



Leica ICC50 HD Manual

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General Instructions

Safety concept

Before using your Leica ICC50 HD camera for the first time, please read the "Safety concept" brochure included with your instrument. It contains additional information about handling and care.



Use in clean rooms

The Leica ICC50 HD camera can be used in clean rooms without any problems.

Cleaning

- Do not use any unsuitable cleaning agents, chemicals or techniques for cleaning.
- Never use chemicals to clean colored surfaces or accessories with rubberized parts. This could damage the surfaces, and specimens could be contaminated by abraded particles.
- In most cases, we can provide special solutions on request. Some products can be modified, and we can offer other accessories for use in clean rooms.

Servicing

- Repairs may only be carried out by Leica Microsystems-trained service technicians. Only original Leica Microsystems spare parts may be used.

Responsibilities of person in charge of instrument

- Ensure that the Leica ICC50 HD is operated, maintained and repaired by authorized and trained personnel only.

Safety concept

The Leica ICC50 HD camera include an interactive CD-ROM with all relevant user manuals. Keep it in a safe place, and readily accessible to the user. User manuals and updates are also available for you to download and print from our web site at www.leica-microsystems.com.

This operating manual describes the special functions of the individual modules of the Leica DM microscopy series and contains important instructions for their operational safety, maintenance, and accessories.

The "Safety concept" booklet contains additional safety information regarding the service work, requirements and the handling of the microscope, accessories and electrical accessories as well as general safety instructions.

You can combine individual system articles with articles from external suppliers (e.g. cold light sources, etc.). Please read the user manual and the safety requirements of the supplier.

Before installing, operating or using the instruments, read the user manuals listed above. In particular, please observe all safety instructions.

To maintain the unit in its original condition and to ensure safe operation, the user must follow the instructions and warnings contained in these user manuals.

Symbols used

Warning of a danger



This symbol indicates especially important information that must be read and complied with. Failure to comply can cause the following:

- Hazards to personnel
- Functional disturbances or damaged instruments

Warning of hazardous electrical voltage



This symbol indicates especially important information that, if not observed, can cause the following:

- Hazards to personnel
- Functional disturbances or damaged instruments.

Danger due to hot surface



This symbol warns against touching hot surfaces, e.g. those of light bulbs.

Important information



This symbol indicates additional information or explanations that intend to provide clarity.

Safety regulations

Description

The individual modules fulfill the highest requirements for observation and documentation of the Leica ICC50 HD camera.

Designated use

- See "Safety concept" booklet

Non-intended use

- See "Safety concept" booklet

The devices and accessories described in this operating manual have been tested for safety and potential hazards. The responsible Leica affiliate must be consulted whenever the device is altered, modified or used in conjunction with non-Leica components that are outside of the scope of this manual.

Unauthorized alterations to the instrument or noncompliant use shall void all rights to any warranty claims!

Location of use

- See "Safety concept" booklet
- Set up the electrical components at least 10 cm from walls and combustible objects.
- Avoid large temperature fluctuations, direct sunlight and vibrations. These conditions can distort measurements and micro-graphic images.
- In warm and warm-damp climatic zones, the individual components require special care in order to prevent the build up of fungus.

Requirements for the owner/operator

- See "Safety concept" booklet

Ensure that:

- The Leica ICC50 HD camera is operated, maintained and repaired by authorized and trained personnel only.
- All operators have read, understood and observe this user manual, and particularly the safety instructions.

Safety regulations (continued)

Repair, service work

- See "Safety concept" booklet
- Only original Leica Microsystems spare parts may be used.
- Before opening the instruments, switch off the power and unplug the power cable.
- Touching the live circuit can cause injury.

Transport

- Use the original packaging for shipping or transporting the individual modules of the Leica ICC50 HD camera.
- In order to prevent damage from vibrations, disassemble all moving parts that (according to the user manual) can be assembled and disassembled by the customer and pack them separately.

Installation in third-party products

- See "Safety concept" booklet

Disposal

- See "Safety concept" booklet

Legal regulations

- See "Safety concept" booklet

EC Declaration of Conformity

- See "Safety concept" booklet

Health risks

Workplaces equipped with microscopes facilitate and improve the viewing task, but they also impose high demands on the eyes and holding muscles of the user. Depending on the duration of uninterrupted work, asthenopia and musculoskeletal problems may occur. For this reason, appropriate measures for reduction of the workload must be taken:

- Optimal arrangement of workplace, work assignments and work flow (changing tasks frequently).
- Thorough training of the personnel, giving consideration to ergonomic and organizational aspects.

The ergonomic design and construction of the Leica DM microscopy series are intended to reduce the exertion of the user to a minimum.

The Leica ICC50 HD

Introduction

Congratulations on purchasing the Leica ICC50 HD Digital Camera Module by Leica Microsystems. The special design of the Leica ICC50 HD makes it a universal, highly versatile tool for viewing microscopic specimens and capturing still images or even video.

Real Full HD display

The integrated HDMI output allows the microscope image to be output to a High-Definition (HD)-capable monitor, where the following resolutions are possible:

- 1920×1080i ("Full HD"). This resolution provides the best possible imaging performance on a Full HD-capable television.
- 1280×720p ("HD ready"). This resolution is suitable for display on televisions labeled "HD ready".

Leica Application Suite

Along with your Leica ICC50 HD, you also obtain the "Leica Application Suite EZ" software (LAS Core on request). It allows additional scenarios to be implemented in which the television and monitor can even be used together. Thus you are ideally prepared for every situation: work at the computer, presentations, training sessions, trade show appearances, material testing and more.

User-friendly even in the smallest detail

Like every digital camera, the Leica ICC50 HD reacts differently to different light sources. However, the white balance is factory set to match the Leica LED illuminators. This means that if you use a Leica LED illuminator, you automatically obtain the best results!

The basics



Your Leica HD camera has many possibilities for various applications and conditions of use. Below are some basic concepts to help you get the most performance for your application.

High Definition

High Definition – 1920 × 1080 resolution without any scaling. (An HD wide screen display is required.)

HD Mode – For use without a computer

- The camera always powers up in HD mode.
- The camera provides an HD image directly to an HD display via the HDMI cable. This image is in a wide screen 16:9 format.
- Images can be captured directly onto an SD card.
- The optional remote control is usable in HD mode for fine tuning the image, remote SD card capture, capturing of movie clips, viewing a gallery of images which are on the SD card, etc.

Power

Power can be provided to the camera in the following ways:

- via the USB cable from a computer
- via the optional USB power supply
- a computer will not see the camera when the camera is in HD mode.



If you would like to switch to PC mode, then launch the Leica imaging software or press the Black Multipurpose button for 5 seconds.

The basics (cont.)

PC Mode – For use with Leica Imaging Software

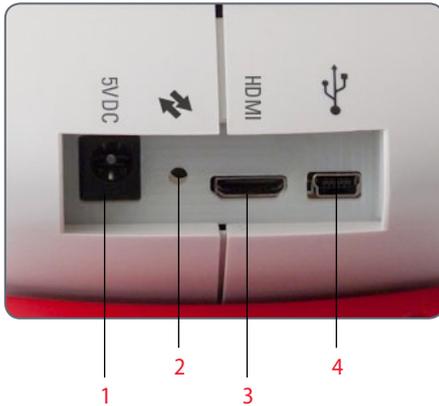
- Upon launching the Leica Imaging software, the camera will switch to PC mode if previously in HD mode or remain in PC mode if previously in PC mode.
- The camera provides a selection of image resolutions (up to 3 megapixels) to the Computer for use with Leica imaging software. The images are in a 4:3 format.
- In addition to a computer display, the live image can also be seen via the HDMI cable on an HD display, but the 4:3 image will be stretched to fit the 16:9 format and appear distorted. If you have the ability to change your display setting to 4:3, you should do so but note the resolution is not the same as in HD mode.
- Images are captured to a folder which you decide via the software.
- The optional remote is not functional when the camera is in PC mode except for the “i” button which shows camera information on the image provided by the HDMI cable.
- Stand alone SD card capture is not possible when the camera is in PC mode.
- Power is provided to the camera via the USB cable from the computer.
- If you would like to switch to HD mode, then close the Leica Imaging Software and once again power up the camera.

Leica ICC50 HD: Overview



1. Black Multipurpose button: Press for 1 second – page through illumination settings. Press for 5 seconds – change mode between HD mode and PC Mode
2. Red Multipurpose button (only active in HD mode):
 - Press for one second to capture image onto SD Card.
 - Press for 5 seconds to set white balance (wait for beep).
 - Press for 10 seconds to reset camera to factory settings (wait for second beep).
3. LED status indicator:
 - Green means power is on and ready for image capture.
 - Red means power is on but not ready for image capture (ie: no SD card, SD card full, Software not launched when in PC mode)
 - Yellow means initializing. Orange means camera failure (restart or call for service).
4. SD card Slot: Accepts SD card for stand-alone image capture.

Leica ICC50 HD: Overview (cont.)



1. Power Supply Socket: Not used at this time.
2. Service Button: To be used by Authorized Service Personnel.
3. HDMI socket: For connecting the provided HDMI cable
4. USB socket: For connecting a computer for Power or for using in PC Mode. For connecting a USB power supply for HD Mode

Front

Infrared Window: Receives the signal from the optional remote control.



Unpacking

 Please do not discard any of the packing materials. They should be used for safely storing and transporting the instrument should the need arise.



The contents include the camera module, CD with imaging software, SD Card, HDMI and USB cable.



If you ordered the Optional USB Power Supply for operating the Leica ICC50 HD without a computer, you have also received a power supply.



If you ordered the handheld remote, you received the remote and the battery CR2025.



Get Ready!

Preparation for Use

Tools used

- Allen key



 Do not insert anything except the SD memory card into the card slot – danger of short circuit and electric shock!

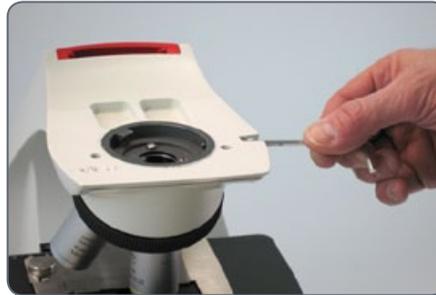
 The Leica ICC50 HD camera module fits between the microscope stand and the microscope's viewing tube.

Preparation for Use

1. If the microscope's viewing tube is in place, remove it.

Attach the Leica ICC50 HD to the microscope stand:

2. Slightly unscrew the set screw (located on top of the stand) with the Allen key tool provided with the microscope.



3. Insert the dovetail (see the underside of the Leica ICC50 HD) into the stand support.



4. Tighten the set screw firmly without forcing it.



Preparation for Use (cont.)

5. Attach the microscope viewing tube onto the Leica ICC50 HD using the set screw, which is located on the left side of the Leica ICC50 HD camera module.



Get Set!

Connection and Operation for Imaging using a Computer

 Instructions for Computer Mode are supplied on the CD ROM which comes with the ICC50 HD.

 10× eyepieces have a fixed circular field of view of 18 mm or 20 mm diameter. The Leica ICC50 HD's field of view, however, is rectangular with a diagonal of 16.4 mm to ensure an even field on the digital image. As a result, the image field of the camera is smaller than the object field seen through the eyepieces.

Installing and Connecting

1. Insert the provided CD into your computer, and follow the instructions to load the software.
2. Insert the Leica ICC50 HD's USB cable into the camera's USB port, and attach the other end of the cable to your computer.



 The Leica ICC50 HD is now powered from your computer via the USB cable, and the LED signal will quickly change from yellow to red. When the LED is red, you are ready to open the software. When the Leica imaging software is launched, the LED will turn green with a quick yellow flash.

4. Follow the software instructions to adjust and capture an image.
5. If you are using a projector, connect your computer to the projector using the cable that came with your projector.

 An image cannot be seen through the projector until the live image appears on your computer.



Limitations in PC Mode

Aspect ratio

 If the Leica ICC50 HD is connected to a computer, images are always output in 4:3 aspect ratio – even if a 16:9 monitor or television is connected via HDMI. The image is necessarily compressed on such a device.

Remote control

 In PC mode, the optional remote control will not work. The menus of the camera are also no longer displayed on the monitor. Instead, all settings are configured on the computer using Leica Application Suite.



4:3 aspect ratio



16:9 aspect ratio

Using an Additional HDMI Monitor in PC Mode

 In PC mode, the camera image is always shown in the preview window of Leica Application Suite. In addition, another computer monitor or television can be connected via the HDMI interface.

 The image resolution on the attached HDMI or television screen is limited to the live image resolution inside the LAS EZ software. Due to technical limitations it is not possible to provide a HD-ready or Full-HD live image stream to the attached screen. In order to see the higher resolution on the attached screen, please use the camera in “HD” mode .

Connecting the HDMI monitor

1. Connect the HDMI cable provided to the Leica ICC50 HD.



2. Connect the HDMI cable to the HDMI television or monitor.

Capturing Images without a computer

 In order to use this mode, you must have an SD card with free memory on it. If the SD memory card is full, the Leica ICC50 HD's LED will remain red and you will not be able to capture any more images.

 In order to take photos without a computer you must be in HD mode (not PC mode). The camera starts up in HD mode and only switches to PC mode when the Leica software is started.

Attaching the power cable

1. Attach the USB cable (supplied with the Camera) into the power-jack in the back of the Leica ICC50 HD and attach the other end into the USB Power Supply. Then plug the USB Power Supply into an appropriate power outlet.



- The LED on the Leica ICC50 HD will change from yellow to red.



Capturing Images without a computer (cont.)

2. Insert the SD memory card into the slot on the side of the Leica ICC50 HD until the card clicks into place.



The camera's LED will turn green. The Leica ICC50 HD is now ready to capture images onto the SD memory card.

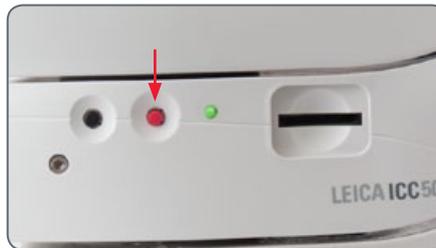


Capturing an image



It is critical to properly set the microscope eyepieces' diopters to ensure that the images on the SD memory card are in focus when the image is in focus through the microscope's eyepieces. Refer to the microscope's User Manual for proper diopter setting. You can also use the HDMI output and an HD display (not provided) as a focusing aid. See next section for proper HDMI setup.

1. To capture an image onto the SD memory card, lightly press the red image capture button, located on the side of the Leica ICC50 HD camera.



- You will hear a beep to acknowledge the button was pressed.
- The camera's LED flashes green while the image is being captured.
- You will hear another beep when the Leica ICC50 HD has completed capturing the image.

The image is now saved on the SD card.

How to handle SD memory cards

 Some SD memory cards may have a write-protect tab. Sliding the tab downward prevents recording of data and protects existing data (e.g. images). When recording to, erasing from or formatting the memory card, slide the tab upward.

Ensure that the memory card is correctly oriented before inserting it in the camera. It may damage the camera if inserted backward by mistake.

Cautions When Handling SD memory cards:

- Memory cards are high-precision electronic devices. Do not bend them, apply force to them, or subject them to shocks or vibration.
- Do not attempt to disassemble or alter the memory card.

- Do not allow dirt, water or foreign objects to contact the terminals on the back of the card. Do not touch the terminals with your hands or metal objects.
- Do not peel away the original label on the memory card or cover it with another label or sticker.
- When writing on the memory card, use a soft point pen (e.g. felt-tip pen). Using a sharp point pen (e.g. ball-point pen) or pencil may damage the memory card or corrupt the recorded data.
- Since some or all of the data recorded on the memory card may be corrupted or erased by electrical noise, static electricity, camera or card malfunction, making a backup copy of important data is recommended.
- Moving a memory card rapidly between temperature extremes will cause conden-

sation to form in the card and lead to a malfunction. To avoid condensation, place the memory card in a sealed plastic bag before moving it into a different temperature zone and allow it to adjust slowly to the new temperature.

- If condensation forms on the memory card, store it at room temperature until the water droplets have evaporated naturally.
- Do not use or store memory cards in locations subject to dust or sand nor in locations subject to high humidity and high temperatures



Using High Definition Video without a computer

1. Attach the USB cable (which came with the camera) into the USB connector in the back of the Leica ICC50 HD camera and the other end into the USB Power Supply. Then plug the USB Power Supply into an appropriate power outlet.
2. Attach the HDMI cable into the "HDMI" connector in the back of the Leica ICC50 HD and the other end into the HDMI connector of your HD device (projector, monitor etc.).



Setting a new white balance for the ICC50 HD

 Make sure that there is no sample in the beam path and that a standard illumination is available when you reset the camera.

Setting a new white balance

Press and hold the red exposure button for 5 seconds. Wait for the beep. A new white balance is set.

Factory settings

Press and hold the red exposure button for 10 seconds. Wait for the second beep. The camera will now reset to factory settings.



 It is recommended to set a new white balance each time you change the type or color temperature of the illumination. This is especially needed when you work with halogen light which can be turned from low intensity yellow to a high intensity blue light. The new white balance setting will generate a neutral background for both illuminations.

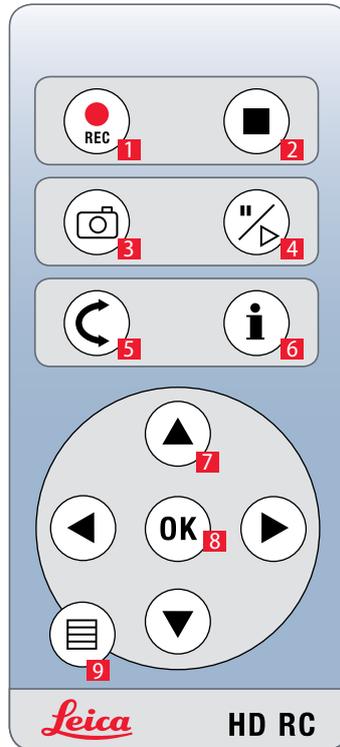
The Camera Menu

If you purchased the optional remote, you will have access to the camera menu.

Optional remote control



The remote control does not work if the camera is in PC mode.



1. Start video recording
2. Stop video recording
3. Save still image to SD card
4. Stop/continue live image
Pause/play movie clip
5. Playback mode
6. Show / hide information box
7. Arrow keys for navigation
8. OK / confirm
9. Call up the camera menu

Viewing images and movies with the optional remote control



If you have purchased the optional remote, the Leica HD camera shows images and movie clips directly on an HD monitor.

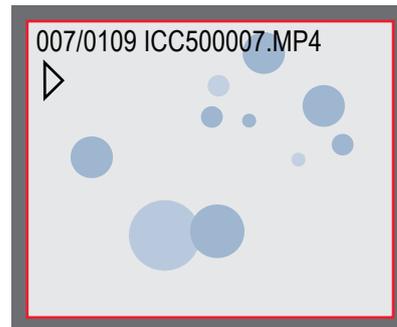
3. To return to live view press any button on the camera or press the key 1, 2 or 9 on the remote control (see previous page).

1. Thumbnail view (first press)

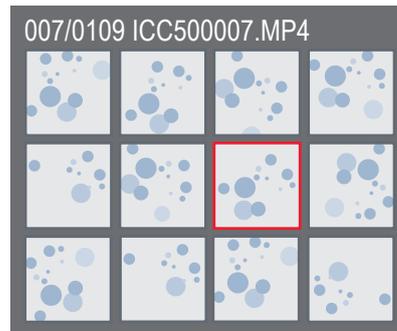
- up/down/left/right  select thumbnail
- OK: Show image in full screen or playback movie clip

2. Single image playback (second press)

- left/right  next image / previous image
-   ► Play movie clip
- left/right  fast forward / rewind



Playback / fullscreen view



Thumbnail view

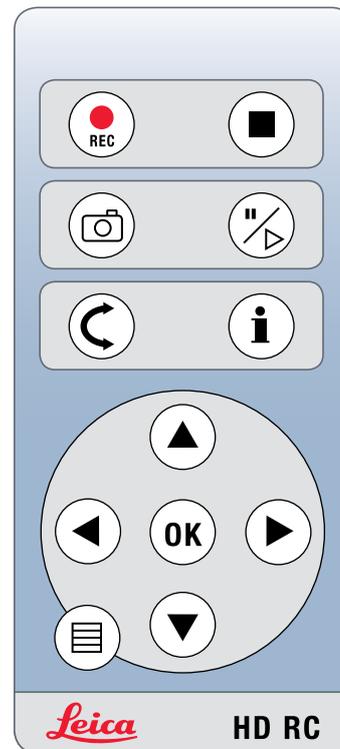
Calling up the Camera Menu

 The remote control does not work if the Leica HD camera is connected to a computer and is in PC Mode. The menus of the camera are also no longer displayed on the monitor. In this case close any Leica Imaging software and re-power up the camera.

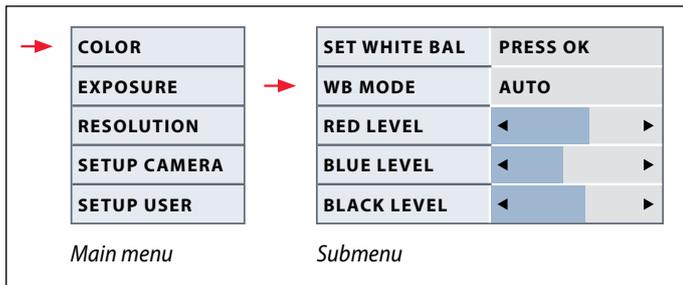


Opening and closing the camera menu

1. Point the remote control towards the camera.
2. Press the  key on the remote control to show the camera menus on the monitor.
3. Press the   and  buttons to select a menu item.
4. Press the "OK" button to confirm a menu item.
5. Press the  button again to hide the camera menus.



COLOR (Automatic White Balance)



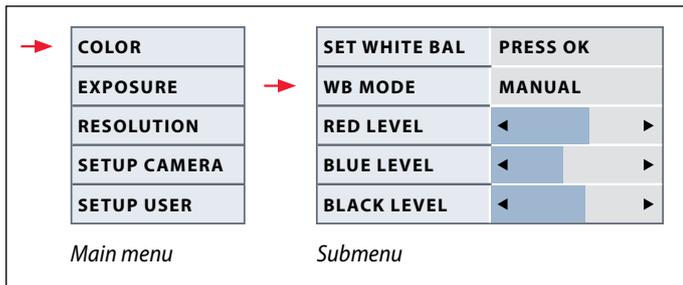
Enabling automatic white balance

1. Press the  button on the remote control.
2. Call up the "COLOR" entry.
3. Set the value for "WB MODE" to "AUTO".
4. Press the  button to exit the menu.

 The "Color" function makes it possible to adapt the camera chip to the ambient light so that color-neutral images can be acquired.

 The values for "RED" and "BLUE" cannot be adjusted if the "WB MODE" setting is set to "AUTO".

COLOR (Manual White Balance)

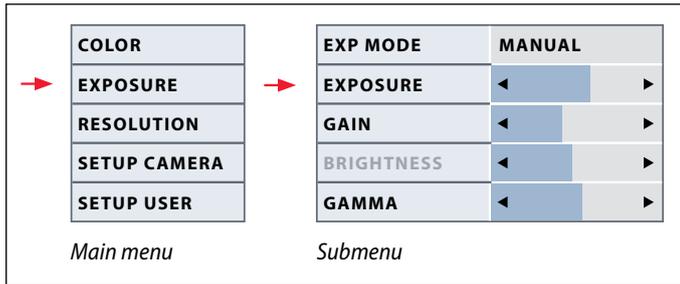


 The "Color" function makes it possible to adapt the camera chip to the ambient light so that color-neutral images can be acquired.

Adjusting the white balance manually (recommended)

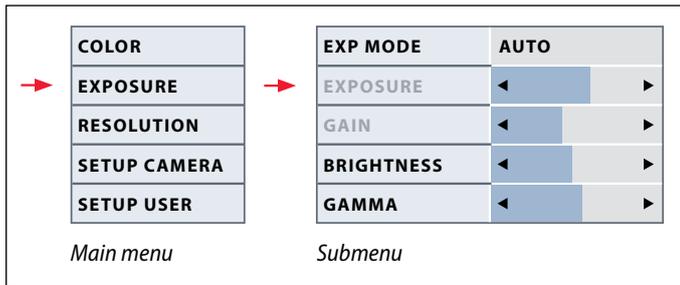
1. Move the specimen out of the field of view so that only the illumination is seen.
2. Press the  button on the remote control.
3. Call up the "COLOR" entry.
4. Select the "SET WHITE BAL" menu item and press the "OK" button.
4. If necessary, correct the values for "RED" and "BLUE" until the image shows a uniform gray area.
5. Press the  button to exit the menu.

EXPOSURE



Manual exposure

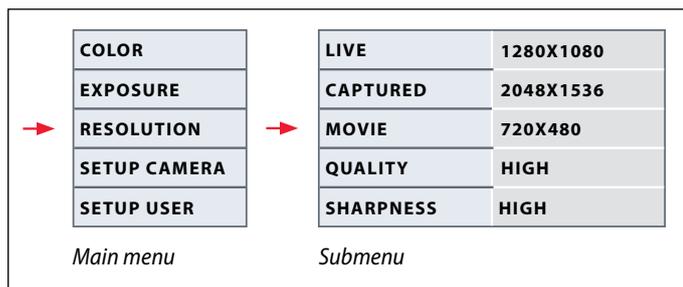
1. Press the  button on the remote control.
2. Call up the command for manual exposure (see diagram at the left).
3. Set the value for "EXP MODE" to "MANUAL".
4. Correct the values for "EXPOSURE", "GAIN" and "GAMMA" until you obtain the desired results for the image.



Automatic exposure

1. Press the  button on the remote control.
2. Call up the command for automatic exposure (see diagram at the left).
3. Set the value for "EXP MODE" to "AUTO".
4. Correct the values for "BRIGHTNESS" and "GAMMA" until you obtain the desired results for the image.

RESOLUTION



 The "RESOLUTION" menu enables you to define the resolution for the live image on the computer, still image capture and video capture individually. This provides optimum results in every situation.

LIVE (resolution of the live image)

Defines the resolution of the live image. The following resolutions are available:

- For direct connection of the Leica HD camera to a monitor or television: 1280×720 or 1920×1080 (16:9 aspect ratio).
- For connection to a computer: 640×480, 1024×768 and 1440×1080 (4:3 aspect ratio)

CAPTURED (resolution of the captured image)

Defines the resolution of the captured image if the Leica HD camera is not connected to a computer. The following resolutions are available: 640×480, 1024×768, 1600×1200 and 2048×1536.

MOVIE (resolution of videos)

Indicates the resolution of the captured videos if the Leica HD camera is not connected to a computer. The resolution of 720×480 pixels cannot be changed.

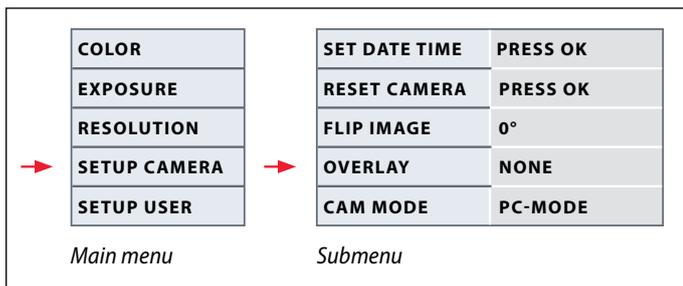
QUALITY (of the image capture)

A higher image quality can slow down the image capture process. Two quality levels are available for selection: "NORMAL" and "HIGH".

SHARPNESS (internal camera sharpness)

Define the amount of sharpening to be applied to the image.

SETUP CAMERA (Camera Settings)



 The camera settings enable you to control internal parameters such as the date or time, update the firmware or reset the camera. You can also switch the camera from stand-alone to PC mode (or vice versa).

SET DATE TIME

This command sets the date and time as well as the format for displaying them. The following formats are available for selection: YYMMDD – DDMMYY – MMDDYY

RESET CAMERA

This command resets the camera to the factory settings. All user information (such as white balance, resolution etc.) is reset.

FLIP IMAGE

Select to flip image 180°.

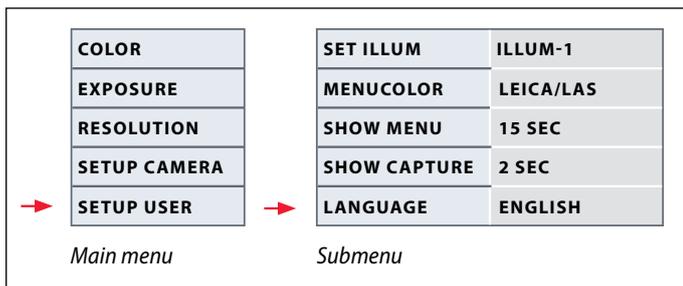
OVERLAY

Shows the following on the monitor: Leica logo, histogram, date/time and image counter.

CAMERA MODE

Toggles between the PC and HD modes. You can also toggle between PC and HD mode by pressing the black button for more than 5 sec until a message appears on the screen.

SETUP USER (User-defined Settings)



 The user-defined settings enable you to, for example, save illumination scenarios and retrieve them later.

SET ILLUM -1 to 3 (save illumination modes)

These settings allow you to store up to three different illumination modes and retrieve them later. Select the illumination number, then press "OK" to save the current camera settings for recurring acquisition situations.

SET MENUCOLOR

Currently, two color schemes are available for the menu guidance. Additional colors may be provided in the future via a firmware update.

SHOW CAPTURE

Defines how long the acquired image is displayed on the screen after being captured.

SHOW MENU

Defines how long the menu is displayed on the screen.

SET LANGUAGE

Select the language of the menu.

Predefined Illumination Scenarios

 The Leica HD camera is supplied with various illumination modes that cover a wide spectrum of possible situations.

Changing the illumination mode

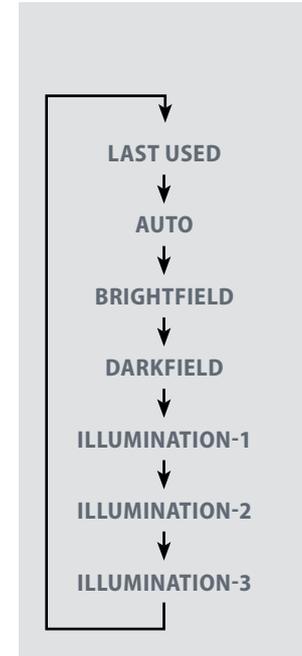
1. Press the black button on the Leica HD camera to display the current illumination mode on the monitor or television.



2. Press the button again to switch to the next illumination mode.
3. Press the red image capture button or wait until the menu no longer appears.

 To return to the last selected mode, press the button until the "LAST USED" setting appears.

 If you do not press the button for 5 seconds, the selected illumination mode is taken over.





Go!

Ready! Set! Go!

Now all you need to do is properly set up your microscope, capture your images, and enjoy!



Care and Cleaning

Care and Cleaning

General

- Keeping all optical components clean is important for maintaining good optical performance.
- Always cover the microscope with the Leica ICC50 HD camera with the plastic dust cover (provided with the microscope), when the instrument is not in use. Be sure power to the camera is off when the dust cover is in place.
- If any optical surface becomes badly coated with dust or dirt, it should be cleaned by blowing the surface with a syringe or brushing it off with a camel hair brush before attempting to wipe the surface clean.
- Optical surfaces should be cleaned with a lint-free cloth, lens tissue or a cotton swab moistened with methanol or commercially available glass cleaner. Do not use alcohol.

- It is very important to avoid the excessive use of solvent. The lint-free cloth, lens tissue or cotton swab should be moistened with solvent, but not be wet enough for the solvent to seep around the lens.

Electrical Considerations



Risk of electric shock. Removing the covers of the Leica ICC50 HD Camera or the Stand-alone Kit exposes hazardous voltages, which if contacted, could cause injury or death. Please contact an authorized Leica Microsystems dealer for technical service.



Specifications

Leica ICC50 HD camera module

Camera	
Weight	700 g (camera only)
Height	50mm
Exposure time	2 milliseconds to 2 seconds
Live image	45 fps (1256 × 720 Px) – 20 fps (1920 × 1080 Px)
Full frame image acquisition	2048 × 1536 pixels, 3.1 megapixels
Movie clip	720 × 480 pixels (MP4)
Sensor size	6.55 mm × 4.92 mm
Pixel size	3.2 μm × 3.2 μm
Sensor grade	Micron 1/2" CMOS
Gain	1× to 20×
Color depth	24-bit
Data format	JPEG / TIFF / BMP / MP4
Operating systems	Windows XP, Windows Vista, Windows 7, Mac OS X
Software available	LAS EZ software (PC), optional LAS modules, Acquire (Mac)
Min. Computer Config.	Intel Pentium 4 or DuoCore, 2 GHz, 2 GB RAM, 24-bit graphics, 1248 × 1024, DVD
Min. Display Specification	1920 × 1080 resolution, HDMI connection, DVI connection possible with HDMI/DVI adapter cable (not provided)

Order numbers

- **13 613 725** Leica ICC50 HD camera (includes USB cable, HDMI cable, SD card and LAS EZ software)
- **13 613 720** USB Power Supply 5V for use with default settings and onboard camera controls when there is no computer
- **13 613 726** Wireless Remote Camera Control for fine tuning the HD image and making additional camera settings when no computer is being used
- **13 613 709** Photoframe reticle for use with 13 613 532 focusing eyepiece when capturing images on an SD card without a display for preview.

Leica ICC50 HD camera module (cont.)

Mechanical and optical interfaces

- Fits between viewing tube and stand via standard Leica Microsystems dovetail
- Center offset of the top dovetail to the bottom < 0.4 mm
- Light distribution Optical 50% / Camera 50%
- Internal video magnification 0.5×
- Sensor Centered to optical axis ± 0.1 mm
- Horizontally / Vertically aligned ± 1 degree

Electronic interfaces

- Computer USB 2.0, mini-USB plug
- High Definition connector Mini-HDMI, HD-ready, and full HD
- LED with 2 colors Ready (green), image capture (red)
- Integrated slot SD (Secure Digital) card
- 1-8GB, WIFI, WORM supported
- Black button for changing illumination modes (press 1 second), and switching from HD to PC mode (press for 3 seconds)
- Red button for capture with SD card (press 1 second), camera reset (press 10 seconds), set new white balance (press 5 seconds)

Other

- Power supply USB 2.0
- Power requirement 4 W
- External power supply
- Operating temperature range +5 °C to 50 °C
- Relative humidity 10 to 90%
- CE Declaration of Conformity Available
- Tested standards EMI/RFI: EN55011-B EN50082-1
- EMC: 61000-3-2 61000-3-3