

Living up to Life

Leica
MICROSYSTEMS

MEDICAL DIVISION

Leica M844 Leica M820

User Manual

10 713 294 – Version 00



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 so that you know and are able to utilize all the benefits of your Leica surgical microscope in an optimum way.

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 new Leica Microsystems surgical microscope.

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This manual covers the following systems:

Leica M844 F40
Leica M844 F20
Leica M844 C40
Leica M844 CT40

Leica M820 F40
Leica M820 F20
Leica M820 C40
Leica M820 CT40

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About this User Manual



In addition to instructions for use, this user manual also provides important safety notes (see the chapter entitled "Safety notes").



Before setting up the product, carefully read through the user manual.

Product identification

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

Type:

Serial No.:

Symbols in this user manual

The symbols used in this manual have the following meaning:



Warning

Indicates a potentially hazardous situation or improper use that could result in serious personal injuries or death.



Caution

Indicates a potentially hazardous situation or improper use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.

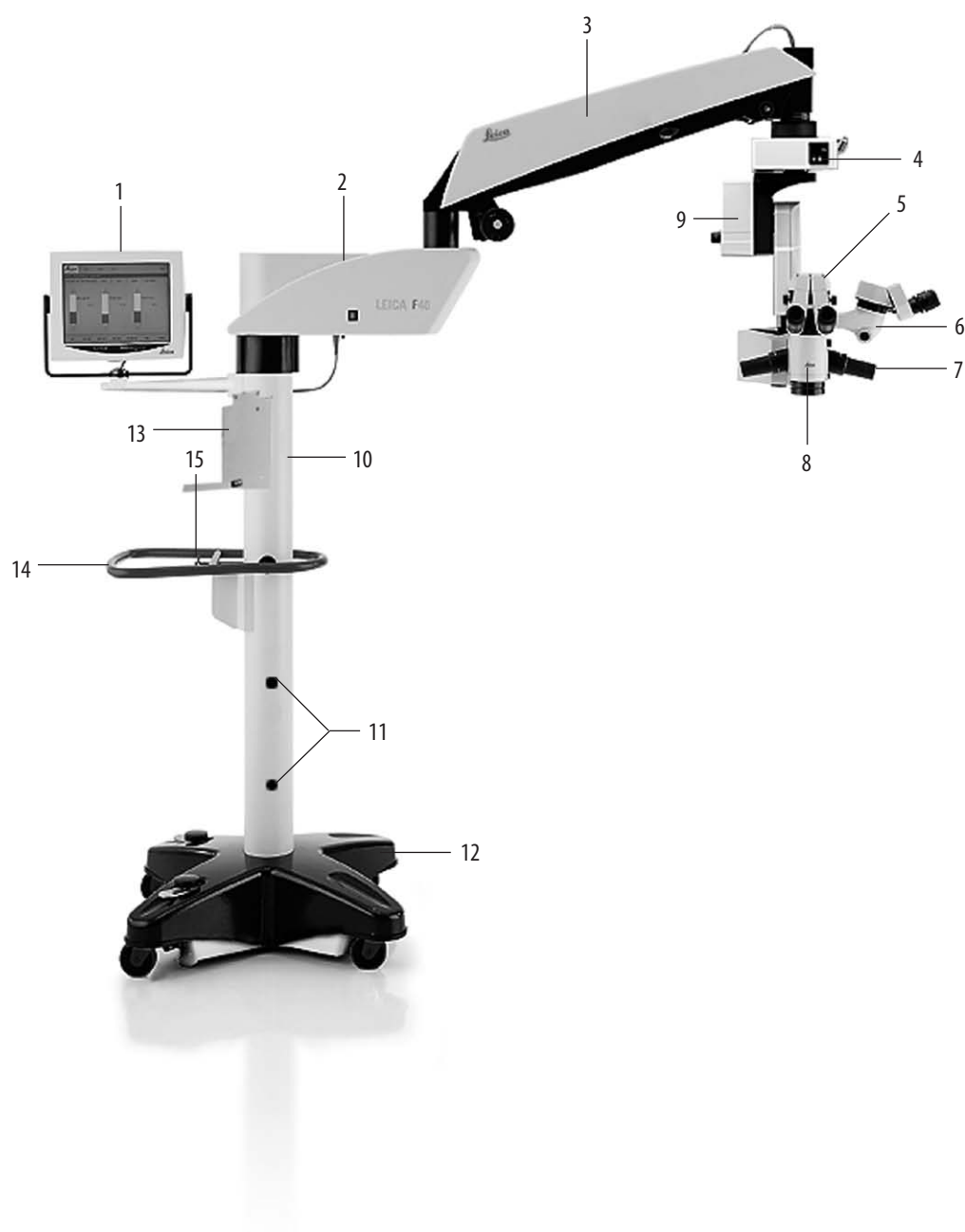


Information about use that helps the user to employ the product in a technically correct and efficient way.



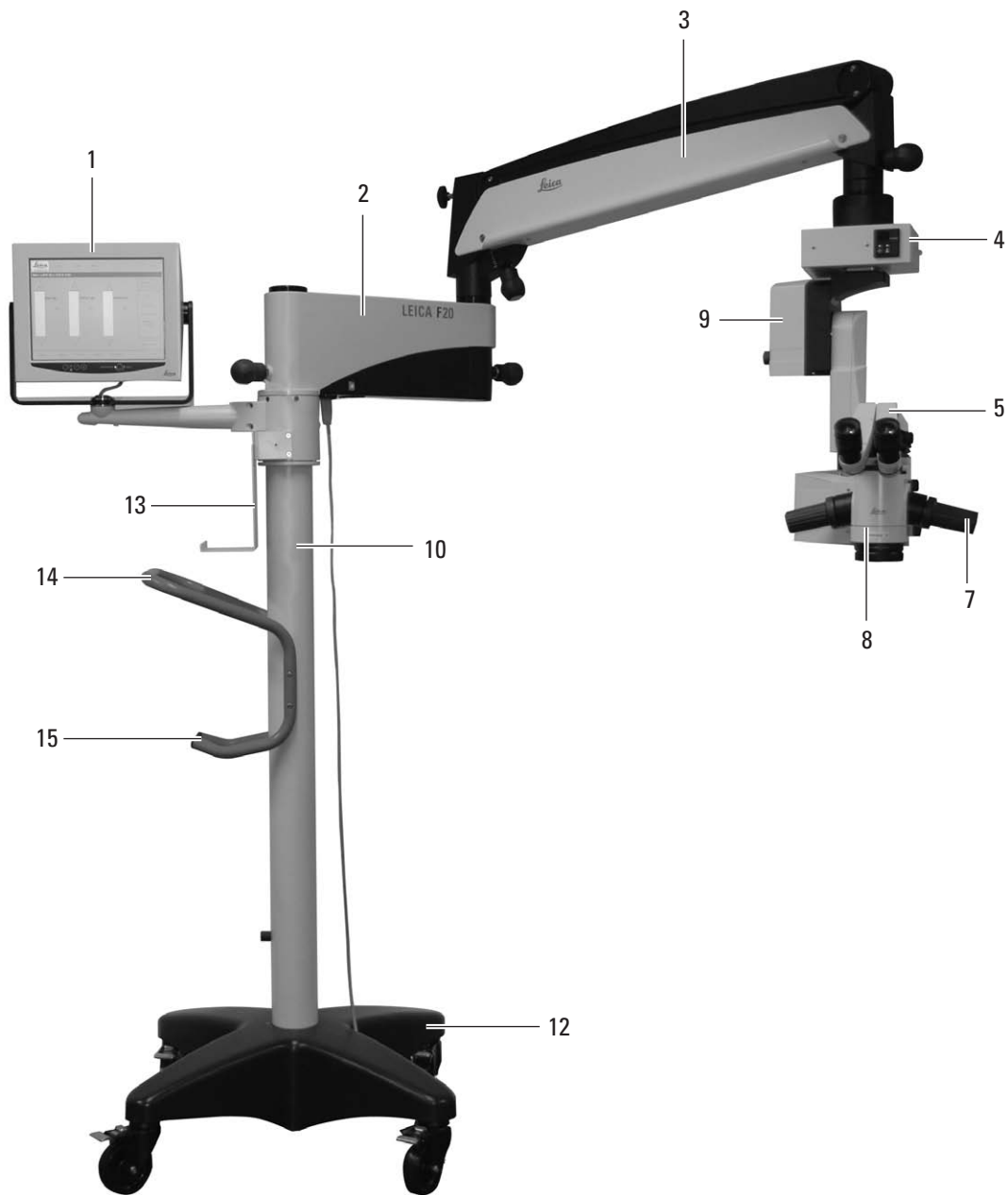
Action required; this symbol indicates that you need to perform a specific action or series of actions. Design and function

Leica M844 F40 and Leica M820 F40



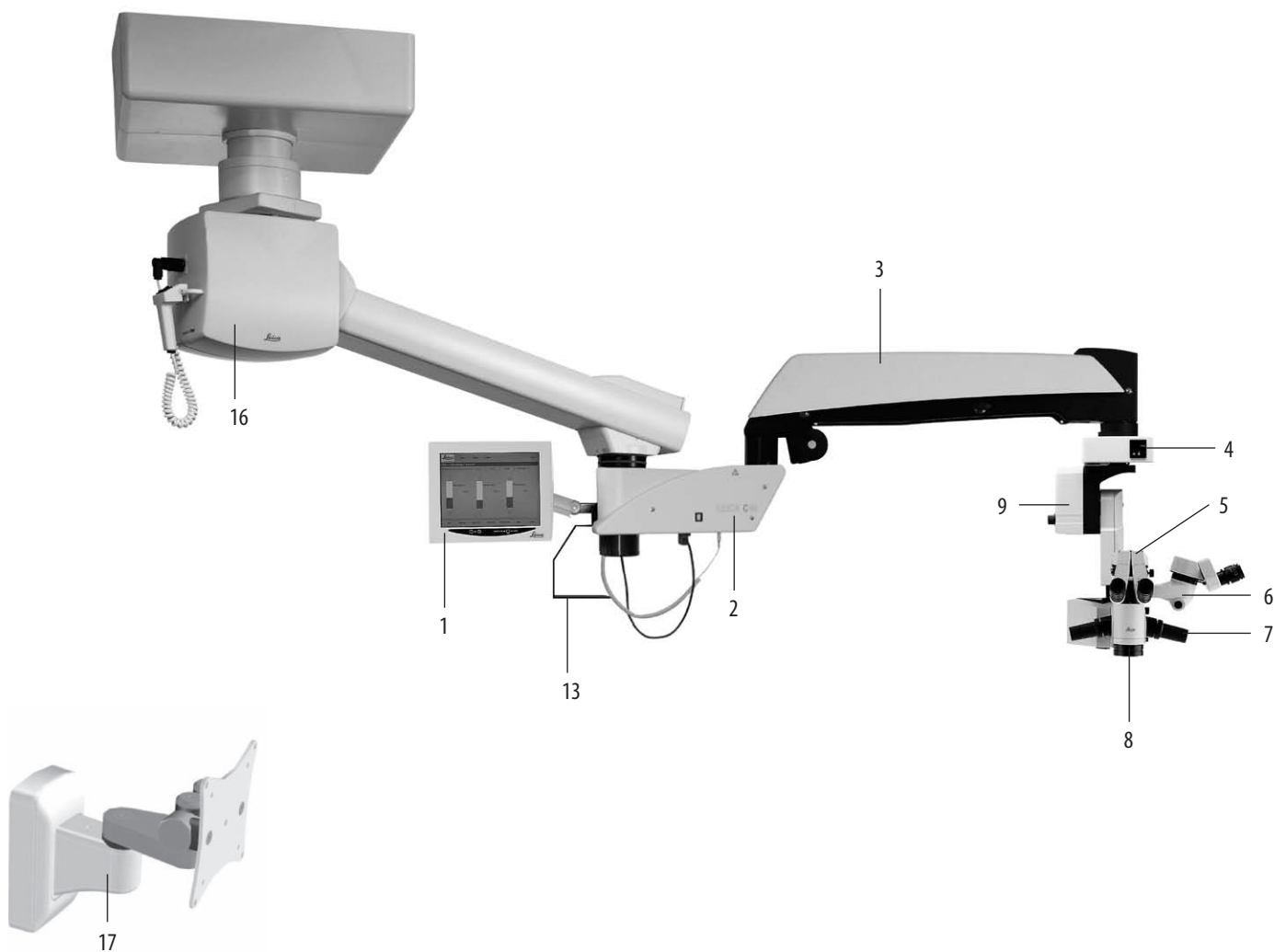
- | | | | |
|---|---|----|--|
| 1 | Control unit | 9 | Tilt head |
| 2 | Horizontal arm | 10 | Column |
| 3 | Swing arm | 11 | Cable support |
| 4 | XY-unit | 12 | Base |
| 5 | Binocular tube | 13 | Holding fixture for video control unit |
| 6 | 0° assistant's attachment (Leica M844 only) | 14 | Handle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

Leica M844 F20 and Leica M820 F20



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

Leica M844 C40 and Leica M820 C40

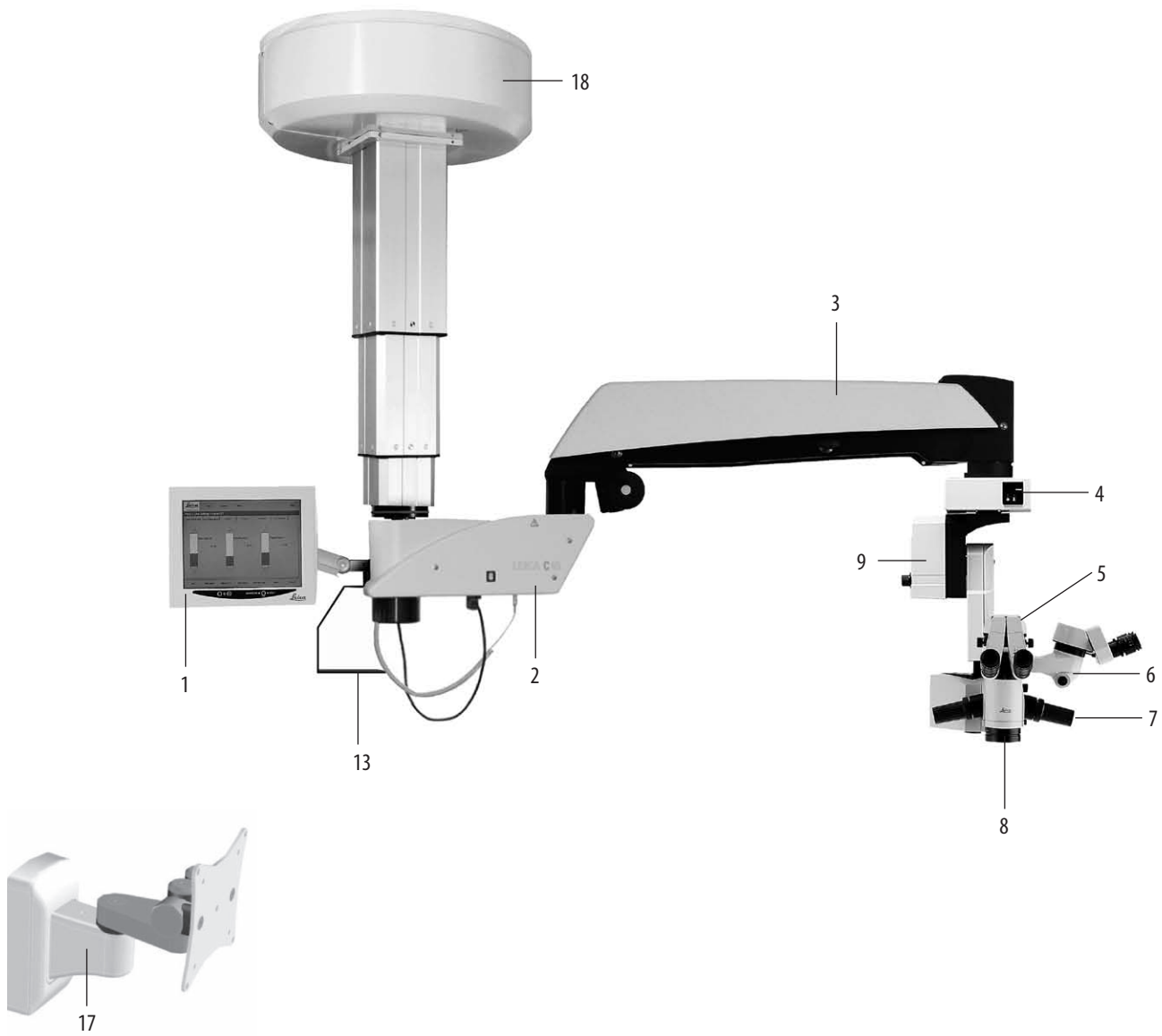


- | | | | |
|---|---|----|--|
| 1 | Control unit | 7 | Handle |
| 2 | Horizontal arm | 8 | Optics carrier |
| 3 | Swing arm | 9 | Tilt head |
| 4 | XY-unit | 13 | Holding fixture for video control unit |
| 5 | Binocular tube | 16 | C40 ceiling mount |
| 6 | 0° assistant's attachment (Leica M844 only) | 17 | Wall mount for control unit (optional) |



Assembly of the ceiling mount:
see enclosed installation instructions.

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

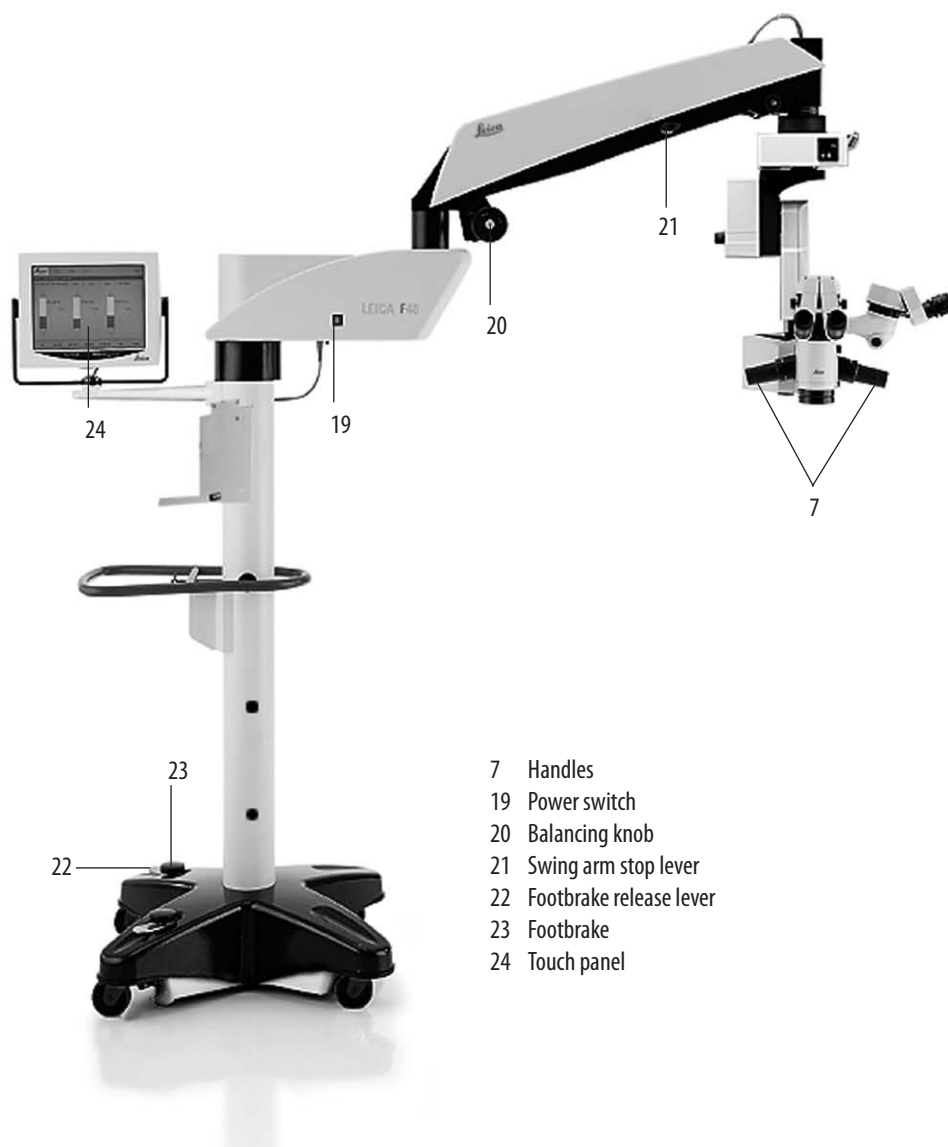
- 9 Tilt head
- 13 Holding fixture for video control unit
- 17 Wall mount for control unit (optional)
- 18 CT40 ceiling mount



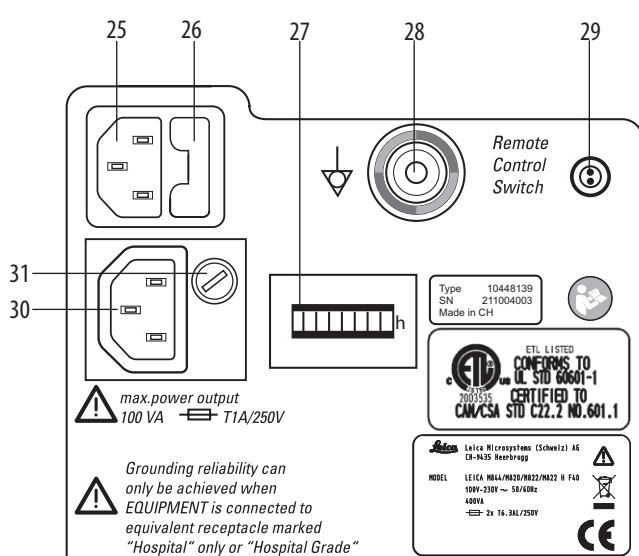
Assembly of the ceiling mount:
see enclosed installation instructions.

Stands

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 (2× 6.3 A, time-lag)
- 27 Running-time meter for the surgical microscope
- 28 Socket for potential equalization
For connecting the Leica M844/M820 to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
- 29 Socket for remote brake release
- 30 Auxiliary power outlet (max. output power 100 VA)
Requirements of use, see page 77.
- 31 Fuse holder (1 A, time-lag)

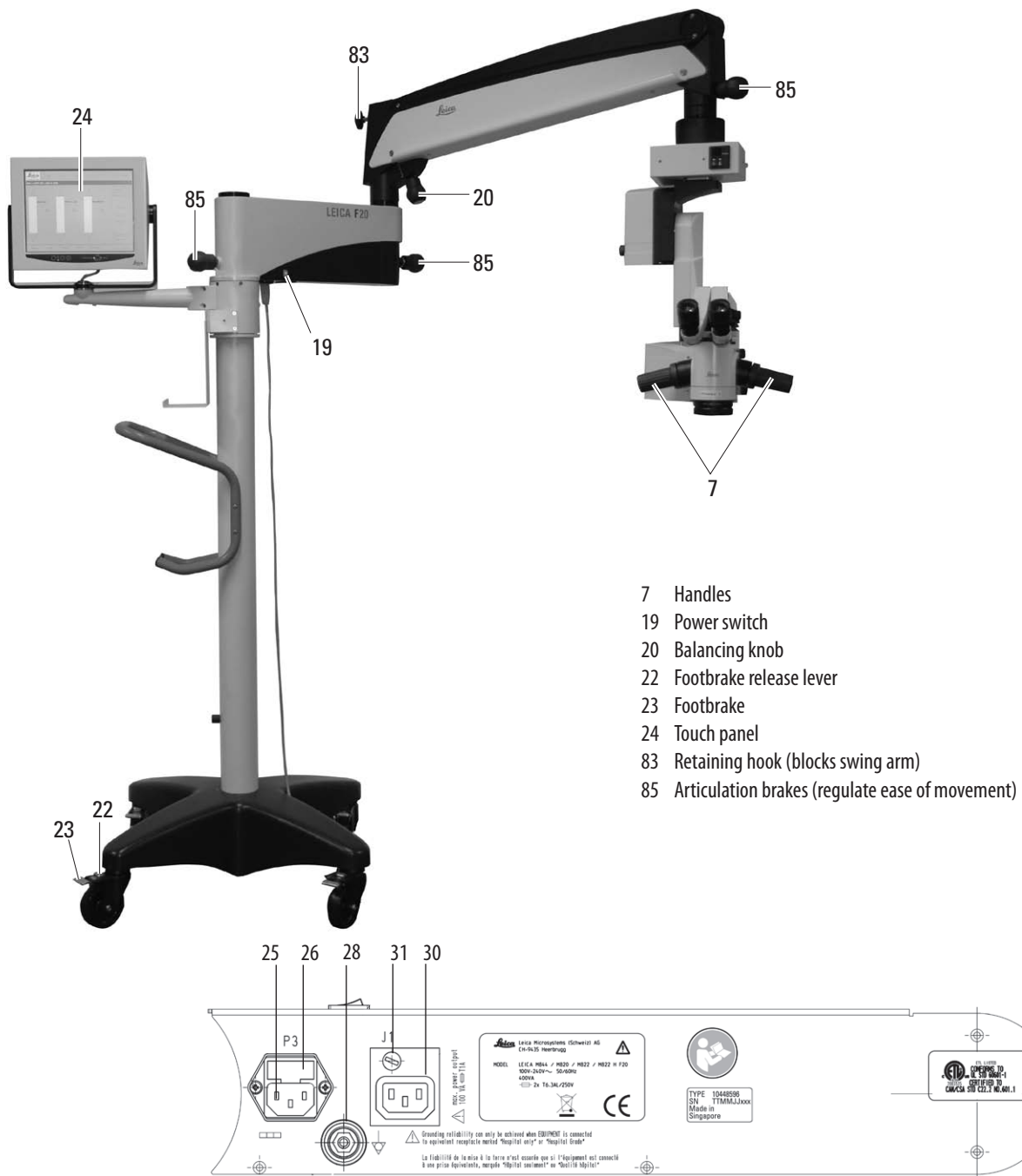


Caution

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. Requirements of use, see page 77.

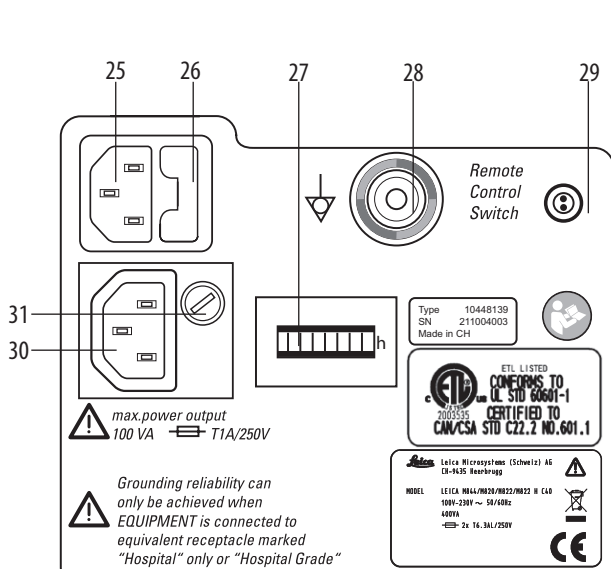
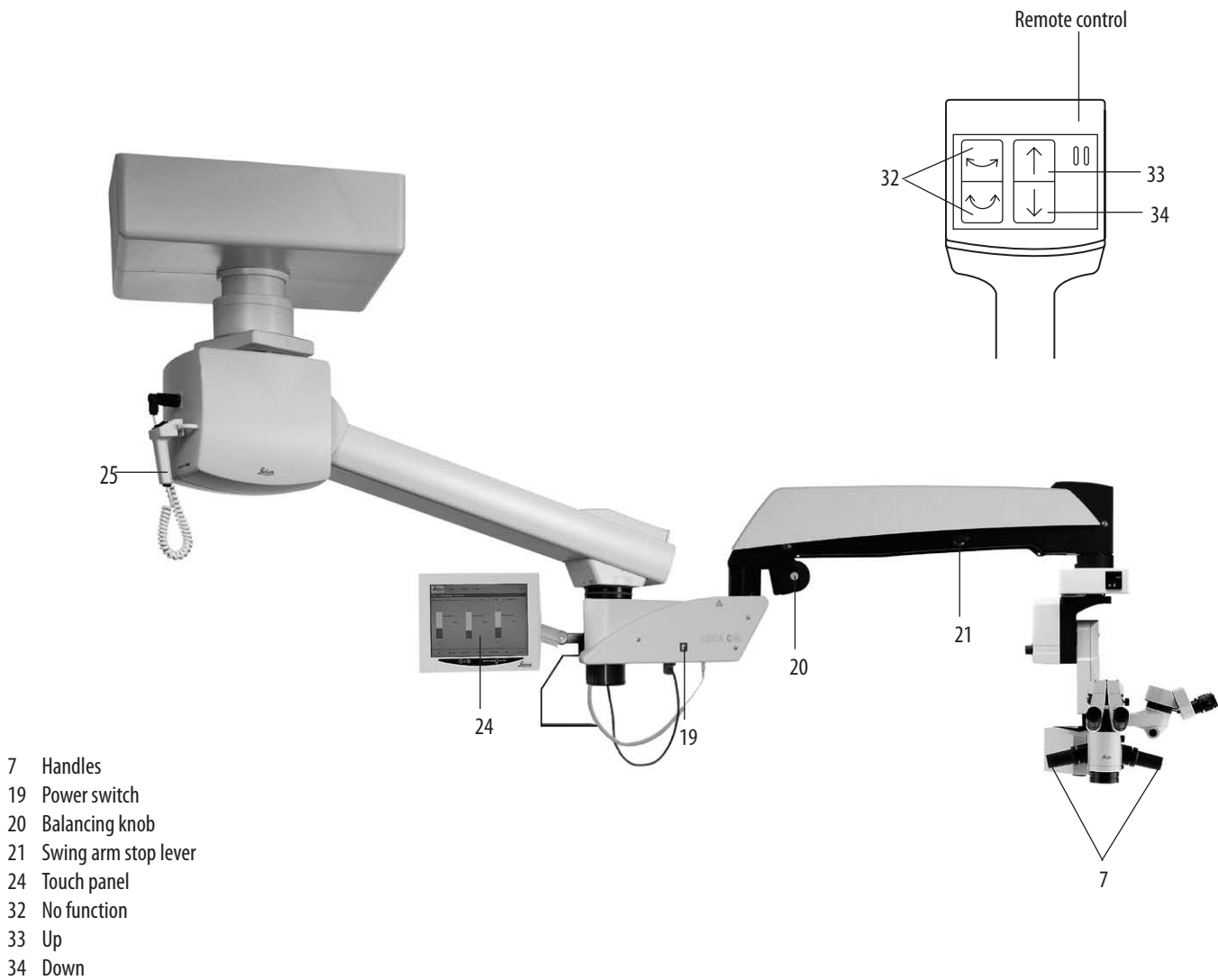
F20 floor stand

**Caution**

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. Requirements of use, see page 77.

C40 ceiling mount



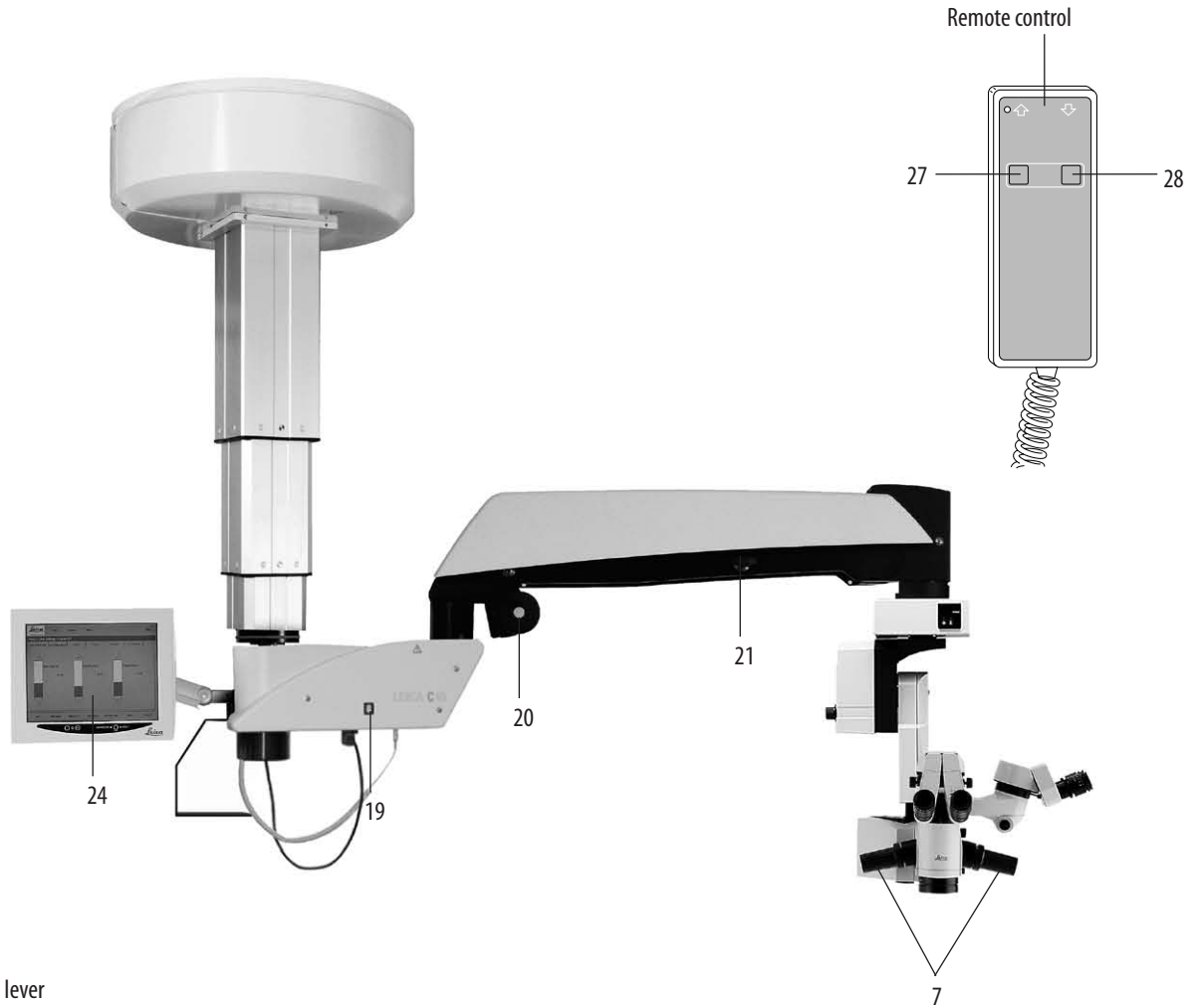
- 25 Power supply
- 26 Fuse holder (2× 6.3 A, time-lag)
- 27 Running-time meter for the surgical microscope
- 28 Socket for potential equalization
- For connecting the Leica M844/M820 to an equipotential bonding device. This is part of the customer's building installation. Observe the requirements of EN 60601-1 (§ 8.6.7).
- 29 Socket for remote brake release
- 30 Auxiliary power outlet (max. output power 100 VA), Requirements of use, see page 77
- 31 Fuse holder (1 A, time-lag)

**Caution**

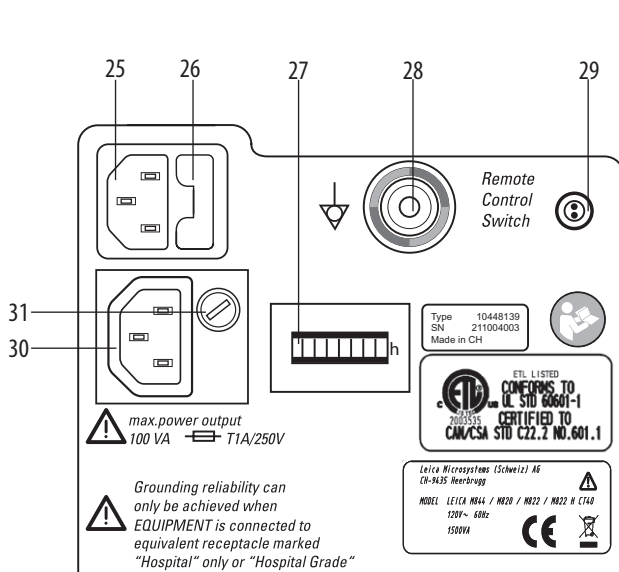
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!

⚠ Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. Requirements of use, see page 77.

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 (2× 6.3 A, time-lag)
- 27 Running-time meter for the surgical microscope
- 28 Socket for potential equalization
For connecting the Leica M844/M820 to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
- 29 Socket for remote brake release
- 30 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see page 77
- 31 Fuse holder (1 A, time-lag)

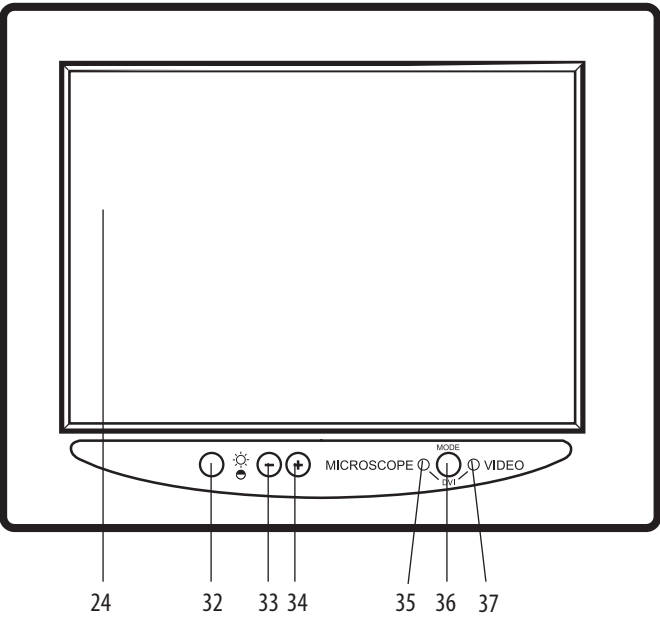


Caution
Connecting unauthorized secondary devices to the auxiliary power socket can lead to damage to the surgical microscope and to the secondary device!

⇒ Never connect secondary devices to the auxiliary power socket unless they conform to the specifications. Requirements of use, see page 77.

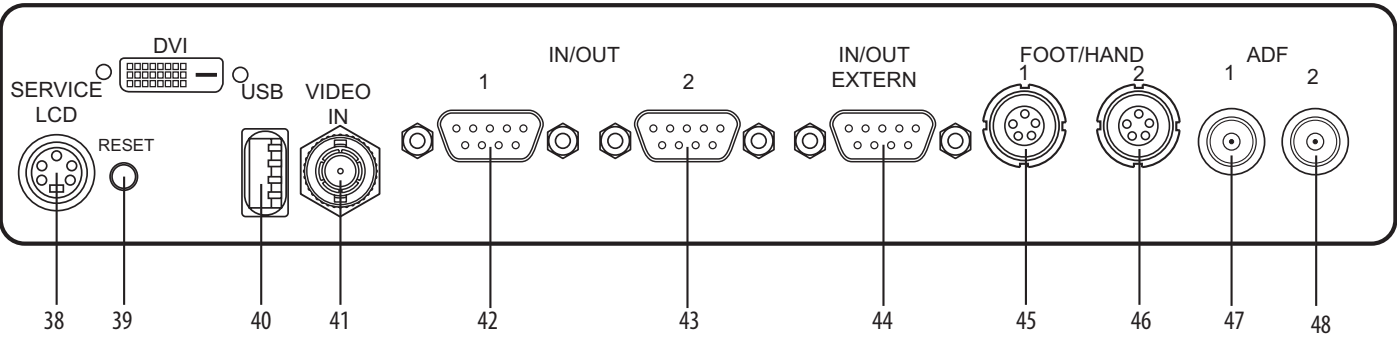
Control unit

Front view



- 24 Touch panel
- 32 Brightness/contrast adjustment
Press 1×: Adjusting the brightness
Press 2×: Setting the contrast
Press 3×: Saving settings and exiting
- 33 Decrease value
- 34 Increase value
- 35 Control unit mode active LED
- 36 Video mode/control unit (microscope) mode switch
- 37 Video mode active LED

Terminals

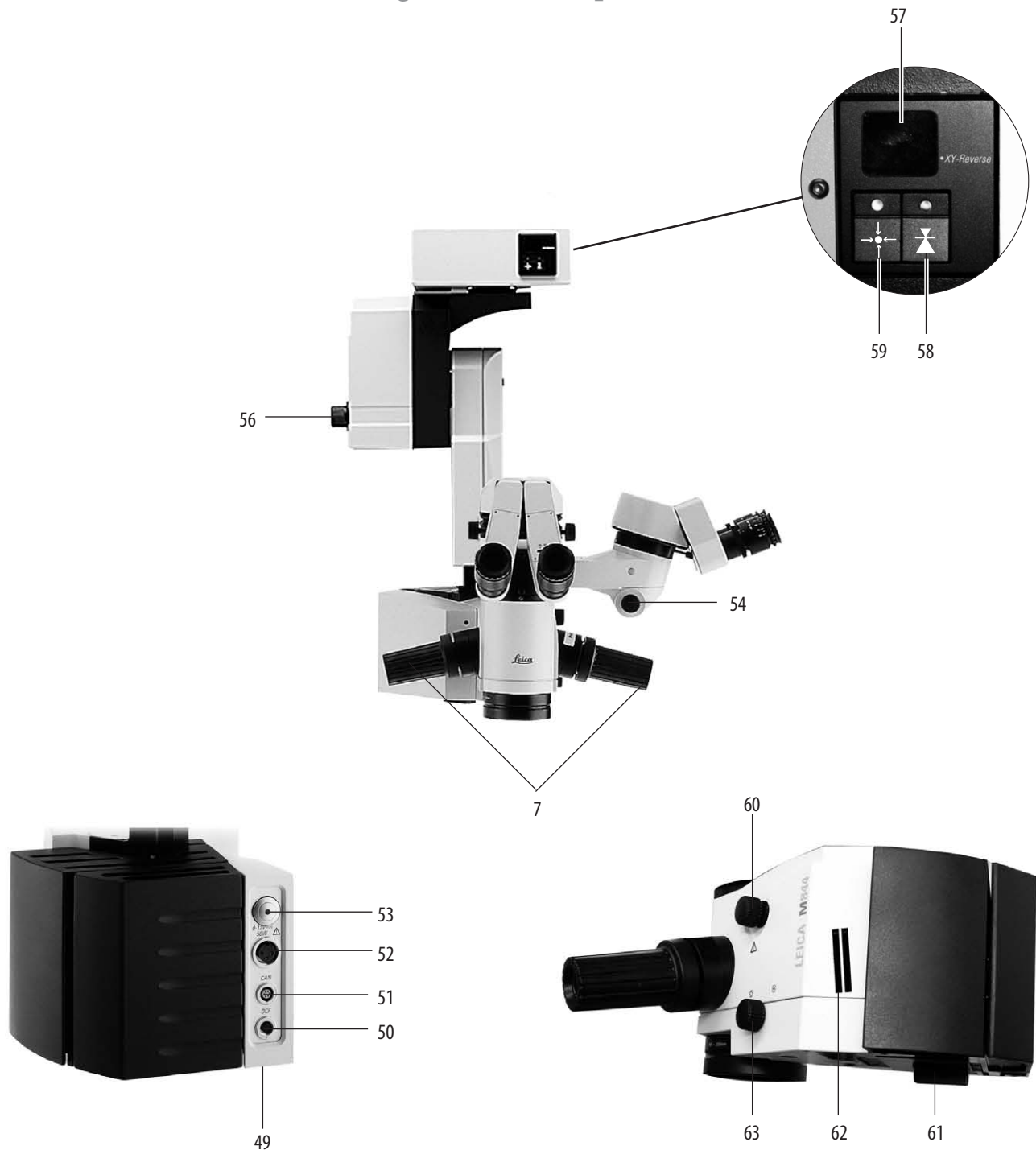


- 38 Leica service interface
- 39 Reset button
- 40 USB connection
- 41 Video input
- 42 Internal CAN 1
- 43 Internal CAN 2
- 44 CAN external
Only devices verified by Leica Microsystems, Medical Division, may be connected here.
- 45 Footswitch or handswitch 1
- 46 Foot-/handswitch 2
Only footswitches and handswitches delivered by Leica Microsystems, Medical Division, may be connected here.
- 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"
Only the Leica Slit Illuminator, Oculus BIOM, or other Leica devices may be connected here.
- 51 CAN bus
Only accessories supplied by Leica Microsystems, Medical Division, may be connected here.
- 52 Socket for external supply to slit illuminator
Only the Leica Slit Illuminator may be connected here.
- 53 OttoFlex™/slit illuminator 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

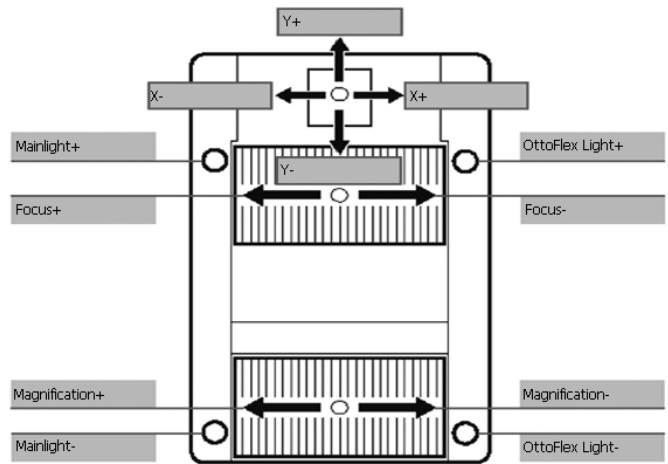
Foot/handswitches and handles

Standard configuration "Cataract"

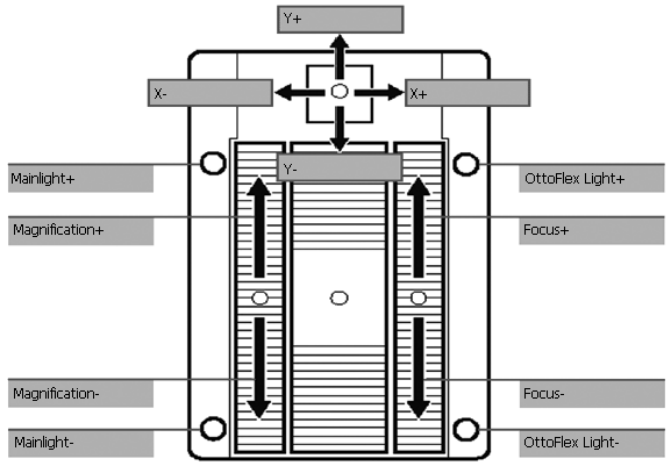
Here is an overview of all possible footswitches and handswitches that you can use to control your Leica M820 and Leica M844 surgical microscopes with the specified "Cataract" standard configuration.

 Footswitches, handswitches, and handles can be assigned individually for each user in the configuration menu (see pages 38 and 39).

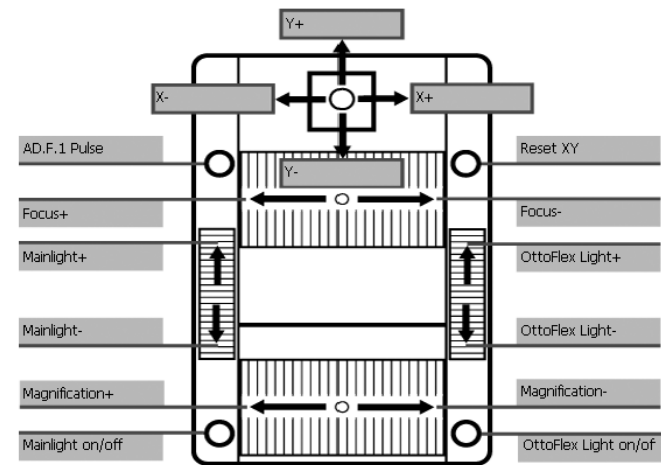
12-function footswitch, cross



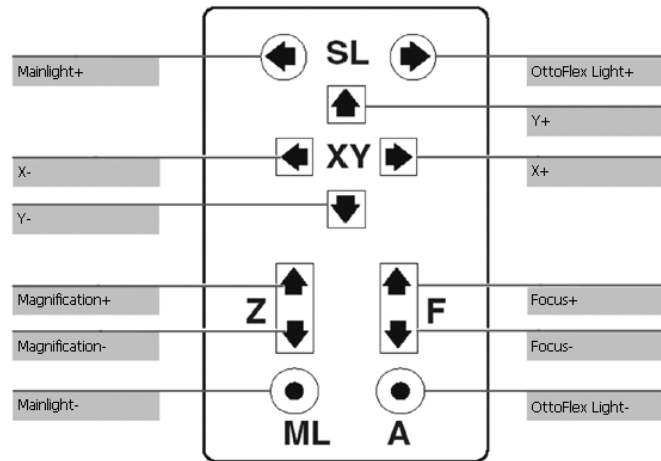
12-function footswitch, long



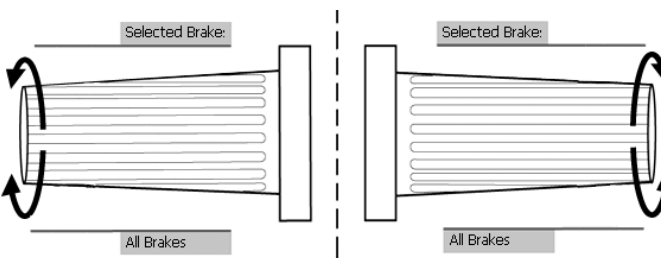
16-function footswitch, cross



Handswitch



Handles



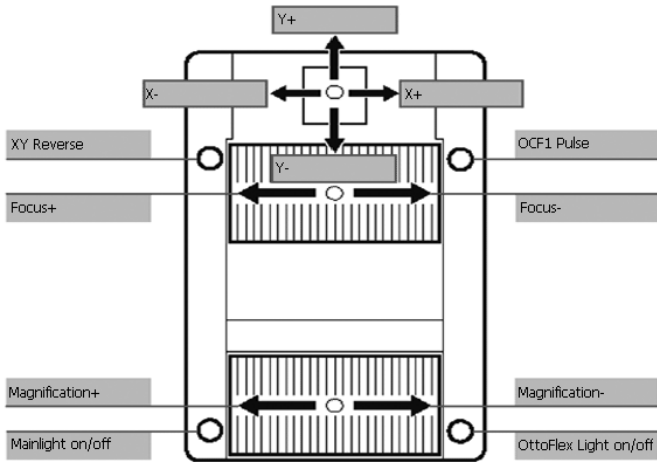
Standard configuration "Retina"

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 specified "Retina" standard configuration.

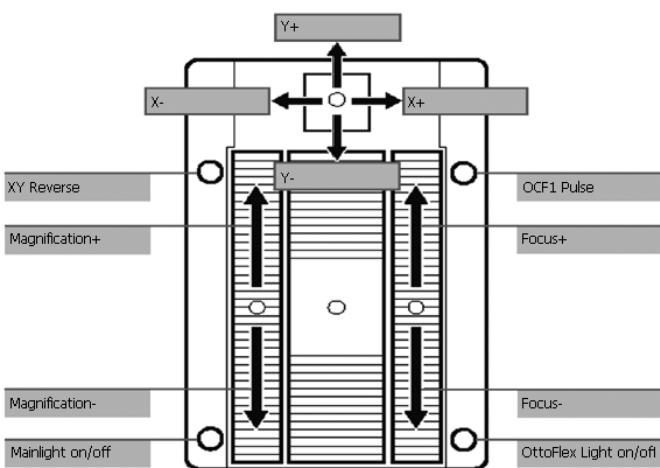


Footswitches, handswitches, and handles can be assigned individually for each user in the configuration menu (see pages 38 and 39).

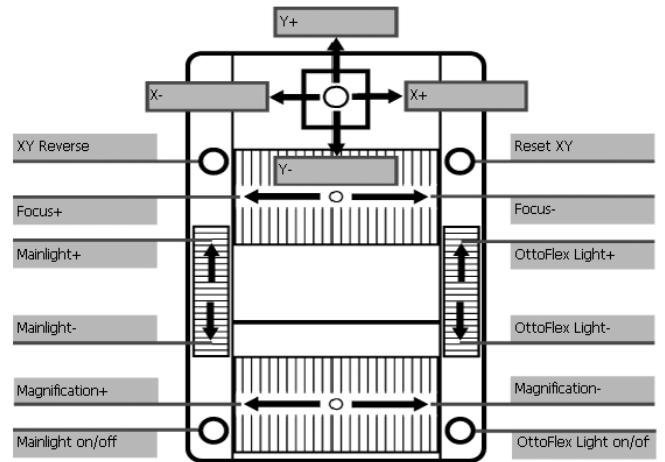
12-function footswitch, cross



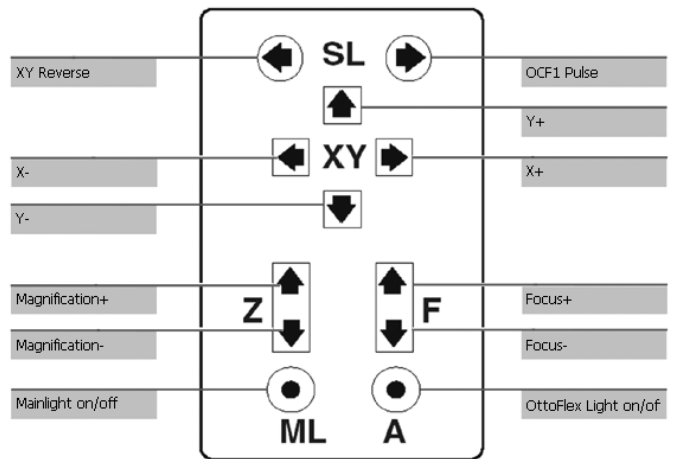
12-function footswitch, long



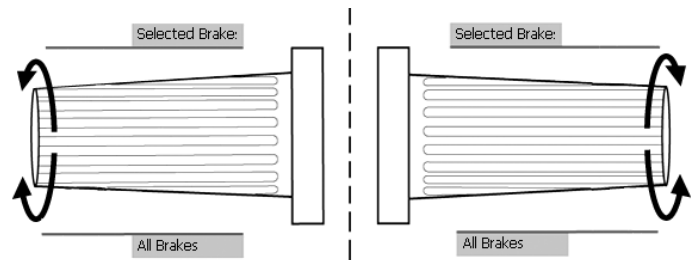
16-function footswitch, cross



Handswitch



Handles



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 66).

Checking accessories

- ⇒ Lock the swing arm.
- ⇒ Outfit the microscope with all accessories for use (see page 17 and page 18).
- ⇒ Turn the 0° assistant's attachment to the desired side (Leica M844, see pages 17 and 20) or install attachment for second observer on the desired side (Leica M820, see page 18).

Balancing

- ⇒ Loosen swing arm and balance it (for F40, C40, CT40 see page 27, for F20 see page 28).

Function check

- ⇒ Switch on the microscope.



Warning

Motors return to their home position

- ⇒ 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.
- ⇒ Footswitch/handswitch: Test all functions.
- ⇒ With handles and remote brake release, check the function of the brakes (for F40, C40, CT40 see page 27, for F20 see page 28).

Positioning at the operating table

- ⇒ Position the surgical microscope at the operating table as desired and secure the brakes on the floor stand (see page 31).

Checking the tube settings

- ⇒ Check the tube and eyepiece setting for the selected user (see page 39).
- ⇒ Treat the eyepieces with an antifogging compound if necessary.

Sterility

- ⇒ Fit sterile components and sterile drape if used (see page 32).



Warning

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

Risk of injury from downward movement of surgical microscope!

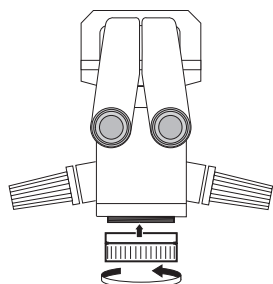
- ⇒ Complete all preparations and adjustments to the stand before the operation.
- ⇒ Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ⇒ Before re-equipping, always lock the swing arm.
- ⇒ After re-equipping, always rebalance the microscope on the swing arm.
- ⇒ Do not release brakes 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 27).

Installing the objectives

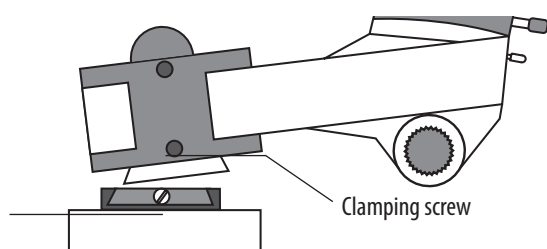
- ⇒ Tighten the objective to the microscope (right-hand threading).



Fitting the 0° assistant's attachment



The 0° assistant's attachment must be directly attached to the optics carrier.



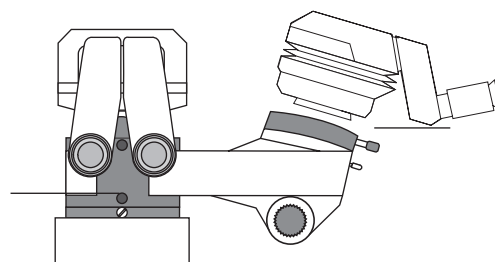
- ⇒ Unscrew the clamping screw as far as necessary using a screwdriver.
- ⇒ Insert the 0° assistant's attachment into the dovetail ring.
- ⇒ Hold the 0° assistant's attachment in place and tighten the clamping screw.



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

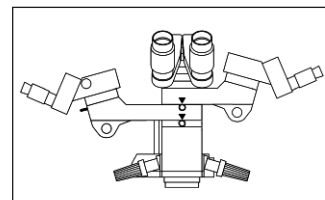
- ⇒ Affix the eyepieces with the fixing rings in the tubes.

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.

- ⇒ Unscrew the clamping screw as far as necessary using a screwdriver.
- ⇒ Insert the flange of the Double Wing into the dovetail ring so that the arrow is positioned directly above the clamping screw.
- ⇒ Hold the Double Wing firmly and tighten the clamping screw.



We recommend that, for the main surgeon, the UltraLow™ III binocular tube be used in combination with the double wing. The UltraLow™ III binocular tube offers better ergonomic conditions.

Fitting optical accessories for Leica M820



Warning

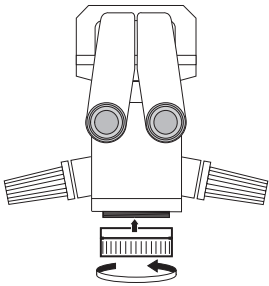
Risk of injury from downward movement of surgical microscope!

- ⇒ Complete all preparations and adjustments to the stand before the operation.
- ⇒ Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ⇒ Before re-equipping, always lock the swing arm.
- ⇒ After re-equipping, always rebalance the microscope on the swing arm.
- ⇒ 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.



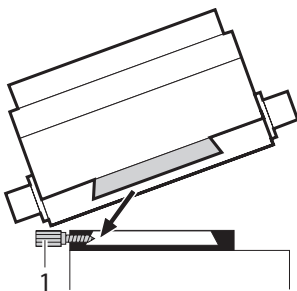
Take care that the articulation brakes are tightened and the swing arm is blocked before you mount accessories to your Leica M820 (see page 28).

Installing the objectives



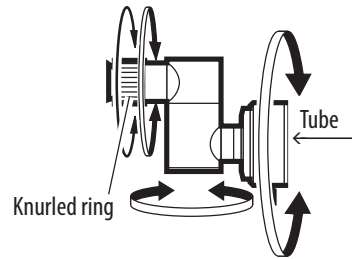
- ⇒ Tighten the objective to the microscope (right-hand threading).

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.

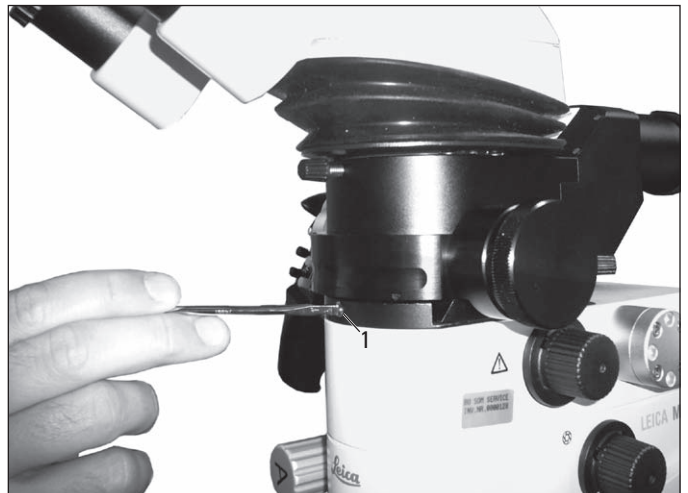
Fitting the tube

- ⇒ 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.

Installing the rotating beam splitter

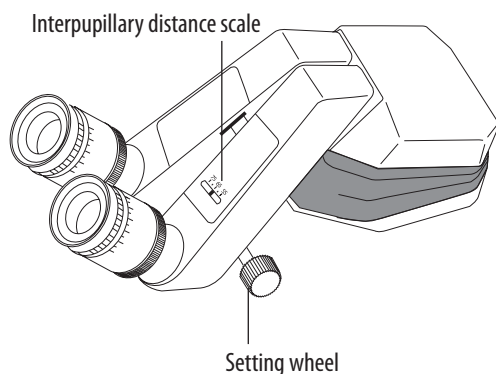


- ⇒ Remove the clamping screw.
- ⇒ Mount the grub screw (1).
- ⇒ Place the rotating beam splitter into the dovetail ring from above.
- ⇒ Tighten the grub screw (1).

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.

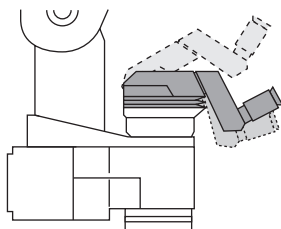


This procedure must be done once for each user. The acquired value (see display) can be stored for each user in the "User Settings" menu under "Tube Settings" (see page 39).

Adjusting the tilt

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

⇒ Tilt the eyepiece tubes upwards or downwards.



Setting up eyepieces

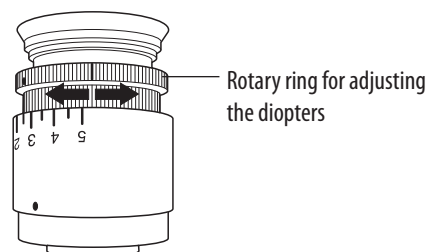
Determining/adjusting diopter settings

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



A parfocally adjusted microscope ensures that the assistant's image and video image appear sharp at all times, regardless of the selected magnification.

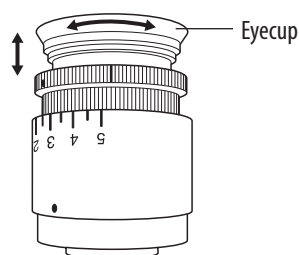
- ⇒ Set individual diopter values for each eyepiece.
- ⇒ Select the minimum magnification.
- ⇒ Place a flat test object with sharp contours under the lens at working distance.
- ⇒ Focus the microscope.
- ⇒ Set the maximum magnification.
- ⇒ Focus the microscope.



- ⇒ Set the minimum magnification.
- ⇒ Without looking into the eyepieces, turn both eye lenses to +5 diopters.
- ⇒ Slowly turn the eyepieces toward -5 diopters individually for each eye until the test object appears in sharp focus.
- ⇒ 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 39).

Adjusting the pupillary distance



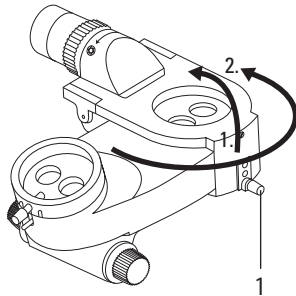
- ⇒ Rotate the eyecups up or down until the desired distance is set.

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



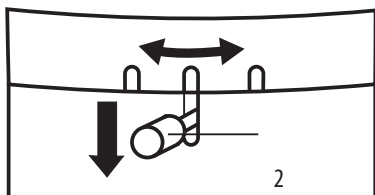
- ⇒ Loosen the screw (1), lift the surgeon's tube on quick changer and rotate the assistant's tube to the other side.
- ⇒ Retighten the screw (1).
- ⇒ After changing the assistant side, turn the camera by 180° to correct the orientation of the video image.

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

Level-up the eyepiece tubes

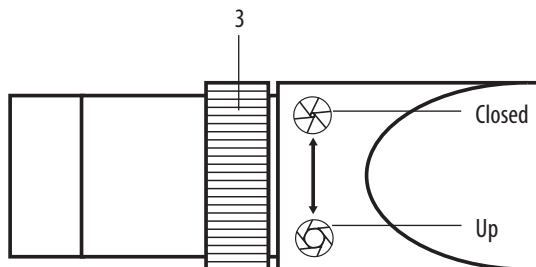
The assistant's tube can be rotated 15° to the left or right.

- ⇒ Push lever (2) 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 (3).

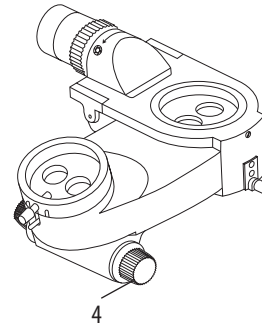


If you are working at a large magnification, you can increase the depth of field of your videos or images by reducing the diaphragm opening.

- ⇒ Reducing the diaphragm opening can affect the red reflex in the video image.

Focusing the 0° assistant's attachment

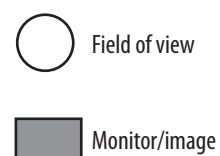
- ⇒ Rotate the fine focusing knob (4) to focus the image seen by the assistant accurately.



Selecting documentation accessories

		Video adapter focal length						
		35 mm	55 mm	60 mm	70 mm	85 mm	100 mm	107 mm
Camera sensor size	1/4 "							
	1/2.8 "							
	1/3 "							
	1/2 "							
	2/3 "							
	1 "							

	Video adapter focal length	
	250 mm	350 mm
Camera sensor size 35 mm		



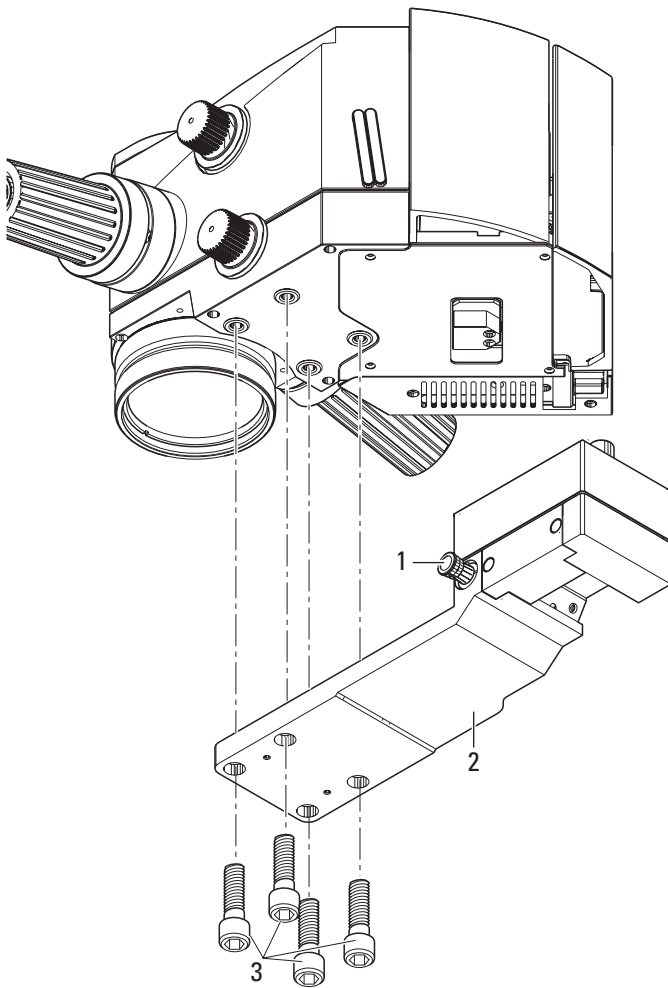
Fitting the Leica Slit Illuminator

General safety information when handling the Leica Slit Illuminator

- When installing and using the slit illuminator, make sure not to pinch any cables.
- When installing, make sure that the interlock of the slit illuminator latches securely.
- Only qualified personnel is allowed to handle the slit illuminator.
- When handling the slit illuminator 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 four screws (3).



Fastening the slit illuminator

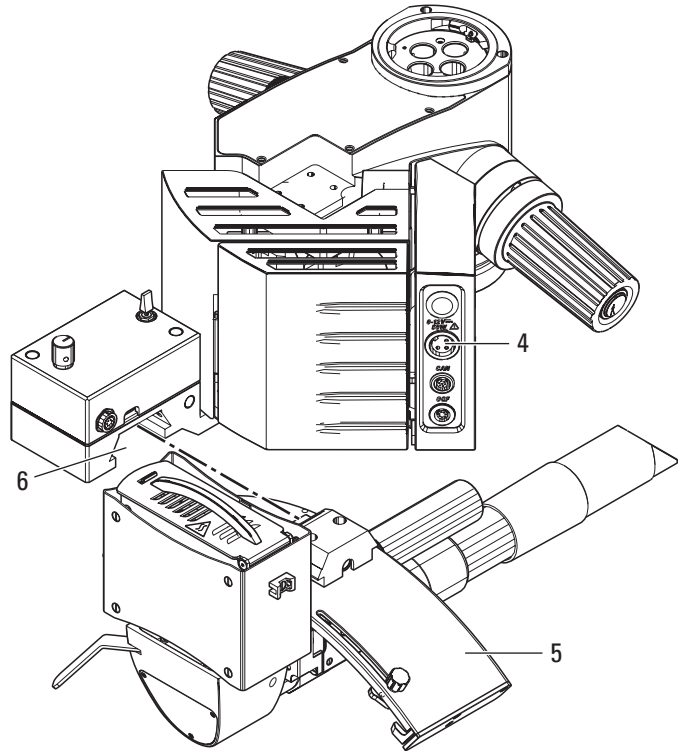


Make sure that the interlock latches securely.

⇒ Loosen the clamp screw (1) and slide the slit lamp (5) into the guide (6).

⇒ Tighten the clamping screw (1).

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



The slit illuminator 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 Burn hazard!

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

Adjusting the slit illuminator

⇒ Move the slit illuminator into middle position using the footswitch and/or handswitch.

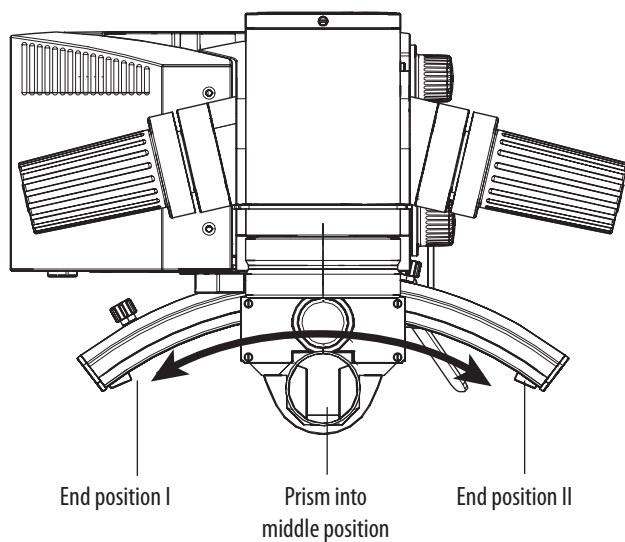


Assign the functions OCF2 pulse and OCF3 pulse on the handswitch or footswitch used so that the slit illuminator can be moved to the right (OCF3) or left (OCF2) using these two keys.

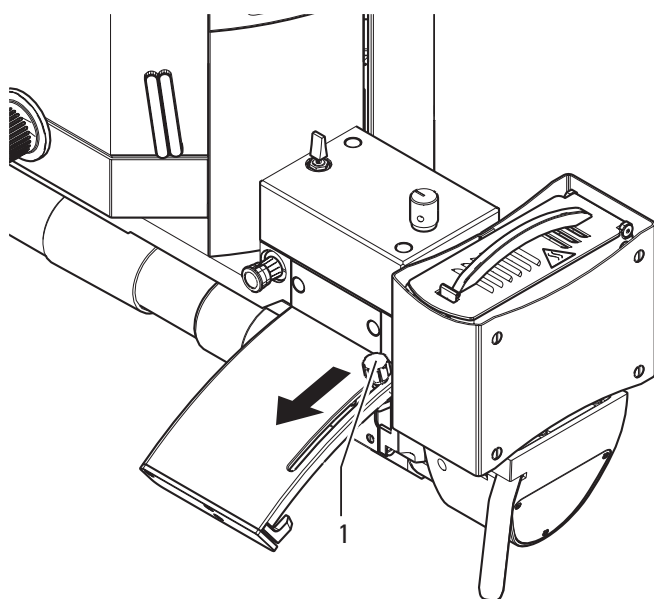
⇒ Rotate the prism into middle position.

⇒ 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 with regard 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 handswitch or footswitch again.



Emergency operation

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

Removing the slit illuminator



When removing the slit illuminator, make sure that both stoppers are in the bottom position.

Fitting the Leica Slit Illuminator



Caution

Danger of crushing due to moving parts!

The parts of the slit illuminator that are moved by motors may crush fingers or the hand when used improperly.

⇒ When handling the slit illuminator, take care not to crush any fingers.

⇒ To activate the slit illuminator, use the OttoFlex/slit illuminator switch (53) on the optics carrier (see page 13).

Adjusting the brightness of the slit illuminator



Warning

Danger of eye injuries!

The light source of the slit illuminator might be too bright for the patient.

⇒ Dim the slit illuminator before switching it on.

⇒ Slowly increase the brightness until the image is illuminated optimally for the operating doctor.

⇒ To switch the slit illuminator on or off, use the OttoFlex ON/OFF function on the handswitch or footswitch.

⇒ 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 down the button with your finger changes the value in increments of five.

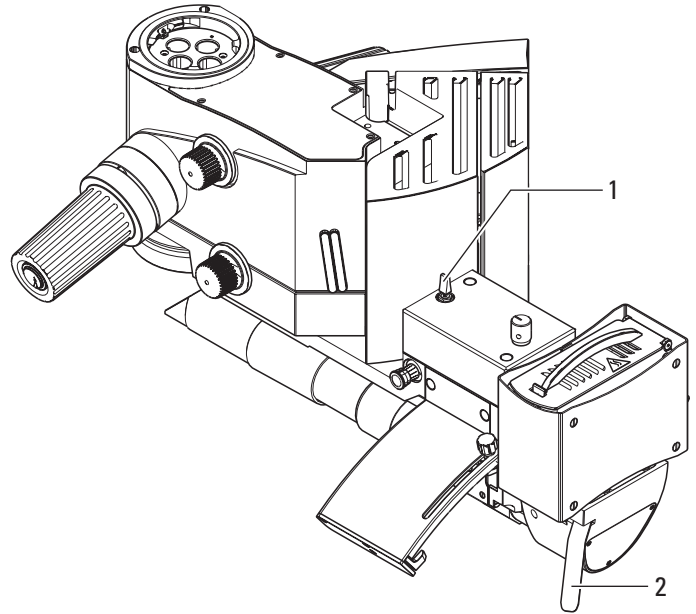
⇒ Brightness of the slit illuminator may also be changed by using a connected handswitch or footswitch with the OttoFlex +/- function.

Moving the slit illuminator

⇒ Assign the functions OCF2 pulse and OCF3 pulse on the handswitch or footswitch used so that the slit illuminator can be moved to the right (OCF3) or left (OCF2) using these two keys.

or

⇒ Move the slit illuminator to the right or left with the handswitch (1).



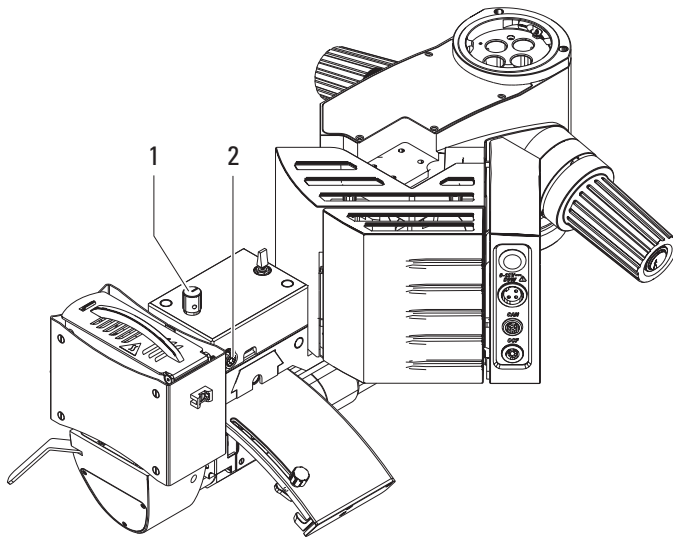
Adjusting the slit width

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



The slit widths can be adjusted from 0.01 to 14 mm. The slit height is 14 mm.

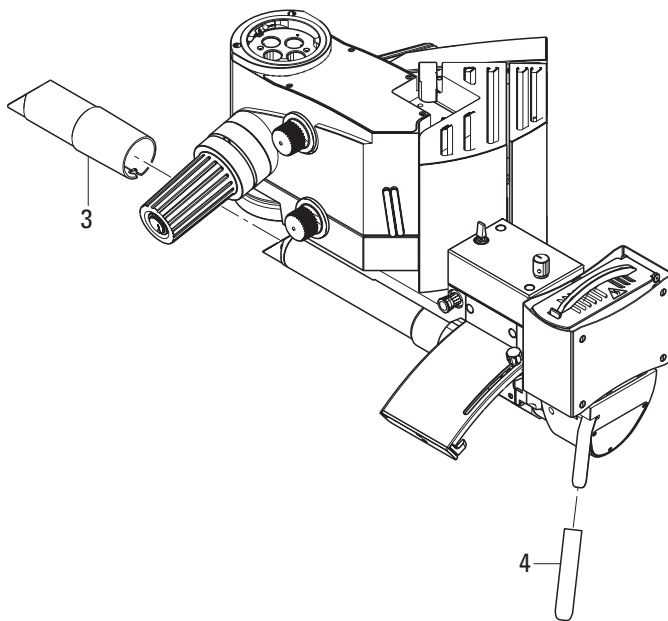
Connecting Oculus BIOM



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

Sterile covers for the slit tube

The slit tube of the slit illuminator 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

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.

- ⇒ During exposure to the light from this instrument, do not exceed the hazard reference values.

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 setting

- ⇒ Switch the light off when interrupting the surgery.

It is recommended to adjust the brightness to the minimum necessary for the surgery.

Infants, patients with aphakia whose eyelens has not been replaced by an artificial lens with a UV protection screen, small children and persons with diseases of the eye are at greater risk.

There also is a greater risk if the patient was exposed to the same or any other ophthalmological instrument using a bright visible light source within the previous 24 hours.

This applies especially if the eye was examined by retina photography.

The decision about which light intensity to use for an application must be made on a case-by-case basis.

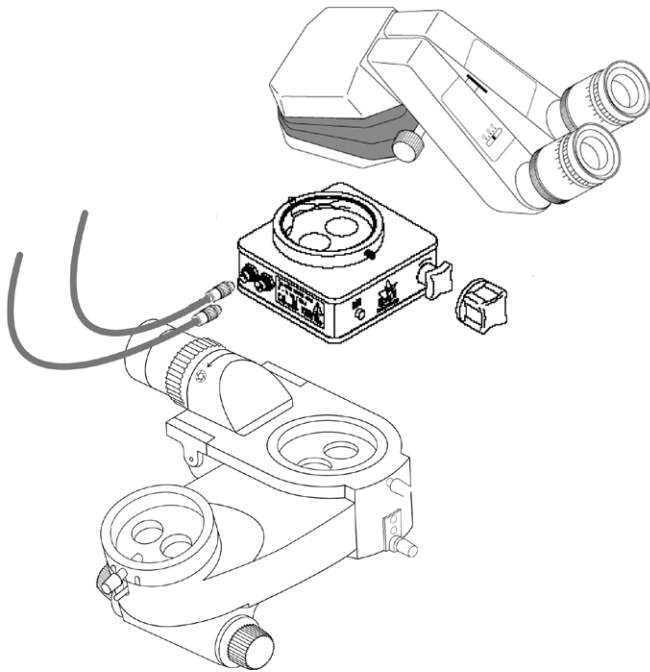
In any case the surgeon has to make a risk-benefit analysis concerning the applicable brightness.

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 ophthalmologic 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 7-pin plug of the SDI control cable (10448163) into the OCF socket on the optics carrier.
- ⇒ Insert the 5-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 OCF1, OCF2, and OCF3 functions in the Extras function group:

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

 If you select the "XY Reverse + OCF1" function, 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

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.

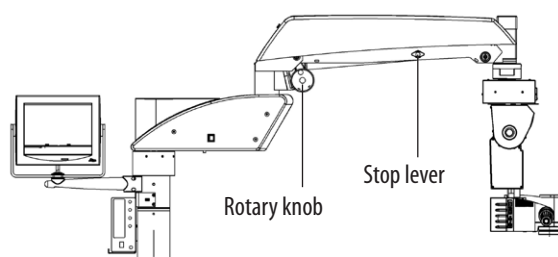
Preparing the stand (F40,C40,CT40)

Balancing the swing arm



Warning
Risk of injury due to downward movement of the surgical microscope!

- ⇒ Never change the accessories or attempt to rebalance the microscope while it is above 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
Risk of injury due to downward movement of the surgical microscope!

- ⇒ Always lock the swing arm:
 - when transporting the microscope
 - when re-equipping



Caution
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
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
Risk of injury due to downward movement of the surgical microscope!

- ⇒ 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 handles or remote brake release when the instrument is in an unbalanced state.



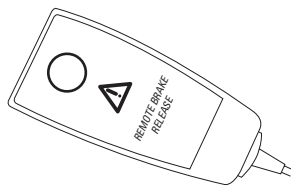
- Unless they are individually configured for the current user, the brakes are released by turning the handles as follows:

- ⇒ 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 39).

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

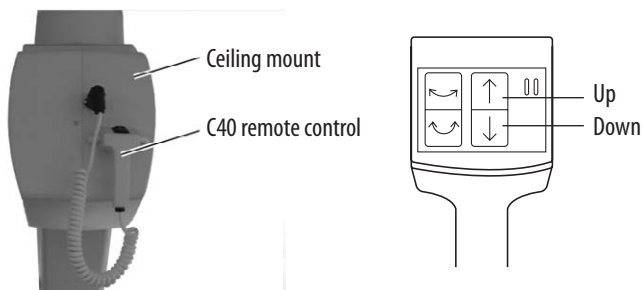


⇒ Press and hold the remote brake release button.
All brakes on the stand are now released.

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 the stand.
⇒ "Down" key: Lower the stand.

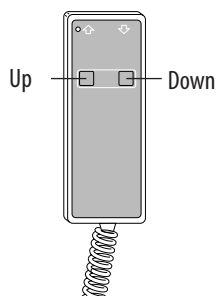


Raising and lowering the CT40 ceiling mount

The CT40 ceiling mount can be raised and lowered electrically. These functions can be controlled via buttons on the remote control unit.

Move telescopic arm to the desired height:

⇒ "Up" key: Raise the telescopic arm.
⇒ "Down" key: Lower the 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.

Stand settings (F20)

Releasing the swing arm

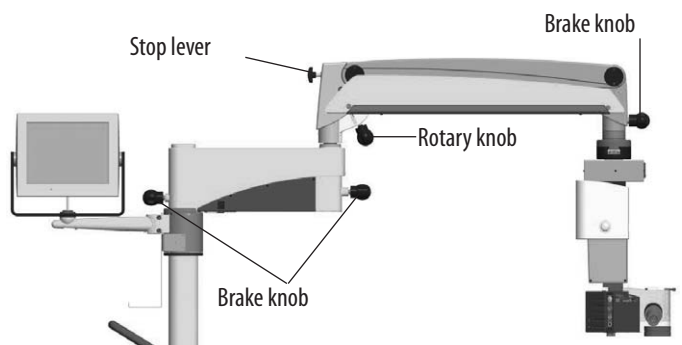


Warning

Risk of injury due to downward movement of the surgical microscope!

⇒ Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
⇒ After re-equipping, always rebalance the microscope on the swing arm.

⇒ Hold the microscope firmly.
⇒ Pull the stop lever and turn it into a vertical position.
The swing arm is now released.



Balancing 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

Risk of injury due to downward movement of the surgical microscope!

⇒ Always lock the swing arm:

- when transporting the microscope
- when re-equipping

⇒ Position the swing arm approximately horizontally.
⇒ Turn the stop lever into a horizontal position.
⇒ Move the swing arm up and down until the stop lever engages.
The swing arm is now locked.

Transport, transporting and rest positions

Transport of the Leica M844 F40 and Leica M820 F40



Warning

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.**
- **Abrupt braking of the surgical microscope at a threshold that cannot be crossed.**

- ⇒ Before transport, always move the Leica M820 F40 and Leica M844 F40 surgical microscopes into the transport position.
- ⇒ Never move the stand in the extended condition.
- ⇒ Always push the surgical microscope; never pull it.
- ⇒ Never roll over cables lying on the floor.



Caution

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.

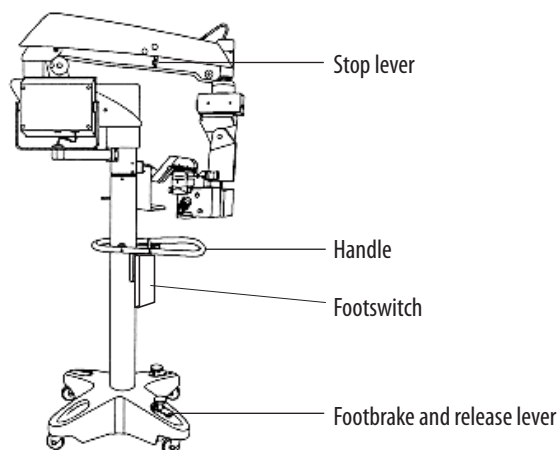


Caution

There is a risk of damage to the Leica M820 F40 and Leica M844 F40 surgical microscopes from uncontrolled tilting!

- ⇒ Firmly hold 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.
- ⇒ 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.
- ⇒ Bring swing arm into transport position.



- ⇒ Release the handle again.
- ⇒ 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!

Transporting the Leica M820 F20 and Leica M844 F20



Warning

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.**
- **Abrupt braking of the surgical microscope at a threshold that cannot be crossed.**

- ⇒ Before transport, always move the Leica M820 F20 and Leica M844 F20 surgical microscopes into the transport position.
- ⇒ Never move the stand in the extended condition.
- ⇒ Always push the surgical microscope; never pull it.
- ⇒ Never roll over cables lying on the floor.



Caution

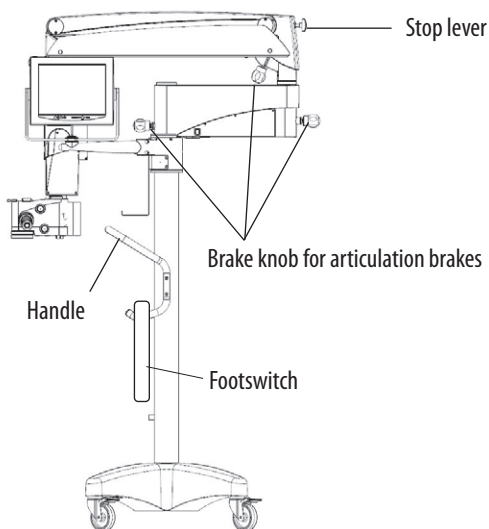
Surgical microscope can move without warning!

- ⇒ Always lock the footbrake when you are not moving the system.

Transport position

Whenever you transport your Leica M820 F20 and Leica M844 F20, first bring it into the transport position.

- ⇒ Unplug and secure the power cable.
- ⇒ Pull the stop lever and turn it into a horizontal position.
- ⇒ Move the swing arm up and down until the stop lever engages.
- ⇒ Open the articulation brakes.
- ⇒ Bring swing arm into transport position.



- ⇒ Tighten the articulation brakes.
- ⇒ Turn the control unit towards the XY-unit.
- ⇒ Hang the footswitch on the suspension device.
- ⇒ Step on the footbrake release lever to release the footbrakes.

Rest position

- ⇒ Bring the microscope into rest position after use.

F40 and F20 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

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; observe the ceiling and lamps.

- ⇒ Swing the microscope away.
- ⇒ 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

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.

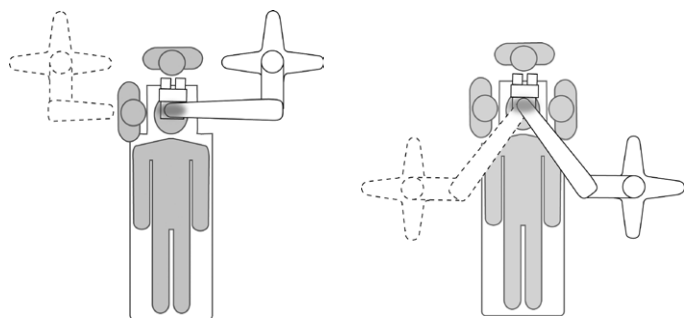
- ⇒ Swing the microscope away.
- ⇒ Remove sterile components.
- ⇒ Lock the swing arm.
- ⇒ Switch off the power switch on the swing arm.
- ⇒ Press the "Up" key on the remote control and raise the stand.

Positioning at the operating table

Leica M820 F40, Leica M844 F40, Leica M820 F20, and Leica M844 F20

- ⇒ Move the Leica M820 F40, Leica M844 F40, Leica M820 F20, and Leica M844 F20 surgical microscopes into the transport position (see pages 29 and 30).
- ⇒ Release the footbrakes (see page 29).
- ⇒ 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 the 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

Danger of fatal electric shock!

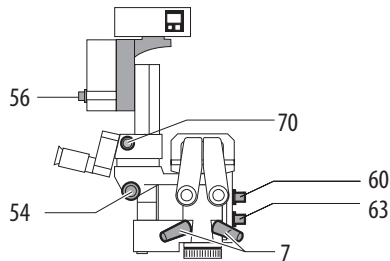
- ⇒ The surgical microscope may be connected to a grounded socket only.

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 69.

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.



Caution 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 F20 and M844 F20) using the handle and extend the swing arm.
- ⇒ Wear 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 to the swing arm with the provided straps. It must still be easy to operate the instrument.



Check the ease of movement of the instrument.

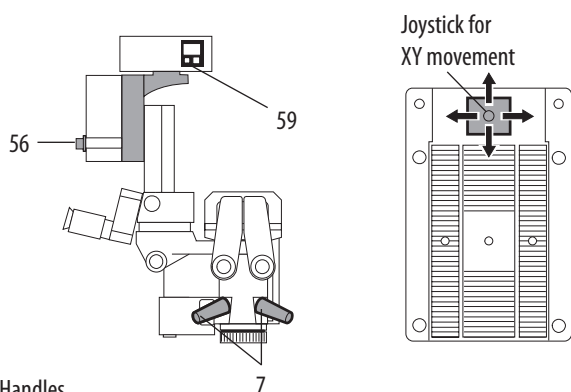


Follow the instructions provided by the manufacturer of the sterile drape.



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

- ⇒ Grasp the microscope by both handles.
- ⇒ Turn one handle to release the brakes (All Brakes) (Leica M820 F20, Leica M844 F20).
- ⇒ Position the microscope and release the handle.

The brakes can also be released using the remote brake release (see page 28).

Also refer to the "Release brakes" chapter on page 27.



Warning Risk of injury from downward movement of surgical microscope!

- ⇒ Do not use the handles or remote brake release when the instrument is in an unbalanced state.

Adjust the articulation brake for Leica M820 F20 and M844 F20 according to personal requirements and weight of the accessories (see page 28).

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°).

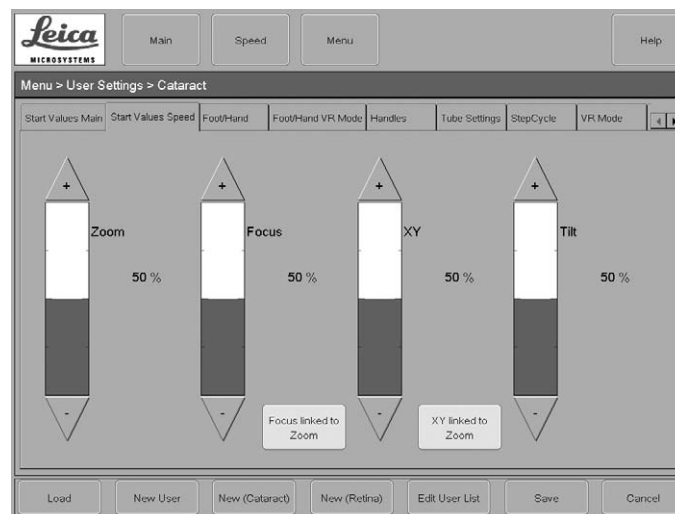
"Reset" buttons

- 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 the 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 the 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 37).



The "XY linked to Zoom" button enables the XY speed to be coupled with the current zoom position. The maximum zoom position yields minimum XY speed and vice versa. The standard setting is "Active".



The "Focus linked to Zoom" button enables the focus speed to be coupled with the current zoom position. The maximum zoom position yields minimum focus speed and vice versa. The standard setting is "Active".

Adjusting the microscope

Adjusting the illumination



Warning

Light that is too intense can damage the retina.

⇒ Observe the warning messages in the "Safety Notes" chapter on page 55.

Adjusting the brightness

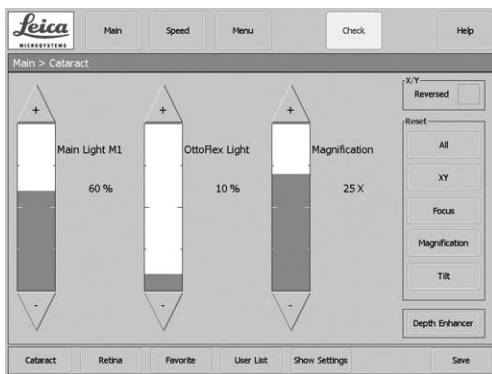
You can adjust the brightness of the active main illuminator and the OttoFlex™ II illuminator using either the touch panel or the footswitch.

Using the footswitch:

Depending on the functions assigned to the footswitch (see page 14), you can switch the main illuminator and OttoFlex™ II illuminator on and off, and increase and decrease their brightness, using the footswitch/handswitch.

Using the touch panel:

⇒ You can change the brightness for the active main illuminator and OttoFlex™ II illuminator by pressing the "+" or "-" key or directly pressing the corresponding brightness bar.



Clicking the "+" or "-" button changes the brightness value in increments of 1. Holding down the 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 a second OttoFlex™ II light source. 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 illuminator has a quick-change lamp mount.

⇒ If a main illuminator 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 67).

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" and the "Protection Filter 5×" are available.

⇒ Remove the filter cover.

⇒ Push in the filter slide, inclined slightly upwards, until it engages.



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



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

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

Adjusting the magnification (zoom)

You can adjust the magnification using the foot switch/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 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 33).
-  You can return the zoom motor to the magnification setting saved for the current user by using the "Reset Magnification" button (see page 35).

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

Destruction of the zoom motor!

⇒ Only adjust the zoom manually 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.

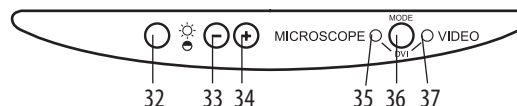
- ⇒ Press the rotary knob.
- ⇒ Set the desired magnification by turning the knob.

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 33).
-  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 33).
-  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.
- ⇒ You can change the brightness with the "+" and "-" buttons.
- ⇒ Press the brightness/contrast (32) key again.
- A bar for adjusting the contrast appears on the screen.
- ⇒ You can 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.

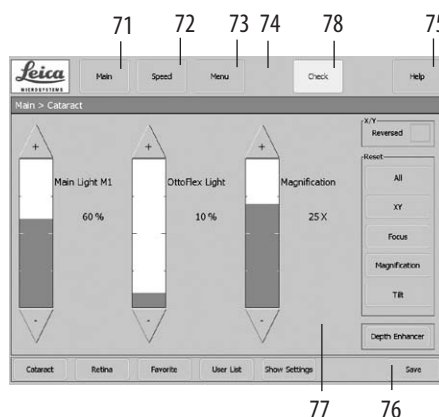
Changing operating modes

- ⇒ 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 illuminated 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 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) | 75 Displays help texts for individual topics |
| 72 Operational mode (drive settings) | 76 Dynamic button bar |
| 73 Configuration menu | 77 Display area with status bar |
| 74 Static menu bar (remains unchanged) | 78 Warning messages |

Switching the microscope on



Warning

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 ($<20 \pm 5$ 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 is selected, it will be in step 0 (see page 40).
- The fast start-up function can be disabled in the Service menu.



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

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.

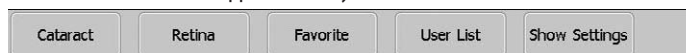
- ⇒ If you move your Leica M844 or Leica M820 back down over the operating field, the illumination switches back on and your Leica M844 or Leica M820 is ready to use immediately.



This function can be deactivated by your Leica service technician.

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 37).

You can store a frequently used profile under the user "Favorite" (see page 37).



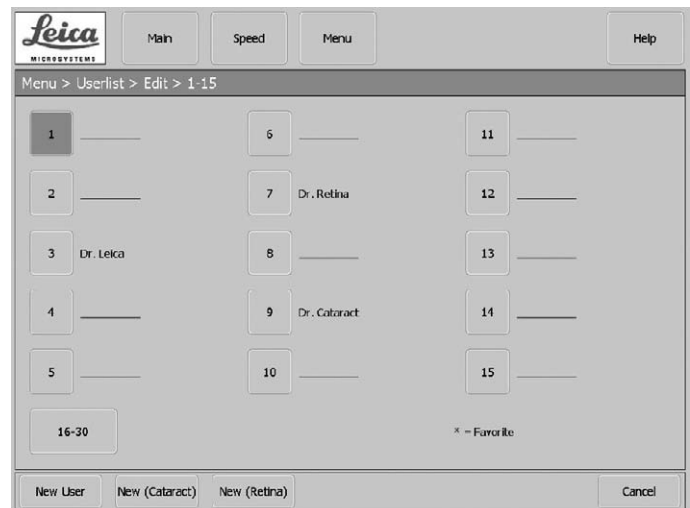
You can click the "Show Settings" button at any time to see an overview of the user settings of the current user.

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

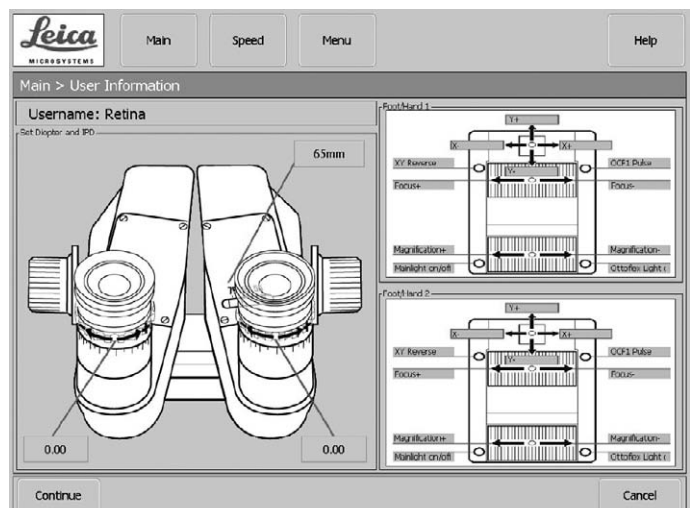
- ⇒ Click the "1–15" and "16–30" button to switch between pages.



When the user list is open, it can be edited at any time (see page 37).



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 that you check the programmed 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"

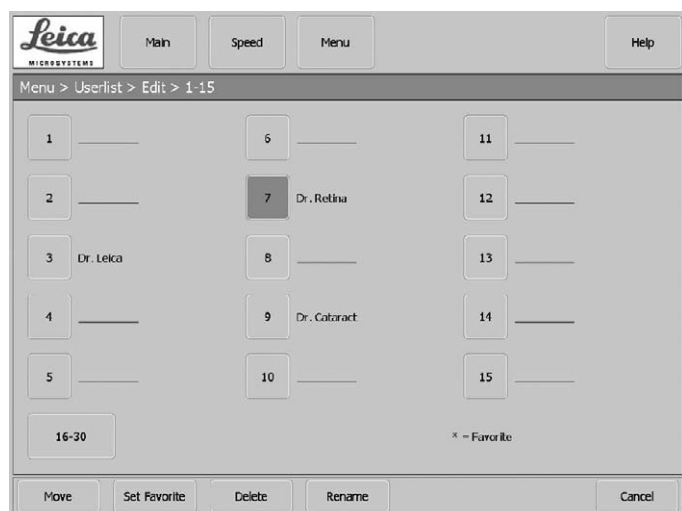
Deletes the selected user. You must click "Confirm" to confirm this action.

"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 a new user with the settings for "Cataract" so that you can modify them.

"New (Retina)":

Loads a new user with the 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 user have been changed), either for the current user ("Save as Current") or under a new username ("Save as New").

Saving user settings

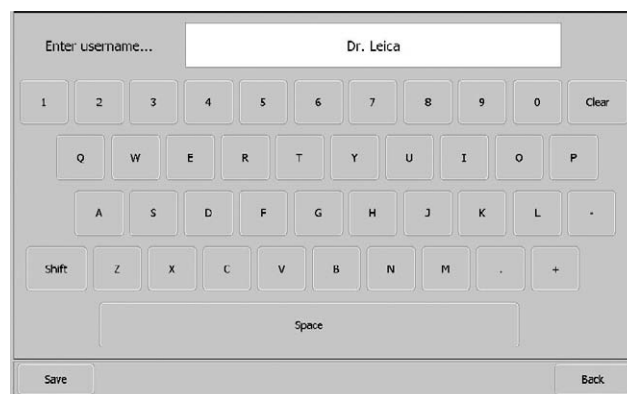
⇒ Click the "Save" button.

⇒ 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 illuminator, the OttoFlex™ II illuminator and the magnification on this screen.

- ⇒ Clicking the "+" or "-" key changes the values in increments of one.
- ⇒ Holding down the button 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

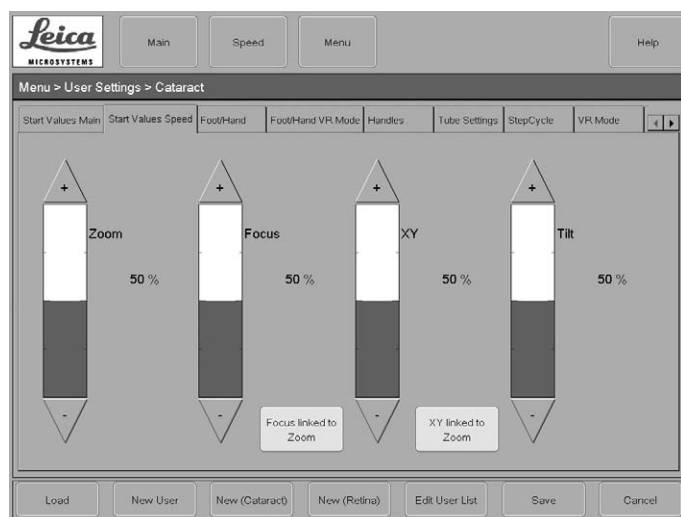
You can set the start values for the zoom, focus, XY and tilt drives on this screen.

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



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

The default values for zoom-coupled focus and XY speeds can be set here per user.



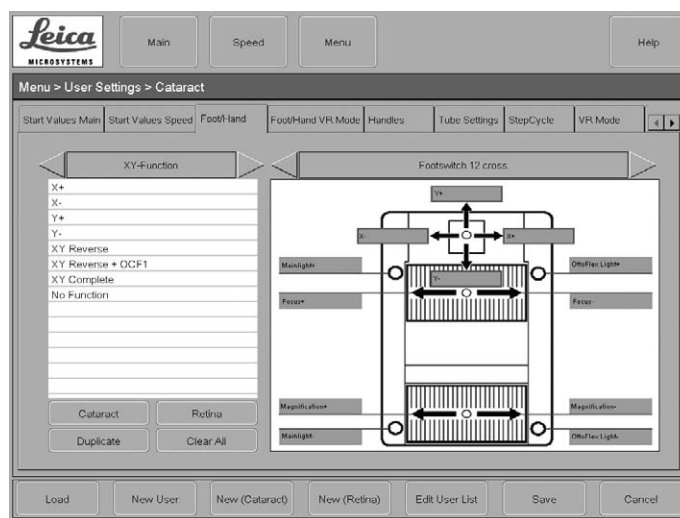
Foot-/handswitch assignment

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.

Configuring individual buttons

- ⇒ 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.
- ⇒ 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

The possible assignments are arranged into function groups.

- Drive – control of the drives
- Extra – control of components and accessories (ADF, OCF)
- Light – control of the illumination
- Reset – reset an individual function or all functions
- DI C800 – control of the Leica DI C800, see separate user manual
- XY-Function – control of the joystick



The "toggle" function changes the status of a function (e.g. On/Off):
The "Pulse" function continuously changes a status (such as increasing the brightness).



The configured assignment applies both to the connection to FOOT/HAND 1 and to FOOT/HAND 2.

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

Foot-/handswitch assignment VR

You can store a special foot-/handswitch assignment for VR mode here.

So that you can switch between the "normal" assignment and assignment in VR mode, the following conditions must be met:

- In the "VR Mode" tab, "foot/hand switch for VR mode active" must be activated.
- In each of the two foot-/handswitch assignments, "VR Mode on/off" must be assigned.
- If the "VR Mode on/off" function is assigned to "Foot/Hand switch" in the foot-/handswitch assignment, it is automatically applied to the same button at "Foot/Hand switch VR".

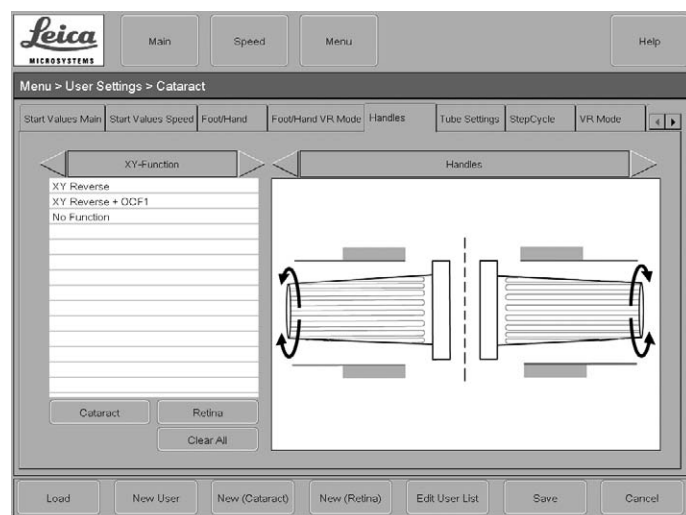
 The adjustment is the same as for the foot-/handswitch assignment; see the previous section.

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.

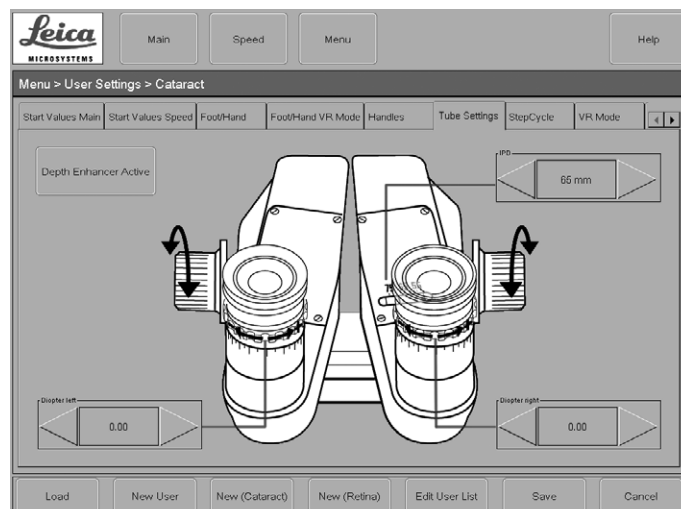


 For the handle, the additional "Handles" function group with the functions "All Brakes" (releases all brakes) and "Selected Brakes" (releases all brakes except the up/down brake) are also available (not available with the Leica M820 F20 and Leica M844 F20).

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

Tube Settings

On this screen, 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™

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

- Mainlight brightness
- OttoFlex™ brightness
- Magnification
- Depth Enhancer
- OCF1
- ADF1
- ADF2
- Focus

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™ parameters

- OCF1 pulse signal; e.g., for triggering an inverter from SDI Oculus
- ADF1, ADF2 pulse signal for triggering external systems, e.g. Leica Video Recording On/Off

The focus can take on three states:

- "Inactive": Off
- "Active (absolute)": the learned, absolute position is accurately approached.
- "Active (relative)": the learned distance between 2 dots is traveled, e.g., for defined contact magnifiers for retina operations.



Caution Risk of injury

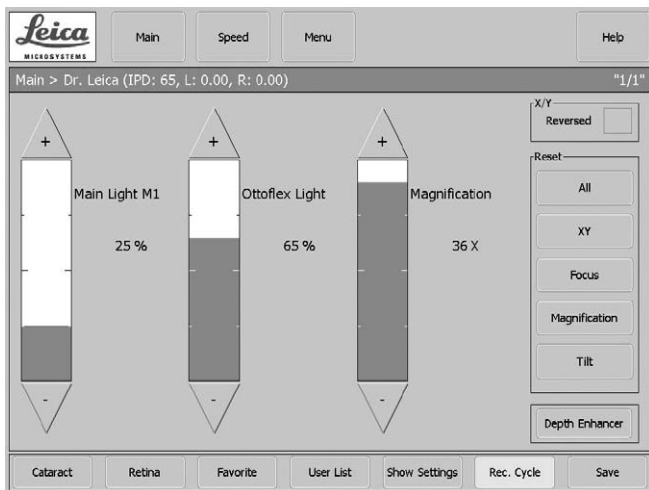
⇒ Pay special attention to the required safety distances if you use the StepCycle™ function together with accessories from other manufacturers that can reduce the working distance to less than 140 mm (non-contact wide-angle observation systems), since focus together with StepCycle is a semi-automated 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™ teach-in mode

- ⇒ In the "Main" or "Speed" menu, activate the teach-in mode by double-clicking the "Rec. Cycle" button.
- ⇒ Press the button on your footswitch/handswitch to which you have assigned the "StepCycle" 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 StepCycle™

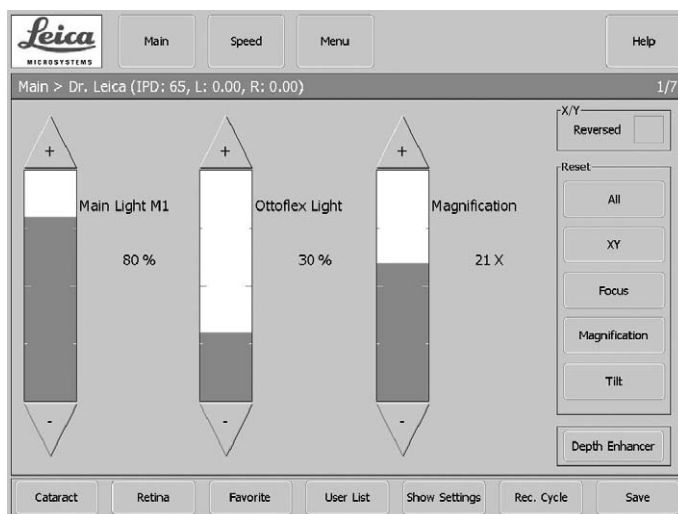
If StepCycle™ settings are stored for a user, the status bar on the right displays the user's current step out of the number of total steps:

- 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.

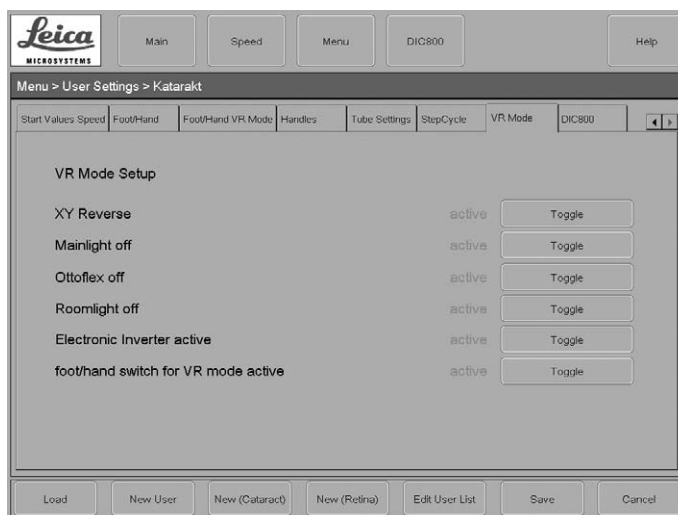


If you load a new user or trigger an Auto Reset, you are returned to Step 0.



VR-Mode

On this page, you can store user-specific settings for the VR mode (viteroretinal mode).



The settings (activated/deactivated) of the following functions can be stored specifically for VR mode:

- XY Reverse – reverse X and Y
- Mainlight off – switch off main light
- Ottoflex off – switch off OttoFlex™ illuminator
- Roomlight off – switch off additional function (ADF1 / ADF2)
- Electronic inverter active – activate inverter
- Foot/hand switch for VR mode active – activate separate assignment of the foot-/handswitch

These functions are activated at the factory.

You can deactivate the functions using the "Toggle" key.

The setting of "Electronic inverter active" depends on the connected inverter:

- Oculus SDI 4c with BIOM: Electronic Inverter active = inactive
- all others: Electronic Inverter active = active



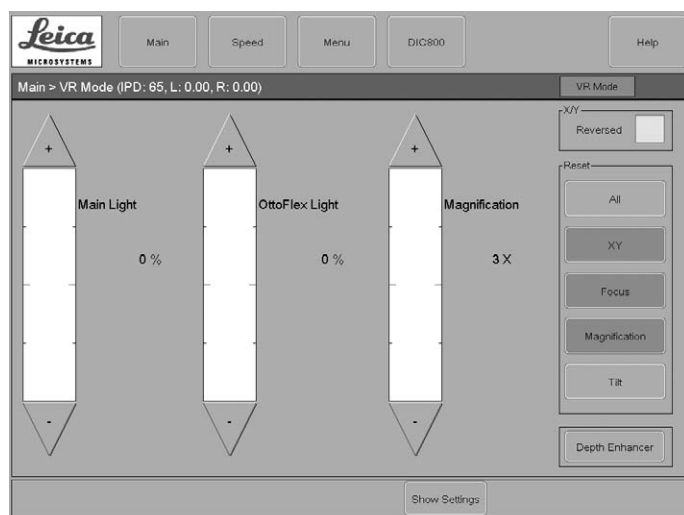
So that you can switch between the "normal" assignment and assignment in VR mode using the foot-/handswitch, the following conditions must be met:

- "foot/hand switch for VR mode active" must be activated.
- In each of the two foot-/handswitch assignments, (Foot/Hand switch/ Foot/Hand switch VR), "VR Mode on/off" must be assigned.
- If the "VR Mode on/off" function is assigned to "Foot/Hand switch" in the foot-/handswitch assignment, it is automatically applied to the same button at "Foot/Hand switch VR".

Using VR mode

⇒ Press the button with the "VR Mode on/off" assignment.

VR mode is activated. The actions activated in the user settings are carried out once. An active VR mode is highlighted in green on the "Main" menu page .



If VR mode is activated, no user settings can be configured. To do so, first deactivate VR mode.

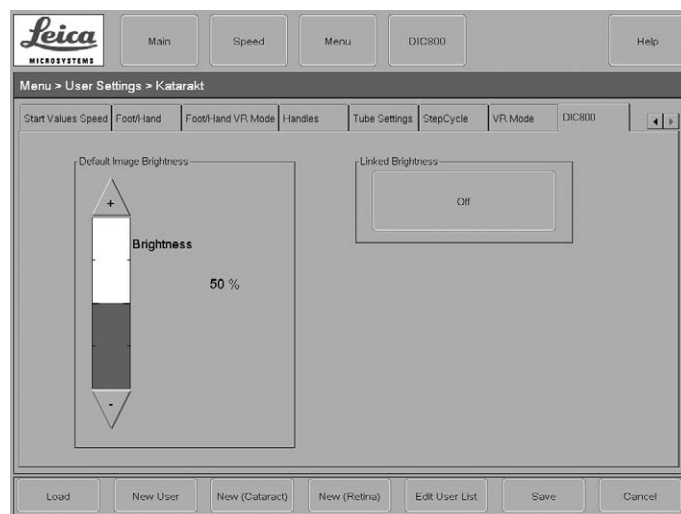
Ending VR mode

⇒ Press the button with the "VR Mode on/off" assignment again.

The microscope undoes all actions again.

DI C800

On this screen, the settings are configured for a connected Leica DI C800 for data superimposition; see separate user manual.



This tab is in the continuation of the menu bar. Use ◀/▶ to toggle between the beginning and end of the menu bar.



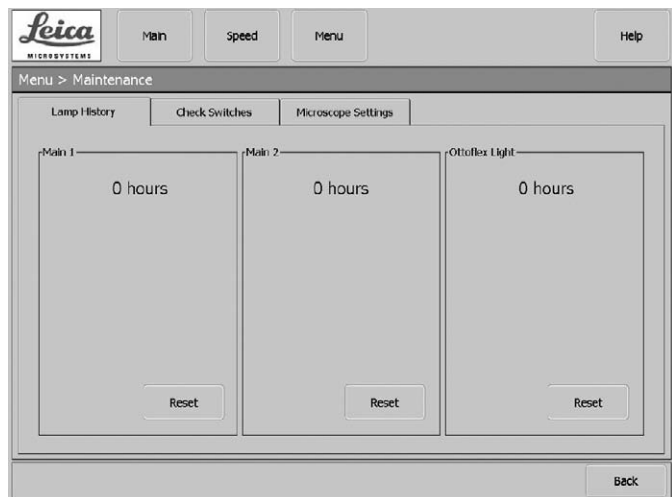
This tab appears only if a Leica DI C800 is connected.

The Maintenance menu



Lamp History

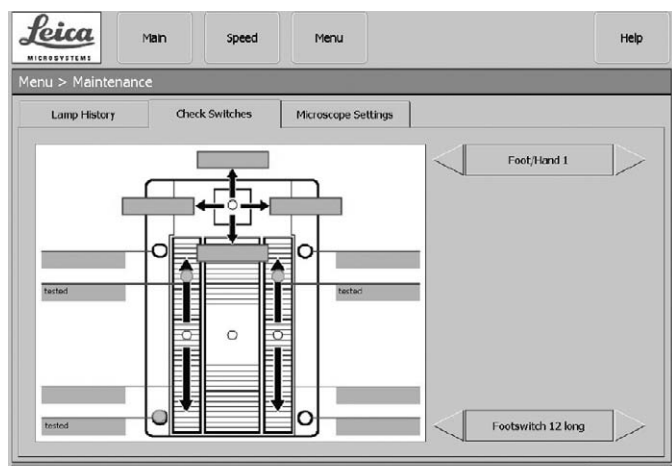
This screen displays the operating hours for each of the following bulbs: Main 1, Main 2, and OttoFlex™ Light.



⇒ 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 foot switches/handswitches and handles you are using.

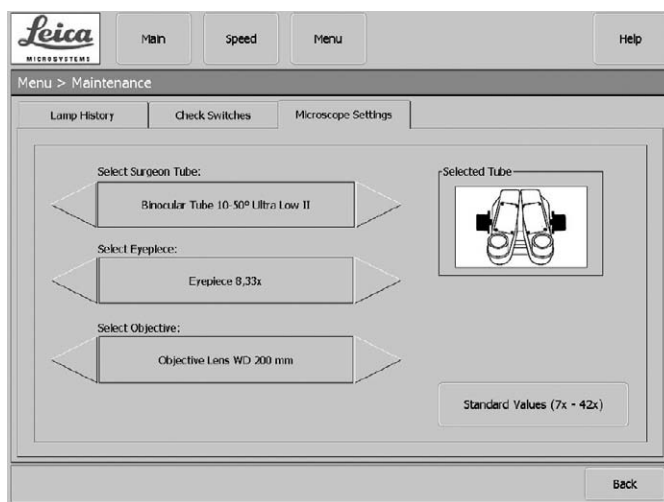


⇒ In the top right selection field, select the connection you are using.
 ⇒ You can scroll forwards or backwards in the list by clicking the arrowheads.
 ⇒ In the bottom right selection field, select the footswitch/ handswitch you want to check.

⇒ 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: UltraLow™ III, eyepiece with magnification 8.33 and objective with WD=200 mm.



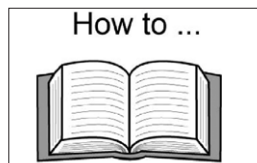
If you activate the "Standard Values" button, the standard magnification is displayed, regardless of the accessories used. The magnification range is between 7x and 42x.

Standard Values (7x - 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.

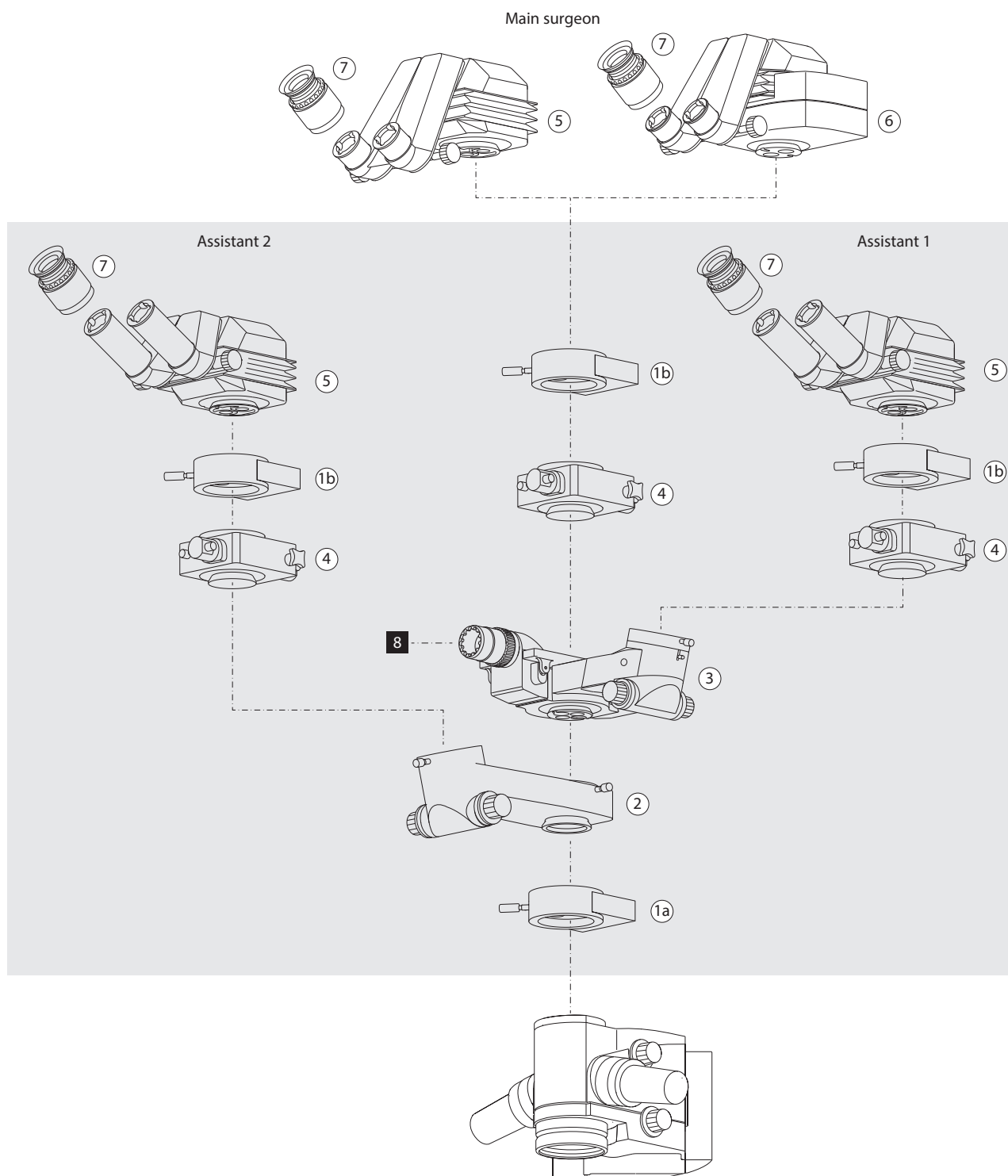


Shutting down the surgical microscope

- ⇒ Where appropriate, end the recording procedure on the documentation system (loss of data).
- ⇒ Bring the surgical microscope into the transport position.
- ⇒ Switch off the surgical microscope at the main switch.

Components and accessories

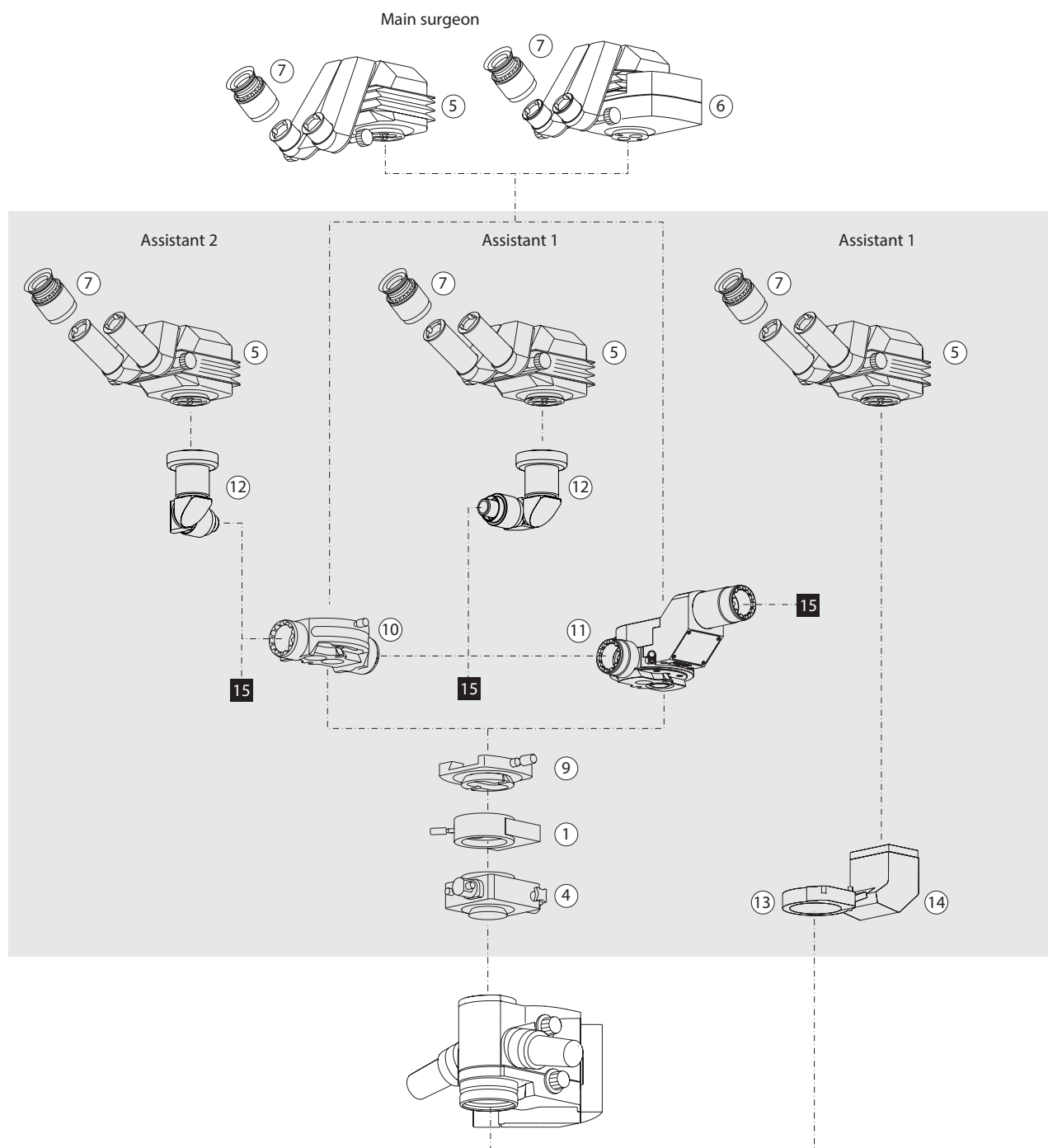
Observer side M844



- ① Laser filter
- ② Second wing
- ③ 0° assistant
- ④ Inverter

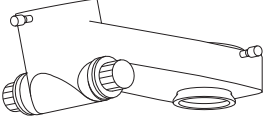
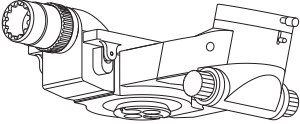
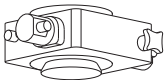
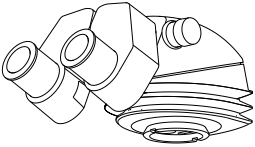
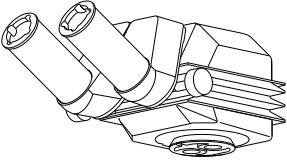
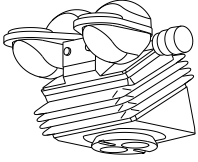
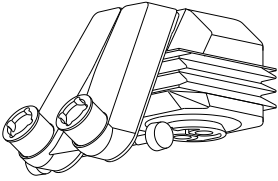
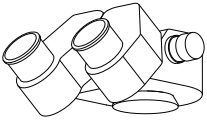
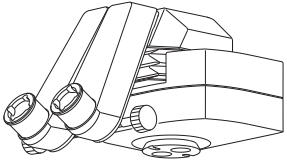
- ⑤ Binocular tube
- ⑥ Leica DI C800
- ⑦ Eyepiece
- ⑧ Interface for video camera/documentation accessories

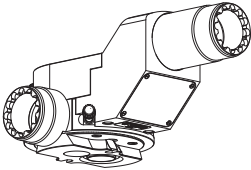
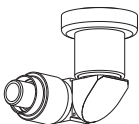
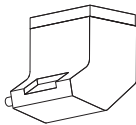
Observer side M820



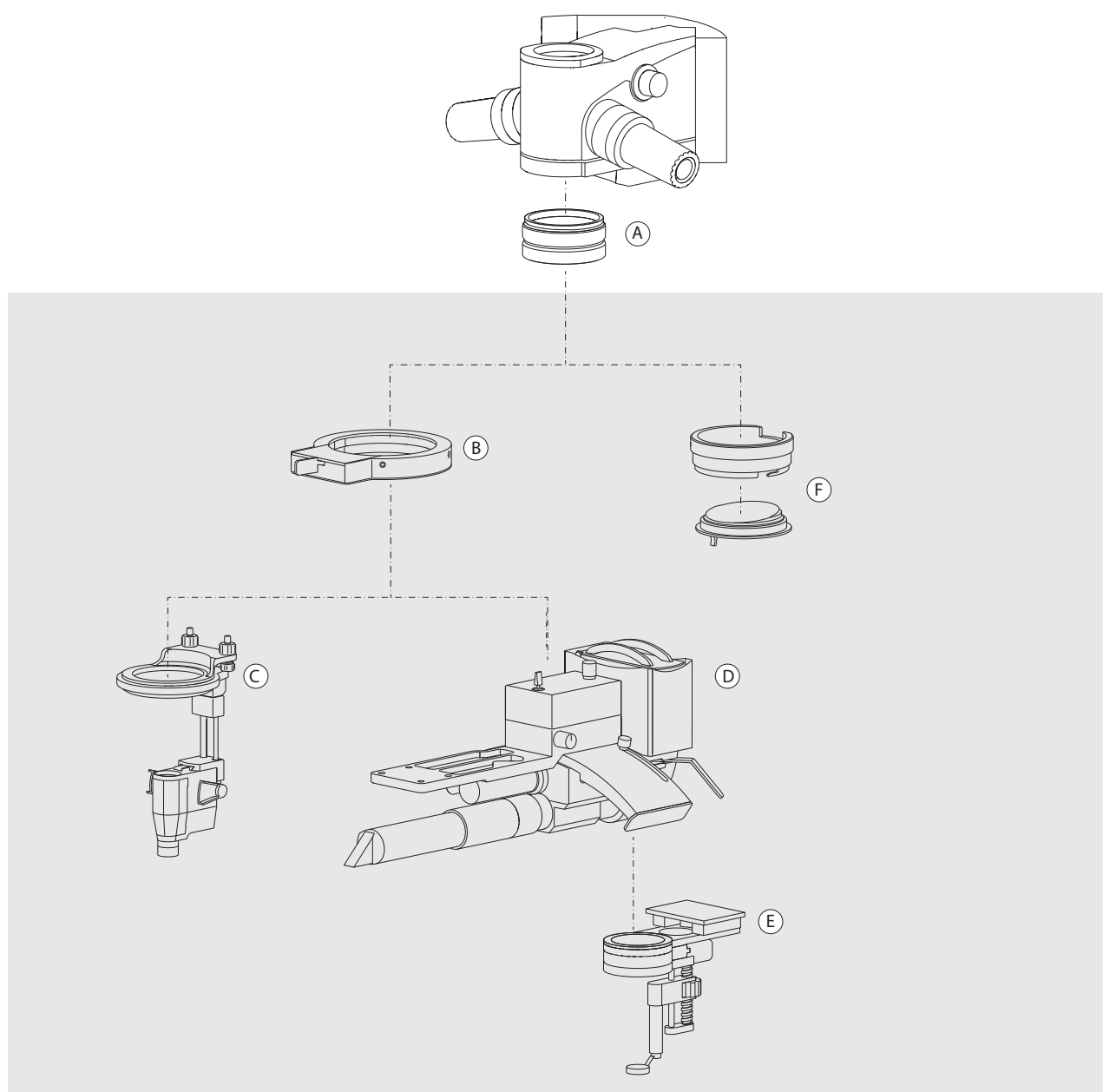
- ① Laser filter
- ④ Inverter
- ⑤ Binocular tube
- ⑥ Leica DI C800
- ⑦ Eyepiece
- ⑨ Stereo adapter

- ⑩ Beam splitter
- ⑪ Rotating beam splitter
- ⑫ Second observer stereo attachment
- ⑬ Adapter
- ⑭ Stereo Assistant Microscope
- ⑮ Documentation port

Item No.	Image	Component/accessory	Description
①a		Laser filter 4 beams	Third-party product, purchased only from third parties
①b		Laser filter 2 beams	Third-party product, purchased only from third parties
②		Second wing	- Enables a third observer in addition to the surgeon and assistant 50 % light splitting with the assistant
③		0° assistant	
④		Inverter	
⑤		Binocular tube, inclinable 5° to 25° with PD	- Adjustable viewing angle and height - Adjustable interpupillary distance
⑤		Binocular tube, 10° to 50° with PD	- Adjustable viewing angle and height - Adjustable interpupillary distance
⑤		Binocular tube, 30° to 150°, T, Type II L	- Tilts 120° - Adjustable interpupillary distance
⑤		Binocular tube, 10° to 50°, Type II, UltraLow™ III	- With extra-low viewing height - Adjustable viewing angle and height - Adjustable interpupillary distance
⑤		Binocular tube, inclined, T, type II	
⑥		Leica DI C800	- Binocular tube with image superimposition for overlaying XGA signals - For further information, see the separate operating instructions

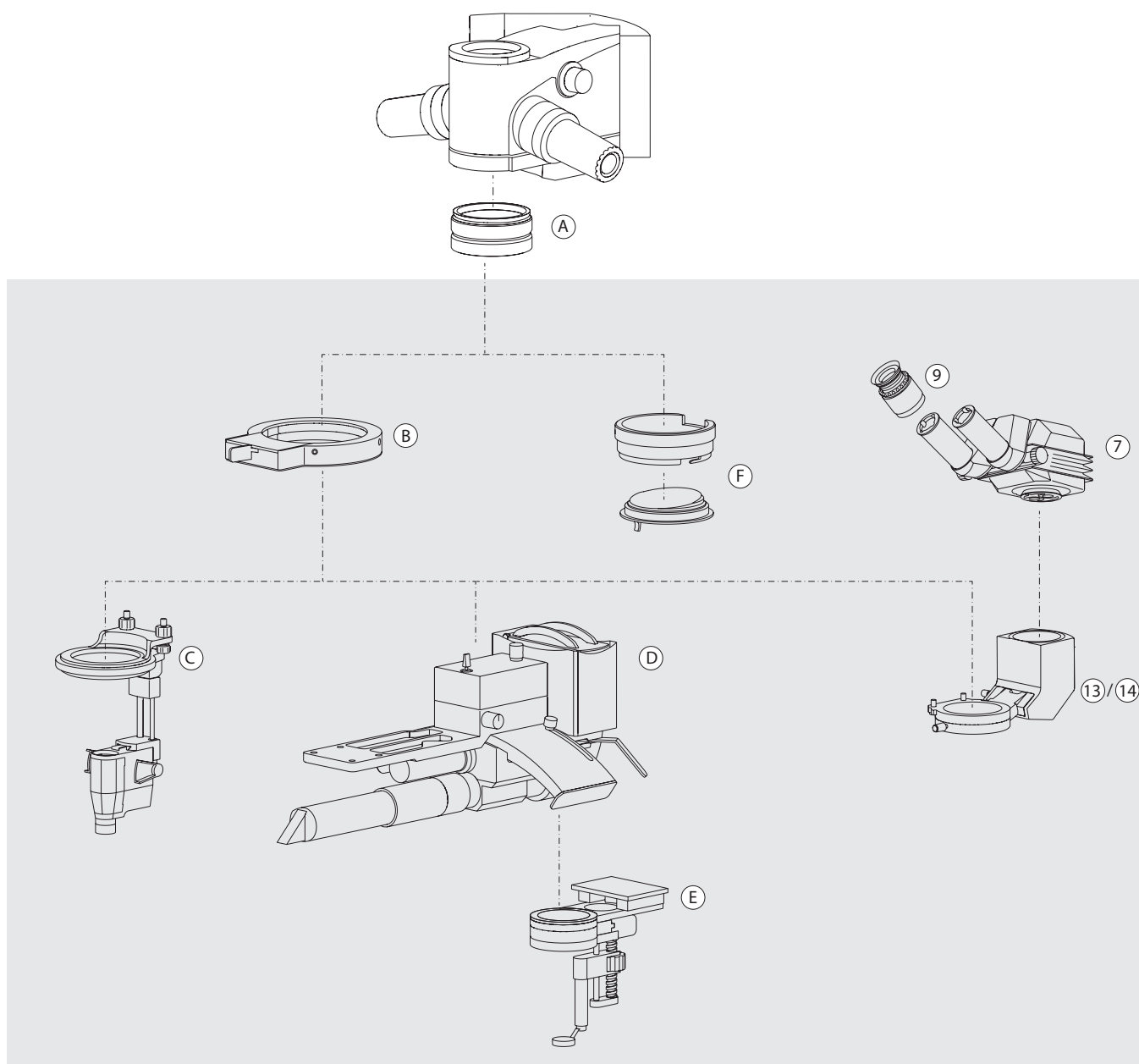
Item No.	Image	Component/accessory	Description
⑦		10× eyepiece 8.33× eyepiece 12.5× eyepiece	
⑦		Leica ToricEyePiece	- Facilitates adjustments to the angle of toric intraocular lenses via an integrated scale - For further information see the separate operating and installation instructions
⑨		Stereo adapter	For assembling a beam splitter
⑩		Beam splitter 50/50 Beam splitter 70/30	The two interfaces can be used as assistant ports and documentation ports.
⑪		Revolving beam splitter 50/50 Revolving beam splitter 70/30	- Revolving (front) assistant port - Fixed (rear) documentation port
⑫		Second observer stereo attachment	For assembly of binocular tube
⑬		Adapter for Stereo Assistant Microscope	
⑭		Stereo Assistant Microscope	Separate assistant microscope

Patient-side M844

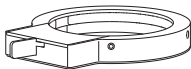
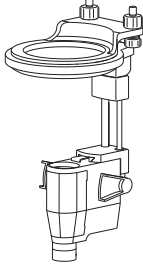
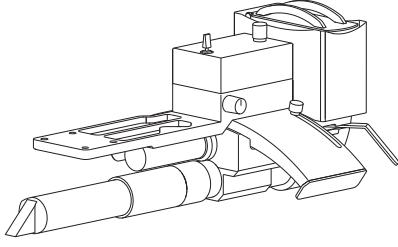
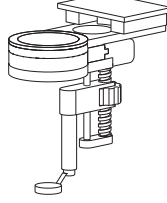


- Ⓐ Lens
- Ⓑ Leica Keratoscope
- Ⓒ Leica RUV800
- Ⓓ Leica Slit Illuminator
- Ⓔ Oculus BIOM
- Ⓕ Protective glass with holder

Patient-side M820



- (A) Lens
- (B) Leica Keratoscope
- (C) Leica RUV800
- (D) Leica Slit Illuminator
- (E) Oculus BIOM
- (F) Protective glass with holder
- (13) (14) Stereo Assistant Microscope with Adapter

Item No.	Image	Component/accessory	
(A)		Objective APO WD175 Objective APO WD200 Objective APO WD225	
(B)		Leica Keratoscope	• LED ring illuminator for displaying astigmatism • For further information, see the separate operating instructions
(C)		Leica RUV800 WD175 Leica RUV800 WD200	• For observing the fundus of the patient's eye • For further information, see the separate operating instructions
(D)		Leica Slit Illuminator	
(F)		Holder for protective glass	
(F)		Protective glass	
(E)		Oculus BIOM	

Combination options on the patient side

	Objective WD175	Objective WD200	Objective WD225	Stereo Assistant Microscope	Leica RUV800	Oculus BIOM	Protective glass	Leica Keratoscope	Leica Slit Illuminator	Dust cover
Stereo Assistant Microscope	✓	–	–		–	7)	–	✓	–	–
Leica RUV800	✓	✓	–	–		–	–	✓	–	–
Oculus BIOM	✓	✓	✓	–	–		–	✓	✓	4)
Protective glass	✓	✓	✓	–	–	–		–	–	✓
Leica Keratoscope	✓	✓	✓	8)	1)	2)	–		5)	6)
Leica Slit Illuminator	–	✓	–	–	–	3)	–	✓		–
Dust cover	✓	✓	✓	–	–	4)	✓	✓	–	

1) Only assembly. To use the Leica Keratoscope, the Leica RUV800 has to be disassembled.

2) Only assembly. To use the Leica Keratoscope, the Oculus BIOM has to be disassembled.

3) Limited movement

4) With special protective sleeve

5) Full function if the Leica Slit Illuminator is swung to the side.

6) Only assembly. To use the Leica Keratoscope, the dust cover has to be removed.

7) Limited view for the assistant

8) Only assembly. To use the Leica Keratoscope, the Stereo Assistant Microscope has to be disassembled.

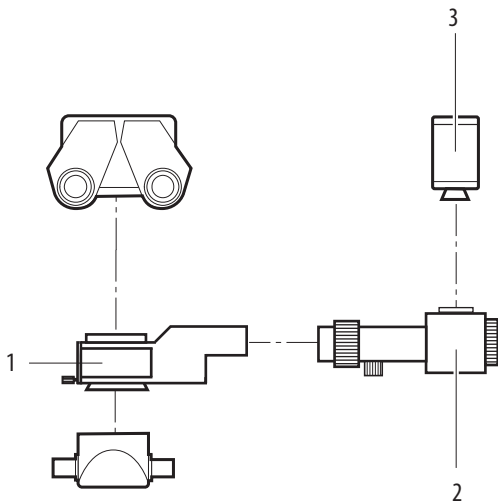
Example 1: Leica RUV800

- Leica RUV800 cannot be used with the WD225 objective.
- Leica RUV800 can be combined with the Leica Keratoscope.
- The combination with the Leica Keratoscope has no effect on the function of the Leica RUV800.

Example 2: Leica Keratoscope

- The Leica Keratoscope can be installed on each objective.
- The Leica Keratoscope can be combined with the Stereo Assistant Microscope, Leica RUV800, Oculus BIOM, Leica Slit Illuminator, and dust cover.
- In each combination case, special requirements for use of the Leica Keratoscope must be observed.

Video and Camera Accessories for Leica M844



- 1 0° assistant's attachment
- 2 Video adapter (Leica ZVA / RVA / MVA)
- 3 C-mount camera (Leica HD C100)

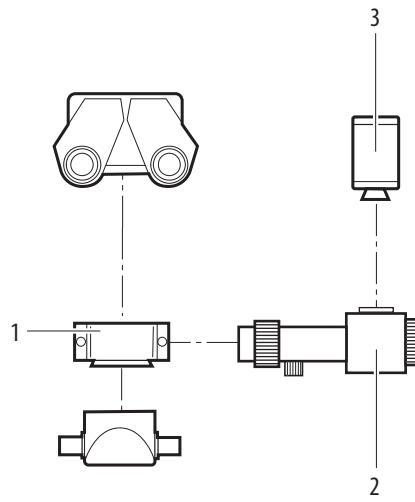
Video adapter

- For commercially-available video cameras with C-mount, complete with adapter.
- The video adapter (2) is installed at the beam splitter.
- Zoom and fine focus function for Leica Zoom Video Adapter.

Adjusting the parfocality of the microscope and video adapter

- ⇒ Configure diopter settings on the eyepieces in accordance with the personal corrections.
- ⇒ Set the maximum magnification on the microscope.
- ⇒ Place a flat test object with sharp contours under the objective.
- ⇒ Look through the eyepieces and focus the microscope.
- ⇒ Set the minimum magnification on the microscope.
- ⇒ Set the desired magnification on the Leica Zoom Video Adapter.
- ⇒ Focus the monitor image on the Leica Zoom Video Adapter.

Video and Camera Accessories for Leica M820



- 1 Beam splitter (50/50 % or 70/30 %), rotating beam splitter
- 2 Video adapter (Leica ZVA / RVA / MVA)
- 3 C-mount camera (Leica HD C100)

Video adapter

- For commercially-available video cameras with C-mount, complete with adapter.
- The video adapter (2) is installed at the beam splitter.
- Zoom and fine focus function for Leica Zoom Video Adapter.

Adjusting the parfocality of the microscope and video adapter

- ⇒ Configure diopter settings on the eyepieces in accordance with the personal corrections.
- ⇒ Set the maximum magnification on the microscope.
- ⇒ Place a flat test object with sharp contours under the objective.
- ⇒ Look through the eyepieces and focus the microscope.
- ⇒ Set the minimum magnification on the microscope.
- ⇒ Set the desired magnification on the Leica Zoom Video Adapter.
- ⇒ Focus the monitor image on the Leica Zoom Video Adapter.

Load table



For the maximum load value, refer to Chapter "Configurations and Weights", page 79.

Equipment Leica M844 serial number

Max. load for stand from microscope interface kg

Group	Art. No.	Description	Weight	Installation	
				Quantity	Total
Assistant	10448192	0° assistant	2.04 kg		,
	10446472	Second wing	1.20 kg		,
	10448231	Stereo Assistant Microscope (incl. adapter):	1.10 kg		,
	10446482	Beam splitter 70/30	0.41 kg		,
	10446565	Beam splitter 50/50	0.41 kg		,
	10448487	Revolving beam splitter 50/50	1.04 kg		,
	10448354	Revolving beam splitter 70/30	1.04 kg		,
	10446992	Stereo adapter	0.22 kg		,
	10448597	Second observer stereo attachment	1.01 kg		,
Optics	10445937	Objective APO WD200	0.41 kg		,
	10445938	Objective APO WD175			
	10445909	Objective APO WD225			
	10448547	Binocular tube, 10° to 50°, Type II, UltraLow™ III	1.42 kg		,
	10448217	Binocular tube, inclinable 5° to 25° with PD	0.74 kg		,
	10448159	Binocular tube, 10° to 50° with PD	1.26 kg		,
	10448088	Binocular tube var. 0° to 180°, T, Type II	1.42 kg		,
	10446574	Binocular tube, inclinable, T, type II	0.74 kg		,
	10448572	Leica DI C800	2.12 kg		,
	10448028	10× eyepiece	0.10 kg		,
	10448125	8.33× eyepiece			
	10446739	12.5× eyepiece			
Accessories for front section of the eye	10448558	Leica Keratoscope	0.21 kg		,
	10448554	Leica ToricEyePiece	0.10 kg		,
Accessories for rear section of the eye	10448555	Leica RUV800 WD175, assembly	0.53 kg		,
	10448556	Leica RUV800 WD200, assembly			
	10448392	Oculus SDI 4c/e	0.72 kg		,
	10448041	Oculus BIOM 4c/m, assembly	0.68 kg		,
	10448355	Leica Slit Illuminator	3.34 kg		,
		Laser filter	0.30 kg		,

Group	Art. No.	Description	Weight	Installation	
				Quantity	Total
Sterilizable components	10180591	Clip-on handle	0.08 kg		,
	10428238	Binocular tube T rotary knob cover	0.01 kg		,
	10446468	Holder for protective glass	0.10 kg		,
	10446467	Protective glass	0.06 kg		,
		Dust covers			,
Documentation	10446592	Leica Zoom Video Adapter (ZVA)	0.76 kg		,
	10448292	Leica Remote Video Adapter (RVA)	0.44 kg		,
	10448290	Leica Manual Video Adapter (MVA)	0.42 kg		,
	10448584	Leica HD C100 (optical head and cable)	0.64 kg		,
				Load	,



This list contains typical equipment articles. Subject to change.

Accessories List for Advanced Configuration

- Leica HD C100 camera system
- Panasonic camera system GP-US932 CSAP/E
- Leica Video Adapter (Manual, Remote, Zoom)
- Leica DI C800 Digital Imaging Color Module
- Leica Slit Illuminator
- Leica Keratoscope
- Leica ToricEyePiece
- Leica RUV800
- Oculus BIOM
- Leica Stereo Assistant Microscope
- Leica Wireless Footswitch, 12 functions, type B
- Leica Wireless Footswitch, 12 functions, type A
- Leica Wireless Footswitch, 16 functions, type B
- Leica Footswitch, 12 functions, type B
- Leica Footswitch, 12 functions, type A
- Leica Footswitch, 6 functions, type B
- Leica Footswitch, 6 functions, type A
- Leica Footswitch, 16 functions, type B

Intended Use

- The Leica Microsystems 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 Microsystems surgical microscope may be used only in enclosed 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 1, 2, 4, and 6 from EN 60601-1-2:2007).
- Portable and mobile as well as stationary RF communication equipment can have a negative effect on the reliability of the Leica M820 and Leica M844 surgical microscopes.

Information 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.
- ⇒ Allocate responsibilities for commissioning, operation and maintenance. Monitor compliance with this.
- ⇒ Only use the surgical microscope if it is free of defects.
- ⇒ Inform your Leica Microsystems representative or Leica Microsystems (Schweiz) AG, Medical Division, 9435 Heerbrugg, Switzerland, immediately if you detect a product defect that could potentially cause injury or harm.
- ⇒ If you use accessories from other manufacturers with the Leica Microsystems surgical microscope, make sure that these manufacturers confirm that the combination is safe to use. Follow the instructions in the user manual for those accessories.
- ⇒ Modifications and maintenance work may be performed only by professionals expressly authorized by Leica Microsystems.
- ⇒ Only original Leica Microsystems replacement parts may be used in servicing the product.
- ⇒ After service work or technical modifications, the device must be readjusted in accordance with our technical specifications.
- ⇒ If the 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 Microsystems will not accept any liability.
- ⇒ The influence on other devices by the Leica Microsystems surgical microscope has been tested in accordance with EN 60601-1-2. The system passed the emission and immunity test. Comply with the usual precautionary and safety measures relating to electromagnetic and other forms of radiation.

User qualifications

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

Directions for the user of the instrument

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

Phototoxic damage to the retina during eye surgery



Warning

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.

- ⇒ During exposure to the light from this instrument, do not exceed the hazard reference values.

If the exposure time exceeds 2.8 min with this instrument at maximum output power, the hazard reference value will be exceeded.

The following table is intended to serve as a guideline and make the surgeon aware of the potential hazard. The data have been calculated for the worst-case scenario:

- Eye with aphakia
- Completely unmoving eye (continuous irradiation of the same region)
- Uninterrupted light exposure, e.g. no surgical instruments in the eye
- Pupils dilated to 7 mm

The calculations are based on the corresponding ISO standards^{1) 2)} and the exposure limit values recommended in them. With a moving eye, a factor of 5 to 10 can be applied to these limit values³⁾.

Main light

Light setting	Recommended maximum exposure time according to ¹⁾ [min.]		
	Without filter	With GG435 filter	With GG475 filter
25 %	77	116	270
50 %	19	28	64
75 %	7	11	25
100 %	3	5	12

OttoFlex™ illuminator

Light setting	Recommended maximum exposure time according to ¹⁾ [min.]	
	Without filter	
25 %	113	
50 %	25	
75 %	9	
100 %	5	



Use the protection filter 5× (10448676) to increase the operation duration by a factor of 5 compared to the standard configuration without a filter.

Sources:

- ¹⁾ DIN EN ISO 15004-2:2007 Ophthalmic instruments – Fundamental requirements and test methods – Part 2: Light hazard protection.
- ²⁾ ISO 10936-2:2010 Optics and photonics – Operation microscopes/Part 2: Light hazard from operation microscopes used in ocular surgery.
- ³⁾ David Sliney, Danielle Aron-Rosa, Francois DeLori, Franz Fankhauser, Robert Landry, Martin Mainster, John Marshall, Bernhard Rassow, Bruce Stuck, Stephen Trokel, Teresa Motz West and Michael Wolffe, Adjustment of guidelines for exposure of the eye to optical radiation from ocular instruments: statement from a task group of the International Commission on Non-Ionizing Radiation Protection (ICNIRP) APPLIED OPTICS, Vol. 44, No. 11, p. 2162 (10 April 2005).

Protect the patient with the following safeguards:

- Short illumination times
- Low brightness setting
- Use of protective filters
- Switching off the illumination during breaks in the operation

It is recommended to adjust the brightness to the minimum necessary for the surgery. Infants, patients with aphakia (whose eyelens has not been replaced by an artificial lens with a UV protection screen), small children and persons with diseases of the eye are at greater risk. The risk is also increased if the person being treated or operated on has, within the last 24 hours, already been exposed to illumination from the same or any other ophthalmological instrument that uses a bright visible light source. This applies especially to patients that have been examined via retinal photography.

The decision about which light intensity to use for an application 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. Despite all efforts to minimize the risk of retinal injury by surgical microscopes, damage may still occur. Photochemical retinal damage is a possible complication of the necessity to use bright light to make eye structures visible during difficult ophthalmological processes.

Stability (floor stands only)

When moved in the operating room, the swing arm must be folded up and locked and the brakes must be applied, otherwise the swing arm could drift out of control and the stand could topple.

Hazards due to movable 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

- Always push the instrument to move it; never 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 Microsystems 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

Motors return to their home position!

- ⇒ 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 illuminators. Replace defective bulbs before the operation begins.
- ⇒ Footswitch/handswitch: Test all functions.
- ⇒ With handles and remote brake release, check the function of the brakes (for F40, C40, CT40 see page 27, for F20 see page 28).



Warning

Danger of fatal electric shock!

- ⇒ Operate the system only with all equipment in its proper position (all covers fitted, doors closed).



Warning

Risk of injury from downward movement of surgical microscope!

- ⇒ Complete all preparations and adjustments to the stand before the operation.
- ⇒ Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ⇒ Before re-equipping, always lock the swing arm.
- ⇒ After re-equipping, always rebalance the microscope on the swing arm.
- ⇒ 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

Burn hazard!

- ⇒ The lamp housing and cover may become hot during use.



Warning

Risk of eye injuries!

The light source of the slit illuminator might be too bright for the patient.

- ⇒ Dim the slit illuminator before switching it on.
- ⇒ Slowly increase the brightness until the image is illuminated optimally for the operating doctor.



Warning

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.

- ⇒ During exposure to the light from this instrument, do not exceed the hazard reference values.
- If the exposure time exceeds 2.8 min with this instrument at maximum output power, the hazard reference value will be exceeded.



Warning

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

Risk of injury from downward movement of surgical microscope!

- ⇒ Never change the accessories or attempt to rebalance the microscope while it is above the field of operation.
- ⇒ After re-equipping, always rebalance the microscope on the swing arm.



Warning

Risk of injury due to downward movement of the surgical microscope!

- ⇒ Always lock the swing arm:
 - when transporting the microscope
 - when re-equipping



Warning

Risk of injury from downward movement of surgical microscope!

- ⇒ 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 handles or remote brake release when the instrument is in an unbalanced state.



Warning

Risk of injury from:

- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**
- **Abrupt braking of the surgical microscope at a threshold that cannot be crossed.**
 - ⇒ Before transport, always move the Leica M820 F20, Leica M844 F20, Leica M820 F40, and Leica M844 F40 surgical microscopes into the transport position.
 - ⇒ Never move the stand in the extended condition.
 - ⇒ Always push the surgical microscope; never pull it.
 - ⇒ Never roll over cables lying on the floor.



Warning

Danger of fatal electric shock!

⇒ The surgical microscope may be connected to a grounded socket only.



Warning

Risk of injury due to downward movement of the surgical microscope!

⇒ Do not use the handles or remote brake release when the instrument is in an unbalanced state.



Warning

Light that is too intense can damage the retina.

⇒ Observe the warning messages in the "Safety Notes" chapter on page 55.



Warning

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

Danger of fatal electrical shock!

⇒ Disconnect the power cable from the power socket before changing fuses.



Warning

Halogen lamps become very hot!

⇒ Always switch off the control unit before changing a bulb.
⇒ Allow bulbs to cool off before changing them.



Warning

Risk of injury from downward movement of surgical microscope!

⇒ Do not exceed the max. load when equipping components and accessories.
⇒ Check the total weight using the following load table (or: using the "Load table" on page 53).



Caution

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. Requirements of use, see page 77.



Caution

Danger of crushing due to moving parts!

The parts of the slit illuminator that are moved by motors may crush fingers or the hand when used improperly.

⇒ When handling the slit illuminator, take care not to crush any fingers.



Caution

There is a risk of damage to the surgical microscope from uncontrolled tilting!

⇒ Firmly hold the handles before triggering the "All Brakes" function.



Caution

Surgical microscope can move without warning!

⇒ Always lock the footbrake when you are not moving the system.



Caution

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

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

Destruction of the zoom motor!

⇒ Use the manual adjustment of the zoom motor only if the zoom motor is defective.



Caution

Risk of injury.

⇒ Pay special attention to the required safety distances if you use the StepCycle™ function together with accessories from other manufacturers that can reduce the working distance to less than 140 mm (non-contact wide-angle observation systems), since focus together with StepCycle™ is a semi-automated function.



Caution

Damage to the touchpanel!

⇒ Operate the touch panel using your fingers only.

Never use hard, sharp or pointed objects made out of wood, metal or plastic.



Caution

Damage to the touchpanel!

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

Manufacturer's declaration of electromagnetic compatibility (EMC)



This "Guidance and manufacturer's declaration" document is based on EN 60601-1-2:2007.

Table 1 from EN 60601-1-2:2007

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
RF emissions in accordance with CISPR 11	Group 1	For its internal functions, the Leica M820 and Leica M844 surgical microscopes use RF energy only. Therefore, its RF emissions are very low and it is not likely to cause any interference in nearby electronic equipment.
RF emissions in accordance with CISPR 11	Class A	The Leica M820 and Leica M844 surgical microscopes are suitable for use in establishments other than domestic establishments and those directly connected to the public low voltage power supply network that also supplies buildings used for domestic purposes.
Harmonic emissions in accordance with IEC 61000-3-2	Class A	
Emissions of voltage fluctuations / flicker in accordance with IEC 61000-3-3	Complies	

Table 2 from EN 60601-1-2:2007

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) in accordance with IEC 61000-4-2	±6 kV contact discharge ±8 kV air discharge	±6 kV contact discharge ±8 kV air discharge	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 immunity according to IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input and output lines	±2 kV for power supply lines ±1 kV for input and output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surges according to 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 power supply voltage fluctuations IEC 61000-4-11	< 5 % U _T (>95 % dip in UT) for 1/2 cycles. 40 % U _T (60 % dip in UT) for 5 cycles. 70 % U _T (30 % dip in UT) for 25 cycles. <5 % U _T (>95 % dip in UT) for 5 s	< 5 % U _T (>95 % dip in UT) for 1/2 cycles. 40 % U _T (60 % dip in UT) for 5 cycles. 70 % U _T (30 % dip in UT) for 25 cycles. <5 % U _T (>95 % dip in UT) for 5 s	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.
Magnetic fields at power frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	Not applicable	

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

Table 4 from EN 60601-1-2:2007

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 RF 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.
Radiated RF – interference to IEC 61000-4-6 Conducted RF interference in accordance with IEC 61000-4-3	3 V _{eff} 150 kHz to 80 MHz 3 V/m 80 MHz to 2.5 GHz	3 V _{eff} 3 V/m	Recommended separation distance: $d = 2.4\sqrt{P}$ for 150 kHz to 80 MHz $d = 2.4\sqrt{P}$ 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 RF 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 RF 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 RF 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.			

Recommended separation distances between portable / mobile RF telecommunication devices 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 RF 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 RF communication equipment (transmitters) and the Leica M820 and Leica M844 surgical microscopes 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 80 MHz $d = 2.4 \sqrt{P}$ in m	80 MHz to 800 MHz $d = 2.4 \sqrt{P}$ in m	800 MHz to 2.5 GHz $d = 2.4 \sqrt{P}$ in m
0.01	0.24	0.24	0.24
0.1	0.8	0.8	0.8
1	2.40	2.40	2.40
10	8.0	8.0	8.0
100	24.0	24.0	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.

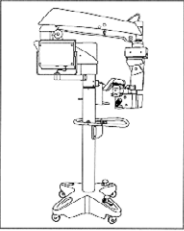
Warning message:

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 it in the vicinity of other instruments, the devices should be monitored to ensure that they function properly in this arrangement.

Signage

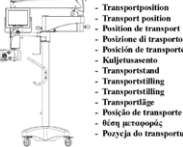
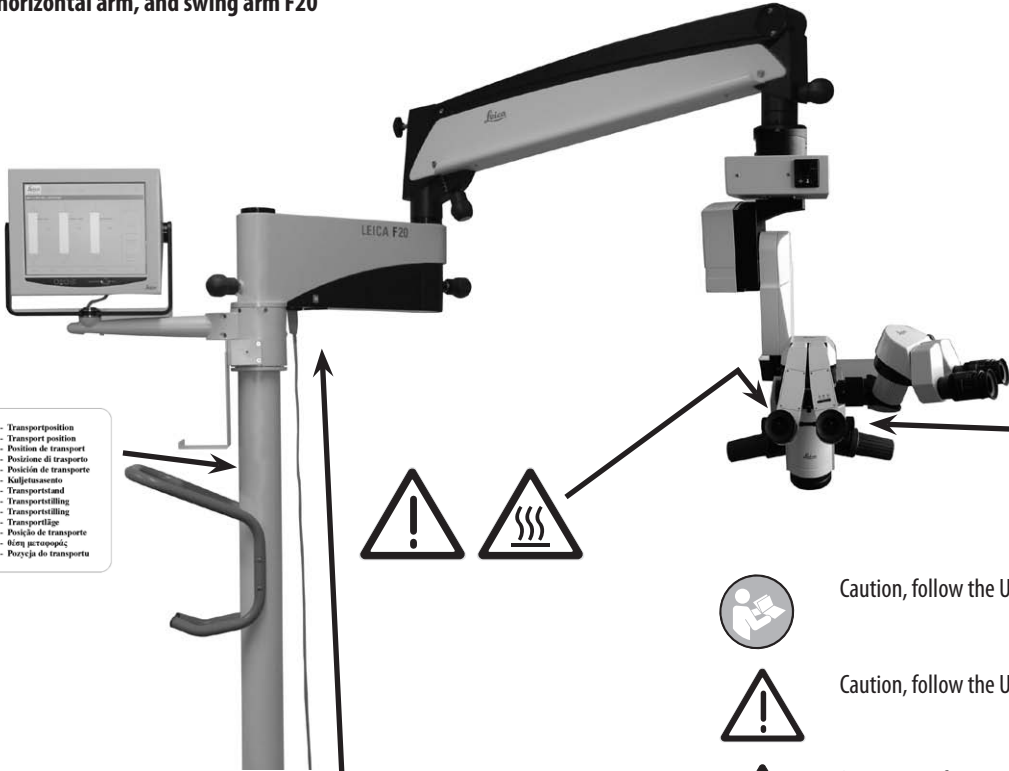
F40 floor stand





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

Floor stand, horizontal arm, and swing arm F20





Leica M844 /
Leica M820



Caution, follow the User Manual



Caution, follow the User Manual



Danger sign for contusions



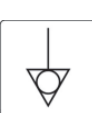
Danger sign for hot surface



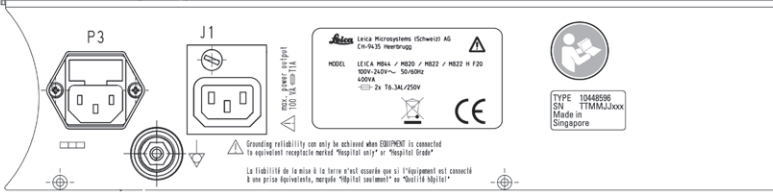
Symbol for alternating current



Symbol for fuses



Equipotential bonding



P3 J1

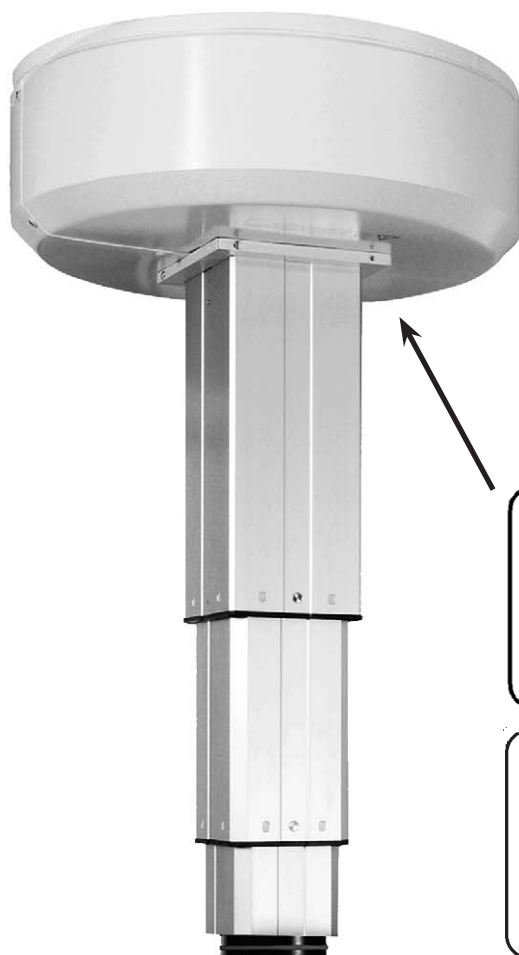
Leica Microsystems (Schweiz) AG
CH-9435 Heerbrugg

MODEL: LEICA M844 / M820 / M822 / M822 H F20
300V, 3A, 50/60Hz - 50/60Hz
KONV: 2x 10,3A/250V

TYPE 10440596
SN ITMMJLJ000
Made in Singapore

Grounding reliability can only be achieved when EARTHING is connected to a grounded receptacle marked "Hospital only" or "Hospital Grade".
La fiabilité du la mise à la terre n'est assurée que si l'équipement est connecté à une prise appropriée, marquée "Hospital only" ou "Hospital Grade".

Leica Telescope Mount



Leica Microsystems (Schweiz) AG
CH-9435 Heerbrugg

MODEL LEICA M844/M820/M822/M822 H CT40
230V~ 50Hz
1400VA

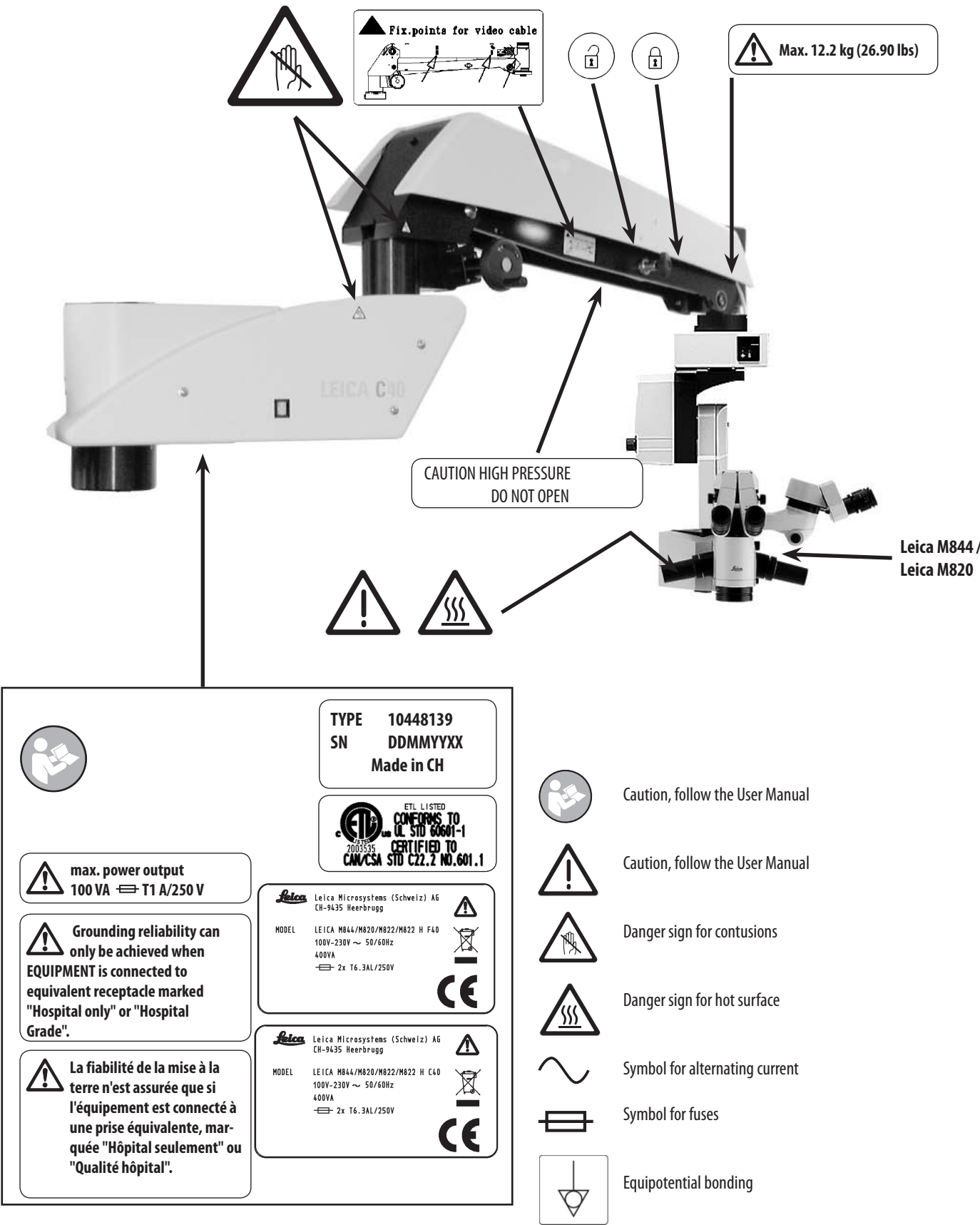


Leica Microsystems (Schweiz) AG
CH-9435 Heerbrugg

MODEL LEICA M844 / M820 / M822 / M822 H CT40
120V~ 60Hz
1500VA



Horizontal arm and swing arm F40 / C40 / CT40



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 bellows and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from moisture, vapors, acids, alkalis, and corrosive substances.
Do not keep any chemicals near the instruments.
- 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.
- To disinfect the surgical microscope, use compounds from the surface disinfectant group based on the following active ingredients:
 - Aldehydes
 - Alcohols
 - Quaternary ammonium compounds.

 Due to potential damage to the materials, never use products based on:

- Halogen-donating compounds,
- Strong organic acids,
- Oxygen-donating compounds.

 Follow the disinfectant manufacturer's instructions.

 We recommend concluding a service contract with Leica Microsystems 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

Damage to the touchpanel!

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



Caution

Damage to the touchpanel!

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

Maintenance

The surgical microscopes Leica M820 F40, Leica M820 F20, and Leica M820 CT40 as well as Leica M844 F40, Leica M844 F20, and Leica M844 CT40 are basically maintenance-free.

To ensure that they always operate safely and reliably, the **Leica M820 C40 and Leica M844 C40** (large Leica Microsystems ceiling mount) operating microscopes 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, Germany). No other lubricants are permissible.

- ⇒ In order to ensure the operational safety of the entire system, however, we recommend having our specialists carry out regular maintenance already after the warranty period has ended. Please contact your local Leica Microsystems (representative) service for maintenance agreements.

- ⇒ Use only original spare parts for servicing.

Care and Maintenance of the Leica Foot switch

After each operation, clean the Leica footswitch in warm or hot water (but below 60 °C). It is basically maintenance-free. In case of defects, please contact the responsible service organization.

Changing fuses



Warning Danger of fatal electric shock!

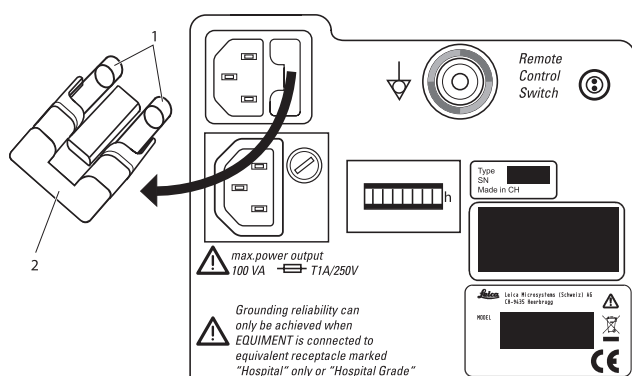
- ⇒ Disconnect the power cable from the power socket before changing fuses.

Changing fuses at the power input socket

- ⇒ Pull out the fuse holder (2) on the underside of the horizontal arm.
- ⇒ Remove the two fuses (1) from the holder and replace them.



Use only 6.3 A time-lag fuses.

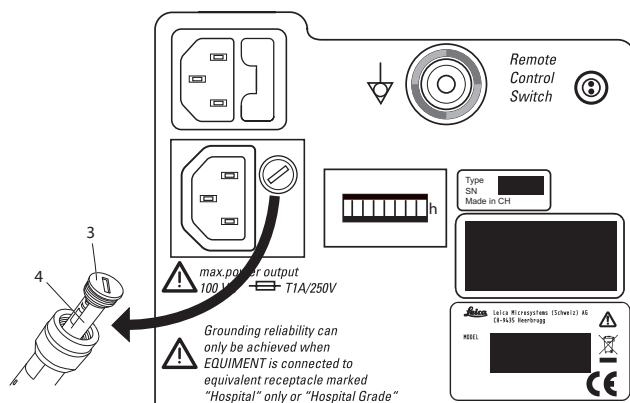


Changing the fuse at the auxiliary power socket

- ⇒ Unscrew the fuse holder (3) on the underside of the horizontal arm.
- ⇒ Remove the fuse (4) from the holder and replace it.



Use only a 1 A time-lag fuse.



Changing lamps



Warning 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!).

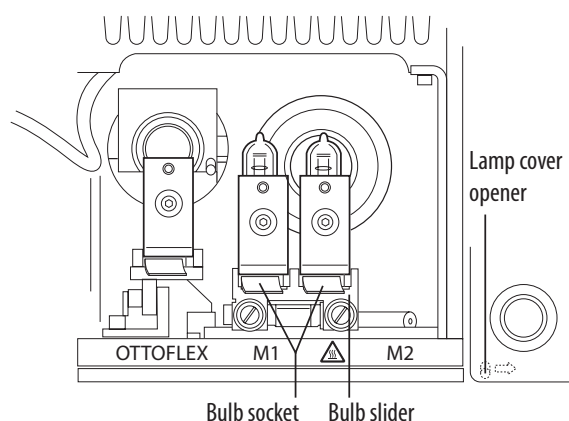
Main light



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



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.

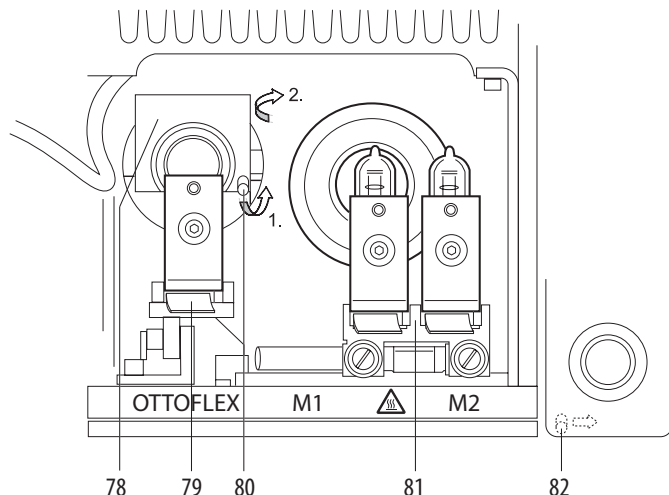
To replace lamp M1, the bulb slider must be all the way to the left.
To replace lamp M2, the bulb slider must be all the way to the right.

- ⇒ Pull on the tab to remove the bulb socket complete with bulb.
- ⇒ Pull on the tab to remove the bulb socket complete with bulb.
- ⇒ Insert the new bulb socket and bulb.

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

 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 42).

Notes on reprocessing of resterilizable products

Products

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

Restriction on reprocessing

With regard to the processing of medical products used on patients having or suspected of having Creutzfeldt-Jacob disease (CJD) or its variant (vCJD), the local legal regulations must be observed. As a rule, resterilizable products used with this patient group can be disposed of safely by incineration.

Work 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 tear 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, detergent, spirits, microfiber cloth

Procedure:

- Rinse surface contamination off of the product (temp. <40 °C). Use some detergent depending upon degree of contamination.
- Spirits may also be used to clean the optics if heavy contamination such as fingerprints, grease streaks, etc. is present.
- Dry off products, except for optical components, with a disposable cloth/paper cloth. Dry off optical surfaces with a microfiber cloth.

Cleaning: automatic

Equipment: cleaning/disinfecting device

It is not recommended to clean products with optical components in a cleaning/disinfecting device. In addition, to avoid damage, optical components must not be cleaned in ultrasonic baths.

Disinfection

The alcohol disinfection solution "Mikrozid Liquid" may be used in accordance with the instructions on the label.

Please note that after disinfection, the optical surfaces must be rinsed thoroughly with fresh drinking water, followed by fresh demineralized water. The products must be dried thoroughly before the subsequent sterilization.

Maintenance

No special requirements

Check and functional test

Check the security of attachment of the rotary knobs and handgrips.

Packaging

Individual: 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 below

Storage

No special requirements

Additional information

None

Contact information of manufacturer

Address of local agent

Leica Microsystems (Schweiz) AG, Medical Division, has 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.

Sterilization

This list provides an overview of the sterilizable components available at Leica Microsystems (Schweiz) AG, Medical Division for the surgical microscope.

Art. 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, binocular tube T	X	
10384656	Rotary knob, transparent	X	
10443792	Lever extension	X	
10446058	Protective glass, multifocal lens		X ¹⁾
10446469	Objective protective glass Leica M680/FL400		X ¹⁾
10446467	Objective protective glass Leica M840/M841		X ¹⁾
10445341	Handle for Leica M655, sterilizable	X	
10445340	Cap for Leica M655/M695, sterilizable	X	
10446842	Handle for Leica M400, sterilizable	X	
10448440	Cover, sterilizable for Leica M320 handle	X	
10448431	Objective protective glass Leica M320		X ¹⁾
10448296	Objective protective glass Leica M720, spare part (package of 10)		X ¹⁾
10448280	Objective protective glass Leica M720, assembly, sterilizable		X ¹⁾
10448581	Cover, sterilizable for Leica RUV800	X	

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

Disposal

The respective applicable national laws must be observed for disposal of the products, with the involvement of corresponding disposal companies.
The unit packaging is to be recycled.



If electrically operated functions do not work properly, always check these points first:

- Is the main power switch switched on?
- Is the power cable connected correctly?
- Are all connecting cables attached correctly?

General

Fault: **The functions cannot be activated with the footswitch/hand-switch.**

Cause 1: A cable connection is loose.

Fault remedy:

- ⇒ Check the power cable.
- ⇒ Check the connection of the handles.

Cause 2: Assignment entered incorrectly on the control unit.

Fault remedy:

- ⇒ Check the assignment of the footswitch/handswitch on the control unit (see pages 38).

Microscope

Fault: **There is no light in the microscope.**

Cause 1: A cable connection is loose.

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 67).

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

Fault remedy:

- ⇒ If the main illuminator fails during the operation, switch to the other lamp using the quick-change lamp mount.
- ⇒ After the operation, check the bulbs and replace any that are defective (see page 67).

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 slit illuminator position.

Fault remedy:

⇒ Check the position of the OttoFlex™/slit illuminator switch (see item 53, page 13) and set it to OttoFlex.

Cause 3: A bulb is defective.

Fault remedy:

⇒ Check the bulbs and replace any that are defective (see page 67).

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: The dioptic correction is not set correctly.

Fault remedy:

⇒ Carry out the dioptic correction by following the instructions exactly (see page 19).

Fault: **Zoom cannot be adjusted electrically.**

Cause 1: The zoom motor has failed.

Fault remedy:

⇒ Push and turn the zoom rotary knob to adjust the zoom manually (see page 35).

Fault: **Undesirable 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 can either not be moved, or only with great physical effort.**

Cause 1: A cable is sticking.

Fault remedy:

⇒ Reroute the affected cable.

Cause 2: The transport lock is not released.

Fault remedy:

⇒ Release the transport lock (see page 30).

Cause 3: A brake is not released.

Fault remedy:

⇒ Contact your Leica Microsystems representative.

Control unit

Fault: The display does not show an image.

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 35).

Cause 2: Assignment entered incorrectly on the control unit.

Fault remedy:

⇒ Check to ensure that the cable connections are tight.

Cause 3: The display is defective.

Fault remedy:

⇒ Contact your Leica Microsystems representative.

⇒ You can still work with your Leica Microsystems surgical 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 Leica Slit Illuminator.

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 Microsystems representative.

F40 stand

Fault: The surgical microscope can either not be moved, or only with great physical effort.

Cause 1: A cable is sticking.

Fault remedy:

⇒ Reroute the affected cable.

Cause 2: The transport lock is not released.

Fault remedy:

⇒ Release the transport lock (see page 30).

Cause 3: A brake is not released.

Fault remedy:

⇒ Contact your Leica Microsystems representative.

C40 ceiling mount

Fault: The Leica M844 C40 or Leica M820 C40 rotates.

Fault remedy:

- ⇒ Contact your Leica Microsystems 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 Microsystems representative.
 - ⇒ Have your Leica Microsystems 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: Bad plug-in connection.

Fault remedy:

- ⇒ Check the clamping terminal.

Cause 3: Fuse provided by customer defective.

Fault remedy:

- ⇒ Replace the fuse.
-

F20 stand

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

Cause 1: The swing arm is not balanced.

Fault remedy:

- ⇒ Balance the swing arm (see page 28).

Cause 2: Poor cable routing.

Fault remedy:

- ⇒ Check the position of the cables, especially in case of subsequently added video cables.

Fault: The swing arm lowers even when the balance scale is set to its highest level.

Cause: Maximum load of optics carrier exceeded.

Fault remedy:

- ⇒ Reduce the total weight and accessories (max. load must not exceed 11.5 kg).

Fault: The microscope is difficult to position.

Cause: Articulation brakes are tightened too much.

Fault remedy:

- ⇒ Adjust the articulation brakes so that you can position the microscope easily (see page 28).

Camera, video

Fault: The image on the monitor is too dark.

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

Fault remedy:

⇒ Optimize the settings for the camera and/or monitor (see manufacturer's operating instructions).

⇒ Also refer to page 21.

Cause 2: Filter in Leica Zoom Video Adapter is set incorrectly.

Fault remedy:

⇒ Adjust the brightness or replace the filter in the dual attachment.

Cause 3: Diaphragm on the Leica Video Adapter connection interface is closed.

Fault remedy:

⇒ Set diaphragm to the "open" position.

Cause 4: Fuse provided by customer defective.

Fault remedy:

⇒ Replace the fuse.

Fault: Images are blurry

Cause 1: The parfocality of the Leica Video Adapter is not adjusted properly.

Fault remedy:

⇒ Check the parfocality of the microscope (see page 19).

Cause 2: The parfocality of the microscope is not set properly.

Fault remedy:

⇒ Check the parfocality of the Leica Video Adapter (see page 52).

Cause 3: Specimen is out of focus.

Fault remedy:

⇒ Focus accurately, insert graticule if necessary.



If your instrument has a malfunction that is not described here, contact your Leica Microsystems representative.

Microscope

QuadZoom™	optical system with 4 beam paths: 100 % stereopsis for surgeon and assistant (only Leica M844)
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
ErgonOptic™ System	Binocular tubes: 10° to 50°, Low and Ultra Low™ III; variable 0-180°; variable 30-150°
Eyepieces	Wide-field eyepieces for spectacle wearers 8.33×, 10×, 12.5×
Objectives	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
XY-unit	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)

Illumination

Main light	Integrated illumination concept for intense, uniform red reflex
OttoFlex™ II	Illuminator module for increasing red reflex, decreasing stray light through the sclera, and increasing image contrast. Variable field diameter from 4 to 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 protection filter and UV protection filter (GG420), integrated accessories

Accessories

0° stereo assistant's attachment	100 % stereopsis at the same magnification, integrated fine focus, rotary ring for binocular tube ($\pm 15^\circ$), Documentation port for 3 simultaneous observers Leica HD C100 camera system Leica Manual Video Adapter (MVA) • Focal length f = 55 mm, 70 mm, and 107 mm • with C-mount port • Manual fine focus Leica Remote Video Adapter (RVA) • Focal length f = 55 mm, 70 mm, and 107 mm • with C-mount port • Motorized fine focus Leica Zoom Video Adapter (ZVA) • 3:1 zoom • Focal length f = 35 mm to 100 mm • with C-mount port • Manual fine focus Leica RUV800, BIOM*, EIBOS*
Double wing Video/camera	
Wide-angle observation system	Leica ToricEyePiece AVI*, SDI*
IOL orientation	Leica DI C800
Inverter	Adapters for installation are available from laser manufacturer
Data superimposition	Motorized, $\pm 23^\circ$, slit width 0.01–14 mm, slit length 14 mm, 180° revolving, quick-change lamp mount
Lasers	All controls can be sterilized, sterile drapes are available
Slit lamp	
Asepsis	
Leica Keratoscope	

* Accessories from third-party
manufacturers

Electrical data

Power socket	
F40 floor stand	Central on the horizontal arm 100–230 VAC ($\pm 10\%$), 50/60 Hz
F20 floor stand	Central on the horizontal arm 100–240 VAC ($\pm 10\%$), 50/60 Hz
CT40 ceiling mount	Terminal strip on the ceiling 120 V ($\pm 10\%$), 60 Hz 230 V ($\pm 10\%$), 50 Hz
C40 ceiling mount	Terminal strip on the ceiling 100–230 V ($\pm 10\%$), 50/60 Hz
Fuse	2 × T6.3 AL / 250 V
Power consumption	
Floor stand	
Leica M844 / M820 F40	400 VA
Leica M844 / M820 F20	400 VA
Ceiling mount	
Leica M844 / M820 C40	400 VA (without ceiling mount) 400 VA (only ceiling mount)
Telescope Mount	
Leica M844 / M820 CT40	(120 V ~60 Hz) 1500 VA (entire system, incl. telescopic unit)
Leica M844 / M820 CT40	(230 V ~50 Hz) 1400 VA (entire system, incl. telescopic unit)
Protection class	Class 1

Auxiliary power socket

Output voltage	100–230 V AC
Fuse	T1 AL, 250 V
Max. permitted power consumption of the secondary device:	100 VA
Max. permitted ground leakage current for the Leica M844/M820 F40 including secondary device, Leica M844/M820 C40 including secondary device, Leica M844/M820 CT40 including secondary device, Leica M844/M820 F20 including secondary device:	IEC/EN 60601-1: 5 mA UL 60601-1: 300 μ A

If the ground leakage current exceeds the permitted limit value, the following measures are required:

- Secondary device does not conform to IEC/EN 60601-1 (EU) / UL 60601-1 (USA):
⇒ Connection via isolating transformer.
- Secondary device conforms to IEC/EN 60601-1 (EU) / UL 60601-1 (USA):
⇒ Establish connection via potential equalization or connection via isolating transformer.

Optical data

With UltraLow™ III binocular tube

Eyepiece	Leica objective OptiChrome™ WD = 175 mm/f = 200 mm	
	Total magnification	Field of view ($\geq$ 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	Leica objective OptiChrome™ WD = 200 mm/f = 225 mm	
	Total magnification	Field of view ($\geq$ 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	Leica objective OptiChrome™ WD = 225 mm/f = 250 mm	
	Total magnification	Field of view ($\geq$ 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

F40 floor stand

Castors	4× 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 requirements	Base: 637 × 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 (at the column): ±170° Axis 2 (in the center): +150°/–170° Axis 3 (over XY-unit): ±270°

F20 floor stand

Castors	4× 100 mm
Weight	Base 174 kg Column with additional weight 55 kg
Total weight	Approx. 270 kg with max. load
Brakes	4 mechanical articulation brakes, locking lever for vertical movement 4 footbrakes, integrated in castors
Load	Swing arm: Max. 11.5 kg from microscope/dovetail ring interface
Space requirements	Base: 606 × 606 mm min. height in rest position: 1949 mm
Range	Extension 1480 mm max.
Stroke	min. 650 mm
Balancing	via gas spring
Turning range	Axis 1 (at the column): 360° Axis 2 (in the center): +180°/–135° 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× M24 FH II 24/50B or FH II 24/150B
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
Stroke	Ceiling mount: ±300 mm Swing arm: 846 mm
Balancing	via gas spring
Turning range	Ceiling mount: 330° Axis 1 (ceiling mount): ±90° Axis 2 (in the center): ±135° Axis 3 (over XY-unit): ±270°
Swing arm	

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× 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.
Stroke	Telescopic unit: 500 mm Swing arm: 846 mm
Balancing	via gas spring
Turning range	Axis 1 (ceiling mount): ±90° Axis 2 (in the center): ±135° Axis 3 (over XY-unit): ±270°

Ambient conditions

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
Transport	–40 °C to +70 °C –40 °F to +158 °F 10 % to 100 % rel. humidity 500 mbar to 1060 mbar atmospheric pressure

CE conformity

- Medical Devices Directive 93/42/EEC including amendments.
- Classification: Class I, in compliance with Appendix IX, Rule 1, and Rule 12 of the Directive.
- Medical Electrical Equipment, Part 1: General Requirements for Safety IEC 60601-1; EN 60601-1; UL 60601-1; CAN/CSA-C22.2 NO. 601.1-M90.
- Electromagnetic compatibility IEC 60601-2; EN 60601-1-2.
- According to a certificate from the Swiss Association for Quality and Management Systems, Leica Microsystems (Schweiz) AG, Medical Division, has a management system that corresponds to the requirements of the international standards ISO 9001, ISO 13485, and ISO 14001 for quality management, quality assurance, and environmental management.

Configurations and Weights



Warning

Risk of injury from downward movement of surgical microscope!

- ⇒ Do not exceed the max. load when equipping components and accessories.
- ⇒ Check the total weight using the "Load table" on page 53.

The stands have the following maximum load from the interfaces of the microscope:

Stand	F40	F20	CT40	C40
Max. load	12.2 kg	11.5 kg	12.2 kg	12.2 kg



The total weight of the load is measured using the "Load table" on page 53.

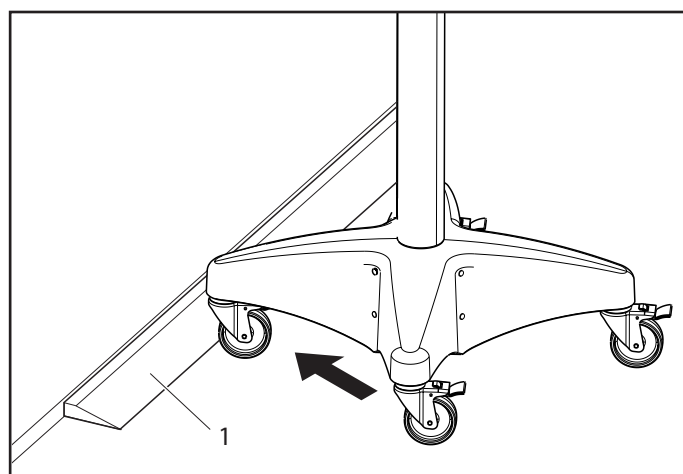
Limitations of use

The Leica M820 F40, Leica M820 C40, Leica M820 CT40, Leica M844 F40, and Leica M844 CT40 surgical microscopes may be used only in enclosed rooms and on solid, level floors and ceilings.



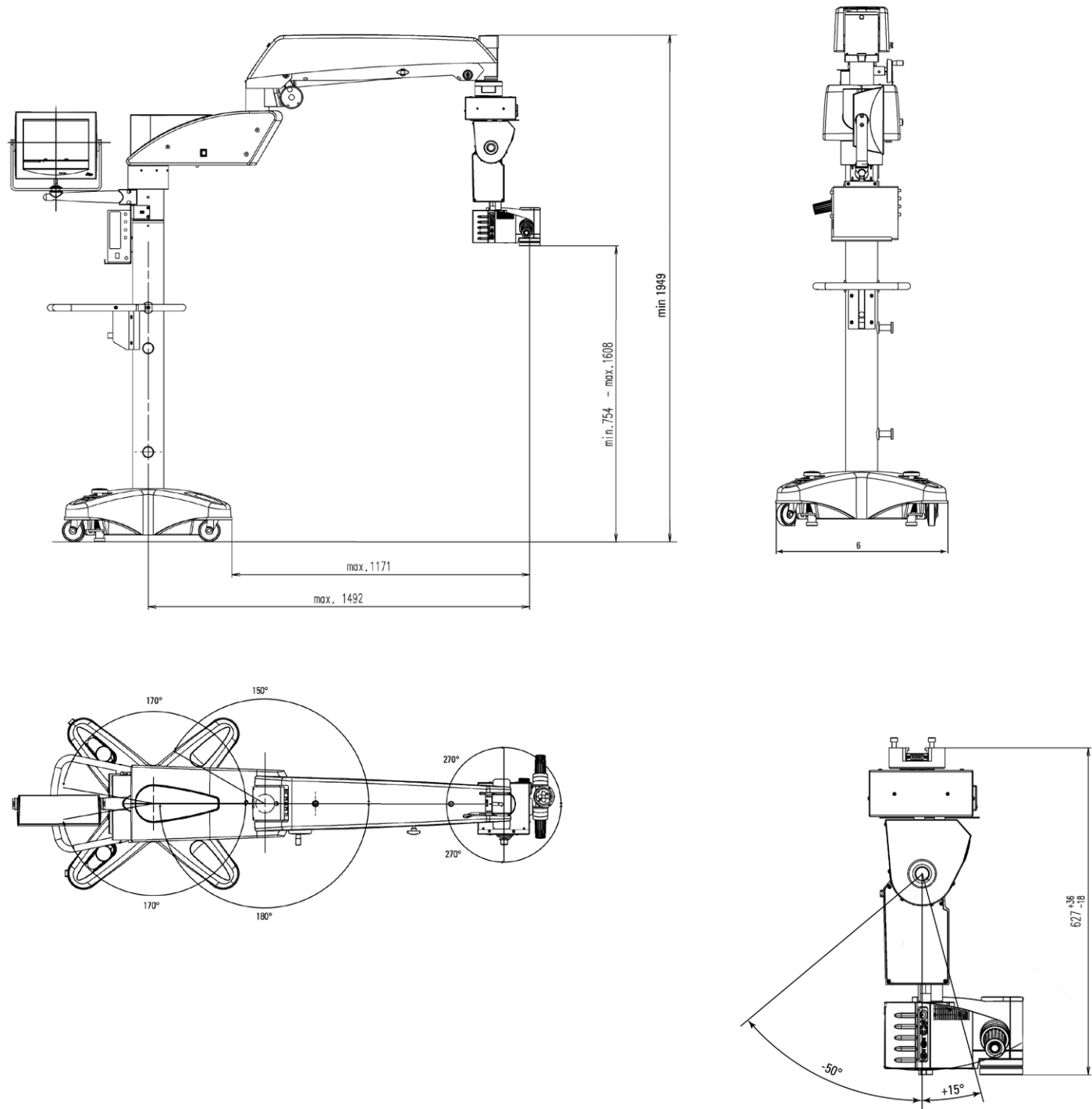
For the Leica M820 F40 and Leica M844 F40, drift effects must be taken into account on floors which slant $>0.3^\circ$.

- The Leica M844/M820 F20 and the Leica M844/M820 F40 are not suitable for crossing thresholds higher than 20 mm.
- Without auxiliary equipment, the Leica M844/M820 F20 and the Leica M844/M820 F40 can only be moved across thresholds up to a max. height of 5 mm.
- To move the Leica M844/M820 F20 and the Leica M844/M820 F40 over thresholds of 20 mm, the wedge (1) included in the packaging can be used.

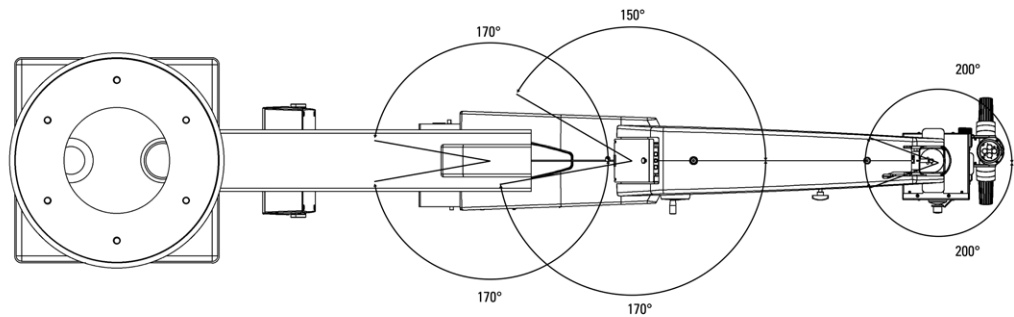
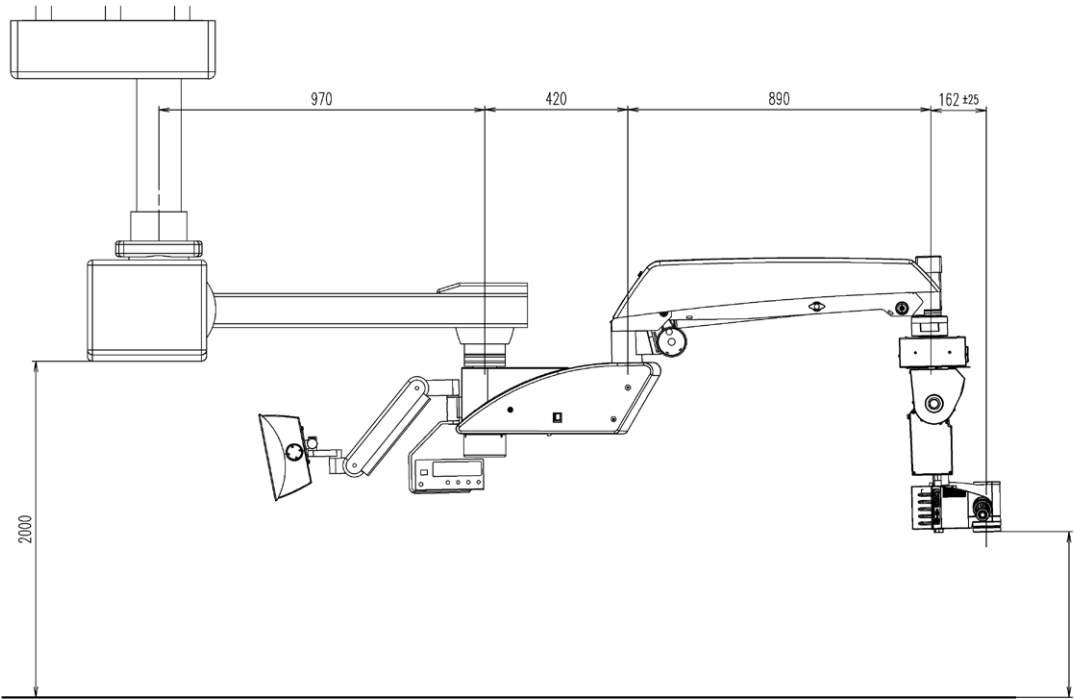


- ⇒ Place the wedge (1) in front of the threshold.
- ⇒ Move the surgical microscope across the threshold in the transport position, pushing it by the handgrip.

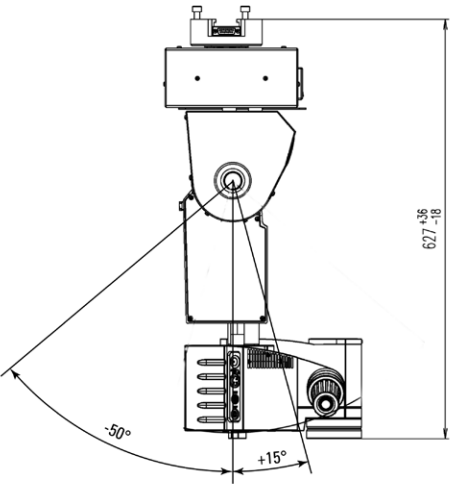
Dimensional drawing (mm) for Leica M820 F40 and Leica M844 F40



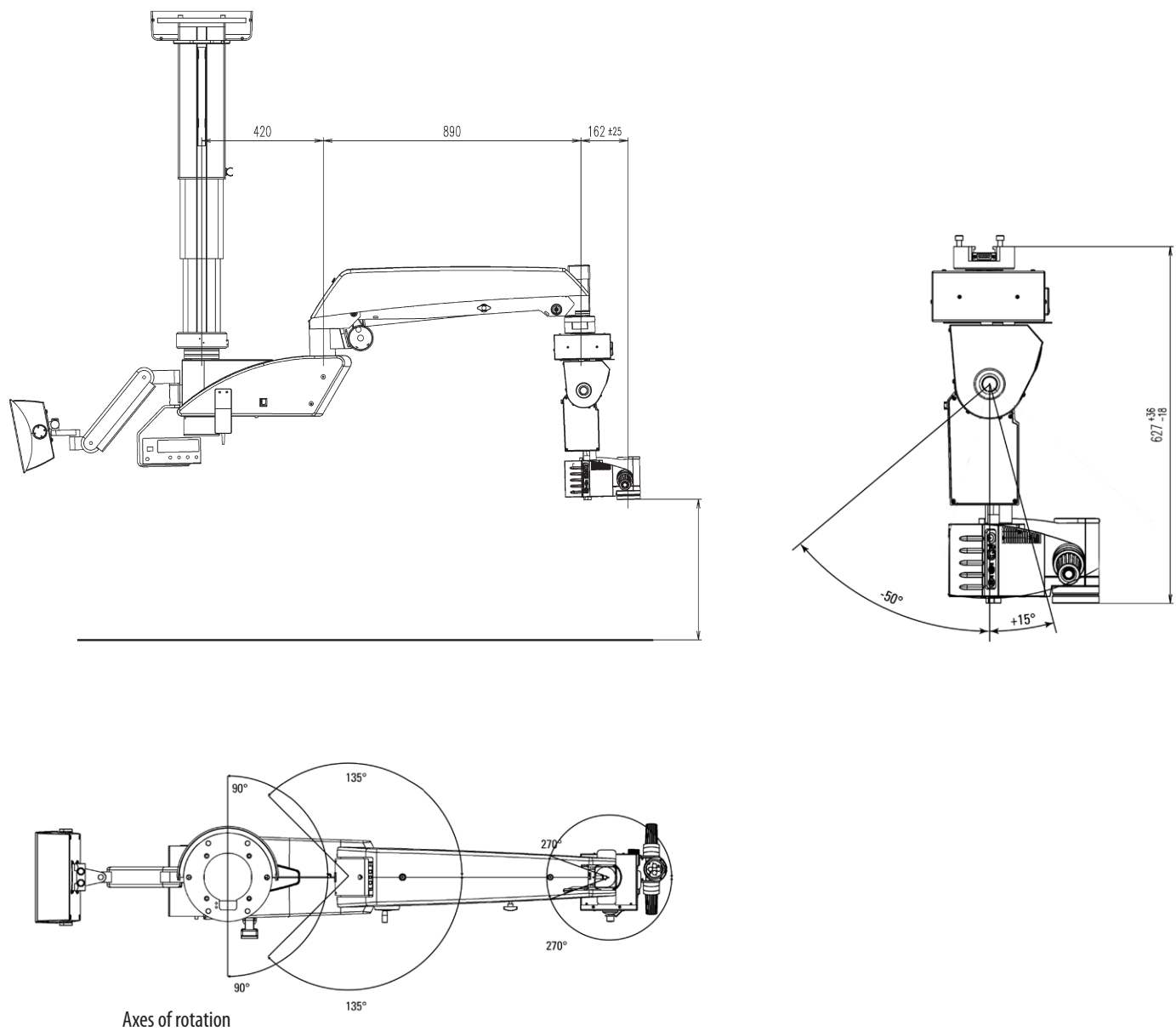
Dimensional drawing (mm) for Leica M820 C40 and Leica M844 C40



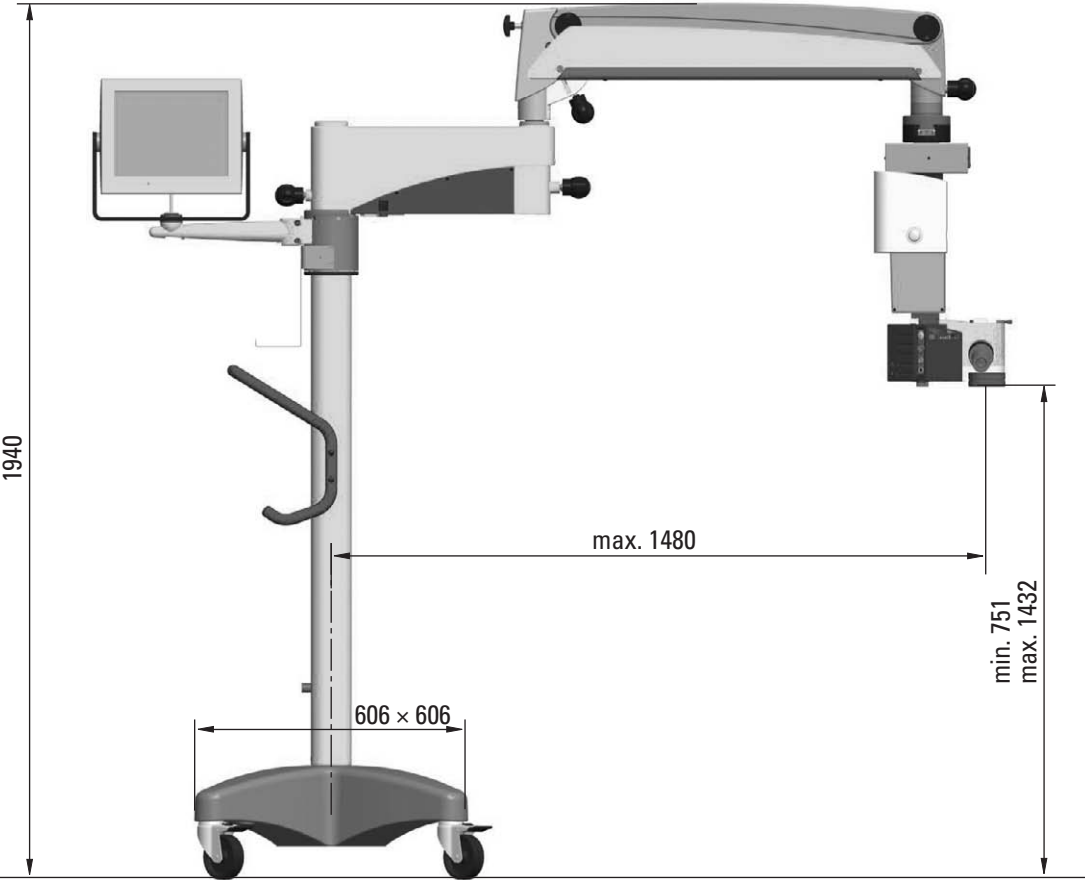
Axes of rotation



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



Dimensional drawing (mm) for Leica M820 F20 and Leica M844 F20



The fruitful collaboration “with the user, for the user” has always been the foundation of Leica Microsystems’ innovative strength. On this basis, we have developed our five corporate values: Pioneering, High-end Quality, Team Spirit, Dedication to Science, and Continuous Improvement.

MEDICAL DIVISION

What does a surgeon expect from an outstanding surgical microscope? Sharp, clear images, and a modular system aligned with the surgeon and OR staff needs.

Innovations for your practice

From the first surgical microscope with widefield optics in the 1980s to the first microscopes with Horizontal Optics and with LED illumination, Leica Microsystems has been at the forefront of innovation in the development of surgical microscopes.

HD video, fluorescence and retinal viewing systems also demonstrate the continued innovative nature of the Leica team. We strive to provide the surgeon with leading edge technology to enhance performance, surgeon comfort, and patient outcomes.

Leica Microsystems – an international company with a strong network of worldwide customer services:

Active worldwide	Tel.		Fax	
USA · Buffalo Grove/Illinois	+1	800 248 0123	+1	847 405 0164
Canada · Concord/Ontario	+1	800 248 0123	+1	847 405 0164
Australia · North Ryde/NSW	+61	2 8870 3500	+61	2 9878 1055
Austria · Vienna	+43	1 486 80 50 0	+43	1 486 80 50 30
Belgium · Diegem	+32	2 790 98 50	+32	2 790 98 68
Denmark · Ballerup	+45	4454 0101	+45	4454 0111
France · Nanterre Cedex	+33	811 000 664	+33	1 56 05 23 23
Germany · Wetzlar	+49	64 41 29 40 00	+49	64 41 29 41 55
Italy · Milan	+39	02 574 861	+39	02 574 03392
Netherlands · Rijswijk	+31	70 4132 100	+31	70 4132 109
Portugal · Lisbon	+351	21 388 9112	+351	21 385 4668
Spain · Barcelona	+34	900 210 992	+34	93 494 95 40
Sweden · Kista	+46	8 625 45 45	+46	8 625 45 10
Switzerland · Heerbrugg	+41	71 726 34 34	+41	71 726 34 44
United Kingdom · Milton Keynes	+44	800 298 2344	+44	1908 246 312
China · Hong Kong	+852	2 564 6699	+852	2 564 4163
· Shanghai	+86	21 6039 6000	+86	21 6387 6698
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Korea · Seoul	+82	2 514 65 43	+82	2 514 65 48
Singapore	+65	6779 7823	+65	6773 0628

