



THERMAL SCOPE  
TS1  
OWNER'S MANUAL



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## X-Vision Optics THERMAL SCOPE OWNER'S MANUAL

Thank you for purchasing the XVT Thermal Scope. X-Vision Optics' all new Thermal Scope (TS1) brings the "heat" with its 400 x 300 uncooled infrared detector that can detect big game well past 2,000 yards. With ten reticle options and six different palettes to choose from, even the pickiest of hunters can fine tune this device to their preferences. With an IP67 weatherproof rating and its durable chassis, the TS1 was built to withstand any and all conditions. The thermal scope provides both day and night use for hunting, scouting, and surveilling. This Operation & Maintenance Manual provides detailed information on the operation method and precautions of the thermal scope. In order to safeguard the personal safety of operators, reasonably and effectively maintain and use the of the thermal scope and guarantee the normal operation of the thermal scope, please carefully read and following the operation specifications before using the thermal scope. Please read this manual thoroughly to take full advantage of all the TM1 features.

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## 1. Package Contents

- Thermal Scope
- 18650 rechargeable battery
- Owner's manual
- Charger
- Video output line
- Safety box



## 2. About the Thermal



## 3. Operating Procedures

- **Install Batteries:** the thermal scope uses a single 18650 battery. See image for battery installation.



- **Power on the Thermal** 
  - Power on, power off
- **Hand wheel** 
  - **Press:** enter menu/determine function
  - **Rotation:** select function
- **Preview Status Display**
  - **Power on:** Long press the power button until a startup picture display on eyepiece screen and start the thermal scope.
  - **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.
  - **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.

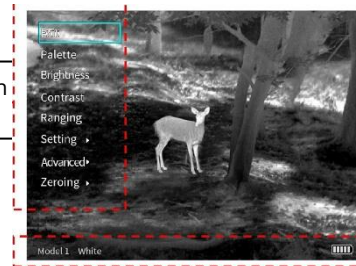
- **Image Interface**

Image interface of the thermal scope without operation

Image interface of thermal scope with key operation



Function Bar



Status Bar

#### 4. Use and Operation

##### Function Menu

1. To enter the function menu: Press the hand wheel to open the function menu on the left side of the display
2. To exit the menu: Select the 'Exit' in the menu top, press the hand wheel to exit the function menu.
3. Selection function: Rotate the hand wheel to select the box, and then press to select such function.
4. Enter function: Press the hand wheel to enter such function adjustment.

**Status Bar**

1. The bottom of the screen displays the current model, color palette, and battery status

**Image adjustment**

**Calibration**

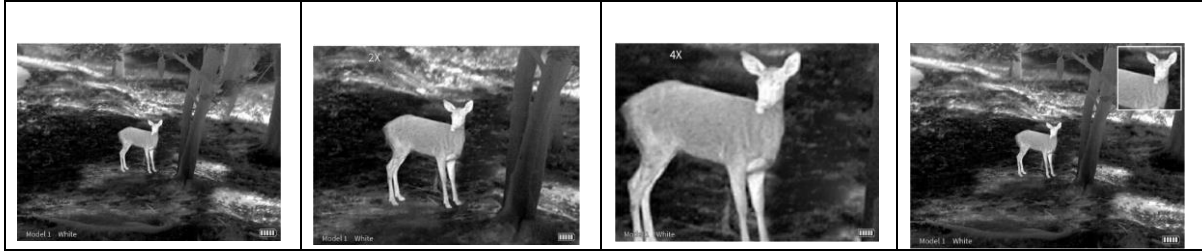
1. During use of the thermal scope, the device will heat up after long-use. This may cause blurriness on the infrared image. The user can choose the calibration mode to correct images and remove abnormalities.
2. In the shutter calibration mode, short press the power button to correct the screen image. It will display 'Calibration completed' and the image will return to normal.
3. In the auto calibration mode, the device automatically corrects the image quality without any action.



**Zoom In & Picture in Picture (PIP)**

1. Modes include 1x, 2x, 4x and PIP.
2. The position of the PIP (picture-in-picture) is adjustable. See the PIP section for more details.
3. 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 2x with a full screen.	4x: The central cursor area of the image is zoomed to 4x with full screen.	PIP: displays images magnified by a factor of two in the window above the screen.
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## Function Menu Options:

### Exit:

**Palette:** Different image colors include white hot, black hot, red hot, red hot 2, red hot 3, green hot and blue hot

**Brightness:** 1-10 levels of image brightness for adjustment from 1 (dimmiest setting) to 10 brightest setting.

**Contrast:** 1-10 levels of image contrast for adjustment, and levels of contrast 1-10 are from darkest to brightest

**Ranging:** The ranging function can estimate the distance of a target of a known target distance. Three examples of targets are available on the device as a reference: 0.25 m, 0.5 m, 1.5 m, and real-time display of distance information of the three targets

### Ranging Operating 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 based on the target size.
3. By comparing the target size with the three reference target sizes, the user can roughly calculate the distance of the target.



### Zeroing

1. If the thermal scope is assembled on different equipment, the zero position will be

different. The first time the scope is mounted on a different rifle, it will need to be re-calibrated. Models should be selected prior to zero calibration. After position storage is complete 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 scope can store zero-calibration positions of six models. The zero-calibration distance of the thermal scope is defaulted to 100 m. Users may select the zero-calibration distance according to their own field conditions.

### Zero-Calibration of the Scope

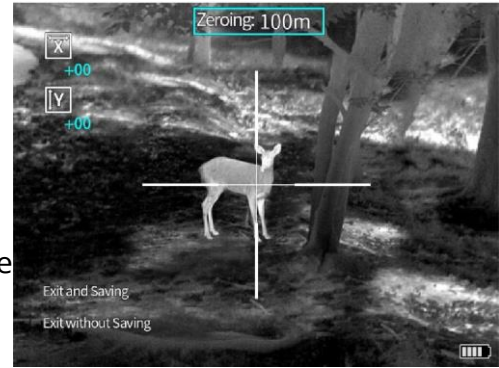
1. The aiming point on the reticle line is moved to the actual point of impact according to its position to complete calibration.
2. Enter the 'advanced' menu
3. Select 'model select'
4. Return to main menu
5. Select zeroing
6. Enter the zero-calibration interface
7. Select zeroing distance
8. Shooting- moving the cursor aiming point to the actual point of impact
9. Save and exit

### Zeroing: 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 hitpoint to know the value (in inches or cm, of each point in X and Y)
5. Select the "X" or "Y" direction according to the relative distance and move the aiming point in the center of the reticle line to the actual point of impact.
  - a. Rotate the hand wheel, and select the "X" or "Y" direction in the box, and press the hand wheel to enter adjustment
  - b. Rotate the hand wheel, move the aiming point in the center 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 until hitting the expected hit point.
7. Complete zero calibration, select save and exit to exit zero calibration. If you do not want to store the zero-calibration position, see exit without saving to exit zero-calibration



## Advanced

1. Enter the 'advanced' menu to browse the reticle line style options.
2. The reticle line is automatically adjusted to the center of the screen. When you exit the menu, the reticle line is restored to its original position.

## Model Select

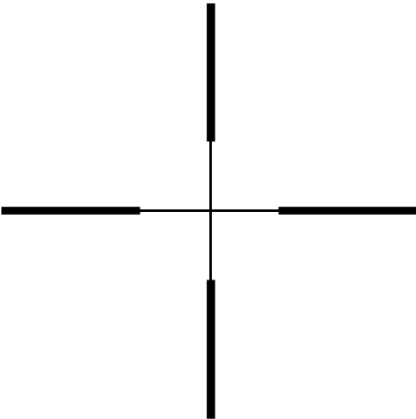


1. The thermal scope can store zeroing positions of six models. If the user has stored zero calibration positions of several models, after the firearm equipped with the thermal scope is replaced, select the model of the current firearm. The thermal scope will automatically adapt the aim line position to the current model to ensure better observing and aiming accuracy.

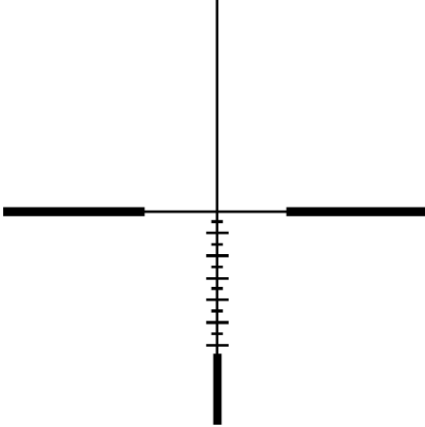
**Reticle Type**

The thermal scope is set with 10 reticles lines options. The thermal scope displays '1' reticle line by default. Enter the advanced menu, select 'reticle type,' select '1-10' 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.

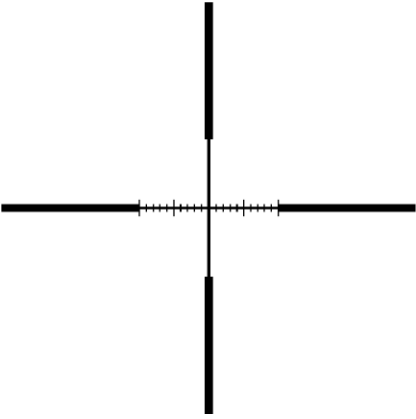
**Reticle Line 1**



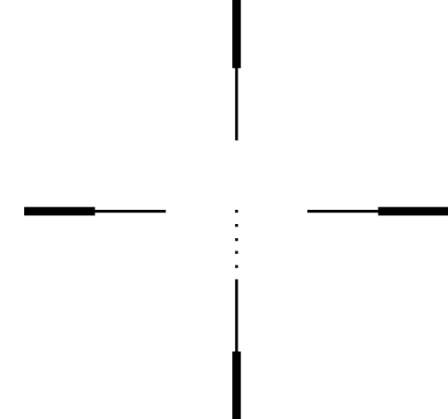
**Reticle Line 2**



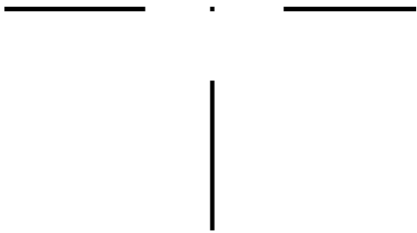
**Reticle Line 3**



**Reticle Line 4**

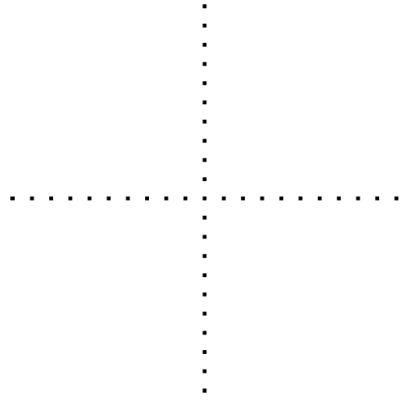


**Reticle Line 5**

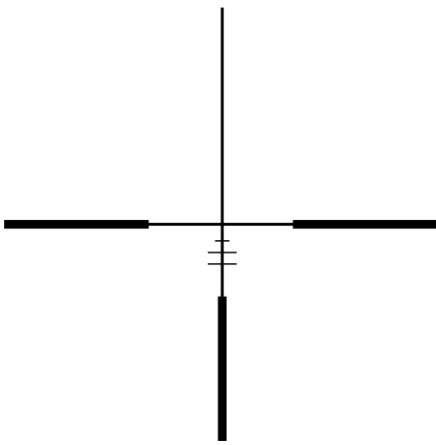


**Reticle Line 6**

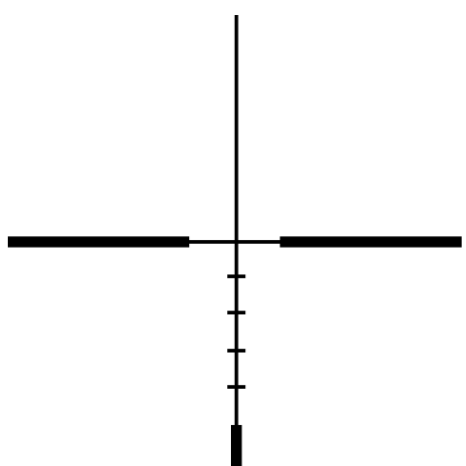
**Reticle Line 7**



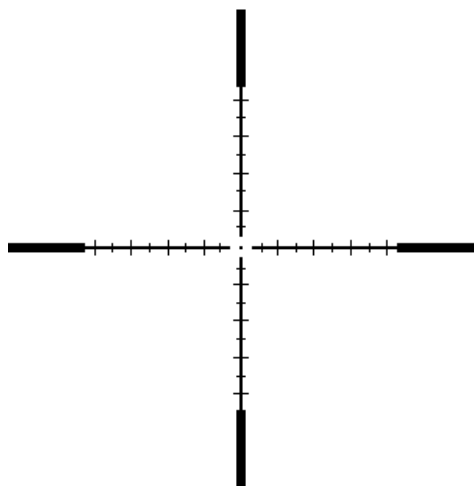
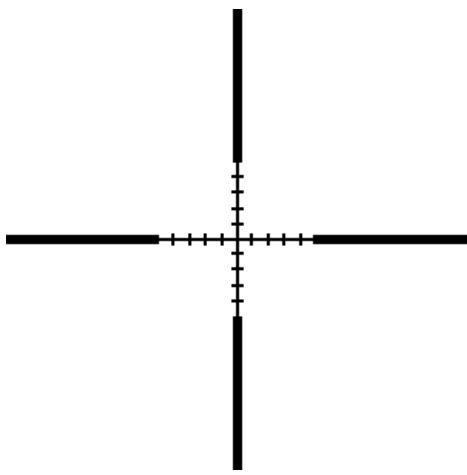
**Reticle Line 8**



**Reticle Line 9**



**Reticle Line 10**



**Reticle Line Color:** The thermal scope is set with black and with for selection

**Setting:** When entering the 'setting' menu, the reticle line is hid. When exiting the menu, the reticle line is displayed.

**Calibration Mode:** The thermal scope has three calibration modes: Automatic calibration, scene calibration and shutter calibration.

1. **Scene and Shutter Calibration:** exit the menu bar, and short press the power button to perform the calibration.
2. **Automatic:** the device automatically corrects the image quality without any action
3. **Scene:** The user manually corrects the image quality as needs. The lens cover must be attached before calibration
4. **Shutter:** The user manually corrects the image quality as needed and the device shutter closes for calibration.

**PIP:** In the zoom-in mode, the position of the PIP window can be adjusted to left, middle, or right. PIP window can be controlled to close.

1. When PIP window is off, the zoom modes are 1x, 2x, 4x, and will cycle between the modes by rotating the hand dial during normal function (not menu function).
2. When the PIP window is on, the zoom modes are PIP, 2x, 4x and will cycle between the modes by rotating the hand dial during normal function (not menu function).

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






**Screen Brightness (Screen BRI):** Users can adjust the screen brightness from 1-10. 10 is 100% screen brightness.

**Auto OFF:** Users can set the auto power off time: Off, 15 minutes, 30 minutes, 60 minutes for selection. If there is no operation in the setting time, the thermal scope will power-off

**Reset:** Users can restore the thermal scope to the factory setting.

1. Enter 'setting' and select 'reset.'

**Battery:** Battery icon is located at the bottom right corner of the screen. The

Battery Icon	Battery Status
	High level
	Mid-high level
	Middle level
	Mid-low level
	Low level

## 5. Troubleshooting

**The thermal scope is not powering on after long press of power key.**

- **Are batteries installed correctly?** Open the battery cover to check that battery is correctly inserted
- **Are batteries sufficiently charged?** Charge batteries
- **Is battery cover tightened securely?** Tighten the battery cap

**After powering on, the image quality is poor and/or the image is blurry.**

- **Lens is not focused.** Rotate the lens focusing ring until the image becomes clear.

**Image has a bright line, black edge, or blurred screen.**

- **Image needs to be corrected.** Conduct shutter calibration.

**Image is blurred.**

- **Lens is not focused.** Rotate the lens focusing ring until the 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 until that image becomes clear

**Interface is not clear**

- **Eyepiece's visibility is not proper.** Adjust the visibility based on the manual

**During use, the thermal scope suddenly shuts down**

- **Check battery cap.** Tighten the battery compartment cap

### **Targeting is unsuccessful after calibration attempts**

- **The initial position of the aim line does not return to zero.** Adjust the initial position of the aim line to "0"

### **Accuracy diminishes after repeated use**

- **The connecting base becomes loose.** Confirm that connecting base is locked and tightened into position.

## **6. Safety Warnings**

- Do not directly expose the thermal scope to high intensity radiation sources such as the sun, carbon dioxide laser and electric welding machine.
- As the thermal scope combines precision optical instruments and electrostatically sensitive electronic devices, do not throw, beat, or vibrate the thermal scope and its accessories to avoid deformation of structure of damage to internal components.
- Do not disassemble the thermal scope. Contact the X-Vision Optics in case of failure. Otherwise, X-Vision Optics is not responsible for warranty repair.

## **7. Cleaning and Transportation**

- When not in use or during transportation, remove batteries, and put the thermal scope in its protective packing case.
- Replace the battery when the battery capacity is low during use to avoid damage due to over discharge.
- To clean non-optical surfaces of the scope, wipe the shell with a piece of clean, soft cloth. Do not clean the device with chemical solvent or diluent.
- As a layer of anti-reflection film is coated on the infrared lens of the thermal scope, 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 can damage the coating of the lens.

## 8. Specifications

- **Magnification:** 2.3 - 9.2x
- **Thermal Sensor:** 400 x 300
- **Pixel Size:** 17  $\mu\text{m}$
- **Frame Rate:** 50 Hz
- **Objective Lens:** 35 mm
- **Field of View:** 60 ft @ 100 yd
- **Detection Range:** 2,600 yd
- **Recognition Range:** 1,100 yd
- **Hotspot Tracking:** Yes
- **Stadiametric Rangefinder:** Yes
- **Picture in Picture:** Yes
- **NETD:**  $\leq 50$  mk
- **Temperature Variation Detection:** 0.08° F
- **Display Resolution:** 1024 x 768 OLED
- **Reticle:** 10 patterns and 2 color options
- **Color Palettes:** 6
- **Power Supply:** Rechargeable 18650 battery (inc.)
- **Battery Life:** 5 hours
- **IP Rating:** IP67
- **Dimensions:** 9 in x 3.5 in x 3 in
- **Weight:** 1.4 lb
- **Mount:** Picatinny
- **Accessories:** Dual battery charger, battery charge cable, hard case, 18650 rechargeable battery, lens cap, video cable



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