**TECHNICAL DESCRIPTION OF THE REQUIRED EQUIPMENT**

**as provided in the technical design**

This project covers and is compliant with early forest fire detection systems in the Statics phase. During its development, the regulations and recommendations from manufacturers of equipment for automatic forest fire detection and environmental systems monitoring and the following regulations are observed:

This project uses some of the most innovative technologies in the field of systems for the early detection of forest fires. The project includes the construction of a control centre (CC) and Automatic Monitoring Station (ANS) for early detection of forest fires, which are a set of radio equipment, video surveillance equipment, server, security, el. power supply; uninterruptible power supplies (UPS).

Automatic Observation Station (AOS) - a high-tech observation complex, which is located on a metal structure and includes functionally connected electronic equipment and components, integrated into a single system for monitoring, security, monitoring, analysis, communication and early reporting of adverse risk events, which may endanger the target territories and species. The station has the ability for remote monitoring, management, diagnostics and restart. Opportunity for year-round work in all weather conditions is provided.

The automatic observation station consists of the following elements with appropriate technical parameters and functional characteristics:

Autonomous power supply system - Autonomous systems supply consumers with electricity produced from renewable energy sources. They are suitable for powering installations in places that are difficult to access, where there is no possibility of connection to the electricity network or the costs for connection are unreasonably high.

The main elements of autonomous systems are photovoltaic panels, charge controller, battery (string) and inverter.

Locating station - the station consists of integrated thermal and video cameras with automatic electromechanical rotating modules and specialized software

1. **TECHNICAL SOLUTION OF THE FIRE DETECTION AND MONITORING SYSTEM**

A thermal optical camera is used to detect and monitor possible fires, as for confirmation of the fire alarm the thermal camera is combined with a normal visual camera, mounted on a single magnifying rotating module (minimum 36 x optical) for detailed observation of the circumstances:

Parameters el. power supply\_\_

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| --- | --- | --- |
| **Camera type** | **Voltage** | **El. consumption** |
| solid resistant thermal camera series, with the possibility of working in outdoors conditions | 21-30 VAC; 21-30 VDC | 24 VAC: 215 VA max. with heating; 24 VDC: 195 W max. with heating |

1. **MONITORING AND CONTROL SYSTEM**

An additional IP motorized (PTZ) camera is provided for the observation tower can be operated for outdoor installation. Operated by the operator, the camera monitors and controls the territory belonging to it, where the possibility of assigning automatic rotation and positioning. There is a possibility to record the camera directly at the workstation №2. All recordings can be viewed locally from the workstation.

Parameters el. power supply\_\_

|  |  |  |
| --- | --- | --- |
| **Camera type** | **Voltage** | **El. consumption** |
| controllable motorized video camera, with the possibility of working in outdoors conditions | 21-30 VAC 50/60 Hz | Outdoor mounting: 60 W / 69VA or 24 W / 44 VA |

* 1. **SIGNAL SECURITY SYSTEM**

In order to increase the security of the facility and preventive protection from unsanctioned intrusion, the observation tower is provided signal security centre, which meets the requirements of BDS IEC 839 and European norms - EN 50131-1. The system is intended for perimeter protection of the monitoring station and protection of the equipment from illegal intrusion, to be used for day and night surveillance and to have a remote control. The system is protected from dust and moisture.

* To provide perimeter to use infrared motion sensors for external mounting.
* A magneto-contact detector is provided for the cabinet door.
* To communicate with the control centre use an internet module, whatever it is connected to a network switch to be integrated into a wireless network connection with the centre.

Signal security switchboard and internet module to be installed in the technological cabinet.

From the technological cabinet to the sensors, mounted on the fence, which limits the fire tower and appropriate equipment, complete the installation with an alarm cable 6x0.22mm2, laid in an excavation in solid HDPE pipe ø 20. All cables are laid at distance from a high voltage of not less than 10 cm. Cutting is allowed in the normal directions of the high and low voltage cables.

At the workstation no. №2 in the control centre, which is provided for visualization, management and archive of the video surveillance and control system, to be installed application software for monitoring and remote control of the tower security system observation. The communication module of the security system is to be connected to the network switch so that it can be integrated into the wireless system connection of the whole system.

* 1. **METEOROLOGICAL STATION**

The meteorological station is used to measure the current meteorological data obtained from the building in real-time. The station measures temperature and relative humidity, wind direction and speed, precipitation amount and atmospheric pressure. The data is for the use and processing of specialized fire prevention software. The meteorological station should be oriented to the north.

* 1. **DATA TRANSFER**

The data transmission is to be wireless, through a radio connection that operates in the free from licensing frequency band 5.4 GHz. which needs to comply with the appropriate institution.

The telecommunication equipment used should have the following minimum technical requirement parameters:

* Operating frequency range: 5470 - 5825 MHz
* Dimensions: 445 x 416 x 34 mm (6.30 x 3.15 x 1.18 ")
* Weight: 3.82kg
* Housing features: UV protected plastic for outdoor installation
* Processor: Atheros MIPS 24KC, 400MHz
* Memory: 64MB SDRAM, 8MB Flash
* Network interface: (1) 10/100 Mbps
* RF connections: (2) RP-SMA (waterproof)
* LED indications: Power supply, mains, signal strength
* Maximum power consumption: 8W
* Power Supply: 24V, 1A PoE Adapter
* Plugin: Passive PoE (Pairs 4, 5+; 7, 8 Return)
* ESD / EMP protection: ± 24KV Air / Contact
* Operating temperature: from -30 to 75 ° C (-22 to 167 ° F)
* Humidity: 5 to 95% without condensation
* Impact and vibration resistance: ETSI300-019-1.4
  1. **LOW ELECTRICAL INSTALLATION**

The central devices for managing the individual elements of the system are located in a telecommunication cabinet. The data transmission is done through cables, passed through a tube from the cupboard next to the tower and mounted on cable racks with a cover mounted on the tower, on the next way:

* To the complex for scanning two cables FTP cat.5e;
* To the camera operated two cables FTP cat.5e;
* To cable station one cable FTP cat.5e;
* For the signal-security system of the tower one alarm cable 6x0.22mm2 for each sensor;
* The signal security system is filled with alarm cable 6x0.22mm2, placed in the excavation in solid HDPE pipe ø 20, next to each of the sensors mounted on the fence.
  1. **AUTONOMOUS ELECTRIC SYSTEM. POWER SUPPLY**

This project is a tower with systems for early detection of forest fires and necessary equipment, mounted in a telecommunication cabinet.

Due to the lack of possibility to connect to the mains, the power supply of the building with el. energy can be generated with electricity produced from renewable sources of energy - photovoltaic panels.

Electricity supply from renewable sources is done through a solar system for power supply.

The block diagram of the autonomous installation is shown in Figure 1.



Fig. 1. Block diagram of the autonomous power supply system

The basic elements of the autonomous system are photovoltaic panels, a controller for battery charging, an inverter, connection cables and installations. The autonomous power supply system guarantees uninterrupted monitoring of the region and timely drowning of a signal about the circumstances.

* 1. **PHOTOVOLTAGE MODULES**

The incoming energy from solar radiation is converted into electricity through photovoltaic modules, mounted on a stationary metal structure. The group from photovoltaic modules are called PV generators.

The designed PV generator is static, ie the photovoltaic modules are mounted immovable, without changing the slope and their position in the process of exploitation.

Use 24 pieces of polycrystalline for the conversion of solar energy modules, with a rated power of 250 Wp and the following characteristics:

* Electrical characteristics
* Rated power, Wp 250 with tolerance ± 3%
* Rated voltage, Vmp (V) 30.5
* Effectiveness, 15.31%
* Rated current - Imp (A) 8.2
* Max. system voltage Ump (V) 1000
* Short circuit - Isc (A) 8.75
* Idle voltage - Voc (V) 37.8
* Mechanical properties
* Cell type Polycrystalline, 60 (6x10) active cells
* Tempered solar glass, 3.2 mm
* Frame Anodized aluminium
* Length 1650 mm
* Width 990 mm
* Depth 40 mm
* Weight 19 kg.

The total installed power of the photovoltaic system is 24 x 250 = 6 000Wp. The array is connected by a solar cable to the DC power supply system, which will be mounted in the technological cabinet for external use.

* 1. **MANAGEMENT OF RENEWABLE SOURCES**

The main elements of the system are photovoltaic panels, operated by controllers, rechargeable batteries (string) and an inverter. The controllers give optimal performance to the photovoltaic panels so that it maintains their operating point always in the zone of maximum power. The controllers also provide optimal battery charging mode. Its purpose is to accumulate excess energy generated and deliver it at night, maintaining an uninterrupted electric power supply to consumers.

The task of the inverter is to convert constant voltage into a variable with industrial frequency, which allows the direct power supply to all consumers at standard and performance. The use of the inverter enables the autonomous photovoltaic installation to provide energy with performance identical to that of central electricity. All those converter elements (controllers, inverter, batteries, etc.) are mounted in a technological cabinet for external mounting. Protective earthing must be installed.

* 1. **LIGHTNING INSTALLATION**

Lightning protection is a complex of technical measures and means of protection against dangerous and harmful effects of lightning, which ensures the safety of people and is avoided induction of voltage in the equipment in the parts with current conductors of the building.

Attached to the steel-tube tower with tension ropes: thermal camera, video camera, weather station and RRA antenna. The thermal camera is mounted on top of the object.

For lightning protection, a lightning rod with a height of 3 m is provided. In this way radius of protection from direct lightning on the top of the tower of 0.75 m will be guaranteed, and the area/terrain 48m, which covers the entire building.

A new down-conductor made of galvanized steel is brought from the lightning receiver rope 50 mm2, attached directly to the steel-tubular tower.

In order to protect against electromagnetic induction and the introduction of dangerous potentials screens of power supplies on the antenna, panels are connected through ground conductors to:

• earthing plates / GNDM 1 / - Fe 300/40 / 5mm with holes 88mm, fastened in the lower end of the tower;

• Earthing plates / GNDM 2 /, attached camera and antenna mounts;

At a height of 1.0 m. from the ground a connection will be made between the grounding conductors and the conductors with 2 pieces of screws M-8/20 mm, in which, by switching off, the temporary resistance will be measured earthing conductors that should not exceed 10 ohms. The connection is mounted in a metal revision. The earthing installation will be performed by two vertical types of galvanized earthing conductors steel, profile - L 63/63 / 6mm with a length of 1.5m, driven into moist soil so that the transient resistance does not exceed 10 ohms. If this is not fulfilled, compact another earthing circuit

* 1. **EARTHING INSTALLATION**

Outdoor earthing installation is performed by vertical types of earthing conductors made of galvanized steel, profile - L 63/63/6mm with a length of 1.5m, compacted in the ground of distance 2.5m from each other, arranged in a line or equilateral triangle and united with galvanized rail 40 / 4mm. The transient resistance of the earthing conductors shall not exceed 4 ohms.

In the technological cabinet are mounted earthing plates / M GB /. The plates for grounding are connected radially:

• Metal cabinet of the technological cabinet

• Metal housing of the technological equipment with an earthing conductor with yellow-green insulation PV-A2 with cross-section min 1x16mm2;

• Grounding conductor with yellow-green insulation PV-A2 with cross-section min 1x16mm2 from

built-in variable resistors;

A yellow-green earthing conductor is implemented from the earthing plate insulation, type PVA2 1x25mm2 in the provided opening at the bottom of the cabinet. Then in advance, the installed pipe is taken out of the foundations and a connection is made with the new external installation for grounding. All copper wire connections with galvanized iron to be filled with bimetal washers, Rp. <0.05 .

Perimeter earthing installation will be performed by four vertical types of galvanized steel earthing conductors, profile - L 63/63 / 6mm with a length of 1.5m, compacted in the ground of distance 2.5m around the perimeter of the fence. These grounders will unite in a common earthing contour of galvanized rail 40/4 mm placed in the ground, on the outskirts of the fence. Photovoltaics are grounded to the joint contour with galvanized rail 40/4 mm set in the ground.

All earthing will be united in a common earthing contour. Grounding is performed with vertical earthing conductors made of galvanized steel, profile - L 63/63 / 6mm with a length of 1.5m, compacted in the ground, where the transient resistance of the earthing conductors should not exceed 4 ohms. If the resistance is not reached, compact additional circuits until Raz is reached. All underground connections are to be filled with arc welding by overlapping on all sides, after which the surfaces should be cleaned of slag and treated with zinc paste.

* 1. **AIRCRAFT NOTIFICATION SECTION**

At an altitude of 28.35m, the indications are mounted on the pipe construction aircraft warning lights, 6W, IP65, low intensity, continuous illumination with a built-in light sensor for automatic switching on and off with reduced visibility in the environment.

The indicator lights will be powered at 230V with an NYY-J 3x1.5mm2 cable from mounted converter 48DS / 230AC in the technology cabinet. A cable line will be inserted into the outlet pipe from the cabinet and cable racks to reach the light

1. **CONTROL CENTER**

All automatic monitoring stations (AMS) of the fire detection system and each information will be managed by a control centre, which will be located in the building of the municipality of Makedonska Kamenica on Kamenicka Street No. 2 in Makedonska Kamenica.

The control centre is equipped with high-quality LCD HD monitors that visualize all synthesized and processed by servers and specialized software information from all locating stations. The system operators have the opportunity to receive in real-time the alarm messages and alarm signals with the specific coordinates and the visual display of the fire zone, information about the weather data, display of digital maps, etc.

There are two workstations in the control centre:

**Workstation №.1** will be used for system integration, visualization, management and archiving of the location station of the integrated thermal and video camera. The station includes Workstation-related monitors and an operating system.

**Workstation №.2** will serve for system integration, visualization, management and archiving of the video surveillance and control system. The station includes Workstation and operating system monitors. Software for integration, video visualization and archiving of cameras for video surveillance and control, remote control, change of set directions for automatic patrolling and the ability to expand the system to 64 cameras.

**Telecommunication module** - the system that provides two-way communication with automatic monitoring stations, management and transmission of data in real-time for the control centre. The telecommunication module is mounted on the roof of the building control centre, located in the municipal building, via an antenna mast.

The transmission of data from the telecommunication module to the central facilities, mounted in the communication cabinet in the control centre is realized via cable FTP cet.5e.

The new antenna mast will be connected to the existing lightning installation of the roof of the building with a new 40 / 4mm galvanized steel conductor.

The control centre provides a backup power supply, using a UPS with 3kVA / 2.4kW capacity that will be mounted in a communication cabinet.

The simultaneous power of the control centre will not exceed Ped. = 3 kW.

The electricity supply to the building of the control centre already exists and is in operation.

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| **ESTIMATED BILL OF QUANTITIES WITH TECHNICAL DESCRIPTION** | | | |
| **№** | **ITEM DESCRIPTION** | **Measure Unit** | **Quantity** |
| **I** | **TECHNOLOGICAL EQUIPMENT FOR TOWER AND SOFTWARE** |  |  |
| 1 | **Delivery and installation of a thermo-optical bispectral camera (for outdoor use, with automatic rotation of 360 for fire detection)** Fire Detection: min. 8 km for the object with 2mx2m Vehicle detection: min. 13.5km for the object with 1.4mx4m Human detection: min. 4.4km for the object with 1.8mx0.5m Menu: English Wiper: Yes Power: 48 VDC/5 A, 220W Work Temperature/Humidity: From -40°C to 60°C (-40°F to 140°F); Humidity: 90% or Less Protection Level: IP66 Standard; TVS6000V Lightning Protection, Surge Protection and Voltage Transient Protection Weight Approx.: 60kg Thermal module Image sensor: Vanadium Oxide Uncooled Focal Plane Arrays Max. Resolution: 640 x 512 Detector Pitch: 17 Response waveband: 8pm to 14pm NETD < 40mk(@25C,F#=1.0) Lens (focal length): 30 mm to 150 mm MRAD: 0.57 to 0.11 mrad Field of View: WIDE 20.56\* x 16.S1\*; TELE 4.15\* x 3.32\* Min. Focusing Distance: 2 m F number: 1.2 Optical camera Image 5ensor: 1/1.8” ProgresslveScanCMOS Min. Illumination:Color 0.005 Lux @ (F3.5,AGC ON): B/W 0,0005 Lux @ (F3.5\) | pieces | 1 |
| 2 | **Delivery and installation of Camera for surveillance overview** High-performance HD outdoor PTZ dome camera with integrated IR illumination for scenes with low or no ambient lighting; Long distance illumination up to 175 m ; Lens - 30x zoom 4.5 mm - 135 mm (F1.6 - F4.4); Video performance Color - 0.05 lx; Mono - 0.01 lx; With IR - 0 lx; Number of LEDs - 4; Wavelength - 850 nm; Video compression - H.265 H.264 M-JPEG; Streaming - Four (4) streams: Two (2) configurable streams in H.264 or H.265; One (1) I-frames-only stream based on first stream; One (1) M-JPEG Stream; Resolution - 1080p ,720p, D1 4:3 (cropped), SD (432p, 288p); Pan Range - 360° continuous; | pieces | 1 |
| 3 | **Delivery and installation (at elevation 28 m) of weather station for measuring current meteorological data. 1 piace** The station should measure: - Temperature, - Humidity - Wind speed - Wind direction - Air pressure and rainfall. | pieces | 1 |
| 4 | **Delivery and installation of switch 8 ports** Network switch with eight gigabit ethernet ports and four SFP ports. Configured, with all ports switched together. Compatible with 1.25G SFP modules. Capable of powering other devices through PoE. Powering:Two direct-input power jacks (5.5 mm outside and 2 mm inside, female, pin positive plug). One DC input supports 48-57 V DC, the other supports 18-28 V DC. Posibilities to use either one, or both inputs at the same time. The power consumption of this device itself under maximum load to be up to 12 W. PoE output This device should supply PoE powering to external devices from its ethernet ports. The output voltage to be selected automatically, depending on what kind of adapter is connected, and what kind of voltage the connected device requires. The device should power 802.3af/at devices. With the included 28 V PSU the max power output of each ethernet port in this mode to be 1 A, total maximum for all ports is 2.8 A. At 802.3af/at high power mode the max power output is 450 mA per port, total max 1.4 | pieces | 1 |
| 5 | **Delivery and installation of set of antenna and module for radio connection** Operating Frequency - 5170 - 5875 MHz; Gain - 25 dBi; Dish Reflector - 400 mm; Networking Interface - (1) 10/100/1000 Ethernet Port; Wireless Approvals - FCC, IC, CE; RoHS Compliance - Yes | pieces | 1 |
| **B.** | **CONTROL CENTER** | |  |
| **I.** | **COMMUNICATION CABINET** |  |  |
| 6 | **Delivery and installation of communication cabinet 27U 600x800 standing** FLOOR-STANDING CABINET 19" ; Height U: 27U; External depth: 800 mm; Total width: 600 mm; | pieces | 1 |
| 7 | **Delivery and installation of fan block 4х, with thermostat** 4 fans with thermostat, 230v/60w, for on top or bottom installation of the cabinet | pieces | 1 |
| 8 | **Delivery and installation of panel 19“ 3U fuse box** 19 "protection strip 3 U with cover, with DIN rail, for 22 modules | pieces | 1 |
| 9 | **Delivery and installation of panel 19" 1U C5e FTP 16XRJ45, charged** 24 port cat.5e patch panel, shielded, krone type, ral 9005 | pieces | 1 |
| 10 | **Delivery and installation of panel 19" 1U arranged, 5 brackets** 1u 19' cable management panel, 5 plastic management rings, horizontal, made of steel | pieces | 2 |
| 11 | **Delivery and installation of shelf 19"** 1U 300, 30 kg 19' shelf with perforation, depth 300mm. max. loading capacity (kg): 30, 1U | pieces | 3 |
| 12 | **Delivery and installation of power delivery unit 8x Schuko 19” 1U, with switch** power distribution panel, 8 sockets, 19' 1U, 2m long cable, with master switch | pieces | 2 |
| 13 | **Delivery and installation of Grounding kit** Earthing kit - ground conductors preassembled with connectors, and have been cut to the correct length. | pieces | 1 |
| 14 | **Delivery and installation of levelling feet set 4 pcs** Leveling Legs for Server Racks - Metal - Hardened Steel; Type - Adjustable | pieces | 1 |
| 15 | **Delivery and installation of switch 16 ports** Fully manageable L3 switch, full wire speed switching, 1U rackmount enclosure Ethernet, Fiber, or 4G (with optional USB modem) gateway connection to Internet  • RouterOS gateway/firewall/VPN router with passive cooling  • up to seventeen gigabit switch ports (1xSFP and 16xRJ45) | pieces | 1 |
| 16 | Configuration and settings of a site | pieces | 1 |
| **II.** | **RADIO ANTENNA FOR RECEPTION/TRANSMISSION** |  |  |
| 17 | **Delivery and installation of set antenna and module for radio connection** Operating Frequency - 5170 - 5875 MHz; Gain - 25 dBi; Dish Reflector - 400 mm; Networking Interface - (1) 10/100/1000 Ethernet Port; Wireless Approvals - FCC, IC, CE; RoHS Compliance - Yes | pieces | 1 |
| 18 | **Delivery and pulling out of communication cable FTP cat.5e from communications cabinet to the radio antenna** | m. | 30 |
| 19 | **Delivery and laying of PVC cable duct 20х20** Cat. 5e cables for local networks Performance 100 MHz Cable with 4 twisted pairs, 100 Ω LSZH sheath: zero halogen Grey RAL 7035 ANSI/TIA colour code Compliant with ISO/IEC 11 801, EN 50173, ANSI/TIA 568 standards Products conforming to the new CPR regulations EuroclassDca for LSZH cables, EuroclassEca for PVC cables | m. | 30 |
| 20 | **Delivery and installation of current collector**  current collector made of steel galvanized splint 40/4 mm on the roof of the Community building to connect with the existing lightning protection installation. | m. | 5 |
| 21 | **Delivery and installation of UPS 3000VA** Power Rating - 3kVA/ 2700W; Cold start - YES, default frequency=50Hz or settable; Acceptable Input Voltage - 110VAC~288VAC; Phase - Single phase in, single phase out; BATTERY Rating/Type - 12VDC/7Ah; Quantity - 8;  Type - ON Line; Formfactor - Tower; | pieces | 1 |
| **III** | **TECHNOLOGICAL EQUIPMENT AND SOFTWARE** |  |  |
| 22 | **Delivery and installation of workstation (Desktop PC)** Intel® Core™ i7 or equivalent, Processor (2,20GHz, 3.70GHzw/turbo, 9Mb Cache, 6 Cores) 8 GB DDR4-2666 SDRAM, 1 TB 7200 rpm SATA HDD, 256 Gb SSD M.2 PCIeNVMe Solid Stare Drive DVD/RW Intel® UHD Graphics 630 Windows 10 Professional 64-Bit, factory installed Integrated Intel UHD 630 Graphics Integrated Realtek R718111HSD-CG Ethernet LAN 10/100/1000 Card Integrated Qualcomm QCA9377 Dual Band 802.11ac with MU-MIMO+Bluetooth 4.1 Card 3 Years RTD Standard Warranty | pieces | 2 |
| 23 | **Delivery and installation of software GPRS/IP monitoring receiver**  Desktop application that emulates GPRS / IP monitoring receiver, with unlimited accounts. Converts the incoming IP signal from communication devices for alarm systems. Received events are converted and stored by the application in CID format before being sent to the output port in the selected reporting format. Input selection (IP port and GSM / GPRS modem) and COM output port Buffers and manages incoming events Registers, visualizes and manages IP and GPRS devices without requiring changes to the control panels Supports SMS registration and reporting via GSM / GPRS modem Monitors the connection with GSM / GPRS modem and reports to the monitoring center in case of network failure Automatic loading of the application with the start of the computer's operating system | pieces | 1 |
| 24 | **Delivery and installation of monitor - 42"** Screen size: 42.51 inches Panel type: LCD Panel Native resolution: 3840 x 2160 Typical maximum brightness: 300 cd/m² Colour support: 1.07 billion Response time: 5ms Refresh rate: 60Hz Contrast ratio: 1200:1 (50m:1 Dynamic Contrast) Viewing angle: 178º horizontal, 178º vertical Power consumption: 63.1W typical | pieces | 1 |
| 25 | **Delivery and installation of monitor - 21.5"** Type - 21.5-inch with LED backlight; Resolution - 1920 x 1080 at 60 Hz; Aspect ratio - 16:9; Viewing angle - Up to 178° horizontal Up to 178° vertical; Brightness - 250 cd/m2; Color suppor - Up to 16.7 million colors; | pieces | 1 |
| 26 | **Delivery and commissioning of software for early detection of fires in the Control Center** The software is based on geographic data, through thermal detection of hot spots. Provide the ability for user control. Support a database with all the information from detected fire alarms, event time data and users. Allows automatic and manual movement of scanning complex. Acoustic and visual alarm in case of fire. Alarm information:, distance from the observation station to the fire. Precise location of the alarm on high resolution photos; Connect the alarm to a high resolution photo. Graphical representation of the observation area on the map. Access data from the weather station integrated in the application. | pieces | 1 |
| 27 | **Setting and testing of the system for early detection of fires** Commissioning of the system, testing of all functionalities | pieces | 1 |
| 28 | **Training of operators to work with the software for early detection of fires** Training for the personnel who will be operating the system, introduction for all functionalities, user options, management of admin account, creation of additional users, management of alarms | pieces | 1 |