

MM Series USER MANUAL

Thermal Imaging Camera



MMV2.0-650L

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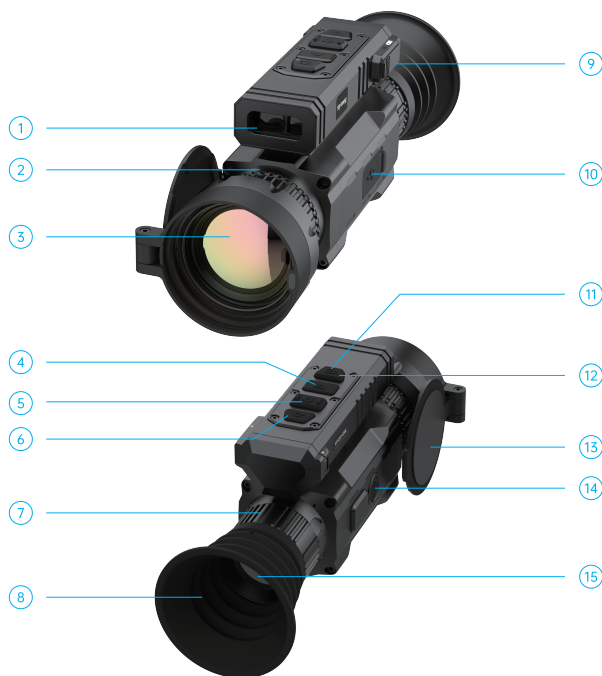
1. Product Overview

1. The MMV2.0-650L is an infrared thermal imaging telescope designed for observation and ranging under nighttime and adverse weather conditions.

2. The device detects thermal radiation from target objects. The thermal imaging module captures the image signal, processes it, and transmits it to an OLED display. Users can view a magnified, clear image through the eyepiece. Additionally, real-time image observation, monitoring, and related settings/operations are available via a dedicated smartphone app.

3. A high-resolution thermal imaging module paired with a large-aperture infrared lens to deliver high-quality thermal images. Adjustable eyepiece focus, enabling sharpness optimization for observed objects at distances ranging from 5 meters to infinity.

2. Product Components



1. Rangefinder Module	2. Objective Lens Focus Ring	3. Objective Lens
4. Up Navigation Button	5. Menu Button	6. Down Navigation Button
7. Eyepiece Diopter Adjustment Ring	8. Eyeshade	9. Battery Compartment Cover
10. USB Cover	11. Photo/Video Recording Button	12. Device Indicator
13. Objective Lens Cap	14. Power Button	15. Eyepiece

3. Package Contents

- ▶ MMV2.0-650L Thermal Imaging Device
- ▶ 18650 Battery
- ▶ Carrying Case
- ▶ Type-C Data Cable
- ▶ User Manual
- ▶ 5V/2A Adapter
- ▶ Mount (with screws, hex nuts, and wrench)

4. Operation Instructions

4.1. Warnings

- (1) Do not point the thermal imaging camera directly at the sun, CO₂ lasers, welding machines, or other high-intensity radiation sources.
- (2) The interval between two power cycles should be at least 20 seconds.
- (3) Handle the device with care during operation. Avoid dropping, striking, or subjecting it to vibrations, as these actions may damage optical/electronic components or cause structural deformation.
- (4) Do not disassemble the thermal imaging camera. In case of malfunction, contact the manufacturer immediately. Unauthorized disassembly will void the warranty.
- (5) When not in use or during transportation, remove the battery and store the thermal imaging camera in a protective carrying case.
- (6) Replace the battery promptly when the battery level is low to prevent deep discharge, which may damage the battery.
- (7) Using the device outside the specified operating conditions may cause damage to the thermal imaging camera.

Note: Only charge with a 5V 2A charger.

4.2. Usage Instructions

- (1) Open the packaging and take out the thermal imaging telescope. Install the battery, then press and hold the power button for 3 seconds to turn it on.
- (2) Look through the eyepiece at the internal display and manually adjust the eyepiece diopter adjustment ring until the symbols and numbers on the screen are clearly visible.
- (3) Point the thermal imaging lens at the target object and adjust the focus ring of the thermal imaging module until the observed object appears sharp and clear.

4.3. Maintenance Notes

- (1) The optical components (thermal imaging lens, eyepiece, and laser rangefinder lens) should only be cleaned when dirt affects image quality. Gently clean with a lens cloth lightly moistened with alcohol. Avoid excessive rubbing to prevent damage to the anti-reflective coating on the lens surface.
- (2) Turn off the thermal imaging telescope immediately after use or when it remains idle for an extended period after startup. This helps prolong the device's operational lifespan.
- (3) Do not point the thermal imaging telescope directly at the sun or other intense natural light sources during operation. Excessive infrared radiation may cause sensor interference, resulting in blurred or distorted images.

5. Button Functions



Power Button:

- (1) Press and hold for 3 seconds to power on; press and hold for 3 seconds to power off.
- (2) With the device powered on, click the Power button to enter standby mode. While in standby mode, click the Power button again to wake up the device.
- (3) In the viewing interface, double-click to switch the shutter.

Photo/Video Button:

- (1) Click to capture image.
- (2) Press and hold >1.5s to start recording; press and hold >1.5s during recording to stop.

Up Navigation Button:

- (1) Click to select up, when there is no menu, it switches the display mode.
- (2) Press and hold: Toggle Picture-in-Picture (PIP) on/off.

Menu Button:

- (1) Click: Open menu; use Up/Down keys to navigate; Click to enter submenus.
- (2) Press and hold during menu operation: Return to previous menu level.
- (3) During ranging: Click to lock/unlock ranging values.

Down Navigation Button:

- (1) Click: Navigate downward; cycles through magnification levels when no menu is open.
- (2) Press and hold: Toggle ranging function on/off.

6. Menu Functions

Icon	Main Menu	Function Description
	Color Temperature	Click the menu button to enter the menu. There are 2 options in color temperature. Selecting "Cool Color" or "Warm Color" will change the imaging screen accordingly.
	Screen Brightness	Click the menu button to enter the menu. There are 10 options for screen brightness. The screen image will change accordingly based on your selection, allowing you to choose the appropriate level according to your usage habits.
	Contrast	Click the menu button to enter the menu. There are 10 options for contrast. The imaging screen will change accordingly based on your selection. The higher the value, the stronger the imaging contrast.
	Image Detail Enhancement	Click the menu button to enter the image detail enhancement option. The higher the number, the more details are displayed.
	Advanced Settings	Function Description
	WiFi	1. Turn on WiFi in the device menu, then enable WiFi on your phone and open the Falcon Outdoor app. Find the MAC address name "APPshow-XX-XXXX" on the phone's WiFi list and enter the password "12345678" to connect the device. 2. After the device is connected to the phone via WiFi, real-time captured images can be observed.
	Picture-in-Picture	Click the Menu button to enter the submenu, then select On or Off. Click the Menu button again to confirm and return to the main menu.
	Reticle Type	Options: Off, and 10 types of reticles are available.
	Reticle Color	Options: Black, White, Gray, Red, Green.
	Zeroing Storage	Used to save the user's ballistic zeroing point parameters.
	Reticle Zeroing Adjustment	► Click the Menu button to enter the reticle zeroing calibration interface. Press the Video button to switch between function options, and use the Up/Down buttons to adjust values. Image Freeze: Click the Menu button to enable or disable screen freeze. Press the Video button to select the X and Y axis values, then use the Up/Down buttons to adjust the reticle position until it aligns with the point of impact. Press the Video button again to move to other options. After adjustment, select Save and click the Menu button to save and exit, or long press the Menu button to exit without saving. The selected distance is used as the zeroing distance for smart ballistics and is saved to the zeroing memory.

	Auto Ballistics	There are three modes for auto ballistics: Off disables the feature, On enables automatic ballistic calculation, and Settings allows you to manually adjust the ballistic parameters.
	Gyroscope	Click the Menu button to enter the submenu, then select On or Off to enable or disable the gyroscope.
	Range Unit Selection	There are two options for range unit selection: Meter / Yard.
	Date & Time	Select the "Date/Time" menu and click the Menu button to enter the sub-options. Press the Video button to navigate through options, use the Up/Down keys to adjust values, and click the Menu button to save and exit.
	Multi-language	Click the Menu button to enter the language settings, use the Up/Down keys to select the desired language, and click the Menu button to confirm.
	Record Audio	After selecting "Record Audio" with the cursor, click the menu button to bring up the submenu. Select "On" or "Off" in the submenu to determine whether video recording includes audio input.
	Defective Pixel Correction	Move the cursor to select the "Defective Pixel Correction" menu, click the menu button to enter the submenu, and click the up/down keys to switch between "Auto Correction" and "Manual Correction" modes. If correction is needed, you must close the lens cover and follow the prompts to perform the defective pixel correction operation. (1) Select "Auto Correction" and click the menu button to correct successfully. (2) Select "Manual Correction", move the cursor through the power button, and click the menu button to correct successfully and save.
	Image Calibration	Enter the Image Calibration menu and select Confirm. Close the lens cover, then click the Menu button to perform background uniformity calibration. Settings are saved automatically when calibration is complete.
	Format	Move the cursor to select the "Format Memory Card" menu, click the menu button to enter the submenu, click the up/down keys to switch selections, and click the menu button again to confirm the option. Please choose and confirm cautiously, as data cannot be recovered after deletion.
	Custom Pseudo-Color Mode	Available modes: White Hot, Black Hot, High Brightness, Low Light, Pseudocolor and Red Hot. Select the appropriate mode based on your needs, or cycle through them using the Up/Down buttons.

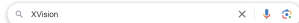
	Zoom Select	Move the cursor to the Zoom option and press the Menu button to open the submenu. Use the Up/Down keys to select the desired zoom level, then press the Menu button to confirm.
	Auto Power Off	Move the cursor to select "Auto Power Off Settings" and click the menu button to bring up the submenu. Select "3 minutes, 5 minutes, Off" in the submenu. The default is Off. After power-on, you can select 3 minutes or 5 minutes for auto power off.
	Default Value	Under the advanced menu, use the up/down keys to select the "Restore Factory Settings" option. Switch selections by click the up/down keys, and click the menu button again to confirm the option. After confirmation, it will restore to the factory default settings. Please operate with caution.
	Factory Reset	Use the cursor to highlight "Factory Reset," then briefly press the Menu button to bring up the submenu. In the submenu, select "Confirm" or "Cancel." If confirmed, the device will be fully restored to its factory default settings (including crosshair/reticle settings and BC data). Please use with caution!
	Version Information	Move the cursor to select "Version", short press the menu button to view the device software version information.

7. Device Connection

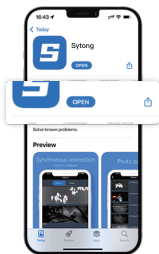
Download the dedicated app to connect the device to your mobile device via WiFi.



Android/iOS: Scan to download



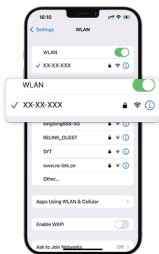
Search "XVision" on Google Play to Download.



Download and install the app



Turn on the device and enable WiFi.



Select WiFi "xx." and connect
(Default WiFi password: **12345678**)



Open the App

8. Technical Specifications



75mm



91mm

224mm

MMV2.0-650L

Sensor:	
Type	Uncooled Vanadium Oxide (VOx)
Resolution	640x512
Frame Rate	50 Hz
Pixel Size	12μm
NETD	≤18mk
Optics:	
Objective Lens	50mm/F1.0
Base Magnification	2.8X
Digital Zoom	1x / 1.5x / 2 x / 2.5x / 3 x / 4 x / 6 x / 8x
Exit Pupil Distance	50 mm
Diopter Adjustment	+5/-5 D
Focusing Distance	5m - ∞
Field of View	8.8°X6.6°
Detection Range	2500m (Target Size: 1.7m x 0.5m)

Display:	
Color Modes	White Hot, Highlight, Black Hot, Low Light, Pseudocolor, Red Hot
Type/Resolution	0.49 inch / OLED / 1920×1080
Power:	
3D Gyroscope	Yes
Power Supply	3-4.2 V
Battery	18650 Li-ion, 3500mAh
External Power	5V (USB)
Runtime	5 hours
Shock Resistance	10000 J
Waterproof Rating	IP67
Operating Temperature	-20°C~+50°C
Size	224x75x91mm
Weight	650g ±5g
Recorder:	
Video/Photo Resolution	1440×1080
Video/Photo Format	.mp4 / .jpg
Storage Card	Built-in 32GB Memory Card
Wireless Channel:	
Frequency	2.4GHz
Standard	802.11 b/g
WiFi Range	15m
Rangefinder:	
Wavelength	905nm

Maximum Range	1000m
Accuracy	+ /-1m

9. Maintenance and Care

- (1) The lens of thermal imaging camera is a critical optical component. During installation and use, avoid contact with oil, chemicals, or other contaminants that may damage the lens surface. Always cover the lens with the lens cap after use.
- (2) When not in use or during transportation, remove the battery and store the thermal imaging camera in its protective case.
- (3) For long-term storage or periods of inactivity, keep the thermal imaging camera in a cool, dry environment.
- (4) Do not clean the housing of the thermal imaging monocular with chemical solvents or thinners. Use a clean, soft, and dry flannel cloth instead.
- (5) If the device is not used for an extended period, power it on and perform a calibration check at least once every six months.

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support@sytong2013.com



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