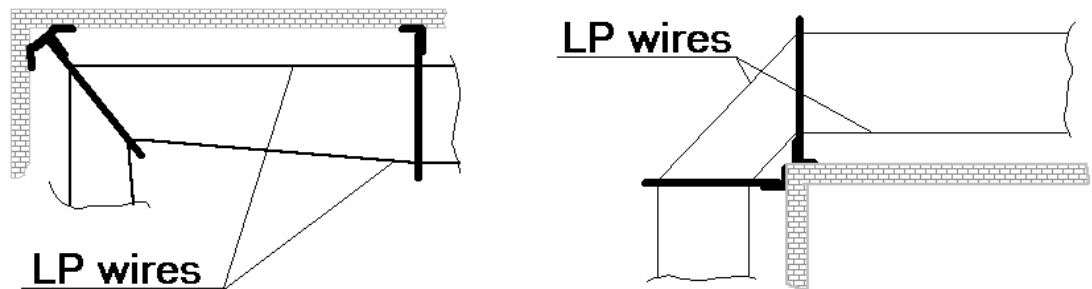


Fig.2.3. LP turns inside and outside the fences

2.4.1.10. In case of fence height difference brackets should be mounted according to fig. 2.4.

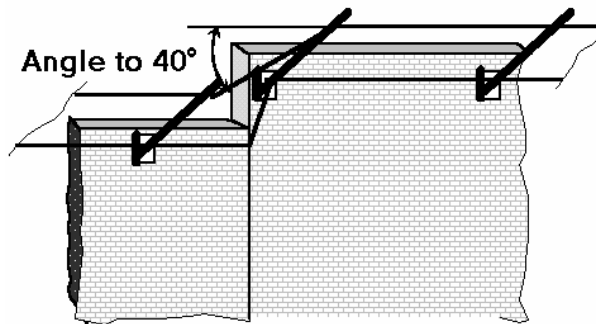


Fig. 2.4 Brackets Mounting in case of Height Difference

2.4.1.11. If LP gets vertical or it goes to the opposite side of the fence it is necessary to provide blending using the possibility to adjust the tilt angle of dielectric consoles according to fig. 2.5.

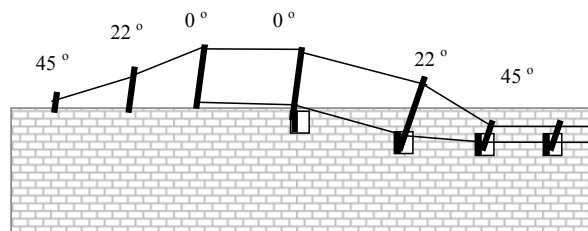


Fig. 2.5 LP Height Difference

2.4.1.12. Fix LP wires on dielectric consoles or posts using hold-downs and strain them to provide their minimal droop.

2.4.1.1.3. To prevent breakages of dielectric consoles pulling LP wires in the place of turns and on the end consoles, it is necessary to mount balance backstays from kapron or similar cord.

2.4.1.14 Check the wire loop in some places with a thread and a ruler.

Strain the thread between neighboring dielectric consoles placing it on the splints of LP wires mounting.

Measure the distance with the ruler from the wire to the control thread in the middle of the bay. The wire droop must be 5 mm minimum.

2.4.2. Rx and Tx setting-up

2.4.2.1. Tx and Rx are mounted on the brackets of the basis mounting kit. They are mounted on the LP opposite sides. The units are fixed to the brackets as LP consoles are fixed in the distance 1 m maximum.

2.4.2.2. The brackets are fixed with the screws (included in MK) to the fence, the support or the console.

It is possible to fix the brackets with the bolts, welding or other means providing their safe mounting.

As for the “visor” variant, it is necessary to install the brackets in the level of LP; for the ground variant- 1, 2 m minimum from the ground.

2.4.2.3 Fix Rx and Tx on the brackets with the screws included in MK of units fixing. The units’ mounting is given in fig.2.6.

2.4.2.4. In the place where Rx is mounted, a junction box (e.g. Barrier- JB) must be installed with supplied lines of communication. The number of junction box contacts is 8 minimum.

2.4.2.5. Tx and Rx must be grounded (see table 1). Metal stubs 1,5m long can be used as grounding conductors. They must be buried directly under the units.

During the organization of a stretched boundary of protection in the mounting places of Rx and Tx each electronic unit must be connected to its ground.

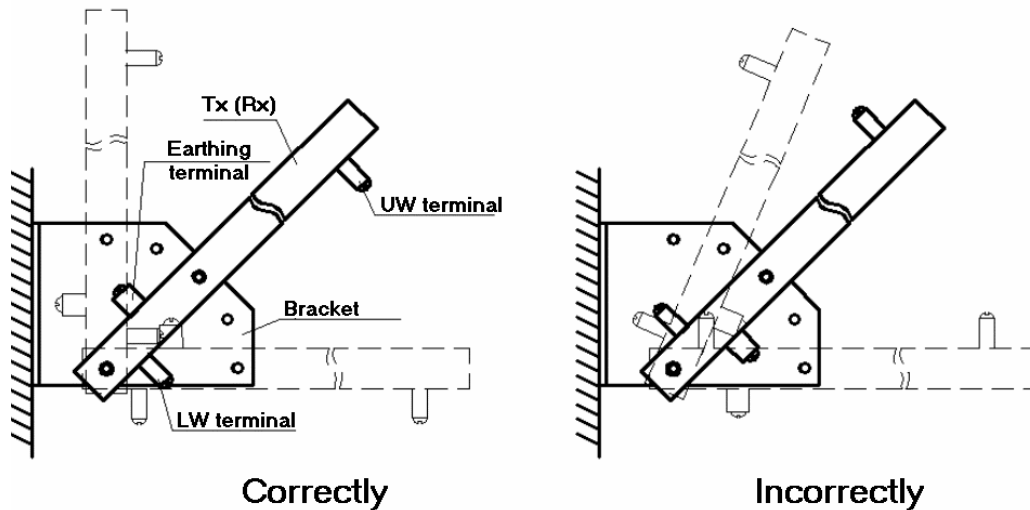



Fig.2.6 Rx and Tx setting-up

2.4.2.6. Connect a grounding conductor to the bonding point “” located on Tx and Rx. It is recommended to apply sealing material over the spots where LP wires are connected to enhance corrosion resistance.

A grounding conductor must be made of copper or steel galvanized wire, braid with the minimal section 2, 5 mm².

The grounding conductor must be laid along the shortest route. It must be fixed reliably and it must not swing because of external influences.

2.4.2.7. Other devices are not recommended to connect to the grounding conductors of the detector.

2.4.2.8. It is not recommended to use zero conductor runs, braids and the ground of electrical machines, mountings as the ground.

2.4.2.9. Strip insulation of wire ends. Connect the LP wires to the wires of UW and LW on Tx and Rx correspondingly. It is recommended to apply sealing material over the spots where LP wires are connected to enhance corrosion resistance.

2.4.2.10. To prevent the wires swaying of LP next to Rx and Tx, it is necessary to fix the wires on the extreme dielectric consoles with the dielectric buckle, the insulating-tape and to provide pulling-up of LP wires acceptable for Rx and Tx.

2.5. Preparation for the Operation

2.5.1. Connect the Rx output cable to the contacts of a junction box according to the marking and fig. 2.7.

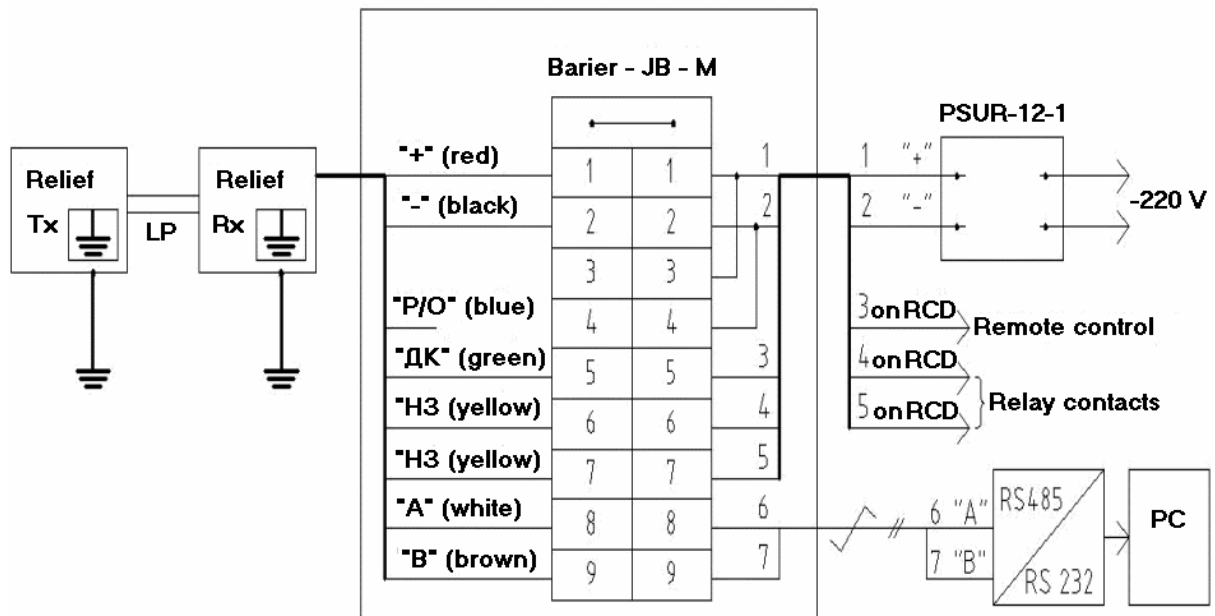


Fig.2.7 Connection of the Detector to the Junction Box

Note! The wires of Rx output cables marked with “A” and “B” symbols are the connection terminals of the serial channel RS-485. If the detector is not used in “FORTEZA-KS” system, it is necessary to prevent their closing between each other or with other circuits.

2.5.2. Fix the Rx output cable to prevent its swing caused by external influence.

2.6 Switching ON and the Detector Operation

2.6.1. Switch ON the detector power supply.

2.6.2. After that in 1 min. maximum the detector is operable for the standby state.

Two-color indicator doesn't glow, the contacts of the output relay are closed, resistance between the wires “H3” (NZ), “H3’ (NZ) cable must be (100 ± 25) Ohm.

2.6.3. If the output relay is opened, the requirements 2.7 must be followed.

2.6.4. Check the detector operation in the following way: with RCD or any device with the function of resistance dimension.

2.6.5. There is the sensitivity adjustment in the detector.

Check the sensitivity of the detector. Do control crossings (stiles) of DZ in different sites with the interval 30...60 sec, fix the ALARM signal generation (TPEBOFA).

2.6.6. The control exploitation is recommended if there were not false alarms or missing.

2.6.7. The sensitivity adjustment is necessary if there were false alarms or missing during the frequency check or the control exploitation.

2.7. Adjustment of the Detector's sensitivity

2.7.1. Switching On of the Automatic adjustment mode

2.7.1.1. In order to switch ON the automatic adjustment mode it is necessary to connect P/O wire of the output cable to contact “+” according to fig.2.8.

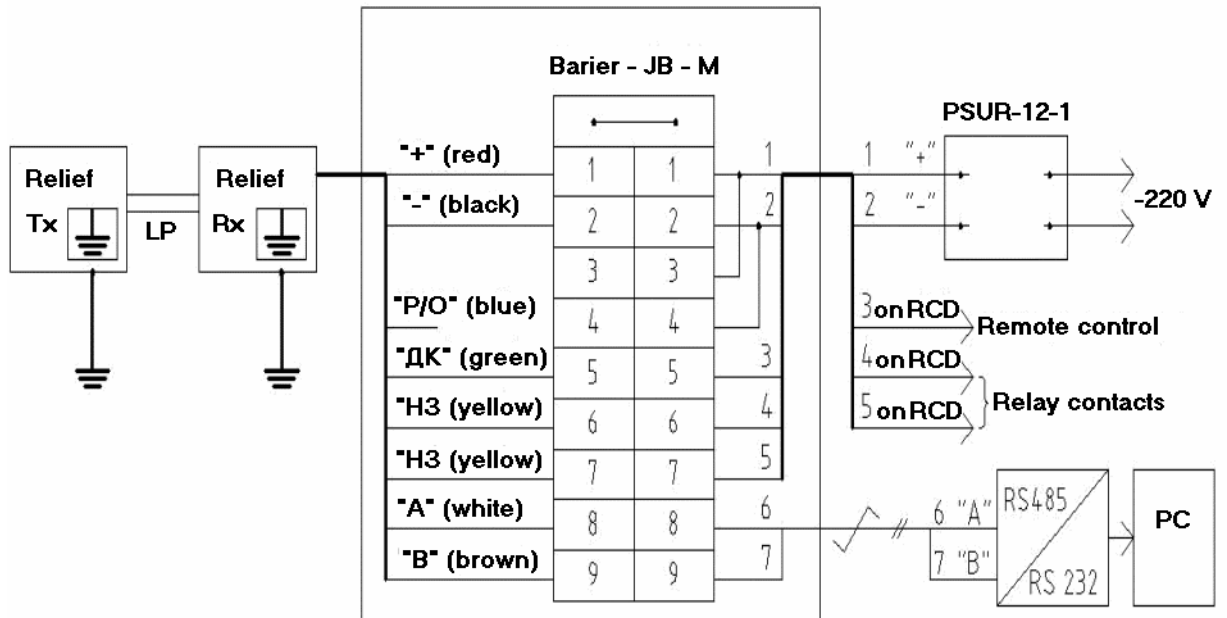


Fig.2.8 Connection of the Detector to the Junction Box of the automatic adjustment mode

2.7.1.2. In 1 min maximum Rx LED must glow with the red and blue color by turns, the output relay contacts must be open.

The detector is ready for the automatic adjustment mode.

Note! During the automatic adjustment mode an experienced operator should be a man of medium sizes, 1,65...1,75 m tall weighting 65...90 kg for the imitation of the security boundary overcoming.

2.7.1.3. For the passage accommodation from the training mode to the operating mode, is recommended to realize the automatic adjustment mode in the direction from Tx to Rx.

2.7.1.4. The total number of simulations depends on LP length and it is performed evenly; the distance is 4...10m. The total number of simulations **must be seven minimum**. The minimal time between penetrations must be 30 sec.

2.7.1.5. The process of the automatic adjustment of the sensitivity can be checked by sight according to dichromatic LED on Rx. If the LED on Rx glows the red and blue color constantly the detector is ready for operation. In this moment it is necessary to be situated from LP, Rx, Tx in the distance of 5 m. If it is not possible for some reasons the experienced operator and the assistant must not move.

If the LED on Rx glows the red and blue color constantly, the simulation of the DZ crossing is fixed, the detector processes the information, installs the detector's sensitivity and fixes the data in RAM of the microcontroller. In this moment the passage of the experienced operator is possible from one place of DZ overcoming simulation to other one.

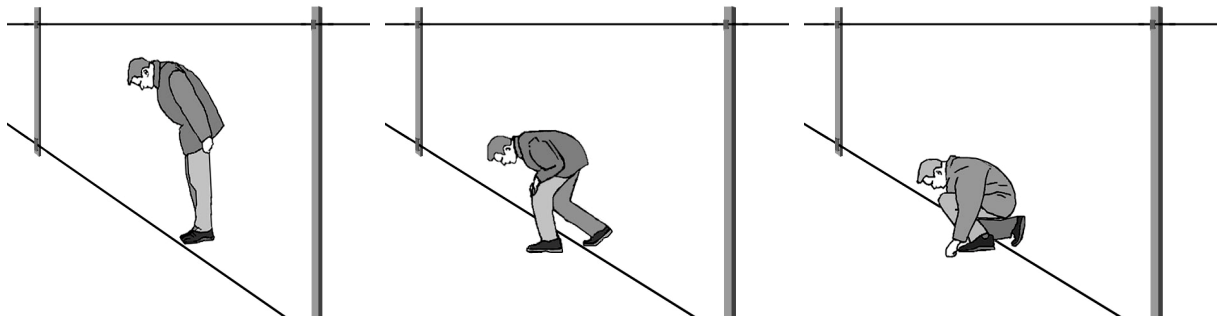
2.7.1.6. In the case when the detector power supply is OFF, the data in RAM is obliterated during the automatic adjustment. The microcontroller returns to the data of the manufacturer's adjustments or to the data of the previous adjustment of the detector stored in ROM.

2.7.1.7. The LED glowing of the red or blue means some defects. The type of the defect and its repair are given in item 2.8.

2.7.2. Adjustment of the Detector's sensitivity with the automatic alignment of "near-the-ground" installation

2.7.2.1. During "near-the-ground" installation of the detector (see fig.2.1. 1) and 2.1. 2) the operator performs some simulations of DZ overcoming by the following means (see fig.2.9).

The operator position relative to UW determines what sensitivity will be installed by the microcontroller.



- 1) experienced operator position in case of slow response setting;
- 2) experienced operator position in case of medium response;
- 3) experienced operator position in case of fast response.

Fig.2.9. Ways of Intrusion Simulations

2.7.2.3. The LED on Rx must glow the red and blue color constantly.

2.7.2.4. The operator must be prepared for DZ entering and take the position depending on the adjusted frequency.

2.7.2.5. The operator must realize the attempt of the overcoming:

- enter DZ of the detector;
- stop under UW for 3...5 sec;
- go away from UW in the starting-point or advance at a distance of 2...3m.

All the stages must be followed in the position depending on the adjusted sensitivity.

2.7.2.6.. If the penetration simulation is fixed, the LED on Rx starts glowing the red and blue color permanently for 10...15 sec.

Note. It is forbidden to wait for the red and blue color permanently when the operator is situated in DZ.

2.7.2.7. After the LED starts glowing in turns, the next simulation can be performed.

2.7.2.8. If penetration simulation is not fixed (it is not a malfunction), the detector training should be kept on in other points of LP. After the standby mode of the detector is ON in the point where the penetration is not fixed, it is necessary to penetrate there once again.

2.7.2.9. After the last attempt of DZ crossing it is necessary to translate the detector to the operating mode. To perform it, it is necessary to switch OFF the wire P/O from the contact 3 (“+” supply voltage) of the junction box.

It is necessary to switch OFF the wire P/O for the time of the LED constant glowing of the red and blue color. If it is impossible to switch ON the wire for some reasons for this time, it is necessary to take UW of the detector by the hand and to switch OFF the wire P/O, after that release UW of the detector.

Note. In the moment when the wire P/O is switched OFF, it is forbidden to switch OFF the power supply of the detector. If the power supply of the detector is vanished, the results of the adjustment are obliterated from the microcontroller RAM.

2.7.2.10. The dichromatic LED must blow out; the detector must be translated to the standby state.

2.7.2.11. If the dichromatic LED didn't blow out and continues to glow permanently the red and blue color, it means about insufficient quantity of attempts to overcome DZ during the automatic adjustment of sensitivity. Return the detector to the training mode and perform three attempts minimum of DZ overcoming.

2.7.2.12. After the training is over, carry out the detector operation testing. Perform the check penetrations into the places where the simulation of DZ overcoming was not fixed.

Perform the check of the detector exploitation.

If the detector generates false alarms or the detector does not operate during the check penetration it is necessary to perform retraining of the detector according to previous items.

2.7.3. Adjustment of the Detector's sensitivity with the automatic alignment in the form of “visor”

2.7.3.1. With “visor” application of the detector (see fig.2.1 3)) the operator realizes some simulations of DZ overcoming (see fig.2.10).

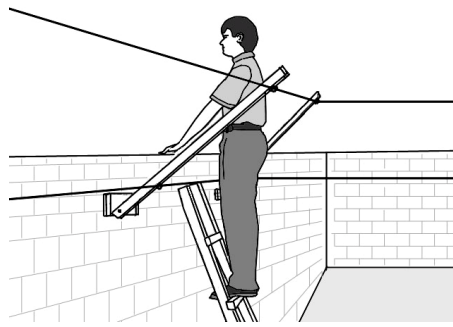


Fig.2.10. Simulation mean of DZ overcoming

2.7.3.2. With the “visor” variant installation it is recommended to perform the training with a wooden ladder.

2.7.3.3. The operator with the stairs in the hands, the assistant must be situated at a distance 2-3 m from LP, Rx, Tx. Perform a simulation of DZ overcoming.

2.7.3.4. The operator must approach quickly to LP. Place the stairs to the fence, go upstairs and be situated between LP wires (see fig.2.10). Stay in a detection zone for 3...5.sec. Go down, take the wooden ladder and move away from LP at a distance 2-3 m.

2.7.3.5. When the operator leaves the DZ, the LED on Rx must glow permanently the red and blue color for 10...15 sec. The attempt is fixed.

Note. It is forbidden to wait for the constant glowing of the LED with the red and blue color when the operator is situated in the DZ of the detector.

2.7.3.6. During the constant glowing of the LED with the red and blue color the operator must go to the following place where the simulation of the DZ overcoming will be realized.

2.7.3.7. If after the operator leaves the DZ the LED on Rx doesn't glow permanently the red and blue color, the detector has not fixed the attempt of the overcoming (it is not a malfunction). Then it is recommended to go along to the protected boundary and to continue the training.

2.7.3.8. After the performance of the late attempt of the DZ overcoming, it is necessary to translate the detector to the operating mode. The wire P/O switching OFF is necessary for the time of the constant glowing of the LED with the red and blue color. If it is not possible to switch OFF the wires for this time for some reasons, it is necessary to take by the hand UW and to switch OFF the wire P/O from “+”, after that to release UW.

Note. In the moment of the wire P/O switching OFF it is forbidden categorically to switch OFF the power supply of the detector. In the case if power supply is switched OFF the results of the adjustment will be obliterated from RAM of the microcontroller.

2.7.3.9. The dichromatic LED must blow out; the detector is translated to the standby state.

If the dichromatic LED didn't blow out and continues to glow permanently with the red and blue color, it means about an insufficient quantity of attempts of the DZ overcoming. In this case it is necessary to return the detector to the training mode and to perform additionally three attempts minimum of the DZ overcoming.

2.7.3.11. After the training is over, carry out the detector operation testing. Perform the check penetrations into the places where the simulation of DZ overcoming was not fixed.

Check the detector exploitation.

If the detector generates false alarms or the detector does not operate during the check penetration it is necessary to perform retraining of the detector according to previous items.

2.7.4. Manual adjustment of the Detector's sensitivity

2.7.4.1. To switch ON the manual adjustment of the Detector's sensitivity mode, switch ON the wire P/O of Rx output cable (see fig.2.11).

It is possible to check the manual adjustment of the Detector's sensitivity mode with RCD or any device with the function of resistance dimension connected to the wires “H3” (NZ), “H3” (NZ) cable of Rx output one.

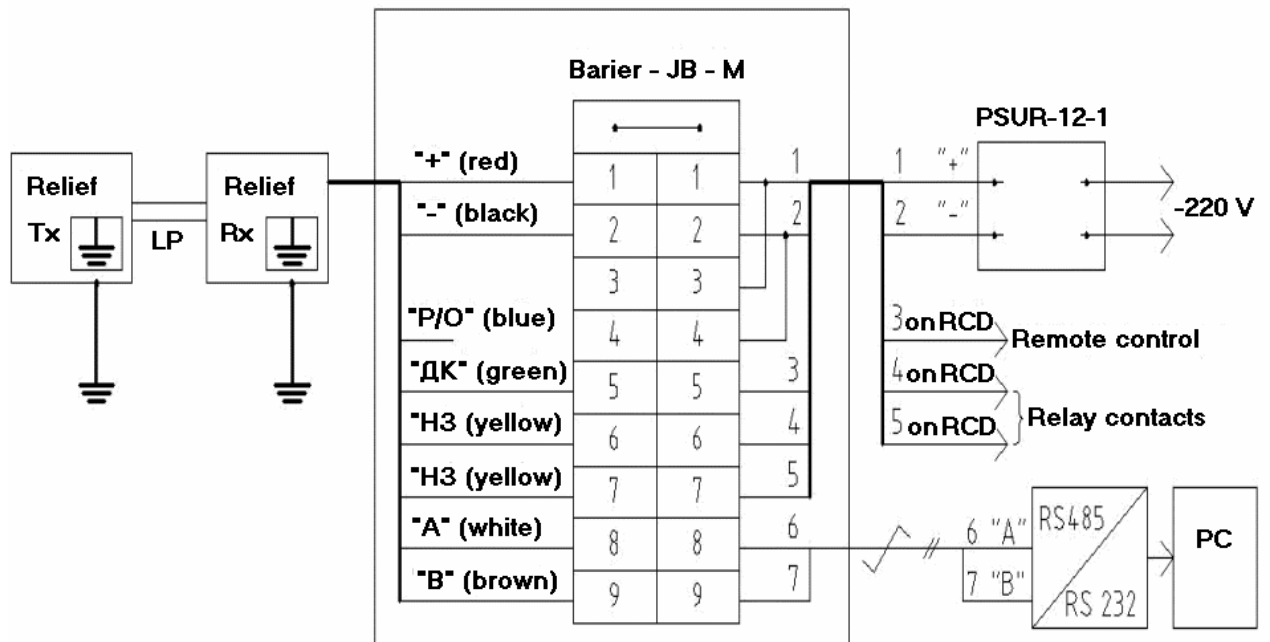


Fig.2.11. Connection of the Detector to the Junction Box of the manual adjustment of the Detector's sensitivity mode

2.7.4.2. The requirements to the operators, to the operators' location on the security boundary, to the mean of the DZ overcoming are similar that the requirements in the following items: 2.7.2, 2.7.3.

Note. During the control crossing of the DZ it is not necessarily to stay for 3...5 sec.

2.7.4.3. Unscrew the blind of the sensitivity control device "Ч".

Install by the control device "Ч" the min sensitivity on the side face by the axis running to the contact marked with the symbol "-" till the anvil. Don't perform control overcoming of the DZ for 1-2 min.

2.7.4.4. Perform the DZ overcoming in any place of the security boundary. It is necessary to check an alarm generation.

2.7.4.5. If an alarm was not generated, it is necessary to increase the detector sensitivity running the axis of the control device "Ч" to the contact marked with symbol "+" for one point.

2.7.4.6. Perform the DZ overcoming.

2.7.4.7. If an alarm was not generated, it is recommended to perform the requirements of 2.7.4.5, 2.7.4.6 till an alarm generation.

2.7.4.8. Realize the DZ overcoming in any place distributing equally the attempts along to the all the LP length. Fix an alarm generation. If it is necessary adjust the detector by running of the control device "Ч".

2.7.4.9. When the sensitivity adjustment is over, it is necessary to close the control device "Ч" by the blind.

Switch OFF the wire P/O from the contact 4 ('- of power supply). The training is over.

2.7.4.10. After the training is over, carry out the detector operation testing.

Perform the control check of the detector exploitation.

If the detector generates false alarms or the detector doesn't operate during the check penetration it is necessary to perform retraining of the detector according to previous items.

2.8. Remote control of the Detector Operation

2.8.1. The remote control is provided in the detector.

2.8.2. To check the detector operation, it is necessary to give the signal of the remote control of voltage 10...30 V with the switch or RCD for 3...10 sec on the wire "RC" (ДК) of Rx output cable.

After when the signal of the remote control is over, the detector must generate ALARM signal (ТРЕБОГА). This confirms the detector operation.

2.8.3. If it is used other dc source for the signal injection of the remote control and not from which the detector receives dc power supply, it is necessary to unit the poles "-" of dc sources.

2.9 List of Possible Malfunctions and Their Repair

2.9.1. The main malfunctions caused by incorrect mounting, operation and the ways of their repair are given in table 2.1.

2.9.2. To switch on the LED it is necessary to switch Rx to the training mode according to the methods specified in item 2.6.5.

ATTENTION! The detector power supply must OFF when malfunctions are repaired.

Table 2.1

Problem	Possible Cause	Solution
1 The detector generates a continuous alarm signal (НЕИСПРАВНОСТЬ signal), LED does not glow.	No power supply.	1 Check the accurate connection of the detector output cable. 2 Check the detector power supply.
2 The detector generates a continuous alarm signal (НЕИСПРАВНОСТЬ signal), LED glows with the red color in the pulse mode.	1 No contact in the points on Rx and (or) Tx where LP wires are connected;	1 Fix the contact, connect the wires to the units according to items 2.4.2.9, 2.4.2.10.
	2 The LP wire (or both wires) is broken.	2 Repair the integrity of LP using connectors IOKCO 28.98.000, solder or replace the wires.
	3. No power supply on Tx.	3. Measure voltage on the contact "UW"(BII) relative to the contact "LW" (HII) on Tx. Voltage must be 8, 0...8, 7 V.
	4. Tx malfunctions.	4. Switch ON the millimeter between the clamp "LW" (HII) on Rx and the lower wire of LP. Measure current of Tx. Tx must be 3...12 ma.
3 The detector generates a continuous alarm signal (НЕИСПРАВНОСТЬ signal), LED glows with the red color permanently.	1. Closing the LP wires.	1. Check the integrity of LP wires isolation. 2. Check the current connection of the wires to the clamps "UW" (BII), "LW" (HII), "UW1"(BIII) on Tx.
	2. Tx malfunctions.	Switch ON the millimeter between the clamps "LW" (HII) on Rx and the lower wire of LP. Measure current of Tx. Tx must be 3...12 ma.
4 The detector generates a continuous alarm signal (НЕИСПРАВНОСТЬ signal), LED glows with the blue color permanently.	The level of signal is insufficient.	Decrease the LP length.
5 The detector generates a continuous alarm signal (НЕИСПРАВНОСТЬ signal), LED glows with the blue color in the pulse mode.	The level of signal is high.	1. Increase the LP length. 2. Install the banding strip between the contacts "UW" (BII) and «UW1" (BIII) on Tx. 3. Connect UW of LP to the contact "UW1" (BIII) on Tx. 4. Increase the distance between LP wires during "visor" application.
6 Reduced delectability of the detector	Insufficient sensitivity caused by the changed operation conditions	Adjust the detector according to item 2.6.
7 False alarm signals (ТРЕВОГА signals) are generated.	1 Unreliable connection of LP wires to Tx and (or) Rx.	1 Check the connection of LP wires. Protect the places of the connection with mastic.
	2 Unreliable connection of grounding conductors to Tx and (or) Rx or to the ground circuit.	2 Check the connection of grounding conductors and restore their reliable connection to the units and the ground circuit.
	3. Ground wires swing of Rx and (or) Tx.	3. Fix the ground wires with dielectric buckles, insulation tape or other similar mean.
	4 Swing of Rx output cable influenced by the wind.	4. Fix the ground wires with dielectric buckles, insulation tape or other similar mean.
	5. Deflection of one or two wires of LP.	5. Stretch the LP wire (wires) according to item 2.4.1.
	6. There are moving objects or vegetation at the distance less than 2 m from LP, Rx, Tx of the detector.	6. Fix or remove the objects and vegetation.

Problem	Possible Cause	Solution
	7. Heightened detector sensitivity caused by the changed conditions of the exploitation.	7. Adjust the detector's sensitivity according to item 2.6.

2.8.3. After the malfunctions are repaired, switch ON the detector. If it necessary, perform retraining according to item 2, 6.

3 Maintenance

3.1 General Instructions

3.1.1 Maintenance is meant to be measures providing the control of technical state of the detector and its operation.

3.1.2 Timely and full performance of maintenance during the operation is one of the important conditions of the detector operating state.

3.1.3 The detector maintenance is meant to be planned performance of preventive works of maintenance works schedule in full twice a year, when settled frosts come (mean daily temperature is 5°C below zero) and after snow melting (mean daily temperature is 10°C above zero).

3.1.4 During storage the detector maintenance is not performed.

3.1.5 During maintenance it is necessary to perform all the works specified in the corresponding schedule; malfunctions and defects must be repaired.

3.1.6 The schedule of maintenance works:

- 1) check if the state of a protective boundary corresponds the requirements of items 2.1.1, 2.1.2;
- 2) perform the external examination of Tx and Rx;
- 3) check the state and pull-up of LP wires;
- 4) check the quality and integrity of bonds and a grounding conductor;
- 5) check the sensitivity of the detector.

Note – After natural disasters (heavy snowfall and drifting snow, hurricanes, heavy showers, etc.), it is recommended to perform unscheduled maintenance of the detector.

3.2 Execution Order of Maintenance

3.2.1 Execution order of works during scheduled maintenance of the detector:

1) determine by external examination whether it is necessary to lop off branches and bushes if they are at the distance of 2 m and less from the near wire of local part; whether it is necessary to remove outside objects (especially metal ones);

- 2) fix the sections of the fence (if they shift about each other);
- 3) check the state and pull-up of the LP wires;
- 4) check the places where LP wires are connected and fixed;
- 5) check the integrity and reliable fastening of dielectric consoles to the fence;
- 6) check the integrity of dielectric posts;
- 7) check the reliability of Rx and Tx fastening;

8) check the state of grounding conductors and ground rods, reliability of connection of ground rods to Tx and Rx;

9) perform check penetrations to a protective boundary.

4. Storage and Transportation

4.1 The detector must be stored in the package of manufacturer according to the storage conditions 3 in cold storage buildings (ГОСТ 15150).

4.2 The detector is transported in the factory package:

– if it is transported by plane it must be transported in a hermetically sealed compartments without distance restriction;

– if is transported by train it must be transported in house cars, containers without distance restriction;

–if is transported by car it can be transported on ground roads at the distance up to 1000 km.

5 Warranty

5.1 The manufacturer guarantees that the detector corresponds to the requirements of 4372 – 43071246 – 028 TY if the user meets the conditions and rules of transportation, storage and operation according to the requirements of the present operating manual.

5.2 The warranty lifetime of the detector is 18 months. The warranty lifetime is counted from the moment of shipping of the detector to the user.

5.3 The warranty does not cover detectors with mechanical failures, also caused by natural disaster (lightning, fire, flood).

5.4 The mean lifetime of the detector is 8 years.

5.5 Claims are addressed to:

European technical service center

E-mail: forteza@forteza.com

6. Acceptance Certificate

6.1.1. Detector “Relief”, patent RU 2273884, serial number _____, made by the close corporation “Okhrannaya Tekhnika” meets technical specifications 4372 – 43071246 – 028 TY and it is found serviceable.

Date of production “ ____ ” _____ 20__.

Quality engineer _____ / _____

6.1.2. Detector “Relief”, patent RU 2273884, serial number _____, of the representative of the customer meets technical specifications 4372 – 43071246 – 028 TY and it is found serviceable.

Representative of the customer _____ / _____

“ ____ ” _____ 20__.

7. Package Certificate

7.1. Detector “Relief”, patent RU 2273884, serial number _____, is packed by the manufacturer according to the requirements of engineering documentation.

Date of packing “ ____ ” _____ 20__.

It was packed by _____ / _____

7.2. After packing the detector “Relief”, patent RU 2273884 was accepted by:

Quality engineer _____ / _____

Representative of the customer _____ / _____

Contact:

European office JSC “Forteza”

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