Leica M844

Leica M820

User manual

10 713 294 – Version I

Living up to Life

Leica
MICROSYSTEMS

Thank you for purchasing a Leica surgical microscope system.

In developing our systems, we have placed great emphasis on simple, self-explanatory operation. Nevertheless, we suggest studying this user manual in detail in order to utilize all the benefits of your new surgical microscope.

For valuable information about Leica Microsystems products and services and the address of your nearest Leica representative, please visit our website,

www.leica-microsystems.com.

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

Leica Microsystems (Schweiz) AG
Surgical Division
CH-9435 Heerbrugg

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This manual covers the following systems:

Leica M844 F40
Leica M844 F19
Leica M844 C40
Leica M844 CT40

Leica M820 F40
Leica M820 F19
Leica M820 C40
Leica M820 CT40

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User manual

In addition to instructions for use, this user manual also provides important safety notes (see the chapter entitled, "Safety notes"). Read the user manual carefully and thoroughly before placing the product in operation.

Product identification

The model code and serial number of your product are provided on the nameplate found on the underside of the swing arm. Write this data into your user manual and always refer to it when you contact us or the service workshop regarding any questions you may have.

Model: Serial No.:

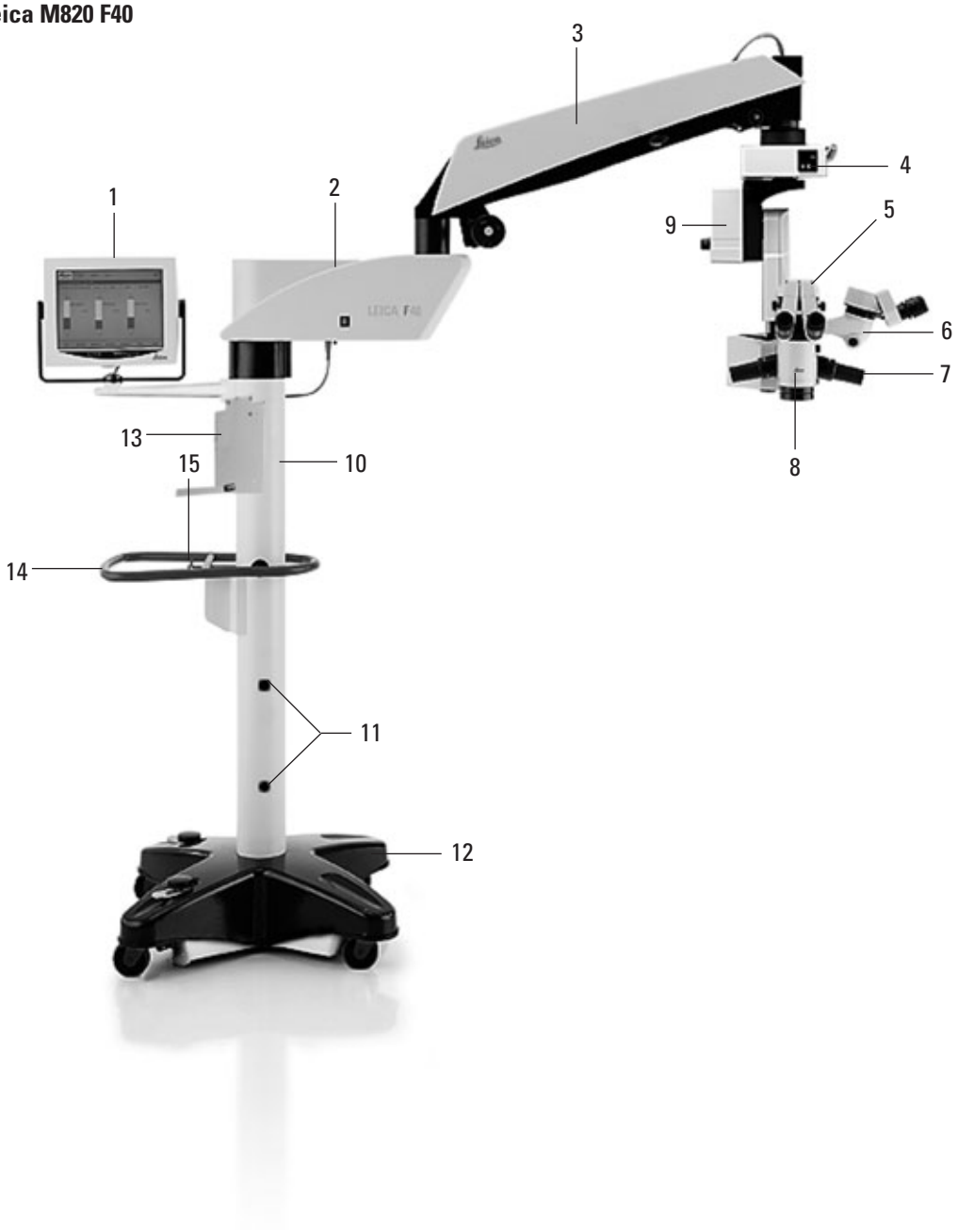
Symbols in this user manual

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

Warning	Warning regarding use hazard or noncompliant use that can lead to serious injury or death.
Caution	Warning regarding use hazard or noncompliant use that can lead to minor injury, but significant article, property or environmental damage.
☞	Useful information that can help the user operate the product correctly and efficiently.
⇨	Request for action; here, you are requested to take action.

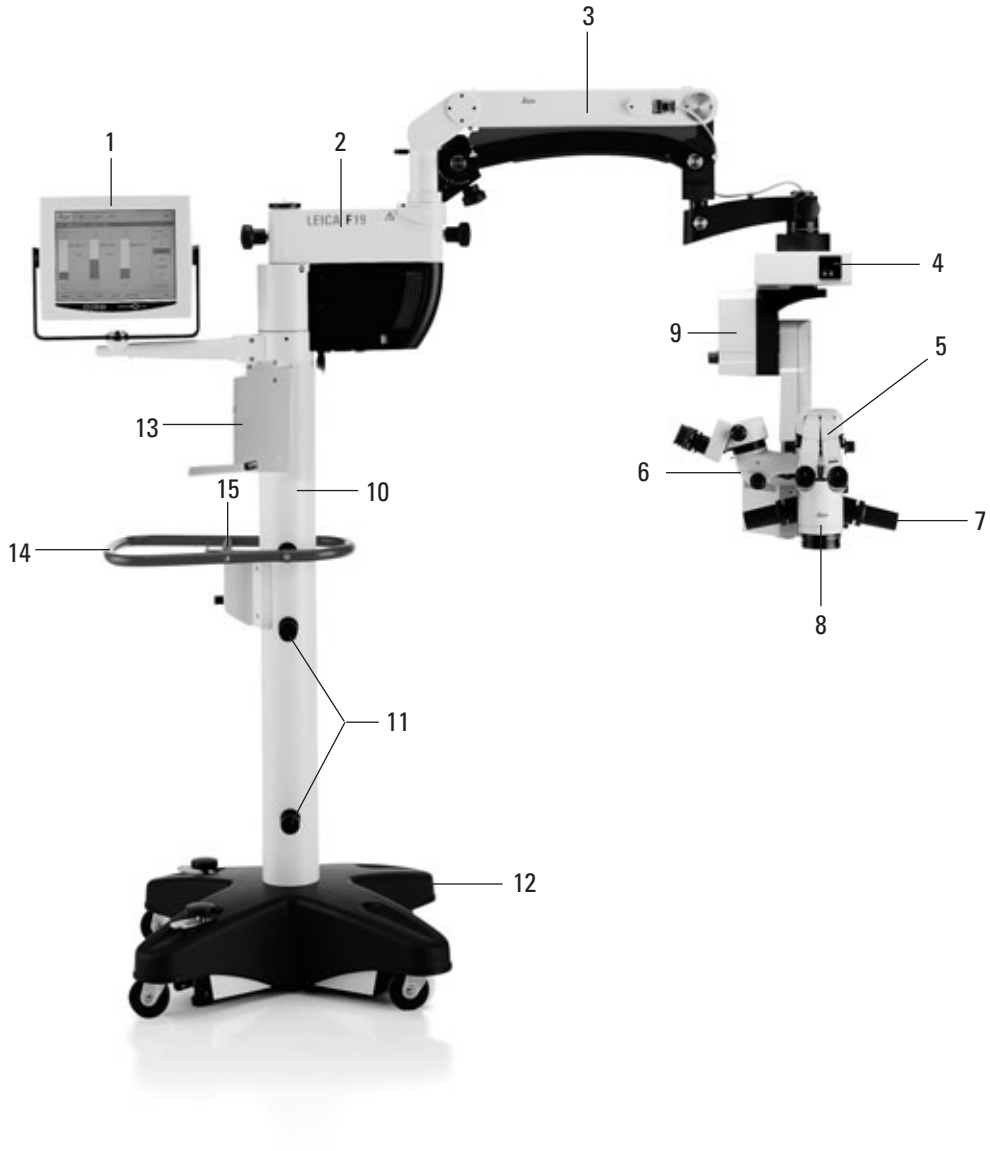
Design and function

Leica M844 F40 and Leica M820 F40



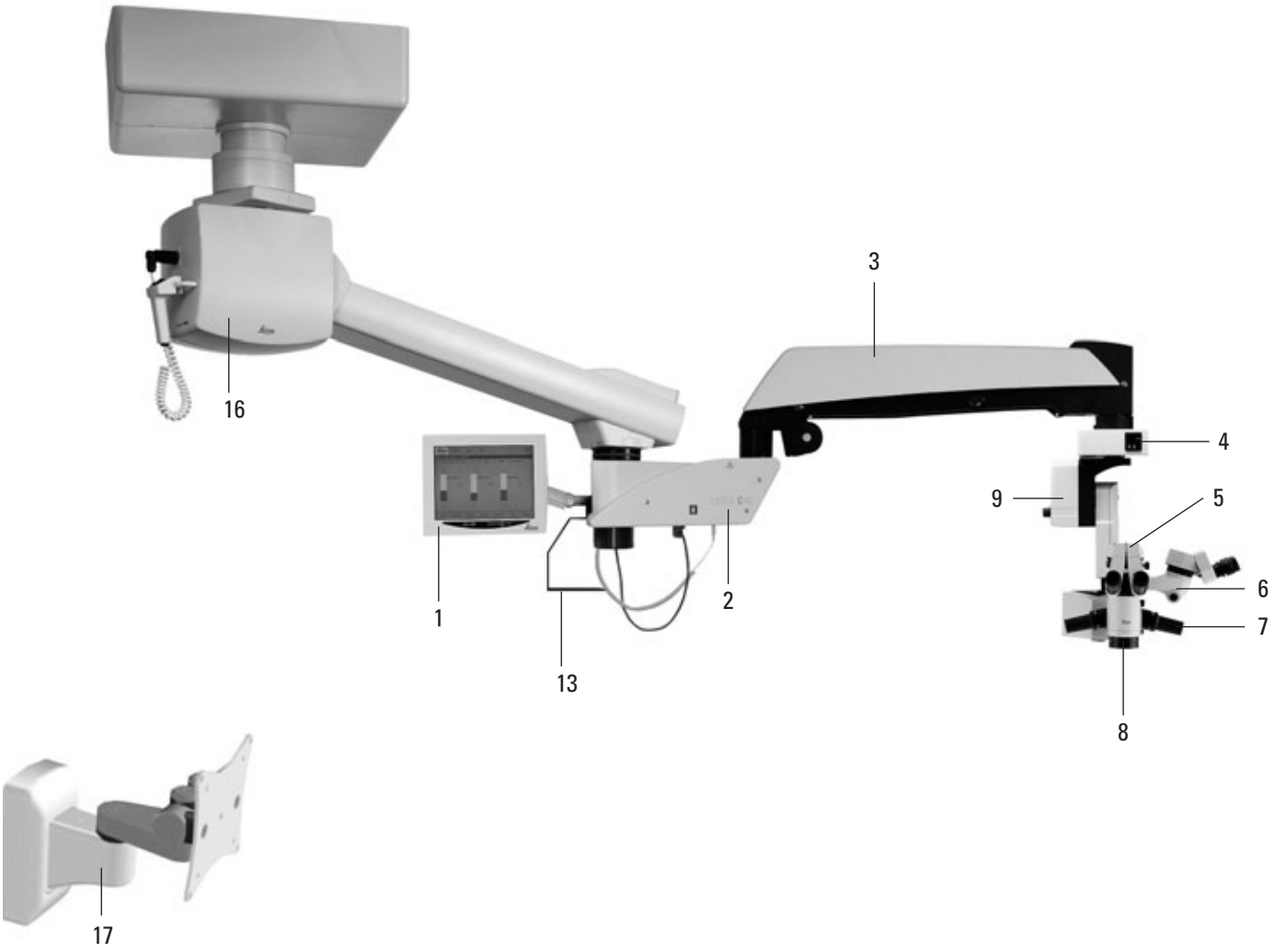
1 Control unit
2 Horizontal arm
3 Swing arm
4 XY unit
5 Binocular tube
6 0° assistant's attachment (Leica M844 only)
7 Handle
8 Optics carrier
9 Tilt head
10 Column
11 Cable support
12 Base
13 Holding fixture for video control unit
14 Handle
15 Suspension device for footswitch

Leica M844 F19 and Leica M820 F19



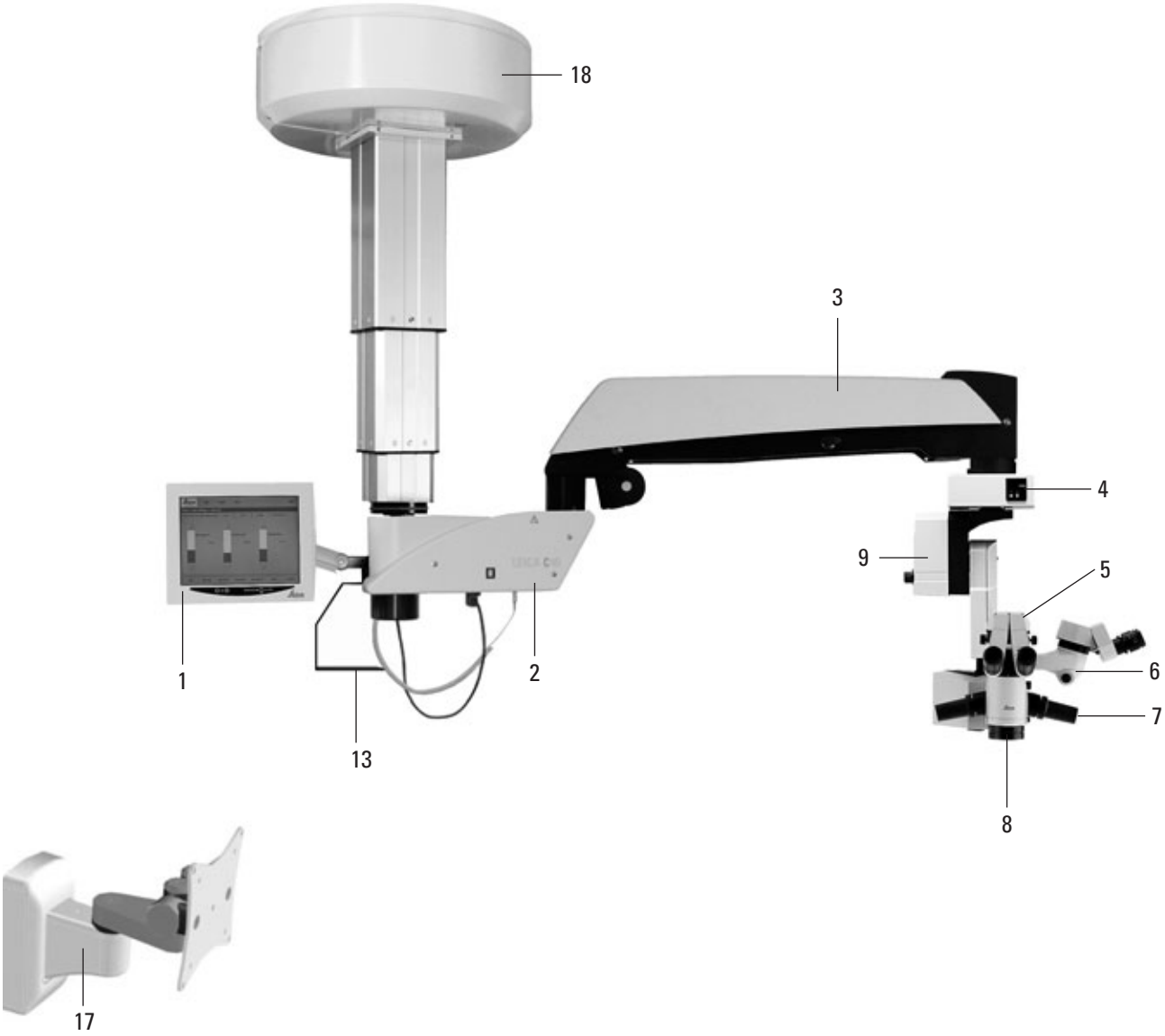
1 Control unit
2 Horizontal arm
3 Swing arm
4 XY unit
5 Binocular tube
6 0° assistant's attachment (Leica M844 only)
7 Handle
8 Optics carrier
9 Tilt head
10 Column
11 Cable support
12 Base
13 Holding fixture for video control unit
14 Handle
15 Suspension device for footswitch

Leica M844 C40 and Leica M820 C40



1 Control unit
2 Horizontal arm
3 Swing arm
4 XY unit
5 Binocular tube
6 0° assistant's attachment
7 Handle
8 Optics carrier
9 Tilt head
13 Holding fixture for video control unit
16 C40 ceiling mount
17 Wall mount for control unit (optional)

Leica M844 CT40 and Leica M820 CT40

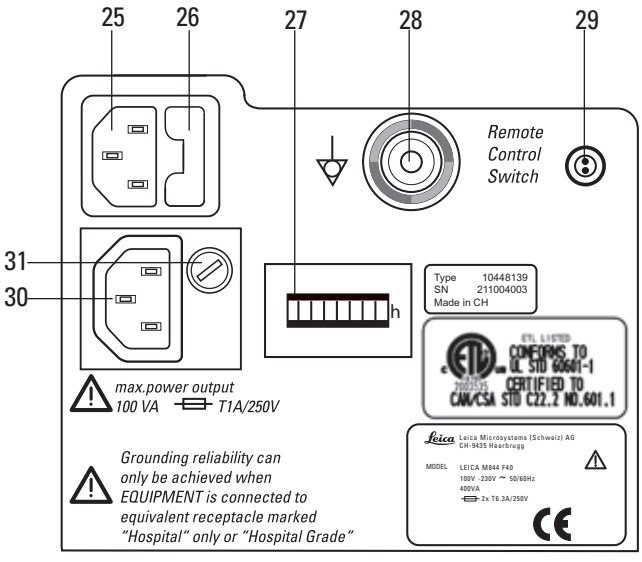


1 Control unit
2 Horizontal arm
3 Swing arm
4 XY unit
5 Binocular tube
6 0° assistant's attachment (Leica M844 only)
7 Handle
8 Optics carrier
9 Tilt head
13 Holding fixture for video control unit
17 Wall mount for control unit (optional)
18 CT40 ceiling mount

Stands/ceiling mounts

F40 floor stand

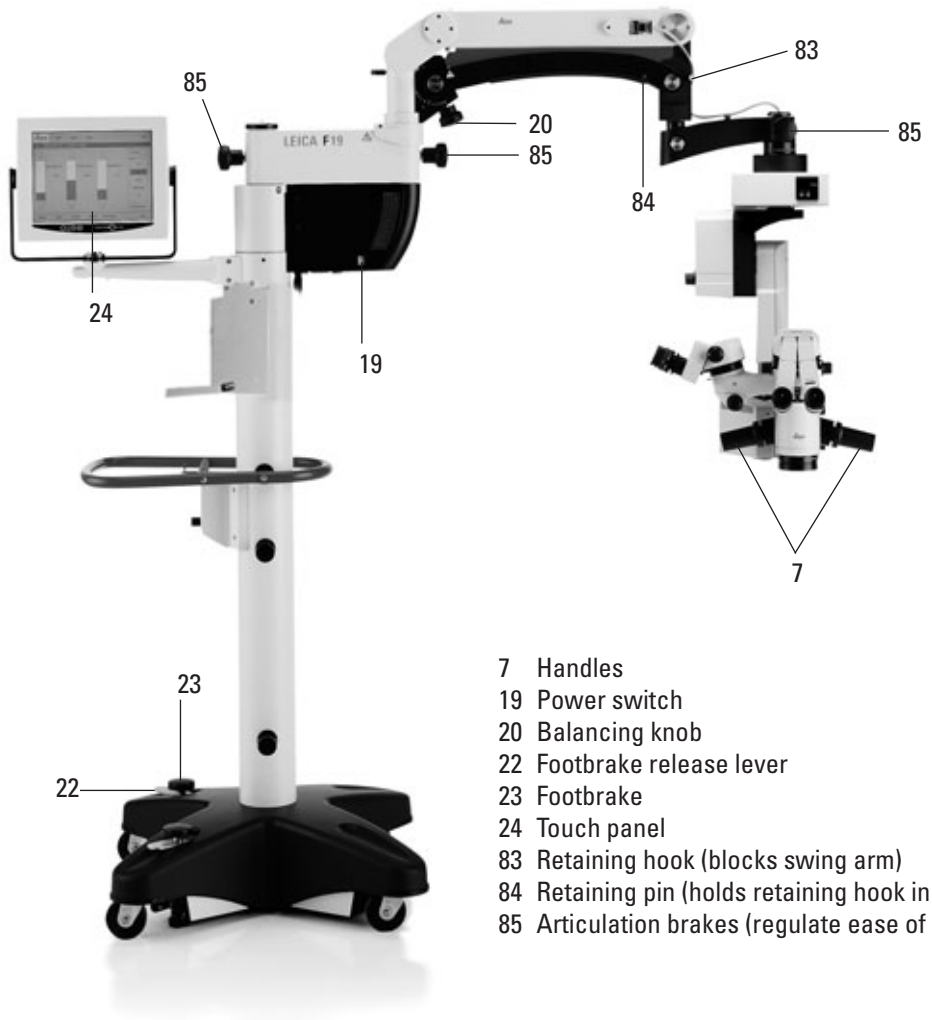
7 Handles
19 Power switch
20 Balancing knob
21 Swing arm stop lever
22 Footbrake release lever
23 Footbrake
24 Touch panel



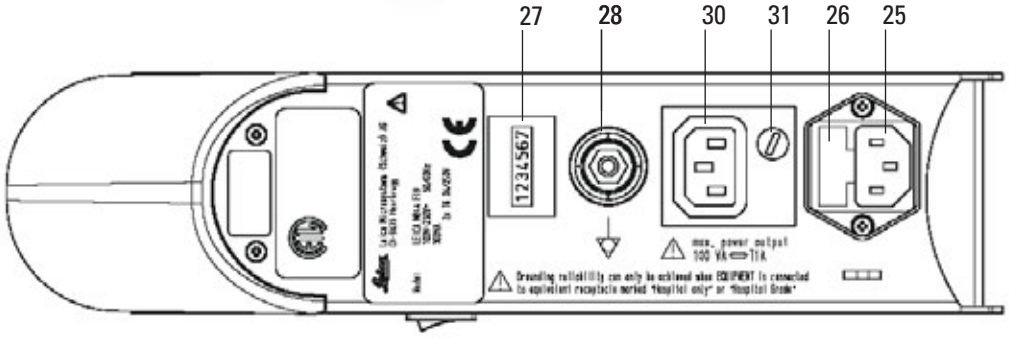
25 Power supply
26 Fuse holder (2x 6.3 A, time-lag)
27 Running-time meter for the surgical microscope
28 Potential equalization socket
29 Socket for remote brake release
30 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see the Technical data, page 67.
31 Fuse holder (1 A, time-lag)

Caution 1
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!
⇨Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. For requirements of use, see the Technical data, page 67.

F19 floor stand



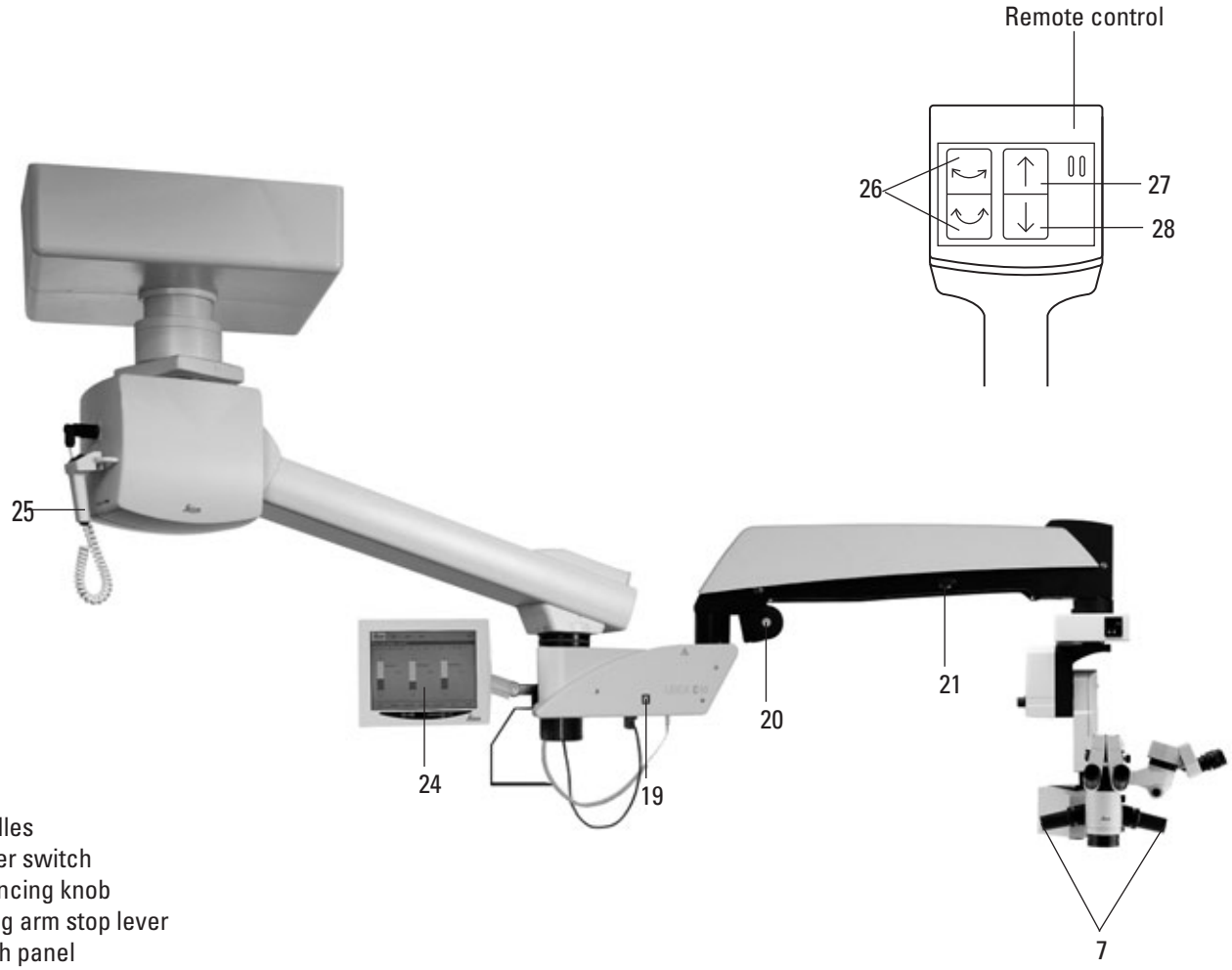
7 Handles
19 Power switch
20 Balancing knob
22 Footbrake release lever
23 Footbrake
24 Touch panel
83 Retaining hook (blocks swing arm)
84 Retaining pin (holds retaining hook in released state)
85 Articulation brakes (regulate ease of movement)



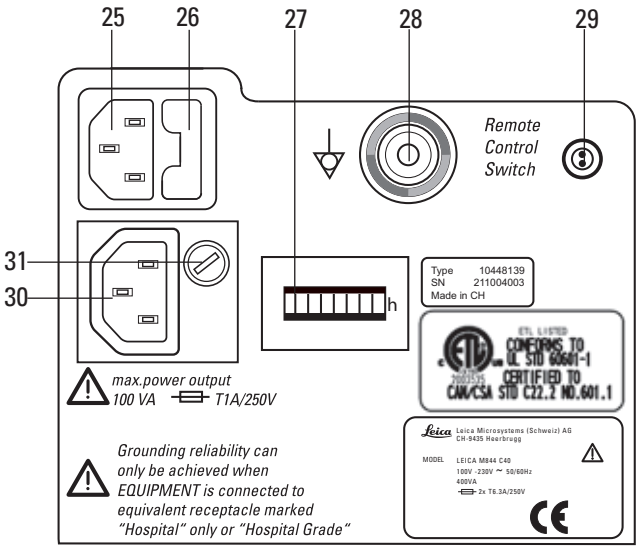
25 Power supply
26 Fuse holder (2x 6.3 A, time-lag)
27 Hour meter for the surgical microscope
28 Potential equalization socket
30 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see the Technical data, page 67.
31 Fuse holder (1 A, time-lag)

Caution 1
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!
⇨Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. For requirements of use, see the Technical data, page 67.

C40 ceiling mount



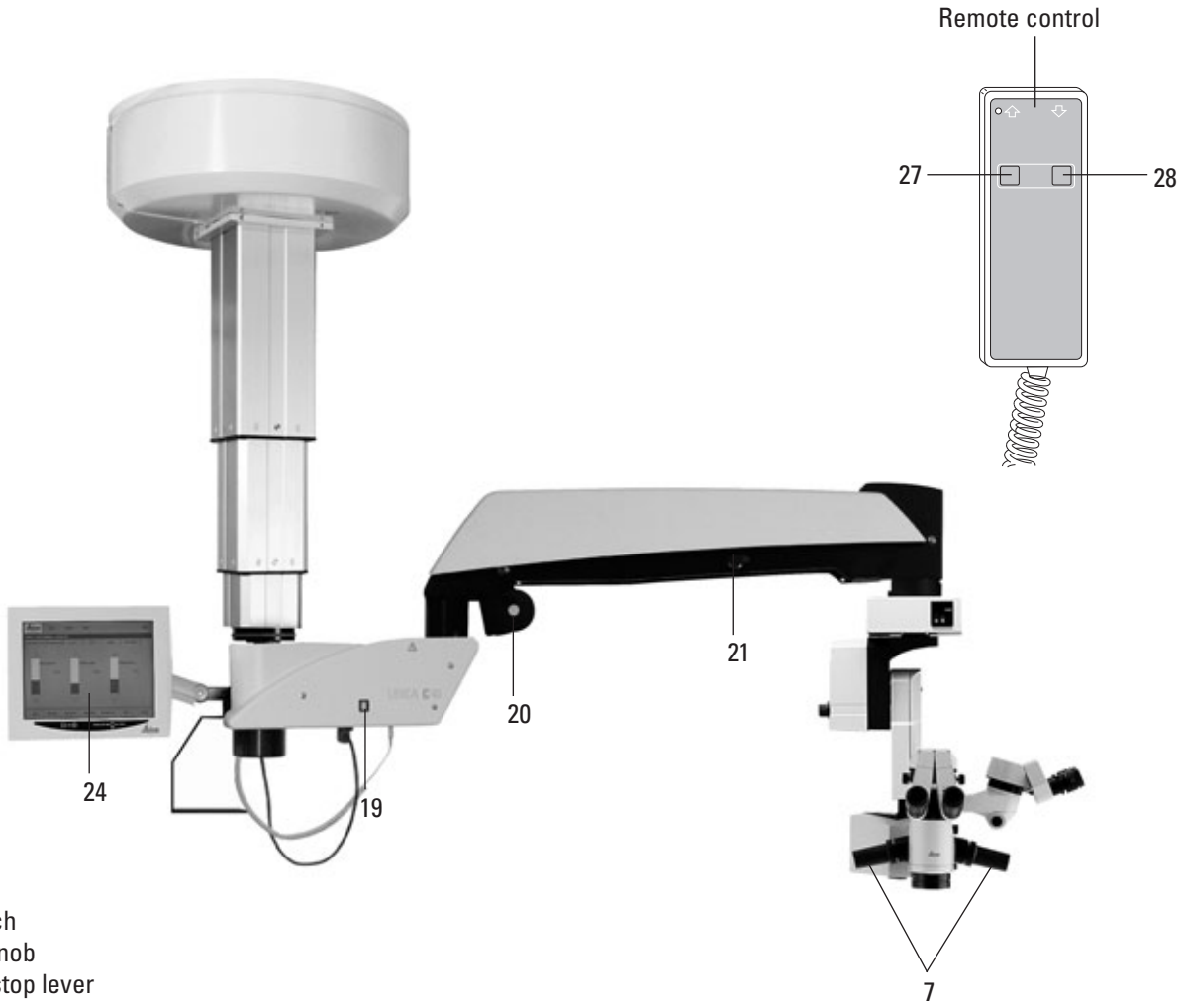
7 Handles
19 Power switch
20 Balancing knob
21 Swing arm stop lever
24 Touch panel
26 No function
27 Up
28 Down



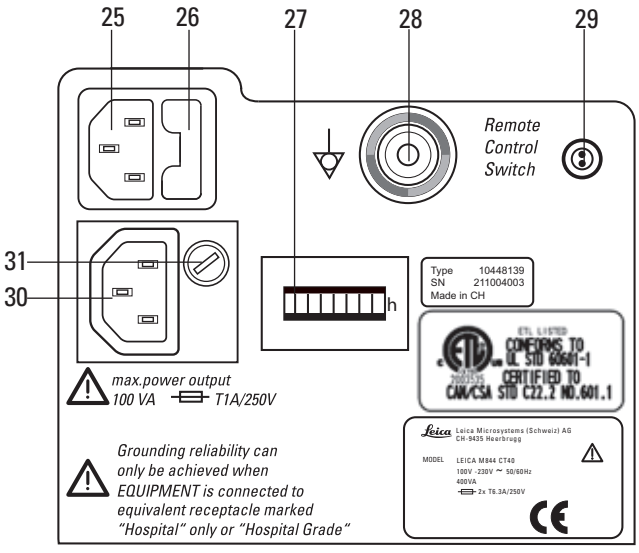
25 Power supply
26 Fuse holder (2x 6.3 A, time-lag)
27 Hour meter for the surgical microscope
28 Potential equalization socket
29 Socket for remote brake release
30 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see the Technical data, page 67.
31 Fuse holder (1 A, time-lag)

Caution 1
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!
⇨Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. For requirements of use, see the Technical data, page 67.

CT40 ceiling mount



7 Handles
19 Power switch
20 Balancing knob
21 Swing arm stop lever
24 Touch panel
27 Up
28 Down

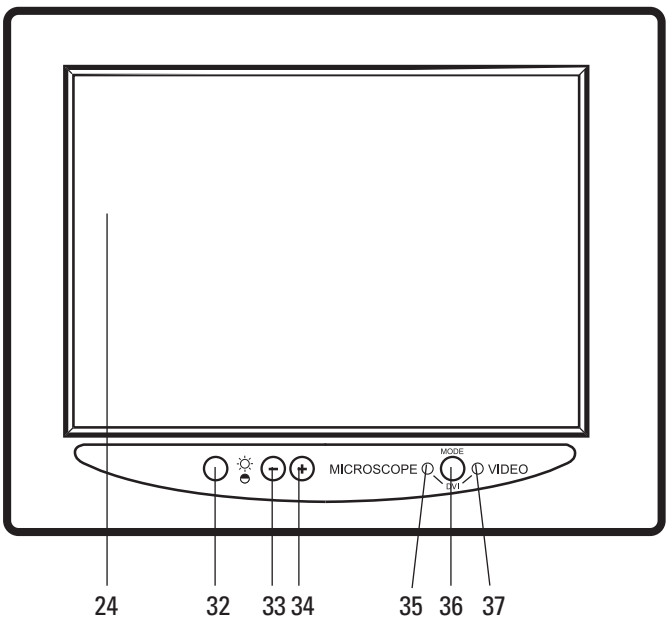


25 Power supply
26 Fuse holder (2x 6.3 A, time-lag)
27 Hour meter for the surgical microscope
28 Potential equalization socket
29 Socket for remote brake release
30 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see the Technical data, page 67.
31 Fuse holder (1 A, time-lag)

Caution 1
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!
⇨Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. For requirements of use, see the Technical data, page 67.

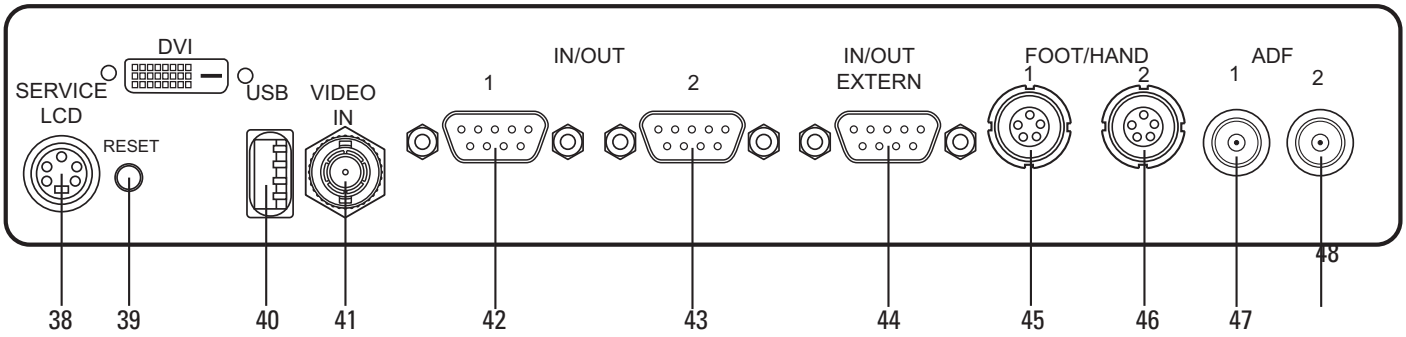
Control unit

Front view



24 Touch panel
32 Brightness/contrast adjustment
Press once to adjust brightness
Press twice to adjust contrast
Press three times to save adjustment and exit
33 Decrease value
34 Increase value
35 Video mode active LED
36 Video mode/control unit (microscope) mode switch
37 Control unit mode active LED

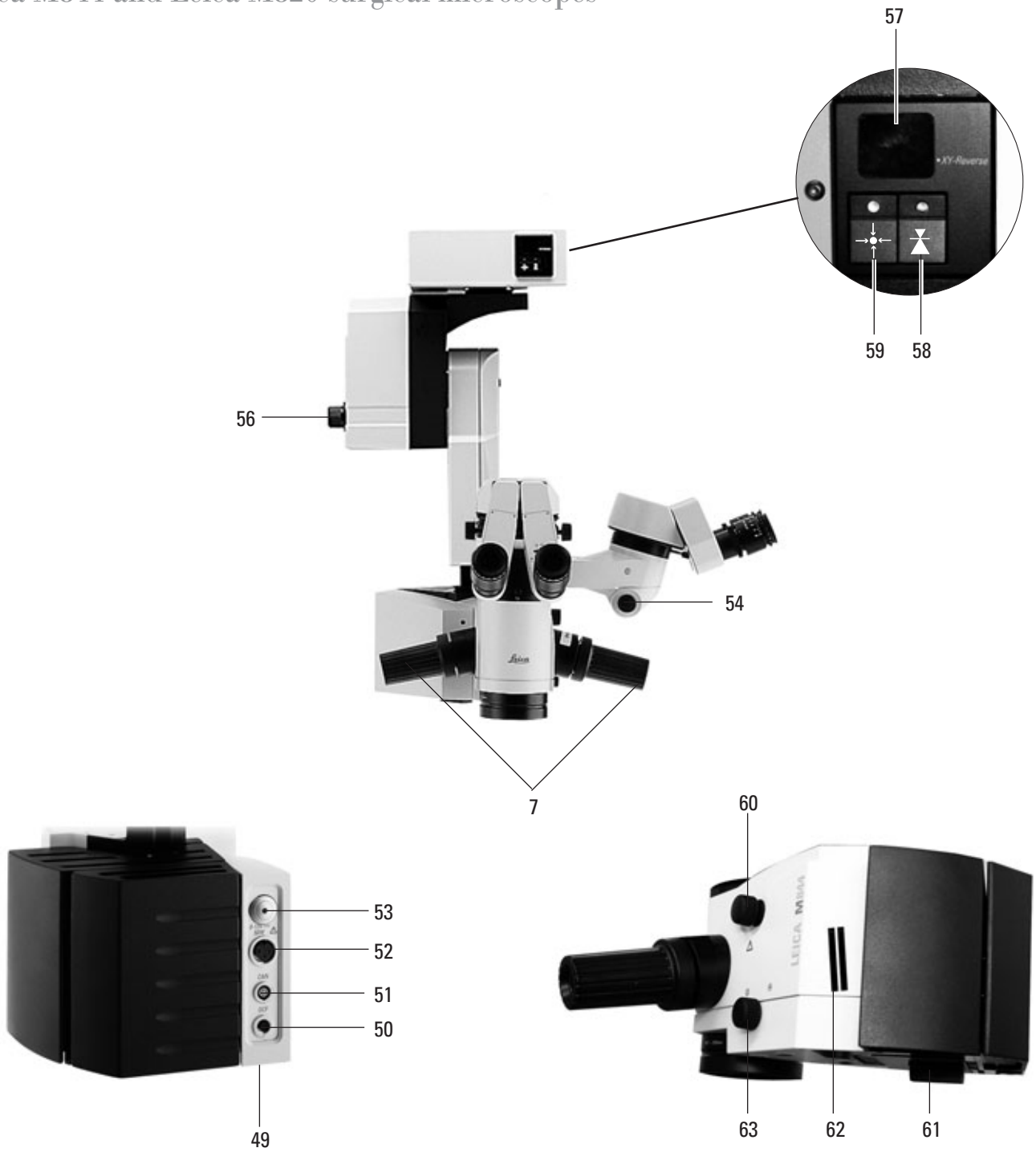
Connections



38 Service interface
39 Reset button
40 USB connection
41 Video input (BNC)
42 Internal CAN 1
43 Internal CAN 2
44 External CAN
45 Footswitch or handswitch 1
46 Footswitch or handswitch 2
47 ADF Additional Function 1
48 ADF Additional Function 2

ADF 1 and 2 are digital relay outputs that can switch 24 V/2 A. During operation, use only the cables provided for CAN, video and footswitch in order to prevent malfunctions.

Leica M844 and Leica M820 surgical microscopes

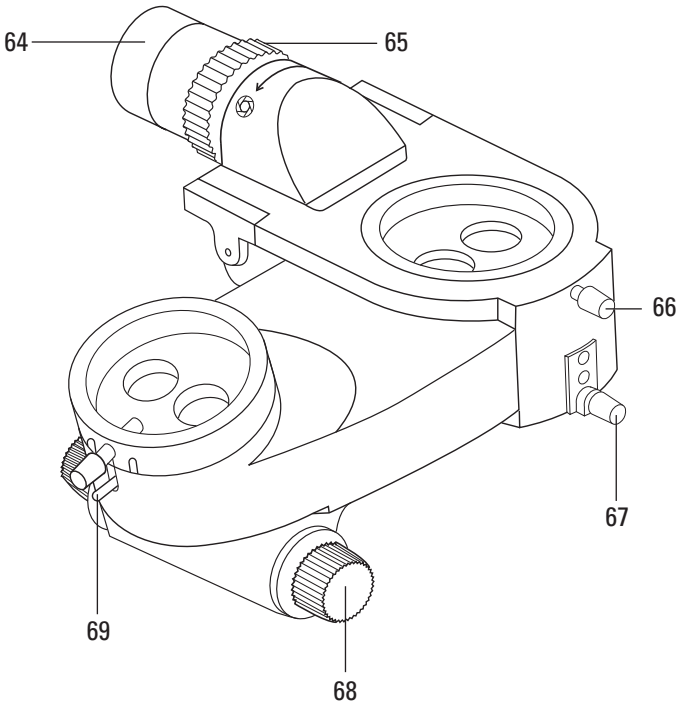


7 Handles
49 Lamp cover opener
50 OCF – Optics Carrier Functions
51 CAN bus
52 Socket for external supply of slit lamp
53 OttoFlex/slit lamp switch
54 Rotary knob for focus fine adjustment (0° assistant's attachment for Leica M844 only)
56 Rotary knob for tilt drive (motorized)
57 Magnification display with XY reverse display
58 Focus reset
59 XY reset
60 Manual zoom emergency drive
61 Quick-change lamp mount
62 Slot for filter slide
63 OttoFlex™ II iris diaphragm

Leica M844 accessories

A comprehensive range of accessories enables the Leica M844 surgical microscope to be matched to the requirements of the task in hand. Your Leica representative will be pleased to help you select the appropriate accessories.

0° assistant's attachment



64 Documentation port
65 Rotary ring for adjusting the diaphragm

☞ Closing the diaphragm can affect the red reflex in the video image.

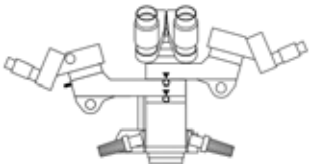
66 Clamping screw for locking the binocular tube in place

☞ Optionally, the clamping screw can be replaced with the provided slotted screw.

67 Clamping screw for releasing the quick changer
68 Focus fine adjustment knob
69 Lever for turning the binocular tube by ±15°

Double wing

The Double Wing allows for a third observer in addition to the surgeon and the assistant.



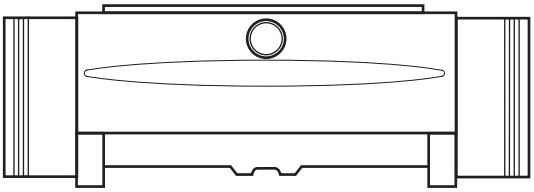
- the same image detail for each observer
- 50 % light distribution with the assistant, still 100 % light for the surgeon
- 100 % stereopsis for all observers
- ±15° horizontal rotation of binocular tubes

☞ The M84x Double Wing (10446740) is available as an optional accessory.

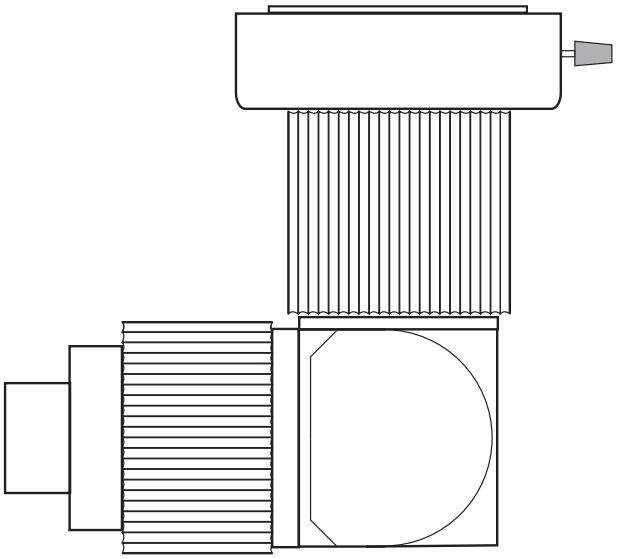
Leica M820 accessories

A comprehensive range of accessories enables the Leica M820 surgical microscope to be matched to the requirements of the task in hand. Your Leica representative will be pleased to help you select the appropriate accessories.

Beam splitter



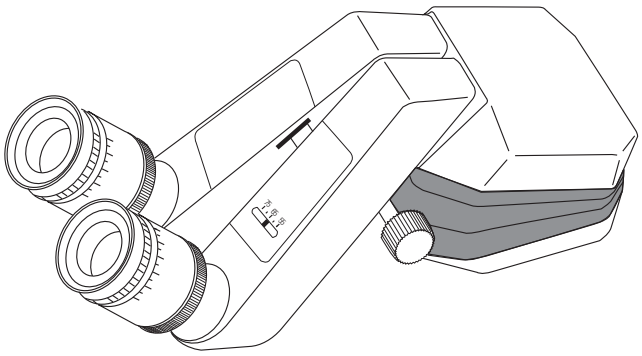
Attachment for second observer



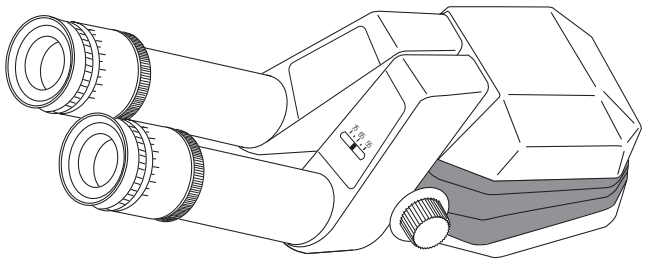
Beam splitter, rotatable, 50/50%

- Allows viewing by a second person or documentation
- Light distribution: 50% to the side, 50% backwards
- The side exit allows a 180° rotation to the left and right
- Rotate always completely to the left or right side and tighten with clamping screw (1)

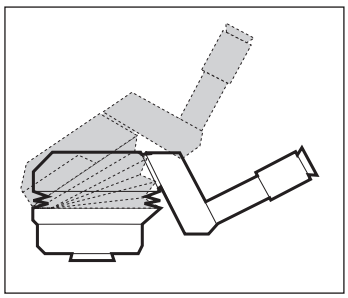
Leica M844 and Leica M820 accessories



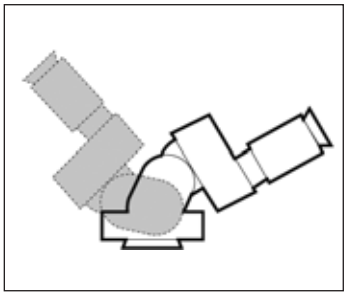
Binocular tube 10° – 50° UltraLow™ II
• with extra-low viewing height
• adjustable viewing angle and height
• adjustable interpupillary distance



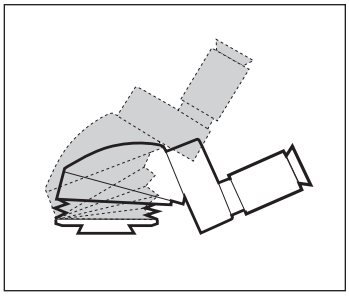
Binocular tube 10° – 50° with PD
• adjustable viewing angle and height
• adjustable interpupillary distance



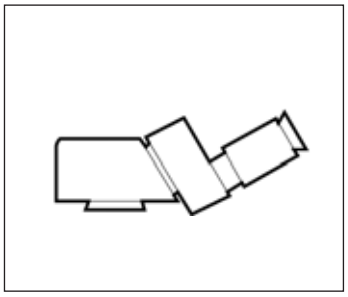
Binocular tube 10° – 50°, low
• adjustable viewing angle and height
• adjustable interpupillary distance



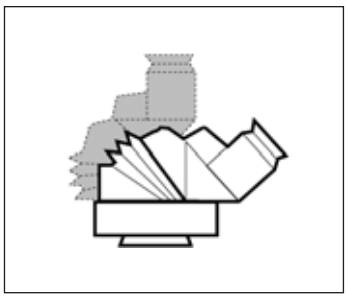
Binocular tube, 180° variable
• tilts 180°



Binocular tube 5° – 25°
• adjustable viewing angle and height
• adjustable interpupillary distance



Binocular tube, low
• not tiltable



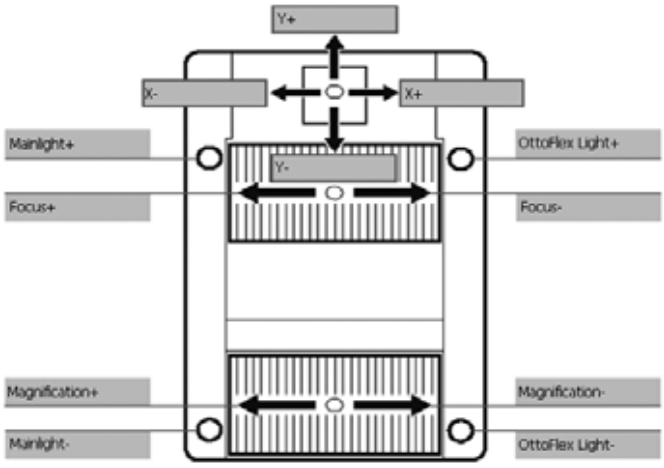
Binocular tube 30° – 150°
• tilts 120°
• adjustable interpupillary distance

Foot/handswitches and handles

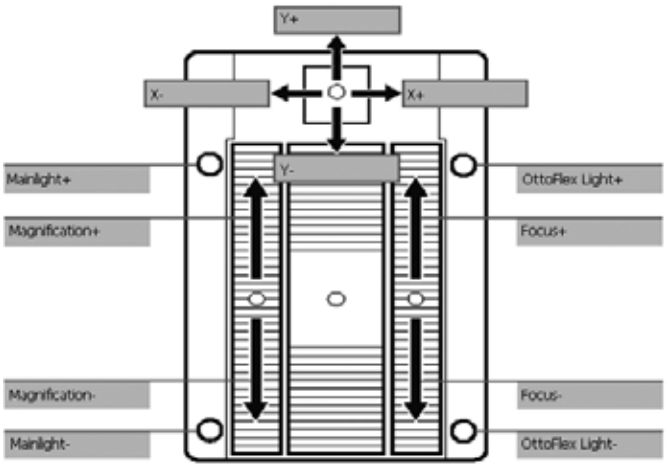
Standard configuration "Cataract"
Here is an overview of all possible footswitches and handswitches that you can use to control your Leica M820 and Leica M844 surgical microscopes with the standard configuration "Cataract".

Footswitches, handswitches and handles can be individually assigned for each user in the configuration menu (see page 43).

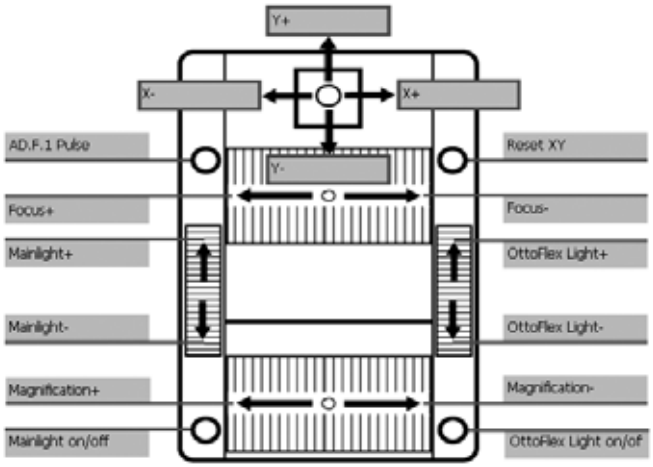
12-function footswitch, cross



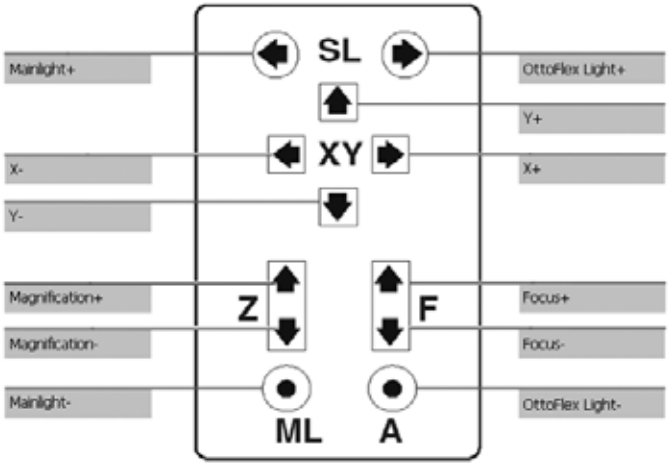
12-function footswitch, long



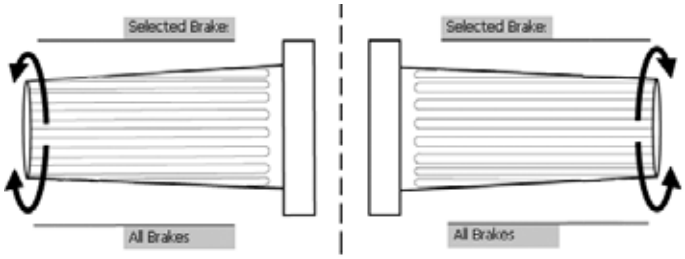
16-function footswitch, cross



Handswitch



Handles

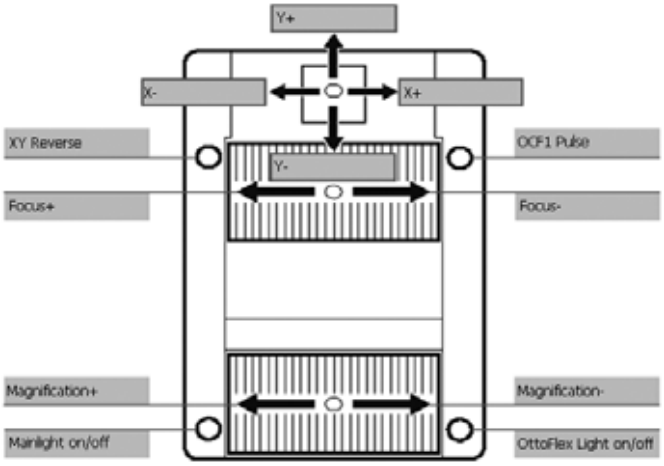


Standard configuration "Retina"

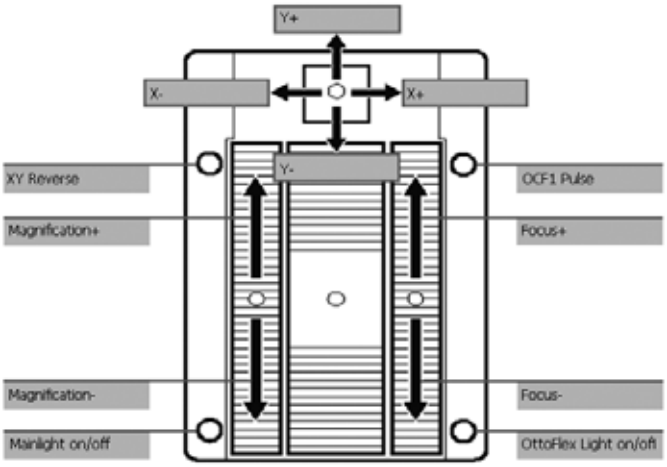
Here is an overview of all possible footswitches and handswitches that you can use to control your Leica M820 and Leica M844 surgical microscopes with the standard configuration "Retina".

☞ Footswitches, handswitches and handles can be individually assigned for each user in the configuration menu (see page 43).

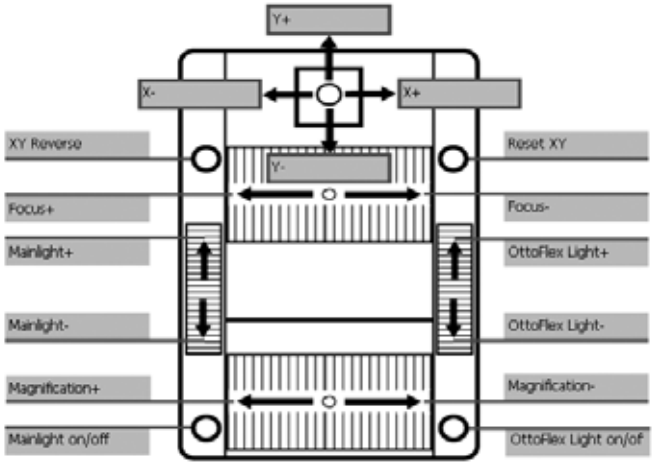
12-function footswitch, cross



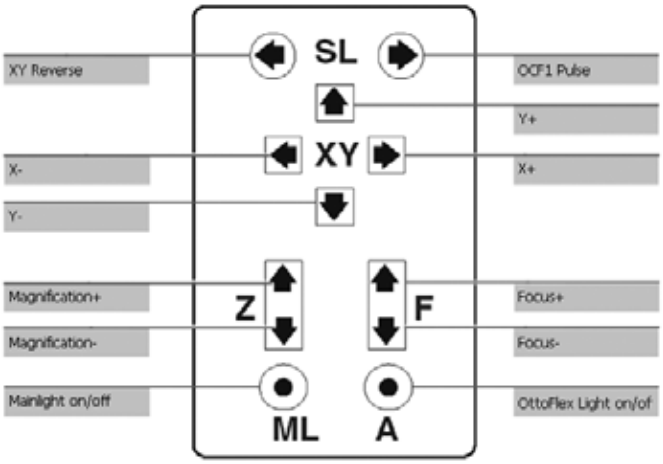
12-function footswitch, long



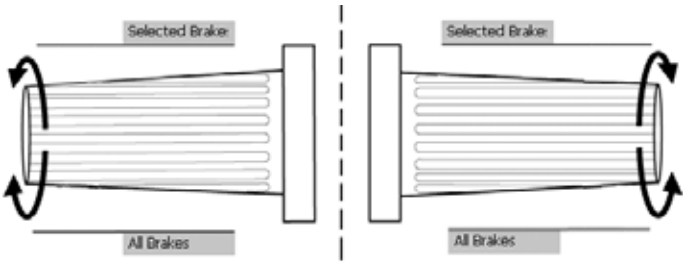
16-function footswitch, cross



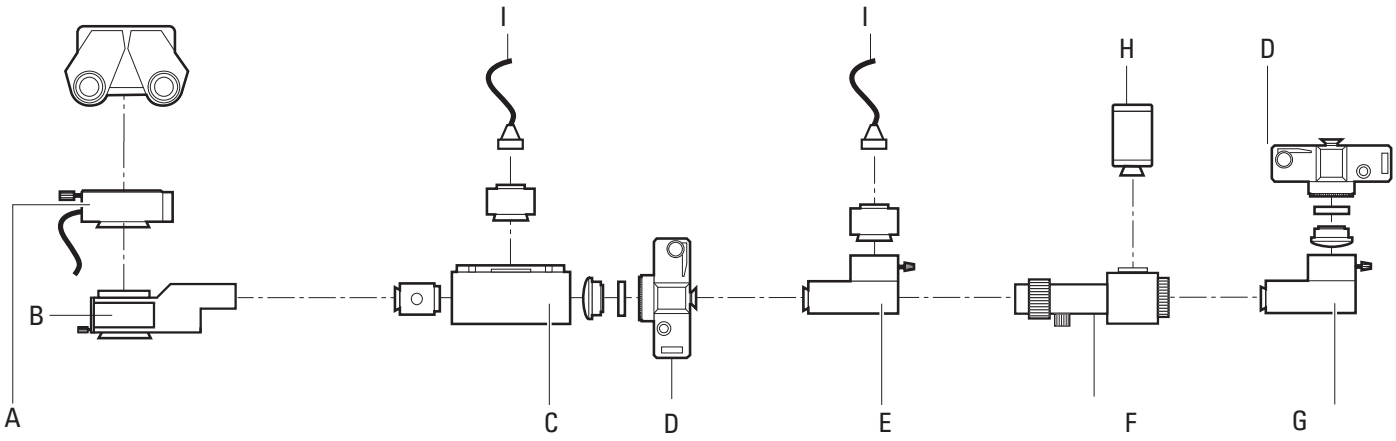
Handswitch



Handles



Video and photo accessories for Leica M844



A Leica 2D pick-up
B 0° assistant's attachment
C Photo/TV dual attachment
D Photocamera
E TV attachment
F Zoom video adapter
G Phototube
H Video camera (such as the Leica D2D V3)
I Leica 2D C-Mount

Leica 2D pick-up
- Video system for recording 2D video sequences.
- The camera (A) is installed between the assistant's attachment and the binocular tube.

Leica 2D C-Mount
- Video system for recording 2D video sequences.
- The camera (I) is mounted on the TV attachment or zoom video adapter.

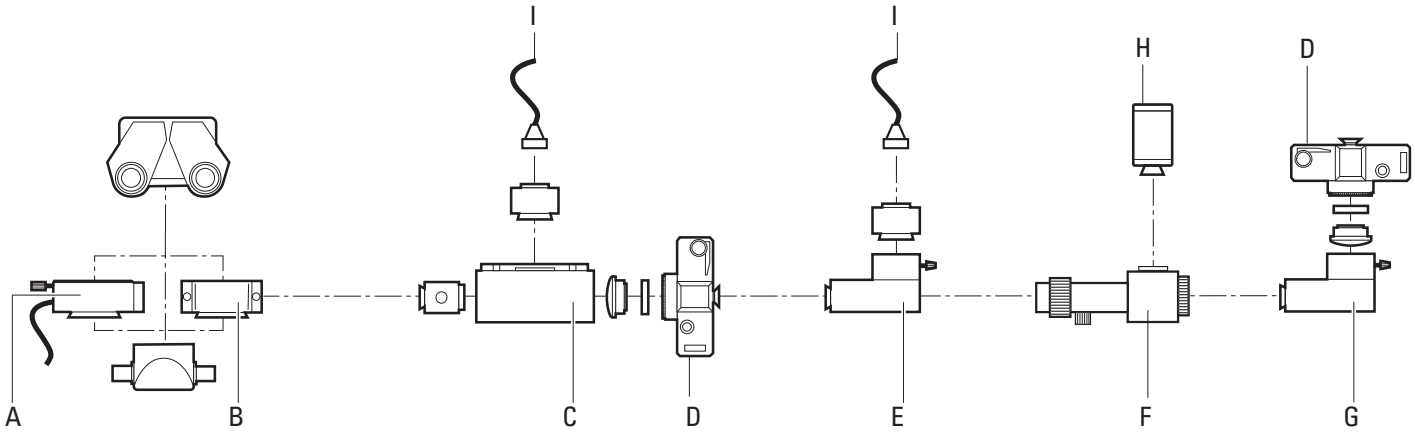
Photo/TV dual attachment
- For using a video camera with C-mount at the same time as an SLR camera.
  Complete with adapters.
- Video camera engageable in 45° increments.
- Video outlet with incorporated brightness adjustment (3 positions).

TV attachment
- For commercially-available video cameras with C-mount, complete with adapter.
- The TV tube attachment (E) is installed at the video port of the 0° assistant's attachment.
- Video camera can be latched in 90° increments.

Zoom video adapter
- For commercially-available video cameras with C-mount, complete with adapter.
- The zoom video adapter (F) is installed at the video port of the 0° assistant's attachment.
- Zoom and fine focus function for Leica zoom video adapter

Phototube
- Complete with adapter, for SLR cameras.
- Adapter f = 250 mm: for large fields of view and short exposure times.
- Adapter f = 350 mm: for high magnifications.
- The phototube (G) is installed at the video port of the 0° assistant's attachment.

Video and photo accessories for Leica M820



A Leica 2D pick-up
B Beam splitter (50/50 % or 70/30 %)
C Photo/TV dual attachment
D Photocamera
E TV attachment
F Zoom video adapter
G Phototube
H Video camera (such as the Leica D2D V3)
I Leica 2D C-Mount

Leica 2D pick-up
- Video system for recording 2D video sequences.
- The camera (A) is installed between the optics carrier and the binocular tube.

Leica 2D C-Mount
- Video system for recording 2D video sequences.
- The camera (I) is mounted on the TV attachment or zoom video adapter.

Photo/TV dual attachment
- For using a video camera with C-mount at the same time as an SLR camera.
  Complete with adapters.
- Video camera engageable in 45° increments.
- Video outlet with incorporated brightness adjustment (3 positions).

TV attachment
- For commercially-available video cameras with C-mount, complete with adapter.
- The TV tube attachment (E) is installed at the beam splitter.
- Video camera engageable in 90° increments.

Zoom video adapter
- For commercially-available video cameras with C-mount, complete with adapter.
- The zoom video adapter (F) is installed at the beam splitter.
- Zoom and fine focus function for Leica zoom video adapter

Phototube
- Complete with adapter, for SLR cameras.
- Adapter f = 250 mm: for large fields of view and short exposure times.
- Adapter f = 350 mm: for high magnifications.
- The phototube (G) is installed at the beam splitter.

Checklist: Before the operation

Cleaning the optical accessories
⇨Select the eyepieces, objective and the documentation accessories (if used) and check them for cleanliness.
⇨Remove dust and dirt (see page 58).

Checking accessories
⇨Lock the swing arm.
⇨Outfit the microscope with all accessories for use (see pages 22-24).
⇨Turn 0°-assistant's attachment to the desired side (Leica M844, see page 25) or install attachment for second observer on the desired side (Leica M820).

Balancing
⇨Release and balance swing arm (see pages 33 and 34).

Function check
⇨Switch the microscope on.

Warning 1
Motors return to their home positions
⇨Before switching on the microscope, ensure that the travel paths of the X- and Y-axes and the focus motor are free of obstructions.
⇨Check the Main Light 1, Main Light 2 and OttoFlex™ II illuminators. Replace defective bulbs before the operation begins.
⇨Test all handswitch and footswitch functions.
⇨Check the brake function using both the handles and the remote brake release (see page 33).

Positioning at the OP table
⇨Position the surgical microscope at the operating table as desired and secure the brakes on the floor stand. (see page 36).

Checking tube settings
⇨Check the tube and eyepiece setting for the selected user (see page 24).
⇨Treat the eyepieces with an antifogging compound if necessary.

Sterility
⇨Fit sterile components and sterile drape if used (see page 59).

Warning 2
Danger of fatal electric shock
⇨Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

Fitting optical accessories for Leica M844

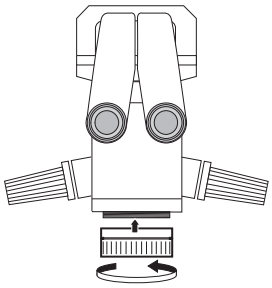
Warning 3
Risk of injury from downward movement of surgical microscope!

⇨Complete all preparations and adjustments to the stand before the operation.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Before re-equipping, always lock the swing arm.
⇨After re-equipping, always rebalance the microscope on the swing arm.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Before re-equipping during the operation, first swing the microscope away from the operating field.

Take care that the articulation brakes are tightened and the swing arm is blocked before you mount accessories to your Leica M844 (see page 34).

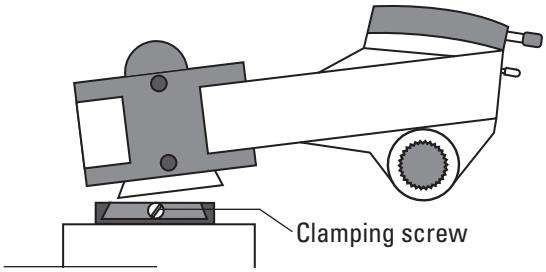
Fitting objectives

⇨Screw the objectives onto the microscope (right-hand threading).



Fitting the 0° assistant's attachment

The 0° assistant's attachment must be directly



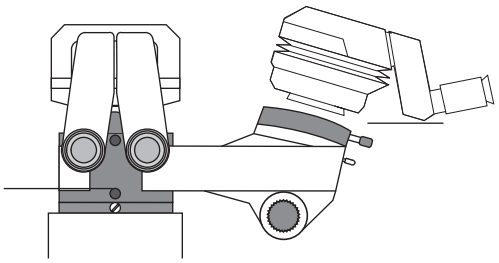
attached to the optics carrier.

⇨Unscrew the clamping screw as far as necessary using a screwdriver.
⇨Insert the 0° assistant's attachment into the dovetail ring.
⇨While holding the 0° assistant's attachment in place, tighten the clamping screw.

Do not use a beam splitter in addition to the 0° assistant's attachment.

Fitting the tube

⇨Release the clamping screw on the dovetail ring of the 0° assistant's attachment and remove the black protective cover.
⇨Carefully insert the second observer tube and tighten the clamping screw.



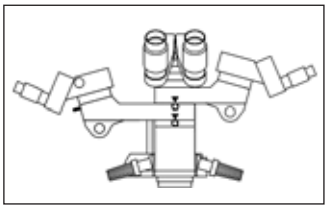
Fitting eyepieces

⇨Fasten the eyepieces with the fixing rings in the tubes.

Fitting the Double Wing

We recommend mounting the longer arm of the Double Wing on the side of the focus housing in order to achieve optimal ergonomic conditions.

⇨Screw out the clamping screw until it stops by means of the screwdriver.
⇨Insert the attachment of the Double Wing into the dovetail ring so that the arrow is positioned exactly over the clamping screw.



⇨Hold the Double Wing firmly and tighten the clamping screw.

When the combination with the Double Wing is used we recommend that the main surgeon uses the UltraLow™ II binocular tube. The UltraLow™ II binocular tube offers better ergonomic conditions.

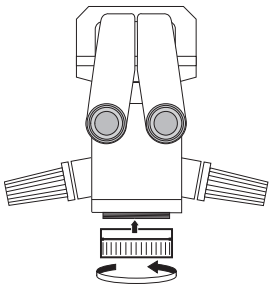
Fitting optical accessories for Leica M820

Warning 3
Risk of injury from downward movement of surgical microscope!

⇨Complete all preparations and adjustments to the stand before the operation.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Before re-equipping, always lock the swing arm.
⇨After re-equipping, always rebalance the microscope on the swing arm.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Before re-equipping during the operation, first swing the microscope away from the operating field.

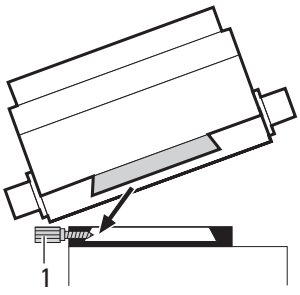
Take care that the articulation brakes are tightened and the swing arm is blocked before you mount accessories to your Leica M820 F19 (see page 34).

Fitting objectives



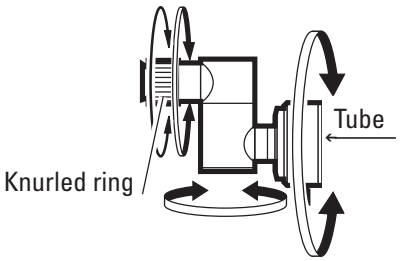
⇨Screw the objectives onto the microscope (right-hand threading).

Fitting the beam splitter



⇨Unscrew the clamping screw to the stop.
⇨Insert the beam splitter into the dovetail ring and turn slightly to the side until the positioning screw engages the guide.

Fitting the attachment for second observer



⇨Install the attachment for second observer to the beam splitter.
⇨Align the attachment for second observer as required.
⇨Fit the tube and set up the image with the knurled ring.

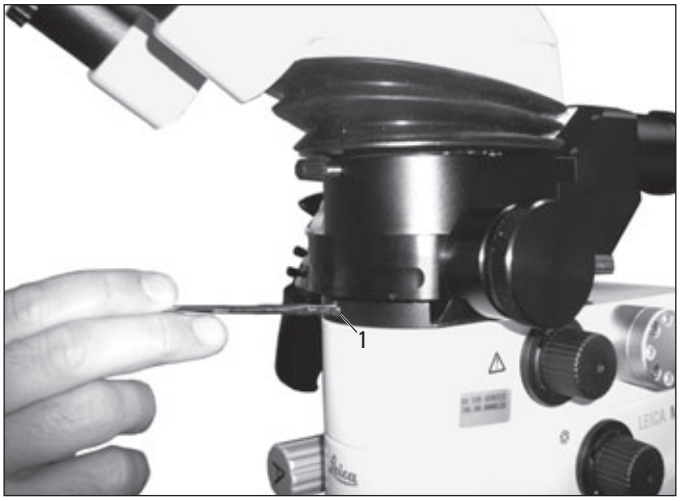
Fitting the tube

⇨Release the clamping screw on the beam splitter and attachment for second observer and remove the protective cover.
⇨Carefully insert the tube and tighten the clamping screw.

Fitting eyepieces

⇨Affix the eyepieces with the fixing rings in the tubes.

Mounting beam splitter, rotatable

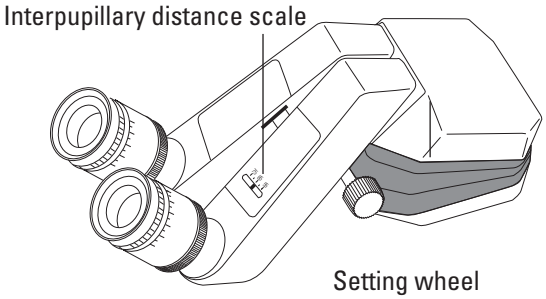


- Remove the clamping screw (1)
- Mount the grub screw (1)
- Place beam splitter, rotatable into the dovetail ring from above
- Tighten the grub screw (1)

Adjusting optical accessories – general information

Tube settings

Acquiring and adjusting interpupillary distance



Adjust the interpupillary distance to a value between 55 mm and 75 mm.

⇨Adjust the interpupillary distance using the setting wheel.

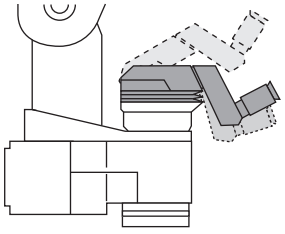
⇨Adjust the interpupillary distance until you see a circular image field.

☞ This procedure must be done once for each user. The acquired value (see display) can be stored for each user in the "User Settings" menu under "Tube Settings" (see page 44).

Adjusting the tilt

⇨Hold the eyepiece tubes of the binocular with both hands.

⇨Tilt the eyepiece tubes upwards or downwards.



Setting up eyepieces

Determining/adjusting diopter settings

The individual diopters can be adjusted continuously for each eyepiece from +5 to -5. Only this method will ensure that the image will stay in focus within the entire zoom range = parfocal. The treatment microscope ensures a high degree of fatigue resistance when the dioptre setting is correct for both eyes.

☞ A parfocal adjusted microscope ensures that assistant´s view and monitor image will always remain sharp

⇨Set individual diopter values for each eyepiece.

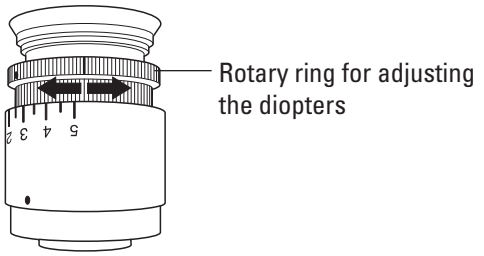
⇨Set to the minimum magnification.

⇨Place a flat test object with sharp contours under the lens at working distance.

⇨Focus the microscope.

⇨Set to the maximum magnification.

⇨Focus the microscope.



⇨Set to the minimum magnification.

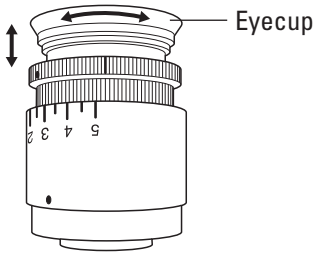
⇨Without looking into the eyepieces, turn both eye lenses to +5 diopters.

⇨Slowly turn the eyepieces towards -5 individually for each eye until the test object appears sharp.

⇨Select the highest magnification and check the sharpness.

This procedure has to be performed only once for each user. The acquired values can be stored for each user in the "User Settings" menu under "Tube Settings" (see page 44).

Adjusting the pupillary distance



⇨Rotate the eyecups up or down until the desired distance is set.

Checking parfocality

⇨Place a flat test object with sharp contours under the lens at working distance.

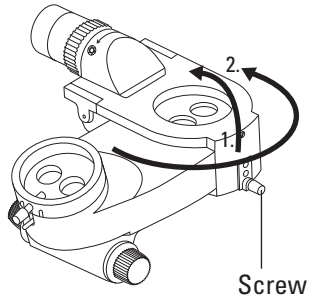
⇨Zoom through the whole range, observing the test object.

⇨The image sharpness must remain constant at all magnifications. If this is not the case, check diopter settings of the eyepieces.

Adjusting optical accessories for Leica M844

Adjusting the 0° assistant's attachment

Changing the assistant side

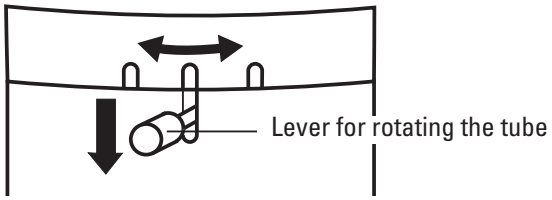


⇨Loosen the screw, lift the surgeon tube on quick changer and rotate the assistant tube to the other side.
⇨Retighten the screw.
⇨After changing the assistant side, turn the camera by 180° to correct the orientation of the video image.

☞ No accessories need to be removed in order to change the assistant side.

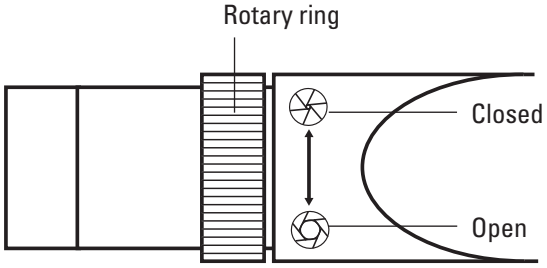
Level-up the eyepiece tubes

The assistant tube can be rotated 15° to the left or right.
⇨Push lever down.
⇨Rotate the tube in the desired direction until it engages at one of the markings.



Documentation port

The documentation port of the 0° assistant's attachment has a diaphragm for optimizing the depth of field.

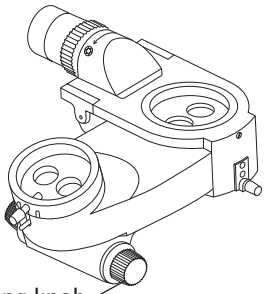


⇨You can adjust the diaphragm by turning the rotary ring.

☞ If you are working at a large magnification, you can increase the depth of field of your video or photo by reducing the diaphragm opening.
⇨Closing the diaphragm can affect the red reflex in the video image.

Focusing the 0° assistant's attachment

⇨Rotate the fine focus button to precisely focus the image seen by the assistant.



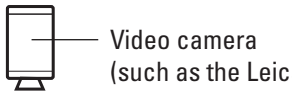
Fitting documentation accessories

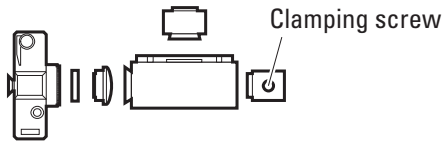
Fitting the Leica 2D

⇨See Leica 2D User Manual (10708979).

Fitting the photo/TV dual attachment

⇨Fit dual attachment on the assistant side of the 0°-assistant's attachment (Leica M844) or on the beam splitter (Leica M820).
⇨Equip the video camera with the TV objective and insert into the dual attachment.
⇨Tighten the clamping screw.
⇨Equip the photo camera with the camera adapter. Screw the photo objective to the camera adapter. Fit the camera to the dual attachment.
⇨Tighten the clamping screw.
⇨Loosen the clamping screw and engage the video camera until it latches in one of the 45° steps depending on the available space.
⇨Tighten the clamping screw.





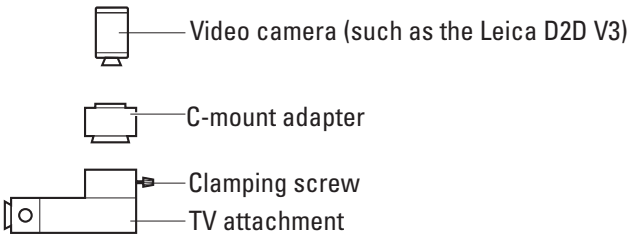
The object image at the camera output is laterally reversed!

Using the dial, the brightness of the video can be adjusted to 30%, 50% or 100%. One of these filters can be switched with the 8% filter provided. To do so, remove the camera and change the filter in the TV output.

TV attachment / zoom video adapter

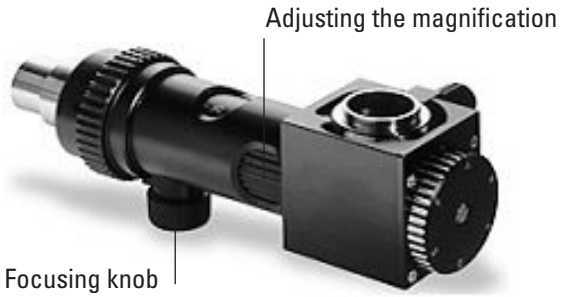
⇨Fasten the TV attachment to the video port of the 0° assistant's attachment (Leica M844) or the beam splitter (Leica M820).
⇨Screw the adapter to the camera using the C-mount.
⇨Insert the camera with the adapter into the TV attachment and tighten the clamping screw.

90° click-stop (TV attachment only):
⇨Loosen the clamping screw.
⇨Latch the camera at one of the 90° steps in accordance with the space available and tighten the clamping screw.

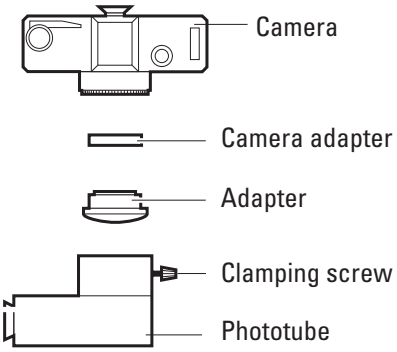


Adjust parfocality of the zoom video adapter.
⇨Select the highest magnification.
⇨Place a flat test object with sharp contours under the objective.
⇨Look through the eyepieces and focus the microscope.
⇨Select the lowest magnification.
⇨Set the maximum magnification (f=100) on the zoom video adapter.
⇨Focus the monitor image on the zoom video adapter.
⇨Set the desired image magnification at the zoom video adapter.

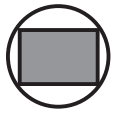
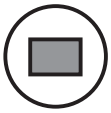
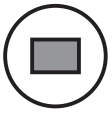
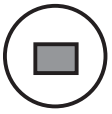
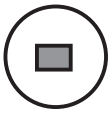
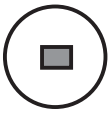
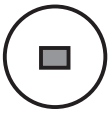
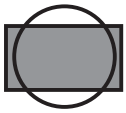
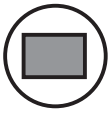
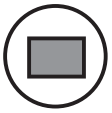
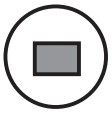
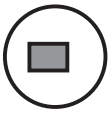
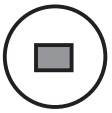
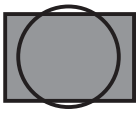
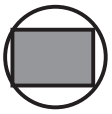
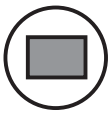
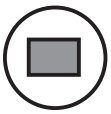
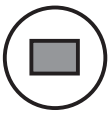
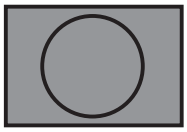
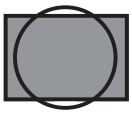
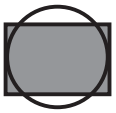
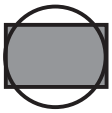
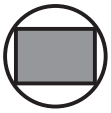
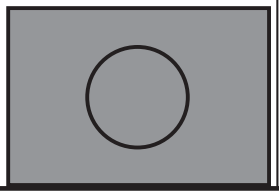
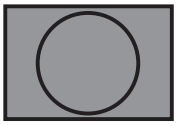
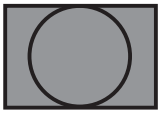
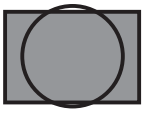
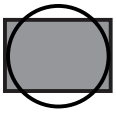
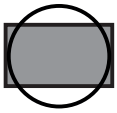
Fitting the phototube



⇨Fasten the phototube to the video port of the 0°-assistant's attachment (Leica M844) or to the beam splitter (Leica M820).
⇨Secure the camera adapter to the SLR camera.
⇨Connect the f = 250 mm or f = 350 mm adapter to the camera adapter.
⇨Secure the camera, complete with adapter, in the phototube. Tighten the clamping screw.



Selecting documentation accessories

	Zoom video adapter 35mm	TV attachment 55mm	PhotoTV dual attachment 60mm	TV attachment 70mm	PhotoTV dual attachment 85mm	Zoom video Adapter 100mm	TV attachment 107mm
1/4 "							
1/3 "							
1/2 "							
2/3 "							
1 "							

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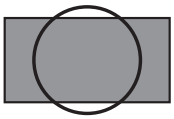
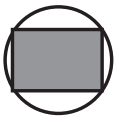
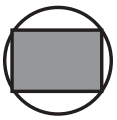
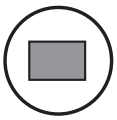
35 mm		
Digital Photo Camera		


Field of view

Monitor/image

Mounting the slit lamp

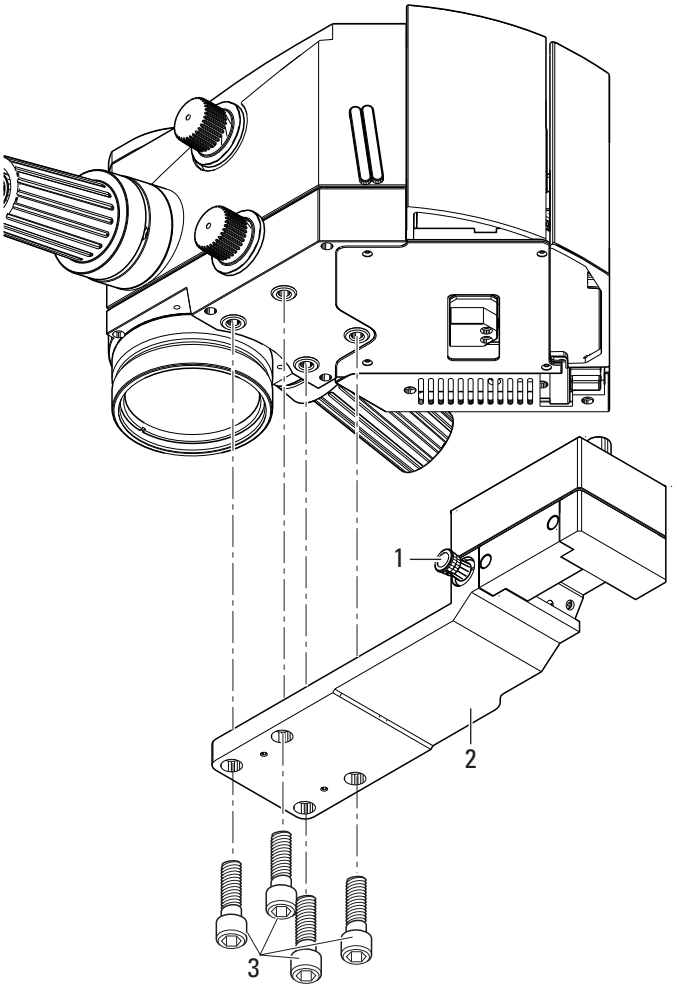
General safety information when handling the slit lamp

- When installing and using the slit lamp, make sure not to pinch any cables.
- When installing, make sure that the interlock of the slit lamp latches securely.
- Only qualified personnel is allowed to handle the slit lamp.
- When handling the slit lamp take care not to crush any fingers.

Mounting the extension plate

⇨Lock the swing arm.

⇨Fasten the extension plate (2) to the optics carrier with 4 screws (3).



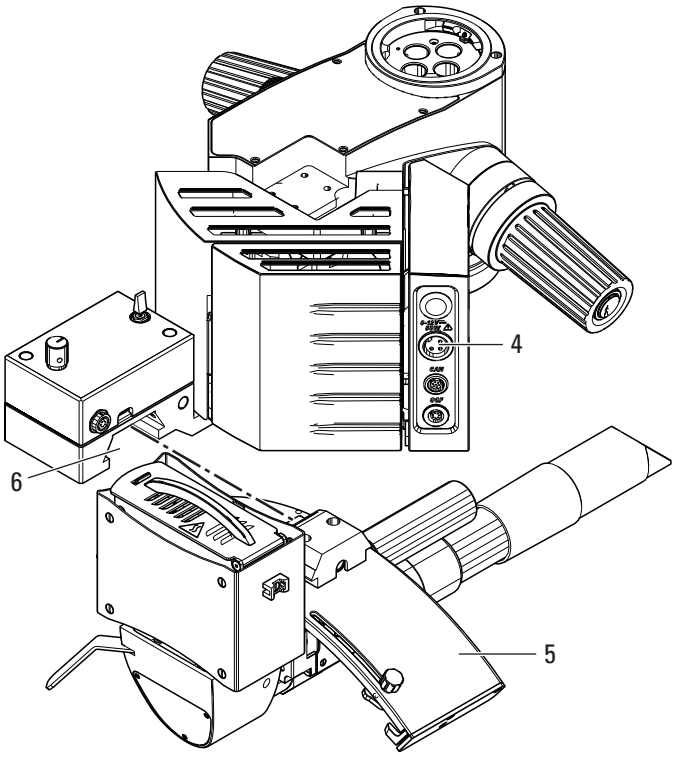
Fastening the slit lamp

Make sure that the interlock latches securely.

⇨Loosen the clamp screw (1) and slide the slit lamp (5) into the guiding (6).

⇨Fasten the clamp screw (1).

Power supply and control signals are connected to the slit lamp via the quick release fastener in the guiding (6).



The slit lamp may only be used with an objective (10445937) with a working distance (WD) of 200 mm.

⇨Insert the 3-pin plug of the dual cable into the external supply socket (4) on the optics carrier.

⇨Insert the 5-pin plug of the dual cable into the OCF socket (50) on the optics carrier (see page 13).

Make sure that there always is a spare lamp with 50 W on-hand.

Warning 4
Danger of burns

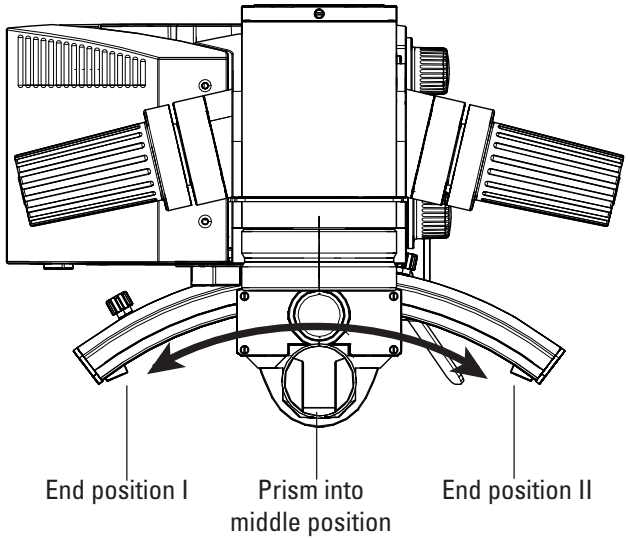
⇨The lamp housing and cover may become hot during use.

Adjusting the slit lamp

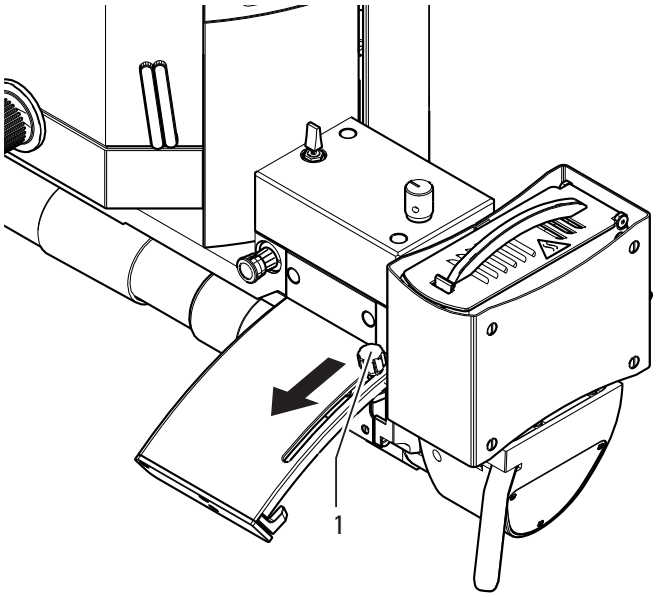
⇨Move the slit lamp into middle position using the footswitch.

Assign the functions OCF2 pulse and OCF3 pulse on the hand switch or foot switch used so that the slit lamp can be moved to the right (OCF3) or left (OCF2) using these two keys.

⇨Rotate the prism into middle position.
⇨Rotate the prism into both end positions and adjust the magnification so that the slit remains in the image field to the left and right.
⇨Make sure that there is no obvious difference between the prism end positions for lateral adjustment referring to the slit image and the edge of the diaphragm.



Left-hand and right-hand of the arc there are two lockable stoppers (1) which may be adjusted individually by the doctor. When a stopper is reached, it may be circumnavigated by pressing the hand switch or foot switch again.



Emergency operation

If the motor of the prism is inoperative, the prism may be moved by hand.

Dismounting the slit lamp

When dismounting the slit lamp, make sure that both stoppers are in the bottom position.

Adjusting the slit lamp

Caution 2
Danger of crushing due to moving parts!
The parts of the slit lamp that are moved by motors may crush fingers or the hand when used improperly.
⇨When handling the slit lamp, take care not to crush any fingers.

⇨For activation of the slit lamp, use the Slitlamp/OttoFlex switch (53) on the optics carrier (see page 13).

Adjusting the brightness of the slit lamp

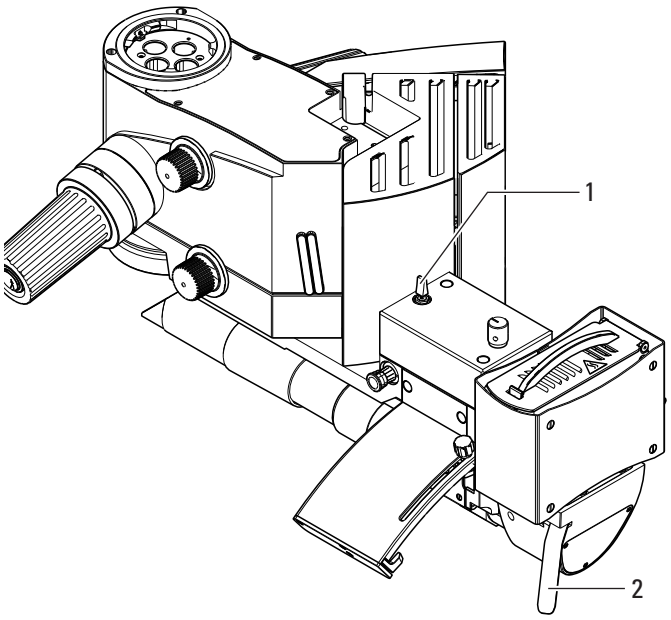
Warning 5
Danger of eye injuries!
The light source of the slit lamp might be too bright for the patient.
⇨Dim the slit lamp before switching it on.
⇨Slowly increase the brightness until the image is illuminated optimally for the operating doctor.

⇨To switch the slit lamp on or off, use the OttoFlex ON/OFF function on the hand switch or foot switch.
⇨To adjust brightness, press the „+“ or „–“ -button, or directly press the brightness bar of the slit lamp.

Clicking the „+“ or „–“ -button changes the brightness value in increments of 1. Holding the mouse button down changes the value in increments of 5.

⇨Brightness of the slit lamp may also be changed by using a connected hand switch or foot switch with the OttoFlex +/– function.

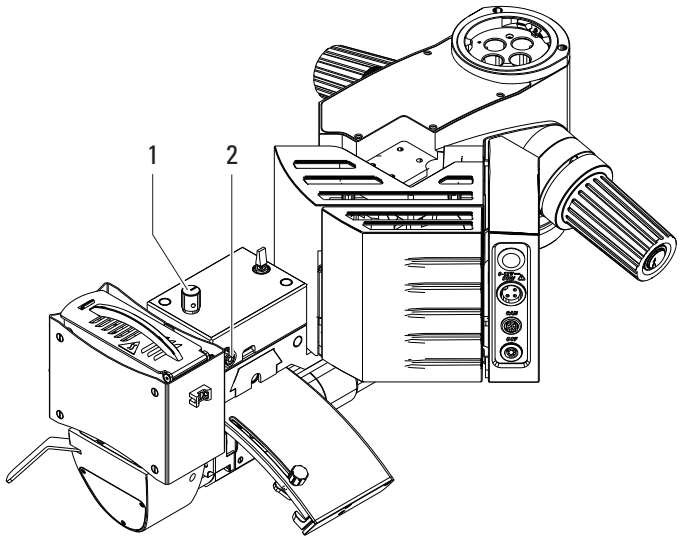
Moving the slit lamp
⇨Assign the functions OCF2 pulse and OCF3 pulse on the hand switch or foot switch used so that the slit lamp can be moved to the right (OCF3) or left (OCF2) using these two keys.
or
⇨Move the slit lamp to the right or left with the nurse switch (1).



Adjusting the slit width
The width of the slit can be adjusted with the lever (2) on the lamp housing of the slit lamp.

The slit width can be adjusted between 0.01 bis 14 mm. The slit height is 14 mm.

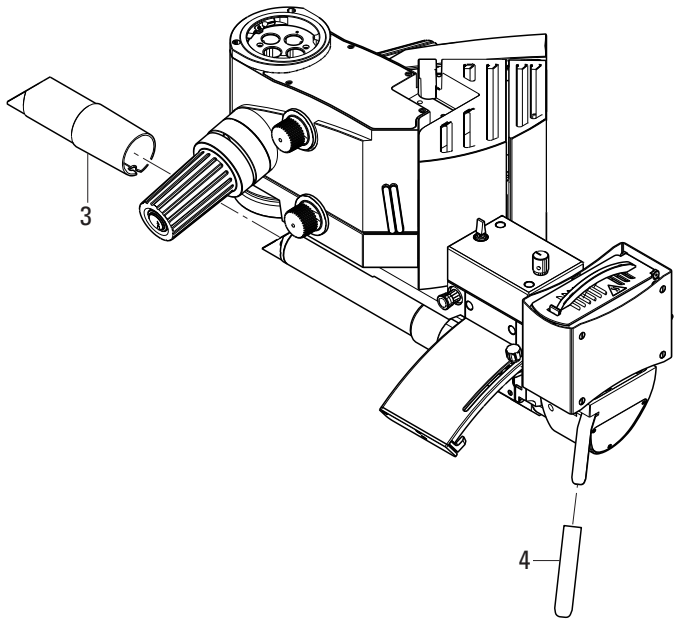
Connecting the BIOM to the slit lamp



⇨Insert the plug of the BIOM into the socket (2) on the slit lamp.
⇨Use the rotary switch (1) to change between BIOM and slit lamp.

Sterile covers for the slit tube

The slit tube of the slit lamp can be protected by sterile cover (3), the lever for adjusting the slit width can be protected by sterile cover (4).



Phototoxic damage to the retina during eye surgery

Warning 6
Damage to the eyes due to prolonged exposure!
The light of the instrument may be harmful. Risk of eye damage increases with the duration of exposure.
⇨Do not exceed the exposure limits.
An exposure to this instrument for longer than 2.8 min at maximum output power exceeds the exposure limits.

The following table shows the allowed surgery durations and their possible extension when reducing the slit width:

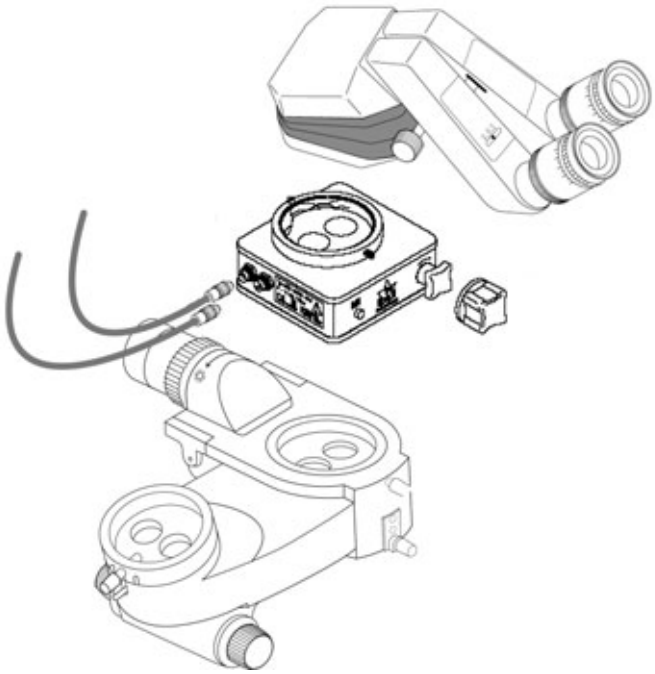
slit width [mm]	time [s]
>6	164
5	181
4	233
3	270
2	455
1	909

⇨Protect the patient by:
- short illumination times
- low brightness level
- switching the light off when interrupting the surgery

It is recommended to adjust the brightness to the minimum necessary for the surgery.
Babies or aphacia patients, where the eye lens has not been exchanged by an artificial lens with UV-protection, infants and patients with eye sickness are at a greater risk.
There also is a greater risk, if the patient was exposed to the same or any other ophthamological instrument using a bright visible light source within the previous 24 hours.
This applies especially, if the eye was examined by retina photography.
Decisions about brightness must be made case by case.
In any case the surgeon has to make a risk-benefit analysis concerning the applicable brightness.
Despite any effort to minimize the risk of damage to the retina by the surgical microscope, injuries still might occur.
Photochemical damage to the retina is one possible complication due to the necessity of using bright light to visualize eye structures during difficult ophthamologic processes.

Wide-angle observation system (such as Oculus)

⇨Fit the SDI between the 0° assistant's attachment and tube as pictured (Leica M844 only).
⇨Insert the seven-pin plug of the SDI control cable (10448163) into the OCF socket on the optics carrier.
⇨Insert the five-pin plug of the SDI power supply cable (10448162) into the CAN socket on the optics carrier.



⇨Screw the BIOM adapter into the underside of the optics carrier.
⇨Loosen the clamping screw, slide the BIOM into the guide and retighten the clamping screw.

☞ You can control the wide-angle observation system using your Leica handswitch or footswitch by assigning the functions OCF1, OCF2 and OCF3:

Inverter on/off	OCF1 pulse
BIOM focus up	OCF2 pulse
BIOM focus down	OCF3 pulse

☞ If you select the function "OCF1 + XY reverse", the wide-angle observation system is switched on and, at the same time, the X and Y movement directions are reversed.

☞ The SDI is mounted directly on the optics carrier of the Leica M820. If a beam splitter is to be used in addition, mount it on the SDI using a stereo adapter (10446992).

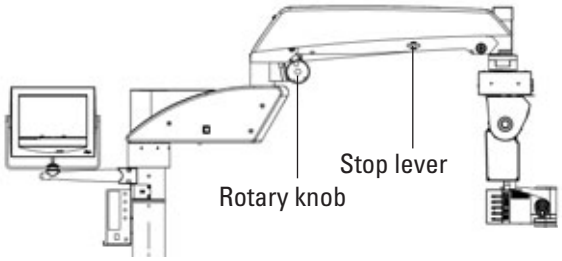
☞ For further information, please see the manufacturer's operating instructions OCULUS (SDI/BIOM = Trade names of OCULUS).

⚠ **Warning 5**
There is a danger of injury to the patient as a result of changing the working distance using the motorized adjustment of the ceiling mount if the working distance falls below the minimum of 140 mm due to the use of accessories (such as wide-angle observation systems).
⇨The footswitch function for moving the ceiling mount up and down may not be used in combination with accessories that cause the working distance to fall below the minimum of 140 mm.
⇨Before up/down movements, always check first to ensure that the range of movement is free of obstructions.

Preparing the stand (F40,C40,CT40)

Balancing the swing arm

Warning 6
Risk of injury through surgical microscope moving down!
⇨Never balance or re-equip the instrument over the field of operation.
⇨After re-equipping, always rebalance the microscope on the swing arm.



⇨Release the swing arm (see below).
⇨Hold the microscope by the handles.
⇨Turn one handle to release the brakes (All Brakes).
⇨Check whether the microscope drifts up or down.

Microscope drifts downwards:
⇨Turn rotary knob clockwise.

Microscope drifts upwards:
⇨Turn rotary knob counterclockwise.

Locking the swing arm

Warning 7
Risk of injury through surgical microscope moving down!
⇨Always lock the swing arm:
when transporting the microscope
when changing equipment

Caution 2
There is a risk of damage to the surgical microscope from uncontrolled tilting!
⇨Firmly hold the handles before triggering the "All Brakes" function.

⇨Pull the stop lever and bring it into a vertical position.
⇨Hold and turn one or both handles to release the brakes (All Brakes).
⇨Move the swing arm up and down until the transport lock engages.
⇨The swing arm is now locked.

Releasing the swing arm

Caution 2
There is a risk of damage to the surgical microscope from uncontrolled tilting!
⇨Firmly hold the handles before triggering the "All Brakes" function.

⇨Grip and turn one handle to release the brakes.
⇨At the same time, pull the stop lever and bring it into a horizontal position. The swing arm is now released.

If necessary, rebalance the swing arm.

Releasing the brakes

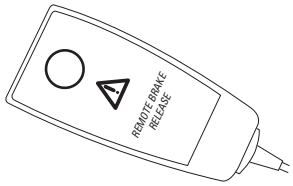
Warning 8
Risk of injury through surgical microscope moving down!
⇨Complete all preparations and adjustments to the stand before the operation.
⇨If settings need to be altered during the operation, first swing the microscope away from the operating field.
⇨If the microscope needs to be re-equipped, do this before the operation.
⇨Before re-equipping, always lock the swing arm.
⇨Do not use the handle or remote brake release when the instrument is in an unbalanced state.

Unless they are individually configured for the current user, the brakes are released by turning the handles as follows:

⇨Turn backwards and hold: selected brakes are released
⇨Turn forwards and hold: all brakes are released

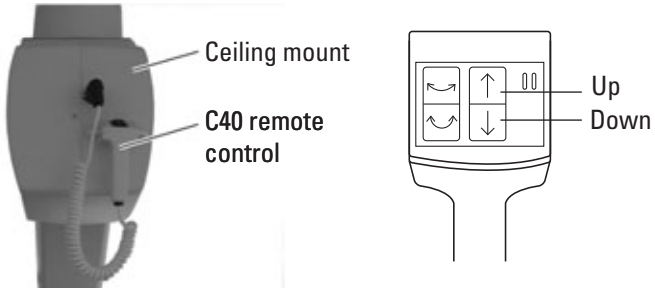
The handles can be individually assigned up to 4 functions for each user in the "User Settings" menu. The "All Brakes" function must be selected at least once (see page 44).

The brakes can also be released using a remote brake release.

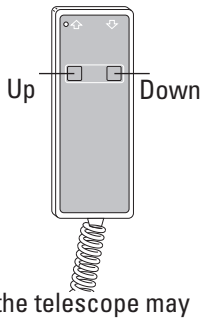


⇨Press and hold the remote brake release button.
⇨All brakes on the stand are now released.

Raising and lowering the C40 ceiling mount
The C40 ceiling mount can be raised and lowered electrically. These functions can be controlled via the remote control unit.
⇨"Up" key: raise stand.
⇨"Down" key: lower stand.



Raising and lowering the CT40 ceiling mount
The CT40 ceiling mount can be lifted and sinked electrically. These functions can be controlled via buttons on the remote control unit.
Move telescopic arm to the desired height:
⇨"Up" key: lift telescopic arm.
⇨"Down" key: sink telescopic arm.



Under permanent-load conditions, the telescope may not be operated for more than 1 minute in a 10 minute period. After 2 minutes of uninterrupted operation, the built-in temperature switch deactivates the motor of the Leica CT40 ceiling mount.

Preparing the stand (F19)

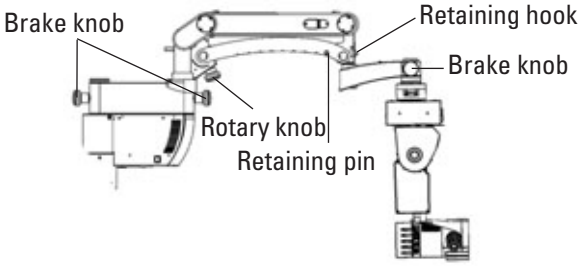
Balancing the swing arm

Warning 6
Risk of injury through surgical microscope moving down!
⇨Never balance or re-equip the instrument over the field of operation.
⇨After re-equipping, always rebalance the microscope on the swing arm.

⇨Hold the microscope firmly.
⇨Releasing the swing arm
⇨See whether or not the microscope drifts.

Microscope drifts downwards:
⇨Turn rotary knob clockwise.

Microscope drifts upwards:
⇨Turn rotary knob counterclockwise.



Adjust the articulation brakes
All joints on the microscope and stand are equipped with articulation brakes, with resistance that adjusts to make the joint easier or more difficult to move.

Make the joint easier to move:
⇨Loosen the black brake knob.
Make the joint more difficult to move:
⇨Tighten the black brake knob.

Locking the swing arm

Warning 7
Risk of injury through surgical microscope moving down!
⇨ Always lock the swing arm:
when transporting the microscope
when changing equipment

⇨Position the swing arm approximately horizontally.
⇨Pull out the retaining pin.
⇨Move the swing arm slightly up and down until the retaining hook engages. The swing arm is now locked.

Releasing the swing arm
⇨Move the swing arm slightly up and down, at the same time pushing the counterlever of the safety hook upwards, until the retaining pin clicks into position.
⇨If necessary, rebalance the swing arm.

Transport, transporting and parked positions

Transport of the Leica M844 F40 and Leica M820 F40

Warning 9
Beware of:
- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**

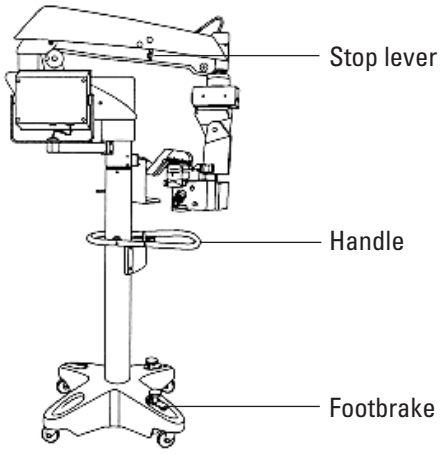
⇨Before transport, always set the Leica M820 F40 and Leica M844 F40 surgical microscopes to the transport position.
⇨Never move the stand in the extended condition.
⇨Always push the instrument to displace it; never pull it.
⇨Never roll over cables lying on the floor.

Caution 3
Surgical microscope can move without warning!
⇨Always lock the footbrake when you are not moving the system.

Transport position
Whenever you transport your Leica M820 F40 and Leica M844 F40, first bring it into transport position.

Caution 2
There is a risk of damage to the Leica M820 F40 and Leica M844 F40 surgical microscopes from uncontrolled tilting!
⇨Firmly grasp the handles before triggering the "All Brakes" function.

⇨Unplug and secure the power cable.
⇨Pull the stop lever and bring it into a vertical position.
⇨Grasp and turn one or both handles to release the brakes (All Brakes).
⇨Move the swing arm up and down until the transport lock engages.
⇨Bring swing arm into transport position.



⇨Release the handle.
⇨Turn the control unit towards the swing arm.
⇨Hang the footswitch on the suspension device.
⇨Step on the footbrake release lever to release the footbrakes.
⇨Move the Leica M820 F40 and Leica M844 F40 by the handle.

Ensure that the display of the control unit does not collide with the XY unit!

Transport of the Leica M844 F19 and Leica M820 F19

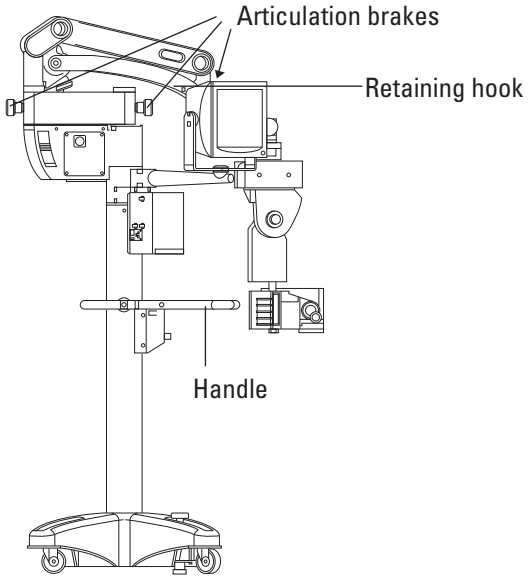
Warning 9
Beware of:
- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**

⇨Before transport, always set the Leica M820 F19 and Leica M844 F19 surgical microscopes to the transport position.
⇨Never move the stand in the extended condition.
⇨Always push the instrument to displace it; never pull it.
⇨Never roll over cables lying on the floor.

Caution 3
Surgical microscope can move without warning!
⇨Always lock the footbrake when you are not moving the system.

Transport position
Whenever you transport your Leica M820 F19 and Leica M844 F19, first bring it into transport position.

⇨Unplug and secure the power cable.
⇨Pull the retaining pin and engage the retaining hook.
⇨Release the articulation brakes.
⇨Bring swing arm into transport position.



⇨Tighten the articulation brakes.
⇨Turn the control unit towards the XY unit.
⇨Place footswitch in the carrier.
⇨Release the foot brakes by depressing the foot lever.
⇨Move the Leica M820 F19 and Leica M844 F19 by the handle.

Parked position

Bring the microscope into rest position after use.

F40 and F19 floor stands

⇨After bringing the microscope into transport position, push it to its storage location.
⇨Firmly depress the footbrake.
⇨Protect your Leica M820 and Leica M844 by covering it with its dust cover.

C40 ceiling mount

Caution 4
Danger of collision!
The surgical microscope can collide with surrounding components, the ceiling or lamps.
⇨Check the danger area before moving the swing arm.
⇨Carefully move the ceiling mount upwards, and observe ceiling and lamps.

⇨Swing the microscope aside.
⇨Remove sterile components.
⇨Adjust the swing arm parallel to the ceiling mount arm and lock it.
⇨Switch off the power switch on the swing arm.
⇨Raise the ceiling mount using the remote control.

CT40 ceiling mount

Caution 4
Danger of collision!
The surgical microscope can collide with surrounding components, the ceiling or lamps.
⇨Check the danger area before moving the swing arm.
⇨Carefully move the ceiling mount upwards, and observe ceiling and lamps.

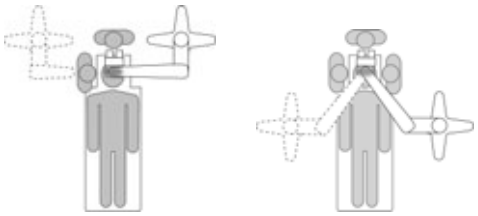
⇨Swing the microscope aside.
⇨Remove sterile components.
⇨Lock the swing arm.
⇨Switch off the power switch on the swing arm.
⇨Press the "Up" key on the remote control and raise the stand.

Positioning at the operating table

Leica M820 F40, Leica M844 F40, Leica M820 F19 and Leica M844 F19

⇨Bring the Leica M820 F40, Leica M844 F40, Leica M820 F19 and Leica M844 F19 surgical microscope into transport position (see page 32).
⇨Release the footbrakes (see page 35).
⇨Using the handle, carefully push the surgical microscope to the operating table and position it as desired:

Positioning options:



All positions are also possible as the mirror image position.

The instrument must be positioned such that the range of movement is large enough for the expected tasks.

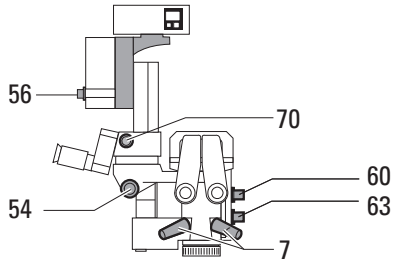
⇨Set footbrake.
⇨Plug the footswitch into the control unit and position it.
⇨Plug the power cable into the horizontal arm.
⇨Connect the potential equalization to the horizontal arm.

Warning 9
Danger of fatal electric shock
⇨The surgical microscope may be connected to a grounded socket only.

Sterile controls

The controls indicated in the diagram can be provided with steam-sterilizable handles or covers.

Use the sterilizable handles also when you use sterile disposable drapes; the controls will be easier to grasp.



7 Handles
54 Rotary knob for focus fine adjustment
56 Rotary knob for tilt head
60 Manual zoom emergency drive
63 OttoFlex™ II iris diaphragm
70 Interpupillary distance setting wheel

Also refer to the "Sterilization" table on page 61.

Before the operation

⇨Press the sterile controls into position so that they engage. The rotary knobs 54, 56, 60, 63 and 70 are identical.

Packaging the footswitch in a plastic bag protects it against dirt.

Sterile drape for stand

Caution 5
Risk of infection!
⇨Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

You can also use an optional sterile disposable drape.

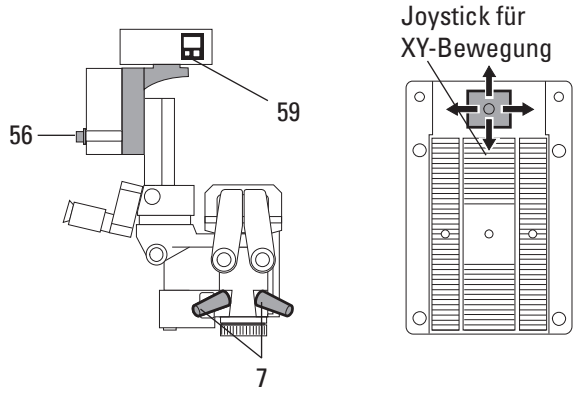
⇨Release the "All Brakes" functions (not available with Leica M820 F19 and M844 F19) using the handle and extend the swing arm.
⇨Put on sterile gloves.
⇨Attach all the sterile controls.
⇨Carefully unpack the sterile drape and pull it over the Leica M820 and Leica M844 surgical microscopes up to the swing arm.
⇨Clamp the protective glass (optional) onto the objective.
⇨Do not attach the sterile drape too tightly with the provided ribbons. It must still be easy to operate the instrument.

Check the ease of movement of the instrument.

Follow the instructions provided by the manufacturer of the sterile drape.

Ensure that you pull the disposable drape only to the end of the swing arm and fasten it there! Do not cover the horizontal arm.

Positioning the microscope



7 Handles
56 Rotary knob for tilt head
59 XY reset

Coarse positioning

⇨Hold the microscope by both handles.
⇨Turn one handle to release the brakes (All Brakes) (not available with Leica M820 F19 and M844 F19).
⇨Position the microscope and release the handle.

☞ The brakes can also be released using the remote brake release (see page 34).

☞ Also refer to the "Release brakes" chapter on page 33.

⚠ **Warning 11**
Risk of injury from downward movement of surgical microscope!
⇨Do not use the handle or remote brake release when the instrument is in an unbalanced state.

☞ For Leica M820 F19 and M844 F19 regulate the articulation brakes according to personal requirements and accessory weight (see page 34).

Fine positioning

⇨Use joystick on footswitch to operate X/Y-drive and position the microscope.

☞ Return to middle position by pressing the "Reset" key (59) or the "Reset" buttons on the control unit.

☞ You can assign the function "XY Reverse" on your handswitch or footswitch in order to reverse the X and Y movement directions.

Adjusting the tilt

⇨Turn the rotary knob (56) for tilt adjustment in the desired direction and hold it there.
⇨The microscope tilts in the desired direction.

☞ The microscope can be tilted 15° forwards and 50° backwards.

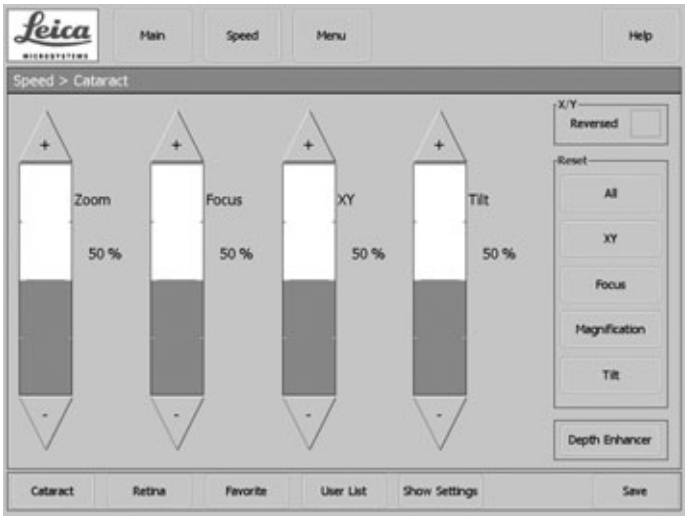
☞ Pressing the "Reset" button on the control unit returns the microscope to home position (0°).

"Reset Buttons"

⇨If a drive is in reset position, the reset button assigned to it appears in green.
⇨A "Reset" button that flashes green indicates that the corresponding drive is moving to reset position.
⇨A "Reset" button that appears in gray indicates that the corresponding drive is outside of the reset position.

Drive settings

☞ Pressing the "Reset All" button returns all motors to home position and reloads the user settings of the current user.



☞ You can adjust the speed at which each of the drives is moved on the "Speed" menu screen.

☞ You can change the drive speeds by clicking the "+" and "-" buttons. You can also set the speed by directly clicking the display bars.

☞ These values can be saved individually for each user (see page 39).

Adjusting the microscope

Adjusting the illumination

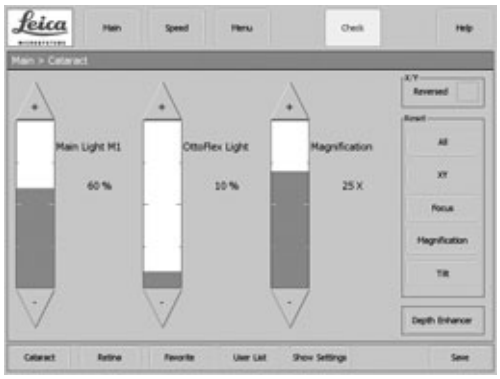
Warning 12
Light which is too intensive can damage the retina.
⇨Safeguard your patients:
short exposure times,
low brightness setting,
use protective filters (GG420 built in).

We recommend setting the minimal required light intensity for the operation. Infants, small children, aphakic patients who have not had their lenses replaced by artificial lenses with UV protection, and persons with eye diseases are at higher risk. The risk is also elevated if the person to be treated has been exposed to illumination from the same or a similar ophthalmological instrument with an intense visible light source within the previous 24 hours. This applies especially to patients that have been examined via retinal photography.
The decision with regard to the light intensity to be used must be made on a case-by-case basis. In any event, the surgeon must evaluate the risks and benefits of the used light intensity.
Damage may occur despite all efforts to minimize the risk of retinal injury by surgical microscopes. Photochemical retina damage is a possible complication arising from the necessity to use intense light to make eye structures visible during difficult ophthalmological processes.

Adjusting the brightness
You can adjust the brightness of the active Main Light and the OttoFlex™ II lamp using either the touch panel or the footswitch.

Using the footswitch:
Depending on the functions assigned to the footswitch (see page 16), you can switch the Main Light and OttoFlex™ II lamp on and off, and increase and decrease their brightness, using the foot/handswitch.

Using the touch panel:
You can change the brightness for the active Main Light and OttoFlex™ II lamp by pressing the "+" or "-" key or directly pressing the corresponding brightness bar.



Clicking the "+" or "-" key changes the brightness value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

Setting the brightness of a lamp to zero switches it off.

The Leica M820 and Leica M844 are also equipped with an additional second light source, called OttoFlex™ II. The combined output of the two light sources is limited electronically.

If you cannot increase the brightness of the desired light source, first decrease the brightness of the other light source; you are then able to increase the brightness of the desired lamp.

Quick-change lamp mount
The main light has a quick-change lamp mount.
⇨If a main lamp fails during the operation, simply switch over to the second lamp.
⇨Activate the second lamp by moving the quick-change lamp mount on the underside of the optics carrier.

The yellow "Check" button appears on the control unit. If you click the button, the informational message "Check Main Light 1 (or 2)" is displayed.
⇨Replace the defective bulb after the operation (see page 59).

Filters
There are two slots (62) in the microscope housing into which filter slides can be inserted.

Left filter slot: Color filter, cobalt filter
Right filter slot: Special filters or diaphragms.

The plane of filter is sharply imaged in the same plane as the object.
The GG420 UV protection filter is built-in. In addition, the GG475 UV protection filter is available.
⇨Remove the filter cover.
⇨Push in the filter slide, inclined slightly upwards, until it engages.

Inserting a filter automatically deactivates the OttoFlex™ II lamp. On the control unit (main menu), the brightness bar for the OttoFlex™ II lamp goes back to zero, and the caption changes to "Filter active".

If a slit lamp is active, it is not switched off if a filter slide is inserted.

After the filter has been removed, the OttoFlex™ II lamp can be switched back on using the hand/footswitch or at the control unit.

Adjusting the magnification (zoom)
You can adjust the magnification using the footswitch/ handswitch or the "Magnification" adjustment bar in the main menu of the control unit.

Clicking the "+" or "-" key changes the magnification value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

You can change the speed at which the zoom motor moves in the "Speed" menu (see page 38).

You can return the zoom motor to the magnification setting saved for the current user using the "Reset Magnification" button (see page 38).

Depth Enhancer
You can activate a double-iris diaphragm to increase the depth of field using the "Depth Enhancer" button.

In the "User Settings" menu, you can assign a default status of the double-iris diaphragm for each user, or assign it as a footswitch function, under "Tube Settings".

Manually adjusting the magnification (zoom)

Caution 6
Destruction of the zoom motor!
⇨Use the manual adjustment of the zoom motor only if the zoom motor is defective.

If the zoom motor fails, the zoom can be manually adjusted using the rotary knob (60) on the optics carrier.
⇨Press the rotary knob.
⇨Set the desired magnification by turning the knob.

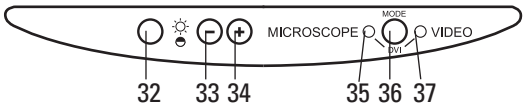
Adjusting the focus
You can focus the microscope using the focus keys on the footswitch.

You can change the speed at which the focus motor moves in the "Speed" menu (see page 38).

You can return the focus motor to the reset position (1/3 up, 2/3 down) by pressing the "Reset" key (59) or the "Reset Focus" button (see page 38).

You can also refocus the 0° assistant's attachment using a fine focus adjustment knob (59).

Touch panel

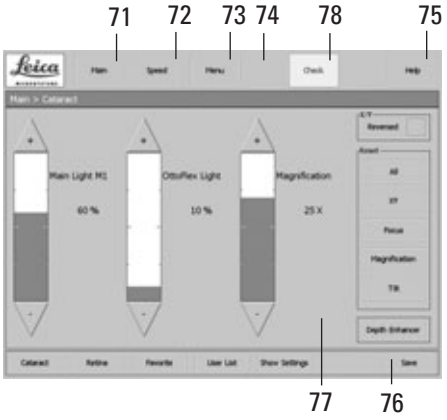


Adjusting brightness and contrast
⇨Press the brightness/contrast (32) key once.
⇨A bar for adjusting the brightness appears on the screen.
⇨Change the brightness with the + and - buttons.
⇨Press the brightness/contrast (32) key again.
⇨A bar for adjusting the contrast appears on the screen.
⇨Change the contrast with the + and - buttons.
⇨Press the brightness/contrast button again (32) to save the values you have set and hide the adjustment bars.

Changing operating modes
⇨You can switch your control unit between the video, control unit and DVI modes using the video/control unit mode switch (36).
⇨The active mode is indicated by an LED (35 or 37).
⇨If video mode is active, the video signal received at the video input (41) is displayed on the monitor.
⇨If control unit mode is active, the touch panel displays a menu interface in which the microscope can be controlled.
⇨If the DVI mode is active, the DVI signal (e.g. Leica MDRS4 video system) is displayed and both LEDs light up.

While video mode is active, any warning that may occur is indicated by an audible signal. This audio warning signal can be deactivated by your service partner if desired.

Menu structure



71 Operational mode (light/magnification settings)
72 Operational mode (drive settings)
73 Configuration menu
74 Static menu bar (does not change)
75 Displays help texts for certain topics
76 Dynamic button bar
77 Display area with status bar
78 Warning messages

Switching the microscope on

Warning 13
Motors return to their home positions
⇨Before switching on your Leica M820 / Leica M844, ensure that the travel paths of the XY, zoom and focus motors are free of obstructions. The tilt motor is not moved.

⇨Switch on your microscope at the power switch of the horizontal arm.
⇨As soon as the main illuminator lights up, your microscope is ready to use.

After the surgical microscope is switched on, the settings of the last active user are loaded.

If the power supply of your microscope is accidentally interrupted for a short period (<20 ±5 seconds), the microscope carries out a fast startup:

- All motors are in the same position as before.
- All illumination settings remain the same.
- XY reverse status is restored where applicable.
- If the StepCycle™ function has been selected, it is in step 0 (see page 45).
- The fast start-up function can be disabled in the Service menu.

In operational mode, the status bar displays the current user and specifies the current location in the menu at all times.

Selecting users

In the "Main" and "Speed" menu screens, the four buttons "Cataract", "Retina", "Favorite" and "User List" appear in the dynamic button bar at all times.

The users "Cataract" and "Retina" are default users provided by Leica.

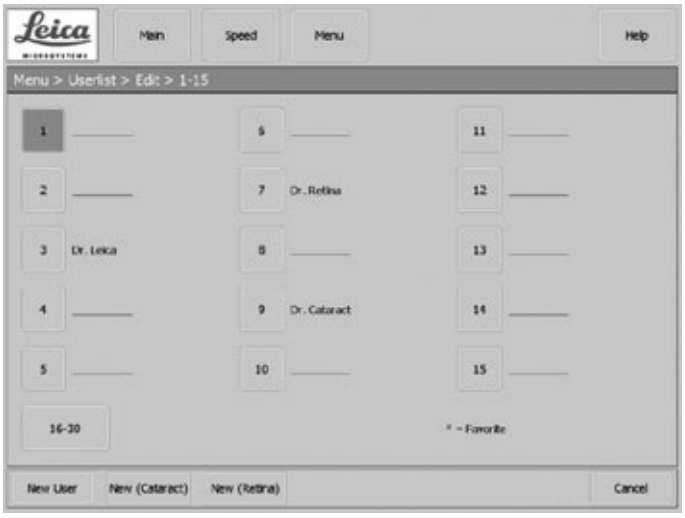
You can adjust the settings of these default users as desired (see page 42).

You can store a frequently used profile under the user "Favorite" (see page 42).

You can click the "Show Settings" button at any time to see an overview of the user settings of the current user.

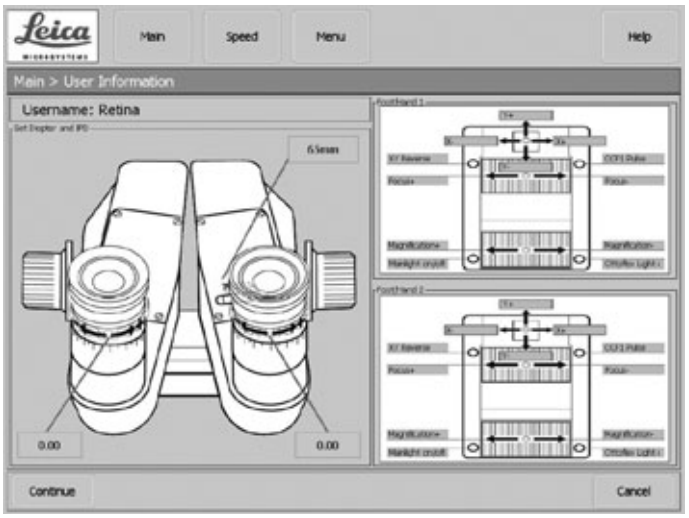
You can click the "User List" button to open a two-page user list from which you can select from up to 30 saved users.

⇨Click the "1-15" or "16-30" button to switch between pages.



When the user list is open, it can be edited at any time (see page 42).

When you select a user, an informational screen for that user appears that specifies the tube settings that are needed, as well as the current footswitch/ handswitch assignments. Press "Continue".



Before starting every operation make sure your personal user settings are selected and make yourself familiarize with your footswitch configuration.

If you have assigned the "StepCycle" function to the footswitch we recommend tthat you check the StepCycle™ procedure without patient before starting the operation.

Editing the user list

Various functions are available in the user list depending on the situation.

⇨If you select a user, the available functions appear in the dynamic button bar:

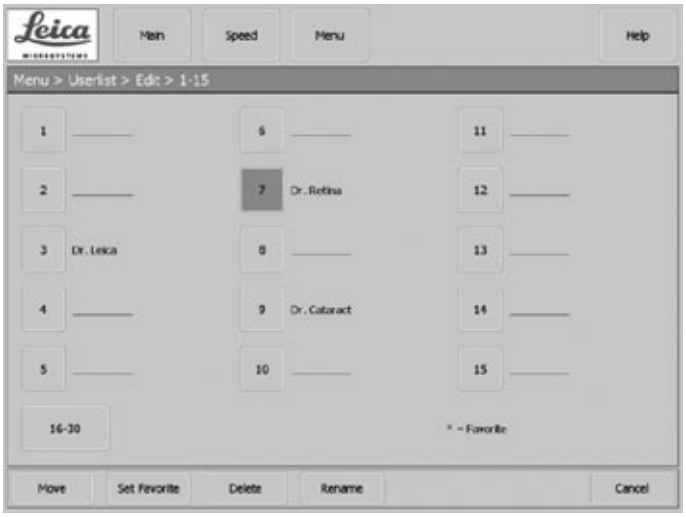
"Move"
Moves the selected user to another available location of your choosing.

"Set Favorite"
Defines a user in the user list whose settings can be directly retrieved from the "Main" or "Speed" menu by clicking the "Favorite" button.

"Delete"
Deletes the selected user. You must click "Confirm" to confirm this action.

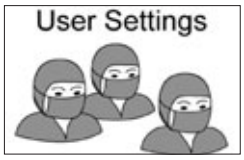
"Rename"
Renames an existing user. The user's settings are not changed.

☞ You can reach the editing mode of the user list via the "User Settings" menu and the "Edit User List" button in the dynamic button bar.



☞ We recommend that you do not change the configuration of the user settings or edit the user list during an operation.

Configuring users (User Settings menu)



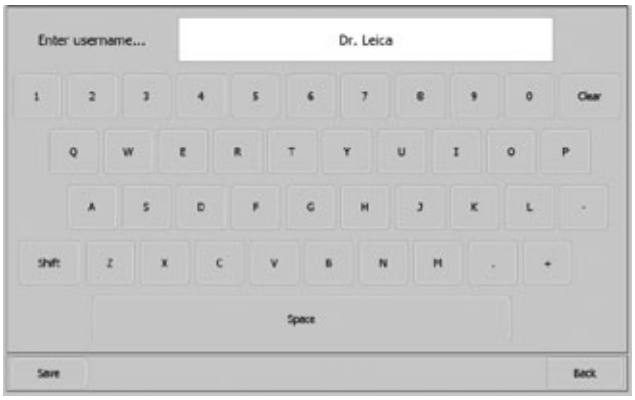
You can configure user settings in this menu.

"Load":
Loads the settings of an existing user so that you can modify them.
"New User"
Opens a new user with "empty" settings.
"New (Cataract)":
Loads the default settings for "Cataract" so that you can modify them.
"New (Retina)":
Loads the default settings for "Retina" so that you can modify them.

☞ You can also add a user from the operational menu. If you want to keep the current settings, you can save them by clicking the "Save" button (which appears as soon as the basic settings of the current users have been changed), either for the current user ("Save Current") or under a new username ("Save as New").

Saving the user settings:

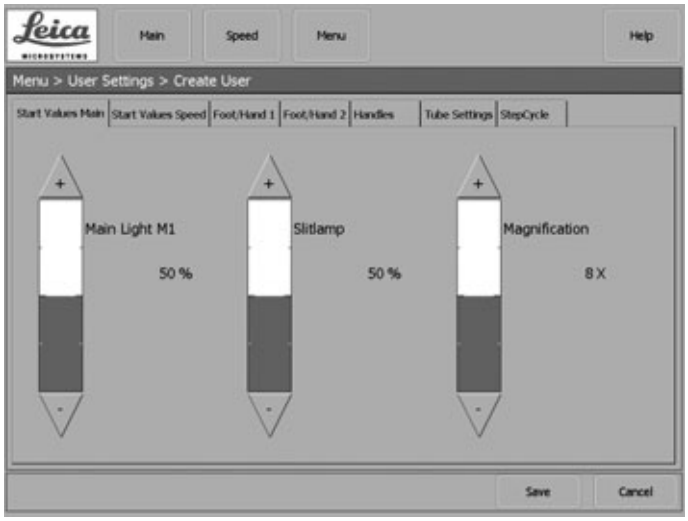
⇨Click the "Save" button.
⇨Select an available location in the user list at which you want to create your user. If you like, you can edit the user list first.
⇨Enter the desired username using the keyboard.
⇨Click the "Save" button to save the user at the desired location under the name you have entered.



Setting the light start values

You can set the start values for the main lamps, the OttoFlex™ II lamp and the magnification on this screen.
⇨Clicking the "+" or "-" key changes the values in increments of one.
⇨Holding down the key with your finger changes the value in increments of five.

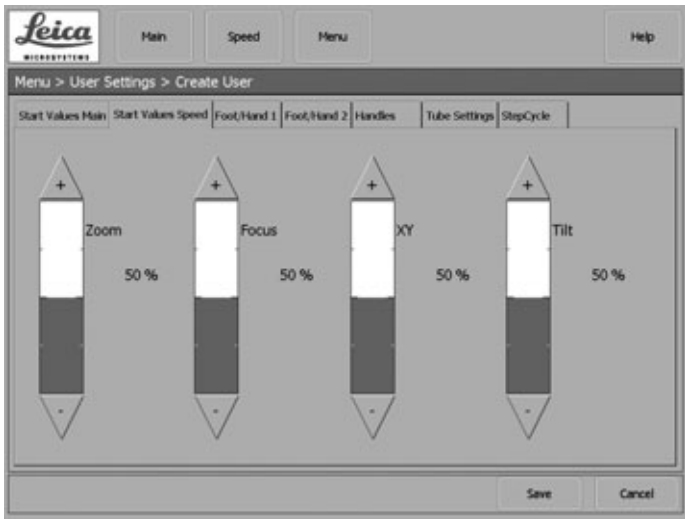
☞ You can also set the desired value by directly clicking the bars.



Setting the drive start values

You can set the start values for the zoom, focus, XY and tilt drives on this screen.
⇨Clicking the "+" or "-" key changes the values in increments of one.
⇨Holding down the key with your finger changes the value in increments of five.

☞ You can also set the desired value by directly clicking the bars.



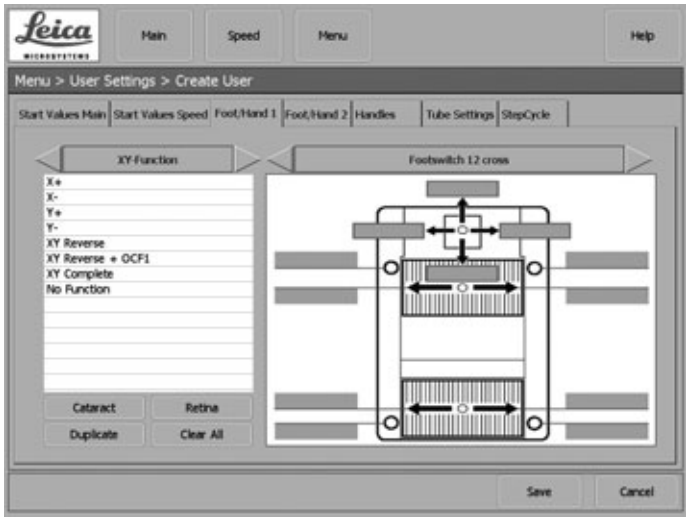
Footswitch/handswitch assignment

Here, you can configure individual settings for each user for your footswitch/handswitch.
⇨In the right selection field, select the footswitch/handswitch you are using.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨If you click the "Cataract" or "Retina" button, the selected footswitch/handswitch is assigned the default settings.
⇨You can then modify these settings as you like.
⇨Clicking the "Clear All" button clears the assignments for all keys.

☞ If you are creating only one footswitch/handswitch configuration for one user, we recommend duplicating it to the second footswitch/handswitch input by pressing the “Duplicate” button. This ensures that your footswitch/handswitch functions the way you want it to, regardless of which input it is plugged into.

Configuring individual keys

⇨In the right selection field, select the footswitches/handswitches you are using.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the left selection field, select the function group that contains the desired function.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨Select the desired function.
⇨Click the caption of the desired key to assign the selected function to it. Or, press the corresponding key on the connected footswitch.



Overview of function groups

Drive: Magnification +
Magnification -
Focus +
Focus -
Tilt +
Tilt-
No function

Extra: AD.F.1 toggle
AD.F.1 pulse
AD.F.2 toggle
AD.F.2 pulse
OCF1 toggle
OCF1 pulse
OCF2 toggle
OCF2 pulse
OCF3 toggle
OCF4 pulse
StepCycle
Depth Enhancer Toggle
No function

☞ The "Toggle" function changes the status of a function (such as On/Off). The "Pulse" function continuously changes a status (such as increasing the brightness).

Light: Mainlight on/off
OttoFlex Light on/off
Mainlight +
Mainlight -
OttoFlex Light +
OttoFlex Light -
All Lights on/off
No function

Reset: Reset Magnification
Reset Focus
Reset Tilt
Reset XY
Reset All
No function

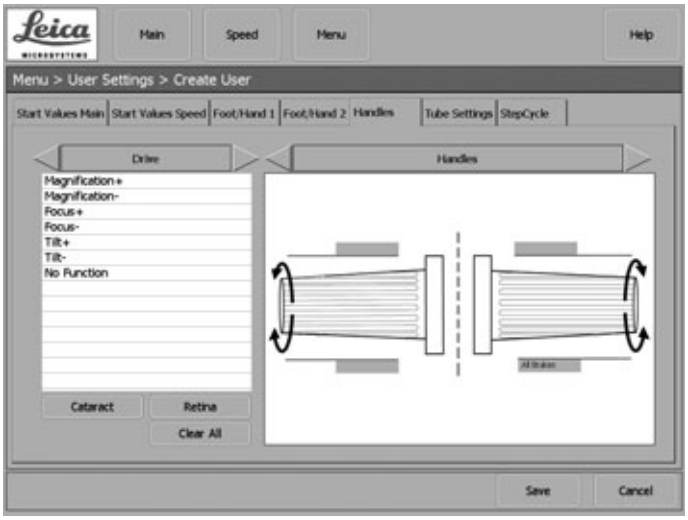
XY function: X+
X-
Y+
Y-
XY Reverse
XY Reverse + OCF1
XY Complete
No function

☞ With the "XY Complete" function, you can assign all four functions of the joystick simultaneously.

Handle assignment

You can assign up to three functions of your choosing to the handle. The fourth function must always be "All Brakes". However, you can assign this function to any position you like.

⇨Select the handle in the right selection field.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the left selection field, select the function group that contains the desired function.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨Select the desired function.
⇨Click the caption of the desired key to assign the selected function to it.

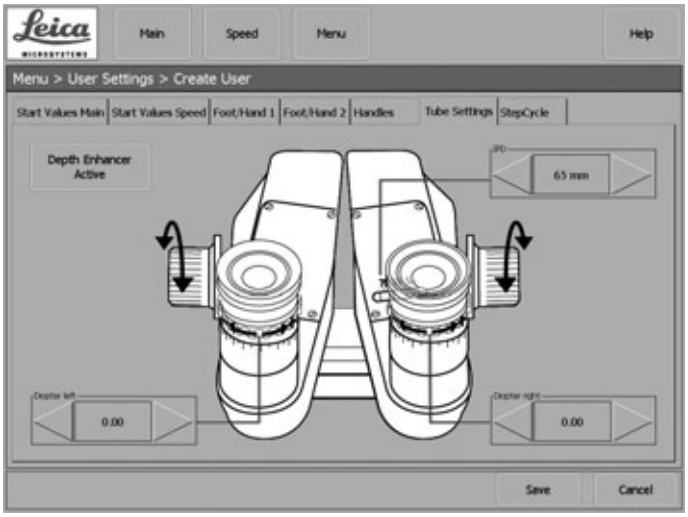


☞ For the handle, the additional functiongroup with the functions "All Brakes" (releases all brakes) and "Selected Brakes" (releases all brakes except the up/down brake) are also available. (Not available with Leica M820 F19 and Leica M844 F19.)

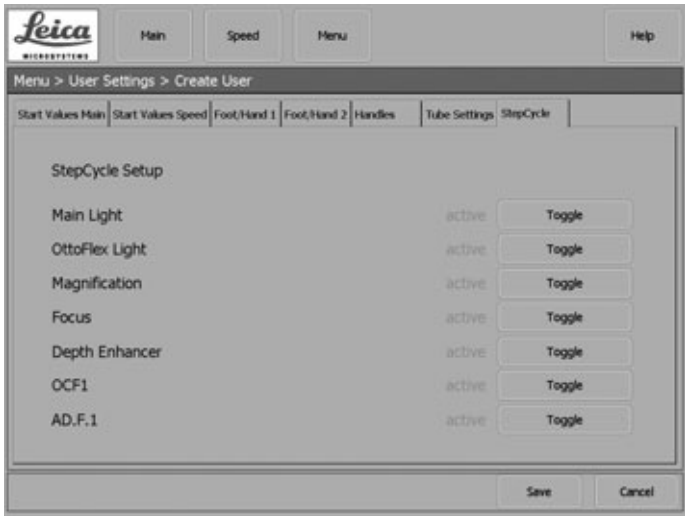
☞ If you would prefer a different brake assignment, please contact your service technician.

Tube Settings

On this page, you can store the diopter values and interpupillary distance for each user. You can also activate or deactivate the "Depth Enhancer" as a basic setting for each user.



StepCycle™
On this screen, you can enable or disable the desired StepCycle™ parameters for the individual users.



☞ When cycling through the StepCycle™ function, only the actively set parameters for the individual user are activated.

StepCycle™

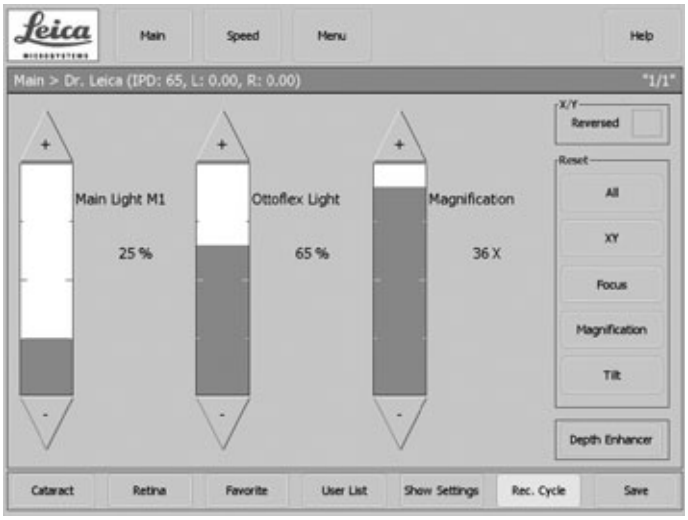
Using this function, you can save the following parameters for various frequently recurring phases (cycles) of the operation:

Main light brightness
OttoFlex brightness
Magnification
Focus
Depth Enhancer
OCF1
AD.F.

⚠ **Caution 7**
Risk of injury
⇨Look especially after the required safety distance if you use the StepCycle™ function together with accessories from other manufacturers that reduces the working distance to less than 140 mm (non-contact wide-angle observation systems) as focus together with StepCycle™ a semiautomated function.

☞ For the StepCycle™ function to be available, you must first assign it to a key on your footswitch/handswitch. Then, the "Rec.Cycle" button appears in the dynamic button bar.

☞ You can create an individual StepCycle™ procedure for each user.



StepCycle™ recording mode
⇨From the "Main" or "Speed" menu, double-click the "Rec. Cycle" button to activate it.
⇨Press the button on your footswitch/handswitch to which you have assigned the "Rec.Cycle" function.
⇨The currently set values for the StepCycle™ parameters are saved.
⇨You can save a maximum of 10 StepCycle™ settings.
⇨Exit the StepCycle™ teach-in mode by double-clicking the "Rec. Cycle" button.
⇨Press "Save" to store your StepCycle™ settings.

☞ It is only possible to store a complete StepCycle™ cycle. Individual steps cannot be modified.

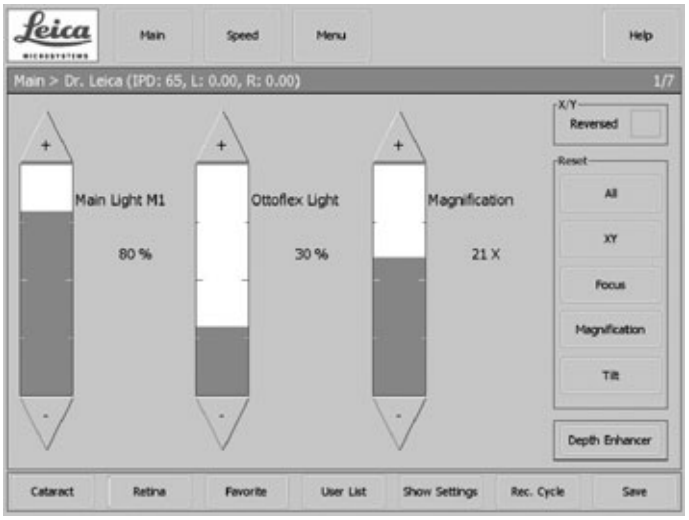
Running through the StepCycle™

If StepCycle™ settings have been saved for a user, the right status bar displays information indicating which step the user is currently in, and how many steps there are total:

- Step 0 means: basic setting of the user
- 1/x means: 1 of x steps

⇨In the "Main" or "Speed" menu, deactivate the "Rec. Cycle" button.
⇨Activate the key of your footswitch/handswitch to which the "StepCycle" function is assigned by clicking it.
⇨You run through a continuous loop of the stored StepCycle™ settings.

☞ If you load a new user or trigger an Auto Reset, you are returned to Step 0.



Auto Reset

If you move the swing arm up to its end position after the operation, you trigger the Auto Reset function:

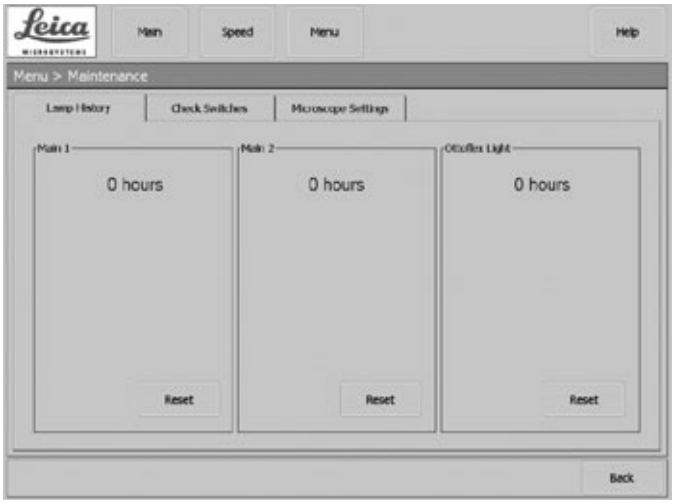
- All of the motors–zoom, focus and XY–move to their reset position.
- The tilt motor is not moved.
- The current user settings are reloaded.
- The illumination is switched off.

⇨If you move your Leica M844 or Leica M820 back down over the OP field, the illumination switches back on and your Leica M844 or Leica M820 is ready to use immediately.

☞ This function can be deactivated by your Leica service technician.

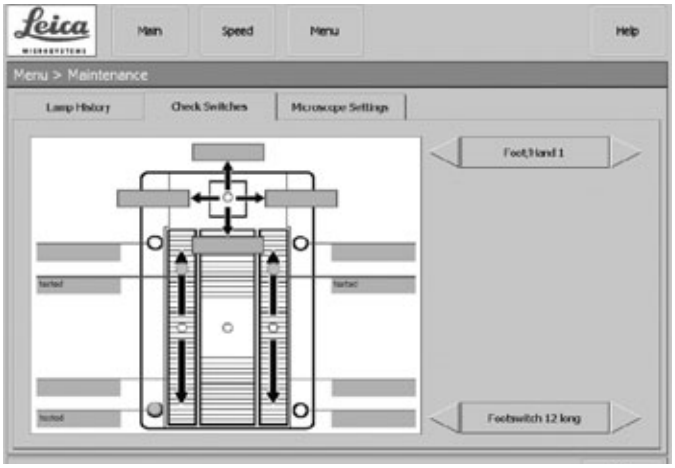
The Maintenance menu

Hour meter for the bulbs (Lamp History)
This screen displays the operating hours for each of the following bulbs: Main 1, Main 2 and Otto Flex Light.



⇨Whenever you replace a bulb, reset the bulb's hour meter to 0 by double-clicking the "Reset" button.

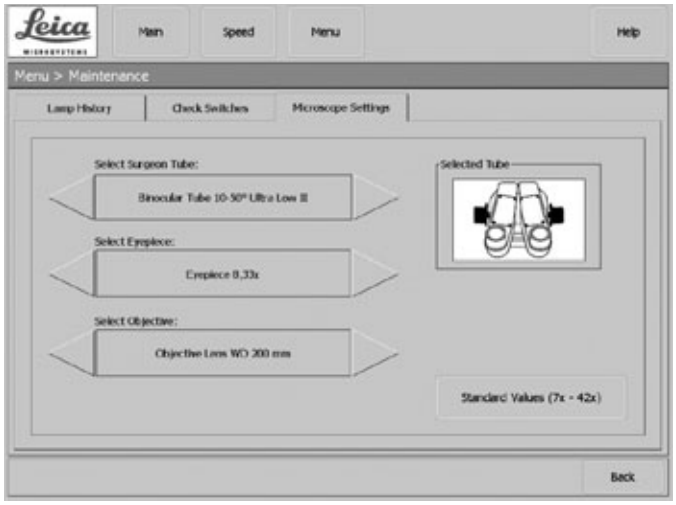
Check Switches
On this screen, you can test the footswitches/handswitches and handles you are using.



⇨In the top right selection field, select the connection you are using.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the bottom right selection field, select the footswitch/handswitch you want to check.

⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨Now press all of the keys, one after the other, of the footswitch/handswitch you want to test.
⇨If the key you have pressed is functioning properly, a green dot appears on it on the display. The comment "tested" appears in the caption field of the key.

Microscope Settings
Enter the accessories you are using into this screen. This will ensure that the correct magnification appears in the "Main" menu.



⇨In the top selection field, enter the tube currently being used by the surgeon.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the middle selection field, select the magnification of the eyepieces being used by the surgeon.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the bottom selection field, select the objective you are using.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.

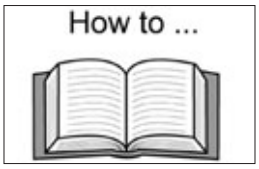
☞ If you do not make a selection, the magnification will be calculated for the standard configuration:
Ultra Low™ II Tube, ocular with magnification 8.33 and objective with WD=200.

☞ If you activate the "Standard Values" button, the standard magnification is displayed, regardless of the accessories used.
The magnification range is between 7x and 42x.

⇨Clicking this button again deactivates it, and you are returned to the selection screen for the accessories you are using.

The "How to…" menu

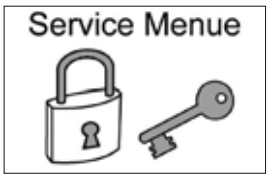
This screen displays short summaries of various aspects of the operation of your surgical microscope.



☞ The "Help" button in the static menu bar provides access to the "How To..." pages at all times.

The Service menu

This area is password-protected.



Intended use

- The Leica surgical microscope is an optical instrument for improving the visibility of objects through magnification and illumination. 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 ceiling.
- The Leica M820 and Leica M844 surgical microscopes are subject to special precautionary measures for electromagnetic compatibility. They must be installed and put into operation in accordance with the guidelines, manufacturer's declarations and recommended safety distances (Tables 201, 202, 204, and 206 from EN 60601-1-2:2001).
- Portable and mobile as well as stationary HF communications equipment can have a negative effect on the reliability of the Leica M820 and Leica M844 surgical microscopes.

Directions for the person responsible for the instrument

⇨Ensure that the surgical microscope is used only by persons qualified to do so.
⇨Ensure that this user manual is always available at the place where the surgical microscope is in use.
⇨Carry out regular inspections to make certain that the authorized users are adhering to safety requirements.
⇨When instructing new users, do so thoroughly and explain the meanings of the warning signs and messages.
⇨Assign individual responsibilities for starting, operating and servicing the Leica surgical microscope and monitor the observance of these responsibilities.
⇨Only use the surgical microscope if it is free of defects.
⇨Inform your Leica representative or Leica Microsystems (Schweiz) AG, Surgical Division, 9435 Heerbrugg, Switzerland, immediately if you detect a product defect that could potentially cause injury or harm.
⇨If you use accessories made by third-party manufacturers with the Leica surgical microscope, be sure that each such manufacturer confirms the safety-engineering, harmless usability of the product and observe the product's user manual.
⇨Modifications to or service on the surgical microscope may be carried out only by technicians who are explicitly authorized by Leica to do so.
⇨Only original Leica replacement parts may be used in servicing the product.
⇨After service work or technical modifications, the unit must be reconfigured with observance to our technical requirements.
⇨If the unit is modified or serviced by unauthorized persons, is improperly maintained (as long as maintenance was not carried out by us), or is handled improperly, Leica will not accept any liability.
⇨The influence on other devices by the Leica 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

User qualifications

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

Directions for the operator of the instrument

⇨Follow the instructions described here.
⇨Follow the directions provided by your employer regarding work organization and safety.

Stability (floor stands only)
When moved in OP, the swing arm must be folded up and locked and the brakes must be applied, otherwise the swing arm may drift out of control and the stand could topple.

Hazards due to moveable parts
This section describes uses that, inadvertently, could lead to hazardous situations.

- Add accessories and balance the stand before the operation, and never over the field of operation.
- Never put your hand between the gas spring and the swing arm; it could become trapped when the swing arm is moved.
- Do not put your fingers between the microscope and the focusing drive; they could get crushed.

Floor stand:
- When displacing the stand, push it. Do not pull it. Feet in lightweight shoes could become trapped beneath the casing of the base.
- The footbrakes must remain engaged throughout the operation.

Electrical connections
The control unit may be opened only by a Leica-approved service technician.

Accessories
Only the following accessories may be used with the Leica M820 and Leica M844 surgical microscopes:
- The Leica accessories described in this user manual.
- Other accessories, provided that these have been expressly approved by Leica as being technically safe in this context.

Dangers of use

Warning 1
Motors return to their home positions
⇨Before switching on the microscope, ensure that the travel paths of the X- and Y-axes and the zoom motor are free of obstructions.
⇨Check the Main Light 1/2 and OttoFlex™ II lamps. Replace defective bulbs before the operation begins.
⇨Test all handswitch and footswitch functions.
⇨Check the function of the brakes using the handles and remote brake release (see page 33).

Warning 2
Danger of fatal electric shock
⇨Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

Warning 3
Risk of injury through surgical microscope moving down!
⇨Complete all preparations and adjustments to the stand before the operation.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Before re-equipping, always lock the swing arm.
⇨After re-equipping, always rebalance the microscope on the swing arm.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Before re-equipping during the operation, first swing the microscope away from the operating field.

Warning 4
Danger of burns
⇨The lamp housing and cover may become hot during use.

Warning 5
There is a danger of injury to the patient as a result of changing the working distance using the motorized adjustment of the telescopic stand if the working distance falls below the minimum of 140 mm due to the use of accessories (such as wide-angle observation systems).
⇨The footswitch function for moving the telescopic stand up and down may not be used in combination with accessories that cause the working distance to fall below the minimum of 140 mm.
⇨Before up/down movements, always check first to ensure that the range of movement is free of obstructions.

Warning 6
Risk of injury through surgical microscope moving down!
⇨Never balance or re-equip the instrument over the field of operation.
⇨After re-equipping, always rebalance the microscope on the swing arm.

Warning 7
Risk of injury through surgical microscope moving down!
⇨Always lock the swing arm:
- when transporting the microscope
- when changing equipment

Warning 8
Risk of injury through surgical microscope moving down!
⇨Complete all preparations and adjustments to the stand before the operation.
⇨If settings need to be altered during the operation, first swing the microscope away from the operating field.
⇨If the microscope needs to be re-equipped, do this before the operation.
⇨Before re-equipping, always lock the swing arm.
⇨Do not use the handle or remote brake release when the instrument is in an unbalanced state.

Warning 9
Beware of:
- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**

⇨Before transport, always set the Leica M820 F19 and Leica M844 F19 surgical microscopes to the transport position.
⇨Never move the stand in the extended condition.
⇨Always push the instrument to displace it; never pull it.
⇨Never roll over cables lying on the floor.

Warning 10
Danger of fatal electric shock
⇨The surgical microscope may be connected to a grounded socket only.

Warning 11
Risk of injury through surgical microscope moving down!
⇨Do not use the handle or remote brake release when the instrument is in an unbalanced state.

Warning 12
Light which is too intense can damage the retina.
⇨Safeguard your patients:
- short exposure times
- low brightness settings
- protective filters (GG420 built in)

Warning 13
Motors return to their home positions
⇨Before switching on your Leica M844, ensure that the travel paths of the XY, zoom and focus motors are free of obstructions. The tilt motor is not moved.

Warning 14
Danger of fatal electric shock
⇨Disconnect the power cable from the power socket before changing fuses.

Warning 15
Halogen lamps become very hot.
⇨Always switch off the control unit before changing a bulb.
⇨Allow bulbs to cool off before changing them.

Dangers of use

Caution 1
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!
⇨Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. For requirements of use, see the Technical data, page 67.

Caution 2
There is a risk of damage to the surgical microscope from uncontrolled tilting!
⇨Firmly hold the handles before triggering the "All Brakes" function.

Caution 3
Surgical microscope can move without warning!
⇨Always lock the footbrake when you are not moving the system.

Caution 4
Danger of collision!
The surgical microscope can collide with surrounding components, the ceiling or lamps.
⇨Check the danger area before moving the swing arm.
⇨Carefully move the ceiling mount upwards, and observe ceiling and lamps.

Caution 5
Risk of infection!
⇨Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

Caution 6
Destruction of the zoom motor!
⇨Use the manual adjustment of the zoom motor only if the zoom motor is defective.

Caution 7
Risk of injury
⇨Look especially after the required safety distance if you use the StepCycle™ function together with accessories from other manufacturers that reduces the working distance to less than 140 mm (non-contact wide-angle observation systems) as focus together with StepCycle™ a semiautomated function.

Caution 8
Damage of the touch panel
⇨Operate the touch panel using your fingers only. Never use hard, sharp or pointed objects made out of wood, metal or plastic.

Caution 9
Damage of the touch panel
⇨Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

Manufacturer's declaration of electromagnetic compatibility (EMC)

☞ **This "Guidance and manufacturer's declaration" document is based on EN 60601-1-2:2001.**

Table 201 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic emissions		
The Leica M820 and Leica M844 surgical microscopes are intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M820 and Leica M844 surgical microscopes should assure that they are used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
HF emissions according to CISPR 11	Group 1	The Leica M820 and Leica M844 surgical microscopes use HF energy only for its internal function. Therefore, its HF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
HF emissions according to CISPR 11	Class A	The Leica Leica M820 and Leica M844 surgical microscopes are 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	Compliant	

Table 202 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M820 and Leica M844 surgical microscopes are intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M820 and Leica M844 surgical microscopes should assure that they are used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance 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 of 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.
Surges 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% UT (>95% dip in UT) for ½ period 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec.	<5% UT (>95% dip in UT) for ½ period 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Leica M820 and Leica M844 surgical microscopes requires continued operation during power mains interruptions, it is recommended that the Leica M820 and Leica M844 surgical microscopes be powered from an uninterruptible power supply or a battery.
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 204 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M820 and Leica M844 surgical microscopes are intended for use in the electromagnetic environment specified below. The customer or the user of the Leica M820 and Leica M844 surgical microscopes should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
			Portable and mobile HF communications should be used no closer to any part of the Leica M820 and Leica M844 surgical microscopes, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance:
Conducted HF – equipment IEC 61000-4-3	3 V_{eff} 150 kHz to 80 MHz	3 V_{eff}	$d = 2.4\sqrt{P}$ for 150 kHz to 80 MHz
Radiated HF – IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 2.4\sqrt{P}$ for 80 MHz to 2.5 GHz 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 HF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1: At 80 MHz, 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 HF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Leica M820 and Leica M844 surgical microscopes are used exceeds the applicable HF compliance level above, the Leica M820 and Leica M844 surgical microscopes should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Leica M820 and Leica M844 surgical microscopes.

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

Table 206 from EN 60601-1-2:2001

Recommended separation distances between portable and mobile HF telecommunications equipment and the Leica M820 and Leica M844 surgical microscopes

The Leica M820 and Leica M844 surgical microscopes are intended for use in an electromagnetic environment in which radiated HF disturbances are controlled. The customer or user of the Leica M820 and Leica M844 surgical microscopes can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile HF communication equipment (transmitters) and the Leica M820 and Leica M844 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	**150 kHz to 2.5 GHz** $d = 2.4\sqrt{P}$ 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.

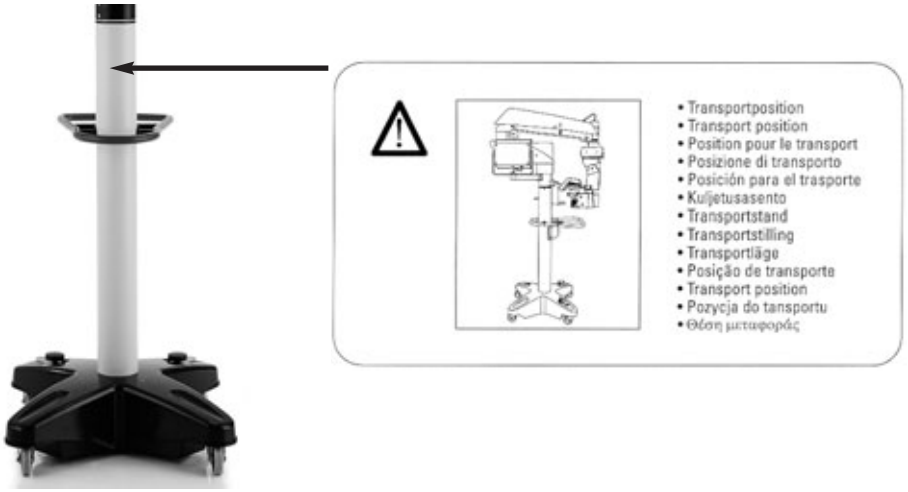
Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Warning message:
Using accessories or cables other than those listed here or those permitted by the manufacturer of the Leica M820 and Leica M844 surgical microscopes may result in increased electromagnetic emissions or decreased immunity.

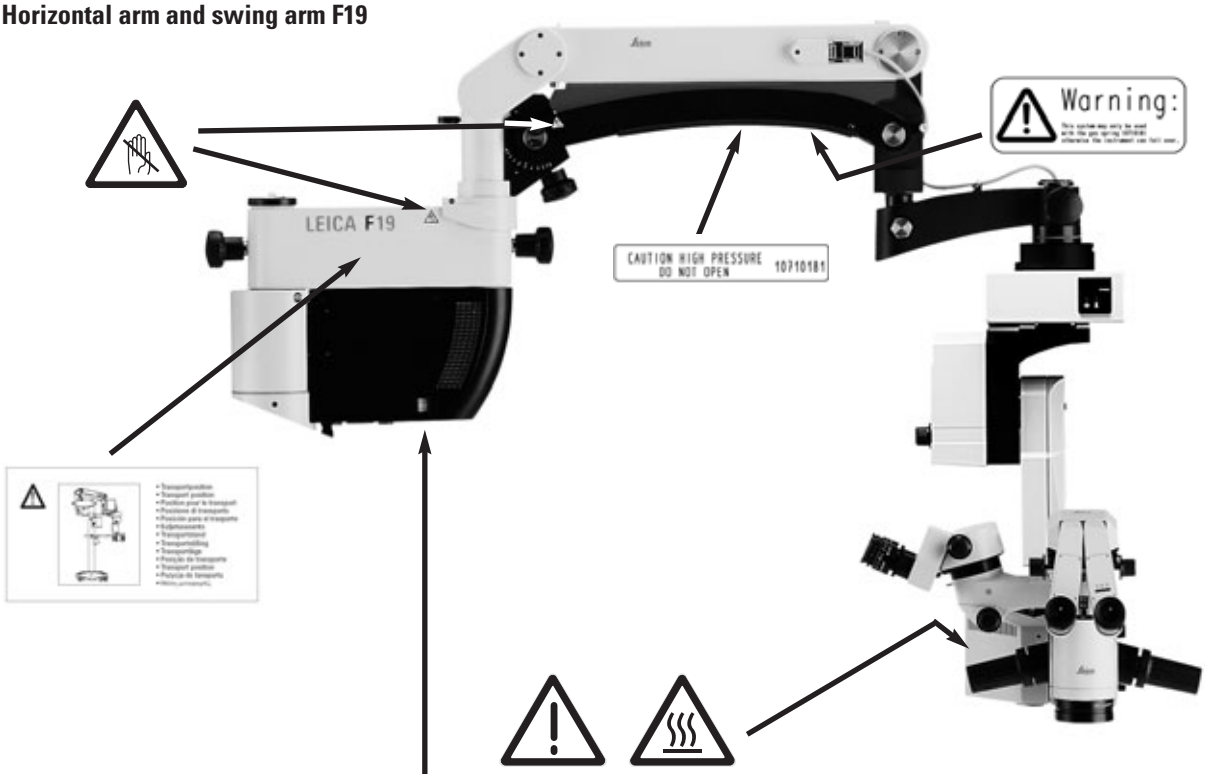
Warning message:
The Leica M820 and Leica M844 surgical microscopes may not be used while positioned directly next to other instruments.
If it is necessary to operate them in the vicinity of other instruments, the microscopes should be monitored to ensure that they function properly in this arrangement.

Signs and labels

Floor stand F40



Horizontal arm and swing arm F19



Caution! Follow the User Manual.

Danger sign for contusions

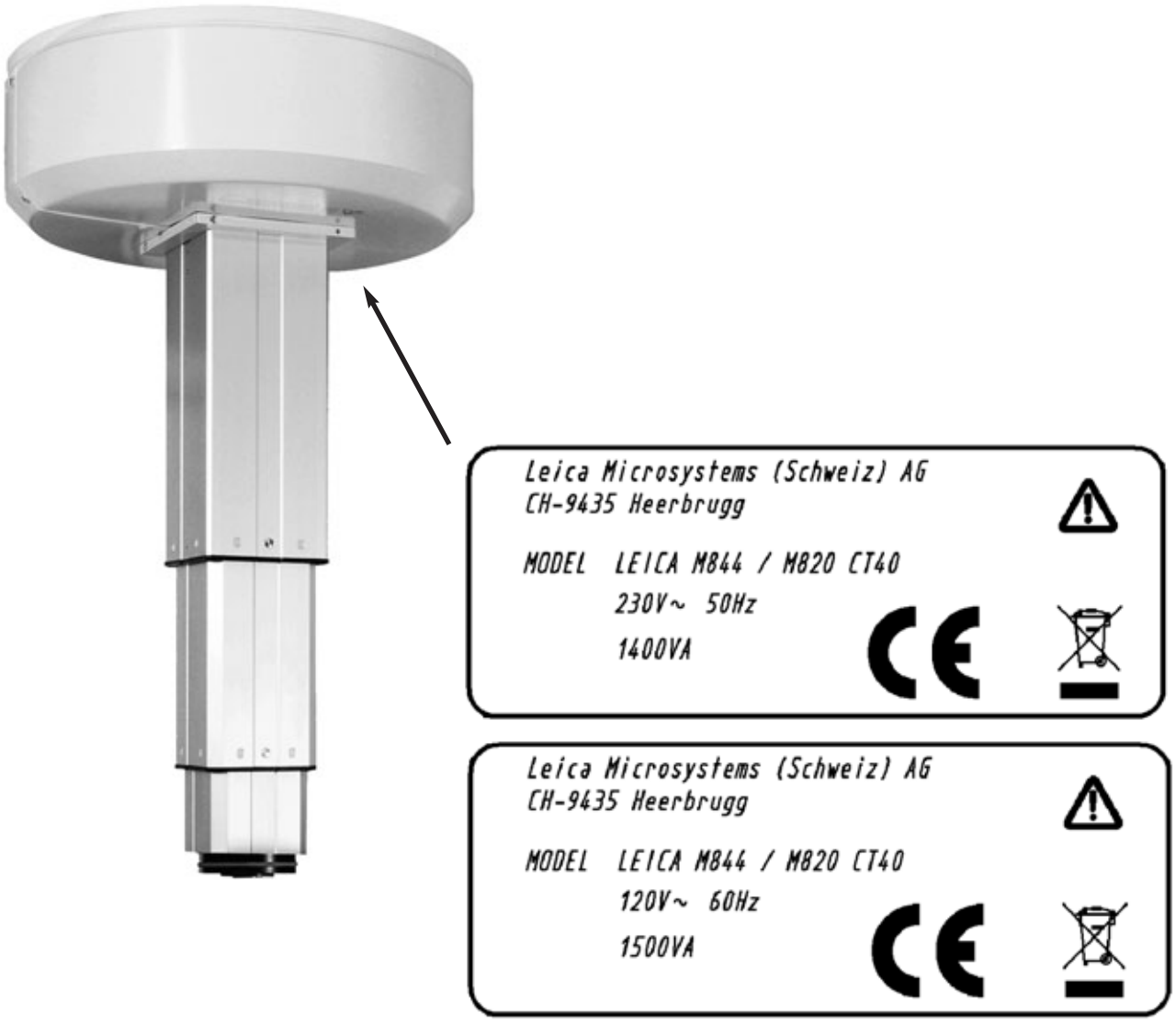
Danger sign for hot surface

Symbol for alternating current

Symbol for fuses

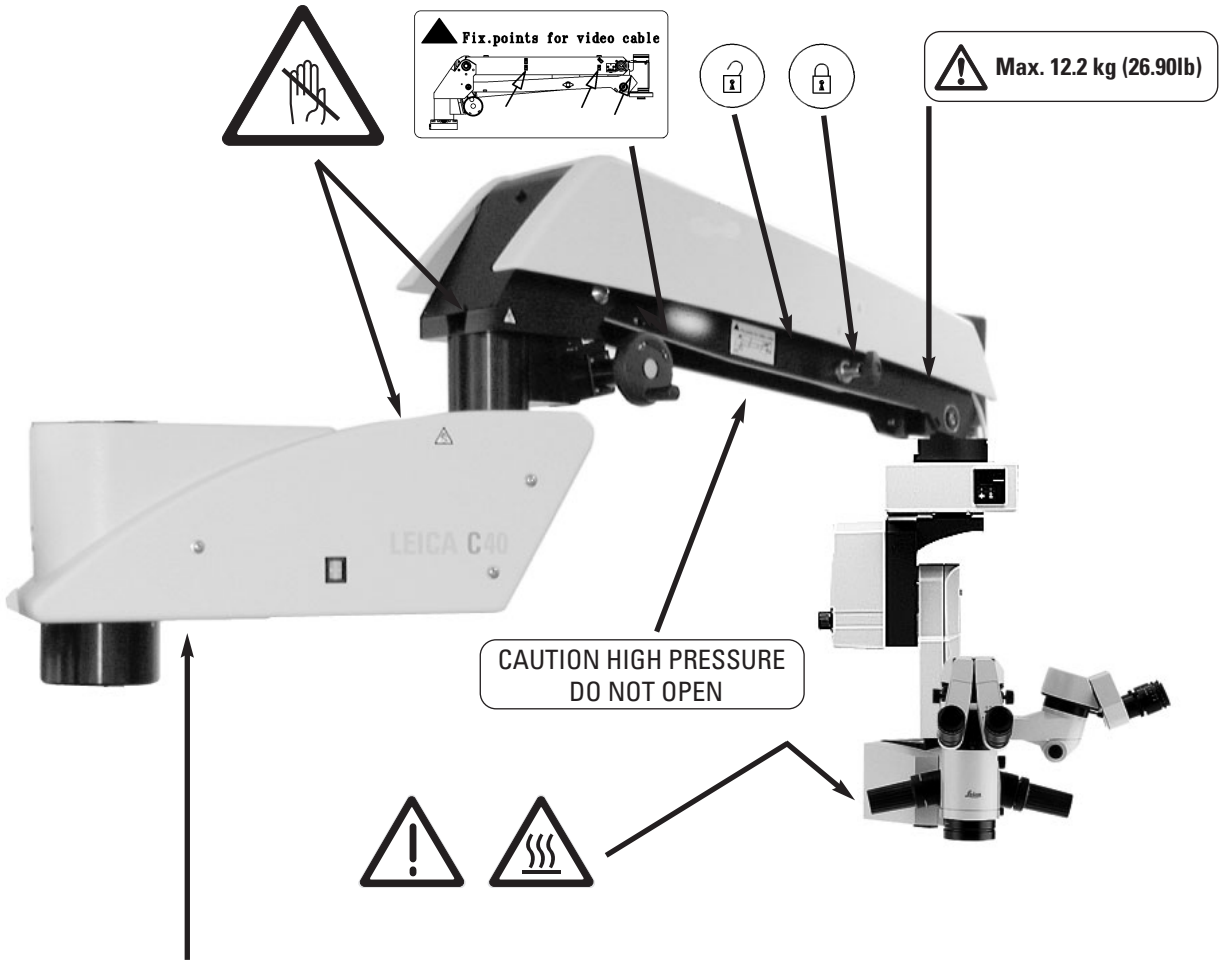
Signs and labels

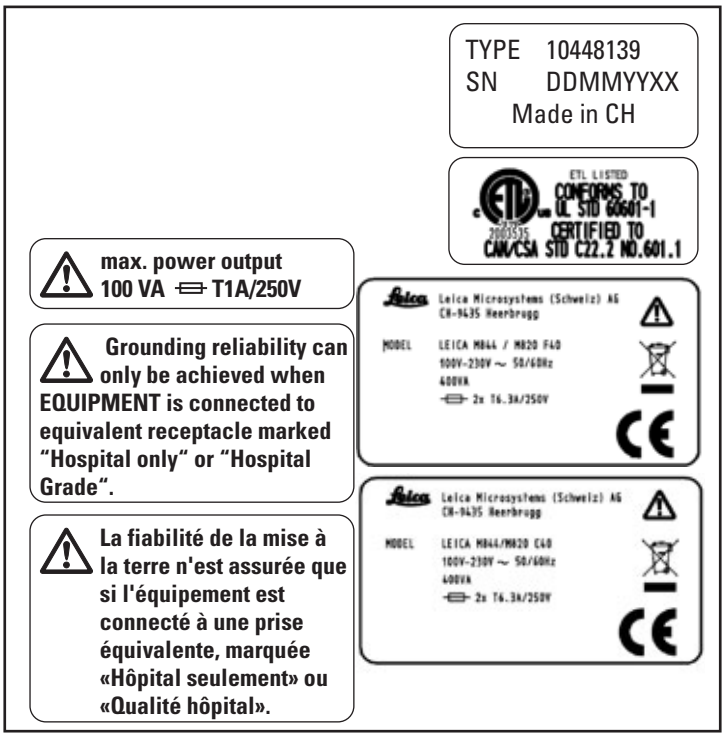
Leica Telescope Mount



Signs and labels

Horizontal arm and swing arm F40 / C40 / CT40





Caution! Follow the User Manual.

Danger sign for contusions

Danger sign for hot surface

Symbol for alternating current

Symbol for fuses

Maintenance instructions

- Put a dust cover over the instrument during breaks in work.
- Keep accessories in a dust-free place when not in use.
- Remove dust with a pneumatic rubber pump and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from damp, vapors, acids, alkalis, and corrosive substances.
  Do not keep chemicals near the instrument.
- Protect the surgical microscope from improper handling.
  Install other device sockets or unscrew optical systems and mechanical parts only when explicitly instructed to do so in this user manual.
- Protect the surgical microscope from oil and grease.
  Never oil or grease the guide surfaces or mechanical parts.
- Remove coarse debris with a moistened disposable cloth.
- For disinfecting the surgical microscope, use compounds from the surface disinfecting group based on the following active ingredients:
  aldehydes,
  alcohols,
  quaternary ammonia compounds.

☞ Due to potential damage to the materials, never use substances based on
  halogen splitting compounds,
  strong organic acids,
  oxygen splitting compounds.

☞ Follow the disinfectant manufacturer's instructions.

☞ It is recommended to conclude a service contract with Leica Service.

Cleaning the touch panel

⇨Before cleaning the touch panel, switch off your Leica M820 and Leica M844 and disconnect it from the power supply.
⇨Use a soft, lint-free cloth to clean the touch panel.
⇨Do not apply cleaning agent directly to the touch panel; rather, apply it to the cleaning cloth.
⇨Use a commercially available glass/eyeglass cleaner or plastic cleaner to clean the touch panel.
⇨Do not apply pressure to the touch panel while cleaning it.

☞ The touch panel is resistant to most disinfectants used in the medical field.

Caution 8

Damage of the touch panel

⇨Operate the touch panel using your fingers only. Never use hard, sharp or pointed objects made out of wood, metal or plastic.

Caution 9

Damage of the touch panel

⇨Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

Maintenance

The operating microscopes Leica M820 F40, Leica M820 F19, Leica M820 CT 40 as well as Leica M844 F40, Leica M844 F19, Leica M844 CT40 in principle are maintenance free.

The operating microscopes **Leica M820 C40 and Leica M844 C40** (Leica ceiling mount with lift arm) – in order to keep safety and reliability – **are subject to regular maintenance inspections** with the following minimum time intervals:

At the latest 5 years after first bringing into service and then at least once a year:

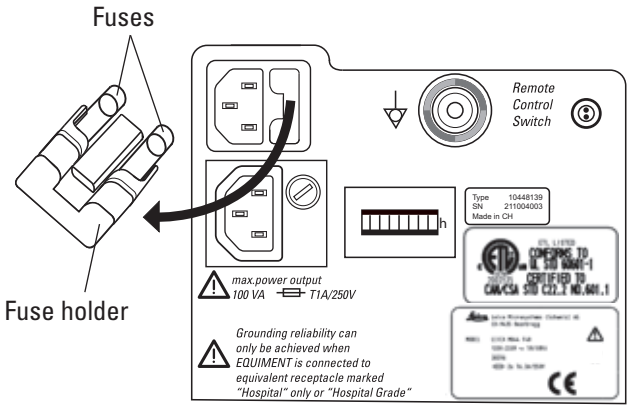
Inspection by trained technicians:

- Functional and visual inspection of the entire ceiling mount
- Visual inspection of all cables
- Electronically safety test
- Check and test of the lift system, in particular all bearings for free movement
- Lubrication of the spindle

☞ Only lubricate the spindle with
STABURAGS NBU 12/300 KP (Klüber Lubrication München KG, Deutschland)
No other lubricants are permissible.

⇨In order to ensure the reliability of the entire system we recommend a frequent maintenance already after warranty end carried out by our specialists. Please contact your local Leica (representative) service for an individual offer.
⇨Only use original spare parts for servicing.

Changing fuses



⇨Pull out the fuse holder on the underside of the horizontal arm.

⇨Remove the two fuses from the holder and replace them.

☞ Use only 6.3 A time-lag fuses.

Warning 14
Danger of fatal electric shock

⇨Before replacing the fuse, unplug the power cable from the power socket.

Changing bulbs

Warning 15
Halogen lamps become very hot.

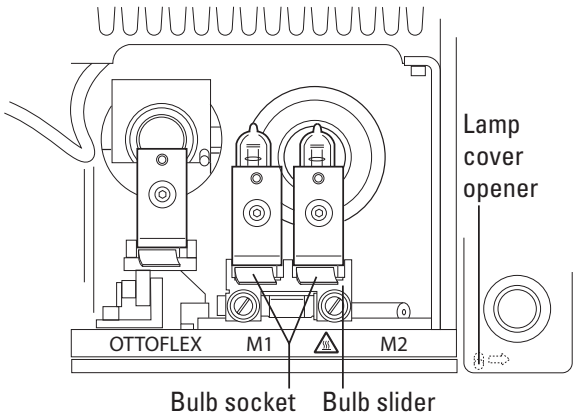
⇨Always switch the main switch off before changing a bulb.

⇨Allow bulbs to cool for 20 minutes before changing them (burn hazard!)

Main Light

☞ Use only precision-formed original Leica 12 V/ 50 W halogen bulbs.

☞ Never touch the glass bulb of halogen lamps with your bare fingers.



⇨Open the cover on the rear of the optics carrier by sliding the lamp cover opener to the right.

⇨To replace lamp M1, the bulb slider must be all the way to the left.

⇨To replace lamp M2, the bulb slider must be all the way to the right.

⇨Pull on the tab to remove the bulb socket complete with bulb.

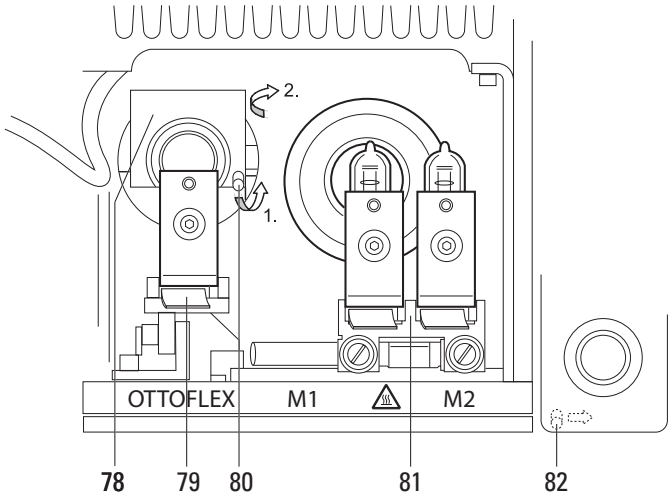
⇨Insert the new bulb socket and bulb.

OttoFlex™ II

☞ Use only precision-formed original Leica 12 V/ 50 W halogen bulbs.

☞ Never touch the glass bulb of halogen lamps with your bare fingers.

⇨Open the cover on the rear of the optics carrier by sliding the lamp cover opener to the right.



78 Reflector
79 Bulb socket
80 Lever
81 Bulb slider
82 Lamp cover opener

⇨Make sure that the quick-change lamp mount is on Main Light 1 so that the bulb slider is all the way to the right.

⇨Fold the reflector on the pin upwards and to the right.

⇨Pull on the tab to remove the bulb socket complete with bulb.

⇨Insert the new bulb socket and bulb.

⇨Fold the reflector back down until it engages.

☞ Whenever you replace a bulb, reset the bulb's hour meter to 0 (see page 46).

Notes on reprocessing of resterilizable products

Products
Reusable products supplied by Leica Microsystems (Schweiz) AG such as rotary knobs, objective protective glasses and capping pieces.

Reprocessing restrictions:
With regard to the processing of medical products used on patients or suspected patients suffering from Creutzfeldt-Jacob disease (CJD) or its variant (vCJD), the local legal regulations must be observed. As a rule, resterilizable products used for these patients can be eliminated without danger by burning.

Occupational safety and health protection
Particular attention must be paid to the occupational safety and health protection of the persons responsible for preparing contaminated products. Current regulations of hospital hygiene and prevention of infection must be observed in the preparation, cleaning and disinfection of the products.

Limitation of reprocessing
Frequent reprocessing has little effects on these products.
The end of the product life cycle is usually determined by wear and year and damage through use.

Instructions

Workplace
Remove surface contamination with a disposable cloth / paper cloth.

Storage and transport
No special requirements.
It is recommended to perform the reprocessing of a product immediately following its use.

Preparation for cleaning
Remove the product from the surgical microscope.

Cleaning: manual
Equipment: running water, rinsing agent, spirit, micro-fiber cloth
Procedure:
- Rinse surface contamination off of the product (temp. <40 °C). Use some rinsing agent depending upon degree of contamination.
- If the optics is heavily contaminated, e.g. finger marks, fat streaks, etc., use spirit for cleaning.
- Dry off products, except for optical components, with a disposable cloth/paper cloth. Dry off optical surfaces with a micro-fiber cloth.

Cleaning: automatic
Equipment: Cleaning/disinfecting device
It is not recommended to clean products with optical components in a cleaning/disinfecting device. In addition, optical components must not be cleaned in ultrasonic baths in order to prevent damage.

Disinfection
The alcohol disinfection solution "Mikrozid, Liquid" may be used in accordance with the instructions on the label.
Please note that optical surfaces must be rinsed thoroughly with fresh drinking water, followed by fresh demineralized water, after disinfection. The products must be dried thoroughly before the subsequent sterilization.

Maintenance
No special requirements.

Control and functional test
Check the snap-on behavior of rotary knobs and handles.

Packaging
Separate: A standard PE bag may be used. The bag must be large enough for the product so that the closure is not under tension.

Sterilization
See Table 1

Storage
No special requirements.

Additional information
None

Contact information of manufacturer
Address of local agent

Leica Microsystems (Schweiz) AG verified that the aforementioned instructions for the preparation of a product are suitable for its reuse. The processing person is responsible for reprocessing with the equipment, materials and personnel and for achieving the desired results in the reprocessing installation. In general, this requires validations and routine monitoring of the process. Every deviation from the supplied instructions should also be examined carefully by the processing person to determine effectiveness and possible detrimental consequences.

Table: Sterilization

Item no.	Designation	Permissible sterilization methods Steam (autoclave) 134 °C, t > 10 min.	 Ethylene oxide max. 60 °C
10180591	Clip-on handle	X	
10428328	Rotary knob, binoc. tube T	X	
10384656	Rotary knob, transparent	X	
10443792	Lever extension	X	
10429792	Capping piece, slit lamp	X	
10445368	Cover, binoc. tube 0–180°	X	
10445289	Handswitch holder	X	
10446058	Protective glass, multifoc. obj.		X [1]
10446469	Objective protective glass Leica M680		X [1]
10446467	Objective protective glass Leica M8xx		X [1]
10443714	Rotary ring, objective 0°	X	
10445341	Handle for Leica M655, sterilizable	X	
10445549	Handle for Leica M695	X	
10445340	Cap for Leica M655/M695, sterilizable	X	

[1] Products with optical components can be steam-autoclaved using the conditions listed above. However, this may lead to the formation of a layer of dots and streaks on the glass surface, which may reduce the optical performance.

☞ If electrically operated functions do not work properly, always check these points first:
- Is the power switch switched on?
- Is the power cable attached correctly?
- Are all connecting cables attached correctly?

General

Fault: The functions cannot be activated with the handswitch or footswitch

Cause 1: A cable connection has loosened.

Fault remedy:

⇨Check the power cable.

⇨Check the handle connections.

Cause 2: Assignment entered incorrectly on the control unit.

Fault remedy:

⇨Check the assignment of the footswitch/handswitch on the control unit (see page 43).

Microscope

Fault: There is no light in the microscope.

Cause 1: A cable connection has loosened.

Fault remedy:

⇨Check the electrical connections.

⇨Check the power cable.

Cause 2: Quick-change lamp mount not positioned correctly.

Fault remedy:

⇨Slide the quick-change lamp mount to the other side (see page 39).

Cause 3: Bulb is defective (message "Check Mainlamp 1/2" appears).

Fault remedy:

⇨If the main light fails during the operation, switch to the other lamp using the quick-change lamp mount.

⇨After the operation, check the bulbs and replace the defective bulb (see page 59).

Fault: There is no OttoFlex™ II light in the microscope.

Cause 1: A filter slide is inserted.

Fault remedy:
⇨Check to see whether a filter slide is inserted; if so, pull it out. Switch the OttoFlex™ II back on.

Cause **2**: The switch is set to the Slitlamp position.

Fault remedy:
⇨Check the position of the Otto Flex/ Slitlamp switch (see page 23) and set it to Otto Flex.

Cause **3**: Bulb is defective

Fault remedy:
⇨Check the bulbs and replace any that are defective (see page 59).

Fault: The image goes out of focus.

Cause 1: Eyepieces not seated properly

Fault remedy:
⇨Check the seating of the eyepieces and screw them in all the way if necessary.

Cause 2: Dioptric correction is not set correctly.

Fault remedy:
⇨Carry out the dioptric correction by following the instructions exactly (see page 24).

Fault: Zoom cannot be adjusted electrically

Cause 1: Zoom motor has failed.

Fault remedy:
⇨Push and turn the zoom rotary knob to manually adjust the zoom (see page 13).

Fault: Unwanted reflections

Cause 1: The sterile drape produces stray reflections

Fault remedy:
⇨Clamp the objective cover of the sterile drape to the objective with the cover tilted slightly forwards.

Fault: The surgical microscope does not move, or requires undue force.

Cause 1: A cable is jammed.

Fault remedy:
⇨Move the jammed cable to another position.

Cause 2: The transport lock has not been released.

Fault remedy:
⇨Release the transport lock (see page 35).

Cause 3: A brake is not released.

Fault remedy:
⇨Contact your Leica representative.

Two-in-One control unit

Fault: There is no picture in the display

Cause 1:	The touch panel is in video mode, but is not receiving a video signal.	**Fault remedy:** ⇨ Switch to control unit mode (see page 40).
Cause 2:	A cable connection has loosened.	**Fault remedy:** ⇨ Check to ensure that the cable connections are tight.
Cause 3:	The display is defective.	**Fault remedy:** ⇨ Contact your Leica representative. ⇨ You can still work with your Leica microscope. All functions can still be operated using the footswitch/handswitch.

Error messages on the control unit

Fault: • Check Main Lamp 1 • Check Main Lamp 2 • Check Slitlamp	**Fault remedy:** ⇨ Switch to the second lamp using the corresponding quick-change lamp mount. ⇨ Replace the defective bulb as soon as possible.
Fault: Check Ottoflex	**Fault remedy:** ⇨ Replace the defective bulb as soon as possible.
Fault: • Compact Stand Brake Controller not present • Zoom-Lamp Controller not present • Focus-Tilt Controller not present • XY Controller not present • Microscope Device Controller not present (Command Interface) • Microscope Device Controller not present (Config Interface)	**Fault remedy:** ⇨ Contact your Leica representative.

F40 stand

Fault: The surgical microscope does not move, or requires undue force.

Cause 1:	A cable is jammed.	**Fault remedy:** ⇨ Move the jammed cable to another position.
Cause 2:	The transport lock has not been released.	**Fault remedy:** ⇨ Release the transport lock (see page 36).
Cause 3:	A brake is not released.	**Fault remedy:** ⇨ Contact your Leica representative.

C40 ceiling mount

Fault: Leica M844 C40 or Leica M820 C40 rotates.	**Fault remedy:** ⇨ Contact your Leica representative. ⇨ Have the adjustment of the suspension checked and readjusted.
Fault: The Leica M844 C40 or Leica M820 C40 drifts up or down.	**Fault remedy:** ⇨ Contact your Leica representative. ⇨ Have your Leica service technician slightly brake the corresponding axis using the built-in drift brakes.

CT40 ceiling mount

Fault: The Leica CT40 cannot be moved up or down.

Cause 1: The Leica CT40 is protected by a temperature switch that switches off in case of overheating.

Fault remedy:
⇨ Wait approximately 30-45 minutes until the telescope motor has cooled off.

Cause 2: Poor plug contact.

Fault remedy:
⇨ Check the clamping terminal.
⇨ Check the plug of the remote control.

Cause 3: Customer's fuse defective.

Fault remedy:
⇨ Replace the fuse.

F19 stand

Fault: The swing arm moves up/down by itself.

Cause 1: Swing arm is not balanced.

Fault remedy:
⇨ Balance swing arm (see page 34).

Cause 2: Bad cabling.

Fault remedy:
⇨ Check the position of the cables, especially in case of subsequently added video cables.

Fault: The swing arm sinks even at the highest level of the balancing scale.

Cause: Maximum load of optics carrier exceeded.

Fault remedy:
⇨ Reduce the total weight of the microscope and accessories

Fault: The microscope is difficult to position.

Cause: Articulation brakes are too tightened.

Fault remedy:
⇨ Adjust the articulation brakes so that you can position the microscope easily (see page 34).

TV, photography

Fault: The image on the monitor is too dark.

Cause 1: The video camera and/or monitor are not set correctly.

Fault remedy:
⇨ Optimize the settings for the camera and/or monitor (see manufacturer's operating instructions).
⇨ Also refer to page 18.

Cause 2: Filter in dual attachment is set incorrectly.

Fault remedy:
⇨ Adjust the brightness or replace the filter in the dual attachment.

Fault: Photos are blurry.

Cause 1: Parfocality of microscope has not been adjusted.

Fault remedy:
⇨ Check the parfocality of the microscope (see page 24).

Cause 2: Object is out of focus.

Fault remedy:
⇨ Focus precisely, insert graticule if necessary.

Microscope

Leica QuadZoom™	Optical system with four beam paths: 100% stereopsis for surgeon and assistant (Leica M844 only)
Leica OptiChrome™	High-performance optics for high contrast, brilliant colors, crisp image definition, and outstanding resolution
Magnification changer	6:1 range, motorized
Field diameter	7 mm to 80 mm
Working distances WD	175 mm, 200 mm, 225 mm
Focusing	Motorized, 54 mm, with automatic reset
Leica ErgonOptic™	Binocular tube 10° to 50°, Low and UltraLow™ II; variable 0-180°; variable 30-150°
Eyepieces	Wide-field eyepieces for spectacle wearers 8.33×, 10×, 12.5*×
Objectives	Leica OptiChrome™ WD 175 mm/f = 200 mm WD 200 mm/f = 225 mm WD 225 mm/f = 250 mm WD: working distance f: focal length
X/Y coupling	Motorized, 50 mm×50 mm, with automatic reset
Tilt drive	Motorized, +15°/–50°
Remote control	12-function footswitch with long or cross pedals, 12-function handswitch, 16-function footswitch with cross pedals
Weight	28.3 kg (with accessories and XY unit)

Lamps

Main light	Integrated illumination concept for intense, uniform red reflex
Leica OttoFlex™ II	Illuminator module for increasing red reflex, decreasing stray light through the sclera and increasing image contrast. Variable field diameter from 4 mm - 35 mm at WD 200 mm Precision-formed halogen bulb 12 V/50 W
Quick-change lamp mount (main light only)	With two precision-formed halogen bulbs 12 V/50 W
Filters	IR barrier filter and UV barrier filter (GG420), integrated

Accessories

0° assistant's attachment	100% stereopsis at the same magnification, integrated fine focus, rotary ring for binocular tube (±15°), documentation port for 3 simultaneous observers
Double wing	
TV/photo	Leica 2D video systems Leica D2D digital video system Leica zoom video adapter f = 35-100 mm Photo/TV dual attachment f = 60/ 85/ 107 mm for TV f = 250/ 350 mm for 35 mm camera TV tube f= 107 mm Phototube f= 250/350 mm
Wide-angle observation system	BIOM*, EIBOS*
Inverter	AVI*, SDI*, OIVSL*, ROLS*
Lasers	Adapters for installation are available from laser manufacturer
Slit lamp	Motorized, ±23°, slit width 0.01-15 mm, slit length 3-15 mm, 180° revolving, quick-change lamp mount
Asepsis	All operating elements can be sterilized, sterile drapes are available

* Accessories from third-party manufacturers

Electrical data

Power socket	
F40 floor stand	Central on the horizontal arm 100–240 VAC (±10%), 50/60 Hz
F19 floor stand	Central on the horizontal arm 100–240 VAC (±10%), 50/60 Hz
CT40 ceiling mount	Terminal strip on the ceiling 100/120 VAC, 220/240 VAC (±10%), 50/60 Hz
C40 ceiling mount	Terminal block on the ceiling 100/120 VAC, 220/240 VAC (±10%), 50/60 Hz
Fuse	2× 6.3 A, time-lag
Power consumption	
Leica M844 / M820 F40	400 VA
Leica M844 / M820 F19	300 VA
Leica M844 / M820 C40	400 VA (without ceiling mount)
Leica Ceiling Mount	400 VA (ceiling mount only)
Leica M844 / M820 CT40	(120V ~60 Hz) 1500 VA (whole system incl. telescope)
Leica M844 / M820 CT 40	(230V ~50 Hz) 1400 VA (whole system incl. telescope)
Protection class	Class 1

Auxiliary power socket

Max. permitted power consumption of the secondary device:	100 VA
Max. permitted ground leakage current of the secondary device:	200 µA at 110 V 300 µA at 230 V
Required conformity of the secondary device:	EN 60601-1 (Europe) UL 60601-1 (USA)

If the device does not conform, it must be connected via an isolating transformer.
If the ground leakage current exceeds the permitted limit value, the following measures are required:

- Device does not conform to EN 60601-1 (Europe) / UL 60601-1 (USA): Connection via isolating transformer.
- Device conforms to EN 60601-1 (Europe) / UL 60601-1 (USA): Connection via potential equalization or isolating transformer.

Optical data

With UltraLow™ II binocular tube

Eyepiece	Objective Leica OptiChrome™ WD = 175 mm/f = 200 mm	
	Total magnification	Field of view (∅ mm)
8.33×	3.4× – 20.4×	53.9 – 9.0
10×	4.1× – 24.5×	51.4 – 8.6
12.5×	5.1× – 30.7×	41.6 – 6.9

Eyepiece	Objective Leica OptiChrome™ WD = 200 mm/f = 225 mm	
	Total magnification	Field of view (∅ mm)
8.33×	3.0× – 18.2×	60.6 – 10.1
10×	3.6× – 21.8×	57.8 – 9.6
12.5×	4.5× – 27.3×	46.8 – 7.8

Eyepiece	Objective Leica OptiChrome™ WD = 225 mm/f = 250 mm	
	Total magnification	Field of view (∅ mm)
8.33×	2.7× – 16.3×	67.3 – 11.2
10×	3.3× – 19.6×	64.3 – 10.7
12.5×	4.1× – 24.5×	52.0 – 8.7

Stands/ceiling mounts

F40 floor stand

Castors	4x 82.5 mm
Weight	Base: 174 kg Column: 83 kg
Total weight	Approx. 330 kg with max. load
Brakes	Four electromagnetic brakes, operated by turning the handles, one stop lever for vertical movement
Load	Max. 12.2 kg from microscope/dovetail ring interface
Space requirement:	Foot: 637 x 637 mm min. height in rest position: 1949 mm
Range	Extension 1492 mm max.
Stroke	846 mm
Balancing	via gas spring
Turning range	Axis 1 (near column): ±170° Axis 2 (in the middle): +150°/-170° Axis 3 (over XY unit): ±270°

F19 floor stand

Castors	4x82,5 mm
Weight of base	174 kg Column: 20 kg
Total weight	Approx. 270 kg with max. load
Brakes	4 mechanical articulation brakes, locking lever for vertical movement
Load	Swing arm: Max 11.5 kg from microscope dovetail ring
Space requirement	Foot: 637 x 637 mm min. height in rest position: 1949 mm
Range	Extension 1305 mm max.
Stroke	652 mm
Balancing	via gas spring
Turning range	Axis 1 (near column): 360° Axis 2 (in the middle): ± 170° Axis 3 (over XY unit): ± 270°

C40 ceiling mount

Ceiling attachment	Max. distance from concrete ceiling to intermediate ceiling: 1200 mm Attachment to concrete shell construction ceiling: 470 mm hole circle 6 x M24 FHA 24/0/50B or FHA 24/0/150B
Weight	Ceiling mount: Max. 90 kg (at max. tube length) Normally approx. 85 kg Swing arm 44 kg
Brakes	Swing arm: Four electromagnetic brakes, operated by turning the handles, one stop lever for vertical movement
Load	Ceiling mount: Max. 85 kg Swing arm: Max. 12.2 kg from microscope/dovetail ring interface
Range	Ceiling mount extension: 957 mm Swing arm extension: 1492 mm
Travel range	Ceiling mount: ±300 mm Swing arm: 846 mm
Balancing	via gas spring
Turning range	Ceiling mount: 330°
Swing arm:	Axis 1 (ceiling mount): ±90° Axis 2 (in the middle): ±135° Axis 3 (over XY unit): ±270°

CT40 ceiling mount

Ceiling attachment	Max. distance from concrete ceiling to intermediate ceiling: 1200 mm Attachment to concrete shell construction ceiling: 440 mm hole circle 4 x M12 HSLB M12/15
Weight	Swing arm: 44 kg
Total weight	Approx. 146 kg
Brakes	Swing arm: Four electromagnetic brakes, operated by turning the handles, one stop lever for vertical movement
Load	Swing arm: Max. 12.2 kg from microscope/dovetail ring interface
Range	Extension 1492 mm max.
Travel range	Telescopic unit: 500 mm Swing arm: 846 mm
Balancing	via gas spring
Turning range:	Axis 1 (ceiling mount): ±90° Axis 2 (in the middle): ±135° Axis 3 (over XY unit): ±270°

Ambient conditions

In use	+10 °C to +40 °C +50 °F to +104 °F 30% to 95% rel. humidity 500 mbar to 1060 mbar atmospheric pressure
Storage	–40 °C to +70 °C –40 °F to +158 °F 10% to 100% rel. humidity 500 mbar to 1060 mbar atmospheric pressure

Standards fulfilled

Conformity CE

- Medical devices directive 93/42/EEC Classification: Class I, in compliance with appendix IX, rule 1, with reference to 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 Surgical Division, within Leica Microsystems (Schweiz) AG, has the management system certificate for the international standards ISO 9001:2000 / ISO 13485:2003 and ISO 14001:2004 relating to quality management, quality assurance and environmental management.

Limitations of use

The Leica M820 F40, Leica M820 C40, Leica M820 CT40, Leica M820 F19, Leica M844 F40, Leica M844 F19 and Leica M844 CT40 surgical microscopes may be used only in closed rooms and must be placed on a solid floor or attached to a strong ceiling or wall.

☞ For the Leica M820 F40 and Leica M844 F40, drift effects must be taken into account on floors which slant >0.3°.

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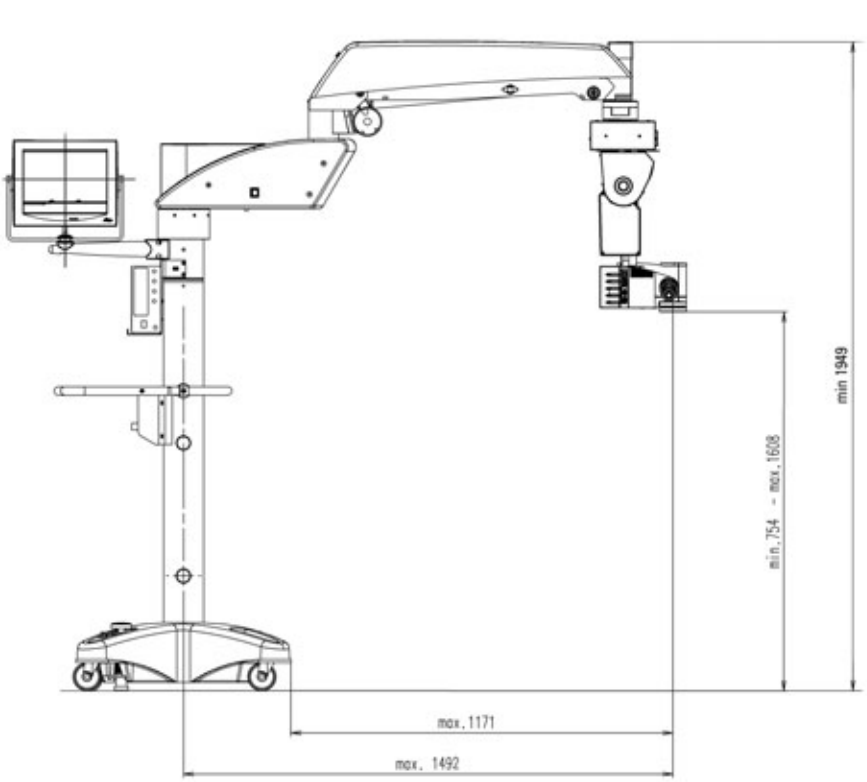
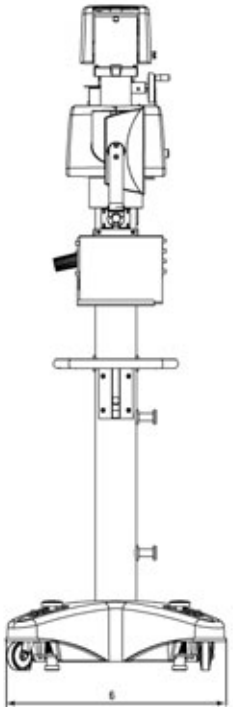
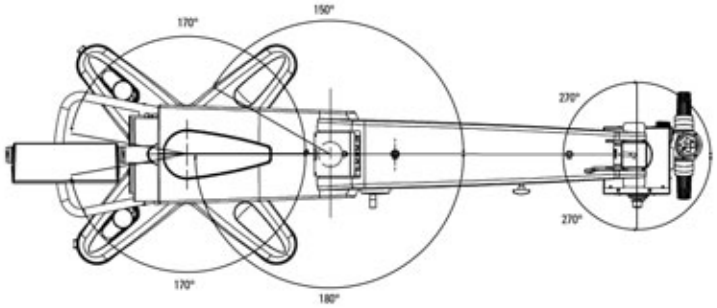
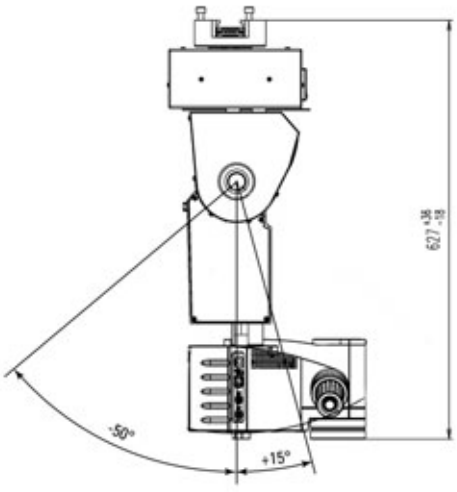
Dimensioning drawing (mm) for Leica M820 F40 and Leica M844 F40

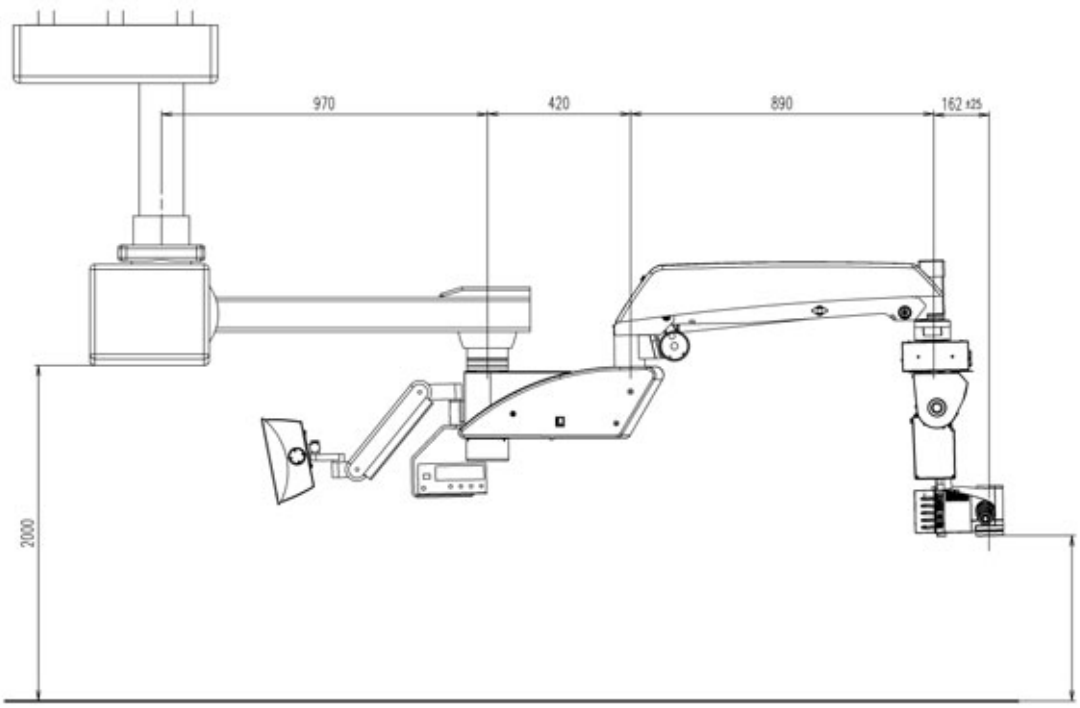


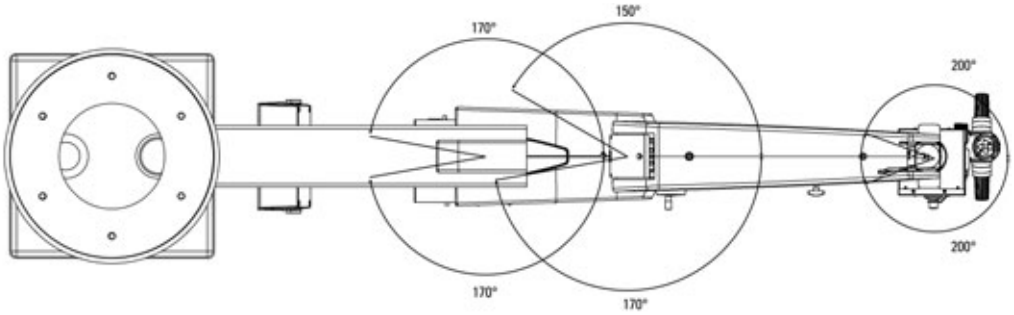




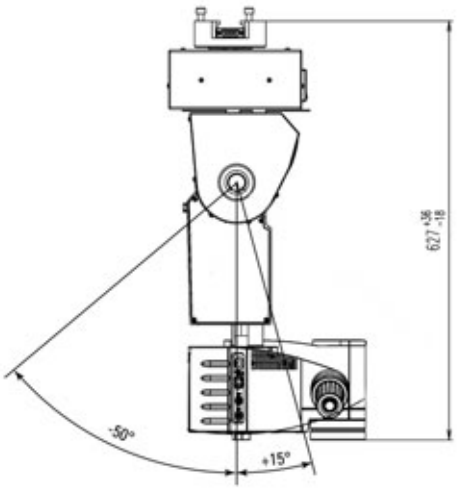


Dimensioning drawing (mm) for Leica M820 and Leica M844 C40

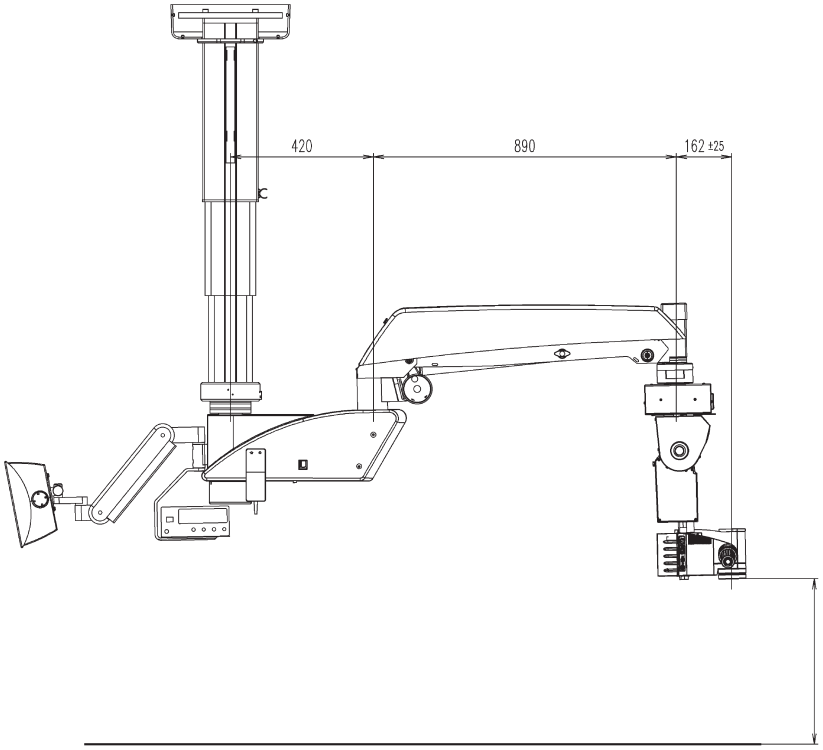


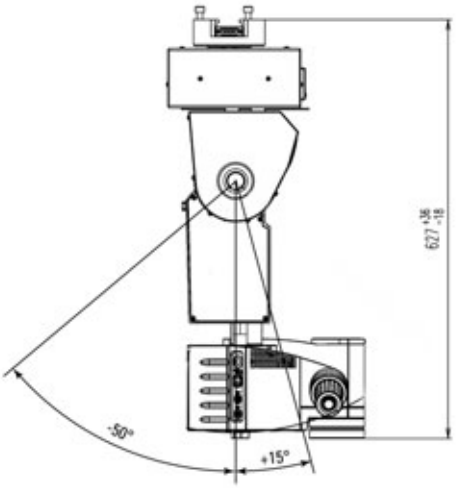


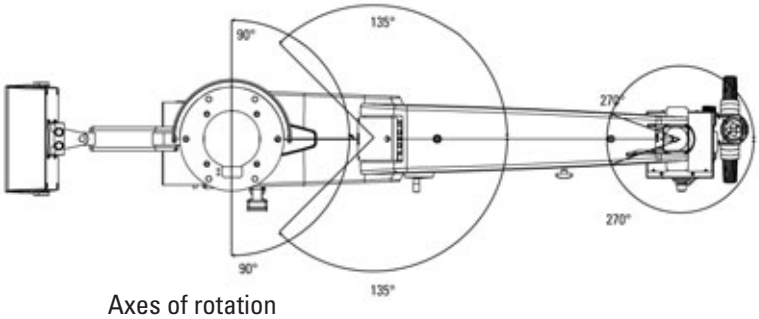
Axes of rotation



Dimensioning drawing (mm) for Leica M820 CT40 and Leica M844 CT40

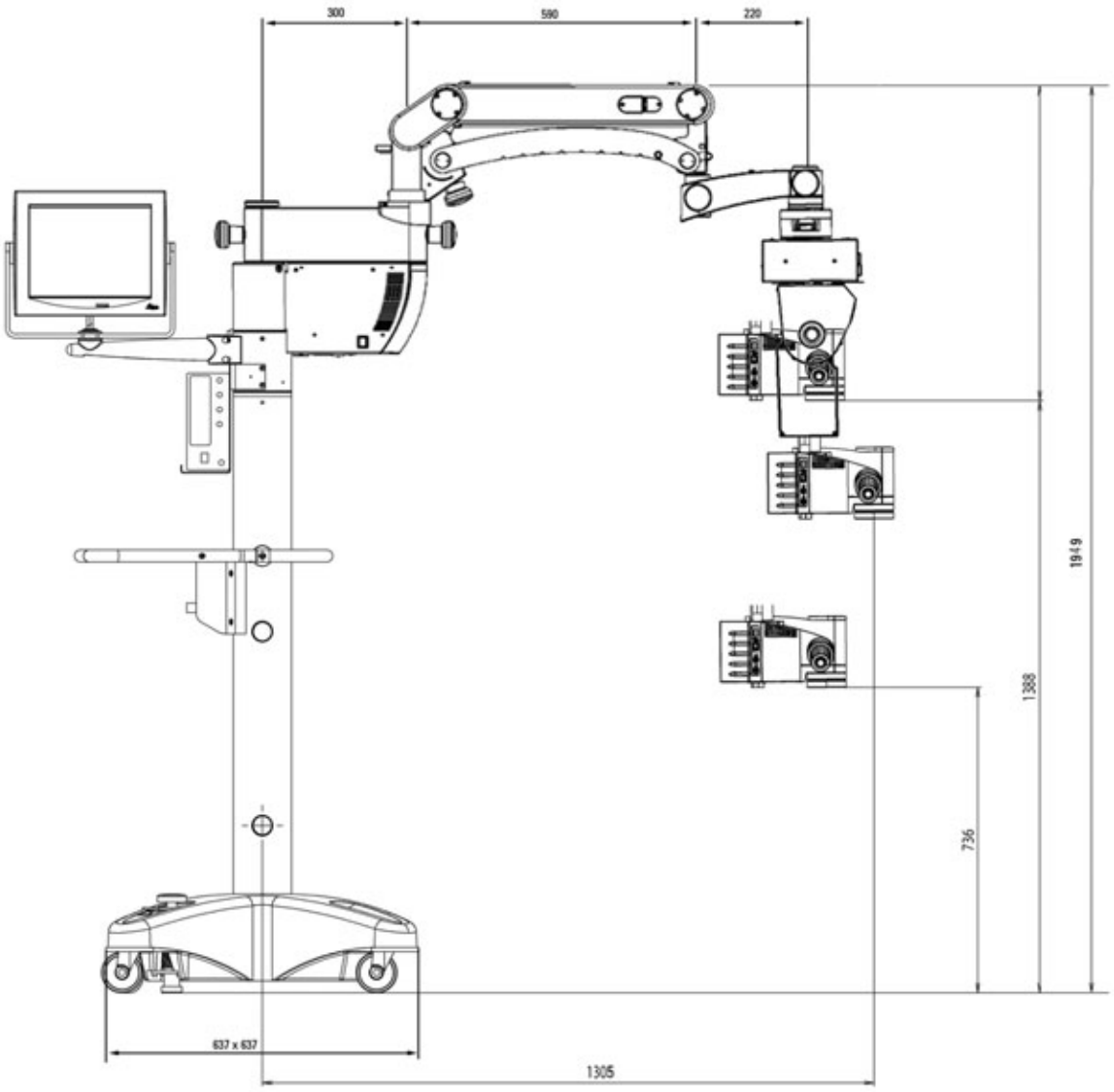


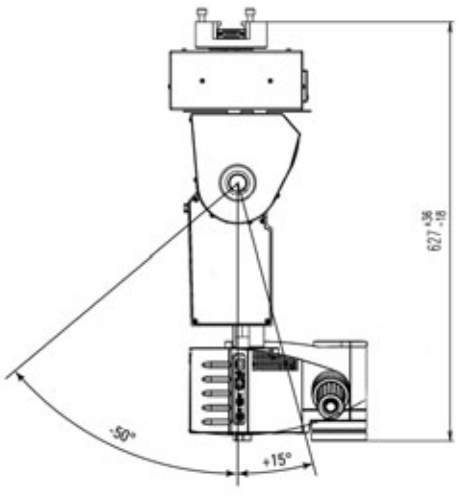




Axes of rotation

Dimensioning drawing (mm) for Leica M820 F19 and Leica M844 F19





“With the user, for the user”
Leica Microsystems

Leica Microsystems operates globally in four divisions, where we rank with the market leaders.

• Life Science Division

The Leica Microsystems Life Science Division supports the imaging needs of the scientific community with advanced innovation and technical expertise for the visualization, measurement, and analysis of microstructures. Our strong focus on understanding scientific applications puts Leica Microsystems’ customers at the leading edge of science.

• Industry Division

The Leica Microsystems Industry Division’s focus is to support customers’ pursuit of the highest quality end result. Leica Microsystems provide the best and most innovative imaging systems to see, measure, and analyze the microstructures in routine and research industrial applications, materials science, quality control, forensic science investigation, and educational applications.

• Biosystems Division

The Leica Microsystems Biosystems Division brings histopathology labs and researchers the highest-quality, most comprehensive product range. From patient to pathologist, the range includes the ideal product for each histology step and high-productivity workflow solutions for the entire lab. With complete histology systems featuring innovative automation and Novocastra™ reagents, Leica Microsystems creates better patient care through rapid turnaround, diagnostic confidence, and close customer collaboration.

• Surgical Division

The Leica Microsystems Surgical Division’s focus is to partner with and support surgeons and their care of patients with the highest-quality, most innovative surgical microscope technology today and into the future.

The statement by Ernst Leitz in 1907, “with the user, for the user,” describes the fruitful collaboration with end users and driving force of innovation at Leica Microsystems. We have developed five brand values to live up to this tradition: Pioneering, High-end Quality, Team Spirit, Dedication to Science, and Continuous Improvement. For us, living up to these values means: **Living up to Life**.

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Italy:	Milan	Tel. +39 02 574 861	Fax +39 02 574 03392
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Netherlands:	Rijswijk	Tel. +31 70 4132 100	Fax +31 70 4132 109
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and representatives in more than 100 countries

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