

BETTITOPE



BS02-13

Thermal Monocular User Manual

TO USERS: Glad to see you! Thanks for choosing our product. To help you use this monocular in a more appropriate and efficient manner, we highly recommend you to read this user guide carefully before use, we also advise you keep this manual safe for easy reference in future.



Publication Statement

This user manual provides detailed instructions on the use and precautions of thermal monoculars. To ensure the safety of operators and the proper maintenance and effective use of the thermal monocular, as well as to guarantee its normal lifespan, our company requires users to read and strictly adhere to the following operating guidelines before using the thermal monocular.

Until a new user manual is published, this document will serve as the standard for the usage and maintenance of the thermal monocular; other materials are for reference only. If any issues arise during use, please provide timely feedback for further study and revisions.

The content of this User Manual is for customer reference only and does not serve as a standard for product delivery acceptance.

Please keep this manual properly for future reference. Just contact us if you lose this manual, we will send you an online file.

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1.Product Overview

The BS02-13 is an infrared thermal monocular that can be used for observation in nighttime and adverse weather conditions.

Explanation of Indicator Lights

Yellow Indicator Light: When monocular is connecting to the computer

Green Indicator Light: When monocular is powered on or in standby mode

Red Indicator Light: When Charging status



Yellow Light



Green Light



Red Light

2. Working Principle

The infrared optical system receives the infrared radiation emitted by the target. Through spectral filtering, the energy distribution of the target's infrared radiation is projected onto the infrared detector array at the focal plane. The detector converts the infrared radiation into electrical signals, which are then amplified by the input circuit with bias and sent to the readout circuit.

The core module digitizes the output signals from the detector and performs corrections on the initial infrared image, including pixel cure, brightness and contrast adjustment, pseudo-color rendering, overlaying interfaces, and so on. The processed signals are sent to the OLED display.

3. Main Features of BS02 Thermal Monocular

- 800x600 OLED Display: BS02 provide an wide viewing area, comfortable viewing experience to locate and analyze failure zones more quickly.
- 256x192 IR Resolution combined with high refresh rate: It makes the image details richer and the target recognition more accurate, 50HZ frame rate makes the screen display smoother.
- Adjustable focal length design: You can adjust focal length of objective and eyepiece based on different observation scenarios, to achieve the best observation setting that you need.
- High sensitivity $\leq 30\text{MK NETD}$: Generally, smaller NETD value represents higher the sensitivity of the device, brings higher temperature resolution and accuracy of the measurement, capture the subtle temperature changes more accurately.

- IP66 Waterproof Grade: It can stop dust from entering as well as splash waterproof, the product can not be immersed in water.
- Removable 3500mAh Lithium Battery: We can use this thermal monocular for about 6~8 hours without rest when 100% charged, and it's convenient to change battery. Remove the insulation sticker above the battery before use.
- Convenient WIFI connection & Data transfer: Easily WIFI connection via your phone, built-in 32GB memory, save up to 120,000 images. Attached type-C charging port helps users transport videos, pictures

3.1 Main Technical Parameters

Item	BS02-13
Detector	256X192 IR Resolution, 12μm
Objective Lens	13mm
Recognition Range (Human)	≥300m
Detection Range (Human)	≥800m
NETD	≤30mK@F1.0
Refresh Rate	50Hz
Field of View (FOV)	13.5° × 10°

Item	BS02-13
Exit Pupil	≥5mm
Eye Relief	≥14mm
Diopter Adjustment	-5~+5SD
Image Polarity	White Hot, Sky Mode, Black Hot, Red Hot, Fusion
System Magnification	1.8X
Digital Zoom	1X、2X、4X、8X
Video/Image Format	.mp4/.jpg
Operating Time	at standard operating temperature
Interface	1/4 NUC
Battery	18650 lithium-ion battery / 3500mAh
Weight	288g
Dimensions	140×76×55mm
Waterproof Rating	IP66
Operating Temperature	-4°F~122°F
Storage Temperature	-22°F~140°F

4. Usage Instructions

4.1 Usage Warnings



In order to guarantee the precision of your measurements and guard your safety, it is imperative that you utilize this product in strict conformity with the guidelines stipulated in the user manual. Please be duly informed that any non-compliance with these instructions may give rise to damages that shouldn't fall within the scope of our complimentary warranty service.



Do not point the thermal monocular directly at the sun, carbon dioxide lasers, welding machines, or other high-intensity radiation sources, or it will damage the lens strictly.



● The thermal monocular combines precision optical instruments with electrostatic-sensitive electronic components. Please do not throw, hit, or shake the monocular or its accessories to avoid deformation of structural parts or dimensions.

● Do not disassemble the thermal monocular. If a malfunction occurs, please contact the manufacturer promptly; otherwise warranty will be void.



When the thermal monocular is not in use, or during transportation, please remove the battery and place the monocular in a protective packaging box.



Replace the battery promptly when it is low to avoid damage from over-discharge.



Operating the monocular outside the specified environmental conditions may cause damage. Do not operate this product in environments that are flammable, explosive, have high steam or humidity, or contain corrosive substances. If we use the device under these conditions, it may affect function performance and lead to safety hazards.



After observing or if the monocular is powered on but not in use for an extended period, please turn it off promptly to extend its effective usage time.



During charging, the product's internal temperature increases potentially affecting measurement accuracy. Therefore, it is advised not to perform measurements while the device is charging or immediately after



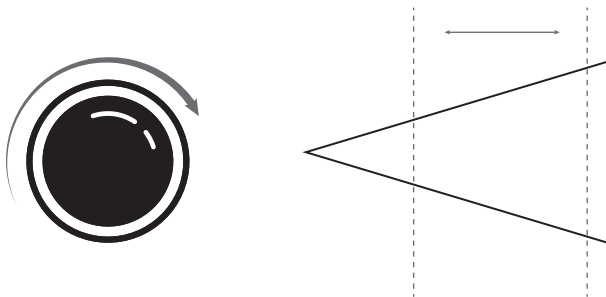
The time interval between turning the monocular on and off should be more than 20 seconds.



Due to power consumption potentially raising the product's internal temperature, to maintain measurement accuracy, please allow the device to warm up for 2 minutes before use if it has not been used for a long time.

4.2 Cleaning and Maintenance of LENS 🧐

- When cleaning non-optical surfaces of the thermal monocular, do not use chemical solvents or thinners. Instead, use a clean, soft, dry cloth to wipe the exterior.
- The infrared lens of the thermal monocular has an anti-reflective coating; clean it only when visibly soiled. Frequent cleaning may wear down the lens coating, Avoid touching the lens surface, as acids from fingerprints can damage the coating and lens. (Only use a dedicated lens cloth for cleaning the lens.)
- If there is dust around the lens, firstly try blowing it down with your mouth, aim to minimize wiping the lens.



Please rotate the Eyepiece Circle and Objective adjustment metal circle to get most clear viewing effect for you.

4.3 Display Icon

4.3.1 Thermal monocular Component Overview



Thermal monocular Component

4.4 Preparation Before Use

4.4.1 Unboxing

Before using the thermal monocular for the first time, please ensure to unbox and check that all components are included.
STEP 1) Open the color box and verify the completeness of the contents according to the thermal monocular configuration list.

STEP 2) Inspect the thermal monocular for any visible damage to the lens, body, eyepiece, buttons, etc.

STEP 3) Check the infrared lens for dirt: if there are visible spots, use a lens cloth to clean the infrared lens, ensuring the lens is clean.

4.4.2 Installing the Battery

STEP 1) When installing the battery, strictly follow the instructions indicated on the label inside the battery compartment; do not install it in reverse.

STEP 2) Use battery in groups; do not mix different types to avoid damage.

STEP 3) Before removing or installing the battery, ensure that the thermal monocular is powered off, Opening the battery compartment while the thermal monocular is on may cause severe damage.

STEP 4) Before the first use of the thermal monocular, confirm that the battery is charged.

STEP 5) Do not disassemble, drop, or short-circuit the battery to prevent accidents.

During use, charging, or storage, if the battery exhibits overheating, discoloration, deformation, odor, or any other unusual phenomena, stop using it immediately.

TIPS: Before first use, please remove insulating sticker above the battery. (An original battery is contained in thermal monocular)

5.Package List

BS02-13 Thermal Monocular Packaging Configuration List

Number	Name	Quantity
①	Thermal Monocular	1
②	18650 Battery	1
③	Type-C Charging Cable	1
④	5V 2A Charger Adapter	1
⑤	User Manual	1
⑥	CALIBRATION CERTIFICATE	1

6. Operation Interface Design

6.1 Button Functions

The thermal monocular is operated by the power button and navigation buttons. The specific functions of the buttons as below:

POWER BUTTON Function

- Turn on/off the monocular to press  power button more than 3 seconds.
- In the powered-on state, hold  power button for 1–3 seconds will display the sleep icon, entering sleep mode. Wake the monocular by briefly pressing Button .
- Press  power button for 1 second to refresh the thermal monocular (Such as a camera refresh the shutter, the device will make a clicking sound when it refresh images.)

MENU BUTTON Function

- Briefly Press Button  to access main menu/sub-menu.
- To turn on/off laser by long pressing Button  for more than 3 seconds when not in menu mode.
- To return the previous menu by Pressing Button  for more than 3 seconds.
- Press Button  briefly again to enter the sub-menu, Confirm and save your menu selection by briefly pressing Button .

NAVIGATION UP/DOWN BUTTON Function

- In menu mode, switch menu items upwards/downwards and adjust values by briefly pressing button  .
- To change thermal imaging mode by briefly pressing Button , Long press Button  for more than 3 seconds to take a photo.
- Switch digital magnification of 1x, 2x, 4x, and 8x by briefly pressing Button , Long press Button  for more than 3 seconds to start video recording.

6.2 Laser ON/OFF

Press and hold Button  for more than 3 seconds to turn on the laser. Press and hold Button  for more than 3 seconds to turn off the laser.

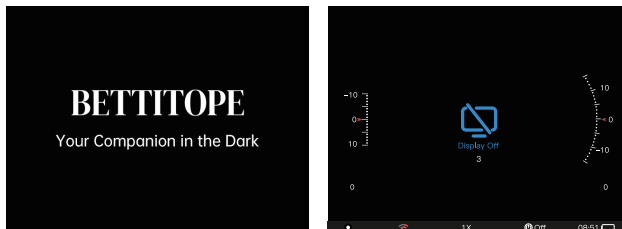
Note: The laser should not be pointed at people's eyes, it will damage people's eyes.

6.3 Power On/Off

In the powered-off state, hold Button  for over 3 seconds to turn on the device.

In the powered-on state, hold Button  for 1-3 seconds until the sleep icon appears on the screen, indicating that the device is in sleep mode.

To wake the device from sleep mode, briefly press Button . Refer to following figure.

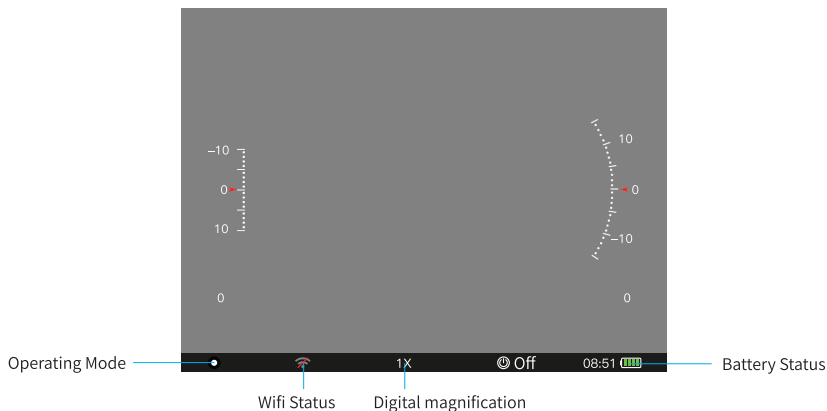


Power On/Off

6.4 Observation Interface Icon

After powering on, the default observation interface will be displayed.

The main interface shows “Digital magnification”, “Operating Mode”, “and Battery Status”. The default content of the main interface as following figure shows .

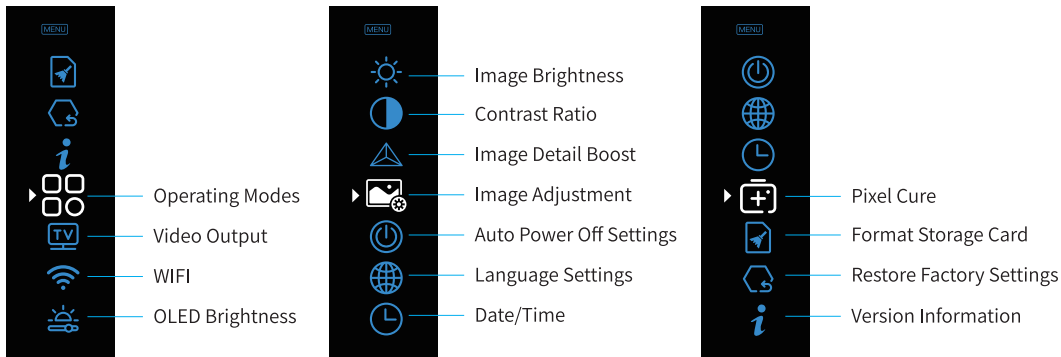


Observation interface

6.5 Main/Sub Menus

Press Button  briefly on main interface to enter Main Menu. Use Button  /  to select options. Briefly press Button  again to confirm and enter next sub-menu.

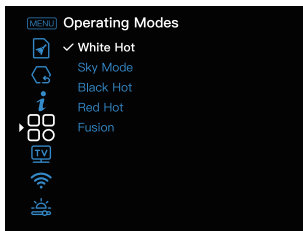
To go back previous menu by briefly pressing Button  , press Button  for about 1-3 seconds to return main menu.



Menu interface

6.5.1 Operating Modes

There are five operating modes for users to choose from: White Hot, Sky mode, Black Hot, Red Hot, Fusion. The default image mode upon startup is “White Hot,” and the current operating mode of the infrared image is displayed at the screen. In the main menu operation interface, briefly press  /  up/down navigation buttons to change “operating modes”, and press Button  briefly to confirm and exit. Refer to following Figures.



Operating Mode



White Hot



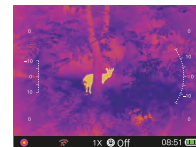
Sky Mode



Black Hot



Red Hot



Fusion

6.5.2 Video Output

When externalizing analog video to the monitor. Firstly, press Button  for 1 second to enter Main menu, press Button  /  (up/down) to reach video output function menu , press Button  for 1 second to enter the sub-menu, press Button  /  (up/down) to select Turn on/off. When you select turn on video output, press button  for 1 second to confirm and it will return to the observing interface, use the cable of the external monitor to plug into the USB port of the machine and turn on the monitor, it will automatically turn on the video output function. When you choose to turn off video output function, briefly press Button  for 1 second to confirm turn off, it will return to the observation interface and the external monitor will be closed at the same time.



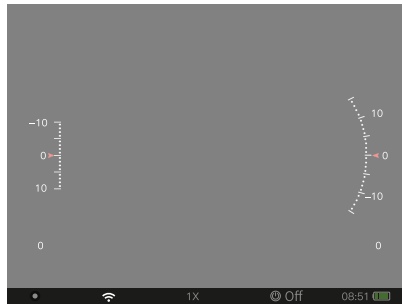
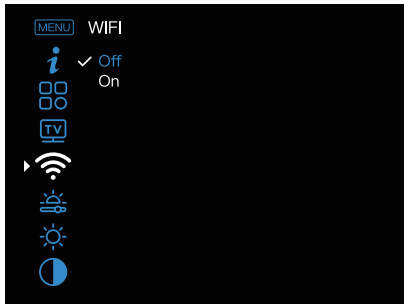
6.5.3 WiFi

To connect the device to your phone via WiFi, Briefly press Button  for 1 second to enter main menu, Press Button  /  to navigate to WIFI  function, briefly press Button  for 1 second to enter sub-menu, press Button  /  to select on/off, briefly press Button  for confirm selection. Download APP named “APPOutDoor”, Turn on WiFi of your phone, find a WiFi name called “ APPOut-Door”, enter password “ 12345678” to connect.

Open app even shows no Internet connection, After connecting to the mobile phone via WiFi, you can observe the real-time images. Turn off WIFI, press Button  for 1 second, then press Button  /  to turn off .



Android/iOS
Scan to download

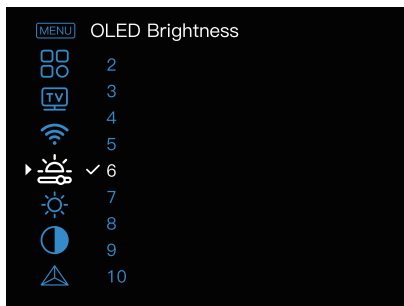


WiFi

6.5.4 OLED Brightness

Brightness adjustment allows you to increase or decrease the OLED brightness. The device offers 10 OLED brightness levels, ranging from dark to bright. The default brightness setting upon initial startup is “6.” Users can select an appropriate brightness level based on personal viewing preferences and current environmental conditions.

Firstly, Briefly press Button  for 1 second to enter main menu, press Button  /  to navigate “OLED Brightness ”, briefly press Button  for 1 second to enter sub-menu, press Button  /  to select your expected brightness, then briefly press Button  for 1 second to confirm and save your selection.



OLED Brightness

6.5.5 Image Brightness

Brightness adjustment allows you to increase or decrease the image brightness. The device offers 10 Image brightness levels, ranging from dim to bright. The default brightness setting upon initial startup is “5.” Users can select an appropriate brightness level based on personal viewing preferences and current environmental conditions.

Firstly, briefly press Button  for 1 second to enter main menu, press Button  /  to navigate “Image Brightness ”, briefly press Button  for 1 second to enter sub-menu, press button  /  to select your expected brightness, then briefly press Button  for 1 second to confirm and save your selection. Long press  for 3 seconds exit menu, go back detection imaging interface.

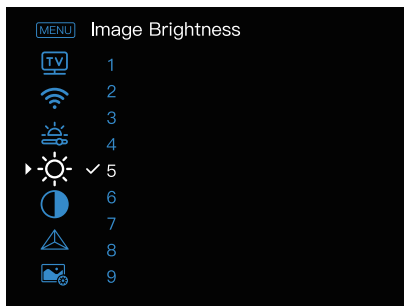


Image Brightness

6.5.6 Image Contrast Ratio

The image contrast Ratio adjustment allows you to increase or decrease the contrast ratio of the image, making the target more distinct. Contrast levels range from 1 to 10, progressing from weak to strong.

Briefly press Button  for 1 second to enter main menu, press Button  /  to navigate “Contrast Ratio ”, shortly press  Button for 1 second to enter sub-menu, press Button  /  to select your expected value, then briefly press the Menu Button  for 1 second to confirm and save your selection.

The default contrast ratio setting upon initial startup is “5.” Users can select an appropriate contrast level based on personal viewing preferences and current environmental conditions.

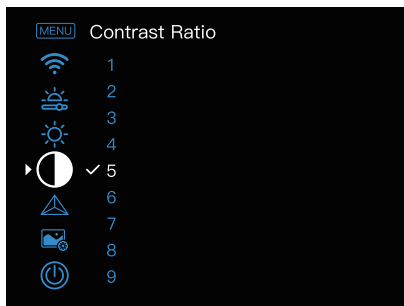


Image Contrast Ratio

6.5.7 Image Detail Boost

Briefly press Button  for 1 second to enter main menu, press Button  /  to navigate” Image Detail Boost ”, press Button  briefly for 1 second to enter the sub-menu, press Button  /  to select your expected image detail grade(there are 5 option, The higher the numerical value, the more details are enhanced), then briefly press Button  for 1 second to confirm and save your selection.

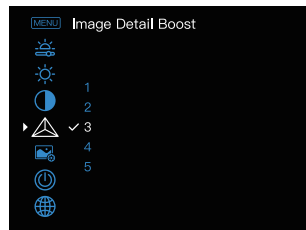


Image Detail Boost

6.5.8 Image Adjustment

To calibrate the background image uniformity, Briefly press Button  for 1 second to enter main menu, press Button  /  to navigate” Image Adjustment ”, Press” Confirm” if you need, then cover the lens to save calibration. Briefly press  button to exit the menu.

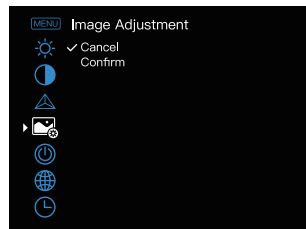
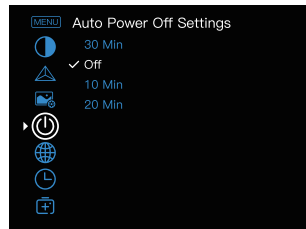


Image Adjustment

6.5.9 Auto Power Off Settings

The default setting is “Off”. After powering on device, you can select automatic shutdown after 3 or 5 minutes.

To adjust Auto Power Off Settings, press Button  briefly for 1 second to access main menu, Press Button  /  to navigate ” Auto Power Off Settings  ”. Press Button  /  to choose expected options(3 mins/5 mins/off) , press Button  for 1 second to confirm the selection and save.



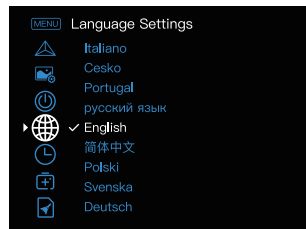
Auto Power Off Settings

6.5.10 Language Setting

The thermal monocular supports English and other languages,allow users to set their preferred language.The default language is English.

Press Button  for 1 second to enter main menu, press Button  /  to navigate sub-menu“ language settings”  , Press Menu Button  for 1 second to enter sub-menu, use Button  /  to switch 13 kinds of different languages, Press Button  for 1 second to confirm and save desired language.

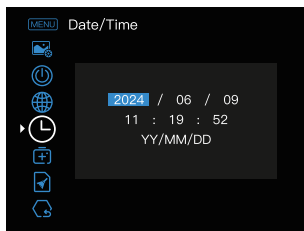
If you don’ t need, Press Button  for 1 second to exit “ language settings” without saving.



Language Settings

6.5.11 Date/Time ⌚

To adjust Date/Time, Briefly press Button **[M]** for 1 second to enter main menu, press Button **[Δ]** / **[▽]** to navigate “date/time” ⌚ , Press Button **[M]** for 1 second to access sub-menu. Use Button **[M]** to navigate through the options(year,month,day,hour,minute,second) , and use Button **[Δ]** / **[▽]** to adjust the values. Once adjustments are complete, Press Button **[M]** more than 3 seconds to save and exit menu mode.



Date/Time

6.5.12 Pixel Fix **[+]**

When need to do pixel cure?

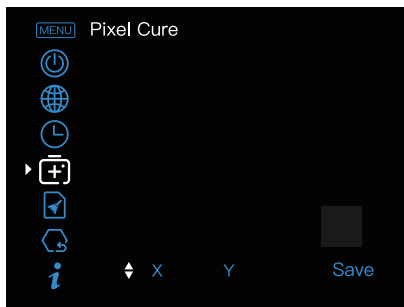
A bad dot is a pixel dot on the detector that's not working properly. Bad dots will appear as abnormal dots on the image produced by the thermal monocular. In the case of a completely failed bad dot, it may appear as a black (not responding to the thermal signal) or white (outputting a saturated signal) pixel dot in the image. For example, on a thermal image, a bad dot may appear as an abrupt white dot in a background that should have an even temperature distribution, affect visual appearance of thermal imaging!

How to make pixel fix?

Press Button  for 1 second to access Main menu, press  /  Up/down button to navigate “Pixel Fix”  , Press Button  for 1 second to access “Pixel Fix”  .

Remember you need to keep lens open during pixel fix progress.

Briefly Press Button  for 1 second to switch X or Y coordinate, To move small crosshairs by pressing Button  /  based on X or Y position until arrive position of bad dot, then press Button  for 1 second to confirm adjustment and save.

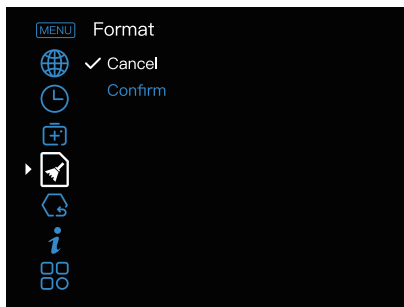


Pixel Cure

6.5.13 Format

When you want to Format the data of Storage Card(built-in storage card), Press Button  for 1 second to access main menu, press Button  /  to navigate format sub-menu, Press Button  for 1 second to enter sub-menu, use Button  /  to switch between “ Confirm/Cancel” options, press Button  for 1 second to confirm your selection. Please choose Confirm carefully! Data cannot be recovered once deleted!

Note: Be careful when using”Format”function. Confirm that this operation will permanently delete all data on the memory card!

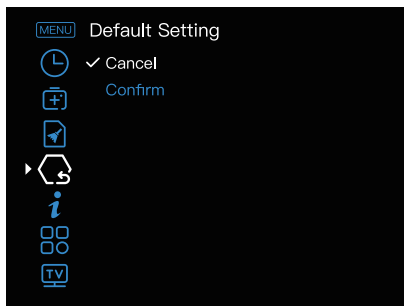


Format Storage Card

6.5.14 Default Setting

To reset the thermal monocular to its original configuration, Press Button  for 1 second to access main menu, press Button  /  to navigate “Default Setting” sub-menu, Press Button  for 1 second to enter sub-menu, use Button  /  to toggle between “Confirm/Cancel” options, press Button  for 1 second to confirm your selection.

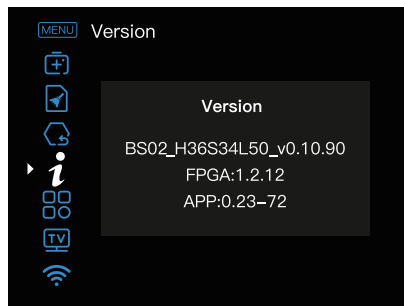
NOTE:Confirming will reset the monocular to factory default settings,so please proceed with caution!



Default Setting

6.5.15 Version

To view version information, Press Button  for 1 second to access main menu, press Button  /  to navigate "Version" sub-menu, Press Button  for 1 second to enter "Version" function, screen will display the software version information of this monocular. Press Button  again to exit version page and turn back main menu.



Version

6.5.16 Photos/Videos Recording

6.5.16(a) Sound Record in video

Automatically available record sound when video recording in default setting, which can't change.

6.5.16(b) Shoot Photos/Videos

To take a photo, Press and hold Button  for more than 3 seconds to start shooting a photo, a camera symbol will displayed in the upper left corner of the screen.

To record a video, Press and hold Button  for more than 3 seconds to start video record. You can also take photos and videos through APP. Connect the APP with WiFi to view the photos taken or videos recorded, you can also connect Type-C port of your computer to view previous photos and videos.

When you start video recording, the duration of the recorded video will be displayed on the upper left corner of the screen, Press and hold Button  for more than 3 seconds to stop recording videos, then video symbol on the screen will disappear.

record photos



record videos



7. Maintenance and Care

7.1 Daily Maintenance, Care, and Calibration

- 1) Turn off the thermal monocular to extend its effective working time after observing or if it were not used for a long time.
- 2) The lens is a critical optical component: avoid contact with oils and chemicals to prevent damage. Always cover the lens when not in use.
- 3) When not using the thermal monocular, and during transport, remove the battery and store the device in its packaging
- 4) For long-term storage, keep it in a cool, dry environment.
- 5) Avoid using chemical solvents or thinners to clean the monocular's exterior; instead, use a clean, soft, dry cloth.
- 6) Clean the lens only when visibly dirty. Firstly try blowing away the dust that is clinging to the lens with your mouth. Avoid touching the lens surface, as acids from fingerprints can damage the coating and lens. (Only use a dedicated lens cloth for cleaning the lens.)
- 7) If the device is not used for an extended period, perform a power-on check and calibration every six months.

Contact Information

We are at service, For any questions or concerns, Contact us at **SUPPORT@BETTITOPE.COM.CN**
ADD: 7F, No. 41 Baotang Road, Hengkeng, Liaobu Town, Dongguan City, Guangdong Province, China
EMAIL: **SUPPORT@BETTITOPE.COM.CN**
Made in china

FCC Warning

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used.

in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

BETTITOPE

We are at service, For any questions or concerns,
Please contact us at SUPPORT@BETTITOPE.COM.CN