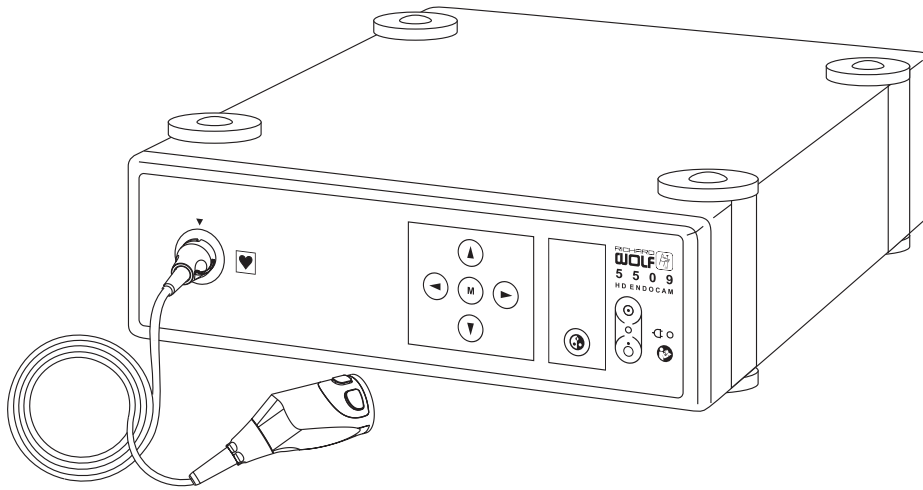


RICHARD
WOLF 
5 5 0 9
HD ENDOCAM

Manual

EN



medical 
HD  

EN

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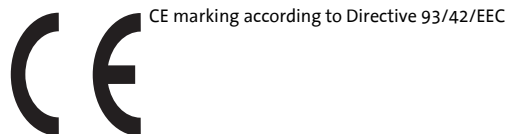
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Manufacturer













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GA-A 250 / Index: 03-10-3.0

Model

HDC905/10000005566 02/0310/ama

	Symbols
	Warning
	Follow the instruction for use
	Symbol for type CF equipment
	Symbol for potential equalization
IP 20	Degrees of protection provided by enclosures (IP-Code)
	Alternating current
	Service
REF	Order number
	Single use only
	Sterile with ETO
	Lot no.
SN	Serial number
	Date of manufacture
	Expiration day
	Pieces, quantity


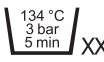










	Symbols
	Latex free
	Number of autoclaving cycles
	Do not get wet
	Top-Bottom
	Fragile
	Waste management
	ON (part of equipment)
	OFF (part of equipment)
	Power connected
	White balance
	Input
	Output

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1 Important User Notes

Read the manual carefully and become familiar with the operation and function of the device and the accessories before use during surgical procedures. Non-observance of the instructions listed in this manual can lead

- to life-threatening injuries of the patient,
- to severe injuries of the surgical team, nursing staff or service personnel, or
- to damage or malfunction of device and/or accessories.

The manufacturer reserves the right to modify the appearance, graphics, and technical data of the supplied product through continued product development.

The words DANGER, WARNING, and NOTE carry special meanings. Sections marked with these words must be read especially attentively.

Subject to technical changes

Please note

DANGER!

The safety and/or health of the patient, user, or a third party are at risk. Comply with this warning to avoid injury to the patient, user, or third parties.



WARNING!

These paragraphs include information provided to the operator concerning the intended and proper use of the device or accessories.



NOTE!

Here you will read information about the maintenance of the device or the accessories.



Federal Law (only for U.S. market)

Exclusion of liability

2 Safety Information

U.S. federal law restricts use of this device to use by or on the order of a physician.

The manufacturer is not liable for direct or consequential damage and the warranty is null and void if:

- the device and/or the accessories are improperly used, prepared, or maintained,
- the instructions and rules in the manual are not adhered to,
- non-authorized persons perform repairs, adjustments, or alterations on or to the device or accessories,
- non-authorized persons open the device,
- the prescribed inspection and maintenance schedules are not adhered to.

Receipt of technical documentation from the manufacturer does not authorize individuals to perform repairs, adjustments, or alterations on or to the device or accessories.

Authorized service technician

Only an authorized service technician may perform repairs, adjustments, or alterations on the device or accessories and use the service menu. Any violation will void the manufacturer's warranty. Authorized service technicians are only trained and certified by the manufacturer.

Intended use

The device may be used only as intended.

Care and maintenance

The service and maintenance of the device and its accessories has to be carried out as per instructions to ensure the safe operation of the device. For the protection of the patient and the operating team, check that the device is complete and functional before each use.

Contamination

Before shipping, decontaminate device and accessories in order to protect the service personnel. Follow the instructions listed in this manual. If this is not possible,

- the product must be clearly marked with a contamination warning and
- is to be double-sealed in safety foil.

The manufacturer has the right to reject contaminated products for repair.

Waste management



This symbol indicates that the waste of electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately instead. Please contact the manufacturer or an accordingly authorized disposal or waste management company for further information.

2.1 Hazards



DANGER!

Technique and procedures

Only the physician can evaluate the clinical factors involved with each patient and determine if the use of this device is indicated. The physician must determine the specific technique and procedure that will accomplish the desired clinical effect.



DANGER!

Check all factory settings.

Factory settings are not mandatory settings for the physician. The physician is responsible for all settings affecting the surgical procedure.

DANGER!**Original accessories**

For your own safety and that of your patient, use only original accessories.

**DANGER!****Not explosion-proof**

The device is not explosion-proof. Do not use in an area where flammable anesthetic gases are present.

**DANGER!****Risk of electrical shock**

To prevent electrical shock, do not open this device. Never open this device yourself. Refer servicing to qualified service personnel.

**DANGER!****Professional qualification**

This manual does not include descriptions or instructions for surgical procedures/techniques. It is also not suitable for training physicians in the use of surgical techniques. Medical peripherals and devices may be used only by physicians or medical assistants with the appropriate technical/medical qualification working under the direction and supervision of a physician.

**DANGER!****Function test**

The function test must be performed prior to each surgery.

**DANGER!****Sterile mediums and accessories**

Always work exclusively with sterile substances and mediums, sterile fluids, and sterile accessories if so indicated.

**DANGER!****Replacement device and accessories**

In case the device or any of the accessories fail during surgery, a replacement device and replacement accessories should be kept within easy reach to be able to finish the operation with the replacement components.

**DANGER!****Cleaning the device**

Do not sterilize the device.

**DANGER!****Condensation / Water penetration**

Protect device from moisture. Do not use if moisture has penetrated the device.





DANGER!
Replacing fuse
 Replace the fuse only with a fuse of the same type and rating.



DANGER!
Device-inherent dangers
 Read the warnings specific to this device in chapter 3.2 "Device-inherent Dangers and Information".



DANGER!
Device defect
 If a device defect is suspected or confirmed, do not use it. Make sure the device can no longer be used until a qualified service technician conducts the appropriate tests and repairs.



DANGER!
Powered accessory
 The residual current flowing through the patient could increase when using endoscopes with electrically powered accessories.



DANGER!
Obvious defects
 Never use the device if it has obvious defects, especially if these involve the power plugs or the mains power supply connection cables. In this case have the device repaired by authorized service personnel.



WARNING!
Check to make sure the available mains voltage matches the data listed on the type label attached to the back of the device. Incorrect voltage can cause errors and malfunctions and may destroy the device.



WARNING!
Endoscope
 The device may only be connected with endoscopes designed for and featuring the technical specification permitting such a combined use. Any utilized endoscopes must comply with the most recent versions of EC 60601-2-18 and ISO 8600.



WARNING!
Electrical Interference
 (See chapter 9 "Guidelines and Manufacturer's Statement - Electromagnetic Compatibility"). Electrical interference with other devices or instruments was practically eliminated when developing this devices and none was detected during testing. However, if you still detect or suspect such interference, please follow these suggestions:

- Move this, the other or both devices to a different location
- Increase distance between used devices
- Consult an electro-medical expert

WARNING!

Leakage current

If more power consuming devices are connected simultaneously to one socket by means of distribution boxes the sum of the individual leakage currents may exceed the tolerated limit values.



3 Device Purpose

3.1 Intended Use

The camera is designed to be used in conjunction with endoscopes during minimally invasive surgery. The camera serves to transfer images from an endoscope to a medical-grade monitor. The camera features a modular design and can be ordered with different endofocus optical lens systems for different focal lengths. The camera is designed for positioning on the viewing end of an endoscope but can also be used in combination with a microscope.



WARNING!

Always use a sterile, disposable cover or sleeve (see chapter 5.2 Using a Sterile Cover/Sleeve, page 21) when using the endoscopic camera or sterilize the camera as described in chapter 6.1.3 Sterilization of the User Part, page 35). Failure to do so may lead to contamination of the sterile field and can cause infections.

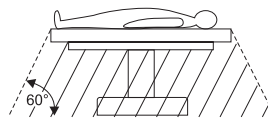
The camera is an extremely small and light endoscopic device with excellent image quality due to a digital image processing system, perfect color display, and ease of use. The camera head is connected with the camera control unit (CCU) via an interchangeable cable. An interchangeable camera cable guarantees the easy and inexpensive reuse of the whole system in case of a defective cable. Additional optional modules are used to implement additional functionalities to control other equipment as well as to control the camera from other devices or with a device control system.

Do not use the device if endoscopic surgery is contraindicated. This device may be used only in rooms equipped and outfitted as specified by VDE Rules 0107.

3.2 Device-inherent Dangers and Information



DANGER!



Explosion hazard

The camera is not intended for use in explosive areas. If explosive narcotic gases are used, the camera control unit must not be operated in the danger zone depicted below.



DANGER!

ON/OFF switch

The device is only completely disconnected from the mains power supply if the power plug is unplugged from the shockproof safety socket. Using the ON/OFF switch at the front of the device switches only the voltage of the camera head off.



DANGER!

Installation

The electrical connections of the operating room where the equipment is used must comply with the corresponding national requirements.



DANGER!

Danger of burns

Contact with the open end of an endoscope or a light cable connected to the light source can result in burns due to the high energy of the emitted light. Avoid long-lasting, motionless contact between the end of the endoscope and the patient's tissue during endoscopic surgery. To avoid danger of burns, do not leave

an active light-light cable, with or without a connected endoscope, on or near the patient.

DANGER!

Danger of ignition

Always comply with national regulations concerning avoiding the danger of ignition caused by electrostatic charges.



DANGER!

Device type CF

Degree of protection against electric shock. The endoscope must not have an electrical conductive connection to the casing of the camera control unit.



WARNING!

Ambient temperature

If the camera control unit is operated within an enclosed device tower or rack system, the operating temperature within this tower may be higher than the ambient room temperature. Therefore, always install the equipment in an environment compatible with the manufacturer's rated ambient temperature (see 8 Technical Data, page 38).



WARNING!

Peripheral devices

Additional peripheral equipment connected to interfaces of the medical monitor has to meet the requirements of the following specifications: EN 60601-2-18 for endoscopic devices and EN 60601-1 for electrical medical devices. All configurations have to comply with EN 60601-1-1 specifications. Whoever connects additional equipment to signal output or signal input is obliged to meet requirements of the standard EN 60601-1-1.



WARNING!

Device interfaces

The device operator may never touch the interfaces of the device and the patient at the same time.



WARNING!

Mobile telephones

The interference caused by electromagnetic waves (e.g. mobile telephones) affecting electronic devices is well known. These should be avoided.



WARNING!

Endoscopes and accessories

The outer surface of the endoscope and each endoscopically usable piece of additional equipment has to be checked to ensure that the area is free of rough spots and/or sharp edges that could harm the patient.



Delivery inspection

4 Initial Device Startup

Always check all parts and accessories of the device immediately after receiving the shipment. The manufacturer considers only replacement claims that have been immediately submitted or reported to a sales representative or an authorized service company.

4.1 Scope of Delivery

Check the delivered equipment for completeness. Compare delivered parts with the enclosed packing list.

Returning the device

If it becomes necessary to return the device, use of the original packaging is required. The manufacturer does not take responsibility for damage that has occurred during transportation if the damage was caused by inadequate transport packaging.

Please make sure that all required information has been supplied:

- Name of owner
- Address of owner
- Device type
- Serial number of the equipment (see identification plate)
- Detailed description of defect

4.2 Preparing the Device

It is the responsibility of the operator to ensure the device is safe and functions as intended when being used.

Setting up the device

Place the device on a level surface and install in a dry environment. The ambient temperature and humidity must meet the requirements mentioned in chapter8 Technical Data, page 38.



WARNING!

Check to make sure the available mains voltage matches the data listed on the type label attached to the back of the device. Incorrect voltage can cause errors and malfunctions and may destroy the device.

While using the device the patient must be treated and kept under observation with the usual medical care.

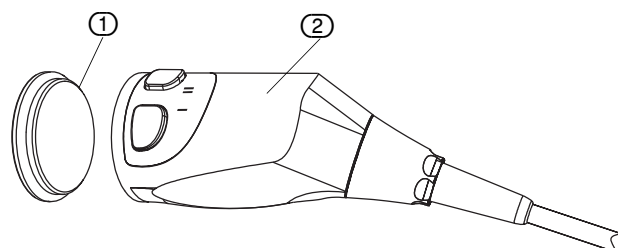
Establish sterile conditions, provided they are required.



WARNING!

Do not use in an area where heating sources or an opening or vent for air conditioning and ventilation are present. Do not expose the unit to direct sunlight, excessive dust, vibrations, or mechanical shocks.

If the camera head is not in use, the protective cap or the lens protector (in case of adapted lens) must be attached.



- Remove protective cap ① from camera head ②.
- The screw lens system onto camera head.

DANGER!

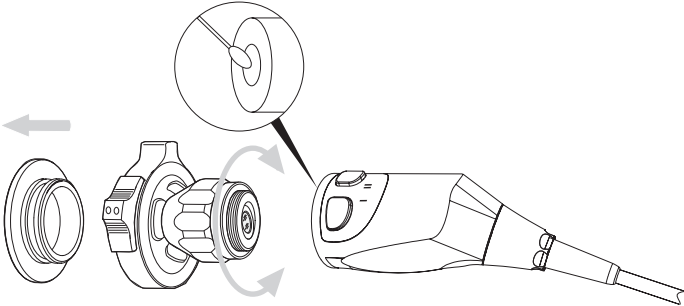
Never pull on the camera cable.
 Never squeeze, compress, bend, or otherwise twist or spindle the camera cable.
 This can damage the wires inside of the cable and cause image loss or cable failure.



4.2.1 Connecting the Camera Heads to the C-Mount Lens System

WARNING!

Before mounting the lens system, check whether the glass surface of the lens and the camera head is dry and free of dust. Use a cotton pad (plastic or wood holders or swabs, never any metal) soaked with alcohol to remove any dirt.



4.3 Camera Control Unit (CCU), Front

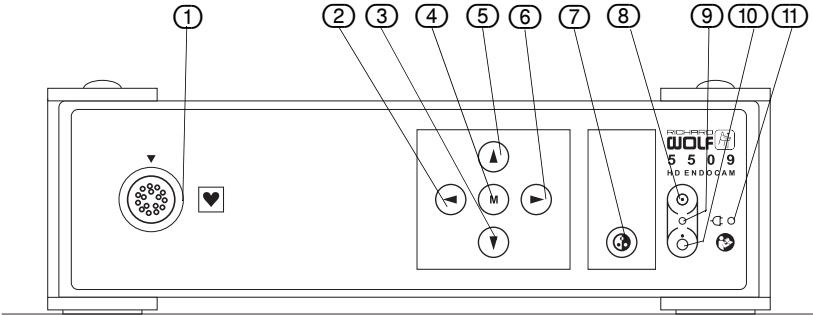


Fig. 4-1 Elements of the camera control unit (CCU), front

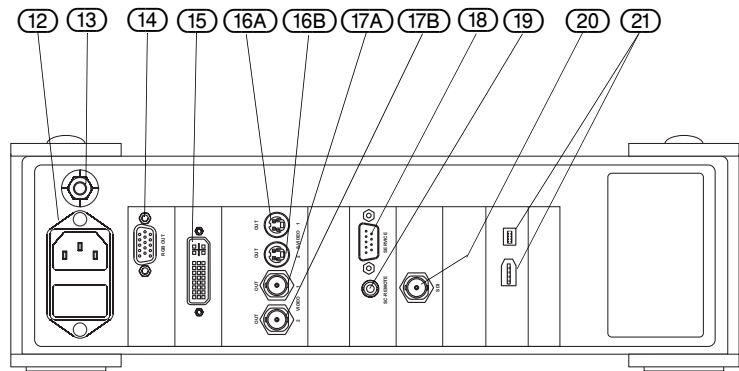
- ① Camera cable jack
- ② Cursor key LEFT (ESC)
- ③ Cursor key DOWN
- ④ Menu key (OK)
- ⑤ Cursor key UP
- ⑥ Cursor key RIGHT
- ⑦ White balance key
- ⑧ ON key
- ⑨ Camera head ON/OFF LED
- ⑩ OFF key
- ⑪ Power supply LED

Please familiarize yourself with the individual elements on the front of the camera control unit (CCU).

4.4 Camera Control Unit (CCU), Rear

Fig. 4-2 Elements of the camera control unit (CCU), rear

- ⑫ Mains socket
 - ⑬ Potential equalization
 - ⑭ HD/RGB output
 - ⑮ HD/DVI output
 - ⑯A S-VIDEO output 1
 - ⑯B S-VIDEO output 2
 - ⑰A VIDEO output 1
 - ⑰B VIDEO output 2
 - ⑱ Service interface RS232
 - ⑲ REMOTE connector
 - ⑳ SDI output*
 - ㉑ Digital outputs DV
- *optional (only Model 5509201)



Please familiarize yourself with the individual elements in the rear of the camera control unit (CCU).

Table 1: Elements of the rear side

⑫	Mains power connection	Power input
	Mains socket: Mains power supply cable connection (comply with rated voltage!)	Mains socket
⑬	Connection for potential equalization	Potential equalization
⑭	HD/RGB output: Output of the RGB video signal (15-pin SUB-HD connector plug, resolution 1280x1024)	HD/RGB output
⑮	HD-DVI output (connector socket DVI 24+5) corresponding with ITU-RBT.709 digital RGB 24 bit, resolution 1280x1024	HD/DVI output
⑯A	S-Video output 1: Output socket for S-VHS systems (Y/C), separate output for luminance and chrominance	S-VIDEO output 1
	Y: 1 Vpp on 75 ohm	
	C: 0.3 Vpp burst on 75 ohm	
⑯B	S-Video output 2: Output socket for S-VHS systems (Y/C), separate output for luminance and chrominance	S-VIDEO output 2
	Y: 1 Vpp on 75 ohm	
	C: 0.3 Vpp burst on 75 ohm	
⑰A	VIDEO output 1: BNC output socket for composite video signal, 1 Vpp on 75 ohm	VIDEO output 1
		*optional

Table 1: Elements of the rear side

(17B)	VIDEO output 2: BNC output socket for composite video signal, 1 Vpp on 75 ohm	VIDEO output 2
(18)	DATA connector: Serial interface RS 232 C (special cable required): For service (null modem cable, 9-pin)	DATA
(19)	REMOTE connector: For remote control functions (relay contacts), e.g. start/stop of video recorder or video printer.	REMOTE
(20)	VIDEO output: BNC output socket for SDI signal. Digital video signal for the lossless transfer of video up to 300 m.	SDI output*
(21)	Firewire/DV output (DV connection 4/6 pin, data rate 400 Mbit/s)	Digital outputs
		*optional

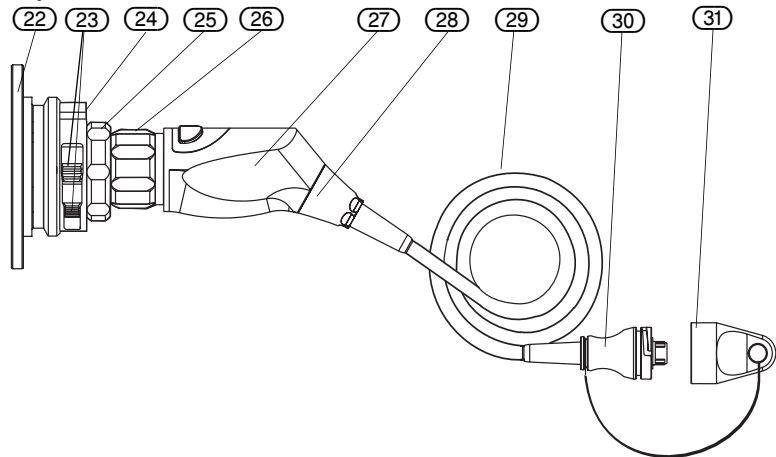
EN

Fig. 4-3 Elements of the camera head (user part)

- ②② Cover lid
- ②③ Latch
- ②④ Quick coupling
- ②⑤ Focusing ring
- ②⑥ Zoom ring
- ②⑦ Camera head
- ②⑧ CHU plug
- ②⑨ Camera cable
- ③① CCU plug
- ③① Sealing cap for disinfecting

4.5 Camera Head (User Part)

Example with RIWO zoom lens 85261.501



Please familiarize yourself with the location of the individual elements on the camera head.

4.6 Connecting the Equipment

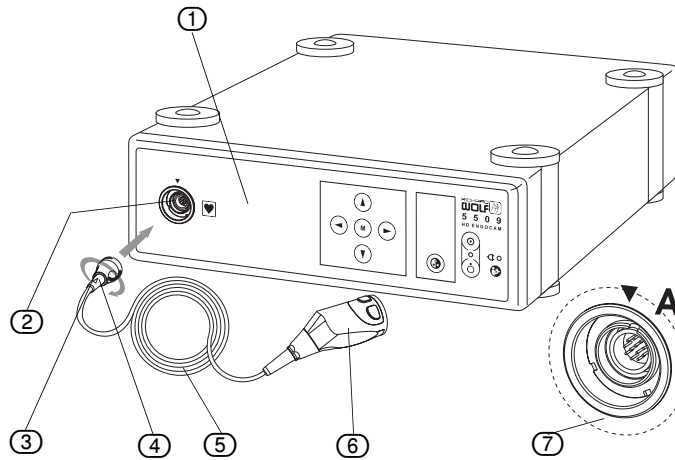
NOTE!

The manufacturer is not liable for direct or consequential damages and the warranty becomes null and void due to improper or incorrect camera assembly.



Fig. 4-4 Connecting the camera head with the camera control unit (CCU)

- ① Camera control unit (CCU)
- ② Socket for CCU plug
- ③ CCU plug
- ④ Marking (arrow)
- ⑤ Camera cable
- ⑥ Camera head
- ⑦ Marking
- A Detail of socket for the CCU plug



WARNING!

Ensure the CCU plug ③ is plugged into the socket correctly. Make sure the arrow marking ④ the correct position is where it should be on the camera cable.

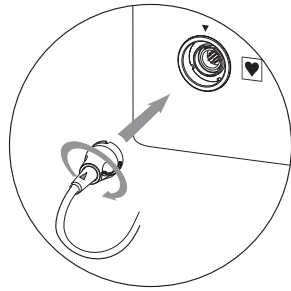


WARNING!

The camera control unit CCU may be plugged in or removed only if the camera control unit (CCU) is switched off (no hot-plugging). If the CCU plug is connected while the CCU is switched on, the camera control unit (CCU) must be switched off and on again.



1. Hold the end of the cable with the plug ③ (identified by quarter-turn fastener) so that the recessed grip areas are at the side and the marking arrow ④ at the camera cable points up.



- Slide plug ③ into socket ② of the CCU until locked in place. Lock plug by turning clockwise 90°. The recessed grip areas are then on the bottom/top.

Unlock plug by turning counterclockwise 90°. Remove cable by pulling straight without bending or kinking the cable.

Disconnecting camera cable from CCU

4.6.2 Connecting Monitor and Endoscope

Use cable to connect camera and control unit

- with a monitor,
- the camera head, and then connect camera head with an endoscope and an endoscopic light source,
- and any additional devices if required.

Follow the instructions of the manufacturer of these devices. Choose a suitable connection for the video signal depending on the required signal quality and the devices to be connected (see Fig. 4-5).

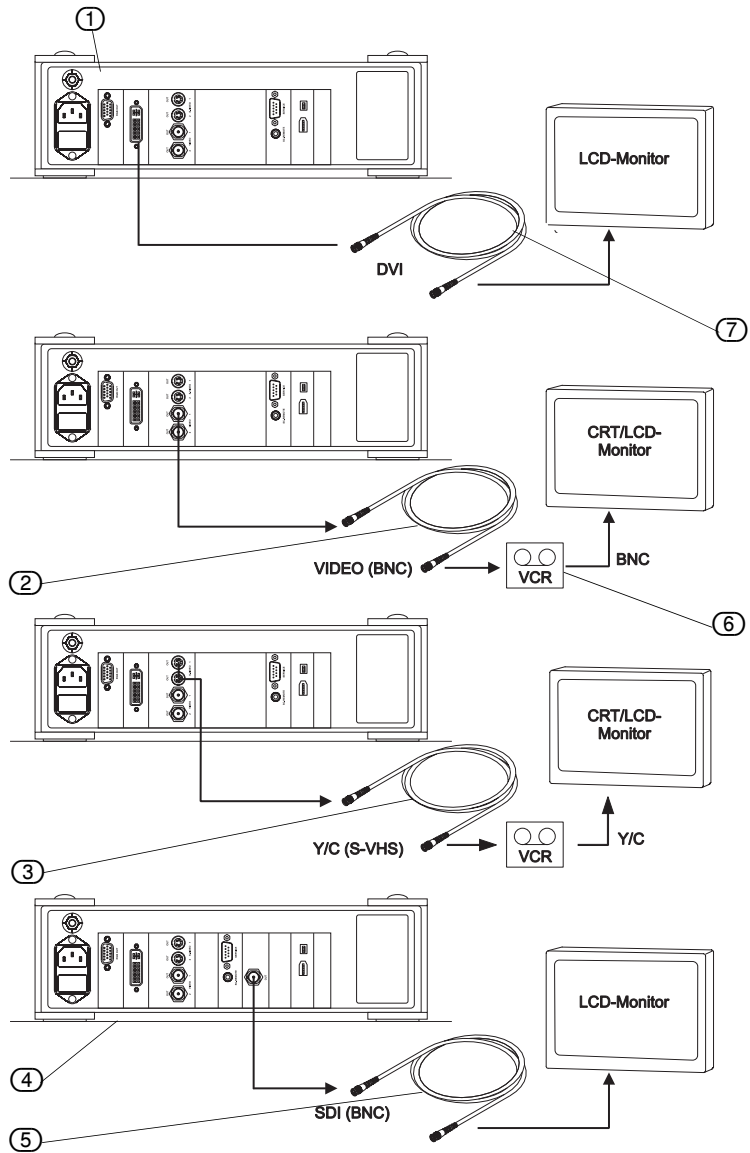
The DVI output should be used to generate the signal with the highest quality. This signal is ideally suited to connect LCD monitors.

Model 5509201 with SDI output must be used for the lossless transfer of video and image information across distances up to 300 meters. This signal is ideally suited to connect LCD monitors.

EN

Fig. 4-5 Example of how to connect to a monitor and a video recorder

- ① Camera control unit (CCU) Model 5509101
- ② Video cable (BNC)
- ③ Y/C Video cable (S-VHS)
- ④ Camera control unit (CCU) Model 5509201
- ⑤ SDI Cable (BNC)
- ⑥ Video recorder
- ⑦ DVI Cable (DVI-D)



4.6.3 Connecting Potential Equalization

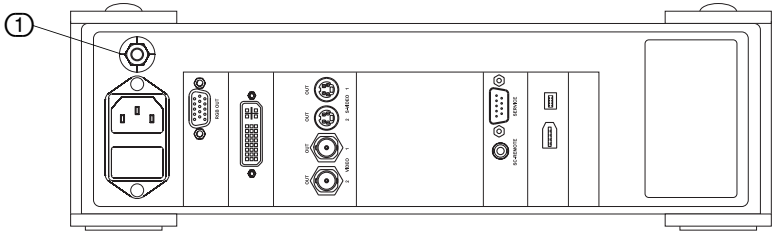


Fig. 4-6 Layout/connection: Potential equalization

- ① Potential equalization

The device is equipped with a potential equalization connection ① according to DIN 42801. Integrate the device into the potential equalization system as specified by local safety rules and regulations.

Potential equalization

4.6.4 Connecting the Mains Connection Cable

WARNING!

Check to make sure the available mains voltage matches the data listed on the type label attached to the back of the device. Incorrect voltage can cause errors and malfunctions and may destroy the device.

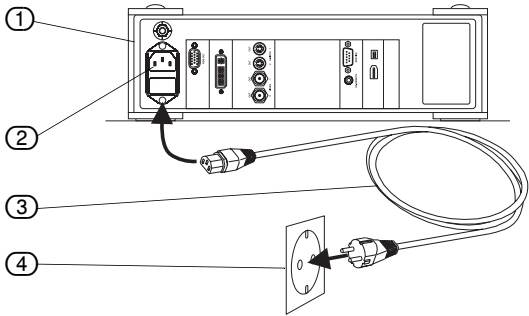


Fig. 4-7 Connecting the mains connection cable

- ① Camera control unit, rear
- ② Mains socket
- ③ Mains connection cable
- ④ Grounded shockproof safety wall socket

The grounded, shockproof safety wall socket should be near the device and within easy reach. The power connection must be equipped with a grounding contact. Make sure the connection data and technical specifications of the mains power supply comply with DIN VDE or national requirements. Comply with the information listed on the device type plate on the case (operating voltage, etc.). The mains connection cable ③ must be plugged into a properly installed, grounded shockproof safety wall socket ④. Use the enclosed mains connection cable to establish a connection between a grounded shockproof, safety wall socket and the rear mains socket ② of the camera control unit. Once the mains connection is established, the camera control unit (CCU) is switched on.

Grounding contact

DANGER!

ON/OFF switch

The device is only completely disconnected from the mains power supply if the power plug is unplugged from the shockproof safety socket. Using the ON/OFF switch at the front of the device switches only the voltage of the camera head off.



Disconnect the device from the mains power supply (pull cable out off the grounded safety wall socket) if the device is not being used for several days or longer.

Disconnect device from power supply



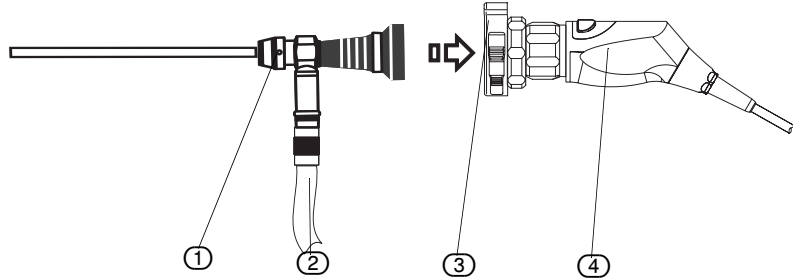
DANGER!

Always grasp the power plug when disconnecting the device from the power supply. Never pull on the cable itself.

4.6.5 Connecting an Endoscope to the Camera Head

Fig. 4-8 Connect the endoscope to the camera head

- ① Endoscope
- ② Optical fiber cable
- ③ Quick coupling
- ④ Camera head



To attach an endoscope, the camera head must be equipped with an optical lens system featuring a quick coupling (3). If necessary, screw the quick coupling onto the camera head (see also chapter 5.1 Using the Quick Coupling, page 20).

1. Release the quick coupling (3) by pressing the latch and then insert the endoscope (1) into the opened quick coupling.
2. Release latch of quick coupling. This locks the endoscope.
3. Connect the fiber optic cable (2) to the endoscope.
4. Turn the camera and the connected devices on.

The camera will perform a system check and activates all settings stored in the setup menu. The following information is briefly depicted on screen:

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5509 HD Endocam

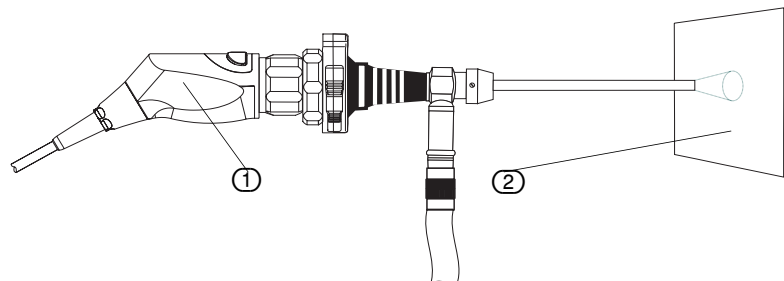
||||||| OK

4.6.6 Performing White Balance

A white balance has to be performed at the beginning of each surgical procedure using light source and endoscope. Hold a white area (e.g. a white sheet of paper) (2) in front of the optical system to fill the screen completely with the white area.

Fig. 4-9

- ① Camera head
- ② White surface (e.g. a sheet of paper)



- Press White Balance key (7) (see Fig. 4-1 Elements of the camera control unit (CCU), front, page 11).
- **White balance** is depicted on the bottom area of the connected monitor.
- The message **Saved** appears if the white balance was completed successfully.
- The display is ended automatically after approx. 3 seconds and the camera is then ready for use.
- If the white balance is too dark or too bright, the following message is dis-

played: **Too dark** or **Too bright**. Change the lighting correspondingly if this is the case.

WARNING!

The white balance function also can be carried out using a head key or the start menu (see 5.4 Camera Menus, page 22).

**4.6.7 Assigning Functions to Head Keys**

The head keys are assigned at the factory. The head key assignment is listed in the "Head Keys Functions" menu. If you wish to change this assignment, follow the steps described in chapter 5.5 Using the Head Key Functions, page 30.

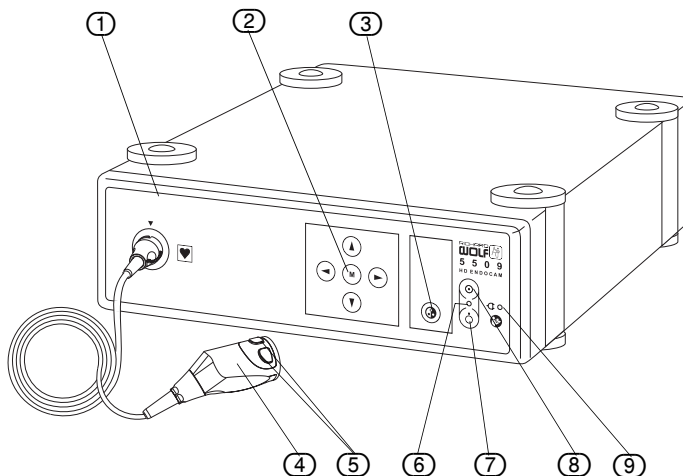
Switching camera on

5 Operating the Device

1. Connect camera head, endoscope, light source, camera control unit, and monitor as described in chapter 4.6 "Connecting the Equipment".

Fig. 5-1 Front of the Device

- ① Camera control unit
- ② Menu keys
- ③ White balance key
- ④ Camera head
- ⑤ Head keys
- ⑥ Camera head ON/OFF LED
- ⑦ OFF key
- ⑧ ON key
- ⑨ Power supply LED



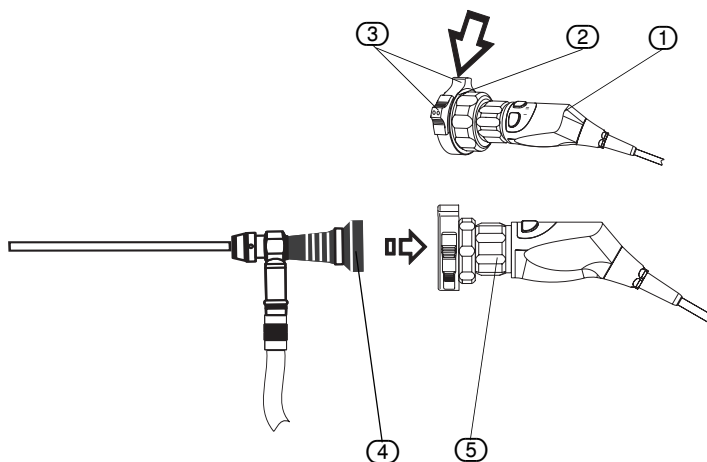
2. (See Fig. 5-1 "Front of the Device") Connect the camera control unit ① with the mains power supply. Once the mains connection is established, the camera control unit (CCU) is ready for operation. The power supply LED ⑨ is illuminated.
3. Switch the camera head ① on, using the ON key ⑧ at the camera control unit ④. If autostart mode is enabled, the camera switches on automatically.
4. The LED ON/OFF camera head ⑥ is illuminated. If the start menu is enabled in the user menu, the screen displays the start menu to select white balance and/or the profile.
5. If the start menu is not enabled, use the ③ key to carry out the white balance. A white balance has to be performed at the beginning of each surgical procedure with connected light source and endoscope.
6. Use the ② menu keys to set the parameters (chapter 5.4 "Camera Menus") and assign the head keys (chapter 5.5 "Using the Head Key Functions") as needed.

5.1 Using the Quick Coupling

The quick coupling is a component of the endofocus or zoom lens screwed clockwise onto the camera head with a C-mount 1" threading.

Fig. 5-2 Quick coupling layout

- ① Camera head
- ② Quick coupling
- ③ Latch
- ④ Endoscope (ocular funnel)
- ⑤ Focusing ring



Opening the quick coupling

Press together the levers ③ of the quick coupling ②. The quick coupling is released and opened.

Insert endoscope (ocular funnel) ④ into the open quick coupling and slightly press the coupling together and then release the latches. The quick coupling automatically adjusts to all ocular makes and models.

Turn focusing ring to the left or the right until the desired image sharpness has been achieved.

Firmly grip the camera head and unscrew the lens system with the quick coupling ② by turning counterclockwise.

Closing the quick coupling

Adjusting image sharpness with focusing ring

Removing the lens system

5.2 Using a Sterile Cover/Sleeve

DANGER!

To prevent contamination of the sterile field and possibly infecting the patient, camera head and camera cable must be sterile when being used. Sterility of the two components can be achieved either through the corresponding preparation or by using a sterile cover or sleeve. For additional information please make sure to read chapter 6 Care and maintenance, page 33.



We recommend commercially available covers should you decide to use this option.

Use the sterile cover as follows: Position and adjust cover so that the lens remains free. Attach the sterile cover to the camera head as follows:

Affix cover ③ to the endoscope ① using adhesive tape ② (see Fig. 5-3 Layout/fastening: Sterile cover or sleeve, page 21). Comply with the instructions and notes of the manufacturer of the covers or sleeves.

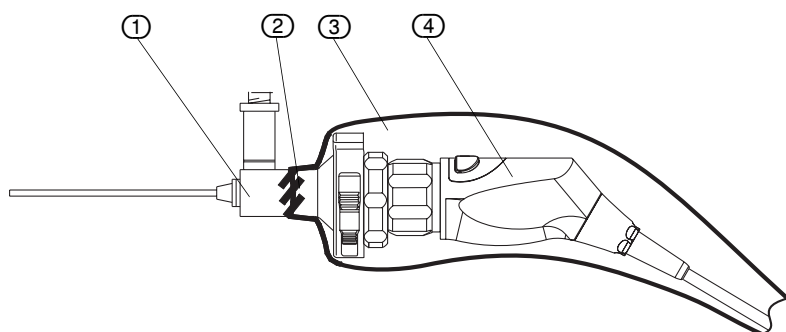


Fig. 5-3 Layout/fastening: Sterile cover or sleeve

- ① Endoscope
- ② Adhesive tape
- ③ Sterile cover or sleeve
- ④ Camera head

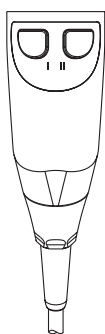
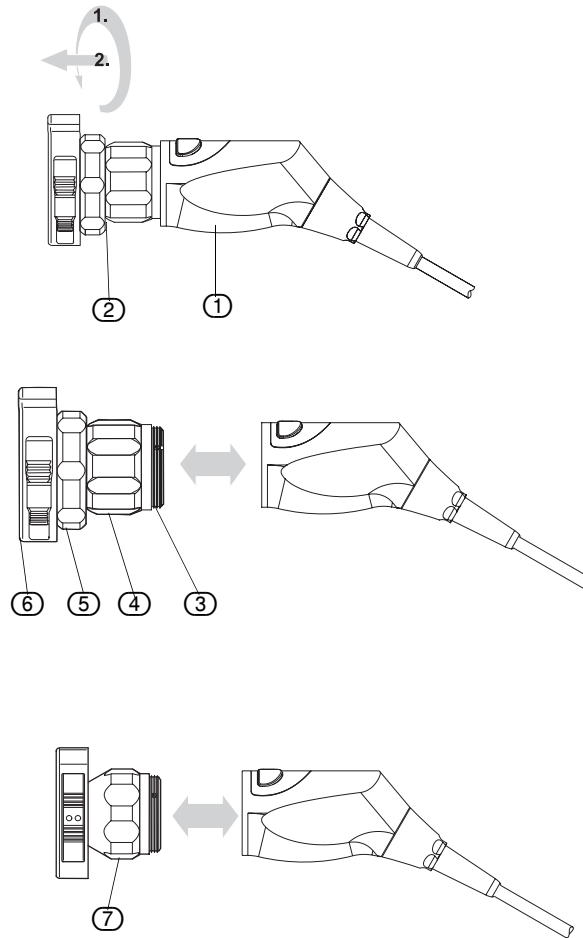
5.3 Using Camera Head without C-Mount Lens System, e.g. on Microscope

Removal is required to attach the camera to a surgical microscope (corresponds with the C mount adapter) or to replace the lens system or objective.

Removing the lens system

Fig. 5-4 Removing the lens system

- ① Camera head
- ② Zoom lens (optional)
- ③ Ring nut
- ④ Zoom ring
- ⑤ Focusing ring
- ⑥ Quick coupling
- ⑦ C-mount lens system



Using the camera main menu

5.4 Camera Menus

5.4.1 Start Menu

The start menu is displayed on screen automatically after turning on the device if this option is enabled in the user menu. If this is the case, the menu keys and the white balance key on the camera control unit (CCU) are without function. Use the head keys I/II of the camera head unit (CHU) to configure/operate the unit.

- Use the I key to "confirm",
- use the II key to "continue",
- or select I -> Yes, II-> No.

Follow the onscreen instructions of the start menu for other settings or adjustments.

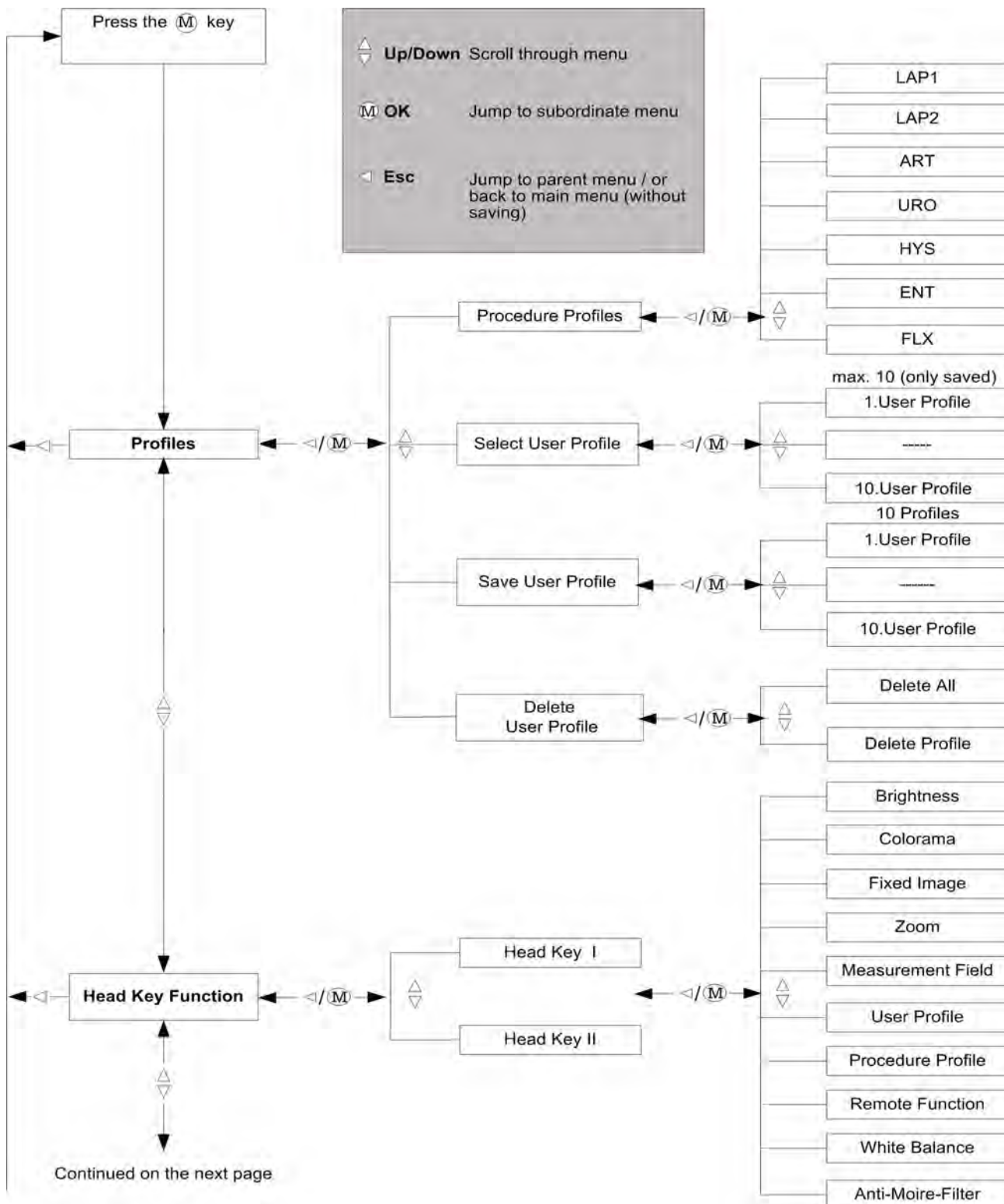
5.4.2 User Menu

Use the camera main menu and the submenus to change/adjust basic settings and assign functions to the head keys. Press the **(M)** key on the camera control unit (see Fig. 4-1 Elements of the camera control unit (CCU), front, page 11). The connected screen depicts the "Main Menu" with the submenus; the footer displays the available icons of the function keys of the camera control unit.

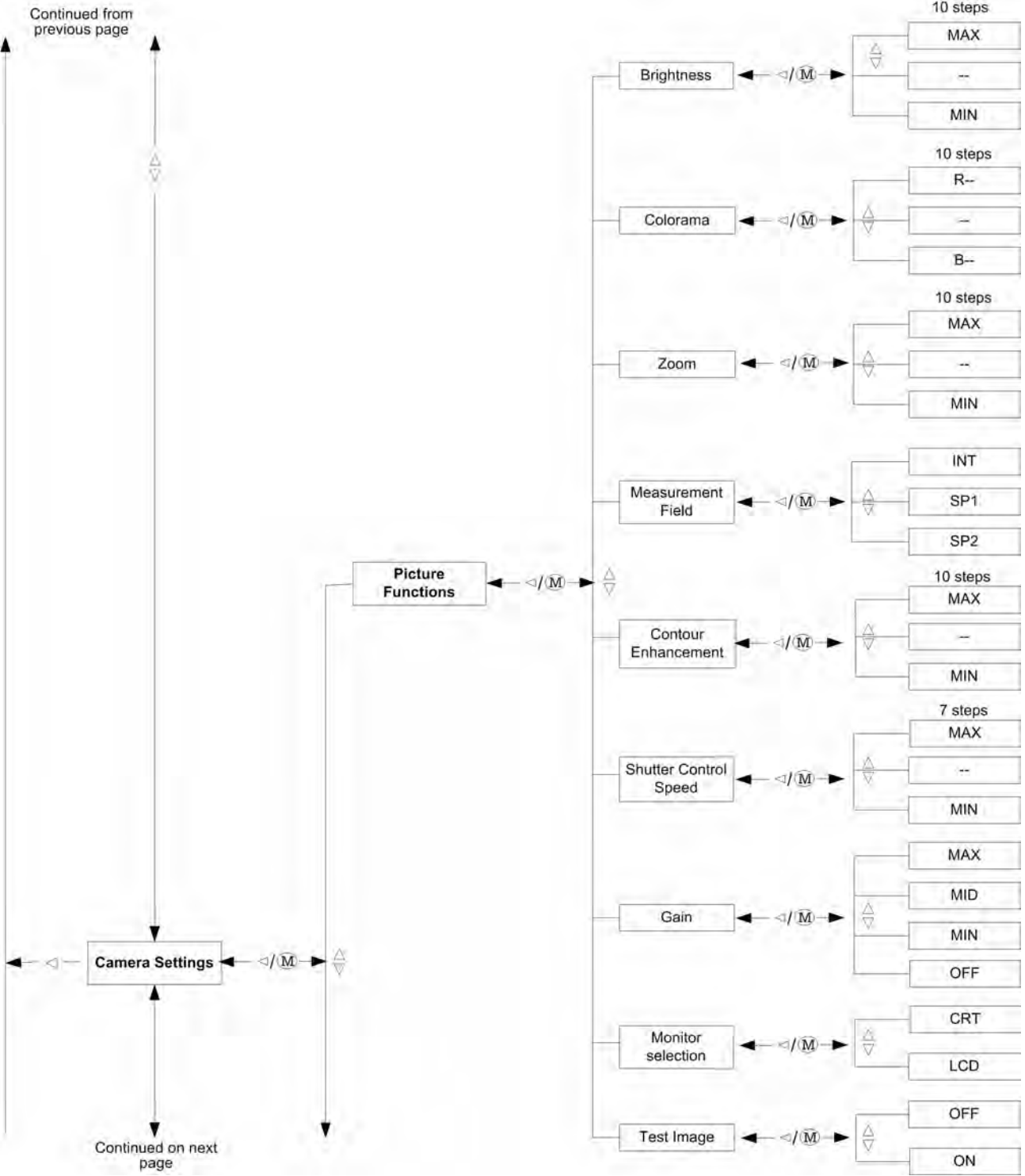
- Sel:▼▲ = Select desired submenu with the UP/DOWN keys. The selected menu is displayed on screen in a color other than the non-selected menus.
- OK: (M) = Press the **(M)** key to confirm the selection and to open the active submenu.
- Esc:◀ = Press the ◀ key to exit the menu and/or to return to the main menu.

The following pages list the menu overview and control functions in the form of a flowchart. Additional explanations for individual menu items are presented in the subsequent text.

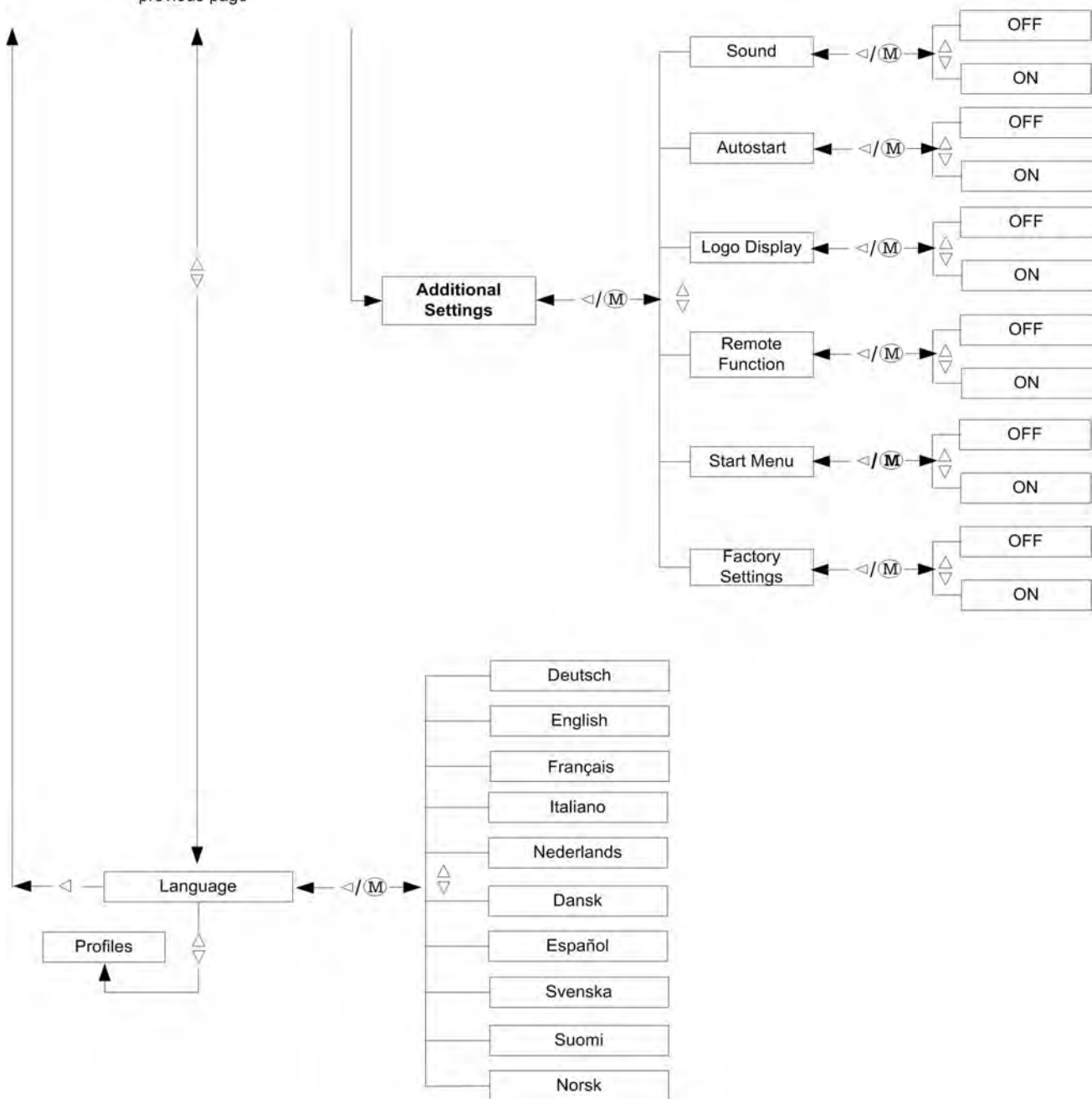
EN



Continued on the next page



Continued from previous page



5.4.3 Procedure Profiles

Procedure profiles are used to optimize the camera's settings for the application at hand.

1. Press the ▼ key until the **Profiles** menu item activated.
2. On the front of the camera control unit, press the (M) key and
3. then the ▼ key until the **Procedure Profiles** menu item is activated.

Confirm your selection by pressing the (M) key and then select the profile with the ▼ or ▲ key.

- LAP1 = Laparoscopy profile 1
- LAP2 = Laparoscopy profile 2
- ART = Arthroscopy
- URO = Urology
- HYS = Hysteroscopy
- ENT = Ear, Nose & Throat
- FLX = When using flexible endoscopes

Exit menu **without saving** = Press the ◀ key.

Exit menu **with saving** = Press the (M) key.

5.4.4 User Profiles

Individual settings of the camera can be saved in 10 user profiles and reactivated whenever needed. A user profile is comprised of all settings of the user menu.

1. On the front of the camera control unit, press the (M) key and
2. then the ▼ key until the **Profiles** menu item is activated.
3. Confirm the selection by pressing the (M) key and
4. then the ▼ key until the **Select User Profile** menu item is activated.

Select user profile

Select from the saved user profiles (max. 10). Select the desired user profile with the ▼ or ▲ key. Confirm the selection by pressing the (M) key.

1. In the user menu, set the functions/values to be assigned to the new user profile.
2. Then select the **Profiles** menu item followed by **Save User Profile**.
3. The list of 10 predefined/saved profiles is depicted on screen:
 - "USER1" = 1st user profile
 - "USER2" = 2nd user profile
 - "USER3" = 3th user profile
 - "USER4" = 4th user profile
 - "USER5" = 5th user profile
 - "USER6" = 6th user profile
 - "USER7" = 7th user profile
 - "USER8" = 8th user profile
 - "USER9" = 9th user profile
 - "USER10" = 10th user profile
4. Select a user profile with the ▼ or ▲ key. This profile can be overwritten with the new one.
5. Press the (M) key to edit the new name.
6. The selected user profile is displayed onscreen, the editable letter flashes.
7. Scroll with the ▼ or ▲ key to select from 26 capital letters, the digits 0-9, and/or an empty space.
 - With the LEFT key ◀ to the left.
 - With the RIGHT key ▶ to the right.
8. Use a name that complies with item 7.
9. Press the (M) key. The new user profile has now been named and saved.
10. Press the ◀ key to return to the submenu.

Creating and saving a new user profile

1. On the front of the camera control unit, press the (M) key and then press the ▼ key as many times as needed to activate the **Delete User Profile** menu item.
2. Confirm the selection by pressing the (M) key.
3. It is then possible to select either **Delete All** (select **No** or **Yes** and confirm selection) or deleting an individual user profile **Delete Profile** (select or confirm selection).

Delete user profile

5.4.5 Assigning Functions to Head Keys

On the front of the camera control unit, press the (M) key and then press the ▼ key as many times as needed to activate the **Head Key Functions**.

	The following functions can be assigned to the head keys:
Brightness	Sets brightness, 10 levels available.
Colorama	Color change towards red color spectrum (R) Color change towards blue color spectrum (B) total of 10 levels available.
Fixed image	Activates/deactivates fixed image.
Zoom	Sets zoom factor, 10 levels available.
Measurement field	Parameter INT - Integral measurement of entire image area. Parameter SP1 - Approx. 1/2 image area. Parameter SP2 - Approx. 1/4 image area.
User profiles	Select from the saved user profiles (only if user profiles have been saved).
Procedure profiles	Select from 7 different procedure profiles.
Remote function	Select high active - switches as long as the head key is pressed. Selection edge trigger - switches when head key is pressed briefly and remains activated – deactivated when head key is pressed again.
White balance	Performs a white balance when selected.
Anti-moiré filter	ON/OFF of the filter to suppress the moiré effect. Especially useful to improve the image quality when using flexible endoscopes. Exit menu without saving = Press the ◀ key. Exit menu with saving = Press the (M) key.

5.4.6 Image Functions

On the front of the camera control unit, press the **(M)** key and then press the ▼ key as many times as needed to activate the **Camera Settings** menu item.

Confirm the selection by pressing the **(M)** key and then use the ▼ or ▲ key to select the menu item **Image Functions**.

Confirm the selection **Image Functions** by pressing the **(M)** key and then select the desired function with the ▼ or ▲ key.

The following functions can be set:

Brightness	Sets image brightness, 10 levels available.
Colorama	Color change towards red color spectrum (R) Color change towards blue color spectrum (B) total of 10 levels.
Zoom	Sets the zoom factor. Exit menu without saving = Press the ◀ key. Exit menu with saving = Press (M) key.
Measurement field	The measurement field area is the image area relevant for the brightness control. Parameter INT - Integral measurement of entire image area. Parameter SP1 - Approx. 1/2 image area. Parameter SP2 - Approx. 1/4 image area.
Contour enhancement	Used to improve image sharpness, 10 levels available.
Shutter control speed	Used to set brightness control speed (shutter speed), 7 levels available.

The camera features an automatic gain control that depends on the image brightness of the depicted object. If the image darkens, an additional gain automatically increases the video output level to the nominal value. Three levels of gain are available or gain can be completely deactivated (MAX, MID, MIN, OFF).

Gain

Special adjustment of the video signals for CRT or flat screen monitors (LCD).

Monitor selection

Switching a test image ON/OFF; used for service tasks.

Test image

5.4.7 Additional Settings

On the front of the camera control unit, press the **(M)** key and then press the ▼ key as many times as needed to activate the **Additional Settings** menu item.

Confirm the selection by pressing the **(M)** key and then use the ▼ or ▲ key to select the function.

The following functions can be set:

Beeping can be set to **Beep OFF** or **Beep ON**.

Sound

ON setting = The device switches on automatically after connecting it to the mains power supply.

Autostart

OFF setting = After connecting the device to the mains power supply, the ON/OFF key has to be pressed to switch the device on (see Fig. 4-1 Elements of the camera control unit (CCU), front, page 11).

ON setting = A logo is displayed on the monitor for approx. 3 seconds after switching the device on.

Logo display

OFF setting = There is no logo displayed on the monitor.

The remote control functions can be used to control external devices, e.g. peripheral video equipment such as videocassette recorders, video printers, etc. Following functions can be set:

Remote function

High Active = The function is activated as long as the key is pressed.

Edge Trigger = Press briefly to start the function. Press again to stop it.

ON setting = Start menu is displayed on the monitor after switching the device on.

Start menu

OFF setting = Start menu is not displayed on the monitor after switching the device on.

The **Factory Settings** function resets all menu items to the factory settings.

Edge trigger

Settings **NO** or **YES**.

Exit menu **without saving** = Press the ◀ key.

Exit menu **with saving** = Press **(M)** key.

5.4.8 Language

On the front of the camera control unit, press the **(M)** key and then the ▼ key as many times as needed to activate the language menu item. Confirm the selection by pressing the **(M)** key and the use the ▼ or ▲ key to select the language menu item. Select one of 10 available languages:

- Deutsch
- English
- Français
- Italiano
- Nederlands
- Dansk
- Español
- Svenska
- Suomi
- Norsk

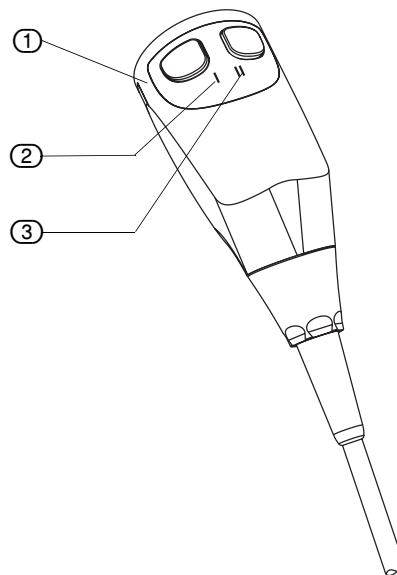
Exit menu **without saving** = Press the ◀ key.

Exit menu **with saving** = Press (M) key.

5.5 Using the Head Key Functions

Fig. 5-5 Layout/Function: Head keys

- ① Camera head
- ② Head key I
- ③ Head key II



Head key function assignment variations

The user is able to change the assignment of the head key function as outlined by the following overview:

Table 2: Head Key Assignment

The following functions are programmable:		
Brightness	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Brighter image
	Head key II	Darker image
	Save	Automatically after 5 seconds

Table 2: Head Key Assignment

Colorama	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Color change towards red color spectrum (R)
	Head key II	Color change towards blue color spectrum (B)
	Save	Automatically after 5 seconds
Fixed Image	Head key I or II	Activate/deactivate by pressing the I or II key again
User Profile	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Scroll up cycling through 10 user profiles
	Head key II	Scroll down cycling through 10 user profiles
	Save	Automatically after 5 seconds
Procedure Profile	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Scroll up cycling through 7 procedure profiles
	Head key II	Scroll down cycling through 7 procedure profiles
	Save	Automatically after 5 seconds
Remote Function	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	ON/OFF depending on the setting
	Head key II	ON/OFF depending on the setting
White Balance	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Triggers white balance
	Head key II	Triggers white balance
	Save	Automatically after 5 seconds

Table 2: Head Key Assignment

Zoom	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Increase zoom; image size gets bigger
	Head key II	Decrease zoom; image size gets smaller
	Save	Automatically after 5 seconds
Measurement Field	Activation with programmed head key (see chapter 5.4.5 "Assigning Functions to Head Keys")	
	Head key I	Scroll up cycling through INT, SP1, SP2
	Head key II	Scroll down cycling through INT, SP1, SP2
	Save	Automatically after 5 seconds

6 Care and Maintenance

WARNING!

Camera head and camera cable must be sterile when being used. Sterility of the two components can be achieved either through the corresponding preparation or by using a sterile cover or sleeve. The camera control unit CCU (or parts of the CCU) must not be sterilized (e.g. through autoclaving). The parts may be damaged!



6.1 User Part

DANGER!

Within the scope of an inspection, the manufacturer of the device has confirmed the suitability of the recommendations to prepare the user part for reuse. It is up to the individual user and the responsibility of the involved employees to make sure the preparations of the individual existing devices, materials, and human resources meet the indicated specifications and requirements to achieve the desired results. Therefore, it is necessary to supervise these procedures. It is recommended to analyze all deviations of the procedure concerning their effects to help control unfavorable consequences.



The user part consists of the camera head, C-mount lens system, quick coupling, and camera cable.

WARNING!

The user part must be sterile when being used. Sterility of the user part can be achieved either through the corresponding preparation or by using a sterile cover or sleeve (see chapter 5.2 Using a Sterile Cover/Sleeve, page 21. Preparation for use without sterile cover explicitly includes cleaning, disinfecting, and sterilization. The permissible sterilization procedures validated by the manufacturer for preparing the user part are described in chapter 6.1.3 Sterilization of the User Part, page 35. Cleaning and disinfection must be carried out even when using a sterile cover or sleeve.



WARNING!

The user part must be cleaned after each use. Achieving the necessary and required cleaning results is the responsibility of the user.



6.1.1 Cleaning the User Part

The purpose of the cleaning process is to prepare the equipment for disinfection. All visible dirt (human body fluids, tissue particles, etc.) must be removed from the surface of the user part.

All common cleaning methods can be used. Note the manufacturer's recommendations concerning suitable cleaners and detergents.

All parts (except lens system) should be cleaned with a soft cloth or a soft brush.

Clean the glass surfaces of the user part with a cotton pad soaked in a cleaning solution. Only clean camera cable when sealing cap has been screwed on tightly. Then rinse the cleaned parts off with distilled water (demineralized water). Carefully dry all parts with a soft cloth. After cleaning the user part, inspect the items visually - if necessary by means of a magnifying glass. Surfaces, particularly the lens, and the transitions between the individual items of the user, part must not show any scratches or any other damage.

Cleaners

Cleaning procedures



WARNING!

Please note that the parts are dry after each cleaning and before the disinfection procedures.



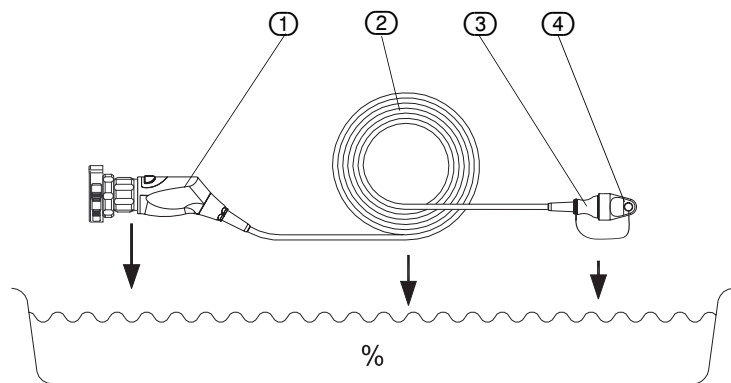
DANGER!

The user part has to be cleaned prior to each disinfection procedure. Disinfecting is not suitable for achieving SAL value (reduction factor) of 10^{-6} or better. A user part only disinfected but not sterilized must be covered with a sterile sleeve or covered when being used.

The following illustrations show a few examples of disinfecting the user part with liquid.

Fig. 6-1 Disinfecting the user part

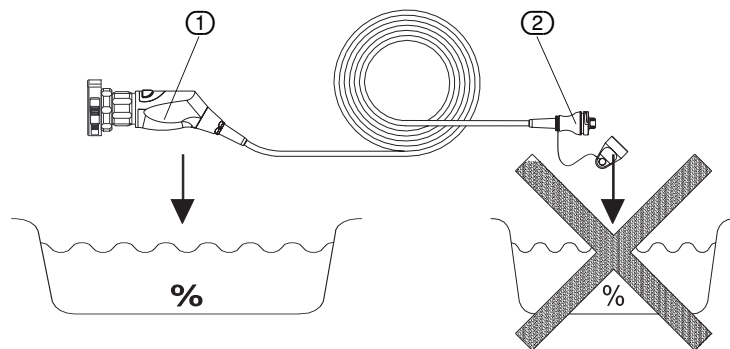
- ① Camera head
- ② Camera cable
- ③ CCU plug
- ④ Sealing cap



- Make sure all items are connected properly and the cable/CCU plug (3) is properly closed off by the tightly screwed on sealing cap (4).
- Surface-active or acidic solvents are not recommended. Use cleaners/disinfectants listed above.
- The soaking cycle of each cleaning liquid (including sterile water) may not exceed 30 minutes.
- In order not to scratch the glass surfaces of the image sensor, avoid direct contact with other instruments.

Fig. 6-2 Disinfecting the user part (II)

- ① Camera head
- ② CCU plug



6.1.3 Sterilization of the User Part

WARNING!

If the user part is not covered with a sterile sleeve or cover when being used, it must be sterilized prior to any surgical utilization. The manufacturer has validated different sterilization procedures that are suitable for preparing the user part. Sterilize the user part only in accordance with one of the sterilization procedures or methods and the associated specifications described below. The manufacturer is not liable for the product or the sterilization success when other sterilization methods or values than the ones described are used.



WARNING!

Thoroughly dry the user part prior to sterilization.



The user part is suitable for the following sterilization procedures and methods:

- STERIS SYSTEM 1[®] sterilization
- STERRAD[®] sterilization system

STERIS SYSTEM 1[®] sterilization system

Comply with the instructions of the STERIS Corporation. The camera head, cable and the lens are compatible with the STERIS SYSTEM 1[®] process for up to 500 cycles. The effects of the STERIS SYSTEM 1[®] process on the camera head and lens after 500 cycles have not been determined.

STERRAD[®] sterilization system

Comply with the STERRAD[®] Advanced Sterilization product instructions. The camera head, cable, and lens are compatible with the STERRAD[®] sterilization process for up to 500 cycles. The effects of the STERRAD[®] process on the camera head and lens after 500 cycles have not been determined.

WARNING!

The STERRAD[®] sterilization system may cause cosmetic changes to some camera head components.



Autoclaving

WARNING!

Use autoclaving only on camera heads labeled "Autoclave"!



WARNING!

Only a cleaned, disinfected, and dry camera head can be sterilized with saturated steam.



Place the camera head with coiled cable (no kinks or folds) into the tray of your autoclave. The following sterilization method has been validated by the manufacturer:

Saturated steam sterilization with pre-vacuum or fractionated pre-vacuum

Table 3: Validated Sterilization Methods

Temperature	132 to 134°C / 270 to 272°F
Pressure	29 psi /2 bar (43.5 psi/3 bar absolute)
Time	3 min
Heating/cooling rate	less than 3 to 5 °C/min or 37 to 41°F/min

Please follow the instructions of the operating manual of the autoclave.



WARNING!

The manufacturer guarantees 500 sterilization cycles with the parameters listed above. The manufacturer is not liable for defects on the camera head, camera cable, or lens with more than 500 sterilization cycles.

After the sterilization process, allow the camera head plus cable to cool off before attaching the head to the camera control unit (CCU) or the lens system.

6.2 Cleaning the Camera Control Unit (CCU)

The flat surfaces of the CCU can be cleaned with a varnish-safe cleaner or disinfectant. Always use cleaners with a neutral pH value to prevent damage to the surface. Comply with the manufacturer's cleaning instructions. Use a soft, slightly moistened cloth.



WARNING!

Liquids or moisture may not penetrate the interior of the camera control unit (CCU).

7 Troubleshooting

Error symptoms	Troubleshooting
Device does not function. Device-on indicator at camera control unit (CCU) is not lit	<ul style="list-style-type: none"> • Check power connection • Return device to manufacturer
No picture on monitor	<ul style="list-style-type: none"> • Check device-on indicator on CCU • Check device-on indicator on monitor • Are all connections established properly and are all cables plugged in firmly? • Is the connected signal type enabled in the monitor? • As a control measure, connect CCU to different monitor • Return device to manufacturer
The monitor depicts the message NO CAMERA CABLE ONLY PLUG IN WHEN CAMERA IS OFF!	<p>WARNING! Connect cable only if camera is OFF.</p> <ul style="list-style-type: none"> • Switch device off • Plug in camera cable as instructed, switch device on again • Camera cable defective: Replace camera cable (chapter 4.6.1 Connecting Camera Head with Camera Control Unit (CCU), page 14) • Return device to manufacturer <p>Caution: An error message is also depicted if a 1CCD camera head has been connected.</p>
Display color not satisfactory	<ul style="list-style-type: none"> • Check all cable connections • Performing white balance • Use COLORAMA function to correct color • Generate test pattern to check monitor • Use control/reference monitor if necessary • Return devices to manufacturer
Distorted image	<ul style="list-style-type: none"> • Generate test pattern • Test pattern OK, camera cable defective; replace camera cable • Return devices to manufacturer

8 Technical Data

Table 4: User part (camera head)

	3 CCD camera (3 HD)	1CCD camera (1 HD)
Camera head	3 x 1/3" lens-on-chip CCD sensors	1/3" lens-on-chip CCD sensor
Sensitivity	1.5 lux	1.5 lux
Min. illumination	2.7 lux	2.7 lux
Operation	Two programmable head keys (10 different user-defined functions assignable by the user)	Two programmable head keys (10 different user-defined functions assignable by the user)
Safety	Waterproof acc. to IEC 529, classification IPX7, classification CF (protection degree against electrical shock: user part type CF) Isolation resistance test max. 500V DC at user part towards CCU housing	Waterproof acc. to IEC 529, classification IPX7, classification CF (protection degree against electrical shock: user part type CF) Isolation resistance test max. 500V DC at user part towards CCU housing
Disinfection/sterilization	Drop-in assembly complete with mounted lens and camera cable (with screwed on protective cap). Compatible with STERIS SYSTEM 1®, max. 500 cycles. Compatible with STERRAD® Advanced, max. 500 cycles.	Drop-in assembly complete with mounted lens and camera cable (with screwed on protective cap). Compatible with STERIS SYSTEM 1®, max. 500 cycles. Compatible with STERRAD® Advanced, max. 500 cycles. Autoclavable, 134°C, 3 min, max. 500 cycles
Dimensions without lens system:	∅ 38, L=91 mm / ∅ 1.49 in, L=3.52 in (length incl. zoom lens and quick coupling)	∅ 38, L=91 mm / ∅ 1.49 in, L=3.52 in (length incl. zoom lens and quick coupling)
Weight	170 g / 6.0 oz (incl. zoom lens and quick coupling)	160 g / 5.6 oz (incl. zoom lens and quick coupling)
Quick coupling	Fits rigid endoscopes (ocular), all models and types, adjustable friction	Fits rigid endoscopes (ocular), all models and types, adjustable friction
Camera cable	Highly flexible special cable, 3 m / 9.8 ft, waterproof, replaceable without special tool, short-circuit-proof	Highly flexible special cable, 3 m / 9.8 ft, waterproof, replaceable without special tool, short-circuit-proof
Operating conditions	Ambient temperature +5°C to +40°C / +41°F to +104°F, air pressure 700 to 1060 hPa, air humidity 30 to max. 85% (non condensing)	Ambient temperature +5°C to +40°C / +41°F to +104°F, air pressure 700 to 1060 hPa, air humidity 30 to max. 85% (non condensing)
Transport and storage conditions	Ambient temperature -20°C to +60°C / -4°F to +140°F, air pressure 700 to 1060 hPa, air humidity max. 90%	Ambient temperature -20°C to +60°C / -4°F to +140°F, air pressure 700 to 1060 hPa, air humidity max. 90%

The camera control unit (CCU) is equipped with a "head detection" function so that any connected camera head (3CCD head/ 1CCD head) is detected and settings are automatically adjusted accordingly.

Table 5: Device versions user part (camera head)

Model	Designation
5509912	3HD Camera head (50 Hz)
5509972	3HD Camera head (60 Hz)
85509902	1HD Camera head (50 Hz)
85509962	1HD Camera head (60 Hz)

Table 6: Camera control unit (CCU)

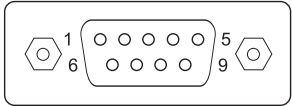
CCU	Digital signal processing, +6 dB with interference suppression signal to noise ratio >62 dB, variable exposure control 1/50 to 1/16.000 s, Automatic residual signal boost up to 400 % digital dynamic aperture, automatic shutter closure, automatic white balance with digital storage, SPOT and INTEGRAL measurement fields, adjustable video level, COLORAMA color adjuster; color bar test pattern, Automatic self-test; user menu for all settings
Operation	With membrane keys/head keys, ON/OFF, white balance, menu settings
Outputs: 1x HD DVI 1x HD RGB analog (VGA) 2x S-video (Y/C or S-VHS) 2x VIDEO (BNC) 1x FireWire/DV 1x SDI (BNC) (=optional)	DVI (24+5) connection, digital RGB 24 bit, resolution of 1280 x 1024, 1x analog RGB (15-pin SUB-D-HD socket, V _{ss} = 0.8 V, Z ₀ =75 Ohm, resolution of 1280 x 1024, 2x S-VIDEO (4-pin Mini DIN, V _{ss} = 1 V, Z ₀ =75 Ohm) 2x VIDEO (BNC connector, V _{ss} = 1 V, Z ₀ =75 Ohm) 1x Firewire/DV (DV socket 4/6 pin), data rate 400 Mbit/s acc. to IEEE 1394a-2000 and PRO DV25, device class AV/C (camera device) compatible with MS Windows XP SP 2 with patch KB88522 and KB904412 BNC connection, V _{ss} = 0.8 V, Z ₀ =75 Ohm, Data rate 270 Mbits/s according ITU-R BT.656/SMPTE-259M
Interfaces	PC interface RS 232 C, REMOTE (3.5 mm jack)
Supply voltage	Medical global power supply unit; 100 to 240 V AC ±10%, 50/60 Hz
Current consumption	max. 400 mA
Fuses	2 x 250 V T 0.8 A
Safety	Type tested according to EN 60601-1 and based on EN 60601-2-18 EMC tested according to EN 60601-1-2 Protection class I Protection degree of case Degree of protection against electrical shock: Equipment type BF, CE symbol, TÜV symbol
Operating conditions	Ambient temperature +5°C to +40°C / +41°F to +104°F, air pressure 700 to 1060 hPa, air humidity 30 to 85% (non condensing)
Transport and storage conditions	Ambient temperature -20°C to +60°C / -4°F to +140°F, air pressure 700 to 1060 hPa, air humidity max. 90%
Dimensions	330 x 100 x 360 mm / 13 x 3.9 x 14.2 in (WxHxD)
Weight	approx. 3.9 kg / 8.6 lb
Technical data subject to modification, revision, and improvement without prior notice.	

Table 7: Device versions camera control unit CCU

Model	Designation
5509101	HD ENDOCAM 5509 CONTROLLER SV-DV
5509201	HD ENDOCAM 5509 CONTROLLER SV-DV-SDI

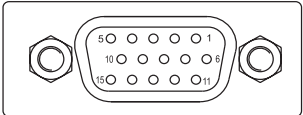
Table 8: Plug and socket assignments

Pin assignment of DATA plug (SUB-D 9-pin)		
1		nc
2		RxD (serial communication)
3		TxD (serial communication)
4	[]	
5		GND
6		
7	[]	
8		
9		nc



Null modem cable (9-pin)							
9-pin socket	2	3	4	6	5	7	8
9-pin socket	3	2	6	4	5	8	7

Pin assignment of RGB socket (SUB-D-HD 15-pin)		
1		R
2		G
3		B
6		GND
7		GND
8		GND
11		GND
13		H-Sync
14		V-SYNC



RGB cable 103.817

Equipped with 2 x SUB-D-HD plug (15 pin)

9 Guidelines and Manufacturer's Statement - Electromagnetic Compatibility

9.1 Impact of Mobile and Portable HF Communication Devices

The emission of high frequency energy by mobile communication devices may impact the function of the electrical medical device. Operating such devices (e.g., cell phones, GPS phones) in the proximity of the electrical medical device is prohibited.

9.2 Guidelines and Manufacturer's Statement – Electromagnetic Emissions

The endoscopic camera is intended for use in an environment as described below. The user/operator of the endoscopic camera should make sure the device is operated within such an environment.

Emitted interference measurements	Compliance	Electromagnetic environment guidelines
HF emission according to CISPR 11	Group 1	The endoscopic camera uses HF energy solely for its internal functions. Therefore, the camera's HF emission is very low and it is unlikely that devices in close proximity will experience interference.
HF emission according to CISPR 11	Class B	The endoscopic camera is suitable for use in all facilities including those in residential areas and those directly connected to a public utility network also supplying buildings used for residential purposes.
Emission of harmonic oscillations according to IEC 61000-3-2	Class B	
Emission of voltage fluctuations / flickers according to IEC 61000-3-3	In compliance	

9.3 Guidelines and Manufacturer's Statement - Electromagnetic Interference Immunity


The endoscopic camera is intended for use in an electromagnetic environment as described below. The customer or operator of the camera should make sure the device is operated within such an environment.

Electromagnetic interference immunity tests	Test level	Compliance	Electromagnetic environment guidelines
Discharge of static electricity (ESD) according to IEC 61000-4-2	± 6 kV contact discharge, ± 8 kV air discharge	In compliance	Floors should be made from wood or concrete or covered with ceramic tiles. If the floor covering consists of synthetic material, the relative humidity should be at least 30%.
Electrical fast transients / bursts according to IEC 61000-4-4	± 2 kV for power lines, ± 1 kV for input and output lines.	In compliance	The quality of the supply voltage should be the same as the voltage of a typical business or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV normal mode voltage, ± 2 kV common mode voltage	In compliance	The quality of the supply voltage should be the same as the voltage of a typical business or hospital environment.
Blackouts, brownouts, and fluctuations of the power supply according to IEC 61000-4-11	< 5% UT* (> 95% crash of the UT) for 1/2 period	In compliance	The quality of the supply voltage should be the same as the voltage of a typical business or hospital environment. If the user/operator of camera requires the continuation of functionality after power interruptions/disruptions, it is recommended to supply the endoscopic camera with power from an uninterruptible power supply.
	40% UT (60% crash of the UT) for 5 periods		
	70% UT (30% crash of the UT) for 25 periods		
	< 5% UT (> 95% crash of the UT) for 5 s		
Power frequency magnetic field (50/60 Hz) according to IEC 61000-4-8	3 A/m	In compliance	Magnetic fields of the mains power frequency should comply with the typical values of business and hospital environments.

*Note: UT is the mains alternating voltage before applying the test levels.

9.4 Guidelines and Manufacturer's Statement - Electromagnetic Interference Immunity - for the Camera

The camera is intended for use in an environment as described below. The user/operator of the camera should make sure the device is operated within such an environment.

Electromagnetic interference immunity tests	Test level	Compliance	Electromagnetic environment guidelines
<p>Conducted HF interference quantities according to IEC 61000-4-6</p> <p>Radiated HF interference quantities according to IEC 61000-4-3</p>	<p>3 V_{eff} 150 kHz to 80 MHz</p> <p>3 V/m 80 MHz to 2.5 GHz</p>	<p>In compliance</p> <p>In compliance</p>	<p>Portable and mobile wireless devices should not be used in closer proximity to the endoscopic camera (including cables/lines) than the recommended safety distance calculated based on the transmitting frequency of the applicable formula. Recommended safety distance:</p> <p>$d = 1.2\sqrt{P}$ for 150 KHz to 80 MHz</p> <p>$d = 1.2\sqrt{P}$ for 80 MHz to 800 MHz</p> <p>$d = 2.3\sqrt{P}$ for 800 MHz to 2.5 GHz</p> <p>With P as the rated output of the transmitter in watts [W] according to the information provided by the manufacturer of the transmitter and d as recommended safety distance in meters [m].</p> <p>The field strength ^a of stationary transmitters should remain lower for all frequencies than the concordance level ^b tested on site.</p> <p>If operated in the vicinity of devices labeled with the following symbol, interference is possible.</p> 

Note 1: The higher frequency range applies for 80 and 800 MHz.

Note 2: These guidelines are probably not realizable in all cases. The distribution and spread of electromagnetic quantities differs depending on the absorption and reflection of buildings, objects, and people.

^a The field strength of stationary transmitters such as base stations of wireless phones and cell phones, ham radio operators, AM and FM radio and TV stations

can theoretically not always determined in advance. A study of the installation site should be considered to determine the electromagnetic environment concerning the stationary transmitter. If the field strength measured at the usage site of the endoscopic camera exceeds the compliance levels listed above, the camera should be monitored for proper function. If unusual performance characteristics are observed, additional measures may be required such as changing orientation or the location of the endoscopic camera.

^bThe field strength should be less than 3 V/m for the frequency range of 150 kHz to 80 MHz.

9.5 Recommended Safety Distances between Portable and Mobile HF Telecommunications Devices and the Camera

The endoscopic camera is intended for use in an electromagnetic environment where HF interferences are controlled. The user/operator of the endoscopic camera can contribute to lowering electromagnetic emissions by complying with the minimum distance between portable and mobile HF telecommunications devices (transmitters) and the endoscopic camera - depending on the output power of the communication device listed below.

Rated output of the transmitter [W]	Safety distance based on the transmitting frequency [m]		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

The safety distance d in meters [m] for transmitters with a max. rated output not listed in the table above can be calculated by applying the corresponding formula in the respective column. P is the max. rated output of the transmitter in watts [W] according to the information provided by the manufacturer of the transmitter.

The higher frequency range applies for 80 and 800 MHz.

Note 2: These guidelines are probably not realizable in all cases. The distribution and spread of electromagnetic quantities differs depending on the absorption and reflection of buildings, objects, and people.

10 Accessory List

The following accessories are available to customize the endoscopic camera to meet your individual needs and applications:

Lens systems

Order No.

RIWO lens system with quick coupling, C-mount threading, drop-in and autoclavable




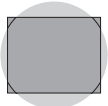



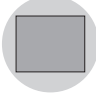
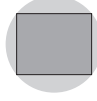

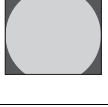
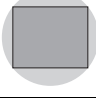

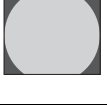
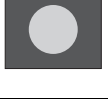








f= 17 mm	85261.172
f= 21 mm	85261.212
f= 24 mm	85261.242
f= 27 mm	85261.272
f= 32 mm	85261.322
f= 38 mm	85261.382

RIWO zoom lens system with quick coupling, C-mount threading, drop-in and autoclavable:

f = 21 to 36 mm	85261.501
-----------------	-----------

RIWO angular lens system with rotating quick coupling, C-mount threading, beam splitter 10% eye / 90% camera:

f= 22 mm	5257.221
----------	----------

LENS								
								
Focal distance		21 mm - 36 mm	17 mm	21 mm	24 mm	32 mm	22 mm	
Type		85261.501	85261.172	85261.212	85261.242	85261.322	5257.221	
ENDOSCOPE	LAP 10 mm 7 mm 5 mm full							
	LAP 5 mm							
	ARTHRO URO ENT 4 mm							
	URO Flex 7305							
	URS							

Miscellaneous

Order No.

Protective cap for camera head (C-mount)	5376.981
DVI D cable 3.0 m	103.830
BNC video cable 1.5 m	103.115
BNC video cable 3.0 m	103.13
S-VHS cable 2.0 m	103.501
Monitor cable RGB 3.0 m	103.817
FIREWIRE connection cable 6-pin - 4-pin	103.601
FIREWIRE connection cable 6-pin - 6-pin	103.602
Remote control cable 1.5 m	5502.991
POAG device cable 0.8 m	32114.311
Power supply cable 3.0 m	2440.03

11 Glossary

Term	Explanation
CCU	Camera control unit (C amera C ontrol U nit)
DV	D igital V ideo (video format)
DVP	D igital V ideo P latform
DVI	D igital V isual I nterface
CHU	Camera head (C amera H ead U nit)
Firewire	Port and protocol used for DV transfer (IEEE 1394)
HD	H igh D efinition
SDI	S erial D igital I nterface

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