Ackermann

User Manual

16-2092

Apollo 4K UHD Camera

Ackermann Apollo is a sophisticated 4K Endoscopic Camera System providing Ultra High Definition Image Resolution at 3.840 x 2.160 pixels. The system includes the control unit with integrated USB recording and archive and a camera head featuring 4 programmable buttons. Additionally, it offers a zoom and freeze function, smoke correction and image enhancement of color and structure, a multi-language setup as well as 10 user presets for surgical applications.

Camera System

CE

Chapter Overview

CONTENTS

Chapter 1

GENERAL INFORMATION

DATA OF THE DEVICE

You will find the technical data that must always be provided when ordering spare parts or other question on the model plate (back of the device) or if a repair is not possible, these components must be sent to Ackermann for repair or be disposed of.

RETURN SHIPMENT

In the case of returns (because of a repair, complaint or other service issue), please observe our conditions of return. These can be found in the service area of our website https://www.ackermannsurgical.com/return-warranty-policy

WARRANTY

IMPORTANT

⚠ The warranty period is one year according to our warranty conditions. Unauthorized opening of the device and repairs, i.e. modifications by persons not authorized by the manufacturer release us from any liability for the operating reliability of the device. Any warranty entitlement therefore expires during the warranty period. Wear parts are excluded from the warranty.

SERVICE, REPAIRS, MODIFICATIONS

ADVICE

All services, such as regular inspections, repairs, modifications, calibrations, etc. may only be performed by the manufacturer or by expressly authorized persons, in consideration of the special safety regulations for medical and technical equipment. Completed services must be entered in the table „Maintenance report“ findable in annex. We recommend at least an annual maintenance.

RESPONSIBILITY

As the manufacturer of the device, we only consider us to be responsible for the impact on the safety, reliability and performance of the unit, if:

- Assembly, upgrade, resetting, modifications or repairs are carried out by persons authorized by us.
- The electrical installation of the particular area meets the requirements of the respective country.
- The device is used in accordance with the instruction manual.

RIGHTS

DISPOSAL

According to the provisions of the European directive 2002/96/EC on used electrical and electronic equipment (WEEE), this symbol signifies that the product may not be disposed of as unsorted municipal waste, but must be collected separately. Contact your dealer regarding the return and / or the collection systems available in your country.

Chapter 2 SAFETY REFERENCE / PLACE THE EQUIPMENT

INTENDED USE

⚠ The device is designed for use in endoscopic diagnosis and endoscopic surgical technique. Use the device only with accessories, wear items, and disposable items, which are listed as accessories by the manufacturer or their safety and biologically acceptable usefulness.

QUALIFICATIONS OF THE USER / OPERATOR

⚠ The unit may only be used by persons with the appropriate professional qualifications and who have been trained on this unit. Before using the unit, the user must be convinced of the reliability and the proper condition of the unit.

STORAGE AND OPERATING CONDITIONS

- Storage temperature: - 20°C to +60°C
- Operating temperature: +10°C to +40°C

- Relative humidity – Storage: 10% to 90%
- Relative humidity - Operation: 30% to 75%

- Atmospheric pressure - Storage: 600 mbar to 1300 mbar
- Atmospheric pressure - Operation: 700 mbar to 1060 mbar

REPLACEMENT DEVICE

Have a replacement device ready for incalculable emergencies (worst-case scenario).

SAFETY MEASURES FOR SETUP AND OPERATION

⚠ For proper operation of the unit and to avoid possible hazards you observe the following precautions:

- Only place the unit on a base secured against tipping.

- The device may only be used in rooms that are installed according to national valid standards. The environmental temperature and the relative humidity must correspond to the values listed above (see storage and operation conditions). If the instrument was exposed to extreme temperatures during transport it should be acclimatized to room temperature prior to operation.

- The plug-in device for a potential equalization should be properly connected. The control unit is basically grounded via the 3-pin type F plug, if it is connected to a grounded power cord as prescribed. When operating the device in rooms of application group 2 according to DIN VDE 0100 it is essential that the device is connected to the stationary potential equalization of the room or the equipment truck by an appropriate cable. The device has an appropriate plug-in connector (according to DIN 42801).

- Use only the power cord provided for the power connection.

- This device may only be connected to a supply network with a protective conductor

- Check if the local mains voltage corresponds to the voltage range of the instrument!

- The patient and the following parts must not be touched at the same time:
    - Touchable contacts of connectors
    - Contacts of fuse holders that are accessible during the replacement of fuses

- Install the instrument in a way that there is always a suitable flow of fresh air.

- Operating the unit in explosion-prone areas is prohibited.

- The safe operation of the device is guaranteed up to a height of 3000m.

- The connection of two or more devices can lead to a higher leakage current.

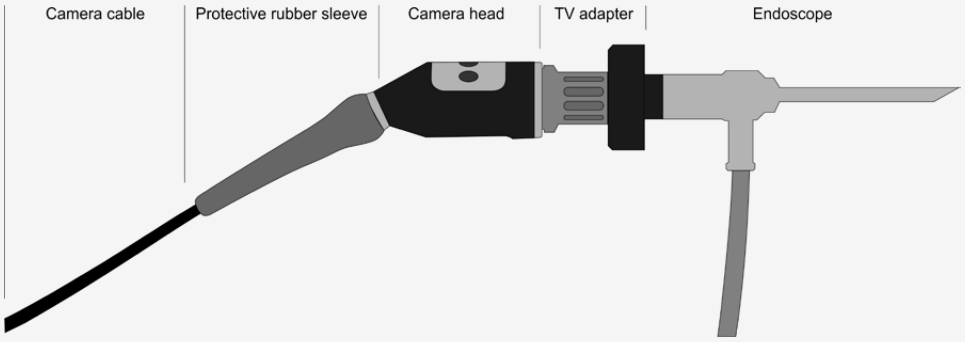
- Electro-medical devices are subject to specific precautions concerning electromagnetic compatibility (EMC). Observe the following information prior to operation:
    - Mobile communication devices can interfere with the function of other electronic devices. Switch off your mobile phone or similar devices close to medical devices or medical facilities.
    - Use solely the enclosed cables and original spare parts (see chapter Unpacking / Standard equipment).The use of other cables and spare parts may lead to a reduced interference resistance and to an increased emitted interference.
    - If the present medical device is stacked or placed directly next to other electronic devices the whole configuration and the present medical device has to be tested for correct function.

- The device must not be operated near flammable gases or flammable substances, and within the direct patient environment.

CAMERA HEAD, CABLE AND PROTECTIVE RUBBER SLEEVE

The following instructions must be observed when handling the camera head. Failure to do so may damage the camera cable or the camera head. In the event of demonstrable application errors due to failure to follow these instructions, a manufacturer's warranty or liability is excluded.

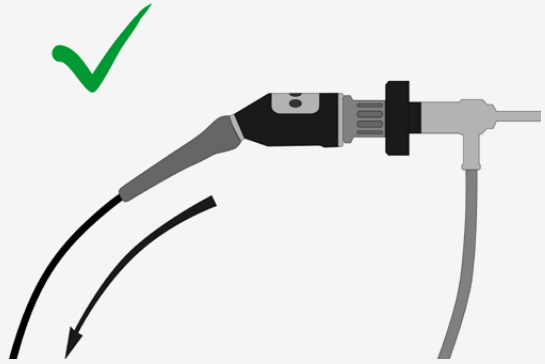
ASSEMBLY OVERVIEW



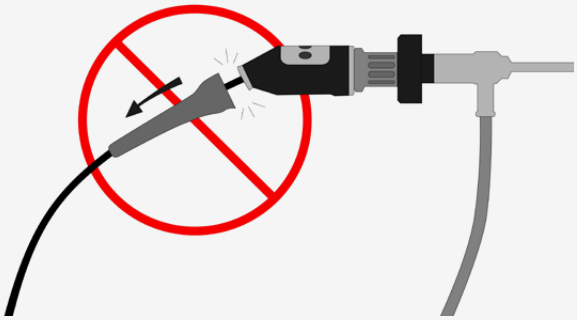
CORRECT CABLE ROUTING

For all applications (including endoscopy as well as cleaning / sterilization), the manufacturer-defined natural run of the cable and the protective rubber sleeve must be maintained.

The direction of the cable is determined by design:



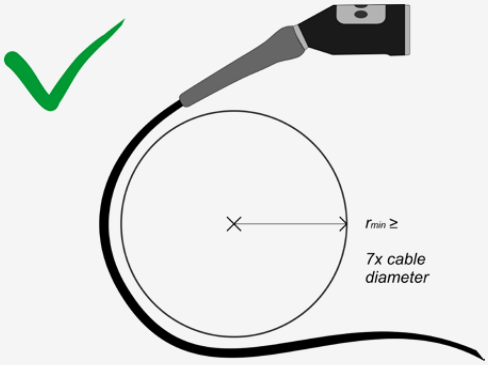
The protective rubber sleeve must not be removed:



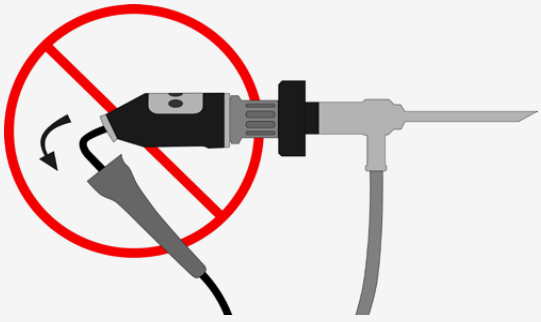
SMALLEST PERMISSIBLE BENDING RADIUS

For all applications (including endoscopy as well as cleaning / sterilization), the cable and the protective rubber sleeve must not be wound / laid / routed in a radius smaller than 7x cable diameter.

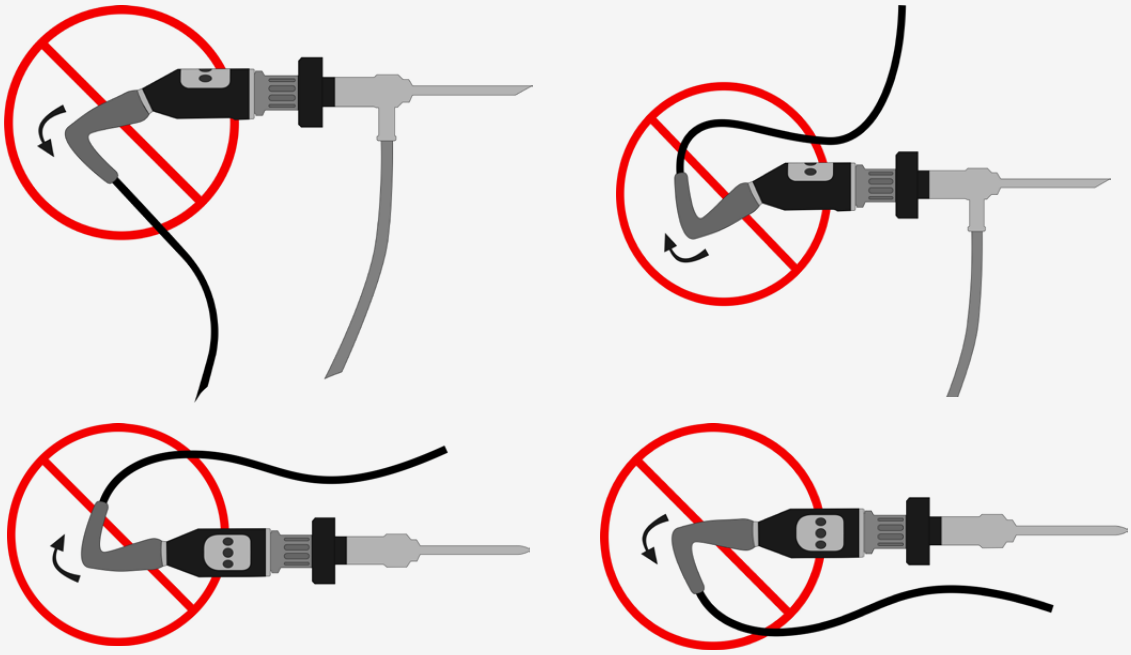
This applies to every direction in which the cable is moved:



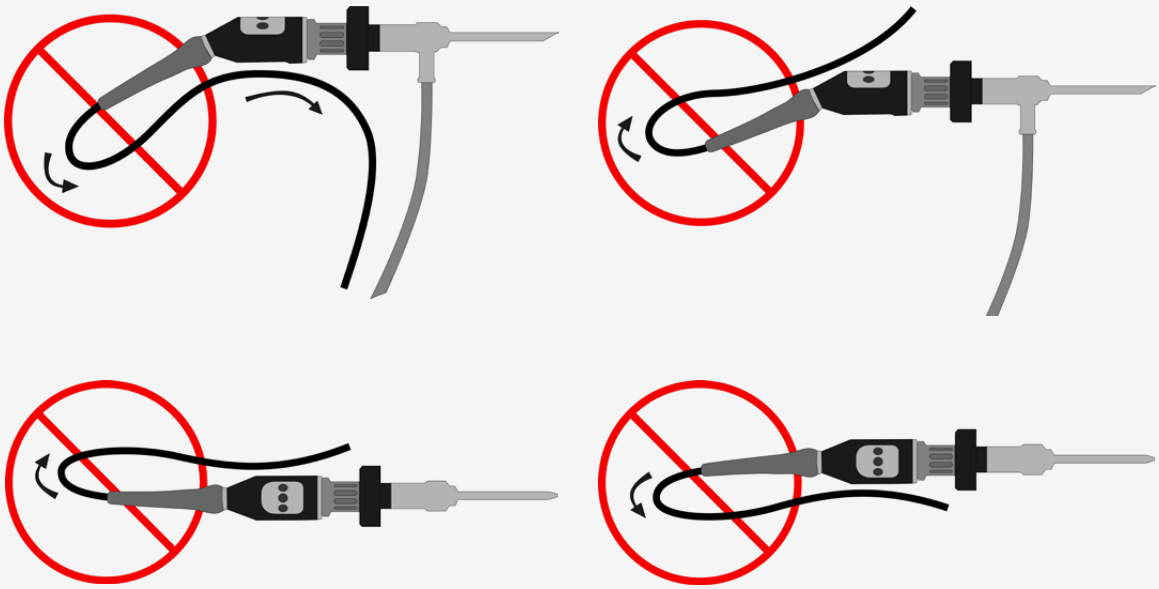
The cable must not be kinked or bent between the protective rubber sleeve and the camera head housing:



The cable and the protective rubber sleeve must not be kinked or bent sharply:



The cable itselve must not be kinked or bent sharply:



Chapter 3

DESCRIPTION OF THE UNIT

This device is a 3-chip camera (MOS) of the latest generation, with superior image quality in 4K ultra high definition (Aspect ratio 16:9) and natural colour reproduction, which was especially adapted for endoscopic applications and meets specific quality standards.
The camera delivers a significantly higher picture quality with very high detail accuracy with 4 times as many picture points as with Full HD. The device is designed according to the latest findings concerning safety of medical devices and complies with the requirement set out in 93/42/EEC (CE).

CE

EQUIPMENT / FUNCTIONS

The camera consists of a control unit (CCU, Camera Control Unit) and a camera. At the front of the camera head is a C-mount thread, where standard lenses, zoom lenses, endoscope adapters and other adapters can be connected. The allocation of the buttons on the camera head is freely programmable, so that various camera functions can be activated or executed via the head buttons (e.g., White balance, Zoom, Freeze, ...)

OSD MENU

This device can be set individually on the integrated on-screen menu. The settings are stored in an internal memory. Ten different user profiles can be created in order to use custom settings.

ZOOM

The camera is equipped with an electronic zoom function. Three different zoom levels (revolution x1.0 -> x1.5 -> x2.0 -> x2.5) can be selected with the buttons on the camera head.

ARCHIVING SYSTEM

Video clips and pictures can be stored on a USB flash drive.

FREEZE

The picture displayed on the screen can be frozen by pressing the buttons on the camera head or by pressing the foot switch (optional) (still picture).

CONNECTIONS

The video signal is available at the rear of the unit as a digital HDMI (4K UHD / HD) and SDI (4K UHD / HD). The remote-out jack is available for the connection of external output devices such as video printers or video recorders. A footswitch can be connected to the Remote-in-terminal.

OTHER

The image brightness is adjusted automatically by the camera board to ensure an optimal display under all lighting conditions.

RECOMMENDED EQUIPMENT COMBINATIONS

Xenon light sources and CO2-Insufflators manufactured by Ackermann.

RECOMMENDED ACCESSORIES

For an optimum utilization of the power spectrum of the 4K camera device, we recommend the use of 4K endoscopes and TV adapters as well as 4K Sony monitors.

Chapter 4 INSTALLATION AND ACTIVATION

RECEIVING INSPECTION

The device and the delivered accessories have to be examined for completeness and apparent damages on receipt. To assert your rights, transport damages must be reported immediately (within 24 hours) to the deliverer. Please always use the original packing if you return the device and the additional instruments. Describe the error / misfunction and attach the address of a contact person for possible requests.

UNPACKING / STANDARD EQUIPMENT

Carefully remove the unit and the included accessories from the packaging. Check the delivery for completeness and for possible damage from transportation. If the delivery should provide a cause for complaint, please contact us or supplier immediately. Store the original packaging, as these can be reused for any possible future shipping.

- Basic equipment
  - Camera unit
  - Camera head with cable 3,05m (10ft)
  - Mains cable (1,80m)
  - USB flash drive
  - HDMI cable (high speed) (2,00m), Jack cable 3,5 (1,55m)
  - Operating Manual

- Optional equipment
  - Footswitch with cable (2,10m)
  - USB keyboard with cable (1,80m)

INSTALLATION

⚠ ATTENTION

▪ Connect the power cord!
Use the supplied power cord to connect the device to the line voltage. Verify that the line voltage displayed on the device is correct. Plug the device only into a grounded protective contact socket.

▪ Connect the camera cable!
Connect the plug of the camera cable to the appropriate jack. The plug has an anti-twist safeguard, so that the plug can only be plugged in one position (red dot on top). Plug the 32-pin connector with notch to the top in the socket. You can connect all the lenses and endoscope adapters that have a C-mount thread to the camera head.

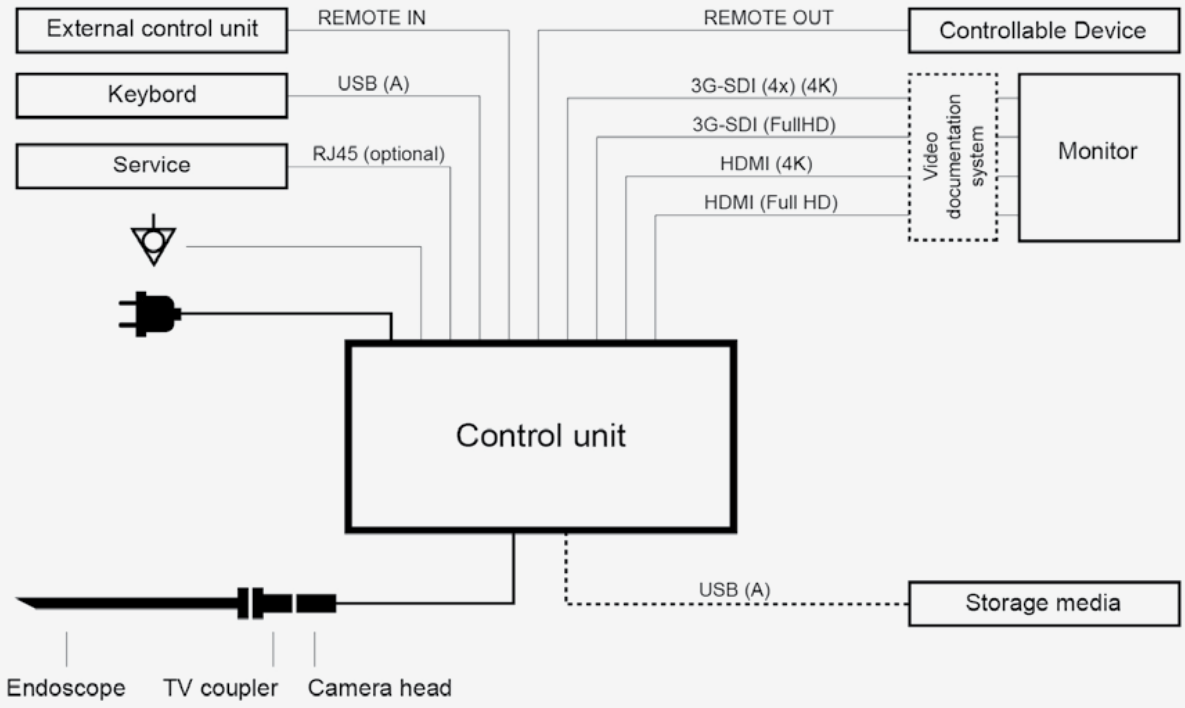
▪ Connect the external output devices!
As described above, the camera provides the video signal in various standards. Here you can connect all external output devices such as monitors, video recorders and video printers.

▪ Connect the equipotential terminal!
Connect the unit to the stationary potential equalization of the room or the equipment truck by an appropriate cable. Observe the local safety rules!

⚠ ATTENTION

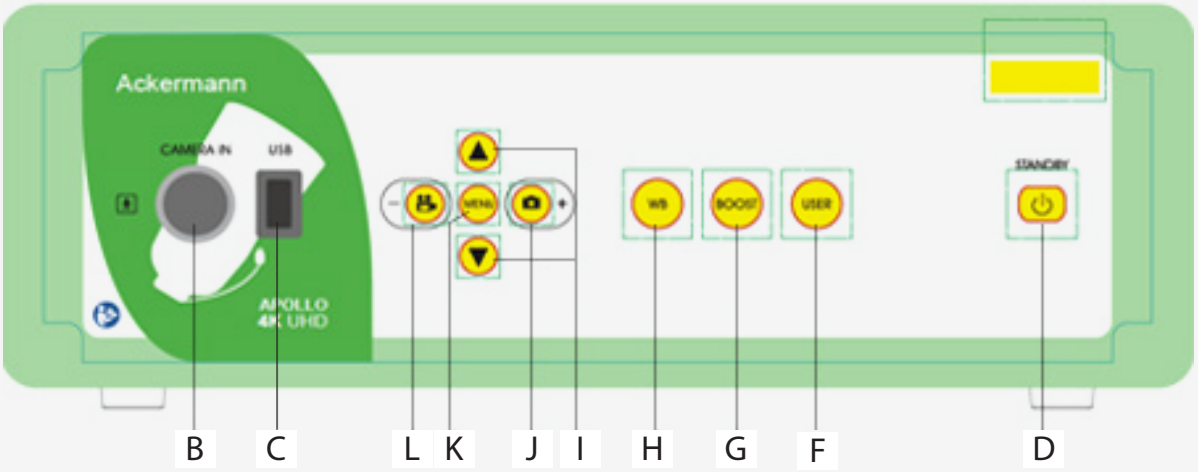
If use the potential equalization, please note the requirements of IEC 60601-1 (current edition). Don't use this terminal as protective ground connection!

CONNECTIVITY OPTIONS

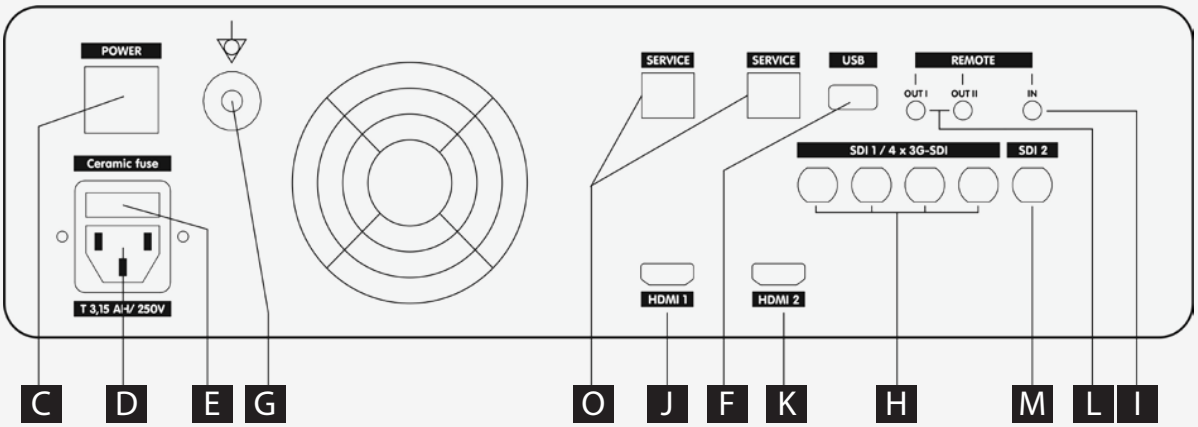


Chapter 5 CONTROL ELEMENTS / CONNECTIONS

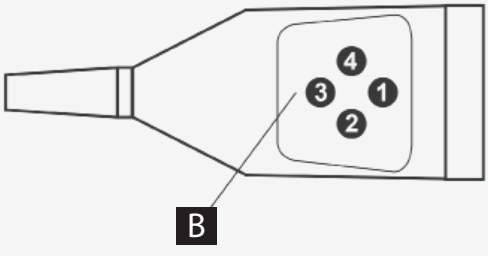
FRONT VIEW



REAR VIEW



CAMERA HEAD



DESCRIPTION OF THE CONTROL ELEMENTS AND CONNECTIONS

B Camera cable:	The plug of the camera cable is connected to this socket. The plug has an anti-twist safeguard, so that the plug can only be plugged in one position. ! Attention ! Use only the supplied camera head and cable!
C USB (A)	This USB-interface it's for connecting the device with USB flash drives to record data. When a USB flash drive is connected to this interface, the notice "USB" appears on the screen.
D Standby:	The control unit is turned on by using this button. Short press of the power button turns the control unit on. The operation mode is indicated by a green illumination of the "POWER" button. By pressing the "POWER" button (approx. 3 sec.) again, the unit is turned off (Standby mode). Note: The mains switch at the rear panel must be switched on, before you can use this button.
E	not applicable
F User:	User profiles can be activated by pressing this button. The individual profiles can be selected by repeatedly pressing this button. The profiles can be set in the menu (see „Setting USER profiles"), the desired profile must be selected. If a USER - change is selected the button „USER" is fully illuminated when reloading the profile and a „U" flashes in the lowest line (right).
G Brightness amplification (Boost)	The camera is equipped with a BOOST function to raise the image brightness in low light conditions. Press the corresponding button to activate the feature. You will hardly recognize an effect on the monitor with adequate lighting. The current setting is indicated by a notice ("B") on the screen. Note: This function can be activated optionally via remote keys (camera head or footswitch) (see "Menu settings").
H White balance (WB):	The white balance of the camera is made with the "WB" button (see "Operation>White balance"). If the function "White balance" is selected, the key „WB" is fully illuminated. „WB" flashes in the lowest line (right) of the OSD while executing the function. An „OK" appears when successful or „NG" when failed after completing the function.
I Sroll buttons:	Menu items can be selected and settings can be executed by using these buttons.
J Image capture / Scroll:	By pressing this button images in JPEG format (1920x1080) can be stored or within the menu settings can be made. By pressing the button the image is captured and will be stored on the connected USB flash drive. During image capturing (approx. 3 sec.) the message "USB" is shown in red. The termination of the storage process is indicated by a brief beep. Note: To use the capture function a USB flash drive must be connected. The capture function can be activated optionally via remote keys (camera head or footswitch) (see "Menu settings"). Within the menu, values of selected menu items can be changed.
K Menu:	User settings can be conveniently carried in a menu. The menu of the camera is activated by pressing this button. The button lights up when the menu is activated.

L Video capture / Scroll:	By pressing this button videos can be stored (MPEG-4) on the connected USB flash drive or within the menu settings can be made. If you want to capture a video clip, press this button one time to start recording. Press the button again to stop the recording. Wait a few seconds for the video to save. You can press this button again to start recording a new video clip, and so on. During video capturing the message “USB” is shown in red. The termination of the storage process is indicated by a brief beep. Note: To use the capture function a USB flash drive must be connected. The capture function can be activated optionally via remote keys (camera head or footswitch) (see “Menu settings”). Within the menu, menu items can be selected.
B Remote control function	With these keys, the functions of the camera can be remotely controlled by the camera head. The head keys are distinguished between pressing the key briefly and a long, so that a total of 8 functions are possible. The allocation of the head buttons can be defined via the OSD menu (see Menu settings – Option “Remote keys“).
C Power switch	The unit is switched on by pressing the power button. The power switch has two switching positions: I (ON – switched on) 0 (OFF – swichtes off) The switch lights up green when the unit is turned on.
D Mains connection	The plug of the power connection cable is connected to this cold equipment power connection. Use only the provided power cord.
E Fuse holder	The equipment fuses are located in the fuse holder. Only use the fuses listed on the model tag! Replacing the fuses is described in the service section of these operating instructions (see „Replacement of the power fuses“).
F USB keyboard	This USB port (Type A) is used to connect an USB keyboard. Any text can be placed on the video image via a connected keyboard. The text remains on the screen or video recordings. A more detailed functional description, see the chapter „Using an USB keyboard“.
G Equipotential terminal	This connector is used to connect the device to the central potential equalization of the OP, or the trolley.
H J K M Video ports	External devices (such as a monitor or recording device) can be connected to the VIDEO OUT jacks. The video signal is available in different standards. ▪ HDMI 1 -> J ▪ HDMI 2 -> K ▪ SDI 1 / 4x 3G SDI -> H ▪ SDI 2 -> M
I L Remote Input / Output	The remote IN jack is for connecting a footswitch (optional). External devices such as a video recorder or video printer can be connected to the remote OUT jack.
O Service	This output is for connection to a light source with automatic brightness control from the same manufacturer. It is also reserved for the service personnel for diagnosis / maintenance purposes.

Chapter 6 OPERATION

START UP

After all cable connections have been made, the camera can be put into operation. Switch on the camera by using the mains switch C on the rear. The green light in the switch lights up.

After that, the camera is in standby mode, indicated by yellow lightning of the push button “POWER” D. By pressing the “POWER” button the device turns into the operating mode. The operating mode is indicated by green lightning of the “Standby” button and a brief bleep. The device performs power-up diagnostics at the start-up. This is indicated by an illumination sequence of the LEDs on the front panel.

Note: Complete operating status is reached after approx. 30 seconds.

Note: The camera head can exceed a temperature of 41 ° C during operation and heat up to 60 ° C under unfavorable operating conditions.

If the connected monitor is switched on, an image appears on the monitor. Now switch on the light source connected to the endoscope and set a medium brightness.

USING THE CAMERA CONNECTED WITH A LIGHT SOURCE

If you are using a light source, that does not provide an automatic intensity control via video level, set the intensity to an average brightness. The powerful shutter guarantees a correct exposure. If there is not enough illumination available, the video signal is automatically enhanced by the Automatic Gain Control. This will add noise to the monitor picture. In this case you should increase the output intensity of the light source.

WHITE BALANCE

The white balance of the camera is made with the “WB” button H. The camera head (with screwed on lens) must be kept on a uniformly illuminated white surface to perform the white balance. Simultaneously press the button for white balance H. It is important to verify that the white area is not eclipsed. A correct color rendition is only guaranteed, when the white balance is properly implemented.

The current setting is stored in the camera and is retained even after switching off. If the function “White balance” is selected, the button „WB“ is fully illuminated. “WB” flashes in the lowest line (right) of the OSD while executing the function. An “OK” appears when successful or “NG” when failed after completing the function.

Note: This function can be activated optionally via remote keys (camera head or footswitch) (see “Menu settings”).

USER PROFILES

The 4K camera unit can handle 10 USER profiles. The user can be changed through the front button „USER“ F or the F5 key (with keyboard connected). The profile can be selected using the scroll buttons I and activated with the menu button K. Profile settings can be made in the menu, while the desired profile must first be selected. The currently active profile is displayed in the menu header in brackets.

Changes of menu settings are saved. The above items are written in the currently active user-memory. They are available immediately.

The following user profiles are available as standard settings (factory default settings):

- Lap 10mm: Standard setting for laparoscopy with 10mm endoscopes

- Lap 10mm enh R Y: Standard setting for laparoscopy with 10mm endoscopes, enhancement function for contrast spreading in the red / yellow area, improved contrast for visualizing the vessels

- Lap 5mm: Standard setting for laparoscopy with 5mm endoscopes

- Lap 5mm enh R Y: Standard setting for laparoscopy with 5mm endoscopes, enhancement function for contrast spreading in the red / yellow area, improved contrast for visualization of the vessels

- Arthro: Standard setting for arthroscopy

- Arthro enh exp: Standard setting for arthroscopy with reduction of overexposure

- Arthro enh R: Standard setting for arthroscopy with enhancement function for contrast spreading in the red area

- Uro Gyn: Standard setting for urology and gynecology

- Uro Gyn enh R Y: Standard setting for urology and gynecology, enhancement function for contrast spreading in the red / yellow area, improved contrast for visualizing the vessels

- Flex: Standard setting for flexible and semi-flexible endoscopes with fiber image guides

MENU SETTINGS

Various functions and parameters can be changed according to individual requirements in the OSD mode.

Note: According the respective software revision, the menu items can deviate from the menu items as described in this manual.

In order to reach the menu mode, press the appropriate button K . In menu mode, the buttons on the front panel have the following functions:

- I Selecting menu items
- J L Changing the settings
- K Activate the functions and submenus

The front panel buttons I, J and L are used to navigate within the menu and sub-menues. All processes are completed by pressing the “MENU” button K . Each of the next menu items is selected or activated by repeatedly pressing the MENU button.

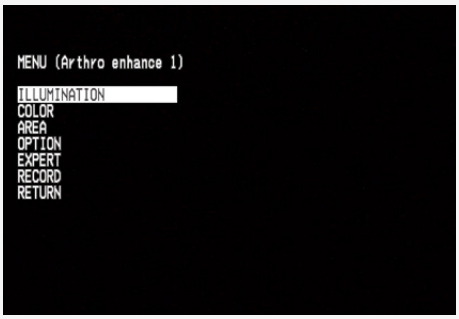
The menu can be controlled if a USB keyboard is connected F . Settings can be made by using the cursor keys. The settings are confirmed with the Enter key.

The changed parameters are automatically saved in the selected USER-profile of the camera. If you have accidentally changed parameters and you are unsatisfied with the picture quality, factory settings can be reset at any time. On that point, select and perform the menu item „factory settings“.

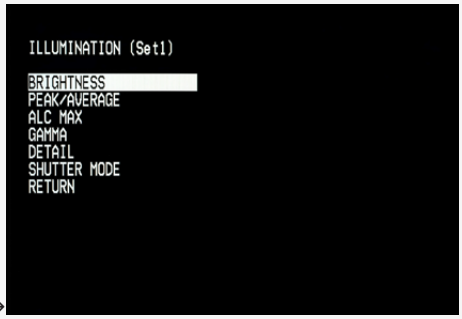
To exit the menu, the menu item „RETURN“ must be used. Optionally, use the „ESC“ key to leave the menu if a USB keyboard is connected.

MENU NAVIGATION

MAIN MENU



SUBMENUS



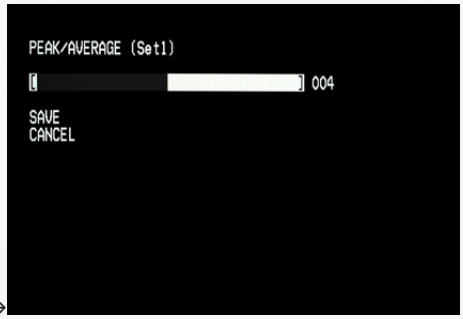
ILLUMINATION (MAIN MENU ITEM 1)

This menu item offers the user the possibility to individually adjust the illumination of the camera image.

BRIGHTNESS

The brightness of the overall image can be regulated under this menu item.
As shown in the picture above, the current value is visualized by a slider and a numerical value. The value is changed by using the buttons J and L Using the buttons H the user can select the items „SAVE“ or „CANCEL“. In case of „SAVE“, the current setting will be saved and is also available after restarting. In the case of „CANCEL“, the set value is discarded and reset to the initial value.

Note: All of the following menu items are set in the same manner.



PEAK / AVERAGE

Sets the ratio of average brightness values to peak values (Average/ Peak) to reduce fading.

→→

ALC MAX

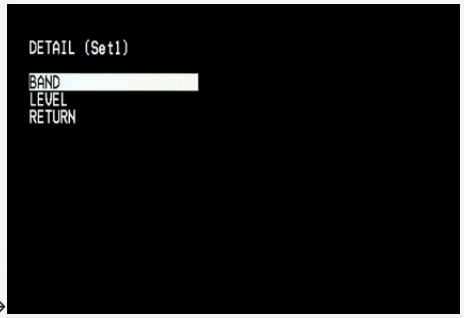
Setting the maximum brightness intensity

→→

GAMMA

Changing the GAMMA value

→→



DETAIL

The detail contrast can be defined under this menu item.

→→→

BAND

Determining the emphasis between coarser and finer image stuctures

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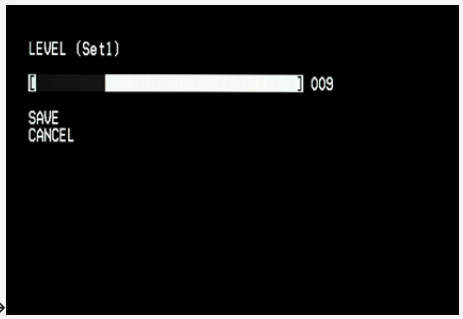
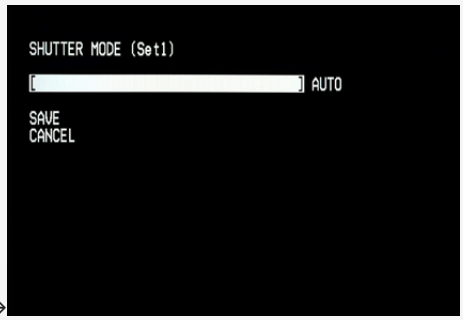
→→→



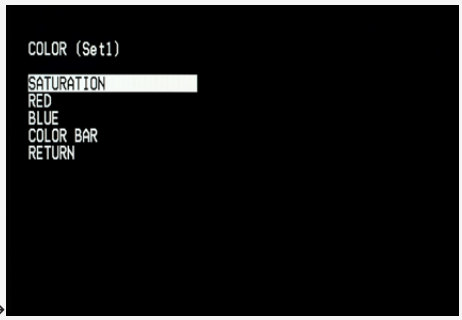
LEVEL

Edge enhancement to enhance the sharpness of the image



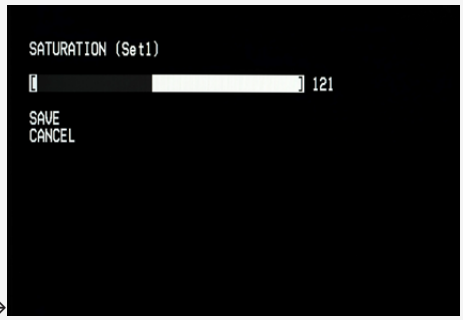
SHUTTER MODE

Setting Shutter-Mode: Manual (1/60…1/10.000) / Automatic



COLOR (MAIN MENU ITEM 2)

In this menu, the total color saturation and the intensity of the individual colors can be set. A color bar pattern can also be inserted (4 COLOR BAR) for test purposes.



SATURATION

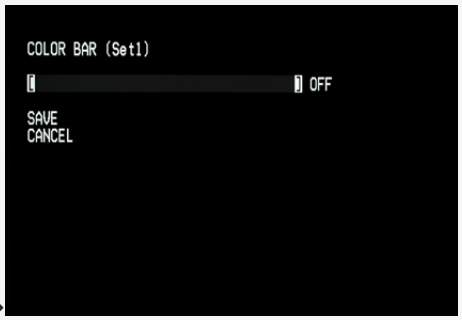
Use this control to adjust the color saturation.

RED

Moving the slider changes the red portion of the image.
(Adjusting the camera to the monitor)

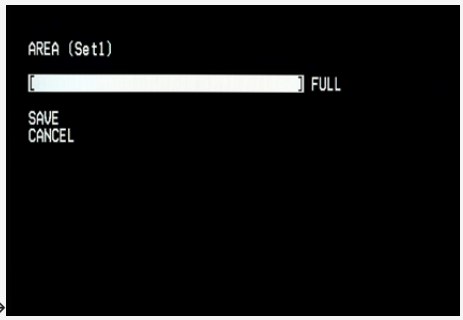
BLUE

Moving the slider changes the blue portion of the image. (Adjusting the camera to the monitor)



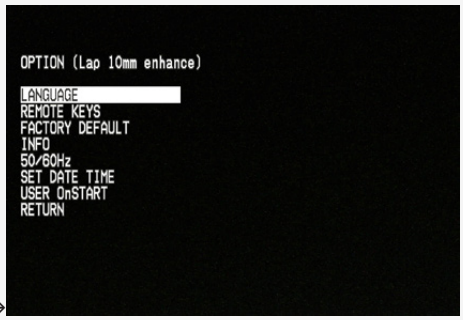
COLOR BAR

View to test the monitor signal

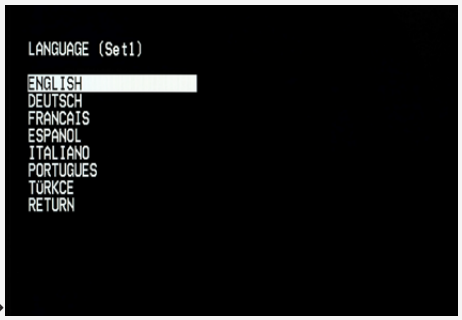


AREA (MAIN MENU ITEM 3)

Under this menu item, the measurement field for the brightness control can be set.



OPTION (MAIN MENU ITEM 4)



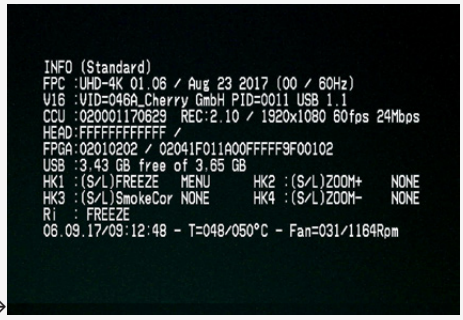
LANGUAGE

In this menu the desired language of the menu can be selected.

REMOTE KEYS (CAMERA HEAD KEYS)

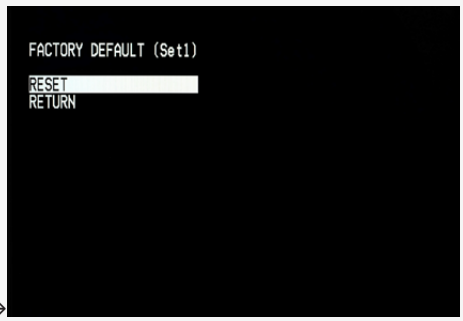
In this menu item, it is possible to assign different functions to the buttons of the camera head B. In the case of the head buttons, a distinction is made between a short and a long key press, so that a total of 8 functions are possible.
The following functions are possible:

- NONE: no function
- WB: white balance
- SC: Smoke correction
- BOOST: Image brightening
- MENU: OSD Menu
- MOV: Video capturing
- PIC: Image capturing
- ZOOM+: Modification Circulation x1,0 > x1,5 > x2.0 > x2,5
- ZOOM - :Modifikation Scaling x1,0 > x2,5 > x2.0 > x1,5
- REMOTE 1: Triggering a switching pulse (currently 300ms)
- REMOTE 2: Triggering a switching pulse (currently 300ms)
- Freezing the image, characterized by “F” Pos = 12 x 26
- Change of user data



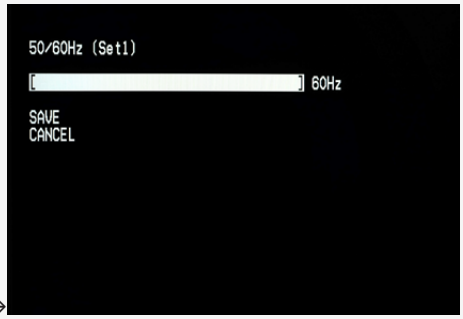
INFOSCREEN

The Infoscreen displays current status information



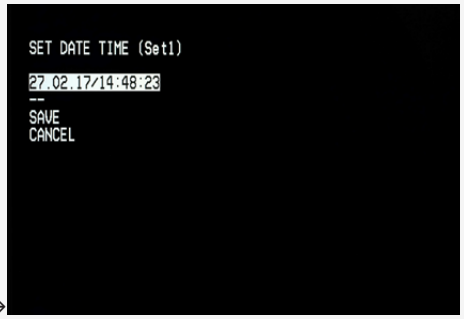
FACTORY DEFAULT

By activating the “Reset” point, all parameters are reset to the factory settings and the system is “rebooted”. This is characterized by a uniform flashing of the button lighting and lasts approx. 7s.



50/60HZ

Switching / setting of the mains frequency (country-specific)



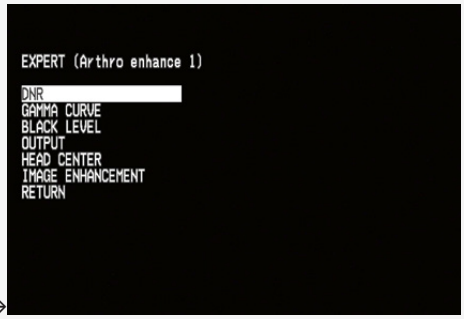
SET DATE TIME

Setting the date and time

Note: These data are not displayed in image or video recordings.

USER ON START

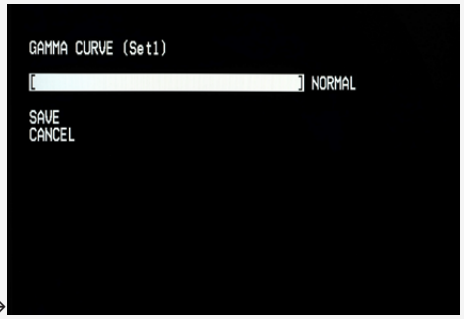
In the “UserOnStart” menu, you can specify whether the user profile selection should first be carried out when the device is restarted, or whether the device starts automatically with the last user profile selected.



EXPERT (MAIN MENU ITEM 5)

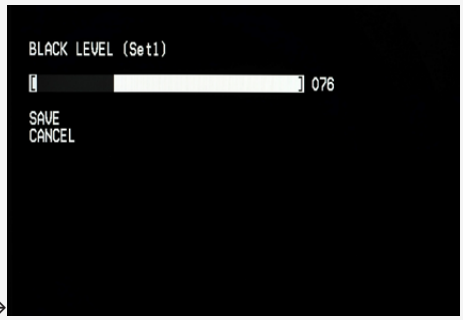
DNR (DIGITAL NOISE REDUCTION)

With “DNR” a noise reduction can be achieved



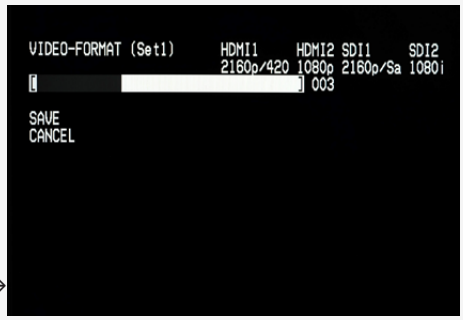
GAMMA CURVE

This menu item can be used to influence the S-curve of the gamma curve. This causes a contrast increase.



BLACK LEVEL

Black level controls the black level.



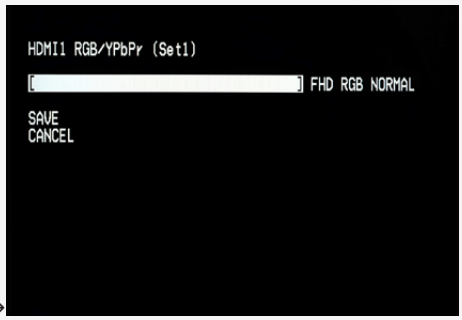
VIDEO FORMAT

Depending on the monitor, the setting of the video resolution can be made here.
- HDMI 1: 4K resolution
- HDMI 2: FullHD resolution
- SDI 1: 4K resolution
- HDMI 2 FullHD resolution

ABBREVIATIONS / METHOD OF IMAGE COMPOSITION:

p: progessive i: interlaced
Sa: Sample interleave Sq: Square division

Note! If an incorrect setting is selected in the video format, no image may appear on the monitor. A reset of the video outputs could help. Please refer to the troubleshooting chapter.

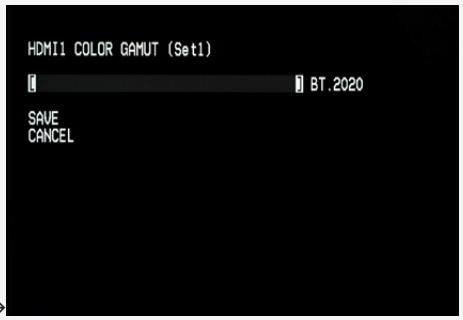


HDMI 1 – OUTPUT

Setting the video signal

HDMI 2 – OUTPUT

Setting the video signal

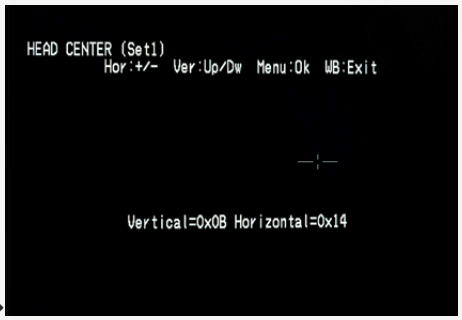


HDMI 1

Selecting the color space between BT.2020 or BT.709.5

SDI 1

Selecting the color space between BT.2020 or BT.709.5



HEAD CENTER

Adjusting the image orientation

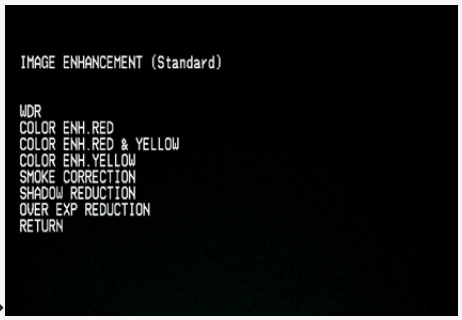


IMAGE ENHANCEMENT

In various modes image enhancements can be made. The mode that is active in the userpreset flashes. If a mode is changed, it is automatically activated.

WIDE DIGITAL RANGE

Increasing the dynamic absorption.

COLOR ENHANCEMENT RED

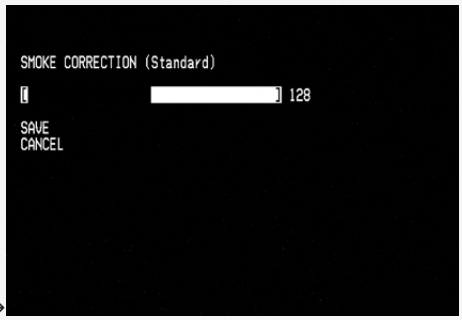
Color adjustment in the red area

COLOR ENHANCEMENT RED & YELLOW

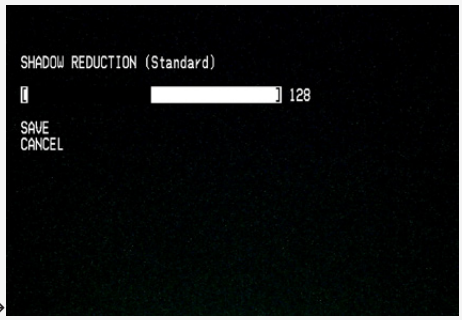
Color adjustment in the red & yellow area

COLOR ENHANCEMENT YELLOW

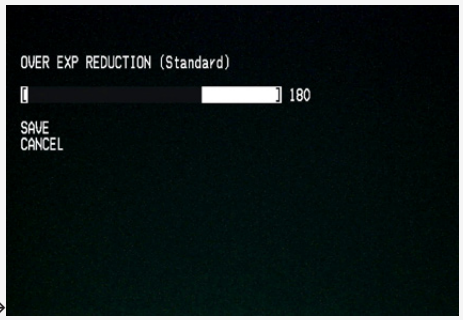
Color adjustment in the yellow area



SMOKE CORRECTION

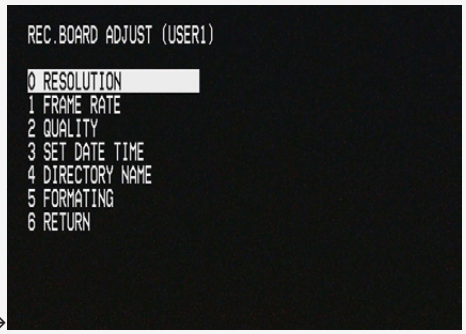


SHADOW REDUCTION



→→→

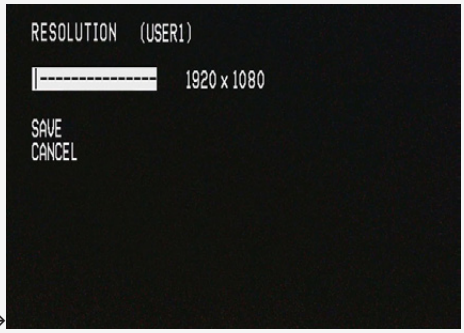
OVER EXPOSURE REDUCTION



→→

RECORD BOARD ADJUSTMENT (OPTIONAL)

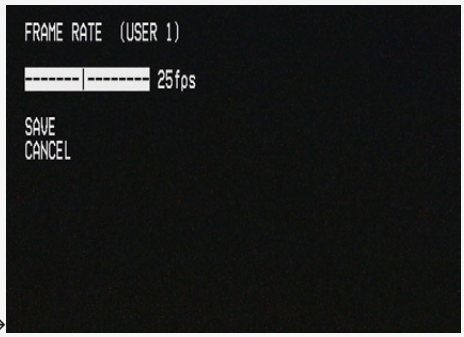
This menu item various parameters associated with the storage of images or videos can be adjusted.
The detailed settings can then be made in the menus below.



→→→

RESOLUTION

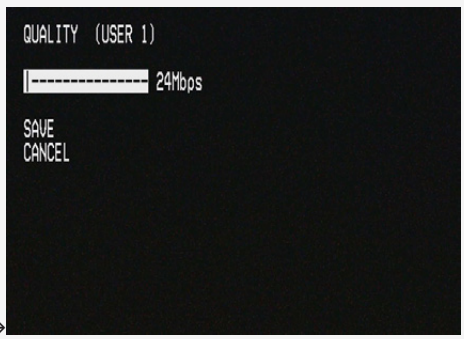
Image resolution in recording mode (1920x1080; 1280x720; 640x360; 320x180)



→→→

FRAME RATE

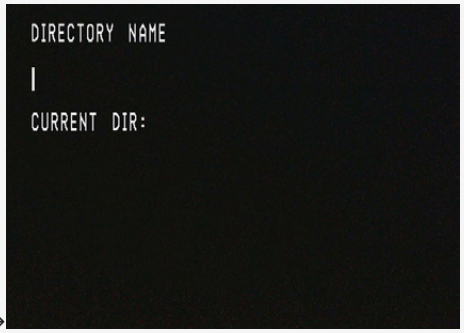
image repetition frequency (60fps; 30fps; 15fps)



→→→

QUALITY

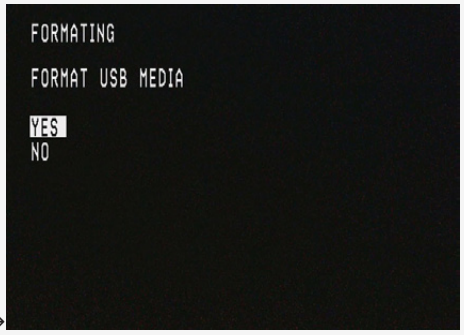
Compression (data rate to the USB memory medium) (24Mbps; 16Mbps; 12Mbps; 8Mbps; 4Mbps)



DIRECTORY NAME

An individual name of the location (folder) can be set under this menu item.

Note: To use this function, a USB keyboard must be connected to the device.



FORMATING

Format the connected USB storage media. The “Format” message flashes during the formatting process. If the formatting is completed successfully, the message “OK” appears.

MORE FEATURES

CONNECTING USB FLASH DRIVES

Use the USB port C (Type A) on the front side of the device for connecting external USB storage devices (flash drives). When a USB device is connected to this interface, the message “USB” appears on the monitor and information on the size and availability (free space) of the storage medium will be displayed momentarily.

Note: The USB flash drive should be formatted with the FAT or extFAT system to reduce the problems of detection.

Note: Press the button “Scroll down” I before removing the USB flash drive. The message „Remove USB Media“ and an acoustic signal (beep) indicate that the USB memory stick can be separated from the device.

RECORDING FUCTION IMAGE

The live image is captured and will be stored on the connected USB flash drive by pressing the button J. During image capturing (approx. 3 sec.) the message “USB” is shown in red. The termination of the storage process is indicated by a brief beep.

RECORDING FUCTION VIDEO

Videos can be captured and stored (MPEG-4) on the connected USB flash drive. Press the button (4) once to start recording. Press the button L again to stop the recording. Wait a few seconds until the save is completed. You can press this button again to start recording a new video clip, and so on. The termination of the storage process is indicated by a brief beep.
Using an USB keyboard
All camera functions can be controlled and settings in the menu can be made by using an USB keyboard. The user is also able to place an individual text on the screen with the aid of the keyboard (see „On Screen Display“).

BUTTON ALLOCATION

The following keys have fixed functions:

F1: Help
F2: INFO
F3: WB (White balance)
F4: BOOST (Brightness amplification)
F5: USER (User settings)
F6: Menu
F7: OSD (input of patient information„)
F10: CLR SCR (Clear Screen)
F11: Picture archiving
F12: Video archiving (Start/Stop)
BREAK: FREEZE (freeze frame)
PRTSC: REMOTE (ext. switching contact)
ESC: QUIT Ende à Menu or OSD
PG-UP: ZOOM+
PG-DW: ZOOM-
STRG+ALT+S: WHITE SHADING
STRG+ALT+P/B: BLEMISH DAT/COM:
- Automatic Pixel Compensation
- STRG+ALT+P: Display
- STRG+ALT+B: Performing the function

Note: The lens must be connected when performing the BLEMISH function.

During the functions of “FREEZE”, “ZOOM” and “USER”, status information is displayed in the bottom line. The function “FREEZE” is marked by an “F”. In the case of a zoom level greater than 1.0, this becomes visible by the display:
- *1,5 / *2,0 / *2,5

ON SCREEN DISPLAY (OSD)

It is possible to place an individual text on the screen by using the USB keyboard. This mode is activated by the F7 key only when the menu is not activated. A cursor flashes in the top left corner in the form of a „|“ character at the initial use after power up. Now the user can modify his input. The following buttons are available for editing tasks:

- HOME: places the cursor in the upper left corner
- END: places the cursor in the lower left corner
- DEL: deletes a character and decrements the cursor position
- BACKSPAC: ditto
- CURSOR LEFT: \
- CURSOR RIGHT: Cursor
- CURSOR UP: move
- CURSOR DOWN: /
- ENTER: Cursor is placed at the beginning of the next line
- SHIFT+ Taste: + button - Second allocation
- TAB: Cursor position +3 shifted
- F10: Delete screen

If an input is not carried out within 20 seconds, the cursor disappears. After resuming the input, the cursor appears at the current position.

The title generator function can be canceled at any time by pressing the “ESC” button. The menu is then also available to the user again. If the title generator function is activated again, the last contents of the screen appear. The user has to actively delete the screen information (F10). The information is lost even after a restart (line voltage Off / On).

Note: The bottom line of the screen is not writable.

SENSITIVITY BOOST

The camera offers an option called Sensitivity Boost (to increase the sensitivity of the CMOS sensor). To activate this function press „CTRL-ALT-S“. If the Sensitivity Boost is activated or disabled the message „SB-ON“ resp. „SB-OFF“ will appear for about 5 seconds left below (on the screen).

Note: The Sensitivity Boost only works in interlaced mode. At activation is switched to 1080i, at deactivation is switched to 1080p. The camera always starts with 1080p.

SHUT DOWN THE DEVICE

Press the “Standby” button D for about 2 seconds to turn off the device. The shutdown is signaled acoustically by a three times beep. Then the device is in standby mode and the LED inside the key lights yellow.
The device completely turns off by pressing the power switch C on the rear.

NOTICE / WARNING SIGNALS

- No camera head detected
    - the buttons I flash in a 500ms cycle with a simultaneous “Beep”.

Chapter 7 SERVICE INSTRUCTIONS

GENERAL MAINTENANCE AND REPAIR INSTRUCTIONS

⚠ The information contained in this chapter is only intended for properly trained personnel, which is proficient in the required knowledge and security arrangements for the repair of electronic equipment. The manufacturer assumes no liability for repairs and modifications carried out by unauthorized personnel. The availability of technical documents of the unit alone does not represent an authorization by the manufacturer for opening of repairing the unit for technically trained personnel. The interventions described in the text of the operating manual are exempt.
Information about further service and repair descriptions are available on request from Ackermann.

SERVICE INTERVAL

🔧 It is recommended that the unit is checked at least once a year by authorized service personnel or by the manufacturer for a reliable operation. The device must be checked after repairs in accordance with the requirements of IEC 62353 or in accordance with applicable national standards / regulations! The results of the annual inspection must be recorded (see table „Maintenance report“).

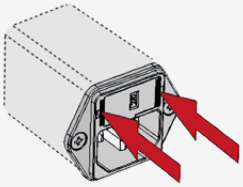
REPLACING THE MAINS FUSES

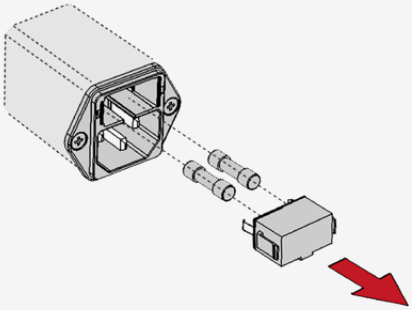
🔧 The mains fuses are located on the rear panel of the unit, above the IEC connector fuse in a small drawer.
- ⚠ Disconnect the main power plug!
- Release the fuse drawer by using a sharp object to unlock the two side clips of the drawer and pull out the drawer.
- Remove the fuses.
- Check the fuses. Blown fuses can be recognized by the black color of the glass bulb, the visibly broken fuse wire or measure the passage of the fuses with an ohm meter.
- Insert the appropriate fuses.

⚠ ATTENTION

- Use only ceramic fuses with a high switching capacity (Ia = 1500 A) according to IEC 60127-2 / V, H!
- Return the fuse drawer (with the small nose down) into the appropriate slot (4); the drawer must snap in audibly on both sides.

Then put the unit into operation. If you have replaced a defective fuse with a new one and it blows again, this indicates a defect in the device. In this case, please send the unit (disinfected) to your dealer for inspection.





CLEANING / DESINFECTION

HOUSING

⚠ ATTENTION

Disconnect the main power plug prior to beginning the cleaning/disinfection!
All external surfaces of the device are resistant to all common cleaners and disinfectants, so that these may be used without restrictions. For the application of cleaning and disinfecting liquids, a soft cloth or blotting paper should be used to avoid scratching the surface and to better dispense and distribute the liquid. The dosing must be accomplished with a cloth, especially with flammable liquids such as alcohol. Do not let any liquids leak into the unit! Let the unit dry for at least 1 hour after cleaning with flammable liquids before switching it on again. Otherwise the risk exists that an explosive mixture of air and cleaning agent ignites when switching on the unit.

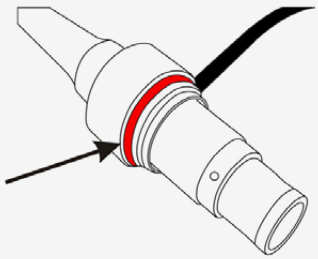
⚠ ATTENTION

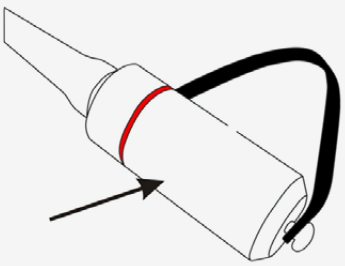
Do not autoclave any part of the equipment!

CAMERA HEAD

The disinfection or sterilization of the camera head can be carried out by the following practices:
STERRAD® 100NX; Steris System 1

1. Preparation:
- Carefully disconnect the camera cable from the camera!
- Check the silicone seal!
- Screw the safety cap on the plug!





2. Pre-cleaning:
Remove fouling from all external surfaces with a soft disposable cloth. Then rinse all visible dirt under running water.

3. Disinfection:
Insert the camera heads for 30 min in an immersion bath of 2.0% Gigasept Instru AF: Temperature: 25 ± 5 ° C.

4. Rinsing / Drying:
Rinse t he camera heads with sterile de-ionized water. Then allow the heads to dry at room temperature.

5. Maintenance, inspection and testing:
Prior to beginning the sterilization check (visually) the camera head in terms of damage and wear.

6. Sterilization:
Follow the instructions for each method of sterilization!

- H2O2 plasma sterilization (STERRAD ® 100NX)-> Temperature: 50°C / Cycle time: 47 min

⚠ ATTENTION

- Wrap the camera head into Tyvek film prior to beginning the plasma sterilization!

- 35% sterilization with peracetic acid (Steris 20), Steris System 1-> Temperature: 50-60°C / Cycle time: 12 min

7. Storage:
The storage is depending on the sterilization practice. Follow the instruction for each practice of sterilization!

⚠ ATTENTION

Incorrect or incomplete cleaning or disinfection may jeopardize the patient or medical staff!

Chapter 8 TROUBLESHOOTING

In the case of a malfunction of the device, please try localizing the error source and repairing it yourself by using the table below, before you return the unit to the manufacturer for repair.

ERROR DESCRIPTION	POSSIBLE CAUSES	REMEDY
No image on the monitor	Power cord not connected	Connect power cord
	Device is not turned on	Switch on the device
	Mains fuses defective	Check / replace the mains fuses
	Camera cable is not connected	Connect the camera cable
	No line voltage available	Check the line voltage
	Video output cable defective / not connected	Check / replace / connect the video output cable
	Video outputs may not be configured correctly	Reset the video outputs: When the device is restarted, press and hold the standby button for more than 5 seconds. The video outputs are reset.
	Monitor not turned on	Switch the monitor on
Menu not visible	BNC connections incorrectly inserted	Check the assignment of the BNC cables to the individual jacks
	Video output incorrectly configured	Check the menu item EXPERT / OUTPUT the setting of the video format (especially Sa / Sq)
Only parts of the image are visible on the monitor or the image is displayed incorrectly	BNC connections incorrectly inserted	Check the assignment of the BNC cables to the individual jacks
	Video output incorrectly configured	Check the menu item EXPERT / OUTPUT the setting of the video format (especially Sa / Sq
Image too dark	Parameter brightness (OSD) set at minimum	Increase brightness parameter
	Measuring range for brightness control is too large	Adjust parameter Area (OSD)
	Lighting insufficient	Improve lighting
	Monitor settings not optimal	Verify / correct the monitor settings

Picture too bright	Parameter brightness (OSD) set at maximum	Decrease parameter brightness
	Measuring range for brightness control is too small	Adjust parameter Area (OSD)
	Monitor settings not optimal	Verify / correct the monitor settings
	Shutter defective	Send unit for repair
Image blurred	Lens fogged	Clean / replace lens
	Lens poorly set	Set sharpness of the lens correctly
Poor picture quality	BNC or Y / C video output in use	Use HD SDI, HDMI DVI or RGB video output
	Lighting insufficient	Improve lighting / increase brightness (OSD)
Bad colors	No white balance	Perform white balance
	Color settings not optimal	Correct color settings (OSD or monitor)
	Monitor settings not optimal	Verify / correct the monitor settings
No colors	Color settings not optimal	Correct color settings (OSD or monitor)
	Video output jack or cable defective	Check / replace the video output jack or the cable
	Monitor settings not optimal	Verify / correct the monitor settings
Image / video storage is canceled (only with recording option)	Data rate is too high	Reduce data rate (quality) in the menu (Options/ Rec. Board adjust)

Chapter 9 SPECIFICATIONS

TECHNICAL DATA

GENERAL DATA	
Line voltage:	100-240 VAC | 50-60 Hz
Power requirements:	60 VA
Mains fuses:	Fuses, 5x20mm, inert 3,15 AH, 250V with high switching capacity (Ia = 1500 A)
Dimensions (WxHxD):	Control unit: 360 x 124 x 335 mm (WxHxD) Camera head: Ø 43mm, Length: 85,7mm (without grommet)
Weight:	Control unit: 6,2 kg Camera head: approx. 200g
CAMERA	
Image sensor:	3 x 1/3“ MOS
TV-System:	Progressiv Scan at 50 / 60 Hz
TV resolution:	3840 x 2160 Pixel (UHD)
Image resolution:	1600 TV-Lines; horizontal
Index ratio:	16:9
S/N:	54 dB
ARCHIVING	
Picture format:	JPG (1920 x 1080)
Video format:	Full HD 1920 x 1080; Mpeg-4 (H.264 Codec); Frame rate: 60fps
CONNECTIONS	
Video outputs Digital:	1 x HDMI 4K (3840 x 2160) 1 x HDMI Full HD (1920 x 1080) 1 x SDI 4K (4 x BNC) (3840 x 2160) 1 x SDI Full HD (1 x BNC) (1920 x 1080)

Video format:	HDMI output: 3840x2160/59.94p, 3840x2160/50p, 1920x1080/59.94p, 1920x1080/59.94i, 1920x1080/50p, 1920x1080/50i SDI output: 3840x2160/59.94p, 3840x2160/50p, 1080/59.94p, 1080/59.94i, 1080/50p, 1080/50i
Archiving:	1 x USB (A)
Other connections:	1 x USB (A) (USB-keyboard) 1 x Remote IN (footswitch) 2 x Remote OUT (video printer, video recorder,…) 2 x RJ45 (service interface)
CLASSIFICATION / CONFORMITY	
Safety class (EN 60601-1)	1
Application part (Typ)	BF
Degree of protection:	IP20
Classification (MDD)	I

SPARE PARTS

ITEMS	DESCRIPTION
Mains fuses	Fuses, 5x20mm, inert 3,15 AH, 250V with high switching capacity (Ia = 1500 A)
Camera head (complete)	Camera head 4K UHD, fully assembled

Chapter 10 APPENDIX

ELECTROMAGNETIC COMPATIBILITY

▪ The present device corresponds to the following standard: IEC 60601-1

▪ Precautionary measures
Electro-medical devices are subject to special precautionary measures concerning electromagnetic compatibility (EMC). This device is to be used for the purposes described in the operation manual and has to be installed, set up, and operated in compliance with the EMC guidelines.

▪ Impact of mobile and portable RF communication devices
The emission of high frequency by mobile communication devices may impact the function of the electro-medical device. Operating such mobile communication devices (e.g. cell phones, GSM phones) in the proximity of the electro-medical device is prohibited.

▪ Electrical connections
Connections between such plugs and sockets may not be established without first implementing ESD precautionary measures.

▪ ESD precautionary measures
Connect all electrical equipment to be connected to the device to a potential equalization system (via PE). Use only the equipment and accessories mentioned in the operation manual. The staff should be informed about and trained in ESD precautionary measures.

⚠ ATTENTION

This device is designated to an environment as specified below. The user of the device should verify that the camera is operated in such an environment.

MANUFACTURER'S DECLARATION – ELECTROMAGNETIC EMISSIONS

Emissions test	Compliance	Electromagnetic environment – Guidelines
Conducted Emissions according to IEC/ CISPR 11: 2015 (L + N, 150 kHz - 30 MHz)	Class A	This device uses HF technology solely for its internal functioning. The level of external HF emission is therefore very low and it is unlikely that other electronic devices in its vicinity will be interfered with. This device is suited for use in professional equipment in the healthcare sector (e.g. medical practices, clinics, operating rooms, intensive care units, hospital rooms, emergency rooms and accident clinics). Note: When used in a residential environment (typically required by CISPR Class B), this equipment may not provide adequate protection for radio services. If necessary, the user must take corrective measures such as implementation or realignment of the device.
Radiated emissions according to IEC/ CISPR 11:2015 (3 m, 30 MHz – 1 GHz, 0 - 360°, h + v pol.)	Class A	
Harmonics according to IEC 61000-3-2:2014	Class A	
Voltage fluctuations/flicker according to IEC 61000-3-2:2013	Yes	

MANUFACTURER'S DECLARATION – ELECTROMAGNETIC IMMUNITY

Immunity tests	Test level	Ful-filled	Electromagnetic environment – Guidelines
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 2; 4; 6; 8 kV Contact discharge ± 2; 4; 8; 15 kV Air discharge	Yes	Floors should be made of concrete or wood or covered with ceramic tile. If the floor is covered with synthetic material and offers no ESD protection, the relative humidity should be at least 30%.
High-frequency electromagnetic fields according to IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 80% AM 1 kHZ Output wires	Yes	Recommended separation distance 0.3 m (12 inches) at the typical assumed transmission power in the corresponding frequency band The formula below, in which 'P' represents the transmitter's rated power in watts (W) as specified by the transmitter's manufacturer, 'd' the minimum distance in meters (m) and 'E' the immunity test level, can be used to calculate possible minimum distances and correct them if necessary, given accurate knowledge of the transmitter's rating. $d = 6 \sqrt{P} : E$ Interference is possible in the vicinity of devices that bear the following symbol. 
High-frequency electromagnetic fields according to IEC 61000-4-3 in the immediate vicinity of wireless communication devices	28 V/m 385, 450, 810, 870, 930 MHz 50% PM 18 Hz	Yes	
	28 V/m 1720, 1845, 1970, 2450 MHz 50% PM 217 Hz	Yes	
	9 V/m 710, 745, 780, 5240, 5500, 5785 MHz 50% PM 217 Hz	Yes	

Fast transient electrical disturbances/bursts according to IEC 61000-4-4	± 2 kV 100 kHz supply lines ± 1 kV 100 kHz signal and data lines	Yes	The quality of the supply voltage should correspond to that of a typical professional installation in the healthcare sector (not the public power grid).
Surges according to IEC 61000-4-5	± 0,5 kV, ± 1 kV 100 kHz (line to line) ± 0,5 kV, ± 1 kV, ± 2 kV 100 kHz (line to earth)	Yes	
Conducted RF interference according to IEC 61000-4-6	6 Veff 150 KHz to 80 MHz 80% AM 1 kHZ (Power line, POAG earthing cable, electrical supply line for heating part)	Yes	
Voltage dips according to IEC 61000-4-11	0% UT; ½ period (at 0, 45, 90, 135, 180, 225, 270 and 315°) 0% UT; 1 period and 70% UT; 25/30 Periods (50Hz/60Hz) Single phase at 0°	Yes	
Voltage interruption according to IEC 61000-4-11	0% UT; 250/300 periods (50Hz/60Hz)	Yes	If the user of this device requires that it continue to function even when interruptions to the energy supply occur, it is recommended that the device be powered from an uninterruptible power supply!

MAINTENANCE REPORT

User	
Address	
Serial-No.:	

SERVICING CHECK UP	NAME	DATE	SIGNATURE

ICONS (INSTRUCTION MANUAL)

	Attention, important information!
	Service information

SYMBOLS (MEDICAL DEVICE)

	Please note accompanying documents
	Application part type: BF
	Caution, dangerous voltages!
	Connection for potential equalization
	Grounding
	AC voltage
	Fuse
	ESD jeopardised parts/devices
	In compliance with EU Directive on Medical Devices“ 93/42/EEC
	In compliance with EU Directive „Used electrical/electronic devices“ WEEE 2002/96/EC
	Manufacturer DIN EN ISO 15223-1
	Pull out the mains plug! (ISO 7010 M006)

COMPANY DATA AND CONTACT

COMPANY NAME :

Ackermann Instrumente GmbH

COMPANY ADDRESS:

Eisenbahnstrasse 65-67
78604 Rietheim-Weilheim
GERMANY

CONTACT :

E : sales@ackermannsurgical.com
W : www.ackermannsurgical.com
P : +49 (0)7461 966 17 - 0
F : +49 (0)7461 966 17 - 70