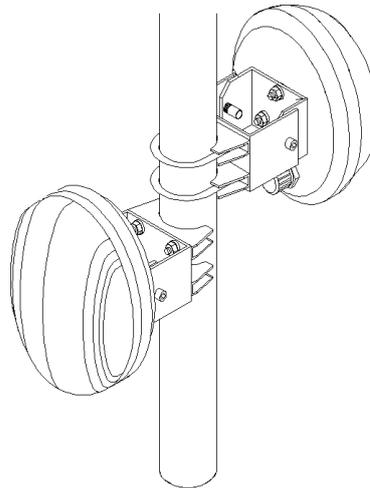




## **RADON**

**(Radon – 50MRS/ 100MRS/  
200MRS/ 300MRS)**

**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 23/04/2014

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 **RADON** 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**

| <b>Item description</b>   | <b>Quantity</b> |
|---|-----------------|
| Transmitter   | 1               |
| Receiver  | 1               |
| Plastic pipe  | 2               |
| measuring cable   | 1               |
| Installation assembly kit <ul style="list-style-type: none"> <li>• 2 brackets</li> <li>• Screw packet for brackets</li> <li>• 4 fixing wrapper</li> </ul> | 1               |
| Installation manual   | 1               |

**CONTENT**

|   |           |
|---|-----------|
| <b>MODELS .....</b>                                   | <b>4</b>  |
| Main features .....                                   | 4         |
| <b>SELECTING MOUNTING LOCATION .....</b>              | <b>5</b>  |
| Avoid the following locations .....                   | 5         |
| <b>MOUNTING THE DETECTOR.....</b>                     | <b>7</b>  |
| Mounting of the bracket .....                         | 7         |
| Mounting of the plastic pipe to the cable gland ..... | 8         |
| Mounting of the detectors .....                       | 9         |
| Installation on pole.....                             | 10        |
| Cross installation .....                              | 11        |
| <b>DETECTOR WIRING .....</b>                          | <b>13</b> |
| Transmitter wiring.....                               | 14        |
| <b>POSITIONING AND FOCUSING .....</b>                 | <b>16</b> |
| Transmitter modulation adjustment.....                | 16        |
| <b>OPERATION .....</b>                                | <b>18</b> |
| Detector contact signals.....                         | 18        |
| Operation check .....                                 | 19        |
| <b>VERIFYING OF INTERFERENCE PRESENCE .....</b>       | <b>19</b> |
| <b>TEST AND MAINTENANCE .....</b>                     | <b>19</b> |
| Walk test.....  | 20        |
| Remote test.....                                      | 20        |
| Detector maintenance .....                            | 20        |
| Clear zone examination.....                           | 20        |
| Special maintenance .....                             | 20        |
| <b>TROUBLESHOOTING.....</b>                           | <b>21</b> |
| <b>SPECIFICATIONS.....</b>                            | <b>22</b> |
| Disclaimer .....                                      | 22        |

## MODELS

| Product code | Description                                       |
|--------------|---|
| Radon-50MRS  | 50 m operating distance, built in external relay  |
| Radon-100MRS | 100 m operating distance, built in external relay |
| Radon-200MRS | 200 m operating distance, built in external relay |
| Radon-300MRS | 300 m operating distance, built in external relay |

The **RADON** is a double position microwave detector for outdoor applications. The MRS model is available in four models (**RADON-50MRS RADON-100MRS RADON-200MRS, RADON-300MRS**) that only difference in the maximum detection zone length from technical points. They comprise a transmitter and a receiver unit, which create a perimeter protection with coverage up to 300 m (RADON-300). 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 **RADON** 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 **RADON** is designed medium and long areas. It can be easily installed on any type of 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 4 different signal frequencies more **RADON** detectors can be combined in order to provide complex perimeter protection with unlimited space or shape.

The **RADON** 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

- **RADON-50MRS** detection zone range: 20 – 50m
- **RADON-100MRS** detection zone range: 40 – 100m
- **RADON-200MRS** detection zone range: 80 – 200 m
- **RADON-300MRS** detection zone range: 120 – 300 m
- Operating temperature: -40 °C to +65 °C

- Power input: 12~ 24 Vdc
- Detection speed range: 0.1 – 10.0 m/s
- Detect human intruders walking, running or crawling on hands and knees
- 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
- 4 adjustable operating frequencies
- Anti dust and water resistant housing (IP65)
- Protection against: Power supply failure, direct sunlight, precipitation (rain and snow) up to 40 mm/hour, wind up to 30 m/s, snow up to 0.5 m, grass up to 0.3 m, tamper.

### **SELECTING MOUNTING LOCATION**

The installation of the **RADON** 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 **RADON**, type of ground should be one of the following: asphalt, cement, soil, clay, gravel or grass (mown)

### **Avoid the following locations**

Avoid installation of **RADON** 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 / 3.5 m (**RADON - 50MRS/ 100MRS/ 200MRS/ 300MRS**) from the centerline between the two units (if maximum operating distance).
- Depth of snow on the ground should not be more than 0.5 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.

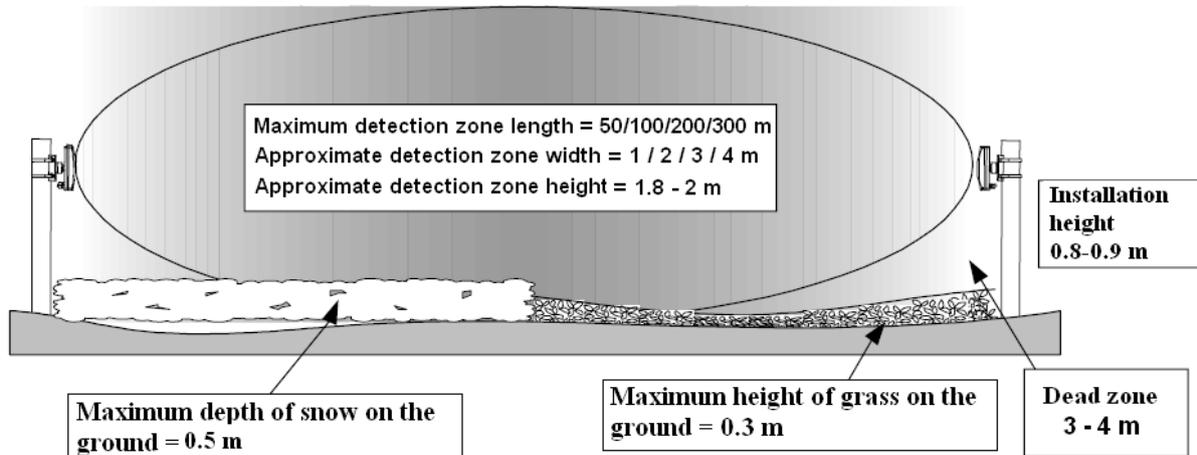


Fig. 1 Approximate detection zone shape for Radon – 50MRS/ 100MRS/ 200MRS/ 300MRS

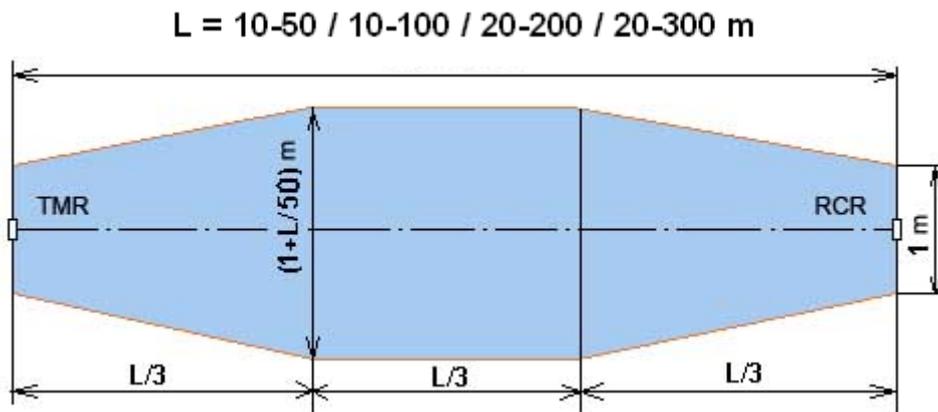


Fig. 2 Approximate clear zone shape for Radon – 50/ 100/ 200/ 300

**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.

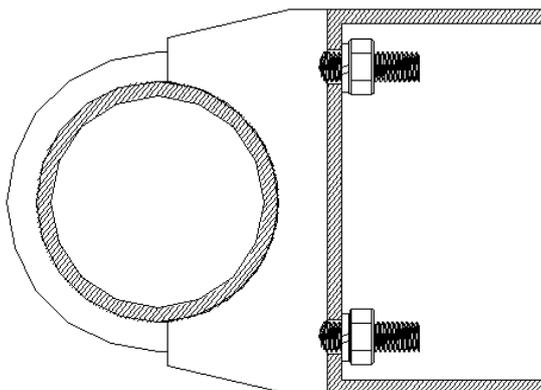
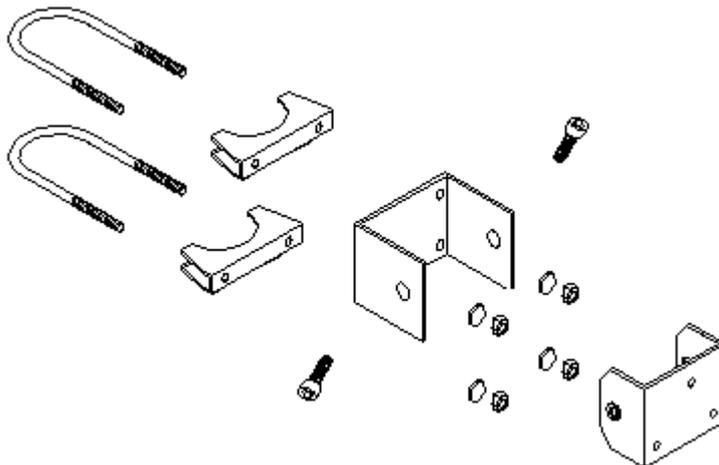
- No transport vehicle moving is allowed within a distance of 2.5m/ 3m/ 4 m / 5 m (**RADON – 50MRS/ 100MRS/ 200MRS/ 300MRS**) from the centerline between the two units.

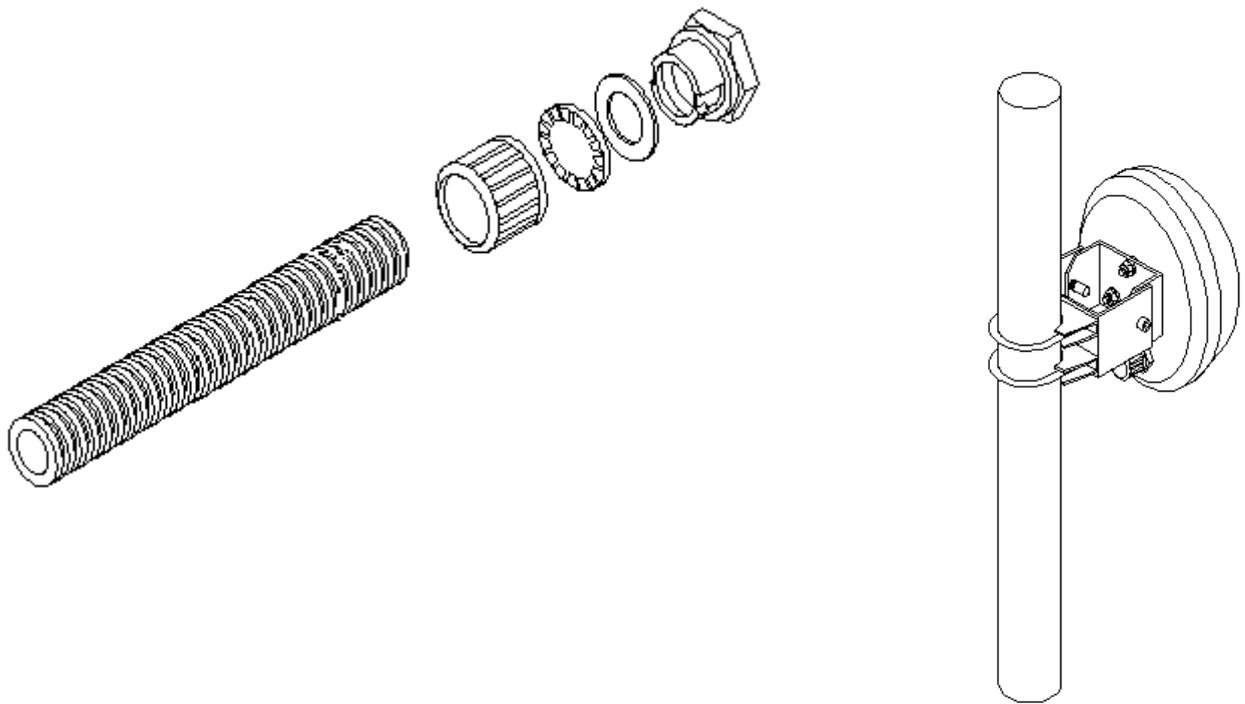
- In case the detector is installed near railroad lines and main roads, the distance should be at least 5 m / 6 m / 8 m / 10 m (**RADON – 50MRS/ 100MRS/ 200MRS/ 300MRS**) from the centerline between the two units.
- The detector units should be installed at least 30 m away from power lines with voltage of 35-500 kV. If wiring is parallel to power lines, it should be laid underground. In this case it is strongly recommended to use ferrit rings to avoid interference.

## **MOUNTING THE DETECTOR**

### **Mounting of the bracket**

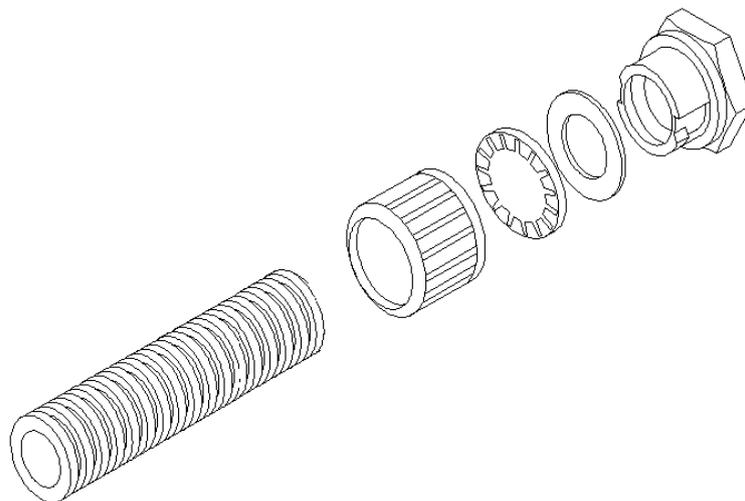
Bracket assembling

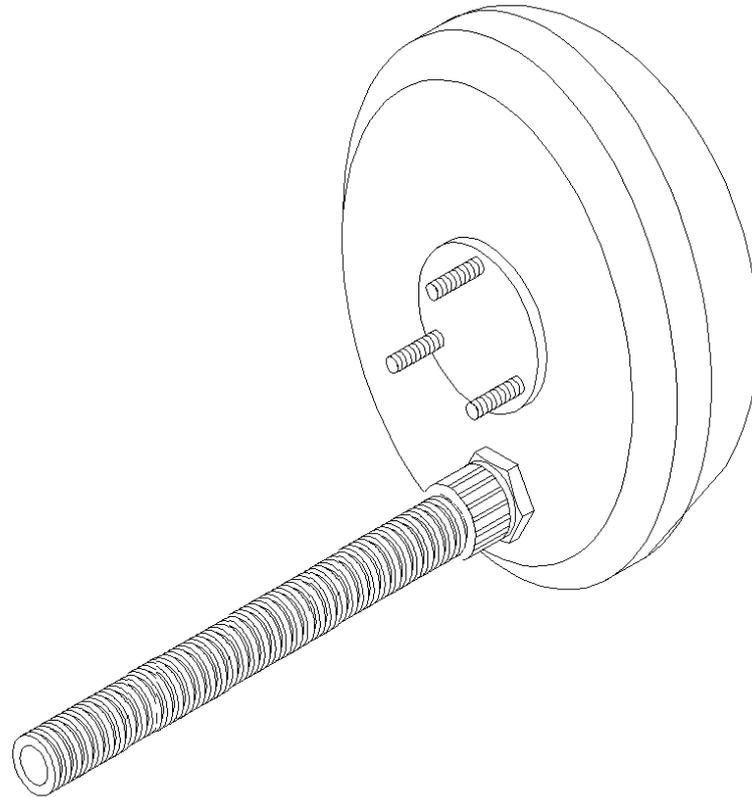




**The older models were supplied with plastic bracket, like above. We supply the newest models with new aluminium bracket, that you can to fit very obviously and easily.**

**Mounting of the plastic pipe to the cable gland**





**Mounting of the detectors**



Transmitter / Receiver position

Take care of the position of the detectors. On the transmitter / receiver the cable input should be at the bottom.

### **Mounting of the junction box**

Fix it to the pole by bands or screws.

### **Installation on pole**

Use metal poles with a diameter of 50 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).

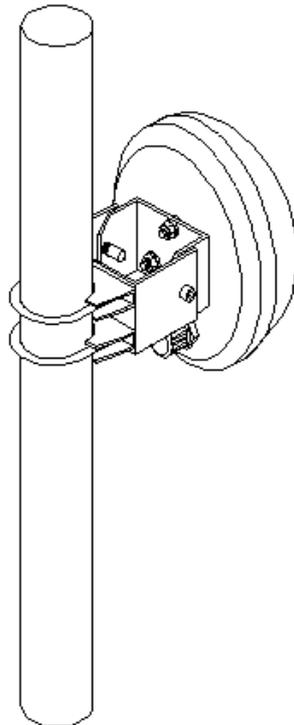


Fig. 3 Installation of transmitter/receiver on pole

Use the steel clams with the aluminium bracket for pole installation. Fix the clams with the screws. Connect the two half of the bracket and fix them by screws. The fastening of screws should be the last step, after focusing the transmitter and receiver in the optimal position.

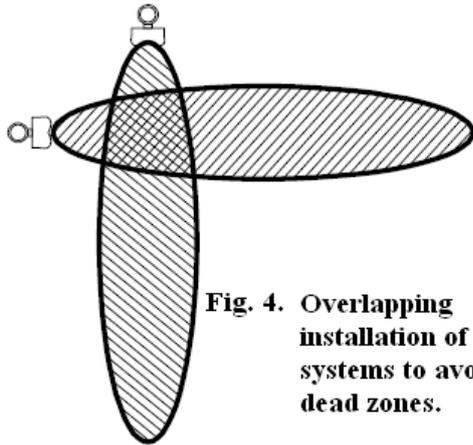
**Note:** Please always install the steel clams according to the photos below.



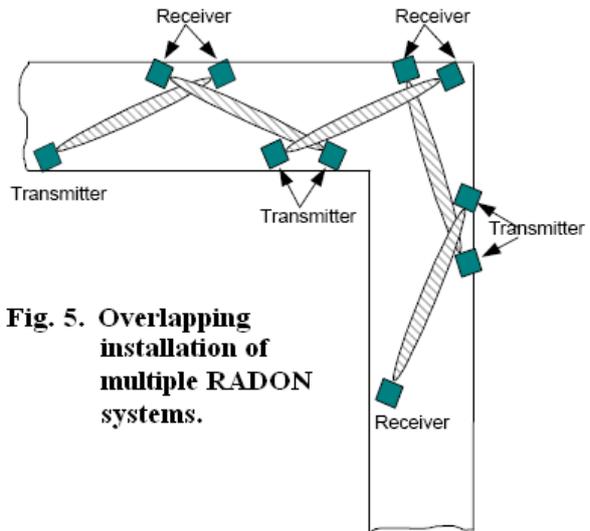
### **Cross installation**

In order to avoid “dead zones” under aerials and to increase the protected area it is possible to install multiple **RADON** 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 4 - 5 m in normal cross installation and 8 - 10 m in parallel cross installation (with 0.5 m axis distance).

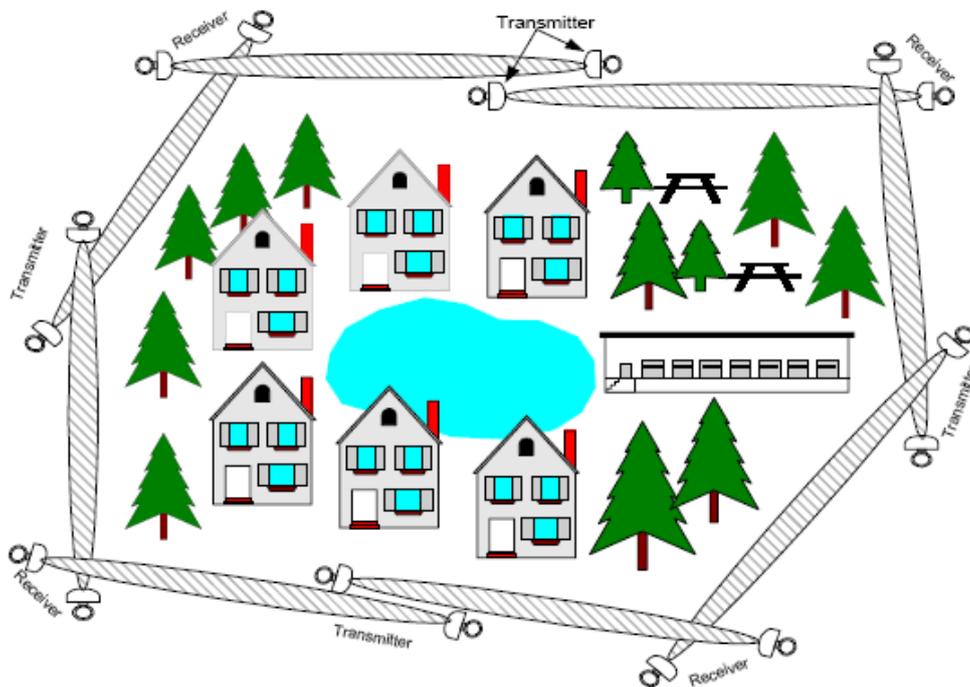
**Note:** The recommended way is to install transmitters only or receivers only at the point of overlap.



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



**Fig. 5. Overlapping installation of multiple RADON systems.**



**Fig. 6 Overlapping installation of RADON 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 the mentioned way in the manual).

**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.

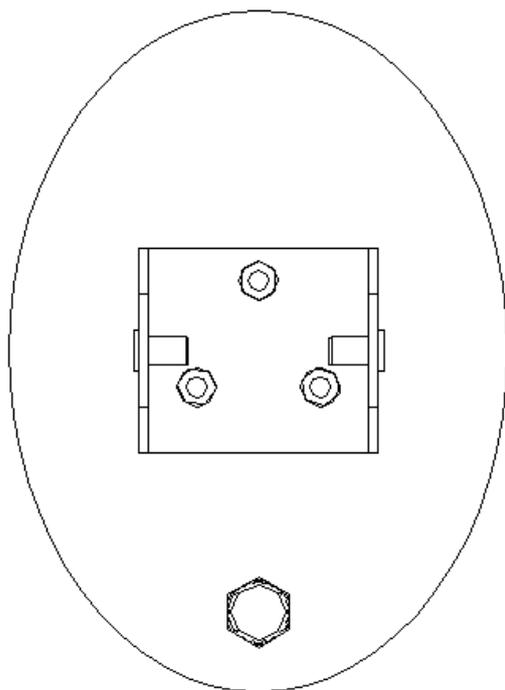
**DETECTOR WIRING**

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

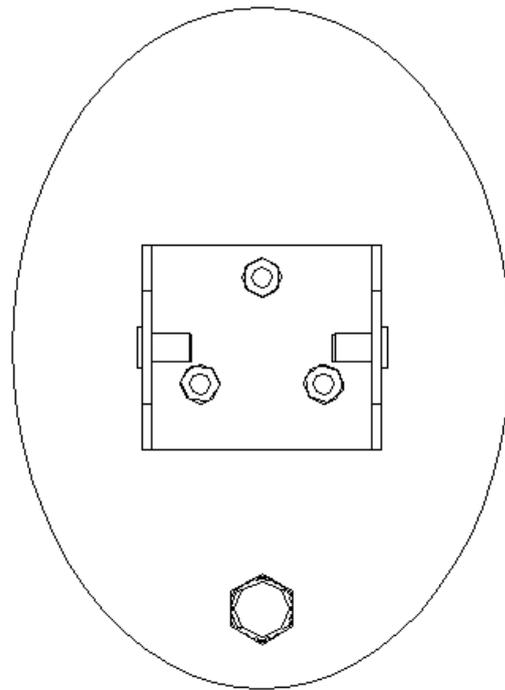
**TMR = Transmitter unit**

**RCR = Receiver unit.**

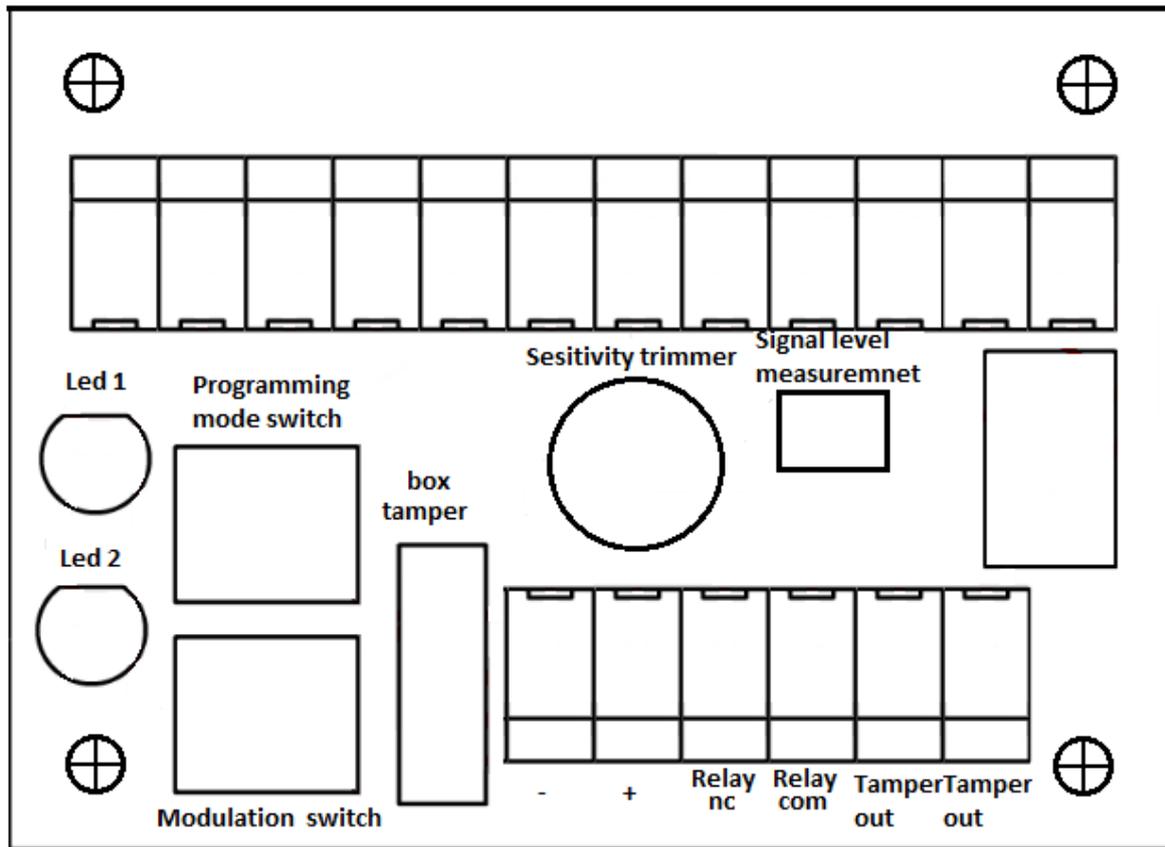
**Fig. 7 Receiver unit**



**Fig.8 Transmitter**



**Junction box terminals**



Sensitivity trimmer:

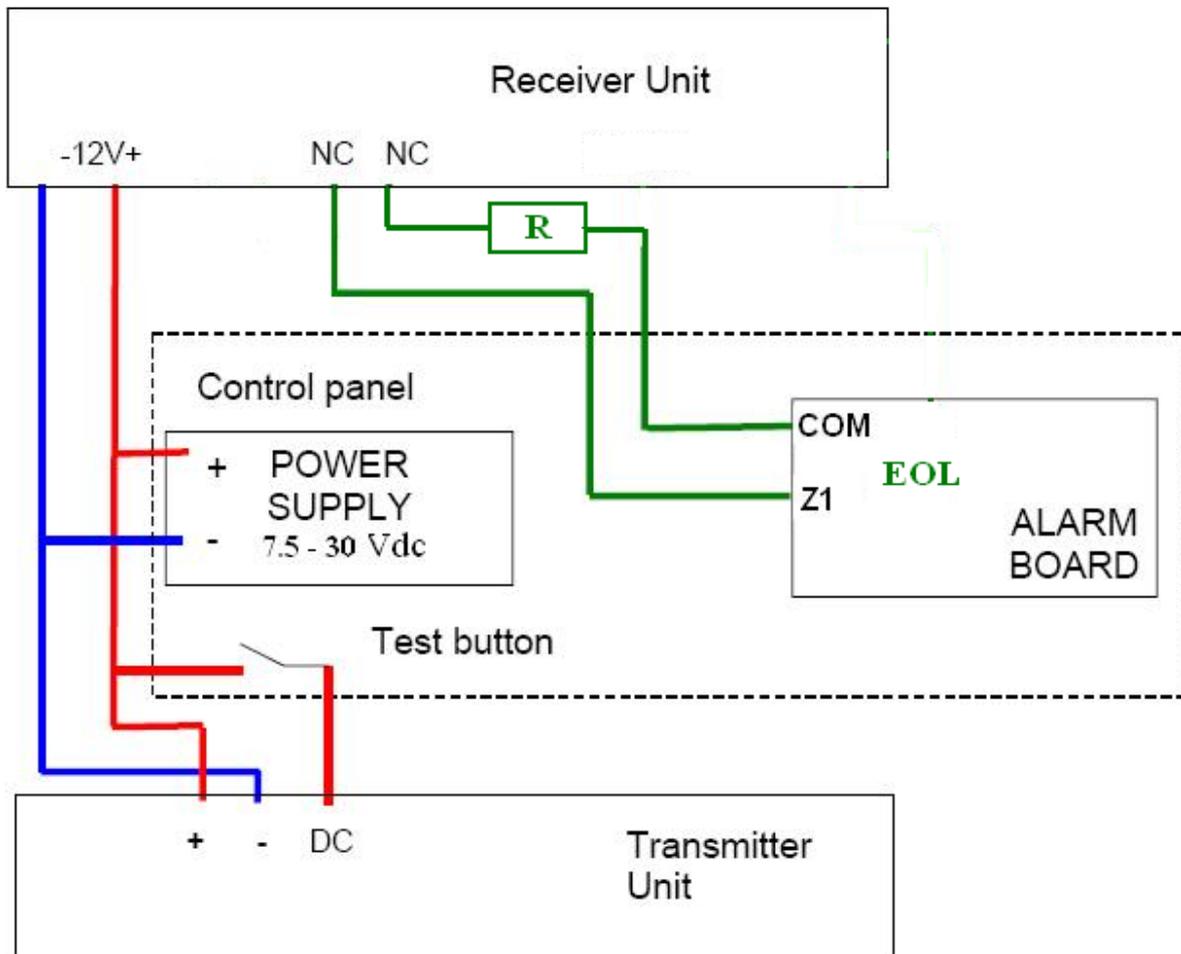
- increase the sensitivity: counterclockwise
- decrease the sensitivity: clockwise

**Transmitter wiring**

| № | Marking of wires |        | Functions of wires   |
|---|------------------|--------|--|
|   | symbols          | colors |  |
| 1 | +                | brown  | <u>Positive power:</u> Connect it to a positive voltage output of 7.5 – 30 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 | DC | green | <p><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.</p> <p><u>Frequency modulation:</u> Use this 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).</p> |
|---|----|-------|--|

**Warning:** Do not open the detector's housing, because it may damage the device!!!



**Fig. 9 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 unexpected alarms.

**Note:** The alarm contact loading capacity is up to 30 Vdc @ 0.1 A.

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

**Note:** If the signal cable length is longer (more than 100 m), please use an external relay at the alarm contacts to avoid contact problems (only with standard Radon).

### **Transmitter modulation adjustment**

In case the angle between the axes of neighboring detection zones is less than 60°, or in case reflected microwave signals, 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). In second point it is possible to turn the detector units by 90° to the same direction.

To change the signal frequency of transmitter, follow the recommendations:

1. Disconnect the power supply unit from the detector for 10 seconds.
2. Connect **only** the remote control wire (DC - green) to positive power and the negative wire (white) to negative power and turn on the power supply.
3. Connect the brown wire to positive power. The transmitter buzzer beeps one long, four short, one long, then the actual frequency modulation (the number of sounds indicates the signal frequency of the transmitter).
4. To change signal frequency to the next channel, disconnect the brown wire, wait 10 seconds, then connect again.
5. Now the transmitter buzzer beeps one long, four short, one long, then the new frequency modulation (the number of sounds indicates the signal frequency of the transmitter). Repeat the procedure, until you reach the requested channel.
6. After frequency setting is finished, disconnect the brown and green from power.
7. Connect the power supply to the detector again, but the remote control wire (DC-green) shouldn't be connected. The transmitter buzzer beeps one long, then the actual frequency modulation (the number of sounds indicates the signal frequency of the transmitter), and one long again. The frequency setting is ready.

### **Receiver modulation adjustment**

The frequency modulation change of receiver proceed as follows:

1. with the power disconnected press and hold the modulation button.
2. Connect the power with the modulation button held press the respective LED flashes quickly.
3. Release the button: the LED indicate the number of adjusted frequency modulation (one flash for mode 1, two flashes for mode 2, etc...). To change the frequency modulation press the button once: the LED flashes quickly and then indicates the next frequency modulation. Choose the required frequency modulation.
4. To save the chosen frequency modulation disconnect the power and after 10 seconds connect the power again without pressing the freq. mod. button. The led will indicate the frequency modulation setting.

### **Positioning and focusing**

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.

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. Check power supply circuits are properly connected. Power supply should range from 7.5 to 30 Vdc.
2. When power is supplied to detector units, the number of buzzer sounds indicates the signal frequency at the transmitter, and the number of LED flashes indicates the signal frequency at the receiver. The receiver and transmitter of a barrier should be adjusted to the same signal frequency.

### **Signal level measurement on receiver**

The actual signal level can be measured with the multimeter connected to the two pole socket of the receiver with the enclosed measuring cable.

**ATTENTION: The detector only enters the signal measurement mode if the transmitter and receiver have already synchronized to each other and there is a constant signal on the receiver from the transmitter.**

1. Set the sensitivity trimmer to the lowest position.
2. Wait until the alarm LED off. If the alarm LED lit more than 30sec, the transmitter and receiver position is not correct.
3. Connect the attached measurement cable to the signal level measurement terminal, connect it to a multimeter and set it to 20Vdc
4. Press the programming mode button for one second to enter the programming mode. LED2 will flashing, it indicates you entered the programming mode.
5. Set the position of the receiver, to get the highest level.
6. Set the position of the transmitter, to get the highest level.
7. Set the position of the receiver again, to get the highest level.
8. Press the programming mode button to exit the programming mode.

**Note:** The positioning could be done if the alarm LED off.

**Note:** The measured voltage should be between 0,5-4,8Vdc. It indicates the signal level, not the distance between the transmitter and receiver. If the voltage is lower than 0,5Vdc or higher than 4,8Vdc, change the position of the detector.

## **OPERATION**

### **Detector contact signals**

The self-diagnostics of the detector has 3 signals:

1. Normal - alarm contact is closed.
2. Alarm - alarm contact is opened for at least 2 sec. The detector generates an alarm if:
  - a walking or crawling on hands and knees human crosses the detection zone
  - an impulse of 5-30 Vdc is supplied to remote control input
3. Trouble - alarm contact is opened continuously. A trouble message is generated if:
  - there is interference from neighboring transmitter

- voltage drops lower than  $7.0 \pm 0,5$  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

### **Operation check**

1. After sensitivity is adjusted check the remote control. Supply power of 5-30 V to the DC (Remote Control) circuit of the transmitter. The detector should generate an alarm.
2. Running-in the detector means that a 24-hour testing period should be implemented after installation, preferably running for at least 3 days with all detections being registered and analyzed. During running-in detector's operation should be checked twice a day by test crossing the detection zone. If false alarms are registered, or no alarms are registered during test crossings, check the sensitivity settings to eliminate defects.

### **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  $90^\circ$  (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 contacts.

### **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**

| <b>Trouble</b>  | <b>Possible reasons for trouble</b>  | <b>Troubleshooting</b>  |
|---|--|---|
| When power supply is on, the receiver is not active (does not enter standby mode).  | No power supply voltage.   | Check power supply voltage of the receiver. If it is off, check the power supply circuit.   |
|   | Wrong voltage polarity.  |   |
| Detections are constantly generated in the alarm circuit, the buzzer is on in every 2 sec.  | Power supply voltage is below normal value.  | Check power supply voltage of the detectors. If it is below normal value, check the power supply circuit.   |
| Detections are constantly generated in the alarm circuit.   | Different signal frequencies of the receiver and transmitter.  | Set the same signal frequencies.  |
| 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.  |
|   | Sensitivity is too high.   | Adjust the suitable sensitivity.  |
|   | The receiver is affected by a neighboring transmitter.   | Carry out frequency or position adjustment as described in the manual.  |
| The detector does not generate alarm by motion.   | 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. |
|   | Sensitivity is too low.  | Adjust suitable sensitivity.  |
|   | The receiver is affected by a neighboring transmitter.   | Carry out frequency or position adjustment as described in the manual.  |
| <b>Note:</b> 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**

| <b>Modell</b>                                | <b>RADON-50MRS</b>             | <b>RADON-100MRS</b> | <b>RADON-200MRS</b> | <b>RADON-300MRS</b> |
|--|--------------------------------|---------------------|---------------------|---------------------|
| <b>Microwave frequency</b>                   | 10.525 ± 0.025 GHz             |                     |                     |                     |
| <b>Maximum transmitting power</b>            | 50 mW                          |                     |                     |                     |
| <b>Maximum length of protection zone</b>     | 50m                            | 100m                | 200 m               | 300 m               |
| <b>Minimum length of protection zone</b>     | 20m                            | 40m                 | 80m                 | 120m                |
| <b>Maximum width of protection zone</b>      | approx.<br>1 m                 | approx.<br>2 m      | approx.<br>3 m      | approx.<br>4 m      |
| <b>Maximum height of protection zone</b>     | approx. 1.8 - 2 m              |                     |                     |                     |
| <b>Power supply voltage</b>                  | 12...24 V                      |                     |                     |                     |
| <b>Power consumption</b>                     | Up to 30 mA at 24 Vdc          |                     |                     |                     |
| <b>Detection speed</b>                       | 0.1...10 m/s                   |                     |                     |                     |
| <b>Remote testing</b>                        | Built in self-tester generator |                     |                     |                     |
| <b>Alarm contact loading capacity</b>        | 30 Vdc @ 0.1 A                 |                     |                     |                     |
| <b>Warm up time after power up</b>           | 30 sec                         |                     |                     |                     |
| <b>Warm up time after alarm message</b>      | 10 sec                         |                     |                     |                     |
| <b>Flatness of ground</b>                    | approx. 0.3 m                  |                     |                     |                     |
| <b>Maximum height of grass on the ground</b> | 0.3 m                          |                     |                     |                     |
| <b>Maximum height of snow on the ground</b>  | 0.5 m                          |                     |                     |                     |
| <b>Alarm message duration</b>                | approx. 2 s                    |                     |                     |                     |
| <b>Dimensions of units</b>                   | 145 x 210 x 65 mm              |                     | 145 x 210 x 65 mm   |                     |
| <b>Weigth of units</b>                       | approx. 0.9 kg                 |                     | approx. 1.2 kg      |                     |
| <b>Operating temperature</b>                 | -40 °C ~ +65 °C                |                     |                     |                     |
| <b>Weatherproofness</b>                      | IP 65                          |                     |                     |                     |

**Disclaimer**

The manufacturer / distributor reserve the right to revise or remove any content in this manual at any time. The manufacturer / distributor do 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.