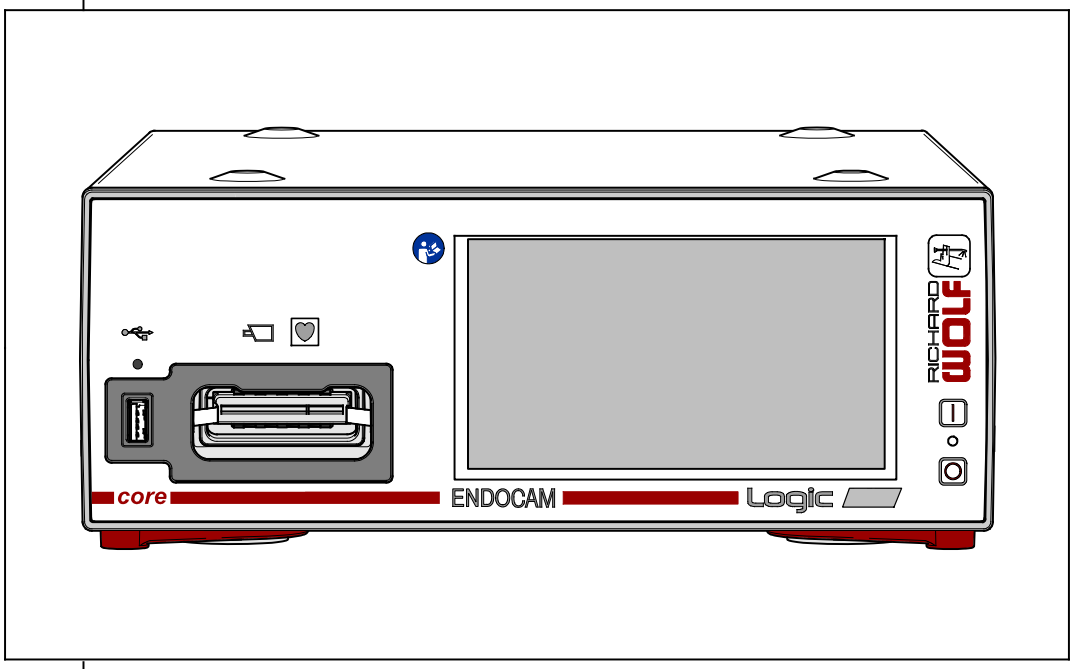
RICHARD WOLF
spirit of excellence

Instruction Manual



Logic HD Camera Controller
ENDOCAM
552510x

Logic 4K Camera Controller
ENDOCAM
5525301

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⚠ Important general instructions and notes for use ⚠

Make sure that the product is only used as intended by adequately trained and qualified medical personnel following the instruction manual Maintenance and repair must be carried out by authorized experts.

Use the product only in the combinations and with the accessories and spare parts specified in this instruction manual. Use other combinations, accessories and replacement parts only if they are expressly intended for the planned application and if the performance characteristics and safety requirements are met. The product must not be altered in any way.

Reprocess the product in accordance with the manual before every use and before return shipment to protect the patient, user and third parties.

This manual is an integral part of the product and must be stored in such a way that it is accessible at any time during its entire life cycle. This manual must be passed on to any subsequent owner or user.

Immediately on receipt, check the product and its accessories for completeness and possible damage. Should the shipment give rise to complaints, please inform the manufacturer or supplier immediately.

Subject to technical changes!
Due to ongoing developments the illustrations and technical data may deviate slightly.

Safety instructions and levels of danger

Symbols	Level of danger
⚠	*WARNING!* Failure to observe can result in death or serious injury.
⚠	*CAUTION!* Failure to observe can result in slight injury or damage to the product.
☞	*IMPORTANT!* Failure to observe can result in damage to the product or surroundings.
☞	*NOTE!* Tips for optimum use and other useful information.

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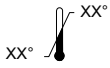
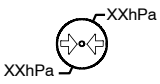
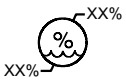
Contents

Contents

1 General information

1.1 Symbols

Symbols	Designation
	Attention, Caution
	Follow the instruction manual
	OFF (no power supply, separation from mains)
	On (power: connection to the power/mains)
	Equipotentality
	Fuse
	Alternating current (AC)
	TYPE CF APPLIED PART
	Camera head connector
	USB interface
	Data input
	Data output
	Network, LAN (Ethernet) interface
	Manufacturer
	Manufacturing date
	Maximum temperature range for shipment, transport and storage
	Permissible temperature range
	Permissible atmospheric pressure range
	Permissible humidity range
	Recycle the product separately. Do not discard together with other waste.
	A Registered Trademark of a Recognized Testing Laboratory, confirm the compliance to the standard of Medical Electrical Equipment CAN/CSA C22.2 No.601-1 (**c**) and UL60601-1 (**us**)

Symbols	Designation
	A Registered Trademark of a Recognized Testing Laboratory, confirm the compliance to the standard of Medical Electrical Equipment CAN/CSA C22.2 No.60601-1 (**c**) and ANSI/AAMI ES60601-1 (**us**)
CE	Identification in conformity with medical devices directive 93/42/EEC **only valid** if the **product and/or packaging is marked with this symbol**. Products of category IIa and above, as well as sterile products or products with measuring function of category I, are additionally identified with the code no. of the notified body (0124).

1.2 Symbols on handheld remote control (option)

Symbols	Designation
	"Escape" or "back"
	“Up"
	"left" or "minus"
	"right" or "plus"
	"down"
	OK button for confirmation
	Function key I
	Function key II

1.3 Intended use

The products Logic HD Camera Controller 552510x and Logic 4K Camera Controller 5525301 are used for visualizing natural or artificially created hollow spaces through images generated by a rigid or flexible endoscope via natural or surgically created passages within the scope of diagnostic or therapeutic medical endoscopy.

The Camera Controller is equipped with different output connectors (USB, video, S-video, etc.) to which USB storage media, image storage devices and other video devices for recording and storing video images and video sequences can be connected.

This product is designed exclusively for use by specialized medical personnel and may only be applied by medically qualified and adequately trained persons.

1.3.1 Performance characteristics

- Image recording.
- Signal processing of the image data.

1.4 Indications and field of use

This product is used for diagnosis and therapy in conjunction with endoscopic accessories.

On the basis of the patient's general condition, the user in charge must decide whether the planned use is possible or not. For further notes and instructions please refer to the latest medical literature.

⚠ *CAUTION!*
The device may fail!
For therapeutic applications, a second camera with the same specifications should be available.

☞ *NOTE!*
We recommend reading relevant literature for the planned application.

1.5 Contraindications and side effects

1.5.1 Contraindications

Contraindications directly related to the product are presently unknown.
On the basis of the patient's general condition the doctor in charge must decide whether the planned use is possible or not.
For further notes and instructions please refer to the latest medical literature.

1.5.2 Side effects

Side effects directly related to the product are currently unknown.

1.6 License agreements

This product contains open-source software from other suppliers which are subject to the GNU license agreements GPL (GNU General Public License), LGPL (GNU Library/Lesser General Public License) and/or Apache license agreements.
The license texts of the GPL, LGPL and Apache license as well as the source code of the corresponding software components are available on the storage medium accompanying the device.
Please read the precise wording to be informed about your rights relating to the aforementioned licenses.

1.6.1 AVC Patent Portfolio License

THIS PRODUCT IS LICENSED UNDER THE AVC PATENT PORTFOLIO LICENSE FOR THE PERSONAL USE OF A CONSUMER OR OTHER USES IN WHICH IT DOES NOT RECEIVE REMUNERATION TO (i) ENCODE VIDEO IN COMPLIANCE WITH THE AVC STANDARD ("AVC VIDEO") AND/OR (ii) DECODE AVC VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE AVC VIDEO. NO LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE OBTAINED FROM MPEG LA, L.L.C.

SEE HTTP://WWW.MPEGLA.COM

1.7 Combinations

Logic HD Camera Controller 552510x and Logic 4K Camera Controller 5525301 must **only** be used in combination with the camera heads and sensor endoscopes approved by Richard Wolf and following the corresponding instruction manual.

From software version **R19** (**>1.3.x**), Logic HD Camera Controller 552510X and Logic 4K Camera Controller 5525301 feature white light, blue light and special modes in Special Imaging Mode **SIM**.
In blue light mode, blue light applications are possible in combination with system components suitable for PDD fluorescence diagnostics.
In white light mode, the white light special modes (e.g. HDR) are only possible in combination with suitable system components.

The device automatically detects whether suitable system components for the corresponding application are connected and only if so, the corresponding mode can be activated.

☞ ***IMPORTANT!***
*For operation in blue light mode please observe instruction manual **GA-A324** for the blue system.*

☞ ***IMPORTANT!***
Connect only USB accessories tested and approved by Richard Wolf to the USB interfaces. Otherwise interference or malfunction cannot be excluded.

☞ ***IMPORTANT!***
*The installation of the entire product including the configuration setting via the **core** nova system must be carried out by an authorized and trained expert.*

☞ ***IMPORTANT!***
Do not connect the device to other networks, such as the hospital in-house network via the LAN (Ethernet) interface.
*The device may only be connected within the **core** nova system via the LAN (Ethernet) interface.*

☞ ***IMPORTANT!***
In addition to this manual follow the latest manuals of the products used in combination with this product.
*Only components approved for the **core** nova system may be connected. For further information please contact Richard Wolf or your representative.*

☞ ***IMPORTANT!***
The OR network must be galvanically isolated from the hospital network, e.g. by:
- *optical network cables with the corresponding optical transceiver for the network switch.*
- *a network isolator for medical devices.*

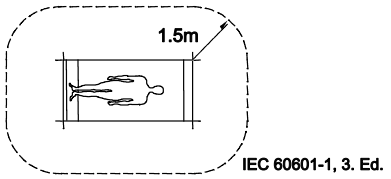
☞ ***IMPORTANT!***
Close any LAN (Ethernet) sockets in the network switch that are not used with the corresponding plastic caps.

1.7.1 Equipotentality

The potential equalization cable represents a direct connection between a medical electrical device and a potential equlization rail.

It serves to equalize differences in potential between enclosures of electrical equipment and firmly installed conductive parts in the patient environment.

1.7.2 Requirements for the products / components of a combination



IEC 60601-1, 3. Ed.

The general requirements depend on whether the products / components are inside or outside the patient environment.

Medically used room		Non-medically used room	Requirements / measures
inside the patient environment	outside the patient environment		Leakage currents to section 16.6 IEC 60601-1:2005 / EN 60601-1:2006 *
MP ~ MP ~	-	-	Verification of the total patient leakage current
MP ~ MP ~ **	-	-	Verification of leakage currents **a)** additional protective earth connection (consult the corresponding manufacturer), **or** **b)** additional isolating transformer for medical applications **
MP ~ NMP ~ * *	-	-	
MP ~ NMP ~ **	-	-	
MP NMP ~	-	-	
MP NMP ~	-	-	
MP ~ MP / NMP ~ **	-	-	
MP ~ NMP ~	-	-	Verification of leakage currents **a)** no plugs with metal housing, **or** **b)** additional isolation device (to avoid voltage differentials)
MP ~ MP / NMP ~	-	-	Verification of leakage currents **a)** common protective earth connection, **or** **b)** additional protective earth connection at **MP** (clarify with the corresponding manufacturer), **or** **c)** additional isolation device (to avoid voltage differentials), **or** **d)** no plugs with metal housing in the patient environment

⊨	additional "isolating transformer" to IEC/ EN60601-1 **	▯	additional isolating device to IEC/ EN 60601-1		Multiple socket strip
- - -	Functional connection	~	Power supply grid		

MP = **medical electrical device** to IEC/ EN 60601-1, ANSI/AAMI es60601-1, CSA C22.2 No. 60601-1
NMP = **non-medical electrical device** in accordance with product-specific IEC/EN/UL standards

* When connected via the same multiple socket strip under standard conditions, the earth leakage current of the socket strip must not exceed 5 mA.
** e.g. Richard Wolf video cart with "isolating transformer"

Only connect devices with a safety extra-low voltage of no more than 60 V DC / 42.4 V AC peak to the connectors for electrical connections, i.e. the signal inputs and outputs.

☞ *IMPORTANT!*

Persons combining products to form a system are responsible for not impairing the system's compliance with performance and safety requirements, and that the technical data and the intended use are adequately fulfilled.
Possible electromagnetic or other interference that may occur between the product and other products can cause faults or malfunctions.
When selecting the system components, make sure that they meet the necessary requirements of the medical environment they are used in, in particular IEC/ EN 60601-1. In case of doubt contact the manufacturer(s) of the system components.
Do not touch connectors for electrical connections between various components (such as signal input connectors and signal output connectors for video signals, data exchange, controls etc.) and the patient at the same time.

1.8 Electromagnetic compatibility (EMC) - IEC 60601-1-2 : 2007

Please observe the following:
The device/system, in the following referred to as **product**, always relates to Logic HD Camera Controller 552510x and Logic 4K Camera Controller 5525301.

Guidelines and manufacturer's declaration - Electromagnetic emissions

The product is intended for use in the environment specified below. The user must assure that the product is used in such an environment.		
Emissions measurement / test	**Compliance**	**Electromagnetic environment - Guidelines**
HF emissions to CISPR 11	Group 1	The product uses HF energy for its internal function. The HF emission level is extremely low and is not likely to cause any interference in nearby electronic equipment.
HF emissions to CISPR 11	Class A	The product is suitable for use in buildings other than residential buildings and buildings that are immediately connected to the public power supply network that also supplies buildings used for residential purposes provided the following warning is observed: **Warning:** The product is only intended for use by specialized medical staff. This product can cause radio interference which may make it necessary to take suitable remedial measures such as new alignment, new positioning or screening of the product or a filter in the connection to the installation site.
Harmonic emissions to IEC 61000-3-2	Class A	
In conformity with IEC 61000-3-3 "Emission of voltage fluctuations / flicker"		

Guidelines and manufacturer's declaration - Electromagnetic immunity

The product is intended for use in the environment specified below. The user must assure that the product is used in such an environment.			
Immunity tests	**IEC 60601 test level**	**Compliance**	**Electromagnetic environment - Guidelines**
Electrostatic discharge (ESD) to IEC 61000-4-2	± 6 KV contact discharge ± 8 KV air discharge	Yes	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transience, bursts to IEC 61000-4-4	± 2 KV for power supply lines ± 1 KV for input and output lines	Yes	Mains/line power quality should be that of a typical commercial or hospital environment.
Surge voltage (surges) to IEC 61000-4-5	± 1 KV line to line voltage ± 2 KV line to ground voltage	Yes	Mains/line power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and supply voltage variations to IEC 61000-4-11	Voltage dip for 0.5 cycle > 95% U_T * Voltage dip for 5 cycles 60% U_T * Voltage dip for 25 cycles 30% U_T * Voltage dip for 5 sec > 95% U_T *	Yes	Mains/line power quality should be that of a typical commercial or hospital environment. If the user of the product requires continued operation during power mains/line interruptions it is recommended that the product be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field, to IEC 61000-4-8	3A/m	Yes	Power frequency magnetic fields should be at levels characteristic of a typical location in a commercial or hospital environment.
* NOTE! U_T is the line / mains voltage prior to application of the test level.			

Guidelines and manufacturer's declaration - Electromagnetic immunity for products that are not life-supporting

The product is intended for use in the environment specified below. The user must assure that the product is used in such an environment.			
Immunity tests	**IEC 60601 test level**	**Compliance**	**Electromagnetic environment - Guidelines**
Conducted HF interference to IEC 61000-4-6 Radiated HF interference to IEC 61000-4-3	3 V_{rms} 150 kHz to 80 MHz 3 V/m 80 MHz to 2.5 GHz	Yes	Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:** $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P}$ for 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ for 800 MHz to 2.5 GHz P = Nominal power output rating of the transmitter in watts (W) (according to the transmitter manufacturer) d = recommended separation distance in meters (m) Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[1], should be less than the compliance level in each frequency range[2]. Interference may occur in the vicinity of devices with the following symbol:
REMARKS: At 80 MHz and 800 MHz the higher frequency range applies. These guidelines may not apply in all situations. The propagation of electromagnetic waves is affected by absorption and reflexion from buildings, objects and people.			
1 = The field strength of stationary transmitters (e.g. base station for radio phone, earth to earth radio stations,, amateur radio stations, radio and television transmitters) cannot be exactly predicted in theory. To assess the EMC environment due to fixed transmitters an electromagnetic site survey should be conducted. If the measured field strength in the location in which the product is used exceeds the applicable compliance level above, the product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be required, such as reorienting or relocating the product. **2** = Over the frequency range between 150 kHz and 80 MHz the field strength should be below 3 V/m.			

Recommended separation distances between portable and mobile HF telecommunication devices and devices which are not life-supporting

The product is intended for use in an electromagnetic environment where HF disturbances are controlled. The user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile HF telecommunications equipment and the product.			
Rated nominal output power of thetransmitter (W)	**Separation distance as a function of transmitter frequency (m)**		
	150 kHz to 80 MHz $d = 1.2 p \mathcal{P}$	**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
For transmitters rated at a nominal output power not listed in the table above, the recommended separation distance (d) in meters (m) can be determined using the applicable equation (observe frequency). P = nominal power of the transmitter in Watts (W). REMARKS: At 80 MHz and 800 MHz the higher frequency range applies. These guidelines may not apply in all situations. The propagation of electromagnetic waves is affected by absorption and reflexion from buildings, objects and people.			

1.9 Electromagnetic compatibility (EMC) - IEC 60601-1-2 : 2014

Please observe the following:
The device/system, in the following referred to as **product**, always relates to Logic HD Camera Controller 552510x and Logic 4K Camera Controller 5525301.

Guidelines and manufacturer's declaration - Electromagnetic emissions

The product is intended for use in the environment specified below. The user must make sure that the product is used in such an environment.		
Emissions measurement / test	**Compliance**	**Electromagnetic environment - Guidelines**
HF emissions to CISPR 11	Group 1	The product uses HF energy for its internal function. The HF emission level is extremely low and is not likely to cause any interference in nearby electronic equipment.
HF emissions to CISPR 11	Class A	The product is suitable for use in buildings other than residential buildings and buildings that are immediately connected to the public power supply network that also supplies buildings used for residential purposes provided the following warning is observed: **Warning:** The product is only intended for use by specialized medical staff. This product can cause radio interference which may make it necessary to take suitable remedial measures such as new alignment, new positioning or screening of the product or a filter in the connection to the installation site.
Harmonic emissions to IEC 61000-3-2	Class A	
In conformity with IEC 61000-3-3 “Emission of voltage fluctuations / flicker"		

Guidelines and manufacturer's declaration - Electromagnetic immunity

The product is intended for use in the environment specified below. The user must assure that the product is used in such an environment.			
Immunity tests	**IEC 60601 test level**	**Compliance**	**Electromagnetic environment - Guidelines**
Electrostatic discharge (ESD) to IEC 61000-4-2	± 8 KV contact discharge ± 15 KV air discharge	Yes	Floors should be wood, concrete or ceramic tile. With floors made of synthetic material, the relative humidity of the ambient air must be at least 30%.
Electrical fast transience, bursts to IEC 61000-4-4	± 2 KV for power supply lines ± 1 KV for input and output lines	Yes	Mains/line power quality should be that of a typical commercial or hospital environment.
Surge voltage (surges) to IEC 61000-4-5	± 1 KV line to line voltage ± 2 KV line to ground voltage	Yes	Mains/line power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and supply voltage variations to IEC 61000-4-11	0% U_T * ; 1/2 period at 0.45, 90, 135, 180, 225, 270 and 315 degrees 0% U_T * ; 1 Period and 70% U_T * ; 25/30 Periods single-phase: at 0 degrees	Yes	Mains/line power quality should be that of a typical commercial or hospital environment. If the user of the product requires continued operation during power mains/line interruptions it is recommended that the product be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field, to IEC 61000-4-8	30A/m	Yes	Power frequency magnetic fields should be at levels characteristic of a typical location in a commercial or hospital environment.
* NOTE! U_T is the line / mains voltage prior to application of the test level.			

Guidelines and manufacturer's declaration - Electromagnetic immunity for products that are not life-supporting

The product is intended for use in the environment specified below. The user must assure that the product is used in such an environment.

Immunity tests	IEC 60601 test level	Compliance	Electromagnetic environment - Guidelines
Conducted HF interference to IEC 61000-4-6 Radiated HF interference to IEC 61000-4-3	6 V_{rms} 150 kHz to 80 MHz 3 V/m 80 MHz to 2.7 GHz	Yes Yes	Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:** $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P}$ for 80 MHz to 800 MHz $d = 2.3 \sqrt{P}$ for 800 MHz to 2.5 GHz P = Nominal power output rating of the transmitter in watts (W) (according to the transmitter manufacturer) d = recommended separation distance in meters (m) Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[1], should be less than the compliance level in each frequency range[2]. Interference may occur in the vicinity of devices with the following symbol: 

REMARKS:
At 80 MHz and 800 MHz the higher frequency range applies. These guidelines may not apply in all situations. The propagation of electromagnetic waves is affected by absorption and reflexion from buildings, objects and people.

1 = The field strength of stationary transmitters (e.g. base station for radio phone, earth to earth radio stations,, amateur radio stations, radio and television transmitters) cannot be exactly predicted in theory. To assess the EMC environment due to fixed transmitters an electromagnetic site survey should be conducted. If the measured field strength in the location in which the product is used exceeds the applicable compliance level above, the product should be observed to verify normal operation.
If abnormal performance is observed, additional measures may be required, such as reorienting or relocating the product.
2 = Over the frequency range between 150 kHz and 80 MHz the field strength should be below 3 V/m.

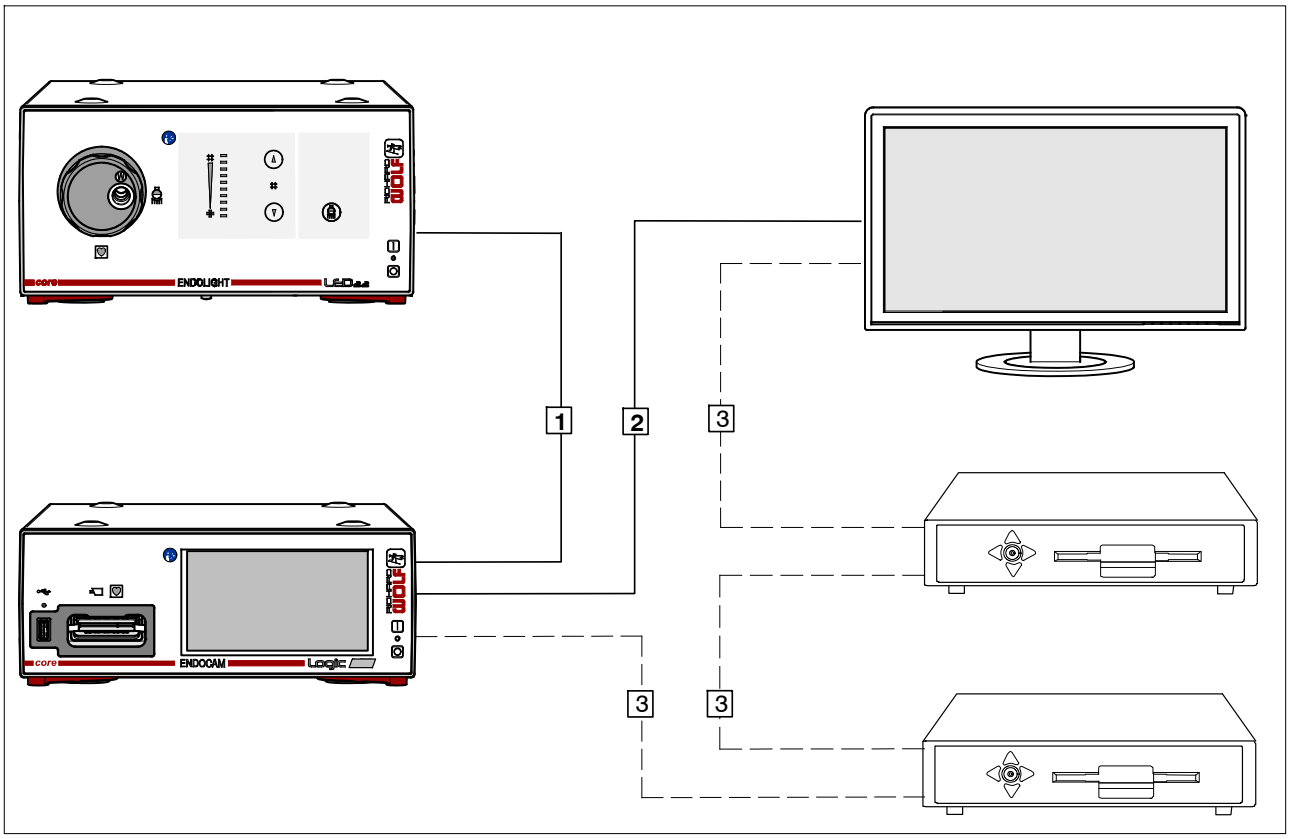
Recommended separation distances between portable and mobile HF telecommunication devices and devices which are not life-supporting

The product is intended for use in an electromagnetic environment where HF disturbances are controlled.
The user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile HF telecommunications equipment and the product.

Rated nominal output power of thetransmitter (W)	Separation distance as a function of transmitter frequency (m)		
	150 kHz to 80 MHz $d = 1.2 p \mathcal{P}$	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

For transmitters rated at a nominal output power not listed in the table above, the recommended separation distance (d) in meters (m) can be determined using the applicable equation (observe frequency). P = nominal power of the transmitter in Watts (W).
REMARKS:
At 80 MHz and 800 MHz the higher frequency range applies. These guidelines may not apply in all situations. The propagation of electromagnetic waves is affected by absorption and reflexion from buildings, objects and people.

1.10 Connection diagram - Camera Controller in video mode



Legend

——— **Direct connection**

1 LAN (Ethernet) connection cable (option) - ***core*** nova System

2 Video cables in accordance with the signal types of the Camera Controller used

— — — **Connection via recording devices**

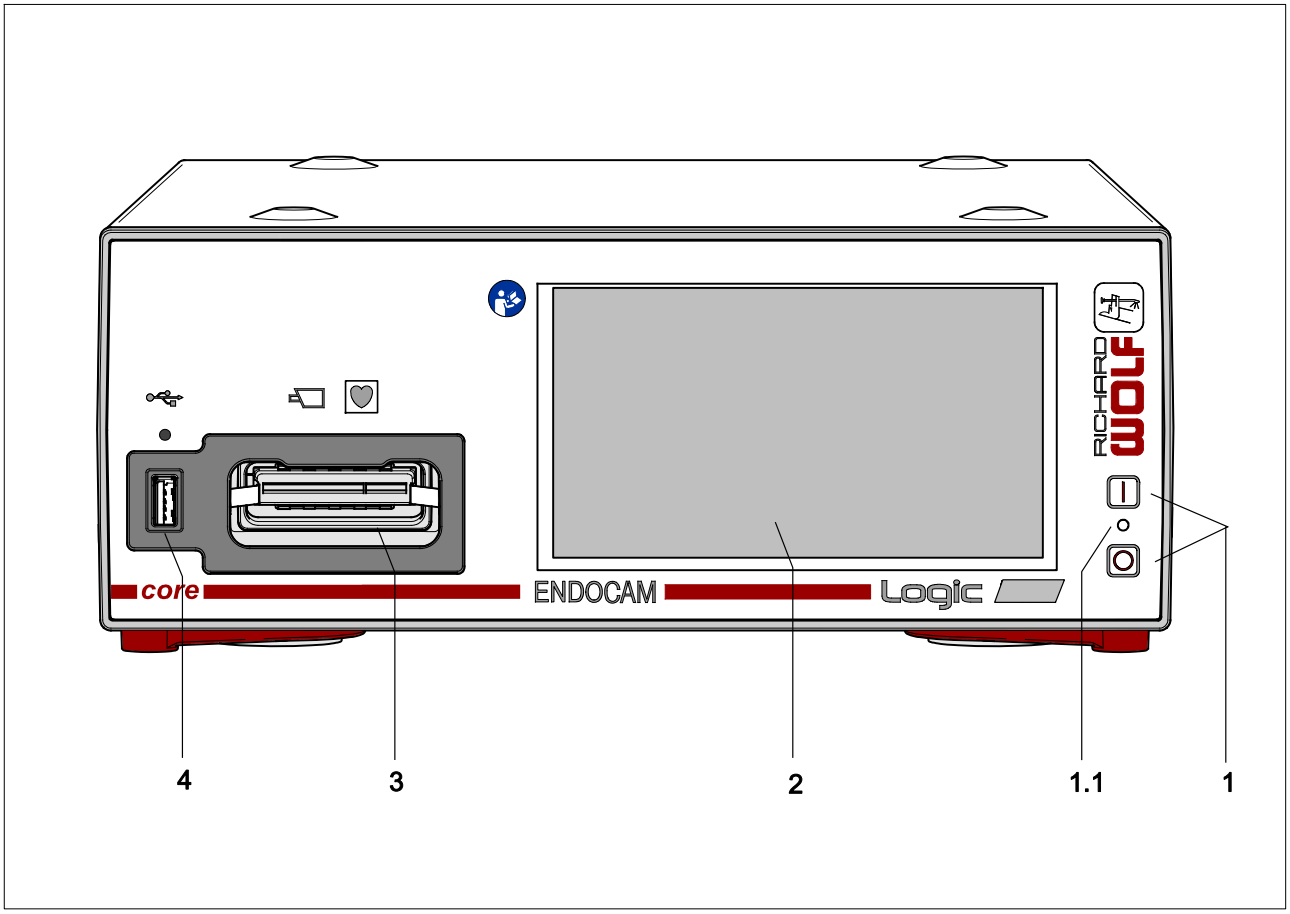
3 Video cables in accordance with signal types of the Camera Controller and recording devices used

☞ ***IMPORTANT!***

*Connection of the LAN (Ethernet) connection cable (**1**) **only** in the case of an **interactive** light source.*

2 Illustration

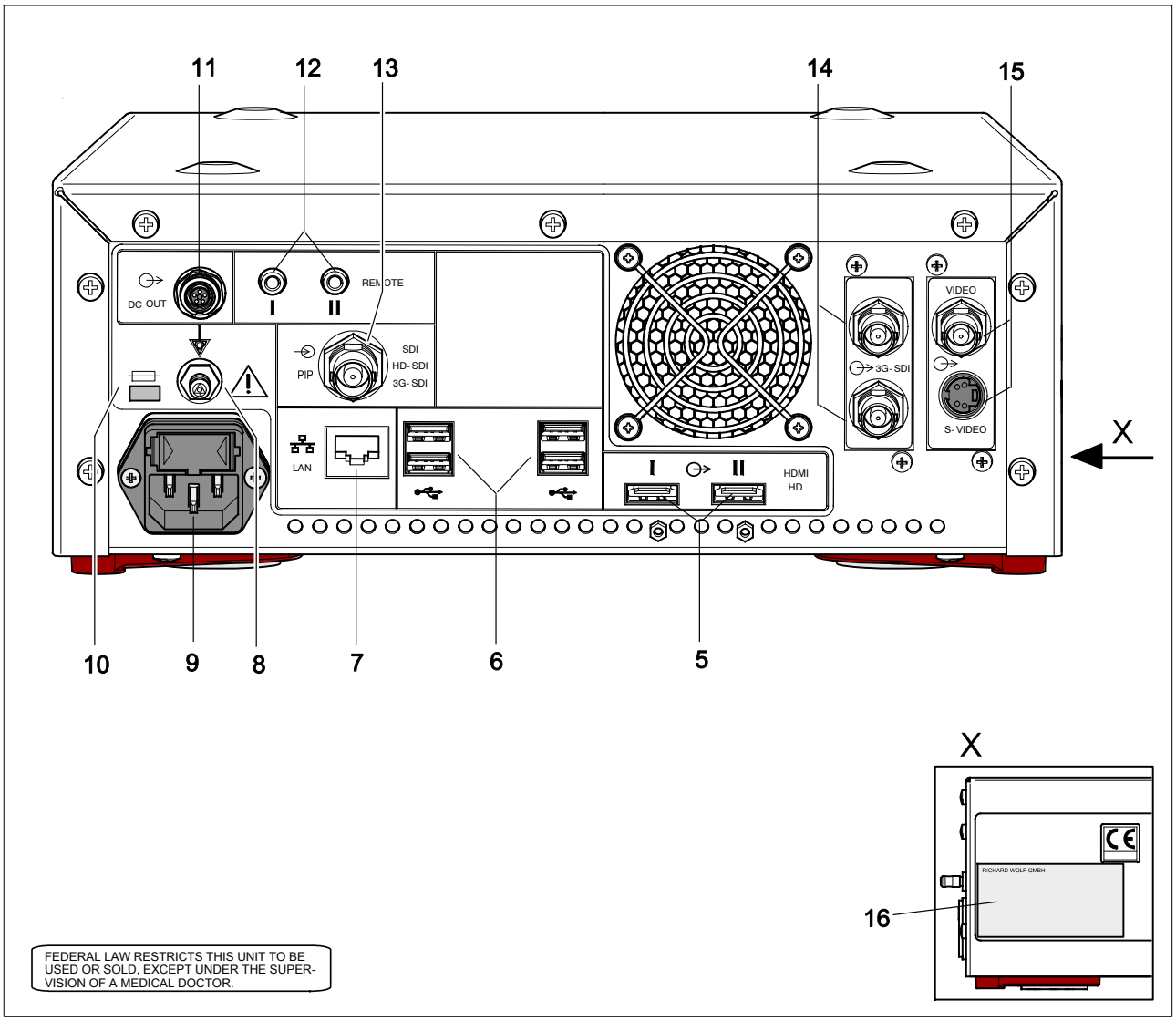
2.1 Front view - Camera Controller for all models



Legend

1	Power/mains switch	**3**	Camera socket (type CF applied part)
1.1	Power ON/OFF LED	**4**	USB 2.0 interface (for external storage media)
2	Touch-screen		

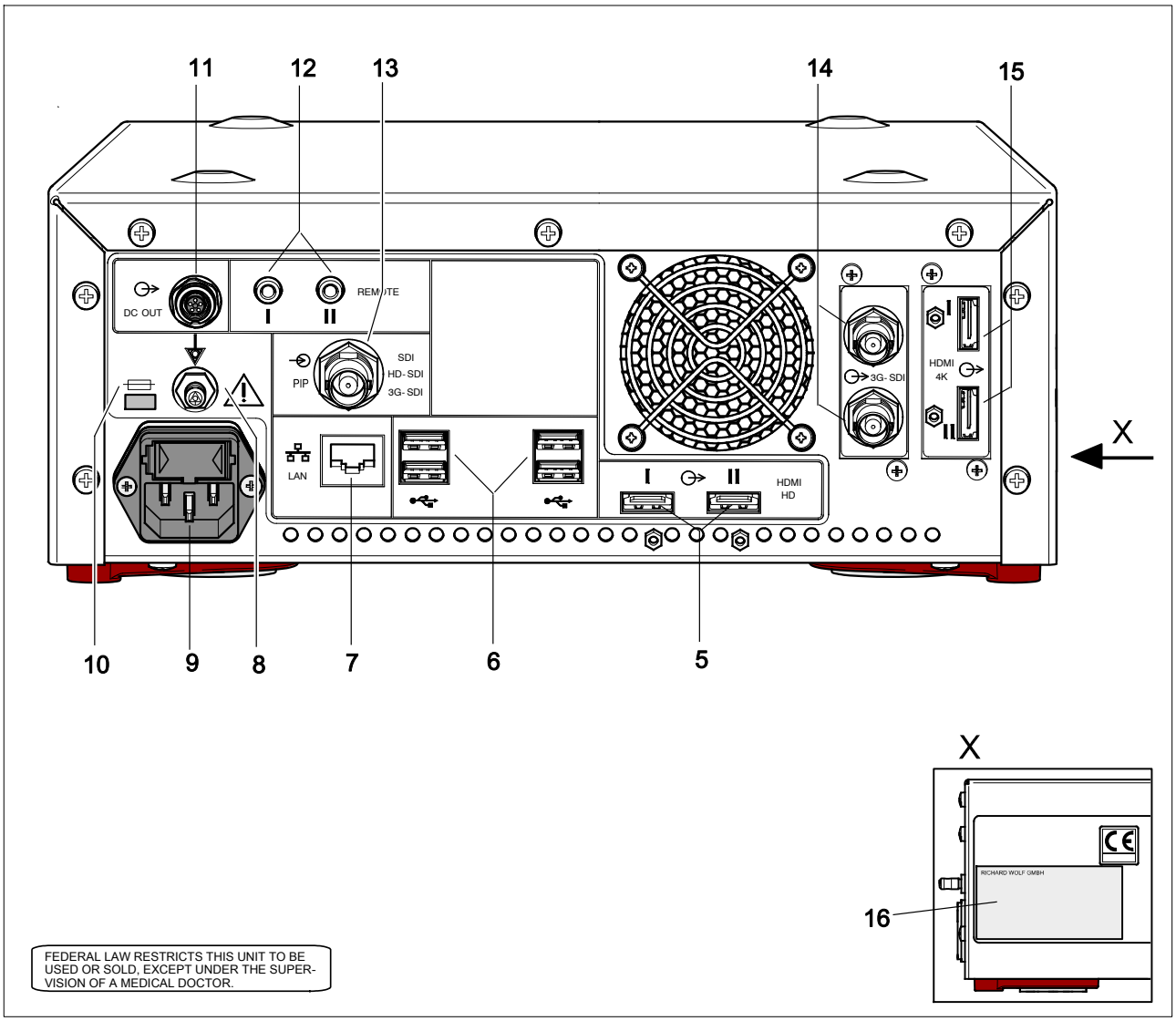
2.2 Rear view - Logic HD Camera Controller 552510x



Legend

5	HDMI HD output	**11**	Power supply 5V DC, 12V DC
6	USB 2.0 port	**12**	Remote output connectors (e.g. printer remote control)
7	LAN (Ethernet) network connector	**13**	PIP module (option)
8	Equipotential connector	**14**	HD-SDI module (option)
9	Power input connector with fuse holder	**15**	SD-Video module (option)
10	Fuse label	**16**	Identification plate

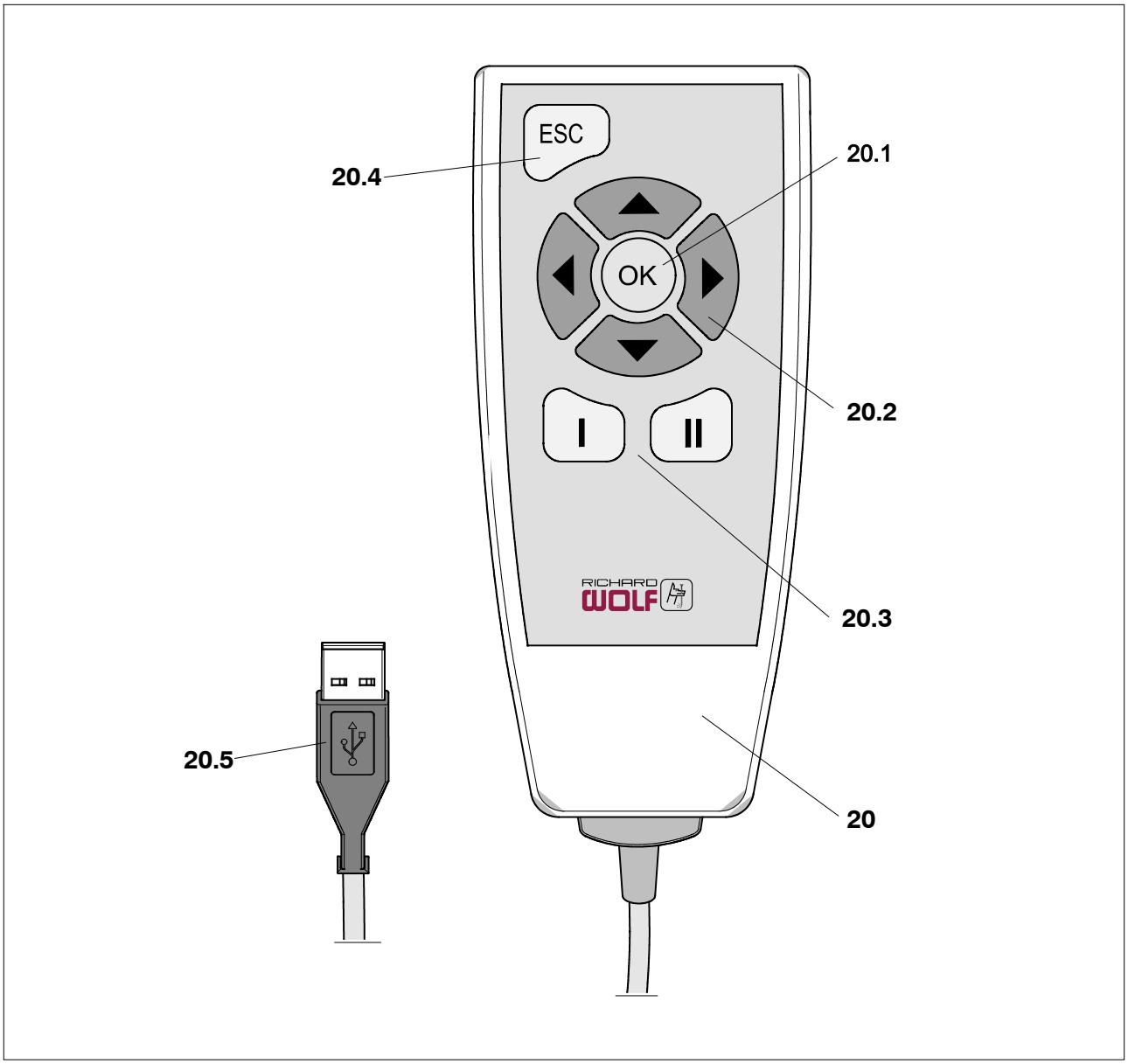
2.3 Rear view - Logic 4K Camera Controller 5525301



Legend

5	HDMI HD output	**11**	Power supply 5V DC, 12V DC
6	USB 2.0 port	**12**	Remote output connectors (e.g. printer remote control)
7	LAN (Ethernet) network connector	**13**	PIP module
8	Equipotential connector	**14**	HD-SDI module
9	Power input connector with fuse holder	**15**	HDMI 4K module
10	Fuse label	**16**	Identification plate

2.4 Illustration of handheld remote control unit (option)



Legend

20	Handheld control unit (option)
20.1	OK button for confirmation
20.2	Cursor keys
20.3	Function keys I and II (programmable key assignment)
20.4	ESCAPE button - back
20.5	USB port

3 Setup

⚠ *WARNING!*
The device is not protected against explosions.
Explosion hazard.
Do not operate this device in areas where there is a danger of explosion.

⚠ *WARNING!*
Danger if a power supply without protective earth is used.
Danger of electric shock!
Connect the device only to a power supply with protective earth connector.

☞ *IMPORTANT!*
Do not the open the device!

☞ *NOTE!*
The line/mains voltage and the voltage indicated on the identification plate must be the same. Connect the device only via the supplied power cable or a power cable with the same specifications.

⚠ *WARNING!*
Device operation may be jeopardized by other devices located in the immediate vicinity or if devices are stacked.
Other devices located in the immediate vicinity or stacked devices may interfere with each other and cause malfunctions, in particular if devices give off energy (e.g. HF surgical devices).
If devices have to be arranged in this way, make sure that the devices work properly.

⚠ *WARNING!*
Safety distance from portable HF communication devices.
Medical electrical devices can be influenced by mobile HF communication devices.
Do not operate HF communication devices in the immediate vicinity of medical electrical devices. Non-compliance can cause the power characteristics of the device to be impaired.

⚠ *WARNING!*
Influence on interference immunity and interference emission.
Use only accessories or cables specified or supplied by the manufacturer.
Other accessories and cables can cause increased electromagnetic interference or a reduced electromagnetic immunity of the device and lead to malfunctions.

⚠ *CAUTION!*
The device may fail due to overheating.
In the case of insufficient air supply, a warning is issued. There is no automatic over-temperature cut-out.
Units with a cooling device [e.g. fan] require a minimum distance of 15 cm from the wall and unobstructed vent slots. Do not cover any openings required for cooling.
To prevent possible accumulation of heat in the closed system cart, place the devices accordingly and/or provide vent slots.

☞ *NOTE!*
To protect the ventilation system from aspirating liquid it is not permissible to place any products or items from which liquids may leak on top of or above the camera controller.

3.1 Connection to the *core* nova system

☞ ***IMPORTANT!***
The plug of the LAN (ethernet) connection cable must engage in the LAN (Ethernet) network socket of the device.
Use only LAN (Ethernet) connection cables with the corresponding locking tab on the plug.

☞ ***IMPORTANT!***
*After connection to the **core** nova system, carry out a function check with the connected devices.*

3.2 Preparation

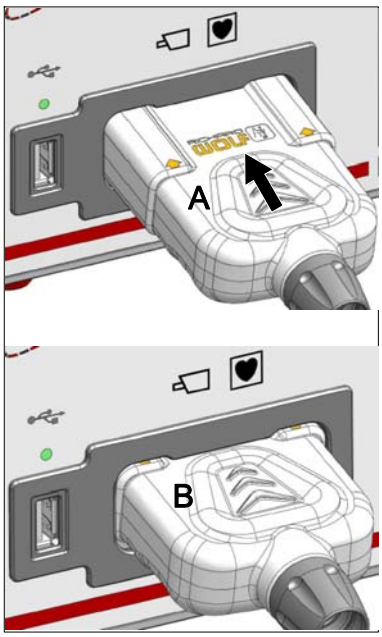
☞ ***IMPORTANT!***
Never direct the camera head at the sun or bright light sources in the vicinity. High-energy radiation in the visible and ultraviolet wavelengths can damage the image sensor. This may result in color distortions and image noise.
When the camera head is not used, the protection cap must be installed.

☞ ***NOTE!***
Remove the protection foil from the touchscreen before the initial setup.

◇ Connect any accessory devices such as a monitor and a light source in accordance with the connection diagrams in section 1.

◇ Switch on the camera controller.

◇ The monitor displays a color bar test chart.



◇ Prepare a compatible camera head or endoscope for connection (follow the relevant instruction manual).

◇ Connect the camera head to the camera controller.

- Hold the camera controller in one hand and insert the camera plug with the two arrows facing upward as far as it will go (**A**).
- **When the camera head is plugged in completely, the two arrows must no longer be visible** (**B**).
- Do **not** press the buttons on the camera head when connecting the camera plug as this could cause a malfunction of the buttons (wrong initialization by the camera controller).

◇ Disconnecting the camera head from the camera controller.

- Hold the camera controller in one hand and pull out the camera plug in a straight line.

☞ *IMPORTANT!*
Never pull at the camera cable.
Never squeeze, pinch and/or excessively bend the camera cable as this may cause damage to the wiring resulting in image failure.

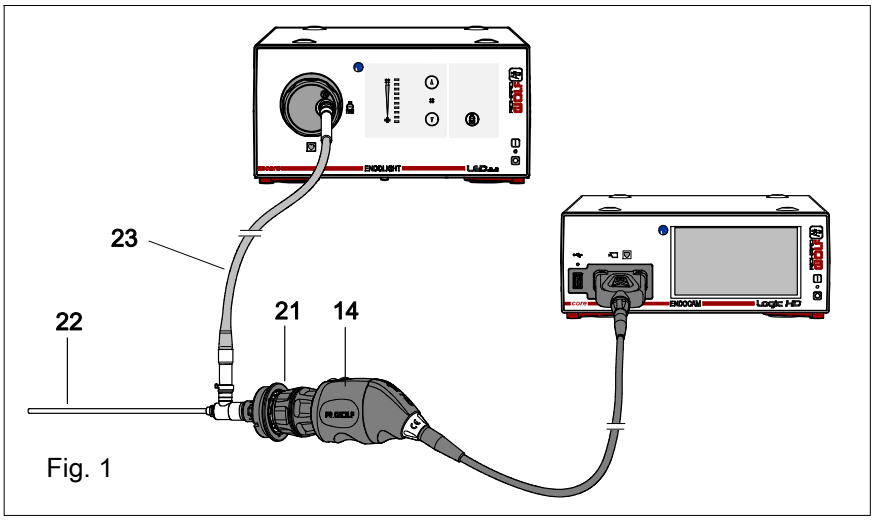


Fig. 1

Legend

14	Compatible camera head	**22**	Endoscope
21	RIWO	**23**	Light cables

3.3 Selecting the menu language

During the initial setup, set the menu language in the "**Settings - Menu settings**" menu.

3.4 Setting the keyboard layout

During the initial setup, set the keyboard layout in the "**Settings - Menu settings**" menu in accordance with the keyboard connected (option).

3.5 Setting date and time

During the initial setup, the date format, date and time must be set in the "**Settings - Date/time**" menu.

3.6 Color bar test chart

The color bar test chart of the camera is used for checking the correct cable connections as well as the color saturation and hue of the monitor. Via the color bar test signal the playback of video and S-Video signals can be adjusted to optimum color rendition.

◇ Pulling the camera plug automatically switches from the camera image to the color bar test chart.

3.7 Adjusting LCD monitors

Changing the settings for brightness, contrast, color saturation, chroma etc. has an influence on the color rendition of LCD monitors.

For optimum image results in combination with a Richard Wolf ENDO-CAM, we recommend using exclusively LCD monitors offered by Richard Wolf.
As a rule, these LCD monitors have been preset and balanced before delivery.

4 Checks

☞ *IMPORTANT!*
Run through the checks before and after each use.
Do not use the products if they are damaged or incomplete or have loose parts.
Return damaged products together with any loose parts for repair.
Do not attempt to do any repairs yourself.

4.1 Visual check

◇ Check the device, the instruments and the accessories for damage, loose or missing parts, hygiene and completeness.

◇ Check all connection cables for damage.

◇ Any inscription, lettering or labeling necessary for the safe intended use must be legible.

➧ Missing inscriptions, lettering or labeling leading to wrong handling or reprocessing must be reinstated.

4.2 Function check

☞ *IMPORTANT!*
Before you perform the function checks, make sure that the devices are in perfect working order and are set up correctly. This must also be guaranteed within the scope of the visual check.

◇ Connect the camera head to the camera controller and the endoscope to the objective lens.

◇ Check the connectors for secure connection.

◇ Switch on the camera controller.

➧ The LED on the power switch lights up.

➧ After a successful self test the device is ready for operation.

◇ Switch on all other devices.

◇ Connect the light cable to the endoscope and switch on the light source.

➧ Direct the endoscope at an object and check the video image on the monitor, ensure sufficient image brightness.

⚠ *CAUTION!*
Danger of glare.
Do not look into the open end when the light cable or endoscope is connected.

◇ Vary the distance between the endoscope and the object; adhere to the typical working distances for the endoscope in question.

➧ Automatic brightness control keeps the monitor image brightness constant through a wide range .

When operated within the *core* nova system:

◇ Check the device is connected to the ***core*** nova system for proper functioning within the ***core*** nova system.

5 Application

5.1 Operation

Logic HD Camera Controller 552510X can process a maximum native resolution of 2K (1920 x 1200 pixels) internally and output the latter at the signal output connector. Depending on the configuration level of the device, the signal type of the output used and the resolution setting selected via the operator manual, the image display is adapted accordingly and the output format is optimized.
Image information of camera heads that can be connected but have a higher pixel number is processed with a maximum of 2K, or HD resolution (1920 x 1080 pixels).

The Logic 4K Camera Controller 5525301 can process a maximum native resolution of **4K** (4096 x 2160 pixels) internally and therefore process the image data of a 4K connected camera head in full resolution. This high native resolution, however, is only available at the outputs marked accordingly.
For the other signal outputs (HDMI HD, LAN stream, optional 3G-SDI) as well as the internal archive (single image, video sequence) there is a maximum signal output of 2K or HD resolution, respectively.

The device parameters are controlled and set via the touchscreen on the camera controller or the **OSD** (**O**n-**S**creen **D**isplay) using the handheld control or PC keyboard.
Serial digital signals can be output via 3G-SDI (1080p/1080i/720p) via optional extension modules.
The optional **PIP**module (**P**icture **i**n **P**icture) allows on-screen display of a second digital image source
Optionally, Logic HD Camera Controller 552510x can output analog video signals (PAL/NTSC).

The color properties of the illumination are called color temperatures and are specified in Kelvin (K). Higher color temperatures are bluish, lower color temperatures are reddish.
To render an image in its natural colors, setting the white balance is required prior to the first use and also after each change of the light source or the endoscopic instruments.
The white balance procedure sets the color gain factors for the red and blue portions of the video image in such a way that they match the color temperature of the light source with the effect that an image is rendered with optimum colors and white objects are displayed as completely white.
On the camera controller, white balancing is possible for a color temperature range between 2300 K and 7000 K.

5.2 Control elements and operating modes

5.2.1 *"Dialog" function*

The ***dialog*** function allows communication between the camera controller and an ***interactive*** light source.
The ***dialog*** function uses the fast ELC control of the camera controller to adapt the image brightness while also automatically controlling the brightness of the light source.
Automatic brightness control "ELC" of the camera controller must be switched on.
The brightness setting of the light source is controlled automatically via the camera controller. It is not possible to control the brightness manually at the light source.

The precondition is a connection between the devices with a LAN (Ethernet) cable, see wiring schematic in section 1.

☞ ***NOTE!***
*We recommend working with the activated **dialog** function **at all times**.*
*The light source can be readjusted manually if required should the **dialog** function fail.*

☞ ***NOTE!***
*If there is no communication between the Richard Wolf devices in **dialog** mode, there is no status information in the camera image.*

☞ ***NOTE!***
*In the case of a communication failure between the camera controller and a light source in **dialog** mode, the function keeping the color temperature constant is not available.*
In other words, when the light output is controlled manually, existing minor changes in the color temperature of the light source are no longer compensated automatically by the camera controller.

5.2.2 Special Imaging Mode (SIM)

From software version **R16** onwards, camera controller 5525 is equipped with **S**pecial **I**maging **M**ode (**SIM**) and from software version **R19**(**>1.3.x**) onward, it is additionally equipped with blue light special modes.
These modes are special operating modes that influence the normal, neutral image rendering of the camera controller by digital image processing processes.
An icon in the status bar indicates that Special Imaging Mode is activated.

For the different profiles not all the Special Imaging Modes (SIM) are always available. To activate the **bluePDD** Special Imaging Mode, for example, a blue profile must be selected.

To create a new user profile: Make sure that for the newly created user profile a suitable profile is used as a template.

☞ ***NOTE!***
In specific situations, Special Imaging Mode may provide advantageous, i.e. enhanced, image rendering (e.g. improved tissue differentiation).

☞ *CAUTION!*

Depending on the situation and use, the selected Special Imaging Mode or activation of the mode may also have a negative impact on image rendering.

On the basis of the situation and the resulting image rendering, the doctor in charge must decide whether using Special Imaging Mode is indicated.

☞ *NOTE!*

Several Special Imaging Modes are stored in the device. Initially, a Special Imaging Mode is assigned to the application settings (profiles).

In the device menu (Menu item „Settings - Image / Color processes – Special Imaging Mode) the mode can be verified and switched over in activated state.

☞ *NOTE!*

If instead of a preset Special Imaging Mode, an alternative mode is to be used on a permanent basis, this alternative mode can be implemented by creating the corresponding user profile (Menu item operation - profiles, see section 5.7.3).

Overview of **Special Imaging Modes** (SIM):

HDR (High Dynamic Range):

Brightening of dark image parts and darkening of very bright image parts.This may enhance the visibility of parts of the image which are either invisible or are in the background. At the same time, blooming of bright tissue is avoided. On the other hand, image contrast is reduced. The HDR mode is also indicated when the endoscope's illumination level is insufficient (e.g. as a result of a weak light source or severe wear of the illumination components).

Contrast (I, II):

Enhanced image contrast and color differentiation. Color rendering remains largely unaffected.

Contrast I: Recommended for image scenes with low color saturation.

Contrast II: Recommended for image scenes with high color saturation (e.g. severe hemorrhages).

Color Contrast (I, II, III):

Functions as **Contrast**, but with a more intense influence on the basic color tone of the image.
The selection of the corresponding Color Contrast Mode depends on the subjective color perception of the user.

Color Contrast I: Recommended for image scenes with high color saturation (e.g. severe hemorrhages).

Color Contrast II: Recommended for image scenes with low color saturation.

Color Contrast III: Recommended for high contrast imaging of blood vessels.

bluePDD:

The special mode **bluePDD** enhances the image contrast and the color differentiation of the color differences generated in the body tissue in fluorescence mode, where the tumor marker has different concentrations.

bluePDD color contrast:

Function same as **bluePDD**, but stronger influence on the basic color shade and color intensity of the fluorescence image.

☞ *IMPORTANT!*
*The attending physician decides on the selection of the necessary **bluePDD** mode on the basis of the prevailing tumor situation or the type and situation of the application.*
*In order to use a **bluePDD** mode, an ENDOLIGHT LED blue light source is required (e.g. model 5165001).*

5.2.3 Automatic brightness control (ELC)

The automatic brightness control **ELC** (**E**lectronic **L**ight **C**ontrol) of the camera controller allows the use of light sources without light control and of light sources with deactivated brightness control.

Advantage of **ELC**: very fast response to the image brightness.

☞ ***IMPORTANT!***

To prevent unnecessary heating of the endoscope, set the light intensity of the light source to a middle value.

*The **ELC** function must not be used in conjunction with the video control of a light source (switch off the video control of the light source) as this would cause undesirable fluctuations in image brightness.*

5.2.4 Temperature protection circuit

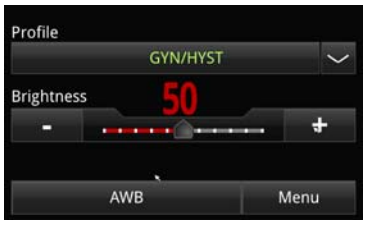
Covered louvers, holes or vent slots in the rear panel or bottom plate of the device or insufficient air circulation can cause a temperature increase inside the device.

This may have a negative impact on image quality and in extreme cases may lead to device failure.

A temperature protection circuit monitors the device temperature and issues a warning in case of temperature increase. There is no automatic over-temperature cut-out.

The fan speed is controlled as a function of temperature.

5.2.5 Menu control via touchscreen

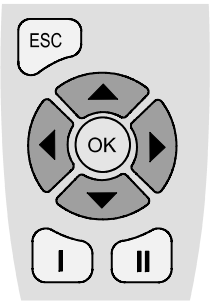


Profiles, brightness, AWB and menu functions:

Some selected functions can be controlled directly via the touchscreen.

Access to all control elements/parameters is only possible in OSD, via the PC keyboard or manual remote control.

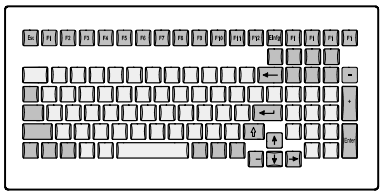
5.2.6 Menu control via monitor with handheld remote control (option)



Menu selection, navigation, confirmation in the menu and function keys:

- The **ESC** key is used to exit the menu or to switch to a higher menu level, respectively.
- The **OK** button serves to select and call up menus, and to confirm settings.
- The arrow keys are used to navigate through the menus or menu items.
- The function keys can be assigned individually (e.g. for white balance) in the **Settings - Function keys** menu.

5.2.7 Menu control via monitor with PC keyboard (option)



Menu selection, navigation, confirmation in the menu and text input:

- The **ESC** key is used to exit the menu or to switch to a higher menu level, respectively.
- The **ENTER** key is used to select and call up menus, and to confirm settings.
- The arrow keys are used to navigate through the menus or menu items.
- The input of texts e.g. patient data is **only** possible via the PC keyboard.
- The function keys F1 and F2 can be assigned individually (e.g. for white balance) in the **Settings - Function keys** menu.
- Other settings via function keys:
  F3 and **F4** = **brightness +/ - , F5 = profiles, F6 = detail levels, F7 = zoom levels, F9 = AWB (auto white balance), F12 = input of patient data (text).**

5.3 Menu levels

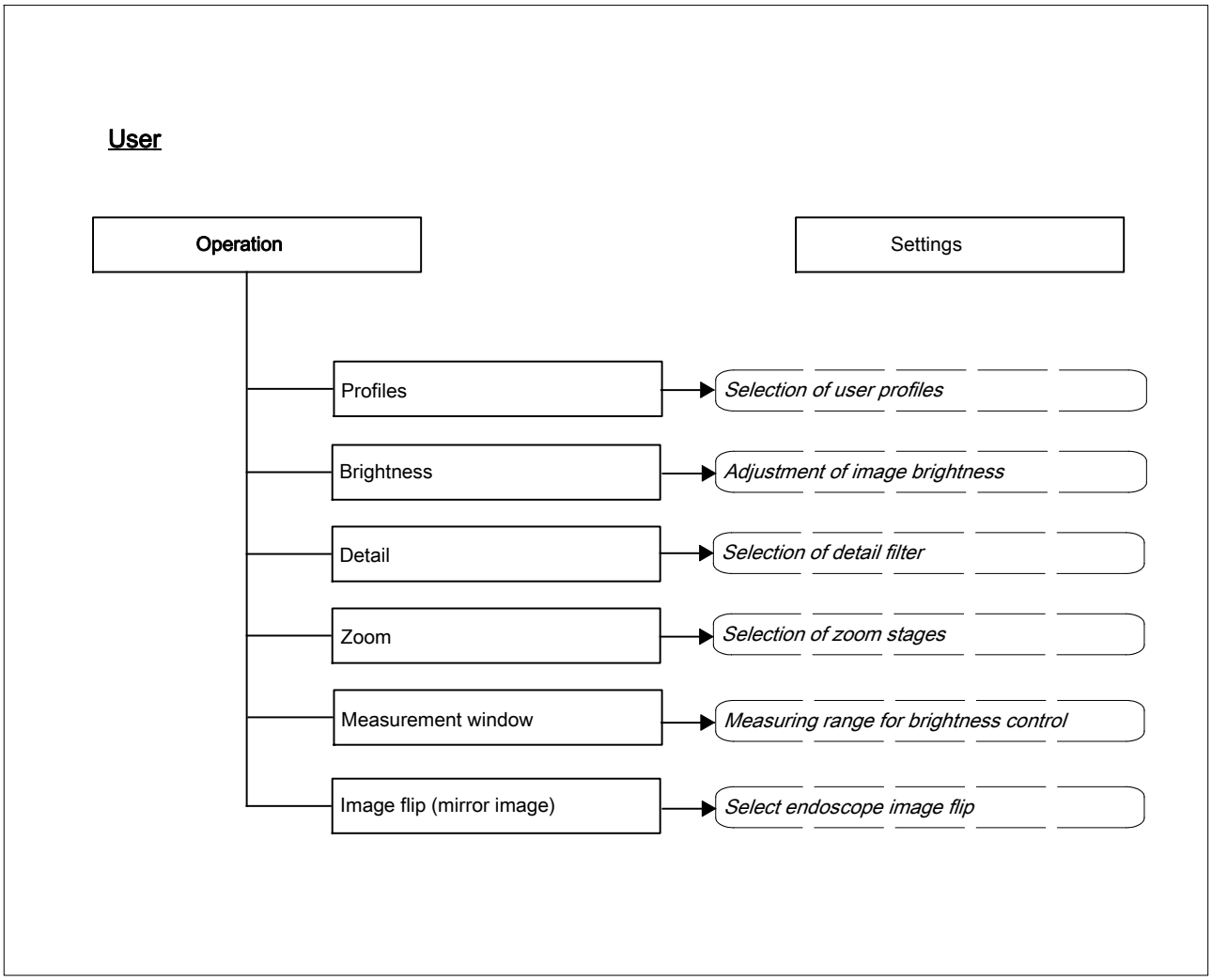
The device menu has 3 sections:

- User operating level
- User parameter settings
- Device service for authorized persons - with password only

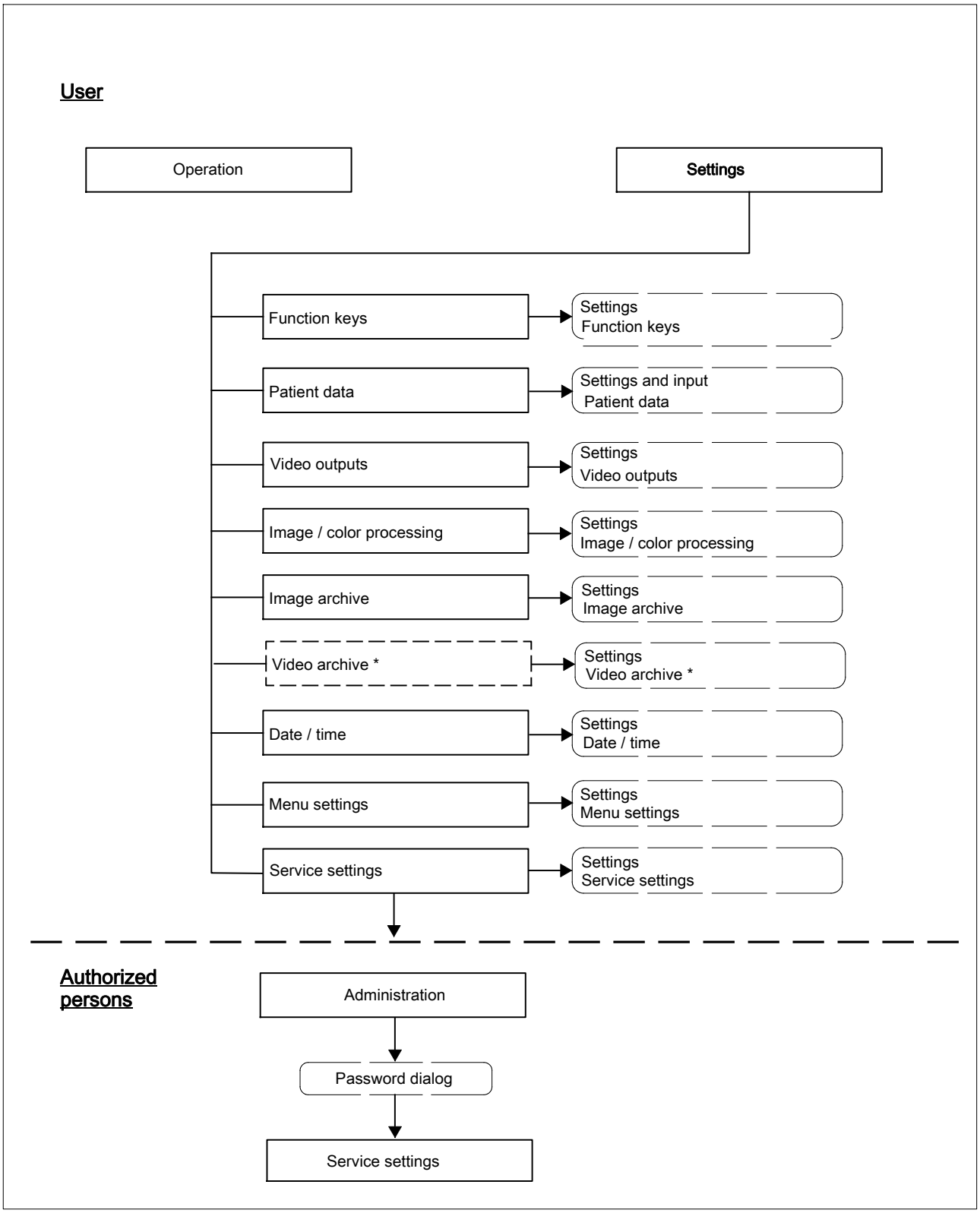
☞ ***NOTE!***
The illustrations of the user interface are only exemplary and vary depending on the application.

5.4 Menu control via monitor with handheld remote control or PC keyboard

5.4.1 Overview - menu structure - "operation" main menu

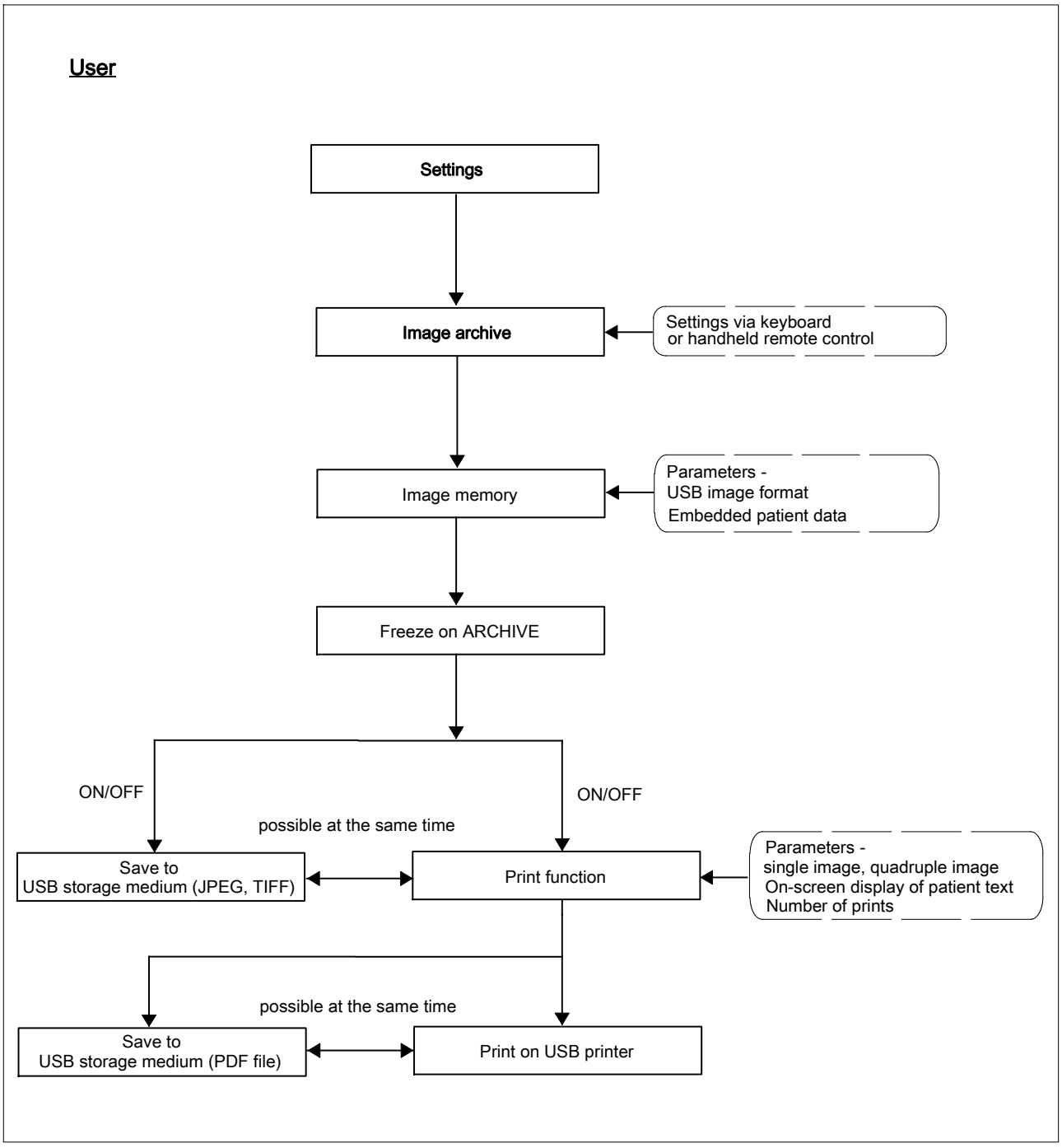


5.4.2 Overview - menu structure - "Settings" main menu



* = only for models 5525105 to 5525108 and 5525301

5.4.3 Overview - menu structure - "Image archive" menu



☞ ***NOTE!***

Depending on the selected archiving method, the quality of the archived image can deviate from the quality of the live image.

5.4.4 Description of the "Settings" submenus

Settings main menu

Submenu	Description
Function keys	Configuration of camera head buttons and remote control / keyboard **Display of function keys:** off / auto / on **Camera head button 1 and camera head button 2:** Brief pressing of buttton (< 1s) - selection via drop-down list Long pressing of button (> 1s) - selection via drop-down list (Special Imaging Mode = additional device functions e.g. PDD) **Configuration of function keys on remote control (keyboard):** Function keys **1** (F1) and **2** (F2)
Patient data	Page 1: **Show patient datat:** on/off, auto = show patient data during image recording **Patient text color:** Selection **Patient text in video image:** "Remote" for printer documentation systems or "Archive" in the case of USB storage media, USB printer Page 2: **Enable lines:** Enable or disable patient data (lines) in the patient text Please observe the following: Enter patient data before every new application.
Video outputs	**OSD:** Disable menu display on various video outputs Please observe the following: Never disable all OSDs simultaneously
Image / color processes	Page 1: **Special Imaging Mode:** Selection of Special Imaging Mode e.g. PDD **Saturation:** Adjustment of color saturation (chroma) **Color adjustment:** Individual color adaptation of the video image
Image archive	**Multiple print:** One or four images per page **Number of printouts:** Selection list **Print patient text with picture:** When printing and saving on USB data carrier, the patient data is briefly shown in the video image. **Print on "Archive":** Selecting this function prints the video image **PDF when using the "Archive" function:** Storing a video image as a PDF file on a USB data carrier **Store on "Archive":** Selecting this function saves the video image as a single frame in JPG or TIF format on a USB data carrier **Freeze on "Archive":** Actuating "Archive" briefly freezes the video image Please observe the following: The image archive is **not** an image documentation in compliance with the obligation to furnish evidence.
Video archive *	**Video quality:** Defines the compression rate **Video to USB:** Activation / deactivation of video recording on USB data carrier **Video to *core*.portal:** Activation / Deactivation of video recording into the ***core*** nova network Please observe the following: The image archive is **not** a video documentation in compliance with the obligation to furnish evidence. (* = only for models 5525105 to 5525108 and 5525301)
Date / time	**Date format:** Sequence of year, month, day adjustable in accordance with country **Time:** 24 hour setting **Date:** Setting in given format

Submenu	Description
Menu settings	**Language:** Selectable for each country **Keyboard layout:** Setting in accordance with the keyboard connected **Menu layout:** Positioning of OSD **Profile dialog during switch-on:** deactivates the profile selection after switch-on **Profile after switch-on:** the selected profile (e.g. urology) is automatically activated when switching on the device **Status bar:** deactivates the status bar (operator's instructions remain enabled) **Insufflator:** activation of display in the status field of the monitor **Pump:** activation of display in the status field of the monitor **Shaver:** activation of display in the status field of the monitor **Size of picture in picture (PIP):** Selection of image size
Service settings	Page 1: **Current software version** **General device parameters:** Display **Factory settings:** Resets all device parameters to the delivery state (works settings). **OSD opacity:** Adjusts the transparency of the OSD relative to the video image Page 2: **ELC:** automatic regulating function to avoid blooming **ELC rate** Control speed of ELC control **Max. gain:** Amplification if image is to dark **Test image:** Selection or deactivation (test pattern only if camera head is not connected) **Pulse duration for remote output:** Depends on the device connected to the remote output **Lead time patient text remote pulse:** Depends on the device connected to the remote output **Administration:** With password only

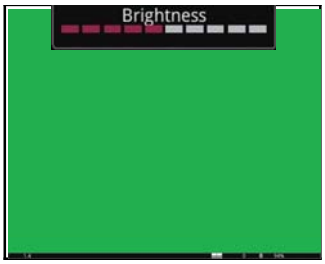
5.4.5 Patient Data Input

☞ ***NOTE!***

*Text (e.g. patient data) can **only** be input via the PC keyboard.*

The F12 key of the PC keyboard serves to call up the input mask for the patient data.

5.4.6 Status display for camera head button actions



The actions of the camera head buttons (e.g. setting the image brightness) are displayed on the monitor.

5.4.7 Symbols and display in the status line at the lower edge of the sceen.

Status line

Symbol	Meaning	In menu / status
	Color has been adjusted (e.g. a little redder)	Settings - Image / color processing
	Image has been mirror-imaged	Operation - Image settings
	Frozen image	Setting - assignment of head buttons/function keys
	The volume has been reduced to minimum	Setting - audio settings
	A Special Imaging Mode is active (e.g. **PDD**)	Status display
	A Special Imaging Mode is active (e.g. **Contrast** or **Color Contrast**)	Status display
	Media Archive is active (the "video to *core*.portal" function can be selected.	Status display
	Special Imaging Mode **HDR** is active	Status display
	Light source is connected via ***dialog*** and ready to operate	Status display
	Printer is connected and ready	Status display
	Image is being printed	Status display
	Printing successfully completed	Status display
	Storage medium connected and ready	Status display
	File is being saved	Status display
	Saving has been successful	Status display
	No camera head connected	Status display

Symbol	Meaning	In menu / status
	Four-in-one print (page X of 4)	Status display
	Print is saved as a PDF-File	Status display
	PDF file is being saved	Status display
	Saving successfully completed	Status display
	Record single frame	Status display
	Save to USB data carrier.	Status display
	Saving of single frame completed	Status display
	Display blinks during video recording	Status display
	Video streaming into the Ethernet network	Status display

5.4.8 On-screen display of blue light mode

Symbol	Meaning	In menu / status
	Blue light mode	Status display
	Blue light mode - stronger increase of the fluorescence level	Status display

5.4.9 Display of function key assignment

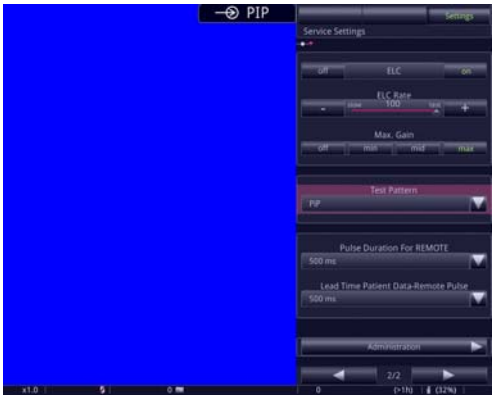
Display of function key assignment (from software version R15 or higher)

off: no display

auto: when switching on or changing the assignment or switching to another profile, the function key assignment is displayed for approx. 5 sec.

on: continuously on

5.5 Archiving with PIP camera controller (Option)



Archiving with camera controller (from software version R15 or higher):

If the camera controller is equipped with the optional modules **PIP** (**P**icture **i**n **P**icture) (digital input) and **3G-SDI** with **video archive** (digital output), the device can be used for archiving images and video sequences.

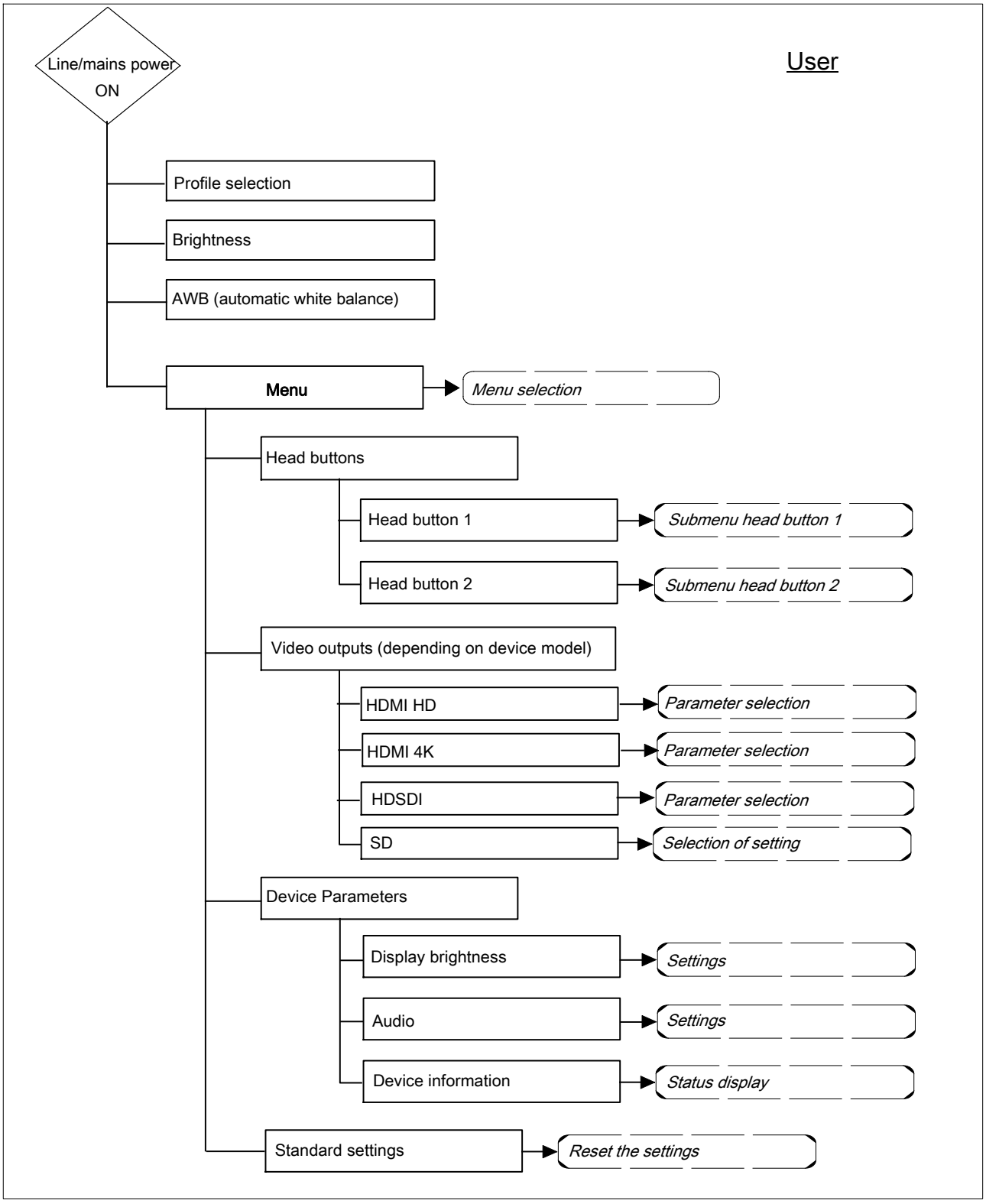
During archiving the camera head must be disconnected.

The image and video signals are input in the camera controller via the **PIP** input. The camera controller converts the image signals to jpg/tif formats and the video signals to a compressed mp4 format. The USB connector serves to archive images (jpg/tif) or video sequences (mp4) to a USB stick, external hard disk or via *core*.portal.

In menu settings - service settings, switch the test pattern to **PiP**.

5.6 Menu control via touchscreen functions on device

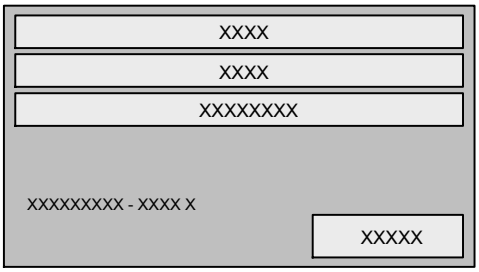
5.6.1 Overview - menu structure



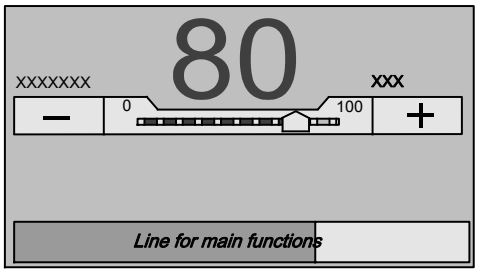
5.6.2 Touchscreen menus

☞ ***IMPORTANT!***
When controlling the device via the touchscreen monitor, touching the monitor surface ***only gently*** *is sufficient.*
Do not touch the surface of the touchscreen monitor with sharp, pointed or contaminated objects as this will lead to a damaged surface or reduced image quality.

☞ ***NOTE!***
The illustrations of the user interface are only exemplary and vary depending on the application.



Touchscreen:
The touchscreen monitor is used for information output and the input or selection of parameters.



Touchscreen areas:
Area for displays and settings:
When the displayed function is active, the displayed numerical value is displayed in "red". The corresponding numerical value is adjusted using the (**+**) and (**-**) buttons or the slide control.
Line for main functions:
Calling up the menus, switching on and off device functions, save, delete etc.

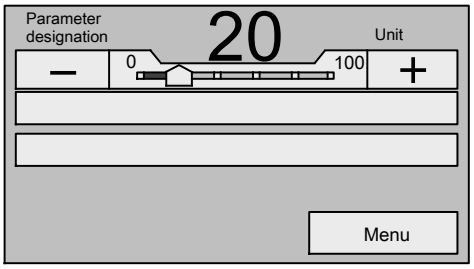
Button functions:

Selected: Button is highlighted, letters are black (button depressed).

Not selected: Button is dark, letters are white (button not depressed).

Selectable: Letters are white.

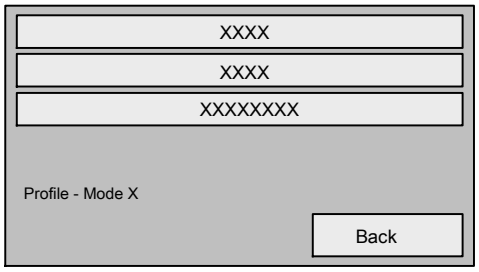
Not selectable: Letters are gray.



Display and parameter setting:

The parameters are displayed as bars and as numbers.

- The (**+**) and (**-**) buttons serve to increase or decrease the value or, optionally, using the slide control (nominal value), if applicable.
- With the (**+**) / (**-**) button continuously depressed, the value changes in increments.

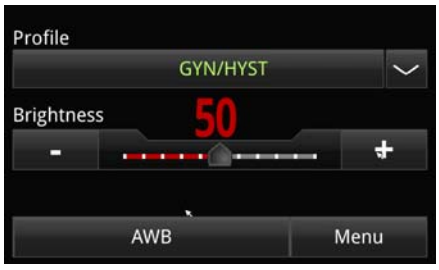


Menu overview - calling up the menus:

The **Menu** button serves to switch from the main level to menu level.

In the menus, any changes in the settings are implemented immediately after the input.

You may exit the menu items with the **Back** button.



Menu display - main menu:

In the main menu, the following functions can be selected on the touchscreen:

Selection of the stored **Profiles**.

Adjusting the **Brightness** of the endoscopic image on the monitor.

Automatic white balance **AWB**.

Menu selection.

5.6.3 Description of "Menu" on touchscreen

Menu	Description
Head buttons	Configuration of camera head buttons and remote control / keyboard **Camera head button 1 and camera head button 2:** Brief pressing of buttton (< 1s) - selection via drop-down list Long pressing of button (> 1s) - selection via drop-down list (Special Imaging Mode = additional device functions e.g. PDD)
Video outputs (depending on device model)	**HDMI HD:** Matching the image resolution to the monitor connected **HDSDI:** Matching the image resolution to the monitor connected **SD:** Matching the image resolution to the connected monitor (PAL or NTSC) **HDMI 4K:** Matching the image resolution to the connected monitor Please note: After matching the image resolution, switch the camera controller off and then on again.
Display brightness	**Brightness:** of the touchscreen
Audio	**Volume:** key tones and messages **Key tone:** Key tones of touchscreen on/off
Device information	**IP address:** Display only with activated network **Net mask:** Definition of the networks that can be contacted in conjunction with the IP address **Software Version:** Display of the installed software version
Audio settings	**Volume:** key tones and messages
Standard settings	Sets "Language" to English Activates all monitor outputs

5.7 Operation of camera controller

☞ ***IMPORTANT!***
Possible malfunction of the device controls.
A malfunction can cause a failure of the controllability of the device without impairing the actual image display. Carry out a restart of the device at a later, convenient point in time.

☞ ***NOTE!***
This camera controller features image sensors with automatic pixel error compensation, i.e. pixel errors in the live image are detected and compensated automatically.
It cannot be excluded, however, that under certain lighting conditions pixel errors are visible for a limited time or at all times.

⚠ ***CAUTION!***
Potential risk for the patient.
Incorrect alignment due to wrong image setting.
Before each use and before each mode change, make sure that a live image is obtained and that it is properly aligned for the application.

5.7.1 General notes on the operation within the *core* nova system

☞ ***NOTE!***
*If the ENDOCAM is integrated into the **core** nova system, the patient data are automatically copied by the **core**.browser.*

☞ ***IMPORTANT!***
Carry out a plausibility check on the patient data before input or selection.

☞ ***NOTE!***
*If the ENDOCAM is integrated into the **core** nova system, both date and time are automatically copied by the **core** nova system.*

☞ ***NOTE!***
*If the ENDOCAM is integrated into the **core** nova system, current images can transmitted directly via the **core** nova system to a server for archiving.*

☞ ***IMPORTANT!***
Danger of stumbling over connection cables.
Danger of collision with the control terminal and danger of contusion from moving parts when adjusting the swivel arm.

⚠ ***CAUTION!***
The control terminal is not sterile.
Possible contamination by touching the control terminal.
Operate / control the control terminal only in the unsterile zone.

⚠ ***CAUTION!***
Possible danger for the patient by misadjustment of system components.
If the values displayed on the control terminal and on the device displays differ, the values must be adjusted and read on the device displays.

5.7.2 Automatic white balance (AWB)

☞ ***IMPORTANT!***

If the white balance is triggered unintentionally, the colors are not rendered correctly during the endoscopic examination.
Repeat the white balance outside the body using a white object.

☞ ***NOTE!***

After each start with the camera head connected or after plugging in the camera head, the user is prompted to carry out a white balance.

White balance after device start or connecting the camera head:

After switching on the camera controller or connecting the camera plug, the white balance procedure can be started by pressing any button on the camera head or **AWB** on the camera controller. The camera controller requires this procedure for full functionality.

Carry out white balance:

◇ Switch on the light source and direct the camera head with endoscope at a white surface.
  ➧ Make sure that there are no external light sources and no colored objects in the camera's field of view.

◇ For automatic white balance press either the **AWB** (**A**utomatic **W**hite **B**alance) button on the touchscreen of the camera controller or the camera head button configured for AWB.
  ➧ On successful completion an operator's note "White balance successful" is issued.
  ➧ If the white balance could not be completed successfully, an operator's note appears (white balance failed) and the white balance must be repeated.

Repeated white balance during operation:

To avoid inadvertent triggering of the AWB during operation, a safety inquiry appears after pressing the AWB button. Then, within 5 seconds, the AWB must be confirmed exactly with the button that was used to trigger the AWB.

After 5 seconds the safety inquiry disappears and the auto white balance request is canceled.

5.7.3 Displaying and editing

◇ The profiles can be selected in the **Operation profiles** menu

Please observe the following: The preconfigured standard profiles (e.g. urology, gynecology) can be edited as required. The changed settings will be available again after switching on the unit. When changing a profile the settings are reset to the default values specified by R.Wolf for this discipline (e.g. urology requires values that differ from the values for laparoscopy).

To store the changed values permanently the adapted standard profile must be copied (**save as**) and saved under a new user profile. The changed settings will be available again after switching on the unit.

The self-defined user profiles may be renamed (overwrite name) or deleted as required.

Depending on the selected template for a created user profile, not all parameters are available. Make sure that for the created user profile a suitable standard profile has been selected as a template.

☞ *NOTE!*

The selected template is the standard profile within which all required changes are carried out before it is stored as a user profile.

5.7.4 Image brightness

In the **Operation - Image settings** menu the nominal value of the automatic brightness control can be preset.

5.7.5 Detail

The **Operation - Detail** menu serves to enhance the contour (image sharpness). The detail levels have been preset.

5.7.6 Electronic zoom

The electronic zoom can be controlled via a suitably configured camera head button or via the menu on the monitor.

5.7.7 Measurement window (endoscopic image adaptation)

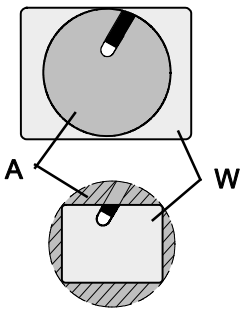


Fig. 2

The setting of the measurement window defines the control range of the automatic brightness control (**ELC**). To optimally adapt the control range to the endoscope used, the control range should **not** be greater than the image circle.

☞ *NOTE!*

*Depending on the focal length of the objective lens, image information of the endoscope (**A**) cannot be detected on the image sensor (**B**) (Fig. 2). Depending on the use and system combination, the brightness control must be adjusted.*

◇ In the **Operation - Image settings** menu (page 2) you may adapt the measurement window for brightness control to the image circle diameter in 4 stages.

5.7.8 Image flip (mirror image)

In the **Operation - Flip** menu, the endoscopic image can be mirror-imaged in 3 axes.

5.7.9 Connecting the USB storage medium

To connect USB sticks and USB hard disks only the USB connector on the front panel of the camera controller may be used.

The USB storage media must be formatted in accordance with the specifications in the technical data in section 9.

After connection to the front panel of the device the USB storage medium is checked. The green LED indicates that the USB data carrier has been detected and is ready for storing data.

The USB data carrier can be used for image archiving (TIFF/JPEG/PDF) and video archiving *

* = only for models 5525105 to 5525108

☞ ***NOTE!***

Depending on the archiving method selected, the quality of the archived image can deviate from the quality of the live image.

5.7.10 USB printer

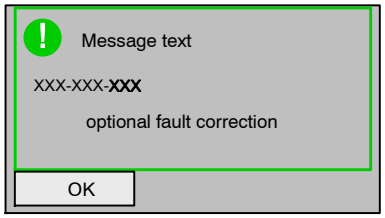
Only USB printers approved by Richard Wolf can be connected to the device.

5.7.11 Taking out of service

◇ To take the device out of service, switch off the power switch and disconnect the device from the power supply / mains.

5.8 Overview of system messages

5.8.1 Structure of system messages



There are 4 different types of message.
The system messages are displayed in the corresponding color together with a symbol and the associated message number, as required by the message type.
For certain messages the *core* nova system will only display the "Follow messages on device" note.

5.8.2 Message types

Symbol	Color	Message type	Description	Alarm sequence
	Green	Operating note	Informs the user about relevant events. (Audio signal can be activated/deactivated in the "**Audio**" menu).	-------
	Turquoise	LOW **error**	Informs the user about imminent dangers. Error of low priority.	1 alarm pulse, symbol does not blink.
	Yellow	**MEDIUM** error	Informs the user about imminent dangers. Error of medium priority.	3 alarm pulses, symbol blinks
	Red	**HIGH** error	Indicates severe device errors excluding any further control of the device. High-priority error.	10 alarm pulses, symbol blinks

5.8.3 Functionality of control elements

Control element	Description
No button	The message window is displayed until the conditions are met, or goes out after approx. 7 s.
OK	The message window can be exited. Device operation may be continued but with limited functions.

5.8.4 Operating messages (green)

Message number	Message text	Possible cause	Corrective action
00-000-014 00-000-019 00-000-219	**Error while storing**	An unexpected error has occurred while storing data	◗ Check storage device
00-000-015 00-000-215	**Storage device is full**	The connected storage device is full	◗ Empty the storage device or use a different one
00-000-016 00-000-216	**Storage device is write protected**	The storage device was write protected via an external PC	◗ Remove the write protection using an external PC
00-000-017 00-000-217	**No storage device connected**	The archive function was triggered although no storage device is connected.	◗ Connect storage device and actuate the archive function again.
00-000-018 00-000-218	**Maximum number of files in folder has been reached**	The maximum number of files per directory (9999) has been reached.	◗ Disconnect and reconnect the USB - a new directory is generated automatically
00-000-106	**No printer connected**	No printer connected Printer switched off	◗ Connect printer, switch on and trigger print function again
00-000-107	**Error while storing the PDF file**	An unexpected error has occurred while storing data	◗ Check storage device
00-000-108	**Please wait, printer buffer is full**	-------	◗ Status message
00-000-109	**Error at printing**	An unexpected error has occurred while printing	◗ Restart the printer and the camera when convenient
00-000-110	**No storage device connected**	PDF file should be saved but no storage device is connected	◗ Connect storage device and actuate the PDF save function again
00-000-111	**Maximum number of files in PDF folder has been reached**	The PDF folder can store a maximum of 9,999 files	◗ Remove old PDF files
00-000-113	**Paper jam in the printer**	Fault in paper feed or output	◗ See printer manual
00-000-114	**Check expendable materials of the printer**	Paper or toner empty	◗ See printer manual
00-000-115	**Please wait, printer is busy**	-------	◗ Status message
00-000-116	**Please close the printer door**	The printer is open	◗ See printer manual
00-000-117	**Too many prints in the collection tray**	Collection tray is full	◗ See printer manual
00-000-120	**Running out of printer paper**	Running out of printer paper	◗ Add printer paper
00-000-230	**Current video recording was aborted.**	Parameters were changed while video recording was running	◗ Restart video archiving
00-000-231 00-000-232	**Function cannot be activated**	With this configuration level this function cannot be activated	◗ Contact technical support
01-000-007	**Storage device removed**	The storage device was removed/ disconnected during storage	◗ Repeat storing procedure
01-000-008	**No storage device available**	No storage device connected	◗ Connect storage device
02-000-010	**Please start the automatic white balance (AWB)**	-------	◗ Carry out message
02-001-000	**Applied part needs higher software version**	The current controller software does not support this applied part.	◗ Contact the service department for a software update
00-000-300 02-002-000	**An error has been detected**	Disconnect and reconnect applied part	◗Disconnect and reconnect applied part
03-000-010	**White balance successful**	-------	◗ Status message
03-000-011	**White balance failed** **Please repeat white balance**	Image blooms or is too dark Original is too colorful or irregularly structured	◗ Check the light source setting ◗ Check distance to object ◗ Use a smooth white surface ◗ Repeat white balance
03-000-012	**AWB is not necessary**	Application part has its own lighting. This requires no AWB	◗ Status message

Message number	Message text	Possible cause	Corrective action
03-000-014	**AWB not possible - switch on light source**	AWB with deactivated light source	◗ Switch on the light source and repeat AWB
03-000-022	**Color balance is not necessary**	Application part has its own lighting. No color balance required	◗ Status message
03-000-023	**White balance not possible in Special Imaging Mode**	Light source is in Special Imaging Mode	◗ Stop Special Imaging Mode and repeat AWB
03-000-024	**ICB not possible - switch on light source**	ICB with deactivated light source	◗ Switch on the light source and repeat ICB
03-000-030	**Special Imaging Mode is not possible with this application part**	The Special Imaging Modes of the applied part and of the light source do not match	◗ Select a suitable applied part or light source
03-000-031	**Application part does not support any Special Imaging Mode**	Application part does not support any Special Imaging Mode	◗ Select suitable application part
03-000-032	**No Special Imaging Mode has been selected**	No Special Imaging Mode has been selected	◗ Select suitable Special Imaging Mode
03-000-033	**Light source does not support Special Imaging Mode**	Switchover to Special Imaging Mode although the light source does not support such SIM	◗ Use a suitable light source
03-000-034	**Special Imaging Mode not possible with this light source**	The selected Special Imaging Mode is not supported by the light source	◗ Use suitable light source
03-000-035	**Error in Special Imaging Mode: no application part connected**	Special Imaging Mode selected, but no suitable application part connected	◗ Connect suitable application part
03-000-036	**Error in Special Imaging Mode: no connection to light source**	There is no dialog connection to the light source	◗ Check light source and connection cable
03-000-037	**Error in Special Imaging Mode: Light source in manual mode**	***dialog*** connection has been deactivated by switching to manual mode	◗ Activate ***dialog*** mode
03-000-038	**This applied part requires a different type of camera controller**	The built state of the camera controller is not compatible with the applied part	◗ Contact technical support
03-000-039	**Really repeat AWB?**	AWB is about to be triggered again – safety inquiry	◗ Press same button within 5 seconds - AWB starts
03-000-040	**Freeze**	-------	◗ Status message
03-000-050	**Light source is switched off**	When triggering AWB the light source is deactivated	◗ Status message
04-000-001	**Please input a profile name**	-------	◗ Carry out message
04-000-002	**Please enter administrator password**	-------	◗ Carry out message
04-000-003	**Please enter service password**	-------	◗ Carry out message
04-000-004	**Preset cannot be deleted**	-------	◗ Carry out message
04-000-005	**Presets cannot be renamed**	-------	◗ Carry out message
04-000-006	**The entered profile name already exists**	A name that already exists has been entered	◗ Change profile name
04-000-007	**Wrong password has been entered**	Wrong password entered	◗ Repeat input
04-000-008	**Not all OSD outputs can be deactivated**	It was tried to switch off the OSD outputs on all monitors	◗ At least in one monitor the OSD output must remain on
05-000-200 05-000-300	**An error has been detected**	A general unspecific error has occurred	◗ Restart the camera when convenient
06-000-010	**Dialog functions are not possible with this light source**	Incompatible light source connected	◗ Connect suitable light source
08-000-000	**Date/time wrong - please check battery**	The battery for the internal clock is flat	◗ Contact technical support

Message number	Message text	Possible cause	Corrective action
09-000-001	**Device temperature too high**	Vent slots (louvers) blocked or dusty Ambient temperature too high	◗ Check ventilation ◗ Ensure sufficient air supply
09-000-005	**Self-test failed**	The device is not ready	◗ Contact technical support

6 Operation in the *core* nova system

6.1 Operation in the *core* nova system

In standard mode the connected device can be controlled via the ***core*** nova system using a control terminal as well as the control options on the device itself.

The ***core*** nova system may have several control terminals. In conjunction with the ***core***.browser software, different functions and devices can be called up on the control terminals and controlled independently.

☞ *IMPORTANT!*

*The connected device can still be controlled manually via the own controls of the device should the **core** nova system fail. For a description please refer to the instruction manual of the corresponding device.*

6.2 Combining and controlling the device

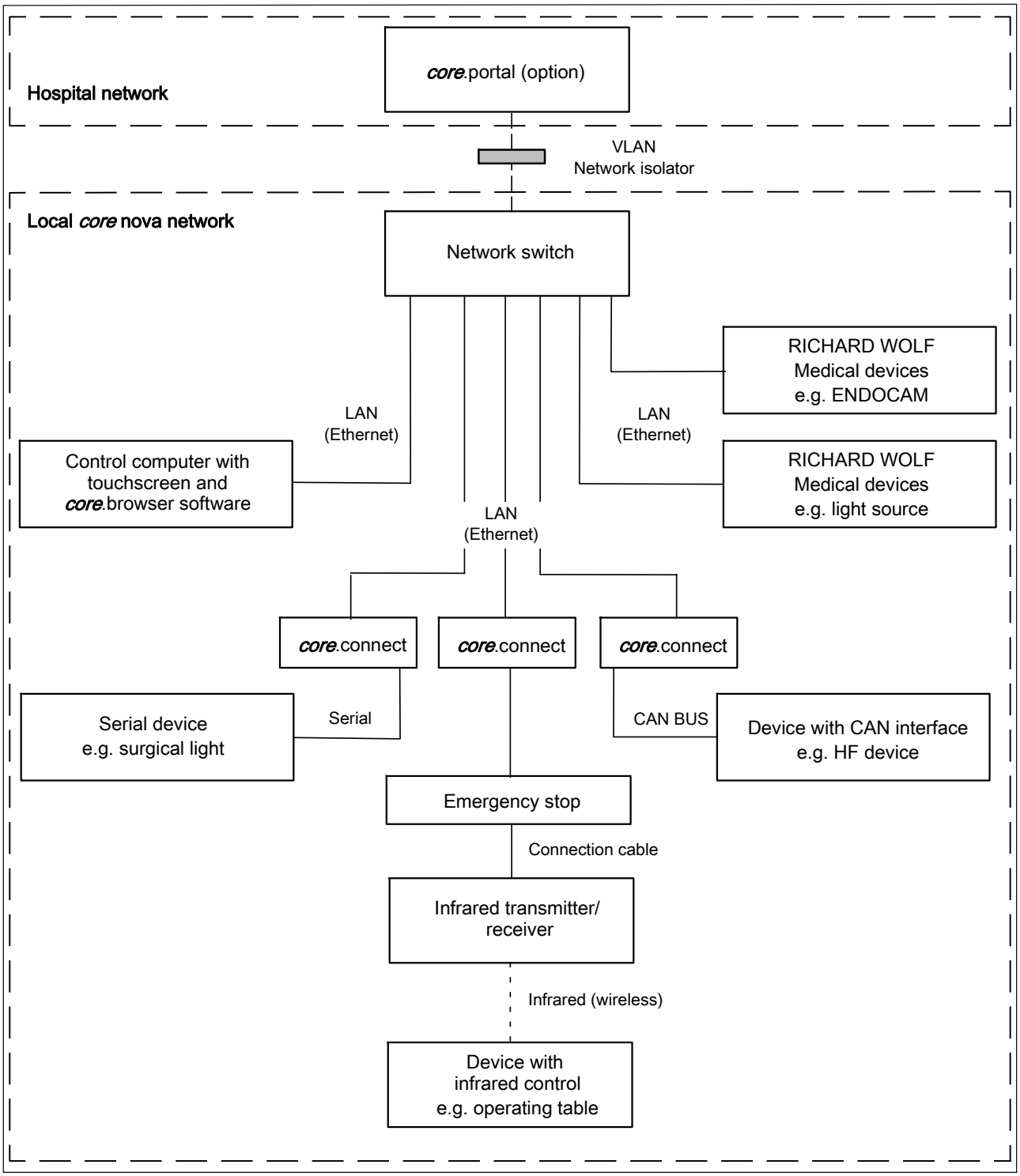
Via the integrated LAN (Ethernet) network interface the device can be integrated in the Richard Wolf ***core*** nova system.

The components must fulfill the following requirements in accordance with the latest instruction manual for the ***core*** nova system, section "Possible combinations".

Further descriptions of use:

- Observe the latest instruction manual for the ***core*** nova system.
- For operation, menu structure, software updates and configurations, follow the latest ***core.***browser instruction manual.
- For a detailed understanding of the device and menu functions, follow the instruction manuals of the connected devices.

6.3 Connection to the *core* nova system



☞ ***IMPORTANT!***
*Configure the hospital network in such a way that there is a logical VLAN (Virtual LAN) network between the **core**.portal and the local **core** nova network.*

7 Reprocessing and maintenance

7.1 Reprocessing of device

⚠ ***WARNING!***
Make sure that no humidity enters the device.
Danger of electric shock!
Before reprocessing switch off and disconnect the device from the power supply / mains.

Clean the device regularly with a soft cloth moistened with surface disinfectant, alcohol or spirit.
Follow the disinfectant manufacturer's instructions!

☞ ***NOTE!***
*The approved surface disinfectants, cleaning agents and disinfectants for devices and universal device carts and utility carts approved by Richard Wolf are described in the document "Chemicals for reprocessing" (**GA-J055**) by Richard Wolf.*

☞ ***IMPORTANT!***
Make sure that no humidity enters the device. Do not use any cleaning agents, scouring agents or solvents on this device.

7.2 Reprocessing of camera head

◇ For reprocessing, follow the manual of the camera head used.

7.3 Maintenance

☞ ***IMPORTANT!***
In your inquiries or correspondence please always indicate the model and serial number on the identification plate. Further documentation is available from the manufacturer on request.

Richard Wolf service:
www.**richard-wolf.com**/service

7.3.1 Maintenance intervals

☞ ***IMPORTANT!***
To avoid any incidents or damage caused by aging and wear it is necessary to service the product and the accessories at adequate intervals. Depending on the frequency of use, but at least once a year, have an expert check the functional and operational safety of the equipment.

8 Technical description

8.1 Troubleshooting

☞ *IMPORTANT!*
If you cannot eliminate the faults with the help of this table, please call the service department or send in the device for repair.
◗ *Do not attempt to do any repairs yourself!*

8.1.1 Device error

Fault / error	Possible cause	Corrective action
Device without function	Power switch is not on	◗Actuate the power switch
	Power cable is not connected	◗Connect the power cable
	Fuse in device is defective	◗Replace fuse
	No line voltage/mains	◗Check in-house power supply
No image	No connection between camera output connector and monitor	◗Check video cable connection
		◗Connect a different video interface or an interface with a different video standard to the monitor and use this signal connection for image display if necessary.
	No power supply	◗Check connection between power cable and power socket (mains cable and mains socket). Switch on the monitor and the video components in the chain.
No image at the 3G-SDI or HDMI HD / 4K output connector	Camera head or controller defective	◗Return the device with camera head for repair
	LCD monitor cannot display the preset digital video format	◗Set the LCD monitor or HD signal in the setup of the camera controller correctly
Image too bright	Monitor incorrectly set	◗Check whether the suitable profile for this application has been selected.
		◗Readjust contrast and brightness on monitor
	Wrong image circle diameter	◗Switch over the endoscopic image adaptation (measurement window) as required.
		◗When using an optical zoom objective lens, adapt the display window or magnification to the measurement window selected.
	Automatic brightness control (ELC) is deactivated	◗Switch on the "ELC" function

8.1.2 Fault in video mode

Fault / error	Possible cause	Corrective action
Incorrect color rendering Automatic white balance	Automatic white balance incorrect	◗Carry out automatic white balance
	Incorrect color setup of monitor	◗Readjust color saturation and color phase (chroma, hue)
	Wrong color setting on the camera controller	◗Correct settings in the **Settings - Image/color processing** menu
Image too dark	Light transmission not optimal	◗Check whether the suitable profile for this application has been selected. ◗Clean the light entry and exit surfaces of the endoscope and light cable
	Service life of lamp (light source) exceeded	◗Replace lamp
	Focal length of objective lens is too large or in case of a zoom objective lens an excessively large focal length has been set.	◗Check the type of objective lens (fixed focal length) or readjust (zoom lens)
	Manual brightness preselection on the light source is set too low	◗Increase setting on manual brightness preselection on the light source
	GAIN function is deactivated	◗Switch on GAIN function or change setting
	Cross section of light cable insufficient	◗Use light cable with larger cross section
Grainy image or image noise	Light transmission not optimal	◗Check whether the suitable profile for this application has been selected. ◗Clean the light entry and exit surfaces of the endoscope and light cable
	Focal length of objective lens is too large or in case of a zoom objective lens an excessively large focal length has been set.	◗Check the type of objective lens (fixed focal length) or readjust (zoom lens)
	Brightness incorrectly set	◗Set the light source to brighter or adjust brightness on controller
	Cross section of light cable insufficient	◗Use light cable with larger cross section
Blurred image	Objective lens not focused	◗Set the objective lens to maximum sharpness
	Endoscope, camera or objective lens window soiled	◗Clean the window
Blurred image or stripes	Endoscope, camera window or objective window is soiled	◗Clean endoscope or window, respectively
Image interference when moving the camera cable	Camera cable defective	◗Send in the camera head with cable for repair
Stripes on the monitor when using HF devices at the same time	HF cable is too close to the camera cable or video cable	◗Route HF cables at some distance to other cables and avoid parallel cable routing
	ENDOCAM Logic HD Controller and HF devices are connected to the same power circuit	◗Connect power cables of HF device and video devices to different socket strips (power circuits). Connect the power cables of all video devices to the same socket strip (power circuit). Connect potential equalization cable.

Fault / error	Possible cause	Corrective action
Error of USB storage media	Wrong file system Incompatible USB storage medium Transmission speed	◗Use only USB storage media in accordance with the specifications given under technical data
dialog function not active	*dialog* function of the lightsource is deactivated	◗ Activate the *dialog* function
	Wrong cable connection between light source and camera controller	Connect the ◗LAN (Ethernet) cable in accordance with the connection diagram in section 1.
	ELC of camera controller deactivated	◗ Switch ELC ON in the menu

8.1.3 Error in the *core* nova system

Fault / error	Possible cause	Corrective action
Device is not logged in the *core* nova system.	Data transfer error Defective LAN (Ethernet) cable or defective LAN (Ethernet) connection (LEDs on the LAN socket do not blink).	◗Check connections and connection cable, replace LAN (Ethernet) cable if necessary ◗Change the network switch
	Network switch has no power supply	◗ If there is no power supply via LAN (Ethernet), use optional power supply unit ◗ Contact service department

8.1.4 Displays on the monitor

Fault / error	Possible cause	Corrective action
No patient text	Patient text deactivated	◗Activate patient text (**Settings - Patient text - ON**)
Patient text difficult to read	Wrong text color	◗Change text color (**Settings - Patient text - Text color patient text**)
No OSD menu visible	OSD menu is deactivated for this video output	◗Activate OSD menu for the corresponding video outputs (**Settings - Video outputs**) ◗ If OSD is deactivated for all video outputs: Set the device to default setting via the front touch screen.
Video image shows color cast	White balance has not been carried out Color adjustment is misadjusted Color adjustment incorrectly set on monitor	◗Perform white balance ◗Correct color adjustment (**Settings - Image/color processing - Color adjustment**) ◗Correct color adjustment of monitor
Switchover of Special Imaging Mode not possible (e.g. bluePDD, HDR)	Applied part does not support Special Imaging Mode	◗Use an applied part suitable for Special Imaging Mode. If in doubt contact the service department
Date / time incorrect	Has not yet been set or has not been set for some time	◗Set date / time (**Settings - Date / time**)
No profile selection on the OSD after starting the camera controller	"Profile dialog after device start" has been deactivated	◗Activate profile selection (**Settings - Menu settings - Profile dialog when switching on**)
No key tone on touchscreen	Key tone deactivated or volume too low	◗Switch on the key tone in the touchscreen menu or check volume, respectively (**Menu - Device parameters - Audio**)
Image output flickers Wrong proportions Image not visible	Incorrect video resolution	◗Change the video resolution in the touchscreen menu (**Menu - Video outputs**)

8.2 Technical Data

Camera controller	Voltage V ~	Frequency Hz	Power consumption VA	Current rating A	Fuse A
552510x	100 - 240	50/60	100	1.0 - 0.4	T 2 AH 250 V
5525301	100 - 240	50/60	120	1.2 - 0.45	T 2 AH 250 V

Electromagnetic compatibility (EMC) to	EN / IEC 60601-1-2
Medical Products Directive 93/42/EEC	Class I
Protection against electric shock	Type CF applied part
Protection class to EN / IEC 60601-1 ; (UL 2601-1 / CSA C22.2 No.601.1 - for USA)	I
Degree of protection against the ingress of liquids	IP 20 (not protected)
Operating mode	Continuous
Degree of protection in the presence of flammable mixtures	This device is not protected against explosions (Do not operate this device in an ignitable atmosphere)
Weight	6.2 kg (13.6 lbs)
Dimensions WxHxD	300 mm x 120 mm x 416 mm
Color control	Automatic white balance by pressing a button
Brightness control	Automatic shutter control + automatic gain control
White balance	Color temperature range between 2300 K and 7000 K
Maximum resolution (552510x)	1920 x 1200 pixels
Maximum resolution (5525301)	4096 x 2160 pixels
USB port (for external storage media)	USB 2.0 (FAT32 / NTFS file system)
LAN (Ethernet) network connector	RJ45 (10/100/1000 Ethernet)
Archive format (single frame)	JPG / TIFF
Archive format (video sequence)	MP4 (H264-MPEG-4-AVC), 3 selectable quality stages

☞ ***NOTE!***
For technical data of the camera head used, see the corresponding manual.

8.2.1 Camera controller extension options

Camera controller	Extension options - Modules		
	PiP (**P**icture **i**n **P**icture) (digital input e.g. external video source)	**3G-SDI** (digital outputs) **+ Video archive**	**SD video** (analog outputs)
5525101	-	-	-
5525102	●	-	-
5525103	-	-	●
5525104	●	-	●
5525105	-	●	-
5525106	●	●	-
5525107	-	●	●
5525108	●	●	●
5525301	●	●	–

8.2.2 Input interfaces

Option	Video inputs	Input format *
PiP (**P**icture **i**n **P**icture)	SDI	720 x 576i (50 Hz) 720 x 486i (60 Hz)
	HD-SDI	1280 x 720p (50 / 60 Hz) 1920 x 1080i (50 / 60 Hz)
	3G SDI	1920 x 1080p (50 / 60 Hz)

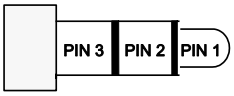
***** = The supplied signal is recognized automatically.

8.2.3 Output interfaces

	HDTV video outputs		Output format *
Digital video	HDMI HD	SXGA HDTV WUXGA	1280 x 1024p (60 Hz) image format 5:4 1920 x 1080p (60 Hz) image format 16:9 1920 x 1200p (60 Hz) image format 16:10
	HDMI 4K	4K (UHD - Ultra High Definition)	3840 x 2160p (60 Hz) image format 16:9
		4K (DCI - Digital Cinema Initiatives)	4096 x 2160p (60 Hz) image format 17:9

Option	HD-SDI video outputs	Output format *
Digital video Image format 16:9	HD-SDI	1280 x 720p (50 / 60 Hz) 1920 x 1080i (50 / 60 Hz)
	3G-SDI	1920 x 1080p (50 / 60 Hz)

Option - only 552510x	Video outputs	PAL output level	NTSC output level
	All level specifications with color bar signal (75% color bar) **		
Analog video Image format 4:3	Video (BNC) composite	1.0 V_{p-p} / 75 Ohm	1.0 V_{p-p} / 75 Ohm
	S-Video (4-pin mini DIN)	Y: 1.0 V_{p-p} / 75 Ohm C: 0.30 V_{p-p} Burst / 75 Ohm	Y: 1.0 V_{p-p} / 75 Ohm C: 0.286 V_{p-p} Burst / 75 Ohm

	Remote output I / II	Output format
Remote		2 x 3.5 mm jack, stereo Normally open contact (NOC): PIN 1 (max. 30V DC at 2 A / min. 10µA at 10mV DC) relative to PIN 3 (GND) PIN 2 is not assigned

	Format	
USB	USB 2.0	Maximum current rating 500 mA per socket

	power supply
DC OUT	Auxiliary voltage outputs 5V DC (1.0 A) and 12V DC (0.4 A)

* = Switchover of output format via touchscreen in the **Video outputs menu.**

** = Switchover of PAL or NTSC output format via touchscreen in the **Video outputs menu**
(The format switchover takes effect on S-Video and video (composite) simultaneously).

8.3 Operating, storage, transport and shipping conditions

Operating conditions	+ 10° C to + 40° C, 30% to 75% rel. humidity, atmospheric pressure 700 hPa to 1060 hPa
Storage, transport and shipping conditions	- 20° C to + 60° C, 10% to 90% rel. humidity, atmospheric pressure 700 hPa to 1060 hPa

☞ ***NOTE!***
To prevent damage during transport or shipment of products, we recommend using the original packaging material.

8.4 Spare parts and accessories

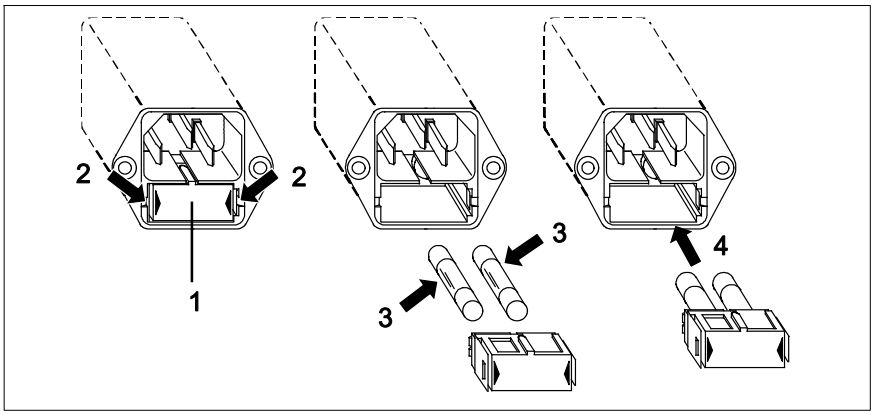
Type	Designation
64268.005	Fuse T 2 AH 250 V (PACK=10PCS)
2440.03	Power cable 3.0 m
N710006	Power cable (USA), 8.0 ft long
103843	HDMI / DVI cable, lockable, 3.0 m
103844	HDMI / DVI cable, lockable, 5.0 m
103847	HDMI / HDMI cable, lockable, 3.0 m
103848	HDMI / HDMI cable, lockable, 5.0 m
103.501	S-VHS cable, 2.0 m
103.502	S-VHS cable, 3.6 m
DZGR-0100-SW-GN	Vector Plus coax cable, 1.0 m
DZGR-0200-SW-GN	Vector Plus coax cable, 2.0 m
DZGR-0300-SW-GN	Vector Plus coax cable, 3.0 m
5502.991	Remote control cable, 1.5 m
32114311	POAG device cable ∅ 4.0 mm, length 0.8 m
32114315	POAG device cable ∅ 6.0 mm, length 6.0 m
72325378	Patch cable RJ45 SFTP, 0.5 m
72325429	Patch cable RJ45 SFTP, 1.0 m
5592105	Plastic cap for network socket, LAN (Ethernet) socket (pack of 8)
72321829	USB Flash memory 32GB (USB stick)
WDBUZG0010BBK-EESN	WD Elements 1TB hard disk
5525401	Handheld remote control, USB
103823	Mini Cleanboard USB, German version (QWERTZ), wipable
103824	Mini Cleanboard USB, English version (QWERTY), wipable
5651051	Digital Color Printer Sony UP-DR80MD
5651926	Color photo print package
85525902	Logic HD camera head, camera cable 3.0 m, cable outlet 30°
5525933	Logic HD PENDUAL camera head, camera cable 3.0 m, angle of camera head 0° to 90°
5525833	Logic HD PENDUAL camera head blue, camera cable 3,0 m, angle of camera head 0° to 90°
85525922	Logic HD camera head, camera cable 3.0 m, cable outlet 30°
85525923	Logic HD camera head, camera cable 5.0 m, cable outlet 30°
85525942	Logic 4K camera head, camera cable 3.0 m, cable outlet 30°
103806	Adapter cable 12V for converter, for the power supply of signal converters
7355071	Sensor ureterorenoscope 8.7Fr, WL 680 mm (BOA Vision)
7355076	Sensor ureterorenoscope 8.7Fr, WL 680 mm (BOA Vision)
7356071	Sensor ureterorenoscope 9.9Fr, WL 680 mm (COBRA Vision)
7356076	Sensor ureterorenoscope 9.9Fr, WL 680 mm (COBRA Vision)
7315001	Sensor cystoscope 16.0Ch, WL 400 mm
	➧ Further accessories on request

8.5 Replacing parts

8.5.1 Device fuses

⚠ *CAUTION!*
The specifications of the device fuses must correspond with the fuse ratings on the identification plate.
Use only the fuses specified in the spare parts list.

★ *Power input connector with fuse holder*



◇ Switch off the device and disconnect the power cable from the wall socket and from the power input connector of the device.
◇ Push together the clamps [2] of the fuse holder [1] and pull out the fuse holder.
◇ Pull out and replace the fuses [3].
◇ Reinsert the fuse holder [4] and push it in until it snaps into place.

8.5.2 Disposal of product, packaging material and accessories

For the disposal observe the relevant regulations and laws valid in your country.
➧For further information please contact the manufacturer.