From Eye to Insight

Leica
MICROSYSTEMS

M822

User Manual

10 743 504 version 04

Date of issue: 2025-06-16

CE

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

www.leica-microsystems.com

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

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Korea only:
부작용보고 문의처:
한국의료기기안전정보원, 080-080-4183

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

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

Contents

This manual covers the following systems:

- M822 F40
- M822 F20
- M822 CT40

1 Introduction

1.1 About this user manual

In this user manual the surgical microscope M822 is described.

In addition to notes on the use of the instruments this user manual gives important safety information (see chapter "Safety notes").

► Read this user manual carefully before operating the product.

1.2 Symbols in this user manual

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

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

Technical documentation and Assembly instruction

The Technical documentation is part of the document “Assembly instruction”.

2 Product identification

The model and serial numbers of your product are located on the identification label on the illumination unit.

► 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.
...	...

2.1 Optional product features

Different product features and accessories are optionally available. The availability varies from country to country and is subject to local regulatory requirements. Please contact your local representative for availability.

3 Safety notes

The M822 surgical microscope is state-of-the-art technology. Nevertheless, hazards can arise during operation.

► Always follow the instructions in this user manual, and in particular the safety notes.

3.1 Intended use

- The M822 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 M822 surgical microscope may be used only in closed rooms and must be placed on a solid floor or securely mounted to ceiling.
- The M822 surgical microscope is subject to special precautionary measures for electromagnetic compatibility.
- Portable and mobile as well as stationary RF communications equipment can have a negative effect on the reliability of the M822 surgical microscope's functionality.
- The M822 is intended for professional use only.

3.2 Indication for Use

- The M822 surgical microscope is suitable for ophthalmic application such as Retina, Cornea and Cataract surgery in hospitals, clinics or other human medical instituations.
- The M822 surgical microscope may only be used in closed rooms and must be placed on a solid floor or mounted to the ceiling.
- These Instructions for Use are intended for physicians, nurses and other medical and technical staff who prepare, operate or maintain the device after appropriate training. It is the duty of the device owner/operator to train and brief all the operating personnel.

3.3 Contraindications

No known contraindications for Use.

3.4 Directions for the person responsible for the instrument

► Ensure that the M822 surgical microscope is used only by persons qualified to do so.

► The M822 surgical microscope may only be operated by trained personnel.

► Ensure that this user manual is always available at the place where the M822 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 M822 surgical microscope when it is free of defects.

► Inform your Leica representative or Leica Microsystems (Schweiz) AG, Medical Division, 9435 Heerbrugg, Switzerland, immediately about any product defect that could potentially cause injury or harm.

► If you use accessories from other manufacturers with the M822 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.

- Only the following accessories may be used with the Leica M822 surgical microscopes:
  - The Leica Microsystems accessories described in chapter chapter 10.2 in this User Manual.
  - Other accessories, provided that these have been expressly approved by Leica as being technically safe in this context.
- Modifications to or service on the M822 surgical microscope may be carried out only by technicians who are explicitly authorized by Leica to do so.
- Only original Leica replacement parts may be used in servicing the product.
- After service work or technical modifications, the device must be readjusted in accordance with our technical specifications.
- If the instrument is modified or serviced by unauthorized persons, is improperly maintained (as long as maintenance was not carried out by us), or is handled improperly, Leica Microsystems will not accept any liability.
- The effect of the surgical microscope on other instruments has been tested as specified in EN 60601-1-2. The system passed the emission and immunity test. Comply with the usual pre-cautionary and safety measures relating to electromagnetic and other forms of radiation
- The electric installation in the building must conform to the national standard, e.g., current-operated ground leakage protection (fault-current protection) is suggested.
- Like any other instrument in the operating theater, this system may fail. Leica Microsystem (Schweiz) AG therefore recommends that a backup system is kept available during the operation.
- Only the supplied power cord may be used.
- The power cord must have a protective conductor and must be undamaged.
- The mains cable must be mechanically secured with the "Power Input" socket to prevent accidental disconnection.
- 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.
- Connecting electrical equipment to the Auxiliary Power outlet will result in the establishment of a “ME System” and may result in a reduced level of safety. The corresponding standard requirements for “ME Systems” must be observed.
- All parts of the M822 shall not be serviced or maintained while in use with a patient.
- Lamps shall not be changed while in use with a patient.
- Use of this equipment adjacent to other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.
- Use of accessories and cables other than those specified or provided by the manufacturer of his equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the Leica M822, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

NOTE:

The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

3.5 Directions for the operator of the instrument

- ► Follow the instructions described here.
- ► Follow the instructions given by your employer regarding the organization of work and safety at work.
- ► Check the illumination intensity before and during surgery.
- ► Don't move system without released brakes.
- ► Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

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 1 min 25 seconds at maximum output power exceeds the exposure limits.

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. Published literature shows that a moving eye may allow for increased time of exposure [3)].

Main light

Light setting	Recommended maximum exposure time according to [1)] [min.]
	Without filter
25 %	8 min 18 s
50 %	2 min 39 s
75 %	1 min 32 s
100 %	1 min 25 s
10 % - Retina Protection Function Active	**20 min 50 s**

OttoFlex™ illuminator

Light setting	Recommended maximum exposure time according to[1)] [min.]
	Without filter
25 %	22 min 15 s
50 %	8 min 58 s
75 %	5 min 21 s
100 %	3 min 46 s
20 % - Retina Protection Function Active	**27 min 52 s**

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.

In addition, the Retina Protection function can be activated during the surgery to reduce the main light intensity up to 10% and OttoFlex up to 20%.

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 M822 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.

3.6 Dangers of use

WARNING

Danger of injury due to:

- **uncontrolled lateral movement of the arm system,**
- **tilting of the stand,**
- **trapping of feet in lightweight shoes beneath the casing of the base.**

▶ For transportation, always move the M822 surgical microscope into the transport position.
▶ Never move the stand while the unit is extended.
▶ Never roll the stand or OP equipment over the cables lying on the floor.
▶ Always push the M822 surgical microscope; never pull it.

WARNING

Risk of injury due to downward movement of the 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.
- ► Balance the M822 after re-equipping it.
- ► 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.
- ► Never carry out the balancing above the patient.

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.

WARNING

Risk of injury from parts falling down!

- ► Complete all preparations and adjustments to the optics carrier before the operation.
- ► Never rebalance or re-equip the optical components and accessories with the instrument over the operation area.
- ► Before the operation, make sure that the optical components and accessories are installed properly.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.

WARNING

Burn hazard!

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

WARNING

Danger of eye injuries!

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.

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.
- ► Observe the warning messages in the "Safety Notes" chapter.

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 operation area.
- ► 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 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.

WARNING

Risk of injury due to downward movement of the 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 changing accessories, always lock the M822.
- ► Balance the M822 after re-equipping it.
- ► 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.
- ► Never carry out the balancing above the patient.
- ► See safety notes in user manual.
- ► Don't use the down / up movement of ceiling mount when the microscope is over the patient.

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 infection.

- ► Always use the M822 surgical with sterile controls and a sterile drape.

WARNING

Risk of injury to the patient.

- ► Don't switch on/off during surgery.
- ► Don't unplug systm during surgery.

WARNING

Danger of injury to the eyes.

- ► Minimize speed of focus motor during retina surgery.

WARNING

Danger of fatal electrical shock.

- ► The M822 surgical microscope may be connected to a grounded socket only.
- ► Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

WARNING

Danger of injury to the eyes due to possibly hazardous optical infrared and UV radiation.

- ► Do not look at the operating lamp.
- ► Minimize exposure to eyes or skin.
- ► Use appropriate shielding.

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.**
- **Collision between user and microscope system. E.g. between head and camera control unit holder (CT40)**
- **Abrupt braking of the surgical microscope at a threshold that cannot be crossed.**

- ► Before transport, always move the Leica M822 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.

WARNING

Reduced light output!

- ► In case of malfunction of the fans, the maximum light output is reduced.

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.

WARNING

Motors return to their home positions

- ► Before switching on your Leica M822, 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 electric shock!

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

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!).

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 "List of weights of balanceable configurations" on chapter 14.13.

WARNING

Light that is too intense can damage the retina.

- ► Observe the warning messages in the "Safety Notes", chapter 3.

WARNING

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

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 chapter 14.5.

CAUTION

Surgical microscope can move without warning.

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

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

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

Danger of injury from uncontrolled lateral movement of the system and arm systems.

- ► When transporting or moving the microscope (F20, F40) on an inclined plane, always lock the swing arm, monitor arm and control unit (see 14.12)
- ► When storing the microscope (F20 only) on an inclined plane use the provided wedge from the transport box (see 14.12).

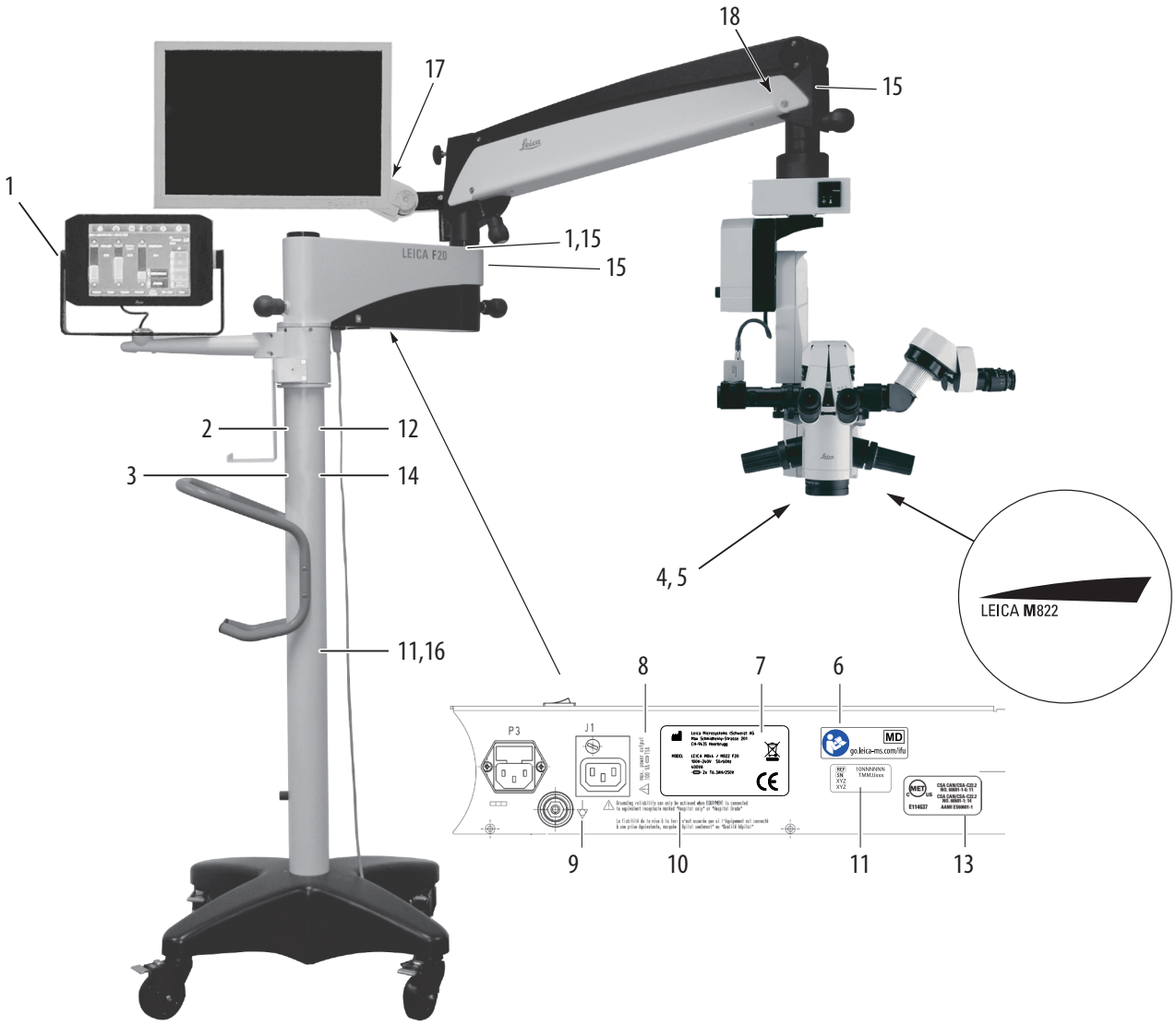
CAUTION

Risk of compromised surgery

- A system safety check will need to be performed accordingly to your country-specific requirements. Leica recommends an annual system and safety check. After a system usage period of 8 years, an annual system and safety check is considered mandatory.
- The systems shall not be used to perform critical use applications after 8 years of system usage or up to 12 years with annually passed system and safety check.
- As all maintenance activities require product specific know-how, it is recommended to contact your responsible service organisation.

3.7 Signs and labels

Horizontal arm and swing arm F20



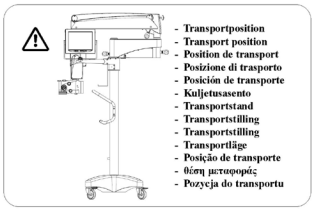
1

Danger sign for squeezing hazard

2

System weight label (F20)

3



Transport position (F20 floor stand)

4

Danger sign for hot surface

5

Caution, follow the user manual

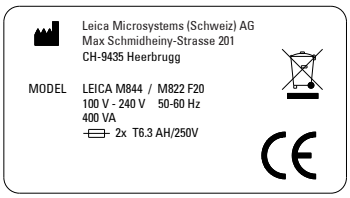
6

Mandatory label - read the user manual carefully before operating the product.
Web address for electronic version of the user manual.

MD

Medical Device

7

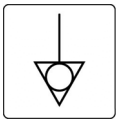


Type label

8

Max. power output

9

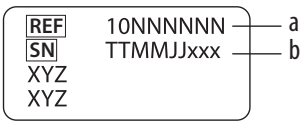


Equipotential bonding

10

Grounding label (only for USA and Canada)

11

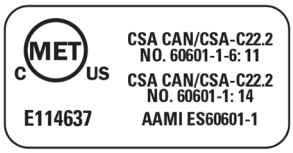


Fabrication label
a Reference number
b Serial number

12

INMETRO label (only for Brazil)

13



MET label

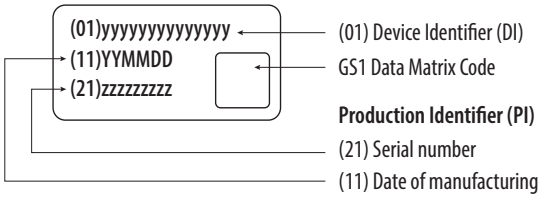
14

ANVISA Registration number (only for Brazil)

15

Tilting danger

16 UDI Label



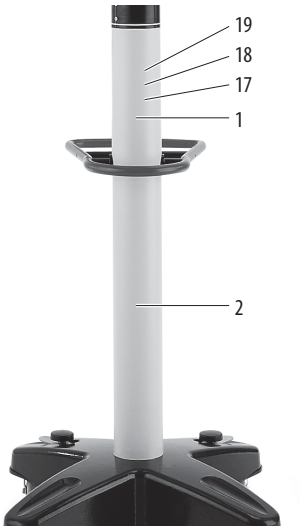
17

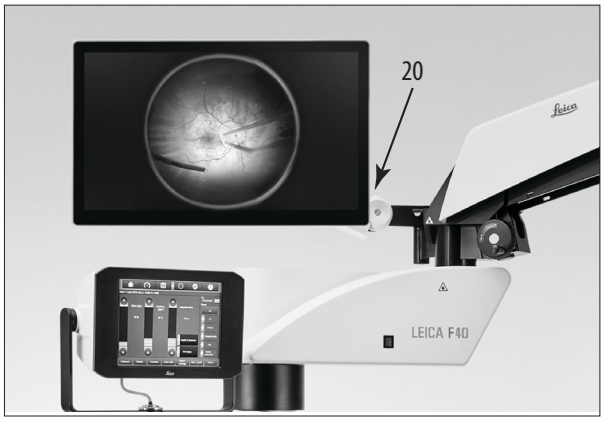
Max. load for monitor arm

18

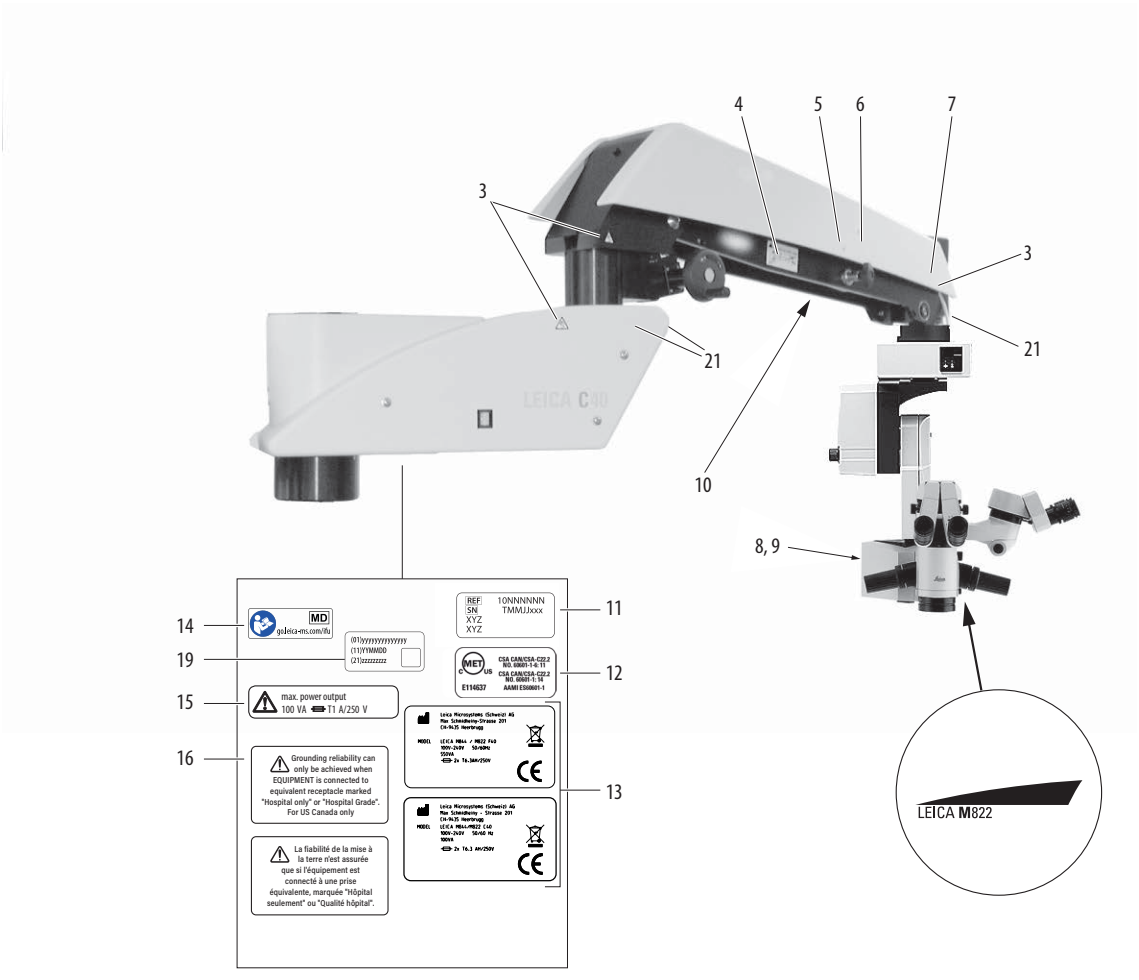
Max. load for optics carrier

F40 floor stand



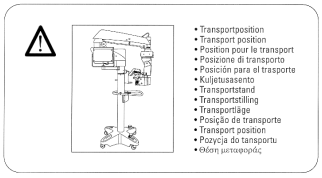


Horizontal arm and swing arm F40 / CT40



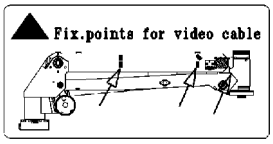
1 

System weight label (F40)

2 

Transport position (F40 floor stand)

3 
Danger sign for squeezing hazard

4 

Fix points for video cable

5 
Open

6 
Closed

7 

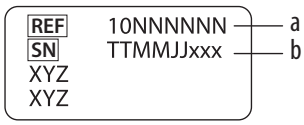
Max. load for optics carrier

8 
Danger sign for hot surface

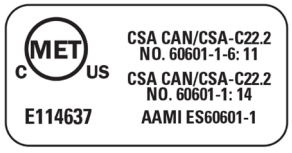
9 
Caution, follow the user manual

10 

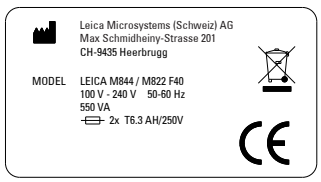
Caution, high pressure

11 

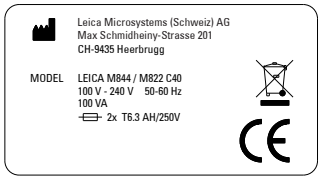
Fabrication label
a Reference number
b Serial number

12 

MET label

13 

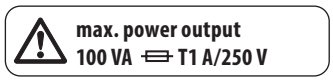
Type labels



14 

Mandatory label - read the user manual carefully before operating the product. Web address for electronic version of the user manual.

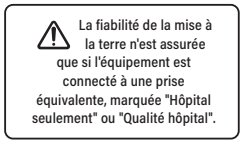
Medical Device

15 

Max. power output

16 

Grounding label (only USA and Canada)



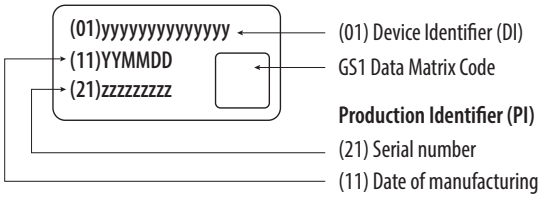
17 

ANVISA Registration number (only for Brazil)

18 

INMETRO label (only for Brazil)

19 UDI Label



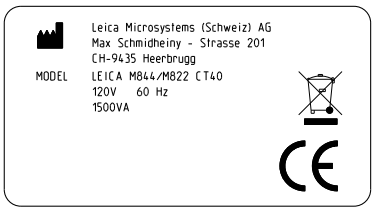
20 

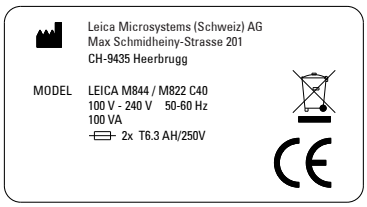
Max. load monitor arm

21 
Tilting danger

Leica Telescope Mount

1

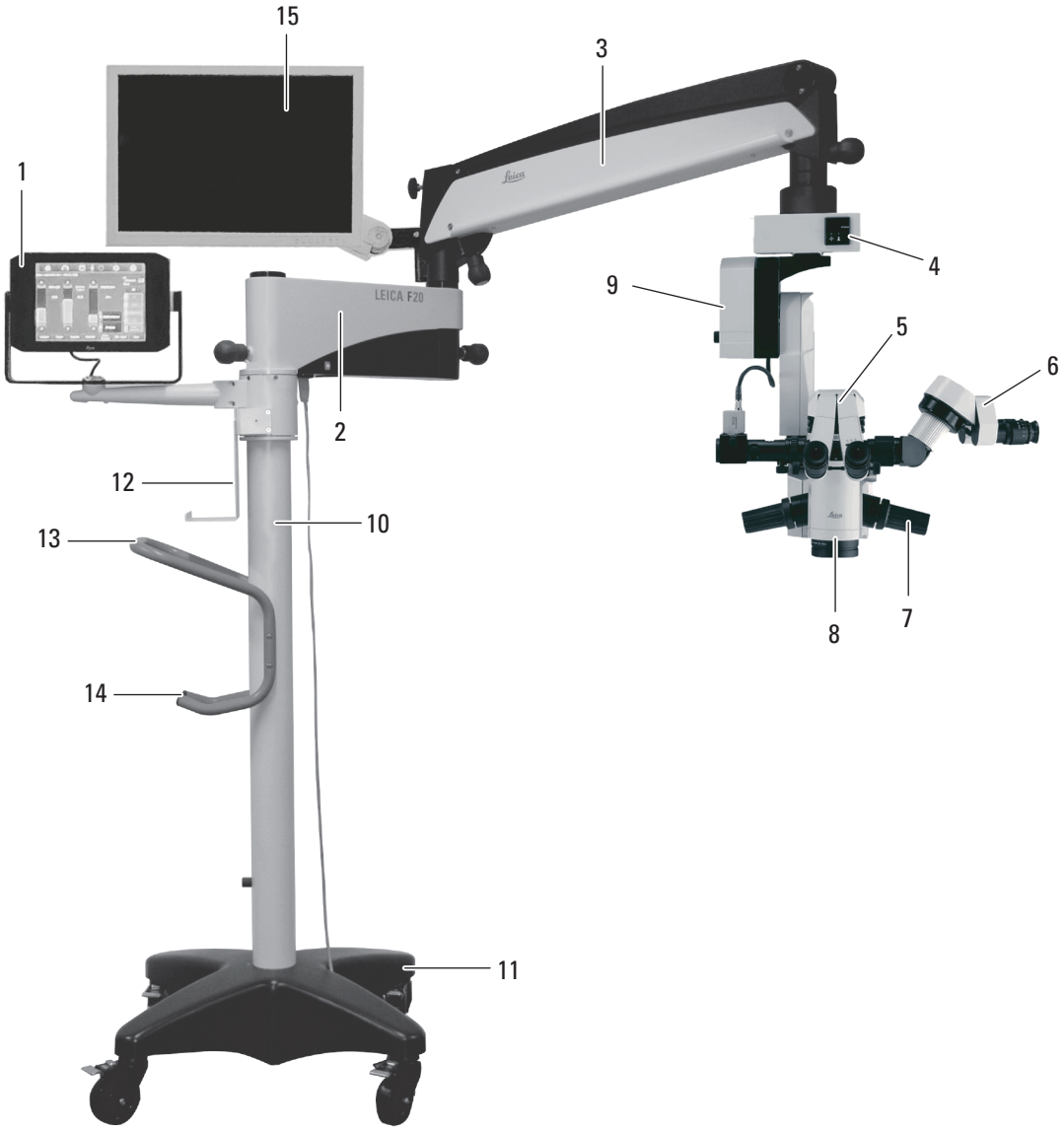




Type labels

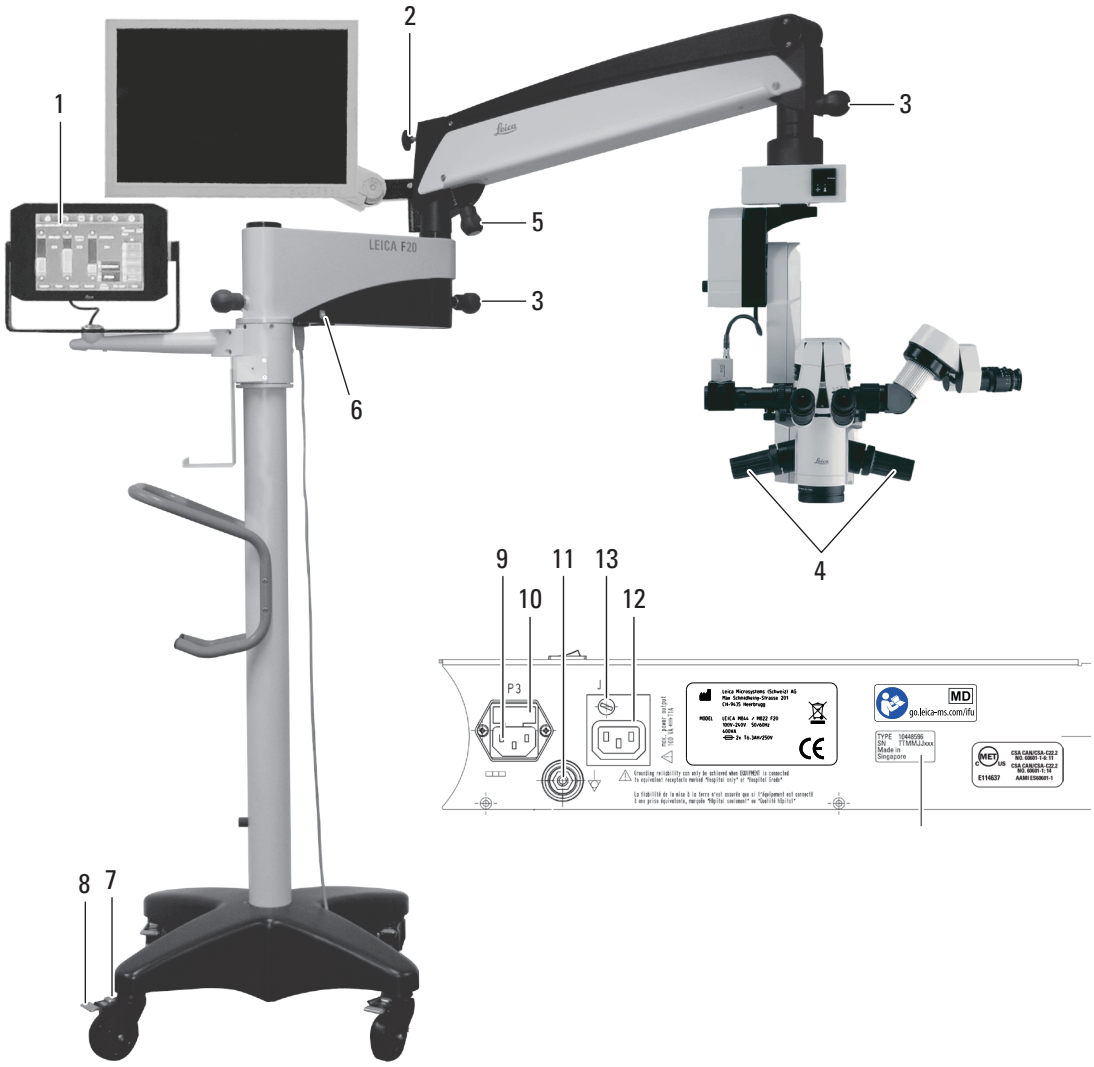
4 Design

4.1 Leica M822 F20



1 Control unit
2 Horizontal arm
3 Swing arm
4 XY-unit
5 Binocular tube
6 Stereo attachment for second observer
7 Handles
8 Optics carrier
9 Tilt head
10 Column
11 Base
12 Holding fixture for video control unit
13 Hand rail
14 Suspension handle for footswitch
15 Optional video monitor and monitor arm

F20 floor stand



1 Touch panel
2 Retaining hook (blocks swing arm)
3 Articulation brakes (regulate ease of movement)
4 Handles
5 Balancing knob
6 Power switch
7 Footbrake release lever
8 Footbrake
9 Power supply
10 Fuse holder (2× 6.3 AH, time-lag)
11 Socket for potential equalization
For connecting the Leica M822 to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
12 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see chapter 14.5.
13 Fuse holder (1 AH, 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 chapter 14.5.

4.2 Leica M822 F40

1 Swing arm
2 XY-unit
3 Attachment for second observer
4 Handles
5 Optics carrier
6 Binocular tube
7 Tilt head
8 Column
9 Cable holder
10 Base
11 Hand rail
12 Suspension handle for footswitch
13 Holding fixture for video control unit
14 Control unit
15 Horizontal arm
16 Optional video monitor and monitor arm

F40 floor stand

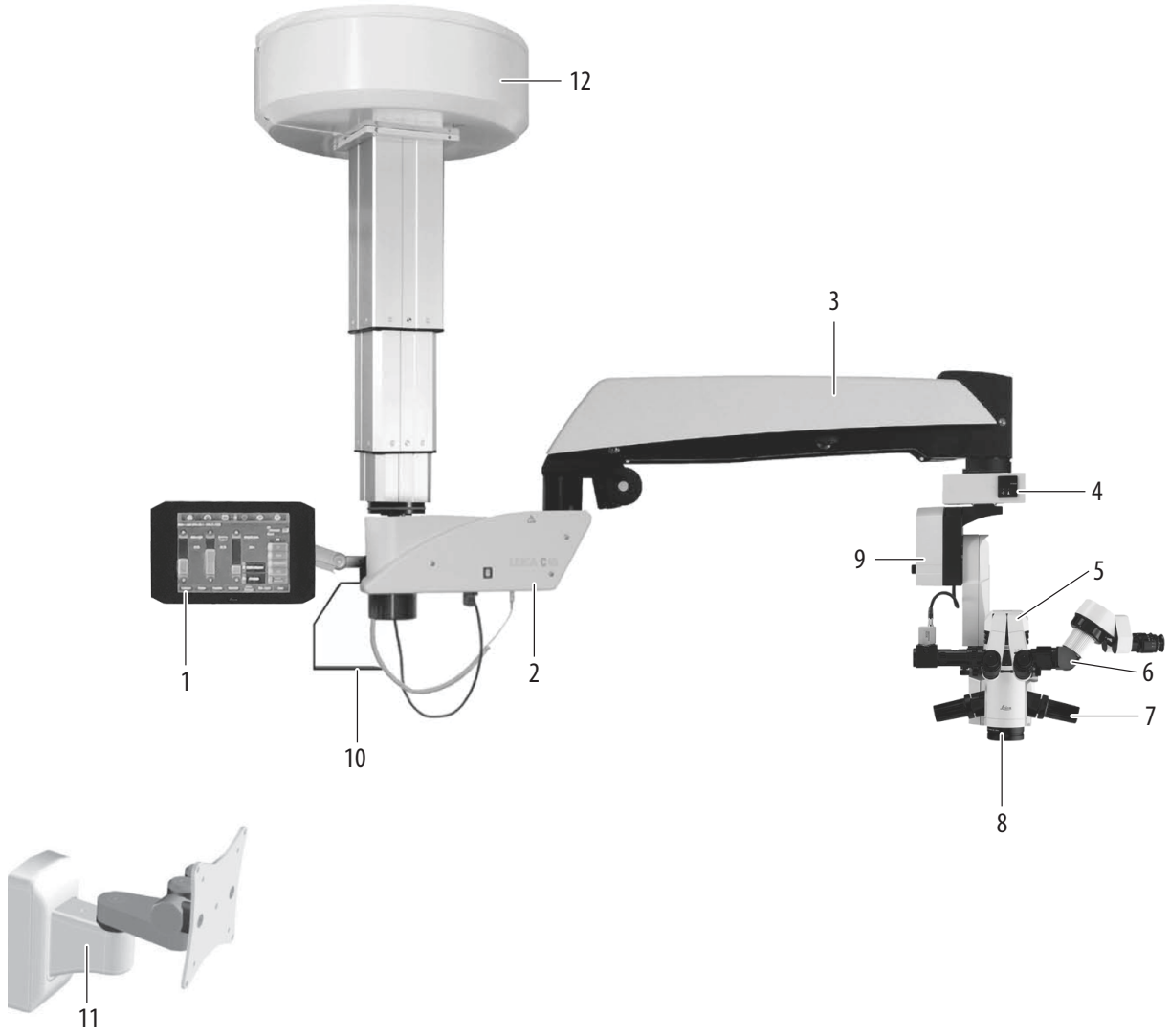
1 Swing arm stop lever
2 Balancing knob
3 Power switch
4 Touch panel
5 Hand rail
6 Footbrake release lever
7 Footbrake
8 Power supply
9 Fuse holder (2× 6.3 AH, time-lag)
10 Running-time meter for the surgical microscope
11 Socket for potential equalization
For connecting the Leica M822 to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
12 Socket for remote brake release
13 Auxiliary power outlet (max. output power 100 VA)
Requirements of use, see chapter 14.5.
14 Fuse holder (1 AH, 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, chapter 14.5.

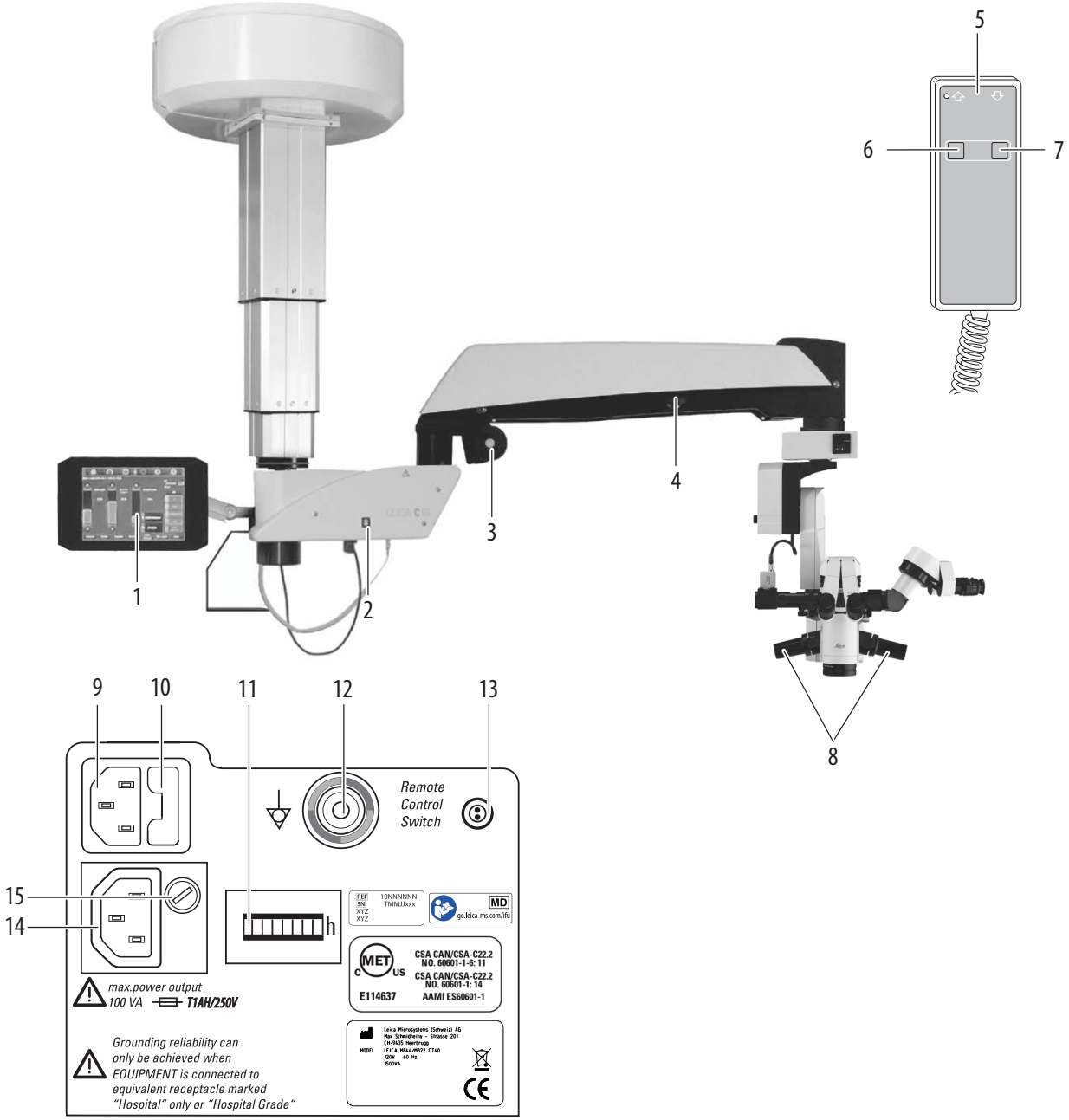
4.3 Leica M822 CT40



1 Control unit
2 Horizontal arm
3 Swing arm
4 XY-unit
5 Binocular tube
6 Attachment for second observer
7 Handles
8 Optics carrier
9 Tilt head
10 Holding fixture for video control unit
11 Wall mount for control unit (optional)
12 CT40 telescope mount

Assembly of the ceiling mount:
see enclosed installation instructions.

CT40 ceiling mount



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 chapter 14.5.

1 Touch panel
2 Power switch
3 Balancing knob
4 Swing arm stop lever
5 Remote control
6 Up
7 Down
8 Handles
9 Power supply
10 Fuse holder (2× 6.3 AH, time-lag)
11 Running-time meter for the surgical microscope
12 Socket for potential equalization
For connecting the Leica M822 to an equipotential bonding device.
This is part of the customer's building installation.
Observe the requirements of EN 60601-1 (§ 8.6.7).
13 Socket for remote brake release
14 Auxiliary power outlet (max. output power 100 VA)
For requirements of use, see chapter 14.5.
15 Fuse holder (1 AH, time-lag)

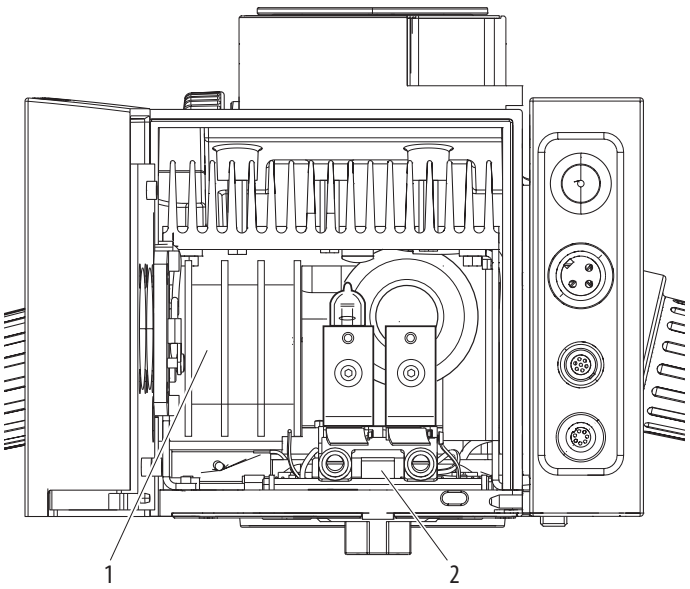
4.4 Leica M822 Optics carrier

- Optics carrier with integrated illumination
- Interface for assistants, either to the left and right side
- Main surgeon interface

The Leica Accessories functions are described in the corresponding user manuals.

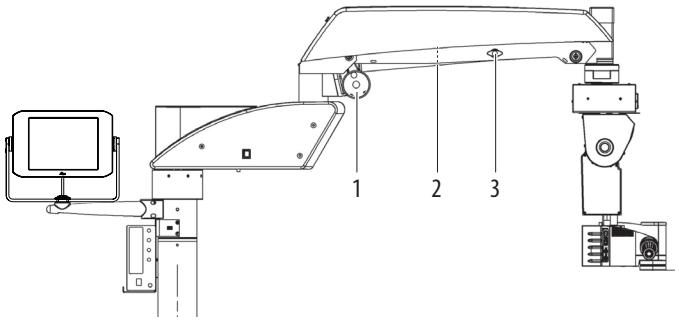
5 Functions

5.1 Illumination



The illumination of the surgical microscope Leica M822 is a main light (1) and a OttoFlex™ light (2). They are located in the optics carrier.
For the main light (1) there is one LED. For the OttoFlex™ light there are two identical bulbs. In case of a failure of the lamp in use, the other lamp can be selected with the Quick-change lamp mount.

5.2 Balancing system



With a balanced surgical microscope M822 you can move the optics carrier in any position without tilting or falling down.
After balancing all movements during operation only need a minor force.
The balancing is done by a gas spring (2) in the swing arm. With the rotary knob (1) the drifts will be adjusted.
The stop lever (3) releases and locks the swing arm.

5.3 Electromagnetic brakes

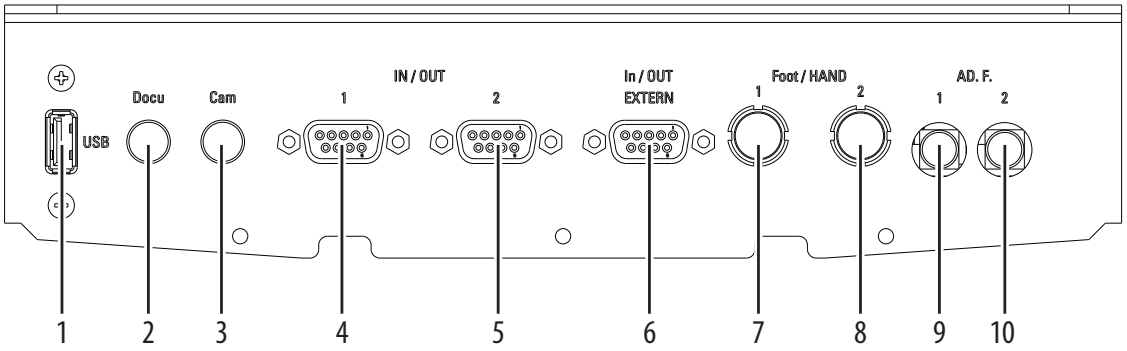
The M822 may be moved only with released brakes.
- ► Do not perform any movements when the brakes are locked.

The M822 F40 surgical microscope has 4 electromagnetic brakes which stop the movements of the stand and surgical microscope. They are operated by turning the handles.

6 Controls

6.1 Control unit

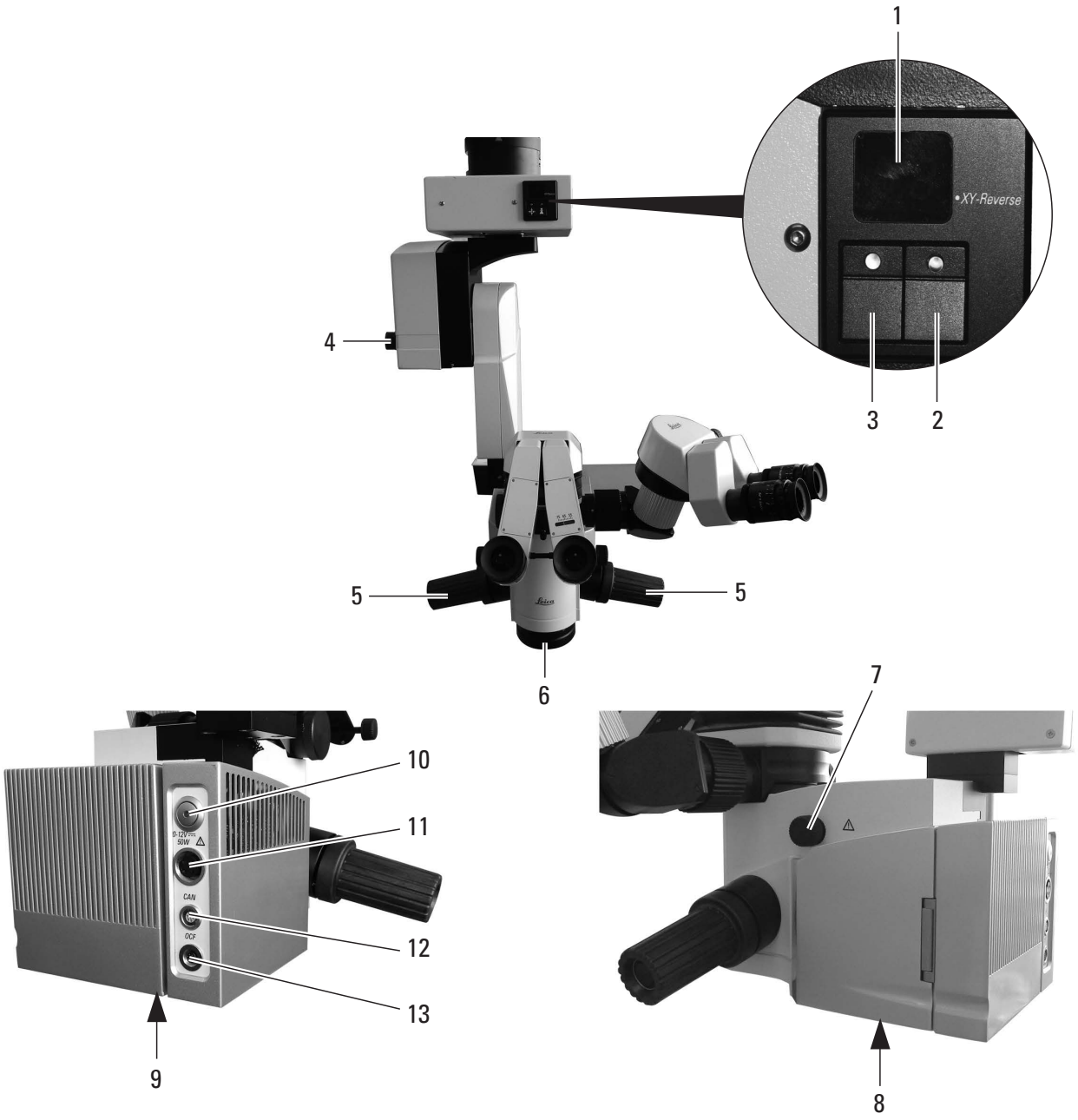
Terminals



1 Leica service interface
2 Documentation control
3 Camera control
4 Internal CAN 1
5 Internal CAN 2
6 CAN external
Only devices verified by Leica Microsystems, Medical Division, may be connected here.
7 Footswitch 1
8 Footswitch 2
Only footswitches delivered by Leica Microsystems, Medical Division, may be connected here.
9 ADF Additional Function 1
10 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 and footswitch in order to prevent malfunctions.

6.2 Leica M822 surgical microscopes



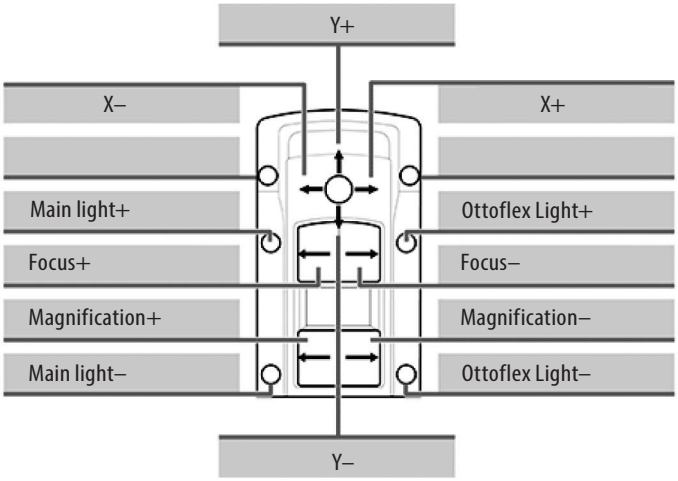
1 Magnification display with XY-reverse display
2 Focus reset
3 XY reset
4 Rotary knob for tilt drive (motorized)
5 Handles
6 Lens
7 Manual zoom emergency drive
8 Quick-change lamp mount
9 Lamp cover opener
10 Coaxial OttoFlex™ illumination/slit illuminator toggle button
11 Socket for external supply to slit illuminator
Only the Leica Slit Illuminator may be connected here.
12 CAN bus
Only accessories supplied by Leica Microsystems, Medical Division, may be connected here.
13 OCF "Optics Carrier Functions"
Only the Leica Slit Illuminator, Oculus SDI, or other Leica devices may be connected here.

6.3 Footswitch and handles

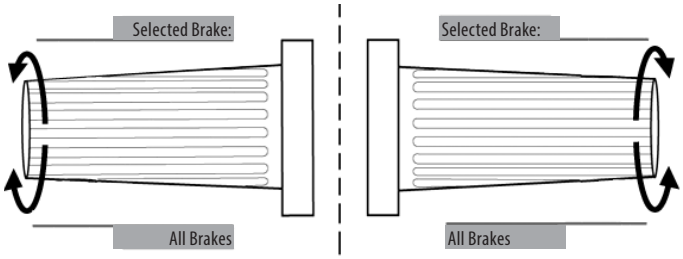
See also User manual Wireless Footswitch, 14 functions.

Footswitch and handles can be assigned individually for each user in the configuration menu (see chapter 9.4.4 and chapter 9.4.8).

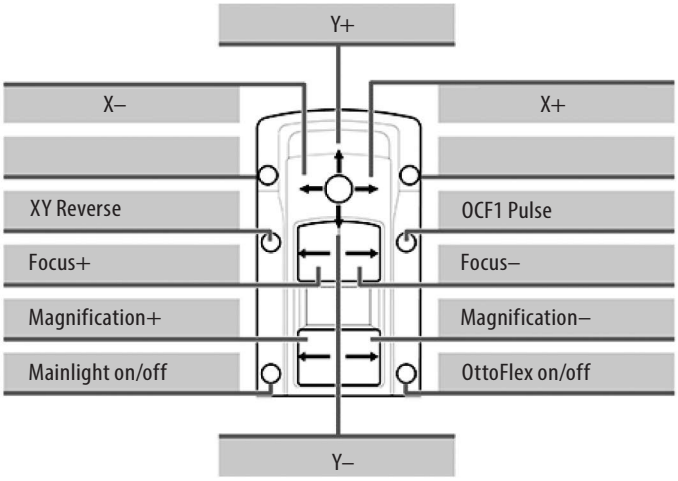
6.3.1 Standard configuration "Cataract"



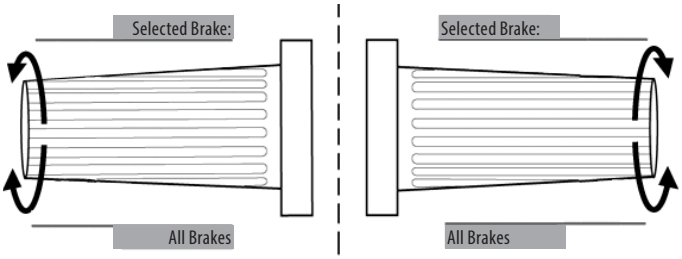
Handles



6.3.2 Standard configuration "Retina"



Handles



7 Preparation before surgery

7.1 Transportation

WARNING

Danger of injury due to:

- **uncontrolled lateral movement of the arm system,**
- **tilting of the stand,**
- **trapping of feet in lightweight shoes beneath the casing of the base.**

► For transportation, always move the M822 surgical microscope into the transport position.
► Never move the stand while the unit is extended.
► Never roll the stand or OP equipment over the cables lying on the floor.
► Always push the M822 surgical microscope; never pull it.

CAUTION

Surgical microscope can move without warning.

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

NOTE

Damage to the M822 surgical microscope during transportation.

► Never move the stand in the extended condition.
► Never roll the stand or OP equipment over the cables lying on the floor.

NOTE

Damage to the M822 surgical microscope due to uncontrolled tilting.

► Hold the handles when releasing the brake.

The M822 shall be moved only with released brakes.

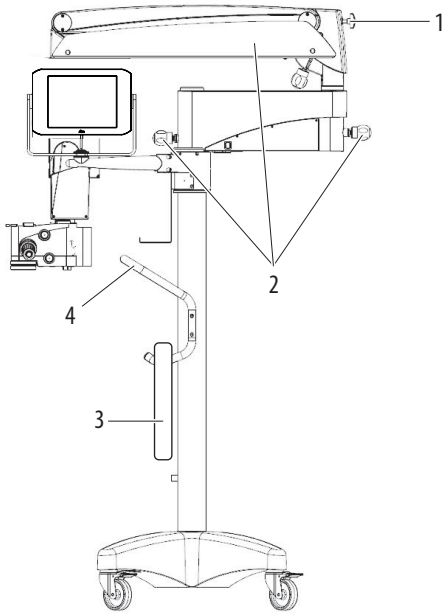
► Do not perform any movements when the brakes are locked.

7.1.1 Transporting the Leica M822 F20

Transport position

Before transporting your Leica M822 F20, always return it to the transport position.

► Unplug and secure the power cable.
► Pull the stop lever (1) and turn it into a horizontal position.
► Move the swing arm up and down until the stop lever engages.
► Open the articulation brakes (2).
► Bring swing arm into transport position.



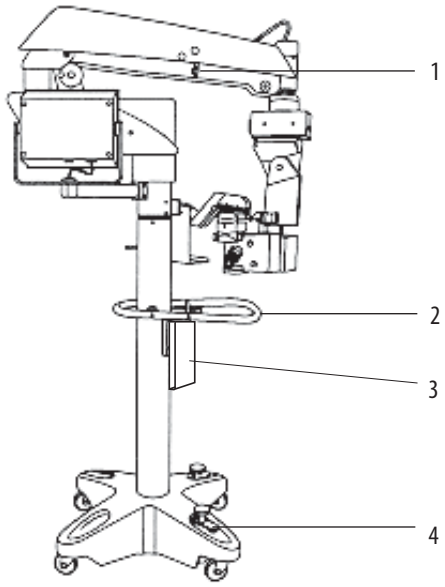
► Tighten the articulation brakes (2).
► Turn the control unit towards the XY-unit.
► Hang the footswitch (3) on the suspension device.
► Step on the footbrake release lever to release the footbrakes.
► Move the Leica M822 F20 by the hand rail (4).

7.1.2 Transporting the Leica M822 F40

Transport position

Before transporting your Leica M822 F40, always return it to the transport position.

- ► Unplug and secure the power cable.
- ► Pull the stop lever (1) and turn 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 stop lever engages.
- ► Bring swing arm into transport position.



- ► Release the handles again.
- ► Turn the control unit towards the XY-unit.
- ► Hang the footswitch (3) on the suspension device.
- ► Step on the footbrake release lever (4) to release the footbrakes.
- ► Move the Leica M822 F20 by the hand rail (2).

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

7.2 Installing optical accessories

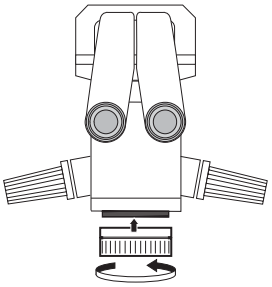
WARNING

Risk of injury due to downward movement of the 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.
- ► Balance the M822 after re-equipping it.
- ► 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.
- ► Never carry out the balancing above the patient.
- ► Before each operation, make sure that the optical components and accessories are sufficiently secured and cannot move.

- ► Make sure that the optical accessories are clean and free of dust and dirt.
- ► Only install accessories on your Leica M822 when the articulation brakes are tightened and the swing arm is locked, see chapter 7.9 and chapter 7.10.

7.2.1 Installing the objectives



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

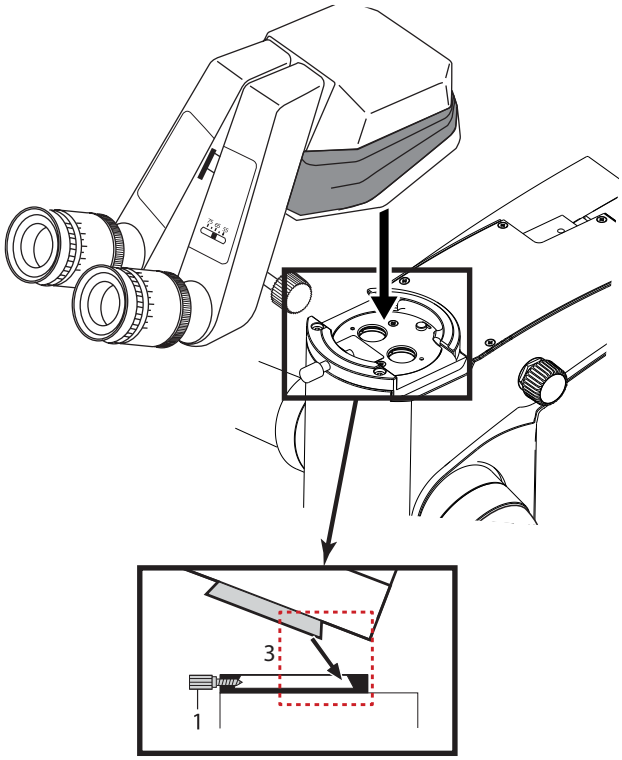
7.2.2 Installing a binocular tube

WARNING

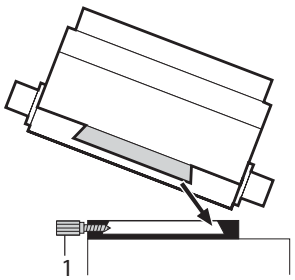
Risk of injury from parts falling down!

- ► Before each operation, make sure that the optical components and accessories are sufficiently secured and cannot move.

- ► Make sure that the optical accessories are clean and free of dust and dirt.
- ► Loosen the clamping screw (1) on the optics carrier.
- ► Remove the protective cap.
- ► Insert the bionocular tube into the dovetail ring (3).
- ► Tighten the clamping screw (1).



Fitting the beam splitter



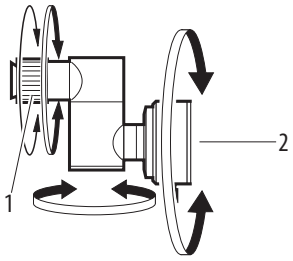
- ► Release the clamping screw (1) on the optics carrier.
- ► Insert the beam splitter into the dovetail ring and tighten the clamping screw.

WARNING

Risk of injury from parts falling down!

- ► Complete all preparations and adjustments to the optics carrier before the operation.
- ► Never rebalance or re-equip the optical components and accessories with the instrument over the operation area.
- ► Before the operation, make sure that the optical components and accessories are installed properly.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.

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 (2) and set up the image with the knurled ring (1).

Fitting the tube

- ► Release the clamping screw on the beam splitter and the 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

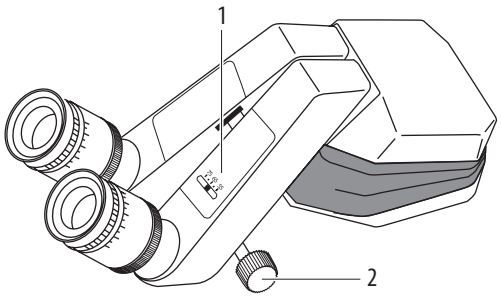
- ► Remove the clamping screw.
- ► Mount the grub screw (2).

- ► Place beam splitter, rotatable into the dovetail ring from above.
- ► Tighten the grub screw (2).

7.3 Setting the binocular tube

7.3.1 Setting the interpupillary distance

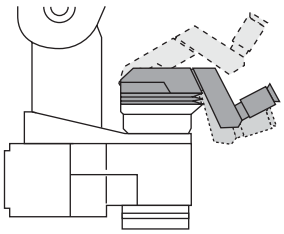
- ► Adjust the interpupillary distance to a value between 55 mm and 75 mm.
- ► Using the adjusting wheel (2), set the interpupillary distance that a circular image field can be seen.



! This procedure has to be performed only once for each user. The measured value (1) can be stored for each user in the "User Settings" menu under "Tube Settings" (see chapter 9.4.9).
The stored value can be read out with "Show Settings".

7.3.2 Adjusting the tilt

- ► Hold the binocular tubes with both hands.
- ► Tilt the binocular tube upwards or downwards until a comfortable position for viewing is reached.



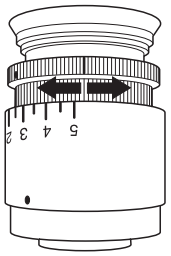
7.4 Adjusting the eyepiece

7.4.1 Determining/adjusting diopter settings for users

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 assistant's view and monitor image will always remain sharp, regardless of the selected magnification.

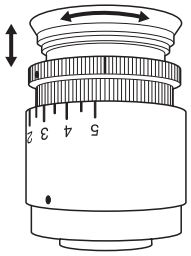
- ► Select the minimum magnification.
- ► Place a flat test object with sharp contours under the lens at working distance.
- ► Focus the microscope.
- ► Set the maximum magnification.
- ► Focus the microscope.
- ► Set the minimum magnification.



- ► Without looking into the eyepieces, turn both eye lenses to +5 diopters.
- ► Slowly turn the eyepieces towards –5 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 measured value can be stored for each user in the "User Settings" menu under "Tube Settings" (see chapter 9.4.9).

7.4.2 Adjusting the pupillary distance



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

7.4.3 Checking parfocality

► Place a flat test object with sharp contours under the objective at working distance.
► Zoom through the whole range, observing the test object.

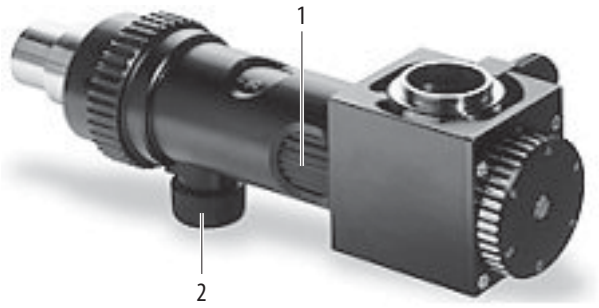
The image sharpness must remain constant at all magnifications. If this is not the case, check diopter settings of the eyepieces.

7.5 Installing documentation accessories

WARNING

Risk of injury from parts falling down!

► Complete all preparations and adjustments on the optics carrier before the operation.
► Never rebalance or re-equip the optical components and accessories with the instrument over the operation area.
► Before re-equipping, always lock the swing arm.
► Check that the optical components and accessories fit well and are fastened securely before the operation.
► Before changing equipment during an operation, swivel the microscope away from the operation area.



1 Adjusting the magnification
2 Focusing knob

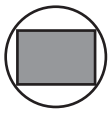
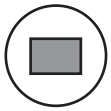
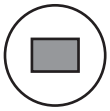
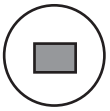
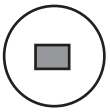
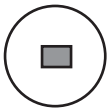
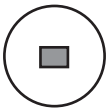
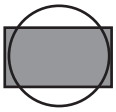
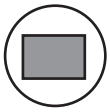
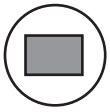
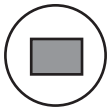
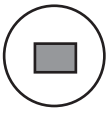
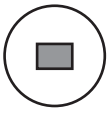
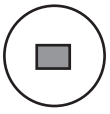
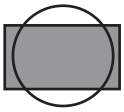
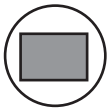
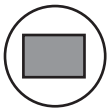
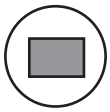
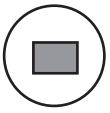
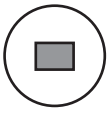
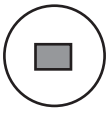
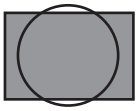
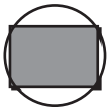
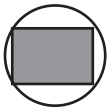
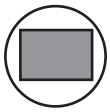
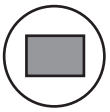
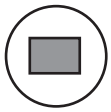
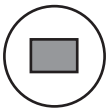
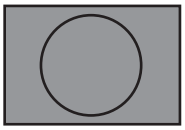
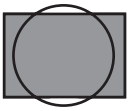
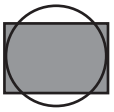
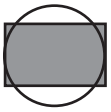
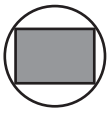
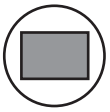
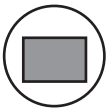
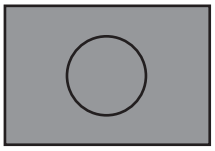
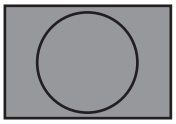
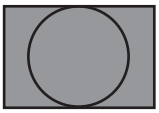
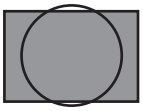
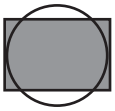
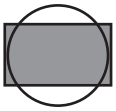
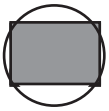
Fitting the phototube

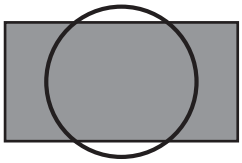
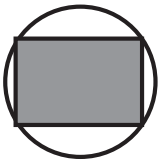
► Fasten the phototube to the documentation port of the 0° assistant attachment or to the beam splitter.
► Secure the camera, complete with adapter, in the phototube. Tighten the clamping screw.

Please refer to section 10.3 for a list of video accessories

7.6 Selecting documentation accessories

Video adpater for length

Camera sensor size	35 mm	55 mm	60 mm	70 mm	85 mm	100 mm	107 mm
1/4 “							
1/2.8 “							
1/3 “							
1/2 “							
2/3 “							
1 “							

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

7.7 Adjusting the Leica Slit Illuminator

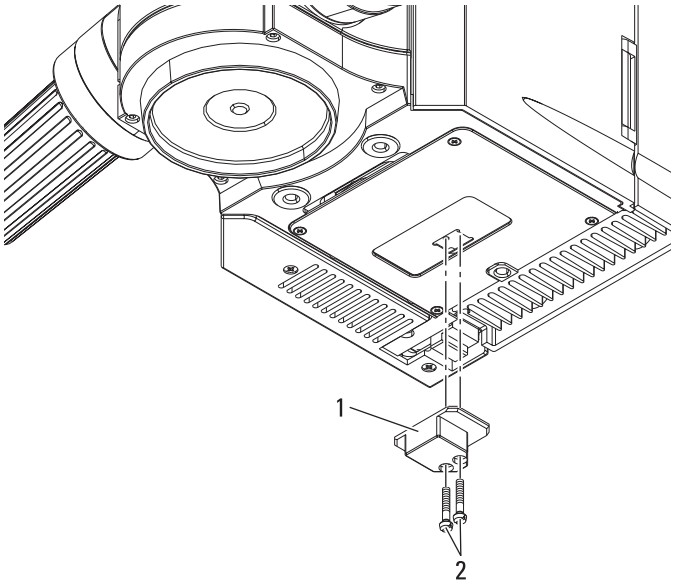
7.7.1 General safety information when handling the Leica Slit Illuminator

- 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 are allowed to handle the slit illuminator.
- When handling the slit illuminator take care not to crush any fingers.

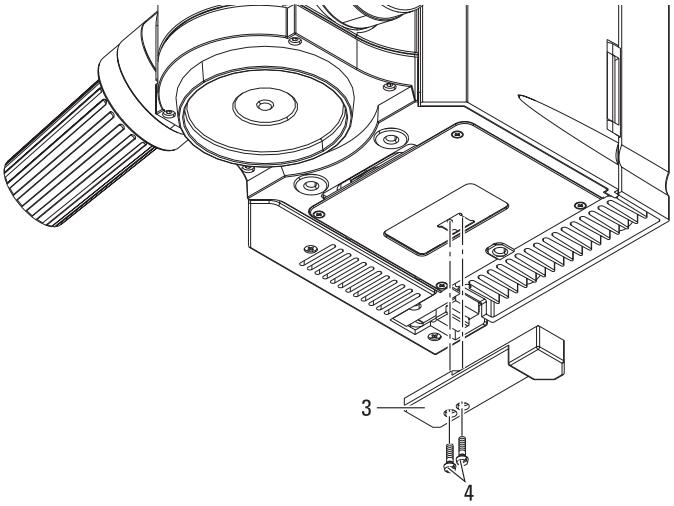
7.7.2 Installing the lever extension

► Lock the swing arm in place.

► Loosen the 2 screws (2) and remove the lever (1) for the quick-change lamp mount.

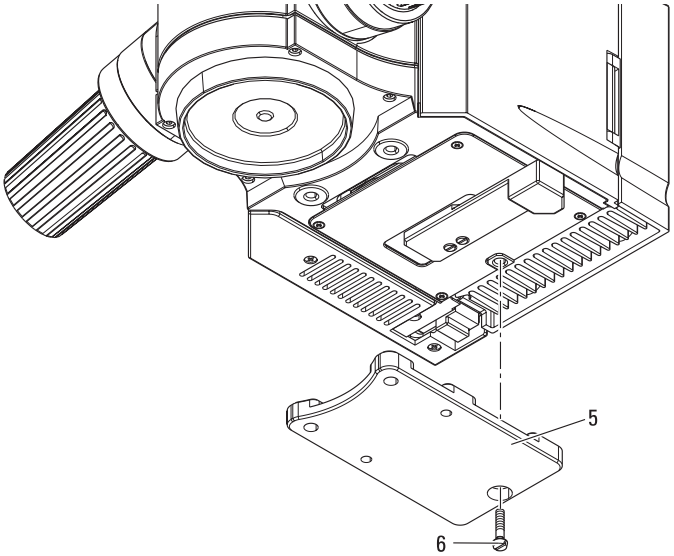


► Install the lever extension (3) with 2 screws (4).



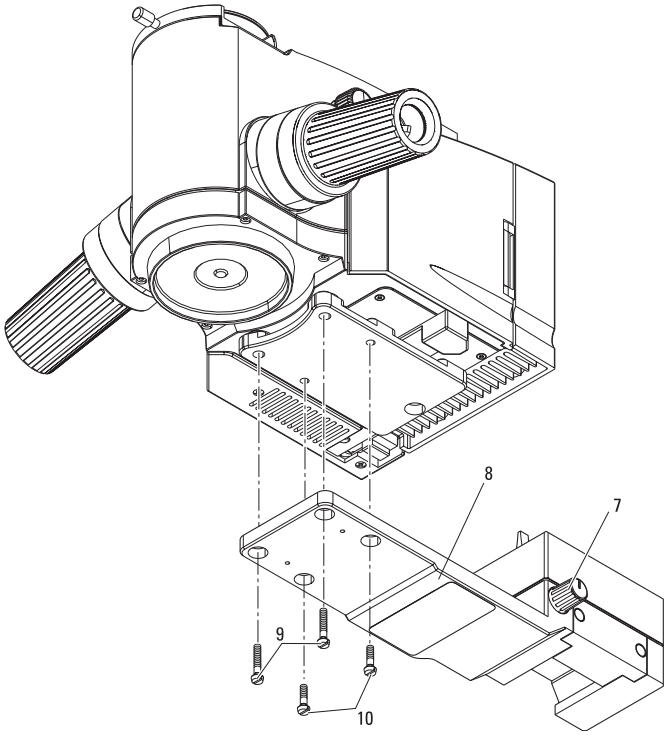
7.7.3 Install the intermediate plate

► Install the intermediate plate (5) with screw (6).



7.7.4 Fastening the extension plate

► Screw the extension plate (8) to the intermediate plate with 2 M6×20 screws (9) and 2 M6×12 screws (10).



7.7.5 Fastening the slit illuminator

WARNING

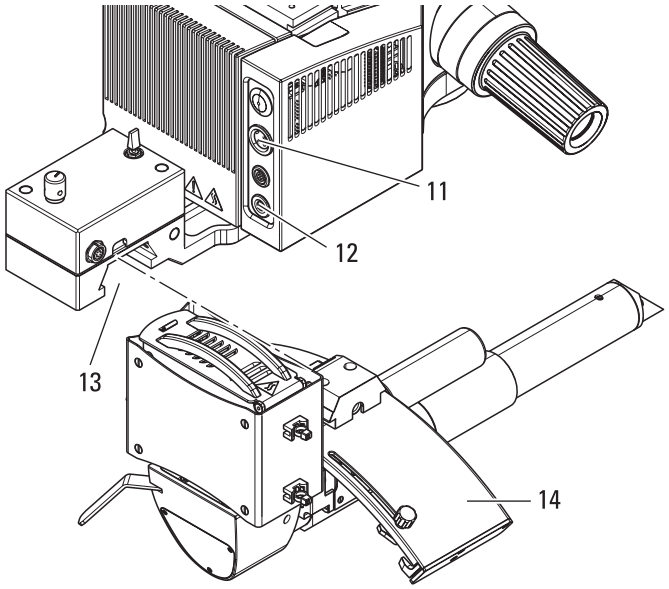
Risk of injury from parts falling down!

- ► Complete all preparations and adjustments to the optics carrier before the operation.
- ► Never rebalance or re-equip the optical components and accessories with the instrument over the operation area.
- ► Before the operation, make sure that the optical components and accessories are installed properly.
- ► Before re-equipping during the operation, first swing the microscope away from the operating field.
- ► Before each operation, make sure that the optical components and accessories are sufficiently secured and cannot move.

Make sure that the interlock latches securely.

- ► Loosen the clamp screw (7) and slide the slit lamp (14) into the guide (13).
- ► Tighten the clamping screw (7).

Power supply and control signals are connected to the slit illuminator via the quick release fastener in the guiding (13).



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 (11) on the optics carrier.
- ► Insert the 5-pin plug of the dual cable into the OCF socket (12) on the optics carrier.

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.

The slit illuminator must be removed for lamp replacement.

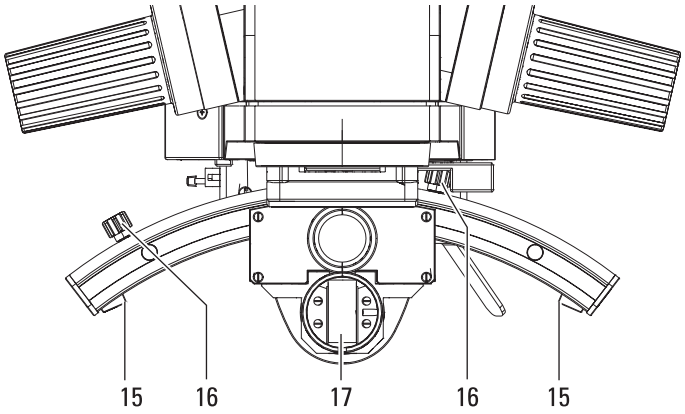
7.7.6 Adjusting the slit illuminator

► Move the slit illuminator into middle position using the footswitch.

Assign the functions Slitlamp left and Slitlamp right to the footswitches used, in order to move the slit illuminator with these two keys to the right (Slitlamp right) and to the left (Slitlamp left).

► Rotate the prism (17) into middle position.
► Rotate the prism into both end positions (15) 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 (16) which may be adjusted individually by the doctor. When a stopper is reached, it may be circumnavigated by pressing the footswitch again.

7.7.7 Emergency operation

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

7.7.8 Removing the slit illuminator

When removing the slit illuminator, make sure that both stoppers (16) are in the bottom position.

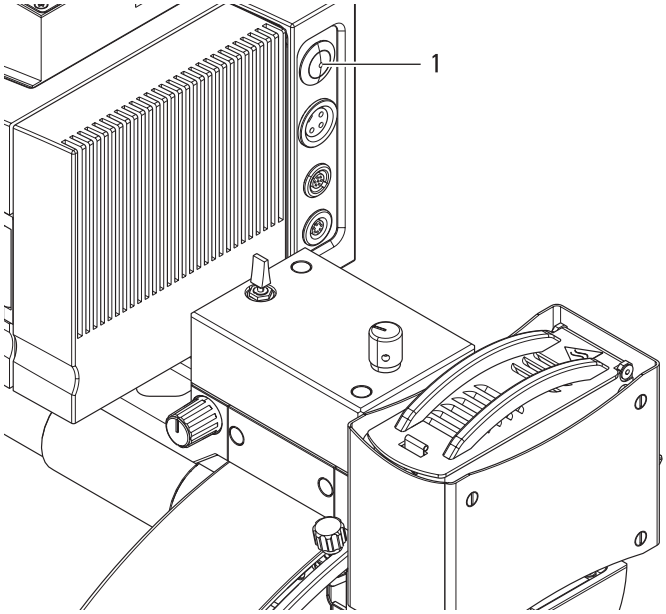
7.7.9 Fitting the Leica Slit Illuminator

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 press the coaxial OttoFlex™ illuminator/slit illuminator (1) toggle button on the optics carrier.



The name will change to "Slitlamp" (2) on the control unit, indicating that the slit illuminator is active.

7.7.10 Adjusting the brightness of the slit illuminator

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.

- ► To switch the slit lamp on or off, use the OttoFlex ON/OFF function on the footswitch.
- ► To adjust brightness, press the ⌃ or ⌄ buttons, or directly press the brightness bar of the "Slitlamp".

Tapping the ⌃ or ⌄ button changes the brightness value in increments of 1. Pressing and holding the buttons changes the values in increments of 2 until you reach the maximum or minimum or until you stop pressing.

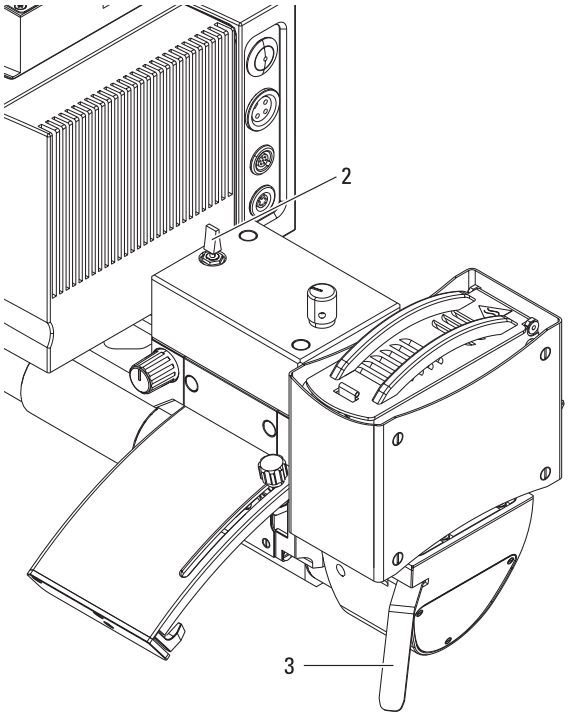
- ► Brightness of the slit illuminator may also be changed by using a connected footswitch with the OttoFlex +/– function.

7.7.11 Moving the slit illuminator

- ► Assign the functions Slitlamp left and Slitlamp right to the footswitches used, in order to move the slit illuminator with these keys to the right (Slitlamp right) and to the left (Slitlamp left).

or

- ► Move the slit illuminator to the right or left with the handswitch (2).

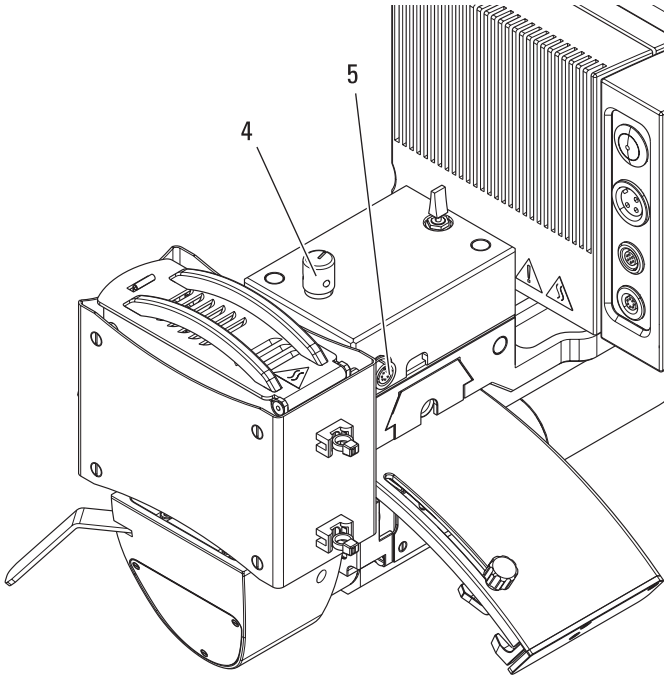


Adjusting the slit width

The width of the slit can be adjusted with the lever (3) 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.

7.7.12 Connecting Oculus SDI

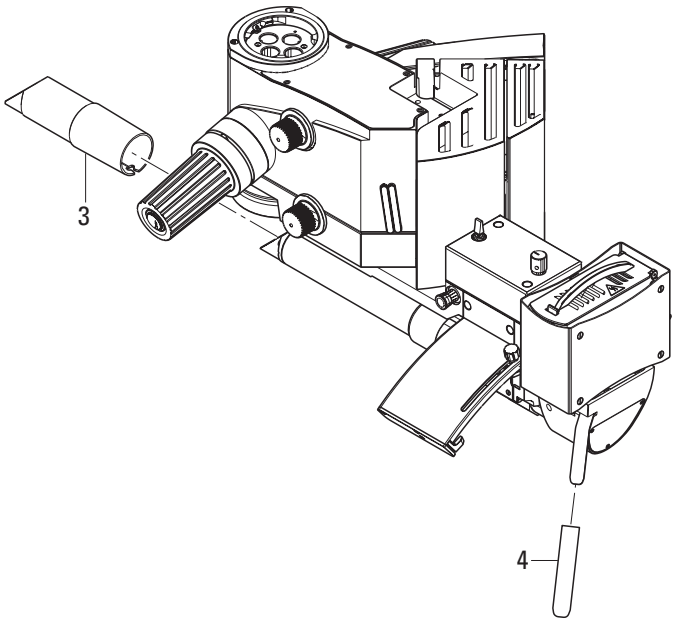


- ► Insert the plug of the SDI into the socket (5) on the slit illuminator.

► Use the rotary switch (4) to change between SDI and slit illuminator.

7.7.13 Sterile covers for the slit tube

The slit tube of the slit illuminator can be protected by sterile cover (6), the lever for adjusting the slit width can be protected by sterile cover (7).



7.7.14 Phototoxic damage to the retina during eye surgery (slit illumination)

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 2.7 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 [min.]
>6	2.7
5	3.0
4	3.9
3	4.5
2	7.6
1	15.1

► Protect the patient with the following safeguards:
- Short exposure times
- Low brightness settings
- 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.

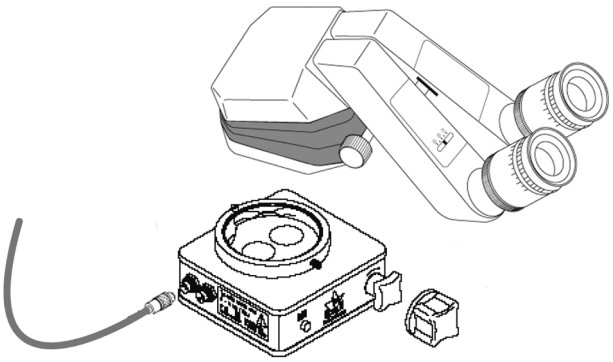
7.8 Wide-angle observation system (such as Oculus)

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.

► Connect the 7-pin plug of the SDI control cable (10448163) to 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 footswitch by assigning the functions OCF1, BIOM Focus + and BIOM Focus –:

Inverter on/off	OCF1 Pulse
BIOM focus up	BIOM Focus +
BIOM focus down	BIOM Focus –

- 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 M822. 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).

7.9 Stand settings (F20)

7.9.1 Releasing the swing arm

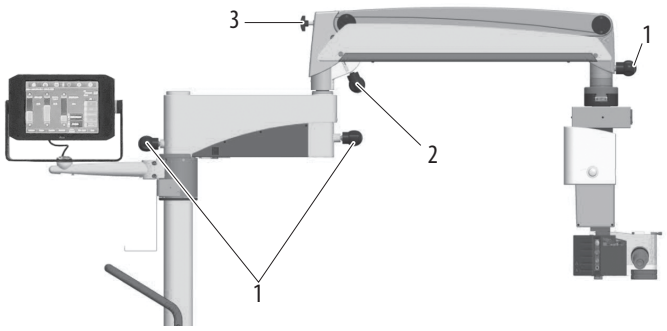
WARNING

Risk of injury from downward movement of surgical microscope

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

► Hold the microscope firmly.
► Pull the stop lever (3) and turn it into a vertical position.

The swing arm is now released.



7.9.2 Balancing the swing arm

► Check whether the microscope drifts up or down.

Microscope drifts downwards:

► Turn rotary knob (2) clockwise.

Microscope drifts upwards:

► Turn rotary knob (2) counterclockwise.

7.9.3 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 (1).

Make the joint more difficult to move:

► Tighten the black brake knob (1).

7.9.4 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 (3) into a horizontal position..
► Move the swing arm up and down until the transport lock engages.

The swing arm is now locked.

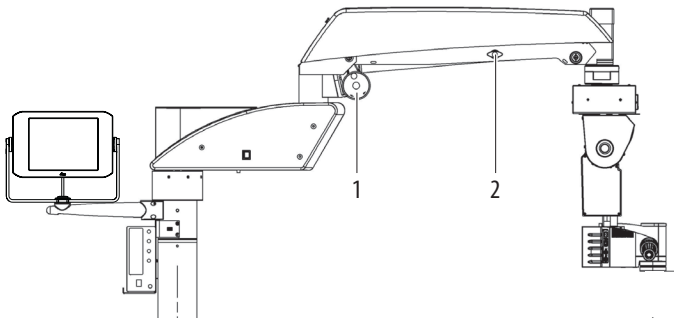
7.10 Stand settings (F40, CT40)

7.10.1 Balancing the swing arm

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 operation area.
- ► 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 (1) clockwise.

Microscope drifts upwards:

- ► Turn rotary knob (1) counterclockwise.

7.10.2 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.

NOTE

There is a risk of damage to the Leica M822 F40 surgical microscopes from uncontrolled tilting!

- ► Firmly hold the handles before triggering the "All Brakes" function.

- ► Pull the stop lever (2) 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.

7.10.3 Releasing the swing arm

NOTE

There is a risk of damage to the Leica M822 F40 surgical microscopes 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.

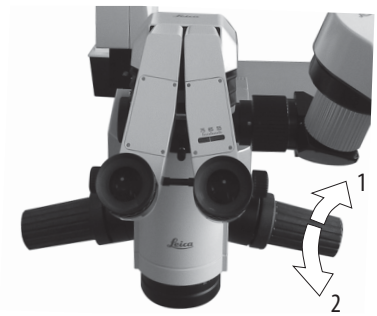
If necessary, rebalance the swing arm.

7.10.4 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.

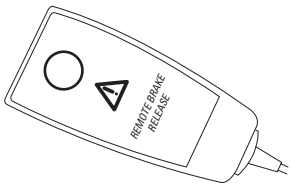


Unless they are individually configured for the current user, the brakes are released by turning the handles as follows:

- ► Turn backwards (2) and hold: Selected brakes are released
- ► Turn forwards (1) 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 chapter 9.4.8).

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



- ► Press and hold the remote brake release button.

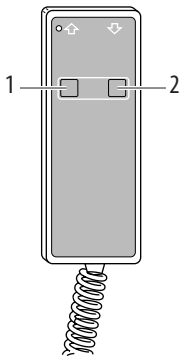
All brakes on the stand are now released.

7.10.5 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.

If the "Up" or "Down" key stucks, please switch opposite direction to stop movement.
If the Up" and "Down" keys are pushed at same time the motor will not move.

7.10.6 Test of emergency stop function of the CT40 ceiling mount

- ► Move the CT40 down.
- ► Press both Up" and "Down" keys at the same time.
  The CT40 must stop.

7.11 Positioning at the operating table

WARNING

Risk of injury due to downward movement of the 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 changing accessories, always lock the M822.
- ► Balance the M822 after re-equipping it.
- ► 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.
- ► Never carry out the balancing above the patient.
- ► See safety notes in user manual.
- ► Don't use the down / up movement of ceiling mount when the microscope is over the patient.

NOTE

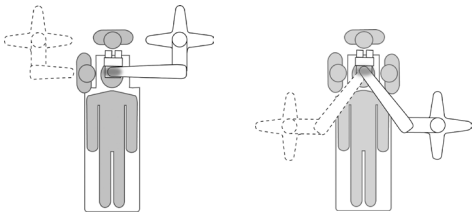
There is a risk of damage to the Leica M822 F40 surgical microscopes from uncontrolled tilting!

- ► Firmly hold the handles before triggering the "All Brakes" function.

The M822 can be positioned easily on the operating table and offers a variety of possibilities for operations on the head or spinal column.
The M822 achieves this large range of positions through its very long and high arm system.

- ► Move the Leica M822 F40 and Leica M822 F20 surgical microscopes into the transport position (see chapter 7.1).
- ► Release the footbrakes (see chapter 7.1).
- ► Move the M822 surgical microscope carefully over to the operating table by the hand rail and into the required position for the operation.

Positioning options



- ► Set the footbrake.
- ► Plug the footswitch into the stand and position it.
- ► Plug the power cable into the stand.
- ► Connect the equipotential bonding to the stand.

7.12 Attaching sterile controls and drape

WARNING

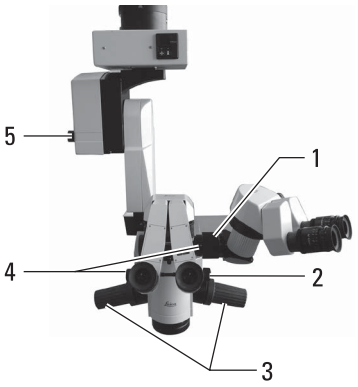
Risk of infection.

- ► Always use the M822 surgical with sterile controls and a sterile drape.

7.12.1 Covers for rotary buttons

Use the covers also when you use sterile disposable drapes. The controls will be easier to grasp.

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



1 Rotary knob for focus fine adjustment
2 Manual zoom emergency drive
3 Handles
4 Interpupillary distance setting
5 Rotary knob for tilting

- ► Attach steam-sterilizable covers to accessories as well (if present).

Before the operation

- ► Press the sterile controls into position so that they engage. Rotary knobs 1, 4 and 5 are identical.

7.12.2 Cover for footswitch

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

7.12.3 Sterile drape for stand

Only use the sterile Leica tested drapes specified in the Accessories section.

CAUTION

Risk of infection.

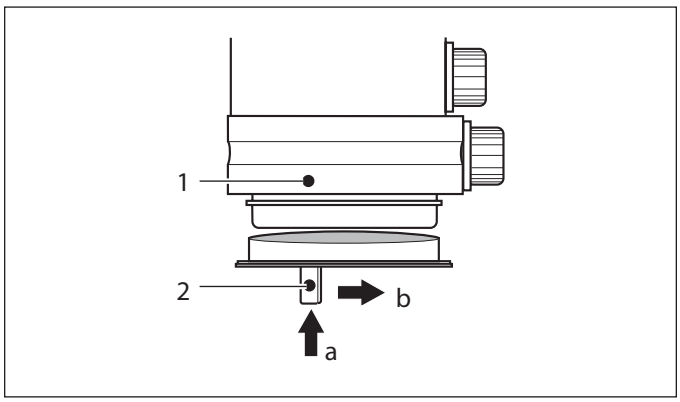
- ► Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

- ► Activate the "All Brakes" function on the handle and extend the arm system (only F40).
- ► Put on sterile gloves.
- ► Attach all the sterile controls.
- ► Unpack the sterile drape carefully and drape it over the M822 surgical microscope as far as the arm system.
- ► Clamp the protective glass (optional) onto the objective.
- ► Do not attach the sterile drape too tightly with the provided ribbons. It must still be easy to move the instrument.
- ► Check the ease of movement of the instrument.

- Follow the instructions provided by the manufacturer of the sterile drape.
- Always use the drape with a protective glass.
- 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.
- Ensure that the optics carrier is not covered when attaching a disposable drape and that the drape creates about a 15 cm diameter space towards the rear for the ventilation slot (danger of overheating).

7.12.4 Attaching the protective glass to the objective

- ► Place the sterilized protective glass on the optics carrier so that the markings on the M822 (1) and on the protective glass (2) are aligned.



- ► Insert the protective glass upwards into the bayonet mount in direction (a).
- ► Turn the protective glass in direction (b) until it engages.

7.13 Function check

Refer to the checklist before operation on chapter 15.1

8 Operation

8.1 Switching the microscope on

WARNING

Risk of injury to the patient.

- ► Don't switch on/off during surgery.
- ► Don't unplug systm during surgery.

WARNING

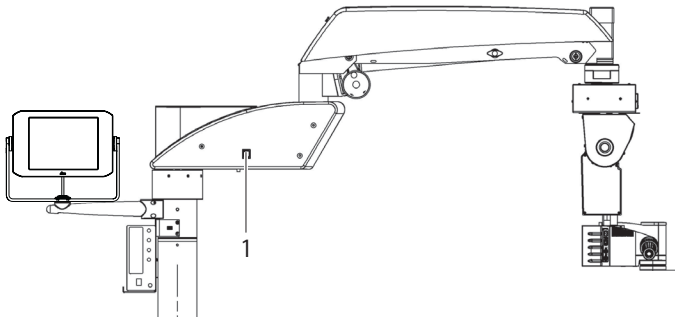
Danger of fatal electrical shock.

- ► The M822 surgical microscope may be connected to a grounded socket only.
- ► Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

WARNING

Danger of injury to the eyes due to possibly hazardous optical infrared and UV radiation.

- ► Do not look at the operating lamp.
- ► Minimize exposure to eyes or skin.
- ► Use appropriate shielding.



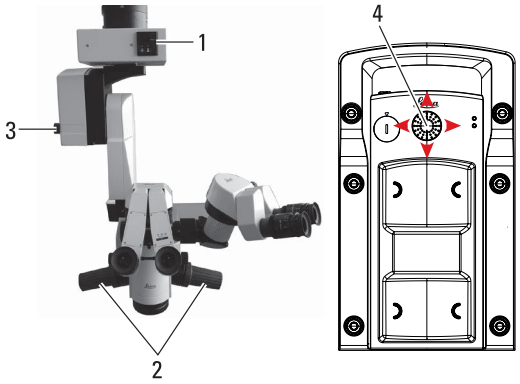
- ► Connect the microscope to a grounded socket.
- ► Do not position the microscope to make it difficult to operate the disconnection device, which is the mains plug.
- ► Switch on the microscope at the power switch (1) on the horizontal arm.
  After the surgical microscope is switched on, the settings of the last active user are loaded.
  As soon as the main illuminator lights up, your microscope is ready to use.

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

- All motors are in the same position as before.
- All illumination settings remain the same.
- XY reverse status is restored where applicable.
- If the StepCycle™ function is selected, it will be in step 0 (see chapter 9.4.10).
- 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.

8.2 Positioning the microscope



8.2.1 Coarse positioning

- ► Hold the microscope by both handles (2).
- ► Turn one handle to release the brakes (All Brakes) (Leica M822 F40).
- ► Position the microscope and release the handle.

- The brakes can also be released using the remote brake release (see chapter 7.10.4).
- Also refer to the "Release brakes" chapter 7.10.4.

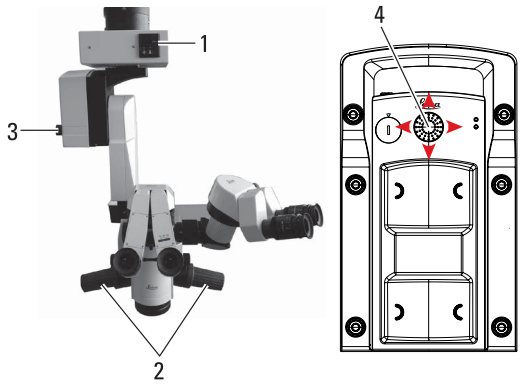
WARNING

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 brakes for the Leica M822 F20 according to personal need and the weight of the accessories, see chapter 7.9.3.

8.2.2 Fine positioning



► Use joystick (4) on footswitch to operate X/Y-drive and position the microscope.

- Return to middle position by pressing the "Reset" key (1) or the "Reset" buttons on the control unit.
- You can assign the function "XY Reverse" on your footswitch in order to reverse the X and Y movement directions.
- You can change the speed at which the XY motors move on the "Speed" menu screen.
- This value can be saved individually for each user (see chapter 9.4.3).

8.2.3 Adjusting the tilt

► Turn the rotary knob (3) 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°).

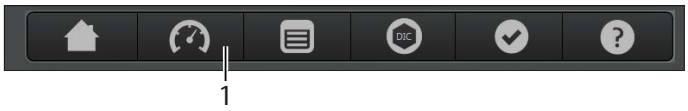
8.2.4 "Reset" buttons

"Reset" buttons on the control panel:

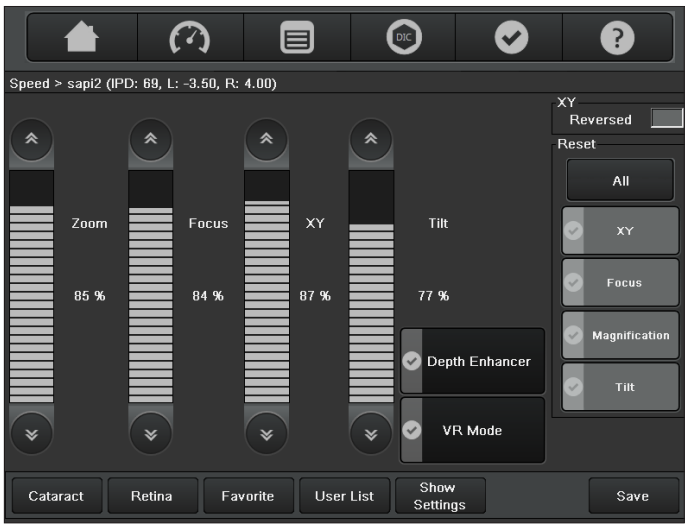
- If a drive is in reset position, the "Reset" button assigned to it appears in green.
- A "Reset" button that flashes green indicates that the corresponding drive is moving to the reset position.
- A "Reset" button that appears in gray indicates that the corresponding drive is outside of the reset position.
- Pressing the "Reset All" button returns all motors to the home position and reloads the user settings of the current user.

8.2.5 Drive settings

► Press the "Drive settings" button (1) on the top menu bar to access the "Speed" menu.



The "Speed" menu is displayed:



- 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 chapter 9.4.3).

8.3 Adjusting the microscope

8.3.1 Adjusting the brightness

WARNING

Light that is too intense can damage the retina.

► Observe the warning messages in the "Safety Notes" chapter.

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

Using the footswitch

Depending on the functions assigned to the footswitch (see chapter 9.4.4), you can switch the main illuminator and OttoFlex™ illuminator on and off, and increase and decrease their brightness, using the footswitch.

Using the touch panel

You can change the brightness for the active main illuminator and OttoFlex™ illuminator by pressing the ▲ or ▼ key or directly pressing the corresponding brightness bar.

- Tapping the ▲ or ▼ button changes the brightness value in increments of 1. Pressing and holding the buttons changes the values in increments of 2 until you reach the maximum or minimum or until you stop pressing.
- Setting the brightness of a lamp to zero switches it off.
- The Leica M822 is also equipped with a second OttoFlex™ 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.

WARNING

Reduced light output!

► In case of malfunction of the fans, the maximum light output is reduced.

Quick-change lamp mount

A quick-change lamp mount is available for the coaxial OttoFlex™ illuminator.

► If the coaxial OttoFlex™ illuminator fails during the operation, switch to the second lamp during use.

► 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. Clicking displays the information "Check coaxial OttoFlex™ illuminator 1" or "Check coaxial OttoFlex™ illuminator 2".

► Replace the defective bulb after the operation (see chapter 11.5).

8.3.2 Retina protection

Exposure time

For additional information, refer to "3.4 Directions for the person responsible for the instrument" .

The user can activate the Retina Protection function during the surgery via the footswitch or the touch panel (1) of the control unit. When Retina Protection function is activated, the main light intensity is reduced to 10% and the OttoFlex intensity is reduced to 20%. The user can still adjust the light intensity below the threshold. When the user deactivates the Retina Protection function, the light intensity will go back to previous intensity.

8.4 Adjusting the magnification (zoom)

You can adjust the magnification using the footswitch or the "Magnification" adjustment bar in the main menu of the control unit.

► Pressing the ⏫ or ⏬ buttons changes the value continuously until the button is released or the maximum or minimum values are reached.

- You can change the speed at which the zoom motor moves in the "Speed" menu (see chapter 8.2.5).
- You can return the zoom motor to the magnification setting saved for the current user by using the "Reset Magnification" button (chapter 9.2.1).

8.4.1 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".

8.4.2 Manually adjusting the magnification (zoom)

NOTE

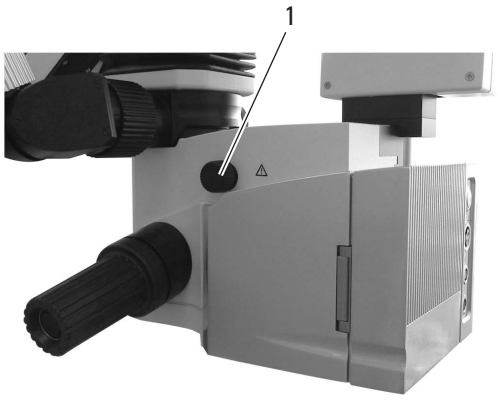
Destruction of the zoom motor!

► 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 (1) on the optics carrier.

► Press the rotary knob (1).

► Set the desired magnification by turning the knob.



8.4.3 Adjusting the focus

WARNING

Danger of injury to the eyes.

► Minimize speed of focus motor during retina surgery.

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 chapter 8.2.5).
- You can return the focus motor to the reset position (1/3 up, 2/3 down) by pressing the "Reset" key (2, chapter 6.2) or the "Reset Focus" button (see chapter 8.2.4).
- You can also refocus the 0° assistant's attachment using a fine focus adjustment knob.

NOTE

Destruction of the focus motor!

► If the focus motor fails, adjust the focus manually by moving optics carrier up or down.

8.5 Transport position

8.5.1 Transporting the M822 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.**
- **Collision between user and microscope system. E.g. between head and camera control unit holder (CT40)**
- **Abrupt braking of the surgical microscope at a threshold that cannot be crossed.**

► Before transport, always move the Leica M822 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.

Whenever you transport your Leica M822 F20, first bring it into the transport position (see chapter 8.5).

8.5.2 Transporting the Leica M822 F40

Whenever you transport your Leica M822 F40, first bring it into transport position.

NOTE

There is a risk of damage to the Leica M822 F40 surgical microscopes from uncontrolled tilting!

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

Whenever you transport your Leica M822 F40, first bring it into the transport position (see chapter 8.5).

8.6 Rest position

► Bring the microscope into rest position after use.

8.6.1 F40 and F20 floor stands

NOTE

Danger of collision!
The surgical microscope can collide with surrounding components, the ceiling or lamps.

► Take care there is enough free space.

► After bringing the microscope into transport position, push it to its storage location.
► Firmly depress the footbrake.
► Protect your Leica M822 by covering it with its dust cover.

8.6.2 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.

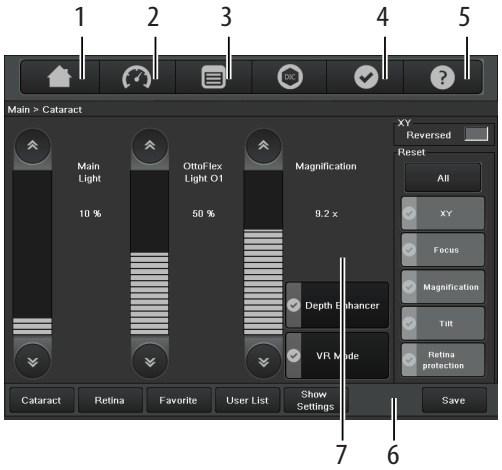
► Swing the microscope away.
► Remove sterile components.
► Lock the swing arm.
► Switch off the power switch on the swing arm.
► Press the "Up" key on the remote control and raise the stand.

8.7 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.

9 Touch panel

9.1 Menu structure



1 Operational mode (light/ magnification settings)
2 Operational mode (drive settings)
3 Configuration menu
4 Static menu bar (remains unchanged)
5 Displays help texts for individual topics
6 Dynamic button bar
7 Display area with status bar

9.2 Switching the microscope on

WARNING

Motors return to their home positions

► Before switching on your Leica M822, ensure that the travel paths of the XY, zoom and focus motors are free of obstructions. The tilt motor is not moved.

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

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

If the power supply of your microscope is accidentally interrupted for a short period (<20 ± 5 seconds), the microscope carries out a fast startup:
- All motors are in the same position as before.
- All illumination settings remain the same.
- XY reverse status is restored where applicable.
- If the StepCycle™ function is selected, it will be in step 0 (see chapter 9.4.10).
- 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.

9.2.1 Auto Reset

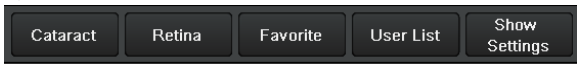
If you move the swing arm up to its end position after the operation, you trigger the Auto Reset function:
- All of the motors – zoom, focus and XY – move to their reset position.
- The tilt motor is not moved.
- The current user settings are reloaded.
- The illumination is switched off.

If you move your Leica M822 back down over the operating field, the illumination switches back on and your Leica M822 is ready to use immediately.

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

9.2.2 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 chapter 9.4).

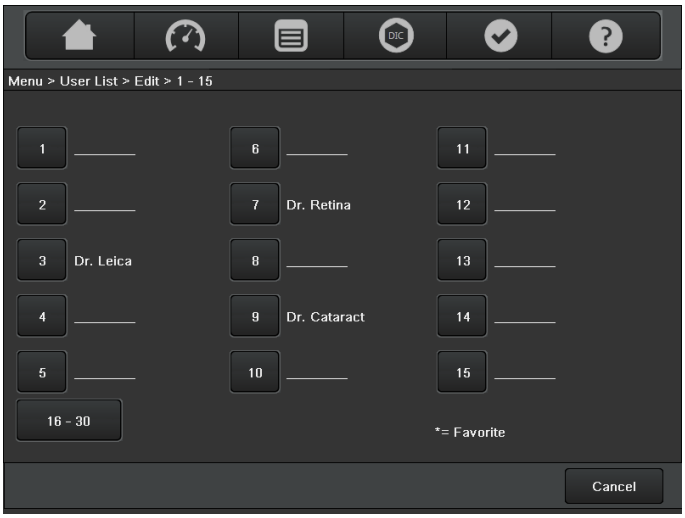
You can store a frequently used profile under the user "Favorite" (see chapter 9.3).

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.

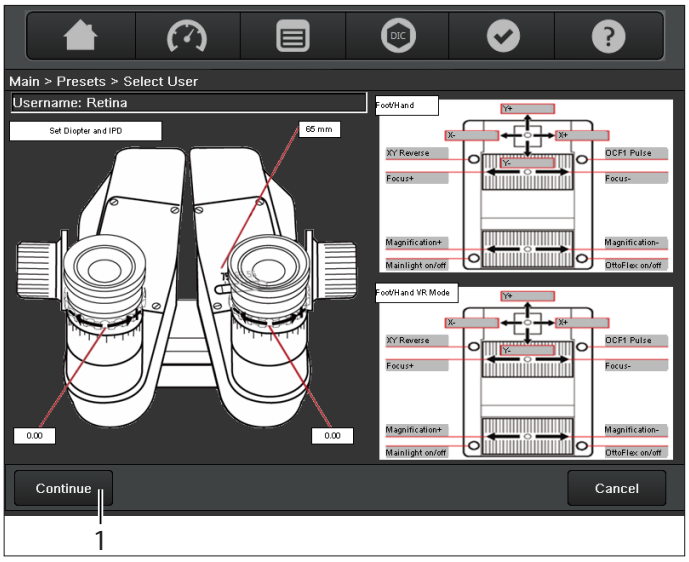
When the user list is open, it can be edited at any time (see chapter 9.3).



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

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 assignments.

► Press "Continue" (1).

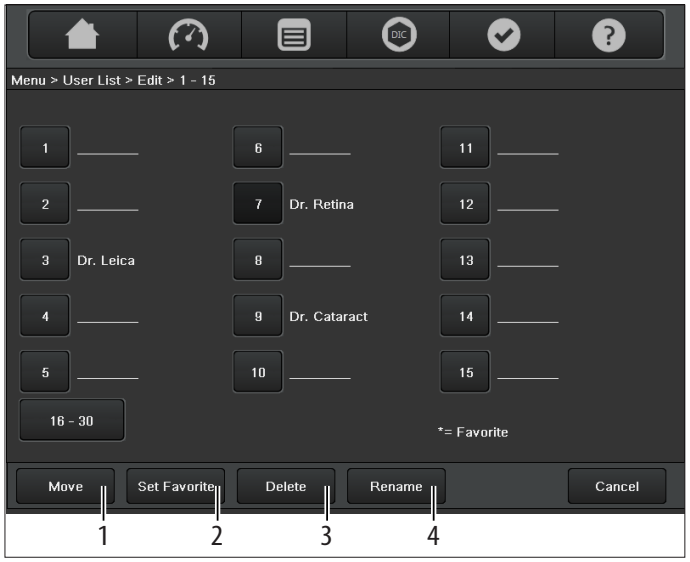


- Before starting every operation make sure your personal user settings are selected and make yourself familiarize with your footswitch configuration.
- If you have assigned the "StepCycle" function to the footswitch we recommend that you check the programmed procedure without patient before starting the operation..

9.3 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:

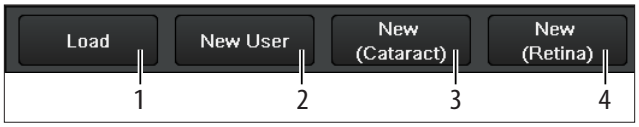


Move (1)	Moves the selected user to another available location of your choosing.
Set Favorite (2)	Defines a user in the user list whose settings can be directly retrieved from the "Main" or "Speed" menu by clicking the "Favorite" button.
Delete (3)	Deletes the selected user.You must click "Confirm" to confirm this action.
Rename (4)	Renames an existing user.The user's settings are not changed.

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

9.4 Configuring users (User Settings menu)

You can configure user settings in this menu.

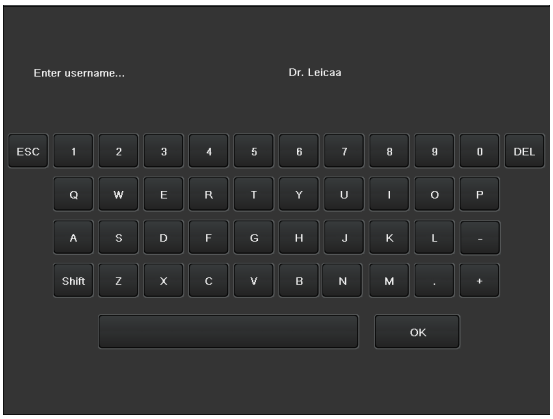


Load (1)	Loads the settings of an existing user so that you can modify them.
New User (2)	Opens a new user with "empty" settings.
New (Cataract) (3)	Loads a new user with the settings for "Cataract" so that you can modify them.
New (Retina) (4)	Loads a new user with the settings for "Retina" so that 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").

9.4.1 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.

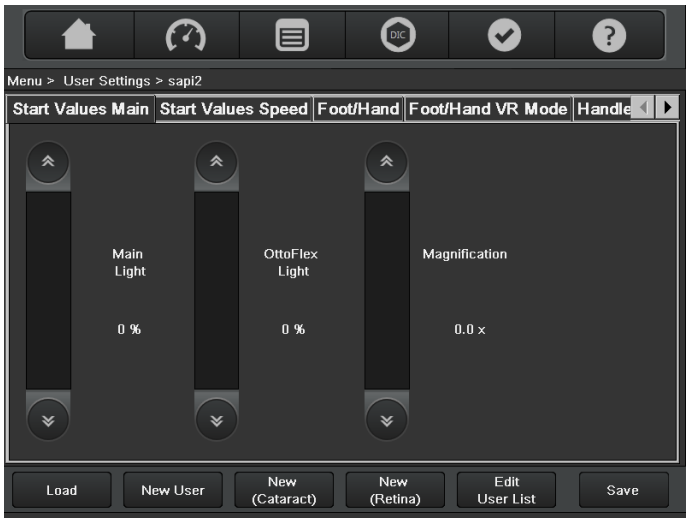


9.4.2 Setting the light start values

You can set the start values for the main illuminator, the OttoFlex™ illuminator and the magnification on this screen.

- Tapping the ⏫ or ⏬ button changes the values in increments of 1.
- Pressing and holding the buttons changes the values in increments of 2 until you reach the maximum/minimum or until you stop pressing.

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



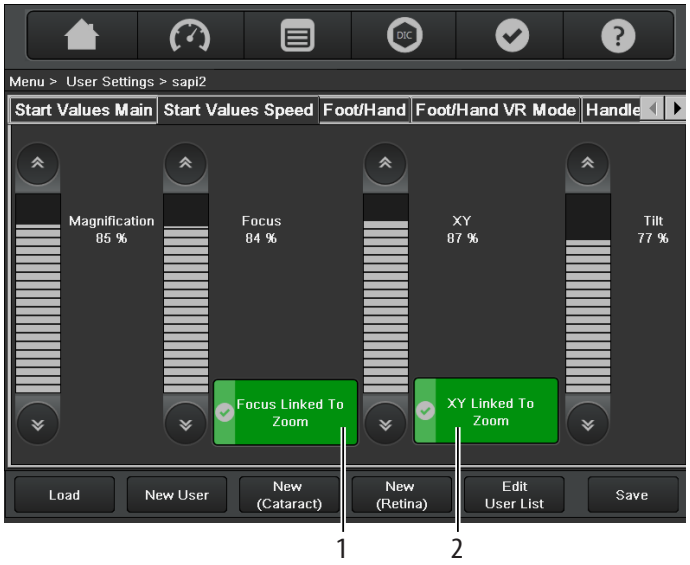
9.4.3 Setting the drive start values

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

- Tapping the ⏫ or ⏬ button changes the values in increments of 1.
- Pressing and holding the buttons changes the values in increments of 2 until you reach the maximum/minimum or until you stop pressing.

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

- The "XY linked to Zoom" (2) 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" (1) 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".



9.4.4 Footswitch assignment

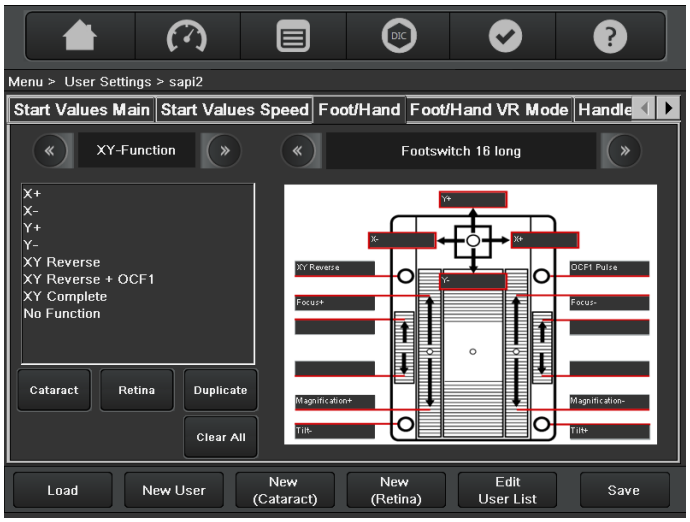
Here, you can configure individual settings for each user for your footswitch.

- ► In the right selection field, select the footswitch 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 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.

9.4.5 Configuring individual buttons

In the right selection field, select the footswitch 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.



9.4.6 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 XY-unit

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.

9.4.7 Footswitch assignment VR

You can store a special footswitch 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:

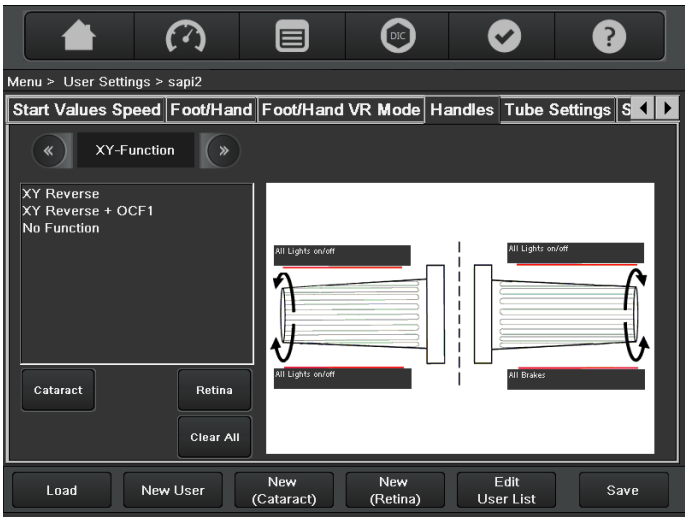
- In the "VR Mode" tab, "footswitch for VR mode active" must be activated.
- In each of the two footswitch assignments, "VR Mode on/off" must be assigned.
- If the "VR Mode on/off" function is assigned to "Footswitch" in the footswitch assignment, it is automatically applied to the same button at "Footswitch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

The adjustment is the same as for the footswitch assignment; see the previous section.

9.4.8 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.

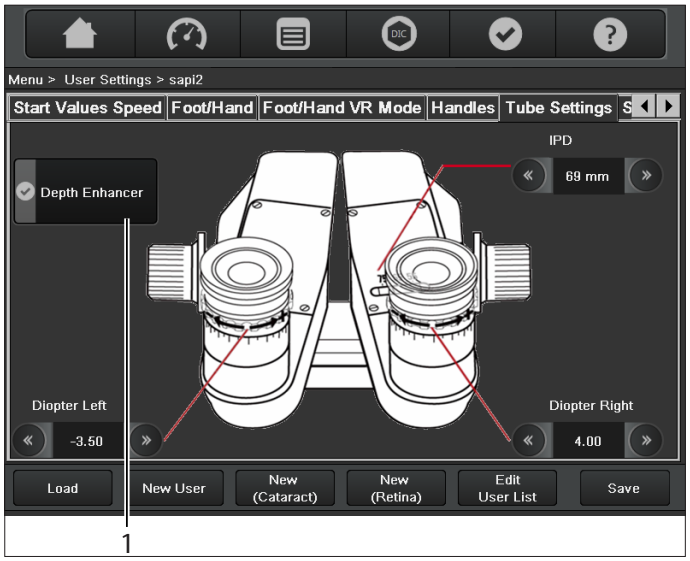


For the handle, the additional "Handles" function group with the functions "All Brakes" (releases all brakes) and "Selected Brakes" (releases all brakes except the up/down brake) are also available (not available with the Leica M822 F20).

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

9.4.9 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" (1) as a basic setting for each user.



9.4.10 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.

WARNING

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. 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 (2).
- ► Press the button on your footswitch 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 (1):

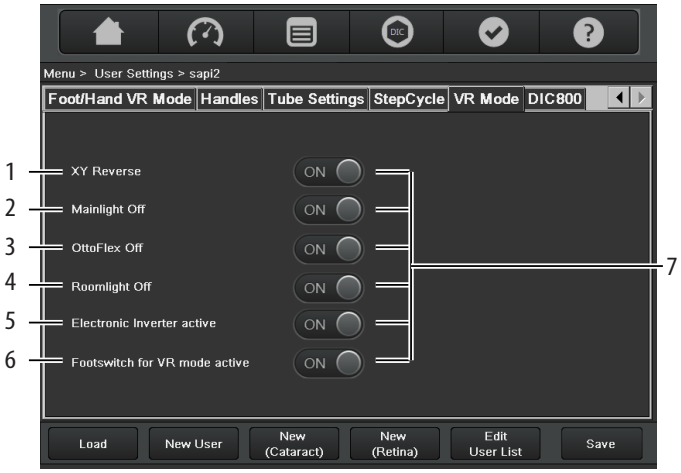
- Step 0 means: Basic setting of the user
- 1/x means: 1 of x steps

- ► In the "Main" or "Speed" menu, deactivate the "Rec. Cycle" button (2).
- ► Activate the key of your footswitch 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.

9.4.11 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" (1) – reverse X and Y
- "Mainlight off " (2)– switch off main light
- "Ottoflex off" (3) – switch off OttoFlex™ illuminator
- "Roomlight off" (4) – switch off additional function (ADF1 / ADF2)
- "Electronic inverter active" (5) – activate inverter
- "Footswitch for VR mode active" (6) – activate separate assignment of the footswitch

These functions are activated at the factory.
You can deactivate the functions using the "Toggle" key (7).

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 footswitch, the following conditions must be met:

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

Using VR mode

► Press the button with the "VR Mode on/off" (1) 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" (1) assignment again.

The microscope undoes all actions again.

9.4.12 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.

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.

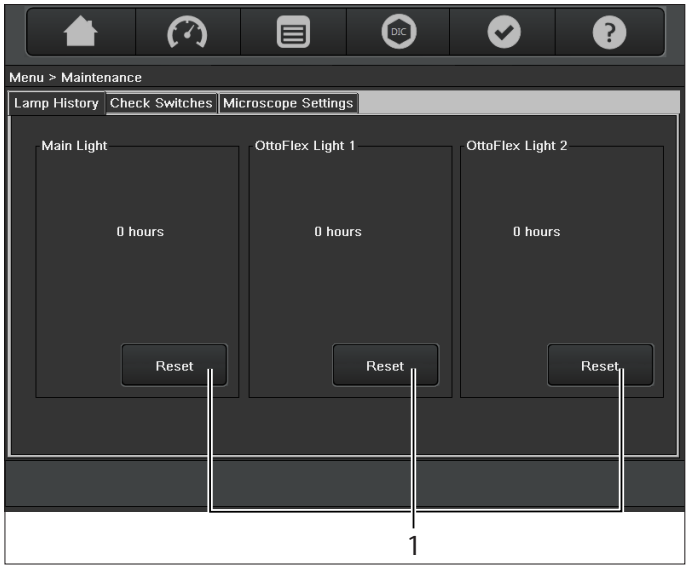
If you move your Leica M822 back down over the operating field, the illumination switches back on and your Leica M822 is ready to use immediately.

This function can be deactivated by your Leica service technician.

9.5 The Maintenance menu

9.5.1 Lamp History

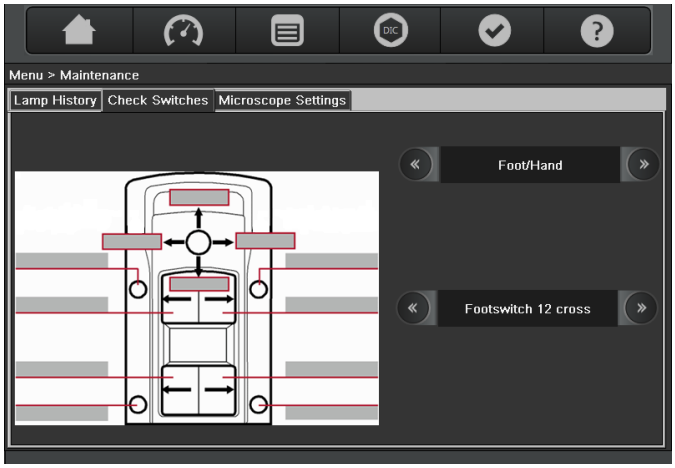
This screen displays the operating hours for each of the following bulbs: Main, OttoFlex™ 1, and OttoFlex™ 2 Light.



► Whenever you replace a bulb, reset the bulb's hour meter to 0 by double-clicking the "Reset" button (1).

9.5.2 Check Switches

On this screen, you can test the footswitches 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 you want to check.

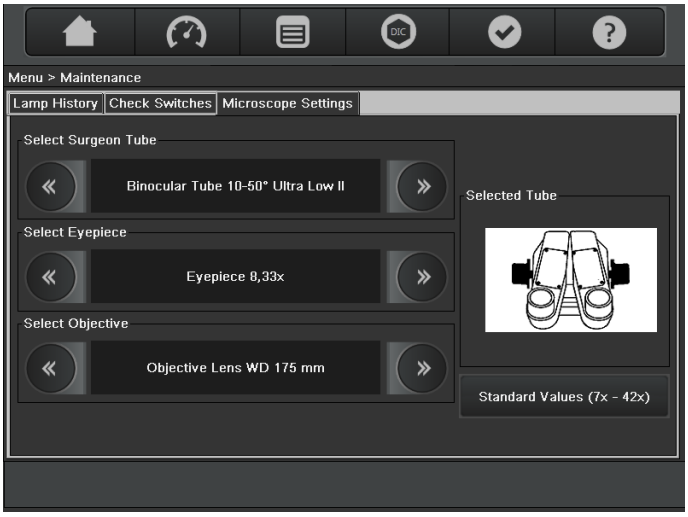
You can scroll forwards or backwards in the list by clicking the arrowheads.

► Now press all of the keys, one after the other, of the footswitch 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.

9.5.3 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.

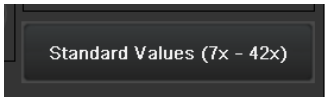
You can scroll forwards or backwards in the list by clicking the arrowheads.

► 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.



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

9.6 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.

9.7 The "Service" menu

This area is password-protected.

10 Accessories

A comprehensive range of accessories enables the M822 surgical microscope to be matched to the requirements of the task in hand. Your Leica representative will be pleased to help you select the appropriate accessories.

10.1 Devices and accessories manufactured by Leica

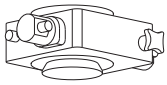
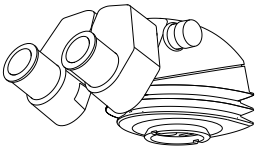
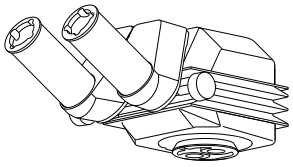
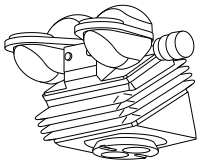
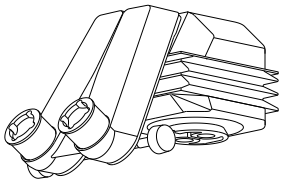
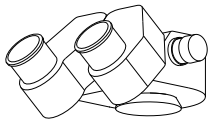
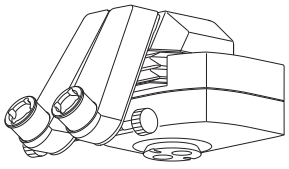
Image	Component/accessory	Description
	Laser filter 4 beams	• Third-party product, purchased only from third parties
	Laser filter 2 beams	• Third-party product, purchased only from third parties
	Inverter	
	Binocular tube, inclinable 5° to 25° with PD	• Adjustable viewing angle and height • Adjustable interpupillary distance
	Binocular tube, 10° to 50° with PD	• Adjustable viewing angle and height • Adjustable interpupillary distance
	Binocular tube, 30° to 150°, T, Type II L	• Tilts 120° • Adjustable interpupillary distance
	Binocular tube, 10° to 50°, Type II, UltraLow ™ III	• With extra-low viewing height • Adjustable viewing angle and height • Adjustable interpupillary distance
	Binocular tube, inclined, T, type II	
	Leica DI C800	• Binocular tube with image superimposition for overlaying XGA signals • For further information, see the separate operating instructions

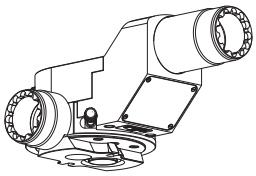
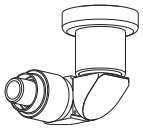
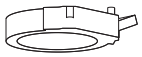
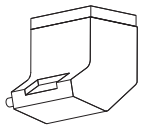
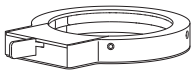
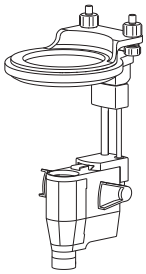
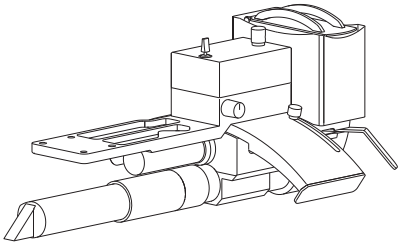
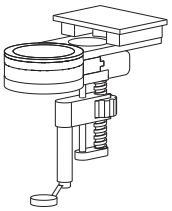
Image	Component/accessory	Description
	10× eyepiece 8.33× eyepiece 12.5× eyepiece	
	Leica ToricEyePiece	• Facilitates adjustments to the angle of toric intraocular lenses via an integrated scale • For further information see the separate operating and installation instructions
	Stereo adapter	• For assembling a beam splitter
	Beam splitter 50/50 Beam splitter 70/30	• The two interfaces can be used as assistant ports and documentation ports.
	Revolving beam splitter 50/50 Revolving beam splitter 70/30	• Revolving (front) assistant port • Fixed (rear) documentation port

Image	Component/accessory	Description
	Second observer stereo attachment	• For assembly of binocular tube
	Adapter for Stereo Assistant Microscope	
	Stereo Assistant Microscope	• Separate assistant microscope
	Objective APO WD175 Objective APO WD200 Objective APO WD225	
	Leica Keratoscope	• LED ring illuminator for displaying astigmatism • For further information, see the separate operating instructions
	Leica RUV800 WD175 Leica RUV800 WD200	• For observing the fundus of the patient's eye • For further information, see the separate operating instructions
	Leica Slit Illuminator	
	Holder for protective glass	
	Protective glass	
	Oculus BIOM	

10.2 Devices and accessories of Leica and of 3rd party manufacturers

10.2.1 HD Recording Systems

- Evo4k

10.2.2 Camera Systems

- Camera System HD C100
- Leica Video Adapter (Manual, Remote, Zoom)

10.2.3 Monitor

- 27" 2D-4K

10.2.4 Footswitch

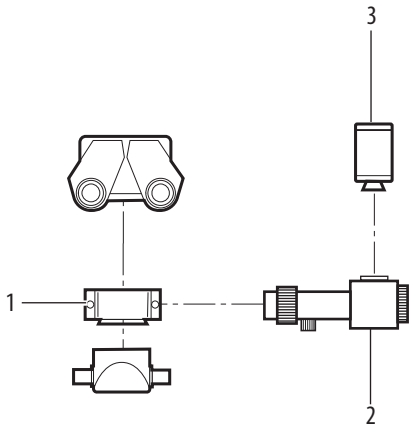
- Wireless Footswitch, 14 functions
- Wireless Footswitch, 12 functions

10.2.5 Others

- Leica Slit Illuminator
- Leica Keratoscope
- Leica ToricEyePiece
- Leica RUV800
- Oculus SDI & BIOM

- Please check with Leica for other compatible accessories.
- Leica is not responsible for the use of non-approved third party products.

10.3 Video accessories for M822



1 Beam splitter (50/50 % or 70/30 %), rotatable 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

The parfocality of the Leica Zoom Video Adapter has to be adjusted.

- ▶ Set the maximum magnification.
- ▶ Place a flat test object with sharp contours under the objective.
- ▶ Look through the eyepieces and focus the microscope.
- ▶ Set the minimum magnification.
- ▶ Set the maximum magnification (f = 100 mm) on the Leica Zoom Video Adapter.
- ▶ Focus the monitor image on the Leica Zoom Video Adapter.
- ▶ Set the desired magnification on the Leica Zoom Video Adapter.

10.4 Drapes

Supplier	Article No.	Main Front	Assistant left	Assistant right
Microtec	8033650EU 8033651EU 8033652EU 8033654EU	✓	✓	✓
Pharma-Sept	9228H 9420H	✓	✓	✓
Fuji System	0823155	✓	✓	✓
	0823154	✓	–	✓
Spiggle & Theis	250013OH	✓	✓	✓
Advance Medical	09-GL800	✓	✓	✓

The use of the Protective glass 10446058 is recommended.

11 Care and maintenance

To ensure that M822 operates safely and reliably over time, we recommend scheduling an annual preventive maintenance (PM) visit to maintain equipment specifications over time, as well as perform an electrical system safety check.
We recommend purchasing a service contract from Leica Service & Support (or authorized Service Providers) to ensure regular inspection, timely response and a direct access to our parts inventory. Please note that only genuine parts from Leica shall be used for maintenance.

CAUTION

Risk of compromised surgery

- A system safety check will need to be performed accordingly to your country-specific requirements. Leica recommends an annual system and safety check. After a system usage period of 8 years, an annual system and safety check is considered mandatory.
- The systems shall not be used to perform critical use applications after 8 years of system usage or up to 12 years with annually passed system and safety check.
- As all maintenance activities require product specific know-how, it is recommended to contact your responsible service organisation.

11.1 Maintenance instructions

- Put a dust cover over the instrument while the brakes are in work.
- Keep accessories in a dust-free place when not in use.
- Remove dust with a pneumatic rubber pump and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from damp, vapors, acids, alkalis, and corrosive substances.
  Do not keep chemicals near the instrument.
- Protect the surgical microscope from improper handling.
  Install other device sockets or unscrew optical systems and mechanical parts only when explicitly instructed to do so in this user manual.
- Protect the surgical microscope from oil and grease.
  Never oil or grease the guide surfaces or mechanical parts.
- Remove coarse debris with a moistened disposable cloth.
- 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-splitting compounds,
- strong organic acids,
- oxygen-splitting compounds.

► Follow the disinfectant manufacturer's instructions.

11.2 Cleaning the touch panel

► Before cleaning the touch panel, switch off your M822 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.

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

NOTE

Damage to the touch panel.

► Operate the touch panel using your fingers only.
  Never use hard, sharp or pointy objects made out of wood, metal or plastic.
► Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

11.3 Care and Maintenance of the Leica Footswitch

We recommend frequent cleaning of the footswitch.

Cleaning

► If the footswitch is connected to the microscope, unplug it.
► Clean the footswitch under running water (<60 °C) and using detergent or spirits if necessary. Do not use any abrasives or scouring agents.
► During cleaning, make sure that the cable plug does not come into contact with the water.
► Dry the footswitch thoroughly.
► In case of defects, contact the responsible service organization.

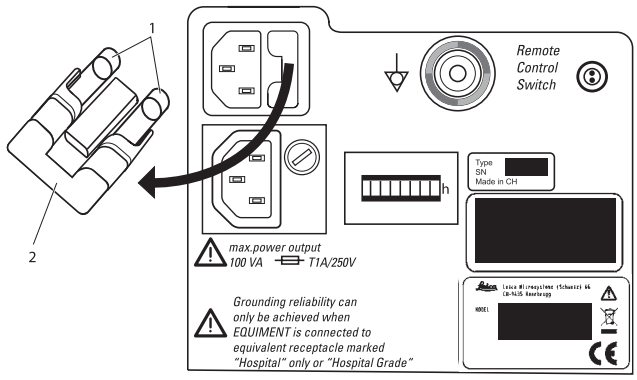
11.4 Changing fuses

WARNING

Danger of fatal electric shock!

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

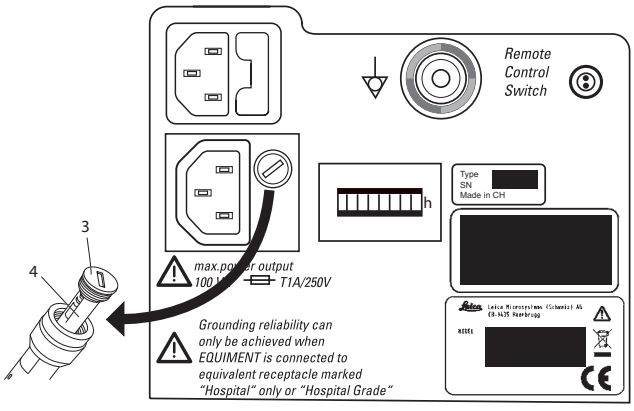
11.4.1 Changing fuses at the power input socket



- ► 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 AH time-lag fuses.

11.4.2 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 1 AH time-lag fuses.

11.5 Changing lamps

WARNING

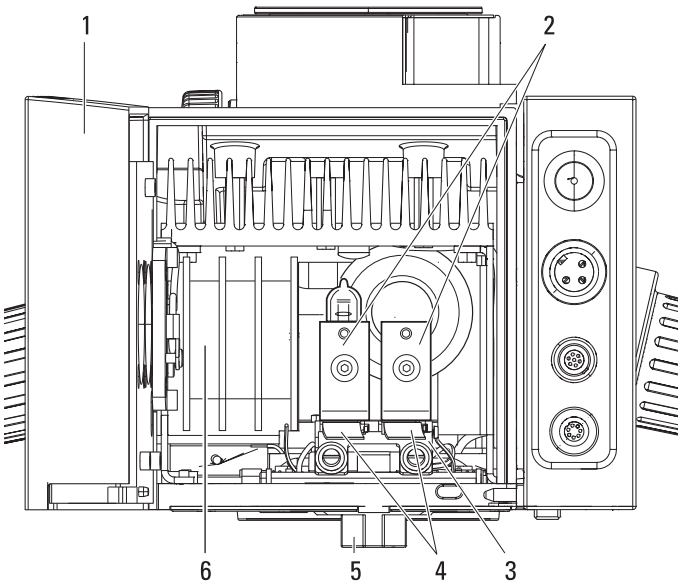
Halogen lamps become very hot!

- ► Always switch the main switch off before changing a bulb.
- ► Do not touch hot lamps.
- ► Allow bulbs to cool for 20 minutes before changing them (burn hazard!).

11.5.1 Changing bulbs with the slit illuminator installed

- ► Remove the slit illuminator following the reverse order of steps listed under Fastening the slit illuminator see chapter 7.7.5.
- ► Change the bulb.
- ► Fasten the slit illuminator, see chapter 7.7.5.

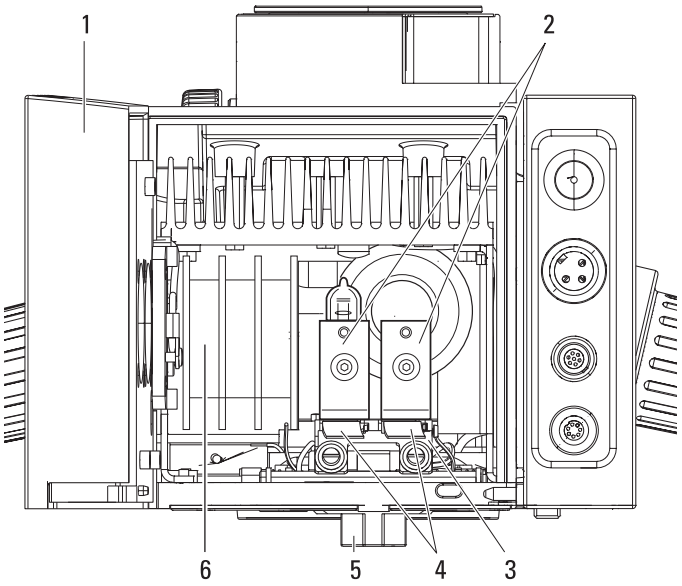
11.5.2 Main light



In the version, the main light (6) consists of an LED lamp and may be replaced by your Leica Microsystems service technician only.

11.5.3 Coaxial OttoFlex™ illuminator

- Use only precision-formed original Leica 12 V/ 50 W halogen bulbs.
- Never touch the glass bulb of halogen lamps with your bare fingers.
- Check the function of the replacement lamps before using it.



- ► Open the cover (1) on the rear of the optics carrier.
- ► To replace the right lamp, the bulb slider (3) must be all the way to the left.
- ► To replace the left lamp, the bulb slider (3) must be all the way to the right.
- ► Pull on the tab (4) to remove the bulb socket (2) complete with bulb.
- ► Insert the new bulb socket and bulb.

Whenever you replace a bulb, reset the bulb's hour meter to 0 (see chapter 9.5.1).

11.6 Notes on reprocessing of resterilizable products

11.6.1 General

Products

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

Limitation of reprocessing

For the medical devices used on patients suffering from Creutzfeldt Jacob Disease (CJD) or suspected of having CJD or variant CJD, the local statutory requirements have to be met. Normally resterilizable products used on this group of patients are to be eliminated without risk by incineration.

Occupational safety and health protection

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

Limitation of reprocessing

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

11.6.2 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 M822 surgical microscope.

Cleaning: manually

- Equipment: running water, detergent, alcohols, microfiber cloth

Procedure

- ► Rinse surface contamination off of the product (temp. < 40 °C). Use some rinsing agent depending upon degree of contamination.
- ► Alcohol 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 micro-fiber cloth.

Cleaning: automatically

- Equipment: cleaning/disinfecting device

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

Disinfection

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

Control and functional test

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

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 Sterilization table on chapter 11.6.3.

Storage

No special requirements.

Additional information

None

Contact information of manufacturer

Address of local agent

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

11.6.3 Sterilization table

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

		Permissible sterilization methods	
Art. No.	**Designation**	**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	
10429792	Sleeve for slit illumination	x	

1) Products with optical components can be sterilized with steam 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.

12 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.

13 What to do if ...?

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?

13.1 General

Fault: The functions cannot be activated with the footswitch.

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 on the control unit (see chapter 9.4.4).

13.2 Microscope

Fault: There is no light in the microscope.

Cause 1: A cable connection has come loose.

Fault remedy:

- ▶ Check the electrical connections.
- ▶ Check the power cable.

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

Fault remedy:

- ▶ Contact your Leica Microsystems representative.

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

Cause 1: The switch is set to the slit illuminator position.

Fault remedy:

- ▶ If the coaxial OttoFlex™ illuminator fails during the operation, switch to the other lamp using the quick-change lamp mount.
- ▶ Check the setting of the coaxial OttoFlex™ illuminator/slit illuminator (see chapter 6.2) and set it to Coaxial OttoFlex™.

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

Fault remedy:

- ▶ Slide the quick-change lamp mount to the other side, see chapter 8.3.1.

Cause 3: Bulb is defective (message "Check Coaxial OttoFlex™ illuminator").

Fault remedy:

- ▶ Check the bulbs and replace any that are defective, see chapter 11.5.

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 dioptric correction is not set correctly.	**Fault remedy:** ► Carry out the dioptric correction by following the instructions exactly (see chapter 7.4.1).

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 chapter 8.4.2).

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 chapter 7.9.1).
Cause 3: A brake is not released.	**Fault remedy:** ► Contact your Leica Microsystems representative.

13.3 Control unit

Fault: The display does not show an image.

Cause 1: Loose cable.	**Fault remedy:** ► Check to ensure that the cable connections are tight.
Cause 2: 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.

13.4 Error messages on the control unit

Fault:
- Check the coaxial OttoFlex™ lamp.
- Check Slitlamp.

Fault remedy:
- ▶ Switch to the second lamp using the corresponding quick-change lamp mount.
- ▶ Replace the defective bulb as soon as possible.

Fault:
- Check Slitlamp (Leica M822)
- 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.

Fault remedy:
- ▶ Contact your Leica Microsystems representative.

Fault: Fan 1 or 2 locked.

Fault remedy:
- ▶ Contact your leica Microsystems representative.

Fault: Overheat in optics carrier.

Fault remedy:
- ▶ Keep the ventilation slots clear.
- ▶ If the problem cannot be fixed, contact your leica Microsystems representative.

13.5 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 chapter 7.10.1).

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 chapter 7.9.3).

13.6 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 chapter 7.9.1).

Cause 3: A brake is not released.	**Fault remedy:** ► Contact your Leica Microsystems representative.

13.7 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.

13.8 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). ► See video and camera accessories for Leica M822, chapter 10.2.
Cause 2: Diaphragm on the Leica Video Adapter connection interface is closed.	**Fault remedy:** ► Set diaphragm to the "open" position.

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 chapter 7.4.3).
Cause 2: The parfocality of the microscope is not set properly.	**Fault remedy:** ► Check the parfocality of the Leica Video Adapter.
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, please contact your Leica representative.

14 Specifications

14.1 Microscope

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	Focus operation motorized, 50 mm×50 mm, with automatic reset
Tilt drive	Motorized, +15°/–50°
Remote control	12- and 14-function footswitch with long or cross pedals
Weight	28.3 kg (with accessories and XY-unit)

14.2 Illumination

Main light	Integrated LED illumination system for intensive, uniform illumination of the field of view
Coaxial OttoFlex™	Illumination unit for generating a clear and stable red reflex, decreasing stray light through the sclera and increasing the image contrast Precision-formed halogen bulb, 12 V/50 W
Quick-change lamp mount (coaxial OttoFlex™ illuminator only)	With two precision-formed halogen bulbs, 12 V/50 W
Filter	Built-in UV-protection 400 nm

14.3 Accessories

Video/camera	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
Wide-angle observation system	Leica RUV800, BIOM*, EIBOS*
Data superimposition	Leica DI C800
IOL orientation	Leica ToricEyePiece
Inverter	AVI*, SDI*
Lasers	Adapters for installation are available from laser manufacturer
Slit lamp	Motorized, ±23°, slit width 0.01-14 mm, slit length 14 mm, 180° revolving, quick-change lamp mount
Asepsis	All controls can be sterilized, sterile drapes are available
Leica Keratoscope	
Leica Stereo Assistant Microscope	

* Accessories from third-party manufacturers

14.4 Electrical data

14.4.1 Power socket

F20 floor stand	Central on the horizontal arm 100-240 V (±10 %), 50/60 Hz
F40 floor stand	Central on the horizontal arm 100-240 V (±10 %), 50/60 Hz
CT40 ceiling mount	Terminal strip on the ceiling 100/120 V, 220/240 V (±10 %), 50/60 Hz
Fuse	2 × T6.3 AH, 250 V

14.4.2 Power consumption

Floor stand

Leica M822 F20	400 VA
Leica M822 F40	550 VA

Telescope Mount

Leica M822 CT40	• (120 V 60 Hz) 1500 VA (entire system, incl. telescopic unit) • (240 V 50 Hz) 1400 VA (entire system, incl. telescopic unit)

Protection class

Class 1

14.5 Auxiliary power socket

Connecting electrical equipment to the Auxiliary Power outlet will result in the establishment of a “ME System” and may result in a reduced level of safety. The corresponding standard requirements for “ME Systems” must be observed.

Output voltage	100–230 V AC
Fuse	T1 AH, 250 V
Max. permitted power consumption of the secondary device:	100 VA

Max. permitted ground leakage current for the Leica M822/F40 including secondary device, Leica M822/CT40 including secondary device, Leica M822/F20 including secondary device:	IEC/EN 60601-1: 5 mA UL 60601-1: 300 µA

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.

14.6 Optical data

With UltraLow™ III binocular tube

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

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

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

14.7 Stands

14.7.1 F20 floor stand

Castors	4× 100 mm
Weight	Base 174 kg Column with additional weight 55 kg
Total weight	Approx. 330 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°

14.7.2 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°

14.7.3 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°

14.8 Ambient conditions

Use	+10 °C to +40 °C +50 °F to +104 °F 30 % to 95 % rel. humidity 780 mbar to 1013 mbar atmospheric pressure
Storage	–30 °C to +70 °C –22 °F to +158 °F 10 % to 100 % rel. humidity 500 mbar to 1060 mbar atmospheric pressure
Transport	–30 °C to +70 °C –22 °F to +158 °F 10 % to 100 % rel. humidity 500 mbar to 1060 mbar atmospheric pressure

14.9 Electromagnetic compatibility (EMC)

Environment for which the instrument is suitable

Hospitals except for near active HF Surgical Equipment and the RF shielded room of an ME System for magnetic resonance imaging, where the intensity of EM Disturbances is high.

Compliance IEC 60601-1-2

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

Immunity
- Electrostatic discharge IEC 61000-4-2:
  CD +/- 8 kV, AD +/- 15 kV
- Radiated RF EM Fields IEC 61000-4-3:
  80 – 2700 MHz: 10 V/m
- Proximity Wireless fields IEC 61000-4-3:
  380 – 5785 MHz: 9 V/m; 28 V/m
- Electrical Fast Transients and
  bursts IEC 61000-4-4:
  ± 2 kV: Power supply lines
- Surges IEC 61000-4-5:
  ± 1 kV Line-to-line
  ± 2 kV Line-to-ground
- Conducted disturbances, induced by RF fields
  IEC 61000-4-6:
  10 V rms
- Rated Power-frequency Magnetic Field IEC 61000-4-8:
  30 A/m
- Voltage dips and interruptions IEC 61000-4-11:
  according to IEC 60601-1-2:2014
- Acceptable operating conditions/responses:
  - flickering/noise on the monitor
  - interruption on the monitor
- Specific compliance criteria for the voltage dips and interruptions test:
  - The equipment is allowed a deviation at the immunity levels (0% of nominal voltage for 5 s), provided the equipment remains safe, experiences no component failures and is restorable to the pre-test state with operator intervention.

14.10 Standards fulfilled

CE conformity

- Medical electrical equipment, Part 1: Generally defined for the security in IEC 60601-1; EN 60601-1; UL 60601-1; CAN/CSA C22.2 NO 60601-1-14:2014.
- Electromagnetic compatibility
  IEC 60601-1-2; EN 60601-1-2; EN 61000-3-2; IEC 61000-3-2.
- Further applied harmonized standards: IEC 62366, IEC60825-1, EN60825, IEC 62471, EN62471, EN 980.
- The Medical Division, within Leica Microsystems (Schweiz) AG, holds the management system certificate for the international standard ISO 13485 relating to quality management & quality assurance.

14.11 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 "List of weights of balanceable configurations" on chapter 14.13.

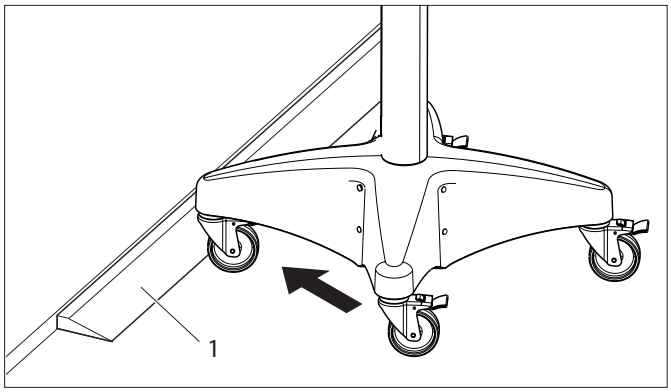
Determine the total weight of the load using the "load table", chapter 14.13.

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

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

14.12 Limitations of use

The M822 may be used only in closed rooms and must be placed on a solid floor.
The M822 is not suitable for crossing thresholds higher than 20 mm.
To move the surgical microscope over thresholds of 5-20 mm, the wedge (1) included in the packaging can be used.
Without auxiliary equipment, the Leica M822 can only be moved across thresholds up to a max. height of 5 mm.



- ► 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.

Moving or storing the microscope on an inclined plane

CAUTION

Danger of injury from uncontrolled lateral movement of the system and arm systems.

- ► When transporting or moving the microscope (F20, F40) on an inclined plane, always lock the swing arm, monitor arm and control unit (see below).
- ► When storing the microscope (F20 only) on an inclined plane use the provided wedge from the transport box (see below).

Transporting or moving the microscope on an inclined plane (F20 and F40):

- ► Use the strap fixations (Figure 1) provided in the transport box to secure the swing arm, monitor arm and control unit arm (F20: Figures 2 to 4; F40: Figures 5 - 6).

Figure 1 - Fixation strap

F20 Stand

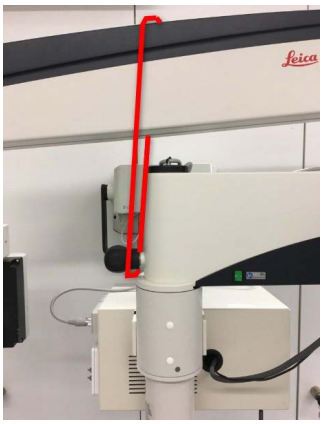


Figure 2 - Strap fixation of parallelogram

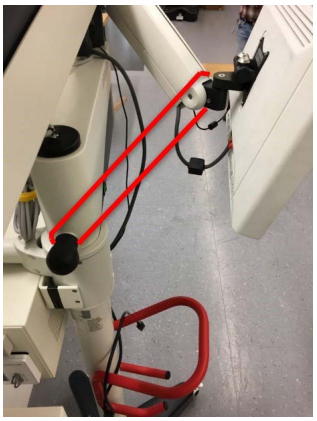


Figure 3 - Strap fixation of monitor

Figure 4 - Strap fixation of Control Unit

F40 Stand

Figure 5 - Strap fixation of parallelogram

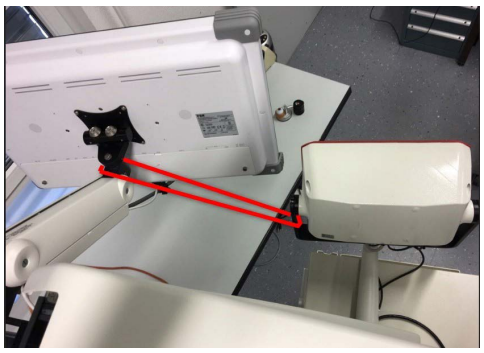


Figure 6 - Strap fixation of monitor

Storing the microscope on an inclined plane (F20 only):

► Use the wedge provided in the transport box (Figures 7 - 8) .

Figure 7

Figure 8

14.13 List of weights of balanceable configurations

For the Leica Leica M822 F40, drift effects must be taken into account on floors which slant >0.3°.

Equipment Leica M822 serial number .....
Max. load for stand from microscope interface ..... kg

				Installation	
Group	**Art. No.**	**Description**	**Weight**	**Quantity**	**Total**
Assistant	10448231	Leica 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			
	10445938	Objective APO WD175	0.41 kg		,
	10445909	Objective APO WD225			
	10448547	Binocular tube 10°–50°, Type II, UltraLow ™III	1.42 kg		,
	10448217	Binocular tube, inclinable 5°-25° with PD	0.74 kg		,
	10448159	Binocular tube, 10°-50° with PD	1.26 kg		,
	10448088	Binocular tube var. 0°-180°, T, Type II	1.42 kg		,
	10446574	Binocular tube, inclinable, T, type II	0.74 kg		,
	10446618	Binocular tube inclinable, 45°	0.56 kg		,
	104466797	Binocular tube, 30°-150°	0.81 kg		
	10448572	Leica DI C800	2.12 kg		,
	10448028	10× eyepiece			
	10448125	Eyepiece, 8.33×	0.10 kg		
	10446739	Eyepiece, 12.5×			
			Loading assistant and optics	**Intermediate sum 1**	,

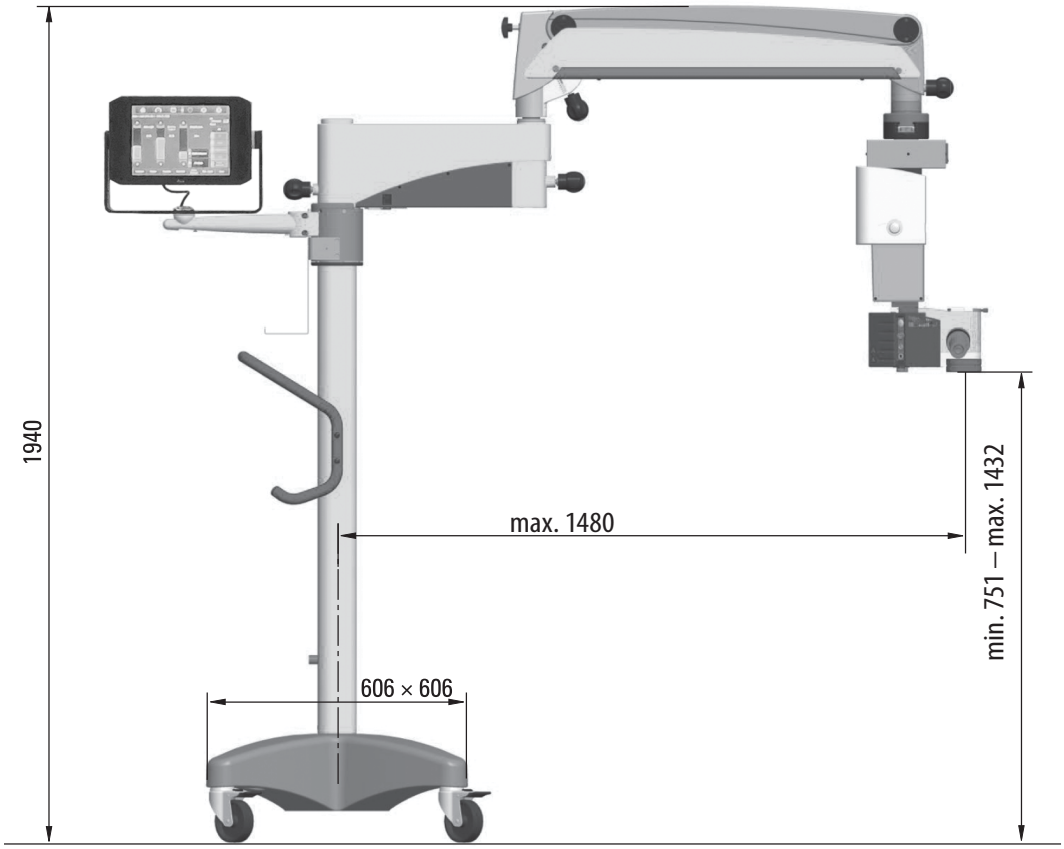
To continue, see the next page

Group	Art. No.	Description	Weight	Installation	
				Quantity	Total
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		,
		Laser manipulator	0.30 kg		
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 of accessories for front/rear section of the eye, sterilizable components, documentation				**Intermediate sum 2**	,
Carry over load for assistant and optics				**Intermediate sum 1**	,
			Complete System	**Load**	,

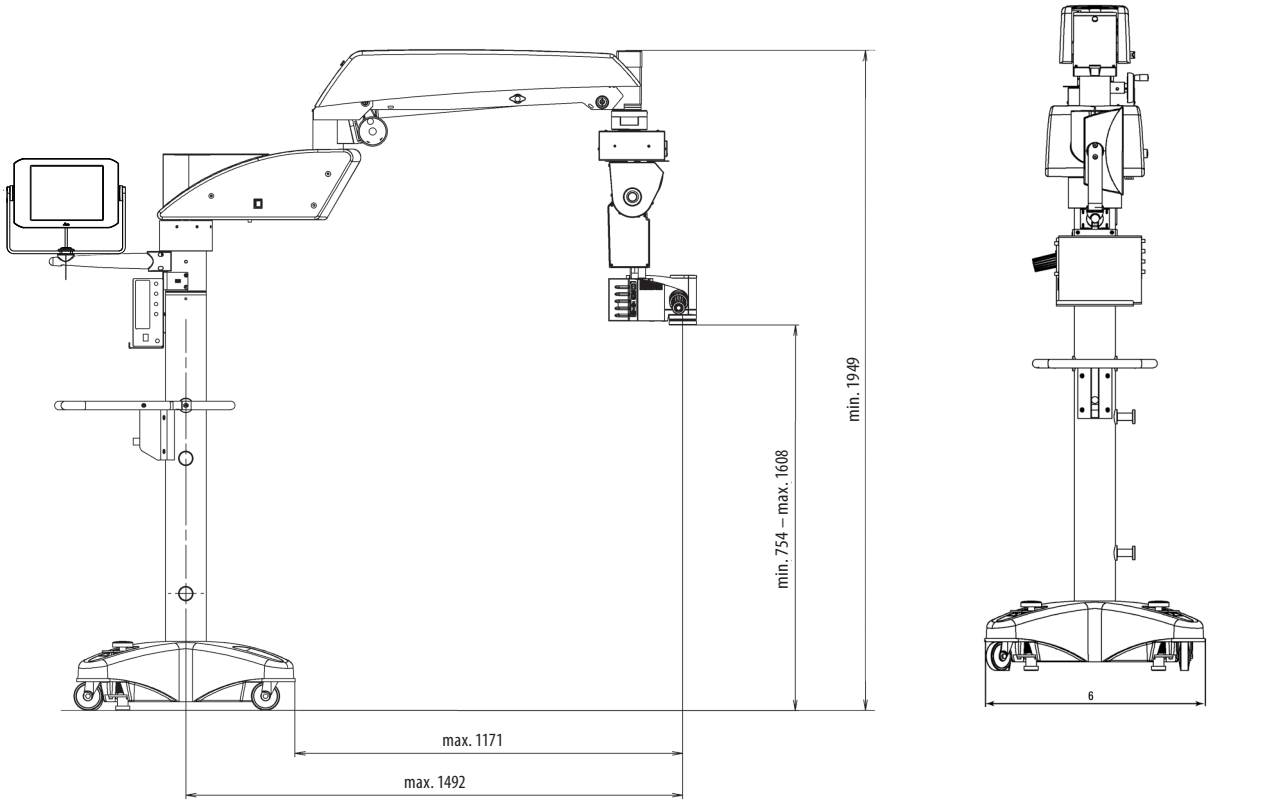
This list contains typical equipment articles. Subject to change.

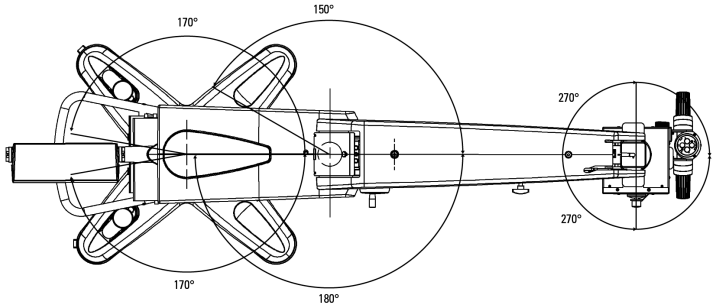
14.14 Dimensional drawings

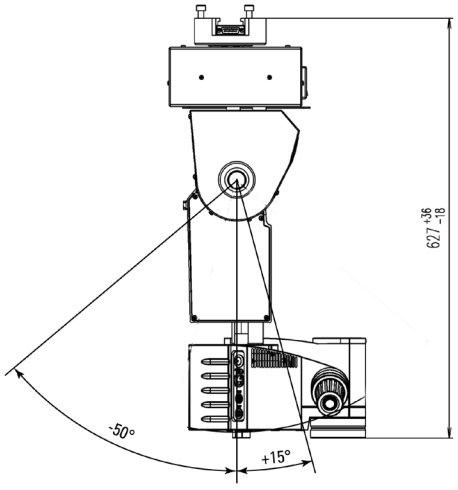
14.14.1 Dimensional drawing (mm) for Leica M822 F20



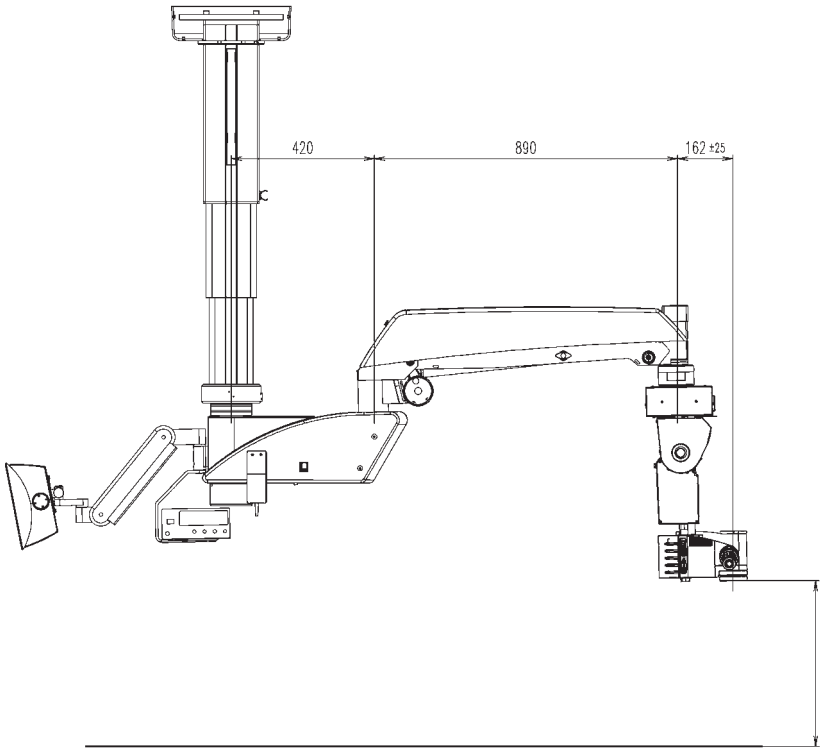
14.14.2 Dimensional drawing (mm) for Leica M822 F40

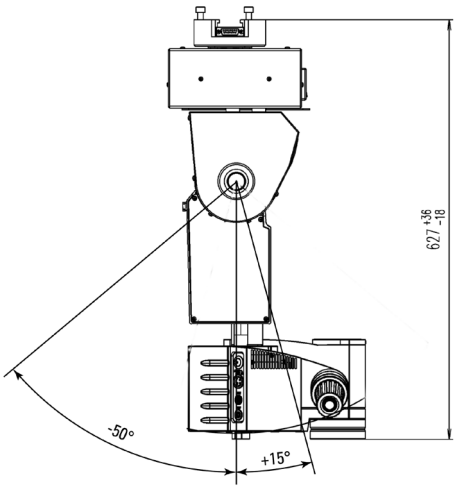


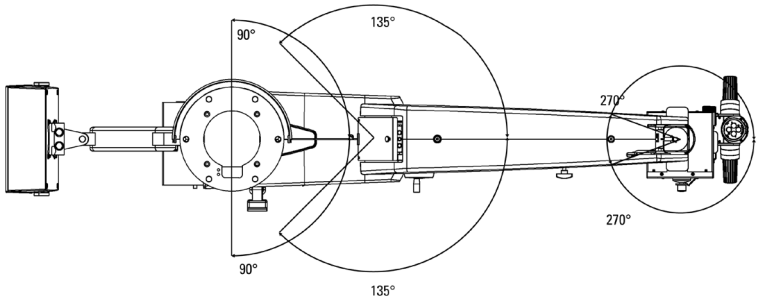




14.14.3 Dimensional drawing (mm) for Leica M822 CT40







15 Annex

15.1 Checklist before the operation

Patient .....

Surgeon .....

Date .....

Step	Procedure	Details	Checked / Signature
1	Cleaning the optical accessories	► Check the tubes, eyepieces and the documentation accessories (if used) for cleanliness. ► Remove dust and dirt.	
2	Installing the accessories	► Lock the M822 in place and install all accessories on the microscope so it is ready for use (see chapter 7.2). ► Connect the footswitch if used. ► Check the camera image on the monitor and realign if necessary.	
3	Checking the tube settings	► Check the tube and eyepiece setting for the selected user.	
4	Balancing	► Balance the M822 (see chapter 7.10.1). ► Turn the handles forwards and hold. All breakes are released. ► Check the balancing.	
5	Function check	► Connect the power cable. ► Switch on the microscope. ► Check the lamp history and make sure that the remaining life time is sufficient for the planned surgery. ► Check the Main Light and the OttoFlex™ illuminators before surgery. ► Test the operational readiness of the magnification motor and the focus motor. ► Replace defective bulbs before the surgery. ► Test all functions on the handles and the footswitch. ► Check the user settings on the control unit for the selected user.	
6	Positioning at the OP table	► Position the M822 on the OP table as required and lock the foot brake (see chapter 8.2).	
7	Sterility	► Fit sterile components and sterile drape if used (see chapter 7.12).	
8	Final work	► Check that all equipment is in its proper position (all covers fitted, doors closed).	

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