From Eye to Insight

Leica

MICROSYSTEMS

Leica HD C100

User Manual

10 733 205 – Version 02

Thank you for purchasing a Leica surgical microscope system.
In developing our systems, we have placed great emphasis on simple, self-explanatory operation. Nevertheless, we suggest studying this user manual in detail in order to utilize all the benefits of your new surgical microscope.
For valuable information about Leica Microsystems products and services, and the address of your nearest Leica representative, please visit our website:

www.leica-microsystems.com

Thank you for choosing our products. We hope that you will enjoy the quality and performance of your Leica Microsystems surgical microscope.

Leica Microsystems (Schweiz) AG Medical Division
Max-Schmidheiny-Strasse 201   CH-9435 Heerbrugg
Tel.:   +41 71 726 3333

Legal disclaimer
All specifications are subject to change without notice.
The information provided by this manual is directly related to the operation of the equipment. Medical decision remains the responsibility of the clinician.
Leica Microsystems has made every effort to provide a complete and clear user manual highlighting the key areas of product use. Should additional information regarding the use of the product be required, please contact your local Leica representative.
You should never use a medical product of Leica Microsystems without the full understanding of the use and the performance of the product.

Liability
For our liability, please see our standard sales terms and conditions. Nothing in this disclaimer will limit any of our liabilities in any way that is not permitted under applicable law, or exclude any of our liabilities that may not be excluded under applicable law.

Contents

1   Introduction

1.1   About this user manual

In this user manual the Leica HD C100 camera system is described.

<table>
<tr><td>⚠</td><td>In addition to notes on the use of the instruments this user manual gives important safety information (see chapter "Safety notes").</td></tr>
</table>

<table>
<tr><td>👁</td><td>▶ Read this user manual carefully before operating the product.</td></tr>
</table>

1.2   Symbols in this user manual

The symbols used in this user manual have the following meaning:

Symbol	Warning word	Meaning
⚠	Warning	Indicates a potentially hazardous situation or improper use that could result in serious personal injuries or death.
⚠	Caution	Indicates a potentially hazardous situation or improper use which, if not avoided, may result in minor or moderate injury.
	Note	Indicates a potentially hazardous situation or improper use which, if not avoided, may result in appreciable material, financial and environmental damage.
!		Information about use that helps the user to employ the product in a technically correct and efficient way.
▶		Action required; this symbol indicates that you need to perform a specific action or series of actions.

2   Product identification

The model code and serial number of the camera and the control unit are located on the identification labels on the rear side.

▶ Enter this data in your user manual and always refer to it when you contact us or the service workshop regarding any questions you may have.

Camera Type	Serial no.
...	...

Control unit type	Serial no.
...	...

3 Safety notes

The Leica HD C100 camera system is state-of-the-art technology. Nevertheless, hazards can arise during operation.
▶ Always follow the instructions in this user manual, and in particular the safety notes.

3.1 Intended use

· The Leica HD C100 camera system is an optical instrument for observation and documentation that works together with a Leica surgical microscope.
· The Leica HD C100 camera system may be used in enclosed rooms only.
· The Leica HD C100 camera system is subject to special precautionary measures for electromagnetic compatibility. It must be installed and put into operation in accordance with the guidelines, manufacturer's declarations, and recommended safety distances (Table 201, 202, 204, 206 in accordance with EN 60601-1-2:2001, 2nd / 3rd edition).
· Portable and mobile RF communication equipment as well as fixed communication equipment can have a negative influence on the proper functioning of the Leica HD C100 camera system.

3.2 Indication for Use

· The HD C100 camera is used to display surgeon's field of view, captures still image and records video.
· These Instructions for Use are intended for physicians, nurses and other medical and technical staff who prepare, operate or maintain the device. It is the duty of the device owner/operator to train and brief all the operating personnel.

3.3 Contraindications

No known contraindications for Use.

3.4 Information for the person responsible for the instrument

▶ Make sure that the camera system is used by qualified personnel only.
▶ Ensure that this User Manual is always available at the place where the camera system is used.
▶ Carry out regular inspections to make certain that the authorized users are adhering to safety requirements.
▶ When instructing new users, do so thoroughly and explain the meanings of the warning signs and messages.
▶ Allocate responsibilities for commissioning, operation and maintenance. Monitor compliance with this.
▶ Do not use the camera system unless it is in proper condition.

▶ Inform your Leica representative or Leica Microsystems (Switzerland) AG, 9435 Heerbrugg, immediately if you detect a product defect that could potentially cause injury or harm.
▶ If you use accessories from other manufacturers with the surgical microscope system, make sure that these manufacturers confirm that the combination is safe to use. Follow the instructions in the user manual for those accessories.
▶ Modifications and maintenance work on the camera system may only be performed by professionals expressly authorized by Leica.
▶ Only original Leica replacement parts may be used in servicing the product.
▶ After service work or technical modifications, the device must be readjusted in accordance with our technical specifications.
▶ If the instrument is modified or serviced by unauthorized persons, is improperly maintained (as long as maintenance was not carried out by us), or is handled improperly, Leica will not accept any liability.
▶ The effect of the Leica HD C100 camera system on other instruments has been tested as specified in EN 60601-1-2. The system passed the emission and immunity test. Comply with the usual precautionary and safety measures relating to electromagnetic and other forms of radiation.
▶ Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Leica HD C100, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

3.5 User qualifications

The Leica HD C100 camera system may be used only by physicians and medical assistance personnel with appropriate qualifications who have been instructed in the use of the instrument. Specific training is not required.

3.6 Directions for the user of the instrument

▶ Follow the instructions described here.
▶ Follow the instructions given by your employer regarding the organization of work and safety at work.

3.7 Dangers of use

⚠ **WARNING**

Risk of injury from damaged components or accessories
► Do not use the camera system, surgical microscope, and accessories unless they are in proper condition.
► Read the following pages thoroughly.

⚠ **WARNING**

Danger of fatal electric shock
► Operate the system only with all equipment in its proper position (all covers fitted, doors closed).
► Only power supply supplied by Leica can be used.
► To avoid the risk of electric shock, device must only be connected on Supply network with protective conductor.

⚠ **WARNING**

Risk of injury from downward movement of surgical microscope
► Complete all preparations and adjustments to the stand before the operation.
► Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
► Before re-equipping, always lock the swing arm.
► After re-equipping, always rebalance the microscope on the swing arm.
► Before re-equipping during the operation, first swing the microscope away from the operating field.

⚠ **WARNING**

Risk of injury from parts falling down
► Complete all preparations and adjustments to the optics carrier before the operation.
► Never rebalance or re-equip the optical components and accessories with the instrument while it is above the field of operation.
► Before the operation, make sure that the optical components and accessories are installed properly.
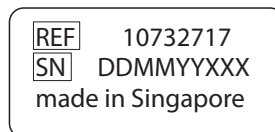► Before re-equipping during the operation, first swing the microscope away from the operating field.
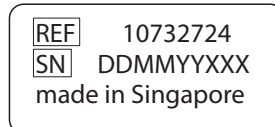
⚠ **CAUTION**

For Stand-alone camera setup
► Do not touch accessible connectors and the patients simultaneously.

3.8 Signs and labels

REF 10732717
SN DDMMYYXXX
made in Singapore

Type plate on the camera

REF 10732724
SN DDMMYYXXX
made in Singapore

Type plate on the control unit

❗ The camera and the control unit have to have the same serial number (SN)

Leica Microsystems (Schweiz) AG
Max Schmidheiny-Strasse 201
CH-9435 Heerbrugg

MODEL   LEICA HD C100
12V ⎓ 2A
24W

Nameplate
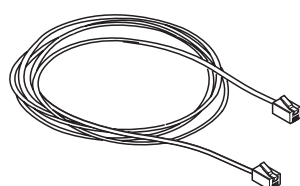
4 Design and function

4.1 Components
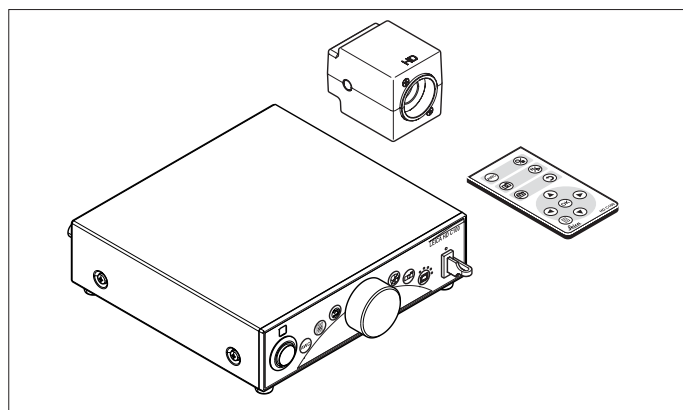
The Leica HD C100 camera system consists of the following components:
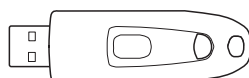- Camera
- Control unit
- Remote control

4.2 Accessories provided

- Camera connection cable, 5 m long 10 733 923

- USB 3.0 Thumb Drive

- User Manual / Installation Manual 10 733 205

4.3 Function

The camera, mounted on a video adapter, takes images from a surgical microscope.
The control unit both configures the camera settings and provides the interface to the monitoring and documentation systems, e.g. computer, recorder, etc.
The signals are simultaneously output to the different peripheral devices.
The camera can be operated by the control unit or by remote control.

4.3.1 Supported Video Signals

The control unit can simultaneously output the following video signals:
- HDMI (High Definition Multimedia Interface) – for fully digital transmission of video signals
- 3G HD-SDI (High Definition Serial Digital Interface) – for transmission of uncompressed video signals for HD, according to the SMPTE 424M standard
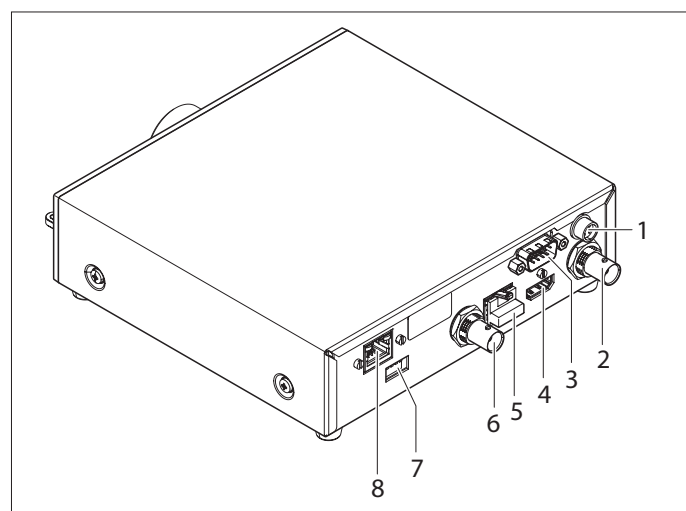- VIDEO / BNC – analog video signal, particularly suitable for environments susceptible to faults

4.3.2 Connections

Connections to the camera
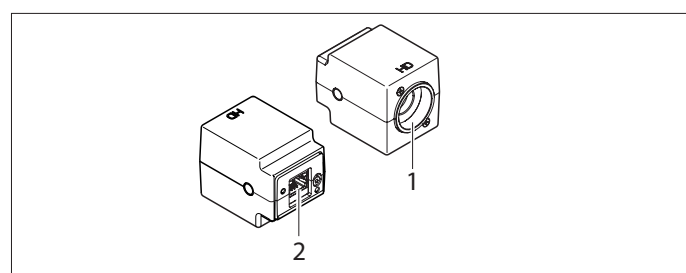
1   C-mount interface for mounting on a microscope
2   Camera connecting cable plug connector

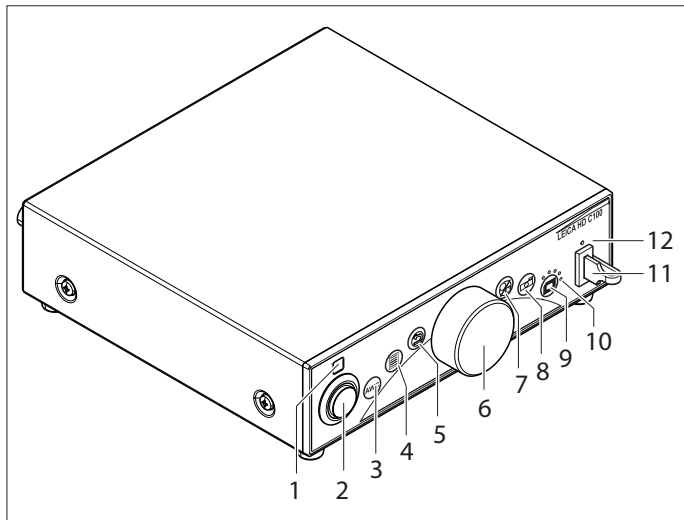**Connections on the rear side of the control unit**

1   DC IN power supply
2   HD-SGI OUT video output
3   Serial port RS232-C
4   HDMI video output
5   LAN network connection – for service purposes
6   VIDEO OUT video output
7   DIP switch to select PAL/NTSC
8   CAMERA input
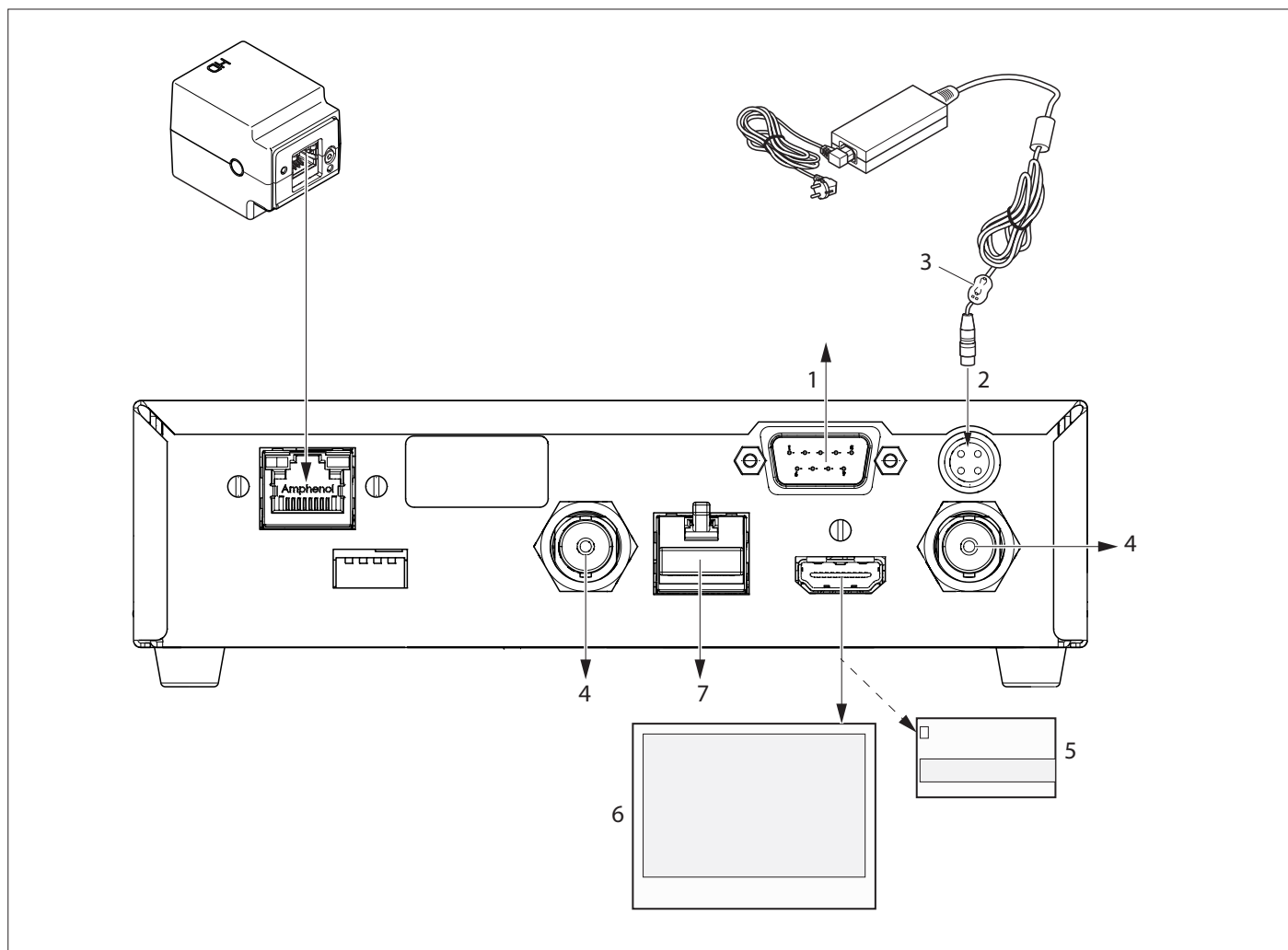
5   Controls

5.1   Control unit

1   Infrared remote control receiver
2   On/off button with LED ring
3   "Automatic white balance" button
4   "Menu" button
5   "Back" button
6   Adjusting knob to navigate in the menu/ press to select
7   "Start/ stop video recording" button
8   "Capture still image" button
9   "Scene data" button
10   LEDs for indicating the selected scene data
11   USB port
12   USB LED; lights if USB thumb drive/ portable hard disk is inserted

5.2   Remote control
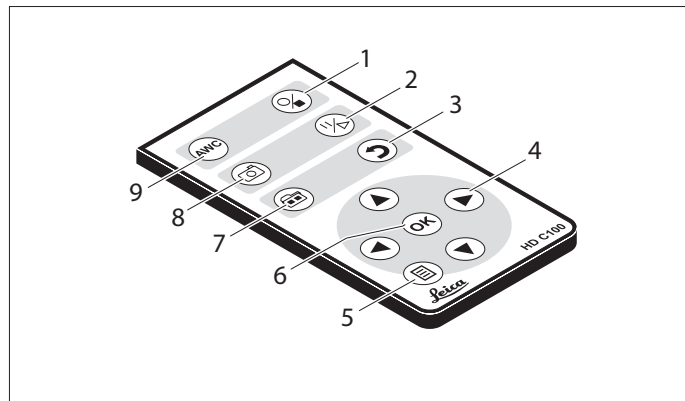
1   "Start/ stop video recording" button
2   "Freeze live view/ play or pause video" button
3   "Back" button
4   Buttons for navigating in the menu
5   "Menu" button
6   "OK/confirm" button
7   "Gallery/live view" button
8   "Capture still image" button
9   "Automatic white balance" button

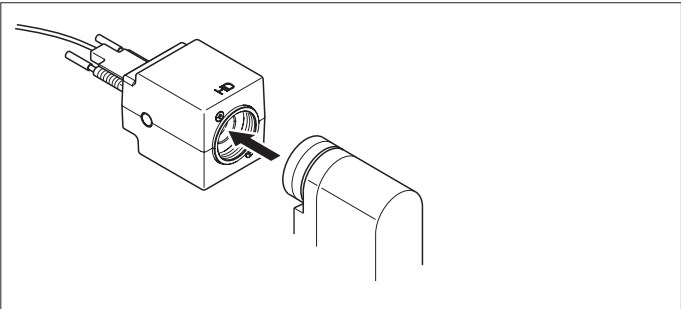## 5.3   Configuration example

1   Serial connection to stand (remote control)
2   12V-DC-supply with ferrite (3) over the connected stand
3   Ferrite (10 744 200)
4   Additional video signals available
5   Documentation system
6   Monitor
7   Network connection (service)

6 Assembly

6.1 Installing the camera

The camera C-mount interface is screwed on to the C-mount interface of the video adapter.

6.2 Installing the control unit

The control unit can be installed or set up as follows:

- In or on a stand
- Permanently screwed into place on an assembly plate
- On a drawer or a device cart
- ▶ Set up the control unit on a suitable surface, for example in a drawer or on a device cart.

Assembly in or on a stand

- ▶ See Installation Manual for the respective stand
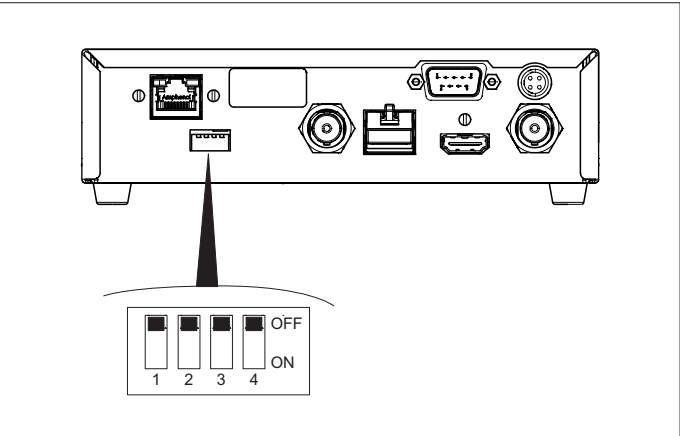
Fixed assembly with assembly plate

- ▶ Screw assembly plate to stand or similar item.
- ▶ Remove the 4 rubber feet on the bottom of the control unit.
- ▶ Screw control unit to the assembly plate.
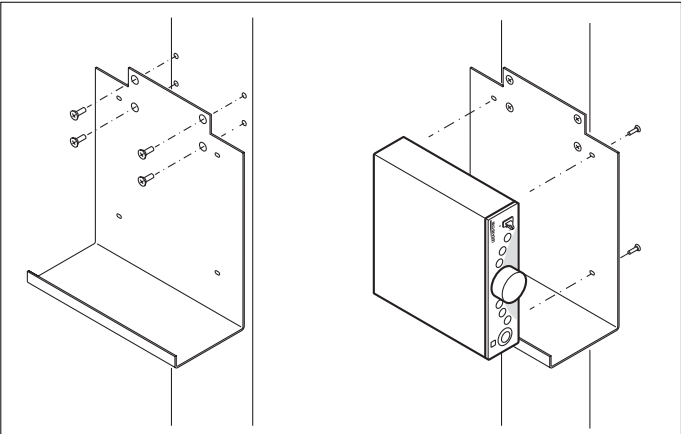
Install on a device cart or similar

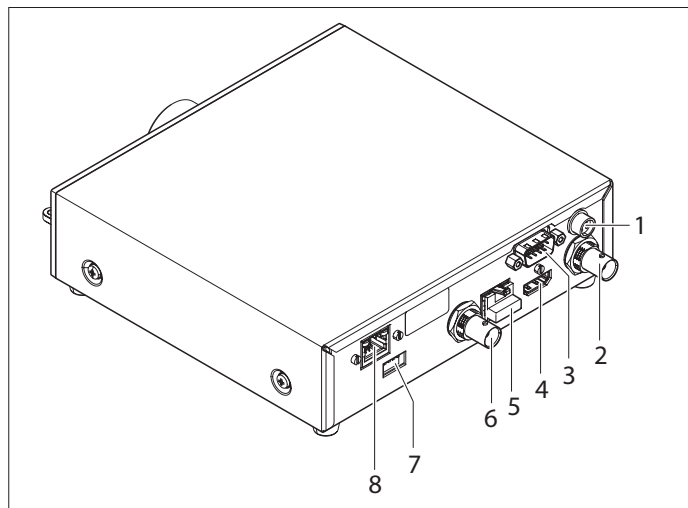- ▶ Set up control unit on a suitable level surface, for example on a device cart.

6.3 Select video format and operating mode

Switch	Position	Assignment
1	ON	Service mode
	OFF	**Operating mode**
2	ON	Service mode
	OFF	**Operating mode**
3	ON	NTSC (60 Hz)
	OFF	PAL (50 Hz)
4	ON	Service mode
	OFF	**Operating mode**

6.4   Wiring

Connect camera and control unit

▶ Attach camera connection cable to the camera and to socket (8) "CAMERA" on the control unit.

Connect peripheral devices to the control unit

The control unit has 3 different video outputs to connect monitor(s) and documentation systems.
The control unit must have at least one monitor connected in order to be operated.
The following connections are available:

- HDMI (4)
- 3G HD-SDI (2)
- VIDEO (BNC) (6)
- ▶ Plug peripheral device connecting cable into the respective socket (2), (4) and (6) of the control unit.

Connect power supply

The Leica HD C100 can be supplied with power over the 12 V supply of the microscope.

▶ Connect 12 V power supply to the socket (1) ("DC IN").
▶ Turn on the microscope.
The control unit is connected to the power supply.

6.5   Switching the Leica HD C100 on/off

Leica HD C100

▶ Switch on the Leica HD C100 with the on/off switch.
The ring LED around the on/off button lights up and the camera image is shown on the connected monitor.
The system is ready to operate.
▶ Switch on peripheral devices.

▶ To switch off, follow the reverse sequence of steps.
The LED ring goes out, and no image is shown on the connected monitor.

Leica HD C100 with power supply from the surgical microscope

▶ Switch on the Leica HD C100 with the on/off button once.
The ring LED around the on/off button lights up and the camera image is shown on the connected monitor.
The system is ready to operate.

| ! | In the following operation phase, the camera system is switched on and off by the surgical microscope. |

7 System Configuration

7.1 Menu overview

Factory default settings are printed in **bold**.

COLOR	AUTO-WHITE CONTROL	PRESS OK [To select]	
	WB MODE	AUTO, **MANUAL**	
	RED LVL	0% - 99%	
	BLUE LVL	0% - 99%	
	BLACK LVL	0% - 99%	
	CHROMA GAIN	0 . . . **21** . . . 99	
EXPOSURE	EXP MODE	**AUTO**, MANUAL	
	EXPOSURE	1/8000 sec., 1/1024 sec., 1/960 sec., 1/480 sec., 1/240 sec., 1/120 sec., 1/100 sec., 1/60 sec.,1/50 sec., 1/40 sec., 1/33 sec., 1/30 sec., 1/25 sec., 1/24 sec., 1/20 sec.	
	GAIN	0 - 36 dB	
	ALC LEVEL	0% . . . **8%** . . . 99%	
	ALC MASK AREA	**NO MASK**, S CIRCLE, M CIRCLE, L CIRCLE, MANUAL (without mask)	
	GAMMA	**0.35**, 0.40, 0.45, 0.50, 0.55, Red-Reflex, FL400, FL560	
	ENHANCEMENT	0 . . . **6** . . . 11	
	ALC Limit	SHUTTER TIME MAX	1/16000 sec., 1/8000 sec., 1/1024 sec., 1/960 sec., 1/480 sec., 1/240 sec., 1/120 sec., 1/100 sec., 1/60 sec.
		SHUTTER TIME MIN	**1/16000 sec.**, 1/8000 sec., 1/1024 sec., 1/960 sec., 1/480 sec., 1/240 sec., 1/120 sec., 1/100 sec., 1/60 sec.
		SENSOR GAIN MAX	0 - **35** dB
RESOLUTION	LIVE	**HD1080p**, HD1080i	
	VIDEO OUTPUT PATTERN	**LIVE**, COLOR BAR, GRAY SCALE, CROSS LINE	
	HDMI OUTPUT	**RGB**, YUV	
SETUP CAMERA	FLIP IMAGE	**0**, FLIP, MIRROR, MIRROR+FLIP	
	IMG ON SCREEN	SHOW DATE	ON, **OFF**
		SHOW LOGO	**ON**, OFF
		LOGO WATERMARK	**25%**, 50%, 100%
		LOGO POSITION	**LEFT UPPER**, RIGHT UPPER, LEFT LOWER, RIGHT LOWER-1, RIGHT LOWER-2
		SHOW SCENE	ON, **OFF**
		SHOW MESSAGE	**ON**, OFF
	USER SET-UP	LANGUAGE	**ENGLISH**, GERMAN, FRENCH, SPANISH, ITALIAN, SWEDISH, JAPANSE
		SHOW MENU	5 sec, **10 sec**, 15 sec, 20 sec, 25 sec, 30 sec, INFINITY
		REMOTE CONTROL	EXT, **IR**
	SET TIME & DATE	**DMY [dd mm yyyy hh:mm]** MDY [mm dd yyyy hh:mm]	
	DNR	**ON**, OFF	
	SET PREFIX	Press OK [To select]	
	FACTORY RESET	Press OK [To select]	
SCENE FILES	SAVE SCENE FILE	**Scene File 1**, Scene File 2, Scene File 3, Scene File 4,Scene File 5	
	SELECT SCENE FILE	**Scene File 1**, Scene File 2, Scene File 3,Scene File 4, Scene File 5	
INFO	Model No., Serial No., hardware version, software version, Scene File, Video Format, Shutter Time, Sensor Gain, Date & Time, Camera Head status		

EJECT USB	Press OK [To select]

7.2 Menu operation

Calling up the menu

► Press the ▤ button on the control unit or the remote control.
The main menu will be displayed on the connected monitor.
The first menu item, "COLOR", is displayed inversely.

LEICA HD C100 MENU Vx.xx
COLOR
EXPOSURE
RESOLUTION
SETUP CAMERA
SCENE FILES
INFO
EJECT USB

Selecting the menu item and configure changes

► Select the desired menu item, for example, "resolution", with the rotary knob or the ▼ / ▲ cursor buttons.
► Select it by pressing the rotary knob or confirm with the ⊛ button.
► Select the desired submenu, for example "LIVE", with the rotary knob or the ◄ / ► cursor buttons.
The available settings are displayed.

LEICA HD C100 MENU Vx.xx		
LIVE	◄ HD1080p ►	
VIDEO OUTPUT PATTERN	LIVE	
HDMI OUTPUT	RGB	

Select the desired settings, for example "HD1080p", with the rotary knob or the ◄ / ► cursor buttons.
► Confirm settings by pressing the rotary knob or the ⊛ button.
The selected submenu is displayed again.

> **!** Settings are not applied until you press the rotary knob or the ⊛ button. When leaving the settings menu by means of the ⟲ button, the existing settings are retained.

Back to the next higher menu level

► Press the ⟲ button to go from a submenu to the next higher menu level.

Exit menu

► Press the ▤ button on the control unit or the remote control.
The menu field is no longer displayed on the monitor.

7.3 Description of the menu items

7.3.1 "COLOR" Menu

Auto-White Control (AWC)

The color white is shown differently according to light source (fluorescent or halogen lamps or daylight).
If you carry out the white balance with a fluorescent lamp but switch to a halogen lamp, the image gets a red coloration. In the opposite situation, the picture gets a blue coloration.
The white balance serves to compensate for this effect.
Sequence:
► Select "Auto white balance".
The message "AWC done" will appear after completion.
► Exit Auto-White control by pressing the rotary knob or the ⊛ button.

White balance mode

Manual:
► Actuate the white balance with the menu item "Auto-White control".
AUTO:
The camera system carries out a white balance automatically in the case of modified light conditions.

> **!** If the "Auto" setting is selected, no individual color settings are possible.

Red level

This menu item is only available in the white balance mode = manual setting.
The higher the value, the more red coloration
The lower the value, the more blue coloration (cyan)
Setting range: 0 % ... 99 %

Blue level

This menu item is only available in the white balance mode = manual setting.
The higher the value, the more blue coloration
The lower the value, the more yellow coloration
Setting range: 0 % ... 99 %

! With high values for the red level and blue level, the picture gets a red coloration (magenta). With low values for the red level and blue level, the picture gets a green coloration.

Black level

The higher the value, the brighter the black is displayed.
The lower the value, the darker the black is displayed.
Setting range: 0 % ... 99 %

Chroma Gain

The higher the value, the more intense the coloration.
The lower the value, the more dull the coloration.
Setting range: 0 ... 99
Chroma Gain = 0: Monochrome image

7.3.2   "Exposure" menu

EXP Mode

· Auto   Automatic setting of the exposure parameters
· Manual   Manual setting of the exposure parameters

Exposure

This menu item is only available in the mode = manual setting.
The possible shutter speeds are :
1/8000 s, 1/1024 s, 1/960 s, 1/480 s, 1/240 s, 1/120 s, 1/100 s, 1/60 s, 1/50 s, 1/40 s, 1/33 s, 1/30 s, 1/25 s, 1/24 s, 1/20 s.

Gain

This menu item is only available in the mode = manual setting.
The brighter the image, the less gain.
The darker the image, the more gain.
Setting range: 0 ... 36 dB

! With a high gain, the noise is also increased.

ALC Level (Auto Light Control Level, automatic brightness adjustment)

This menu item is only available in the mode = auto setting.
The higher the value, the brighter the image appears.
Setting range: 0 % ... 99 %

ALC Mask area

This menu item is only available in the mode = auto setting.
The ALC mask area defines the image section to which the automatic brightness adjustment should be applied.
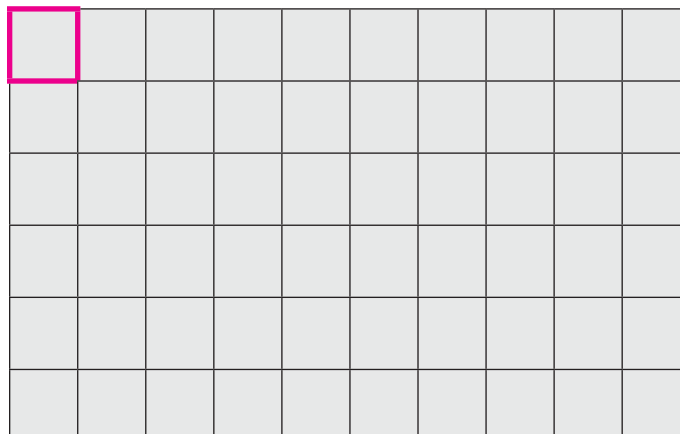Possible settings:
No mask, S Circle, M Circle, L Circle, Manual
Procedure for mask area = manual

After selecting "Manual", the screen appears divided into 10 × 6 fields.
The cursor is in the upper left field.

► Select the desired field with the rotary knob or the cursor buttons ◄ / ►and confirm by pressing the rotary knob or the OK button.
► Use the same procedure for other fields.

Gamma (color depth)

The higher the value, the higher the color contrast, and the darker the black is displayed.
The lower the value, the lower the color contrast, and the brighter the black is displayed.
Setting range: 0.35, 0.40, 0.45, 0.50, 0.55, Red-Reflex, FL400, FL560

Enhancement (contrast gain)

The more high-contrast the image, the less gain.
The more low-contrast the image, the more gain.
Possible settings: 0 ... 11

ALC Limit

This menu item is only available in the mode = auto setting.
Set the limit for exposure and gain.
· Shutter time max
  Possible setting range : 1/16000 s, 1/8000 s, 1/1024 s, 1/960 s, 1/480 s, 1/240 s, 1/120 s, 1/100 s, 1/60 s.
· Shutter time min
  Possible setting range: 1/16000 s, 1/8000 s, 1/1024 s, 1/960 s, 1/480 s, 1/240 s, 1/120 s, 1/100 s, 1/60 s.
· Sensor gain max
  Possible setting range : 0 ... 35 dB

7.3.3   "Resolution" menu

Live

Change live view resolution
Possible setting : HD1080p, HD1080i

Video output pattern

Selection of a sample to test the camera and the monitor

Possible setting : Live, Color bar, Gray scale, Cross line

HDMI output

Switch output for HDMI
Possible setting : RGB, YUV

7.3.4 "Setup camera" menu

Flip image

0	Original orientation
Flip	Image is mirrored horizontally
Mirror	Image is mirrored vertically
Mirror + Flip	Image is rotated 180°

Image on screen

Show date	Show current date on the lower right edge. Possible settings: on, off
Show logo	Show Leica logo. Possible settings: on, off
Logo watermark	Depiction of the Leica logo as a watermark. Possible settings: 25%, 50%, 100%
Logo position	Select position of the Leica logo. Possible settings: Left upper, Right upper, Left Lower, Right Lower-1 (date and time are also shown at this position), Right Lower-2S
Show scene	Show current scene file on the lower right. Possible settings: on, off
Show message	Show system message on the lower right. Possible settings: on, off

User Set-up

Language	Set menu language. Possible settings: English, German, French, Spanish, Italian, Swedish, Japanese
Show menu	The menu is automatically closed if no operation is completed within the set time. Possible settings: 5 sec, 10 sec, 15 sec, 20 sec, 25 sec, 30 sec, INFINITY
Remote control	Set control via RS232 or Infrared Possible settings: Ext, IR

Set time and date

► Select date format: DMY (Day-Month-Year) or MDY (Month-Day-Year.

► Enter date and time in the selected format.

DNR (Digital noise reduction)

This function reduces the noise of an image. With it, the resolution is also slightly reduced.
Possible settings: on, off

Set prefix

The function is to change the first 5 characters of the file name.
The prefix (first 5 characters) of the file name is shown by pressing the ⊛ button on the remote control.

LEICA HD C100 MENU V1.0				
L	E	I	C	A

► Select the character that needs to be set with the cursor buttons ◄ / ► and confirmed by pressing the ⊛ button.
A keyboard appears.
► Select the new character from the keyboard using the cursor buttons ◄ / ► and confirmed by pressing the ⊛ button.

1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	-
Z	X	C	V	B	N	M	<	>	+

Factory reset

After selecting "Reset Settings to factory", a confirmation prompt, "Proceed to reset?" appears.
► Select OK / cancel with the rotary knob or the cursor buttons ◄ / ► and confirm by pressing the rotary knob or the ⊛ button.
The system resets all settings to factory settings and undergoes a restart.

7.3.5 "Scene Files" menu

The previously configured menu settings for certain users, locations or tasks can be saved as "Scene data" and later be recalled.
Leica HD C100 provides 5 memory locations ("Scene Files") for scene data.

Save scene file

Assign the current settings to Scene Files 1 to Scene Files 5.
If the memory location was already assigned, it can be overwritten with the new settings.
The saved settings can be recalled at any time with the assigned memory location ("Scene Files").

The Scene data are assigned at the factory as follows:

Scene Files	Department
1	Neurosurgery
2	FL400
3	Cataract
4	Vitrectomy
5	FL560

Select scene file

▶ Select Scene Files 1 to Scene Files 5 with the ◉ button on the control unit or the cursor buttons ◀ / ▶ and confirmed by pressing the ⊗ button.

When you select the memory location ("Scene Files"), the stored scene data is active.

7.3.6 "Info" menu

The following information is shown by pressing the ⊗ button on the remote control (example):

MODEL :	HDC100
SERIAL NO.:	DDMMYYXXX
HW VERSION :	V1.0
SW VERSION :	V1.0
SCENE FILE :	1
VIDEO FORMAT :	1080p59.94
SHUTTER TIME :	Jan-60
SENSOR GAIN :	14 dB
DATE & TIME :	01/01/2018 0:02
CAMERA HEAD :	CONNECTED

7.3.7 "Eject USB" menu

The function is to remove USB storage device safely form the control unit.

> ❗ • Select EJECT USB before removing the USB storage device.
> • Remove the USB storage device after the message " USB EJECTED SUCCESSFULLY" appears.

8 Preparation before surgery

8.1 Choosing scene data

Leica HD C100 can save 5 configurations for certain tasks or environments as scene data.
The currently selected scene data is shown by the LEDs by means of the "Scene data" button and on the monitor (if enabled).
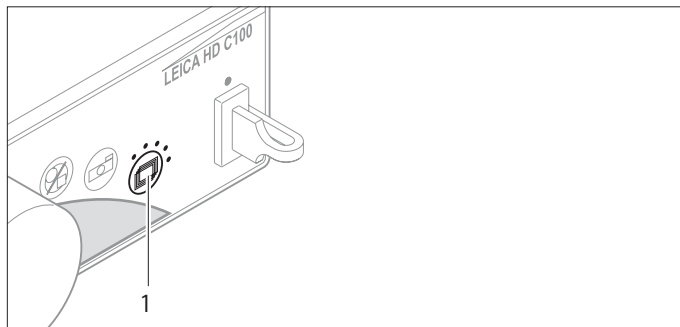
▶ Press the "Scene data" button (1) until the LED for the desired scene data lights up on the control unit.

With the factory settings, the selected scene data appear on the monitor.

Leica HD C100 immediately works with the stored settings.

> ❗ Scene data can only be selected on the control unit.

The scene data are assigned at the factory as follows:

Scene Files	Department
1	Neurosurgery
2	FL400
3	Cataract
4	Vitrectomy
5	FL560

If working without scene data

▶ Configure the menu settings for the current environment and task.

8.2 Carrying out a white balance

A white balance is recommended before every operation for optimum image quality.

> ❗ If "White balance mode" = "Auto" is selected in the menu and in the selected scene data, the camera system automatically carries out a white balance when light conditions change.

White balance in "White balance mode" = "Manual"

▶ Press the "AWC" button on the control unit or the remote control.

The system carries out an automatic white balance.

After completion, the message "AWC done" appears.

▶ Exit Auto-White control by pressing the rotary knob or the ⓞⓚ button.

8.3 Preparing photos/videos

A USB storage device has to be plugged into the control unit so that photos/videos can be captured/recorded with the Leica HD C100 camera system.
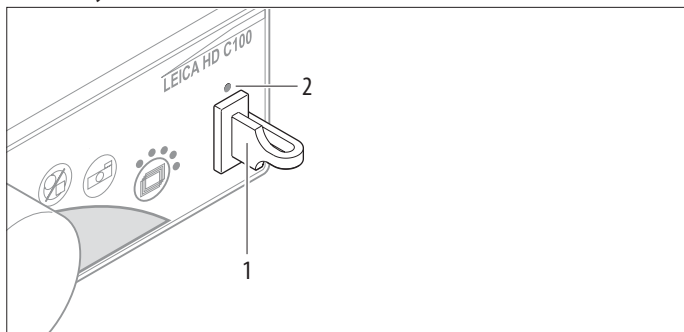
▶ Take off the USB port protective cap (1) on the front side of the control unit and insert the USB storage device.

The LED (2) above the port will light.

Leica HD C100 is ready to preparing photos/videos.

!	• If the USB storage device inserted does not have any capacity left, the message "Storage device is full" appears on the monitor.
	• After removing the USB storage device, put the protective cap (1) back on the socket.
	• The USB storage device needs to be formatted to FAT32/exFAT file system.
	• Do not unplug the USB storage device during recording/capturing.

NOTE

USB 3.0 and above storage device with writing speed of minimum 150MB/s must be used.

8.4 Preparing the documentation system

▶ Make sure that the documentation devices are connected to the control unit.

▶ Turn on documentation device(s).

▶ Check the settings on the documentation devices and, where appropriate, adapt them; see the user manuals for the documentation devices.

8.5 Checking the camera connection

▶ Press the "Info" key on the control unit or the remote control.

The following information is shown on the monitor (example):

MODEL :	HDC100
SERIAL NO. :	DDMMYYXXX
HW VERSION :	V1.0
SW VERSION :	V1.0
SCENE FILE :	1
VIDEO FORMAT :	1080p59.94
SHUTTER TIME :	Jan-60
SENSOR GAIN :	14 dB
DATE & TIME :	01/01/2018 0:02
CAMERA HEAD :	CONNECTED

If CAMERA HEAD status is NOT CONNECTED

▶ Check the connection between the camera head and the control unit.

9 Operation

9.1 Freeze image

▶ Press ⌽ button on the remote control.

The current image is shown frozen on the monitor.

▶ To clear the frozen image, press ⌽ button again on the remote control.

The live image is shown on the monitor.

❗
- The "Freeze " function is only possible using the remote control.
- The frozen image can be captured by pressing the ⌾ button.

9.2 Taking photos

▶ Press the ⌾ button on the control unit or on the remote control.

The current image is saved to the USB storage device in the .jpg data format.

❗ If the ⌾ button is pressed and no USB storage device is plugged into the control unit, the message "No storage device is found" appears on the monitor.

9.3 Recording videos

▶ Press the ⌾ button on the control unit or on the remote control to start video recording.

▶ Press the ⌾ button again to end video recording.

The video is saved to the USB storage device in MP4 data format.

9.4 Playing back photos

▶ Press the ⌾ button on the remote control or the rotary knob.

The list of the photos taken appears.

▶ Select the desired photo with the rotary knob or the cursor buttons ◀ / ▶ and confirm by pressing the rotary knob or the ⊛ button.

The photo selected is displaying on the monitor.

❗ Do not use the playback function in combination with the Autofocus or with IGS systems.

9.5 Playing back videos

▶ Press the ⌾ button on the remote control or the rotary knob.

The list of the videos recorded appears.

▶ Select the desired video with the rotary knob or the cursor buttons ◀ / ▶ and confirm by pressing the rotary knob or the ⊛ button.

The video selected is playing on the monitor.

▶ Press the ⌽ button on the remote control to pause or resume the video.

10 Care and maintenance

10.1 Maintenance instructions

► Keep accessories in a dust-free place when not in use.
► Remove dust with bellows and a soft brush.
► Protect the camera system from moisture, vapors, acids, alkalis, and corrosive substances.
► Do not store any chemicals near the instruments.
► Protect the camera system from improper handling.
► Do not assemble other plugs, or unscrew optical systems and mechanical parts, unless explicitly instructed to do so in these instructions.
► Protect the camera system from oil and grease.
► Never oil or grease the guide surfaces or mechanical parts.
► Remove coarse debris with a moistened disposable cloth.
► To disinfect the camera system, use compounds from the surface disinfectant group based on the following active ingredients:
  · Aldehydes
  · Alcohols
  · Quaternary ammonium compounds

!	Due to potential damage to the materials, never use products based on: · Halogen-donating compounds · Strong organic acids · Oxygen-donating compounds

!	· Follow the disinfectant manufacturer's instructions. · We recommend concluding a service contract with Leica Service.

10.2 Maintenance

10.2.1 Camera and control unit

The camera and control unit are basically maintenance-free.

10.2.2 Remote control

If the control unit is no longer responding to or has only limited response to the remote control, changing the battery is necessary.

► Open the battery compartment cover on the rear side of the remote control and remove the old battery.
► Insert new Type CR2025, 3V lithium battery and re-close the battery compartment cover.

!	Dispose of old empty batteries in accordance with the applicable federal guidelines.

10.3 Disposal

!	Observe the relevant federal regulations when disposing of the device. Suitable waste disposal companies are to be used. The unit packaging is to be recycled

11 What to do if…?

! If electrically operated functions do not work properly, always check these points first:
   - Is the supply voltage properly connected and switched on?
   - Are all connecting cables attached correctly?

Fault:	**No image on the monitor or documentation system**	
Cause:	Failure of or damage to camera and/or control unit.	**Fault remedy:** ▶ Check ambient conditions. ▶ Check for mechanical damage. ▶ Operate the camera system in accordance with this User Manual. ▶ Check the compatibility of the connected devices. ▶ Check wiring.
Fault:	**Date and time display missing or incorrect**	
Cause:	Buffer battery in the control unit is empty.	**Fault remedy:** ▶ Contact your Leica representative.
Fault:	**No or insufficient remote control reaction**	
Cause 1:	IR receiver on the front side of the control unit is dirty.	**Fault remedy:** ▶ Clean control unit with a moistened disposable cloth.
Cause 2:	The remote control unit battery is empty	**Fault remedy:** ▶ Change the remote control unit battery.
Fault:	**No or insufficient operating button function on the control unit**	
Cause:	DIP switch on the rear side of the control unit is not in operating mode.	**Fault remedy:** ▶ Check the DIP switch, see section „6.3 Select video format and operating mode", page 8. ▶ Contact your Leica representative.
Fault:	**The camera only shows the color bar**	
Cause:	Control unit and camera are incorrectly connected.	**Fault remedy:** ▶ Check the wiring. ▶ Check the plug connection. ▶ Contact your Leica representative.
Fault:	**Blurry image**	
Cause:	De-focused video adapter.	**Fault remedy:** ▶ Check compatibility of the connected devices. ▶ Contact your Leica representative.
Fault:	**White balance not possible**	
Cause:	Image too bright.	**Fault remedy:** ▶ Activate the ALC. ▶ Select a smaller diaphragm.

12   Technical Data

12.1   Mechanical data

Mounting the camera	with a C-mount interface
Dimensions	
Camera	$42 \times 47 \times 58$ mm
Control unit	$170 \times 44 \times 159$ mm
Weight	
Camera	120 g
Control unit	950 g

12.2   Electrical data

Leica HD C100

Power supply	$12\ V \pm 20\ \%$
Power consumption	$\leq 18\ W$
Buffer battery (control unit)	Lithium battery CR2025, 3 V
Remote control battery	Lithium battery CR2025, 3 V

12.3   Optical data

Image recording element	1/2.8" progressive 1-chip CMOS(3M)
Number of pixels	2048(H)×1536(V)
Video format	SD(NTSC) or SD(PAL)
	"1080/60P/60i" or "1080/50P/50i"
Signal to noise ratio	54 dB

12.4   Ambient conditions

Use	$+10\ °C$ to $+40\ °C$ ($+50\ °F$ to $+104\ °F$)
	30 % to 95 % rel. humidity
	780 mbar to 1013 mbar atmospheric pressure
Storage	$-40\ °C$ to $+70\ °C$ ($-40\ °F$ to $+158\ °F$)
	10 % to 100 % rel. humidity
	500 mbar to 1060 mbar atmospheric pressure
Transport	$-40\ °C$ to $+70\ °C$ ($-40\ °F$ to $+158\ °F$)
	10 % to 100 % rel. humidity
	500 mbar to 1060 mbar atmospheric pressure

> **!** When the HDC100 camera is integrated into the microscope system, the camera control unit which is in the enclosed compartment can operate up to 50 °C. However, the ambient temperature remains at maximum 40 °C.

12.5   Electromagnetic compatibility (EMC)

Environment for which the instrument is suitable:
Hospitals except for near active HF Surgical Equipmentand the RF shielded room of an ME System for magneticresonance imaging, where the intensity of EM Disturbances is high.

Compliance IEC 60601-1-2:

Emissions

- CISPR 11, Class A, Group 1
- Harmonic Distortion per IEC 61000-3-2 Class A
- Voltage Fluctuation and Flicker per IEC 61000-3-3 Class A, Figures 3-7

Immunity

Electrostatic discharges IEC 61000-4-2:	$CD \pm 8\ kV$, $AD \pm 15\ kV$
Radiated RF EM Fields IEC 61000-4-3:	80–2700 MHz: 3 V/m
Radiated RF EM Fields and Proximity Wireless fields:	380–5785 MHz: 9 V/m; 28 V/m
Electrical Fast Transients and bursts IEC 61000-4-4:	AC mains: $\pm 2\ kV$ / 100 kHz
Surges IEC 61000-4-5:	$\pm 1\ kV$ sym.
	$\pm 2\ kV$ unsym.
Conducted disturbances, induced by RF fields IEC 61000-4-6:	3 V rms
Rated Power-frequency Magnetic Field IEC 61000-4-8:	3 A/m
Voltage dips and interruptions IEC 61000-4-11:	according to IEC 60601-1-2:2014

12.6   Standards fulfilled

CE conformity

- Medical Devices Directive 93/42/EEC, including amendments
- Classification: Class I medical device
- Medical Electrical Equipment, Part 1:
  Generally defined for the security in EN 60601-1
- Electromagnetic compatibility: EN 60601-1-2

The Medical Division, within Leica Microsystems (Schweiz) AG, holds the management system certificates for the international standard ISO 13485 relating to quality management, quality assurance and environmental management.

12.7   Limitations of use

The camera system Leica HD C100 may be used in enclosed rooms only.

12.8   Control Unit Drill Pattern

LEICA

MICROSYSTEMS

CONNECT
WITH US!

Leica Microsystems (Schweiz) AG · Max Schmidheiny Strasse 201 · CH-9435 Heerbrugg

T +41 71 726 3333

www.leica-microsystems.com