FORTUNA

THERMAL VISION BINOCULAR

FORTUNA
GENERAL BINOCULAR



19S3 | 25S3 | 40S3 | 50S3 | 75S3 | 100S3

19S6 | 25S6 | 40S6 | 50S6 | 75S6 | 100S6

USER'S MANUAL

FORTUNA GENERAL BINOCULAR

Thermal vision binocular

User's manual

Models:

19S3, 25S3, 40S3, 50S3, 75S3, 100S3,

19S6, 25S6, 40S6, 50S6, 75S6, 100S6.

CONTENT

1. General Information 2
2. Device Features and Application 3
2.1. Application
2.2. FORTUNA GENERAL BINOCULAR Series Features
3. Shipping Kit and Accessories 4
3.1. Shipping kit
3.2. Accessories
4. Specifications 5
5. Device Features and Controls 6-7
6. Operation 8-9
6.1. Unpacking
6.2. Installing the Batteries
6.3. Turning On and Off
6.4. Dioptric Adjustment of Eyepiece
6.5. Calibration
7. Electronic Adjustment 10-11
7.1. Digital Zoom
7.2. Selecting Adjustable Parameters
7.3. Selecting the Image Colour
8. Lens Changing 12
9. Pixel Correction 13-14
9.1. Automatic Dead Pixels Removal
9.2. Cancelling the Automatic Dead Pixels Removal
9.3. Manual Dead Pixels Removal
9.4. Saving the Correction Results
9.5. Exiting the Correction Menu
10. Options 15
10.1. Attaching External Power Supply (not included)
10.2. Attaching Video-Recorder (not included)
11. Rangefinder (not included) 16
12. Troubleshooting 18
13. Maintenance and Storage 19
13.1. Maintenance of the Device
13.2. Cleaning
13.3. Preparing for Storage
13.4. Storage
14. Warranty 20
15. Acceptance Certificate 22

1. General Information

In this manual you can find the instructions for use, maintenance and servicing of the thermal vision devices FORTUNA GENERAL BINOCULAR series. In the further manual these devices are referred to as "device", "scope", "goggles" or "binocular" depending on the application in the manual context.

Attention!
It is absolutely forbidden to point the device at the high-temperature objects (the sun, welding, fire, etc.)

2. Device Features and Application

2.1. Application.

The thermal vision device FORTUNA GENERAL BINOCULAR is developed to viewing both in the darkness (at night) and in the daytime in normal or severe weather events, such as the mist, light rain, snow, fog and smoke.

The device detects passively the thermal radiation of objects and landscapes, is flash resistant and does not need additional source of light. Although the device limits the visibility through glass, water, heavy rain or snow. The device can serve as helmet-mounted goggles and as a tripod-mounted binocular.

The device is designed with the shutterless calibration technology enabling quick start and continuous image without stops and delays. The specially developed control electronics of the device works without complicated menu.

The device is reliable, compact and user-friendly. All the main functions are easily and ergonomically controlled.

2.2. FORTUNA GENERAL BINOCULAR Series Features:

- Viewing and aiming at any time of the day and in poor weather conditions;
- 384x288/640x480 core, 17 μm, 50/25 Hz;
- Maximal detecting distance – from 475 to 2400 meters;
- Changeable lens;
- Compact and light device;
- Plastic enclosure with rubber grips;
- Waterproof enclosure filled with nitrogen;
- Helmet- or tripod-mounted;
- High-aperture F/1.0 lens;
- Two colour high-resolution AMOLED displays 800x600;
- Digital multi-functional menu;
- Automatic silent calibration;
- Video output for external video recorder;
- Possible connection to external power supply;
- Possible connection to external laser rangefinder (Fortuna LRF)

3. Shipping Kit and Accessories

3.1. Shipping Kit

Thermal vision device FORTUNA GENERAL BINOCULAR	1
Power batteries CR123	2
User's manual	1
Pouch (case)	1

3.2. Accessories

Upon request the shipping kit can include:

- 5V external power supply;
- Video recorder to save image on the SD card;
- Hard case for carrying and storage of the device.
- Tripod

4. Specifications

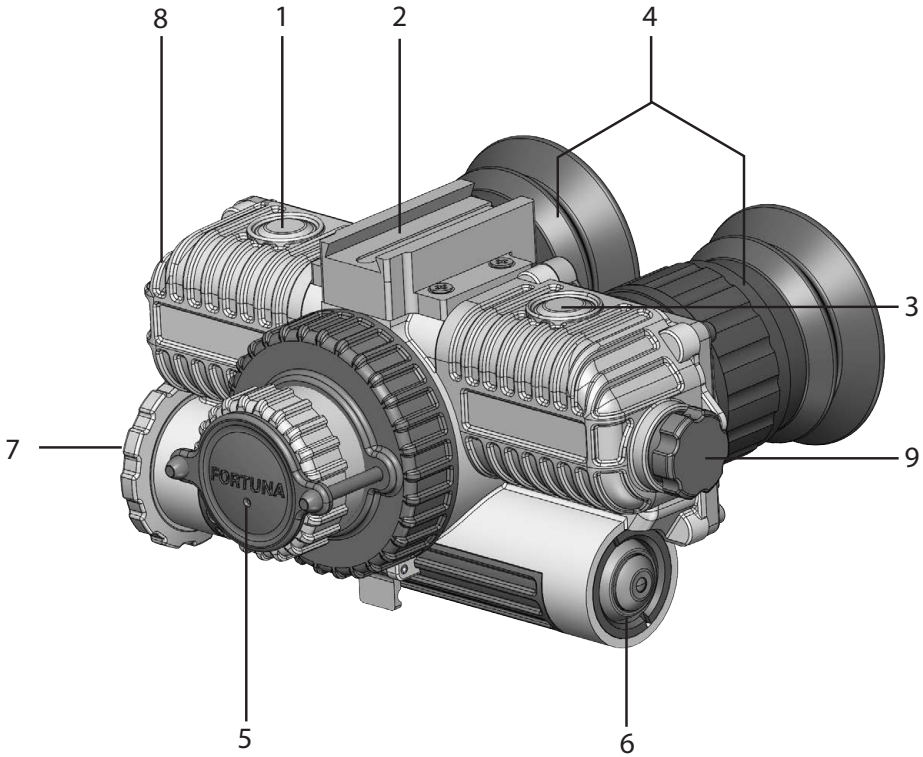
Table1 provides the information on physical, electrical, mechanical, optical and performance specifications of FORTUNA GENERAL BINOCULAR thermal vision devices.

Table 1

Model	19S3	25S3	40M3	50S3	75S3	100S3	19S6	25S6	40S6	50S6	75S6	100S6
Thermal imaging core,	384x288, 17 μm						640x480, 17 μm					
Spectral range, μm	7,5…14											
Frequency, Hz	50											
Sensitivity, mK	<50											
Calibration	silent, electronic											
Lens, F/1.0	19 mm	25 mm	40 mm	50mm	75 mm	100 mm	19 mm	25 mm	40 mm	50 mm	75 mm	100mm
Optical zoom	1,6	2,1	3,4	4,4	6,3	8,4	0,95	1,3	2,0	2,6	3,8	5,0
Field of View, deg	19,0 x14,5	14,6 x11,1	9,3 x7,0	7,2 x5,4	5,0 x3,7	3,7 x2,8	29,8 x23,2	23,5 x18,1	15,2 x 11,5	11,8 x8,9	8,3 x6,2	6,2 x4,7
Lens focusing	Manual from 5m to ∞	Fixed from 20m to ∞		Manual from 5m to ∞	Manual from 10m to ∞		Manual from 5m to ∞	Fixed from 20m to ∞		Manual from 5m to ∞	Manual from 10m to ∞	
Eye relief, mm	25											
Dioptric adjustment	-5…+5											
Display	AMOLED 800x600 x2pcs. (0.5)											
Power supply	up to 8.4 V (CR123A x 2 pcs. or RCR123A x 2pcs.)											
Minimal continuous run time at 25°, h	5											
Protection class	IP67											
Maximum impact load, g	500											
Operating temperature range, ℃	-30…+50											
Dimensions, mm	155x95 x115	155x95 x130	155x95 x135	155x95 x165	155x95 x185	155x95 x200	155x95 x115	155x95 x130	155x95 x135	155x95 x165	155x95 x185	155x95 x200
Weight with batteries, grams (CR123A x 2 pcs)	~410	~440	~460	~750	~850	~1100	~410	~440	~460	~750	~850	~1100

The producer reserves the right to change without notice technical specifications and shipping kit of the device.

Fig.1



1. Digital zoom button;
2. Head mounting interface;
3. Black/white inversion button;
4. Eyepieces with eyeguards;
5. Lens with protective cap;
6. On/off button;
7. Battery case cover;
8. Video output and external power supply socket with protective cap;
9. Menu control encoder.

Fig. 1 shows the view, main units and controls of the device.

High-aperture germanium lens (5) in the enclosure focuses thermal radiation of the object on the sensitive area of the detector - uncooled bolometer core. When not operated the lens is closed with the protective cap.

On top of the device (3) there are two buttons: black/white inversion button (3) on the left and digital zoom button (1) on the right. On the left side of the enclosure there is the menu control encoder (9).

The enclosure contains the whole electronics of the device which transforms the detector signal into the digital image of the object shown on the AMOLED displays through the eyepieces with the eyeguards (4).

Dioptric adjustment of the eyepiece is performed with the rings; the pupillary distance is also adjustable.

The electrical circuit for the device is powered with two batteries CR123A placed in the battery case. The device turns on and off with the button (6). The universal socket (8) covered with the protective cap serves to connect the external power supply and to output video image on the external display or recorder. The device is mounted on the head or helmet with the head mounting interface (2).

6. Operation

6.1. Unpacking

Prior to unpacking the device, make sure that all the main components are present in compliance with cl.3 of this manual. If some of the items listed in cl.3 of this manual are missing, please, address the supplier. Prior to turning on the device, visually inspect the enclosure, optical surfaces and other parts of the device. Make sure there are no fractures, scratches, caverns, cracks and other faults in the view of the device and its parts. Otherwise address the supplier or the manufacturer of the device.

6.2. Installing the Batteries

Prior to inserting the batteries make sure they do not have any cracks, caverns, leaks or bubbles. Never insert defective batteries. Do not use together new and old batteries or batteries of different types (of different manufacturers). The device is powered with two CR123A batteries or rechargeable batteries of RCR123A (16340) type.
Insert the batteries:
1. Open the battery case cover (7);
2. Insert the batteries observing the polarity marked on the outer surface of the device;
3. Close tightly the battery case cover.

Attention!
Li-Ion battery contains SO_2 (sulphur dioxide) under pressure. Do not heat, pierce, disassemble, short-circuit, recharge or in any other way put pressure on the battery. Turn the device off if the battery case is overheated. Wait until the battery cools prior to reinstall it.
Do not store or transport the device with the inserted batteries.

6.3. Turning On and Off

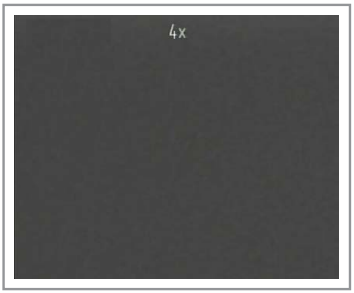
The device turns on and off with the button (6), fig. 1. The button has two positions: "ON" – the button is pushed, and "OFF" – the button is pulled.

6.4. Dioptric Adjustment of Eyepiece

The eyepieces' dioptric adjustment range is from -5 to +5 dioptres. Turn the eyepiece dioptric adjustment ring (4), fig.1 to achieve the sharp display image. To make the viewing more comfortable adjust the pupillary distance by shifting the eyepieces together or pulling them apart.

6.5. Calibration

All FORTUNA GENERAL BINOCULAR models feature the electronic calibration. The user does not need to calibrate the device while operating it. The device is calibrated automatically as required.

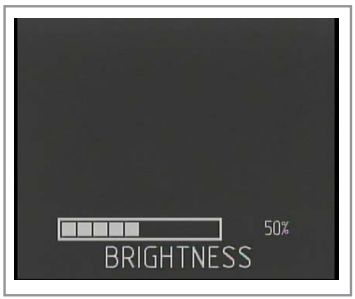


7.1. Digital Zoom

The button (1) on the device enclosure pressed shortly changes the digital zoom of the device to 2x, 4x (for models with 640x480 core resolution – 2x, 4x, 8x). The display shows the digital zoom rate (2x, 4x or 8x).

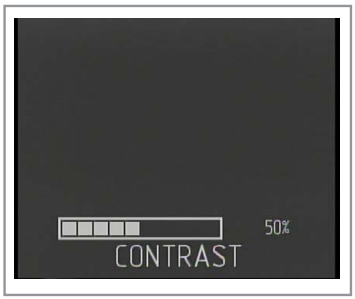
7.2. Selecting Adjustable Parameters

The device features manual adjustment of brightness, contrast and thermal sensitivity aimed to make the viewing conditions more comfortable.



7.2.1. Brightness Adjustment

To adjust brightness press encoder knob (9) on the device enclosure once until the brightness adjustment menu appears.
Select the required brightness level by turning the knob. Press the encoder knob to select another parameter to adjust or exit the adjustment menu.



7.2.2. Contrast Adjustment

To adjust contrast press encoder knob (9) on the device enclosure twice until the contrast adjustment menu appears.
Select the required contrast level by turning the knob. Press the encoder knob to select another parameter to adjust or exit the adjustment menu.



7.2.3. Manual Adjustment of Thermal Sensitivity

To improve the quality of the observed image (depending on the contrast of the observed object and the background temperature) the device features the manual adjustment of the core (microbolometer) sensitivity.

To adjust the thermal sensitivity press the encoder knob (9) on the device enclosure thrice until the sensitivity adjustment menu appears.

Select the required sensitivity level by turning the knob. Press the encoder knob to select another parameter to adjust or exit the adjustment menu.

7.3. Selecting the Image Colour

Button (3) on the device enclosure pressed shortly selects one of the modes: "white – hot" or "black – hot".

8. Lens Changing

The device features the changeable lens to provide required zoom and field of view.

ATTENTION: when changing the lens, be extremely careful to prevent the exposure of internal surfaces of the lens and thermal vision core to foreign contaminants (dust, dirt, moist, finger prints, etc.). In case of exposure, wipe carefully these surfaces with an alcohol-wetted cotton bud.

8.1. Lens Removal

Turn over the device to make the lens removal more convenient. At the bottom of the enclosure there is a mark – a white dot. On the lens enclosure there are white and red dots. Turn the lens against the device enclosure to align the white dot on the device enclosure with the red dot on the lens enclosure. Remove the lens carefully.

8.2. Lens Mounting

Turn over the device to make the lens mounting more convenient. Align the white dot on the device enclosure with the red dot on the lens enclosure and insert carefully the lens. Turn the lens against the device enclosure to align the white dots.

9. Pixel Correction

While the operation, black and white dots may appear on the display. The device features the correction function to delete these dots.



ATTENTION: Correction shall be performed with the lens cap CLOSED!

1. Turn on the device (button (6))
2. Press and hold simultaneously buttons 1 and 3 at least for 5 seconds until the correction menu appears.

There are two modes of the dead pixels removal – manual and automatic. However it should be noted that automatic mode cannot guarantee the complete removal of all the dead pixels. In this case the remaining pixels should be removed manually. Switch between the modes by pressing shortly the encoder (9).

Modes:

AUTO – automatic dead pixels correction (see p. 9.1);

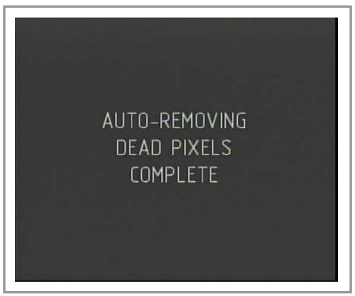
X – move the crosshair along X axis;

Y – move the crosshair along Y axis;

SAVE – saving (see p. 9.4);

RESET – cancelation of the automatic dead pixels removal (see p. 9.2);

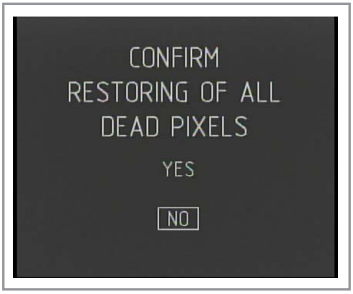
EXIT – exit (see p. 9.5).



9.1. Automatic Dead Pixels Removal

To remove automatically the dead pixels press shortly the encoder (9) to select the option "Auto" and press button (1) to complete the removal. The display shows the message confirming the successful removal.

If any pixels remain, remove them in manual mode (see p. 9.3). Then save the result (see p. 9.4.) and exit the correction menu (see p.9.5).



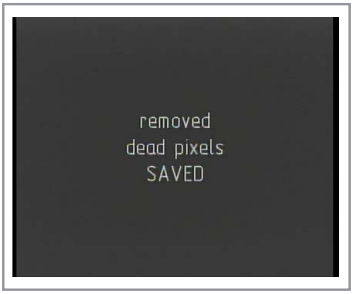
9.2. Cancelling the Automatic Dead Pixels Removal

To cancel the automatic dead pixels removal press shortly the encoder (9) to select the option Reset and press button (1). The display shows the confirmation request.

To confirm, turn the encoder to select Yes and press button (1) to cancel the correction. To exit without cancellation select No and press button (1).

9.3. Manual Dead Pixels Removal

Press the encoder (9) to switch between "X" and "Y" and turn the encoder to move the crosshair. Align the crosshair centre with the dead pixel and press button (1).



9.4. Saving the Correction Results

When the dead pixels are automatically or manually removed the result should be saved. Using the encoder (9) select the Save option and press button (1) to save the results. The message confirming saving was successful appears on the display.

9.5. Exiting the Correction Menu

To exit the correction menu select the Exit option with the encoder (9) and press button (1).

10.1. Attaching the External Power Supply (not included)

To increase the run time of the device it is possible to attach the external 5V power supply with a USB connector. Take off the safety cap from the input (8) and using the cable supplied with the device, connect the external power supply to the device.

10.2. Attaching Video-Recorder (not included)

To record the process of observation, the video-recorder (Newton CVR640 type) can be attached to save the image on the SD card. Take off the safety cap from the output (8) and using a cable adapter (not included), connect the device to the video-recorder.

11. Rangefinder (not included).

The rangefinder enables to detect the exact distance to the target. The scope features the possibility to attach the external laser rangefinder (Fortuna LRF). The measured distance is displayed in the right upper corner of the screen. To enter the rangefinder settings menu press and hold (more than 2 seconds) the encoder (9) of the binocular. The rangefinder settings menu appears on the screen.



To navigate the menu press shortly the button (1) or (3).

11.1. Turning on/off the rangefinder readings

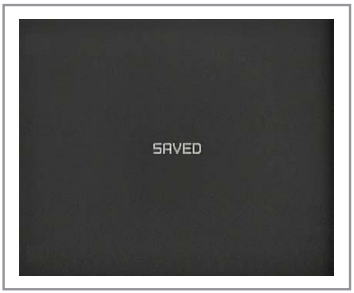
To turn on/off the rangefinder readings on the device display press and hold (more than 2 seconds) the encoder knob (9) with the option "Rangefinder on/off" selected. When the rangefinder turns on, the display shows the message "Rangefinder on", when it turns off – "Rangefinder off". The receiver card is turned on/off. When turning on the rangefinder the icon "S:" is flashing in the right upper corner. It is flashing until the device is connected to the rangefinder, then the icon "S:" is displayed continuously.



11.2. Rangefinder Adjustment

Attention: When the rangefinder is installed on the device for the first time, the rangefinder needs to be adjusted – to align the rangefinder optical axis with the measurement area on the display

• Turn on the target finder on the rangefinder unit;
• Press and hold (more than 2 seconds) the encoder knob (9) to enter "Rangefinder adjustment" menu. The rangefinder measurement area appears in the centre of the display;
• Point the laser target finder on the thermally contrast object at distance of 50-100 meters;



• Viewing through the binocular align the measurement area with the object using the encoder knob ("left" and "right") and buttons (1) and (3) ("down" and "up");
• Save the measurement area adjustment by holding the encoder knob (9) for more than 2 sec. The display shows the successful saving confirmation and the device returns in the rangefinder settings menu.

For more details about the rangefinder operation consult "The Rangefinder User's Manual".

The device does not start.	1. No batteries. 2. The batteries are low. 3. Poor contact.	1. Insert the batteries. 2. Replace the batteries. 3. Clean the contact pads.
Poor image quality. *Blurred image.*	1. Dirty inlet objective lens or eyepiece. 2. The lens is not focused. 3. Low contrast due to rough conditions of observation; heavy rain, heavy fog, low temperature gradient of the observed objects.	1. Clean the optics with spirit - ether mixture. 2. Focus the optics.
Diagonal lines on the monitor.	The batteries are low.	Replace the batteries.
No image.	1. Contrast and brightness are not adjusted. 2. The batteries are low.	1. Adjust contrast and brightness. 2. Replace the batteries.

12.1. Maintenance of the Device

The maintenance of the device includes visual inspection of its parts, cleaning and installing standard and optional accessories.

12.2. Cleaning

Cleaning the device.

1. Remove carefully the dirt from the device enclosure with clean and soft cloth.
2. Wet the cloth with water and wipe thoroughly the device surface (except optics).
3. Wipe the wet and clean enclosure with dry and clean cloth.
4. Using a soft brush remove carefully dust, sand and dirt from the optical surfaces.
5. Wet soft woollen cloth with the spirit-ether mixture and clean the optical surface of the lens and eyepiece with light twisting movements from the centre edgewards. Change the cloth after each wiping cycle. Repeat the actions until complete cleaning of the optics.

Cleaning the accessories.

Wipe the accessories with a brush or cloth wetted with soapy water (if required).

Attention!
Prior to put the device in the pouch or the case for storage, dry thoroughly each item from the device kit.

12.3. Preparing for Storage

1. Check the condition of the device.
2. Remove the batteries.
3. Clean the device and its accessories.
4. Put the device and the accessories in the case (the pouch).

12.4. Storage

After usage and maintenance the device should be stored in the factory package as described in clause 12.3. This ensures that the device is kept ready to use for the whole guarantee period of storage and usage.

14. Warranty

Guarantee service life of the device is 24 months from the delivery date. Without the note on the delivery the guarantee period begins on the manufacturing date from the factory.

The warranty is effective only with the correctly filled acceptance certificate with the serial number, delivery date and clear stamps of the supplier and manufacturer.

The guarantee repair is performed free of charge (including the cost of work, materials, and, if required, transportation) on the manufacturing factory or in the service company.

Any complaints about the item quality are considered after the quality inspection on the manufacturing factory. The decision on replacement or repair of the item or its parts is within the competence of the specialists of the manufacturing factory or the service. The replaced parts and units become the property of the manufacturer or the service-centre.

After the guarantee service the warranty period is not renewed but continues. The liability under this warranty is limited with the liabilities specified in this document unless otherwise specified by the applicable law.
If during the usage of the item it is revealed that the parameters of the item do not correspond with the user's manual, please consult immediately with the manufacturer on the address and the phone numbers specified in the user's manual.

Within the whole guarantee period the owner has the right to free repair of the item's defaults resulting from the manufacturing faults.

The manufacturer's warranty does not cover the following:
• Loss of the user's manual for the item;
• Alterations of the user's manual text, damage and alteration of the serial number or in the manual in case of their mismatch;
• Mechanical damage, damage due to the chemicals exposure or misuse;
• Usage of the item for improper applications;

• Damage or malfunctioning due to exposure to fire, corrosive substances, actions of animals or insects;
• Defaults due to force-majeure (fire, natural disasters etc.);
• Incompetent repair, disassemble or adaptation to the weapon and other interference of unauthorized persons not provided for by the manual;
• Damage resulting from disregard of rules of usage, storage and/or transportation by the fault of the owner, the transport company, service firm, persons or firms authorized for adaptation;
• Unauthorised alteration of the item's design.

15. Acceptance Certificate

The thermal vision device FORTUNA GENERAL BINOCULAR _____
Serial number _____,
complies with the design documents of the manufacturer and is considered ready for operations.
This type of products is not under mandatory certification.

Date of sale _____
Seller _____

Seal

Notes

Manufacturer of
thermal vision devices FORTUNA

Fortuna Optics EOOD

district "Vitosha", "Karpusitsa",
Damyanitsa str. 2, Office 1, section "G", 1619, Sofia, Bulgaria
tel.: +359 88 2399915
e-mail: info@fortuna-optic.com
fortuna-optic.com