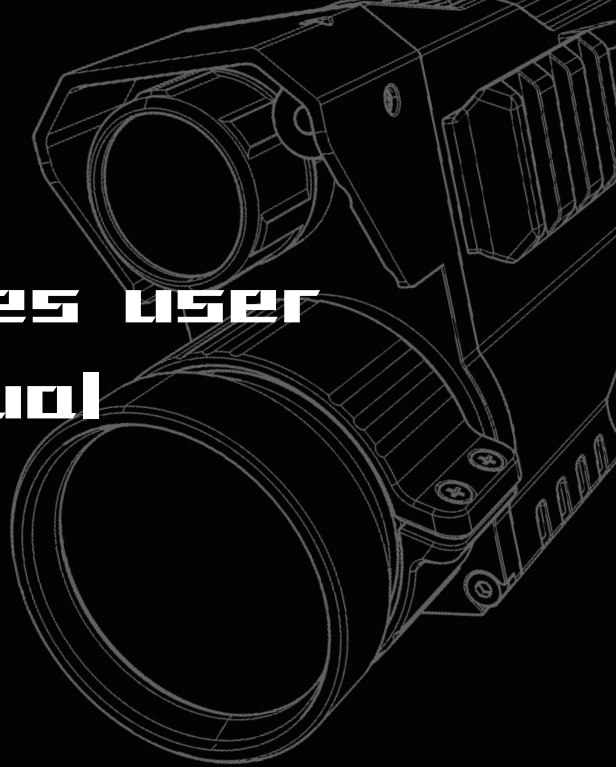


NNIPO

TR20 series user manual



Shenzhen NNPO Technology co., ltd

April.2021

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- **About this manual**

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• PREFACE

This manual explains how to use the thermal imager and matters needing attention. Please read the manual carefully before using the thermal imager, and use the thermal imager according to the standard operation method to avoid danger or property loss during operation. Please keep this manual properly for future reference.



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

Description of icons used in the manual:



— Warning, the words involved in danger or harm.

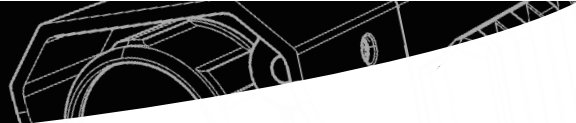


— Tips, additional instructions, or helpful techniques.



— Comments, a description of the meaning of words.

Precautions for safe use



• DANGER

- In the process of equipment installation and use, all electrical safety regulations of the using countries and regions must be strictly observed. Use a matched power supply that meets the requirements of SELV (safety extra low voltage).
- Please use the power adapter provided by the regular manufacturer. Please refer to the product parameter table for specific requirements of the 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 batteries to avoid chemical burns.
- Do not place the battery within the reach of children.
- If the equipment is laser equipment, do not direct the laser at human eyes to avoid possible harm to human eyes.

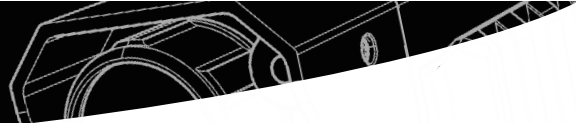
- After the laser is turned on, it is strictly forbidden to aim the laser at objects with strong reflection, such as glass and reflector, to avoid laser reflection damaging the thermal imaging detector.

• CAUTION



- Do not put the thermal imager directly at high-temperature targets, such as the sun, laser, welding machine, etc., otherwise the thermal imaging detector will be damaged.
- The time interval between two power-on and power-off should be greater than 20 seconds.
- The thermal imager combines precise optical instruments and electronic equipment sensitive to static electricity, so please avoid objects falling on the equipment or vibrating the equipment vigorously, and keep the equipment away from places where magnetic field interference exists.
- Avoid installing the equipment where the surface vibrates or is easily impacted (ignoring this item may damage the equipment).

Precautions for safe use



- Exceeding the use environment specified in this manual may cause damage to the thermal imager. Please 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, please take out the battery and place the thermal imager in a protective packaging box.
- When the battery is too low during use, please replace the battery in time to avoid damage to the battery caused by over discharge.
- When the equipment is not in use, please cover the lens protection cover to protect the image sensor.
- When it is necessary to clean the non-optical surface of the thermal imager, do not scrub with chemical solvents, thinners, etc., but wipe the shell with clean, soft and dry flannelette.
- The infrared lens of thermal imager is coated with an anti-reflection film, which only needs to be cleaned when it is obviously dirty. Frequent scrubbing of the lens may lead to wear of the lens coating. Please avoid touching the lens surface.

Acidic substances on the skin left by fingerprints will damage the coating and lens surface. Only use special lens cloth to clean the lens.

- If you connect your products to the Internet at your own risk, including but not limited to network attacks, hacker attacks, virus infections, etc., our company will not be responsible for the abnormal operation and information leakage of the products, but we will provide you with technical support related to the products in time.
- 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.
- Please do not disassemble the thermal imager by yourself. Please contact the factory in case of failure, otherwise no warranty will be given.
- Please keep all the original packaging materials of the equipment properly, so that in case of problems, the equipment can be packaged with packaging materials and sent to the service center for processing. Our company will not bear any responsibility for accidental damage in transit caused by non-original packaging materials.

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•1 Product overview

TR20 series is an excellent infrared thermal imaging scope. Compact design, small size, light weight and portable. Using the most advanced infrared thermal imaging night vision system with excellent image quality. It can meet the requirements of high shock vibration and can adapt to various harsh environments. There are a variety of aiming cursors can be selected, with the functions of taking pictures, video recording, WIFI transmission, etc., to meet various applications in law enforcement inspection, outdoor hunting and other occasions.

•2 Product features

- Light, small and powerful.
- The most advanced 12 μ m pixel, which provides clearer image and farther observation;
- The world's exclusive warm color display design, which protects the eyes even in case of long-term use.

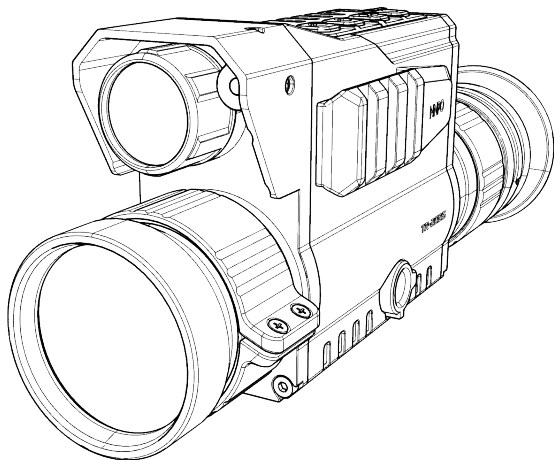


Figure 1 Thermal imager

- The only lighting auxiliary function in the world;
- APP remote control and real-time Internet streaming media;

·3 Main technical parameters

Resolution,Pixel	Uncooled 384*288
Pixel Size, micron	12μm
Refresh Rate	50Hz;
Display Resolution	1280*960 (LCOS)
Digital zoom	2×, 4×
Objective Lens	19mm/25mm/35mm
Field of View (HxV)	13.8°×10.4°/10.5°×7.9°/7.5°×5.7°
Eyerelief	40mm
Dioptre adjustment, dpt	±5
Calibration	Shutter Calibration, scene Calibration, automatic Calibration
Reticle	8 types and 5 colors;
palette	white hot,black hot,red hot,green hot,blue hot,amber,iron red,hot iron

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picture in picture	yes
flashlight	yes
Laser indicator	yes
WIFI	Connect with mobile APP
digital compass	yes
accelerometer	yes
Hot spot tracking	yes
Take pictures and videos	yes
video output	Composite video output
battery	1x 18650
Working hours	Single battery > 4 hours
External power supply	TYPE-C
Shell material	Aviation aluminum alloy

measure/ weight	19mm focal length	186mm*51mm*74mm	540g
	25mm focal length	189mm*51mm*74mm	560g
	35mm focal length	195mm*51mm*74mm	560g

the protection grades	IP67
Working temperature	-30°C~60°C

• 4 Packing configuration

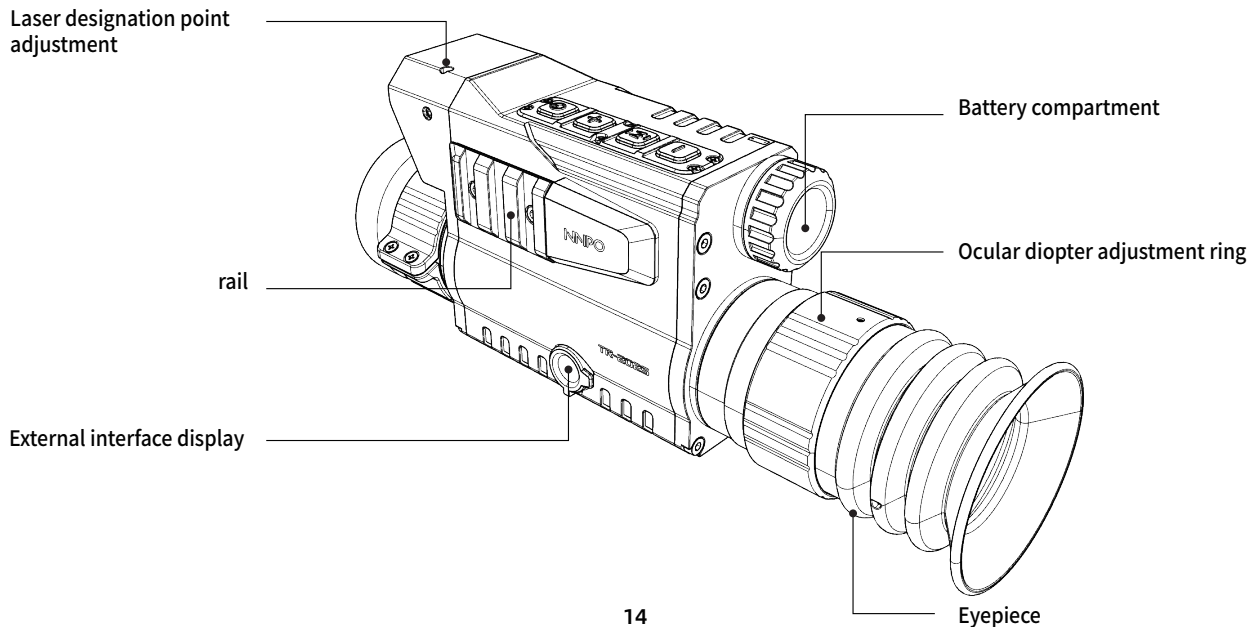
The thermal imager configuration is shown below.

item No	item description	quantity
①	Thermal imager	1 piece
②	Model 18650 rechargeable battery	2pieces (optional)
③	charger	1 piece
④	User manual	1 piece
⑤	Wipe cloth	1 piece
⑥	tool kit	1 set

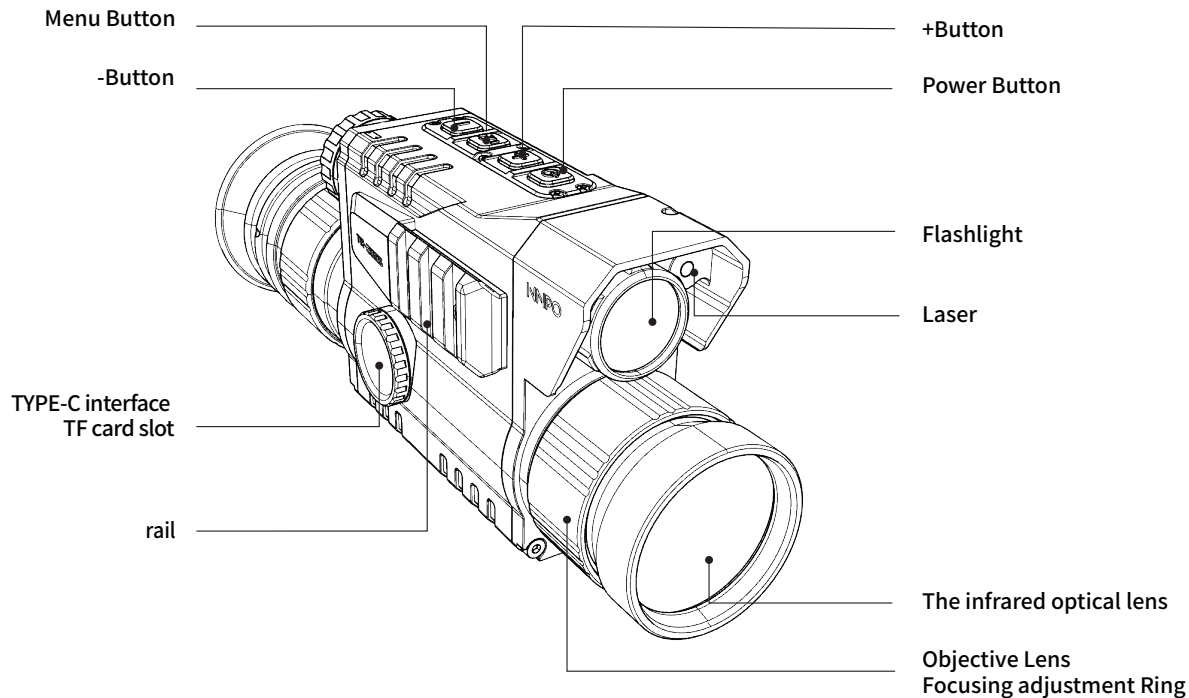


• 5 Use operation

• 5-1 Components of thermal imager



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• 5-2 Preparation before use

• 5-2-1 Check

Check whether the lens, body, eyepiece and keys of the thermal imager are obviously damaged, and wipe the infrared lens with a lens cloth to ensure that the lens is clean.


• 5-2-2 Battery installation

This product uses a single 18650 battery. Open the battery compartment cover and load the battery in the direction indicated by the positive and negative poles of the fuselage.




• 5-3 Key function description

• 5-3-1 The thermal imager buttons are shown below.

Key descriptions are as follows:

-  : confirm operation of power ON/OFF, ranging ON/OFF , menu Enter and standby mode;



-  : zoom, laser indication ON/OFF, palette ON/OFF, menu+operation;
-  : enter or exit shortcut menu/main menu and flashlight switch;
-  : photo taking, video recording, Calibration, menu-operation;
- Keys can be divided into three operation modes: short press, long press (3 seconds) and double click (short press twice in a row).

The function operation list is as follows:

Button	Trigger state condition	Short press	Long press for 3 seconds	Double click (short press twice in a row)
Powerkey	Power OFF status	/	Power ON	/
	Sleep state	Wake up	Wake up	/
	At power on-shortcut key	Sleep	Power OFF	Ranging on/off
	At power-on-menu operation	Enter key	Power OFF	/

Button	Trigger state condition	Short press	Long press for 3 seconds	Double click (short press twice in a row)
+key	shortcut key	Zoom	Laser indicator on/off	Switching Palette color
	Menu operation	Move up menu options	/	/
menu	shortcut key	Enter the shortcut menu	Enter the main menu	Flashlight on/off
	Menu operation	Back to advanced menu/exit menu	/	/
-key	shortcut key	Photo taking stop recording	Start/stop recording	Calibration
	Menu operation	Move down menu options	/	/

•5-4 Power On/Off

When the product is not turned on, press the power button for 3 seconds until the boot screen appears on the eyepiece screen and the thermal imager starts.

After self-checking, infrared images are displayed on the eyepiece screen.

When the product is turned on, press the power button for 3 seconds, and the thermal imaging is turned off.



• 5-5 Key shortcut operation instructions

- Zoom : press the **+** key briefly; Electronic image magnification ($\times 1$, $\times 2$, $\times 4$ switching in sequence)
 - Switch Palette : double-click the **+** key;
 - Laser indicator ON/OFF : long press **+** key;
 - Flashlight ON/OFF : double - click the menu key;
 - Photo taking : when not recording, press the **-** key briefly;
 - Start recording : when not recording, long press **-** key;
 - Stop recording : when recording, press the **-** key short or long;
 - Calibration : double click the **-** key; (The equipment will perform Calibration according to the currently set Calibration method;)
 - Laser ranging switch : double click the power button; (the ranging version is valid)
- Shortcut key operation is only valid when the product does not enter the menu.



• 5-6 Commissioning of thermal imager

• 5-6-1 Eyepiece vision adjustment

In order to adapt to users with different eyesight, the thermal imager is equipped with visual degree adjustment. When the interface icon or text on the screen is blurred, it means that the eyepiece visual acuity does not match the user visual acuity. Please adjust the eyepiece visual acuity.



Slowly rotate the vision adjusting ring until the icon text in the picture is clearly visible, then the eyepiece has adapted to the user's eye vision, and the vision adjustment is completed.

• 5-6-2 Focusing of infrared lens

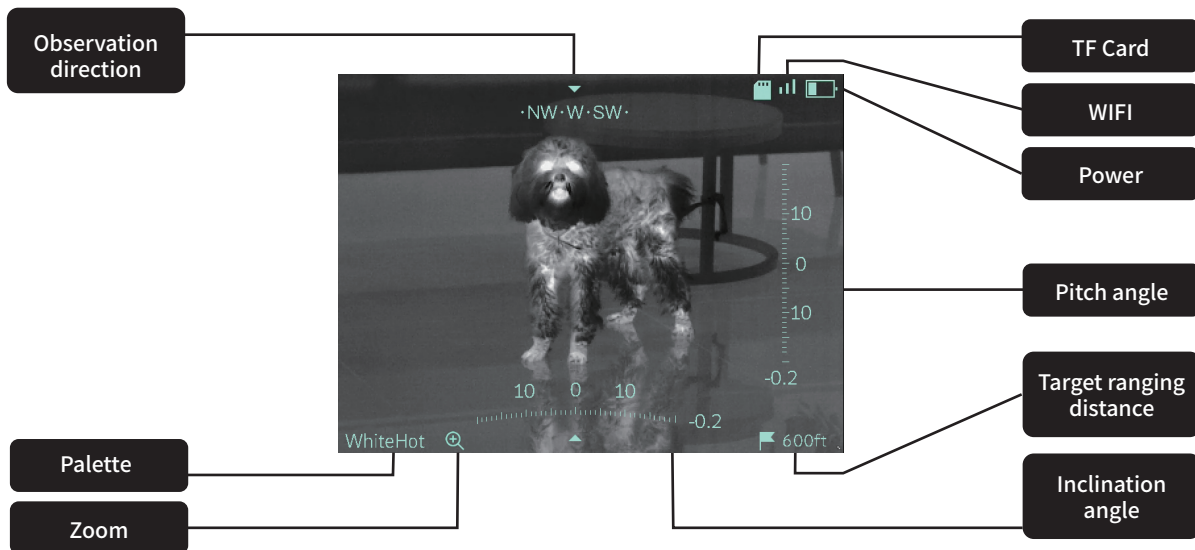
The lens of the thermal imager is provided with a lens focusing ring at the front of the lens.

After the thermal imager is turned on, aim the thermal imager at the observation target and rotate the lens focusing ring until the image is clear. When the distance of the observed target changes, the image may be blurred. Turn the lens focusing ring to refocus until the target image is clear.

The focusing ring rotates clockwise for close focus and counterclockwise for long focus.

•5-7 Main image interface of thermal imager

The image interface of thermal imager without menu operation is shown in the following figure.





•5-8 Operating instructions of thermal imager shortcut menu

•5-8-1 Enter the shortcut menu



Press the menu button briefly, and the shortcut menu pops up on the left side of the screen.

•5-8-2 Calibration

Calibration can eliminate snowflakes, jitter, stripes, etc., and make the image clearer.

In the process of using the thermal imager, due to long-time operation, the thermal imager device heats up, which may cause snowflakes, jitter, stripes, etc. in the infrared image, affecting the viewing experience. Users can correct the image and eliminate image anomalies.

- ☐ • Automatic Calibration: the product automatically performs shutter compensation;
- Shutter Calibration: manual compensation is required, and internal baffle is used for correction;
- Scene Calibration; Manual compensation is required, and external scenes are used for correction.

-  The effect of scene Calibration is the best. Before performing scene Calibration, please use the lens cover and other objects to block the lens. The objects that block the lens should be flat and have uniform temperature distribution.
-  During the calibration process, the image will solidify for 0.5 seconds, which is not an abnormality of the thermal imager;

• 5-8-3 picture in picture

- OFF
- upper left
- Upper middle
- upper right

• 5-8-4 laser ranging

Laser ranging on/off; (the ranging version is valid)

• 5-8-5 Hot spot tracking

Hot spot tracking on/off;

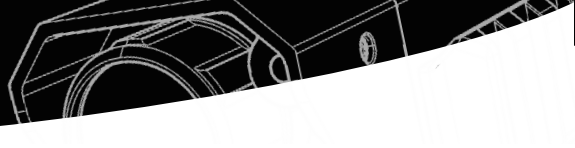
When hot spot tracking is turned on, a cursor appears on the screen to identify the hottest spot in the scene.

• 5-8-6 compass

Compass information display on/off;

When compass information is turned on:

- The observation direction display appears at the top of the screen;
- Pitch angle display appears on the right side of the screen.
- The tilt angle display appears at the bottom of the screen.



• 5-8-7 WIFI

WIFI on/off;

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

• 5-8-8 Low Power

Low Power function on/off;

When the Low Power function is turned on, the system enters the power-saving working state, the WIFI function cannot be used, and the screen brightness decreases.

• 5-9 Operating instructions of main menu of thermal imager

•5-9-1 Palette

Image polarity adjustment (pseudo-color band adjustment) can make infrared images display in different colors, which is convenient for users to observe and recognize targets.

The thermal imager is provided with eight palettes for users to choose from, namely white hot, black hot, red hot, green hot, blue hot, amber, iron red, hot iron.

•5-9-2 bright

 Image brightness level can increase or decrease the brightness of the scene image.

The thermal imager is provided with 1-10 image brightness options, and the brightness from 1 to 10 is from darkest to brightest. Users can choose appropriate brightness according to their personal viewing habits and current environment.



•5-9-3 contrast

- ✎ Image contrast adjustment can increase or decrease the contrast of the scene image and make the target more prominent.

The thermal imager is provided with 1-10 image contrast options, and the contrast ratios from 1 to 10 are from weakest to strongest. Users can choose appropriate contrast according to their personal viewing habits and current environment.

•5-9-4 Sharp

Image sharpness adjustment can make the edge of the observed target more obvious and make the target outline clearer.

The thermal imager is equipped with 1-5 grades of image sharpness, and the sharpness from 1 to 5 grades is from the weakest to the strongest. Users can choose appropriate sharpness according to their personal viewing habits and current environment.

• 5-9-5 setting

• 5-9-5-1 calibration

Same operation as shortcut menu

• 5-9-5-2 picture in picture

Same operation as shortcut menu

• 5-9-5-3 Hot spot tracking

Same operation as shortcut menu

• 5-9-5-4 screen Brightness

Screen brightness level can increase or decrease the screen brightness of eyepiece display.



The thermal imager is equipped with 1-10 screen brightness options, and the 1-10 screen brightness ranges from weakest to strongest. Users can choose appropriate screen brightness according to their personal visual habits.

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



• 5-9-5-5 Automatic sleep

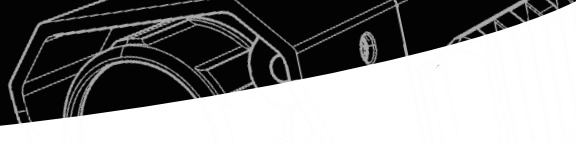
The automatic sleep function is turned on and off, and the automatic sleep time is set;
After the automatic sleep is turned on, the device will automatically enter the sleep state after the thermal imager is not used for a long time and reaches the automatic sleep time.
In the sleep state, most functions of the device will be turned off, and the device can be turned on quickly after waking up the sleep.

• 5-9-5-6 automatic OFF

The automatic shutdown function is turned on and off, and the automatic shutdown time is set;
After the automatic shutdown is turned on, the equipment will automatically shut down after the thermal imager has not been used for a long time to reach the automatic shutdown time.

• 5-9-5-7 Reset

Restore the factory default settings;



• 5-9-6 Advanced settings

• 5-9-6-1 Reticle Type

The thermal imager is provided with 8 types of dividing lines to choose from.

• 5-9-6-2 Reticle color

The thermal imager is provided with five kinds of dividing line colors to choose from. They are white, black, red, green and yellow.

• 5-9-6-3 Model

The thermal imager is equipped with 6 modes, which can preset the brightness and contrast in different scenes, and can quickly switch during use.



•5-9-6-4 Zeroing

When the thermal imager is installed on different equipment, the zero position will be different.

When the thermal imager is replaced with assembly equipment, zero calibration is required.

Zero calibration can be carried out at A,B and C .

- X: move the dividing line left and right;
- Y: move the dividing line up and down;

•5-9-6-5 language

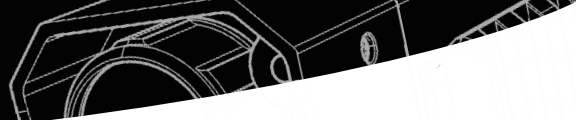
Switch the operating language of the thermal imager.



• 6 Analysis and elimination of common faults

If your instrument fails, first check the common failures shown in Table 5. If the causes are not listed below, please contact our company as soon as possible.

Fault detect	Fault location	Solution measure
The thermal imager does not start after pressing the power button for a long time	When the battery installed correctly	Open the battery cover and check whether the battery is loaded in the opposite direction
	Whether the battery charged enough	Take out the battery and charge it
	The battery cover is not tightened	Tighten the lens cover



Fault detect	Fault location	Solution measure
The image quality is poor and the image is blurred after starting up	Scene correction is not aligned with the uniform temperature correction target The lens is out of focus	Cover the lens cover, or use other targets with uniform temperature distribution for compensation and correction Rotate the lens focusing ring until the image is clear
The image appears bright lines, black edges and colorful screens	Image correction is not performed	Perform a compensation (correction) operation
Imaging blur	The lens is out of focus Contamination of infrared lens	Rotate the lens focusing ring until the image is clear Clean the lens with a special lens cloth
Observe different distances	The lens is out of focus	Rotate the lens focusing ring, Until the image is clear
Unclear interface	Inappropriate eyepiece vision	Adjust the visual acuity according to the instructions



Fault detect	Fault location	Solution measure
During use, the thermal imager suddenly shuts down	Loose battery compartment cover	Tighten the battery compartment cover
In the process of use, the precision drops obviously	Loose connecting seat	Check whether the connecting seat is completely locked
Unable to shut down normally	Unable to shut down	Press and hold the power button for forced shutdown

• 7 maintaining

If the target is not observed for a long time after the observation is finished or started, it should be shut down in time to prolong the effective utilization time of the thermal imager.



The lens of thermal imager is an important optical component. During installation and use, avoid oil stains and various chemical substances from contaminating and damaging the lens surface. After use, please cover the lens cover.

When the thermal imager is not in use and during transportation, please take out the battery and place the thermal imager in the safety box.

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

Do not scrub the thermal imager housing with chemical solvents, thinners, etc., but clean, soft and dry flannelette.

The thermal imager lens only needs to be cleaned when it is obviously dirty. Please avoid touching the lens surface. The acidic substances on the skin left by fingerprints will damage the coating and lens surface. Only use special lens cloth to clean the lens.

When it is not used for a long time, it should be checked and corrected once every six months.

Thank you for choosing this product. In order to fully enjoy the perfect after-sales service support, please carefully read terms of product warranty card after purchase and keep it properly.

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

1. The warranty period starts from the first purchase date 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 product delivery date. If the invoice date of the product is later than the actual delivery date of the product, the warranty period shall start from the actual delivery date of the product

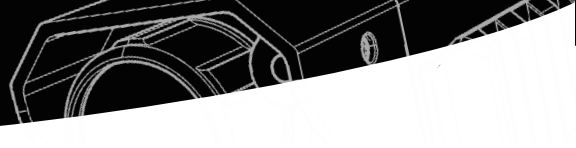
2. No warranty scope (only excerpts, please refer to the after-sales service policy for details):

- ① beyond the prescribed warranty period;
- ② Faults or damages caused by misuse, accident, modification, inappropriate physical or operating environment, natural disasters, surge and improper maintenance or storage;
- ③ Faults or damages caused by third-party products, software, services or behaviors;

- ④ normal decolorization, wear and consumption during product use;
- ⑤ The product can run normally without interruption or error;
- ⑥ Data loss or damage;
- ⑦ Consume spare parts, unless it is a failure due to material or process defects;
- ⑧ Unable to produce valid product warranty certificate and valid original purchase invoice or receipt, the original serial number label of the product is altered, replaced or torn, the product has no serial number or the product model or number on the warranty certificate is inconsistent with the real product;
- ⑨ The product is not used according to the attached instructions and operation manual, or the product is not used for the intended function or environment, which has been confirmed by NNPO lithography

After that, determine any other circumstances in which you violate the operation manual.

3. The Company is not responsible for the extra promises made by the seller or any third party, and you should ask these third parties to honor them.



protection to fix card

User name	
Detailed address	
Tel	
Product model	
Product number (S/N)	
Purchase date	
Seller	
Tel	



Note:

1. Enjoy free warranty during the warranty period and preferential services outside the warranty period with this card.
2. This warranty card is only applicable to the products in this warranty card, and is valid only after being stamped by the sales unit.
3. The product warranty clauses of special projects shall be subject to the specific purchase and sale contract.

MOBILE APPLICATIONS

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Android



Brand: NNPO

Product model: TR20

Service hotline: 0086-0755-2790 1239

Official website: www.nnpotech.com

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