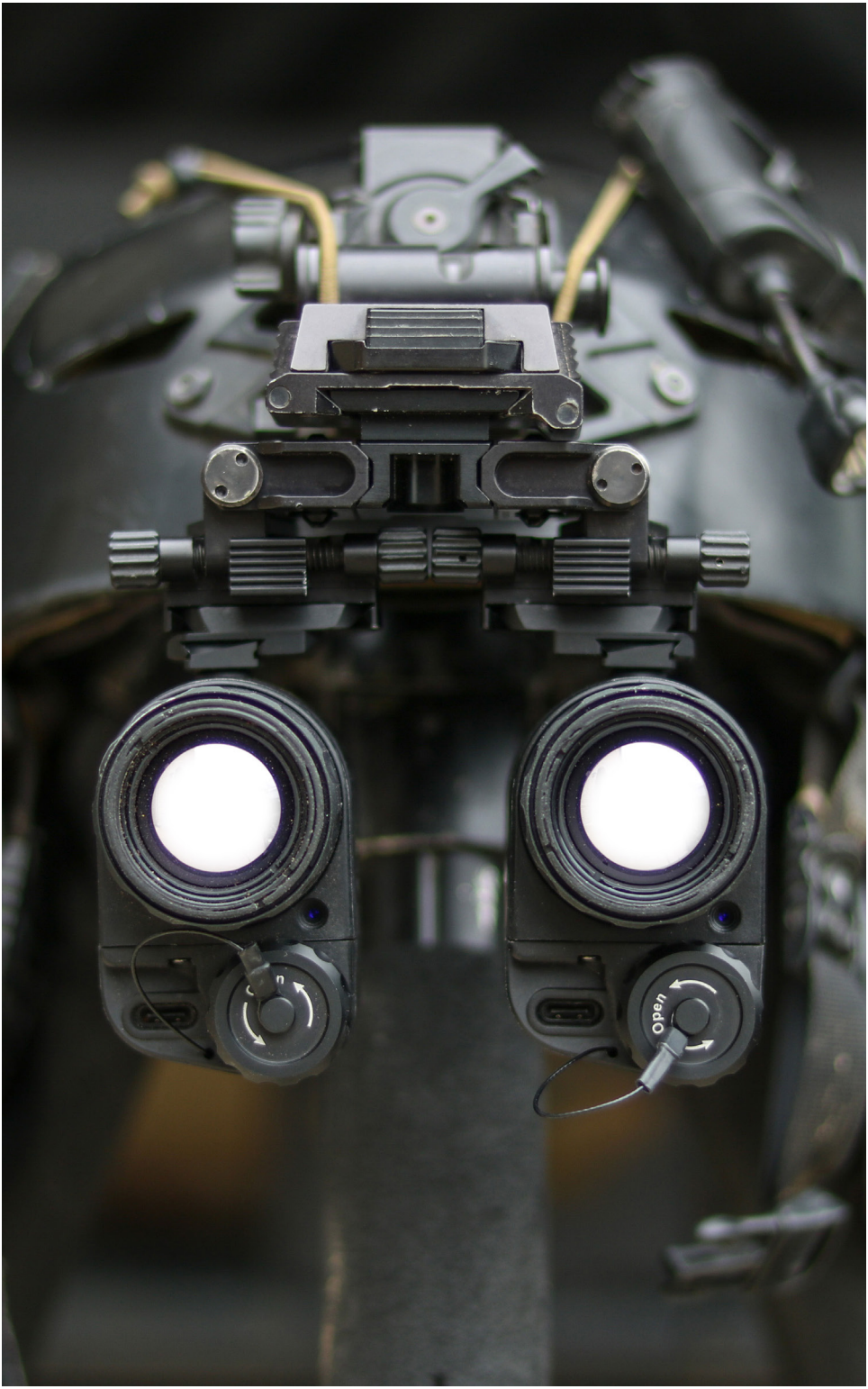
INFIRAY OUTDOOR MINI SERIES

Multi-function Thermal Imager

MH25 **ML19**

User's Manual

InfiRay Outdoor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ITAR REQUIREMENTS

These products may be subject to export and foreign trade control laws of the United States and may not be exported without prior approval of the U.S. Department of State. Learn more at irayusa.com/ITAR.

NOTE: Use of a CR-123, or two 16340 batteries will harm your unit and void your warranty, please see more at irayusa.com/batteries

1 OVERVIEW

The InfiRay Outdoors Mini Series is one of the smallest fully multi-functional thermal imagers on the market. It can be used as a handheld monocular or helmet mounted for hands-free use. It's features include picture-in-picture, Stadiametric Rangefinder, Bluetooth*, digital magnetic compass, pitch and roll measurement, and analog video output. The Mini Series is compatible with rechargeable 16650 and 16340 batteries and can be powered externally through the USB-C port with a 5V battery pack. The Mini Series is operated by an intuitive menu system and user-friendly rotary encoder button. This simple one button operation has positive clicks with each selection and allows for quick and easy operation in dark environments.
*Requires external remote, for control only, not transfer of data.

Figure 1-1. Product Contents

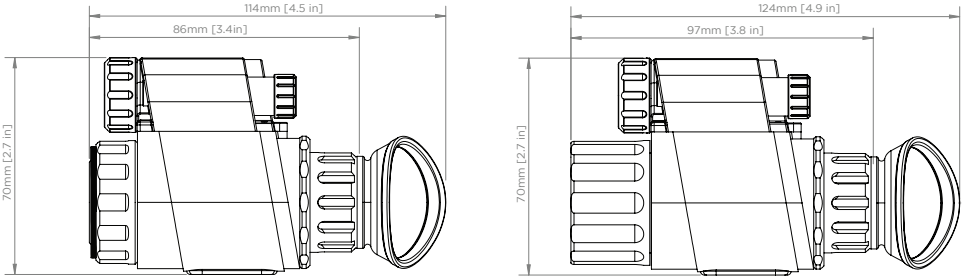

Figure 1-2. Product Dimensions

2 TECH SPECS

	MH25	ML19
DETECTOR SPECIFICATIONS		
Resolution	640×512	384x288
Pixel Size	12μm	17μm
Spectral Response	8~14μm	
NETD	≤600mK@75°F, f/1.2	≤600mK@75°F, f/1.0
MRTD	≤600mK@75°F, f/1.2	≤600mK@75°F, f/1.0
Frame Rate	50Hz	
OPTICAL SPECIFICATIONS		
Objective Lens	25mm f/1	19mm f/1
Focus Mode	Manual	
Field of View	17.5°×14°	19°×15°
Detection Range	1,375 Yards	950 Yards
Digital Zoom	1.0-8.0X	1.0-4.0X
Eye Relief	12mm	
Exit Pupil	5mm	
Diopter Adjustment (with Factory Eyepiece)	-4 - +3	
DISPLAY SPECIFICATIONS		
Type	LCOS	
Resolution	1280×960	
FUNCTION SPECIFICATIONS		
Digital Compass	Yes	
Motion Sensor	Yes	
Laser Pointer	None*	
Rangefinder	Stadiametric	
PIP	Yes	
Palette	White/Black/Red/Rainbow	
Remote Control	Bluetooth**	
Battery	16340/16650 NOTE: The Mini Series will not function properly using a CR123A	
Max. Battery Life	16340—up to 1.5 hours 16650—up to 3 hours	
Operating Temperature	14°F~122°F	
Power Consumption	<2000mW	
IP Rating	IP67	
Weight (without battery)	8.64 Oz	7.93 Oz
Size (with eyeshade installed)	5.03”×2.75”×1.77”	4.6”x2.75”×1.77”
External Interface	2 - M3 x 3(Bottom and left side)	

3 MINI SERIES BLUETOOTH CONTROLLER

The Bluetooth remote controller is shown in figure 1, it includes a rotator, power button, **M** button and **C** button. The **M** button is a shortcut key to the pallet and the **C** button is a shortcut key to calibration.

How to connect remote controller

1. Enable the Bluetooth option on the device menu, the Bluetooth icon will blink on the top of the screen.
2. Long press the power button on the remote controller for 15 seconds, until the new Bluetooth icon is shown on the screen and stays continuously illuminated in blue. Once connected, you may release the power button on the remote.
3. If the Bluetooth connection is lost, the remote controller will re-connect automatically within 1 minute.

NOTE: The Mini Series Bluetooth Controller must be manually connected to the Mini Series via Bluetooth each time it is used.

How to disconnect

Disable the Bluetooth option on the device, the remote controller will automatically turn off if it can not find a connection within 1 minute.

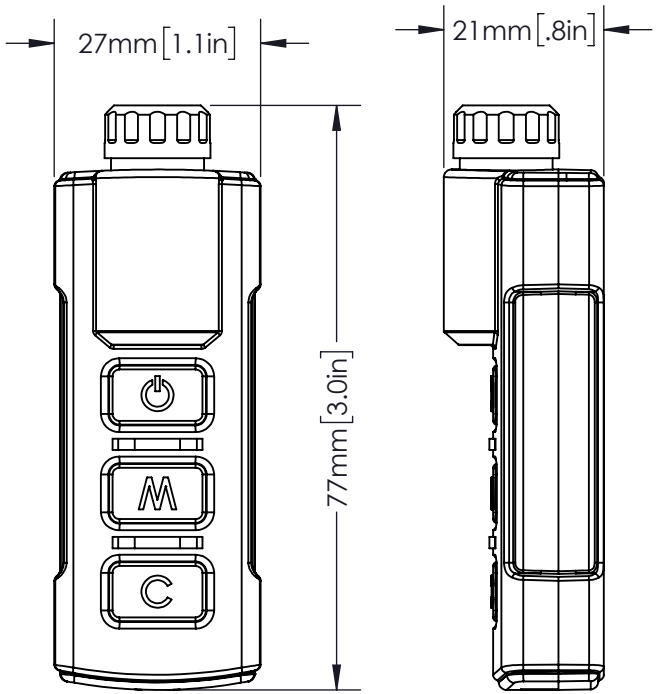

Figure 3-1. Mini Series Bluetooth Controller

4 ACCESSORIES:

PVS-14 Eyepiece upgrade for Mini Series

The PVS-14 eyepiece is an optional upgrade for Mini Series. Upgrading the eyepiece will provide an increase in the usable eye relief and interpupillary divergence, and decreases the perceived optical magnification to 1X. This upgrade also makes the Mini Series compatible with any standard PVS-14 eyepiece accessory and provides additional comfort when used as a helmet mounted optic**.**

PART NUMBER	DESCRIPTION
IRAY-AC02	iRayUSA MINI/BRAVO Case with Padded Dividers - 1312 9x7x4
IRAY-AC06	iRayUSA 180 Degree USB-C Cable for Mini Series 36”
IRAY-AC08	iRayUSA USB-C to Analog RCA/USB Cable 36”
IRAY-AC10	Nitecore 16340 Rechargeable Battery - 10 Pack
IRAY-AC14	iRayUSA PVS-14 Eyepiece Upgrade for Mini Series

5. SYSTEM FUNCTIONS

- Shuttered Calibration and Manual Calibration
- White Hot, Black Hot, Red Hot, Rainbow
- Up to 8x digital magnification (4x on ML19)
- Image brightness adjustment, sharpness adjustment, contrast adjustment
- Electronic compass
- Pitch and Roll Measurement
- Stadiametric rangefinder
- Picture-in-picture
- Bluetooth remote controller
- Automatic standby
- Power and video interface through USB-C
- Mini Rail Mounting Interface

6. PRODUCT DIAGRAM

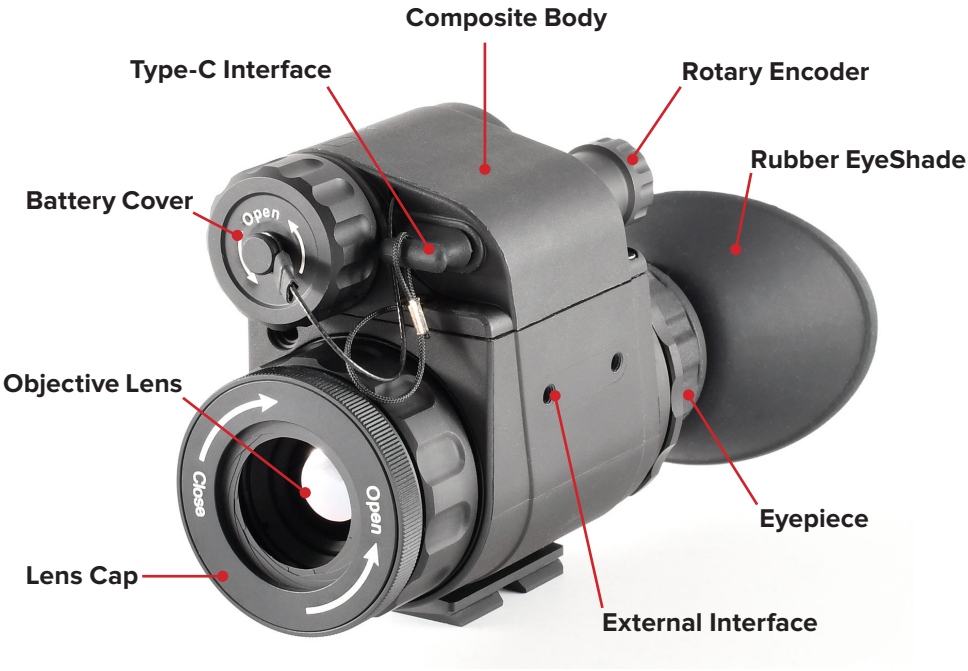

Figure 6-1. MH25 Diagram

7. OPERATION FUNCTIONS

The Quick Command Menu, Advanced Menu and other functions can be accessed via the rotary encoder. All menus can be closed by pressing the encoder for 3 seconds.

7.1 Powering On/Off

To power on – hold the encoder button down for 3 seconds.
To power off – point the device down and hold the power button for 3 seconds.

7.2 Digital Magnification

When there is no menu displayed, rotate the encoder to digitally zoom in and out. Digital magnification will increase when the encoder is rotated clockwise, and digital magnification will decrease when rotated counterclockwise. Rotating the encoder slowly will increase or decrease the digital magnification inincrements of 0.1 and rapid rotation will increase or decrease digital magnification by 1.0. Current magnification is displayed in the upper left icon cluster.

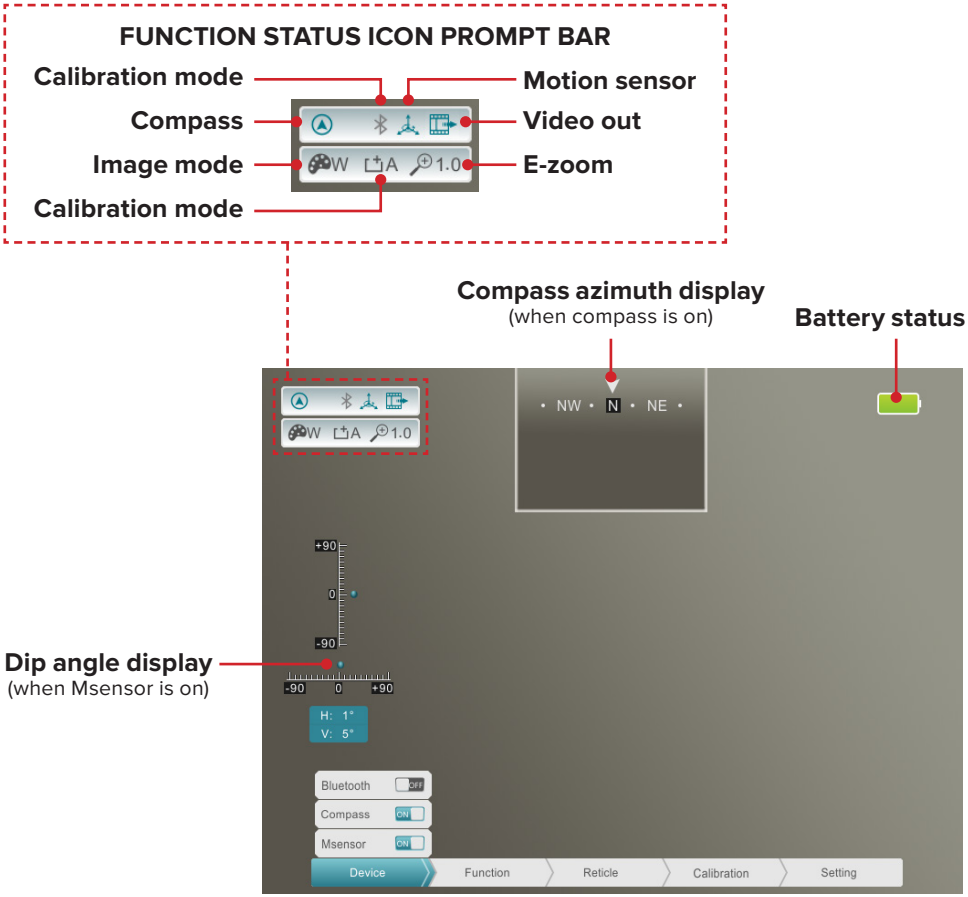

Figure 7-1. Normal display interface

7.3 QCM Quick Command Menu

The quick command menu is activated with a short press of the encoder. The QCM has 3 functions including NUC (Non-Uniform Calibration), color palette selection and brightness adjustment. Rotating the encoder will toggle functions and a short press will activate the function. If the encoder is not activated within 5 seconds the QCM will disappear automatically. Pressing the encoder for 3 seconds will close the QCM.

Note: Pressing the encoder for 3 seconds while orienting the Mini Series downward will turn the unit off.

Note: The laser feature is non-functioning on the Mini Series because there is no laser in the US configuration.

NUC - Short press while the lens is facing down will perform silent NUC. All other orientations will perform shuttered NUC.

COLOR PALETTE - (White Hot / Black Hot / Red Hot / Rainbow).

BRIGHTNESS - Screen brightness adjustment.

Figure 7-2. Quick Command Menu

7.4 Advanced Menu

To activate the advanced menu, press and hold the encoder for 3 seconds. Make sure the lens is not pointing down, as a 3 second press pointing down will power the unit off.

The advanced menu displays 5 submenus including Device, Function, Reticle, Calibration and Setting. Each submenu contains several options and corresponding options expand (if present) when a submenu is selected, as shown in figure 5-3. Please note, some menus are disabled.

Note: The reticle feature is non-functioning on the Mini Series because there is no reticle in the US configuration.

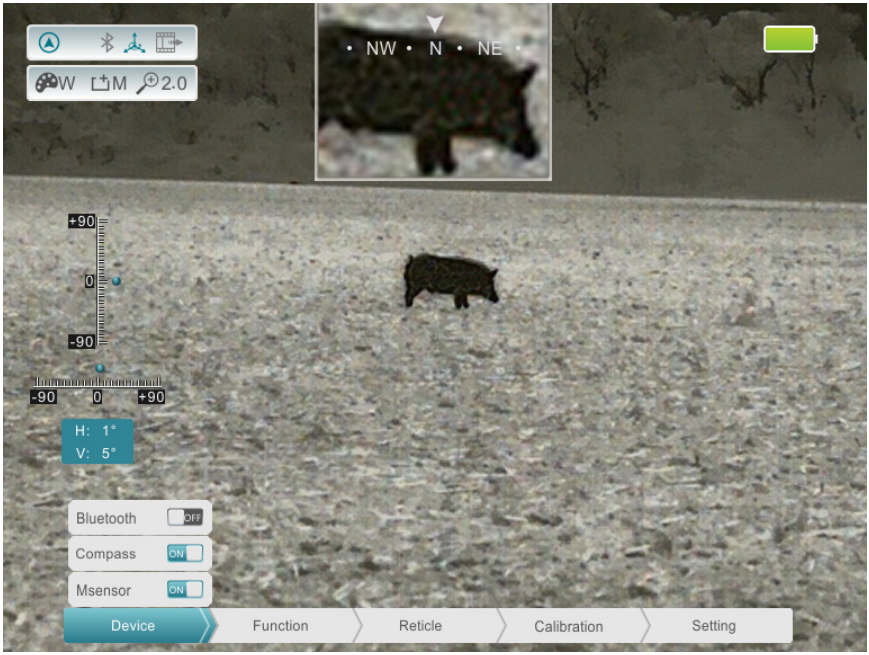

Figure 7-3. Advanced Menu

Menu Operations:

Once the advanced menu is displayed, short press the encoder to toggle through the 5 menu selections. Rotate the encoder to toggle through the selections in each submenu.

Short press the encoder to select a particular setting or function in the submenu and rotate the encoder to make changes to that setting or function. Short press the encoder to lock the changes and return to the preceding menu.

Press and hold the encoder for 3 seconds to exit the advanced menu. The advanced menu will exit automatically after 30 seconds of inactivity. The details of the advanced menu are shown in table 5-1 and the relevant operation status is shown in figure 5-4, 5-5, 5-6, 5-7:

Figure 7-4. Function Menu

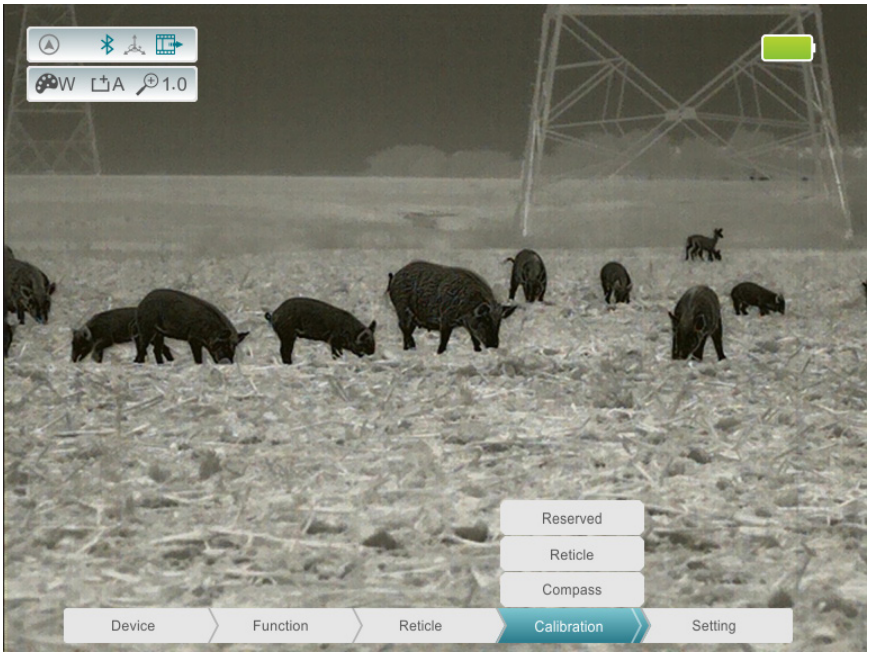

Figure 7-5. Calibration Menu

Figure 7-6. Setting Menu

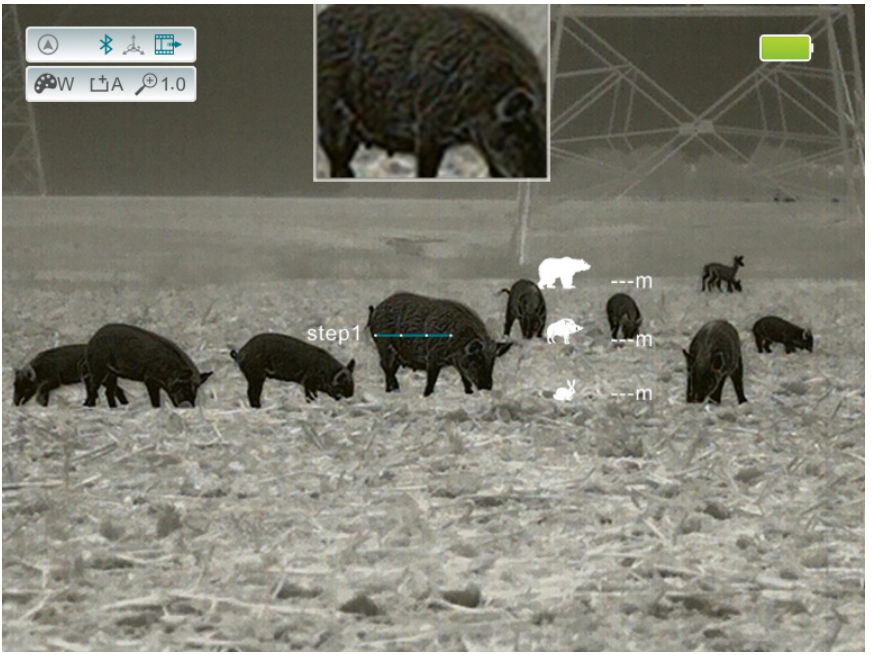

Figure 7-7. Rangefinder interface

Figure 7-8. Compass calibration interface

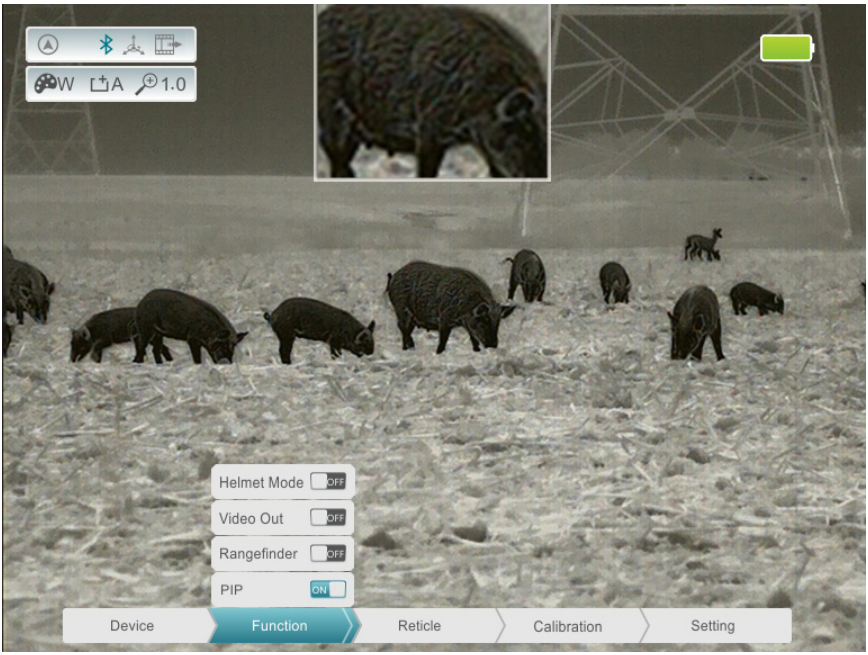

Figure 7-9. PIP interface

TABLE 7-1. DETAILS OF THE ADVANCED MENU

FUNCTION ITEMS	OPTION ITEMS	FUNCTION
DEVICE	Bluetooth	ON/OFF
	Compass	ON/OFF
	Msensor	ON/OFF
FUNCTION	Helmet Mode	ON/OFF
	Video Out	ON/OFF
	Rangefinder	ON/OFF
	PIP	ON/OFF
RETICLE	Type	
	Color	
	Pattern	
CALIBRATION	Laser	
	Reticle	
	Compass	
SETTINGS	Factory Reset	Restores monocular to original factory settings
	Sleep Mode	Turns sleep mode on/off. The standby time can be set to 5min, 15min, or 30min
	Sharpness	Image sharpness adjustment between level 1 and 9.
	Contrast	Image contrast adjustment between level 1 and 9.
	Brightness	Image brightness adjustment between level 1 and 9.
	NUC Mode	Automatic correction (A) and manual correction (M).

	STATUS
Enables/Disables Bluetooth remote control. Remote Controller must be connected each time the Mini Series is powered on. For more info see section 3 **Bluetooth video and data transfer are not supported**	Icon turns blue
Displays and updates directional heading automatically according to the geomagnetic direction.	The upper left icon turns blue, and the azimuth bar appears above.
Measures the pitch angle and horizon angle of the monocular relative to the ground.	The upper left icon turns blue, and the dip angle scale appears at the left.

Decreases the size of the image in the digital display	Image will be displayed at a reduced size in the center of display
Enables analog video output via USB-C port	The upper left icon turns blue.
Align the ranging line to the top (or bottom) of the target and press encoder to record position 1. Then align the ranging line to the bottom (or top) of the target and press to record position 2.	The stadiametric rangefinder interface is shown in figure 5-4.
Displays a digitally zoomed (2X) version of the main display.	Image (192x144) shown in the upper middle portion of the main display.

The reticle is disabled on the Mini Series.

The laser is disabled on the Mini Series.

After selecting this option, short press the encoder. After pressing the encoder, a dialog box will appear. Select “Yes” to execute or “No” to cancel.	Dialog prompts
Short press to select setting, rotate encoder to toggle between levels and press encoder to lock the selection.	—
	Real-time display
Rotate cursor to this option and short press the encoder to switch between A and M.	Displayed in the upper left corner.

8 PREVENTATIVE MAINTENANCE

Please contact iRayUSA or an authorized vendor for assistance before attempting to perform any maintenance beyond simple cleaning or battery replacement in the Mini Series. There is no customer needed maintenance. Unauthorized repairs or modifications may void your warranty.

8.1 Battery Replacement

- Power off unit before replacing the batteries;
- The battery power icon is displayed on the upper right side of the display. There are four levels of power.
- When the battery icon turns to red, it means that the power is less than 25% and the battery needs to be replaced or connected to external power.
- To replace the battery, rotate the battery cap counterclockwise, remove the old battery and insert the new battery button side down. The correct battery orientation is also noted on the outside of the battery compartment.

NOTE: Use of two 16340 batteries will harm your unit and void your warranty..

8.2 Product Cleaning and Maintenance

- Avoid using harsh chemicals or solvents to clean the monocular housing or lenses.
- Lightly rinse the monocular housing with water and wipe clean with a soft cloth.
- For the eyepiece and objective lenses, remove any large particles or loose dirt using compressed air. Fine cleaning should be performed with a lens cloth or lens pen. Clean water, alcohol, or general-purpose window cleaner may be used to remove stubborn stains. Avoid using excessive force as this may result in scratching the lenses.

9 SAFETY REGULATION

The Mini Series is designed to provide years of uninterrupted use with minimal upkeep in the field. Please follow the following suggestion to ensure the best reliability of your unit.

Be sure to dispose of batteries properly. Do not short circuit, puncture or disassemble.

Inspect all batteries for cracks, leakage, or bulging prior to installation in the Mini Series.

Do not use external power supplies that output over 5V with the Mini Series.

Avoid pointing the Mini Series toward intense sources of heat such as the sun, fire, or other hot objects, as prolonged exposure can damage the thermal sensor.

Do not store Mini Series with batteries installed.

10 GENERAL TROUBLESHOOTING

Please contact iRAYUSA or an authorized vendor for assistance before attempting to perform any modifications or repairs beyond the scope of the troubleshooting procedures in this manual. Unauthorized repairs or modifications may void your warranty.

REGISTRATION: irayusa.com/register

WARRANTY: irayusa.com/warranty

SUPPORT/SERVICE: irayusa.com/support

Table 10.1 General Troubleshooting Chart

TROUBLE	POSSIBLE CAUSES	TROUBLESHOOTING
Image is blurry	Objective isn't focused	Rotate the objective lens until the image becomes clear.
	Overdue NUC correction.	Performing image correction via QCM
Display menu and icons are blurry	Diopter setting not adjusted properly	Rotate diopter ring on eyepiece until the display
No analog video output	Video output not enabled	Enable video out in Function Menu
	The data cable does not match.	Replace data cable.
Unit will not power on	Check battery orientation	Check battery orientation and voltage.
	Insufficient external supply voltage.	Check the voltage of external power supply.
Unit fails to turn off	The lens is not facing down.	Tilt unit downward while pressing the rotary encoder

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