TRIBOELECTRIC GUARD ALARM
FOR PERIMETER AREAS
“FORTEZA TRIBO-M”

Operation Installation manual

Document Part Number FOR2012-09-03

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Contained in the Operation Installation Manual is the information on the design and technical characteristics of the triboelectric guard alarm “Tribo-M” meant for perimeter areas (hereinafter referred to as guard alarm) as well as the information on its installation and use.

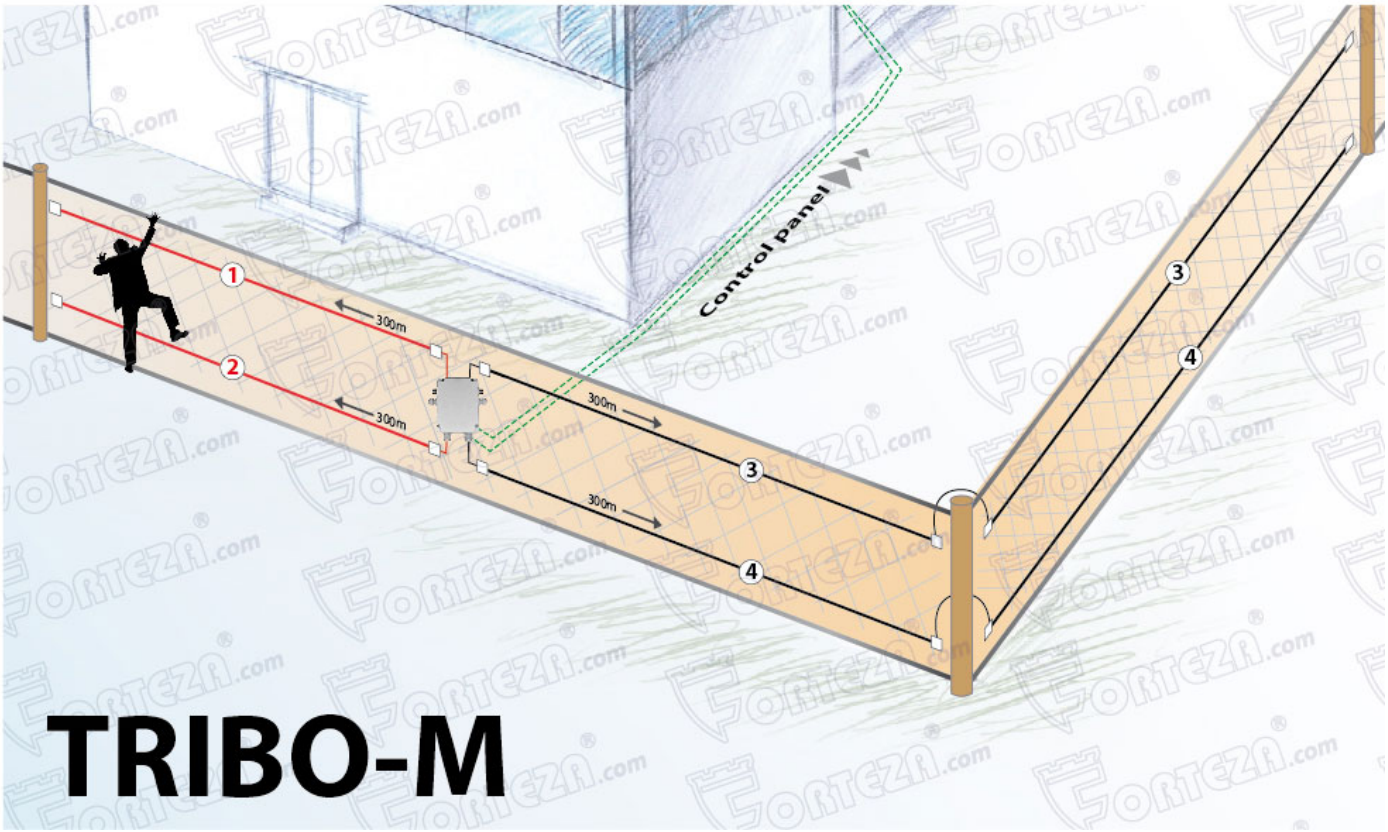
1. General information

1.1 Purpose

Triboelectric single-position passive and unmasked guard alarm “Tribo-M” with surface detection zone is designed for extended perimeter areas and is used as a stationary unit.

The guard alarm for perimeter fences mean to generate alarm signals after the local deformation/vibration of the fence and the sensitive element fastened to it in the case of an unauthorized penetration by climbing over the fence, without any facility, and as a result - deformation/vibration of the fence and the sensitive element over its fasteners.

The guard alarm ensures the monitoring of the sensitive element integrity (the element of tribo electric effect), the connecting element being checked as well. On their damage (short-circuit or broken element) the guard alarm generates an alarm signal on the fault.



1.2. Operating Conditions

The guard alarm is intended for continuous round-the-clock operation. Its performance is maintained within the set normal values. The guard alarm does not generate the false “Alarm” signals on and after exposure to the outdoor environmental factors (OEF) given in Table 1.1.

Table 1.1

OEF	Description	Value
Acoustic noise	Is not regulated	
Elevated ambient temperature	Elevated operating temperature	+ 50 ^{o}C
Low ambient temperature	Low operating temperature	- 40 ^{o}C
Elevated humidity	Up to 98% at a temperature of +35 ^{o}C Is not regulated with a signal-processing unit (SPU) installed in the metal alarm cabinet	
Low humidity	Is not regulated	
Rain	Is not regulated	
Hoar-frost and ice-crusted ground	Thickness (at wind speed)	2 mm (10 m/s)
Dew	Is not regulated	
Blanket of snow	Is not regulated	
Fog	Of any intensity	
Saline (sea) fog	Of any intensity	
Dust (sand)	Particles circulation speed	10 m/s
	Dust (sand) flow density	5 kg/m^2/s
Ultra-violet solar radiation	Is not regulated	
Wind	Mean wind speed	20 m/s
	Maximum wind speed value	30 m/s
Blizzards and sand-storms	Of any intensity	
Ground	Maximum sub grade slope for the fence	30 deg.
	Terrain irregularities along the fence axis	± 0,30
Herbage	Is not regulated	
Flood	For fence - depth	0.3 m

Table 1.1 continued

OEF	Description	Value
One-man movement, movement of several people (from 3 to 5 men) and big animals	Distance to the guarded zone	0.5 m
Driving of wheeled, full-track and electric-battery vehicles	Distance to the guarded zone (working on LF) Distance to the guarded zone (working on HF)	1.5 m 6 m
Railway freight and passenger	Distance to the guarded zone (working on LF) Distance to the guarded zone (working on HF)	15 m 45 m
Power lines (up to 500kV)	Distance to the guarded zone	5 m
Exposure to the radar electromagnetic field	Is not regulated (with a signal-processing unit installed in the metal alarm cabinet)	
Exposure to the ultra-short pulses of the electromagnetic field	Is not regulated (with a signal-processing unit installed in the metal alarm cabinet)	
Exposure to the momentum neutron flux	Is not regulated	
Influence of birds and small animals over the fence components: - birds - small animals	Weight	1 (5) kg up to 20 kg

1.3. Technical characteristics

- The maximum length of the sensitive element (*Forteza sensitive element*) in a single zone up to 300 m;
- The maximum length of the non-sensitive element (*Forteza non-sensitive element*) in a single zone up to 300 m;
- Entrance areas 4 independent zones;
- Relay outputs 4 independent outputs;

- Power source 9-36 V (DC);
- With voltage drop below 5 V the guard alarm goes into the “Alarm” mod. ;
- Current consumption < 100 mA;
- Operating temperature from -40 °C to +50 °C;
- Alarm, tamper output dry relay contact;
- The duration of alarm signal is 1 s, minimum;
- Fixed resistor value to control integrity of sensitive and non-sensitive elements;
- Fixing on the metal fence with plastic ties on wooden with metal fix in elements (contact Forteza);
- Compatibility any alarm control panel;
- IP class IP55;
- Equipment set up using computer;
- Integral remote control of the detector. Suitable for any monitoring and control system;

. **1.4. Standard equipment**

The following equipment is included in the guard alarm delivery set:

- Signal-processing unit;
- CD with Software Manual
- Warranty

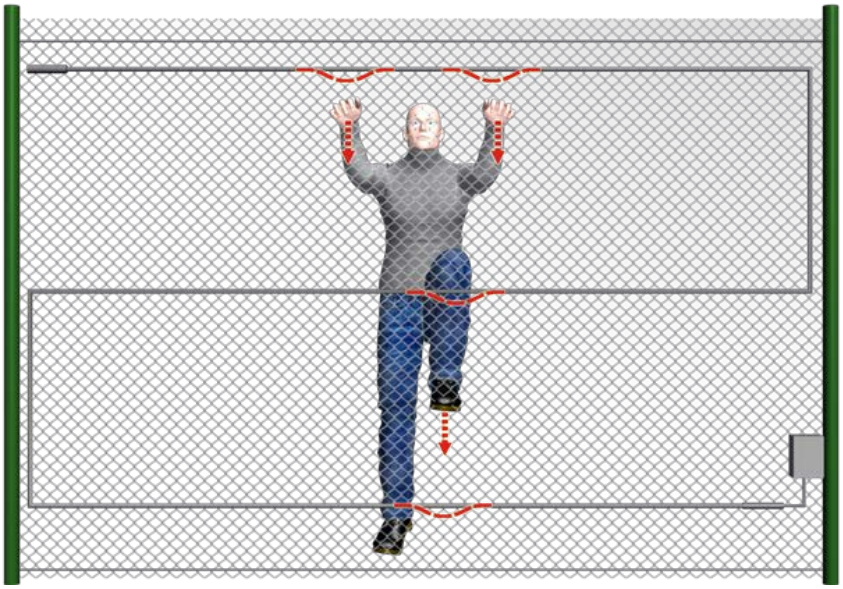
Optional: end sleeve, connection sleeve, USB/RS485 converter, sensitive element, non-sensitive element, plastic ties can be included in the delivery set on the customer request.

The number of connection sleeves and couplings and the sensitive element length are to be agreed in ordering.

2. Principle of operation and design

2.1. Principle of operation

The basis for the guard alarm operation is generation of electrical signals in the sensitive element and at its stress centers (points of the sensitive element rigid fastening to the fence) under mechanical action on the fence components and their subsequent detection by the signal-processing unit.



2.2. Design

2.2.1. Sensitive element (SE)

The sensitive element mounted on the fence is meant for electrical signal generation under unauthorized mechanical actions on the fence**.** The sensitive element protection length depends on the guarded zone length, the fence height, number of supports, and the selected way of the sensitive element mounting on the fence.

2.2.2. Non sensitive element (NON-SE86)

Element is using to connect Tribo-M unit with sensitive cable. The most commonly used version if the Tribo-M is at a distance from the protected fence.

2.2.3. Signal-Processing Unit (SPU)

The signal-processing unit Forteza Tribo-M (SPU) is used for the sensitive element signals detection and the alarm signal generation.

SPU is designed in the metal case with RS485 connection for alignment using the PC, grounding, terminals for detection zones and alarm outputs connection.

Provided on the SPU case are fasteners meant for its installation.

2.2.4. Connection sleeve (CS)

The connection sleeve is meant for connecting the sensitive element together with its non-sensitive element which connected to the signal processing unit and for the connection point shielding and sealing.

In equipping gates and wickets use should be made of an extended connection sleeve permitting to fix a spiral wrap hose for the non-sensitive element protection.

The connection sleeve is used when needed to connect two separate portions of the sensitive or non-sensitive element and for the connection point shielding and sealing.

The coupling is equipped with nylon ties needed for its fastening to the fence.

2.2.5. End sleeve (ES)

The end sleeve provides a continuous monitoring of the sensitive element and the SPU connecting element integrity. It is also meant for the sensitive element end point shielding and sealing.

2.2.6. Converter USB - RS485 (RS485)

Using to connect Tribo-m processing unit with computer to set up system parameters

2.2.7. Plastic ties

Plastic ties are using to fix sensitive element to the fence. Mounting claims is needed to transmit deformation or vibration from the fence to sensitive element.

3. Application

To ensure the required detector operation stability (unauthorized actions detection), high noise immunity (actually an utter absence of false responses) and specified sabotage resistance

THE FOLLOWING SHOULD BE PROVIDED:

- proper fence mounting (flexible fences should be stretched uniformly with specified tension force);
- combination of different-type fences with respective schemes of sensitive element laying and fastening;
- fence uniformity, i.e. the fence in one detection zone should be made from the same material because different-material sections generate signals of different strength when subjected to an unauthorized action;
- sensitive element proper installation and tightness;
- SPU detection zones optimal sensitivity setting;

Versions of Fence Equipping

Possible are the following versions of the guard alarm installation:

- flexible fence made of reinforced barbed tape, element netting, element netting “Rabitsa”, barbed element, etc. (Fig.1);
- rigid (continuous) fence made of metal elements (forged and welded gratings, solid metal plates, corrugated plates, etc.), concrete, bricks, wood, etc. (Fig.2);
- gates, wickets, etc. (Fig.3).

3.1. Flexible Fence (Fig. 1)

Flexible fence is actually a fence made of metal element netting according, barbed element, element of rust-resistant steel, bimetallic element, reinforced barbed tape, etc.

The sensitive element is mounted directly on the fence’s flexible elements. The supports enabling a violator to get over the fence without touching its flexible elements being available, the sensitive element is mounted on the supports as well.

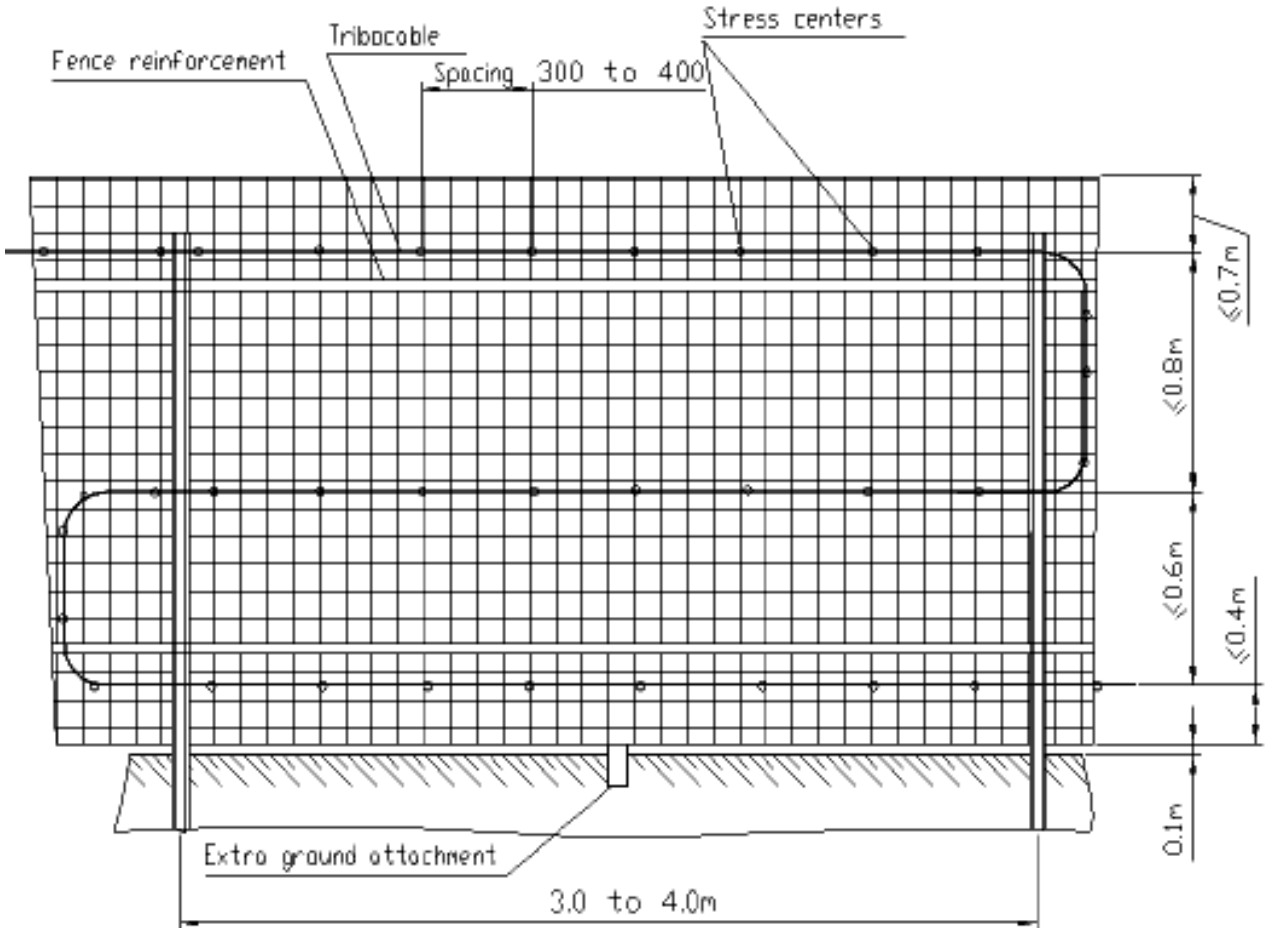
The “Alarm” signal is generated on the flexible fence under local deformation of the fence and the sensitive element fastened to it in the case of an unauthorized penetration by climbing over the fence, without any facility, and as a result – deformation/vibration of the fence and the sensitive element over its fasteners.

To obtain the required noise immunity, be sure to limit the flexible fence mobility under wind as much as possible.

Element-Netting Fence (Fig. 1a)

The element-netting fence should meet the following requirements: make sure the netting is stretched uniformly between the fence supports in a horizontal plane with a force of 100 kg, minimum

Fig. 1a

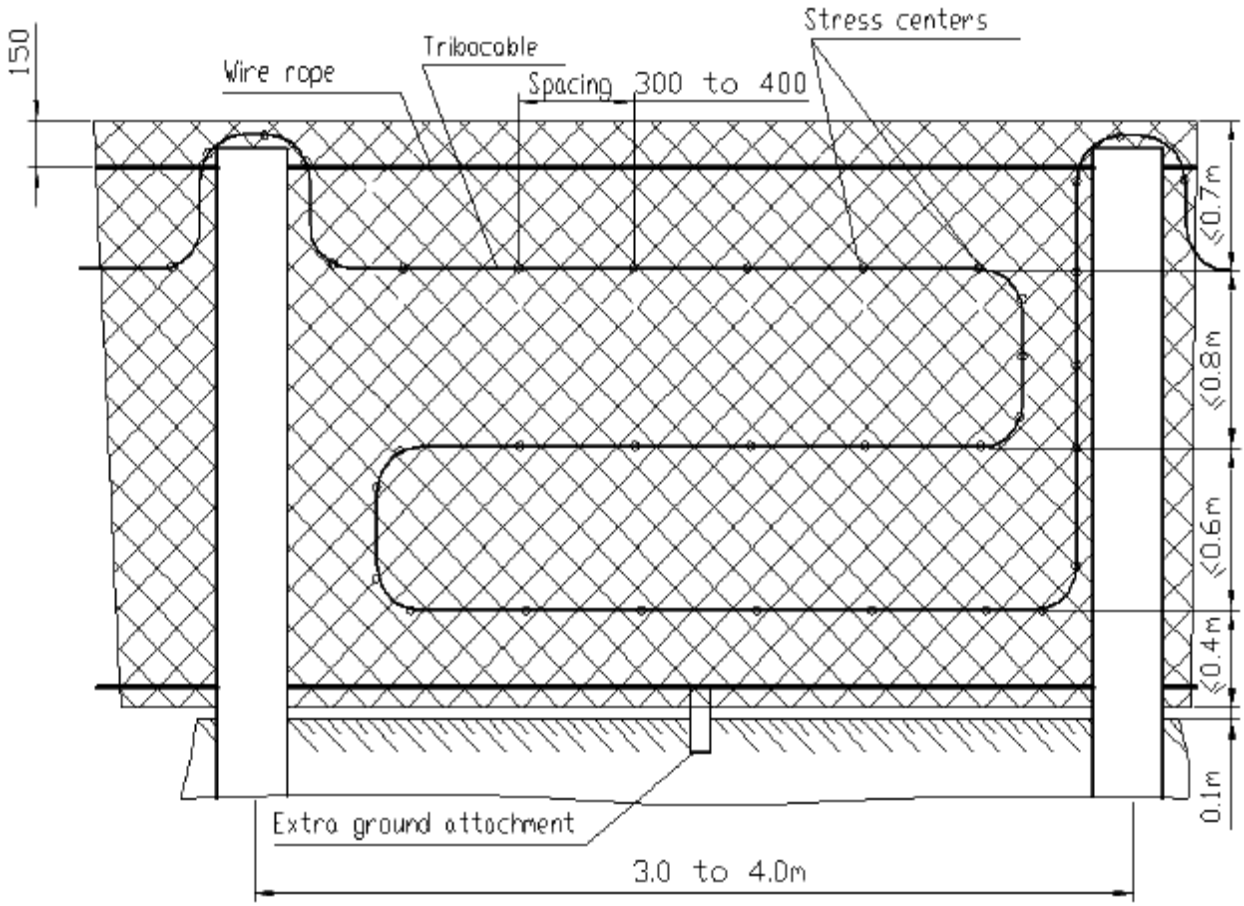


Element-Netting Fence (Figs 1b and 1c)

The element-netting fence should meet the following requirements

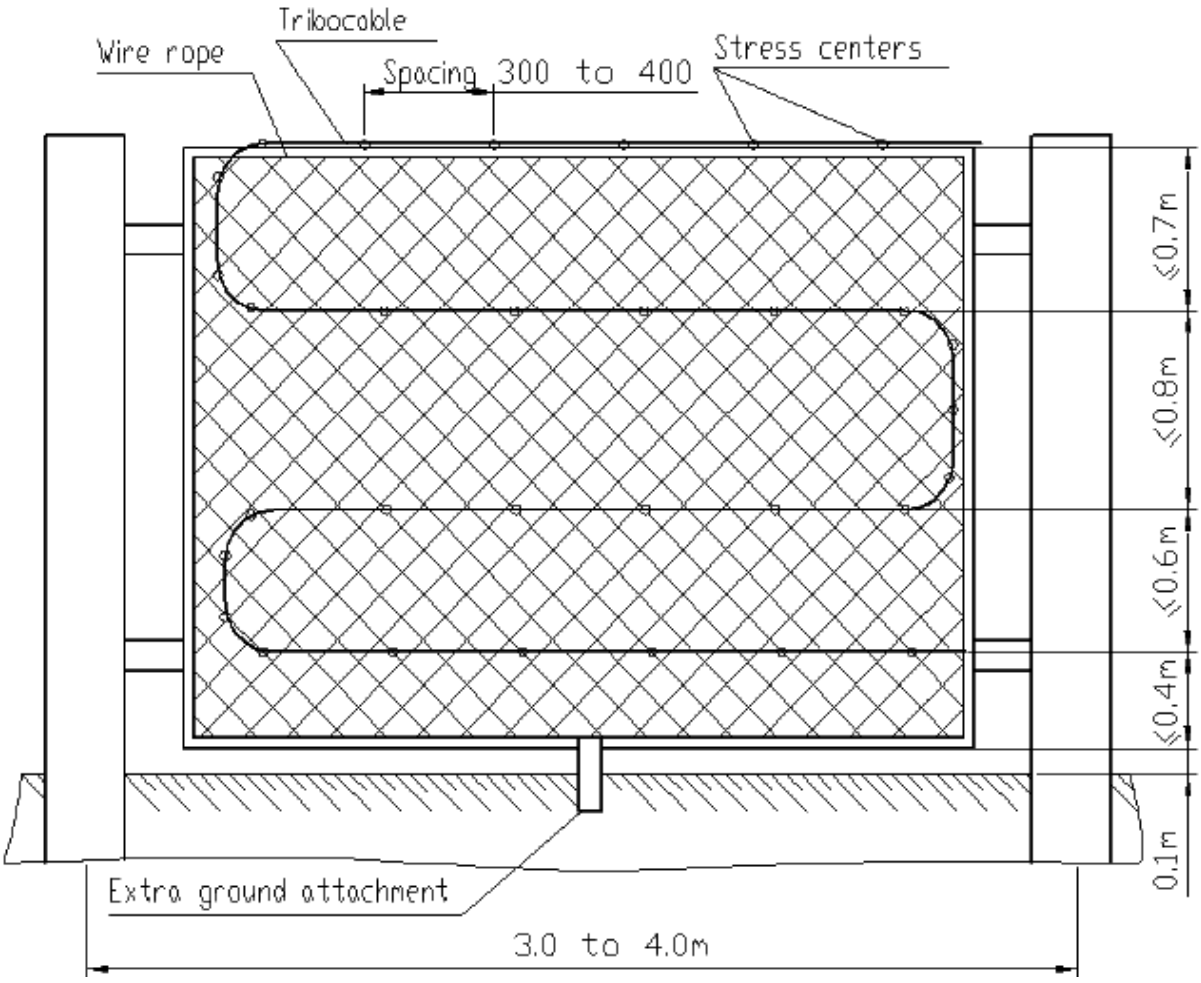
- make sure the netting is stretched uniformly between the fence supports in a horizontal plane with a force of 100 kg, minimum and fastened to the upper and lower element ropes (Fig. 1b);

Fig 1 b



- a frame made of angle sections being used, make sure the netting is stretched uniformly and fastened to the all sides of the frame. In addition be sure to lay the sensitive element along the upper angle section of the frame and the fence supports (Fig. 1c).

Fig. 1c

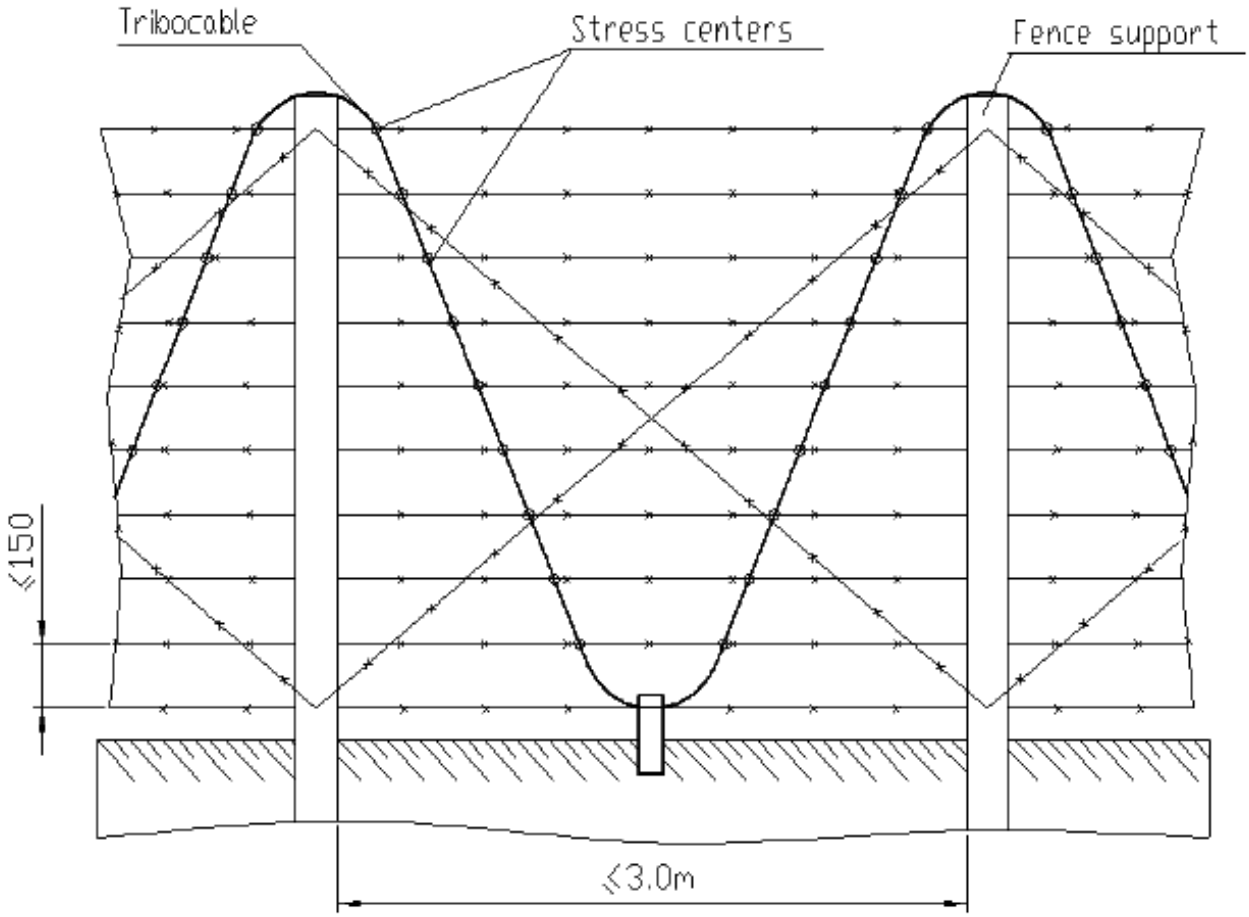


3.2. Barbed-Element Fence (Fig. 1d)

The barbed-element fence is actually barbed element stretched in several level lines between rigid supports. Stretched diagonally is also barbed element fastened to each level element line, which, in its turn, should be rigidly fastened to each fence support.

The barbed-element fence should meet the following requirements: make sure barbed element is stretched in a horizontal plane with a force of 200 kg, minimum.

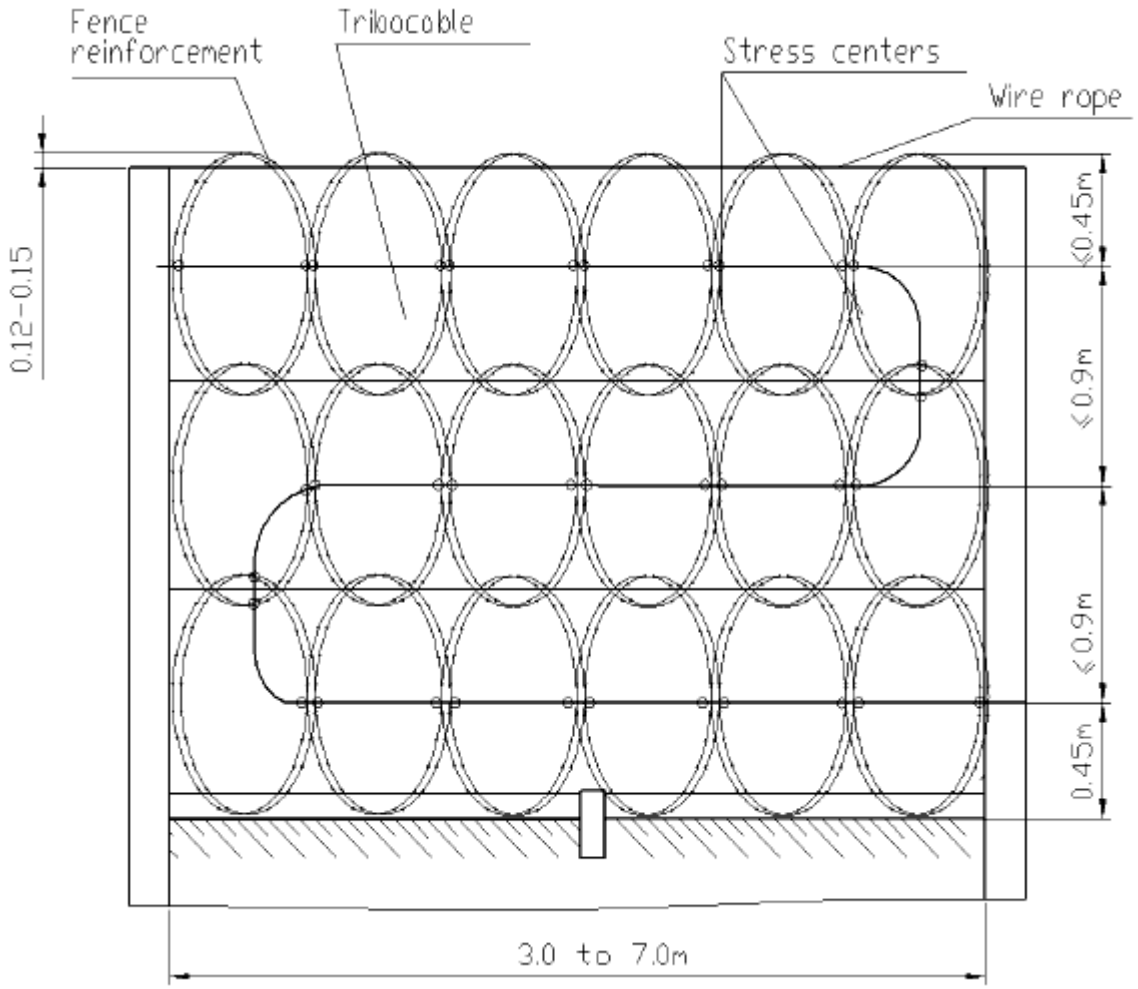
Fig. 1d



3.3. Fence Made of Flat (Round) Reinforced Barbed Tape (Fig. 1e)

The Reinforced Barbed tape fence should meet the following requirements: make sure the reinforced barbed tape is fastened to the element ropes stretched between the fence supports with a force of 200 kg, minimum.

Fig. 1e



3.4. Wooden and rigid fence

Rigid (Continuous) Fences (Fig. 2)

Rigid fence is a fence made of metal elements (forged and welded gratings, solid metal plates, corrugated plates, etc.), wooden materials, reinforced concrete panels, concrete blocks, brickwork or masonry.

The sensitive element is mounted directly on the rigid fence elements. The supports enabling a violator to get over the fence without touching its rigid elements being available, the sensitive element is mounted on the supports as well.

To equip rigid fence of forged and welded gratings be sure to lay the sensitive element according to the diagram with stress centers on every bar **(Fig. 2 a)**;

Fig. 2 a

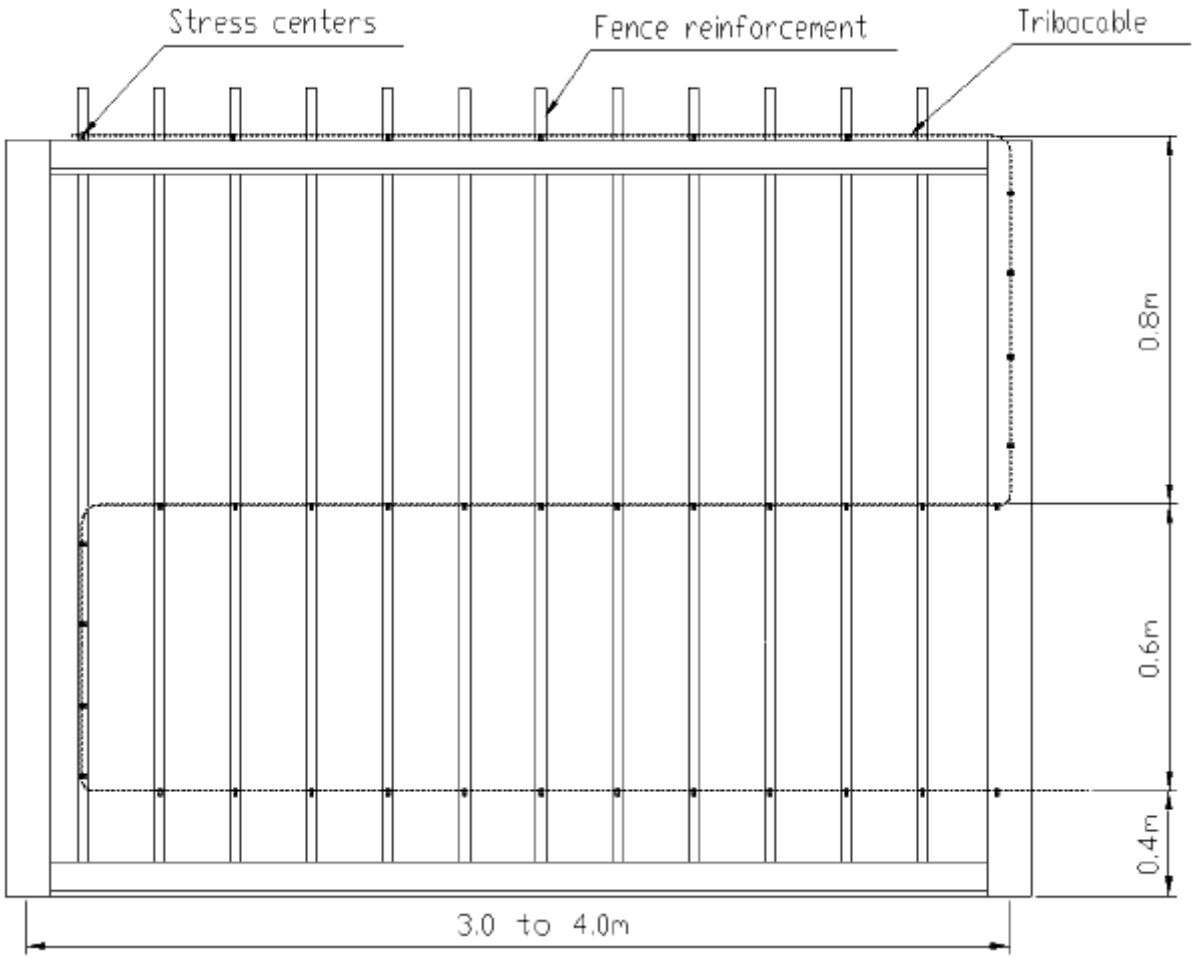
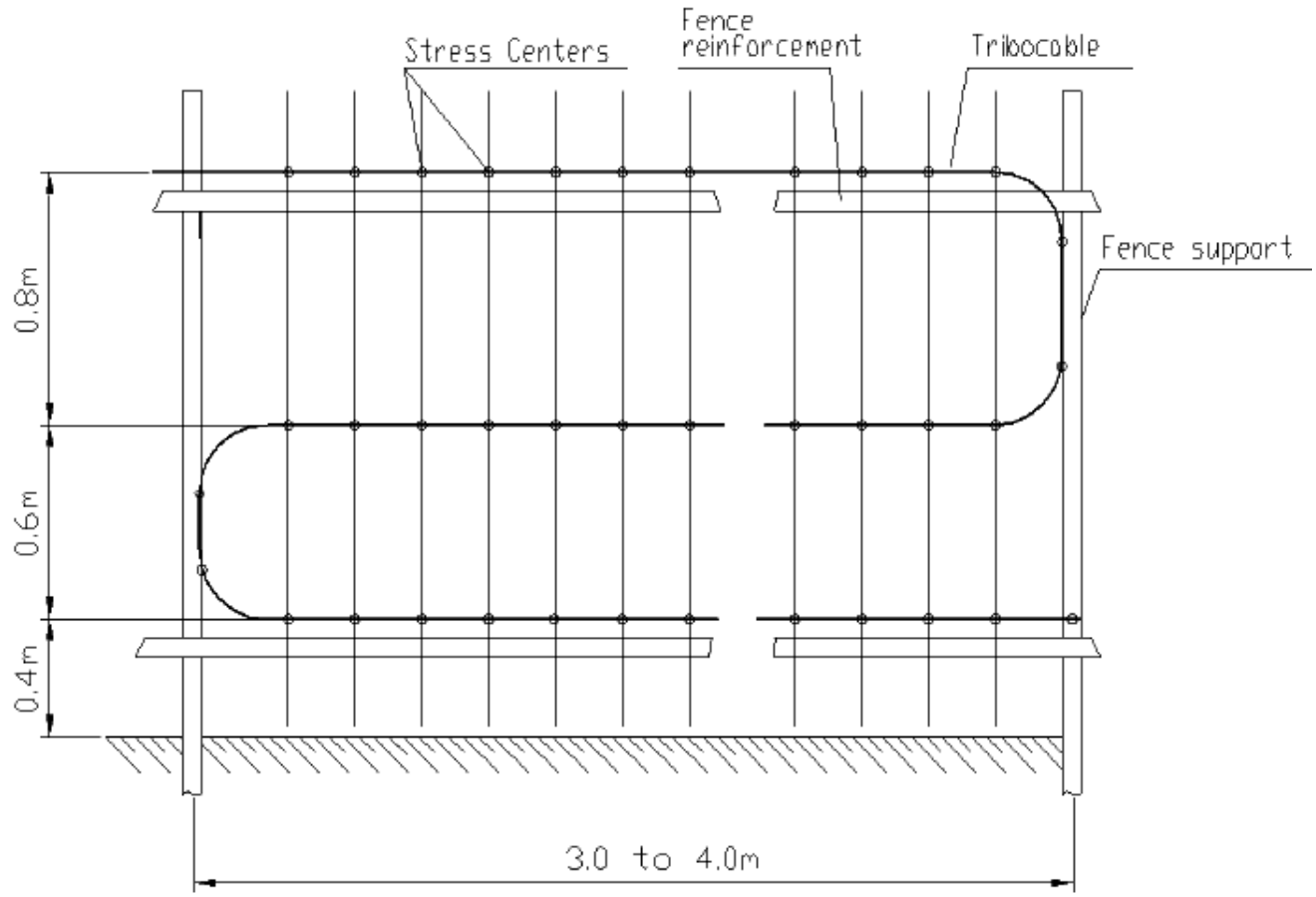
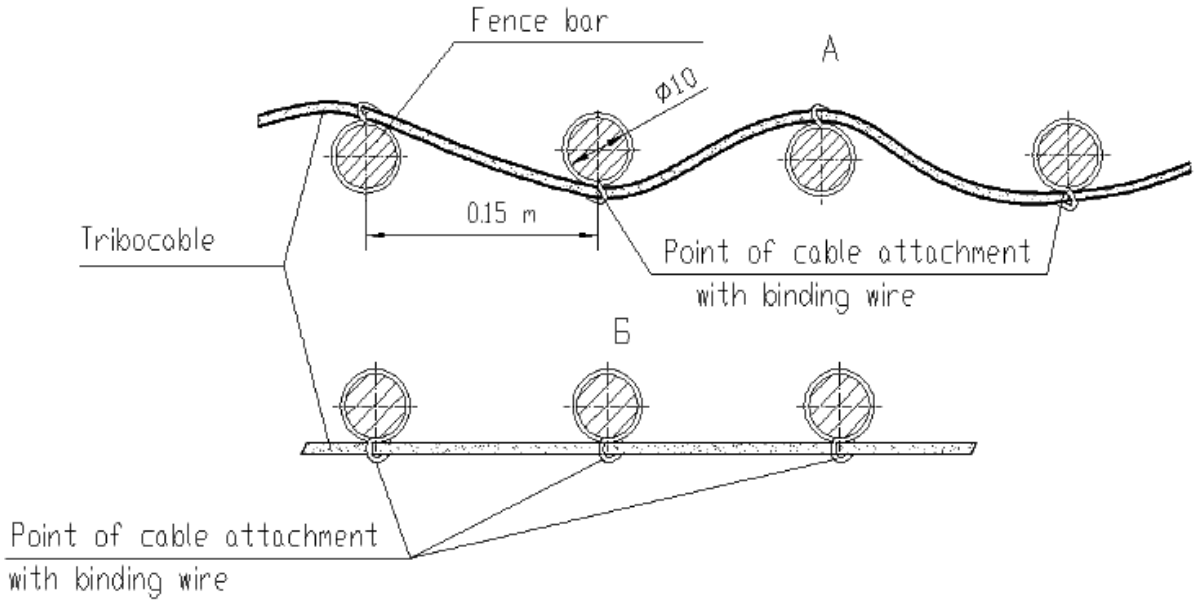


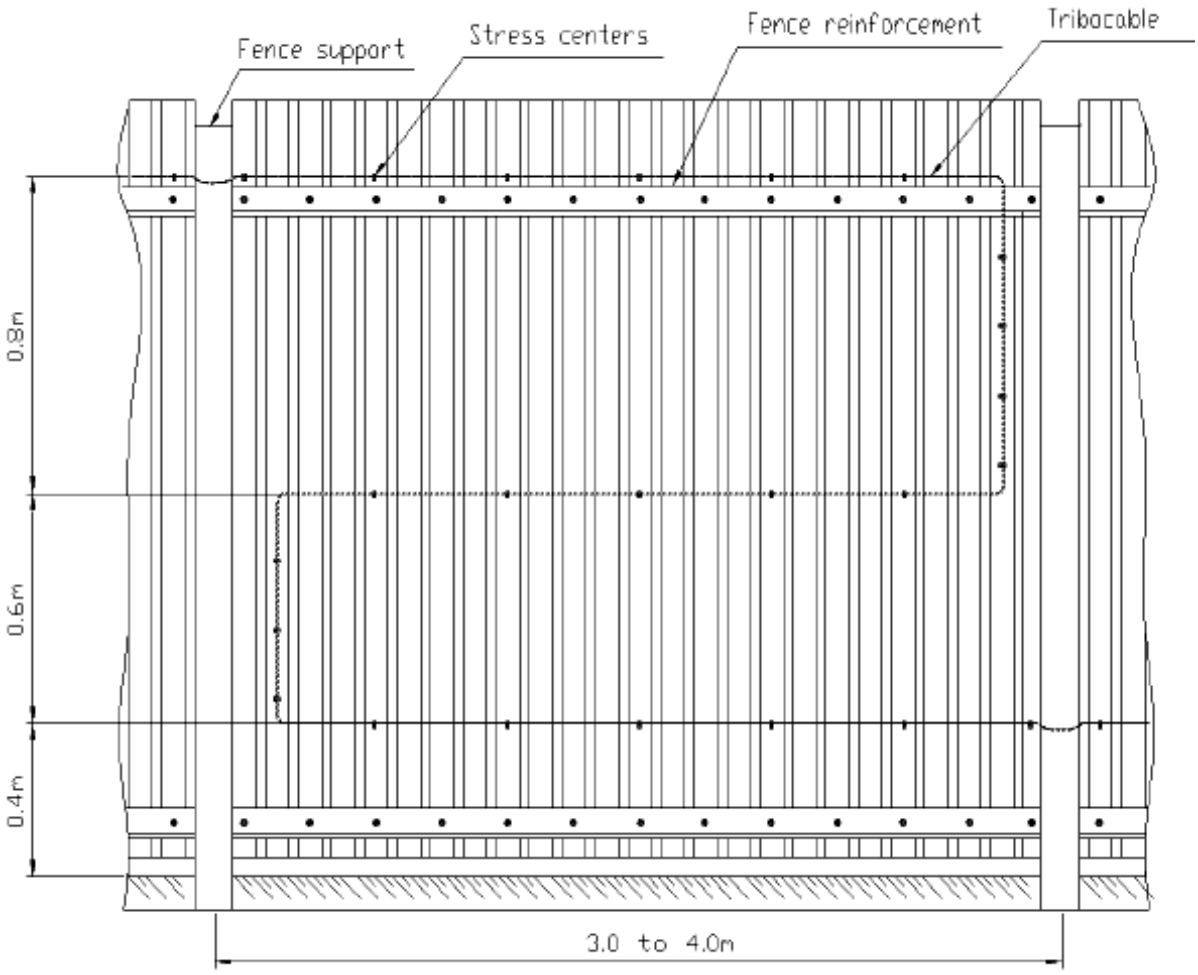
Fig 2 a (continue)



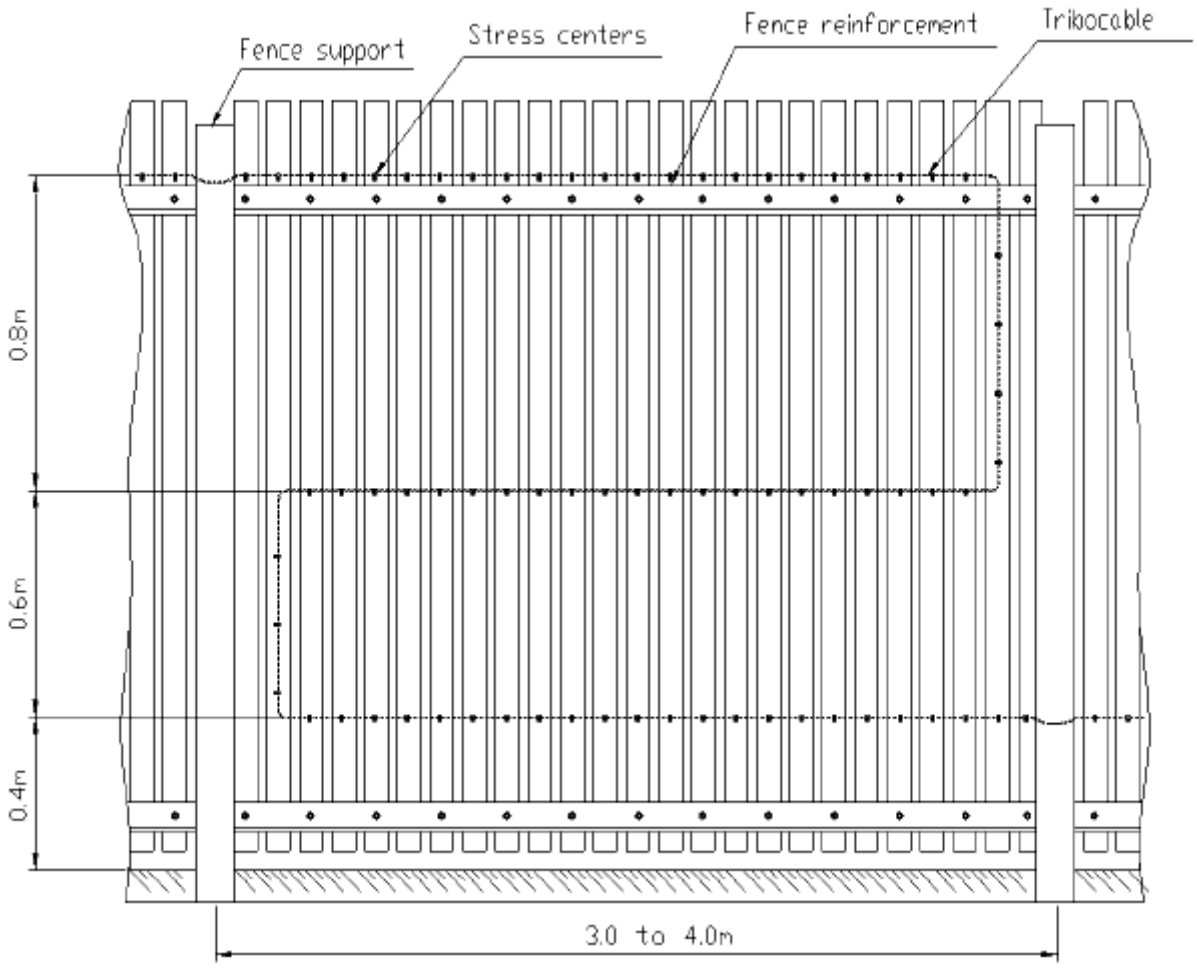


To equip rigid fence of wooden materials, solid metal plates and corrugated plates, be sure to lay the sensitive element according to the diagram, stress centers being made with clamps **(Rigid Figs 2 b and Wooden 2 c)**.

Rigid Fig. 2 b


Fence support
Stress centers
Fence reinforcement
Tribocable
0.8m
0.6m
0.4m
3.0 to 4.0m

Wooden Fig. 2 c



Note. If the stiffener is available at the top of the fence, be sure to lay the sensitive element along this stiffener as well.

To equip rigid solid fence of reinforced concrete panels, concrete blocks, brickwork or masonry, be sure to lay the sensitive element along the fence upper crown under the visor made of deformable material, for example, plate **(Fig. 2d)**.

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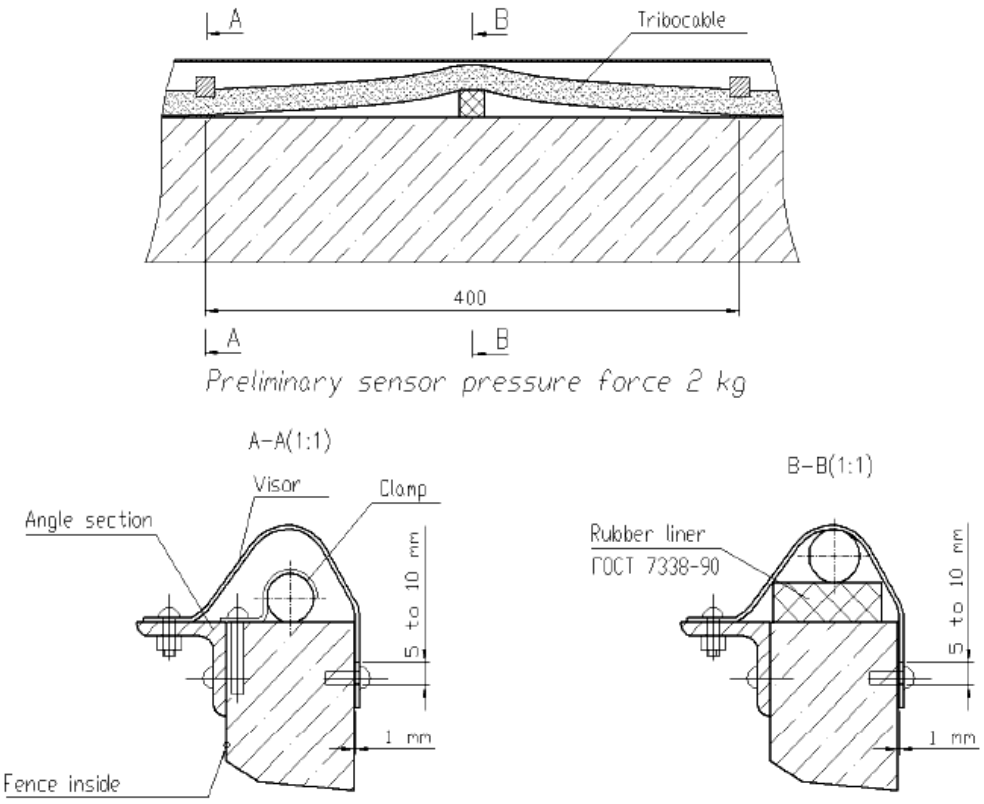
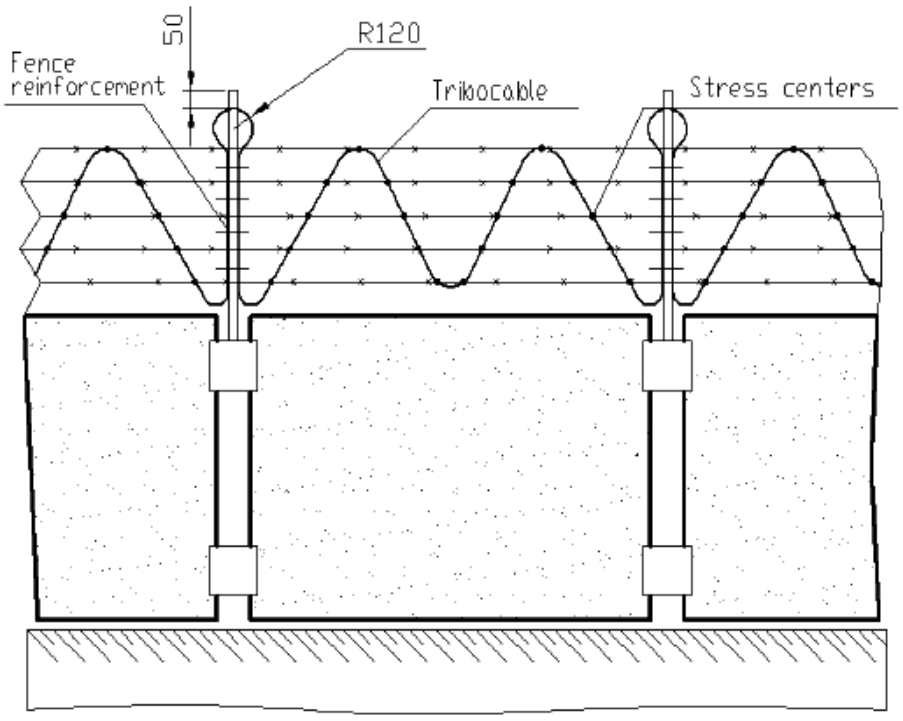
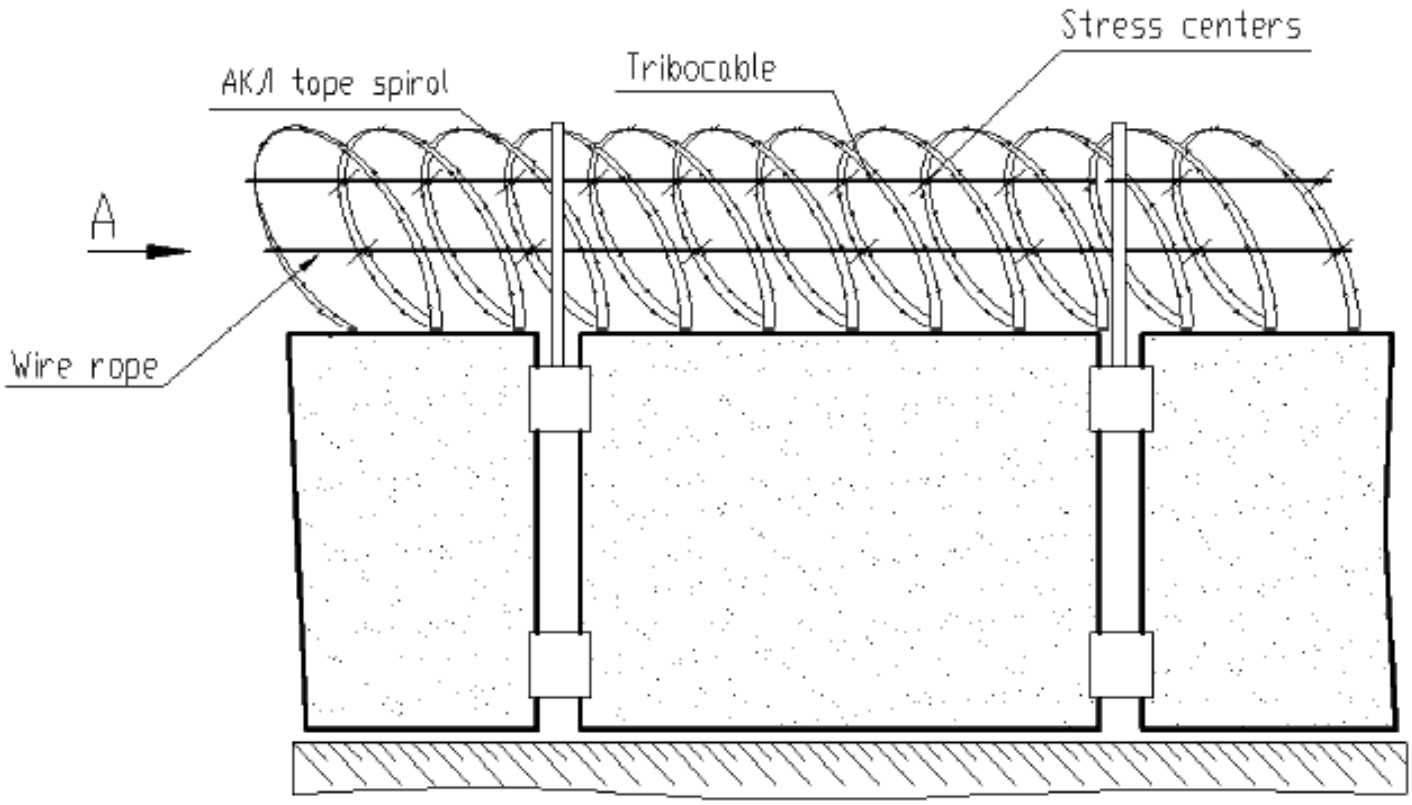
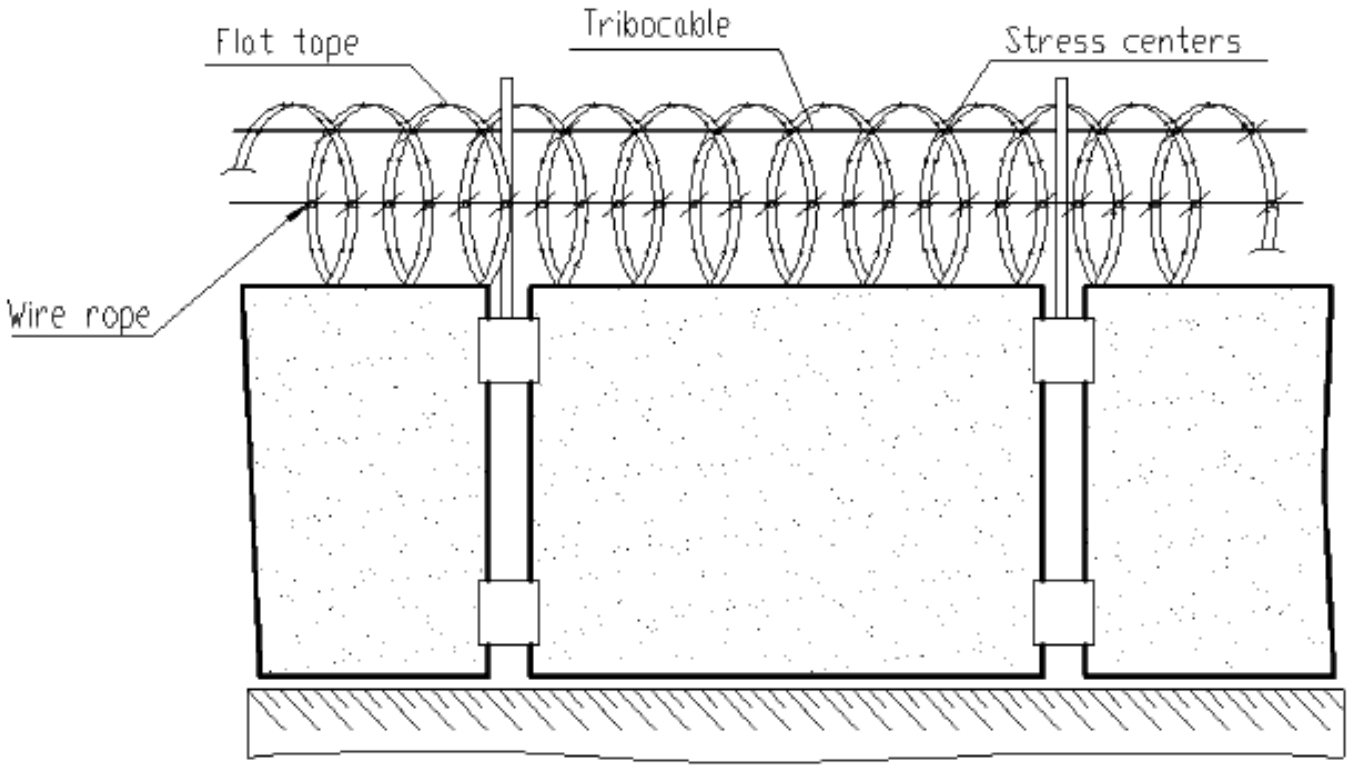
Fig. 2d

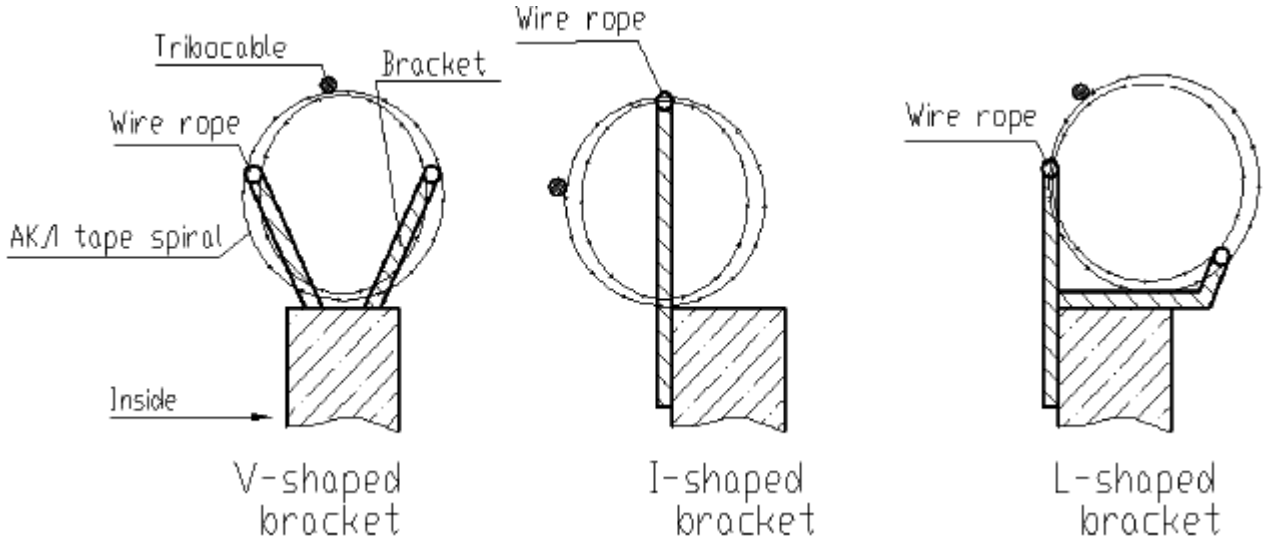


If an extra flexible fence is available over the solid one, be sure to lay the sensitive element along the flexible fence **(Fig. 2e)**.

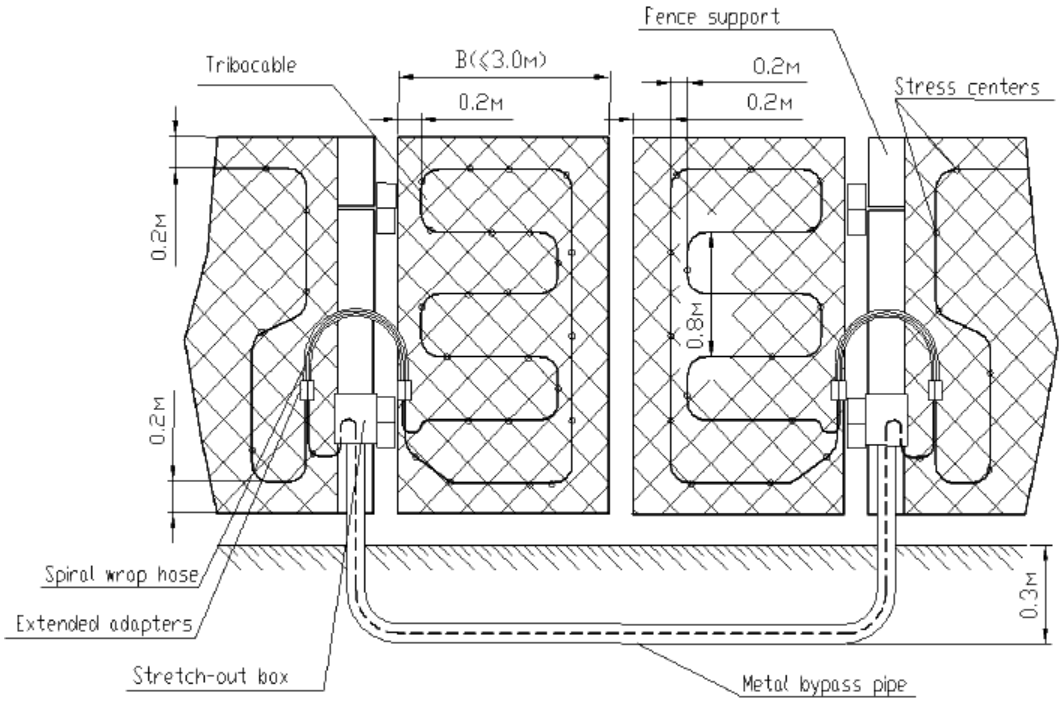



Stress centers
Tribocable
AKA tape spirol
A
Wire rope


Flat tape
Tribocable
Stress centers
Wire rope



Gate (Wicket) (**Fig. 3**)



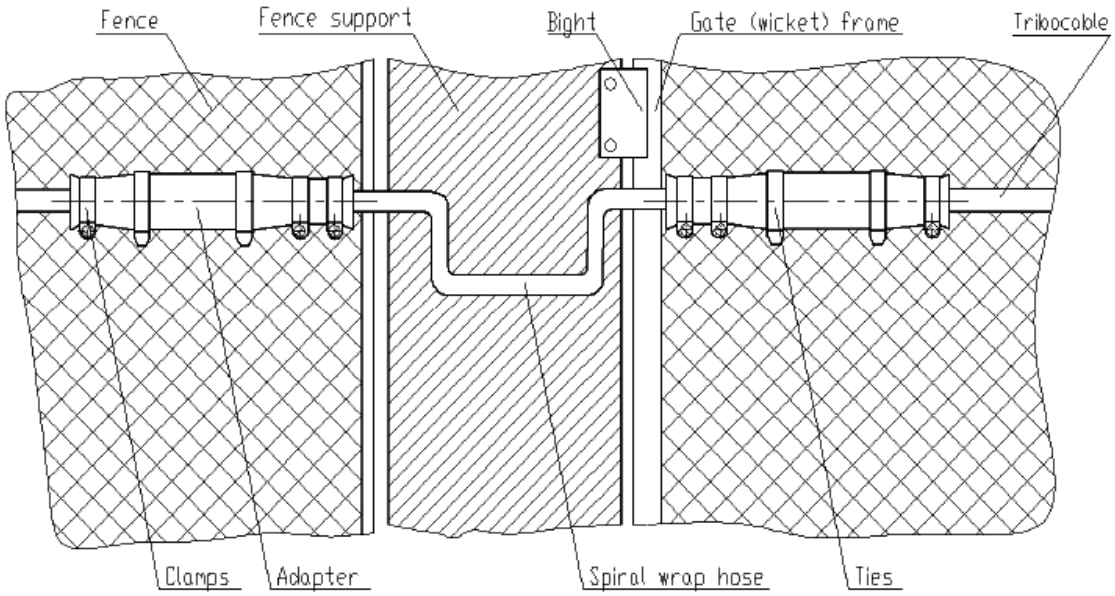
The gate (wicket) is actually a frame made of metal angle sections or tubes, the inner space being filled with bars or netting welded to the frame. The inter-bar clearance should not exceed 0.15 m.

The aforesaid requirements cover gates (wickets) as well.

The fence and the gate being of the **same material**, just **one sensitive element** can be used.

If so the sensitive element is laid on supports between the fence and the gate through special stretch-out boxes, **extended** connection sleeves and a spiral wrap hose.

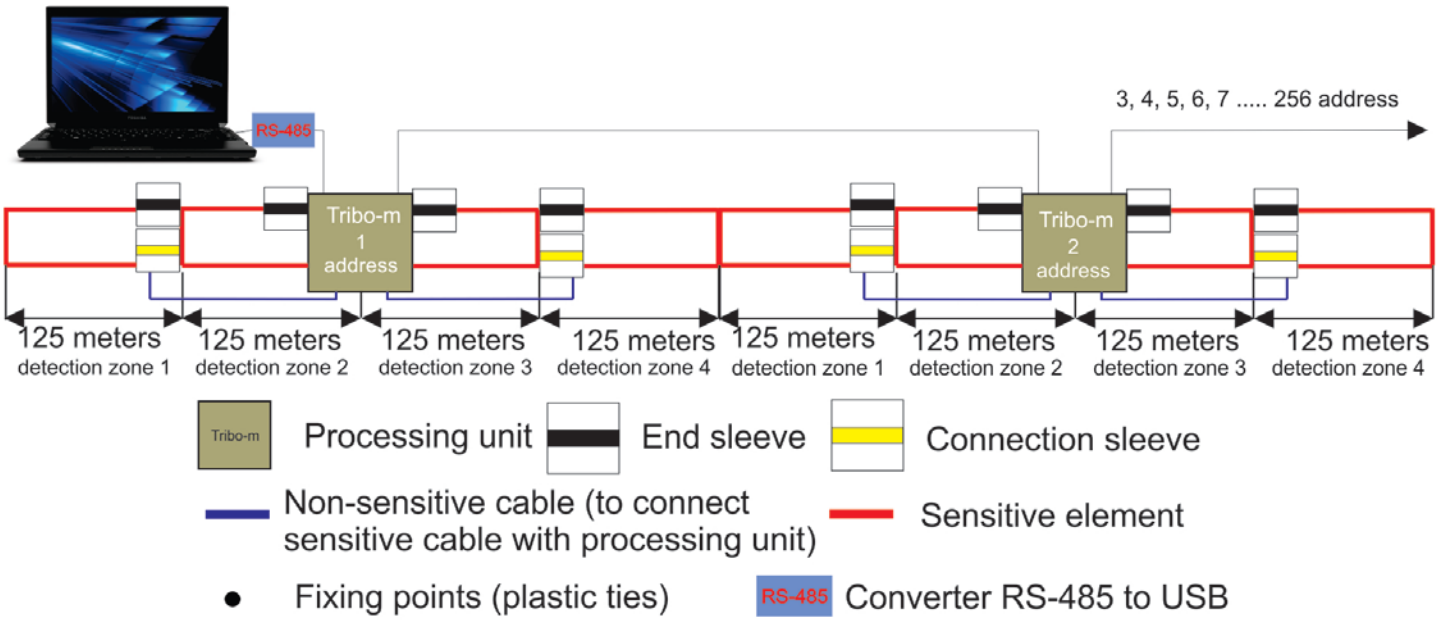
Be sure to lay the sensitive element from one gate leaf to another in a metal bypass pipe buried at a depth of 0.3 m, minimum.



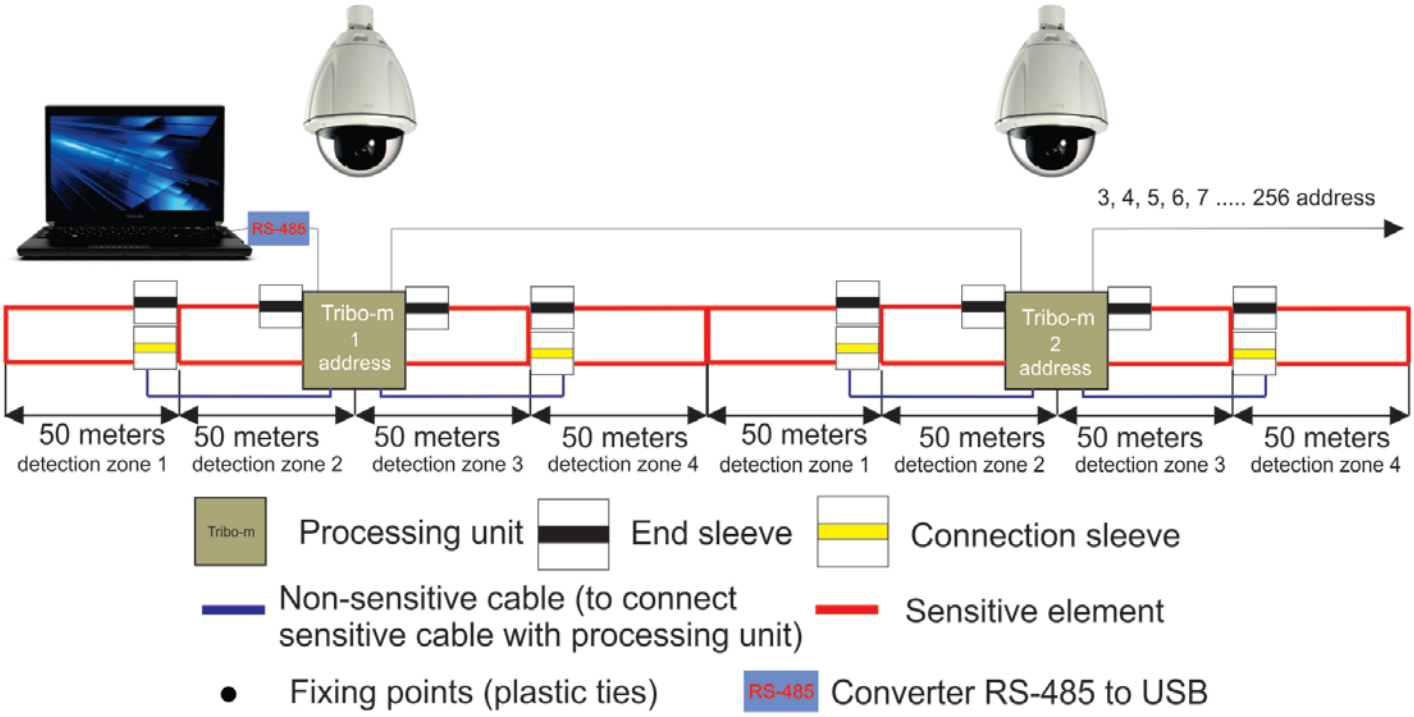
The fence and the gate being of different materials, be sure to connect them with separate detection zones.

3.5. Detection zones

Using the non-sensitive element facility to create detection zones up to 125 m.



If Tribo-M system is connected with CCTV system there is an option to install detection zone up to 25 m. or 50 m. depending from the project requirements.



This variant is most successful for solar panels field perimeter protection, where Tribo-M connected with CCTV Speedomes cameras and it is possible to direct an respective camera to an alarmed zone and start monitoring and record 50 meters area.

4. Serviceability check

Safety Precautions

Only a skilled electrician, familiar with the present Manual is entitled to perform the guard alarm installation, operation and maintenance.

Serviceability Check

The guard alarm is to be inspected for external defects on its receipt from the manufacturer.

Check the guard alarm for serviceability in compliance with Table 4.1.

Table 4.1

Description and procedure of check	Technical requirements
Check of completeness	Correspondence with the warranty
Check for appearance Visual inspection	Absence of mechanical damages and corrosion. Availability of intact Manufacturer seal on the cover of the SPU case

5. Installation and preparation for use

5.1. General

Be sure to observe all norms and regulations for assembling and wiring work in the guard alarm installation.

The guard alarm being powered from the remote power source, select the type of element and the conductor cross-section so that the voltage across the SPU terminals is from 9 to 36 V with the output power supply voltage changing within permissible limits.

IMPORTANT. To ensure the guard alarm trouble-free operation provision should be made for the standby DC power supply

Use non-sensitive element to connect the sensitive element to the signal-processing unit.

Make sure non-sensitive element is hidden and the possibility of its damage is eliminated when laying the element from the signal-processing unit to the sensitive element end.

5.2. SPU TRIBO-M installation

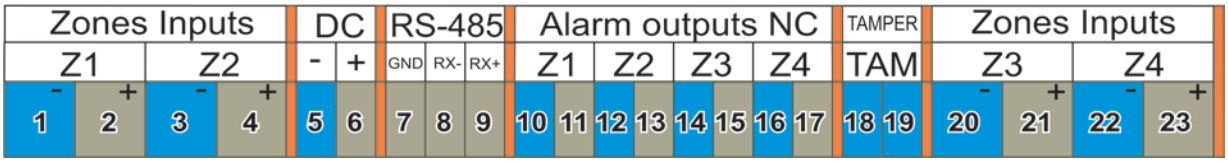
In perimeter protection it is a good practice to install the signal-processing unit in the metal splash-proof cabinet to improve the guard alarm sabotage resistance and to allow for the additional equipment location (an alarm button, a network controller of the data acquisition and processing system, etc). Be sure to locate the cabinet and the signal-processing unit in it so, that the connecting elements of the sensitive elements, alarm stub, RS-485 stub and power leads are conveniently connected and the possibility of SPU periodic inspection and adjustment is provided.

Prior to the SPU installation, do holes layout work for the SPU fastening and fasten it with screws and screw nails.

The following equipment is to be connected to the signal-processing unit:

- ground connection (uninsulated copper element of cross-section 1.0 mm^2, minimum);
- sensitive element (can be connected directly or using non-sensitive element);
- alarm stub;
- supply line.

Connection scheme "FORTEZA TRIBO–M"



1) To connect zone 1 element shield
2) To connect zone 1 central elements
3) To connect zone 2 element shield
4) To connect zone 2 central elements
5) Power supply minus 9 - 30 V DC
6) Power supply plus 9 - 30 V DC
7) "GND" - contact of the computer interface RS – 485
8) "RX - " - B contact of the computer interface RS – 485
9) "RX + " - A contact of the computer interface RS – 485
10) Contact NC (normally closed) the target relay – INPUT 1/ZONE1
11) Contact NC (normally closed) the target relay – INPUT 1/ZONE1
12) Contact NC (normally closed) the target relay – INPUT 2/ZONE2

13) Contact NC (normally closed) the target relay – INPUT 2/ZONE2
14) Contact NC (normally closed) the target relay – INPUT 3/ZONE3
15) Contact NC (normally closed) the target relay – INPUT 3/ZONE3
16) Contact NC (normally closed) the target relay – INPUT 4/ZONE4
17) Contact NC (normally closed) the target relay – INPUT 4/ZONE4
18) TAMPER - box tamper's contact NC (normally closed)
19) TAMPER - box tamper's contact NC (normally closed)
20) To connect zone 3 element shield
21) To connect zone 3 central elements
22) To connect zone 4 element shield
23) To connect zone 4 central elements

CAUTION.

Be sure to ground the guard alarm only at one point - by a fastener on the SPU case.

In mounting the connecting element, sensitive element and end sleeve, be sure to eliminate the possibility of grounding at other points of electric circuit.

Check the conductors' polarity in connecting the supply line.

5.3. Sensitive element laying

FORTEZA OFFER

The kind of laying depends from the fence type. If Tribo M is used for non-standard fences we offer first to try it working with this kind of fence. Prepare a sensitive element about 10 meters and install it on the fence (1 or 2 segments) in your chosen way.

1) **Connect to Tribo-M unit and set up it's sensitivity.**
2) **Test Tribo-M sensitivity.**
3) **Test Tribo-M for noise immunity (wind, vibration, shocks).**
4) **If Tribo-M detects an intruder and don't give alarms from noises - this variant of laying can be used on all segments of this fence. Sensitivity will be the same for all distance.**

Prior to laying, proceed as follows:

- Arrange the sensitive element along the fence inside without bights; make sure it is free of mechanical damages and the sensitive element ends are protected from moisture ingress.

To lay the sensitive element, proceed as follows:

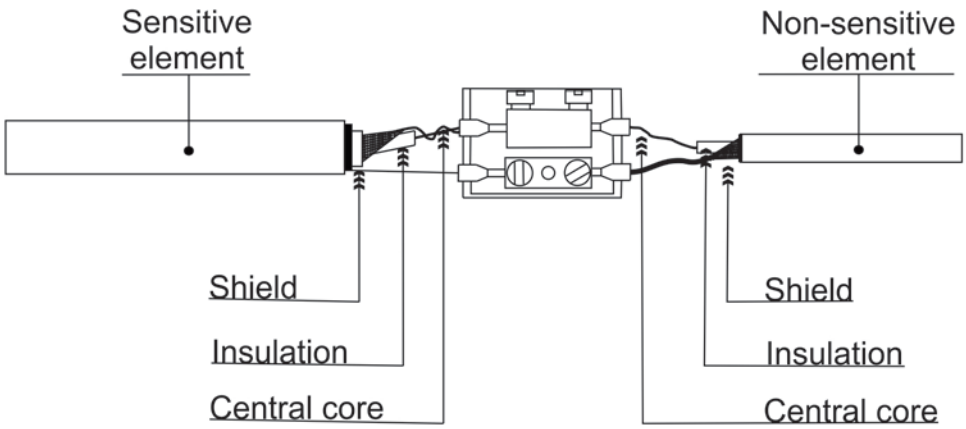
- proceed according to the design documents;
- make sure the ambient temperature is not less than minus 10 ^{o}C;
- laying the sensitive element along the fence, make sure, that the radius of its bend is 120 mm minimum;
- stress points should be made with plastic ties (140 x 3.5 mm) Nylon 6.6 self-extinguishing V2 UL94. Temperature range -40/+100, distance between stress point is from 20 up to 45 cm, depends from a fence type ;
- the parts of sensitive element must be connected over a connection sleeve only.

CAUTION. The sensitive element fastening should be rigid enough to prevent its ANY lengthwise movement relative to the attaching point and the fastener movement relative to the fence.

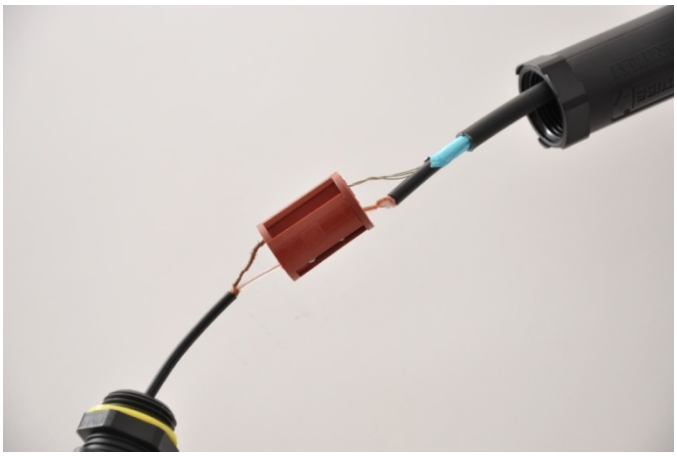
Creating fixing points on the sensitive element , BE SURE, that you provide visible deformation of the sensitive element without its integrity breaking.

5.4. Connection of sensitive element with non-sensitive element.

Splice the ends of the sensitive element and non-sensitive element.

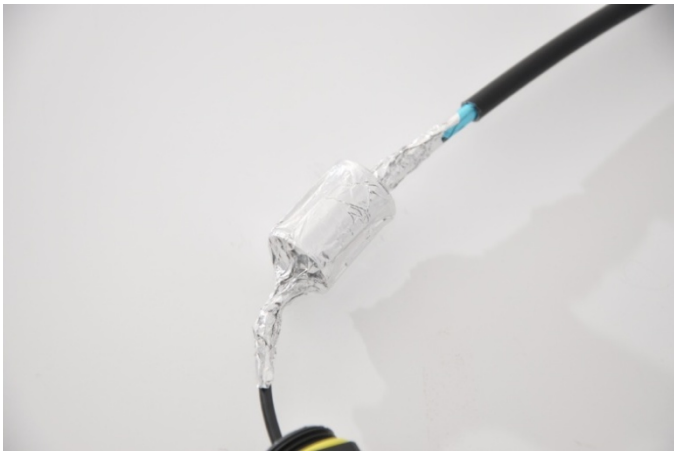


1) Connect sensitive element with non sensitive element.



2) Seal the contact.

3) Use the foil to shield the connector.

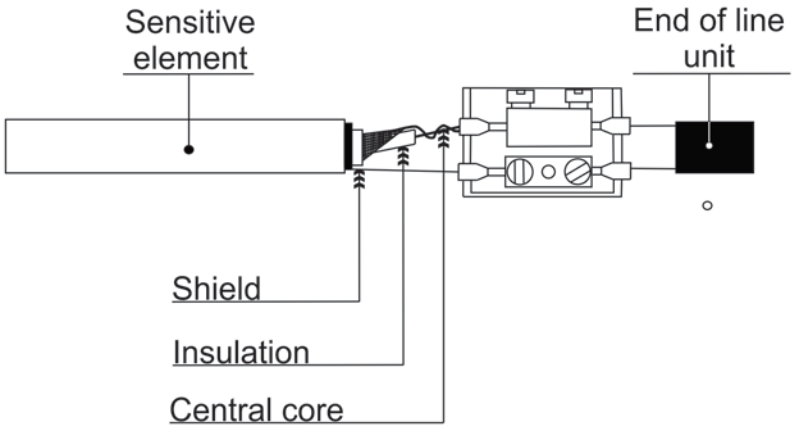


4) Close the connection sleeve.

To ensure against moisture running down from the element towards the coupling, install the coupling horizontally on the fence.

5.5. End sleeve connection

With all electrical connections completed according to the schematic diagram, use nylon ties being a part of the coupling delivery set to fastened it to the fence.



1) Connect Sensitive element with end resistance.

2) Seal the contact.

Seal the contact (N) and end resistance with seal tape.

3) Use the foil to shield the end connection.

4) Close end sleeve.

To ensure against moisture running down from the element towards the end sleeve, install the end sleeve horizontally on the fence.

With all electrical connections completed according to the connection diagram, use nylon ties being a part of the end sleeve delivery set to fastened it to the fence.

6. The procedure of programming

The programming pack contains the software and an RS485/USB interface for connecting to an USB-port of a PC. The software requires Windows XP or later operating system on the PC. At least one COM-port (physical or USB-emulated) is required. Installation is not required for running the software; it can be started by clicking on the respective icon or ".exe" file. The folder, from which the program is started, has to contain the following files:

"Aplication.exe" – file for software, installation and configuration

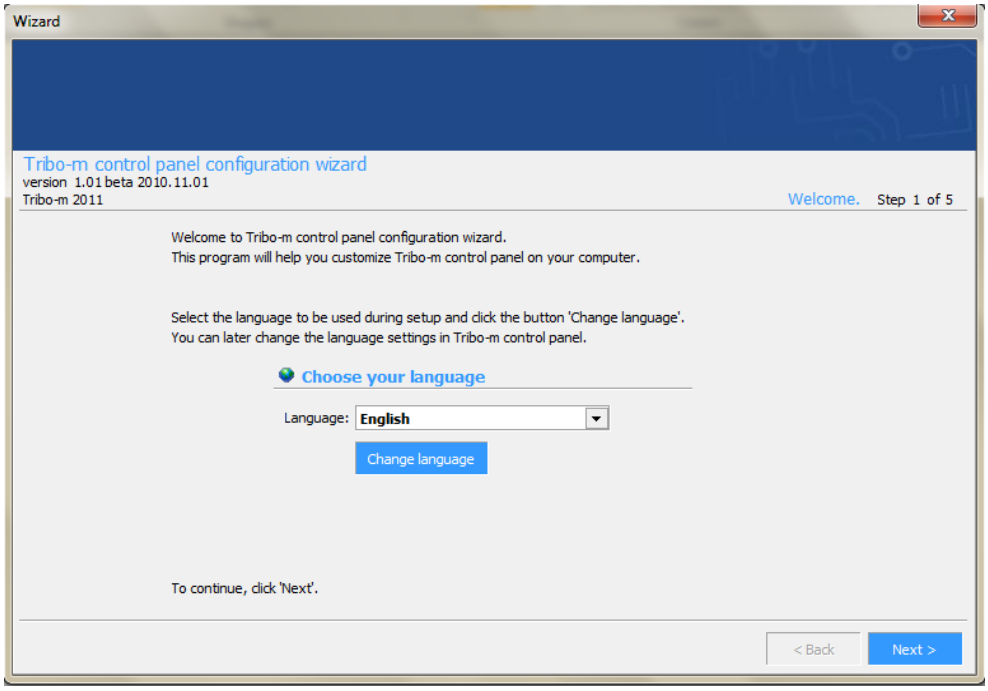
"English.lng" – English interface

"Russian.lng" – Russian interface

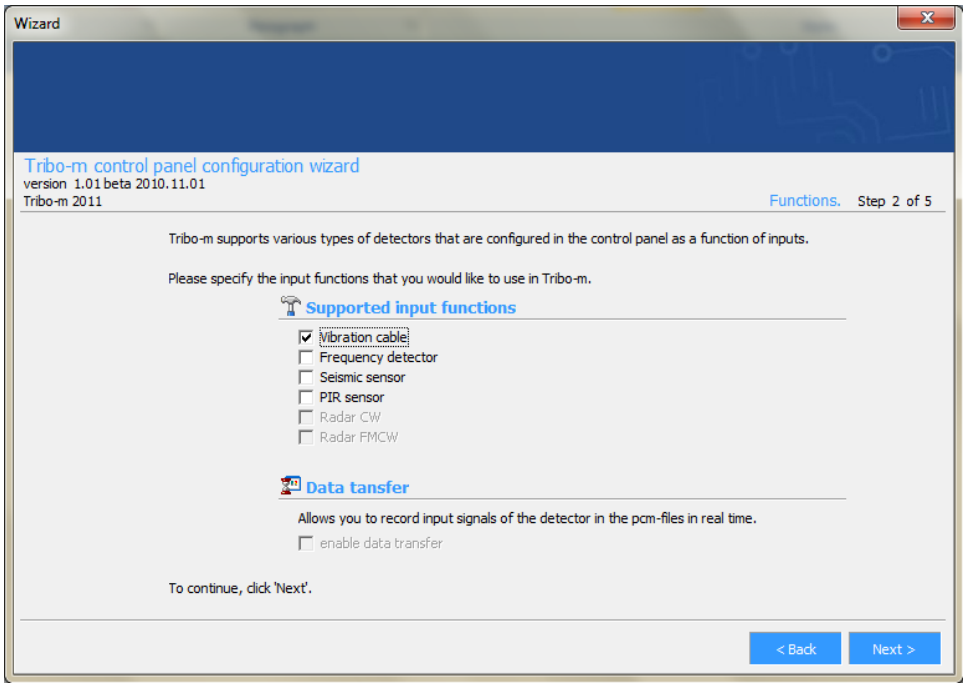
6.1. Software installation

Double click one .exe file Tribo-m 2011 wizard will start.

Select the installation language.

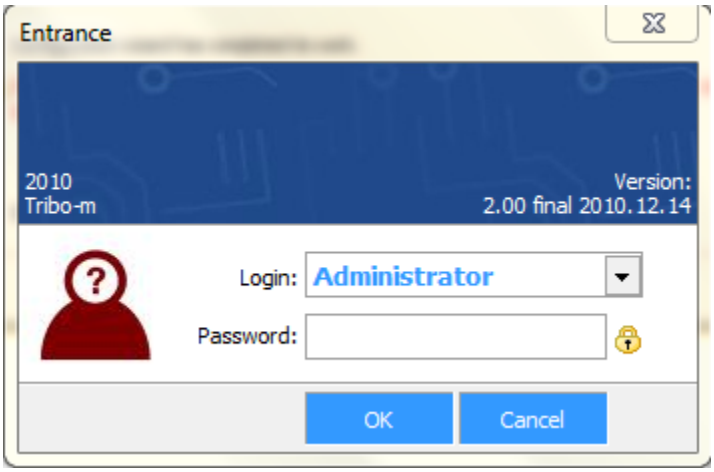


Select the supported input functions.



6.2. Programming from a PC

Connect the communication element to the RS-485 socket of the Tribo-M central unit via the USB/RS-485 interface. Connect the other end of the element to one of the free USB-ports of the PC. After launching the program the following window appears on the display (program entrance):



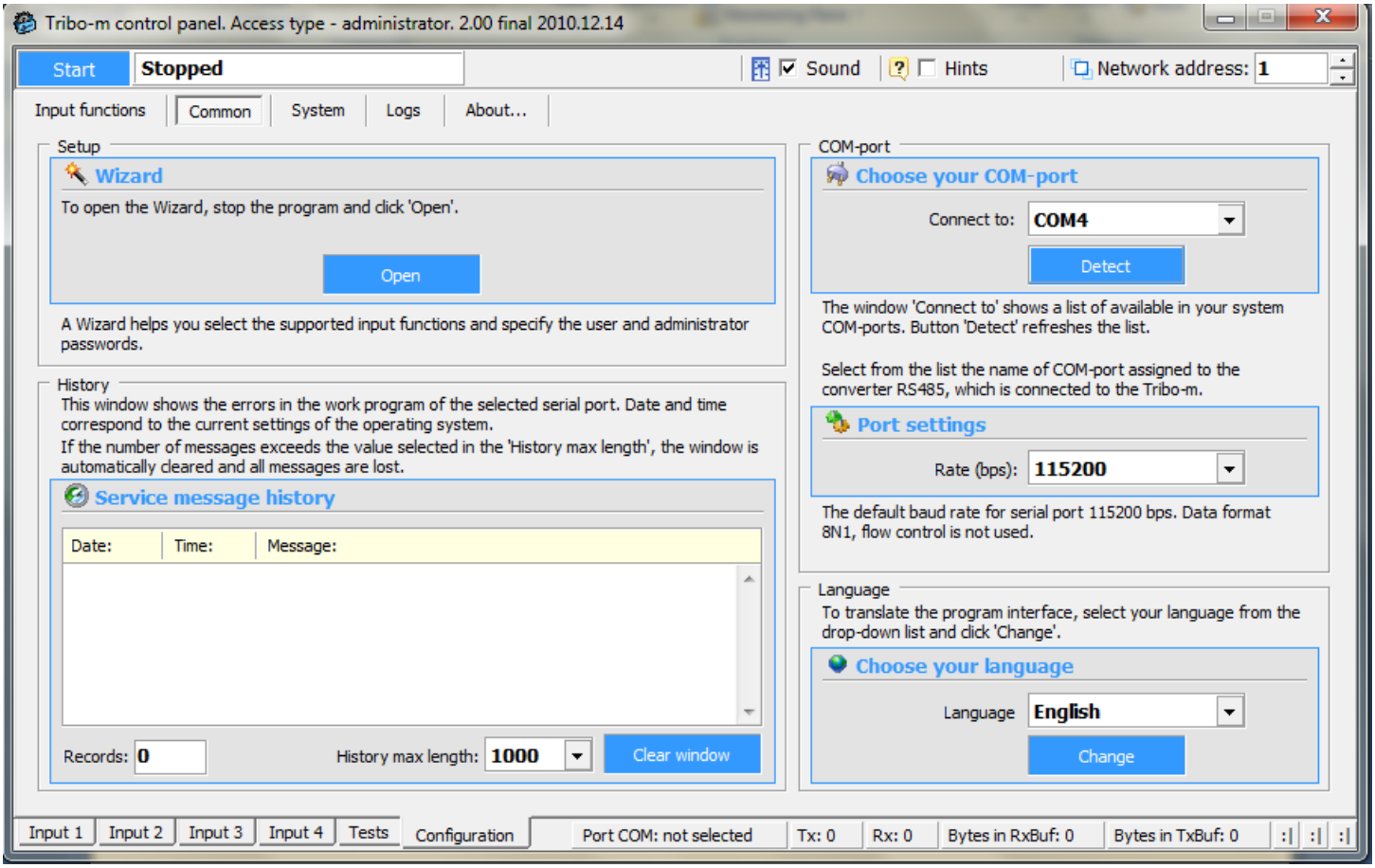
Type in the “Login” (USER or ANDMINISTRATOR), “Password” which corresponds to the user than click on the “OK” button. In case of successful authorization the main window of the program appears on the display: If the “COM-port” and connection speed (“Rate”) settings are correct, the programming procedure can be begun by clicking on the “Start” button. The user may choose a Language: the default language is English.

The following characteristics appear on the status-board of the window:

- the chosen COM-port and the connection speed (rate)
- the number of sent/received data-packages
- the active network-address

The user navigates in the program, choosing from the necessary chapters. The “Active Address” field enables the user to type in the network-address of the wished detector (from 1 to 254). The address of the current detector is shown in the “Active Address” column.

6.3. Setting the COM port



For configuration of the COM-port choose “Configuration” - “COM-port” in the “Common” chapter.

By pressing of the „Detect” button the program finds all the COM-ports of the PC. Parameters of the chosen COM-port may be set in the “Port settings” part.

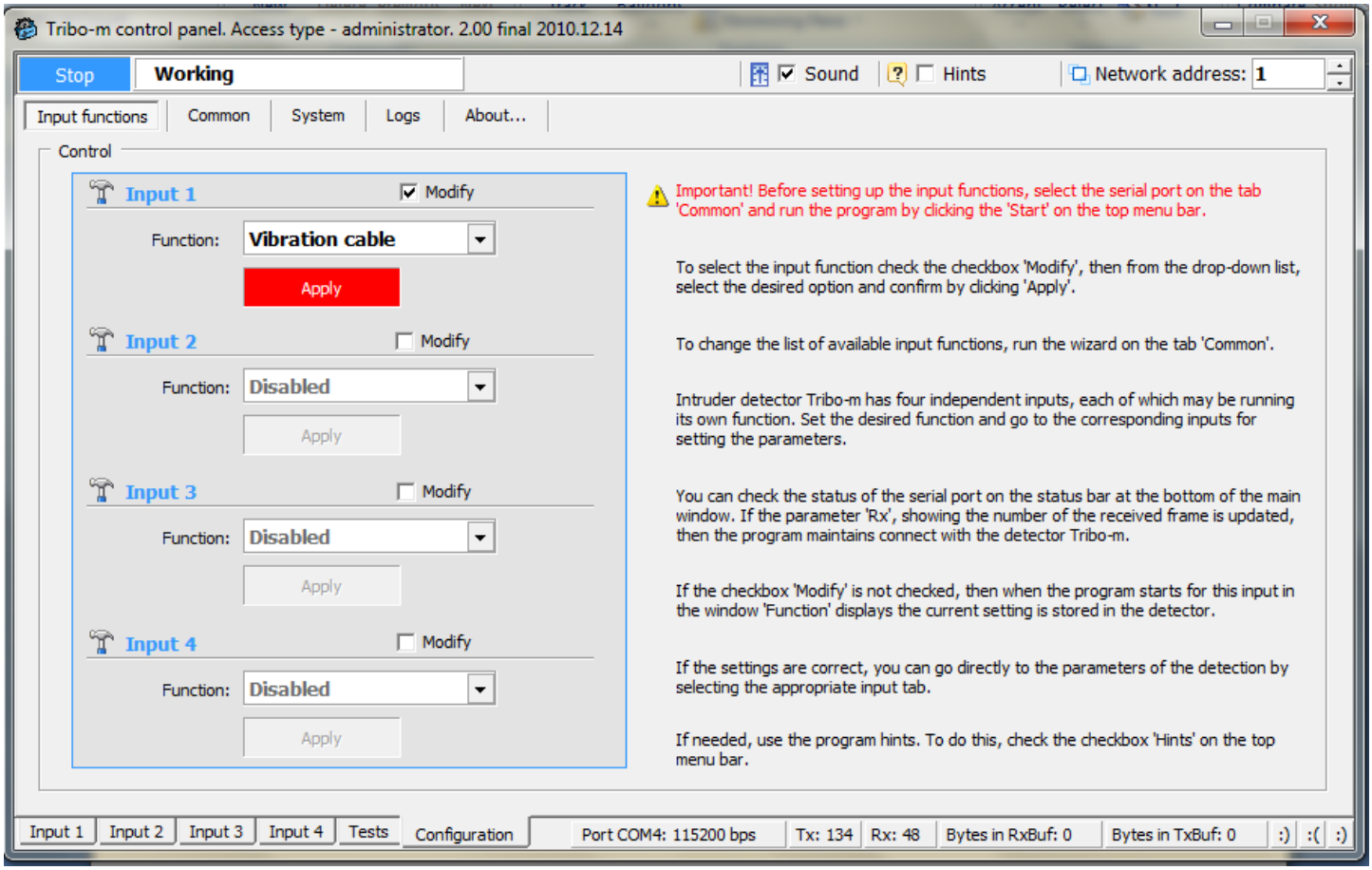
The default Rate (bit/s) for the Forteza “Tribo-m” is 115200 bit/s – this speed has to be chosen in the Rate (bit/s) field.

Press „Start” to open the chosen COM-port. If the “Active address”, „COM-port” and „Rate (bit/s)” fields are filled in properly, the following windows appear on the status-panel: „Frames in Tx Buf”, „Bytes in Rx Buf”. If this does not happen, check the connection between the Forteza “Tribo-m” central unit and the PC, and whether the parameters are given properly.

6.4. Select or check of the inputs functions

To set the function of a certain input, open the “Input functions” feature in the “Configuration” chapter.

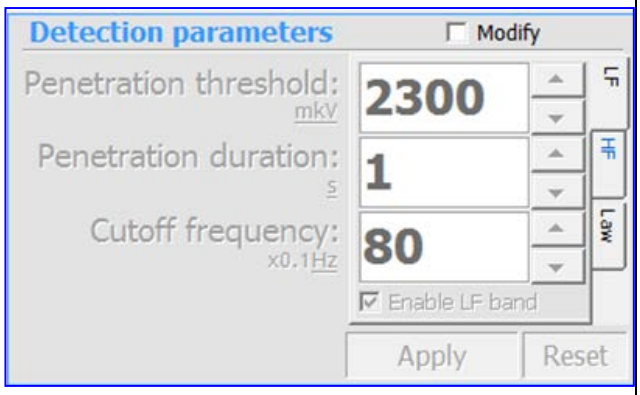
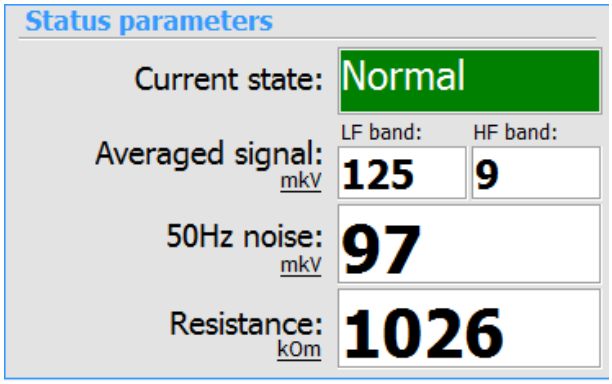
Input functions. Configuration -> Input functions -> Input 1. Choose a channel which is connected to a sensitive element (element) 1 of 4. In our case we use **Input 1**, click “Modify”, set Vibration element. When click **Apply** to save changes.



Note: You may determine a function only for the channel, which chosen at the moment.

6.5. Check system working status

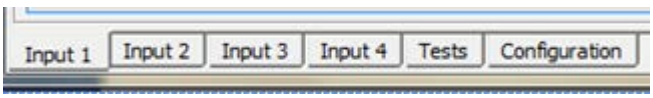
After choosing the “Vibration element” for a certain input, the user can open the menu of the respective input for configuration. The menu will open depending on the function chosen previously – first choose the function for the input and then make the configuration. The parameters may be divided into the following groups:

• **Detection parameters** 	**Modify –** change settings **Penetration threshold (mkV)** – channel sensitivity **Penetration duration (s) –** time which trigger signal exceeds the sensitivity level up to. **Cutoff frequency (x0.1 Hz)** – value depends from the hardness of the fence **LF** – low frequency adjustment (deformation) **HF** – high frequency adjustment (vibration) **LAW** – depends from the set up setting, whether dry relay output for the channel will be open. Function OR and AND is available. **Enable LF** – disable or enable band parameters **Enable HF** - disable or enable band parameters **Apply** – save parameters
• **Status parameters** 	**Current state –** shows that is the state at the moment. **Normal** - the detector is not alarmed at the moment. Relay output close. **Overcome** – LF signal from sensitive elements higher than penetration threshold. Relay output open. **Destruction** - HF signal from sensitive elements higher than penetration threshold. Relay output open. **Break** - processing unit don't see the end terminator. **Averaged signal (mkV) –** you can see- what signal is receiving by processing unit from sensitive element. **50Hz noise (mkV) –** influence from power supply lines. **Resistance (kOm) –** sensitive element control from sabotage.

The detection parameters can be changed by the user, the status parameters and operating mode not.

6.6. LF or HF frequency adjustment

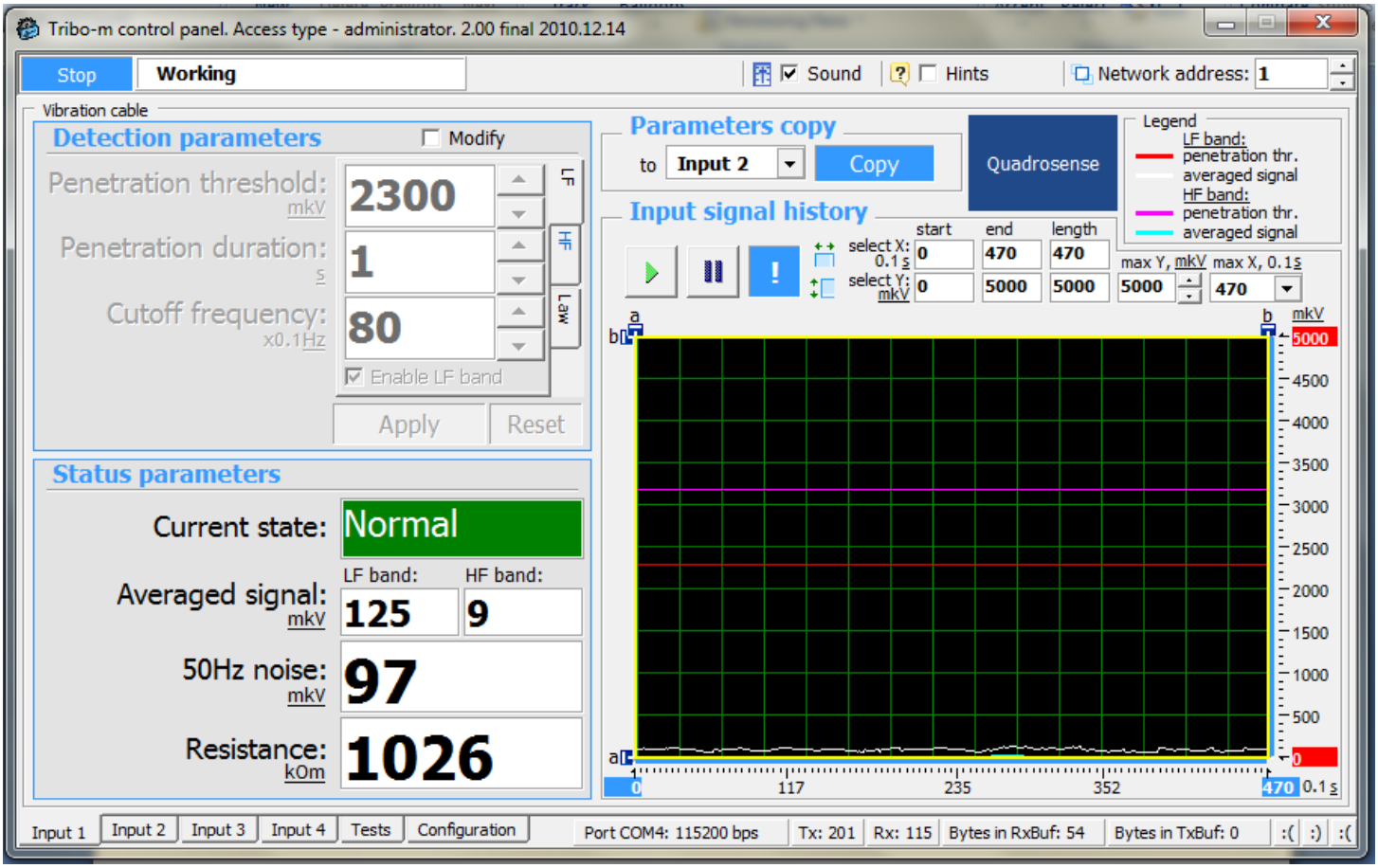
Select the Input 1 (at the program bottom)**, select <u>Detection parameters</u>** Modify



Check frequency parameter which you want to adjust LF or HF. Example LF (low frequency adjustment mode), low frequency used to detect (deformation) intruder then he try to climb over the fence

Status parameters

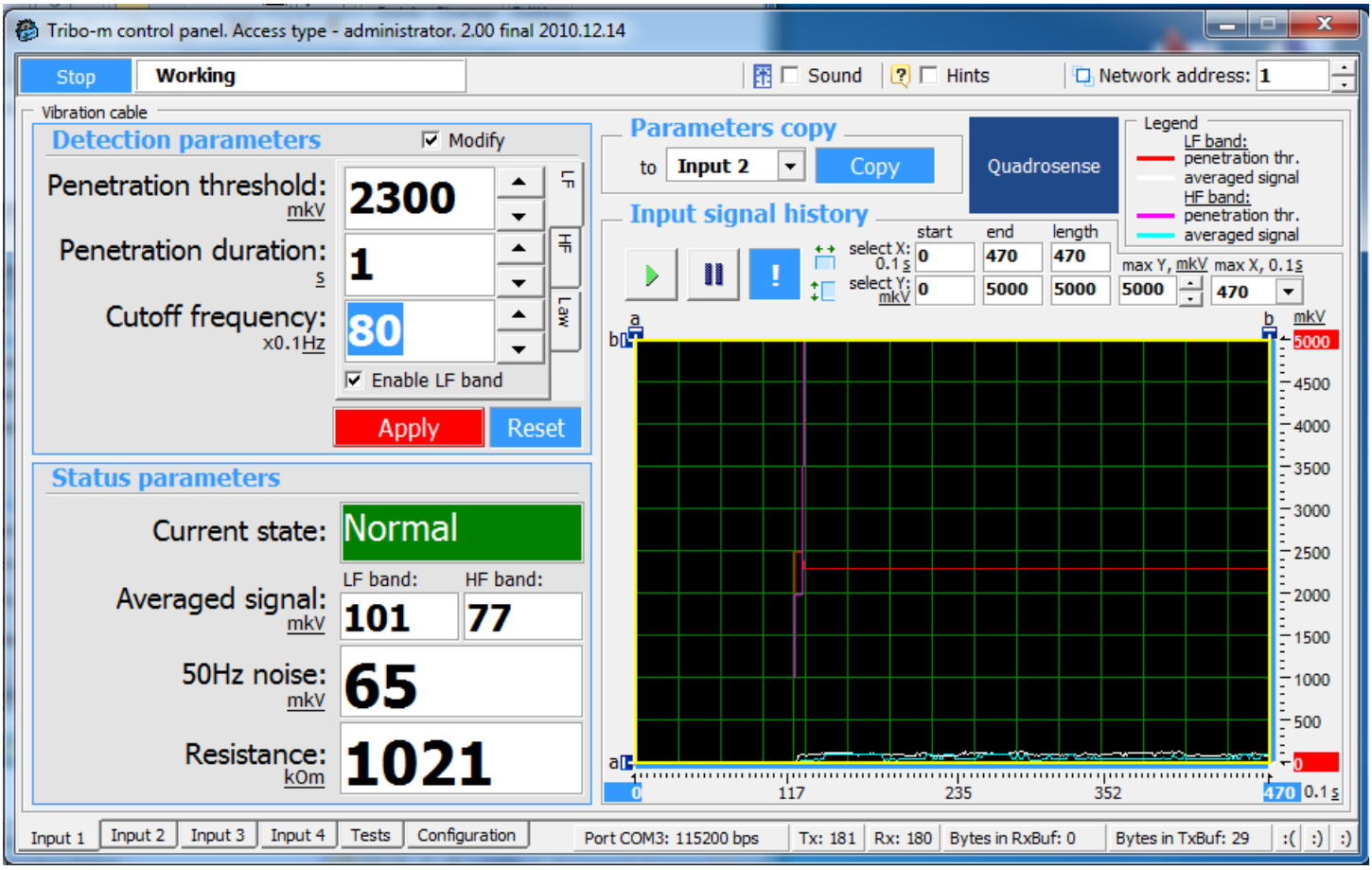
Check Input 1 state: Status parameters - Averaged signal LF band or HF band: shows a signal from the sensitive element which registries the processing unit. In our condition LF is about 125 mkV and HF is about 9 mkV .



6.6.1. Setting the system sensitivity for LF

Detection Parameters - Modify - Cutoff frequency. The value depends from the hardness of the fence is expressed in numbers from 5 to 95, depending on the hardness of the fence. What is harder the fence number higher Example: Metal chainlike fence (fig. 1) from 15 to 30, boiled rod (5 mm) from 30 to 45, and wooden palisade (fig. 2 c.) from 45 to 85. When you click the **Apply.**

Wooden fence Cutoff frequency is 80.



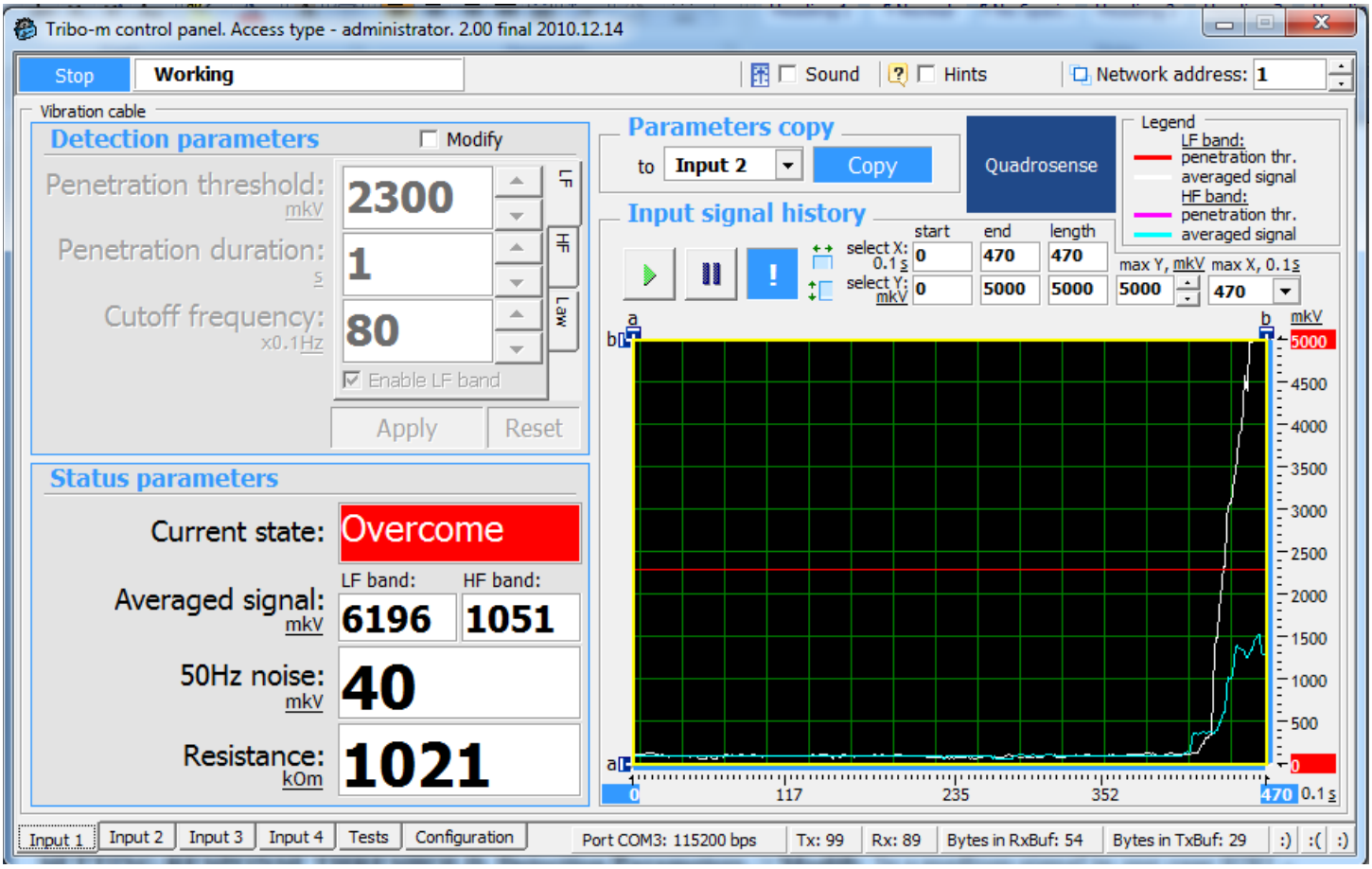
To change any of the **Detection parameters** choose **Modify**, than change the parameters. Confirm the change of parameters by clicking on the **Apply** button. After confirmation the parameters get stored in the non-volatile memory-module.

These parameters also may be copied to be applied for further inputs. By pressing **Copy** the system automatically opens the parameters of the next input to be configured.

The Status parameters reflect the condition of the sensitive element and the main operational characteristics in real time. The diagram shows the changes of average signal strength. Set the thresholds depending on the parameters of the object (sensitive element, fence type, type of sensitive element fastening, typical weather).

Capture the maximum signal from sensitive element

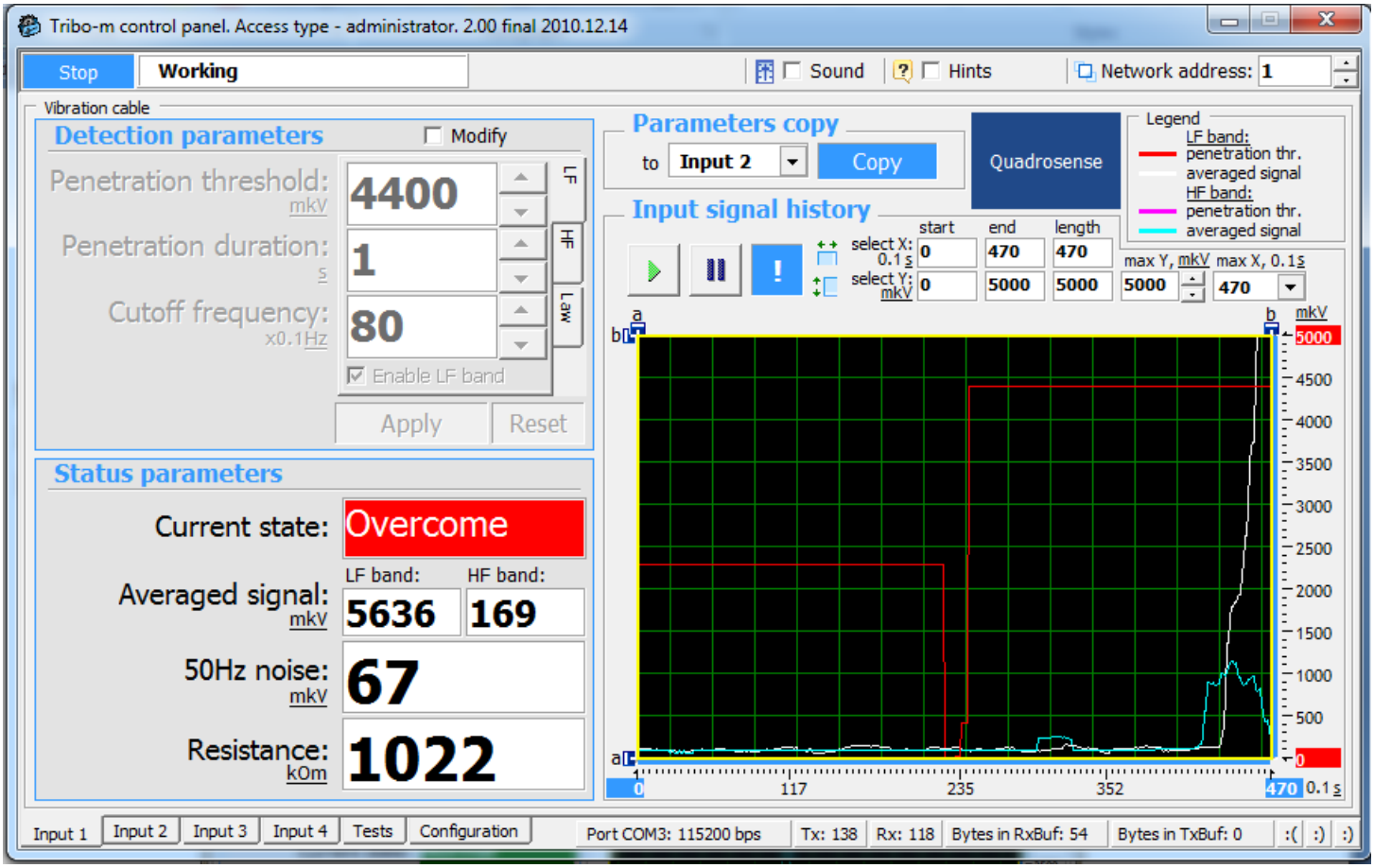
Look at **Averaged signal**, and a colleague climb over the fence online. Visually fix the maximum level of signals. In our case, it is 6200 mkV.



Setting response threshold

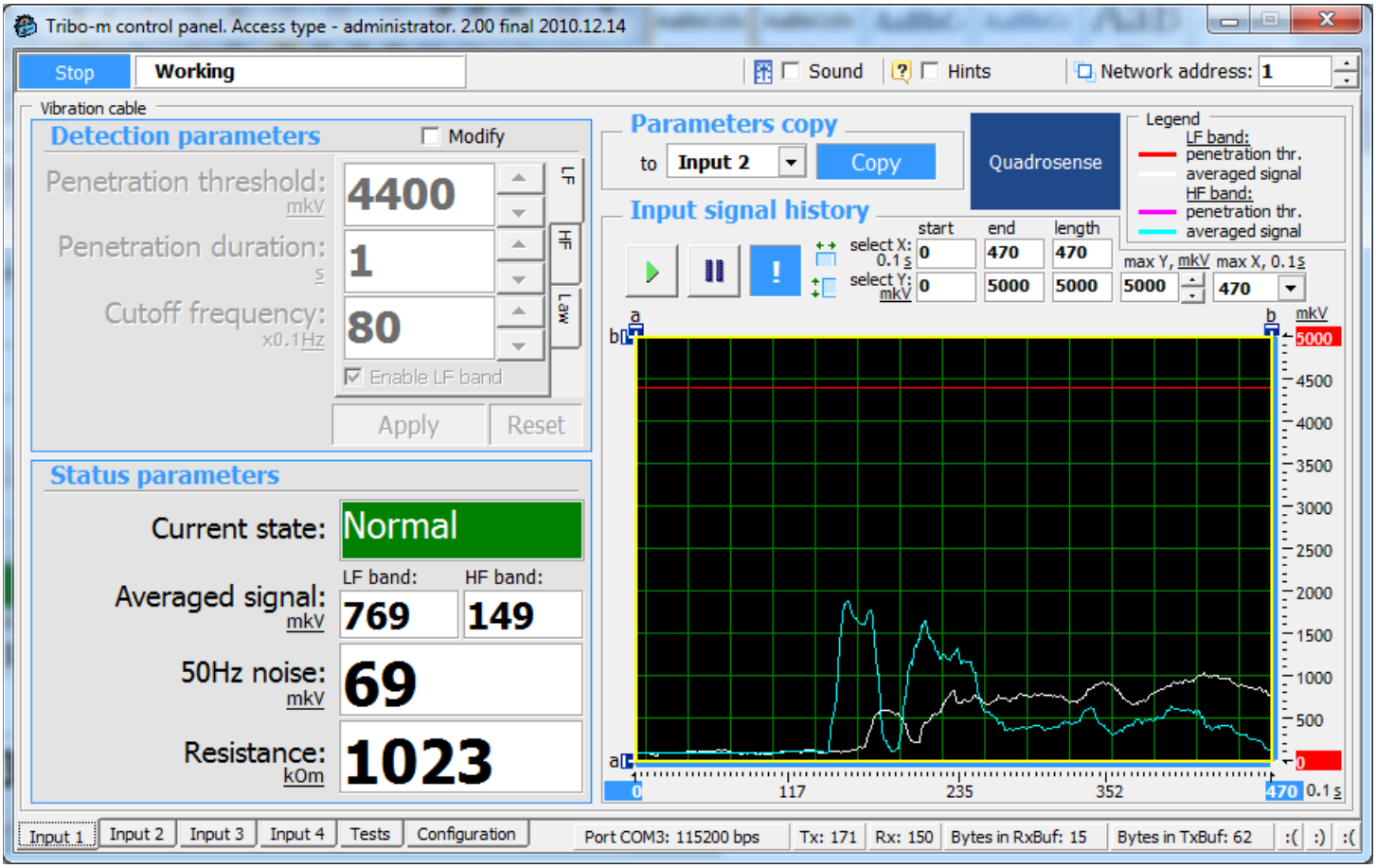
Detection Parameters -> Modify. Highest signal is 6200 mkV. From 6200 minus approximately 30% (to do system more sensitive). We get 4400. Obtained data entry into the cell **Penetration threshold**. Penetration duration set 1 s. Click **Apply.**

Check one more time detection, when intruder try to climb over the fence.



Check system for the disturbance

Verify that the system does not respond to an external disturbance. You can shake the fence, pretending if it is the wind, finally, like a tree branch. Because for this example, the level of disturbance is 769 mkV, so the P**enetration threshold** (4400 mkV for low frequency LF) – is enough to avoid a false alarm.



6.6.2. Setting the system sensitivity for HF

BE CAREFUL USING HF – because signal is generated from fence vibration. It can be fence vibration as result of influence of cars, trains, moving near the fence. Before you use HF, you need to check influences, that may affect a protected fence.

Select **Input 1**

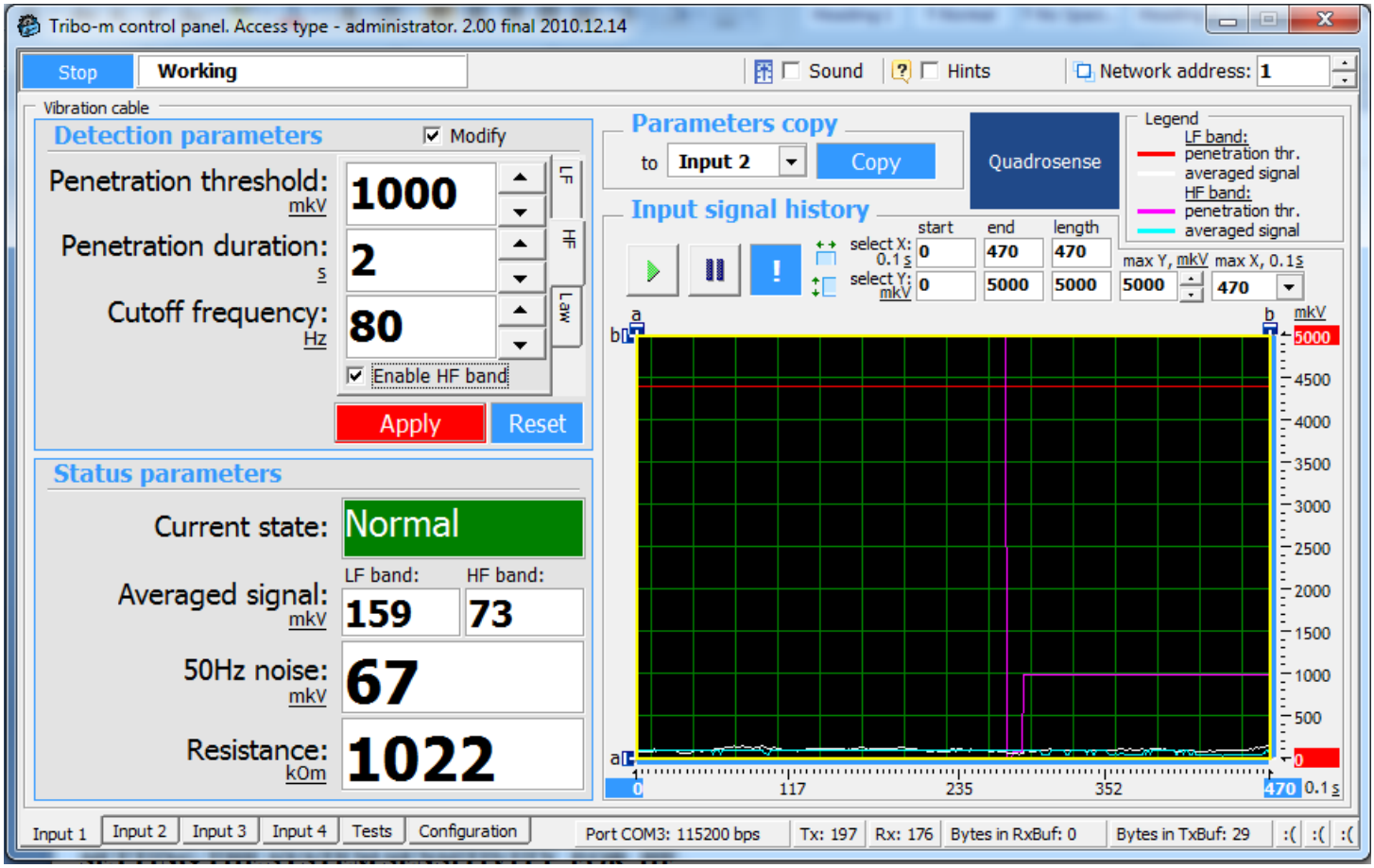
Detection parameters

Check frequency parameter which you want to adjust. **Detection parameters – Penetration threshold – HF** (high frequency adjustment mode), high frequency used to secure from cutting, smashing a fence.

Status parameters

Check **INPUT state: Status parameters - Current state:**

Check **Averaged signal HF band:** shows a signal from the sensitive element which registries the processing unit. The signal is not stable changing, in our condition it is about 73 mkV .



Detection Parameters - Modify - Cutoff frequency - the total system sensitivity is expressed in numbers from 5 to 85, depending on the hardness of the fence. For harder fence - the greater number. Metal chain like fence from 15 to 30, boiled rod (5 mm) from 30 to 45, and wooden palisade from 45 to 85. Then you click - **Apply.**

We have installed the sensitive element on wooden fence so the **Cutoff frequency** 80 Hz and **Penetration duration** 2 s.

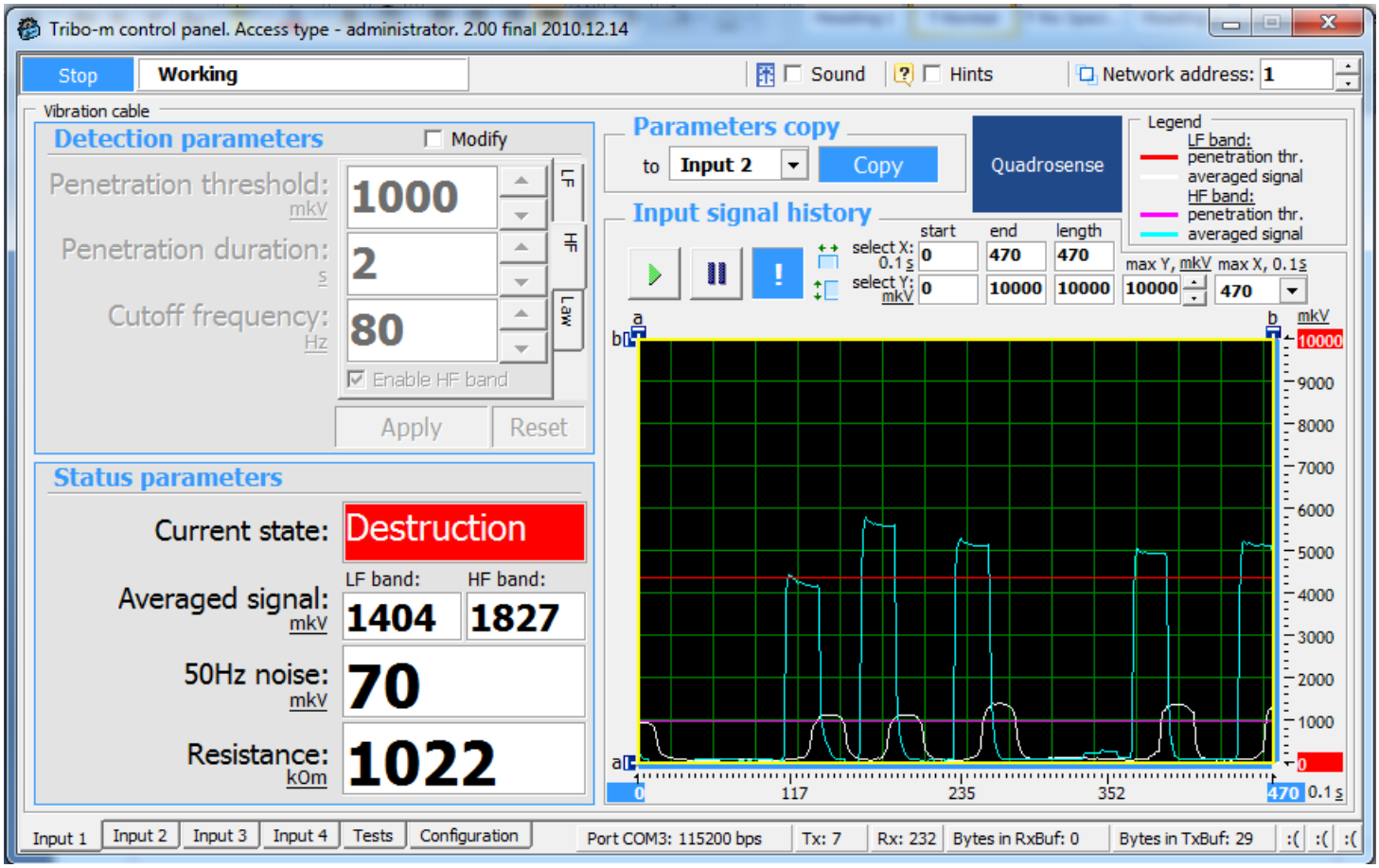
To change any of the **Penetration duration** parameters, choose **Modify,** than change the parameters. Confirm the change of parameters by clicking on the **Apply** button. After confirmation the parameters get stored in the non-volatile memory-module.

The given parameters also may be copied to be applied for further inputs. By pressing **Copy** the system automatically choose the parameters of the next input to be configured.

Status parameters reflect the condition of the vibration element and the main operational characteristics in real time. The diagram shows the changes of average signal strength. Set the thresholds depending on the parameters of the object (fence type, type of sensitive element fastening, typical weather).

Capture the maximum signal from sensitive element

Set in average signal sensor “wooden fence-break” or “metal fence-cut through”. Look at **Averaged signal**, and a colleague simulate a break or cut of the fence. Visually fix the maximum level. In our case, for a wooden fence, we have 5000 mkV (please see in graphic view).

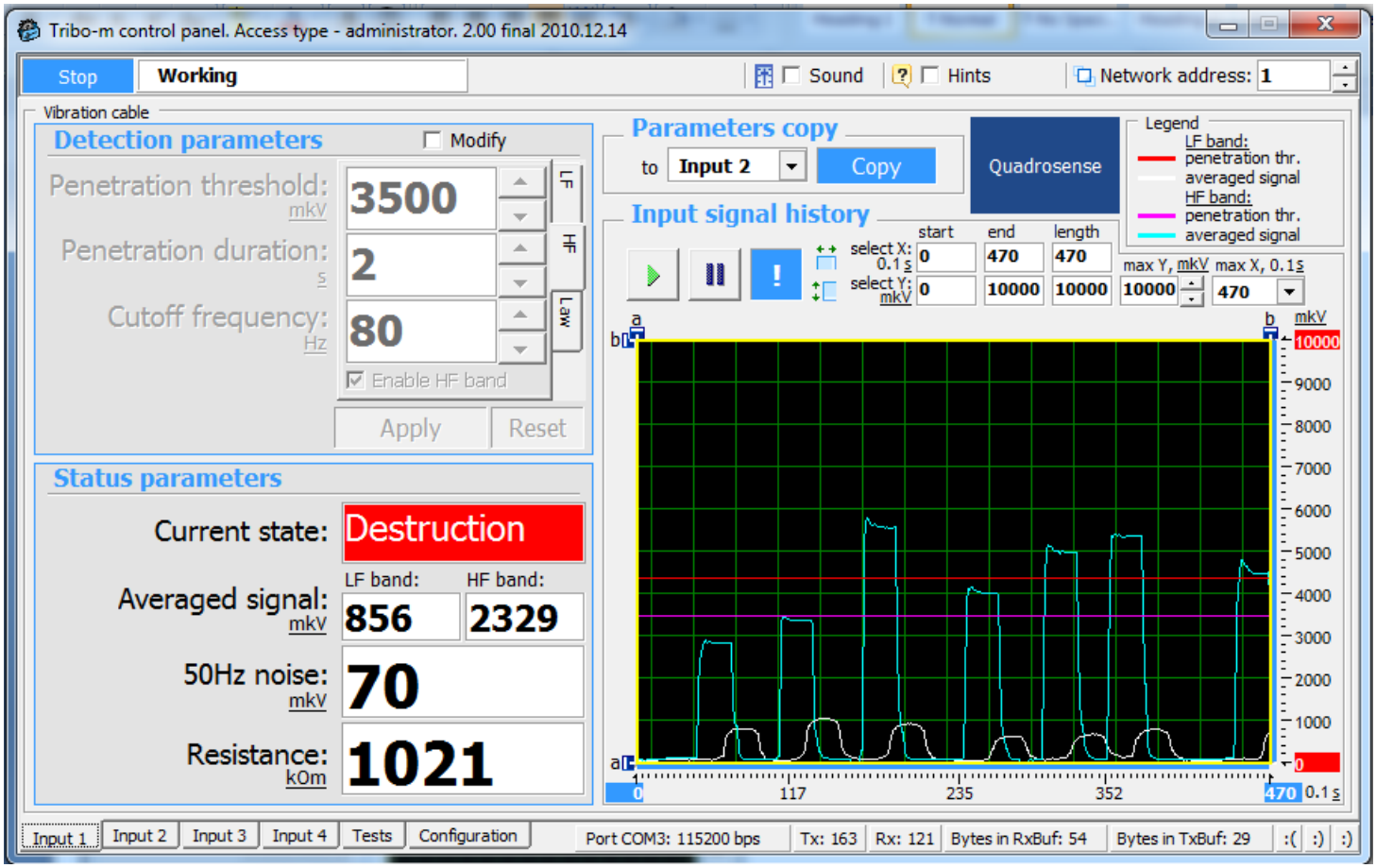


Setting response threshold

Detection Parameters - Modify. The medium signal (in our case is 5000 mkV) - minus about 30% (to make system more sensitive). We get 3500 obtained data entry into the cell **Penetration threshold**. **Penetration duration** set 2 s. Click **Apply.**

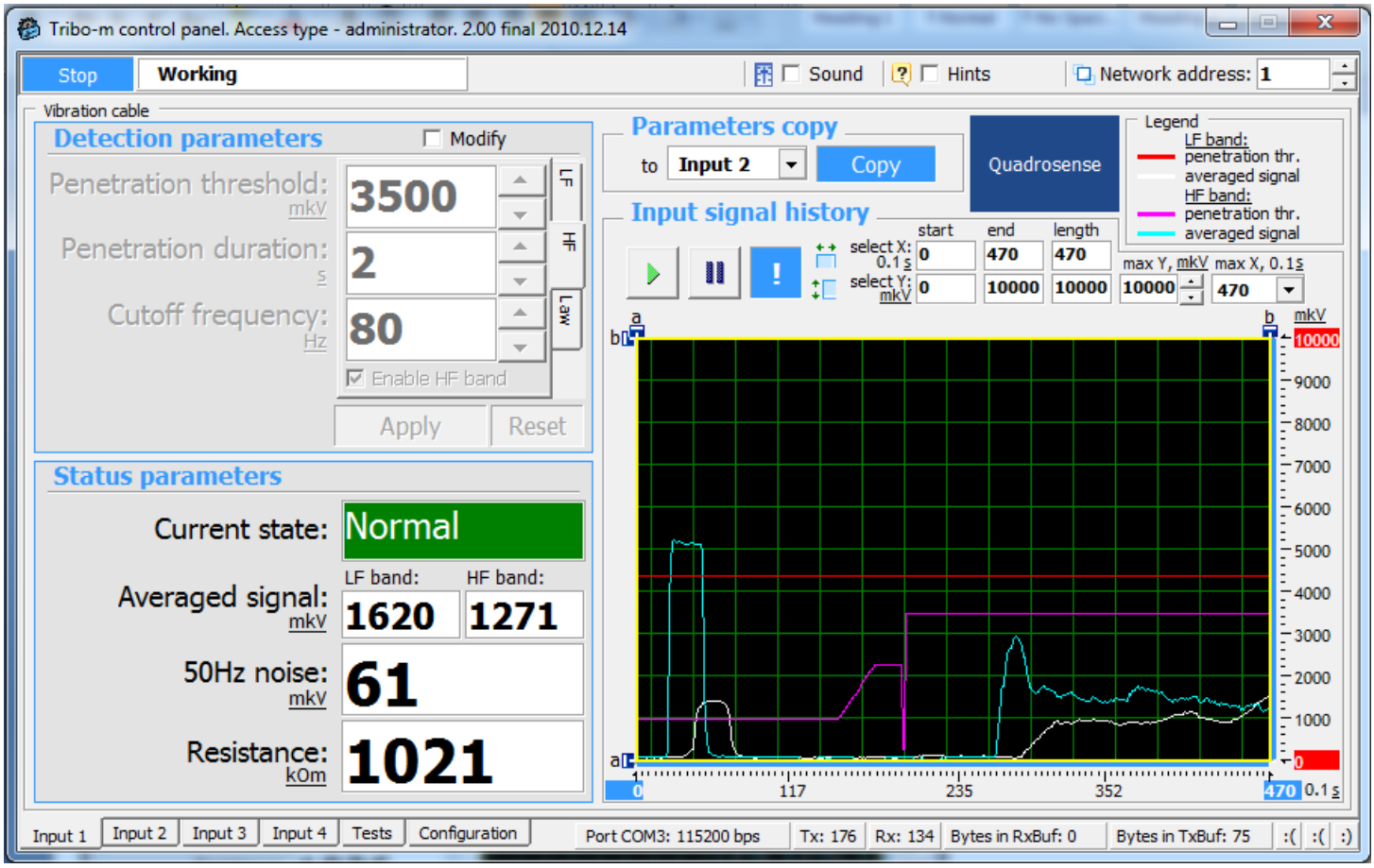
Setting response threshold

There are simulated breaks of the fence (crushes), which cause higher signal change than the **Penetration threshold**. In that way is generated an alarm by opening Zone 1 (by Input 1) relay contacts.



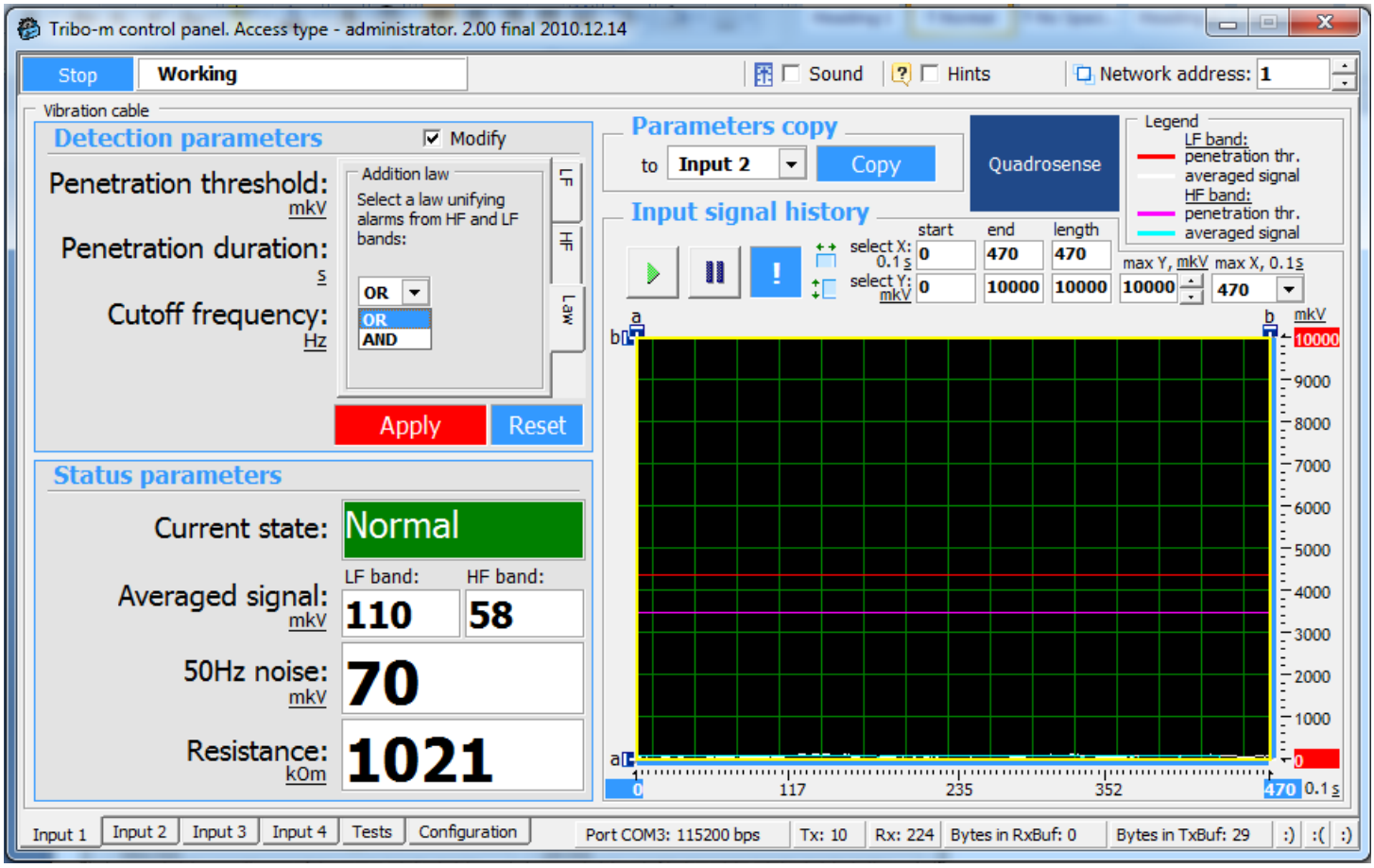
Check system for the disturbance

Verify that the system does not respond to an external disturbance. You can shake the fence, pretending if it is the wind, finally, like a tree branch. Because for this example, the level of disturbance is 1271 mkV (3000 maximum), so the P**enetration threshold** (3500 mkV for high frequency HF) – is enough to avoid a false alarm.



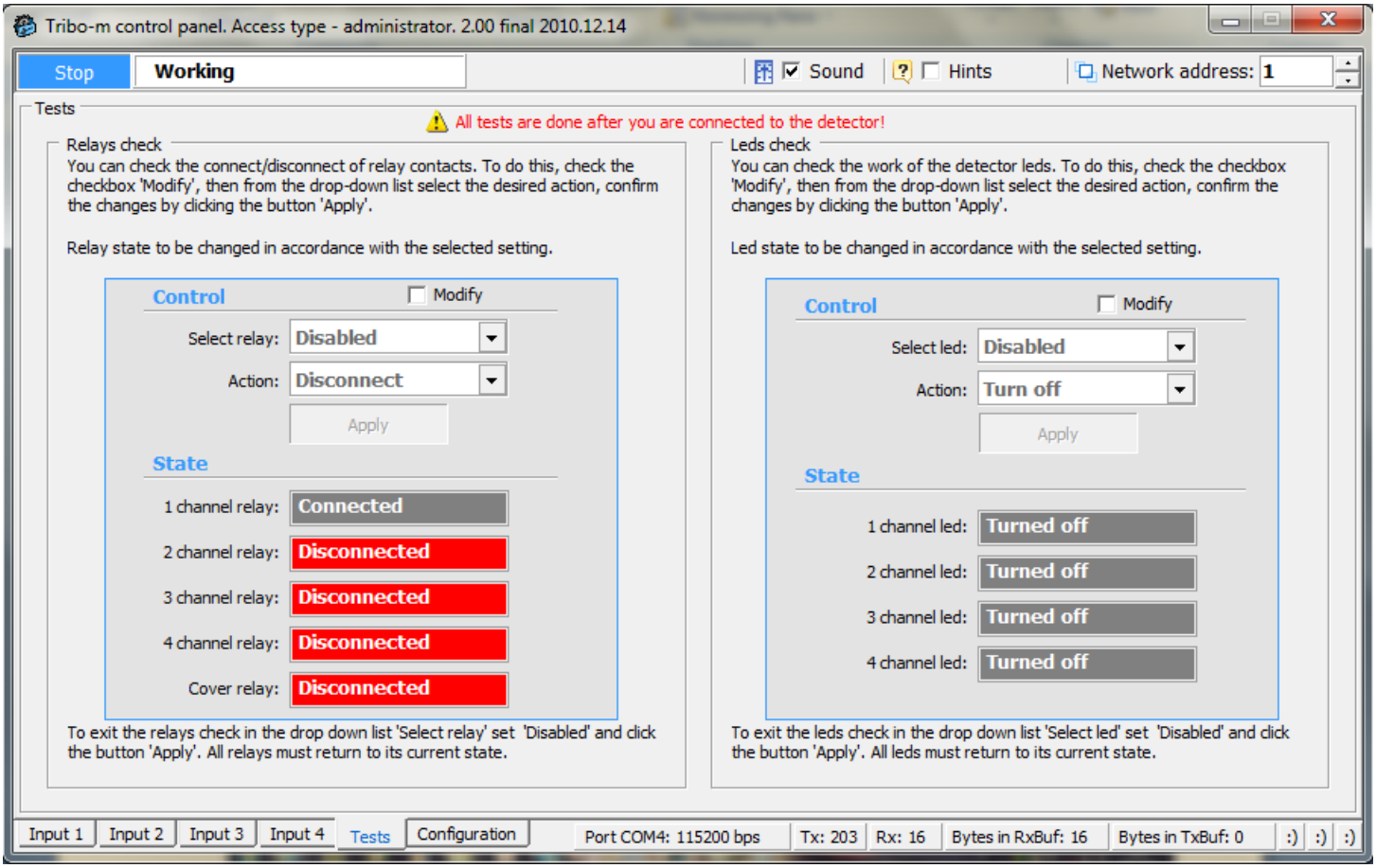
Alarm generation algorithms

Depending from the project requirements and fence type you can use different operation algorithms Enable/ Disable HF or LF. If you would like to use both frequencies you can select **Law** - Alarm output algorithm **AND** (alarm generates the LF and HF alarmed) or **OR** (alarm generates HF or LF).



7. Check of output relays

To check the operation of the relay-contacts open **Tests** menu.



To check the operation of the relay-contacts choose **Modify** in the “Relay check” field. Then switch to test-mode in the **Control (**1. relay, 2. relay, 3. relay, All relays). Choose the status of the relays to be checked (connect, disconnect), then press **Apply.** Check the connecting/disconnecting of the relays with a control set.

Note: After checking the operation of the relays do not forget to switch off the test-mode (**Disabled** in the **Control** field) than confirm it by pressing **Apply**. Otherwise the test-mode will be switched on and the status of the relays will not match the actual status of the channel (the relay will stay opened, thus provoking an alarm, even if no alarm signal coming from the detector/detectors).

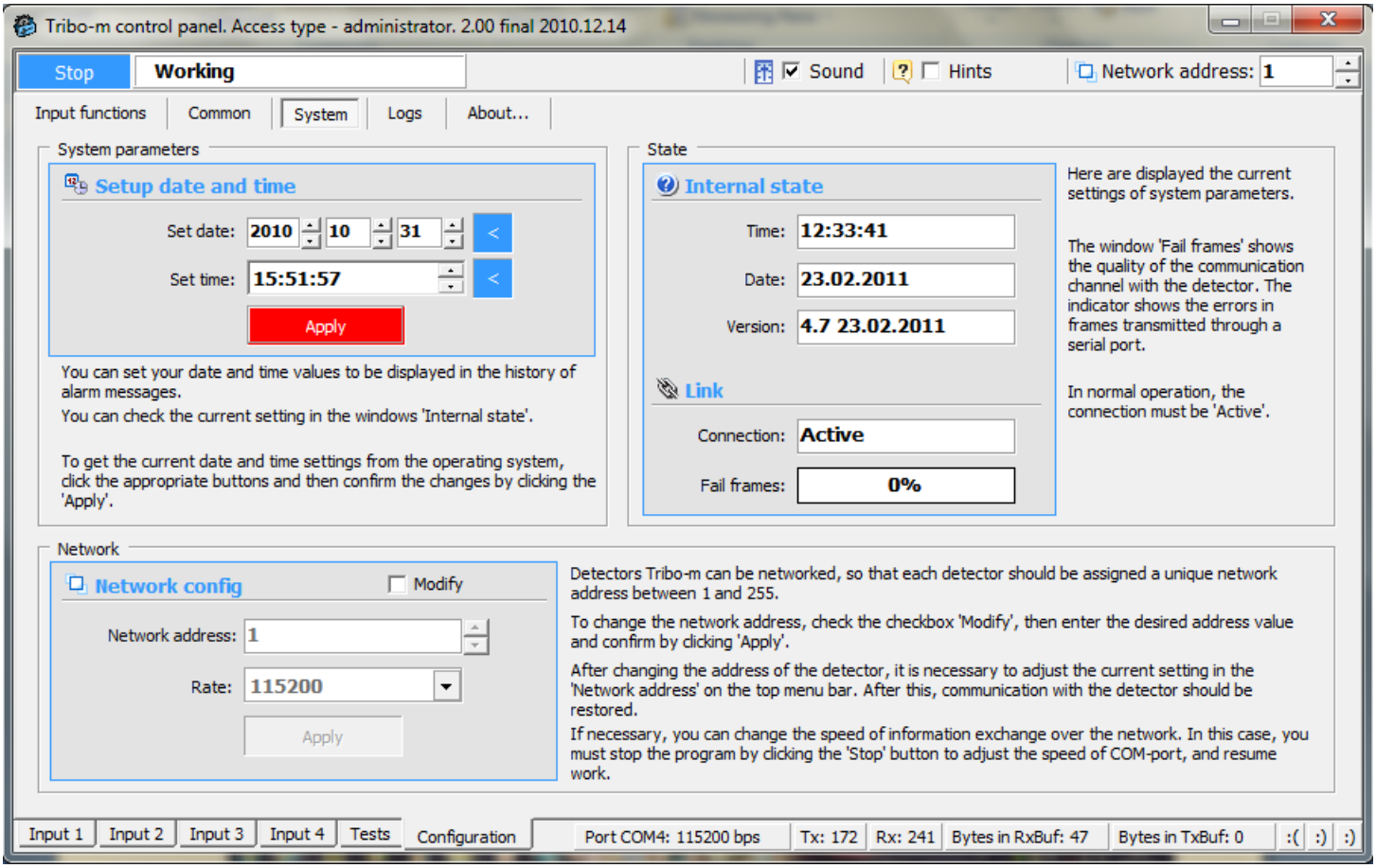
Leds check – don’t use at the moment.

8. System parameters

To set the parameters of the Forteza “Tribo-m”, choose **System** in the **Configuration** chapter.

To set the date and time press the „>” button for the **Set date** and **Set time** features. After typing in the wished date and time press **Apply** and check, if the correct date and time appear in the respective windows. The correct date and time is substantial for the operation of the system log.

Note: The date and time settings disappear, when the power supply is interrupted. Always set the date and time repeatedly, if the power supply of the system was switched off.



The “Software version” indicates, when the running version of the software was installed, also the characteristics of this version. The manufacturer develops the software constantly. The development is carried out in a way that the latest version of the software is always compatible with every older versions of the Forteza “Tribo-M”. Thus you can always download the latest version of the software.It will always be compatible with your Forteza “Tribo-m”.

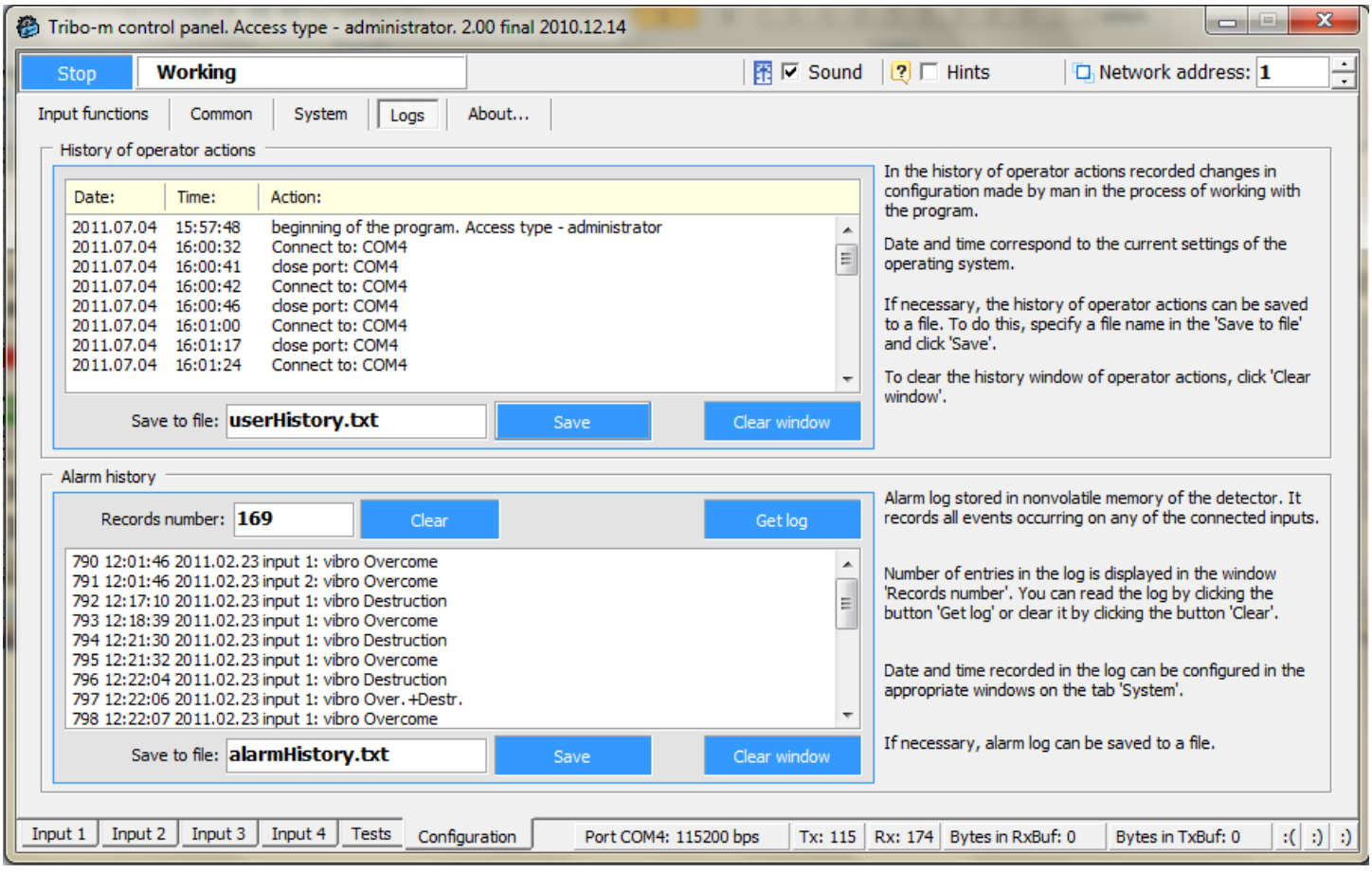
9. Operation of the system log

To check the list of events happened during the operation of the Forteza “Tribo-M” system open the **Log**” feature in the **Configuration** chapter. In this section you can check the list of events, saved in the non-volatile memory module. The system log allows you to analyze the events, which occurred during working of the device.

The memory-module saves notes of max 256 events. When the 256 note is saved, the system automatically deletes the first 128 notes from the log, thus the amount of events, saved in the log becomes 128.

The system gives each event a serial number by saving. The maximal number, which the system can give – 65536.

The **Record number** window shows the actual amount of records in the memory-module. To clear the log press **Clear** in the **Control** section.



Note: Pressing the **Clear** button in the sections **Control** and **History** sections has a different effect.

10.Setting the parameters of the RS-485 communication

To set the parameters of the RS-485 communication choose “RS-485” in the **Configuration** section. The **Parameters** field enables the user to set the **Network address** and the data-exchange **Rate**. To change the settings choose **Modify** than press **Apply** for confirmation.

After changing the exchange rate and network address, carry out the correction of the **Active Address** in the upper corner of the program-window; also correct the data in the **COM-port** section. Don’t forget to change the **Rate**, otherwise there will be no communication between the Forteza “Tribo-M” central unit and the software.

The status of the connection between the software and the central unit as well as the percentage of faulty data packages is shown in the **State** window (active/passive).

P. S. The described options are standard. If you want to accurately adjust the sensitivity, you can change all the settings as you need.

Manufacturer's garantees

The manufacturer guarantees the conformity of the sensor specifications to the Document FOR2012-09-03 requirements if a user meets the service conditions and operating rules specified by the Document FOR2012-09-03.

Warranty period is 24 months since the date of sale by the manufacturer.

Guarantees do not cover sensors:

- with broken guarantee stamps;
- with mechanical failures,
- which are out of order because of natural disasters (lightning, fire and flood).

Mean lifetime is 8 years.

For warranty and post-warranty service you can contact:

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JCS "Forteza"
Tilzes str. 38

91112 Klaipeda

Lithuania
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E-mail forteza@forteza.com