

RD235 SERIES USER MANUAL

Shenzhen NNPO Technology co., ltd



Thermal sensor



App remote control



Photo



Video

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Made in China

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Foreword

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· PREFACE

This Manual describes the operation methods and precautions of the thermal imager. Please read the Manual carefully before using the thermal imager, and use it in accordance with the standard operation methods to avoid danger or property loss in operation. Please keep this Manual properly for future reference.



After the laser is turned on, do not irradiate the eyes and skin. The laser emitted by the equipment may cause damage to the eyes and skin.

Description of icons used in the manual:



— Warning, the words involved in danger or harm.



— Tips, additional instructions, or helpful techniques.



— Notes, the explanation of the meaning of words.

Safety Precautions for Using



• DANGER

- In the process of equipment installation and use, the electrical safety regulations of the country and region where the equipment is used must be strictly observed. The power supply matching and conforming to SELV (safety extra low voltage) shall be used, and DC5V 2A shall be used for power supply.

- The power adapter provided by the regular manufacturer shall be used. Please refer to the product parameter table for the specific requirements of power adapter.

- During wiring, disassembly and other operations, the power supply of the equipment should be disconnected, and live operation is not allowed.

Do not place the battery near the heat source or fire source to avoid direct sunlight.

- Batteries of correct specifications should be used, as improper use may cause explosion hazard. After the battery is installed or removed, it is required to close the battery compartment safely.

- Do not swallow the battery to avoid chemical burns.

Do not place the battery within the reach of children.

In case of a laser equipment, do not direct the laser at human eyes to avoid possible damage.



- After the laser is turned on, it is strictly forbidden to align the laser at the objects with strong reflection such as glass and mirror, to avoid damaging the thermal imaging detector by laser reflection.

• CAUTION

- After the laser is turned on, it is strictly forbidden to align the laser at the objects with strong reflection such as glass and mirror, to avoid damaging the thermal imaging detector by laser reflection.

- Do not direct the thermal imager at high temperature targets, such as the sun, laser, electric welding machine, etc., otherwise the thermal imaging detector will be damaged.

- The time interval between switching on and off should be more than 20 seconds.

- Because the thermal imager combines precise optical instruments and electronic equipment sensitive to static electricity, it is necessary to avoid objects falling on the equipment or vigorously vibrating the equipment, and keep the equipment away from the place where there is magnetic interference.

- The equipment should not be installed in the place where the surface vibrates or is vulnerable to be impacted as far as possible (ignoring this may damage the equipment).

Safety Precautions for Using

- It may cause damage to the thermal imager if it is used in the environment beyond the specification. Do not use the product in extremely hot, cold, dusty, corrosive, high salinity or high humidity environment. Please refer to the product parameter table for specific temperature and humidity requirements.

- When the thermal imager is not in use, and during transportation, remove the battery and place the thermal imager in a protective package.

- When the power is low during use, replace the battery in time to avoid damage caused by over discharge.

When the equipment is not in use, cover the lens cap to protect the image sensor.

- When it is necessary to clean the non optical surface of the thermal imager, do not use chemical solvents, diluents, etc. to scrub, but apply a clean, soft, dry flannel cloth to wipe the shell.

- The infrared lens of thermal imager is coated with a layer of anti-reflection film, which needs to be cleaned only when it is obviously dirty. Frequent scrubbing may cause wear of the lens coating. Please avoid touching the surface of the lens. The acid substance on the skin left by the fingerprint will damage the coating and the surface of the lens. Only use special lens cleaning wipes to clean the lens.

- If you connect your products to the Internet, you need to bear your own risks, including but not limited to network attack, hacker attack, virus infection, etc. NNPO will not be responsible for the abnormal operation of the products, information leakage and other problems caused by this, but NNPO will provide you with product related technical support in a timely manner.

Equipment access to the Internet may suffer network security problems, please enhance the protection of personal information and data security. When you find that the equipment may encounter network security risks, please contact us in time.

- Do not disassemble the thermal imager by yourself. In case of any failure, please contact the manufacturer in time, otherwise the warranty will not be granted.

- Keep all the original packaging materials of the equipment properly so that in case of any problem, the equipment can be packed with packing materials and sent to the service center for handling. NNPO shall not be liable for any accidental damage during transportation caused by the use of non original packaging materials.

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• 1 Product overview

RD23S is a good quality infrared thermal imaging monocular. It is light weight and compact size, easy to carry. Using the most advanced infrared thermal imaging night vision system, the image quality is excellent with high shock resistance. It can be snapshot captured, video recording, WIFI app connection with phone for transmission. It can meet various applications in law enforcement, outdoor hunting and other occasions, no matter it is day or night and no matter how bad weather conditions are.

• 2 Product features

- It is optional with laser rangefinder;
- Replaceable battery, no trouble with working hours;
- Excellent image processing, highlighting the target;
- 12 μ m pixel thermal sensor, clear image, long detection range;
- WIFI App remote control, Photo and video real time sharing on media



Thermal Imaging

•3 Main technical parameters

Detector	Uncooled 384 * 288/640*512
Pixel Size	12μm
Frame Frequency	50Hz;
Eyepiece display	1024*768 (OLED)
Digital Zoom	2×, 4×, 8×
Focal Length	19mm/25mm/35mm
Field of View (HxV)	384*288: 19mm 13.8°×10.4° / 25mm 10.9°×7.5°/35mm 7.5°×5.7° 640*512: 19mm 22.9°×18.4° / 25mm 17.5°×14°/35mm 12.5°×10°
Diopter (Range)	±5
Scene Mode	Jungle, Recognition
Calibration Mode	Shutter calibration, scene calibration, automatic calibration
Palettes	White hot, Black hot, Red hot, Green hot, Fusion, Iron red
Picture-in-Picture	Yes
WIFI	connection with phone
Cursor	Yes
Hot Track	Yes

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Snapshot capture /Video recording		Yes
Audio sound		Yes
Laser range finder		Optional
CVBS output		Composite video output (Via USB)
Firmware upgrade		Yes
Battery type		Single 18650 replaceble
Operating time(h,max)		Single battery > 4 hours
External power supply		TYPE-C interface
Housing (without LRF)		Aviation aluminum alloy
Housing (with LRF)		Aluminum alloy +plastic
Dimension	19mm focal length	155 mm ×59 mm × 70 mm
	25mm focal length	159 mm ×59 mm × 70 mm
	35mm focal length	159 mm ×59 mm × 70 mm
weight	19mm focal length	333g/353g
	25mm focal length	330g/350g
	35mm focal length	345g/365g
Protection level		IP66
Working temperature		-20℃~60℃

• 4 Packing configuration

The configuration of the thermal imager is as followings.

S/N	Item	Qty.
①	Thermal imaging scope	1 piece
②	18650 rechargeable battery	2 (optional)
③	Charger	1 piece
④	Operation & Maintenance Manual	1 piece
⑤	Lens cleaning wipes	1 piece

①



②



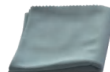
③



④



⑤



• 5 Operation

• 5-1 Thermal imager components



•5-2 Preparation before use

•5-2-1 Check

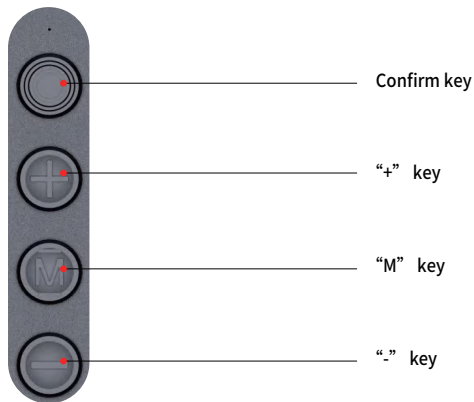
Check whether the lens, body, eyepieces and keys of the thermal imager are obviously damaged. Wipe the infrared objective lens with the lens cleaning wipes to ensure that the lens is clean.

•5-2-2 Install the battery






This product uses a single 18650 battery. Open the battery compartment cover and install the battery in the direction indicated by the positive and negative poles on the body.

• 5-3 Key function description

• 5-3-1 Keys (The keys of the thermal imager are as follows.)








The key description is as follows:

-  Power /Sleep Button: Power on/ Power off /Sleep mode switch
-  Confirm key: calibration, switching palette color, menu confirmation operations;
-  + key: Zoom , switching reticle, menu + operation
-  Menu key: enter or exit the menu,laser rangefinder on/off;
-  “-” key: Menu-operation, photo taking, video recording;
- There are two operation modes: short press and long press (hold 2 seconds)

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The function operation list is as follows:

Key	Trigger state condition	Press and release	Press and hold 2 seconds
	Shutdown status Sleep status Starting up - shortcut key	/ Starting up Sleep	Starting up Starting up Shutdown
	Shortcut key Menu operation	Switching palette color Menu confirmation operation	Calibration /
	Shortcut key Menu operation	Digital Zoom Move up menu options	/ /
	Shortcut key Menu operation	Ranging ON/OFF Return to previous menu/Exit menu	Enter main menu /
	Shortcut key Menu operation	Photo capture Move down menu options	Video recording /



•5-4 Power on/off

When the device is not turned on, press and hold  the power key for 2 seconds until the start screen appears on the display and the thermal imager is powered on .

When the device is turned on, press and hold  the power key for 2 seconds to turn off the thermal imager.



Refer to the figure below for the main view of the device display.






•5-5 Sleep mode

Sleep mode is used to save battery power. In the view mode, short press  the power key. After a second, the display will turn off. Press  the button again to exit the Sleep Mode.

•5-6 Shortcut key operation instructions

When the device does not enter the menu, some common functions can be operated quickly by pressing the keys.

- Digital zoom: short press  + key; zoom (× 1, × 2, × 4, × 8 sequence switching)
- Switching palette color: short press  confirm key;

- Calibration : long press  the confirm key(The device will perform non-uniformity correction according to the current calibration mode;)
- Laser rang finder ON/OFF: long press  +key (valid for Rangfinder Version device)
- Photo capture: when it not video recording, short press  ” -” key
- Video recording: long press  ” -” key
- Stop video recording: short press  ” -” key

Note: Shortcut key operation is only valid when the device does not enter the menu.

• 5-7 Thermal imager commissioning

• 5-7-1 Eyepiece visibility adjustment

In order to adapt to users with different vision, the thermal imager is designed with visibility adjustment. When **the interface icon or text on the screen is blurred**, it means that the visibility of the eyepiece does not match that of the user. Please adjust the visibility of the eyepiece.

Slowly rotate the visibility adjustment ring until **the icon and text in the screen is clearly visible**, it means that the visibility of the eyepiece has adapted to that of the user, and the visibility adjustment is completed.

•5-7-2 Infrared lens focusing

The lens of the thermal imager is provided with a lens focusing ring at the front of the lens.

After the thermal imager is turned on, the thermal imager should be aimed at the observation target, and the lens focusing ring should be rotated until the image is clear. When the distance of the observation target changes, the image may be blurred. The lens focusing ring should be rotated to refocus until **the target image is clear.**

Clockwise rotation of the focusing ring is far focusing, and counterclockwise rotation is near focusing.









• 5-8 Main image interface of thermal imager

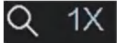
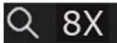
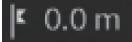


When the thermal imager is in the view observation interface, the image interface is as shown in the figure below.



In view observation interface, shortcut key operations can be performed, and shortcut operations are detailed in related section; .

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Status Item	Symbol	Option	Function
Power indicator		full charge	The battery is sufficient and can be used with confidence
		low-battery	Pay attention to charging or replacing the battery soon
		out of charge	The machine is about to fail to work before charging
		the battery is charging	The machine can be used normally while charging
Wi-Fi hotspot		Wi-Fi is connected	APP software can be used
		Wi-Fi is not connected	App software cannot be used
TF card status		The card is inserted	Photos and videos can be stored on the device
		The card is not inserted	Photos and videos cannot be stored on the device

Status Item	Symbol	Option	Function
Digital Zoom ratio		No digital zoom	No digital zoom, wider field of view
		8x digital Zoom	8x digital zoom, bigger target
Target LRF value	/	No LRF value	Disable LRF function
		Real-time LRF value	Enable LRF function and real-time ranging
Audio and video recording		Record video and sound at the same time	Playback with video and sound
		Record video without sound	Playback with video but no sound









• 5-9 Main image interface of thermal imager





When thermal imaging is in the menu operation interface, the image interface is as shown in the figure below.




In the menu operation interface, you can perform the operation of the menu bar.

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Menu Item	Symbol	Option	Function
palette		6 palettes settings to choose	Switch between six palettes
Brightness		10 levels of image brightness	Adjust the image brightness
Contrast		10 levels of image contrast	Adjust the image contrast
Scene mode		Jungle, Recognition	Switch between two modes
LRF		Off (default) /On	Enable or disable LRF
Image CALIB.		Auto, Shutter, Scene	Switch between three modes
PIP		Off/On	Enable or disable the PIP function.
Hot Tracking		Off/On	Enable or disable hot spot mark (marking the spot of highest temperature).

Menu Item	Symbol	Option	Function
Cursor		Off/On	Enable or disable cursor
Wi-Fi		Off/On	Enable or disable Wi-Fi
Audio		Off/On	Enable or disable audio
Setting		Set screen Lumi. , Auto-sleep, Auto-off, language, time synchronization, Restore , version etc	Setting system parameters and view the firmware number

• 5-9-1 Enter main menu

Press and release the  menu key, and a main menu will pop up on the left side of the screen.

After entering the operation menu interface, the key description is as follows:

1. Switch the menu item. Move the menu item up or down with the  "+" and  "-" keys.
2. Select the menu item. Select a menu item via  the Confirm key.
3. Modify the key value. Modify the key value with the  "+" key and  "-" key.

• 5-9-2 Palette

The infrared image can display different colors by adjusting the image palette (the adjustment of palette color band), so as to facilitate the users to observe and identify the target.

The thermal imager has 6 kinds of palette for users to choose, which are white hot, black hot, red hot, green hot, fusion, hot iron.

• 5-9-3 Brightness

The brightness of the scene image can be increased or decreased by adjusting the image brightness.

The thermal imager is designed with 1-10 levels of image brightness, which ranges from the darkest to the brightest. Users can choose the appropriate brightness according to their viewing habits and current environment.

•5-9-4 Contrast

The scene image can be increased or decreased by adjusting the image contrast to make the target more prominent.

The thermal imager is designed with 1-10 levels of image contrast, which ranges from the weakest to the strongest. Users can choose the appropriate contrast according to their viewing habits and current environment.

•5-9-5 Scene mode

Choose the scene mode suitable for the current use environment, jungle mode or recognition mode, to achieve better observation effect.


•5-9-6 Laser rangefinder

Laser ranging ON/OFF (valid for Ranging Version device)

•5-9-7 Calibration (correction)

Calibration (correction) can eliminate the snowflakes, jitters, fringes and so on, and make the image clearer.

In the process of using the thermal imager, the components of thermal imager will heat up due to long-time operation, which may cause snowflakes, jitters, stripes and so on in the infrared image, affecting the viewing experience. The user can correct the image and eliminate the abnormal image.

- Automatic calibration: the product automatically performs shutter correction;
- Shutter calibration: manually trigger shutter calibration by long pressing  the "Confirm" button .
- Scene calibration: manual calibration is needed and external uniform scene is used for correction;

Note: The effect of scene calibration is the best. Before scene calibration, the lens cap or other objects should be used to block the lens. The objects that block the lens should be flat and the temperature distribution should be uniform.

Note: In the process of correction, the image will solidify for 0.5 seconds, which is not abnormal in the thermal imager.

• 5-9-8 Picture-in-Picture

- PIP: NO/OFF

• 5-9-9 Hot track

- hot spot track on/off

When hot spot track is turned on, a cursor appears on the screen to identify the hottest spot in the scene.

•5-9-10 Cursor

Cursor display on/off

•5-9-11 WIFI

WIFI on/Off

When the WIFI is turned on, it can be connected with the mobile phone through WIFI, displayed and operated on the mobile APP.

•5-9-12 Audio sound

Audio sound on/off

Turn on the audio sound of recording, and the live sound will be recorded simultaneously into the video; turn off it, and the recorded video will have no sound.

•5-9-13 Setting

•5-9-13-1 Screen brightness

The brightness of eyepiece display screen can be increased or decreased by adjusting the screen brightness button.

The thermal imager is designed with 1-10 levels of screen brightness, which ranges from the darkest to the brightest. Users can choose the appropriate screen brightness according to their viewing habits.

Note: If the screen brightness is too high, long-term use may cause damage to vision.

•5-9-13-2 Automatic sleep

The automatic sleep function of device can be turned on and off, and the automatic sleep time is set;

After the automatic sleep is turned on, when the thermal imager has not been used for a long time and it is up to the automatic sleep time, the device will automatically enter the sleep status.

In the sleep status, most of the functions of the device will be turned off. After waking up, the device can be turned on quickly.

•5-9-13-3 Automatic shutdown

The automatic shutdown function of device can be turned on and off, and the automatic shutdown time is set;

After the automatic shutdown is turned on, when the thermal imager has not been used for a long time and it is up to the automatic shutdown time, the device will automatically shut down.

• 5-9-13-4 Language

Switch the operation language of thermal imager.

• 5-9-13-5 Time setting

Setting the time on the screen of the device

• 5-9-13-6 Firmware version

Indicating the firmware version


• 5-9-13-7 Default setting

Restore the factory default settings.

• 5-10 Defective pixel correction

"Defective pixel correction(DPC)" are persistent or often bright or dark pixel on the thermal imaging image, which may appear during use and can be corrected. Before you start switch the palettes mode to White Hot mode.



On the observation interface, press and hold the  "Confirm" and  "+" keys simultaneously to enter the Defective pixel correction setting interface.


Short press the  "M" key to select Axis, and short press again to switch the moving direction of the axis.

In the X-axis adjustment item, short press the  "+" and  "-" keys to adjust the X-axis direction of the reticle.

In the Y-axis adjustment item, short press the  "+" and  "-" keys to adjust the Y-axis direction of the reticle.

When the center position of the cursor reaches the defective pixel , short press the  "Confirm" button to correct the current defective pixel.

Press the  "+" and  "-" keys simultaneously to cancel the current defective pixel correction.

After all the defective pixel have been corrected, long press the  "Confirm" button to exit the current defective pixel correction interface and return to the observation interface.

• 5-11 Client software introduction

We recommend using the NNPO Connect software. Search the NNPO Connect software in App Store (iOS System) or Google PlayTM (Android System). Install the client software on your mobile phone first, and then connect your phone to the hotspot of the thermal device. Refer to related section for details of Wi-Fi hotspot connection.

1. Run the app and connect the phone with the device.
2. If the device is inactivated, set the password and activate it. If the device is activated, enter the password to add it to the app
3. When the device is added, the live view can be seen. You can view the interface of the monocular on the software. User can change such image parameters as brightness, contrast, zoom, palettes directly via phone as well as record video on phone/tablet memory.

• 6 Analysis and troubleshooting of common faults

If your instrument fails, first check the common faults shown in Table 5. If it is not caused by the following faults, please contact NNPO as soon as possible.

Fault detection	Fault location	Actions
The thermal imager will not start up after the power key is pressed and held	Whether the battery is installed correctly	Open the battery cover and check that the battery is installed in the opposite direction
	Whether the battery is fully charged	Take out the battery and charge it
	The battery cover is not tightened	Tighten the lens cap

After service

Fault detection	Fault location	Actions
Image is poor and blurred after starting up	Scene correction is not aligned with uniform temperature correction target Lens are out of focus	Cover the lens cap, or use other targets with uniform temperature distribution for compensation and correction Rotate the lens focus ring until the image is clear
Bright line, black edge and flower screen appear on the image	Image correction is not performed	Perform the compensation (correction) operation
Image is blurred	Lens are out of focus Infrared lens are contaminated	Rotate the lens focus ring until the image is clear Use special lens cleaning wipes to clean the lens
Different distances were observed	Lens are out of focus	Rotate the lens focus ring until the image is clear
The interface is not clear	The visibility of eyepiece is improper	Adjust the visibility according to the Manual

Fault detect	Fault location	Solution measure
The thermal imager is shut down suddenly during use	The battery compartment cover is loose	Tighten the battery compartment cover
The precision is decreased obviously during use	The connecting seat is loose	Check whether the connecting seat is fully locked
It is unable to shut down normally	It is unable to shut down	Press and hold the power button to force the shutdown

• 7 Maintenance and Service

After the observation is completed or if the target is not observed for a long time following the startup, it should be shut down in time to extend the effective utilization time of the thermal imager.

After service

The lens of thermal imager is an important optical component. Therefore, in the process of installation and use, oil stains and various chemical substances should be avoided to contaminate and damage the lens surface. After use, please cover the lens cap.

When the thermal imager is not in use, and during transportation, remove the battery and put the thermal imager in a safety box.

When the thermal imager is stored for a long time or does not work, it should be kept in a cool and dry environment as far as possible.

Do not use chemical solvents, diluents, etc. to scrub, but apply a soft, dry flannel cloth to wipe the thermal imager shell.

The lens of thermal imager only needs to be cleaned when it is obviously dirty. Please avoid touching the surface of the lens. The acid substance on the skin left by the fingerprint will damage the coating and the surface of the lens. Only use special lens cleaning wipes to clean the lens.

When it is not used for a long time, it should be electrified for check and correction once every six months.

After service

Thank you for choosing this product. Please read the Product Warranty Card carefully and keep it properly to be fully entitled to the perfect after-sales service support.

We will provide you with after-sales service according to the standard product warranty commitment. Please check the official website for details of after-sales service policy. Some of the information is excerpted as follows:

1. The warranty period starts from the date of the first purchase of the product, and the purchase date is subject to the invoice date of the purchased product. If there is no valid invoice, the warranty period will be calculated from the date of delivery. If the invoice date is later than the actual delivery date of the product, the warranty period shall be calculated from the actual delivery date of the

2.No warranty coverage (only some of the information is excerpted, please refer to the after-sales service policy for details)

- ① Exceeding the specified warranty period;
- ② Failure or damage caused by misuse, accident, modification, improper physical or operating environment, natural disaster, surge and improper maintenance or storage;

After service

- ③ Failure or damage caused by the products, software, services or behaviors of a third party
 - ④ Normal decolorization, wear and consumption during the use of the product;
 - ⑤ The product can run normally without interruption or error;
 - ⑥ Data loss or damage;
 - ⑦ Consumable parts, except for the failure due to material or process defects;
 - ⑧ Failure to show valid warranty certificate and valid original purchase invoice or receipt, alteration, replacement or tear of original serial number label, absence of serial number or inconformity of product model or number on warranty certificate with actual product;
 - ⑨ Any other circumstances in which the product is not used in accordance with the attached instructions or operation manual, or the product is not used in the intended function or environment, and it is confirmed that you have violated the operation manual.
3. NNPO will not be responsible for the additional promises made to you by the seller or any third party, and you should ask these third parties to fulfill them.

protection to fix card

User name	
Detailed address	
Tel	
Model	
S/N	
Date of purchase	
Seller	
Tel	

After service

Note:

1. You will be entitled to the free warranty within the warranty period and preferential service beyond the warranty period with this card.
2. This Warranty Card is only applicable to the products stated in it, which is valid after being sealed by the sales unit.
3. The warranty terms of special items shall be subject to the specific purchase and sale contract.