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EyeCGas® 2.0

OGI – Optical Gas Imager, Camera
User Manual

Rev 01 | Doc P/N: UM-8G9A0000B

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Safety

Read all instructions and warnings before using this product. Your EyeCGas® 2.0 infrared camera is like any other tool. It must be used properly and safely. All users should be trained in the proper and safe use of infrared imaging prior to using the EyeCGas® 2.0 infrared camera. This is especially important for users who may use the product in potentially hazardous or explosive environments. Failure to follow these instructions could result in death or serious injury.

Battery Warnings and Cautions

⚠	CAUTIONS
	Lithium polymer and Lithium-ion batteries are volatile. Thus:
	▪ Do not expose the battery to temperatures above 60°C (140°F).
	▪ Do not disassemble the battery.
	▪ Use only EyeCGas® 2.0 battery packs manufactured by Opgal (part number 8G9M5000C).
	▪ Use only the supplied battery charger to charge the battery packs.
	▪ Damage to the EyeCGas® 2.0 system caused by batteries manufactured by other companies may void the system warranty.
	▪ Do not charge the battery pack(s) while they are hot.
	▪ Do not charge the battery pack(s) or operate the battery charger in a hazardous environment.

⚠	CAUTIONS
	▪ Recycle the battery pack(s) at an approved disposal location.
	▪ Operating the battery pack(s) in high or low temperature environments will reduce operational run time.
	▪ Do not expose the battery pack(s) to fire or extremely high temperatures.
	▪ Do not cause damage to or attempt to short circuit the battery pack(s).
	▪ Fully charge a battery pack if it has not been used in two months.
	▪ Do not leave a battery pack in the charger for extended periods of time.
	▪ Store battery packs at ambient conditions between 10°C - 27°C (50°F – 80°F) and less than 70 % relative humidity, as in a home or office

General Warnings

⚠	**WARNING - EXPLOSION HAZARD**
	Do not connect or disconnect devices to EyeCGas® 2.0 while circuit is live, unless area is known to be non-hazardous.

Camera Certification

ATEX HAZARDOUS AREA SAFETY CERTIFICATION FOR ZONE2

- ATEX II 3G Ex nL IIC T6
- EN 60079-0:2012/A11:2013
- EN 60079-11:2012
- EN 60079-15:2010

OTHER CERTIFICATIONS

- ANSI/ISA-12.12.01-2013
- Non-incendive Electrical Equipment for Use in Class I and II, Division 2, and Class III

CSA C22.2 NO. 213-M1987, FIRST EDITION

- Non-Incendive Electrical Equipment for Use in Class I, Division 2

EyeCGas® 2.0 Nameplate

The EyeCGas® 2.0 nameplate is located on the camera behind the battery.

The nameplate contains the product serial number (A) that may be needed when requesting service.
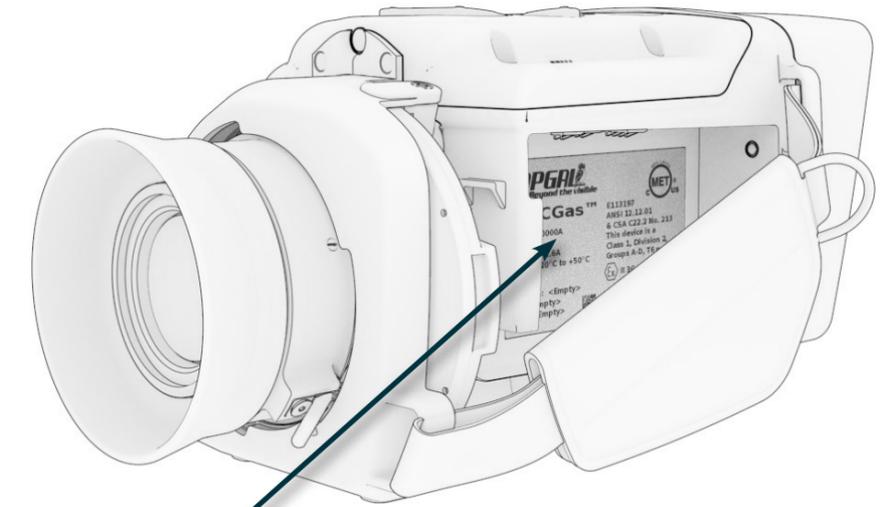
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Overview

EyeCGas® 2.0 is a handheld infrared camera engineered specifically for use in gas leak detection. The EyeCGas® 2.0 camera is designed to withstand the rigors of everyday handling in refineries and chemical plants, and also incorporates safeguards for use in hot air environments. EyeCGas® 2.0 uses include: maintenance, video documentation of plant survey inspection, and on-line update of database. Some of the benefits of using infrared technology are increased worker safety, reduced environmental emissions, and substantial financial savings as a result of leak detection and remediation.

This chapter provides an overview of the EyeCGas® 2.0 system and includes:

- System Layout
- Camera Overview
- Opening the Box

NOTE
To ensure that we are able to reach you with any product or software updates, please fill out the warranty card enclosed with your EyeCGas® 2.0 infrared camera.

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System Layout

USB connectivity

Audio headset connectivity

HD camera

GPS connectivity

Infrared camera

Wi-Fi connectivity (camera as hotspot)

Bluetooth connectivity

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Camera Overview

EyeCGas® 2.0 is a handheld infrared camera capable of autonomous imaging and recording operations for the detection of gas leaks. It is designed to withstand the rigors of everyday handling in refineries and chemical plants.

The EyeCGas® 2.0 camera consists of the following major components:

LCD display

Keypad buttons

HD camera

Connectors

Holding strap

Battery

IR Lens

Airflow fan

Tripod mount
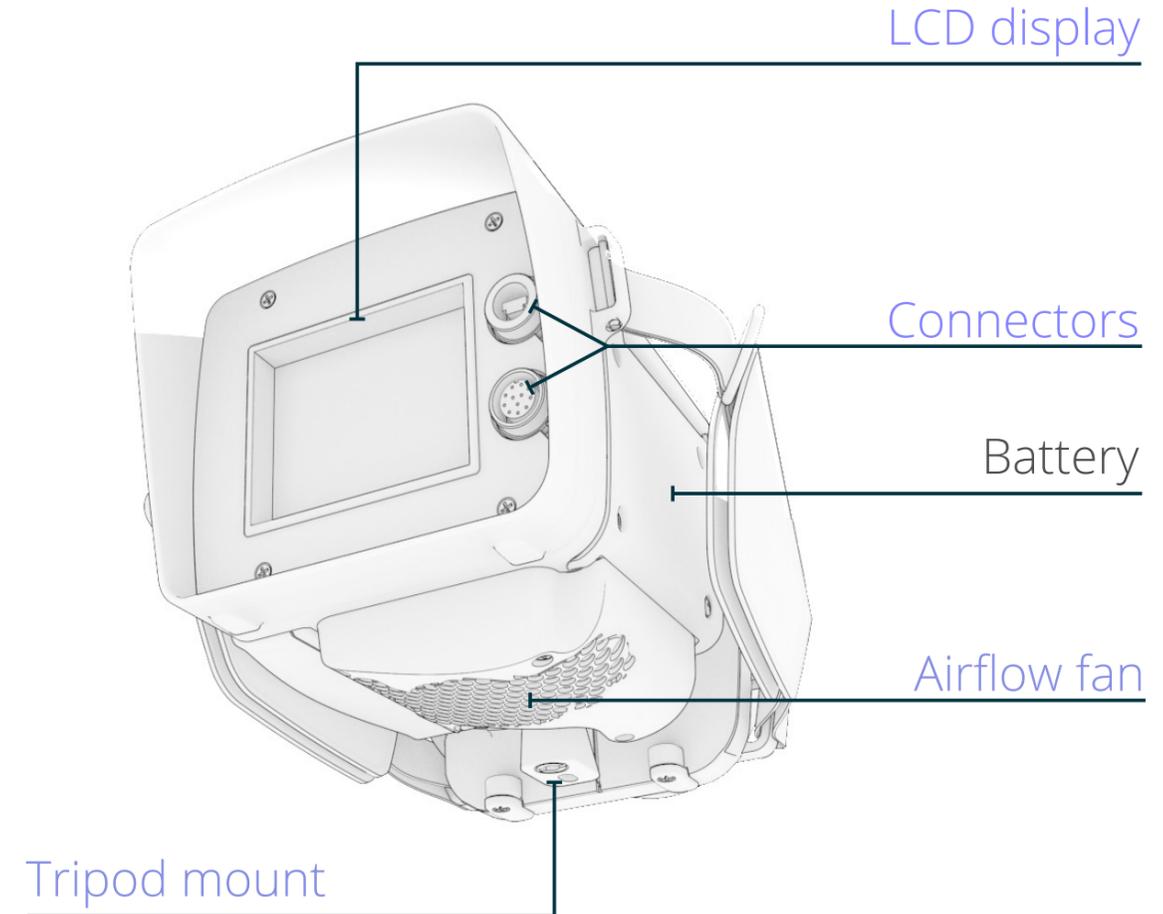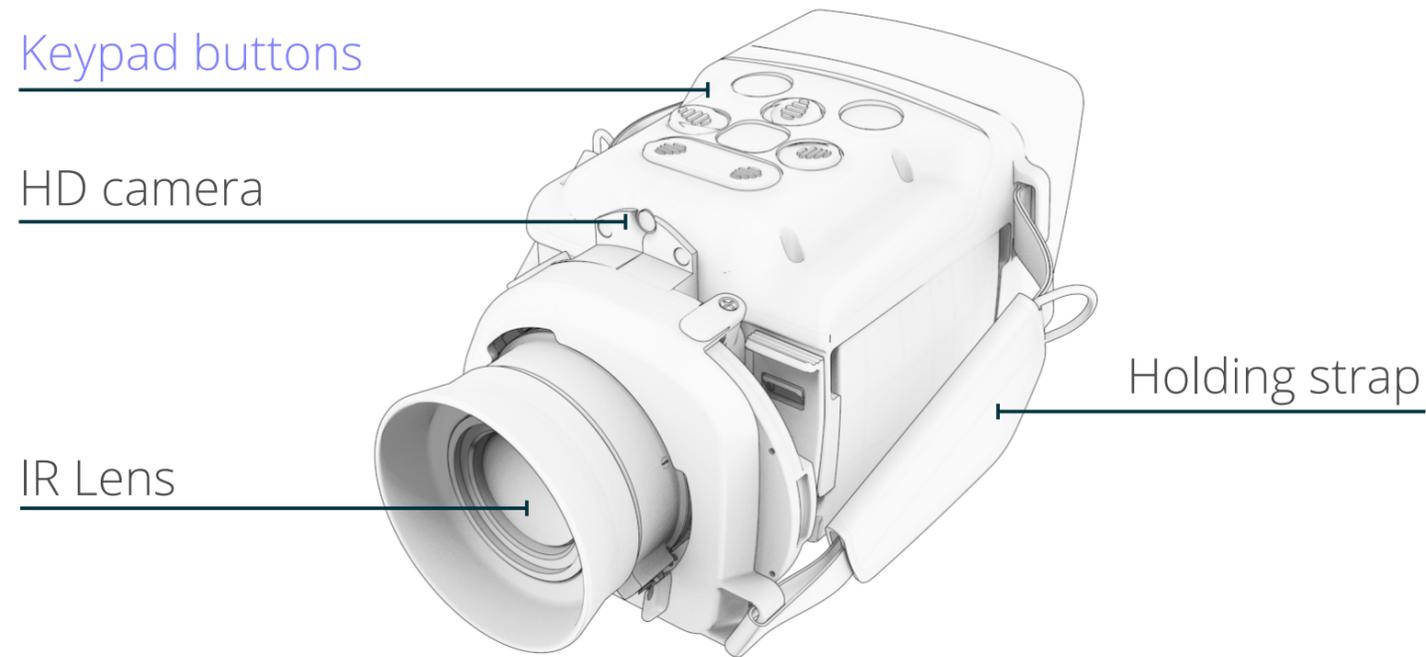
NOTE
The camera can operate in four different viewing modes: visible, normal, enhanced, and thermography.

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KEYPAD BUTTONS OVERVIEW

A set of buttons is used to both control operation of the EyeCGas® 2.0 camera and to navigate through the camera's on-screen menu.

Keypad functionality depends on the state of EyeCGas® 2.0:

- Camera is powered off
  (see Powering On Camera).
- Camera is in operation mode
  (see Keypad Buttons Used During Camera Operation).
- Camera is in configuration mode
  (see Keypad Buttons Used During Menu Configuration).

Power on
Power off
Menu

Zoom
Left navigation

Snapshot

NUC
Polarity
Color palette
Up navigation

Viewing mode
Right navigation

Record

Enhancement
Emissivity
Down navigation
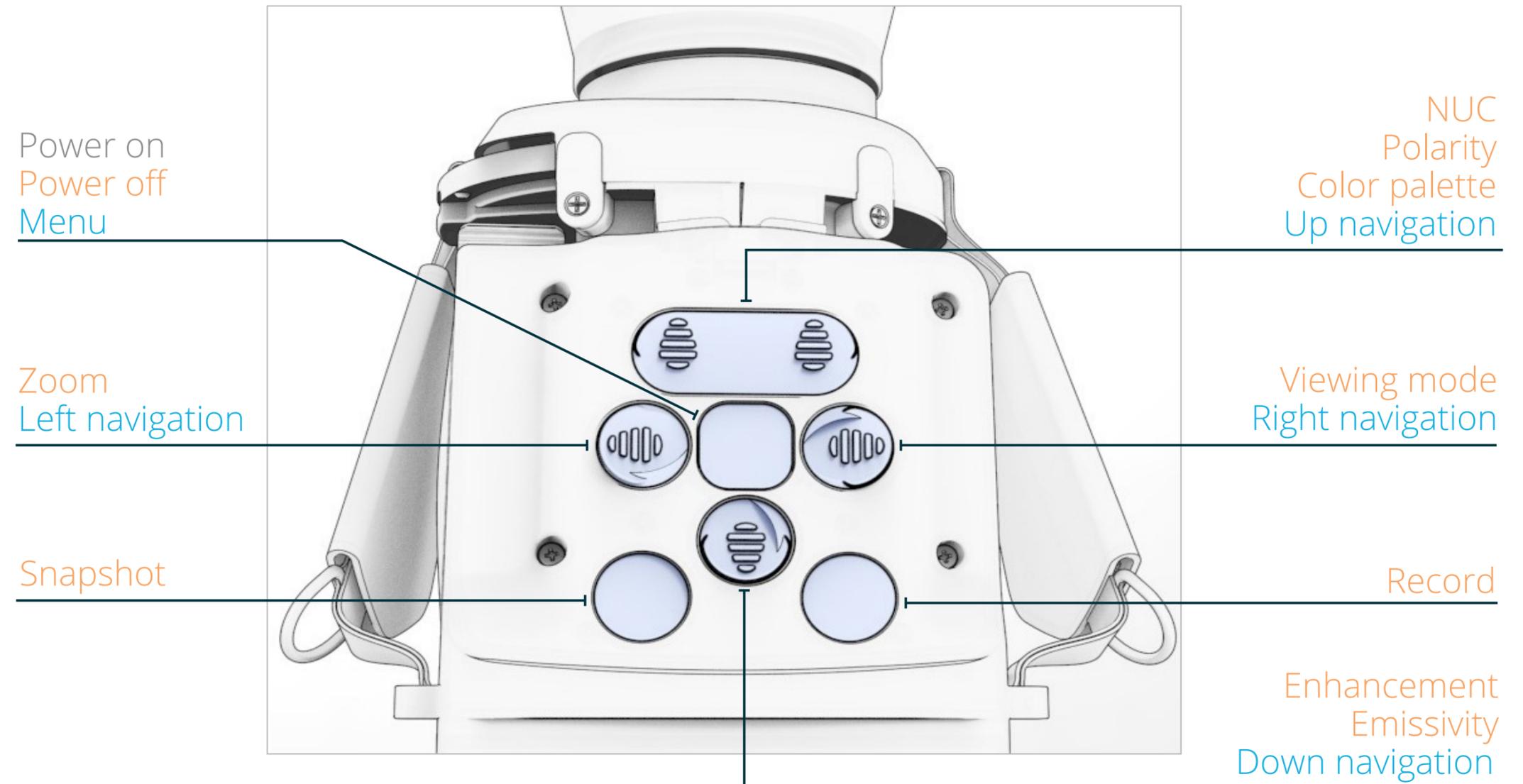
NOTE
The top button can be pressed on the right or left side. The functionality, however, is the same.

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LCD DISPLAY

The LCD screen (A) displays color video when filming in visible mode, and high-resolution grayscale video when filming in the normal, enhanced, and thermography viewing modes.

NOTE
To magnify the LCD screen image by 300%, and for easier viewing in brightly lit areas, attach the glare shield (see Attaching the Glare Shield).

CONNECTORS

The USB connector (B) allows for connectivity to a computer or tablet (see Connecting via USB). The accessories connector (C) allows for connectivity to an audio headset (see Attaching the Headset).

CAUTION
When connectors are not in use, they must be covered by their protective cap at all times.

WARNING - EXPLOSION HAZARD
Do not connect or disconnect devices to EyeCGas® 2.0 while circuit is live, unless area is known to be non-hazardous.

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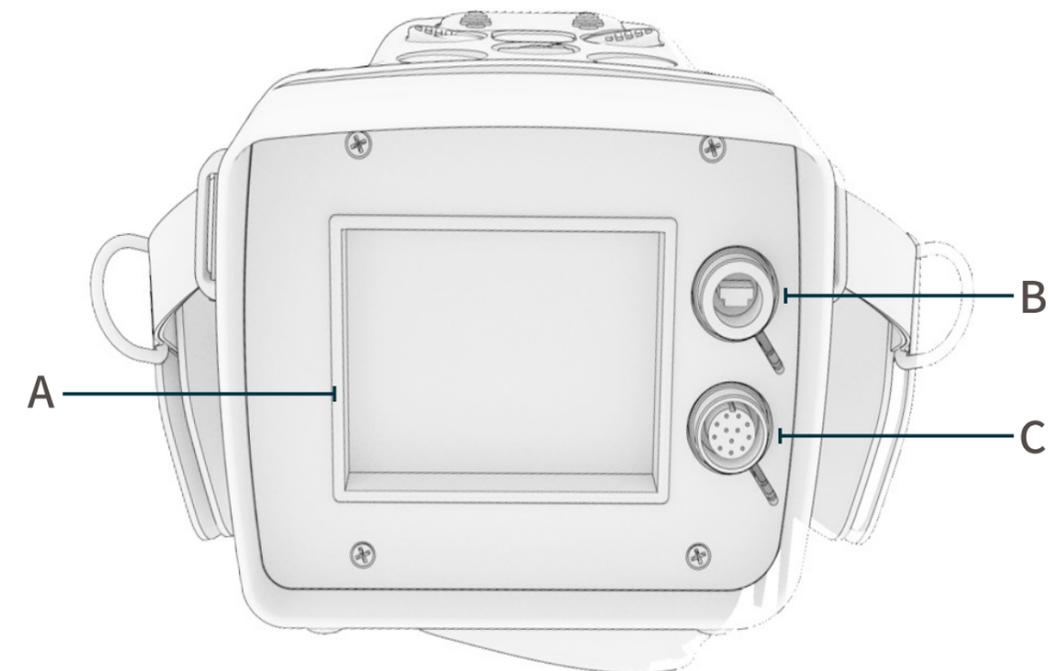
AIRFLOW FAN

An external fan is used to indirectly cool the electronic components inside EyeCGas® 2.0. The airflow fan takes in air from the bottom of the camera (A) and expels it from the side (B).
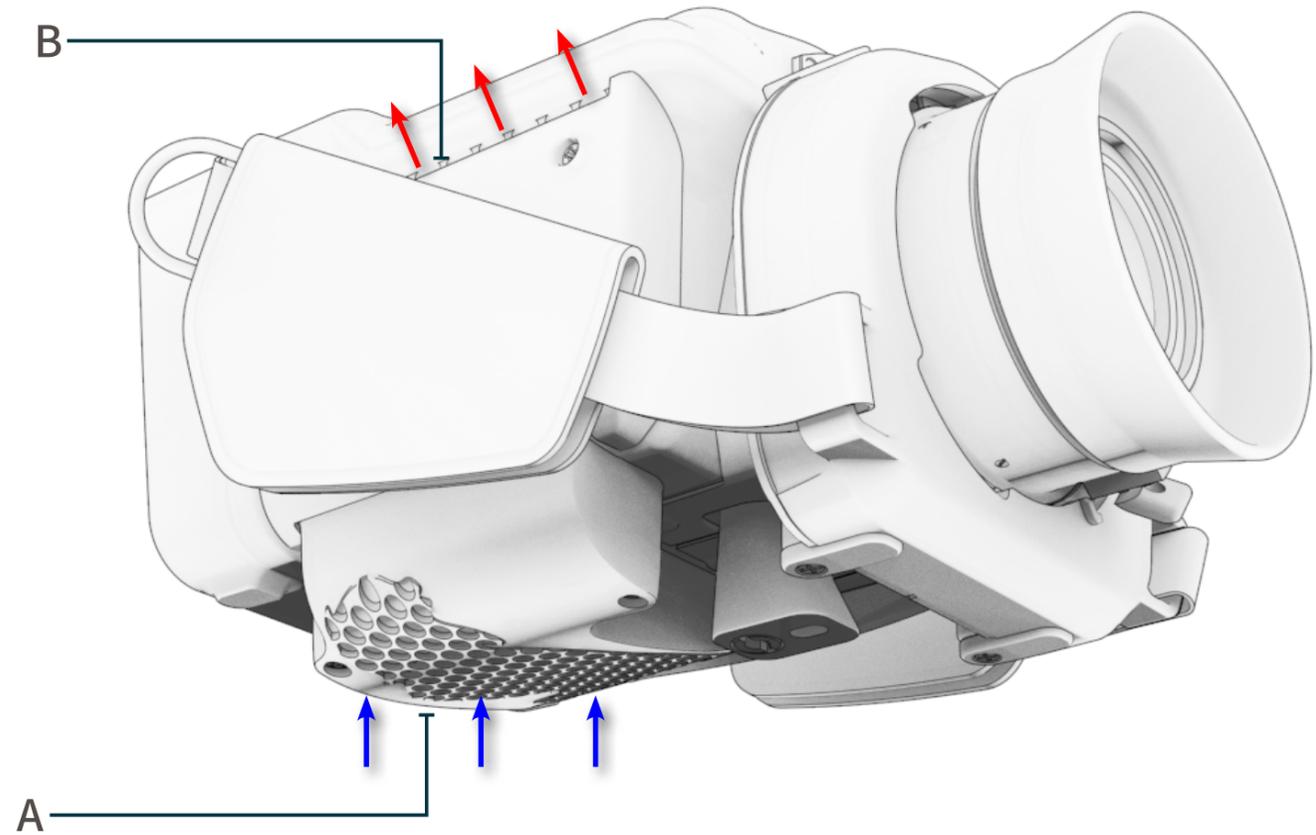
CAUTION	
Verify proper operation of the fan. Ensure the vents are clean and that airflow is not blocked.	

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TRIPOD MOUNT

The tripod mount (A) allows the camera to connect to a tripod.

A

⚠	**CAUTION**
	Ensure the camera is securely fastened to the tripod and the tripod legs are stable.

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Opening the Box

After receiving the EyeCGas® 2.0 delivery, open the box and verify that the package contains all the parts mentioned in <u>List of Standard Components</u> and any optional accessories ordered separately (see <u>List of Optional Components</u>).

LIST OF STANDARD COMPONENTS

EyeCGas® 2.0 comes standard with all items listed in the table below.

ITEM IMAGE	NAME	PART NUMBER	QTY	MORE INFORMATION
	Carrying Case	PM-8G9A0000B	1	Stores the camera, battery packs (up to 2), battery pack charger, glare shield, shoulder strap, USB cable, USB memory stick with user manual, and lens cleaning kit.
	EyeCGas® 2.0 Camera	8G9A0000B	1	Handheld infrared camera. See <u>Camera Overview</u>.

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ITEM IMAGE	NAME	PART NUMBER	QTY	MORE INFORMATION
	Glare Shield	8G9A0020C	1	Prevents screen glare which impedes direct viewing of the LCD display. Also magnifies the LCD screen 300%. See Attaching the Glare Shield.
	Battery Pack	8G9M5000C	2	One battery pack powers the EyeCGas® 2.0 camera continuously for over five hours. See Attaching the Battery.
	Single Battery Charger	8G9M6000C	1	Enables charging of a single battery pack. See Charging the Battery.
	Shoulder Strap	8G9A0029B	1	Provides hands-free transport of the camera.

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ITEM IMAGE	NAME	PART NUMBER	QTY	MORE INFORMATION
	USB 2.0 Cable	1002056ALF	1	Connects EyeCGas® 2.0 camera to a computer or tablet. See Connecting via USB.
	Lens Cleaning Kit	1000932A	1	Enables cleaning of the camera lens. See Cleaning the Lens.
	EyeCGas® 2.0 User Manual	UM-8G9A0000B	1	
	EyeCGas® 2.0 Quick Start Guide	QG-8G9A0000B	1	

LIST OF OPTIONAL COMPONENTS

	NAME	PART NUMBER	QTY	MORE INFORMATION
	Headset for EyeCGas® 2.0	8G9A0050B	1	Enables an audio track to be recorded during video recording. See Attaching the Headset.
	AC Power Supply	8G9K0500A	1	Enables powering of the camera through a wall or car power outlet.
	Triple Battery Charger	8G9M6000B	1	Enables charging of up to three battery packs.
	75mm f/1.2 Manual Athermal Lens Assembly	8G9T7500A	1	Allows for gas detection at longer distances.

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	NAME	PART NUMBER	QTY	MORE INFORMATION
	Optical Filter Replacement Kit	8G9K0120A	1	Allows for replacement of the EyeCGas® 2.0 optical filter. See Replacing the Optical Filter.

www.

Operation

This chapter provides information on how to operate the EyeCGas® 2.0 camera and includes:

- [Preparation for Use](#)
- [Camera Startup](#)
- [Viewing Modes](#)
- [Frequently Used Operations](#)
- [Camera Settings](#)
- [Attaching Accessories to Camera](#)
- [Powering Off Camera](#)
- [Replacing the Battery](#)
- [Replacing the Lens](#)
- [Replacing the Optical Filter](#)

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Preparation for Use

This section provides information on preparing the camera for use and includes:

- [Charging the Battery](#)
- [Attaching the Battery](#)
- [Adjusting the Side Straps](#)

CHARGING THE BATTERY

To charge a battery:

1. Plug the battery charger into a power outlet.

2. Remove the adhesive tape from battery contacts.

3. Insert the battery into the charger until it latches.

LEDs on the battery charger indicates the following:

- Red - charging

- Green - fully charged

- Flashing red - error (e.g., incorrect placement on the charger or an improperly functioning battery)

	NOTES
	▪ Verify correct orientation when inserting the battery into the charger.
	▪ Fully charge a battery prior to use.
	▪ A fully depleted battery takes about 7 hours to charge.
	▪ For battery warnings and cautions, see Battery Warnings and Cautions.

ATTACHING THE BATTERY

To attach a battery to the camera:

1. Ensure the battery contacts (A) are facing up.

2. Slide the battery up along the camera until it snaps in place (B).

B

A
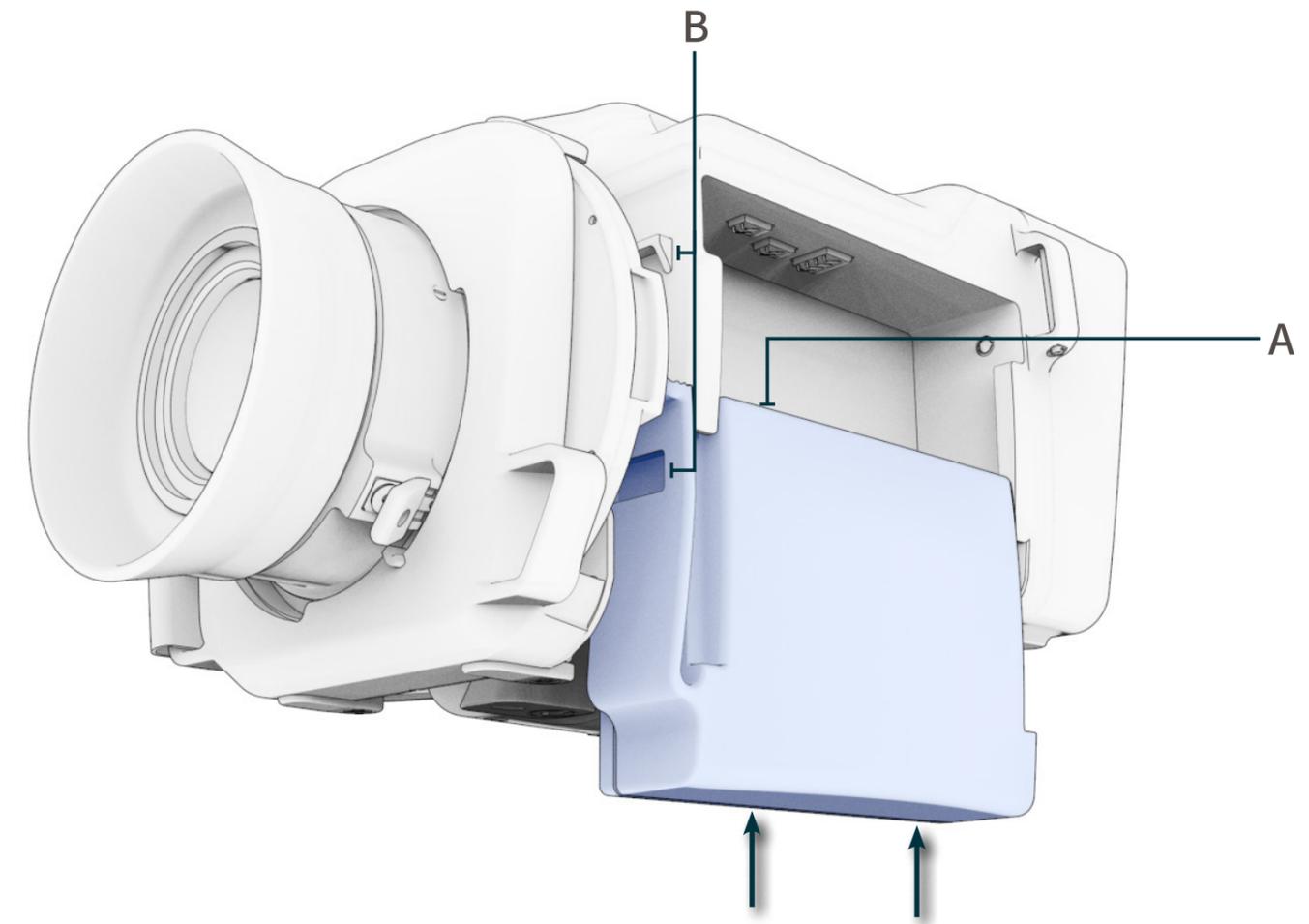
NOTES
▪ The battery status indicator on the LCD display indicates battery charge level (see Camera Status Indicators).
▪ For information on replacing the battery, see Replacing the Battery.

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ADJUSTING THE SIDE STRAPS

The straps on both sides of the camera allows the camera to be held comfortably and securely, and also allow for comfortable operation of the keypad buttons.

To adjust the side straps:

1. Lift up the flap (A).

2. Adjust the strap length.

3. Push the flap back down.
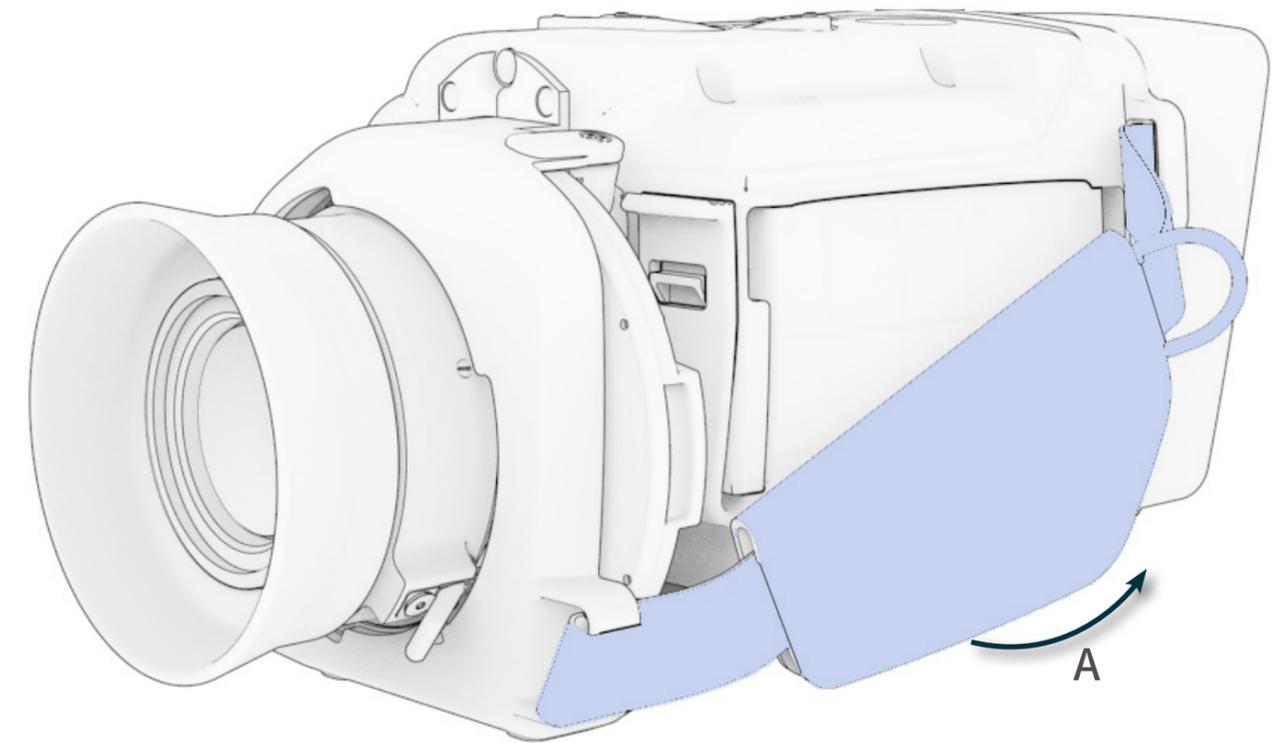
A

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Camera Startup

This section provides information on the camera startup sequence and includes:

- [Powering On Camera](#)
- [Power-Up Sequence](#)
- [Removing Lens Cover](#)
- [Screen Overlay](#)

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POWERING ON CAMERA

Before powering on the camera, ensure the battery is properly inserted and fully charged (see Attaching the Battery).

To power on the camera:

1. Ensure the lens cover is mounted on the lens (A).

2. Press the **power button** (B) for one second. The camera powers on and the power-up sequence begins.

A
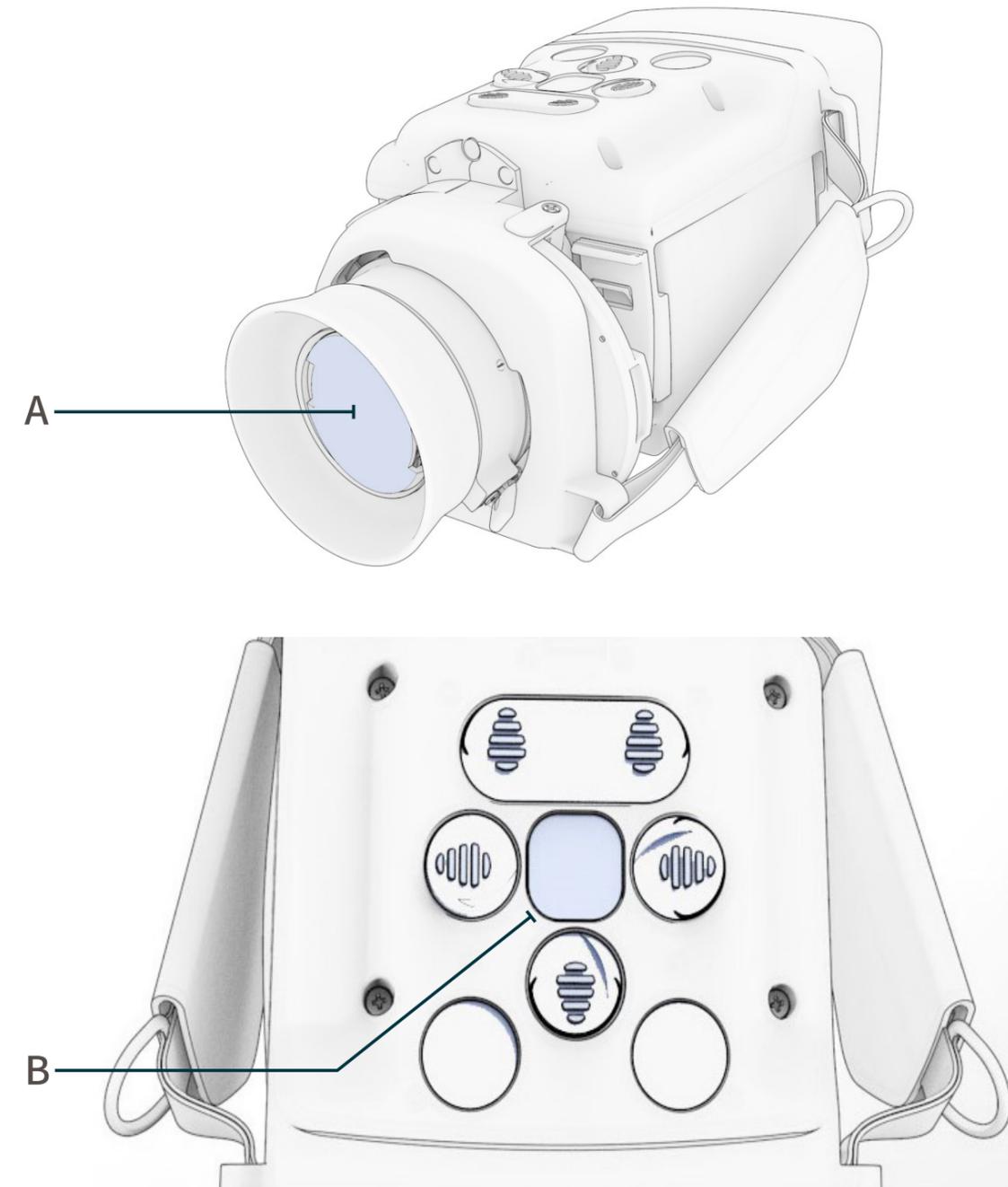
NOTES
▪ The lens cover must be mounted on the lens while the camera is performing the power-up sequence.
▪ The camera maintains the settings from when it was last powered off.
▪ For information on powering off the camera, see Powering Off Camera.

B

www.

POWER-UP SEQUENCE

The camera goes through the following power-up sequence:

1. A black screen, followed by the Opgal logo, are displayed for approximately ten seconds.

2. The cooler starts.

3. The camera starts in <u>visible mode</u>.

4. The **cooler** icon (A) blinks for 8-10 minutes, indicating the camera is in cool down state.

5. The camera performs an automatic NUC when cool down is complete (see <u>Performing Non-Uniformity Correction (NUC)</u>).

6. Once cool down is complete, all viewing modes become available and cooler icon (A) disappears.

NOTES
▪ The cool down process allows the infrared detector to reach operating cryogenic temperature. Once this temperature is achieved, the cooler icon disappears, indicating cool down is complete.
▪ During the cool down process the camera menu is available (see Camera Settings).

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## REMOVING LENS COVER

Remove the lens cover once the power-up sequence has completed.

To remove the lens cover:

1. Verify the lens cover is tied to the side of the camera (A).

2. Push in both latches on either side of the cover (B).

3. Remove the lens cover.
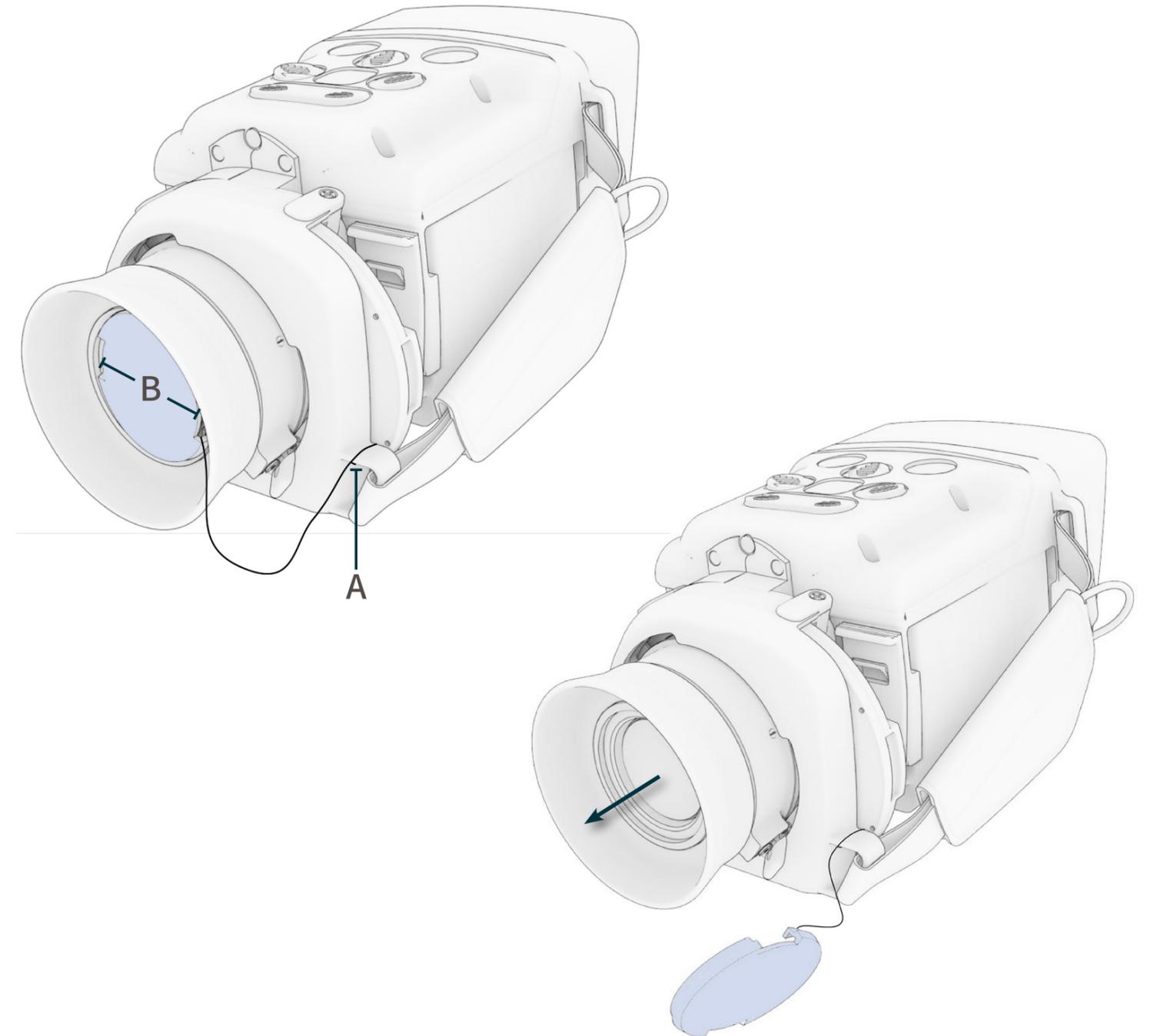
CAUTION
To prevent the lens from being scratched, always mount the lens cover over the lens when the camera is not in use.

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SCREEN OVERLAY

After the camera has powered up, the following indicators are displayed on the screen:

- **Viewing Status Indicators (A) –** includes indicators for viewing mode, zoom value, and image polarity.

- **Date and time (B) –** date is displayed in MM/DD/YY or DD/MM/YY format; time is displayed in 12-hour or 24-hour format (see Setting Date and Time).

- **Camera Status Indicators (C) –** includes icons for cooler, recording, snapshot, battery status, and memory status.

- **Connection Status Indicators (D) –** includes icons for USB, GPS, Wi-Fi, and Bluetooth connection status.

- **Longitude and latitude coordinates (E) –** acquired from the GPS receiver (see Connecting to GPS).
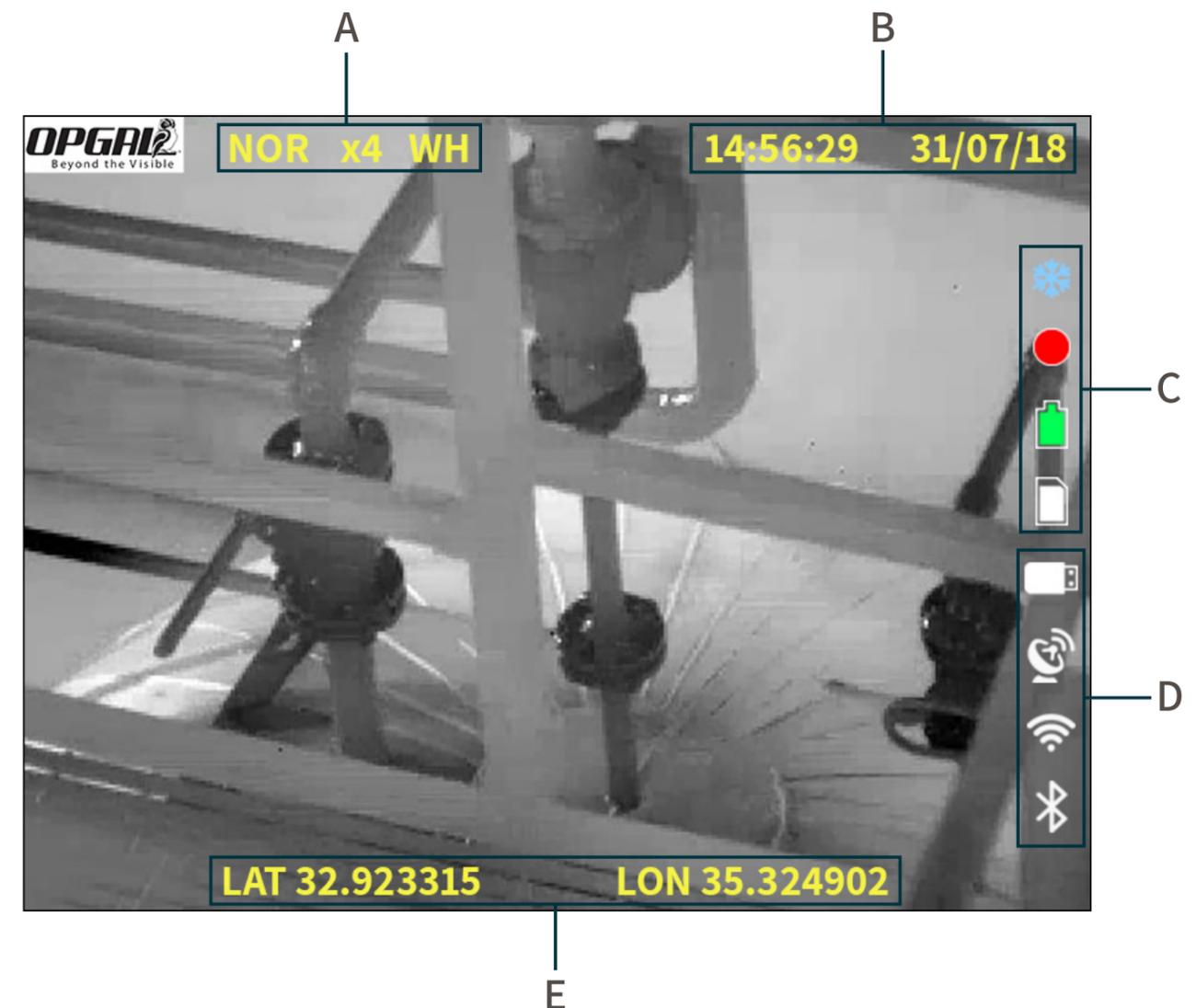
A   B

NOR x4 WH   14:56:29   31/07/18

C

D

LAT 32.923315   LON 35.324902

E

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Viewing Status Indicators

The viewing status indicators include the following:

- **Viewing Mode (A) –** options include:
  - » **VIS –** visible
  - » **NOR –** normal
  - » **ENH –** enhanced
  - » **TMF –** thermography

  See [Viewing Modes](#).

- **Zoom value (B) –** indicates digital zoom value. Options include: 1x, 2x, 4x, 8x, or 16x (see [Zooming](#)).

- **Image polarity (C) –** options include:
  - » **WH –** white hot
  - » **BH –** black hot

  See [Selecting Polarity](#).
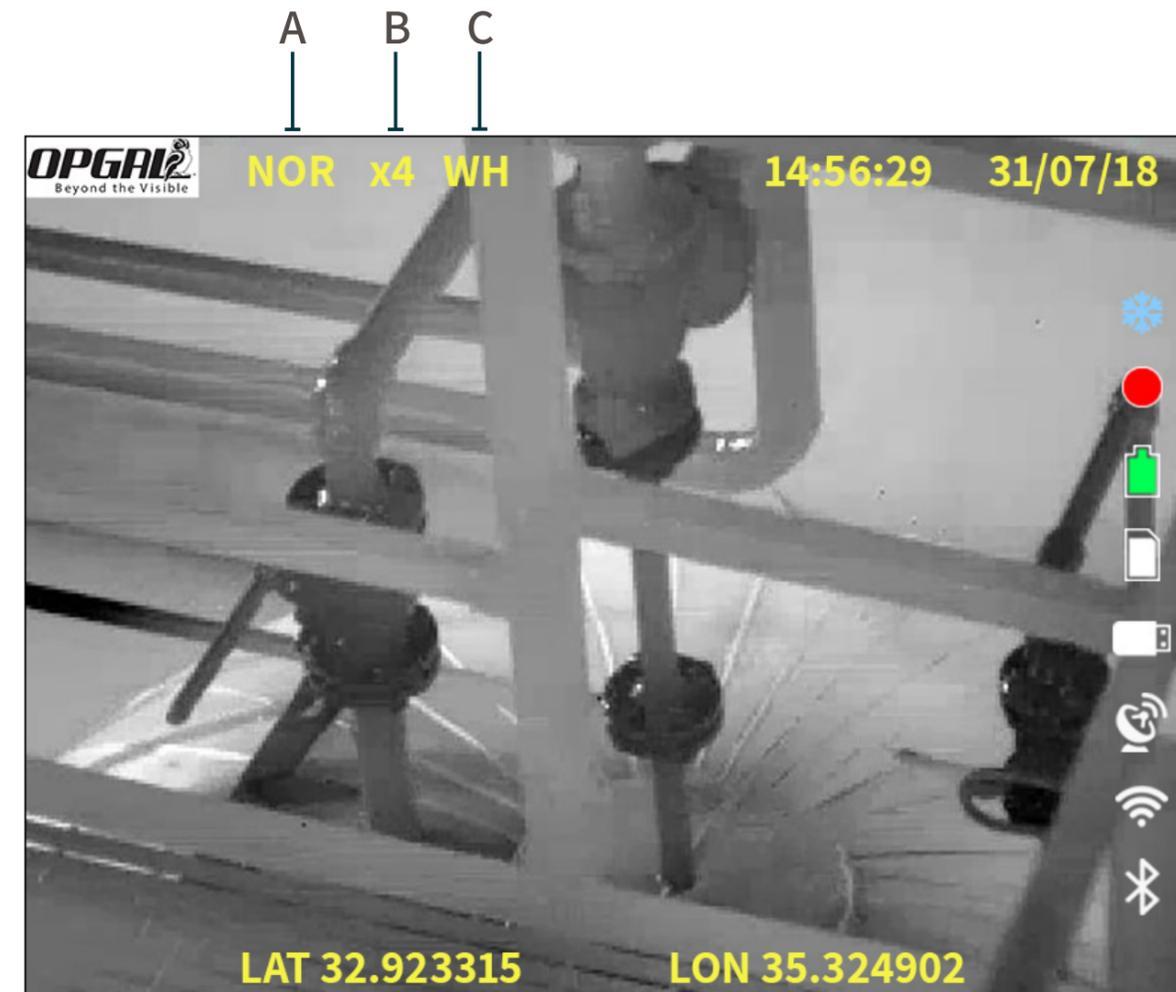
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Camera Status Indicators

The camera status indicators include the following icons:

- **Cooler (A) –** indicates cooler is active. Icon blinks during cool down state, and appears with a red cross (E) when cooler is deactivated (see Activating/Deactivating Cooler).

- **Recording (B) –** indicates recording is active (see Recording Video).

- **Battery (C) –** indicates amount of battery charge remaining.

- **Memory (D) –** indicates amount of internal memory used.

- **Snapshot (F) –** indicates a snapshot has been taken (see Taking a Snapshot).
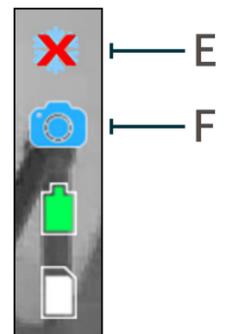
NOTE
When a snapshot is taken, the snapshot icon briefly appears over the recording icon if recording is in progress.

NOR x4 WH   14:56:29   31/07/18

A
B
C
D

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E
F

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Connection Status Indicators

The connection status indicators include the following icons:

- **USB (A) –** indicates EyeCGas® 2.0 is connected to a computer or tablet via a USB cable with the Net Adapter option enabled (see Connecting via USB).

- **GPS (B) –** indicates that GPS is turned on (see Connecting to GPS).

- **Wi-Fi (C) –** indicates EyeCGas® 2.0 is functioning as a mobile hotspot (see Connecting via Wi-Fi).

- **Bluetooth (D) –** indicates EyeCGas® 2.0 is connected to a device via Bluetooth (see Connecting via Bluetooth).

	NOTE
	Blinking icons indicate there is no connection. Steady icons indicate there is a connection.

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Viewing Modes

Keypad

EyeCGas® 2.0 operates in the following viewing modes:

- Visible Mode

- Normal Mode

- Enhanced Mode

- Thermography Mode

A

B

SWITCHING BETWEEN VIEWING MODES

To switch between viewing modes, press the **mode button** (A). The viewing mode indicator on the LCD display (B) indicates the currently selected mode.
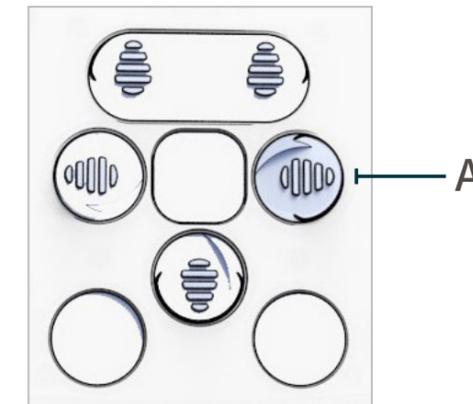
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VISIBLE MODE

In visible mode, EyeCGas® 2.0 displays video using the HD video camera.

Visible mode is used for situational awareness and component identification.

The following indicators are specific to this mode:

- **VIS (A)** – indicates visible mode is active.

A

NOTE
Operations available in visible mode are:
• Recording Video
• Taking a Snapshot
• Zooming

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NORMAL MODE

In normal mode, EyeCGas® 2.0 produces a very smooth thermal image. Normal mode is used to detect medium to large sized gas leaks in environments with high temperature differences between the gas and the background. This mode is used for general monitoring of components in search of potential gas leaks.

The following indicators are specific to this mode:

- **NOR (A) –** indicates normal mode is active.

- **WH or BH (B) –** indicates polarity.

NOTE
Operations available in normal mode are:
▪ Recording Video   ▪ Taking a Snapshot   ▪ Zooming   ▪ Performing Non-Uniformity Correction (NUC)   ▪ Selecting Polarity

ENHANCED MODE

In enhanced mode, EyeCGas® 2.0 utilizes proprietary algorithms to enhance gas detection. Enhanced mode is used for detecting low gas flow leakages and when working in an environment with a uniform (low-contrast) background.

The following indicators are specific to this mode:

- **ENH (A) –** indicates enhanced mode is active.

- **Number (B) –** indicates enhancement level.

- **WH or BH (C) –** indicates polarity.

NOTES
▪ Enhanced mode is the recommended mode for gas detection.
▪ Operations available in enhanced mode are:
▪ Recording Video
▪ Taking a Snapshot
▪ Zooming
▪ Performing Non-Uniformity Correction (NUC)
▪ Selecting Polarity
▪ Choosing Enhancement Level
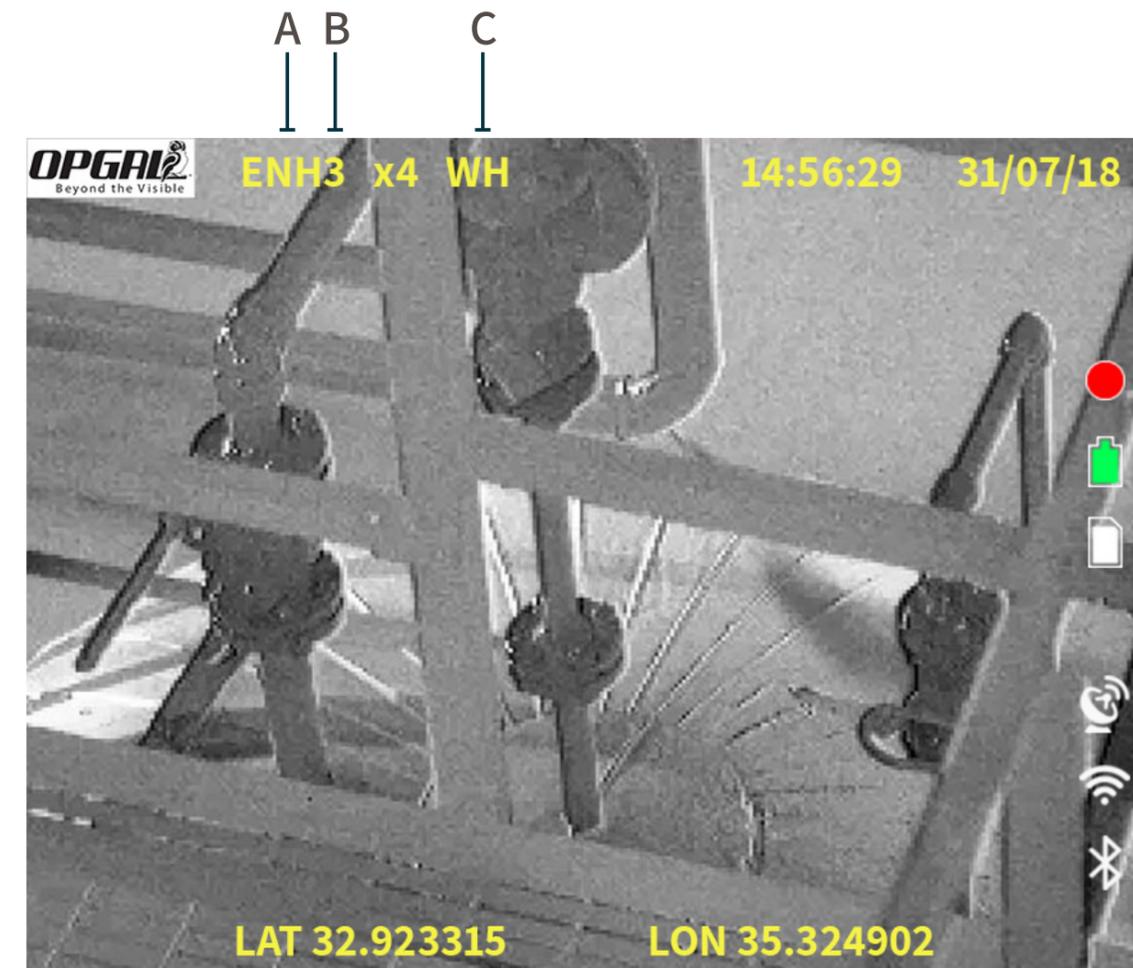
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THERMOGRAPHY MODE

In thermography mode, EyeCGas® 2.0 identifies surface temperature variations of objects and displays these variations as differences in color. Colors are determined based on the color palette selected (see Selecting Color Palette).

The following indicators are specific to this mode:

- **TMG (A) –** indicates thermography mode is active.

- **Number (B) –** indicates emissivity value.

- **Temperature (C) –** indicates average temperature within the bounded area.

- **Vertical bar (D) –** indicates temperature range and color palette.

NOTE
Camera operations available in thermography mode are: ▪ Recording Video ▪ Taking a Snapshot ▪ Zooming ▪ Performing Non-Uniformity Correction (NUC) ▪ Selecting Polarity ▪ Choosing Emissivity Value
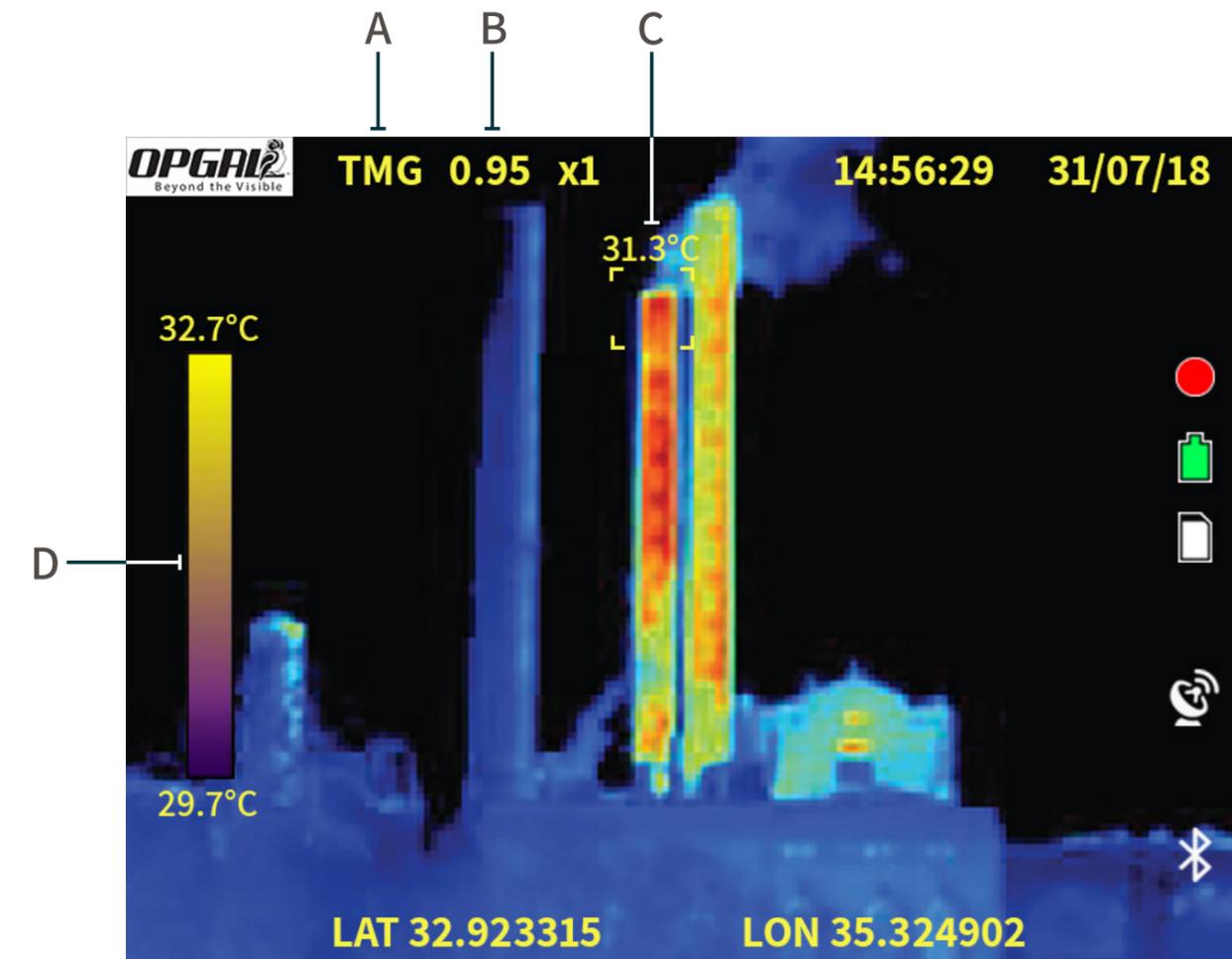
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Frequently Used Operations

This section reviews frequently used camera operations and includes:

- [Keypad Buttons Used During Camera Operation](#)
- [Recording Video](#)
- [Taking a Snapshot](#)
- [Zooming](#)
- [Performing Non-Uniformity Correction (NUC)](#)
- [Selecting Polarity](#)
- [Selecting Color Palette](#)
- [Choosing Enhancement Level](#)
- [Choosing Emissivity Value](#)

NOTE
See also: ▪ Switching Between Viewing Modes   ▪ Powering Off Camera

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KEYPAD BUTTONS USED DURING CAMERA OPERATION

The following buttons are used in all viewing modes:

- Power Off
- NUC
- Viewing Mode
- Record
- Snapshot
- Zoom

The following button is used in normal and enhanced viewing mode:

- Polarity

The following button is used in enhanced viewing mode only:

- Enhancement

The following buttons are used in thermography viewing mode only:

- Color Palette
- Emissivity
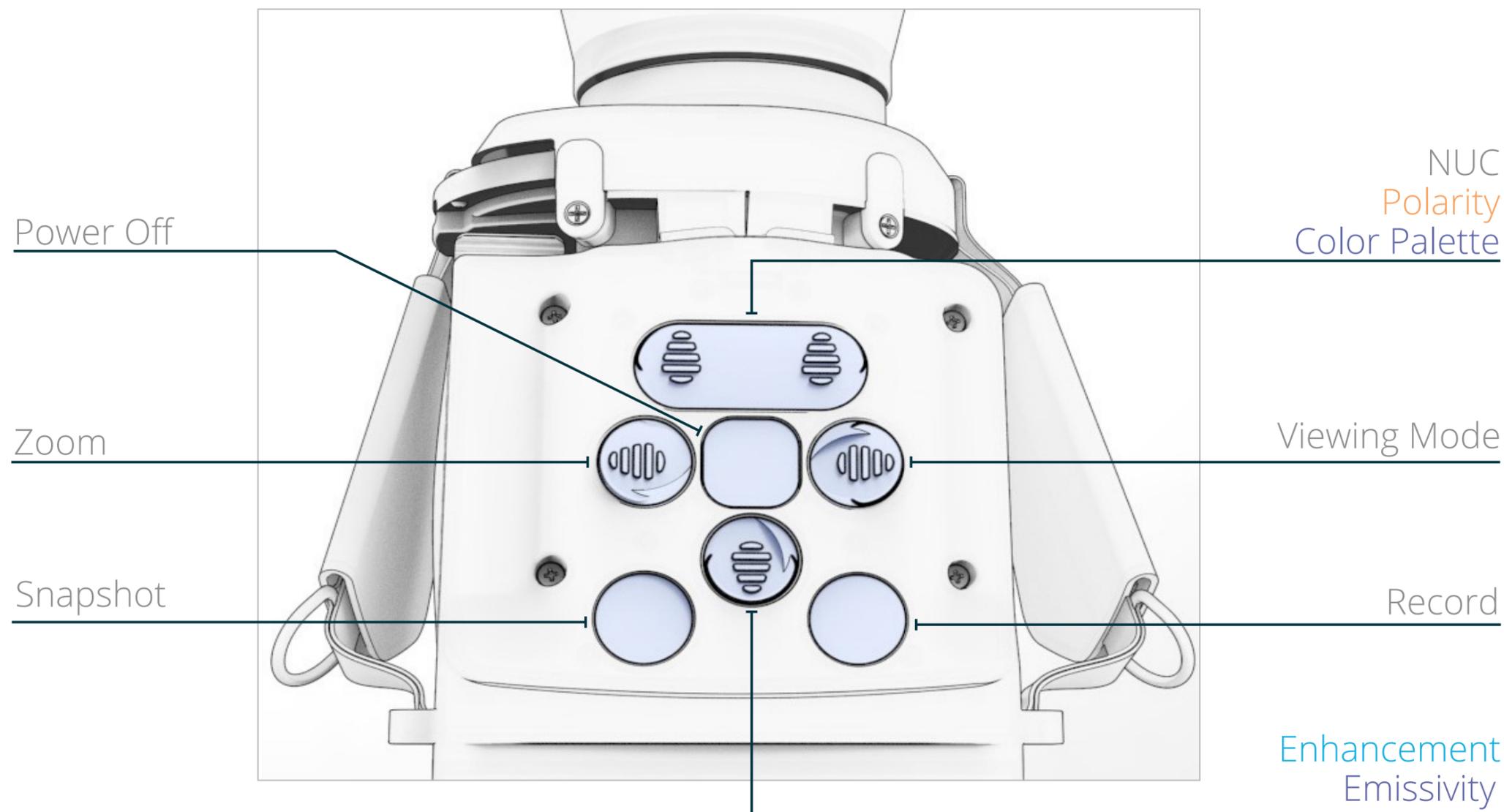
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Snapshot

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RECORDING VIDEO

To record video:

1. Set the camera to the required viewing mode (see Switching Between Viewing Modes).

2. Press the **record button** (A).

   A red indicator (B) starts blinking.

3. To stop the recording, press the **record button** (A).

   The red icon disappears and the video is saved in the camera's internal memory.

Keypad
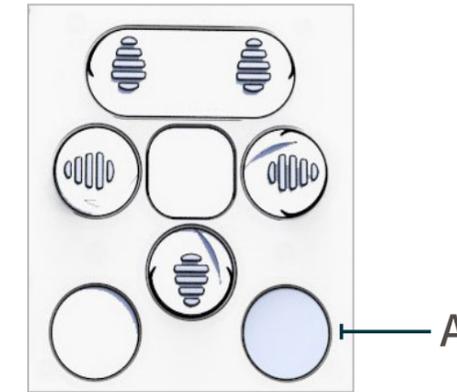
	NOTES
	▪ Viewing modes can be switched while recording is in progress (see Switching Between Viewing Modes).
	▪ Recording audio is possible using the audio headset (see Attaching the Headset).
	▪ Video files can be viewed and managed on the camera's LCD screen using the menu system (see File Management).

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TAKING A SNAPSHOT

To take a snapshot of the image shown on the screen, press the **snapshot button** (A). A blue icon (B) briefly appears on the screen, and the image is saved in the camera's internal memory.

Keypad

A

B
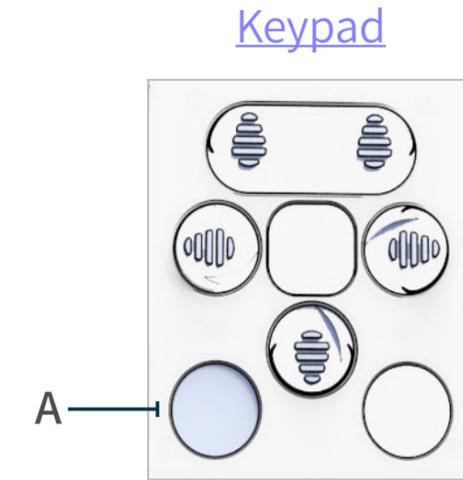
NOTE
Image files can be viewed and managed on the camera's LCD screen using the menu system (see File Management).

www.

ZOOMING

To activate digital zoom, press the **zoom button** (A). Each button press advances the digital zoom as follows:

Keypad

A

1x → 2x → 4x → 8x → 16x

visible mode only

(cycles back to 1x)
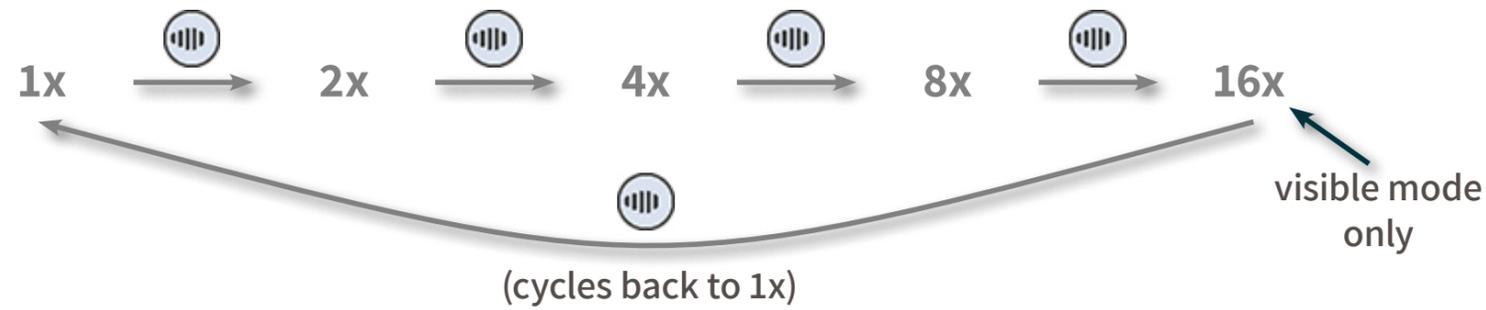
The current zoom level is indicated on the display (B).

B
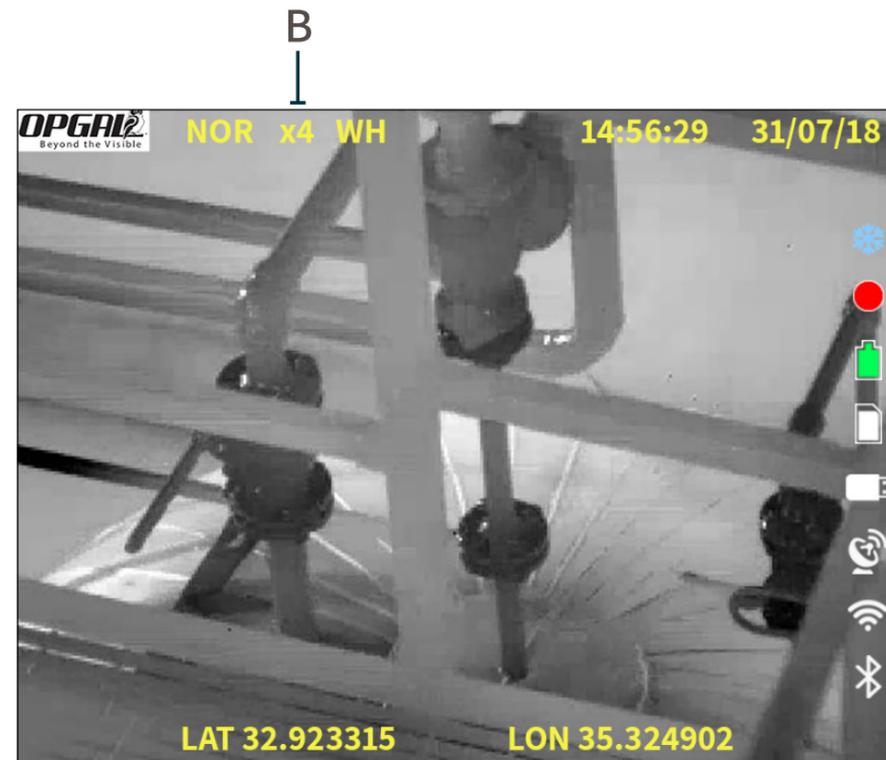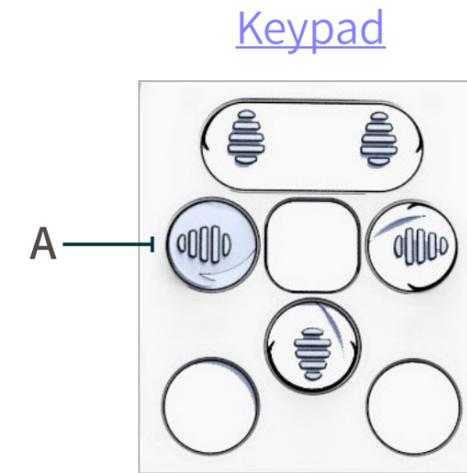
NOTES
▪ Digital zoom advances to 16x zoom in visible mode only.
▪ Zoom can also be set using the menu system (see Setting Zoom Level).

OPGAL
Beyond the Visible
NOR x4 WH   14:56:29   31/07/18

LAT 32.923315   LON 35.324902

www.

PERFORMING NON-UNIFORMITY CORRECTION (NUC)

The NUC process corrects for image noise or artifacts caused by external or internal temperature changes.

To perform the NUC process:

1. Mount the lens cover (A) on the camera lens.

2. Press the **NUC button** (B) for 3 seconds.

   The image on the screen freezes for a few seconds, indicating NUC is in progress.

Perform the NUC process separately on either of the following:

- **IR image –** run NUC in normal or enhanced mode.

- **Thermography image –** run NUC in thermography mode.

A

Keypad

B ——— press for 3 seconds
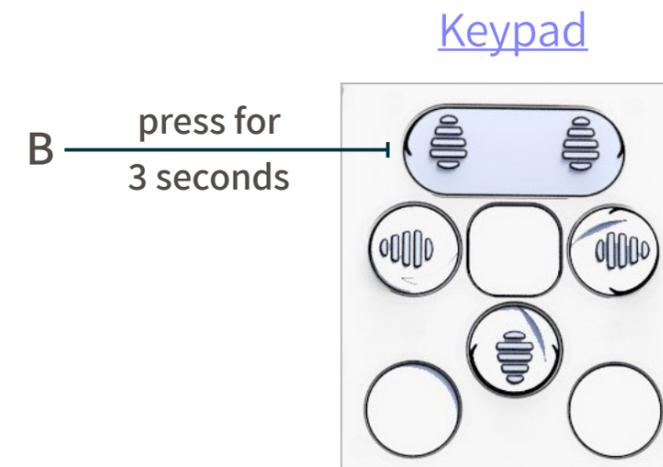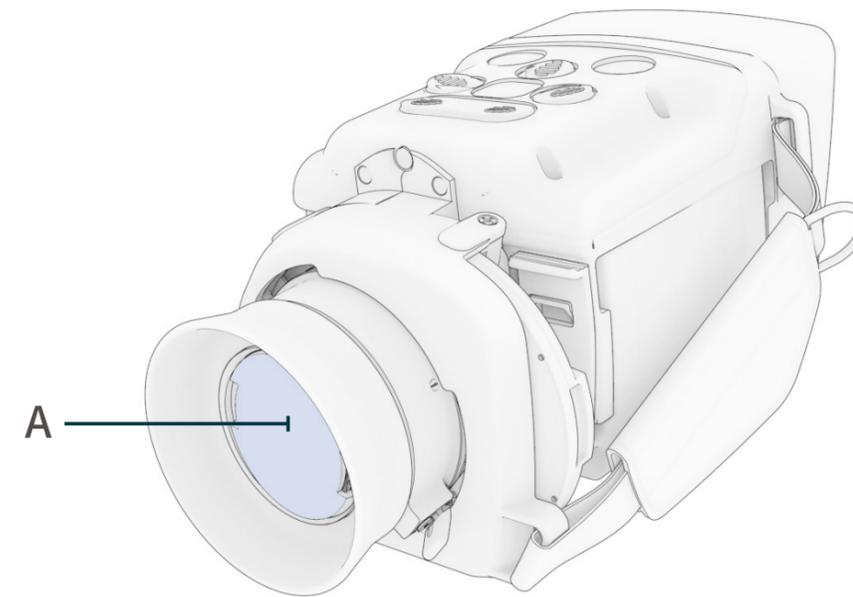
NOTES
▪ Only perform NUC when there is image degradation.
▪ The NUC process does not resolve poor image quality caused by lens condensation or dirt on the lens.

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SELECTING POLARITY

Polarity determines whether hot objects are displayed as white or black.

To select polarity:

Keypad

1. Select normal or enhanced viewing mode (see Switching Between Viewing Modes).

2. Press the **polarity button** (A) to switch between the following two modes:

   » **White Hot (WH) mode –** The hottest parts of the infrared image are displayed in white, while the coolest parts are displayed in black.

   » **Black Hot (BH) mode –** The hottest parts of the infrared image are displayed in black, while the coolest parts are displayed in white.

The current polarity mode is indicated on the display (B).

NOTES
▪ Polarity selection functions in normal viewing mode and enhanced viewing mode only.
▪ Polarity can also be set using the menu system (see Setting Polarity).

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SELECTING COLOR PALETTE

A color palette is a predefined range of colors which correspond to variations in surface temperature of objects. A palette should be chosen which best shows thermal differences in the scene.

To select a color palette:

1. Select thermography viewing mode (see Switching Between Viewing Modes).

2. Press the **color palette button** (A).

   Each button press changes the color palette as follows:

   Iron → **Rainbow** → **Vivid** → **ISO green** → **ISO red** → **B&W**

   (cycles back to iron)
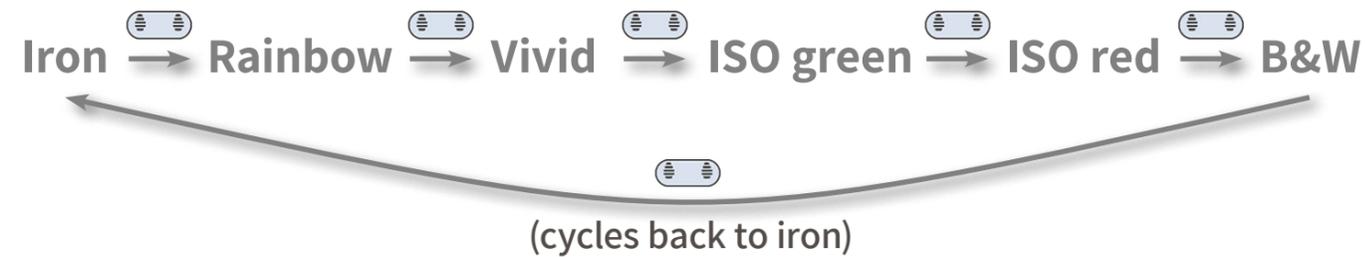
The vertical bar (B) indicates current color palette and temperature range.

NOTES
▪ Color palette selection functions in thermography viewing mode only.
▪ The color palette can also be set using the menu system (see Defining Thermography Mode Settings).

Keypad
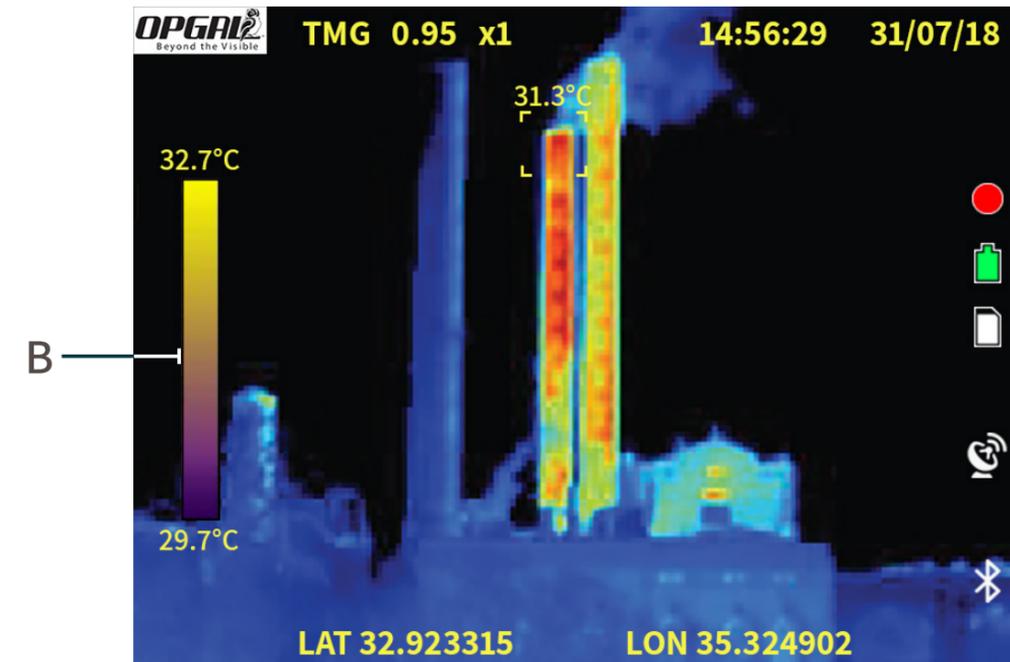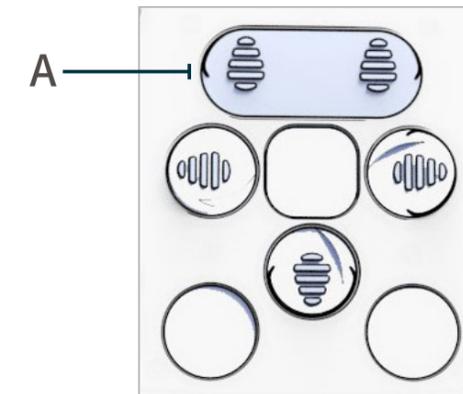
A

B

TMG 0.95 x1   14:56:29   31/07/18
31.3°C
32.7°C
29.7°C
LAT 32.923315   LON 35.324902

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CHOOSING ENHANCEMENT LEVEL

A low enhancement level allows the infrared sensor to be more sensitive to gas. However, low enhancement levels also generate grainier images. An optimum level should thus be chosen between gas detection and clear image generation.

To choose enhancement level:

1. Select enhanced viewing mode (see Switching Between Viewing Modes).

2. Press the **enhancement button** (A).

   Each button press changes enhancement level by 1, advancing from 0 to 10 in a cyclic manner. The current level is indicated on the display (B).

Keypad

A

B

clearer image   (each button press increments by 1)   better detection

0   1   2   3   4   5   6   7   8   9   10

(cycles back to 0)
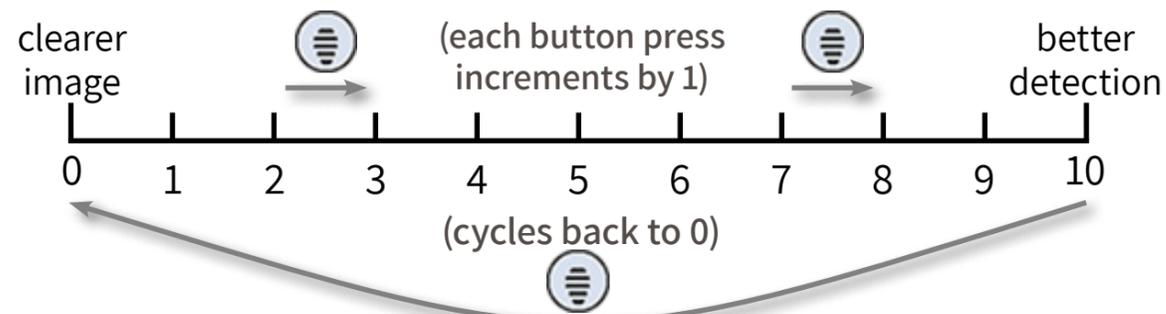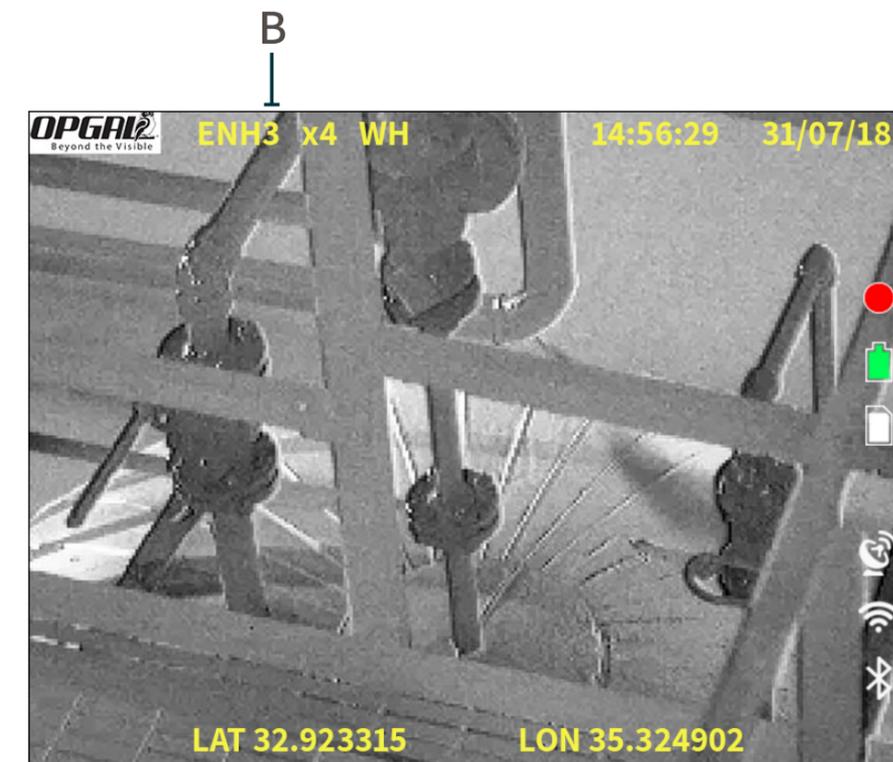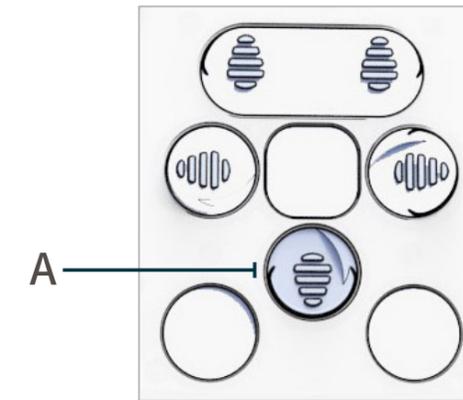
NOTES
▪ Enhancement level selection functions in enhanced viewing mode only.
▪ Enhancement level can also be set using the menu system (see Setting Enhancement Level).

ENH3   x4   WH   14:56:29   31/07/18

LAT 32.923315   LON 35.324902

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CHOOSING EMISSIVITY VALUE

Emissivity value is chosen according to the physical characteristic of the material being reviewed.

To choose emissivity value:

1. Select thermography viewing mode (see Switching Between Viewing Modes).

2. Consult the emissivity table and choose the relevant value.

3. Press the **emissivity button** (A) to select the desired value.

   Each button press changes emissivity value by .05, advancing from .1 to 1 in a cyclic manner. The current value is indicated on the display (B).

Keypad

A

B

NOTES

▪ Emissivity value selection functions in thermography viewing mode only.

▪ Emissivity value can also be set using the menu system (see Defining Thermography Mode Settings).
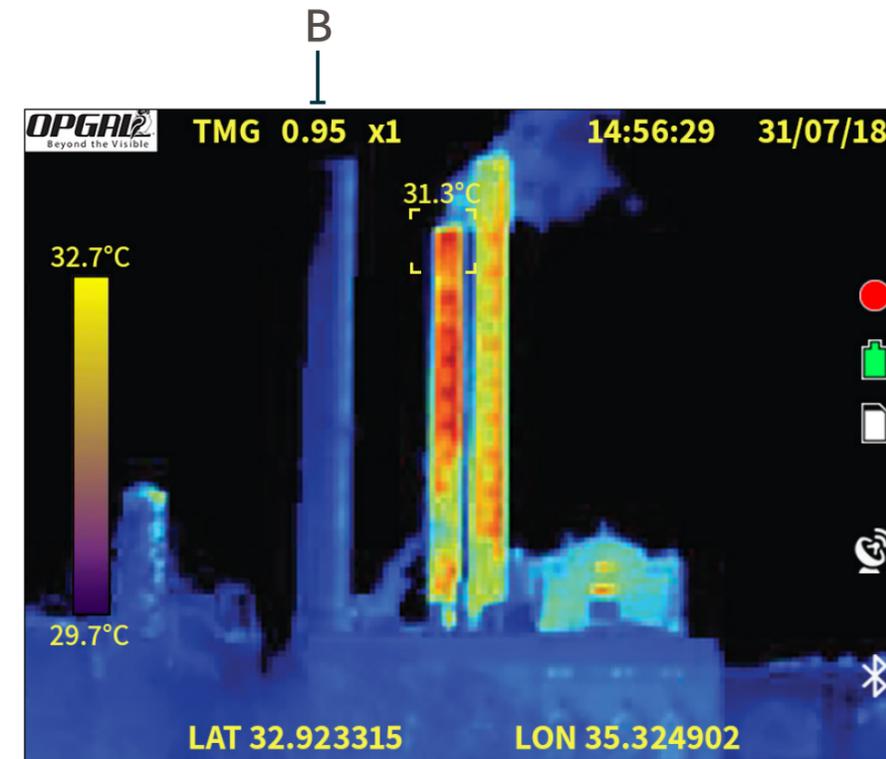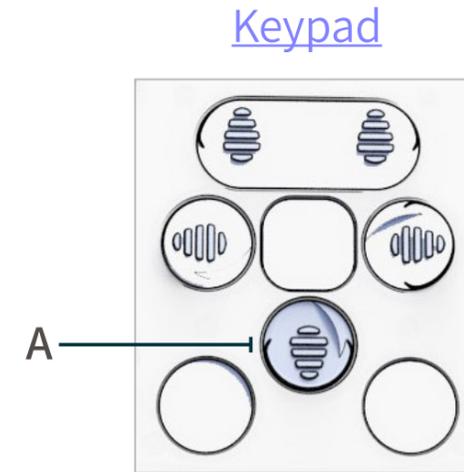
Emissivity Values of Common Materials

Material	Emissivity
Aluminum foil	0.03
Aluminum, anodized	0.9[11]
Asphalt	0.88
Brick	0.90
Concrete, rough	0.91
Copper, polished	0.04
Copper, oxidized	0.87
Glass, smooth (uncoated)	0.95
Ice	0.97
Limestone	0.92
Marble (polished)	0.89 to 0.92
Paint (including white)	0.9
Paper, roofing or white	0.88 to 0.86
Plaster, rough	0.89
Silver, polished	0.02
Silver, oxidized	0.04
Snow	0.8 to 0.9
Water, pure	0.96

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Camera Settings

This section reviews the various camera settings configured using the on-screen menu system and includes:

- [Keypad Buttons Used During Menu Configuration](#)
- [Menu Navigation](#)
- [Menu Overview](#)
- [File Management](#)
- [Settings](#)
- [Connectivity](#)
- [Imaging Modes](#)

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KEYPAD BUTTONS USED DURING MENU CONFIGURATION

The following buttons are used to access and
navigate the menu system:

- Menu
- Left navigation
- Up navigation
- Right navigation
- Down navigation
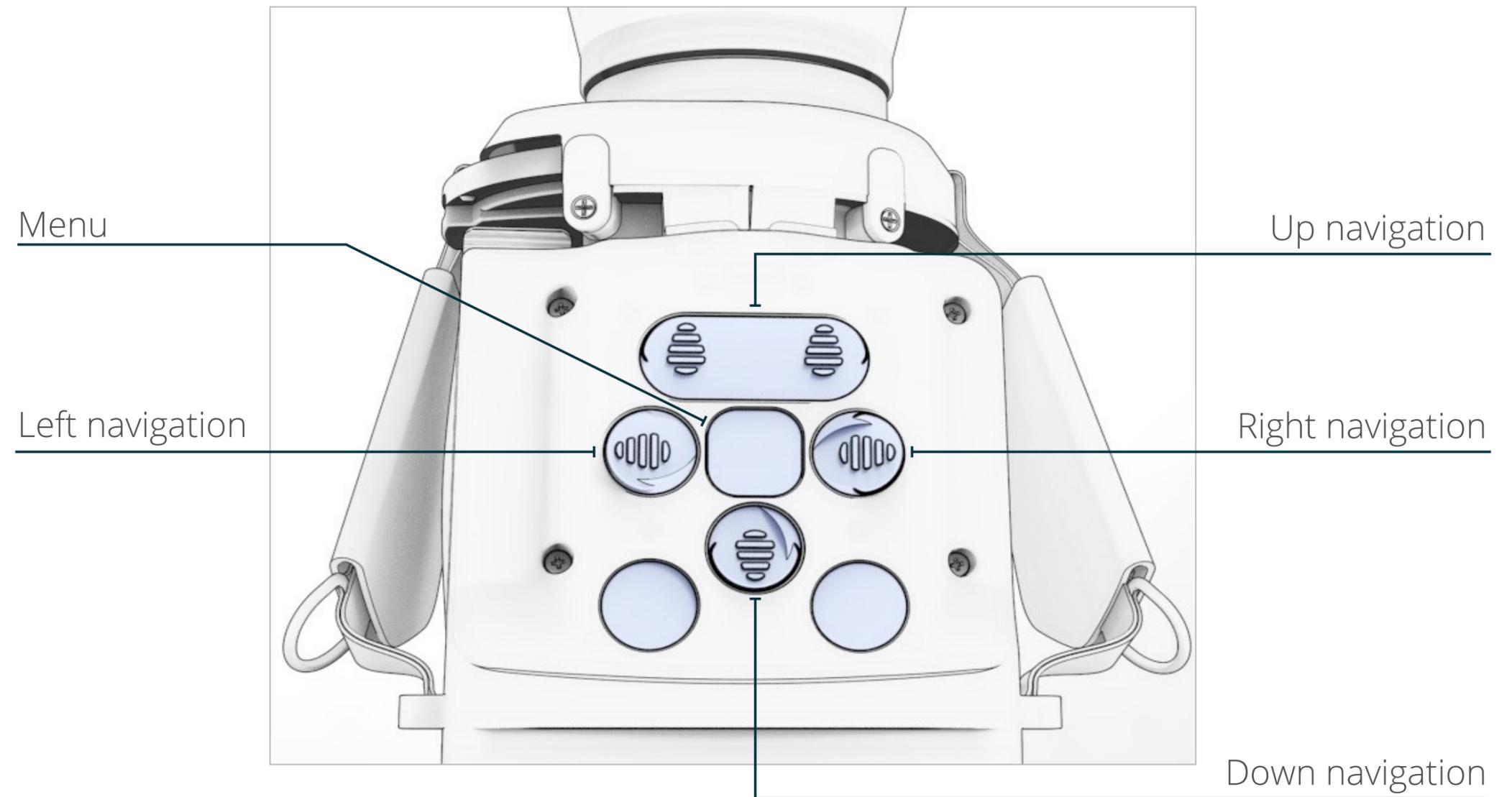
Menu

Up navigation

Left navigation

Right navigation

Down navigation

MENU NAVIGATION

EyeCGas® 2.0's menu system consists of four menu tabs. Under each tab is a list of options which contain either sub-menus or information.

The general process for navigating the menu system is as follows:

Displaying the Menu

Press the **menu button** (C). The menu appears with the leftmost tab highlighted.

Navigating Between Tabs

Press the right (B) or left (A) navigation button to navigate to the relevant menu tab. The selected tab is highlighted (D).
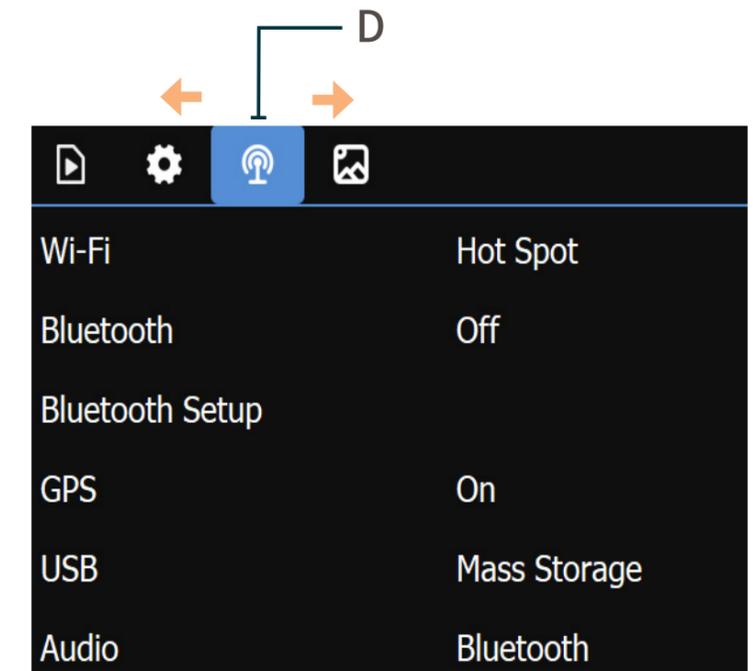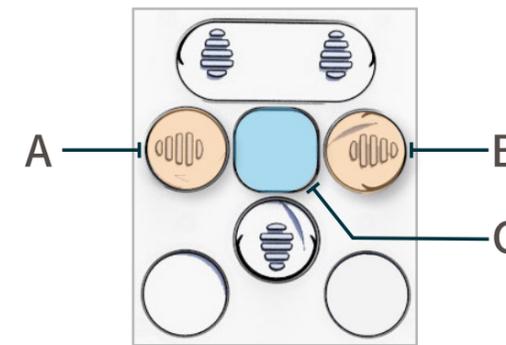
Wi-Fi	Hot Spot
Bluetooth	Off
Bluetooth Setup	
GPS	On
USB	Mass Storage
Audio	Bluetooth

www.

Scrolling Vertically Between Menu Options

Press the down (A) or up (B) navigation button to scroll between menu options.
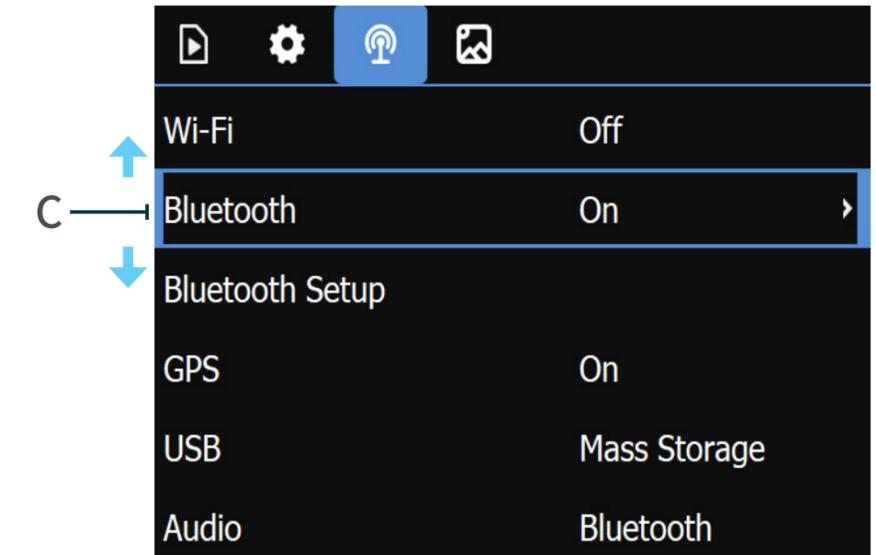
Selecting a Menu Option

Press the right (A) navigation button to select a menu option.

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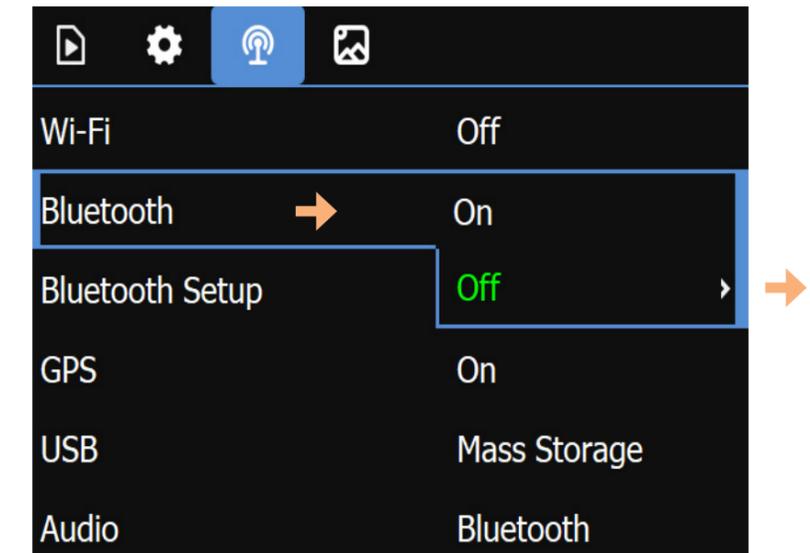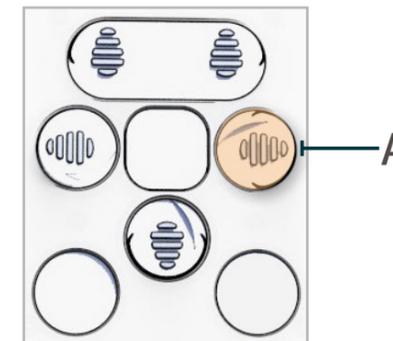
MENU OVERVIEW

Use the right and left navigation buttons to navigate between menu tabs.
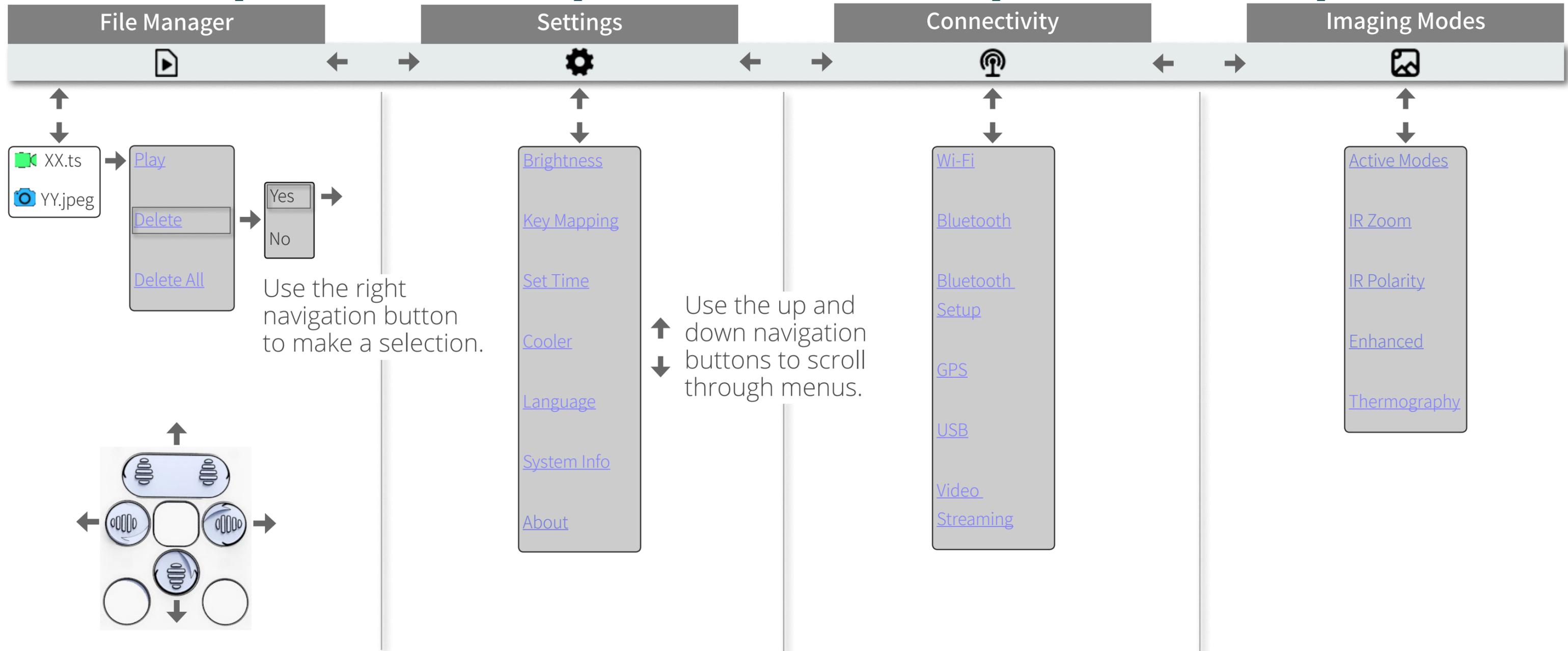
File Manager	Settings	Connectivity	Imaging Modes

XX.ts
YY.jpeg

Play

Delete

Delete All

Yes

No

Use the right navigation button to make a selection.

Brightness

Key Mapping

Set Time

Cooler

Language

System Info

About

Use the up and down navigation buttons to scroll through menus.

Wi-Fi

Bluetooth

Bluetooth Setup

GPS

USB

Video Streaming

Active Modes

IR Zoom

IR Polarity

Enhanced

Thermography

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FILE MANAGEMENT

The file manager tab allows for viewing and deleting videos and images saved in the camera's internal memory.

This section includes:

- [Playing Videos](#)
- [Viewing Images](#)
- [Deleting a Single Video or Image](#)
- [Deleting All Videos and Images](#)
- [Transferring Files using Mass Storage](#)
- [Transferring Files using FTP](#)

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Playing Videos

1. Display the menu. The file manager tab is already selected.

2. Scroll to and select the relevant video file.

3. Select **Play**.

NOTE
Video files are saved in **.ts** format, a video streaming file format used for storing video on DVDs. This file format is also able to store audio and data information. TS stands for Transport Stream.

XX.ts

YY.jpeg

Play

Delete

Delete All

Click the right navigation button to make selection.
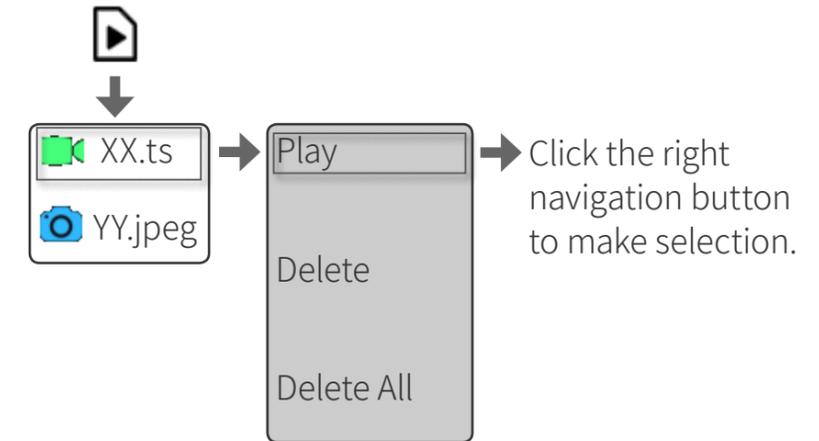
Viewing Images

1. Display the menu. The file manager tab is already selected.

2. Scroll to and select the relevant image file.

3. Select **Show**.

NOTE
Image files are saved in **.jpeg** format.

XX.ts

YY.jpeg

Show

Delete

Delete All

Click the right navigation button to make selection.

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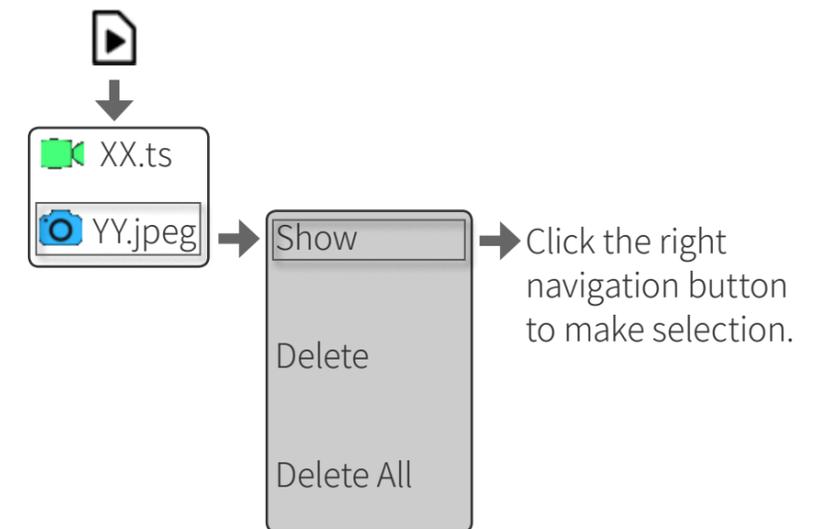
Deleting a Single Video or Image

1. <u>Display the menu</u>. The file manager tab is already selected.

2. <u>Scroll</u> to and <u>select</u> the relevant video or image file.

3. <u>Scroll</u> to and <u>select</u> **Delete**.

4. <u>Select</u> **Yes** to confirm deletion.

XX.ts
YY.jpeg

Play

Delete

Delete All

Yes

No

Click the right navigation button to make selection.
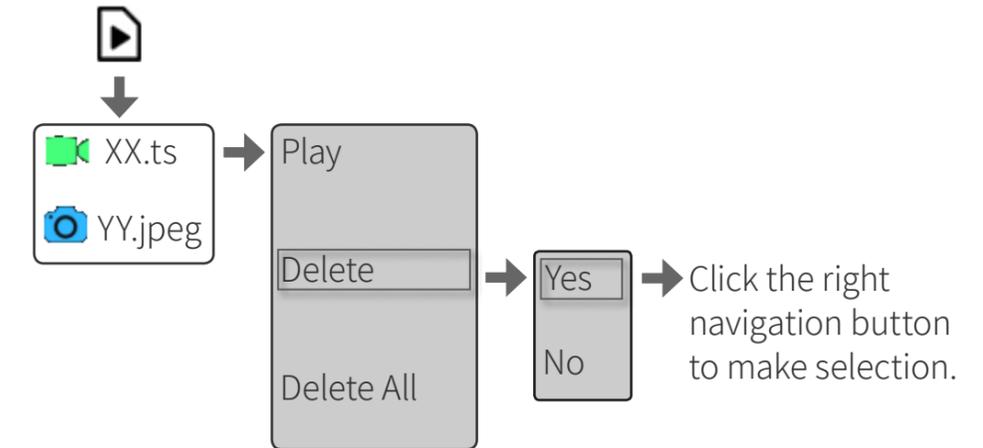
Deleting All Videos and Images

1. <u>Display the menu</u>. The file manager tab is already selected.

2. <u>Scroll</u> to and <u>select</u> any video or image file.

3. <u>Scroll</u> to and <u>select</u> **Delete All**.

4. <u>Select</u> **Yes** to confirm deletion.

XX.ts
YY.jpeg

Play

Delete

Delete All

Yes

No

Click the right navigation button to make selection.

www.
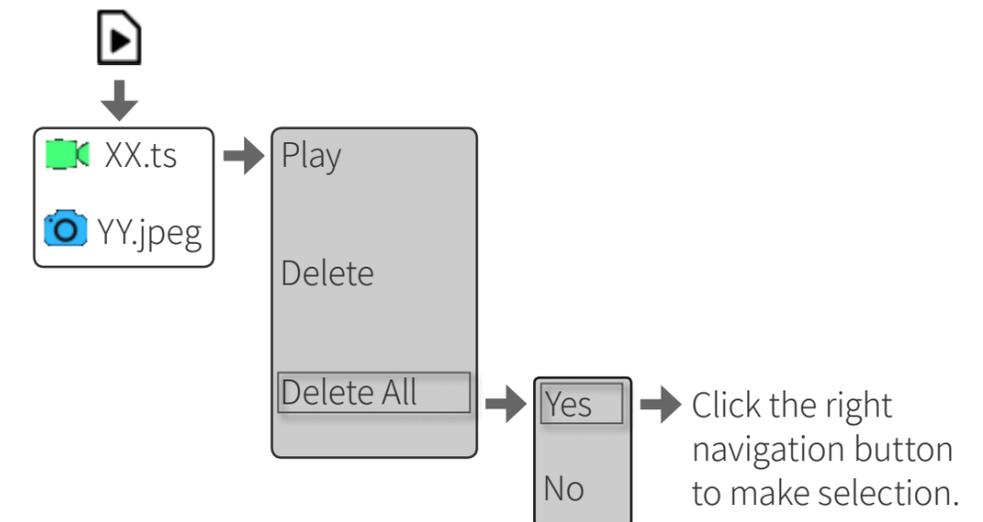
Transferring Files using Mass Storage

To transfer files from the camera to a computer using the USB mass storage option:

1. Select the mass storage option under USB settings (see [Connecting via USB](#)).

2. Connect the USB cable between the camera and a computer.

3. Move the files as needed.

Transferring Files using FTP

FTP file transfer can done either through a USB cable or through Wi-Fi.
To transfer files from the the camera to a computer or mobile device using FTP:

1. Select net adapter option under USB setting (see [Connecting via USB](#)) or connect using Wi-Fi (see [Connecting via Wi-Fi](#)).

2. Open an FTP client application on the computer or mobile device.

3. Enter the relevant information in the FTP application.

4. Move the files as needed.

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SETTINGS

The settings tab enables setting camera preferences and viewing system information.

This section includes:

- [Adjusting LCD Brightness](#)
- [Displaying Keypad Map](#)
- [Setting Date and Time](#)
- [Activating/Deactivating Cooler](#)
- [Selecting Language](#)
- [Viewing System Information](#)
- [Viewing About Information](#)

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Adjusting LCD Brightness

LCD display brightness levels are set from 10% to 100% by increments of 10.

To adjust the LCD brightness:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **Brightness**.

4. Choose the desired brightness level using the up and down navigation buttons.

5. Select the brightness level.

Brightness

Brightness   80%

Click the right navigation button to make selection.

Key Mapping

Set Time

Cooler

Language
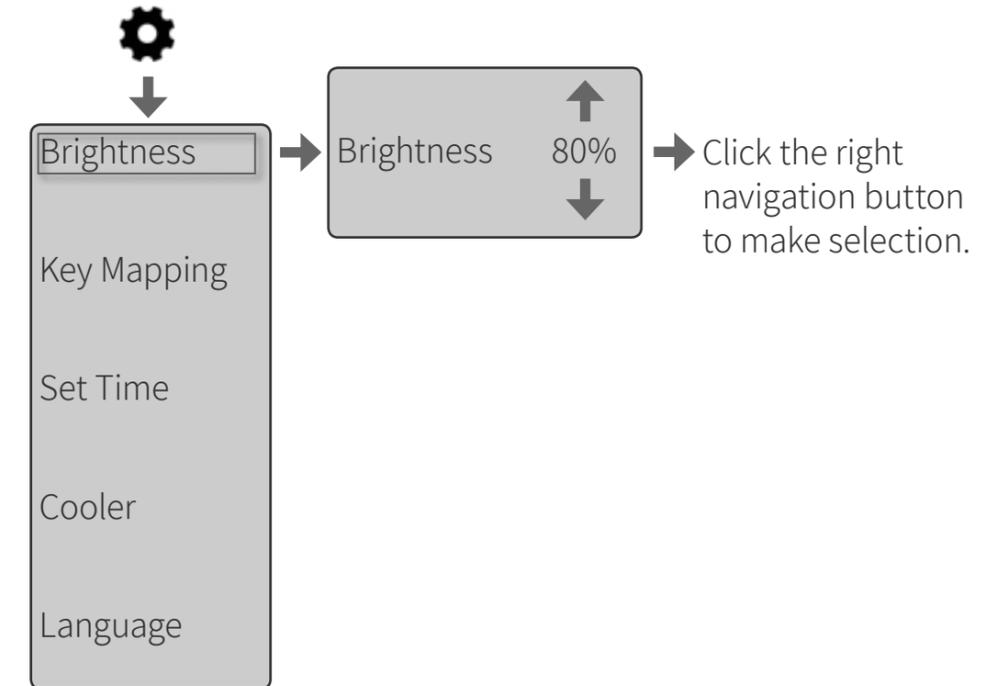
NOTES
▪ Low brightness level is suitable for operating EyeCGas® 2.0 at night.
▪ Use a low brightness level to save battery life.

www.

Displaying Keypad Map

The keypad map (A) assists in recognizing keypad button functionality, which changes depending on the current operating state of EyeCGas® 2.0 (see Keypad Buttons Overview). The keypad map is an on-screen diagram that includes a descriptor of the each button's functionality.

To display the keypad map on the screen:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **Key Mapping**.

4. Select **On**.

Brightness

Key Mapping ➡ On ➡ Click the right navigation button to make selection.

Off

Set Time

Cooler

Language

A

NOR x4 WH   14:56:29   31/07/18

LAT 32.923315   LON 35.324902
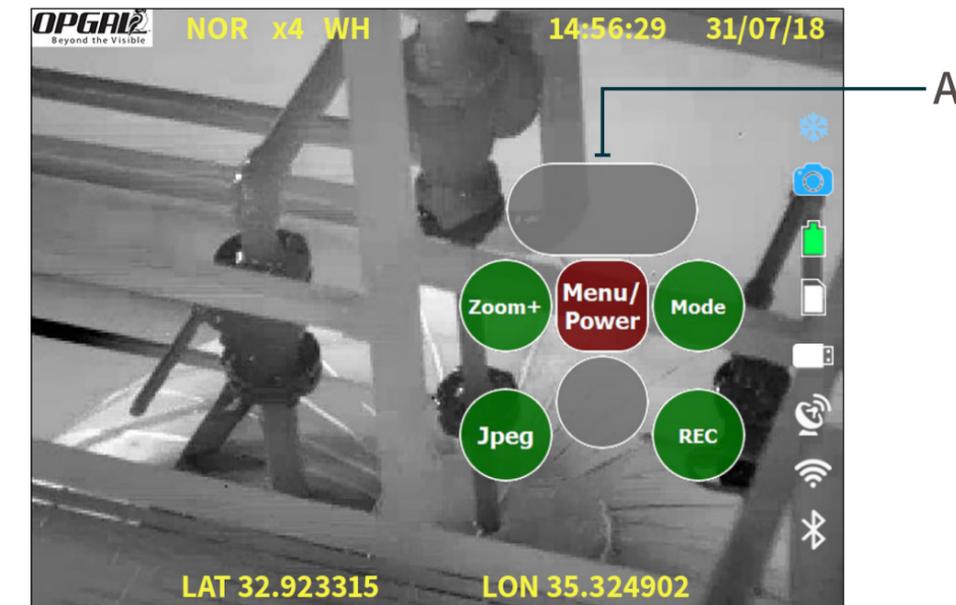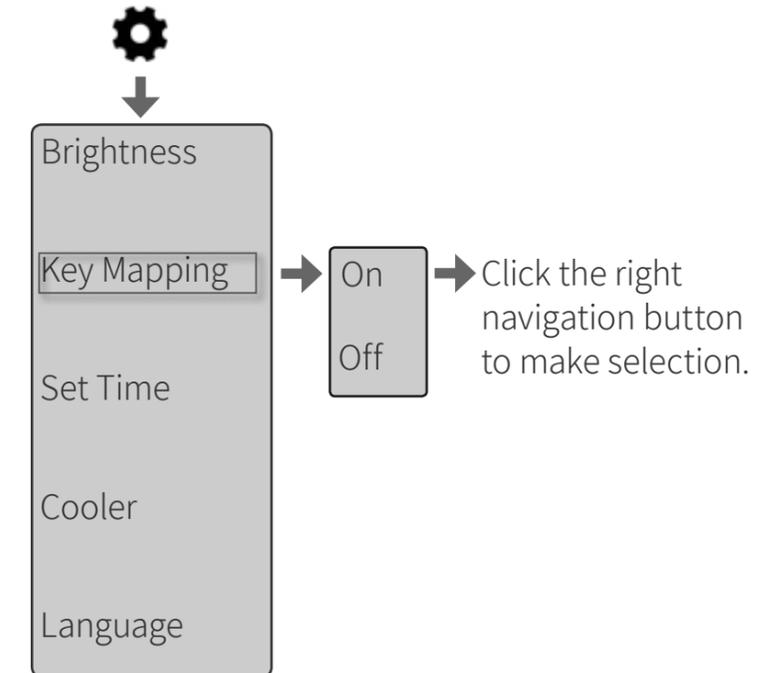
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Setting Date and Time

This section explains how to set the EyeCGas® 2.0 internal date and time.

The date and time appear at the top of the LCD display (see Screen Overlay).

To set the date and time:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **Set Time**.

4. In the **Time** row, select the hour, minute, and time format options.

5. Choose the desired number and format using the up and down navigation buttons.

6. In the **Date** row, select the day, month, year, and date format options.

7. Choose the desired number and format using the up and down navigation buttons.
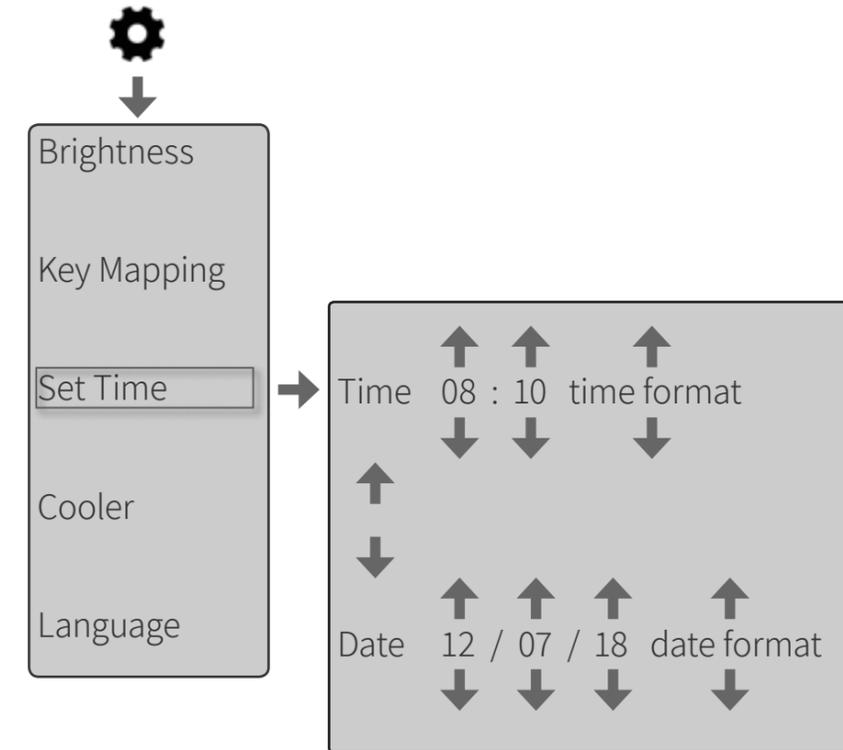
NOTES
▪ Time format is defined as 12-hour or 24-hour.
▪ Date format is defined as DD/MM/YY or MM/DD/YY.

Activating/Deactivating Cooler

EyeCGas® 2.0 uses a cooled IR sensor, and thus the sensor cooler must be activated when using the IR camera. When the cooler is off, the camera switches automatically to visible mode.

To activate or deactivate the cooler:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **Cooler**.

4. Select **On** or **Off**.

Brightness

Key Mapping

Set Time

Cooler → On → Click the right navigation button to make selection.

Off
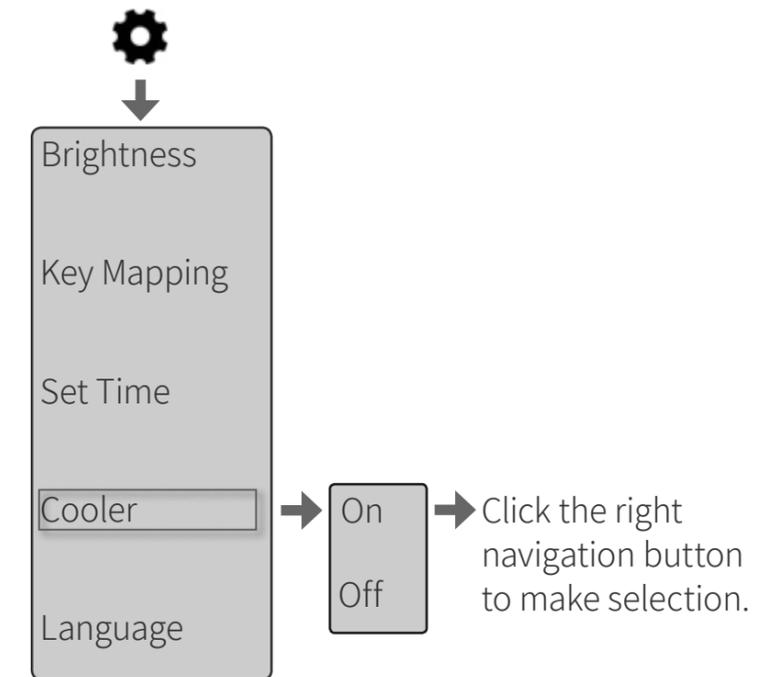
Language

Selecting Language

To select the display language:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **Language**.

4. Select the desired language from the displayed options.
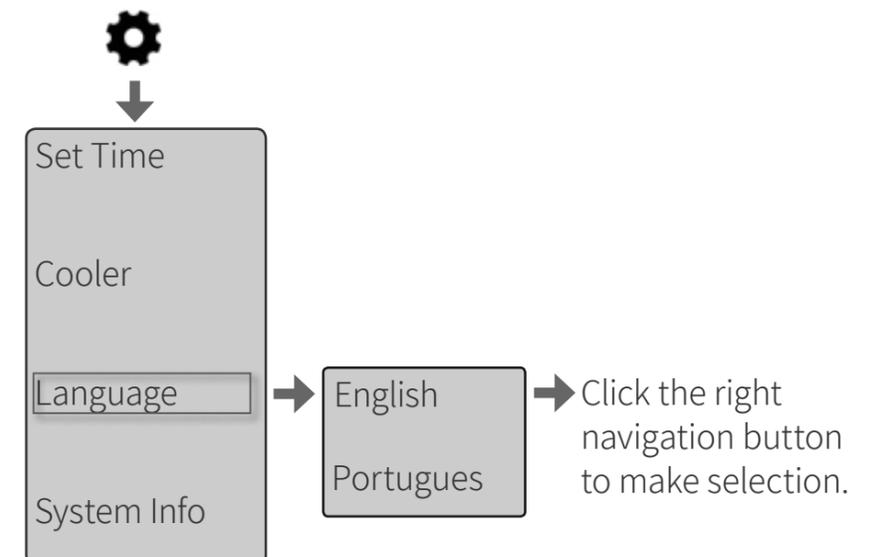
Set Time

Cooler

Language → English → Click the right navigation button to make selection.

Portugues

System Info

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Viewing System Information

System information includes software version number, network status, and amount of internal memory left.

To view system information:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **System Info** (A). The system info screen (C) appears. If necessary, scroll down to view all the information.

4. Press the left navigation button to return to the menu.

Viewing About Information

About screen includes copyright information.

To view this information:

1. Display the menu.

2. Navigate to the settings tab.

3. Scroll to and select **About** (B). The about screen (D) appears.

4. Press the left navigation button to return to the menu.
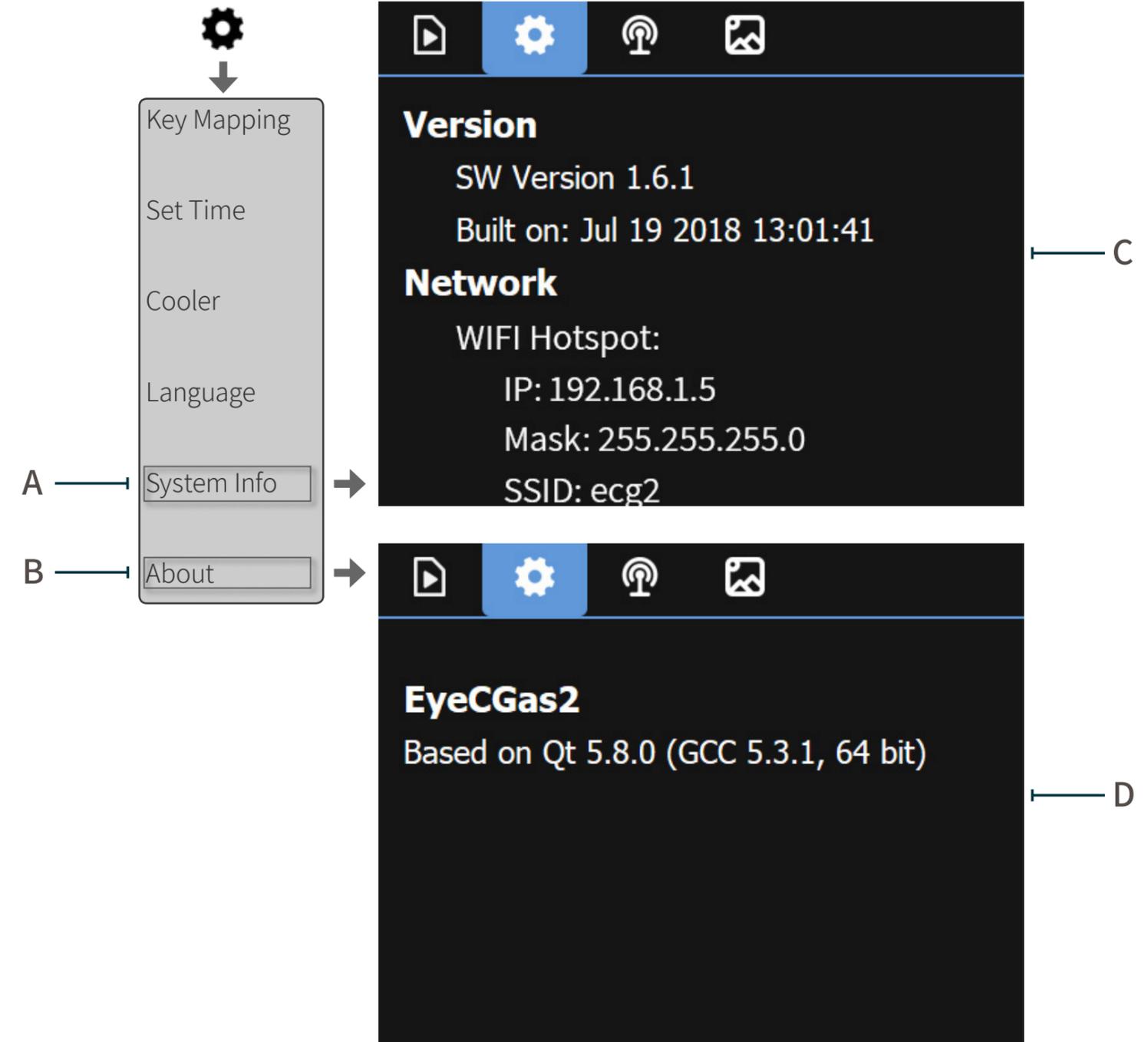
Key Mapping

Set Time

Cooler

Language

A — System Info →

B — About →

C

Version
SW Version 1.6.1
Built on: Jul 19 2018 13:01:41

Network
WIFI Hotspot:
IP: 192.168.1.5
Mask: 255.255.255.0
SSID: ecg2

D

EyeCGas2
Based on Qt 5.8.0 (GCC 5.3.1, 64 bit)

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CONNECTIVITY

The connectivity tab enables connecting EyeCGas® 2.0 to peripheral devices using Wi-Fi, Bluetooth, GPS, and USB.

This section includes:

- [Connecting via Wi-Fi](#)

- [Connecting via Bluetooth](#)

- [Connecting to GPS](#)

- [Connecting via USB](#)

- [Enabling Video Streaming](#)

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Connecting via Wi-Fi

This section reviews the tasks associated with connecting a peripheral device to EyeCGas® 2.0 using Wi-Fi communication.

To enable Wi-Fi connection:

1. Display the menu.

2. Navigate to the connectivity tab.

3. Scroll to and select **Wi-Fi**.

4. Select one of the following options:

   » **Hot Spot –** the camera serves as a Wi-Fi hot spot, enabling a mobile device to connect to it.

   » **Off –** turns Wi-Fi off.

5. Locate the SSID (A) and password (B) in the system information screen. Use these parameters to connect the peripheral device to the camera's Wi-Fi hotspot.

NOTES
▪ Consult with your network administrator regarding specific communication settings.
▪ Set the computer firewall to allow communication with EyeCGas® 2.0.
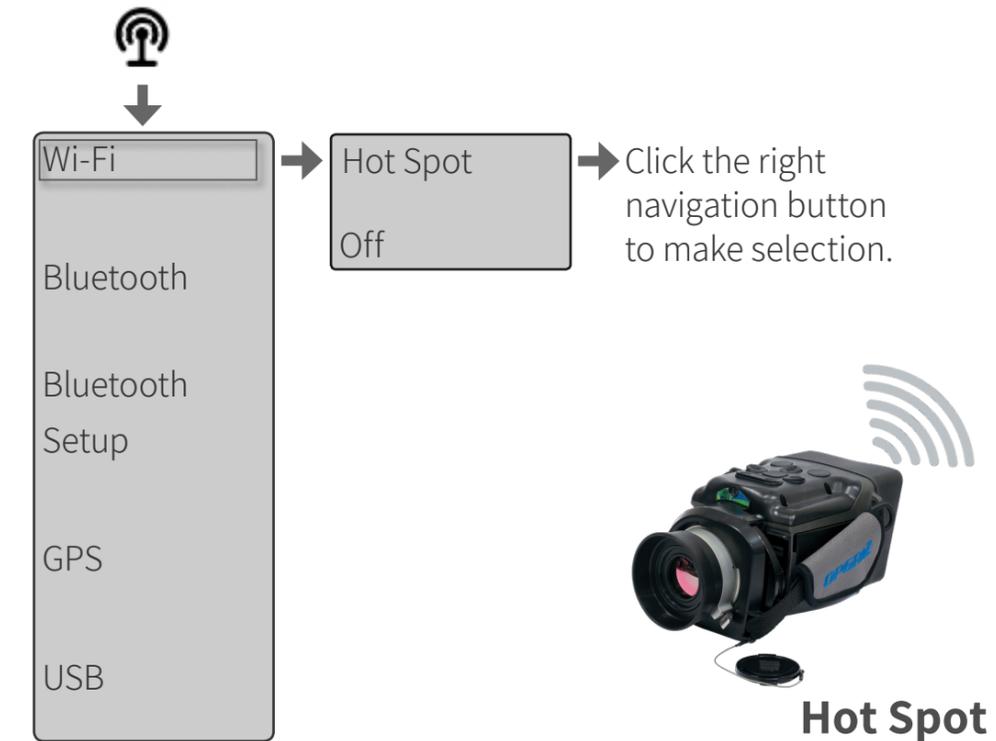
Wi-Fi	→	Hot Spot	→	Click the right navigation button to make selection.

Bluetooth

Bluetooth Setup

GPS

USB

Hot Spot
Off

Hot Spot

SW Version 1.6.1
Built on: Jul 19 2018 13:01:41
Network
WIFI Hotspot:
IP: 192.168.1.5
Mask: 255.255.255.0
A— SSID: ecg2
B— Password: 12345678

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Connecting via Bluetooth

Bluetooth connectivity allows the camera to connect to devices such as tablets, analyzers, and external GPS.

To connect to a Bluetooth device:

1. Display the menu.

2. Navigate to the connectivity tab.

3. Scroll to and select **Bluetooth** (A).

4. Select **On**.

5. Scroll to and select **Bluetooth Setup** (B).

   The camera searches for Bluetooth devices that are in pairing mode, and displays a list of the detected devices on the screen.

6. Select the relevant Bluetooth device from the list.
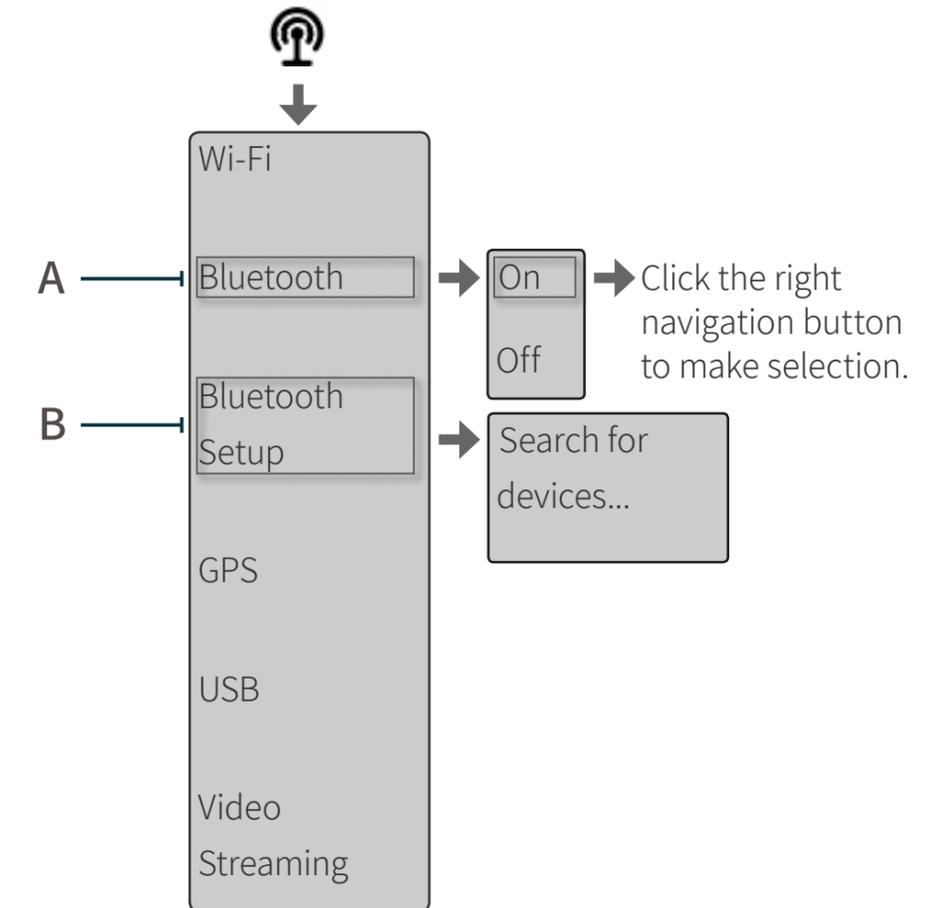
NOTE
To enable pairing mode on a Bluetooth device, consult the device's user manual.

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Connecting to GPS

GPS connectivity allows for geo-locating the position where the inspection is being performed.

To connect to GPS:

1. Display the menu.

2. Navigate to the connectivity tab.

3. Scroll to and select **GPS**.

4. Select **On**.

Once connected to GPS, longitude and latitude coordinates are displayed on the main screen, indicating the camera's location (see Screen Overlay).
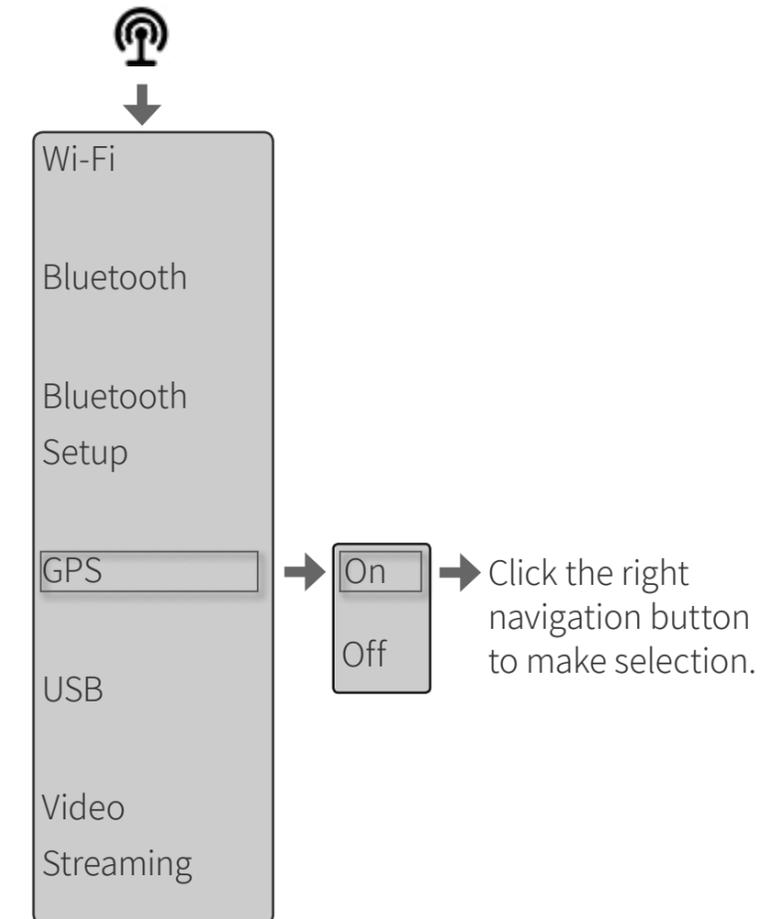
| Wi-Fi |
| Bluetooth |
| Bluetooth Setup |
| GPS |
| USB |
| Video Streaming |

| On |
| Off |

Click the right navigation button to make selection.

www.

Connecting via USB

USB connectivity allows for networking communication and file transfer.

To connect to a computer or tablet via USB:

1. Display the menu.

2. Navigate to the connectivity tab.

3. Scroll to and select **USB**.

4. Select one of the following options:
    »   **Mass Storage –** enables transferring files between the camera and computer/tablet, as well as upgrading the camera software.
    »   **Net Adapter –** enables network communication between EyeCGas® 2.0 and a computer or tablet using the USB cable.

5. Remove the cap from the camera's USB connector (A) and connect the USB cable between the camera and a computer or tablet.

NOTES
▪ The camera keypad is disabled when mass storage option is selected.
▪ Set the computer firewall to allow communication with EyeCGas® 2.0.
▪ Consult with your network administrator regarding specific communication settings.
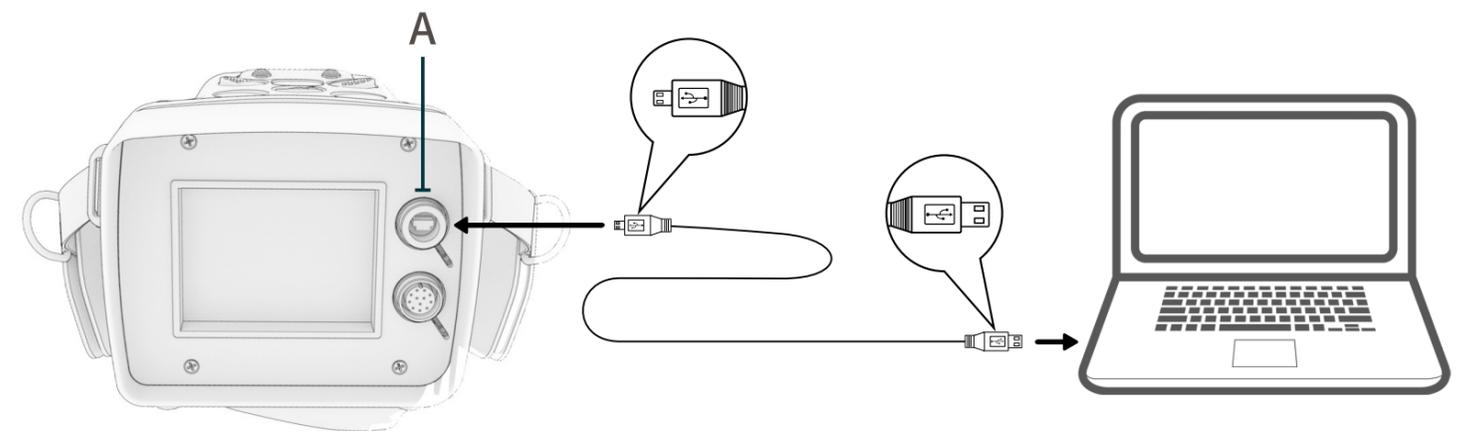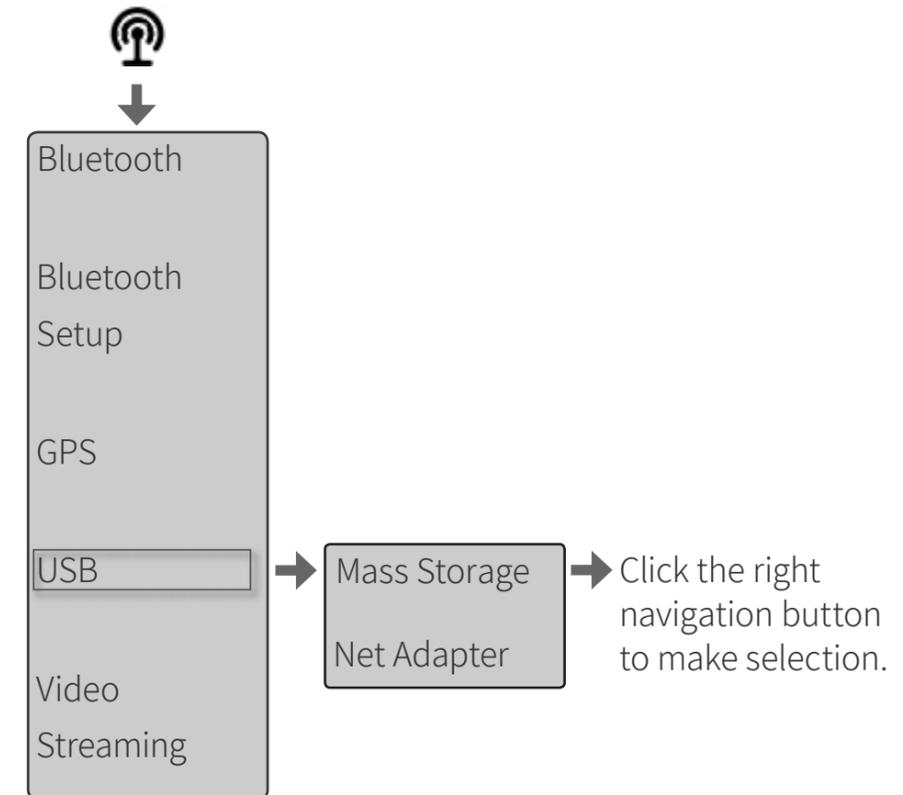
Bluetooth

Bluetooth Setup

GPS

USB → Mass Storage → Click the right navigation button to make selection.

Net Adapter

Video Streaming

A

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Enabling Video Streaming

EyeCGas® 2.0 can stream live video to peripheral devices connected via Wi-Fi or USB. To receive the video stream, the peripheral device must run a suitable media application (e.g., VLC Media Player or Neptune Player).

To enable video streaming:

1. Verify that a connection to the peripheral device is established via Wi-Fi (see Connecting via Wi-Fi) or via USB (see Connecting via USB, and choose the Net Adapter option).

2. Display the menu.

3. Navigate to the connectivity tab.

4. Scroll to and select **Video Streaming**.

5. Select **Enable**.

Bluetooth Setup

GPS

USB

Audio

Video Streaming

Enable

Disable

Click the right navigation button to make selection.
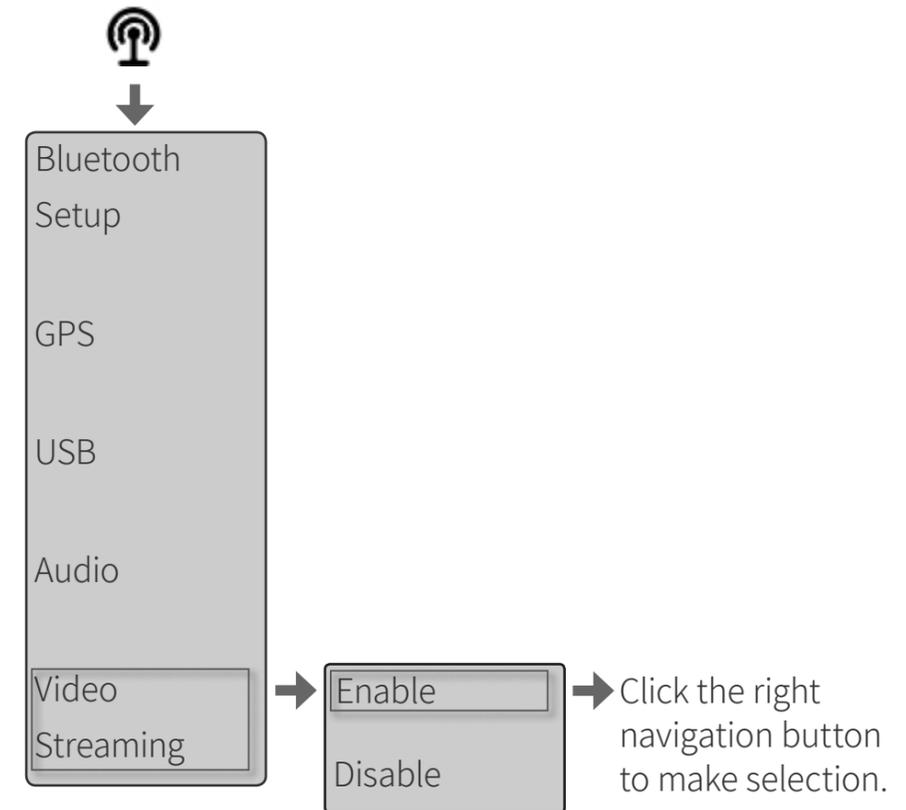
NOTE
EyeCGas® 2.0 video streaming is done using RTSP protocol with the camera acting as the server.

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In a media application:

6. Select **Stream** (B) from the Media menu (A).

www.
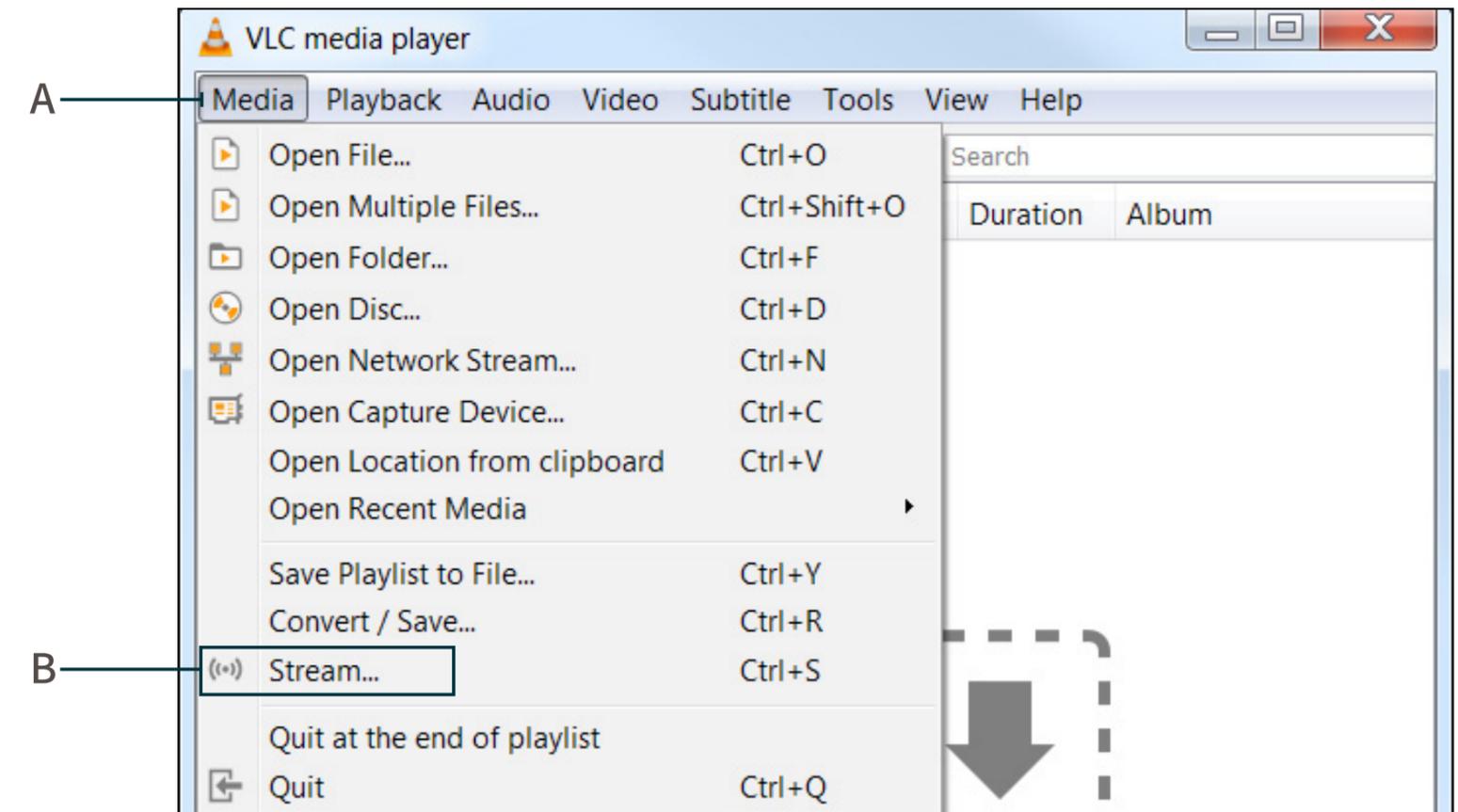
7. Click the **Network** tab (A).

8. Type the URL (B).

    The URL is constructed as follows:

    rtps://**[IP address (D) found in system info screen]**/video.sdp
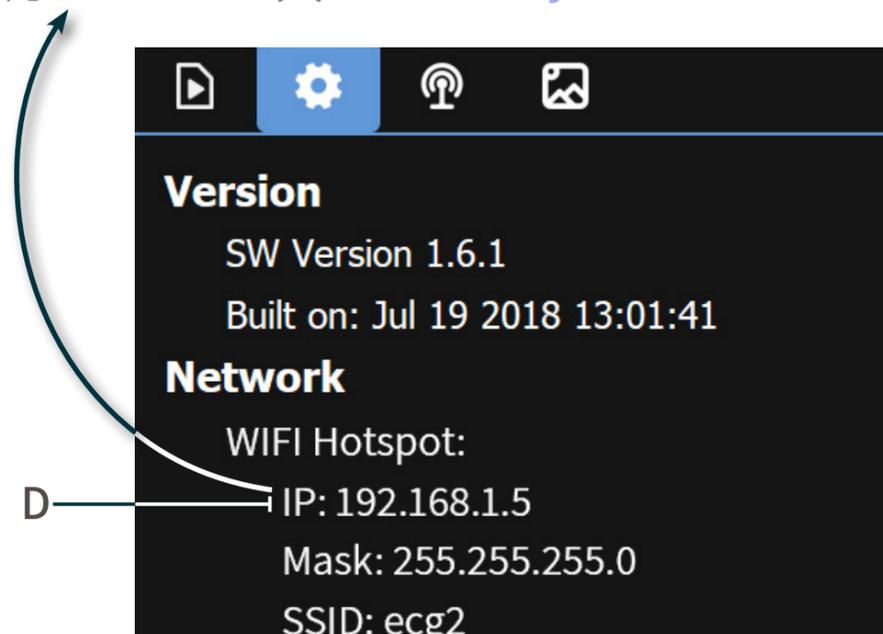
9. Click **Stream** (C).
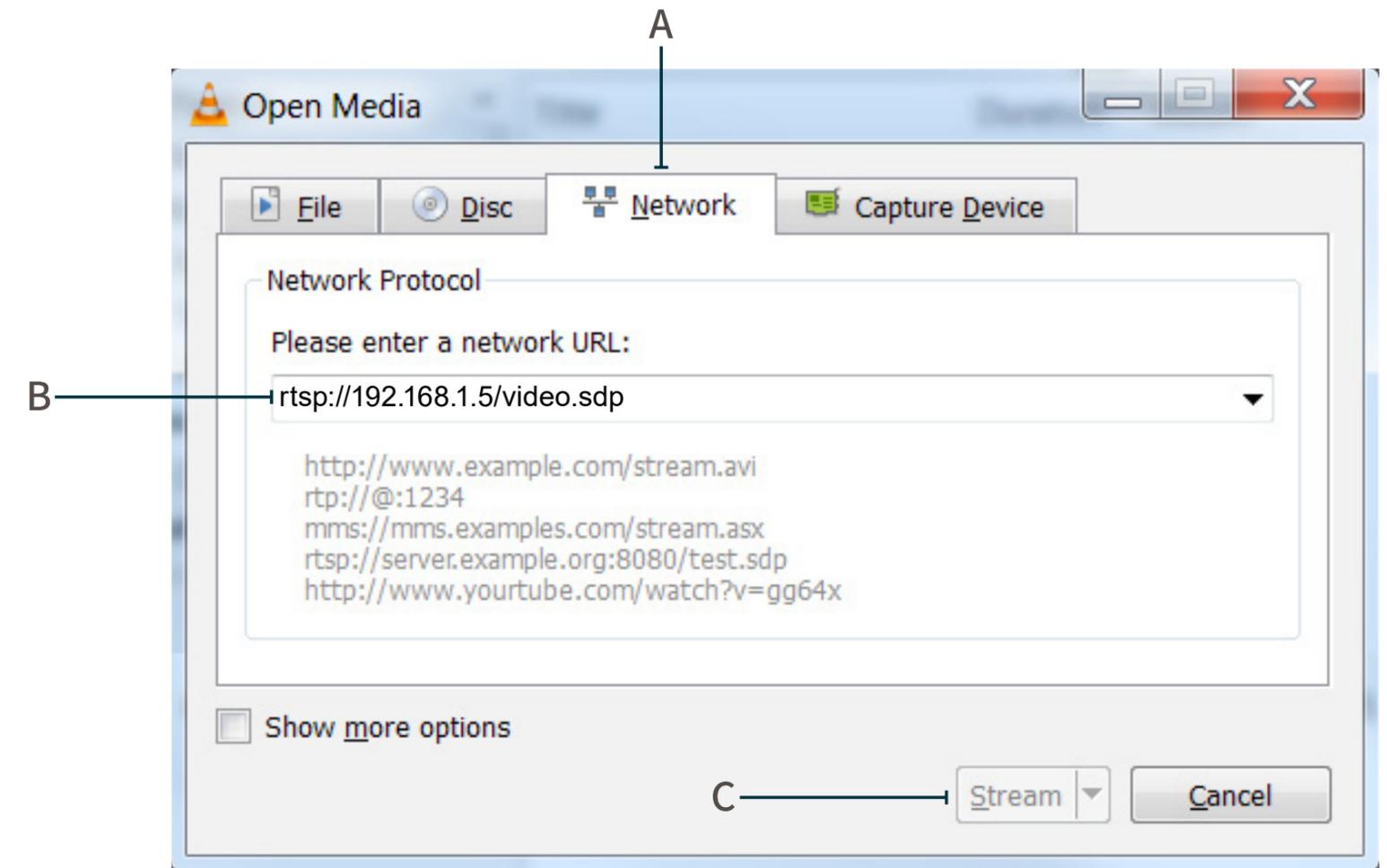
NOTES
▪ The live video stream displays the same viewing mode as that shown on the camera's LCD display.
▪ Latency may occur when streaming in a Wi-Fi congested area.

www.

IMAGING MODES

This section include:

- [Defining Active Modes](#)

- [Setting Zoom Level](#)

- [Setting Polarity](#)

- [Setting Enhancement Level](#)

- [Defining Thermography Mode Settings](#)

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Defining Active Modes

Pressing the mode button (A) on the keypad switches between viewing modes (see Switching Between Viewing Modes).

To select whether enhanced and thermography modes are available when the mode button is pressed:

Keypad

A

1. Display the menu.

2. Navigate to the imaging modes tab.

3. Scroll to and select **Active Modes**.

4. In the Active Modes menu:

   » Select **Enhanced** and select **On** or **Off**.

   » Select **Thermography** and select **On** or **Off**.
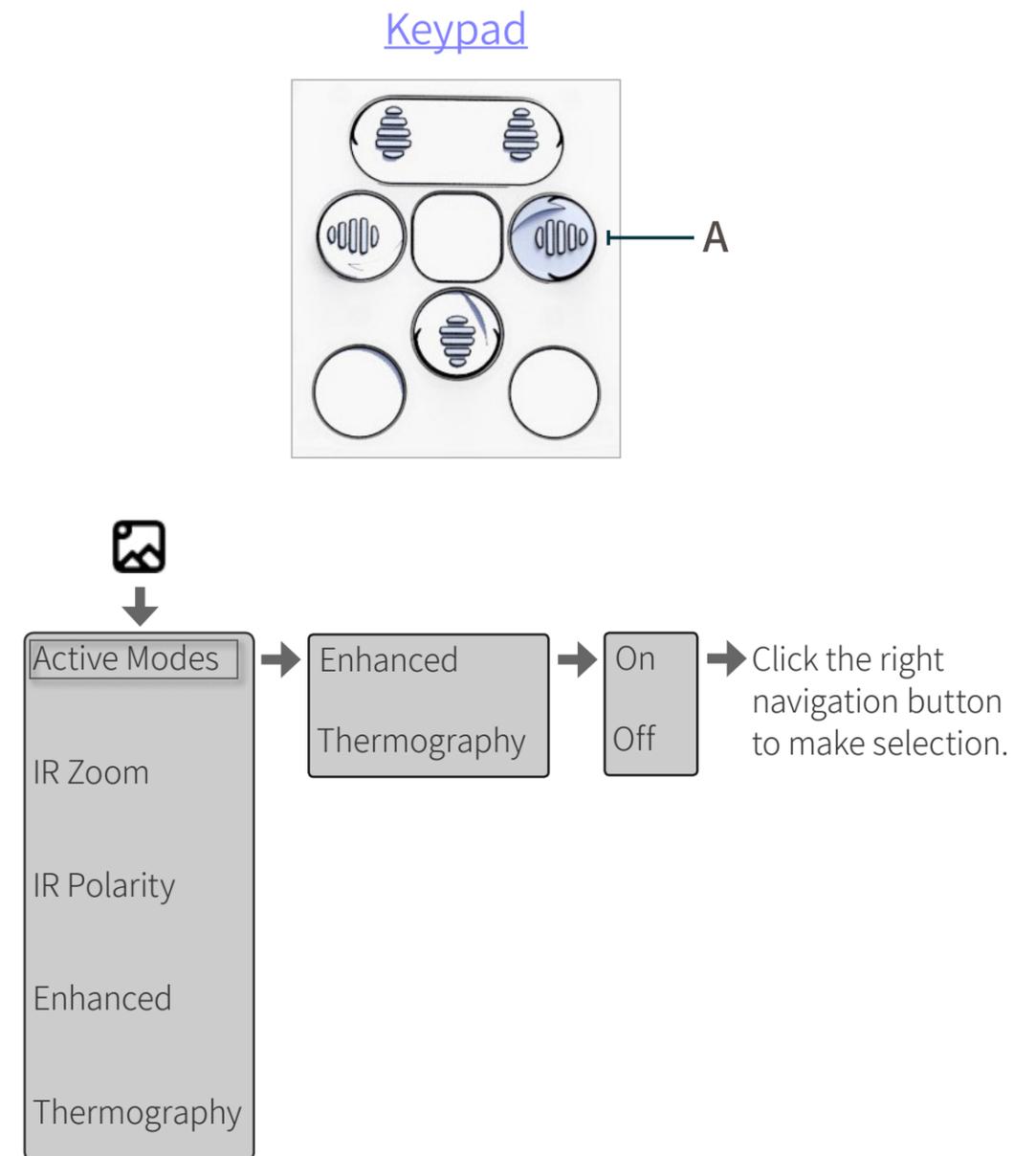
Active Modes		Enhanced		On		Click the right navigation button to make selection.
IR Zoom		Thermography		Off		
IR Polarity						
Enhanced						
Thermography						

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Setting Zoom Level

This section reviews the option to set a zoom level using the menu system.

To set zoom level:

1. Display the menu.

2. Navigate to the imaging modes tab.

3. Scroll to and select **IR Zoom.**

4. Select the desired zoom level.
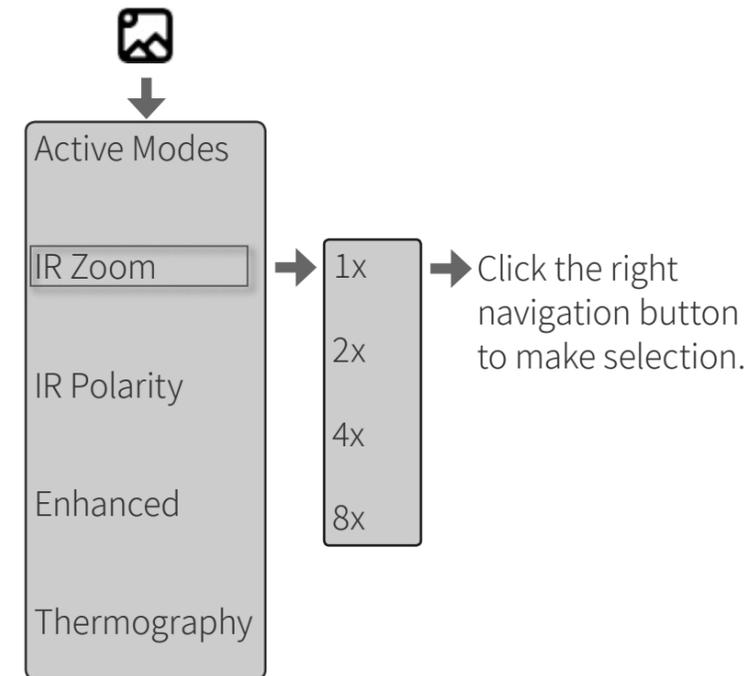
NOTE
The zoom level can also be adjusted using the keypad buttons (see Zooming).

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Setting Polarity

This section reviews the option to define a polarity value when using normal or enhanced viewing modes.

To set polarity value:

1. Display the menu.

2. Navigate to the imaging modes tab.

3. Scroll to and select **IR Polarity.**

4. Select **BH** or **WH**.

Active Modes

IR Zoom

IR Polarity ➡ BH ➡ Click the right
navigation button
to make selection.
WH

Enhanced

Thermography
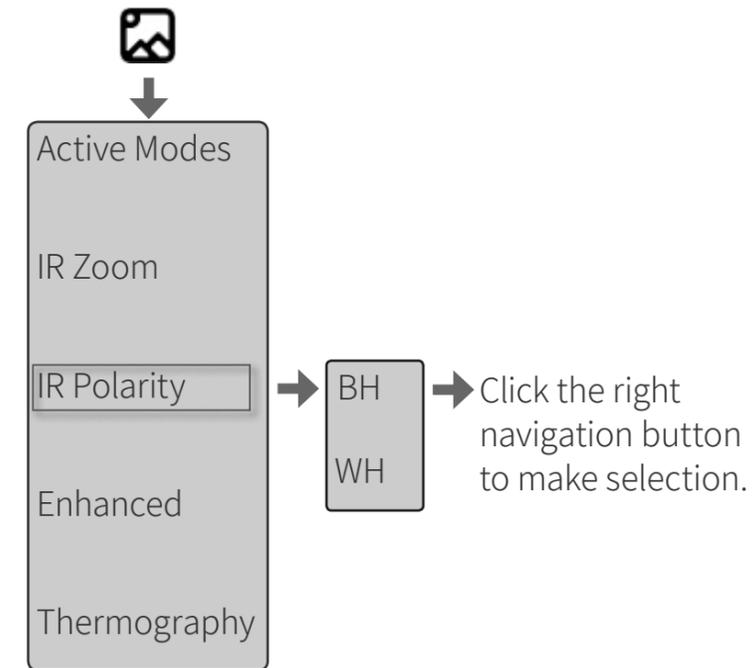
NOTE
Polarity can also be set using the keypad buttons (see Selecting Polarity).

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Setting Enhancement Level

This section reviews the option to define an enhancement level when using enhanced viewing mode.

To set enhancement level:

1. Display the menu.

2. Navigate to the imaging modes tab.

3. Scroll to and select **Enhanced**.

4. Select **Level**.

5. Choose the desired enhancement level using the up and down navigation buttons.

6. Select the enhancement level.
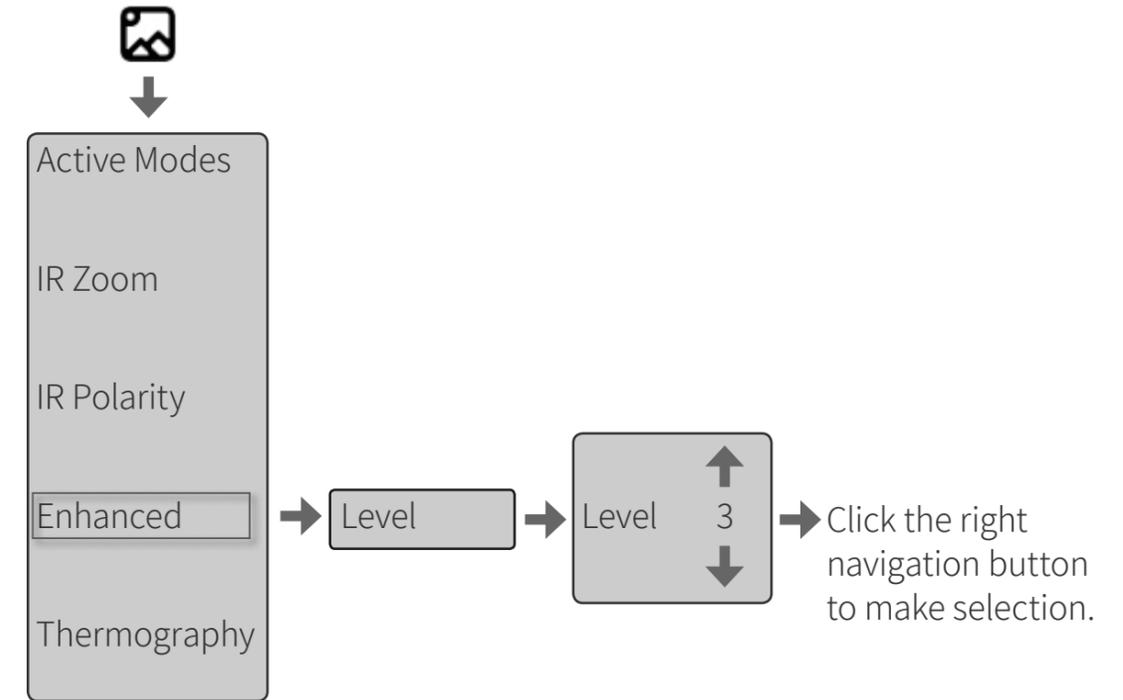
| Active Modes |
| IR Zoom |
| IR Polarity |
| Enhanced | → | Level | → | Level 3 ↑↓ | → Click the right navigation button to make selection. |
| Thermography |

| NOTES |
| --- |
| ▪ Enhancement levels are set from 0 to 10 by increments of 1. For more information on enhancement level, see Choosing Enhancement Level. |
| ▪ Enhancement level can also be adjusted using the keypad buttons (see Choosing Enhancement Level). |

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Defining Thermography Mode Settings

This section reviews the option to define the following thermography mode settings when using thermography viewing mode: temperature unit, emissivity value, reflected temperature, and color palette.

To define thermography mode settings:

1. Display the menu.

2. Navigate to the imaging modes tab.

3. Scroll to and select **Thermography**.

4. In the Thermography menu:

   » Select **Units** (A) and select **Celsius**, **Fahrenheit**, or **Kelvin**.

   » Select **Emissivity** (B) and choose the desired emissivity value using the up and down navigation buttons.

NOTES
▪ Emissivity values are set from 0.1 to 1 by increments of .05. For more information on emissivity value, see Choosing Emissivity Value.
▪ Both emissivity value and color palette can also be defined using the keypad buttons (see Choosing Emissivity Value and Selecting Color Palette).
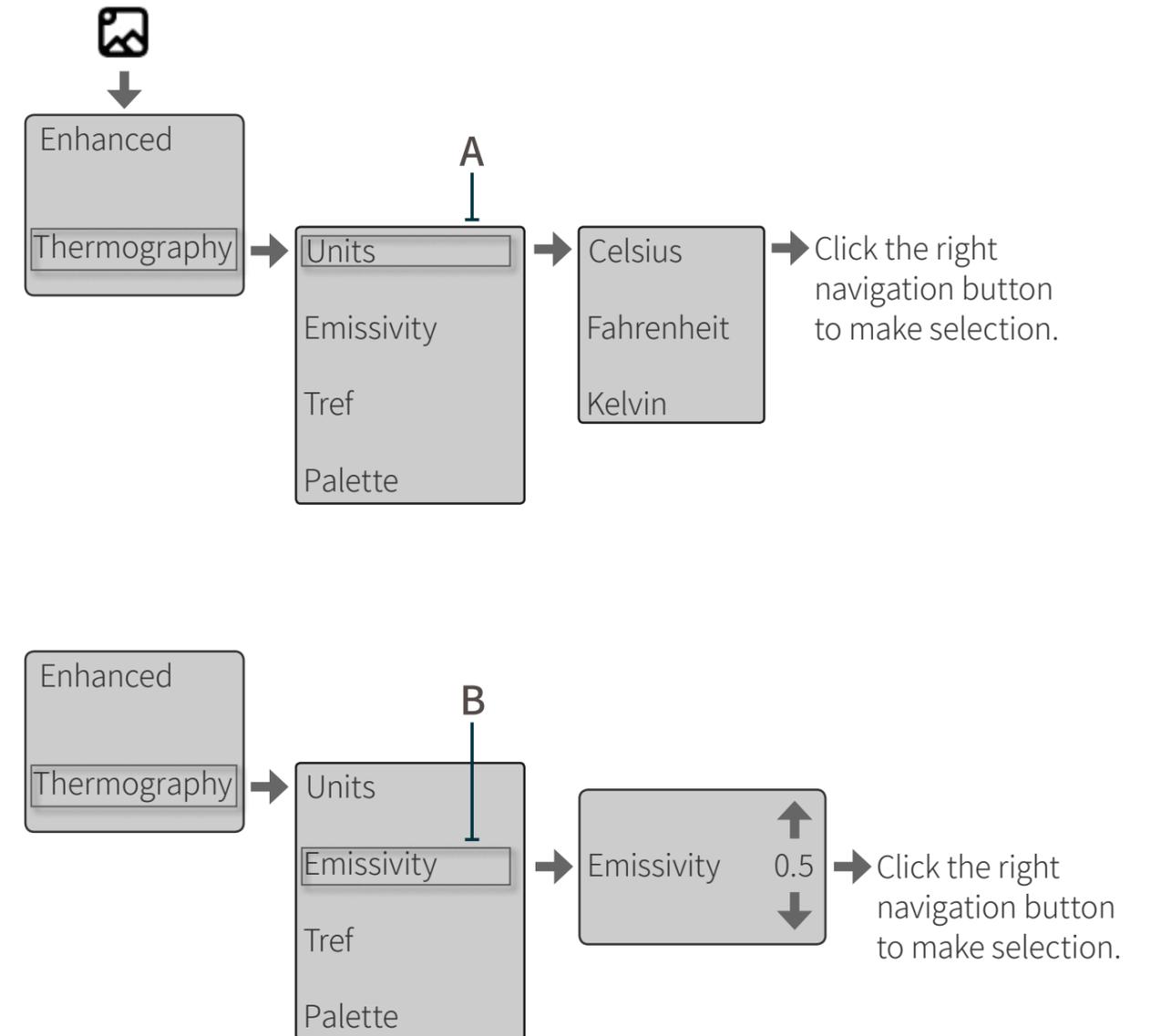
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Defining Thermography Mode Settings (cont.)

» Select **Tref** (C) and choose the desired Tref level using the up and down navigation buttons.

» Select **Palette** (D) and select from the following color palette options: **Iron**, **Rainbow**, **Vivid**, **Iso Green**, **Iso Red**, and **B & W**.

Enhanced

Thermography → Units / Emissivity / Tref / Palette

C

Tref 95 K → Click the right navigation button to make selection.

Enhanced

Thermography → Units / Emissivity / Tref / Palette

D

Iron / Rainbow / Vivid / Iso Green / Iso Red / B & W → Click the right navigation button to make selection.
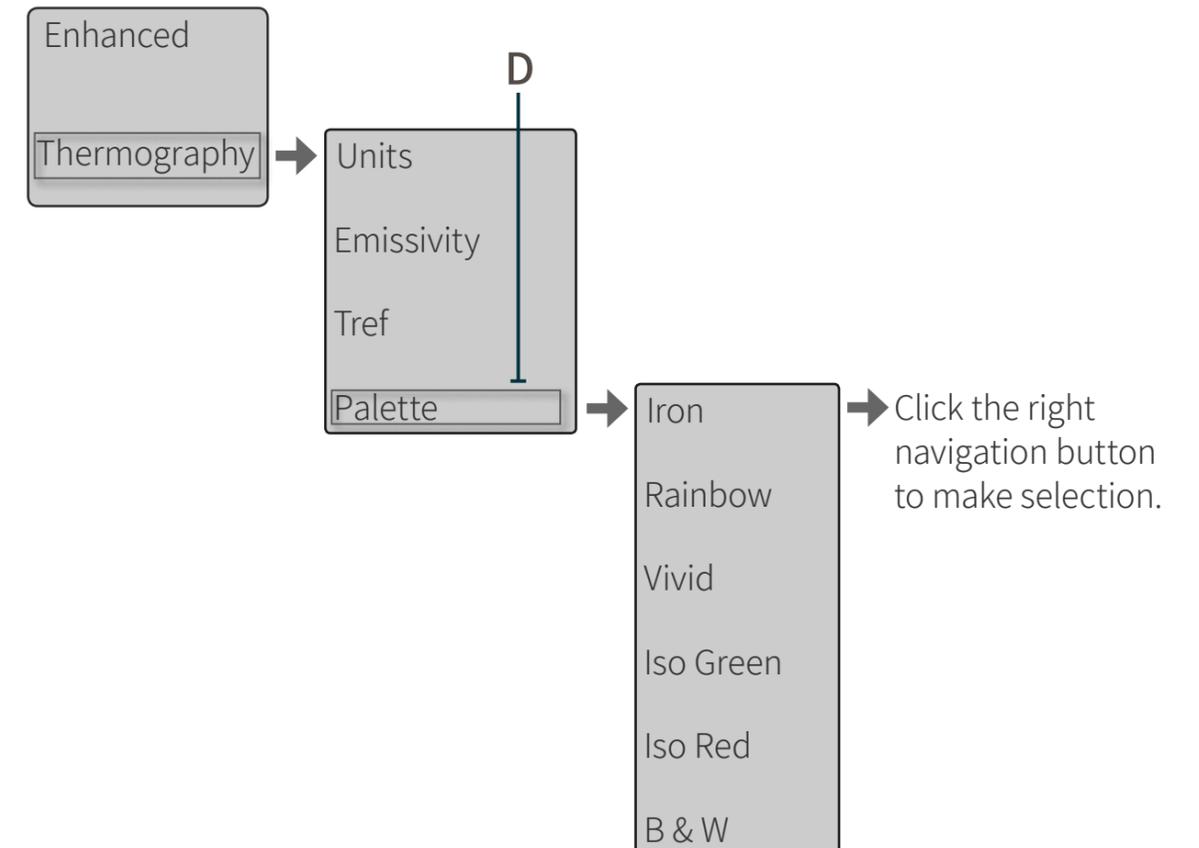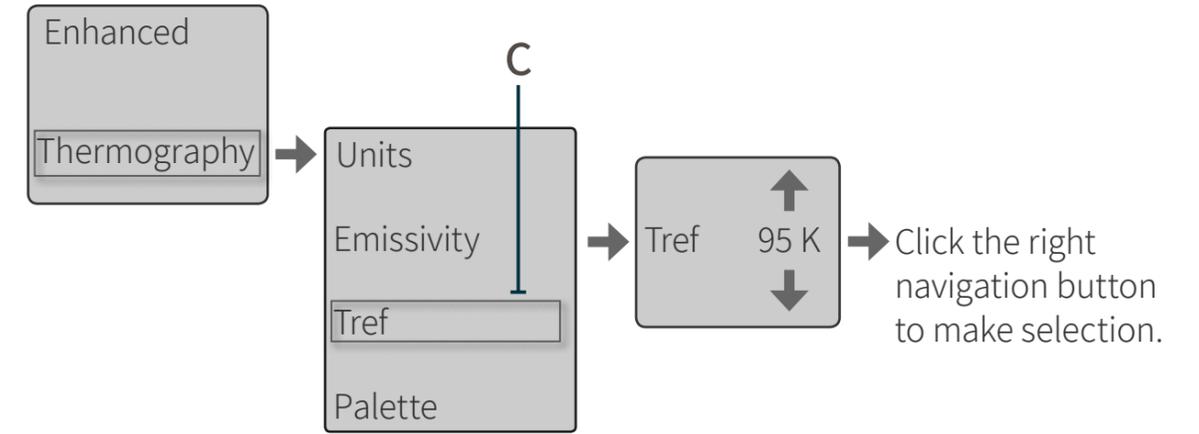
NOTES
▪ Tref stands for reflected temperature, and it indicates surrounding temperature. Tref levels are set from -20°C to 100°C by increments of 5°.
▪ For more information on color palette, see Selecting Color Palette.

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Attaching Accessories to Camera

The following sections describe how to attach various accessories to the camera:

- [Attaching the Glare Shield](#)
- [Attaching the Headset](#)

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ATTACHING THE GLARE SHIELD

The glare shield reduces the effects of reflected light on the LCD display, as well as magnifies the LCD display by 300%.

To attach the glare shield to the back of the camera:

1. Place the glare shield over the camera display.

2. Insert the latches (A) into the strap hooks (B) on the back of the camera.

3. Tighten the glare shield strap.

To release the glare shield, pull up on the strap buckle and loosen the strap.
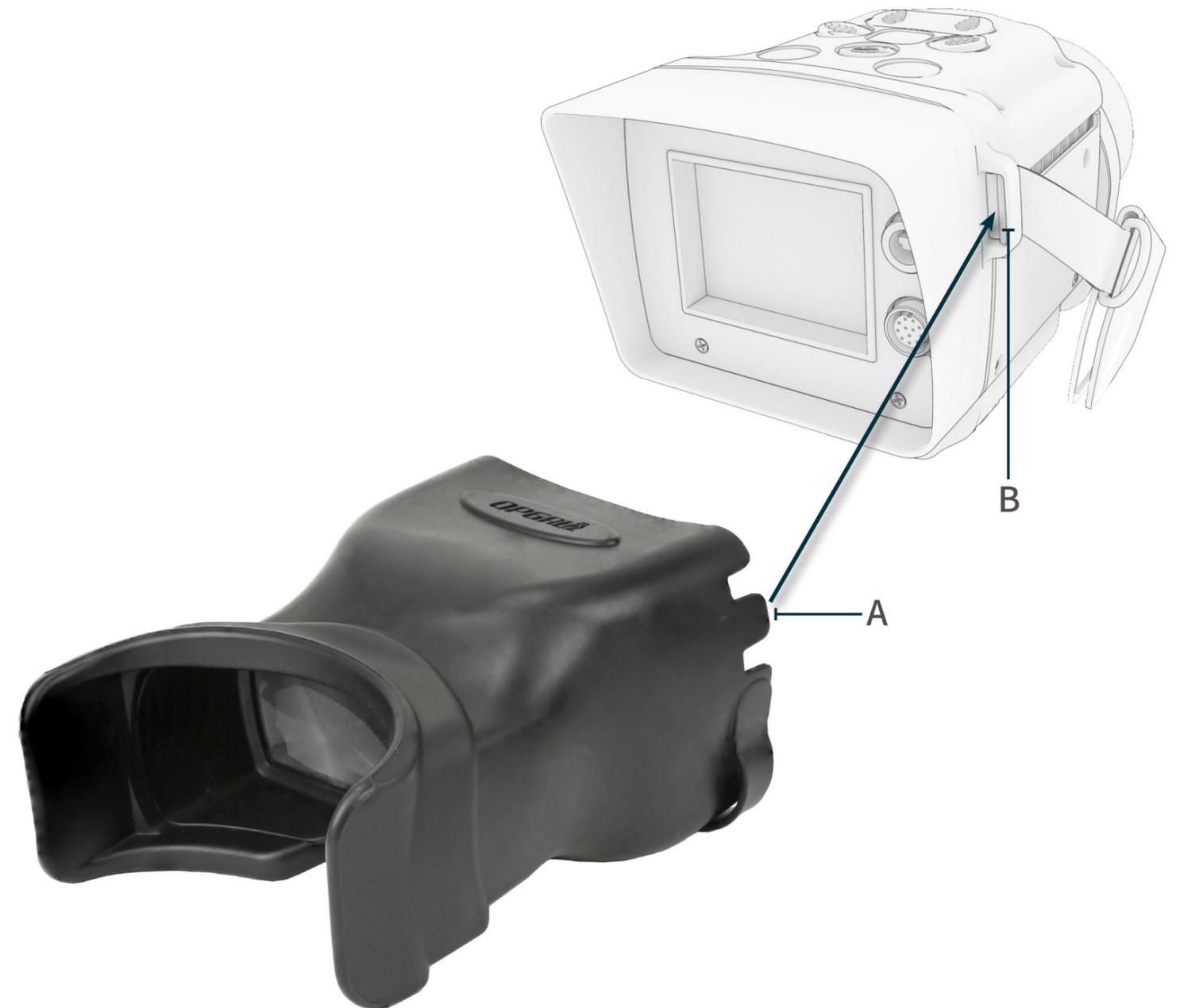
⚠	**CAUTION**
	Clean the glare shield lens using only a dust pen blower and the LensPen brush (see Cleaning the Lens). Do not use any cloth or other material to clean the glare shield lens, as this can easily scratch the plastic surface.

ATTACHING THE HEADSET

The headset enables an audio track to be recorded during video recording. During video playback, the headset speakers output the recorded audio.

To attach the headset to the camera:

1. Remove the cap from the camera's accessories connector (A).

2. Plug the headset into the camera to enable audio recording.

A

B
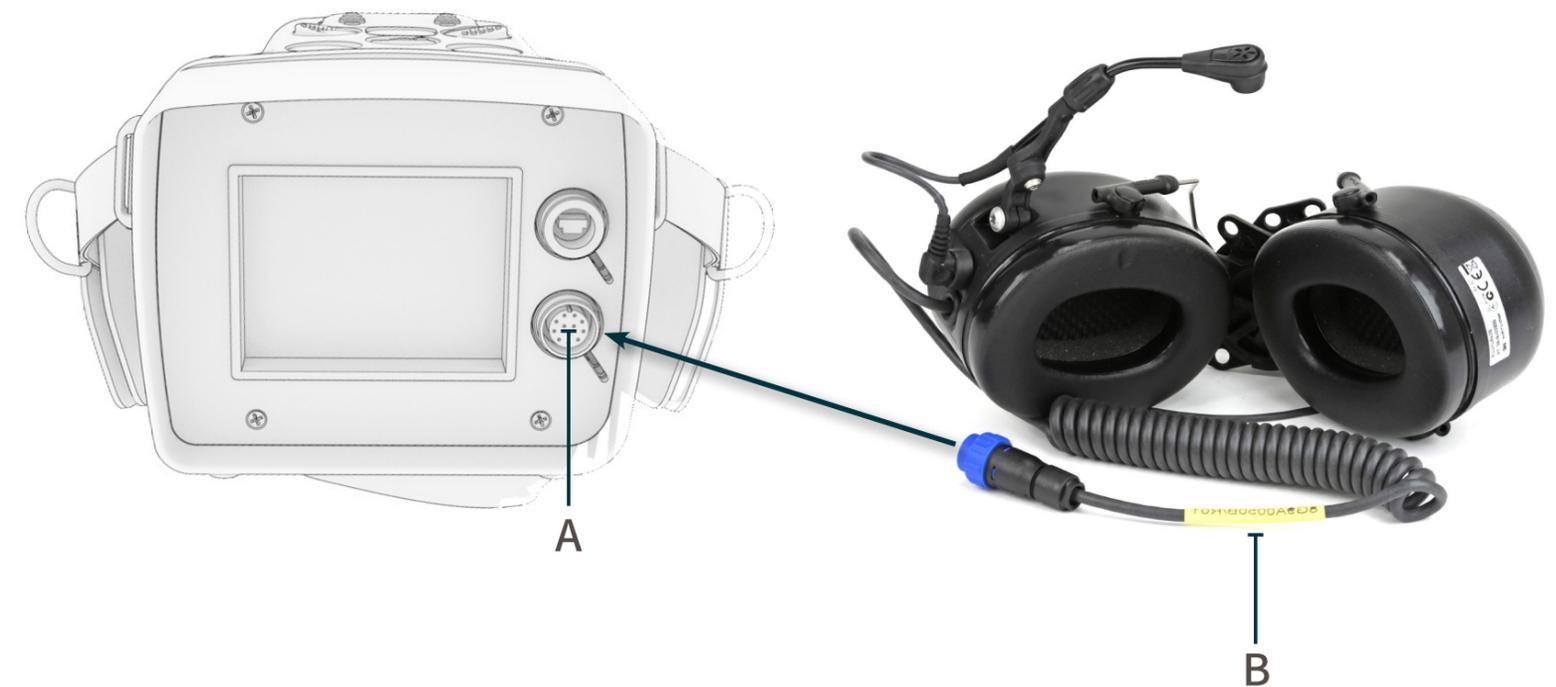
⚠	**CAUTION**
	Verify that the headset has a yellow label (B) near the connector, meaning it is compatible with EyeCGas® 2.0. Do not use the old headset with the white label.

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Powering Off Camera

To power off the camera, press the **power button** (A) for 3 seconds.

Keypad

NOTE	
The USB cable must be unplugged in order for the camera to power off.	

A — press for 3 seconds

Replacing the Battery

To replace the battery:

1. Power off the camera.

2. Pull the battery latch out slightly (A).

3. Remove the battery from the camera (B).

4. Insert a fully-charged battery (see Attaching the Battery).

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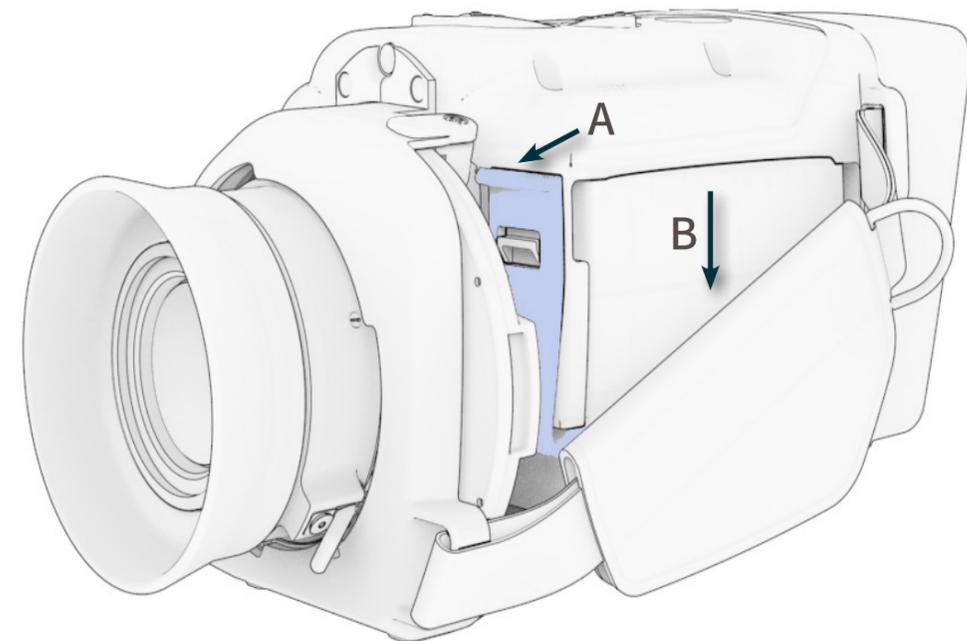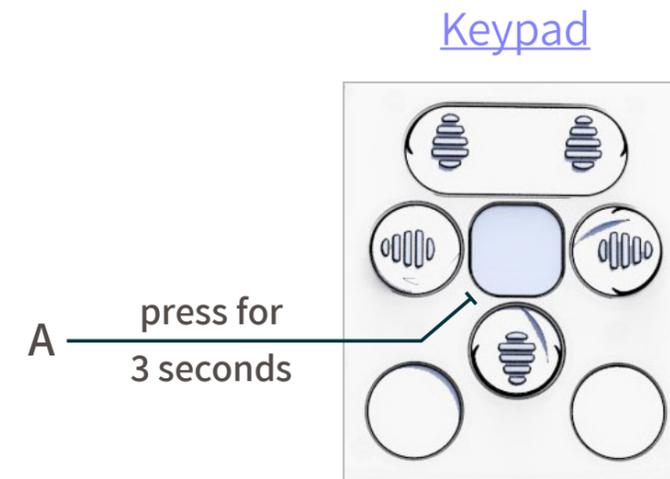
# Replacing the Lens

⚠	**CAUTION**
	Lens replacement should be done in a clean area. Ensure the lens stays free from dust or dirt particles (see Cleaning the Lens), and that dust or dirt particles do not enter the camera when replacing the lens.

To replace the camera lens:

1. Power off the camera.

2. Press the quick release latch (A) towards the camera body.

3. While holding the latch (A), rotate the lens counter-clockwise to its releasing position (B).

4. Remove the lens from the camera (C) and cover both sides of the lens with the protective cap.

5. Connect the replacement lens to the camera and rotate it clockwise until it clicks in place.
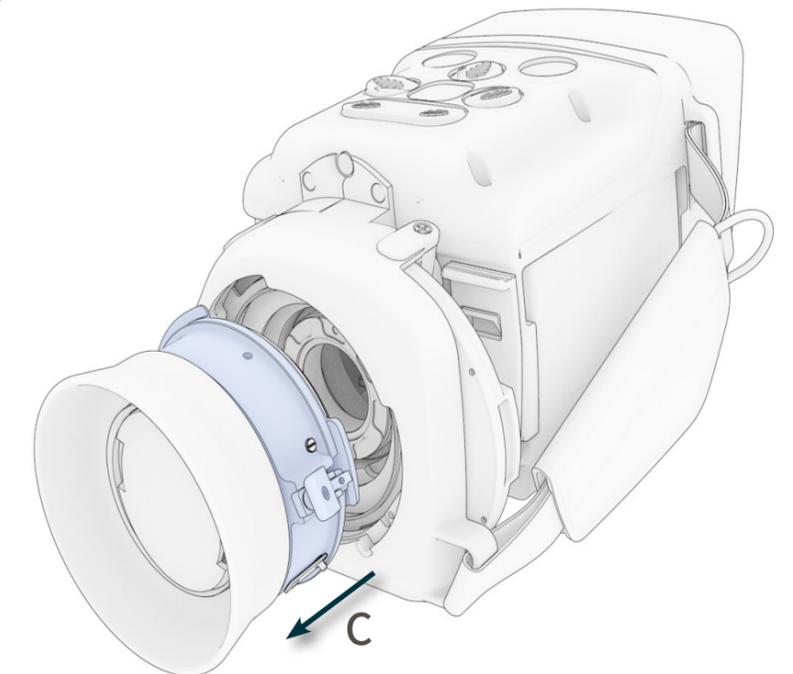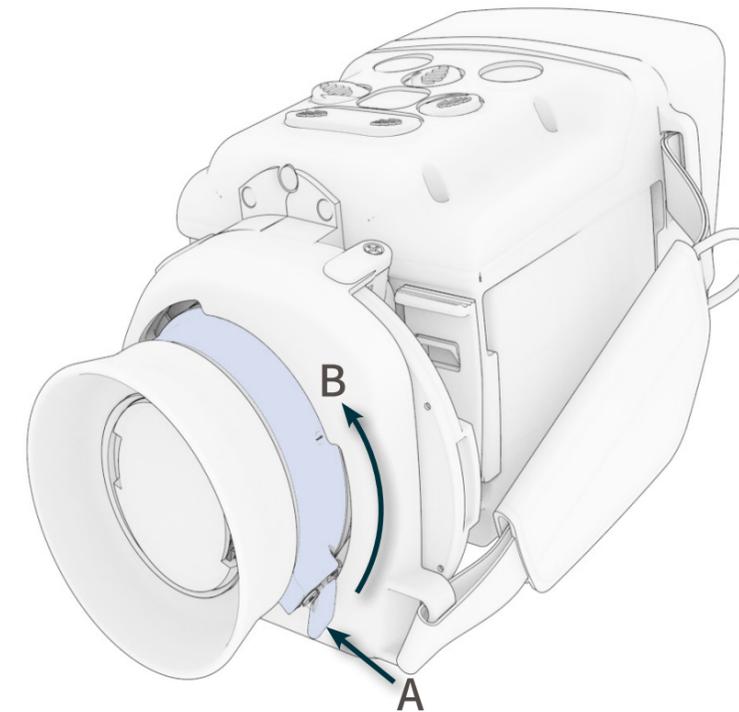
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Replacing the Optical Filter

⚠	**CAUTION**
	▪ Be careful not to touch the optical filter.
	▪ Optical filter replacement should be done in a clean area. Ensure the filter stays free from dust or dirt particles, and that dust or dirt particles do not enter the camera when replacing the filter.

A

B

To replace the optical filter:

1. Remove the lens from the camera (see Replacing the Lens).

2. Assemble the filter replacement tool by screwing the tool head (B) onto the handle (A).

3. Insert the tool into the camera and turn counterclockwise (C) to remove the optical filter which is currently in the camera.

C

4. Place the removed filter into the optical filter box.

5. Point the camera up and gently insert the new filter into the camera.

6. Using the tool, turn the optical filter clockwise until tight.

7. Reconnect the lens to the camera.

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Technical Specifications

Gases detected	400+ compounds such as: Methane, Acetic acid, Benzene, Butadiene, Butene, Butane, Dimethyl-Benzene, Ethane, Ethylene, Ethyl benzene, Ethylene oxide, Hexane, Heptane, Isobutylene, Isopropyl alcohol, Isoprene, Methanol, MEK Methyl Ethyl Ketone, Octane, Pentene, Propane, Propanal, Propanol, Propylene, Propylene oxide, Styrene, Toluene, Xylene
Detector Type	Cooled high sensitivity MCT, 320 x 240 pixels
Spectral Range	Default for VOC 3.2μm to 3.4μm Optional for heavier alkanes 3.3μm to 3.5μm
Optics	18.5° x 13.6° with 30mm lens, F# 1.1, manual focus
Imaging Modes	Normal IR, Enhanced, Thermography, and Visible Spectrum
Thermography	Spot temperature measurement, 6 color palettes
Connectivity	WiFi (2.4 GHz), Bluetooth, and Ethernet over USB
Physical Properties (Size / Weight)	230mm x 110mm x 130mm (9" x 4.3" x 5.1") / 2.3kg (5lbs) w/o battery
Batteries	Field replaceable, 12V Li-ion, 4.5+ continuous operating hours

Maintenance

To prevent the lens from becoming scratched, always mount the lens cover on the lens when the camera is not being used.

Cleaning the Lens

If the IR lens becomes dirty or smudged, use the LensPen to clean the lens:

1. Remove dirt and dust particles from the lens surface with the LensPen brush.

2. Wipe the lens surface with the LensPen cleaning tip using circular motions.

⚠	**CAUTION**
	Do not wipe or rub the lens with any cloth other than one intended for optics use.

Cleaning the LCD Screen and Camera Body

The LCD protective screen may be cleaned with a dampened optical cloth or tissue.

The camera body may be cleaned with a soft cotton cloth dampened with water. Do not use any solvents.

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Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION	SEE
The power-up sequence does not start after pressing the **Power** button.	Battery is not connected properly.	Disconnect and reconnect the battery. Verify the battery is securely in place.	pg. 79
	Battery is empty.	Switch to a different battery.	pg. 79
IR video doesn't appear after power-up sequence ends.	Lens cover is still mounted on the lens.	Remove the lens cover from the lens.	pg. 26
Ghost video appears with the real video.	NUC on scenery.	Mount the lens cover on the lens and perform the NUC sequence.	pg. 41
Recording process stops without pressing the **Record** button.	Internal memory runs out of storage.	Transfer files from the camera to a computer or tablet, then perform the recording again.	pg. 65
	Battery is depleted. **Note:** The camera ends a recording sequence when less than 3% of battery charge is left.	Switch to a different battery.	pg. 79
The massage "Scan and Fix" appears on the computer after connecting the camera.	Causes vary. **Note:** This is a Windows warning.	Follow the Windows prompts to perform the disk scan.	---

Technical Support

	NOTE
	Consult the Troubleshooting section of this manual before contacting Opgal regarding a technical support or service matter.

Technical support

For technical support inquiries, follow the inquiry submission instructions on our technical support page at www.eyecgas.com/support. Our team will assess your question or issue and respond back to you within 24 business hours.

Service

If your EyeCGas® 2.0 infrared camera is not performing properly, contact Opgal at +972 4-995-3961. Describe the problem to the Opgal representative as completely as possible. For your convenience, your representative may try to help you diagnose or correct the problem over the phone. Before returning your EyeCGas® 2.0 infrared camera, verify with your representative that the product should be returned to Opgal. Opgal Customer Service will provide you with written permission and a return merchandise authorization (RMA).

If the return is a non-warranty repair, an Opgal Customer Service Representative will provide you with a repair invoice estimate. To authorize repair, you must provide Opgal a purchase order for the amount of the estimate. Once Opgal receives your authorization, we will issue you a return authorization number so that you can return the unit for service. If the cost of repairs exceeds the stated quote by more than 15%, an Opgal representative will re-estimate your repair and will contact you for authorization to complete repairs. After repairs have been completed, the unit will be returned to you and Opgal will invoice you for the actual repair amount.

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Prior to returning your product, decontaminate and clean it to remove any hazardous or contaminated materials that may have settled on the product during use. Laws and/or shipping regulations prohibit the shipment of hazardous or contaminated materials. Products suspected of contamination will be professionally decontaminated at the customer's expense.

⚠	**CAUTION**
	Do not attempt to disassemble the sealed case of the EyeCGas® 2.0 camera. If the unit is not functioning properly, return it to Opgal for evaluation. Disassembling the unit voids all warranties.

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Warranty

Opgal warrants to the original purchaser that the EyeCGas® 2.0 and all features/accessories installed in the unit are free of defects in materials and workmanship under intended use and service for a period of one (1) year from date of manufacture. Opgal's obligation under this warranty is limited to repairing or replacing, at its option, articles that are returned within the warranty period and that, after examination, are shown to Gas Leak Solution's satisfaction to be defective, subject to the following limitations:

- Article must be returned to Opgal with shipping charges prepaid.
- Article must not be altered from its original configuration.
- Article must not have been misused, abused, or damaged in transport.
- Maintenance and field replaceable items, if defective, are covered under warranty for a ninety (90) day period. These items include:
  - » Batteries
  - » Straps
  - » Display covers
  - » AC/DC adapters
- All other parts and accessories except those installed in the EyeCGas® 2.0

Opgal provides a limited lifetime warranty on the EyeCGas® 2.0 outer shell. This warrants that the outer shell is free of defects in materials and workmanship under intended use and service for the original purchaser. Opgal's obligation under this warranty is limited to repairing or replacing, at Opgal's option, articles that after examination are shown to Opgal' s satisfaction to be defective, subject to the following limitations:

1. Article must not be altered from its original configuration.

2.   Article must not have been misused, abused, or damaged in transport.

3.   When the outer shell is obsolete and Opgal no longer stocks the part, the limited lifetime warranty will be terminated.

In no event shall Opgal be responsible for damages, loss of use, or other indirect, incidental, consequential or special costs, expenses or damages incurred by the purchaser, notwithstanding that Opgal has been advised of the possibility of such damages.

Any implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to one (1) year from the date of manufacture.

Some states do not allow the exclusion or limitation of incidental or consequential damages or allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Extended Warranty

The extended warranty has all the same terms and conditions as the one-year warranty, except it is for a period totaling two years (standard one-year warranty plus one additional year).

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Contact Information

For help with this device, please contact Opgal at:

Website

www.opgal.com
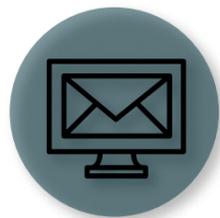
E-mail

info@opgal.com

Phone

Israel: +972 4-995-3903

USA: +1 678-578-4700, ext. 1

Address

Opgal Optronic Industries Ltd.

21 Hanapach Street,

Karmiel 2161401

Israel

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Certifications

This equipment is suitable for use in hazardous locations as certified below:

- UL1604, Electrical Equipment for Use in Class I and II, Division 2, and Class III (Classified) Locations.
- CSA C22.2 No. 213-M1987, Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations.
- ANSI/ISA-12.12.01 - Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III Hazardous (Classified) Locations.
- ATEX II 3G Ex nL IIC T6.

This equipment is certified IP65 water jets and dust resistant as stated below:

With Jetting Water (IP65) - CEI / IEC 60529: 1989+A1:1999 Degrees of protection provided by enclosures (IP Code). Paragraph 14.2.5 - Test for second characteristic numeral 5 with the 6.3 mm nozzle.

THANK YOU!