Leica M320
User manual

10 718 878 – Version A

Living up to Life

Leica
MICROSYSTEMS

Thank you

for deciding in favor of a Leica surgical microscope system. 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

Leica Microsystems (Schweiz) AG
Surgical Microscopy Business Unit

Product identification

The model code and serial number of your product are provided on the nameplate found on the underside of the control unit. Copy this information to the line below so that it is handy in case you have questions for our representatives or service locations.

Type: Serial number:

CONTENTS

1.1 BASICS

Be sure to read the User Manual and the "Safety Notes" chapter carefully before assembling and operating the product.

Keep the manual close to the instrument.

1.2 INTENDED USE

The Leica surgical microscope is an optical instrument for magnifying and illuminating specimens. It can be applied for observation and documentation and for human and veterinary medical treatment.

The Leica surgical microscope may be used only in closed rooms and must be placed on a solid floor or attached to a strong wall or ceiling.

Not for use in eye operations!

1.3 SYMBOLS

1.3.1 IN THE MANUAL

WARNING

Can cause death or severe injury.

CAUTION

Can cause minor injury.

NOTE

Can cause property damage.

INFO

Information that is not safety-related, but is useful or important.

1.3.2 ON THE INSTRUMENT

Observe shipping documents

Alternating current

European Conformity logo

1.4 REQUIRED TOOLS

Allen key:
- Size 2.5 for installing accessories (dovetail interface)
- Size 3 for optimizing the balance of the optics carrier
- Size 4 for handle holder
- Size 8 for balancing the swing arm

Provided brake knob

2.1 USER PROFILES

Responsible body
Person or company responsible for the use and maintenance of the surgical microscope (hospitals, physician's practices).

Users
Physicians and trained medical personnel with appropriate qualifications who have been instructed in the use of the instrument. Specific training is not required.

Authorized trained personnel
Authorized electricians or other technicians expressly authorized by Leica with corresponding training.

2.2 SAFETY NOTES

Directions for the person responsible for the instrument/authorized trained personnel

- The surgical microscope may be used by qualified users only.
- Regularly check to make sure the users are complying with safety requirements.
- Provide comprehensive instructions and explain the warning messages.
- Assign and monitor responsibilities for commissioning, operating and maintenance.
- Use the surgical microscope in proper condition only.
- Do not place the drape to close to the instrument, as otherwise it can overheat and shut off.
- Inform your Leica representative or Leica Microsystems (Schweiz) AG immediately if you detect a product defect that could potentially cause injury or harm.
- Use original accessories or approved Leica accessories only.
- Use only high-quality HDMI cables with a maximum length of 15 m.
- Use only monitors approved for medical purposes or equipped with an isolating transformer.
- Modifications or repairs may be carried out by authorized trained personnel only.
- Use only original Leica parts in maintenance work.
- After maintenance or technical modifications, readjust the instrument in accordance with our technical specifications.
- If the instrument is modified by or maintenance has been performed by unauthorized personnel, if the equipment is improperly maintained or if the instrument has been operated improperly, Leica disclaims all liability.
- The owner or operator shall be held liable for the function of the system if the system has been assembled incorrectly by individuals who do not belong to Leica Microsystems (Schweiz) AG.
- The influence on other devices by the Leica M320 surgical microscope has been tested in accordance with EN 60 601-1-2. The system passed the emissions and immunity test. The standard preventive measures and safety regulations pertaining to electromagnetic and other radiation have to be observed.

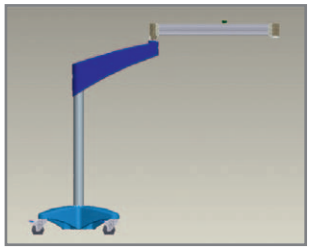
2.3 DIRECTIONS FOR THE OPERATOR OF THE INSTRUMENT

- Follow the User Manual.
- Follow the instructions given by your employer regarding the organization of work and safety at work.
- Do not modify the surgical microscope.
- Danger of tilting of the floor stand! When moving the floor stand, fold up the swing arm as described above and tighten the articulation brakes.
- Risk of injury from moving parts! Assemble and balance the accessories before the operation. Do not install it above the field of operation.
- Risk of injury from rolling of the floor stand! Always push the microscope to move it; never pull it. Do not roll it over anyone's feet. Lock the footbrakes during the operation.
- Do not shine lights in anyone's eyes.
- Do not cover up the ventilation slot of the optics carrier.
- Before an extended period of non-use, remove the battery from the remote control.

2.4 DISPOSAL

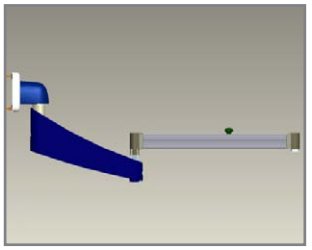
For disposal of the products and the batteries of the remote control and the video camera, observe valid national laws.

3.1 STANDS

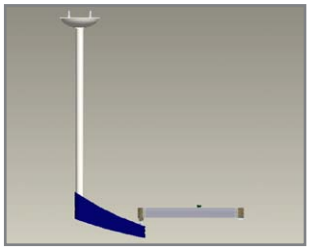


Rolling floor stand (F12)

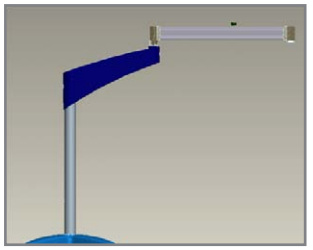
Standard for operating manual



Wall stand (W12)



Ceiling mount (C12)



Floor stand/baseplate (FP12)

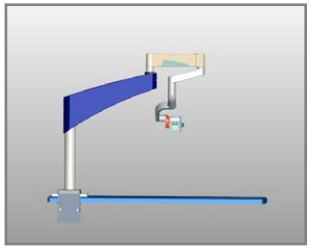
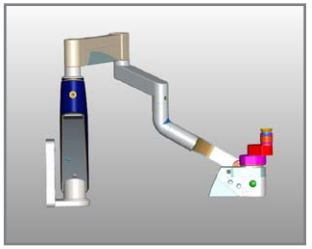


Table stand with terminal (TC12)



Wall stand (LW12)

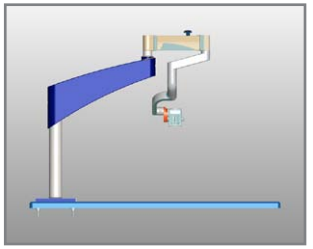


Table stand with plate (TP12)

3.2 SWING ARM AND HORIZONTAL ARM

Swing arm and horizontal arm

Integrated tilt switch

Move the swing arm upwards. Light switches off automatically.

INFO

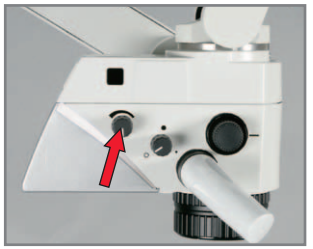
The integrated tilt switch is not available for models TC12, TP12 and LW 12.

3.3 OPTICS CARRIER

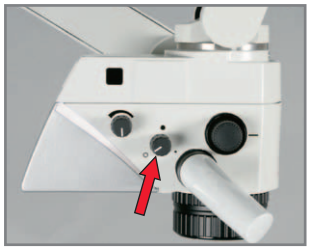
INFO

Caps for magnification changer are steam or gas-sterilizable.

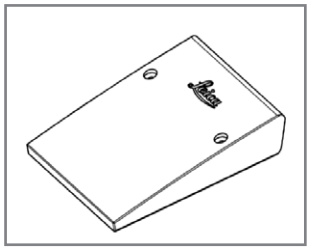
Magnification changer, on both sides, levels: 6.4, 10, 16, 25, 40x



Illumination control for illumination intensity.



Filter and diaphragm controls for white light, orange filter and spot illumination.

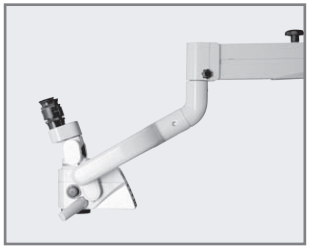


Counterweight for balancing when many accessories are used.

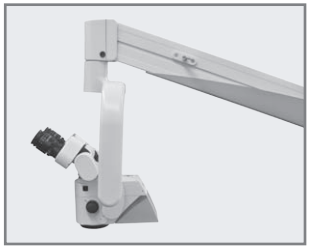
3.4 MICROSCOPE CARRIER

INFO

Two different versions are available.



Inclined

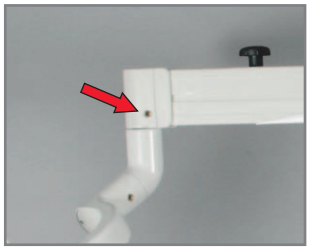


Upright

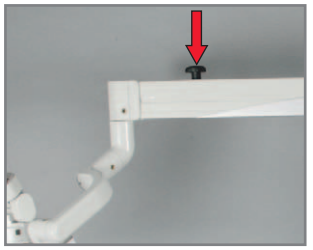
INFO

Upright installation is not possible for models TC12, TP12 and LW 12.

3.5 BRAKE KNOBS/ARTICULATION BRAKES



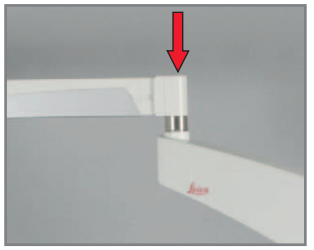
Articulation brake



Brake for locking the vertical position

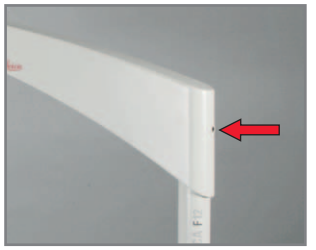
INFO

The brake for locking the vertical position is not available for models TC12, TP12 and LW 12.

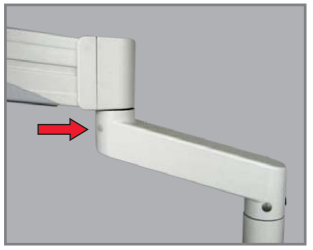


Joint for balancing

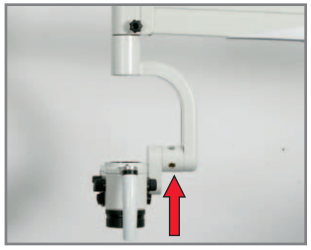
Articulation brake



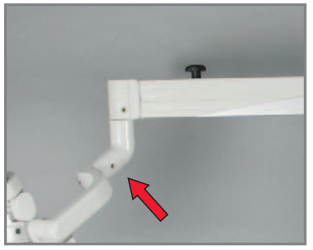
Articulation brake



Articulation brake
(LW12, TP12, TC12)



Tilt brake

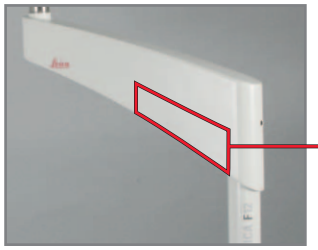


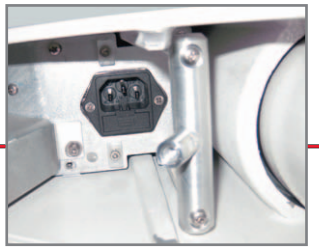
Rotary brake
(inclined version)

3.6 CONNECTIONS

Brake knob for setting the articulation brakes

Main switch





Power socket

Port for BNC/HDMI cable

4.1 INSTALLING THE ACCESSORIES

CAUTION

Risk of injury from downward movement of the swing arm!
Before installing accessories, tighten the articulation brakes. See "5.3 TRANSPORTING THE MICROSCOPE".

INFO

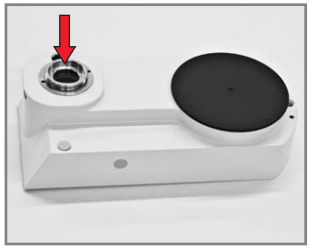
Here is an example of installing the accessories using the ErgonOptic Dent. Install any other accessories in a similar manner.

Unscrew the clamping screw.

Push the accessory into the dovetail interface.

Tighten the clamping screw.

4.2 DOCUMENTATION OUTPUT


C-mount port for commercially available video camera

4.3 HANDLES

4.3.1 INSTALLING AND REMOVING THE FRONT HANDLE

NOTE

Installing the front handle before the rest of the accessories.

INFO

Gray handle sleeves are steam or gas-sterilizable.
White handle sleeves can be disinfected.

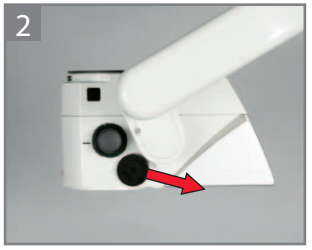
Screw on the handle sleeve holder.

Insert until the handle sleeve clicks into place.

Push the knob and release the handle sleeve.

4.3.2 INSTALLING THE SIDE HANDLES

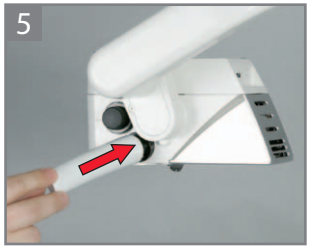
Screw the handle apart.



Remove cover with key.

Screw open the bottom holder for the handle. Handle tilt is individually adjustable.

Refit the handle sleeve holder.



Insert until the handle sleeve clicks into place.

4.4 ERGONOPTIC DENT

INFO

Improves ergonomics at certain working positions: Turning range 45° with 180° binocular tube.

ErgonOptic Dent: optical extension for more comfortable work.

For installation, see "4.1 Installing the accessories".

4.5 ERGOWEDGE

INFO

The ErgoWedge gives a binocular with a fixed angle a variable viewing angle of 5° to 25°.

ErgoWedge

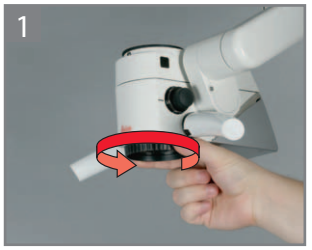
Ideal in combination with inclined binocular tube 45°.

For installation, see "4.1 Installing the accessories".

4.6 OBJECTIVES

INFO

Fixed and fine objectives available in various focal lengths.



Remove the cover from the optics carrier.

Screw in the objective.

Turn the fine focusing objective for fine focus.

4.7 PROTECTIVE GLASS

INFO

The protective glass is used to protect the objective. The glass is steam or gas-sterilizable.

Fine focusing objective:
The nose points forward.

Fixed objective:
The nose points 90° towards the left or right.

4.8 BINOCULAR TUBES


Binocular tube 5° – 25°


Inclined binocular tube


Binocular tube, 180° variable


Straight binocular tube


Binocular tube, variable 30° – 150°

4.9 EYEPIECES


Inclined binocular tube 45°

For installation, see "4.1 Installing the accessories".

INFO

Possible eyepieces:
- 10x eyepiece, standard (except for Straight Tube 12.5x)
- 10x eyepiece with crosshair reticle for easier image centering
- 12.5x eyepiece, shows image with similar magnification to that on the screen

Set the eyepiece in place.

Tighten the rotary ring.

4.10 ADAPTER

NOTE

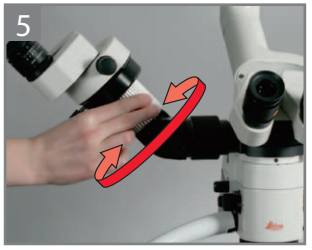
The microscope is not balanced. To prevent it from tipping over, tighten the articulation brakes.

Install the stereo adapter.

Fit the beam splitter. For 50/50% or 70/30% observation.

Install the stereo attachment for second observer on the left side.

Fit the binocular tubes.



Turn the white ring to align the cutout for the assistant.

NOTE

For installation, see "4.1 Installing the accessories".

4.11 MOUNTING STERILE COMPONENTS

CAUTION

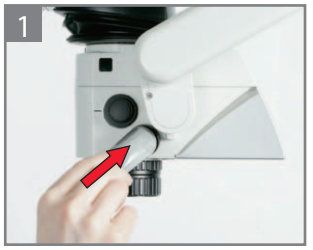
Danger of infection!
Avoid touching the sterile components. Allow sufficient free space.

INFO

Do not install the sterile components until shortly before the operation.

Handle sleeves and caps for the magnification changer are steam and gas-sterilizable.

Sterilize the handle sleeves and caps after use.

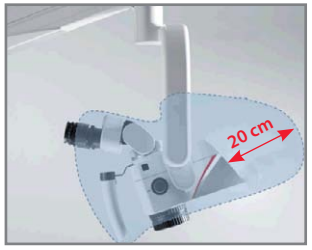


Insert until the handle sleeve clicks into place.

Attach the caps.

Attach protective glass on objective. The noise points forwards (fine focus objectives) or 90° to the left/right (fixed objectives).

4.12 INSTALLING THE DRAPE



Fit the drape.

CAUTION

Do not wrap the drape around the microscope too tightly. The distance between the microscope and drape should be 20 cm. Danger of overheating!

4.13 EXTERNAL ORANGE FILTER

INFO

Filters out the parts of the light spectrum that cause rapid curing of dental composite.

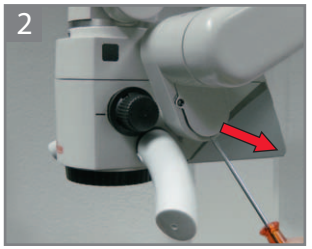
External orange filter: additional accessory for dentistry.

NOTE

For installation, refer to the separate Assembly Instructions provided.

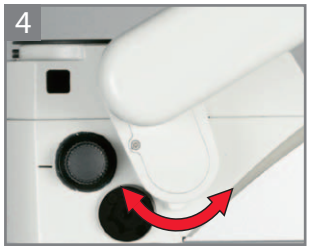
5.1 BALANCING THE SWING ARM

Remove the screw.



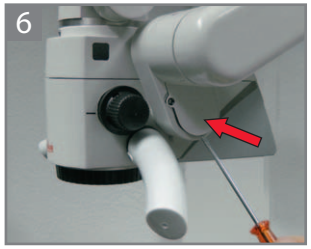
Remove the side cover.

Remove the screws.



Set the desired position. Four different positions can be set.

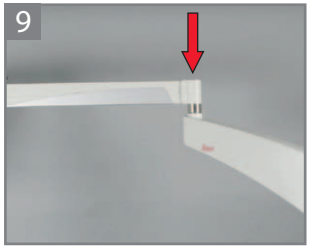
Fasten the screws.



Refit the side cover.

Fasten the screw.

Loosen the brake knob for locking the vertical position.

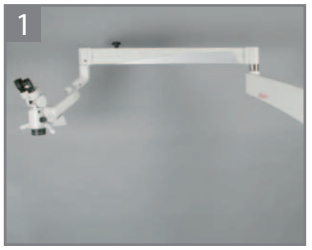


Adjust the balancing joint to the weight using an Allen key (size 8).

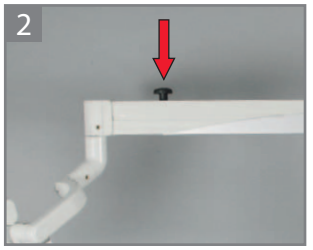
5.3 TRANSPORTING THE MICROSCOPE

⚠ CAUTION

Risk of injury from outward movement of swinging arm! Transport the microscope in transport position.



Place swing arm in a horizontal position.



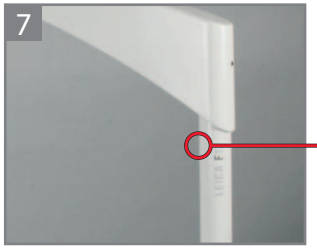
Tighten the brake knob for locking the vertical position.

Turn the optics/microscope carrier towards the outside.

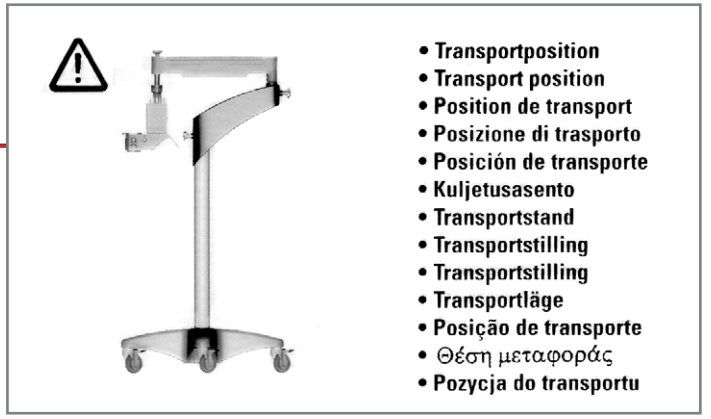
Tighten the articulation brake.

Open the articulation brake.

Fold the swing arm together. Tighten the articulation brake.

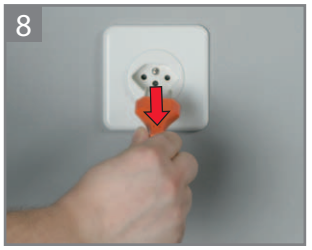


Compare the position of the swing arm with the attached sign.

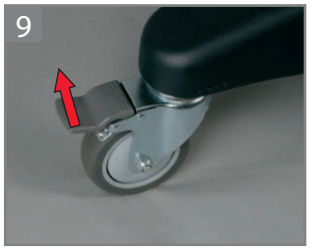


NOTE

Damage of the cable!
Always pull the plug, never the cable.



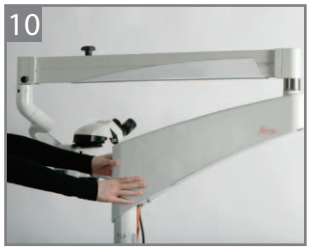
Unplug the power cable.



Release the footbrakes.

CAUTION

Risk of injury to feet!
Always push the instrument to move it; never pull it.



Push the microscope to the installation location and position it.

CAUTION

Danger of microscope rolling away on its own!
Tighten the footbrakes.

Tighten the footbrakes.

5.4 STARTING UP

WARNING

Risk of death from electrical shock!
Connect the microscope to a grounded socket only.

INFO

Video camera: If there is a simultaneous analog connection, only the HDMI signal is output.

The length of the HDMI cable must not exceed 15 m. Use only high-quality HDMI cables.

HDMI cables are available from Leica.

INFO

Image output: Resolution via HDMI is always 720p. Check to ensure that the monitor is compatible with the HD standard.

INFO

Use only monitors approved for medical purposes or equipped with an isolating transformer. Isolating transformers are available from Leica.

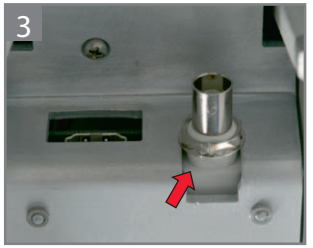
1

Remove cover of the horizontal arm.

2

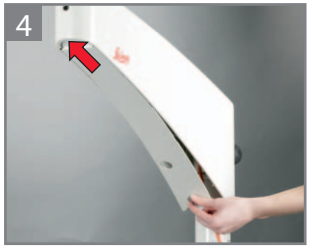
Plug the power cable into the horizontal arm and fasten it using cable ties.

3



Plug the HDMI/BNC cable into the horizontal arm and fasten it using cable ties.

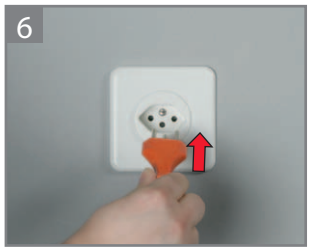
4



Screw in the cover of the horizontal arm and tighten it.

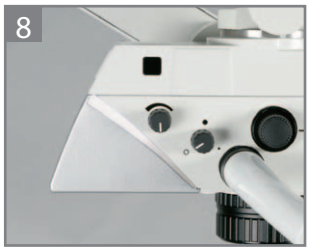
5

Connect the HDMI/BNC cable to a suitable monitor or screen.



Connect power cable.

Switch on the main switch.
Main switch lights up in green.



White LED illumination on the optics carrier lights up.

5.5 ADDITIONAL SETTINGS

5.5.1 ADJUSTING THE DESIGN LED ILLUMINATOR

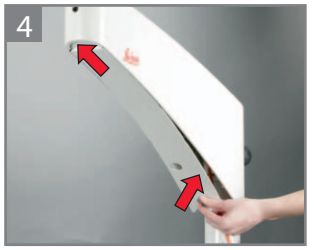
INFO

There are five different dimming levels.

Switch on the main switch. Main switch lights up in green.

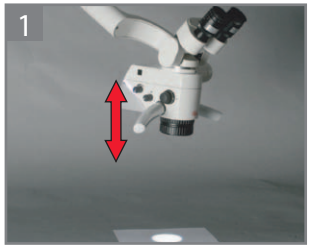
Remove cover of the horizontal arm.

Using a ball-point pen or similar object, press the switch until the desired dimming level is reached.



Screw in the cover of the horizontal arm and tighten it.

5.5.2 ADJUSTING THE WORKING DISTANCE



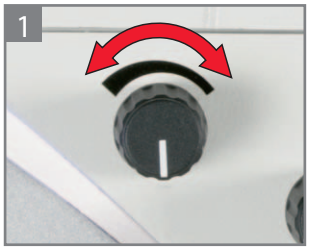
Coarse focus by raising and lowering the microscope.

Fine focus via optional fine focusing objective.

5.5.3 ADJUSTING THE ILLUMINATION

⚠WARNING

Injury to retina! Do not shine lights in anyone's eyes.



Set the desired illuminance.

Select the desired filter or diaphragm function:
- ○ White light
- ● Orange filter
- • Spot illumination

5.5.4 ADJUSTING THE INTERPUPILLARY DISTANCE

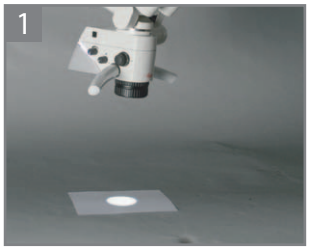
Look into the eyepieces. Depending on the model, move the tube manually or using the drive knob until a circular field is visible.

5.5.5 ADJUSTING THE PARFOCALITY WITH CAMERA AND MONITOR

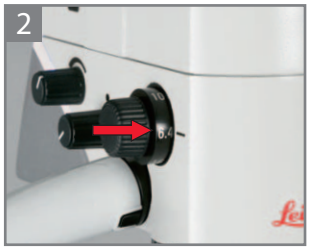
INFO

Parfocal means that the sharpness remains constant over the entire magnification range.

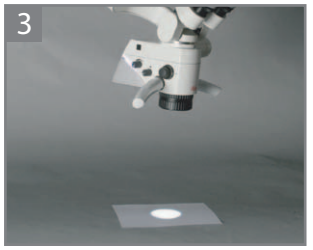
Adjust the diopter settings for both eyes separately and accurately.



Place a piece of paper with writing on it under the objective.

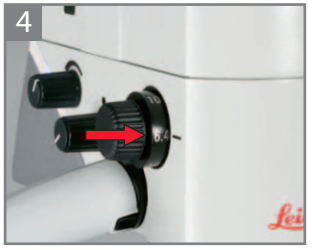


Maximum magnification (40x)

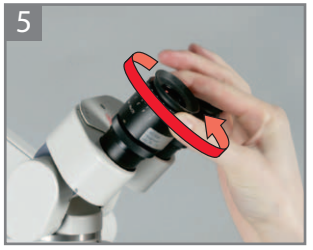


Bring the writing on the sheet of paper into sharp focus on the monitor.

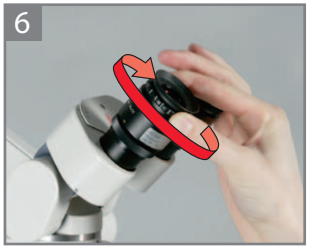
Adjusting the diopter settings



Without looking into the eyepieces, set the minimum magnification (6.4x).
The image on the monitor must remain sharp!



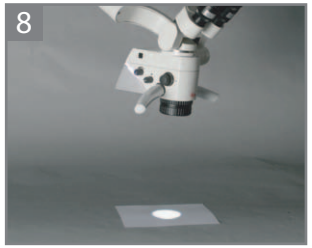
Turn the dioptric correction on the eyepieces to "+5".



Look into the eyepieces. Rotate each eyepiece individually clockwise, in the "–5" direction, until each eye sees the writing in sharp focus.

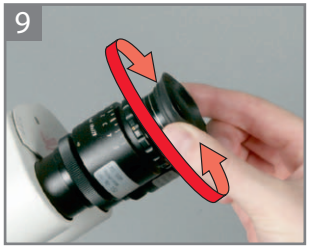
Set the maximum magnification (40x).

8



Bring the writing on the sheet into focus.

9



Turn out the eyecups to the desired distance.

INFO

The writing should now remain sharp when you change the magnification. If it does not, repeat the procedure.

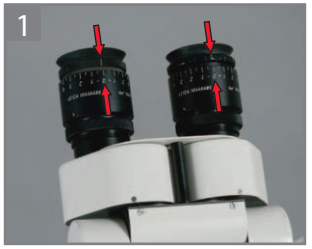
5.5.6 ADJUSTING THE PARFOCALITY WITHOUT CAMERA AND MONITOR

INFO

Parfocal means that the sharpness remains constant over the entire magnification range.

Adjust the diopter settings for both eyes separately and accurately.

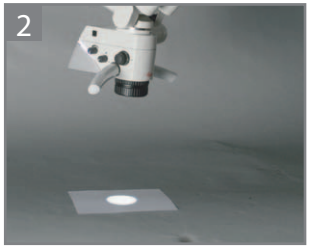
Personal diopter setting known:



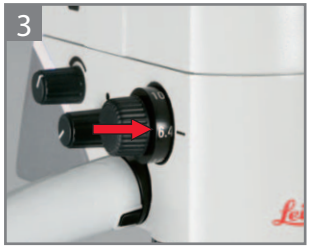
Set dioptric correction on eyepieces.

Personal diopter setting known:

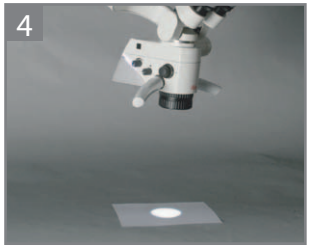
Adjust the dioptric setting at the eyepiece to 0.



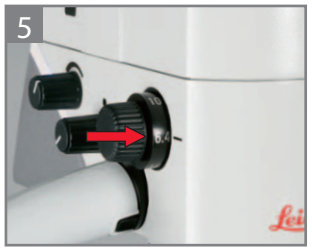
Place a piece of paper with writing on it under the objective.



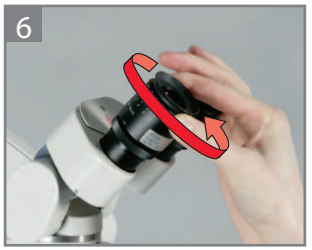
Setting the maximum magnification (40x).



Bring the writing on the sheet of paper into focus.



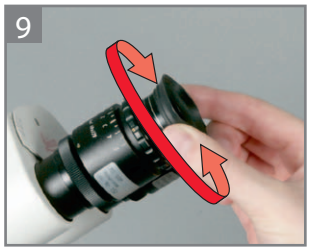
Without looking into the eyepieces, set the minimum magnification (6.4x).



Turn the dioptric correction on the eyepieces to "+5".

Look into the eyepieces. Rotate each eyepiece individually clockwise, in the "–5" direction, until each eye sees the writing in sharp focus.

Set the maximum magnification (40x).



Turn out the eyecups to the desired distance.

INFO

The writing should now remain sharp when you change the magnification. If it does not, repeat the procedure.

6.1 INFORMATION

6.1.1 STANDARD DELIVERY

- Remote control
- SD card (4 GB or similar)

6.1.2 REQUIREMENTS

- HDMI port: HDMI-capable screen or television set to the HD ready (720p) or Full-HD (1080p) standard.

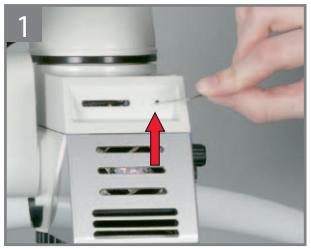
or

- BNC port: Screen or television with analog video connector

INFO

The video camera can be used with analog monitors. However, it is optimized for HD monitors with HDMI ports.

6.1.3 SETTING PAL/NTSC



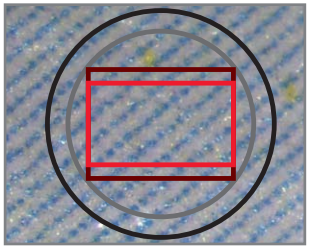
Using a paperclip or similar object, toggle the microswitch next to the SD memory card.

6.1.4 EFFECTIVE DISPLAYED SECTION

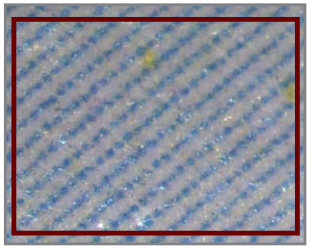
INFO

The live image and captured image do not show the same section one sees when looking through eyepieces.

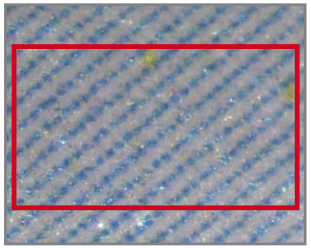
For easier image centering, install the 10.5x eyepiece with crosshair reticle.



10x eyepiece
12.5x eyepiece
4:3 aspect ratio
16:9 aspect ratio



4:3 section

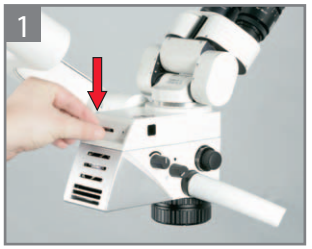


16:9 section

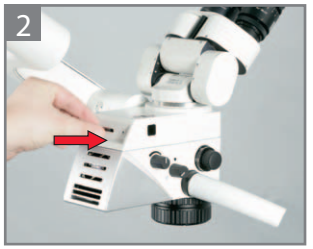
6.2 SD MEMORY CARD

INFO

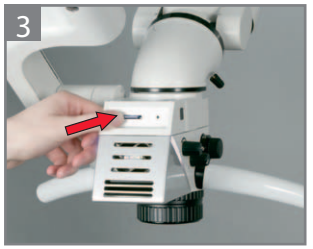
An SD memory card cannot be formatted in the video camera. Format it at a computer or external digital camera.
The video camera is designed for SD memory cards up to 32 GB.
Leica recommends SD memory cards from Kingston or SanDisc (Speed Class 4 or better).



Push down the cover flap.



Insert the SD memory card into the video camera.



Push in the SD memory card and remove it.

6.3 REMOTE CONTROL

6.3.1 CHANGING THE BATTERY

Testing the battery

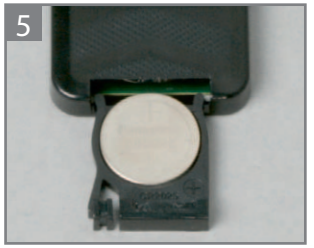
Switch on the screen, set the minimum magnification (6.4x).

Hold the remote control in the beam path, press any key.

LED of the remote control is illuminated when the button is pressed.

Changing the battery

Remove the battery insert from the rear side.



Replace the battery. (Button battery type CR2025)

6.3.2 OVERVIEW

- Start video recording
- Stop video recording
- Save still image to SD card
- Freeze image / live image
- Live image / playback mode / thumbnail
- Show / hide information box
- Arrow keys for navigation
- Arrow keys for navigation
- Arrow keys for navigation
- Arrow keys for navigation
- OK / confirm
- Calling up / exiting the Camera Menu

6.4 GRAPHICAL USER INTERFACE

6.4.1 CAMERA MENU

Point the remote control towards the camera.

Call up the Camera Menu with ☰.

Navigate with the arrow keys.

Press OK to confirm.

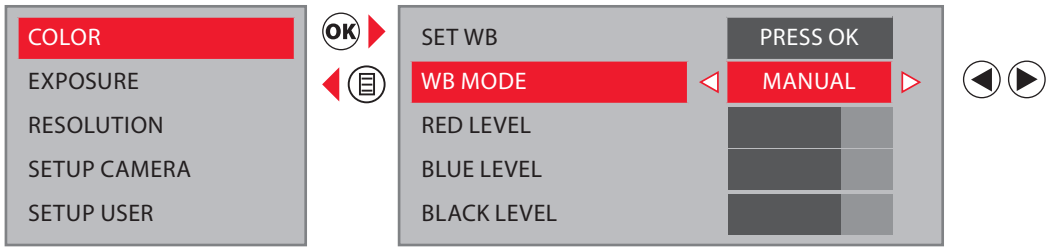
Exit the Camera Menu with ☰.

6.4.2 COLOR (WHITE BALANCE)

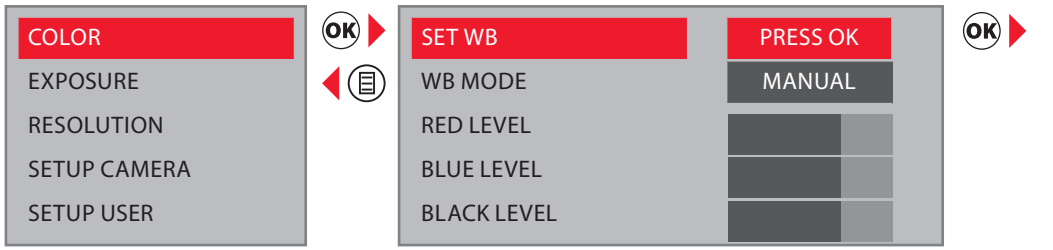
INFO

- Camera set at the factory for optimum results with a Leica LED illuminator!
- When changing the illumination type or color temperature, reset the white balance.
- Use neutral white paper or a neutral gray chart for the white balance.

Manual White Balance (recommended)

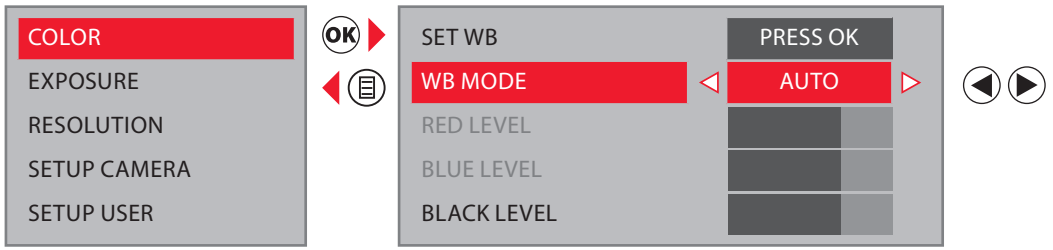


Select "MANUAL" for Manual White Balance (recommended).
Lay neutral white paper or a gray chart under the focus of the microscope.

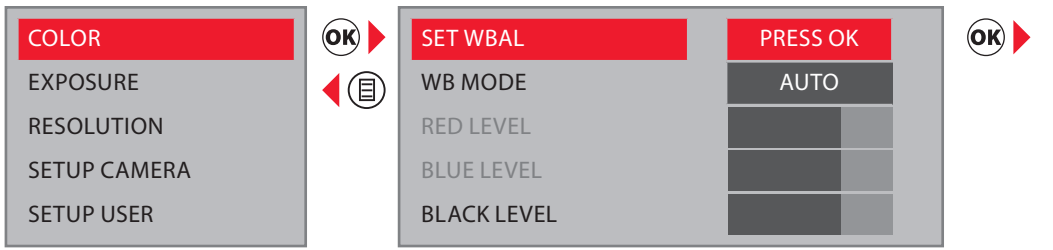


Press OK. Adjust the "RED LEVEL", "BLUE LEVEL", and "BLACK LEVEL" as needed.

Automatic White Balance



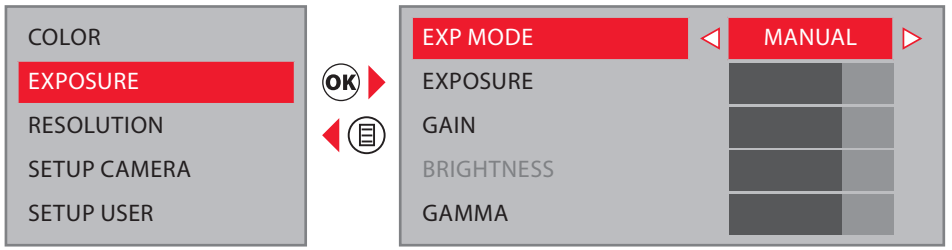
Select "AUTO" for automatic white balance.
Lay neutral white paper or a gray chart under the entire field of view / in the focus of the microscope.



Press OK. Adjust the "BLACK LEVEL" as needed.

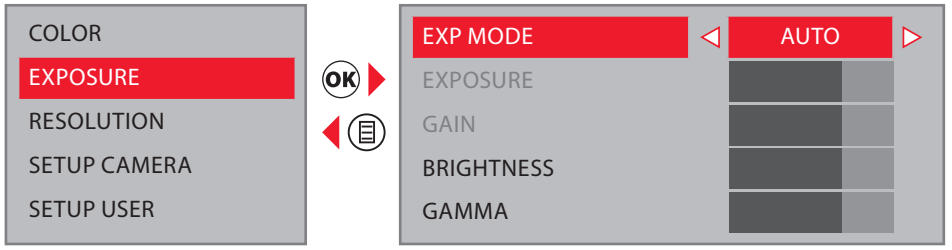
6.4.3 EXPOSURE

Manual exposure



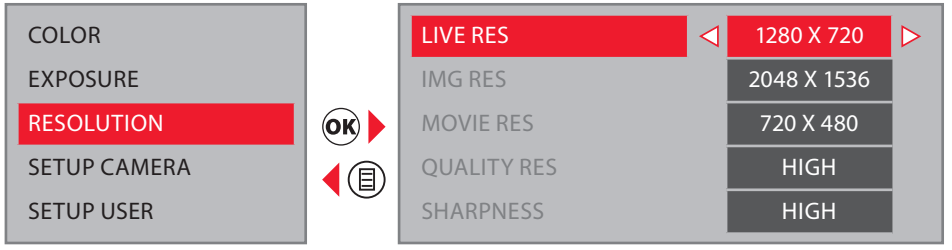
Select "MANUAL" for manual exposure.
Correct the values for "EXPOSURE", "GAIN", and "GAMMA".

Automatic exposure



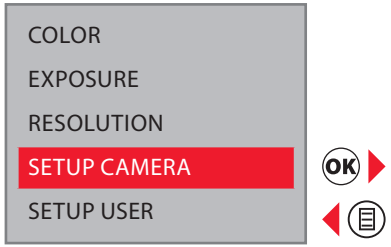
Select "AUTO" for automatic exposure.
Correct the values for "BRIGHTNESS" and "GAMMA".

6.4.4 RESOLUTION

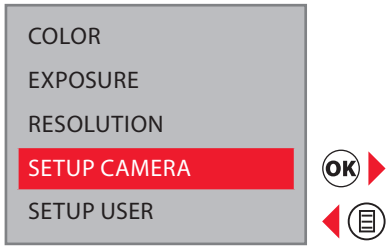


Select the resolution of the live image:
"1280x720": 16:9 aspect ratio
"1024x768": 4:3 aspect ratio

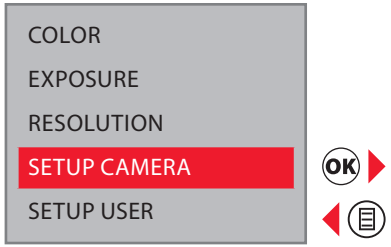
6.4.5 SETUP CAMERA (VIDEO CAMERA SETTINGS)



Select and adjust the format for date and time:
"DMY" = Day/Month/Year: European format, 24h
"MDY" = Month/Day/Year: American format, 12h (AM/PM)

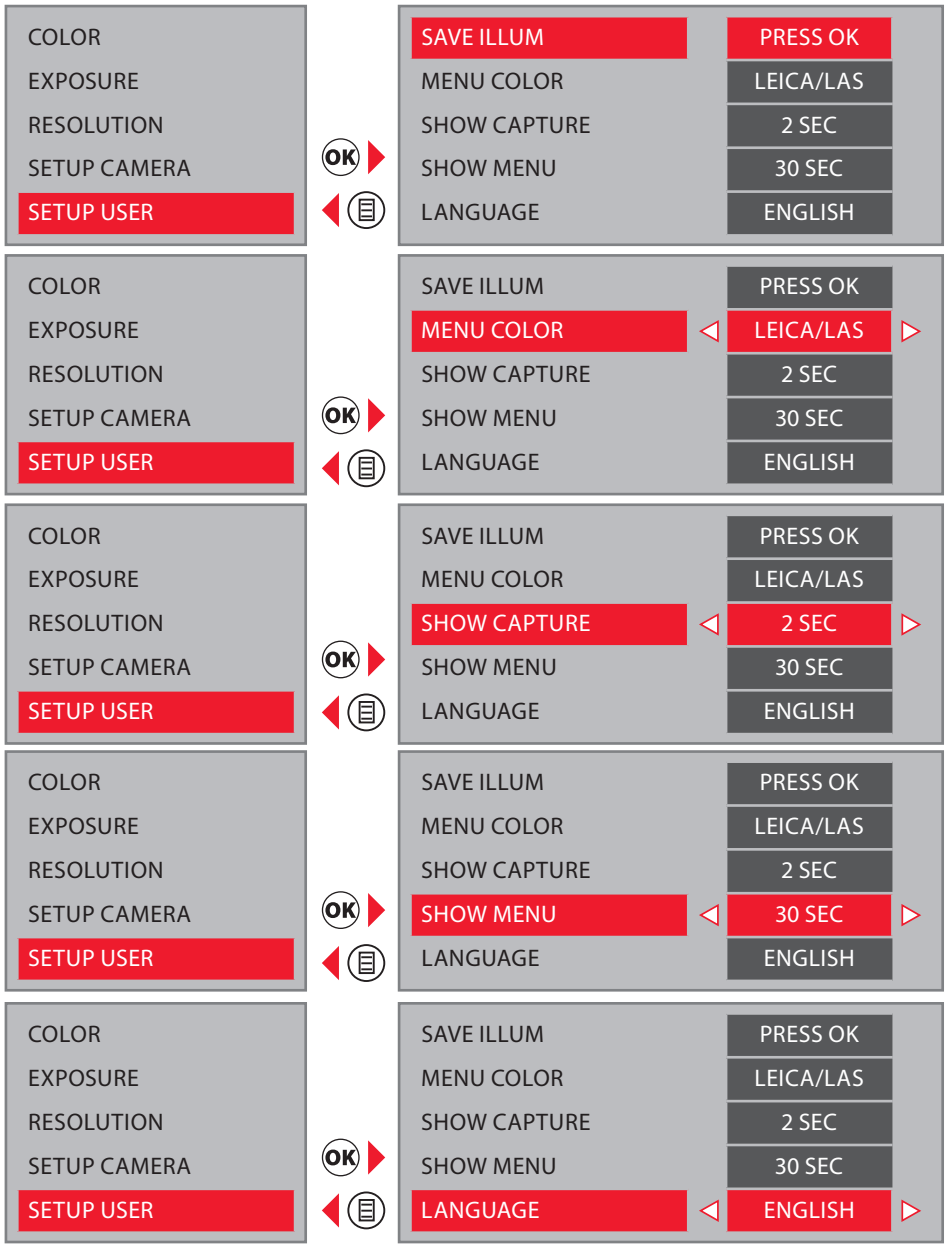


Press OK to restore all settings of the video camera to the factory settings.



"DEFAULT": Show information box on screen: Leica logo, histogram, date and time, image counter
"NONE": Hide information box

6.4.6 SETUP USER (USER-DEFINED SETTINGS)



Press OK to save changes from the "COLOR" menu as an illumination scenario for USER.

Select color scheme for menu:
"LEICA/LAS": red
"DEFAULT": blue

Select the display duration of the image after it is captured:
"OFF", "1 SEC", "2 SEC", "3 SEC", "INFINITE"

Select the display duration of the Camera Menu on the screen:
"5 SEC", "10 SEC", "15 SEC", "20 SEC", "25 SEC", "30 SEC"

Select the language.

6.4.7 PREDEFINED USER SCENARIOS

Press ▲ once.

ILLUMINATION ◁ CURRENT ▷

◀ ▶

INFO

The active selection is applied if no key is pressed for 5 seconds.

Select the illumination scenario:
"CURRENT": last selected illumination scenario
"SCENE I", "SCENE II", "SCENE III": Predefined illumination scenarios
"USER": Illumination scenario configured under "SETUP ILLUM"

6.4.7 SHADING

Press ▲ twice.

LENS SHADING ◁ DEFAULT ▷

◀ ▶

INFO

Visible at the lowest magnification (6.4) only.

"DEFAULT": Electronic brightening of the corners.
"OFF": No electronic brightening of the corners.

6.4.8 CAMERA MODE

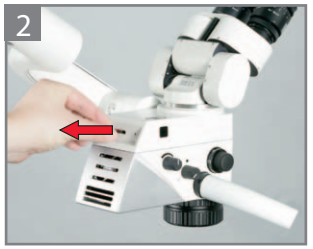
"NORMAL": Optimized for applications
"DEMO": Optimized for demonstrations

Press ▲ once.

6.5 ACQUISITION

6.5.1 IMAGES

Press on the remote control or video camera.
A signal tone sounds.



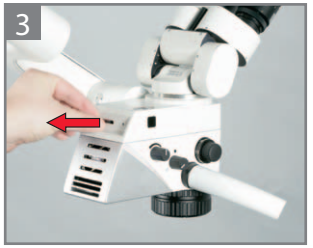
Remove the SD memory card.

Transfer the images to a computer using the SD card reader.

6.5.2 VIDEOS

Start the acquisition: Press REC on the remote control or on the video camera.
A signal tone sounds.

End the acquisition: Press ■ on the remote control or on the video camera.
A signal tone sounds.



Remove the SD memory card.

Transfer the video to a computer using the SD card reader.

INFO

You can show and hide the timer using the ⓘ key.

6.5.3 VIEWING IMAGES

Call up playback mode using ⟲.

Scroll using ▲ and ▼.

Call up the miniature view using ⟲.

Navigate using ◀, ▶, ▲, ▼, select the image using OK.

Return to the live image using ⟲.
Exit playback mode: use ⏯, ⓘ, REC, ■, or 📷.

6.5.4 VIEWING VIDEOS

Call up playback mode using ⟲.

Scroll using ▲ and ▼.

Play and pause the video using OK.

Fast forward the video using ▶, rewind the video using ◀.

Call up the miniature view using ⟲. Return to the live image using ⟲.
Exit playback mode: use ⏯, ⓘ, REC, ■, or 📷.

Maintenance instructions

- Keep accessories away from dust when not in use, e.g. protect them using a dust cover.
- Remove dust with a pneumatic rubber bulb and a soft brush.
- Clean lenses and eyepieces using special optics cleaning cloths and pure alcohol.
- Thoroughly clean the optics carrier using germicidal disinfectant after each time it is handled.
- Protect your microscope from moisture, fumes and acids and from alkaline and caustic materials Do not store chemicals close to the instrument.
- Protect it from improper handling. Never install other device sockets or unscrew optical systems and mechanical parts unless explicitly instructed to do so in this User Manual.
- Protect the microscope from oil and grease. Never oil or grease the guide surfaces or mechanical parts.
- Remove coarse contamination using a damp disposable cloth.
- Use disinfectants based on the following active ingredients: aldehydes, alcohols, quaternary ammonium compounds.
- No not use preparations based on the following: halogen-splitting compounds, strong organic acids, oxygen-splitting compounds.
- Camera: Keep optical components clean. Clean optical surfaces using a lint-free cloth. Soak the cloth using a little methanol or glass cleaner. Do not use alcohol.
- Do not use ethanol or spirits.

Tropical environment/fungus

Leica Microsystems employs certain safety precautions in its manufacturing techniques and materials. Other preventive measures include:
- Keep optical parts clean.
- Use and store them in a clean environment only.
- Store under UV light when not in use.
- Use in continuously climate-controlled rooms only.
- Keep moisture away and cover using a plastic cover filled with silica gel.

Notes on reprocessing of resterilizable products

Limitations on reprocessing
Observe local legal regulations when processing medical products used to treat patients who have or are suspected to have Creutzfeldt-Jakob disease (CJK) or its variant (vCJK). Usually, these resterilizable medical products
can be safely disposed of by burning.

Occupational safety and health protection
Observe work safety and health protection of persons responsible for processing contaminated products.
Current regulations of hospital hygiene and prevention of infection must be observed in the preparation, cleaning and disinfection of the products.

Instructions

Workplace
Remove surface contamination with a paper towel.

Reprocessing
Recommended: reprocess a product immediately after use.

Cleaning
Needed: water, detergent, spirits, microfiber cloth
1. Flush the surface with running water (<40°C), using a little detergent if necessary.
2. Also use spirits to clean optical components.
3. Dry optical components using a microfiber cloth, dry the rest of the product using a paper towel.

Sterilization

		Permissible sterilization methods	
Article No.	Designation	Steam autoclave 134°C, t > 10min.	Ethylene oxide max. 60°C
10180591	Clip-on handle	x	
10428328	Rotary knob, binocular tube T	x	
10384656	Rotary knob, transparent	x	
10443792	Lever extension	x	
10429792	Capping piece, slit illuminator	x	
10445368	Cover, binocular tube 0–180°	x	
10445289	Handswitch holder	x	
10446058	Protective glass, multifoc. obj.	x [1)]	x [1)]
10446469	Protective objective glass, Leica M680		x [1)]
10446467	Protective objective glass, Leica M840/M841		x [1)]
10448431	M320 protective glass	x [1)]	x [1)]
10443714	Rotary ring, objective 0°	x	
10445341	Handle for Leica M655, sterilizable	x	
10445549	Handle for Leica M695	x	
10448440	M320 sterilizable handles (gray)	x	
10445340	Cap for Leica M655/M695, sterilizable	x	

[1)] Products with optical components are steam-sterilizable, reduction of optical performance possible.

Disinfection
After disinfection, thoroughly clean optical surfaces using running water/fresh drinking water and then rinse using fresh, demineralized water. Dry the products completely before the subsequent sterilization.

Leica Microsystems (Schweiz) AG validates:
The instructions above are suitable for preparing a product to be reused. The processor is responsible for the desired results. Before deviating from the instructions provided, first verify the deviations for effectiveness and possible consequences.

Maintenance

The Leica M320 surgical microscope is maintenance-free. To ensure operational safety and reliability, Leica Microsystems (Schweiz) AG recommends taking the precaution of contacting the responsible service organization. There, periodic inspections can be agreed or a maintenance contract can be concluded.

8.1 MICROSCOPE

Problem	Solution	Location
Swing arm moves up/down by itself.	Balance system/swing arm.	See "5.1 Balancing the swing arm"
Swing arm is lowered when the articulation brakes are engaged.	- Reduce the total weight (at the optics carrier). - Tighten the brake knob for locking the vertical position.	See "5.1 Balancing the swing arm"
Microscope moves with difficulty or not at all.	Loosen/reset the articulation brakes.	See "3.5 Brake knobs/ articulation brakes"
No light.	- Check/replace lamp. - Check illumination control and illuminance. - Check the filter and diaphragm control. - Lower the swing arm, the tilt switch may be active. - Check the socket and fuse. - Contact service technician	Instructions for replacing the LED
Insufficient light.	Check illumination control and illuminance.	See "5.4.3 Adjusting the illumination"
Image is not sharp.	- Screw in eyepieces firmly. - Set the parfocality and diopter settings correctly.	See "5.4.4 Adjusting the eyepieces"
Microscope tilting.	- Balance system/swing arm. - Tighten the articulation brakes.	See "5.1 Balancing the swing arm"
Interference from light reflections.	Turn the protective glass, must be at an oblique angle relative to the work surface.	
Streaks in the image.	Clean optics.	
No image.	Magnification control not engaged.	
Beep every four seconds, light switches off automatically after five minutes.	Contact service technician, have fan replaced.	
Double beep every four seconds, light switches off automatically after five minutes.	Allow the LED to cool off, switch off the instrument.	

8.2 VIDEO CAMERA

Problem	Solution	Location
No acquisition possible, "SD Card Lock" appears on the screen.	Push the slide bar for write protection on the SD memory card upwards.	
No acquisition possible.	Insert SD memory card.	See "6.2 SD memory card"
Remote control does not work.	- Check battery. - Point remote control at video camera, not at screen.	See "6.3.1 Changing the battery"
Specimen out of focus.	- Focus accurately. - Use eyepiece with crosshair reticle.	
No image on screen.	- Check cable connection. - Check screen.	
Photo is too dark.	Reset colors.	See "6.4.2 COLOR (white balance)"
Colors not accurate.	Carry out white balance.	See "6.4.2 COLOR (white balance)"

Electrical data

Power socket	
Stand F12, W12, C12, FP12, TC12, TP12, LW12	Centrally located on the control unit 100–240 V AC (± 10%), 50/60 Hz
Fuse	2 x T 6.3 A/250V
Power consumption	Leica M320 F12/C12/W12/FP12: 100 VA
Safety class	Class I
Control unit	Connection sockets for - Power cable - HDMI - BNC

Surgical microscope

Magnification	Manual apochromatic 5-step magnification changer 6.4/10/16/25/40x
Stereo base	24 mm
Fix Objective (standard) Fix Objective (optional)	f=250 mm f=200, 225, 250, 300, 350, 400 mm
Manual fine focus Objective (optional)	f=200, 250, 300 mm
Eyepiece (standard) Eyepiece (optional)	10x21B 12.5x17B, 8.33x22B, Eyepiece 10x21B with centr. reticule
Tilt	–30°/+100°
Reset functions	Limit switch for light on/off

Lamps

Light source	Direct and long-lasting 2-LED illumination Average service life of 60,000 h for an end-of-life criterion of 70% of the initial brightness; Class 1 LED Product
UV filter	UV and IR-free LED illumination
Orange filter	OG530
Light intensity adjustment	Using a drive knob on the optics carrier

Optical Data

Objective f = 250 mm				
Eyepiece	Total magnification (mm)		Field of view Ø (mm)	
	min.	max.	max.	min.
8.33 x 22	2.1	13.4	86.2	13.6
10 x 21	2.6	16.2	82.2	13.1
12.5 x 17	3.2	20.2	66.6	10.6

Stands

Leica M320 F12 Floor stand	
Max. extension range	1775 mm (Fully stretched for the inclined version)
Travel range (up/down)	800 mm
Base	Footprint: 608 x 608 mm
Transportation height, min	1621 mm
Balancing Range	Min. 1.1 kg to max. 4 kg load on the optics carrier
Brake system	Fine adjustable mechanical brakes for all rotation axis with detachable brake knob.
Rotation ranges	At column: 360° For the swing arm: +190°/–125° For the microscope carrier at swing arm: +/–155° For the lateral microscope carrier movement: +/–60°
Weight of the whole	
System with max. load	ca. 116 kg

Accessories

Binocular tube - with fixed angle - variable	 3 different selection options 3 different selection options
Handles	2 variants: Sterilizable/disinfectable or disinfectable
Rotary knobs	Sterilizable
Protective glass	Sterilizable
Orange filter	External UV light filter up to 530 nm for illumination and observation
ErgoWedge	5° to 25°angle for binocular tubes with fixed angle
ErgonOptic Dent	with 52° swivel angle, for binocular tubes variable from 0° to 180°
Remote control	IR remote control for the integrated video camera
Counterweight	Weight for balancing the optics carrier
Beam splitter	50/50% and 70/30%
Stereo adapter	Spacer for installing the beam splitter
Eyepieces	8.33x, 10x, 10x with crosshair reticle, 12.5x

Video Accessories

M320 HD Video & Photo Camera	
Integrated (optional) HD video camera	1280x720 px video resolution and 3MB photo resolution
Functions	Playback function for video and photo and thumbnail view
Storage	Video and photo on SD card, video optionally also on external recording system
Video signal	Available in HDMI and analog (PAL/NTSC selectable)
Video/photo control	IR remote control and two hard keys on camera body, all camera settings with on screen menu
M320 IVA Integrated Video Adapter	
Adapter	Integrated (optional) video adapter for attachment of external c-mount cameras
Length of optics	Focal length of optics f=55 mm

Ambient conditions

Use	+10 °C to +40 °C +50 °F to +104 °F 30% to 75% relative humidity 500 mbar to 1060 mbar air pressure
Storage	–30 °C to +70 °C –22 °F to +158 °F 10% to 100% relative humidity 500 mbar to 1060 mbar atmospheric pressure

Standards

Council Directive 93/42/EEC on Medical Devices (MDD) and its amendments.

Classification: Class I, in compliance with Annex IX, rule 1 and rule 12 of the directive.

Medical Electrical Equipment, Part 1: General Requirements for Safety IEC 60601-1; EN 60601-1; UL60601-1; CAN/CSA-C22.2 NO. 601.1-M90.

Electromagnetic compatibility IEC 60601-1-2; EN 60601-1-2.

The Medical Division, within Leica Microsystems (Schweiz) AG, holds the management system certificates for the international standards ISO 9001, ISO 13485, and ISO 14001 relating to quality management, quality assurance and environmental management.

Limitations on use

The Leica M320 surgical microscope may be used in enclosed rooms and on flat surfaces with max. 0.3° unevenness. Or at stable walls or ceilings that do fulfill our specifications (see installation manual).

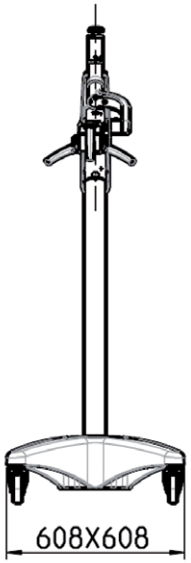
Unsuitable for ophthalmology.

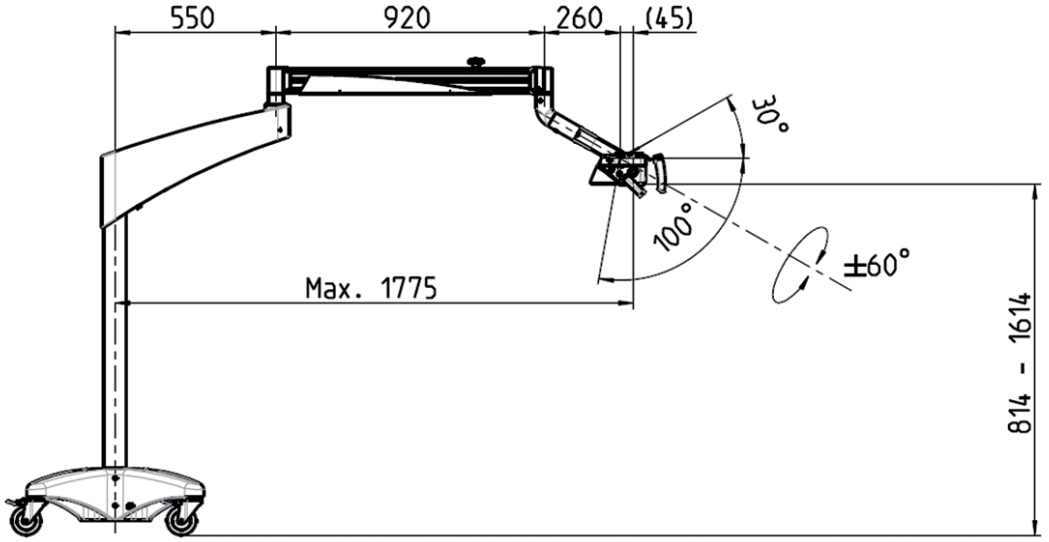
Working range

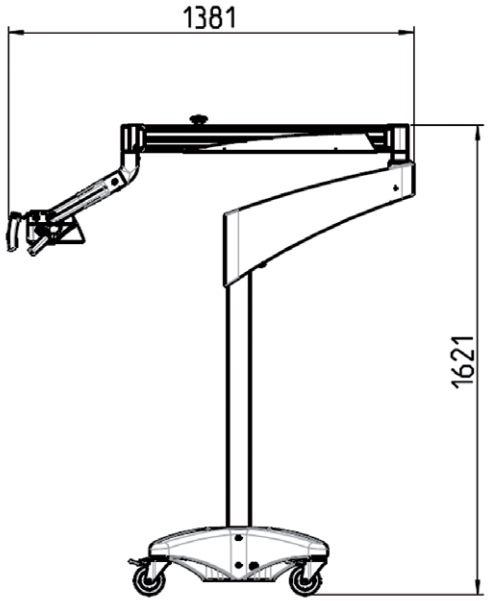
	M320 F12	M320 W12	M320 C12	M320 FP12
Max. extension range	1775 mm	1775 mm	1775 mm	1775 mm
Travel range (up/down)	800 mm	800 mm	800 mm	800 mm
Base	608x608 mm	NA	Diameter 247 mm	Diameter 247 mm
Transportation height, min	1621 mm	NA	NA	NA
Balancing Range	Min 1.1 kg to max 4 kg	Min 1.1 kg to max 4 kg	Min 1.1 kg to max 4 kg	Min 1.1 kg to max 4 kg
Brake system	Fine adjustable brakes for all axes with detachable brake knob.			
Rotation ranges	For column 360° Swing arm +190°/–125° Microscope carrier on swing arm ±155° Lateral microscope carrier movement ±60°	For column 180° Swing arm +190°/–125° Microscope carrier on swing arm ± 155° Lateral microscope carrier movement ±60°	For column 180° Swing arm +190°/–125° Microscope carrier on swing arm ±155° Lateral microscope carrier movement ±60°	For column 360° Swing arm +190°/–125° Microscope carrier on swing arm ±155° Lateral microscope carrier movement ±60°
Total weight of the system with maximum load	116 kg	35 kg	48 kg	46 kg

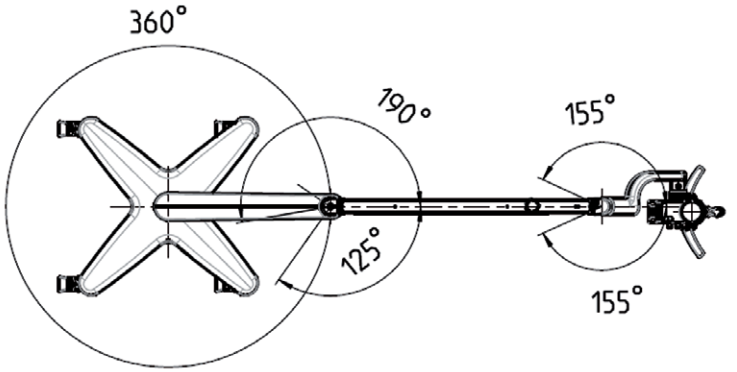
M320 TC12	**M320 TP12**	**M320 LW12**	**Comment**
1455 mm	1455 mm	1455 mm	Fully stretched for the inclined version
300 mm	300 mm	300 mm	
250x250 mm	250x250 mm	NA	
NA	NA	NA	
Min 1.1 kg to max 3 kg	Min 1.1 kg to max 3 kg	Min 1.1 kg to max 3 kg	Load on the optics carrier
Fine adjustable brakes for all axes with detachable brake knob.			
- For column 180° - Swing arm +150°/–150° - Extension arm on swing arm ±155° - Microscope carrier on extension arm - Lateral microscope carrier movement ±60°	- For column 180° - Swing arm +150°/–150° - Extension arm on swing arm ±155° - Microscope carrier on extension arm - Lateral microscope carrier movement ±60°	- For column 180° - Swing arm +150°/–150° - Extension arm on swing arm ±155° - Microscope carrier on extension arm - Lateral microscope carrier movement ±60°	
41kg	38kg	30kg	

Dimensions (in mm)









Manufacturer's declaration of electromagnetic compatibility (EMC)

Table 1: Emission

Guidance and manufacturer's declaration – electromagnetic emissions		
The Leica M320 surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M320 surgical microscope should assure that it is used in such an environment.		
Emission test	**Compliance**	**Electromagnetic environment – guidance**
RF emissions CISPR 11	Group 1	The Leica M320 surgical microscope uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Leica M320 surgical microscope is suitable for use in establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations / flicker emissions IEC 61000-3-3	according	

Table 2: Immunity (all devices)

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M320 surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M320 surgical microscope should assure that it is used in such an environment.			
Immunity test standard	**IEC 60601 test level**	**Conformity level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient / burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply lines IEC 61000-4-11	<5% U_T (0.5 cycle) 40% U_T (5 cycles) 70% U_T (25 cycles) <5% U_T for 5s	<5% U_T (0.5 cycle) 40% U_T (5 cycles) 70% U_T (25 cycles) <5% U_T for 5s	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	Not applicable	

Note: U_T is the a.c. mains voltage prior to application of the test level.

Table 4: Immunity (not life-supporting devices)

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M320 surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M320 surgical microscope should assure that it is used in such an environment.			
Electromagnetic environment – guidance			
Portable and mobile HF communications should be used no closer to any part of the Leica M320 surgical microscope, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.			
Immunity test standard	**IEC 60601 test level**	**Compliance level**	**Recommended separation distance**
Conducted RF equipment IEC 61000-4-3	3 V_{rms} 150kHz to 80MHz	3 V_{rms}	d = 2.4 √P 150kHz to 80MHz
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5GHz	3 V/m	d = 2.4 √P 80MHz to 2.5GHz
Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 			

Note 1: At 80MHz and 800MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Leica M320 surgical microscope is used exceeds the applicable HF compliance levels above, the Leica M320 surgical microscope should be kept under observation in order to determine whether it is operating correctly. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Leica M320 surgical microscope.

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3 V/m.

Table 6: Recommended separation distances (not life-supporting devices)

Recommended separation distances between portable and mobile RF communications equipment and the Leica M320 surgical microscope	
The Leica M320 surgical microscope is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Leica M320 surgical microscope can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Leica M320 surgical microscope as recommended below, according to the maximum output power of the communications equipment.	
	Separation distance according to frequency of transmitter in m
Rated maximum output power of transmitter W	**150kHz to 2.5GHz d = 2.4 √P in m**
0.01	0.24
0.1	0.8
1	2.4
10	8.0
100	24.0
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.	

Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Warning Message

Using accessories or cables other than those specified here or as approved by the manufacturer of the Leica M320 surgical microscope can lead to elevated electromagnetic emissions or reduced interference resistance.

The Leica M320 surgical microscope may not be used in direct proximity of other devices. If it is necessary to operate it in the vicinity of other instruments, the instrument should be monitored to ensure that it functions properly in this arrangement.

Grounding reliability can only be achieved when EQUIPMENT is connected to equivalent receptacle marked "Hospital only" or "Hospital Grade"

ETL LISTED
CONFORMS TO UL STD 60601-1
CERTIFIED TO CAN/CSA STD C22.2 NO. 601.1
Intertek 2003535

Leica Microsystems (Schweiz) AG
CH-9435 Heerbrugg

MODEL LEICA M320 LW12/ TP12/ TC12
100V-240V ~ 50/60Hz
100VA
2x T6.3A/250V

- Transportposition
- Transport position
- Position de transport
- Posizione di trasporto
- Posición de transporte
- Kuljetusasento
- Transportstand
- Transportstilling
- Transportstilling
- Transportläge
- Posição de transporte
- Θέση μεταφοράς
- Pozycja do transportu

TYPE 10NNNNNN
SN TTMMJJxxx
XYZ ^ ^ ^ ^
XYZ

Class 1 LED PRODUCT

LEICA W12

LEICA C12

"With the user, for the user" – Leica Microsystems

Active worldwide

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Denmark:	Ballerup	Tel. +45 4454 0101	Fax +45 4454 0111
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and representatives in more than 100 countries

The Medical Division, within Leica Microsystems (Schweiz) AG, holds the management system certificates for the international standards ISO 9001, ISO 13485, and ISO 14001 relating to quality management, quality assurance and environmental management.

CE

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