

TS series thermal imager Operation Manual



Publisher' s Note

This Operation & Maintenance Manual provides detailed information on the operation method and precautions of the thermal imager. In order to safeguard the personal safety of operators, reasonably and effectively maintain and use the thermal imager, and guarantee the normal service life of the thermal imager, please carefully read and strictly obey the following operation specifications before using the thermal imager.

Before publication of a new manual, operation and maintenance of light thermal imagers shall be subject to this Operation & Maintenance Manual, and other materials are for reference only.

In case of any problem found in the use of the product, please contact us as soon as possible for further study and modification.

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Warning Page

Warning

① Do not directly expose the thermal imager to high intensity radiation sources such as the sun, carbon dioxide laser and electric welding machine.

② As the thermal imager combines precision optical instruments and electrostatically sensitive electronic devices, do not throw, beat or vibrate the thermal imager and its accessories at will to avoid deformation of structural members or installation dimension.

③ Do not disassemble the thermal imager by yourself. Contact the manufacturer in case of failure. Otherwise, we are not responsible for warranty repair.

④ When the thermal imager is not used or during transportation, take batteries out, and put the thermal imager in a protective packing case.

⑤ Replace the battery duly when the battery capacity is low during use to avoid damage to it due to over discharge.

⑥ Service environment beyond this manual may damage the thermal imager.

Notes 1

① To clean non-optical surfaces of the thermal imager, do not scrub with chemical solvent or diluent, and wipe the shell with a piece of clean, soft and dry flannel.

② As a layer of anti-reflection film is coated on the infrared lens of the thermal imager, cleaning is required only when there is an obvious dirty, scrubbing the lens frequently may damage the coating of the lens. Avoid touching the surface of the lens as acid materials on skin left by fingerprint will damage the surfaces of the coating

and lens. Use only special lens cloth to clean the lens.

③After observation or when the target is not observed for a long period of time after power-on, power the thermal imager off in time to prolong its effective utilization time.

Notes 2

①Install the battery of the thermal imager positively or negatively without positive and negative difference.

②Before disassembling the battery, make sure that the thermal imager is powered off. Otherwise, the thermal imager will be seriously damaged if the battery compartment is uncovered to disassemble the battery when the thermal imager is powered on.

③Before the thermal imager is first used, make sure to charge batteries for at least 5h.

④Use auxiliary batteries of the thermal imager.

⑤Do not disassemble, throw up or short-circuit batteries to prevent any accident.

⑥Immediately stop using batteries with overheating, discoloration, deformation, smell or other abnormal phenomena during use, charging and storage.

Notes 3

①After restore factory, all zeroing data will be lost, need to zeroing anew.

②Before performing scene calibration, make sure that the lens cover is closed or the lens is evenly aligned;

Operation Manual

1、 Main Performance and Technical Parameters

Model	TS425	TS435	TS450
Detector			
Detector type	400×300 uncooled infrared detector		
Pixel size	17μm		
Optical properties			
Focal length	25mm	35mm	50mm
Visual angle	14.9×11.2	10.7×8.0	7.5×5.6
Focusing	Manual focusing, from 10m to infinity		
Display			
Eye lens	1024*768 color OLED		
Visibility regulation	-4°~+4°		
Machine magnification	1.6~6.4X	2.3~9.2X	3.3~13.2X
Aiming properties			
Model select	6 models		
Reticle type	10 kinds		
Reticle color	blank、 white		
Graduation and alignment precision	≤1mil		
Image display			

Palette	White hot、blank hot、red hot1、red hot2、red hot3、green hot、blue hot		
Zoom-in	2X、4X、PIP		
Brightness	Adjustable		
Contrast	Adjustable		
Other functions			
Ranging	0.25m、0.5m、1.8m sizes target		
Calibration model	Automatic、Scene、Shutter		
Hot track	Adjustable		
PIP	Adjustable		
Screen BRI	Adjustable		
Stand-by	Adjustable		
Auto power-off	Adjustable		
Power			
Battery	Rechargeable single 18650 lithium battery		
Working hours	≥ 3 hours (@25°C, Standard low temperature battery) ≥ 5 hours (@25°C, Panasonic 3400mah 18650)		
Detecting distance (km)			
Human (1.8m*0.5m)	0.7	1	1.4
Car (2.3m*2.3m)	1.7	2.4	3
Recognition distance (km)			
Human (1.8m*0.5m)	0.35	0.5	0.7

Car (2.3m*2.3m)	0.7	1	1.4
Reliability			
Level of protection	IP67		
Reverse battery connection protection	No positive and negative difference, installed positively or negatively		

2、Packing list

S/N	Description	Qty.
1	Thermal imager	1
2	18650 rechargeable battery	1
3	Operation Manual	1
4	Charger	1
5	Video output line	1
6	Safety box	1

3. Use and operation

3.1 Parts of thermal imager





3.2 Battery installation

The thermal imager uses a single 18650 battery which shall be installed in the following:



3.3 Button functions

S/N	Button	Graphical representation	Functions
1	Power button		Power-on, power-off
2	Hand wheel		Press: enter menu/determine function Rotation: select function

3.4 Power-on/off

3.4.1 Power-on

Long press the power button until a startup picture display on the eyepiece screen, and start the thermal imager.

3.4.2 Display off

Long press the power button to display a 'shutdown progress bar' on the eyepiece screen, before completion of the shutdown progress, release the power button, it go into display off mode, then the screen off. In the state, press any button to display on.

3.4.3 Power-off

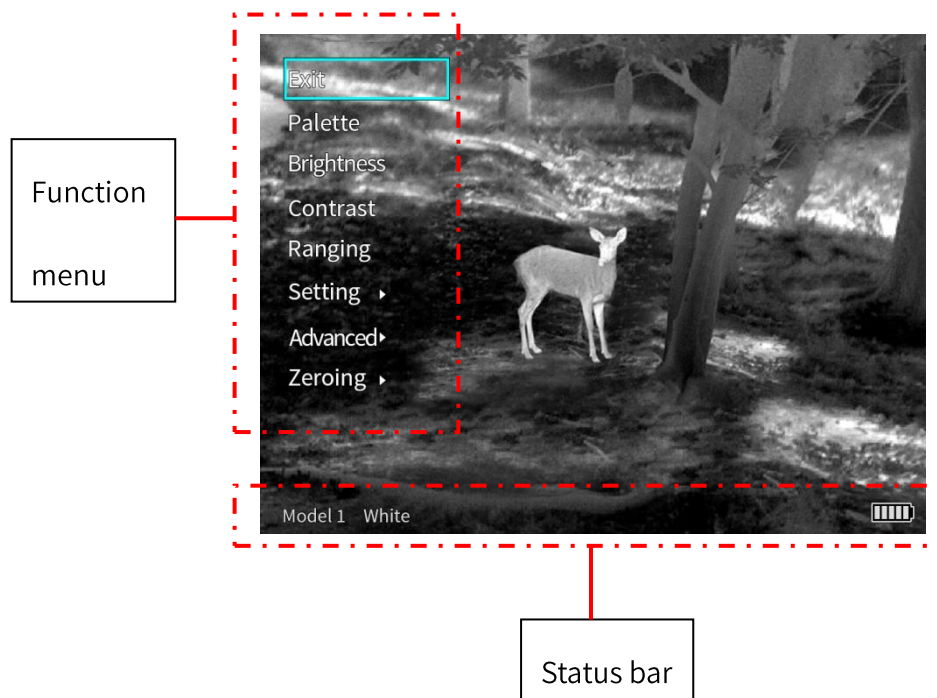
Long press the power button to display a 'shutdown progress bar' on the eyepiece screen, after completion of the shutdown progress, release the power button, power off.

3.5 Image interface

Image interface of the thermal imager without operation,



Image interface of the thermal imager with key operation,



3.5.1 Function menu

Press the hand wheel to pop up the function menu in the image left, carry out all thermal imager functional operation in the menu.

Enter the menu: Press the hand wheel to pop up the function menu.

Exit the menu: Select the 'Exit' in the menu top, press the hand wheel to exit the function menu.

Selection function: Rotate the hand wheel to select the box, and then select such function.

Enter function: Press the hand wheel to enter such function adjustment.

3.5.2 Status bar

It is below the image and displays the current model, palette and electric quantity

status.

3.6 Image adjustment

3.6.1 Calibration

During use of the thermal imager, devices of the thermal imager will go hot after long-time operation, which may cause snow, jitter, strip, etc. in infrared images, thus influencing watch experience. The user can choose the calibration mode to correct images according to the demand, and remove abnormalities.

In the scene or shutter calibration mode, short press the power button to correct, it' s will display 'Calibration completed' on the screen, calibration completed.



In the auto calibration mode, the device automatically corrects the image quality without any action.

3.6.2 Zoom in

There are many optional zoom-in modes: 1X, 2X, 4X and PIP. The position of PIP is adjustable, see the 'PIP' chapter for details.

Operation procedure:

When the menu bar is not displayed, rotate the hand wheel up/down to switch zoom in modes, and the reticle line is synchronized to zoom in.

1X: The main screen is displayed in the original size.



2X: The central cursor area of the image is zoomed to 2 times with full screen.



4X: The central cursor area of the image is zoomed to 4 times with full screen.



PIP: The main screen displays the original screen; images magnified by a factor of two are displayed in the window above the screen.



3.6.3 Palette

The thermal imager is set with many image colors for users to select, that is white hot, black hot, red hot1, red hot2, red hot3, green hot and blue hot.

Through palette adjustment, infrared image can be displayed with different colors, which is convenient for users to observe and identify targets.

3.6.4 Brightness

The thermal imager is set with 1-10 levels of image brightness for adjustment, and the levels of brightness 1-10 are from the darkest to the brightest.

Users can select corresponding brightness according to their own watch habits and the current environment.

3.6.5 Contrast

The thermal imager is set with 1-10 levels of image contrast for adjustment, and

the levels of contrast 1-10 are from the darkest to the brightest.

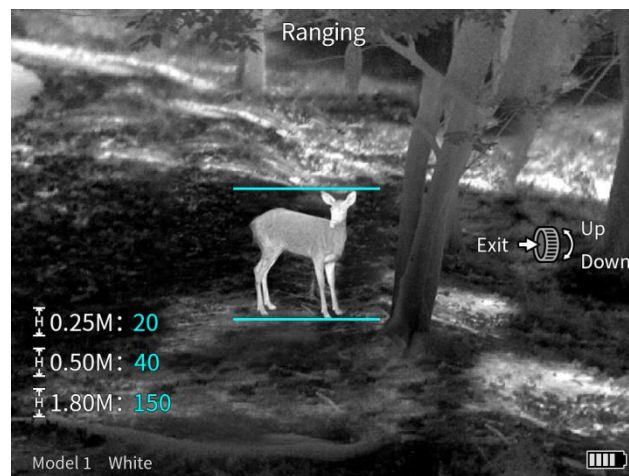
Users can select corresponding contrast according to their own watch habits and the current environment.

3.6.6 Ranging

The ranging function can estimate the distance of a target by a known target distance. Three examples of targets are available on the device as a reference: 0.25m, 0.5m, 1.8m, and real-time display of distance information of the three animals.

Operation procedure:

- 1、 Press the hand wheel, enter the menu, rotate the hand wheel, select the 'Ranging' in the box, press the hand wheel to enter the ranging function;



- 2、 Align the lower horizontal line with the bottom of the target image, rotate the hand wheel up/down to change the width between the upper and lower horizontal lines until the upper horizontal line is aligned with the top of the target icon. At this time, the distance can be calculated and displayed automatically.

- 3、 By comparing the target size with the three reference animal sizes, the user

can roughly calculate the distance of the target.

3.7 Zeroing

Since the thermal imager is assembled on different equipment, the zero position will be different. When the equipment equipped with thermal imager is changed for the first time, the thermal imager must be subject to zero calibration.

‘Model select’ prior to zero calibration. After position storage is completed for the current zero calibration, the zero calibration will be automatically stored in the selected model.

For each model, one zero calibration position can be stored. The thermal imager can at most store zero calibration positions of 6 models. The zero calibration distance of the thermal imager is defaulted to be 100m. Users may select the zero calibration distance according to their own field conditions.

Principle of zero calibration of thermal imager: the aiming point on the reticle line is moved to the actual point of impact according to its position to complete calibration.

Enter the ‘advanced’ menu — select ‘model select’ — return to main menu — select ‘zeroing’ — enter the zero calibration interface — select ‘zeroing distance’ — shooting — moving the cursor aiming point to the actual point of impact — save and exit.

Operation procedure:

- 1、 Short press the menu, enter the menu, rotate the hand wheel to select

'advanced', press the hand wheel to enter 'advanced menu', rotate the hand wheel, select 'model select', complete model selection, select Return to return to main menu;



2、 Rotate the hand wheel, select zeroing;





3. Short press the hand wheel, enter the zero calibration distance selection;

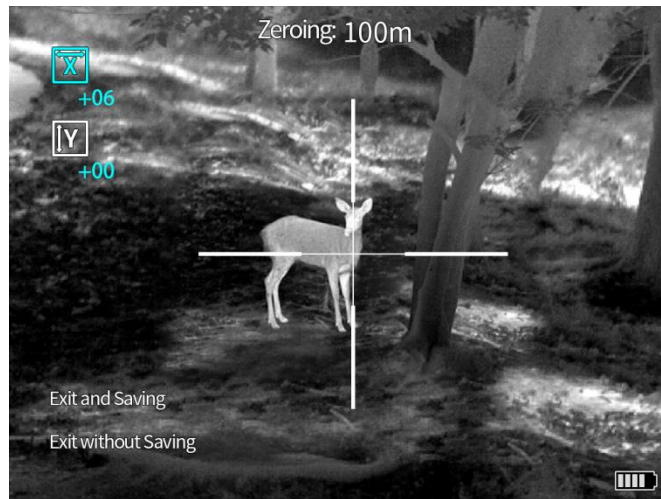


4. Aim the expected point of impact with the center of the reticle line, shoot, and calculate the relative distance from the actual point of impact to the expected hit point.

5. Select the "X" or "Y" direction according to the relative distance, and move the aiming point in the centre of the reticle line to the actual point of impact;

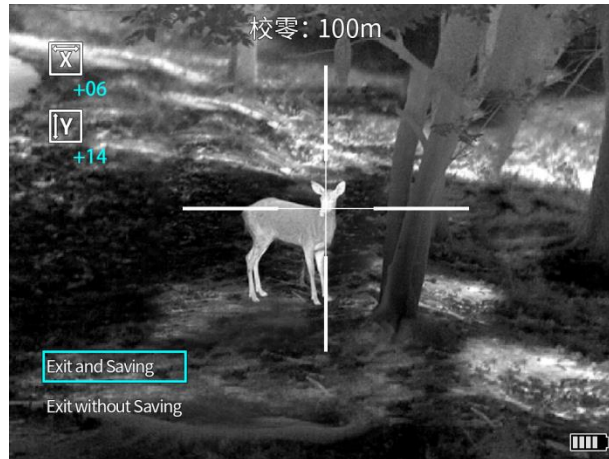
- 1) Rotate the hand wheel, and select the "X" or "Y" direction in the box, and press the hand wheel to enter adjustment;

- 2) Rotate the hand wheel, move the aiming point in the centre of the reticle line to the actual point of impact;



6、 Aim at the expected hit point with the aim line adjusted, and shoot. Adjust the position of the reticle line in the image again according to the actual point of impact till hitting the expected hit point;

7、 Complete zero calibration, select save and exit to exit zero calibration. If do not want to store the zero calibration position, see exit without saving, exit zero calibration.



3.8 Advanced

Enter the ‘advanced’ menu, in order to facilitate the browsing of the reticle line style, the reticle line is automatically adjusted to the center of the screen. When you exit this menu, the reticle line is restored to its original position.

3.8.1 Model select

The thermal imager can at most store zeroing positions of 6 models. If the user has stored zero calibration positions of several models, after the equipment equipped with thermal imager is replaced, please select the model of the current equipment, the thermal imager will automatically adapt the aim line position to the current model, to ensure better observing and aiming accuracy.

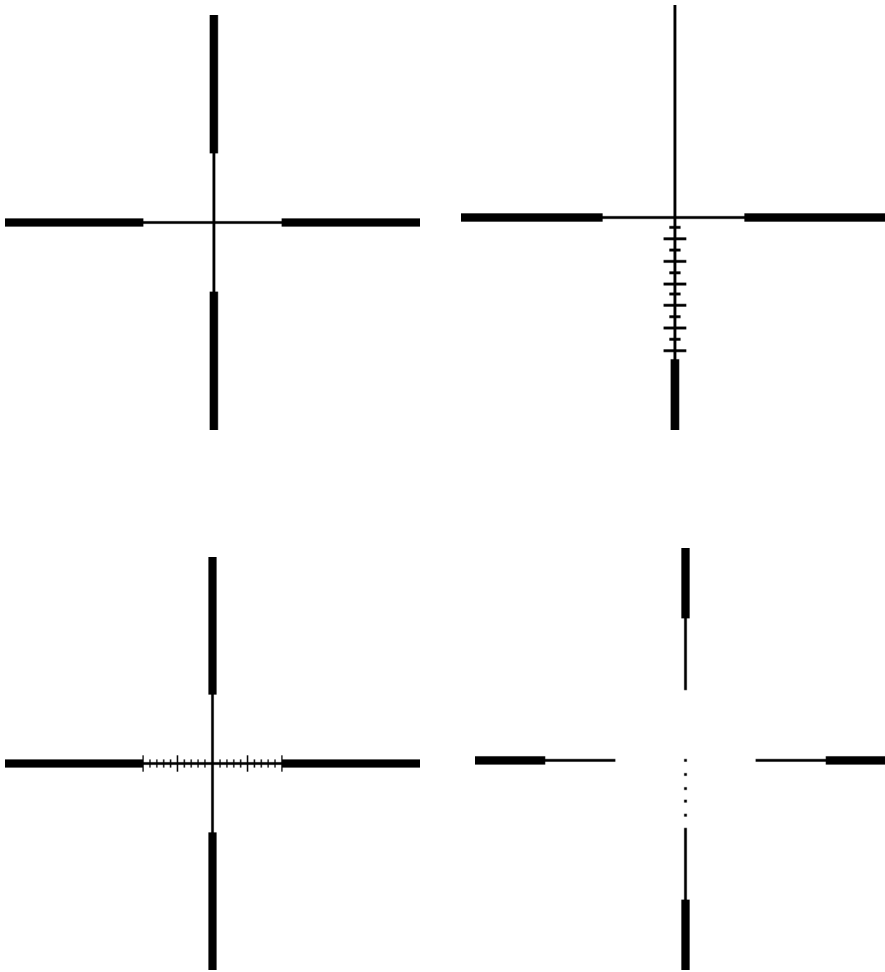
Enter the ‘advanced’ menu – select ‘model select’ – select model – exit menu.

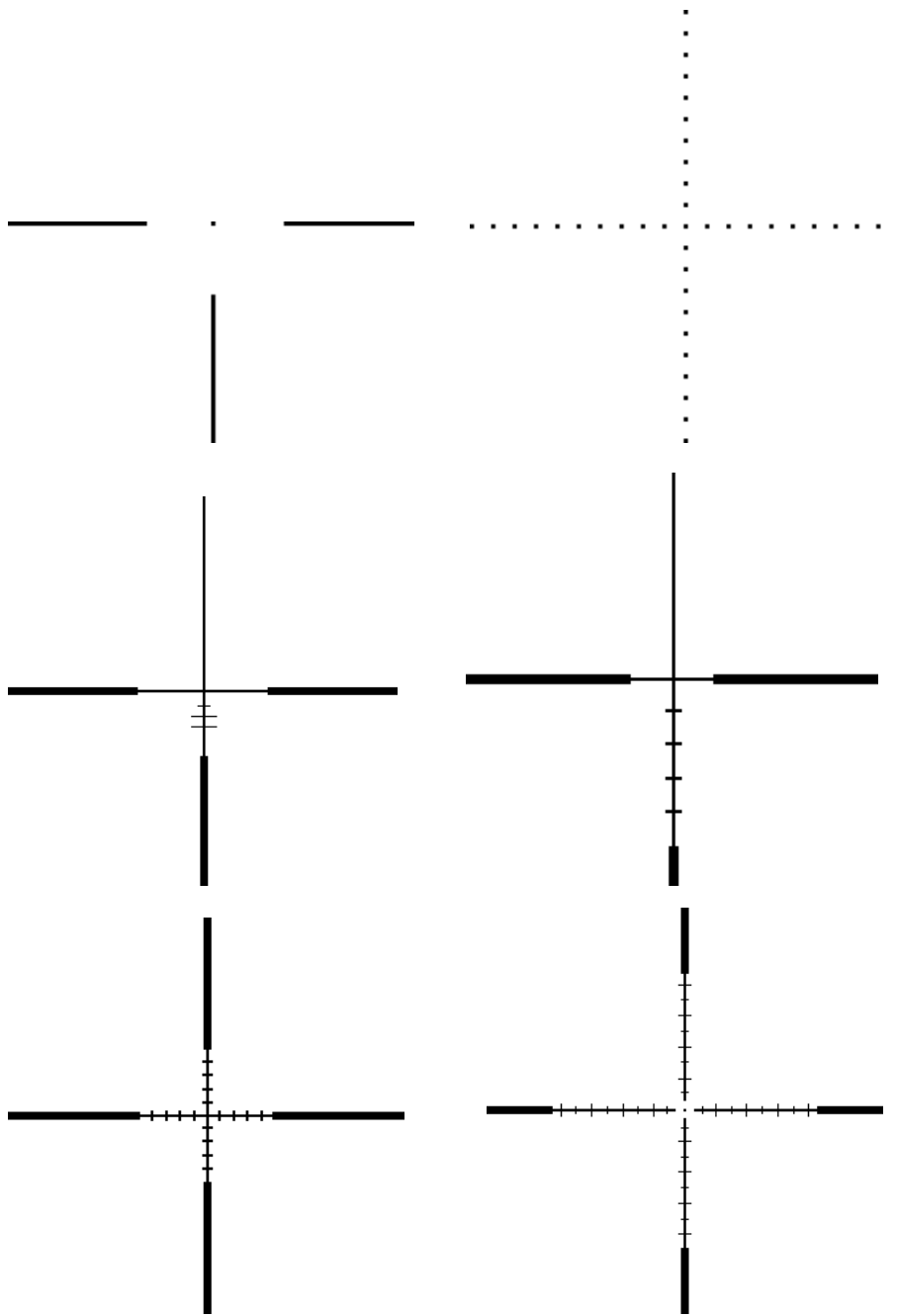
3.8.2 Reticle type

The thermal imager is set with 10 reticle lines for selection. The thermal imager displays ‘1’ reticle line by default.

Enter the advanced menu, select 'reticle type' ,select '1-10 kinds' 、'none' of reticle line, then the reticle line will be displayed in the center of the image. After zero calibration, the user can use the center of the reticle line to observe and aim.

10 types of reticle lines as shown:





3.8.3 Reticle color

The thermal imager is set with black and white for selection.

Enter the 'advanced' menu – select 'Reticle color' – select color – exit menu.

3.9 Setting

Enter the 'setting' menu, the reticle line is hidden. When you exit this menu, the reticle line is displayed.

3.9.1 Calibration mode

The thermal imager can be set with different calibration modes, automatic calibration, scene calibration, and shutter calibration.

In scene and shutter calibration, you need to exit the menu bar and short press the power button to perform the calibration action.

Auto: The device automatically corrects the image quality without any action.

Scene: The user manually corrects the image quality as needed, and the lens cover needs to be attached before calibration.

Shutter: The user manually corrects the image quality as needed, and the device shutter closes for calibration.

3.9.2 PIP

In the zoom-in mode, the position of the PIP window can be adjusted. The available positions are: left, middle, and right. You can also control the PIP window to close.

When the PIP window is off, the zoom mode is 1X, 2X, 4X cycle switching;

When the PIP window is on, the zoom mode is PIP, 2X, 4X cycle switching.

3.9.3 Hot track

When hot track is on, the tracking box will track the area at the highest temperature in the image.

3.9.4 Screen BRI

Users can adjust the screen brightness. Enter the 'screen BRI' — to adjust the screen brightness.

3.9.5 Auto OFF

User can set the auto power off time: Off, 15min, 30min and 60min for selection, If there is no operation in the setting time, power-off.







3.9.6 Reset

By entering 'setting' — 'reset' , users can restore the thermal imager to factory setting.

3.10. Battery tip

A battery tip icon is arranged at the bottom right corner of the screen. The battery tip icon is shown in following table.

S/N	Icon	Battery status
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1		High level
2		Mid-high level
3		Middle level
4		Mid-low level
5		Low level
6		Power off level

4、 Common Fault Analysis and Troubleshooting

If your instrument goes wrong, please check the common faults shown in following table. If your instrument is not caused by the following fault causes, please contact our company as soon as possible.

Fault detection	Fault locating	Solutions
Thermal imager is not started after long pressing of power key	Are batteries installed correctly?	Open the battery cover to check to see whether the battery is put in the opposite direction
	Are batteries charged sufficiently?	Take the battery out for charging
	Is battery cover screwed up?	Screw up the lens cover
After startup, image quality is poor and image is blurring	Lens is not focused	Rotate the lens focusing ring till that image becomes clear
Image has bright line, black edge or blurred screen phenomenon	Image need to be corrected	Do shutter/ scene calibration
Image is blurring	Lens is not focused	Rotate the lens focusing ring till

		that image becomes clear
	Infrared lens is polluted	Use special lens cloth to clean the lens
Different distance is observed	Lens is not focused	Rotate the lens focusing ring till that image becomes clear
Interface is not clear	Eyepiece's visibility is not proper	Adjust the visibility based on the Manual
Thermal imager, during use, shuts down suddenly	The battery cover becomes loose	Screw up the battery compartment cover
Targeting is still unsuccessful after multiple times of calibration	The initial position of the aim line does not return to zero	Adjust the initial position of the aim line to "0"
Precision reduces obviously during use	The connecting base becomes loose	Check to see whether the connecting base is completely locked