



RADIY-2

(Rady-2/1, Rady-2/2, Rady-2/3)

Microwave barrier



Installation manual



This electronic device complies with EU norms (EUROPEAN COMMUNITY) about electric safety on apparatus that can generate electromagnetic interferences.

English version 15/01/2009

Dear **Customer**,

We thank you very much for choosing our item. Now we would like to invite you to read carefully the following instructions before installing the product in order to use all its capacities.

Warning: We remind you that the installation should be realized by a qualified person. The installer must respect all the standards and regulations. The manufacturer or distributor will decline any responsibility in case of improper use by the user or incorrect installation by the installer. Any modifications carried out NOT by a qualified person can damage the device.

This operation manual contains information concerning application, design, operation, technical specifications, structure of security detector **RADIY-2** and installation / maintenance instructions necessary for the most effective usage of its technical potential.

Note: Manufacturer constantly works on the improvement of the device, thus some modifications can be made which, however, do not affect its normal function.

PACKAGE CONTENTS

Item description	Quantity
Transmitter	1
Receiver	1
Installation assembly kit <ul style="list-style-type: none"> • 2 brackets • 1 locking wrench • 4 fixing wrapper 	1
Installation manual	1

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The **RADIY-2** is a double position microwave detector for outdoor applications. It is available in four models (**RADIY-2**, **RADIY-2/1**, **RADIY-2/2**, **RADIY-2/3**) that differ in the maximum detection zone length. It comprises a transmitter and a receiver unit, which create a perimeter protection with coverage up to 300 m. The transmitter and receiver should be mounted facing each other during operation. The dimensions of the detection zone vary according to the distance between the receiver and transmitter units and according to the sensitivity settings.

The **RADIY-2** microwave barrier is an advanced detection system, utilizing microwave technology, eliminating false alarms while maintaining high security standards for the detection of human intruders into the protected area.

The **RADIY-2** is designed to small, medium and long areas. It can be easily installed over any type of fence or on pole. It provides a solid barrier protection and blocks all perimeter activities. The barrier rejects interferences caused by birds and small animals due to its powerful method of false alarm elimination.

Due to the 2 different signal frequencies more **RADIY-2** detectors can be combined in order to provide complex perimeter protection with unlimited space or shape.

The **RADIY-2** is designed for continuous round-the-clock operation and keeps its characteristics within a wide temperature range of -40 °C up to +65 °C.

Main features

- **RADIY-2** detection zone range: 10 – 200 m
- **RADIY-2/1** detection zone range: 10 – 100 m
- **RADIY-2/2** detection zone range: 10 – 50 m
- **RADIY-2/3** detection zone range: 10 – 300 m
- Operating temperature: -40 °C to +65 °C
- Power input: 12 ~ 27 Vdc
- Detection speed range: 0.1 – 10.0 m/s
- Detect human intruders walking, running or crawling
- Immunity to small animals and birds motion in the detection zone 5 m away from the detector
- Installation height: 0.8 – 0.9 m
- Quick and easy installation on pole, fence or wall
- Quick and easy setting possibilities

- 2 adjustable operating frequencies
- Anti dust and water resistant housing (IP55)
- Protection against: Power supply failure, direct sunlight, precipitation (rain and snow), wind up to 30 m/s, snow up to 0.7 m, grass up to 0.3 m, tamper.

SELECTING MOUNTING LOCATION

The installation of the **RADIY-2** requires that the transmitter and the receiver face each other, so that the two antennas may be correctly aligned.

- The two units must be positioned in direct line at the edge of the area.
- The protected zone must be free from obstacles like walls, fences, trees, ditches, metal objects or other microwave detectors and systems.
- For proper operation of **RADIY-2**, type of ground should be one of the following: asphalt, cement, soil, clay, gravel or grass (mown).

Avoid the following locations

Avoid installation of **RADIY-2** on the following type of ground: thick vegetation, grass (not mown), water, sand and metal.

The ground must not have movable parts near the sensitive zone, any grassy areas must be frequently mown, there should not be any flowing water (especially longitudinally), ground where structural features may be changed.

The installation site should satisfy the following requirements (see fig 1 and fig 2):

- The surface of the site should be leveled with a maximum slope angle of 15°
- No obstacles as bushes or group of trees or walls and fences, metal objects, within a distance of 2.5 m / 1.5 m / 1 m / 3.5 m ("**RADIY-2**" / "**RADIY-2/1**" / "**RADIY-2/2**" / "**RADIY-2/3**") from the centerline between the two units
- Depth of snow on the ground should not be more than 0.7 m
- Height of the grass on the ground should not exceed 0.3 m. It is important to mow the grass regularly to avoid its movement interfering with the microwave signal.

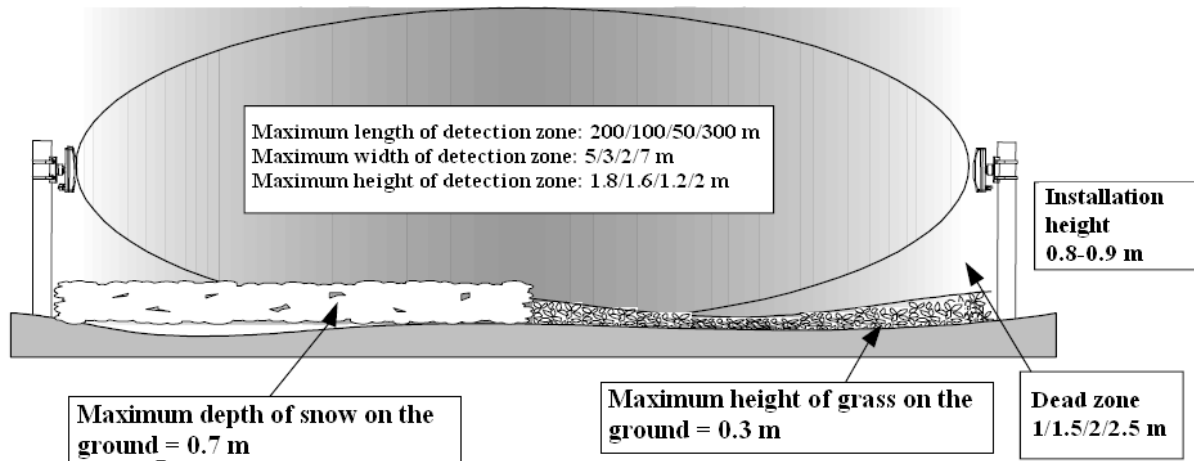


Fig. 1 Approximate detection zone shape for “Rادی-2”/”Rادی-2/1”/”Rادی-2/2”/”Rادی-2/3”

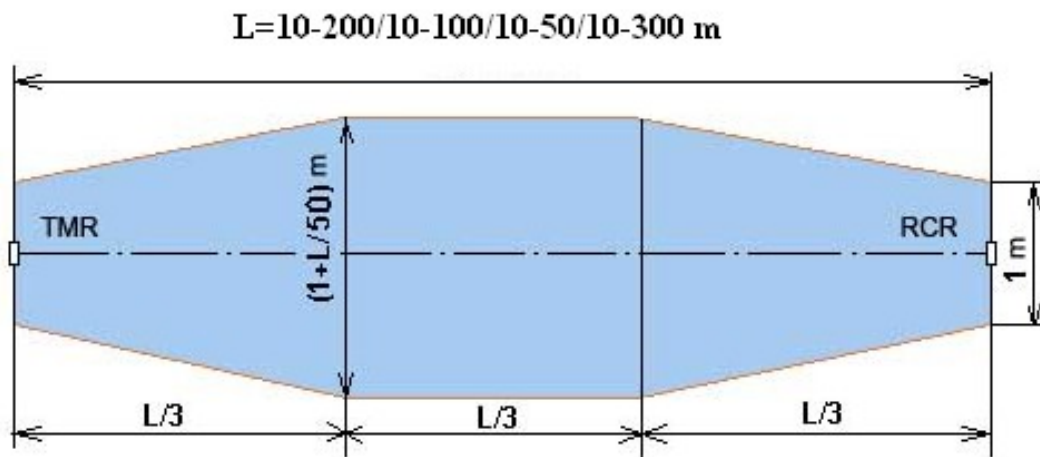


Fig. 2. Approximate clear zone shape for “Rادی-2”/”Rادی-2/1”/”Rادی-2/2”/”Rادی-2/3”

Note: The real detection zone is always narrower than the clear zone in Figure 2. But no obstacles allowed to be in the clear zone to avoid false alarms.

- No transport vehicle moving is allowed within a distance of 3.2 m / 1.8 m / 1.2 m / 4.5 m (“RADIY-2” / ”RADIY-2/1” / ”RADIY-2/2” / ”RADIY-2/3”) from the centerline between the two units.
- In case the detector is installed near railroad lines and main roads, the distance should be at least 6.4 m / 3.6 m / 2.4 m / 9.0 m (“RADIY-2” / ”RADIY-2/1” / ”RADIY-2/2” / ”RADIY-2/3”) from the centerline between the two units.
- The detector units should be installed at least 30 m away from power lines with voltage of 35-500 kV. If wiring is parallel to power lines, it should be laid underground.

MOUNTING THE DETECTOR

Installation on pole

Use metal, cement or massive plastic poles with a diameter of 90-100 mm as the support.

Note: It is allowed to install two units on a single support pole, but the two units must be identical (two transmitters or two receivers).

Installation height of receiver and transmitter units should be in a way that the bottom surface of the plastic housing will be 0.8-0.9 m above the top of the surface (ground and grass).

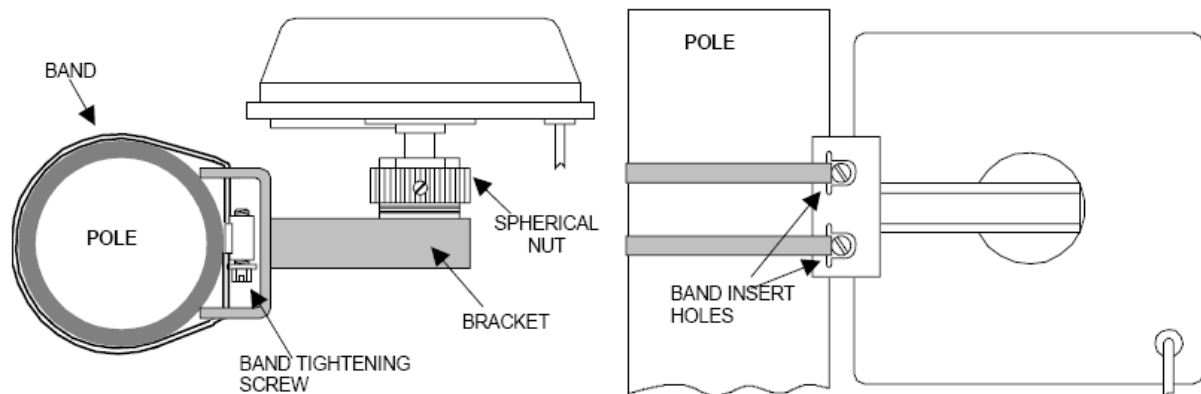


Fig. 3. Installation of transmitter/receiver on pole

Use the steel bands with the bracket for pole installation. Wrap the bands around the pole and through the bracket holes.

Fix the bands with the screws and cut unused bands. Connect the plastic housing to the bracket using the spherical nut and hold it with the screw on the nut.

Note: The fastening of spherical nuts should be the last step, after focusing the transmitter and receiver in the optimal position.

Top installation

The **RADIY-2** can also be installed on top of a fence or a wall.

The installation height of transmitter and receiver units should be in a way, that the bottom surface of the plastic housing will be 0.2 m above top of fence or wall.

The support of detectors should be mechanically connected to the fence to ensure stability and reliability.

Cross installation

In order to avoid “dead zones” under aerials and to increase the protected area it is possible to install multiple **RADIY-2** systems with overlapping. Overlap configurations are performed with the units located at the angles of protected area. The minimum overlap for effective protection must be at least 2-2.5 m / 1.5-2 m / 1-1.5 m / 2.5-3 m (“**RADIY-2**” / “**RADIY-2/1**” / “**RADIY-2/2**” / “**RADIY-2/3**”) (depending on the transmitter and receiver distance, the sensitivity set and installation height).

Note: The recommended way is to install transmitters only or receivers only at the point of overlap.

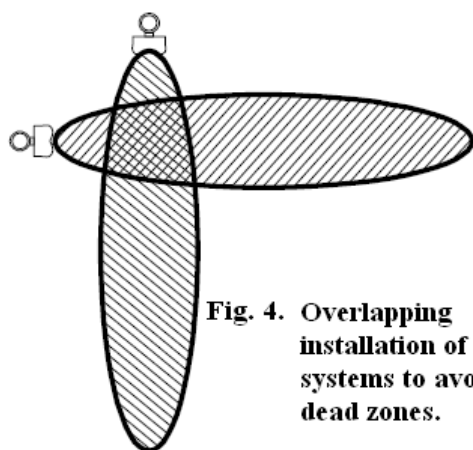


Fig. 4. Overlapping installation of 2 systems to avoid dead zones.

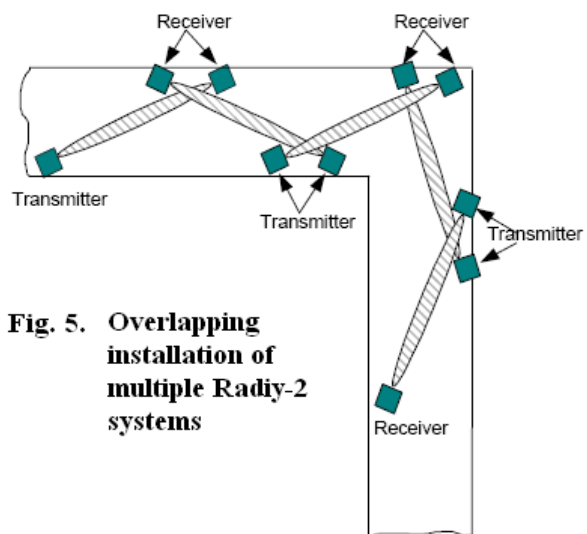


Fig. 5. Overlapping installation of multiple Rادی-2 systems

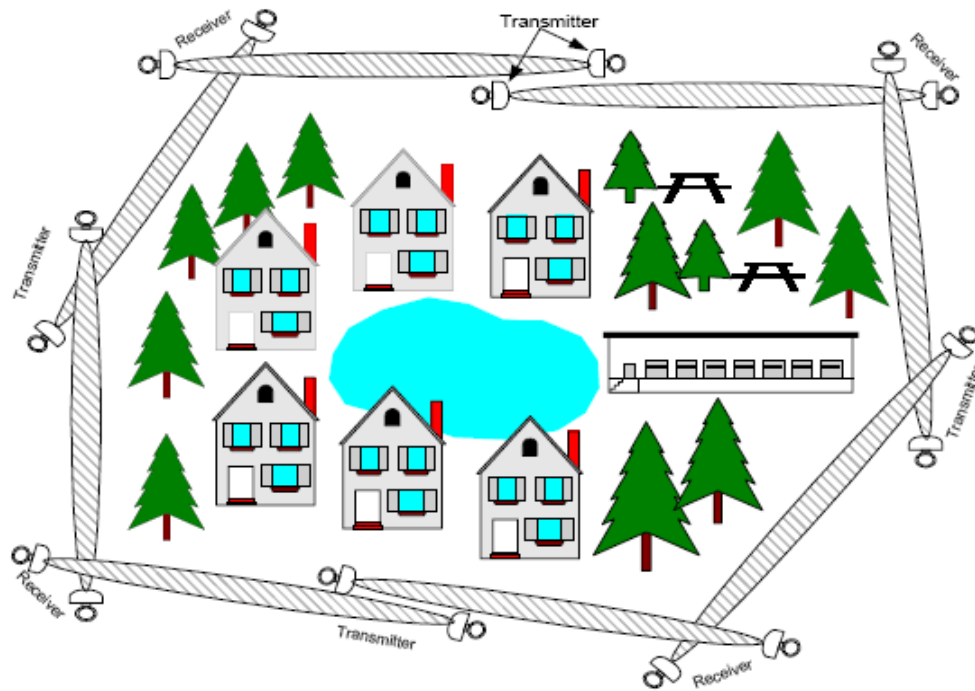


Fig. 6. Overlapping installation of RADIY-2 systems for perimeter protection

Note: To avoid co-interference between neighboring detectors, you can adjust them to different frequencies (don't forget to change receiver's and transmitter's frequency too with connecting of the suitable cables).

Note: Avoid installation in a way where the reflected microwave signals (by metal fences and other metal objects or by wet surfaces after rain and snow) may cause interference and false alarms.

DETECTOR WIRING

Note: The meaning of signs on the devices the following:

ИПД = Transmitter unit

ИПМ = Receiver unit.

Fig. 7. Receiver unit

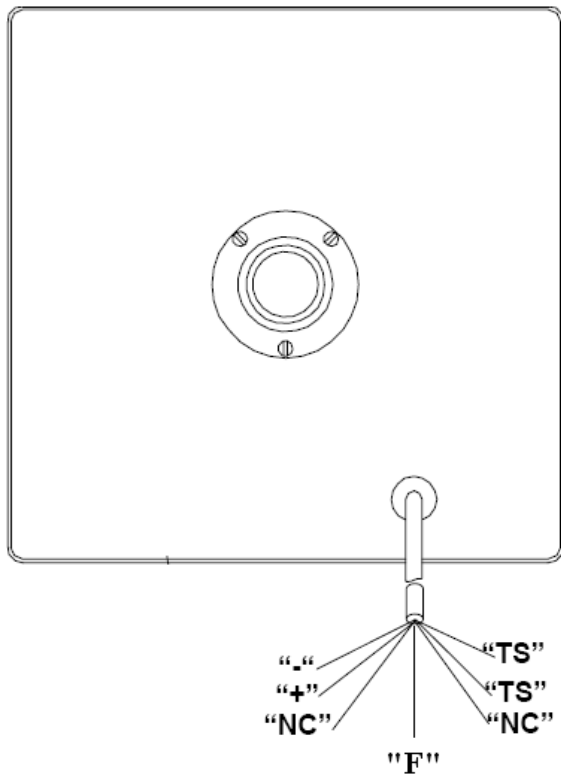
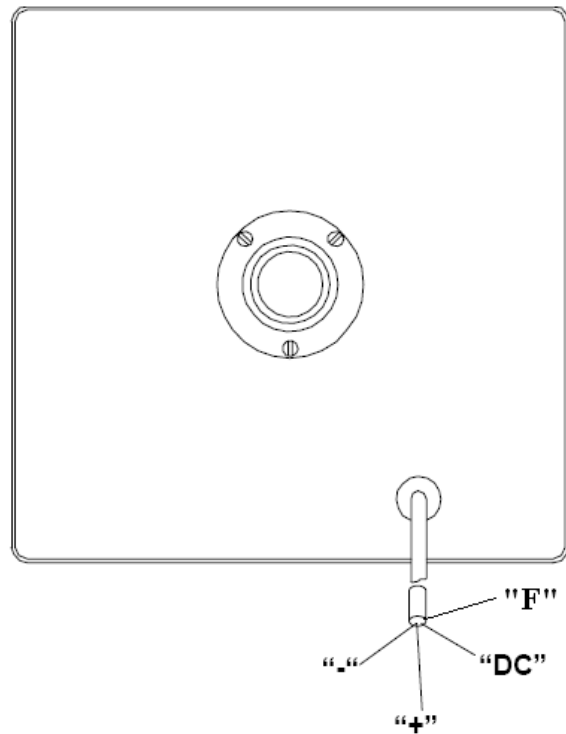


Fig. 8. Transmitter unit



Warning: Do not consider the colors of the wires. They may change. Verify always the symbols attached on the single wire.

Receiver wiring

№	Marking of wires		Functions of wires
	symbols	colors	
1	+	red	<u>Positive power:</u> Connect it to a positive voltage output of 12 – 27 Vdc power source (usually from the alarm control unit).
2	-	green	<u>Negative power:</u> Connect it to a negative voltage output or ground of power source (usually from the alarm control unit).
3, 4	ИИС / NC	white	<u>Alarm output:</u> NC alarm relay output

			contacts (usually connect it to normally closed zone in the alarm control panel).
5, 6	БЛ / TS	blue	<u>Tamper output:</u> NC tamper relay output contacts to sign front cover opening of the detector (usually connect it to normally closed 24-hour zone in the alarm control panel).
7	F	black	<u>Frequency modulation:</u> Connect this wire to negative power wire if you want to use another receiver frequency modulation. With this function you can synchronize the operation of two devices. (Don't forget to change transmitter frequency as well).

Transmitter wiring

№	Marking of wires		Functions of wires
	symbols	colors	
1	+	red	<u>Positive power:</u> Connect it to a positive voltage output of 12 – 27 Vdc power source (usually from the alarm control unit).
2	–	white	<u>Negative power:</u> Connect it to a negative voltage output or ground of power source (usually from the alarm control unit).
3	ДК / DC	blue	<u>Test input:</u> Connect it to a positive voltage output of 5 – 30 Vdc power source to test the operation of the system. During the test an alarm signal should be signed in the receiver.
4	F	black	<u>Frequency modulation:</u> Connect this wire to negative power wire if you want to use another transmitter frequency modulation. With this function you can synchronize the operation of two devices. (Don't

		forget to change receiver frequency as well).
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Warning: Do not open the transmitter housing, because it may damage the device!!!

Receiver panel circuit

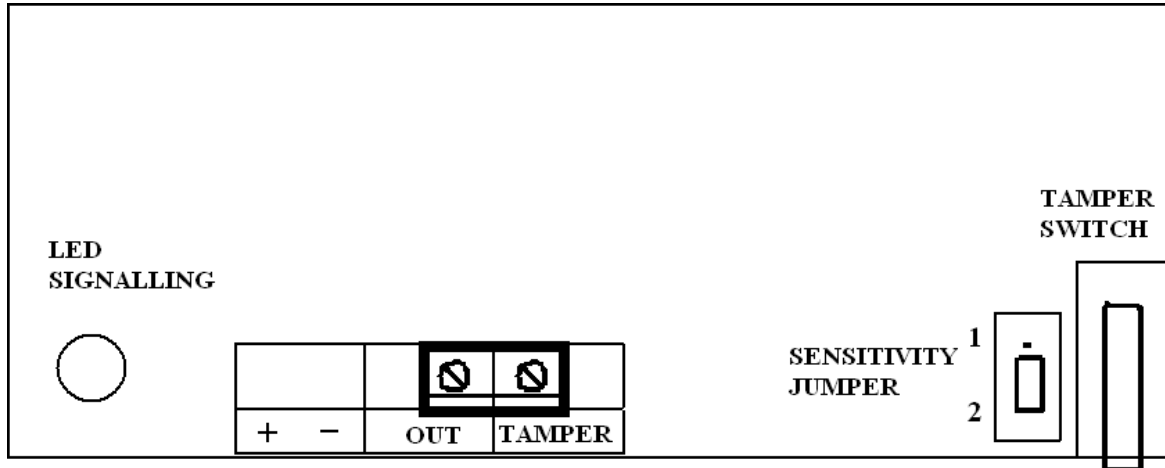


Fig. 9. Receiver panel circuit

Sensitivity jumper:

Position 1: Low sensitivity

Position 2: High sensitivity

Connection to alarm control panel

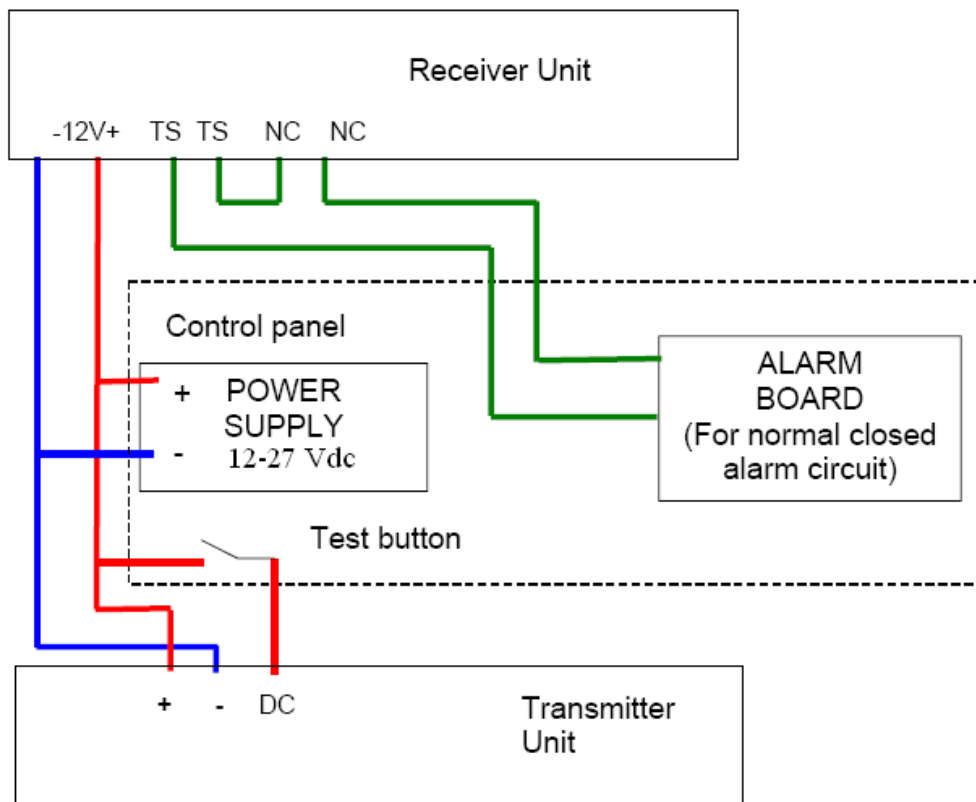


Fig. 10. Connection to alarm control panel

Note: Always use separated cables for the power supply circuit as the cables for the alarm signal circuit to avoid unexplained alarms.

Note: The alarm relay and tamper relay loading capacity is up to 72 V @ 0.1 A.

Note: All the electronic connections should be carried out only after power is disconnected.

Note: To avoid co-interference between neighbouring detectors, you can adjust those to different frequencies. The receiver's and transmitter's frequency should also be adjusted to the same. You can adjust transmitter's and receiver's frequency with connecting the suitable cables.

POSITIONING AND FOCUSING

For preliminary set-up, focus the receiver and transmitter as if a virtual direct line connects the receiver and the transmitter. The detector can be adjusted to an angle of +/- 15° degrees on any surface.

Make sure that the antenna's radiating surfaces of receiver and transmitter are parallel (radiating surface is perpendicular to the virtual direct line).

1. Apply power to the detector and check the voltage level to be suitable.
2. Remove the receiver cover with unscrewing the 4 fixing screws.
3. Wait 1-2 minutes for the detector power up period and check the LED indicator.
4. In standby mode the LED should be off.
5. Perform check-crossings along the full detection zone length, to check if the detector indicates an alarm by lighting the led on the receiver panel. Check-crossings should be performed:
 - in an upright and crawling position in the middle of the detection zone
 - in an upright and crawling positions at the distance of 5-10 m from the transmitter and receiver units
6. Close the receiver cover

Note: If the receiver indicates signal deficiency (the indicator blinks intermittently every 2 s; 0.25 s on, 1.75 s is off), it is required to check if the detector is installed correctly and all the requirements are met.

In case the range of neighboring sites differs a lot, or the angle between the axes of neighboring detection zones is less than 60°, cross talk between the detectors that causes false alarms is possible. In this case it is necessary to change the signal frequency of one of the detectors (transmitter and receiver). To change the signal frequency, connect the "F" wire of the receiver and transmitter to negative power wire ("-"). Besides, it is possible to turn the detector units by 90°.

OPERATION AND TUNING

The transmitter and receiver units have to be placed on the opposite sides of a protected site. The transmitter sends microwave impulses to the receiver. The receiver analyzes the amplitude and temporal characteristics of the received signal and if these characteristics match the **intruder** model, the detector generates an alarm signal.

Detector contact signals

The self-diagnostics of the detector has 4 signals:

1. Normal - contacts of the alarm and tamper relay contacts are closed.

2. Alarm - alarm relay contacts opened for at least 2 sec, tamper relay contacts are closed and the ALARM LED flashes. The detector generates an alarm if:

- a walking or crawling human crosses the detection zone
- an impulse of 5-30 Vdc is supplied to remote control input

3. Trouble – alarm relay contacts are opened and lighting up ALARM LED until the malfunctioning is eliminated, tamper relay contacts closed. A trouble message is generated if:

- there is interference from neighboring transmitter
- voltage drops lower than $9.6 \pm 0,6$ Vdc
- either the receiver or the transmitter unit is malfunctioning
- either the receiver or the transmitter unit is blocked with non radio-transparent objects
- normal operation of the receiver unit is sabotaged by an external electromagnetic field

4. Tamper – tamper relay contacts are opened. A tamper message is generated if the receiver front cover is removed.

After installation is carried out, the detector automatically adjusts length, threshold levels and detection speed range. You can only change the sensitivity setting with the sensitivity jumper in the receiver (1-low sensitivity, 2-high sensitivity).

Detector LED indication

1. Alarm - the receiver LED is lighting for 2-30 sec
2. Standby - the LED is off
3. Power supply deficit - the LED blinks intermittently every 2 s (1 s on, 1 s off)
4. Low input signal - the indicator blinks intermittently every 2 s (0.25 s on, 1.75 s is off)
5. Malfunction - the receiver LED is lighting continuously (for more than 30 s).

VERIFYING OF INTERFERENCE PRESENCE

To verify the absence of interference on the receiver, switch off the power supply of the transmitter or use the test input of the transmitter. If the receiver doesn't signal alarm in this case, there are interference problem (the receiver has signal from another transmitter).

In case of interference, you can proceed as one of the following:

- Change the positions or the distances of the units
- Change frequency modulation
- Change the polarization, rotating 90° (around detection zone axis) in the same direction the transmitter and receiver
- Change technology of detection.

TEST AND MAINTENANCE

Note: After tuning the system it is recommended to check functionality for 2-3 days, to verify the installation and tuning with all detections being registered and analyzed. During this period detector's operation should be checked twice a day by performing test crossing of the detection zone.

It is recommended to perform routine inspection of the system with the following tests.

Walk test

1. Cross the detection area in different locations with different speed and body position (crawling, etc.).
2. Verify detection by observing alarm signal relay.

Remote test

1. Apply 5-30 Vdc from control unit to the wire marked "DC" on the transmitter unit.
2. An alarm signal should be received in the control unit for 2 seconds.

Detector maintenance

1. Check the functionality of the detectors with walk test and remote tests.
2. Check the tightness of fastening elements.

Clear zone examination

1. Visually check if the detector condition is in compliance with mounting location chapter of the installation manual. Cut off tree branches and bushes, mow the grass (considering the possible growth up to the next clear zone examination) and remove unnecessary objects from the clear zone.
2. In wintertime remove snowdrifts from the sector or increase the installation height of the detector.

Special maintenance

1. After snowstorms, heavy rains, hurricanes, and in case if intensive vegetation growth, it is recommended to perform extra maintenance operations.

Remote test is recommended every day. Walk test, detector maintenance and clear zone examination is recommended according to detector's environment, but at least once a year.

TROUBLESHOOTING

Trouble	Possible reasons for trouble	Troubleshooting
Detections are registered in the alarm circuit, the LED does not light up.	Power supply voltage at the receiver is below normal value or off.	Check power supply voltage of the receiver. If it is below normal value or off, check the power supply circuit.
Detections are generated in the tamper circuit.	The control panel cover is not properly installed.	Check the control panel cover is properly installed.
Detections are constantly generated in the alarm circuit, during detection generation the red LED is flashing.	Power supply voltage is below normal value or off.	Check power supply voltage of the detectors. If it is below normal value or off, check the power supply circuit.
High false alarm rate.	The detector has not been installed or used in accordance with the installation manual requirements.	Check the compliance of installation and usage conditions with installation manual requirements.
	The receiver is affected by a neighboring transmitter.	Carry out frequency or position adjustment as described in the manual.
	Power supply voltage impulse level is too high or power supply voltage is unstable.	Check power supply voltage of the detectors. If it is too high or unstable check the power supply circuit. Check the power supply by replacing it with an operable one.

Note: To find out which unit is in malfunction it is recommended to replace the units one by one with operable ones and perform check crossings.

SPECIFICATIONS

Modell	RADIY- 2	RADIY- 2/1	RADIY- 2/2	RADIY- 2/3
Microwave frequency	9.5 ± 0.2 GHz			
Maximum transmitting power	50 mW			
Maximum length of protection zone	200 m	100 m	50 m	300 m
Minimum length of protection zone	10 m			
Maximum width of protection zone	5 m	3 m	2 m	7 m
Maximum height of protection zone	1.8 m	1.6 m	1.2 m	2 m
Power supply voltage	12...27 V			
Power consumption	Up to 70 mA at 24 Vdc			
Detection speed	0.1...10 m/s			
Remote testing	Built in self-tester generator			
Alarm relay loading capacity	72 V @ 0.1 A			
Tamper relay loading capacity	72 V @ 0.1 A			
Warm up time after power up	30 sec			
Warm up time after alarm message	10 sec			
Flatness of ground	approx. 0.3 m			
Maximum height of grass on the ground	0.3 m			
Maximum height of snow on the ground	0.7 m			
Alarm message duration	approx. 2 s			
Dimensions of units	160 x 115 x 45 mm			
Weigth of units	approx. 0.35 kg			
Operating temperature	-40 °C ~ +65 °C			
Weatherproofness	IP 55			

Disclaimer

The manufacturer / distributor reserves the right to revise or remove any content in this manual at any time. The manufacturer / distributor does not warrant or assume any legal liability for the accuracy, completeness, or usefulness of this manual. The content of this manual is subject to change without notice.