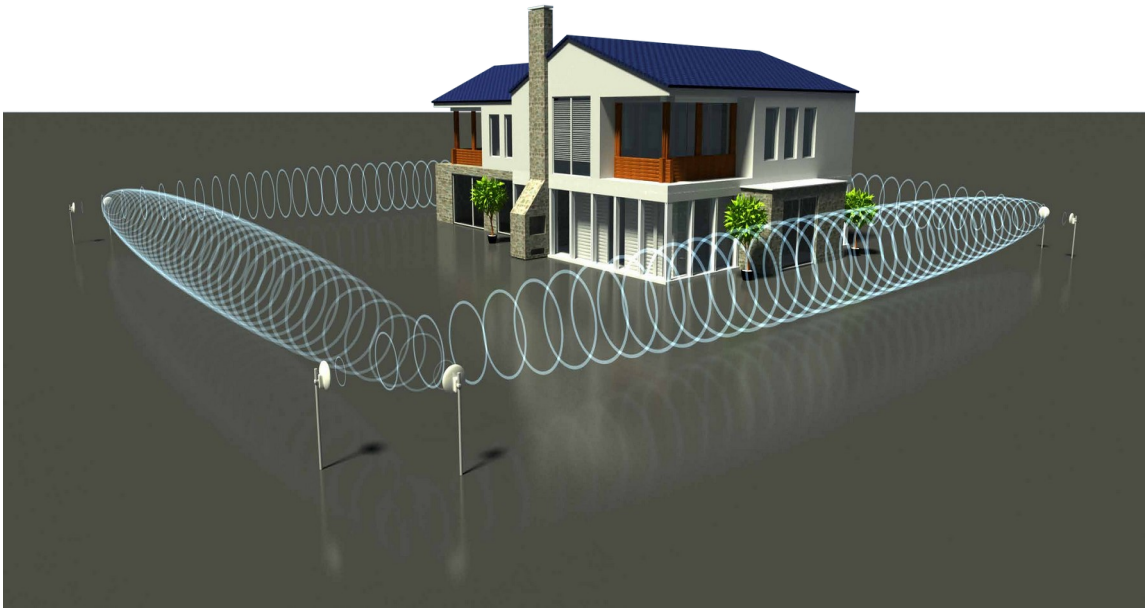
Local Microwave Protective Detector
Predix (100m, 200m, 300m)

Description Manual & Service Instruction



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CONTENTS

1. DESCRIPTION AND OPERATION

The present description manual and service instruction contains information about the operation of the local microwave protective detectors series Predix (100m 200m 300m) below the detector. In this document there is information required for the correct operation (use, transportation, storage and maintenance) of the detector.

The following abbreviations are used in the present document:

Tx - transmitter

Rx - receiver.

MK - mounting kit;

1.1. Purpose

1.1.1. The purpose of the sensors is to protect the perimeter sectors and to detect an intruder crossing this sector at his “full height” or “bent”. An alarm is generated by breaking the individual point relay contacts. Then it is transmitted on the receiver.

1.1.2. The detector is intended for continuous round-the-clock outdoor operation at an ambient temperature -40ºC…+60 C and relative humidity up to 98% at the temperature +35 C.

1.1.3. When the sensor operates with the alarm complex, you can control the sensor with RS-485 interface.

1.2. Specifications

1.2.1. The recommended length (L) of a sector for modifications:

Predix (300m) – 10…300 m

Predix (200m) – 10…200 m

Predix (100m) – 10…100 m

The detection zone height, h:

Predix (300m)	1,8 m* maximum
Predix (200m)	1,8 m* maximum
Predix (100m)	1,6 m* maximum

The detection zone width, b :

Predix (300m)	2,1 m* maximum
Predix (200m)	1,9 m* maximum
Predix (100m)	1,5 m* maximum

** in the middle of a sector at the maximum length*

The cross speed:	0,1 up to 10 m/sec
The quantity of the frequency channels	8
Supply voltage	9…30 V
Current consumption	to 163 mA maximum
Tx	70 mA maximum

Rx	113 mA maximum
Individual point relay parameters:	
Switching voltage	30 V maximum
Switching current	0,1 A maximum
Alarm contact resistance	100 Ohms maximum
“dead” zones	2…3 m
Protection class	IP55

The configuration and the dimensions of the detection zone are given in fig.1.1. and table 1.1

Length of a sector, m	25	50	100	200	300
Detection zone width, m, max	0,7	1,0	1,5	1,9	2,0
Detection zone height, m, max	1,4	1,4	1,6	1,8	1,8

Table 1.1

1.2.2. The detection zone is a volumetric part of a sector that being the very specialty in the kind of detection, and any movement within this sector will generate an alarm.

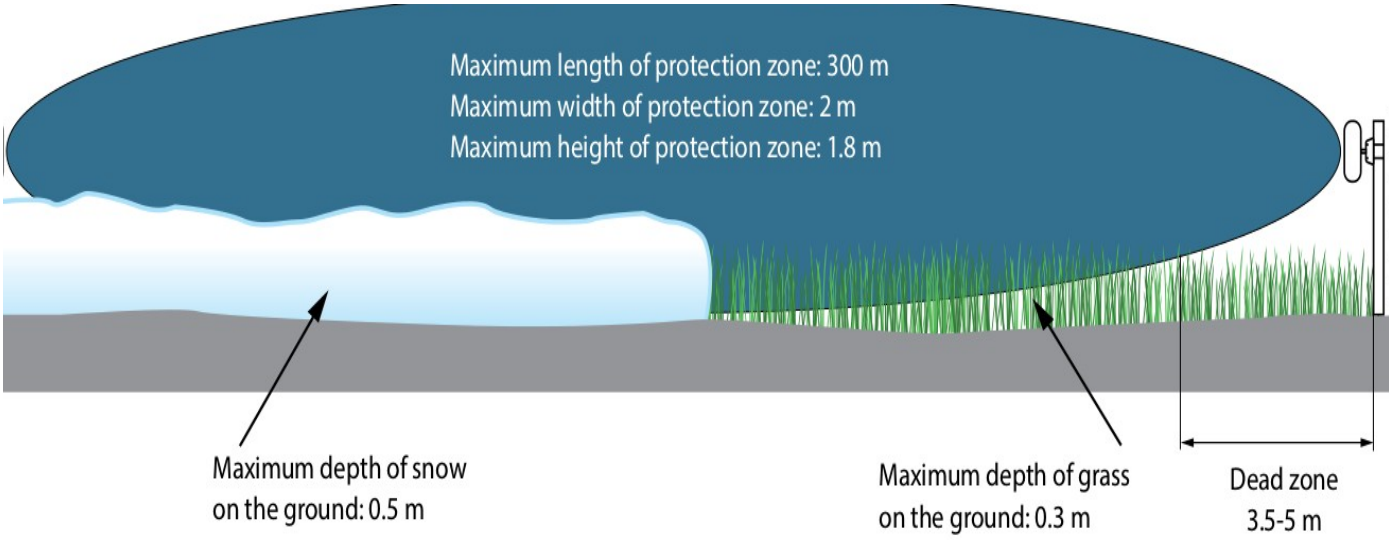


Fig.1.1. Detection zone

1.2.3. In Fig.1.1 and Table 1.1 the height and the width of the detection zone are given for the middle of the sector. Moving towards the receiver or transmitter these dimensions decrease evenly, given the geometry of positioning the receiver and transmitter.

1.2.4. The recommended distance from the axis of the detection zone up to fences, building walls and other motionless objects at the sector length:

80…200m - 1, 1 m minimum

25…80m - 0, 8 m minimum

10…25m - 0, 4 m minimum

1.2.5. The sensor generates an alarm when:

an intruder crosses the detection zone. Detection probability is 98 % when an intruder crosses the detection zone at his “full height” or “bent”;

external electromagnetic field influences on Rx for its masking. There may be no alarm signal, but in this case the sensor should save its operability.

In alarm the contacts of optoelectronic individual point relay is broken (standby mode) for 3 sec minimum. Orange and brown wires marked «NC» (normally closed, or «NO» - normally open) and this alarm is transmitted over RS-485 interface too.

Note: At the distance of 3-5 m from the supports with Tx and Rx the probability of the intruder’s detection, who is moving stooping down (crawling through) in the detection zone, is less than 98 % as an intruder can stoop down and pass below the detection zone.

1.2.6. The sensor generates a fault signal at:

the absence of Tx signal;

the absence of supply voltage or at its reduction lower than 8 mV;

Rx or Tx failure.

When a fault signal is generated, the individual point relay contacts are broken, and a fault signal is transmitted over RS-485 interface up to the malfunction repair.

1.2.7. When the exchange is interrupted over RS-485 interface, a fault signal is generated by the alarm complex.

1.2.9. The sensor doesn’t generate false alarms at:

rain, snow, thick fog;

solar radiation;

wind speed up to 30 m/sec;

objects moving with the linear dimensions up to 0,2 m (birds or small animals);

irregularities up to ± 0,3 m;

snow up to 0,5 m (without additional adjustment);

grass up to 0,3 m;

the influence of ultra-short waves emissions of the range 150-175 MHz and the power up to 40 W at the distance 6 m maximum.

1.2.10. The sensor is immune to electromagnetic interferences (voltage impulses in supply circuits, breaks of mains supply, electrostatic discharges and electromagnetic fields).

1.2.11. The case of the sensor is made of impact-resistant plastic immune to UV radiation and the temperature changes in all the performance range.

1.2.12. The sensor mean lifetime is 8 years.

1.2.13. Maximum dimensions of the units without a mounting kit in mm:
transmitter: 165x165x180 mm
receiver: 165x165x180 mm

1.2.14. Maximum weight of Rx +Tx units with a mounting kit: 1.7 kg:

1.3. Sensor components

Receiver – 1 pc
Transmitter – 1 pc
Mounting kit (MK) including:
brackets – 2 pcs
clamps – 4 pcs
cable conduit – 2 pcs
USB flash drive with software, user manual and additional information is supplied at the customer order.
The protocol converter USB/RS-485 with the port isolation cable for PC are supplied at the customer order.

1.4. Operation principle

1.4.1. The sensor is a bistatic microwave device. The sensor principle of operation is to generate an electromagnetic field between Tx and Rx. This field forms a volumetric detection zone in the form of a long ellipsoid of rotation. The sensor registers changes of the field when an intruder crosses a protected area.

1.4.2. An intruder crossing the detection zone causes some changes of the signal amplitude in Rx. The signal passes through the amplifier and is compared with the thresholds value according to the algorithm. If the signal change on Rx input is provoked by a person passage, then Rx generates an alarm, breaking actuating relay contacts. The signal changes depend on: height and weight of the intruder, place of the sector crossing, its relief and speed of the movement.

1.4.3. The signal on Rx input can be changed under the influence of other interference factors: precipitations, vegetations, small animals, electromagnetic interference, swinging of tree branches or gates, crossing the detection zone and which are commensurable with intruder movements.
Other reasons, e.g. location of extensive constructions in the detection zone or near it (fences, walls), irregularities and snow can influence on the Rx input signal. In these cases the detection zone form is distorted because of re-reflections and interferences.

Multi thresholds operation algorithm permits to reduce the number of false alarms. **That's why one should observe the recommendations of the subsection 2.1.**

1.4.4. The alarms reception and indication are performed with the security system controlled by the relay contacts, and with the security systems operating with RS-485 interface. When an alarm is generated, the normally closed contacts are broken.

2.INSTALLATION AND ADJUSTMENT PROCEDURE

The preparation to the sensor operation is the following:

preparation of the sector;
signal cables and power supply laying;
Tx and Rx installation;
sensor connection (connection of power supply and intruder alarm loops);
alignment of Tx and Rx antennas
Rx thresholds setting.

The principles and methods of these steps are given in i. 2.1-2.8.

2.1. Requirements for the protected sector of Rx and Tx alignment

2.1.1. The sector where Tx and Rx are located should meet the following requirements:

1. The height of irregularities should not exceed ±0,3m. If irregularities of the sector surface from the plane exceed ±0,3m, the specifications of the detector can worsen. In this case the issue of the use of the detector under these conditions is defined by the trial operation.
2. The height of the grass should not exceed 0,3m;
3. The height of the snow should not exceed 0,5m;
4. The maximum incline of the sector is 45˚;
5. Single fixed objects (e.g. posts, trees without lower branches) can be situated in the detection zone at the distance of 0,5 m minimum from the axis;

The width of the sector should meet item 2.1.3

2.1.2. The detector can be mounted if the width of the sector is less. In this case if "Calibration mode" voltage is less than 50 mV, it is necessary to change Rx and Tx position relative to the support. For example, if Rx and Tx are at the left from the support, turning the wall bracket relative to the support at 180º, fix Rx and Tx at the right from the support. If it is not successful and "Calibration mode" voltage is less than 50 mV, it is necessary to realize the trial operation and according to its results to make a decision about the possibilities of the detector operation in these conditions.

2.1.3. Moving objects influenced by wind: wings of gate, bushes, trees branches, etc. **should not be situated** in the detection zone and at the distance of:

- ± **1,7 m** from the axis connected Rx and Tx at the perimeter length **from 50 to 100 m**;
- ± **2,2 m** from the axis connected Rx and Tx at the perimeter length **from 100 to 200 m**;
- ± **2,6 m** from the axis connected Rx and Tx at the perimeter length **from 200 to 300 m**.

2.1.4. Sector width should not be less than the detection zone one (see **Table 1.1**).
The sensor can be mounted if the sector width is less. In this case the sensor application is determined by trial operation.

2.1.5. The range of the sector's slope is 40˚ maximum.

2.1.6. The sensors with different channels should be mounted on the neighbor sectors. When the sensor is mounted one after another on the sectors, a number of the channels should be repeated successively from 1 to 4 providing the maximum distance of the sensors with the same letter.

2.1.7. To increase the detection zone in the height, it is possible to align the sensors in two tiers. The sensors should have different channels; two transmitters should be installed from one side of the protected area, two receivers – from another one. The sectors lengths should be identical.

2.1.8. The sensor can limit the maximum intruder's speed. If the maximum intruder's speed is reduced, the interference immunity will be increased. The manufacture produces the sensors with the maximum intruder's speed of 2 m/sec up to 8 m/s .You can reduce the minimum intruder's speed up to 0.1 m/sec ("middle") and up to 0.4 m/sec ("low")*. You can change the intruder's speed with the PC software. After that it is necessary to set the alarm sensitivity again.

For example: open perimeter path – high movement speed of violator (10 m/s); the area between the fence and the auxiliary facilities (min. 0,2 m/s, max. 8 m/s) – the average movement speed of violator; the sensor is installed on top of the fence – low speed of violator (0,1 m/s).

2.2. TX and RX mounting

2.2.1. Mark the perimeter area for the places where the supports will be mounted. To generate a continuous protected boundary, the installation of Tx and Rx isn't permitted on adjacent perimeter sectors. The right installation on adjacent perimeter sectors is Tx and Tx, Rx and Rx. To generate the continuous protected boundary, it is necessary to provide the overlapping of the sectors detection zones (see fig. 2.1 and 2.2). The overlapping is necessary to eliminate the possibility of the sector overcoming under or above Tx (Rx) unit near the support.

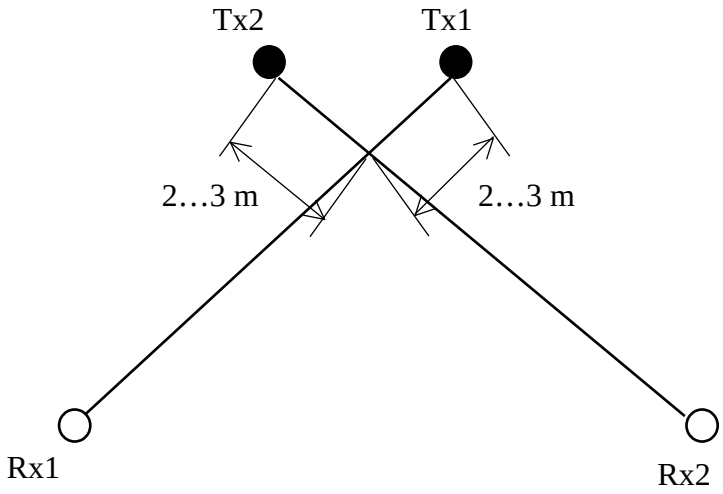


Fig. 2.1

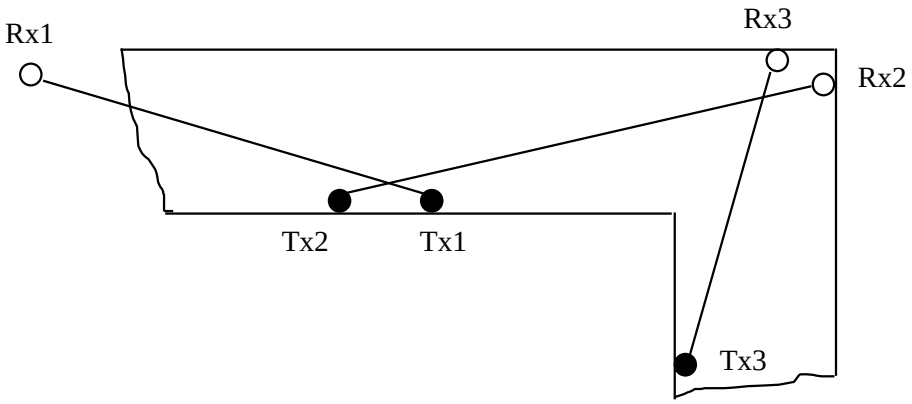
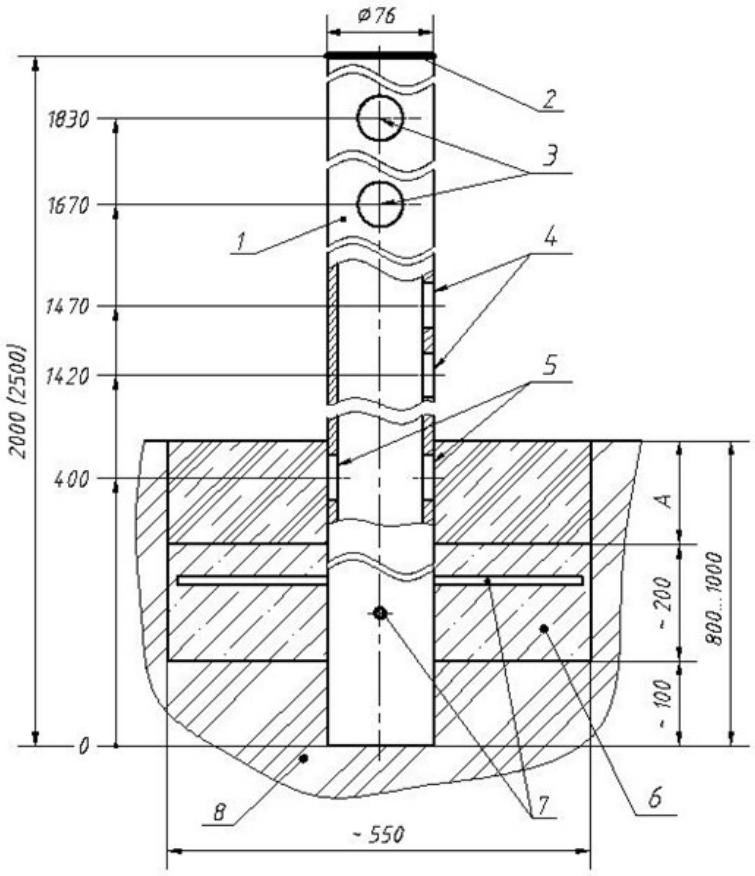


Fig. 2.2

Note: To avoid co-interference between neighboring detectors, you should place detectors with different operation channel.

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.

2.2.2. Mount the supports. It is recommended to use metal or asbestos-cement tube as supports of 70…90 mm diameter. The height of the support above the surface of the ground is given in fig. 2.3. In the places where there is a lot of snow, the superstructure of the support should be 1500 mm minimum. As for the support construction, it is necessary to provide some dowels for concreting and some holes for the cable gland. The example of the support mounting is given in fig. 2.3. In the snowy regions the superstructure of the support should be 1500 mm minimum.



1 - support;
2 - plastic plug;
3 - hole for the cable input inside the support;
4 - hole for the main cable and sensor cable input;
5 - hole for the main cable input;
6 - concrete (gravel);
7-dowels for prevention the unauthorized dismounting of the support;
8- ground

Fig. 2.3

Notes:

1. *For A size the ground should be laid after installation works.*
2. *Dimensions are given in millimeters (mm).*

2.2.3. Other variants of the sensor mounting (for example on the fence or wall) can be applied according to the protection tactics. If the sensor blocks the top of the fence, it is recommended to fasten the support with the fence with a solid mechanical or welded joint.

Sensor	Max detection zone length (L), m	Max detection zone width (b), m	Max detection zone height (h), m

Predix (100m)	60	1,0	1,0
Predix (200m)	120	1,5	1,5
Predix (300m)	160	1,5	1,5

Table 2.1

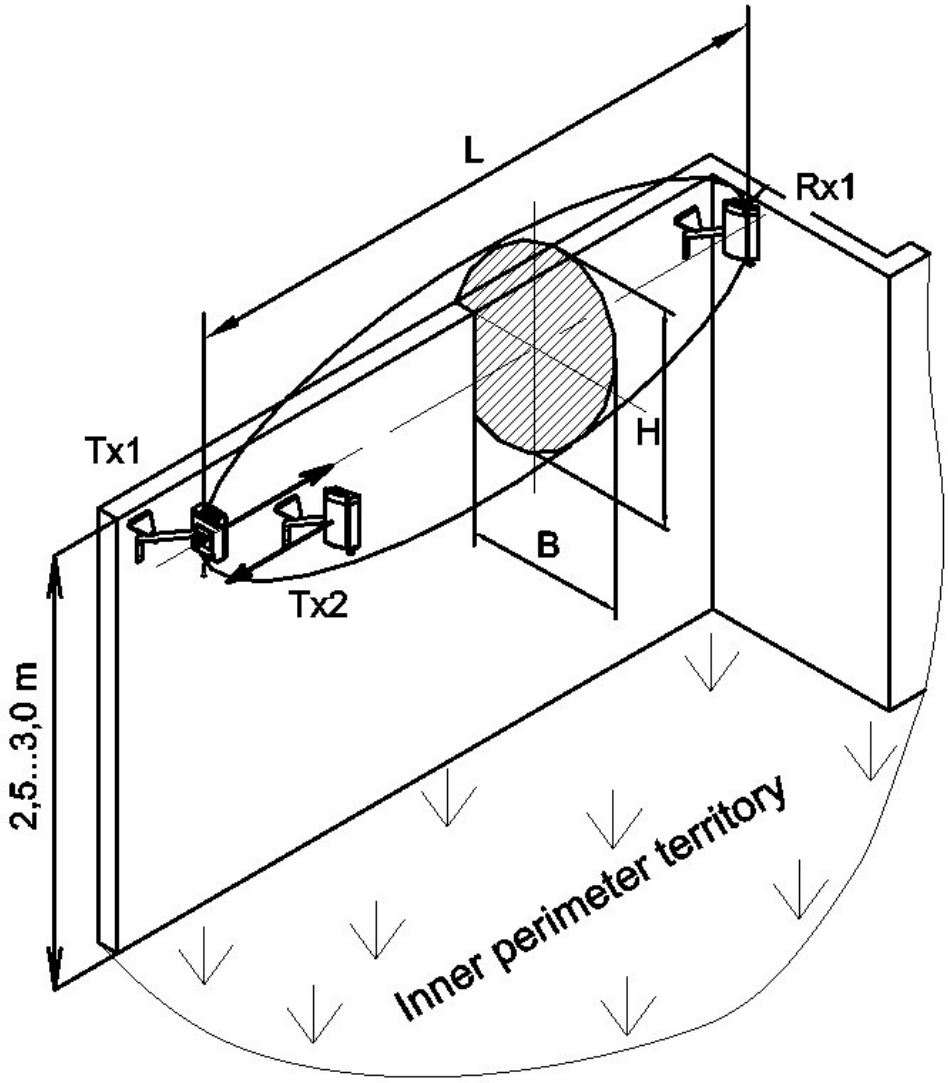


Fig.2.4

2.2.4. Lay the main cables according to the project of the security system. It is recommended to use multi-core cables with the core screen or metal sheath. The cable core section is chosen on condition that the supply voltage is not less than 9 V for every sensor unit. It is not recommended to lay the main cables near heavy electromagnetic interference sources (power lines, antenna systems, and etc.) and to use free cable cores for impulse signal transmission.

CAUTION! To reduce the level of electromagnetic interferences, it is recommended to mount the power supply unit at a distance up to 300 m from the place where the sensors are installed.

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.

2.3. Sensor connection

2.3.1. Connect the necessary power, signal and remote control circuits. Rx and Tx unit is connected with its own cables. The color or marking of the cable conductors indicate their purpose.

The information about cable conductors marking, color and purpose is given in **Table 2.2.**

Rx			Tx		
Circuit	Color	Purpose	Circuit	Color	Purpose
+	brown	Supply voltage	+	brown	Supply voltage
-	white		-	white	
RS485 A	green	Contacts of RS-485 connection	N/A	green	N/A
RS485 B	yellow		N/A	yellow	
NC	gray	Normally closed contacts of the relay			
NC	pink				

Table 2.2.

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

2.3.3. The type and the nominal of the terminal element of the security systems loop (resistor, condenser and diode) are determined by the type of the control device. The detector is connected to the control device. Usually it is a resistor. The nominal resistance of this resistor should take into the clamping resistor of the lightning circuit (this resistor - 100 Ohm) and resistance of the security systems loop (depends on the chosen cable type and its length).

3. PRELIMINARY CONFIGURATIONS

Before using the package it is necessary to install the Detector Control Panel software. At start the software tries to connect to the device with the default settings. These can be modified at the communication settings (Figure 3.1).

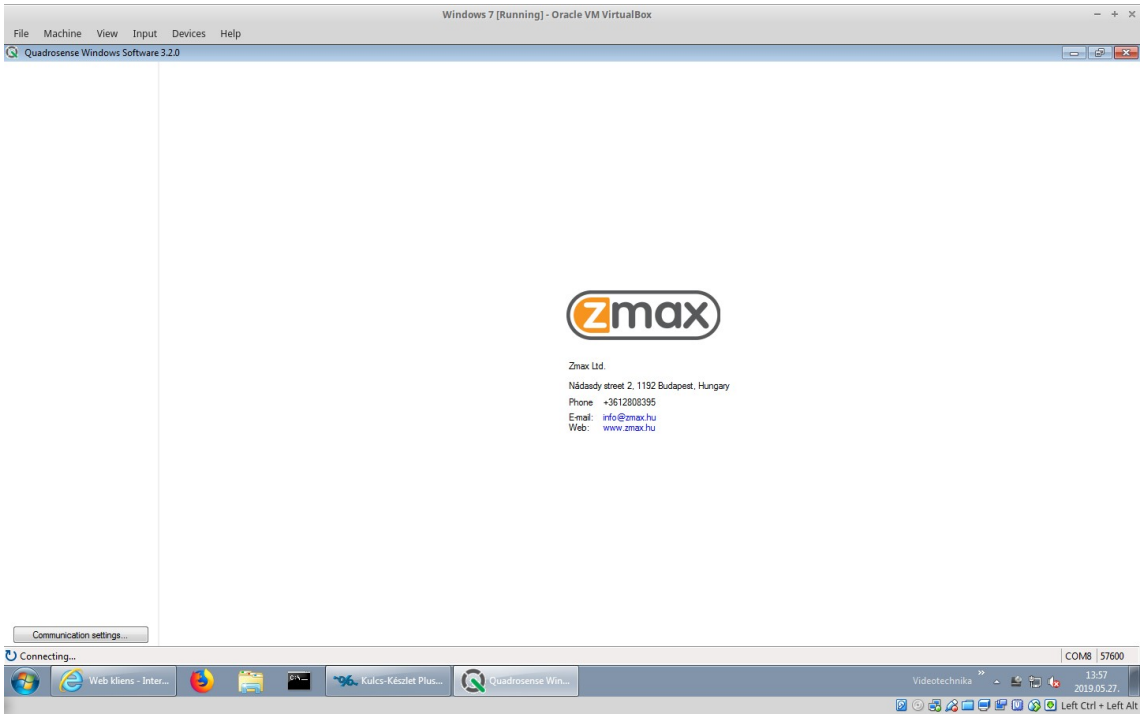


Figure 3.1

When the software is initially started, the connection to detector 1 (factory default) is made at the speed of 57,600 bps.

4. PROGRAM MENUS

Nomad tab:

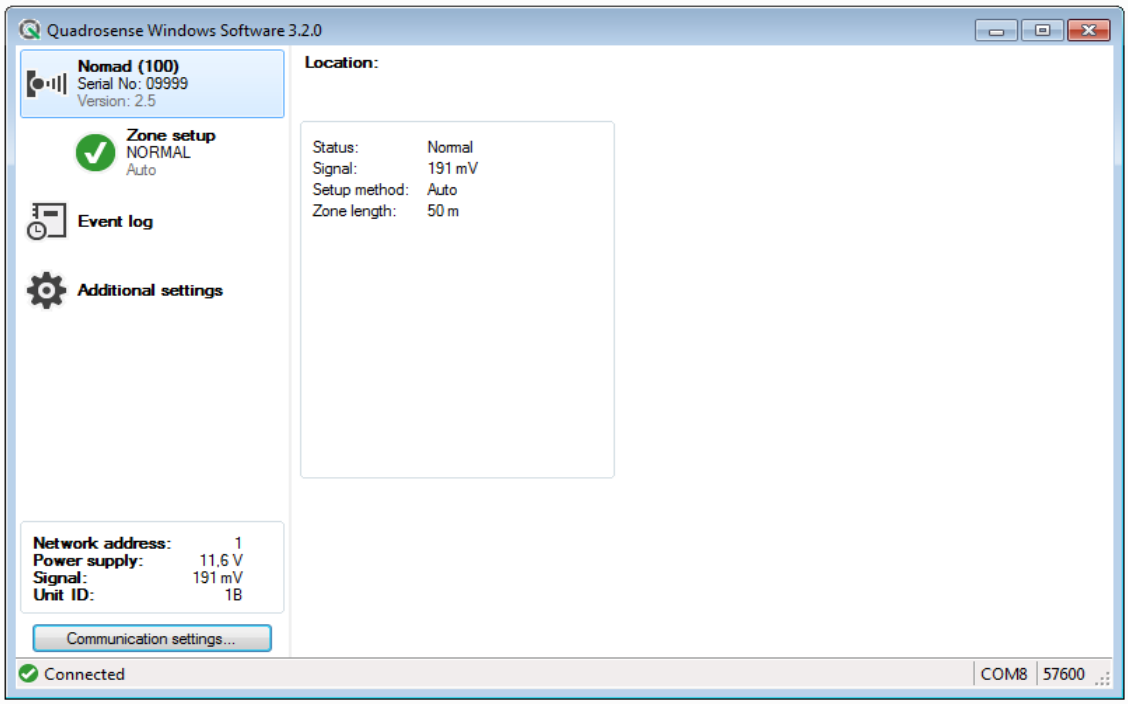


Figure 4.1

After connecting the PC to the detector, the main window with active Nomad tab (Figure 4.1), which displays the detector parameters. The Nomad button contains the following information:

Nomad: Information about detectors model *Predix*, operation length.

Serial No: The serial number of the device.

Version: Version of software.

In the left down corner you can see:

Network address: The address of the device.

Power supply: The voltage of power supply in volts.

Signal: Shows the signal between transmitter and receiver.

Unit ID: It means the frequency modulation of the receiver. The transmitter and receiver is on the same frequency modulation (1A ~ 4B).

Before starting work, it is recommended to go to the Additional setting tab and synchronize the time and date. This action is necessary for the further adequate display of information in the LOGS journal.

Zone setup:

Settings tab

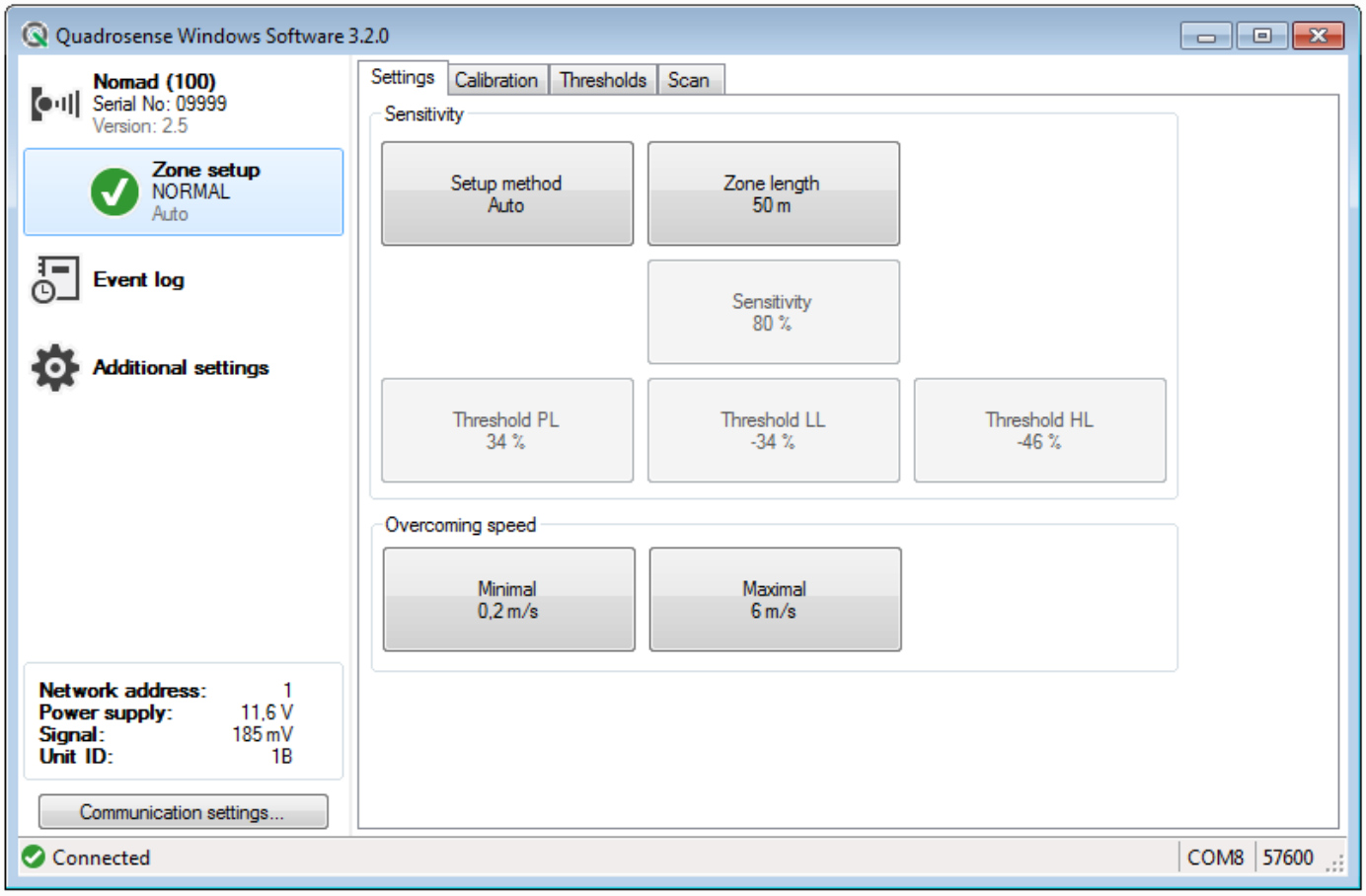


Figure 4.2

Inputs status show next to the Zone setup:

Normal — green
Alarm — red
Failure (Break, Closed, Noise) — yellow.

In the Zone setup menu you can see the current setting parameters. They have the following meaning:

Setup method: The currently selected setup method. You can choose:

Auto (you can change Zone length)
Manual (you can set sensitivity)
SPECIAL 1
SPECIAL 2

In most of the cases Auto setting is recommended.

Zone length: The currently selected operation distance for the detector. It is really important to choose the proper operation distance.

Note: It is used only in Setup Method: AUTO

Note: If the zone length is not the real distance, there might be higher false alarm rate or poor sensitivity.

Sensitivity: It means the sensitivity of detection. You can only set sensitivity in 'Manual' Setup method. In most of the cases sensitivity setting is not recommended.

Threshold: You can set the overcoming thresholds. What signal strength is needed to an alarm.

Note: It is used only in Setup Method: Special

Overcoming speed: It is the motion speed range which is identified by the detector.

Note: Too big speed range has higher false alarm rate, too low speed range has poor sensitivity.

Calibration tab

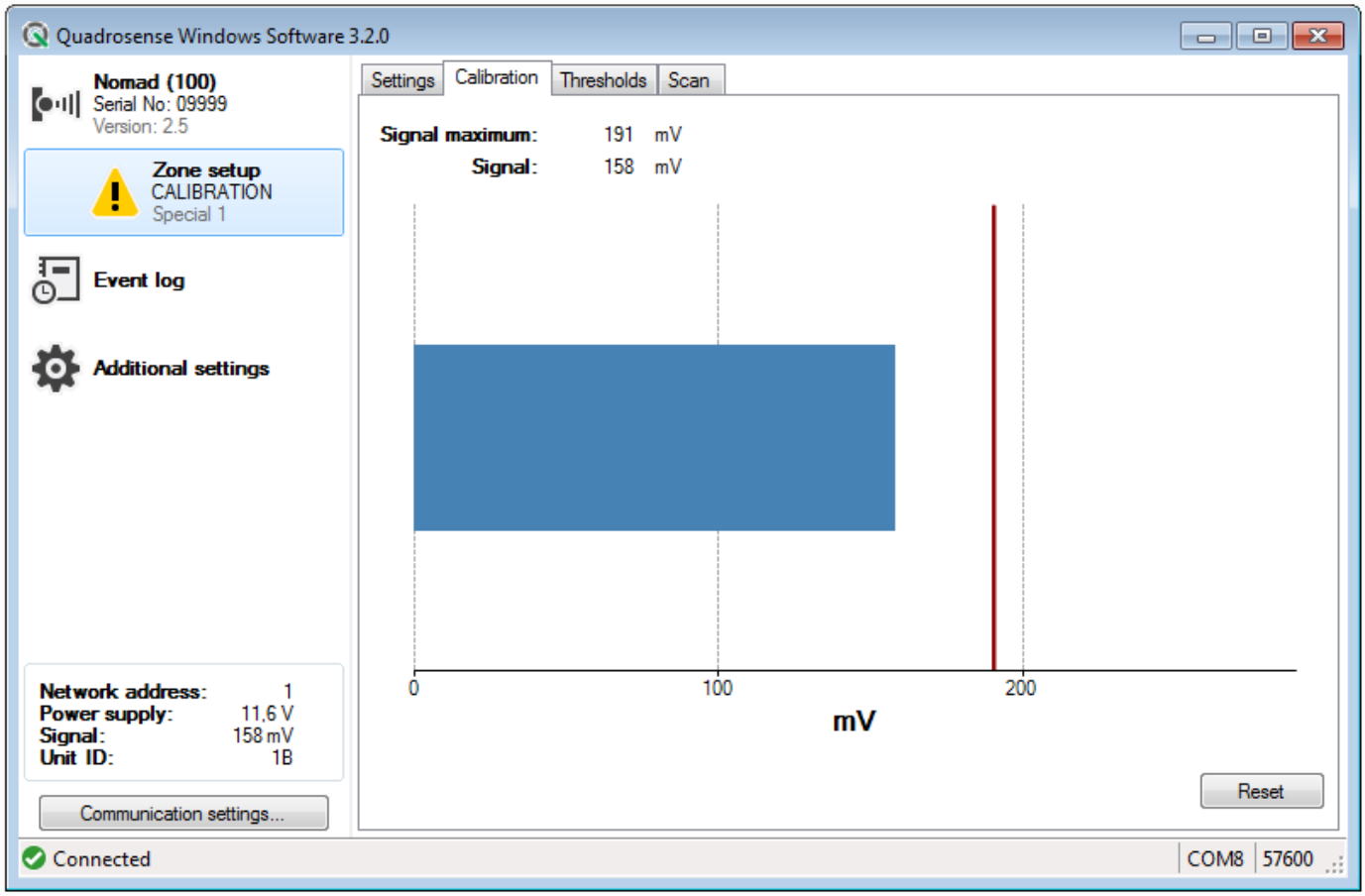


Figure 4.3

Here you can see the maximum signal, and the current signal strength.
This is used in the calibration process (chapter 5).

Thresholds tab

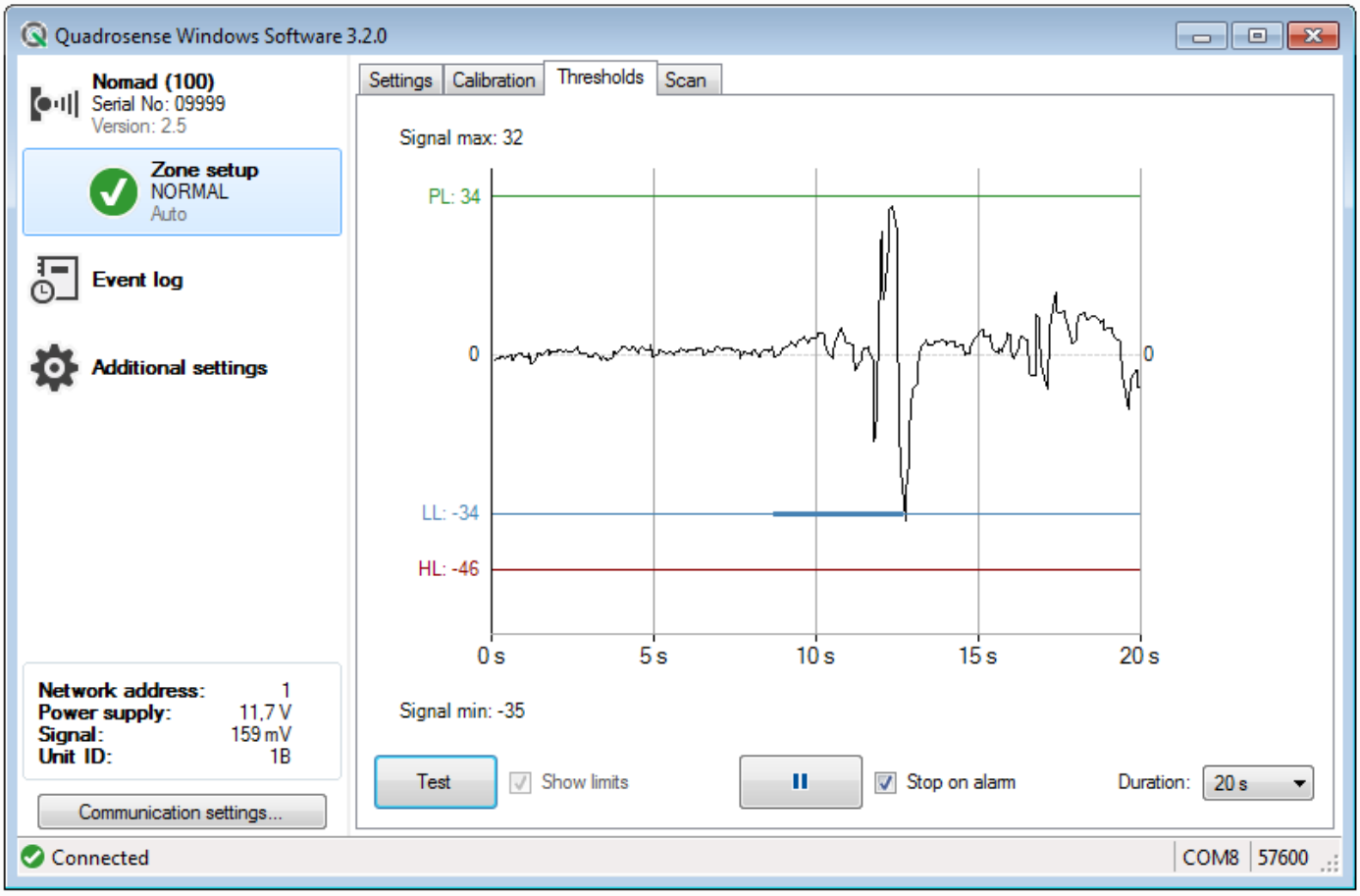


Figure 4.4

Here you can see the current signal strength with the thresholds on a graph. Used for the calibration of the detector's sensitivity (Chapter 6).

NOTE: In Setup mode: special, you can change the threshold values here too.

Scan tab

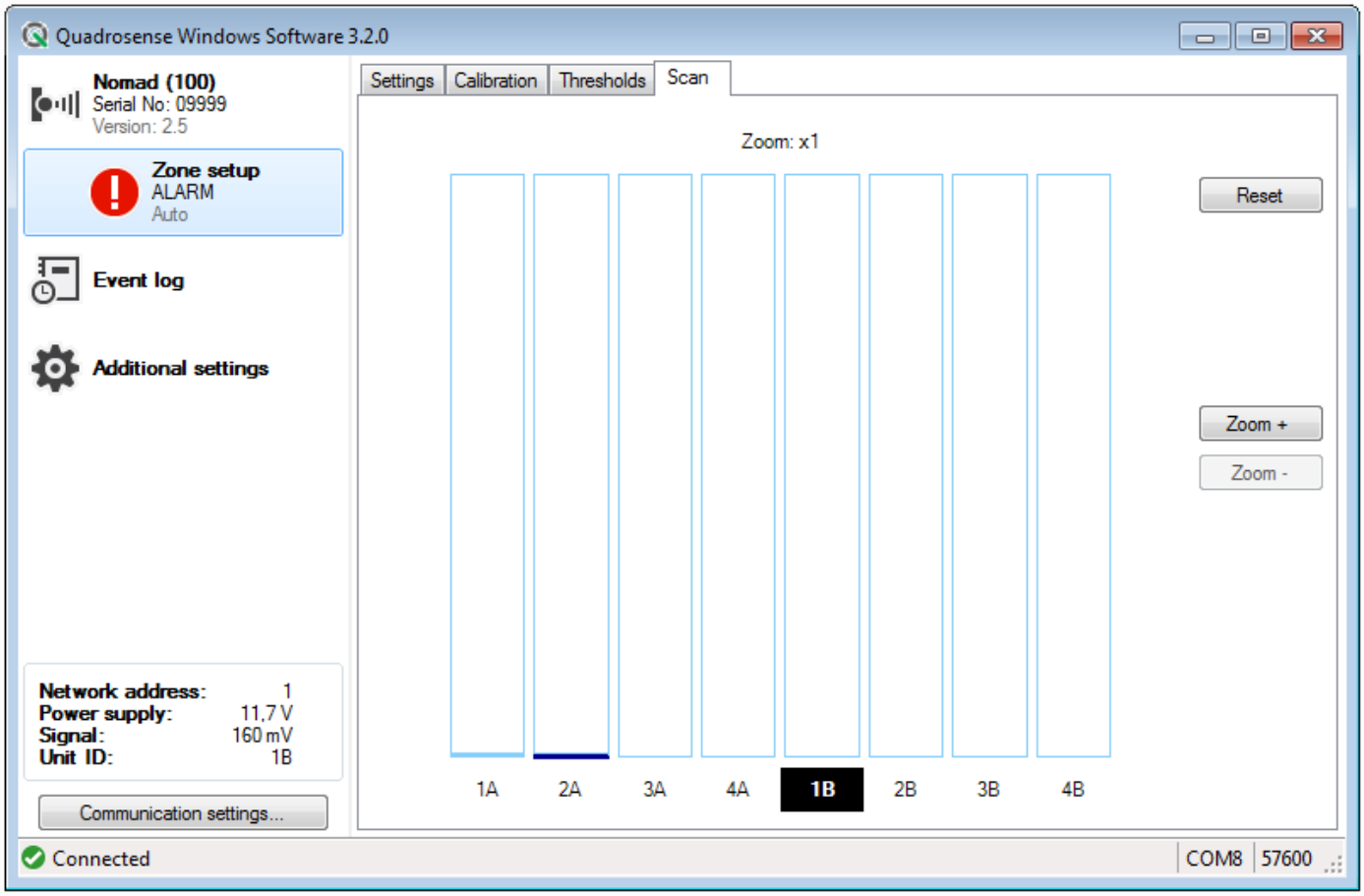


Figure 4.5

Here you can see the signals of the eight channels “seen” by the receiver.

Event log:

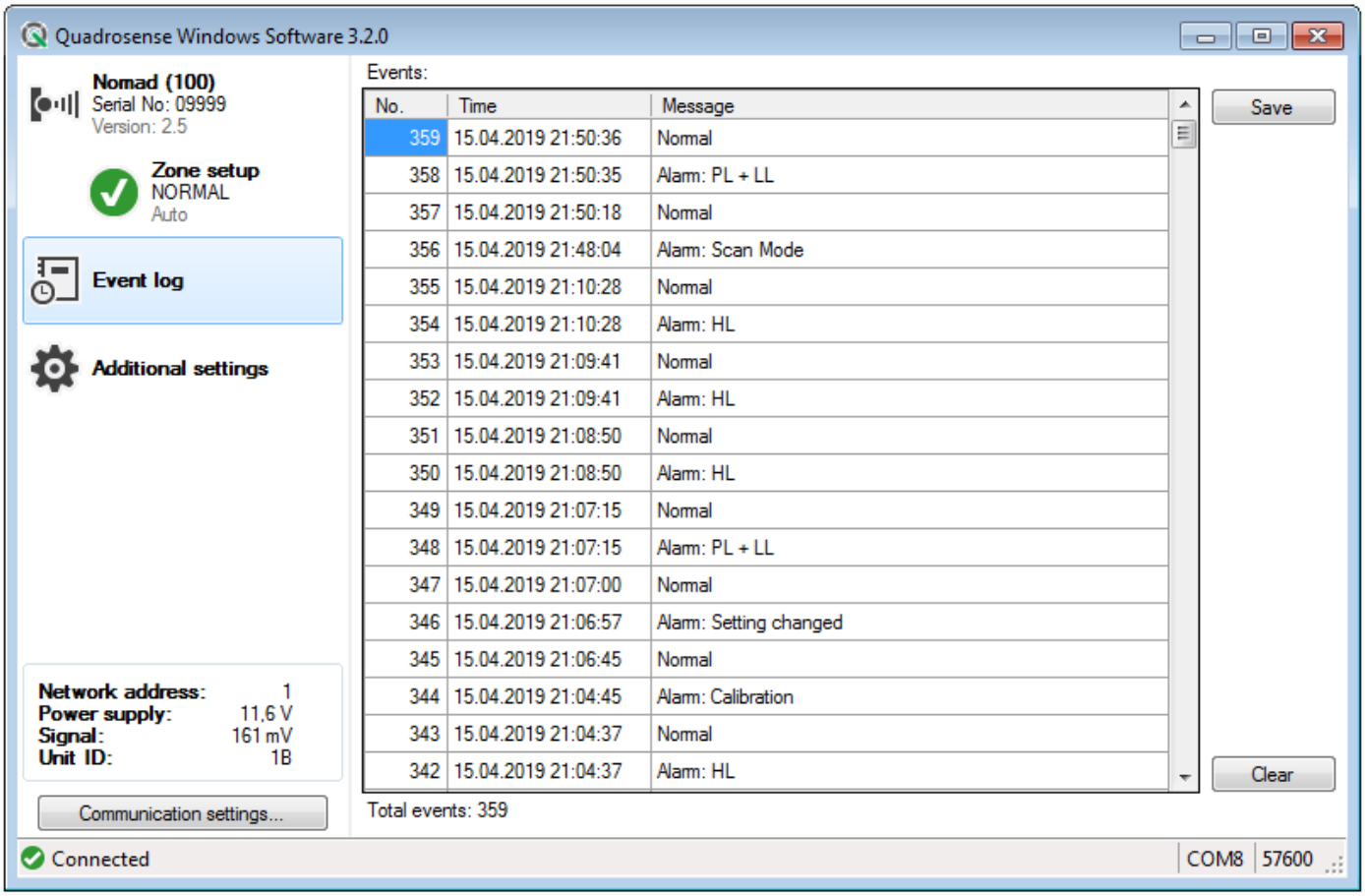


Figure 4.6

Here you can see the the log events.

With the save button you can save the log into a text file.

With the Clear button you can clear the log.

Additional settings:

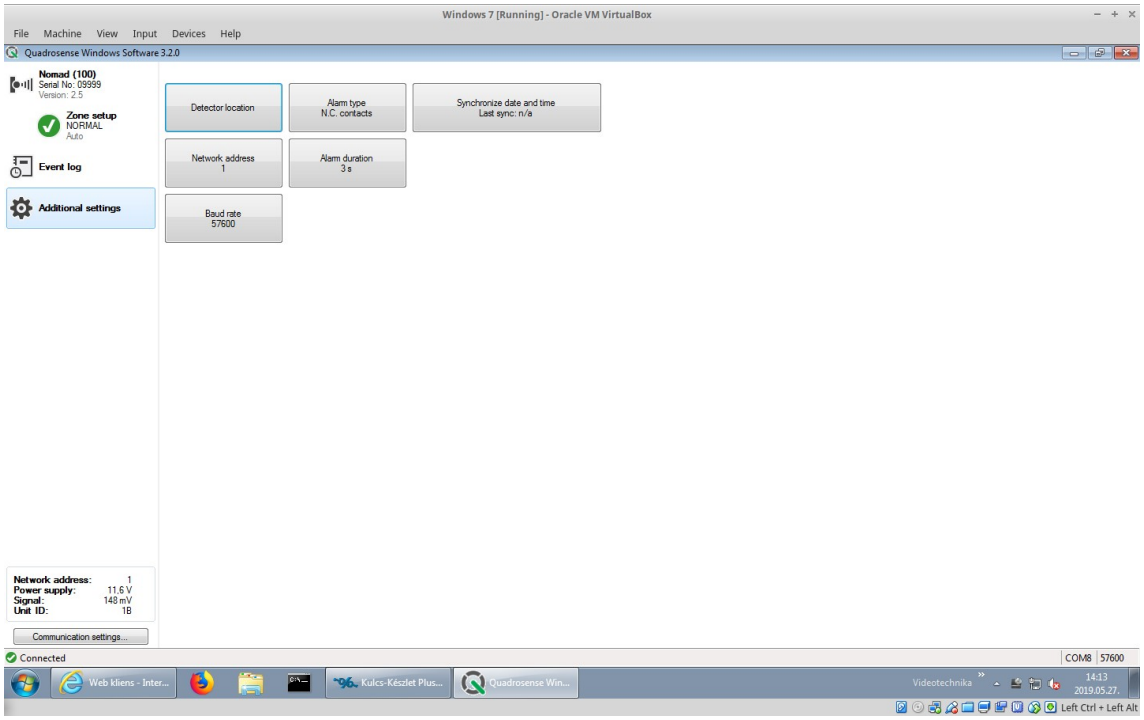


Figure 4.7

Detector location: Customisable information about detector's location.
Alarm type: Relay (normally close / normally open contact)
Synchronize date and time: Update the device's time from the PC.
Network address: Change the device's network address.
Alarm duration: Set the duration of alarm notification.
Baud rate: The communication frequency of the RS-485 protocol.

5. SENSOR ADJUSTMENT

5.1. Before any changes in Setup tab, you need to calibrate your detector. You can make it if you select Calibration tab.

5.2. Firstly you need to calibrate (fine positioning) the transmitter unit, then the receiver unit.

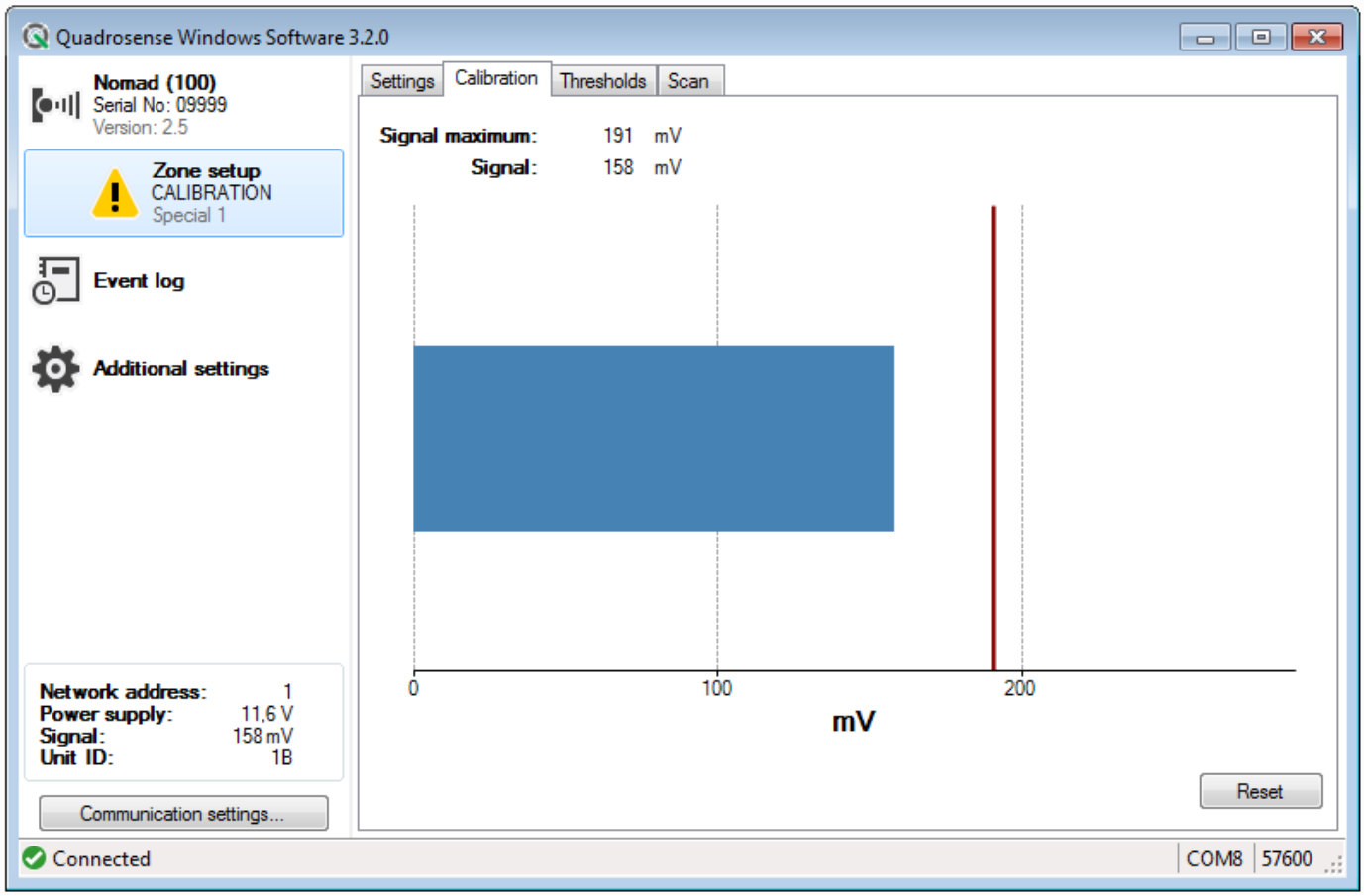


Figure 5.1

5.3. Here you can see the received signal from the transmitter on a dynamically changing scale. The maximum value of the current positioning is always signed. If you are close to the maximum value of the current positioning, the changing lane becomes green. It means the positioning made well. If the lane is red, you should continue positioning as you are not close to the maximum value. With 'Reset maximum' button you can reset the current maximum, and you can look for another reference value.

Note: Always recommended a few minutes of positioning to have a good maximum value of current positioning, what you can use as a reference.

5.4. Check the value of "Calibration" voltage as a result of the adjustment. If "Calibration" voltage is less than 3 mV, it is necessary to repeat the alignment vertically and horizontally for more exact adjustment. The boundary values of 50 mV and 800 mV during the adjustment are recommended for the resource of the signal level to provide a long operation;

NOTE: There should be at least 50 mV minimum signals. Detectors installation height is 95 cm. If you cannot reach it: change the position (95 cm + 5 cm or 95 cm – 5 cm.) of the detectors or the operating distance;

5.5. If the voltage controlled by the calibration is over 800 mV (on short sectors), it is recommended to make the misalignment of Rx and Tx upwards at a small angle so the voltage does not exceed 800 mV.

NOTE: Misalign Rx and Tx down or towards is not recommended.

5.6. The detector keeps its operation using "Calibration" voltage …2.5 mV. The recommended boundary values of 8 mV and 200 mV during the adjustment are recommended for the resource of the signal level to provide a long operation.

6. DETECTORS SENSITIVITY SETTING

6.1. After successful calibration you can come back to settings menu. Here you can define the working parameters of the detectors. Signal must be stable, within the range +15 mV or -15 mV, if the noises signal is changing more than +15 mV or -15mV please check the detection zone, there can be moving objects. If you can't remove them or there is no moving object which can make influence to detection zone, please use manual setup method. Were set up the sensitivity level 2-3 times higher than existing noises signal level.

If detector don't generate the alarms throw passages, clear the detection zone as write in 2.1.3.

Note: Black line – signal between transmitter and receiver
Green and Blue – 1 section alarm thresholds
Red – 2 section alarm threshold (Alarm)

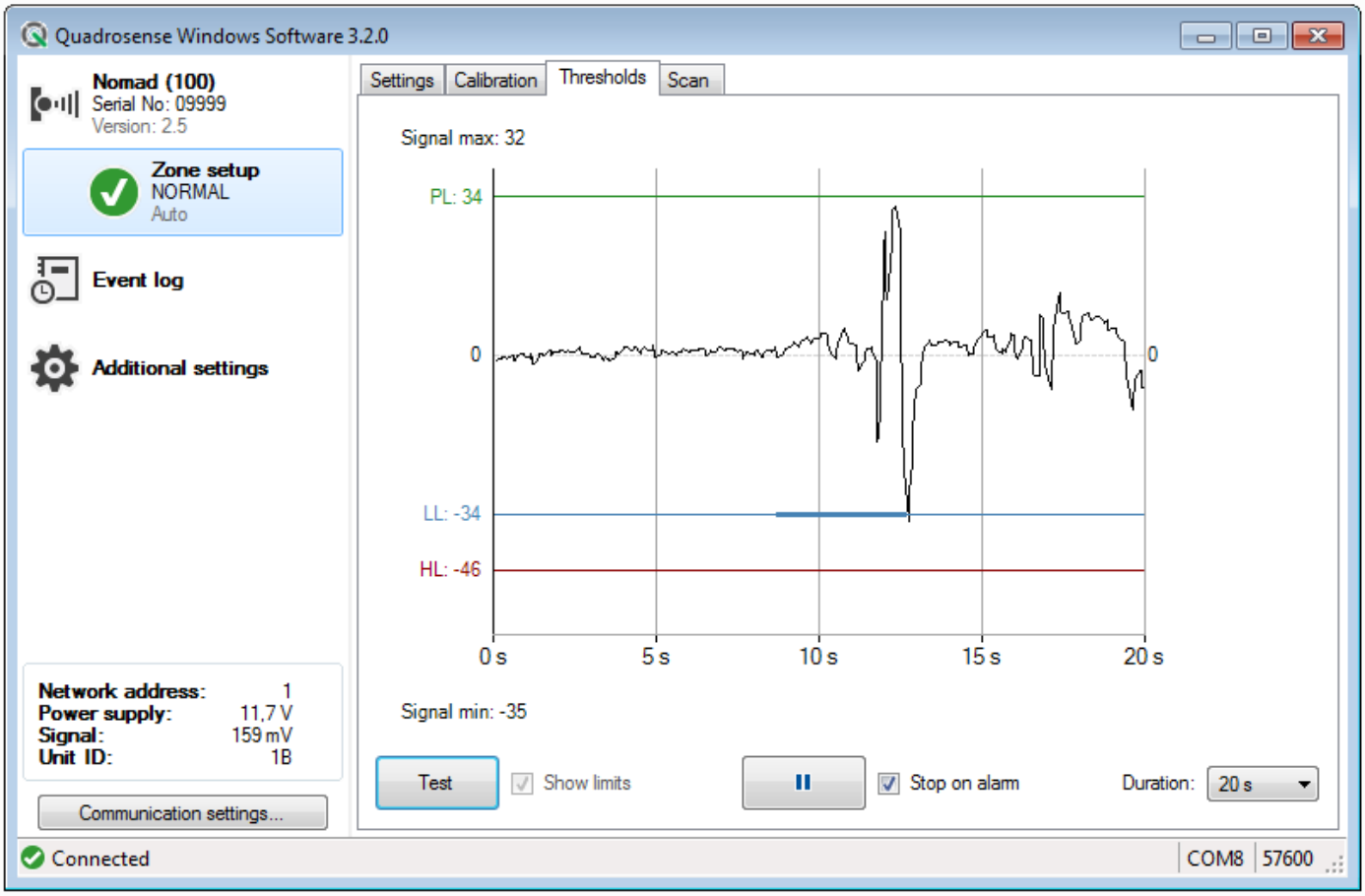


Figure 6.1

6.2. Setup Method: Auto

In most of the case ‘Auto’ mode and default sensitivity value is recommended. The most important is to set the proper ‘Zone length’ according to the installation site, sensitivity value will be set up automatically.

Note: If the zone length is not the real distance, there might be higher false alarm rate or poor sensitivity.

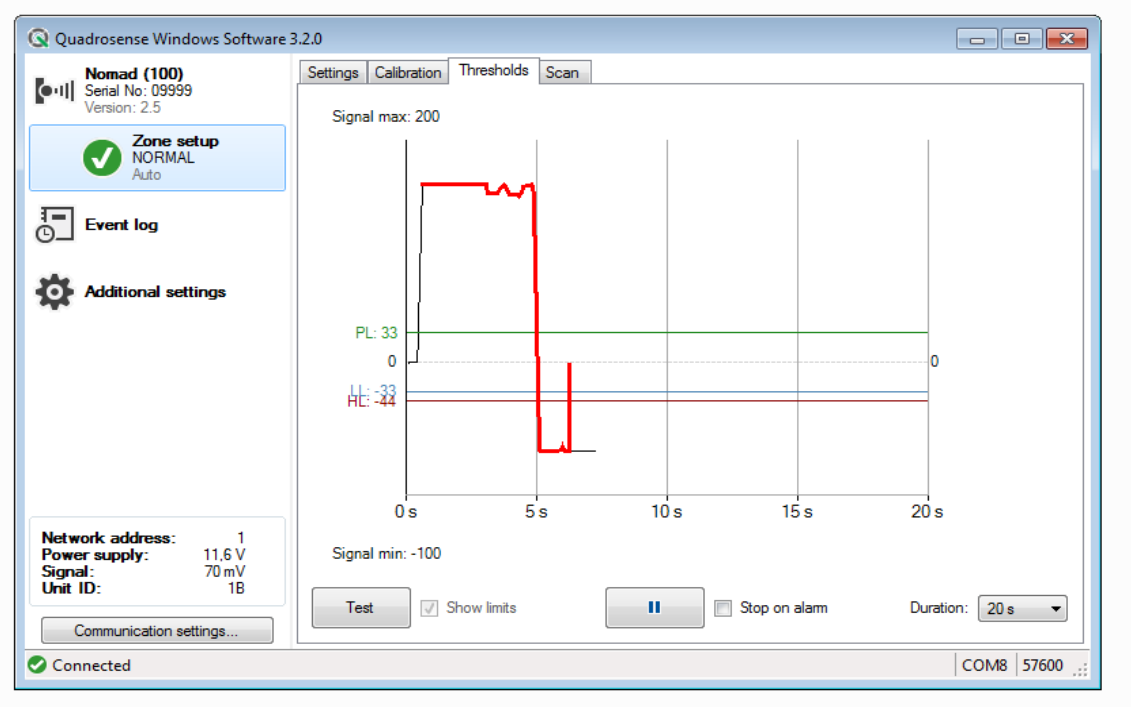


Fig 6.2

6.2.1. Do these passages in “full height” and “bent” on different distances from Tx and Rx. It is recommended to begin doing these “approved” passages in the middle of the protected zone. After each passage it is necessary to leave the detection zone for the distance of 1-2 m and make a pause from 5 to 7 sec. Otherwise, the results of the previous passage can influence on the next one.

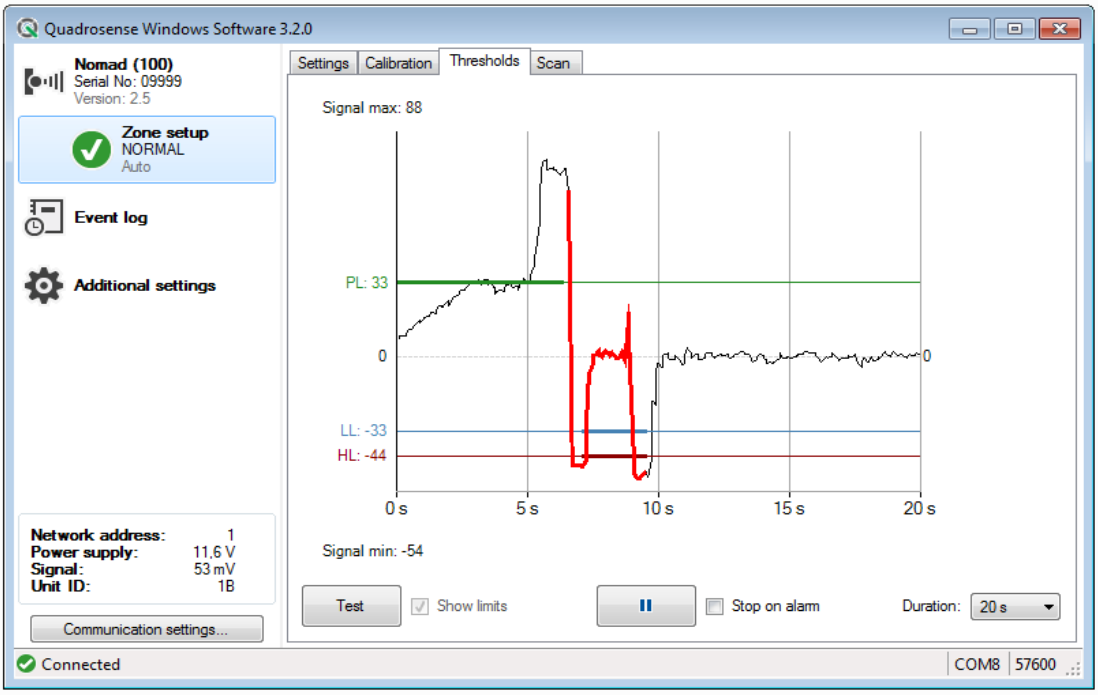


Fig. 6.3

6.2.2. You can change the minimum detected speed in m/s (Vmin), the maximum detected speed in m/s (Vmax). You can confirm your settings with ‘OK’ button.

Note: Too big speed range has higher false alarm rate, too low speed range has poor sensitivity.

6.2.3. Setup method: Manual

In ‘Manual’ setup method you can set sensitivity. But in most of the case ‘Auto’ mode and default sensitivity value is recommended. You can send your setting to the receiver with ‘OK’ button, or you can cancel your settings with ‘Cancel’ button.

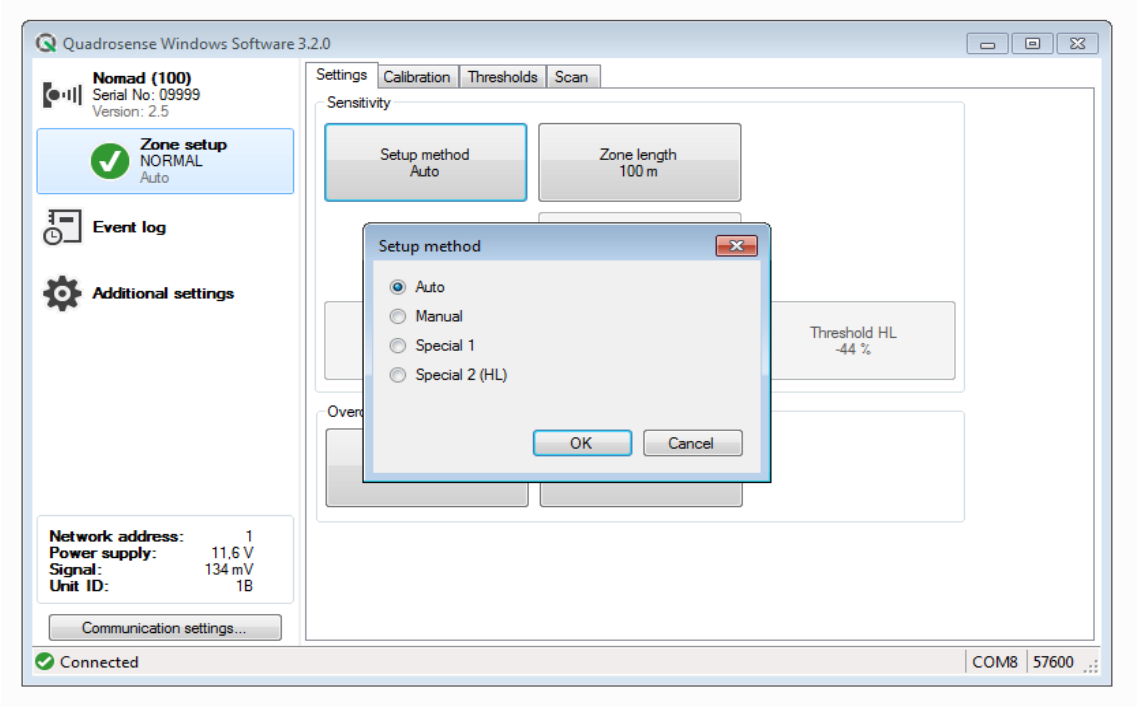


Fig.6.4
Select method: Manual

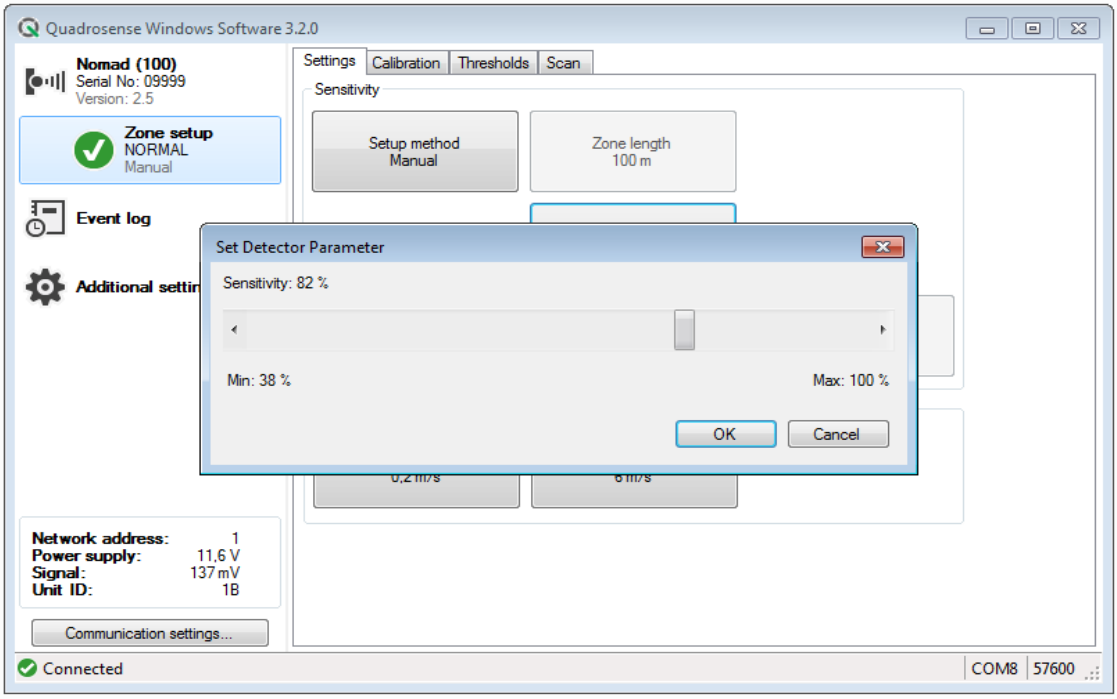


Fig.6.5 Sensetivity window is active, zone length is deactive.

6.3.4. Set the sensitivity with the “approved” passages. Do these passages in “full height” and “bent” on different distances from Tx and Rx. It is recommended to begin doing

these “approved” passages in the middle of the protected zone. After each passage it is necessary to leave the detection zone for the distance of 1-2 m and make a pause from 5 to 7 sec. Otherwise, the results of the previous passage can influence on the next one. If needed change the sensitivity.

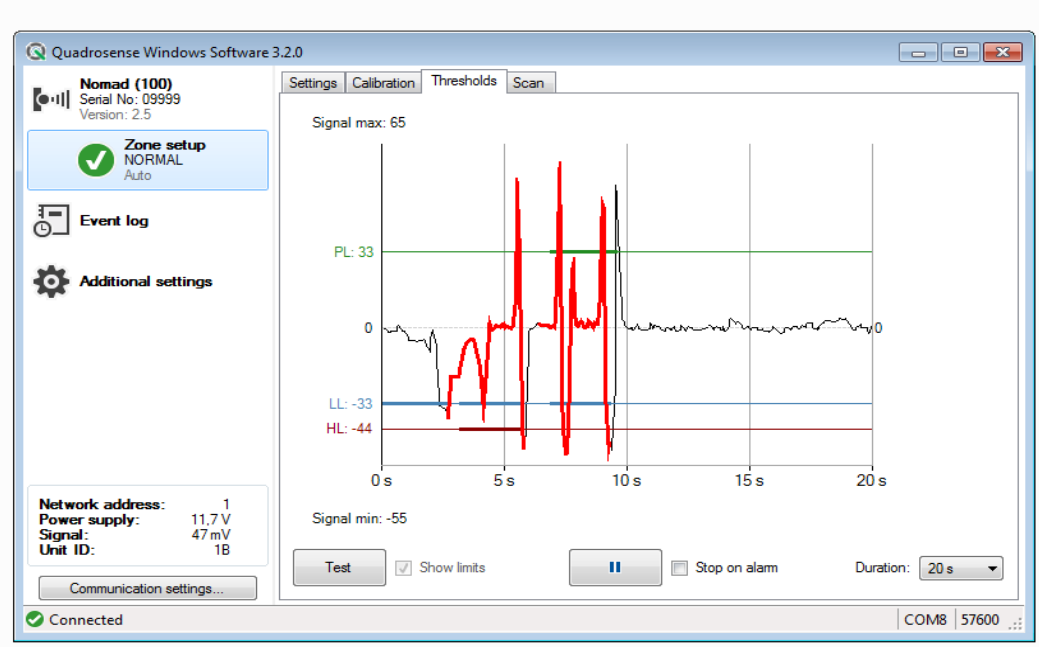
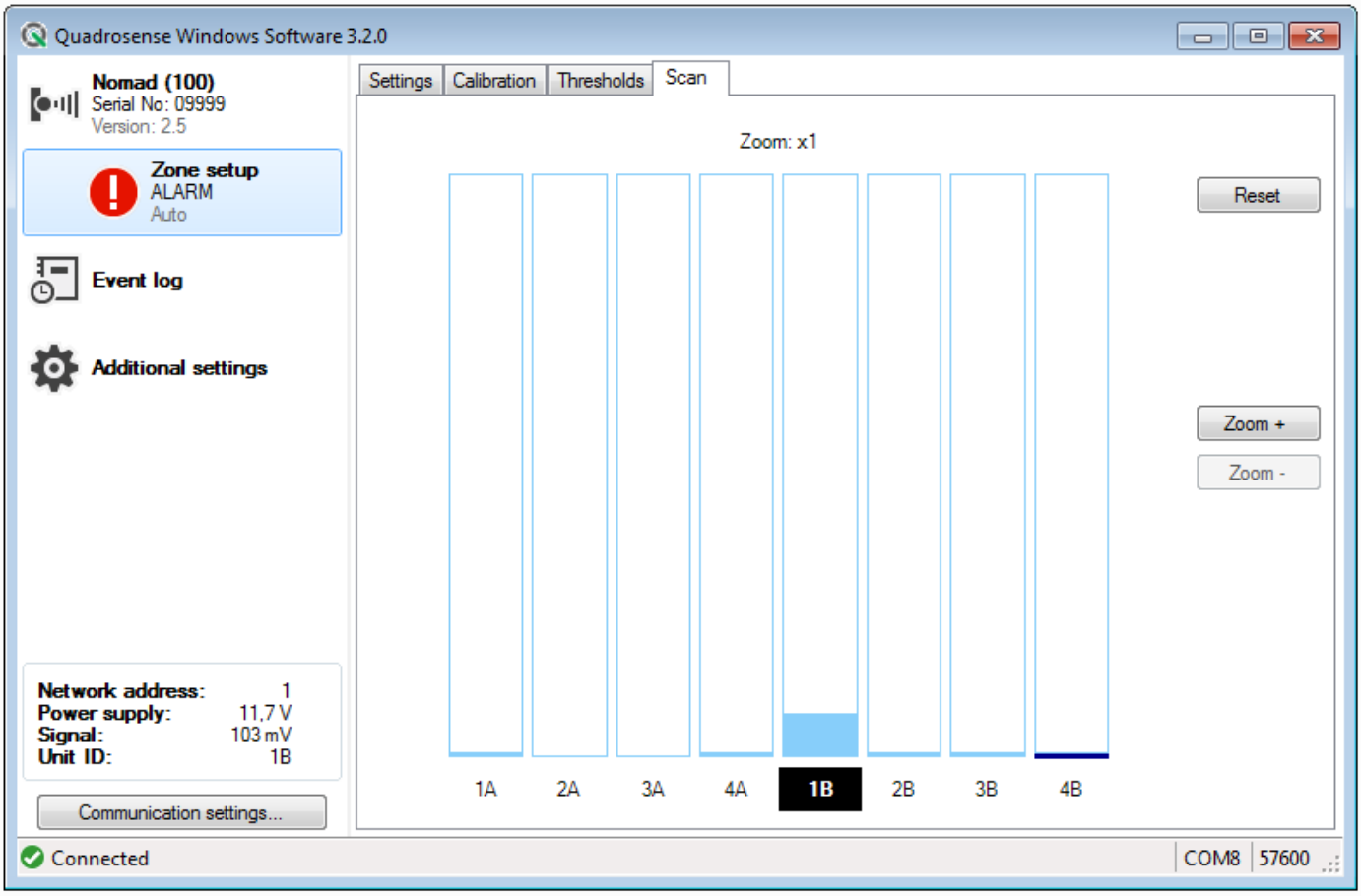


Fig. 6.6 Testing of detection zone

6.3.5 Then adjustment of sensitivity is completed. Disconnect the RS-485 and close the software.

7. SCANNING



In order to monitor electronic environment in the place, where the sensors receiver is installed, additionally to evaluate the influence of neighboring detectors, select SCAN tab. The histogram of signal levels will be displayed in the window for each of the eight frequency channels (Figure 7.1). If necessary, you can use the histogram scaling function (ZOOM).

The “own” transmitter’s signal level must be at least 5 times higher than the background level, when the other transmitters are off.

8. WORK WITH LOG

During operation, the detector records all occurring events and writes them to non-volatile memory. To view the events history it is necessary to open LOGS tab (Figure 8.1).

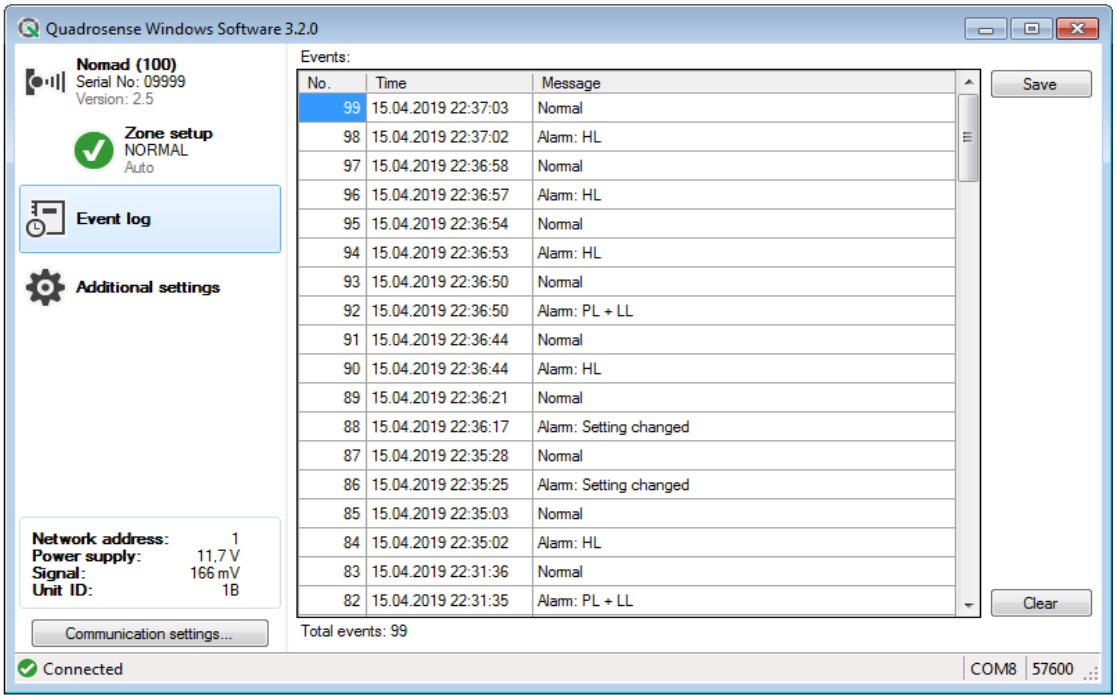


Figure 8.1

LOGS contain the history of statuses of each detector input (Normal, Alarm, Break, Closed) and duty personnel actions history (changing the detector settings).
Log can be used for the detailed analysis of the events that occurred during operation.
For convenience, after switching on the detector it is recommended to set the date and time. For that it is necessary to press TIME AND DATE SYNCHRONIZATION button in the Additional settings. Time and date are used to generate entries in the event log.
If the detector power fails, time and date are not saved. Therefore, after each power failure, time and date should be set again.
Maximum number of records that can be stored in the detector's memory is 1,000. When 1,001-st event occurs, the oldest record is deleted. Thus, up to 1,000 recent event records can be stored in the detector's memory.
It is possible to save the log into a text file. To do this, press SAVE LOGS button. The saved log can be found in the installation directory/EventsLogs directory. The log can be cleared by pressing CLEAR button. (**Figure 8.1)**

9. INSTALLATION OF SOFTWARE FOR COMPUTER USING MICROSOFT WINDOWS OPERATION SYSTEM

You can find the latest installation version of the software in the USB flash drives, which you can ask to include it with your order. The software's name is **Detector Control Panel** (stylized Q with green-colored stem).
The first time you run the program, you may need to select the communication port (COM-Port).

Connection to the computer is carried out:

Connect the RS 485 converter to the communication network wires (RS A to green, RS B to yellow), which are in the receiver's six-strands wire. On the main window in Communication settings tab → Detector address must be selected for a number (by factory default-1).

Note:

PC program <u>Detector Control Panel</u> has implemented ability to perform a test in order to check the environmental influence on the sensors protection zone and to receive recommendations for selecting the levels of the thresholds, which are in use.

The sequence of actions when performing the test:

1. Perform sensor adjustment (orientation of the transmitter / receiver to each other)
2. Select levels of thresholds for intruder detection.
3. Activate the test

During the test:

The intruder must not be in the detection zone.

Simulate possible environmental influence on the detection zone (movement of nearby transport or people, swaying of branches or bushes, due to the wind and etc.)

Duration of the test:

Minimum 15 seconds

Maximum until the activation of the software widow "Next"

Possible messages after the test procedure:

Noise immunity is good – it means that the value of the interference level / threshold level ratio is sufficient for the sensor to work stably.

Noise immunity is bad – it means that the value of the interference level / threshold level ratio is not sufficient for the sensor to work stably and is critical. The display shows the recommended threshold levels for such interference.

Very big interference – it means that the value of the interference level / threshold level ratio is unacceptable. Sensors stable operation is not possible.

10. MAINTENANCE

10.1. Performance check

10.1.1. During the exploitation it is recommended to test the sensor operation transmitting the remote control signal TEST 1-3 times a day.

10.2. Maintenance check

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

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

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

- the absence of dust, dirt, snow and ice from the side of Tx signal transmission and Rx signal reception; clean the units if necessary;
- the absence of foreign objects in the protected sector.

10.2.2.2. Every quarter:

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

10.2.2.3. The grass height is controlled during seasonal works. If the grass height is over 0,3 m, the grass should be mown down.

10.2.3. If the snow height changes, false alarms can be generated because of the signal reduction at the Rx input. In this case it is necessary to remove the snow or to change the height of Tx and Rx antennas.

After the height of the antennas is changed, they should be aligned. The thresholds should be aligned as described above.

13. SAFETY MEASURES

13.1. The current safety standards for the operation with electrical facilities with the voltage up to 1000 V should be observed during mounting, preventive maintenance and repair of the sensor.

13.2. The sensor’s power supply is 9 - 30 VDC. That’s why before the sensor operation it is necessary to study the elements and cables arrangement in the power supply.

13.3. Cables should be laid, terminated and connected to the sockets only when the supply voltage is OFF.

13.4. Replace a fuse in the power supply when the power supply is OFF.

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

13.6. Installation and maintenance of the sensor must be performed only by people, who underwent special safety trainings and became acquainted with safety measures.

13.7. It is recommended to install a separate switch on the power supply line.

14. TROUBLESHOOTING GUIDE

List of possible troubles is given in table 14.1.

Trouble	Possible Cause	Repair
1. The receiver relay is always closed.	The operation signal is in the upper critical point (900 mV) of the allowed operation diapason.	Increase the distance between Rx and Tx or disalign of Rx and Tx vertically at a small angle.
	The operation signal is in the lower critical point (8 mV) of the allowed diapason.	Change detectors installation height (85 cm + 5 cm or 85 cm – 5 cm.) or it is needed to lower the distance between Rx and Tx.
2. The receiver relay is always open.	No operation signal from Transmitter or lower than 2.5 mV.	1.Check power supply on Tx. 2.Check the frequency channels on Tx and Rx, they must be on the same channel. 3.Check calibration of detector. See point 5 in this manual. 4.Tx or Rx is broken.
	The operation signal is more than 900 mV.	Check calibration of detector. See point 5 in this manual.
	Adjustment is carried out using PC or switch off the device when the Rx was in «Calibration» mode.	Connect PC and exit the „Calibration“ mode or restart the Rx by disconnecting the power supply.
5. The Receiver constantly generates alarms	Communication line is broken.	Check the cable integrity and the accuracy of its connection. Restore the communication line.
	The protective device in the supply unit is blown.	Replace the protective device.
	The detector alignment is disturbed.	Align Tx and Rx antennas.
	Tx fails.	Replace Tx.
	Rx fails.	Replace Rx.
6. False alarms of the detector	Moving branches are in a detection zone and they cause alarms.	Inspect the sector and remove interference factors. Check the accuracy of the Rx sensitivity setting.
	High grass is in the sector.	

	Snow blanket is higher than one specified in the manual and this reduces an input signal.	
	Animals circulate in the sector.	
	The Rx sensitivity is too high.	
7. The detector does not generate alarms when an intruder crosses the sector.	Rx sensitivity is too low.	Check the accuracy of the Rx sensitivity setting.
8. The receiver connection with PC is broken.	RS-485 driver installation with mistakes	Reinstall the driver
	If using the RS-485 connection cable 8 (see Table. 2.2 (green RS A, yellow RS B), was changed then connected.	Check connection of RS A and RS B

Table 14.1

15. STORAGE

15.1. The detectors should be stored in the package in warehouses at an ambient temperature +5 C…+30 C and relative humidity 85% maximum.
During storage the influence of hostile environment should be prevented.

16. TRANSPORTATION

16.1. Packaged detectors can be transported by any transport (if by plane – in pressurized modules) if they are transported in covered cars, holds or covered bodies they can be transported at the distance up to 10 000 km.
The boxes should be placed to prevent their shifting or fall in case of jolts and blows.