

# Optic-electron Device SPIN-2



Operating manual

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The Operating manual is intended for correct and safe operation of the device SPIN-2 (further in the text “device” or “instrument”) designed for detection of covert electro-optical surveillance systems and for evaluation of the Instrument technical condition with the goal to make decision whether it should be sent for repair. Special training of personnel does not require for product servicing.

## 1. DESCRIPTION AND PRINCIPLE OF OPERATION

### 1.1. Area of application

The Device is designed for search and visualization of location electro-optical surveillance systems (ESS). It operates in various lighting conditions in moderate climate on open air, under a shed or in the premises.

### 1.2. Technical parameters

#### Distance of ESS detection (with the base lens 75 mm):

Minimal	2 m
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Maximal	50 m
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#### The receiver of the reflected signal is highly sensitive video camera:

Size of receiver	752x582 pixels
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Minimal illumination	0.0003 lx (F1,4)
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#### Detector cell' lens:

Focal distance	75 mm
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Receiving channel field of view	$(5,0 \pm 0,2^\circ) \times (3,8 \pm 0,2^\circ)$
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Focus control range	2 m ... $\infty$
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Signal to noise ratio, at least	46 dB
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Output signal format	CCIR
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#### Backlight illumination:

Wavelength of laser	$810 \pm 5$ nm
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Power of laser radiation in continuous mode	not less than 0,2W
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#### Eyepiece and built-in display:

Turning range of ocular	$\pm 4$ diopters
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Microisplay type and resolution	AMLCD 0,44", 640x480 pixels
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#### Power supply:

4 rechargeable Li-ion batteries	of type 18650
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Power consumption, up to	11W
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Time of continuous work without battery replacement/ charge at normal climatic conditions, not less than	6 hours
<b>Overall dimensions, not more than:</b>	
Device	(217±5)x(144±5)x(75±5) mm
Delivered set in standard package-case	470x370x180mm
<b>Weight, not more than:</b>	
Instrument with battery, up to	(1,5±0,1) kg
Delivered set in standard package-case	5.5 kg
<b>Climatic conditions of the instrument operation</b>	
Operating temperatures range	-30°C...+40°C
Operating temperatures range during transportation	-40°C...+60°C
Relative humidity at plus 25°C, up to	95%
Absence of influence of atmospheric precipitation	

**Functional capabilities:**

- laser radiation power adjustment;
- sharpness adjustment of receiving TV-camera;
- continues/pulse laser illumination mode;
- backlight illumination brightness adjustment;
- indication of battery charge level;
- automatic device shutdown when battery is discharged;
- activation time up to 5 s;
- protection class from dust and water IP65.

**1.3. Delivery set.**

1.3.1. The delivery set is in accordance with the Table 1.

Table 1

Description of goods	Q-ty	Comment
Device SPIN-2	1	
Li-ion rechargeable battery of type18650	4	
Container for batteries	1	
Charging unit	1	
Mains adapter for charging unit	1	
Video cable	1	
Cleaning tissue	1	
Package-case	1	
Operating manual	1	



Buttery delivered uncharged.

#### 1.4. Principal of operation.

1.4.1. SPIN-2 controls are shown in Figure 1.

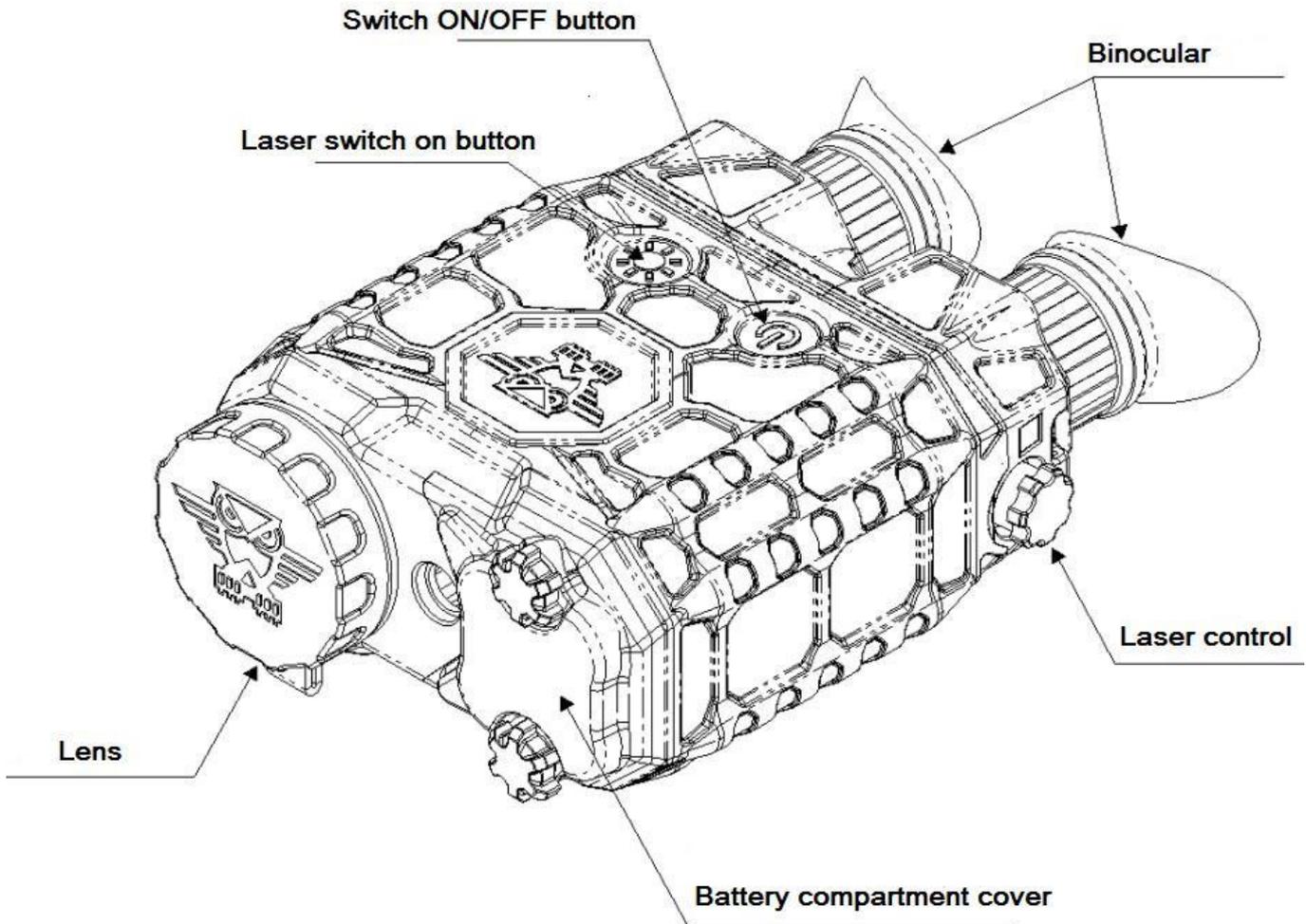


Fig. 1. Control keys of SPIN-2

1.4.2. The principal of operation is based on the cat's eye (retroreflection) phenomena, i.e. on ability of optical objects to reflect the transmitted radiation in the opposite direction at an angle close to angle of sight.

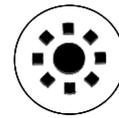
As the source of transmitted radiation used is the semi conducting laser IR diode (transmitting channel). Reflected signal is registered by sensitive CCD matrix video camera.

The transmitting channel forms the laser beam in the form of vertically located rectangular scanning field. When required and depending on the distance to the observed object the power of scanning field illumination can be changed to get the best image contrast. Image details sharpness focusing is performed by adjustment of video camera lens.

1.4.3. Modes management of the device carried out by two buttons, which shown in figure 2 and laser control to change laser radiation power:



Switch ON/OFF button



Laser switch on button

Fig.2

1.4.4. The visualization of observed object is performed through built-in pseudo binocular. Available on the instrument housing standard video signal output (CCIR format) is used for connection to external monitor, video recorder or PC (the last one should be equipped with the video input PCB) to enhance the quality of obtained image

1.4.5. At the bottom part of the instrument' casing the 1/4" thread hole is provided allowing mounting the instrument on tripod by means of a screw.

1.4.6. The level of battery charge is indicated in the right top corner of the image (Fig. 3). When the battery is flat the instrument is automatically switched off.

To switch the laser illumination on press and keep pressed corresponding control button.

When using the instrument the observer looks through its binocular trying to detect the searched object (ESS) and as a result of successful search to visualize on monitor screen or in view finder the places of location of intensive glowing dots (flares) upon less bright scanning field background. In cases when outside the scanning field such glowing dots (flares) disappear they can be interpreted as potential ESS. If flares do not disappear when laser illumination is switched off they are not considered as potential ESS.

1.4.7. The example of image obtained by moving it on the wall from the distance 15 m are shown on figure 3.

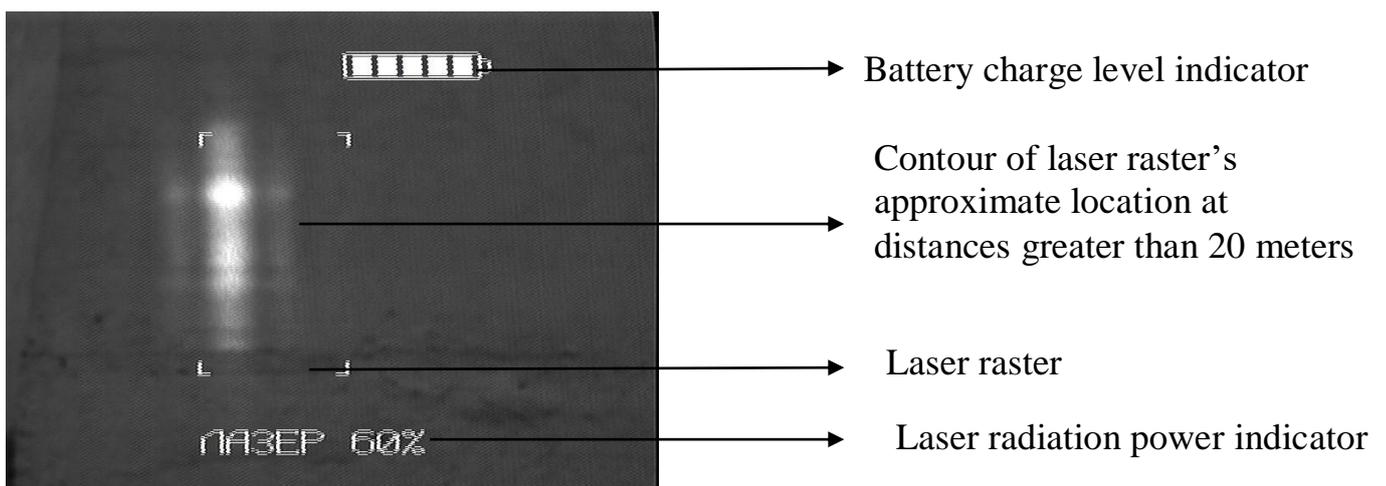


Fig.3. Example of image obtained with help of SPIN-2

## 1.5. Marking.

1.5.1. The marking provided on the instrument housing contains the following information:

- Short name of the manufacture;
- Name of the instrument;
- Unique factory number;

## 1.6. Packaging.

1.6.1. The instrument SPIN-2, battery, charging unit, mains adapter for charging unit, video cable and operating manual are put in standard packing (robust, shock- and moisture proof plastic package-case).

1.6.2. Optionally standard plastic package-case can be packed in the transportation packing (plywood box).

## 2. RUNNING THE INSTRUMENT

### 2.1. Operational restrictions.

2.1.1. Before the battery is to be inserted into the correspondent instrument compartment it is necessary to make sure that the Instrument is switched off.

2.1.2. **IT IS NOT ALLOWED TO RUN INSTRUMENT WITH OPENED COVER OF THE BATTERY COMPARTMENT and to unseal the Instrument (to break integrity of a guarantee seal)!**

2.1.3. It is not recommended to use for Instrument power supply the power supply sources different from the source that is in delivered set as this may cause fail of the Instrument.

2.1.4. It is not recommended to use type of the charging unit for standard battery different from the one in the delivered set as this may lead to battery incomplete charging or failure.

2.1.5. **It is not allowed** to close the battery terminals as this may cause its failure.

2.1.6. Do not store the battery at the temperature exceeding plus 60°C, for example, in the car left on the sun.

2.1.7. To maintain stated battery capacity in case of work at the low temperatures it is recommended to store it in warm place, for example in a pocket and to insert it into the Instrument just before use.

2.1.8. It is recommended to perform the battery charging at the ambient temperature from plus 10° to plus 30°C.

2.1.9. **It is not allowed** to switch on the charging unit under rain or at high humidity.

2.1.10. During the Instrument operation or transportation it is not allowed to touch by hands or in any other manner to make dirty outlets of lens and laser filter as this may have negative influence and significantly worse operation of the Instrument. If outlets of lens and laser filter became dirty it is required thoroughly to clean these outlets with specially provided tissue before continuing to use the instrument.

### 2.2. Preparation for use.

2.2.1. To prepare the Instrument for use it is required to fulfill the following steps:

- Take the Instrument and battery out of the standard package;
- Unscrew the cover of the battery compartment;
- Remove the battery compartment cover;
- If the battery is uncharged - charge it;

To charge the battery it is required to fulfill the following steps:

- Connect the charging unit to mains;
- Insert the battery into charging unit;
- Charge the battery. The battery charge level is indicated in the process of charging on the screen of the charging unit;
- Insert the battery in the instrument;
- Close the battery compartment cover and tighten it with screw;
- Switch on the Instrument.

2.2.2. To charge the lithium ion battery it is necessary to remember the following:

- It is not required to discharge the battery prior to its charging as presence of residual charge do not have effect on its rating;
- Recommended ambient temperature for charging process is from plus 10° to plus 30°C;
- Battery charging shall be performed on the flat surface in absence of vibration;
- During charging the charging unit can heat up a little. This is normal;
- If fully charged battery will be inserted in the charging unit then value 100% will be present on the charging unit display.

## **2.3. Running the Instrument**

### **2.3.1. Security measures:**

2.3.1.1. It is prohibited to direct the laser towards people, animals and vehicles (especially aircraft). The laser beam can blind the driver or pilot of the aircraft and cause a crash.

2.3.1.2. Probing infrared semiconductor laser of class IV laser danger installed in the device. Infrared radiation is not visible to the naked eye.

2.3.1.3. The impact of laser radiation on the eye can cause temporary or permanent vision disorders, and also skin injuries. Even diffuse reflected laser radiation is dangerous for eyes and skin at a distance of less than 10 cm.

2.3.1.4. Information on whether the laser turned on is displayed in the form of figures showing percentage of maximum radiation power.

2.3.1.5. To eliminate the harmful laser radiation exposure, it is not recommended to:

- watch the laser radiation along the optical axis;
- to turn on the laser, if in the observable sector at a distance less than 50 meters there are shiny objects, as well as at the distance less than 50 meters in any direction from the operator, including outside the monitored area, there are people.

### **2.3.2. It is required to fulfill the following steps to run the Instrument:**

- Switch on the instrument by pressing and keep pressed for approx. 2 seconds button “ON\OFF”;
- Orient the instrument lens in the direction of examined area;
- When required – carry out diopter adjustment of binocular to fit operator’s vision, this is done by rotation of corresponding control keys. The image of battery level sign in binocular shall be razor sharp;
- Depending on the illumination level and required focusing depth adjust the position of lens diaphragm by means of rotation of corresponding ring (during night time it is recommended fully to open the diaphragm); get maximal sharp image in binocular;

- Be aware of the absence of any people within the field of view of the Instrument, after that press and keep pressed the «**LAZER**» button that switches it on.
- When necessary rotate the handle of laser power adjustment and regulate it depending on distance from observed objects. The indication of the laser power value (in percent) is displayed on the bottom part of the image. Usually at distance of 10m the power shall be minimal (10%) while at distances above 40m it shall be maximal (99 %). At the same time, it is required to obtain optimal contrast of the image within the scanning field. The interior elements within scanning field also should be well observable. It is necessary to take into account that in conditions of high-illumination level or at considerable distances the keyline of laser scanning field may be invisible but this is acceptable and practically do not have any effect on the of ESS detection probability. The laser illumination spot (pattern) can be seen (via binocular) if to orient the Instrument on the uniform surface (like wall or screen) located at the distance of 20 – 50m;
- Keep push button «**LAZER**» pressed and perform scanning of area of interest. All appeared glowing dots seen within the scanning field limits, i.e. occurring within the area illuminated by laser, are considered as reflecting surfaces of optical and electrooptical surveillance systems. At the same time when laser is switched off or scanning filed illuminated by laser is moved away from the initial observation position these dots shall disappear and this is the criteria how to separate detected ESS from ghost flares.

2.3.2. The Instrument switch off is performed in reverse to switch on order.

#### 2.4. Operation in extreme situation:



2.4.1. **Warning!** When the instrument is switched on it is necessary to keep away eyes of operator or any other person from the laser illumination beam.

2.4.2. In case of fire, switch off the device and to take measures for fighting fire.

2.4.3. If device is used in emergency operating conditions (high temperature, humidity, vibration, etc.) measures should be taken to reduce the effects of accidental factors on the product.

### 3. TECHNICAL MAINTENANCE AND REPAIR WORKS

3.1. The Instrument maintenance does not require special training.

3.2. In cases when an output window of the Instrument and/or the view-finder lens are dirty they should be cleaned with clean tissue (cloth) made from the natural or microfibrous suede intended for rubbing of optical details (for example glasses).

3.3. The current repairs are performed in accordance with the Table 2.

Table 2

Description of failure effects and damages	Possible reasons	Actions to be taken to eliminate the failure
When the instrument is switched on there is no image in view finder,	There is no contact between spring contacts and battery contacts. The battery is flat. The battery failed.	Clean the contacts of battery and battery compartment from dirt and oxides bend the spring contacts and try to insert battery once again. Charge the battery. Replace the battery.
When operating the instrument disturbing flashings, flares and stains are continuously present.	The output window of the instrument is dirty.	Clean the output window with clean tissue made of natural or micro fiber suede.
Battery graphical symbol displayed on the charging unit screen start blinking and it dimly glow.	The battery is wrongly inserted in the charging unit. There is no reliable contact with the charging unit.	To insert battery in the charging unit in a right manner to provide reliable contact.

**Note:** If measures taken to eliminate the problems listed in the table with the aim to restore serviceability of the instrument failed, it is necessary to pass over the Instrument for repair to the specialized repair division of the manufacture.

#### 4. TRANSPORTATION AND STORAGE

4.1. The Instrument should be transported in special transportation container by any type of cargo and passenger transportation means at ambient temperature from minus 30°C to plus 50°C and relative humidity up to 95% at ambient temperature plus 25°C. The direct influence of atmospheric precipitation is not allowed.

4.2. After transportation and prior to use, the Instrument prior to use should be kept in normal climatic conditions not less than 12 hours.

4.3. During transportation it is recommended to remove the battery from the instrument.

4.4. The Instrument should be stored in standard package stacked on racks in capital heated storehouse at air temperature from plus 5°C to plus 40°C and relative humidity up to 80 % at temperature plus 25°C. In a premise for storage should not be conducting dust and vapors of acids and alkalis, and also gases causing corrosion and destroying insulation.

4.5. In case of storage the battery should be removed from the instrument and stored separately in corresponding slot of standard package-case.

4.6. Before long term storage of the battery in idle state once a year it should be totally charged and totally discharged after. Such charge/discharge operations should be repeated once a year for preservation of operability of the battery.

## **5. MANUFACTURER'S WARRANTY**

5.1. The manufacturer guarantees compliance of a product to requirements of specification within 12 months from the date of it put in operation, but no more than 18 months from the date of goods shipment (with taking into account storage and transportation time) if the conditions of use, storage and transportation stipulated in the present Operating manual are met.

5.2. Guaranteed storage term is 6 (six) months.

5.3. Service lifetime (with replacement of the battery when required) is - 5 years.

5.4. The warranty obligations cover electrical or mechanical defects of basic items caused by bad workmanship or faulty material within the period stated in clause 5.1.

5.5. Such warranty shall not include batteries or other products to which a specific manufacturer's warranty applies.