



Gradient Lens Corporation

## User Guide

# HAWKEYE<sup>®</sup> PRO VIDEOSCOPE



**Gradient Lens Corporation<sup>®</sup>**

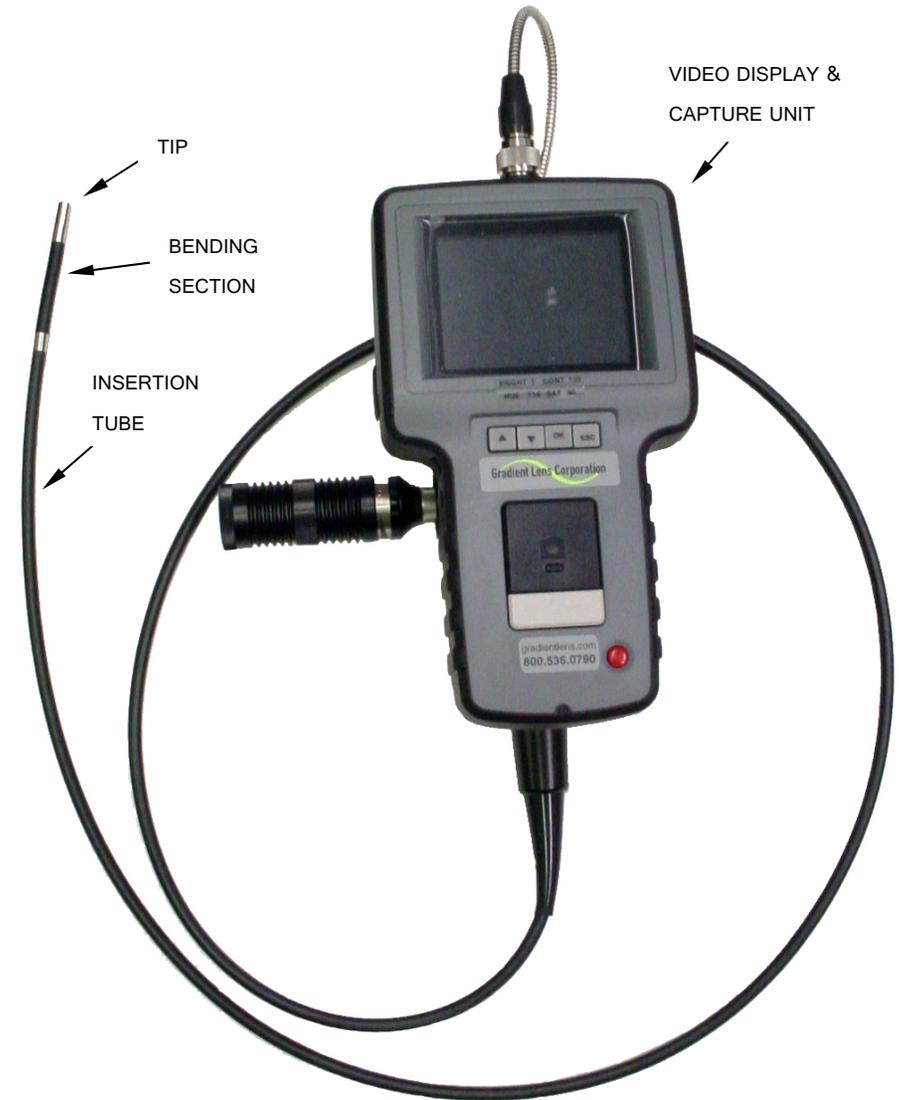


The Hawkeye® Pro Videoscope consists of a CMOS image sensor mounted in the tip of a flexible insertion tube. The insertion tube is attached to a video display and capture unit via an articulation control handle that allows remote control of the tip position for a more versatile inspection. The Hawkeye® Pro Videoscope display and capture unit is easy to use and designed with simple operational function and controls.

### Hawkeye® Pro Videoscope

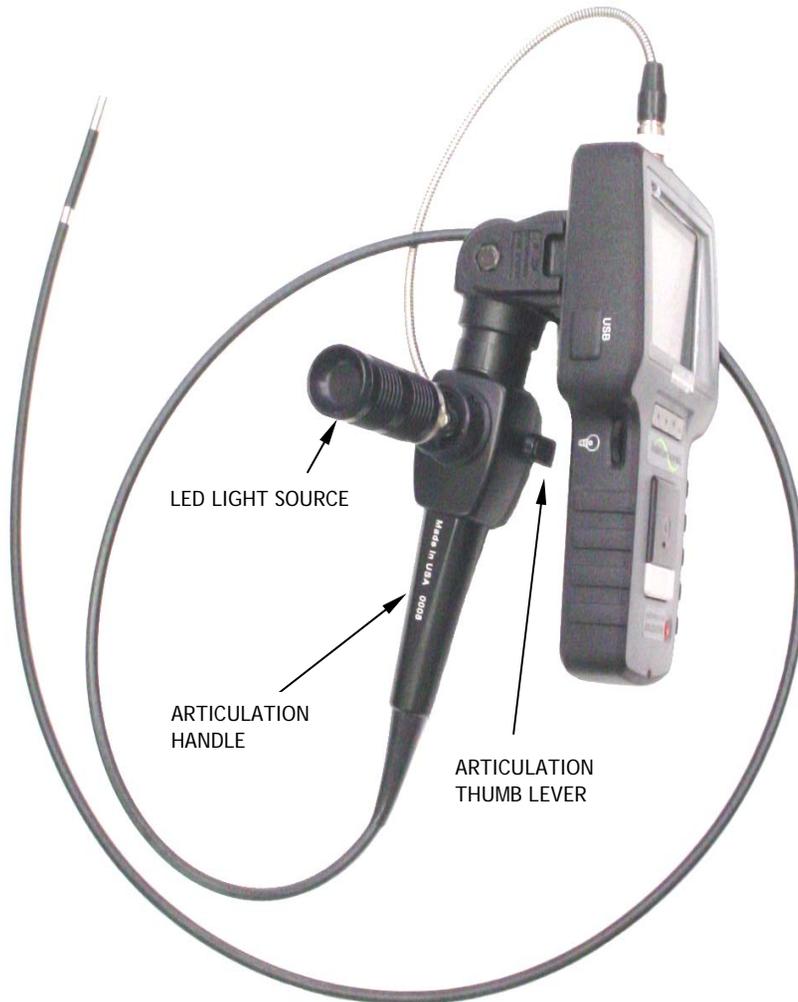
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## System Description

Light is provided by a high-intensity LED source attached to the articulation handle. The variable-intensity light source is powered by a rechargeable lithium-ion battery. Its light is transmitted through fiber optics in the insertion tube to the tip of the scope. The video display and capture unit is powered by its own built-in rechargeable battery.



(2-way articulating model shown, 4-way similar)

## System Description

### Articulation Handle

The articulation handle is held in the operator's hand and contains the mechanism for adjusting the videoscope's articulating tip. The handle is grasped in one hand and the tip is steered via a thumb lever. It is designed to facilitate one hand operation of the articulating tip while looking at the LCD display. This leaves the operator's other hand free to push, pull and rotate the flexible insertion tube as needed. Both hands work together to position the tip and to point it toward the area to be inspected.

### Insertion Tube

The insertion tube is most of the working length of the videoscope and is constructed to be durable and flexible at the same time. Its flexibility allows it to be snaked through equipment bends in order to get to areas not accessible by rigid borescopes or other inspection instruments. Its durable construction protects the camera and power connections and houses the articulation cables and illumination fibers. All models have a stainless steel monocoil at their center for resistance to accidental crushing, and most incorporate a steel/tungsten outer braid to resist damage while sliding over harsh surfaces.

**THE INSERTION TUBE IS ELECTRICALLY CONDUCTIVE. DO NOT ALLOW CONTACT WITH ELECTRICALLY LIVE OBJECTS. SERIOUS INJURY OR DEATH MAY RESULT!**

### Bending Section

The bending or articulation section connects the insertion tube to the tip and houses the articulating collar assembly. This is the most flexible part of the scope, allowing the tip of the 4-way articulating model to be pointed in almost any direction (the 2-way swings through a single plane). Its need for flexibility however makes it the most vulnerable part of the scope and it cannot tolerate the same rough handling as the insertion tube. Its steel/Tungsten outer braid does provide protection from sliding over rough surfaces.

### Tip

The tip houses the CMOS Image sensor, some associated electronics and the polished end of the illumination fiber bundle. The imaging optics and electronics are covered by a window that protects these components from environmental contaminants.

## System Description

The video display and capture unit displays live video and captured still or video images on its built in LCD display. It can output live video to an external monitor via a composite signal connector and the included cable. Stored images can be downloaded to a computer via the USB port and included cable, or through the removable SD memory card. (Details - see p. 18)



## System Setup

The Hawkeye® Pro Videoscope is shipped disassembled in a protective case.



Attach Main Sections

Attach the Articulation Handle to the back of the Video Capture & Display Unit using the mounting screw and knob as shown below..



The hinge clamp may be loosened to allow changing the angle between the Articulation Handle and the Video Display & Capture Unit.

Many orientations of the display are possible, each user can experiment to find which is most comfortable for them.



Connect Cable

Once the Articulation Handle is fastened to the Video Display and Capture Unit in the desired position, connect the power and signal cable as shown. Rotate the connector until it will push into its socket. Then tighten the clamping ring with fingers only.



Install SD Memory Card

Next, insert the SD Memory Card into its slot as shown. Make sure the gold contacts are facing toward the video display screen as shown in the photo. Push the card in gently as far as your finger will allow and release. **DO NOT FORCE THE CARD INTO ITS SLOT WITH THE CONTACTS FACING THE WRONG DIRECTION.** The card will remain in place. To remove the card, push it in a little and release. It will spring out far enough to grasp and remove.



**Charge Main Battery**

Connect the power supply to the DC/IN jack as shown. Plug the power supply into an AC outlet and allow the Video Display and Capture Unit to charge its internal battery. A full charge takes 4-6 hours and will run for about 3 hours.



**Charge Light Source Battery**

Insert one of the light source batteries into its charger. Make sure the metal contacts on the battery are at the same end of the slot as the contacts in the charger. Slide the battery fully into the slot until the contacts touch. Connect the power supply and charge the battery.

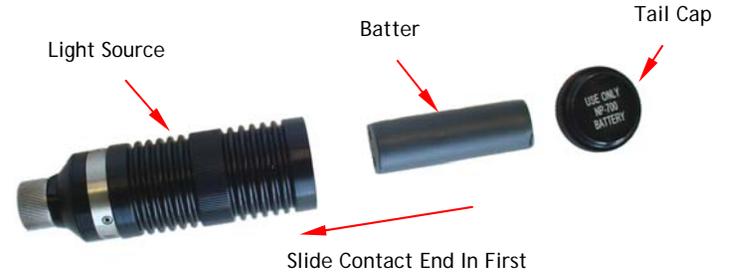
The red STATUS light indicates that power is ON to the charger.

The CHARGE light will flash green if the battery is not connected. When charging a discharged battery it will glow a steady red at first. Then it will flash alternately red and green. As the charge builds up, the red flashes will become shorter in duration until they finally cease. At that point the light will glow a steady green indicating that charging is complete. This takes about an hour or less. A full charge will last about 45 minutes at full intensity.



**Install Light Source**

Install the charged battery into the LED Light Source: Remove the tail cap. Slide the battery into the cavity with the metal contacts facing IN. Replace the tail cap.



Check the operation of the LED Light Source. Rotate the switch tab and confirm that the light turns on and brightens as the switch is rotated.



Handle. Align the Light Source with the Light Post on the Articulation Handle and thread them together with the knurled ring. Tighten with fingers only.



**Install 90-degree Mirror Tip**

If the optional 90-degree mirror tip adapter is needed, install it by removing the tip cap and threading on the 90-degree adapter. Always use the scope with the Tip Cap or an adapter installed to protect the Tip threads.



**FINGER-TIGHTEN ONLY OR DAMAGE MAY RESULT!**

**Check Operation:**

Before using the videoscope it is a good practice to check for any visible damage as well as operation of the tip articulation and verify the image. Look for any sign of penetration or crushing of the insertion tube, bending neck or tip that might indicate damage to the imaging system, or other damage that might compromise performance. Uncoil the Insertion Tube and check for adequate tip articulation by moving the control lever(s). Adjust the light intensity and check that the tip window is not dirty.

To effectively perform a videoscope inspection, you must be familiar with the internal design of the equipment you are inspecting and also be familiar with the operation of the videoscope's display and capture unit. Inside the equipment your vision will be limited, so you must be able to visualize the location of the videoscope and its orientation to the area to be inspected.

**Holding the Videoscope**

Hold the articulating handle/ body in one hand in a way that is comfortable and allows you to both look at the LCD display and actuate the articulation control. Use the other hand to hold the insertion tube and guide it toward the inspection area. The display mounting system swivels to allow positioning the display at different angles to the handle. Some models may be positioned to allow the articulation levers to be worked with the fingers instead of the thumb.

**Power On**

Turn the Video Capture & Display Unit's power on by pressing and holding the power button for 1-2 seconds until you see the screen flash. The system will start up and go into Normal mode, displaying a live image from the CMOS sensor. To turn the unit off, push the power button again.



**Inserting the Videoscope:**

Before inserting the videoscope into equipment, ensure that the bending section is straight and the articulation lock is not engaged. The tip should move freely when the articulation controls are moved. With the tip in the forward neutral position, slowly begin to insert the scope into the equipment. Watch the image to see where the scope is pointed as you guide the tip to the inspection area. If a bend must be negotiated, articulate the tip in the direction of the bend so as to keep the tip from buckling. If the scope is obstructed by objects or bends, rotate the tube back and forth while moving it forward. This kind of movement helps to overcome snags on equipment edges.

Continue guiding the scope forward until the target area is visible in the display.



Articulating the Viewing Tip

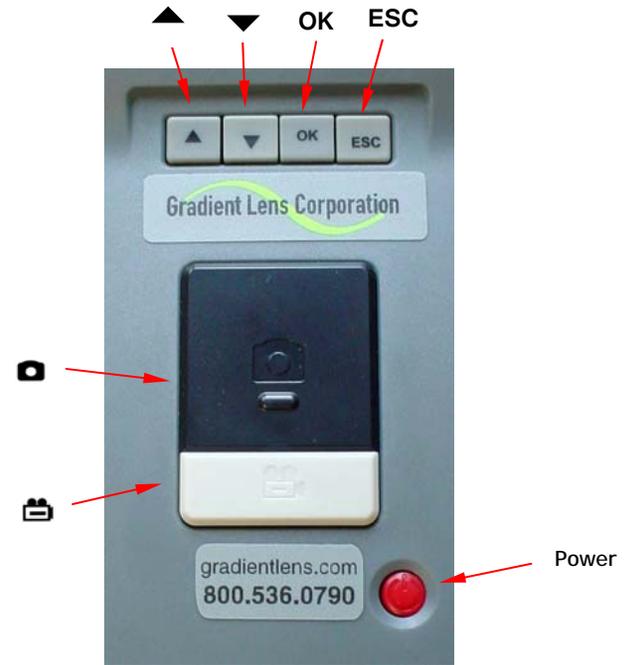
To articulate the tip move the thumb lever(s). In the 4-way configuration, one lever controls right/left movement and the other controls up/down. The Articulation Handle includes a friction lock mechanism. Use this friction lock to fix the tip in the desired direction. You can also apply the lock loosely before articulating, and then lock it down tightly after the tip is in the final viewing position. Use caution when bending the insertion tube or bending section, excessive force can cause damage.

Withdrawing the Borescope

When the inspection is completed, carefully withdraw the videoscope. **Be sure to release all articulation locks prior to withdrawal** to prevent damage to the articulation system. Move the articulation controls back and forth to ensure they are in the loose neutral position and the tip is free to bend as needed during withdrawal. Pull out the scope slowly, and be ready to catch the viewing tip when it exits to prevent possible damage to the tip. If the scope snags on equipment edges, try rotating the tube back and forth.



Power ON / OFF

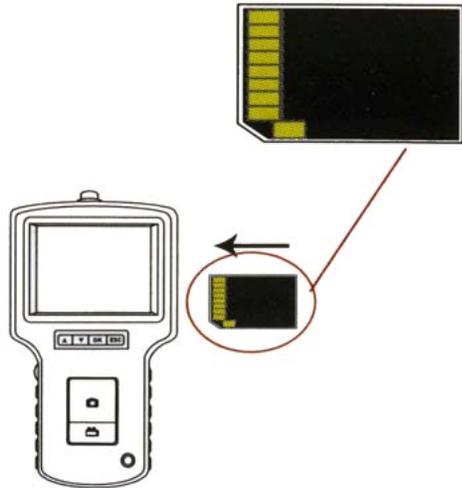


Press and hold the Power button for 1-2 seconds to turn unit on.

The Gradient Lens Corporation logo will appear. Then 'CAMERA' and the battery and memory status indicators will appear for a few seconds. When these indicators disappear the unit is in Normal mode and ready to record.

To turn the unit off press and release the Power button.

**Installing SD Memory Card** - Take care to insert the SD card with the appropriate orientation - contacts should be visible when inserting the card with the video display screen facing you.



**Operating Modes**

There are 3 operating modes:

- Normal Mode:** Displays current camera input and date/time. From this mode still pictures and video are captured.
- Image Review Mode:** Displays captured still pictures and video.
- Menu Mode:** Allows file maintenance, changing settings, etc.

The unit powers up in Normal mode.

From Normal mode -

- Enter Image Review mode by pressing ▲ or ▼.
- Enter Menu mode by pressing OK.

Return to Normal mode from any other mode by pressing ESC.

**Normal Mode**

**Capture a Still Photo:** In Normal mode, press the button. Still photo files are saved as .JPG.

**Capture a Video Clip:** In Normal mode, press the button to start recording. The elapsed time display will be visible in the lower left of the image to indicate that you are recording. Press the button again to stop recording and save the clip. Pressing the button will also stop the recording process and save the clip. Video files are saved as .ASF.

**Memory & Battery Charge Indicators** - In Normal mode, press ESC to display the memory and battery indicators. Memory capacity remaining is displayed as a percentage. Low battery power is indicated by the battery status indicator depicting a less than full charge and turning yellow.



**Image Review Mode**

**View captured photos or video clips:** Push the ▲ or ▼ button to enter Image Review mode. You can scroll forward or back through the photos and videos using the ▲ or ▼ buttons. Video files may be played, paused and resumed by pressing the button. While a still or video file is displayed, (video not playing), pressing the OK button will bring up the DELETE menu. Select YES and press OK to delete the file. To exit Image Review mode, press ESC.

**Delete a Single File:** Press ▲ or ▼ to enter Image Review mode. Scroll to the required file using ▲ or ▼ buttons. When the required photo or video file is displayed press OK. A frame will be displayed to confirm the delete function. Select 'YES' with ▲ or ▼ and press OK to confirm.



Menu Mode

**Display Main Menu:** In Normal mode : Press the OK button to display the Main Menu as follows:

- DELETE ALL
- VIDEO OUTPUT
- DATE/TIME SETUP
- LANGUAGE
- VIDEO FORMAT
- AUTO POWER OFF



You can scroll through the functions on this menu using the ▲ and ▼ buttons and select the function using the OK button.

DELETE ALL

Deletes all saved files, video and still photos. When this function is selected, the unit displays a frame which includes two options. Use ▲ and ▼ to select “Yes” or “No” and press OK to confirm.



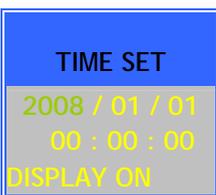
VIDEO OUTPUT

This function transfers the video signal to and from an auxiliary display using the supplied cable. The unit will automatically switch to the auxiliary display when the cable is connected and will revert to the built in display when the cable is disconnected. This function will allow you to toggle between displays if both are connected. Simply press OK while this function is selected to toggle between displays.



DATE/TIME SETUP

Sets the date and time. Select this function and use the ▲ and ▼ buttons to select year/month/day or hour/minute/second fields, then press the ⏪ and/or ⏩ buttons to scroll through the numbers to set the date and time. If “DISPLAY” indicates “ON” status, the date and time will be displayed on the screen. Captured images will always include a time/date stamp. Confirm changes by pressing OK.



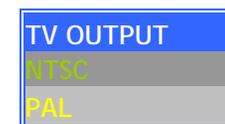
LANGUAGE

If your unit is supplied with a language option this function will allow you to select English or the optional language.

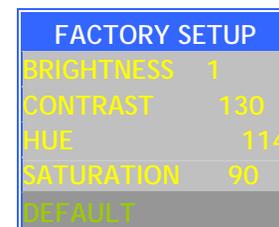


VIDEO FORMAT

This function allows you to choose the format of the output video signal for an auxiliary display. The options are NTSC and PAL. Use the ▲ and ▼ to select and press OK to confirm.



While the TV OUTPUT options are displayed, pressing the ⏻ button will display the FACTORY SETUP menu. Here the factory settings for the video display may be changed or reset. Use ▲ and ▼ and press OK to select the property to be changed. Then use ▲ and ▼ to change the setting and OK to confirm. Holding the ▲ or ▼ buttons down for a couple of seconds will cause the settings to change more rapidly. Each unit is optimized from the default settings by Gradient Lens Corp. prior to shipping. These optimized settings appear on a label on the main unit should they need to be re-entered.



AUTO POWER OFF

Select this function by pressing the OK button, use the ▲ and ▼ to select time for auto power off or to disable the auto power off function press OK to confirm.



## Operation - Misc.

**Connecting to an Auxiliary display:** Use the included AV cable to connect your auxiliary display to the jack on the right side of the Video Display & Capture Unit. (Note: The display must accept a composite input). The unit will automatically switch to the auxiliary display when the cable is connected. The displays may be toggled by using the VIDEO OUTPUT function on the main menu.

**Transferring image files to a personal computer:** The Video Display & Capture Unit will act as a memory card reader and is accessible via a USB 1.1 or 2.0 port. Plug in the Mini USB 1.1 connector to the USB port and open the drive associated with the chosen port. The stored images are contained in the location  $X:\backslash DCIM\100MEDIA$  where  $X$  is the drive letter. Jpegs can be viewed with Windows Picture Viewer and .asf video files play in Windows Media Player.

## Cautions

- Do not remove the SD memory card during capture operations, data will be lost and the memory card may be damaged.
- Video files use large amounts of memory quickly. We recommend 80X SD card or faster for best quality video clips.
- Use cotton swabs and alcohol to clean the tip optics.

## Warnings

- Do not use this product in inadequately ventilated environments especially where there may be explosive fumes.
- Do not use chemical cleaners or solvents to clean the surfaces of the Main Unit or insertion tube.
- Do not open the product there are no user serviceable parts.
- Handle product carefully and do not crush, or bend the insertion tube beyond its normal operating bend radius.
- This product is not for use in the medical field.
- Do not use in direct sunlight.
- Store product in a dry adequately ventilated area.
- Do not allow contact with electrically live objects.

## Troubleshooting

The following troubleshooting hints should help you to solve some performance problems on site. If a problem is not solved using these suggestions, call the Service Center at the number listed under the SERVICE section of the Warranty page and arrange to return your videoscope for evaluation and repair.

### NEVER Attempt to Disassemble the Videoscope

If Image Is Not Clear and Sharp...

- If using a detachable tip adapter, the tip may not be properly attached. Detach tip adapter and reinstall.
- Lenses or glass windows may be dirty. Clean glass surface on insertion tube tip with alcohol and cotton swab (or soft cloth). Also clean detachable tip if being used.
- Light may be insufficient. Increase light source intensity or move viewing tip closer to object.

If the Video Display & Capture Unit is not working properly...

- Nothing on LCD screen: Battery Power too low. Recharge battery.
- No Image - but words and status symbols on LCD display: Power and signal cable is not connected securely. Reattach cable.
- Cannot capture photos or video: No SD Card inserted.
- Shut down: Battery has discharged below operating threshold. Recharge battery.
- !!! No functions working!!! If all functions freeze or fail, first try to power the unit off and restart. If the unit does not recover insert an insulated needle into the hole on the back of the main unit to perform a system reset.



If Articulation Is Difficult...

- Articulation locks may be fully or partially engaged. Release locks.
- Articulation cable movement may be hindered by bends in the insertion tube. Keep tube as straight as possible during inspection.
- Viewing tip movement may be blocked due to its position inside equipment. Try to reposition tip by rotating tube or moving tip forward or backward.

**Do Not Apply Excessive Force on Articulation Controls**

If Image Is Not Bright Enough...

- Light source intensity may be at a low setting. Turn to maximum intensity.
- Viewing tip may be too far from object. Move tip closer to object.
- If using a detachable tip adapter, the tip may not be properly attached. Detach tip adapter and reinstall.
- Lenses or glass windows may be dirty. Clean glass surfaces on viewing tip, light guide connector and eyepiece with alcohol and cotton swab (or soft cloth). Also clean detachable tips if being used.
- Light source capacity may be insufficient for application.

Button	Normal mode	Image Review mode	Menu mode
	Switches to Image Review mode and scrolls reverse through still images and videos.	Scrolls to previous still image or video.	Scrolls up through selections.
	Switches to Image Review mode and scrolls forward through still images and videos.	Scrolls to next still image or video.	Scrolls down through selections.
OK	Enters Main Menu.	To delete current image or video.	Confirm selection.
ESC	Displays battery and memory status.	Returns to Normal mode and displays 'CAMERA' and battery and memory status.	Returns to Normal mode and displays 'CAMERA' and battery and memory status.
	Captures a still image (jpeg). While recording a video clip, pressing this button will stop the recording process.	While viewing a video file this button will play/pause/resume the current video clip.	Returns to Normal mode.
	Pressing this button starts/stops video recording.	Returns to Normal mode and displays 'CAMERA' and battery status.	Returns to Normal mode.

## Specifications

### Insertion tube Specifications

Image Sensor	CMOS Image Sensor
Resolution (Dynamic/Static)	320(H) X 240(V) / 640(H) X 480 (V)
Insertion Tube Tip Diameter	6mm
Frame rate	~30fps
Exposure	Automatic
White Balance	Fixed
Field of View (FOV)	50°
Depth of Field (DOF)	1.5cm - 10cm
Light source	Rechargeable LED
Working temp	-20° - 70°C

### Main Unit Specifications

Power	DC 5V
Display	3.5" TFT LCD Monitor 320 X 240 Pixels
Interface	Mini USB 1.1 / AV out
Battery	Rechargeable Li-Polymer Battery (3.7V)
Video Output Format	NTSC & PAL
Recording Medium	SD card (capacity up to 2G)
Still image storage format	JPEG (640 X 480)
Video Recording storage format	ASF (320 X 240)
Language	English + option (one language)
Working/ Storage temp	-20° - 60°C
While charging battery temp	0° - 40°C

## Notices

### USA

This device has been tested to be in compliance with part 15, class A of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Canada

This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## WARRANTY

Gradient Lens Corporation warrants that all Hawkeye borescopes and accessories will be free of defects in materials and workmanship for one year from the date of first retail purchase.

Video and lighting products have manufacturer's warranties for one year.

This warranty does not cover breakage or failure due to tampering, misuse, neglect, accidents, improper installation, modification, shipping, or to improper maintenance, service and cleaning procedures. This warranty is also void if the instrument is not used in accordance with the manufacturer's recommendations or if required service is performed by anyone other than an Gradient Lens Corporation authorized agent. No other express or implied warranty is given.

## SERVICE

Should service of the equipment be required, call the Gradient Lens Corporation facility to obtain shipping directions.

If you have any questions requiring the safety of your equipment please contact Gradient Lens Corporation at the following:

Toll Free	Telephone	FAX	Web
800-536-0790	585-235-2620	585-235-6645	www.gradientlens.com

Email: info@gradientlens.com

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