

HAYDEN MEDICAL

4K Endoscopic Camera System

405-466CS

User Manual & Troubleshooting Guide



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1. Safety Information

General Warnings

To reduce the risk of fire or electric shock, do not expose the system to rain or moisture.

The system is not supplied sterile. Before initial use and between procedures, ensure that all applicable components have undergone the cleaning, disinfection, or sterilization required by their validated instructions for use and facility procedures. Do not assume that surface wiping is sufficient for patient-contacting accessories.

The light source produces high-intensity illumination. Do not look directly into the light output. Excessive light intensity may cause eye injury and may cause the endoscope, tissue, or nearby materials to become hot. Use only the illumination level necessary to obtain adequate visualization.

- Do not connect peripheral equipment that supplies excessive voltage to the system.
- Use the supplied power cable or an appropriately rated replacement power cable. Do not use damaged, worn, kinked, or poorly insulated cables.
- Do not block ventilation openings. Adequate airflow is required to prevent overheating.
- Do not disassemble, modify, or attempt to internally service the system unless authorized to do so.

Immediately discontinue use if a power or accessory cable becomes worn or damaged.

Do not install, operate, or store the system:

- | | |
|--|---|
| • Near flammable chemicals or materials | • Near liquids or where the system may be exposed to rain |
| • In direct sunlight | • Directly adjacent to heating or cooling outlets |
| • Near space heaters or other significant heat sources | • Where electrical power is unstable |
| • In environments with excessive salt or sulfur concentrations | • In extremely hot or cold environments |
| • In excessively humid or dusty environments | • In areas subject to significant mechanical vibration |
| • Near strong magnetic fields | • Near strong electromagnetic sources |

Follow these environmental restrictions during installation, operation, and storage.

Patient Heat Considerations

For smaller patients, particularly those weighing less than **5 kg (11 lb)**, heat transmitted through the endoscope may be more noticeable and may potentially cause discomfort or thermal injury.

Reduce light-source intensity when appropriate and periodically monitor the temperature of the endoscope tip during prolonged procedures.

WARNING: If the endoscope tip temperature exceeds **41°C (105.8°F)**, immediately reduce the light-source intensity or suspend use and allow the endoscope to cool before continuing.

2. Intended Use and System Overview

2.1 Intended Use

The Hayden Medical 405-466CS is intended to provide illumination and visualization during endoscopic procedures performed by qualified healthcare professionals.

When connected to a compatible endoscope, the system captures and displays real-time endoscopic images.

2.2 Clinical Applications

The system may be used for visualization and documentation in endoscopic procedures including:

- General surgical procedures requiring endoscopic visualization
- ENT examinations and interventions
- Nasal endoscopy
- Sinus procedures
- Laryngoscopy
- Arthroscopy
- Gastrointestinal endoscopic visualization
- Urological endoscopic examinations
- Gynecological endoscopic procedures
- Pulmonary endoscopy
- Neurosurgical endoscopic visualization
- Plastic and reconstructive procedures requiring endoscopic visualization

The listed applications must be consistent with the intended use and instructions for the connected endoscope and accessories.

2.3 Clinical Settings

The system is intended for use in appropriately equipped clinical environments, including:

- Hospital operating rooms
 - Surgical centers
 - Outpatient clinical environments
 - Physician offices
 - Medical training and education facilities
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2.4 Compatibility

The system is designed for use with a range of commercially available endoscopes, including rigid and flexible endoscopes.

Before connecting third-party equipment, verify mechanical, optical, electrical, and regulatory compatibility.

2.5 Operator Requirements

The system should only be operated by qualified healthcare professionals who have received appropriate training in the endoscopic procedure being performed and understand operation of the connected equipment.

2.6 Contraindications

No contraindications relating directly to this device are currently known. The responsible physician must determine whether the intended endoscopic procedure is appropriate based on the patient's condition.

3. Components and Controls

3.1 System Components

The 405-466CS system consists of:

- Integrated video processor/control unit
- 27-inch display
- Endoscopy camera head
- Camera coupler
- LED cold light source
- Power cable
- Video connections
- USB storage support (feature; compatible storage device not necessarily supplied)

3.2 Front Control Panel

- | | |
|-------------------------------------|------------------------------|
| 1. Decrease Light Source Brightness | 7. Menu Right / Fast Forward |
| 2. Increase Light Source Brightness | 8. Menu |
| 3. Light Source Sleep | 9. Select |
| 4. Menu Up / Zoom In | 10. Exit |
| 5. Menu Down / Zoom Out | 11. Video Playback / Record |
| 6. Menu Left / Rewind | |

3.3 Side Panel Connections



- | | |
|--------------------------|--------------------------|
| 1. USB 1 | 5. HDMI 2 — Video Output |
| 2. USB 2 | 6. DVI — Video Output |
| 3. SDI — Video Output | 7. Camera Input |
| 4. HDMI 1 — Video Output | 8. LED Light Output |

3.4 Camera Head Controls



1. Image Capture

Captures a still image.

2. Zoom In

Increases image magnification.

3. White Balance

Initiates manual white balance.

4. Zoom Out

Decreases image magnification.

4. Technical Specifications

4.1 Electrical and Imaging Specifications

Display	27-inch 4K display
Image Sensor Size	1/1.8-inch
Image Resolution	3840 × 2160 pixels
Approximate Pixel Count	8.3 million pixels
Minimum Illumination	0.5 Lux
Resolution	1800 TVL
Signal-to-Noise Ratio	50 dB
White Balance	Automatic / Manual
Video Outputs	3G-SDI DVI HDMI 1 HDMI 2
Power Input	AC 100–240 V, 50/60 Hz USA: 120 V, 60 Hz Europe: 230 V, 50 Hz
Input Power	≤300 VA
Fuse	5 × 20 mm, F3AL 250 V

4.2 Environmental Conditions

Operating Conditions

Temperature	5°C to 35°C 41°F to 95°F
Relative Humidity	20–95%, non-condensing
Atmospheric Pressure	86–106 kPa 25.4–31.3 inHg

Storage and Transport Conditions

Temperature	-10°C to 60°C 14°F to 140°F
Relative Humidity	20–95%

5. Installation and Setup

1. Remove the system and accessories from their packaging.
2. Inspect all components for visible damage and verify that the required accessories are present.
3. Place the system on a stable, level surface with sufficient ventilation.
4. Keep the system away from flammable or corrosive materials and position it where it cannot easily be knocked over.
5. Connect the camera head to the camera interface. Align the red indicator on the camera connector with the corresponding red indicator on the system connection before insertion.
6. Connect the light-guide cable to the LED light output and secure the connection.
7. Connect any required video outputs, USB storage devices, or other compatible accessories.
8. Insert the power cable into the AC power input.
9. Connect the power cable to a properly grounded **AC 100–240 V, 50/60 Hz** power source (USA: 120 V, 60 Hz; Europe: 230 V, 50 Hz).
10. Verify that all connections are secure.
11. Move the main power switch to the **ON (1)** position.
12. Confirm that the display powers on.
13. Confirm that an image from the camera head appears on the display.

WARNING — FIRE HAZARD: When the light source is operating, keep the end of the endoscope and any exposed light-guide output away from paper, surgical drapes, bedding, and other flammable materials.

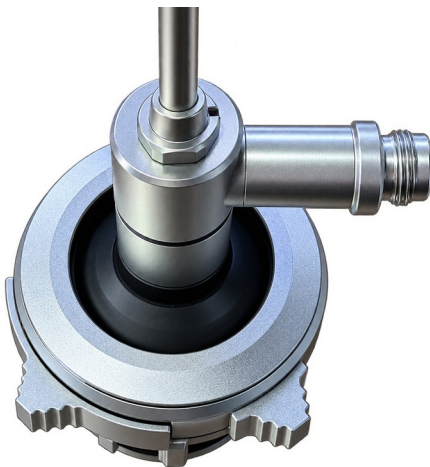


Camera input: align the red indicators

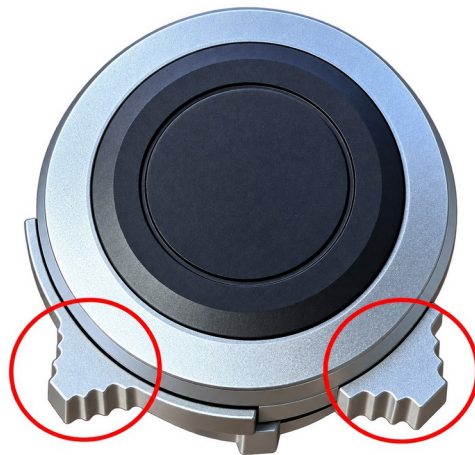


LED light output

5.1 Attaching the Endoscope to the Camera Coupler



Endoscope inserted into the coupler



Textured release tabs (circled)

1. Locate the two textured release tabs on opposite sides of the camera coupler.
2. Pinch both tabs together to open the coupler's locking mechanism.
3. While holding the tabs, insert the endoscope eyepiece into the center of the coupler.
4. Release the tabs to secure the endoscope in place.

To prevent the endoscope from rotating:

5. Push both tabs outwards simultaneously. Although no visible movement may occur, this action helps tighten the connection.
6. Gently check that the endoscope is securely attached and does not rotate or move freely.

NOTE: Ensure the endoscope is properly secured before beginning a procedure. Do not force the connection.

6. Operating Instructions

6.1 Before Use

1. Inspect the power cable for damage.
 2. Inspect the camera and light-guide cables.
 3. Check connectors for damage or contamination.
 4. Inspect the system housing.
 5. Confirm that ventilation openings are unobstructed.
 6. Verify that the camera and optical surfaces are clean.
 7. Connect the appropriate endoscope.
 8. Power on the system.
 9. Confirm proper image output.
 10. Adjust the light source to the lowest intensity that provides adequate visualization.
-

6.2 Focusing

If the displayed image is blurry or out of focus, adjust the focus at the camera head/coupler and, where applicable, at the endoscope.

If the endoscope has previously been used, verify that its optical surfaces are clean and free of residue before adjusting focus.

6.3 White Balance

The system supports automatic and manual white balance.

For manual white balance:

1. Aim the camera at a clean white object.
2. Position the camera so that the entire image field appears white.
3. Make sure no colored objects or contamination are visible in the image.
4. Press the **WB** button on the camera head.
5. Allow approximately **2–3 seconds** for the white-balance process to complete.

Incorrect white balance may cause inaccurate image colors.

6.4 Still Image Capture

Storage and Image Retrieval

Confirm that the storage device is recognized before capturing images. To retrieve saved images, use the system's available playback or file-access functions and follow facility procedures for transferring and protecting patient information. Use only a USB storage device that is compatible with the system.

To capture a still image:

1. Verify that compatible storage is connected.
 2. Position the endoscope to display the desired image.
 3. Quickly press and release the image-capture button on the camera head.
 4. The “PIC” indicator will appear on the display when an image is captured.
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6.5 Video Recording

Recording Precautions

Confirm sufficient available storage before recording. If recording does not start or a storage warning appears, stop and check whether the USB device is properly connected and recognized. Do not disconnect storage during an active recording or while files are being saved. Recording format, maximum duration, and supported storage capacity must be confirmed against the device specifications.

To begin recording:

1. Verify that a compatible USB storage device is connected.
2. Press the record button on the display.
3. Confirm that recording has started.

To stop recording:

1. Press the record button again.
 2. Wait until the screen confirms that recording has ended.
 3. Do not remove the USB storage device before the recording-ended confirmation appears.
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6.6 Video Playback

Returning to Live Imaging

Exit the playback menu and verify that the live camera image is restored before resuming the procedure. If no live image appears, check the camera connection and selected display mode.

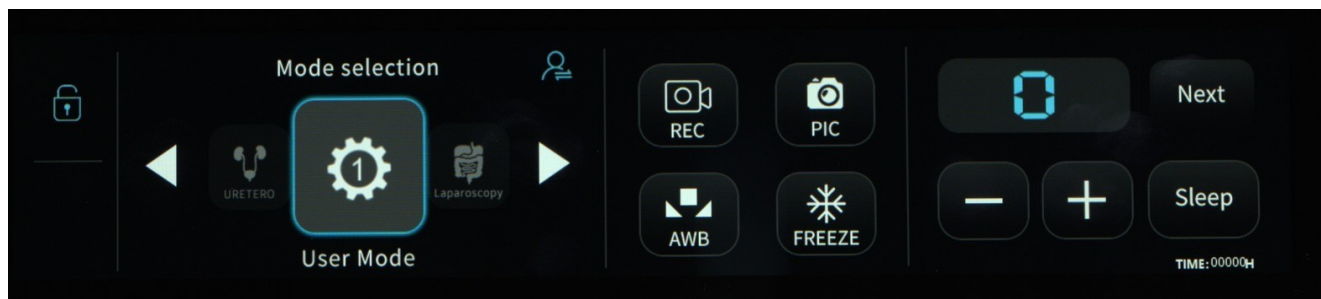
1. Press **MENU**.
2. Use the Up and Down controls to locate **Playback**.
3. Press **Select**.
4. Select the desired recorded file.
5. Use the Left and Right controls for rewind and fast-forward.
6. Press Exit to return to the previous menu.

6.7 Shutdown

1. Stop any active recording.
2. Confirm that recording has completely ended.
3. Move the main power switch from **ON (1)** to **OFF (0)**.
4. Disconnect the power cable.
5. Disconnect accessory cables.
6. When disconnecting a cable, grasp the connector close to the system and pull straight outward. Do not pull on the cable itself.
7. Clean and disinfect applicable components.
8. Store the system in a clean, dry, stable location.

7. On-Screen Display Settings

Press **MENU** on the front control panel to access system and image settings.



Available settings include:

- Scene
- Automatic White Balance
- Color
- Brightness
- Saturation
- Contrast
- Sharpness
- Gain
- 3D Noise Reduction
- Gamma
- Dynamic Range Control
- Metering Mode
- Playback
- System

7.1 Scene Modes

Available procedure-oriented scene modes include:

- Arthroscopy
- Fiber
- PTED
- Cystoscopy
- Ureteroscopy
- User Mode
- Laparoscopy
- ENT
- Gynecology

Select the scene mode that most closely corresponds to the procedure being performed.

7.2 System Settings

Settings Precautions

Record the existing configuration before changing advanced, key, video-output, or recording settings. Change only settings you understand and verify normal image output afterward. Consult authorized service personnel before changing unfamiliar advanced settings.

The System menu includes the following settings:

- Language
- Video Output
- Video Mode
- Date and Time
- Clock Display
- Software Version
- Reset
- Advanced Settings
- Key Settings
- Recording Settings
- Network Settings
- Storage Information
- Electrical Frequency

Electrical Frequency

Set the frequency to correspond to the local electrical supply to minimize image flickering caused by electrical interference.

In the United States, select **60 Hz**. In Europe and other regions with 50 Hz mains power, select **50 Hz**.

8. Troubleshooting

Light Source Does Not Illuminate

Possible Cause: Light source is in sleep mode, brightness is set too low, or the light-guide cable is disconnected.

Solution: Check the light-source controls and the cable connection without looking directly into the light output. If illumination cannot be restored, discontinue use and contact support.

USB Storage Is Not Recognized or Recording Does Not Start

Possible Cause: Storage device is disconnected, unsupported, full, or unavailable.

Solution: Stop recording attempts, confirm the storage connection, and check the available storage information in the system menu. Use only storage media confirmed compatible with the equipment. Do not remove storage while data is being written.

Image Flickers or Video Output Is Unstable

Possible Cause: Video configuration, electrical-frequency setting, cable connection, or electromagnetic interference.

Solution: Check video connections and the applicable system settings. Verify normal operation away from potential interference sources. If the problem persists, discontinue use and contact support.

Display Does Not Show an Image

Possible Cause: Power cable is not properly connected.

Solution: Verify that the power cable is securely connected to the system and electrical outlet.

Possible Cause: Camera cable is not properly connected.

Solution: Disconnect and securely reconnect the camera cable.

System Case Becomes Abnormally Hot

Possible Cause: Ventilation is restricted.

Solution: Remove anything blocking the ventilation openings.

Maintain at least **5 cm (approximately 2 inches)** of clearance around the system.

Listen for operation of the internal cooling fans. If the cooling fans cannot be heard or the system continues to become excessively hot, discontinue use.

Image Is Blurry

Possible Cause: Residue is present on the camera or endoscope.

Solution: Remove the endoscope and determine whether the camera head produces a clear image independently. Clean applicable optical surfaces and reconnect the endoscope.

Possible Cause: Focus is incorrect.

Solution: Adjust the camera/coupler focus control until the image becomes clear.

Image Color Is Incorrect

Possible Cause: White balance is incorrect.

Solution:

1. Aim the camera at a clean white target.
2. Fill the complete image field with white.
3. Ensure that no iodine, colored material, or contamination is visible.
4. Perform white balance again.

Automatic white balance may require approximately **2–3 seconds**.

Possible Cause: Color or tone settings have been changed.

Solution: Review the image settings or reset the appropriate color/tone settings.

Power Indicator Does Not Illuminate

Possible Cause: Power connection or fuse problem.

Solution:

- Verify the power cable connection.
 - Verify power is available at the outlet.
 - Confirm the main power switch is ON.
 - Do not open the enclosure to inspect the fuse. Contact authorized service personnel if a fuse problem is suspected.
-

Image Contains Strong Reflections or Bright Spots

Possible Cause: Light-source intensity is too high.

Solution: Reduce light-source brightness until the image is properly exposed.

IMPORTANT: If a problem cannot be corrected using these troubleshooting procedures, discontinue use and contact Hayden Medical for service assistance.

9. Cleaning and Disinfection

9.1 General Precautions

Disconnect the system from AC power before cleaning.

- Clean the equipment in a well-lit location so dirt and contamination can be clearly identified.
- Do not use benzene, paint thinner, or other aggressive volatile solvents.
- Do not spray cleaning liquid directly onto the system.
- Do not use excessively wet wipes.

Prevent liquids from entering:

- Connectors
- Seams
- Ventilation openings
- Electrical connections

CAUTION: Excess liquid entering seams or connectors can damage the equipment.

9.2 External Case

1. Gently remove dust using a soft, dry cloth.
2. For stubborn contamination, lightly dampen a cloth with neutral detergent.
3. Wipe the contaminated area.
4. Remove detergent residue.
5. Dry the surface.
6. The exterior may then be wiped using a soft cloth or surgical gauze with isopropyl alcohol at approximately **50–70% v/v**, or **75% medical alcohol**, as appropriate.

CAUTION: Do not allow cleaning solutions to enter the system.

9.3 Camera Head

If debris or biological residue is present:

1. Remove visible contamination using a soft brush or cloth.
2. Wipe the camera surface using a soft cloth or surgical gauze.

Suitable cleaning solutions include:

- **Isopropyl alcohol:** approximately 50–70% v/v
 - **Ethanol:** approximately 76.9–81.4% v/v
3. Carefully wipe the optical surface.
 4. Use suitable lens paper to remove remaining residue.
 5. Ensure no visible staining or contamination remains on the lens.

9.4 Cables

1. Wipe cables thoroughly using a soft cloth or surgical gauze.
2. If necessary, use a small amount of neutral detergent.
3. Remove any detergent residue.
4. Dry the cable completely with a clean dry cloth.

Avoid sharply bending or kinking cables during cleaning or storage.

9.5 Display

1. Remove loose dust from the LCD using an appropriate dust blower.
2. Make sure coarse particles have been removed before wiping the screen.
3. Using a slightly damp soft cloth or LCD-specific wipe, clean from the center of the display outward.
4. If moisture remains, dry the display using a clean dry wipe.

CAUTION: Do not use aggressive or non-specialized solvents on the LCD. Certain solvents may damage the display polarizer.

10. Inspection and Maintenance

Pre-Use Inspection

The system should be inspected before use to help ensure safe and reliable operation.

Cables

- Cables are not damaged.
- Cable insulation is intact.
- Connectors are undamaged.
- Cables are not excessively kinked or twisted.

Main System

- Connectors are free from dust and foreign material.
- The enclosure is undamaged.
- No external screws are loose.
- Ventilation openings are clear.

Power-On Test

- The display operates normally.
- The camera produces an image.
- The light source functions normally.
- Front-panel buttons respond correctly.
- No abnormal sounds or excessive heat are present.

Document and address any defects identified during the pre-use inspection according to facility procedures.

Monthly Inspection

- Inspect the enclosure.
- Check for loose screws.
- Inspect for damaged components.
- Inspect all connectors.
- Remove accumulated dust and foreign material.
- Inspect cables for deterioration.

Annual Inspection

Perform a comprehensive functional and performance inspection of the system at least annually in accordance with facility maintenance procedures.

Service Restrictions

Do not disassemble or modify the system.

Internal repair should only be performed by appropriately qualified and authorized service personnel.

Immediately discontinue use if:

- A cable is damaged.
- The enclosure is damaged.
- Cooling fans are not functioning.
- The system repeatedly overheats.
- Electrical operation is abnormal.
- Normal imaging cannot be restored.
- The system cannot pass its pre-use inspection.

11. EMC and Environmental Guidance

Medical electrical equipment may be affected by electromagnetic interference.

Portable and mobile RF communication equipment may affect system operation. Verify normal operation if the system must be used close to or stacked with other electrical equipment.

To reduce electromagnetic interference:

- Keep the system away from strong RF transmitters whenever practical.
- Keep the system away from strong magnetic fields.
- Use appropriately specified cables and accessories.
- Verify normal operation when equipment is positioned close to other electrical devices.
- Do not touch connector pins identified with an electrostatic-discharge warning.
- Follow applicable facility electromagnetic compatibility procedures.

If uninterrupted operation is required during a power failure, connect the system to an appropriately rated uninterruptible power supply or battery-backed electrical source.

Environmental Disposal

At the end of the system's useful life, dispose of the equipment, electronic components, and accessories in accordance with applicable local laws and regulations.

Do not dispose of electronic medical equipment as ordinary waste where prohibited.

12. Service and Support

For technical support, replacement parts, troubleshooting assistance, service, or warranty information regarding the Hayden Medical 405-466CS, contact Hayden Medical at info@haydenmedical.com or 661-296-7200.

Before Contacting Support

Have the following information available:

- **Product SKU:** 405-466CS
- Unit serial number
- Purchase date and proof of purchase, if available
- Description of the problem
- Any error or status messages displayed
- Accessories connected when the problem occurred
- Type of endoscope connected
- Troubleshooting steps already performed

IMPORTANT: Do not disassemble the system in an attempt to correct an internal malfunction.

Warranty

Warranty terms, coverage periods, exclusions, and service procedures are governed by the Hayden Medical sales documentation and warranty information supplied with the product.

Unauthorized modification, misuse, accidental damage, improper maintenance, operation outside the specified environmental conditions, or unauthorized repair may affect warranty coverage.

Contact & Support

For questions regarding the operation, maintenance, or troubleshooting of your camera system, please contact Hayden Medical. Our team is available to assist with product inquiries and technical support.

HAYDEN MEDICAL

Website: www.haydenmedical.com

Email: info@haydenmedical.com

Phone: (661) 296-7200

For additional product information and resources, please visit our website.