

# Portable Thermal Imager KAIR



Operating manual

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This Operation Manual (OM) is intended for proper and safe operation of KAIR-thermal imager (hereinafter referred to as 'product' or 'device') and the assessment of its technical condition when considering the necessity to send it for repair. Product maintenance does not require any special training of staff.

## **1. DESCRIPTION AND PRINCIPLE OF OPERATION**

### **1.1. Area of application**

1.1.1. KAIR portable thermal imager is intended for creation and visualization of thermal images of objects in the long-wave infrared (IR) range while tackling various tasks of twenty-four-hour search and surveillance of targets areas at night (hours of darkness) and in conditions of strong optical interference, such as smoke, fog, with the option to save a snapshot in the internal memory of the device, the device operating in moderate climate conditions both outdoors and indoors.

### **1.2. Technical Parameters**

- 1.2.1. Type of radiation detector - uncooled micro bolometer matrix.
- 1.2.2. Number of sensitive elements 640x480 pixels.
- 1.2.3. Operating spectral range 8-14 microns.
- 1.2.4. Thermal sensitivity 0.06 ° C.
- 1.2.5. Conversion frequency of image at least 25 Hz.
- 1.2.6. Field of view with base lens (10.4° x7.8 °) ± 0.5 °.
- 1.2.7. Video format PAL.
- 1.2.8. Range of human detection at least 1050 m.
- 1.2.9. Range of human recognition at least 350 m.
- 1.2.10. Power supply from 2 removable Li-ion batteries with a voltage of 3.6 V. The battery is charged from an external charger.
- 1.2.11. The device has the option to operate from an external adapter.
- 1.2.12. Continuous operation under normal climatic conditions with a fully charged battery at least 2 hours.
- 1.2.13. Time to enable operation mode after switching, up to 7 seconds.
- 1.2.14. Time to deploy the device in operation (or shutdown, with stacking in standard packing), up to 3 minutes.
- 1.2.15. The product has the following functions and settings:
  - Brightness adjustment;
  - Digital zoom x1, x2, x4;
  - Saving images and video on a removable memory;
  - The option to connect to an external adapter and monitor via multi-purpose cable;
  - The option to change the polarity of image (white-hot, black-hot);
  - Battery discharge indication;
  - Automatic shutdown of the device at battery depletion.
- 1.2.16. The device has the following features:
  - Partially rubber-bonded product's case is made of light alloy metal.
  - The device is controlled by 4 buttons placed on the upper part of the case and one On / Off button located on the right side of the product's case.

- The product has binoculars with protective hood, which reduces lighting level of the observer's face.
  - The device has automatic shutdown of binocular display when moving it away from the eye of the observer and the automatic switch of displays when approaching the eye of the observer.
  - The device has a splashproof connector on the left side of the case to connect to an external adapter and monitor.
  - The Switch is located on the right side of the case in the deepening, which excludes accidental switch (on/off) of the device.
  - On the upper part of the case, there is a threaded attachment for mounting laser designator, rangefinder, etc.
  - On the lower part of the case, there is a threaded hole for mounting it on a tripod or bracket.
  - Leak-proof battery compartment.
  - Use the adjust ring to focus the lens.
- 1.2.17. Overall dimensions 185x118x68 mm.
- 1.2.18. Weight with rechargeable battery 0.98 kg.
- 1.2.19. Enclosure class IP65.
- 1.2.20. Operating temperature range from -20 °C to + 50 °C.
- 1.2.21. Storage temperature range from -40 °C to + 65 °C.

### 1.3. Delivery Set

1.3.1. The delivery set of the product is specified in Table 1.

Table 1		
Name	Pcs	Note
KAIR portable thermal imager	1	
Carrying case	1	
Li-ion rechargeable battery	2	
Mains adapter with cable	1	
Charger	1	
Multi-purpose cable	1	
SD memory card	1	
Cloth for cleaning optics	1	
Operation Manual	1	
Data sheet	1	
Study poster	1	
Standard transport package (case)	1	

1.3.2 Main components of the device are shown in Figure 1.



Figure 1.

- |                                    |                              |
|------------------------------------|------------------------------|
| 1. KAIR thermal imager             | 7. Multi-purpose cable       |
| 2. Carrying Case                   | 8. Cloth for cleaning optics |
| 3. Rechargeable batteries - 2 pcs. | 9. Operation Manual          |
| 4. Mains adapter                   | 10. Transport case           |
| 5. Mains adapter cable             | 11. Charger                  |
| 6. SD memory card                  |                              |

#### 1.4. Controls.

1.4.1. The main components of the device and the control layout are shown in Figure 2.



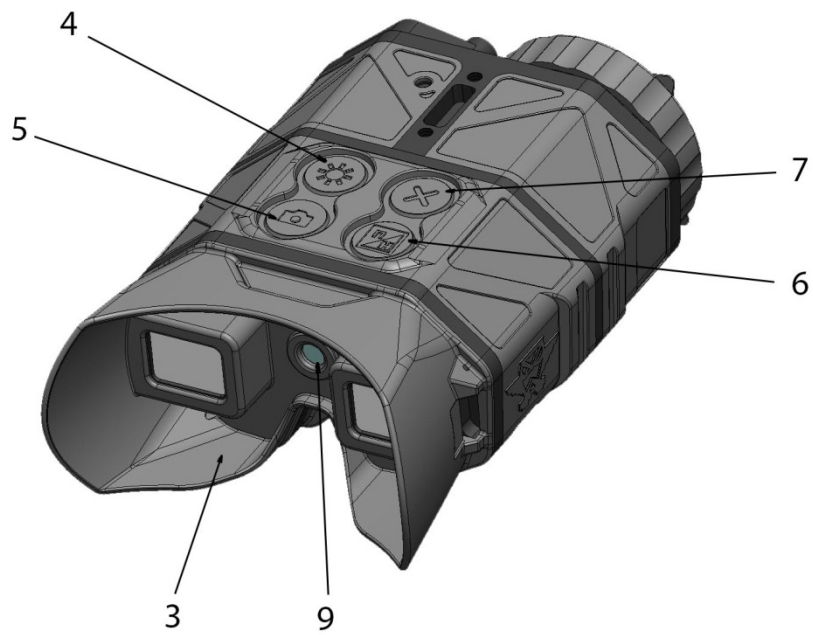


Figure 2.

- |                                |                             |
|--------------------------------|-----------------------------|
| 1. Lens                        | 7. Zoom Button              |
| 2. Lens Cover                  | 8. On / Off Button          |
| 3. Binocular                   | 9. Proximity Sensor         |
| 4. Brightness Button           | 10. Battery Compartment Lid |
| 5. Photo / Video Record Button | 11. Connector               |
| 6. Positive / Negative Button  |                             |

## **1.5. Marking.**

1.5.1. Marking of product, which includes short name of the manufacturer or a trademark of the manufacturer, part number, individual serial number and year of manufacture is marked on the code plate on the case of the device and on the package (case). Case with the device is packaged in a cardboard box.

1.5.2. The product is sealed on a regular package (case) by the agreement with the customer. The product itself is not sealed.

## **1.6. Packing**

1.6.1. The product is packed in a standard package (plastic case).

1.6.2. The product in the standard package is packed in a matched transport packaging (cardboard box). Sealing and unsealing of the product is carried out by the representative of the QC department.

## **2. PROPER USE**

### **2.1. Operational restrictions.**

2.1.1. Before starting, carefully read this Operation Manual.

2.1.2. When finished, power off the device to prevent battery discharge during transportation and storage.

2.1.3. **It is prohibited** to open battery compartment of the product, replace batteries, remove protective lid of the battery compartment in the conditions of high humidity (over 90%), condensate, or the possibility of water penetration into the interior content of the product and its parts.

2.1.4. **It is prohibited** to immerse the product into water, do not operate the product at temperatures beyond the limits specified in p.1.2.20.

2.1.5. **It is prohibited** to turn on the product in the case of water ingress.

2.1.6. Replacement of battery should be carried out only when the device is powered off.

2.1.7. **It is prohibited** to power the device with other sources, including structurally similar, except for regular rechargeable battery and a standard power supply unit.

2.1.8. Disconnecting of power sources (AC adapter, battery) and their connection to the device should be carried out only after the device has been turned off.

2.1.9. Do not direct the lens into the sun, open flame or extremely hot objects, including in the off state because long-time exposure to high intensity radiation can cause permanent damage to the radiation detector.

2.1.10. Before using the product, it should be noted that the higher ambient temperature level, the lower detection characteristics. Also direct solar radiation dramatically reduces product efficiency. Maximum efficiency is achieved in the dark, cold season or in cloudy cool weather.

### **2.2. Getting Started**

2.2.1. Before using the device, make sure there is no violation of operational restrictions p. 2.1.

2.2.2. Remove the unit off the standard package.

2.2.3. Make sure there is no mechanical or chemical damage on the power units. Check for any mechanical damage on the product.

2.2.4. Install rechargeable batteries into the battery compartment of the device carefully observing polarity. The battery must fully fit into the battery compartment without effort.

2.2.5. Close battery compartment lid tight to prevent penetration of foreign objects and water into the case while operating the device.

2.2.4. Turn on the device and make sure the battery is fully charged.

2.2.5. Charge the battery using regular charger.

2.2.6. While operating current state of the battery is displayed as a graphic symbol of battery image in the upper right corner of the screen. The emptier the battery is, the less shaded segments battery symbol has. At battery depletion, the device is switched off automatically.

2.2.7. Only regular mains adapter must be used for network power supply. Mains adapter is connected to the product via connector 2 (position 11) using multi-purpose cable.

### **2.3 Product Use.**

2.3.1. Open the protective lens cover (position 2).

2.3.2. Enable the device (position 8). The image appears after 5-10 seconds, during which radiation receiver has been calibrated. After that, the device is ready to start operating.

2.3.3. Adjust the lens to the desired viewing distance. To do this, select the object at an appropriate distance and by rotating lens adjustment ring (position 1), achieve clearest image of the object.

2.3.4. To improve ease of observation, there are different options of image settings - brightness change (position 4), zoom (position 7), display 'positive-negative' (position 6).

2.3.5. To save the image (photo mode), shortly press the button (position 5).

Title 'Photo' is on display. The image is saved as soon as 'Photo' disappears from the display.


2.3.6. To record video image (Video Mode), keep the button (position 5) pressed for more than 1 second. Title 'Video' is on display and recording starts. Blinking 'Video' means that recording is in progress. To stop recording, press the button (position 5), and the title 'Video' will disappear.


**\*\*ATTENTION!** In case there is no SD card, or no sufficient free space on the SD card, the following message appears: 'Recording failed'. It does not disappear until you replace SD card and restart the device.

2.3.7. The device has an installed proximity sensor (PS) for reducing the disclosure of the observer from the luminescence display of the device. When the PS is operating, the displays are enabled only in case the device is in working position (by the face).

To enable PS, place the device in working position (by the face), simultaneously press 7 and 6 buttons and keep them pressed for 5 seconds, during



which the sensor will be calibrated. An icon will be displayed  (sensor has been enabled)

To turn off the PS, press the buttons 7 and 6 simultaneously and keep them pressed for 5 seconds. A crossed-out icon is on display  (sensor is off).

In case of incorrect operation of the proximity sensor, related to changes in external conditions or the change of the operator, carry out recalibration of PS. To do this, power off and then power on the PS.

2.3.8. When finished, turn off the device (position 8).

2.3.9. Close the lens cover.

2.3.10. When placing the device for storage or leaving it without use for more than a few days, remove the batteries.

## **2.4. Safety measures.**

2.4.1. In case of fire on the device, power off the device and take measures to put out fire.

2.4.2. In case of emergency operating conditions (high temperature, humidity, vibration, etc.), take measures to reduce the impact of emergency factors on the product.

## **3. MAINTENANCE SERVICE**

3.1. Product maintenance does not require special training of staff.

3.2. Any oxidation and salt presence on the surfaces of the batteries must be avoided. When any appear, the batteries must be replaced.

3.3. Optical surfaces of the device (eyepiece, output window) when dirty should be cleaned only with a clean cloth made of genuine or microfiber suede, designed for cleaning optical parts (eg glasses). Before that, blow away the grains of sand and dust. To remove heavy grease, use a cotton swab moistened in ethanol, having preliminary removed solids from the optics with a soft brush.

3.4. Product functional testing and its technical inspection are controlled by checking paragraphs 1.2.13.-1.2.15.

3.5. Replacing the battery is required in case of their failure or due to a significant loss of capacity. The criterion for battery replacement is decrease in the time of continuous operation from a fully charged battery to less than 70% of the nominal.

3.6. Preservation (degreasing, reconservation) of the product is carried out by packing it in its standard package (plastic case).

## **4. REPAIR**

4.1. Minor repair of the product is carried in accordance with Table 4.

Table 4

Failure and damage consequences	Possible Reasons	Troubleshooting
When powered, there is no image on display in the eyepiece.	Battery capacity is exhausted. Rechargeable batteries are discharged. Contacts in battery compartment have been oxidized.	Replace the batteries.  Charge the rechargeable batteries.  Clean contacts in battery compartment.
No video signal on the external device connected.	Video connectors have been inserted incorrectly.	Check connection of video cable connectors.
Distorted image -overlapping of previous image (the effect of the stored frame) - Heavy moire - Blurred or stripe image	Continuous operation in a static position. Mechanical effect. Sharp thermal contrast.	Carry out matrix calibration To do this keep the buttons 4,5,6 and 7 simultaneously for 15 s в течении 15с until 'Matrix Calibration' message appears. At the end of calibration (all the messages and icons disappear), switch off and then switch on the device. Calibration may take up to five minutes depending on the matrix state. <b>Do not power off the device while calibration.</b>

4.2. Product repair that goes beyond minor repair, in accordance with p.4.1 is carried out by the manufacturer.

## 5. STORAGE

### 5.1. Storage conditions.

5.1.1. The device must be stored packed on the shelves in the capital heated rooms at temperature from 5 °C to + 40 °C and a relative humidity of 80% at temperature of +25 °C or in unheated rooms at temperature from - 40°C to + 65°C at no vapors of acids, alkalis, current-conducting dust and other chemically active substances, gases that cause corrosion and destroy insulation. It can be stored in a standard package when stacked (horizontally) on the shelves with up to 4 products. Stacking in a vertical position is not allowed.

## **5.2. Storage life.**

5.2.1. Storage life of the product in a standard package is 1 year in heated ventilated premises at ambient temperature from + 50 °C to + 400 °C and a relative humidity of up to 80% at temperature of 25 °C.

## **5.3. Terms of placing the product in storage and withdrawing it from storage.**

5.3.1. When placing the product for storage, clean it off contamination, remove all traces of moisture, fully charge the battery and place them and other components in the cells. Do not store the product with a battery installed in the battery compartment of the device.

5.3.2 When withdrawing it from storage, the components of the product should be removed from the package and kept under standard climatic conditions for at least 12 hours.

## **6. TRANSPORTATION**

### **6.1. Requirements for transportation and transportation conditions.**

6.1.1. Transportation of the device is carried out in a transport container by all kinds of goods and passenger transport at a height of no more than 12,000 meters without distance limits at ambient temperatures from -40 °C to + 65 °C and protected against direct exposure of precipitation and reactive components. When carried in railway wagons, the shipment should be small low-tonnage. After transportation and before using, keep the product in standard climatic conditions for at least 12 hours.

### **6.2. The procedure to prepare the product for transportation and methods of attachment during transportation.**

6.2.1. Before transporting the product in a standard package, it can be packed into an extra matched shipping container (carton or plywood box). Products in transport containers should be secured in such a way as to ensure the stability of their position, excluding mutual displacement and strokes. During loading, unloading and transporting, the requirements of handling marks on the shipping container must be strictly observed.