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Transmitted Light Bases

TL RC™ (MDG 32)

TL RCI™ (MDG 30)

User Manual

Leica
MICROSYSTEMS

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Dear User

Thank you very much for your trust in Leica Microsystems. We hope your work with our high-quality, efficient products is both enjoyable and successful.

In developing our instruments, we have placed great weight on simple, self-explanatory operation. However, take your time to read the user manual, in order to familiarize yourself with the optimal use of all the benefits and options of your stereo microscope. Should you have any questions, please consult your local Leica representative. You will find the address of the closest local representative as well as valuable information about products and services from Leica Microsystems on our homepage at www.leica-microsystems.com. We are gladly at your service. CUSTOMER SERVICE is a big thing with us. Not only before the sale, but afterwards as well.

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Stereo & Macroscopy Systems
www.stereomicroscopy.com

The user manual

This user manual is available in 20 additional languages on our interactive CD-ROM.

User manuals and updates are also available for download on our homepage at www.stereomicroscopy.com.

The user manual at hand describes the safety instructions, assembly, and handling of the TL RC™ and TL RCI™ transmitted-light bases.

Safety concept

1.1 The user manual

The TL RC™/TL RCI™ transmitted-light bases come with an interactive CD-ROM containing all relevant manuals in 20 additional languages. Keep this CD-ROM in a safe place, where it is available to the user. User manuals and updates are also available for download and print-out on our homepage at www.stereomicroscopy.com.

The TL RC™ and TL RCI™ transmitted-light bases are a module of the Leica M stereo microscope series. This user manual describes the special functions of the transmitted-light base and contains important instructions for operating safety, maintenance and the accessory parts.

The M2-105-0 user manual for the Leica M stereo microscopes contains additional safety rules for the stereo microscope, accessories and electrical accessories, as well as instructions for maintenance.

You can combine the transmitted-light base TL RC™ with any cold light source and a glass fiber light guide (active $f = 10\text{mm}$, tail tube $f = 13\text{mm}$). Please read the user manual and the safety requirements of the supplier.



Before assembly, start up and use, please read the user manuals cited above. In particular, please observe all safety instructions.

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

1.1.1 Symbols used



Warning of danger

This symbol indicates information, which must be read and obeyed. Disregarding these instructions

- can cause hazards to personnel!
- can lead to functional disturbances and damaged instruments.



Warning of dangerous electrical voltage

This symbol indicates especially important information, which must be read and obeyed

Disregarding these instructions can lead to

- can cause hazards to personnel!
- can lead to functional disturbances and damaged instruments.



Warning - hot surface

This symbol warns you of tangible, hot points, such as light bulbs.



Important information

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

Action

- ▶ This symbol within the text indicates that certain operations must be carried out.

Explanatory notes

- This symbol indicates additional notes and explanations provided in the text.

Figures

(1.5) Numbers in brackets within the descriptions relate to the figures and the items within those figures. Example (1.3): Figure 1 is located, for example, on Page 8 and item 3 is the filter carrier.

1.2 Safety regulations

Description

The transmitted-light bases TL RC™ and TL RCI™ fulfill the highest requirements for observation and documentation of Leica stereo microscopes of the M series. It contains a path-folding mirror, a device for partial pupil illumination and relief contrast generation, a ground-glass screen, an additional condenser and Fresnel lenses. The complete stand consists of:

- Transmitted-light base TL RC™ or TL RCI™
- Stand 300 mm or 500 mm long with focusing drive, manual coarse/fine or motorized focus
- Glass stage plate, clear, 220×170×4mm
- Light source and light guide according to requirements

Accessories:

- Gliding stage
- Leica MATS Thermocontrol System with heating stage
- Polarization set
and many more (see Expansion diagram)

Intended uses

TL RC™ and TL RCI™ transmitted-light bases are used in the assembly of Leica M series stereo microscopes via tripod column and microscope carrier. They can be combined with any cold light source and light guide and allows you to observe transparent specimen with relief contrast and direct transmitted light. The TL RCI™ transmitted-light base possesses an integrated halogen lamp that particularly supports control by Leica Application Suite (LAS) software.

Prohibited uses

If you use the transmitted-light base TL RC™/TL RCI™, its components, and the accessories in a way other than that described in the user manual, harm may be caused to people or objects.

Never:

- Change, rebuild or take apart parts, if not specifically instructed to in this manual.
- Let non-authorized persons open parts of the instrument.
- Use the transmitted-light base TL RC™/TL RCI™ for investigations and operations on the human eye.

The units or accessory components described in the user manual have been checked for safety and possible dangers. Always consult the responsible Leica office or the main plant in Wetzlar at any time there is a need to adjust the unit or it is combined with non Leica components which go beyond the scope of this manual. Unauthorized adjustment of the unit or improper use renders the warranty null and void.

Place of use

- Only use the transmitted-light base TL RC™/ TL RCI™ in closed, dust free rooms and between +10°C and +40°C. Make sure that the rooms are free of oil vapors or other chemical vapors and extreme humidity.
- Set up the electrical components at least 10 cm from walls and combustible objects.
- Avoid large temperature fluctuations, direct sunlight and vibrations. This can cause faulty measurements or microphotographs.
- In warm, or warm and humid climatic zones, the transmitted-light base TL RC™/ TL RCI™ requires particular care to prevent formation of fungus.

Responsibilities of person in charge of the instrument

Ensure that

- The transmitted-light base TL RC™/ TL RCI™ and the accessories are only operated, maintained and repaired by authorized and trained personnel.
- Personnel who use the instrument have read and understood this user manual and in particular the safety instructions and obey them.

Repairs, servicing work

- Repairs may only be carried out by servicing engineers trained by Leica Microsystems or your own authorized technical personnel.
- Only original Leica Microsystems parts may be used.
- Before opening the devices, turn off power and unplug mains cables.



If you touch the electric circuit of the equipment, you may receive an electric shock.

Transport

- Use the original packaging for shipping or transporting the transmitted-light base TL RC™/ TL RCI™ and the accessory components.
- To prevent damage through vibrations, remove and pack specially all the moving components which you installed yourself, in accordance with the user manual.

Integration in third-party products

The following must be observed if Leica products are built into third-party products: The manufacturer of the complete system or the person putting it on the market is responsible for adhering to applicable safety regulations, laws and guidelines.

Disposal

The products described here must be disposed off in accordance with applicable local laws and regulations.

Legal requirements

Adhere to general and local regulations relating to accident prevention and environmental protection.

EU declaration of conformity

The transmitted-light base TL RC™/ TL RCI™ and the accessories have been constructed according to the state of the art and issued with an EU declaration of conformity.

Controls



Fig. 1

- 1 Cooling element of integrated halogen illumination (TL RCI™ only)
- 2 Adapter plate for easy assembly of focusing drives
- 3 Standard stage 10 447 269
- 4 Filter bracket for up to three filters
- 5 Control button for the upper and lower Rottermann-Contrasts™ flap
- 6 Button to rotate and side-to-side movement of mirror
- 7 TL RCI™ transmitted-light base

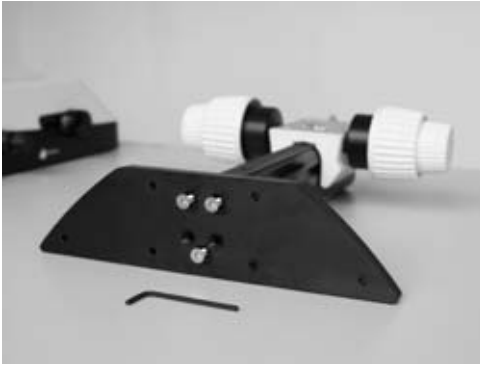


Fig. 2 Adapter plate vertical pole - transmitted-light base



Fig. 3 Adapter between focusing drive and microscope carrier

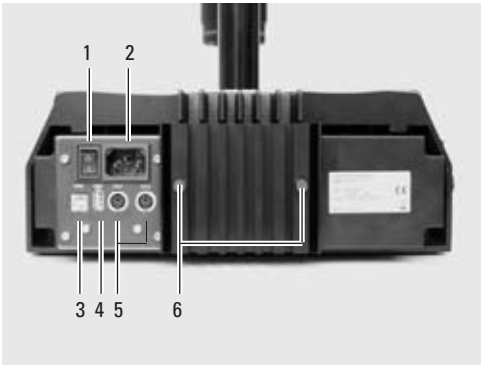


Fig. 4 Back side of transmitted-light base TL RCI™



Fig. 5 USB mouse for TL RCI™ control

- 1 Power switch
- 2 Power socket
- 3 USB socket Type B
- 4 USB socket Type A
- 5 2× Can-Bus
- 6 Screws for halogen lamp replacement

Assembly



Before unpacking, make sure no person can get injured by falling or tilting part.

3.1 Unpacking the base

The base is delivered with the adapter plate attached. The selected stage (IsoPro™ cross-stage or standard stage 10 447 269), and the focusing drive will have to be mounted later. Make sure the devices are unpacked on a flat, sufficiently dimensioned, and non-slip surface.

3.2 Stage assembly

The TL RC™/ RCI™ transmitted-light base can be equipped with two different stages. The selected stage is mounted on the base before start-up. The two stages can be easily exchanged at any time.

The following paragraph assumes the base without the stage mounted. Disassembly is performed in reverse order of the following steps.

3.2.1 Standard stage

- ▶ Take the glass plate from the rectangular gap in the standard stage.
- ▶ Position the stage on the transmitted-light base in such way that the four holes align over those in the base.
- ▶ Attach the stage to the base with the four supplied Allen screws.
- ▶ Insert the glass plate back into the standard stage.

3.2.2 IsoPro™ cross-stage

Before the IsoPro™ cross-stage is mounted to the base, the axis containing the control buttons is attached optionally on the left or the right side of the cross-stage.

If the controls shall be mounted on the left side, the gear rod on the bottom side of the cross-stage must be unscrewed and re-attached in reverse.

- ▶ Take the glass plate from the cross-stage.
- ▶ Turn the cross-stage around and place it onto a non-slip surface.
- ▶ Change the gear rod (6.2) from the left to the right side.
- ▶ Skip the next two steps to mount the controls.

Control assembly

- ▶ Take the glass plate from the cross-stage.
- ▶ Turn the cross-stage around and place it onto a non-slip surface.
- ▶ Attach the axis with the control buttons (6.1) to the desired side. The fastener snaps into the cross-stage magnetically.
- ▶ Attach the axis with the two supplied Allen screws.
- ▶ Attach the cover rail to the cross-stage.

Cross-stage assembly

- ▶ Place the cross-stage onto the base.
- ▶ Pull the upper part of the cross-stage carefully toward the user, fixing the lower part onto the transmitted-light base.
- ▶ Attach the cross-stage evenly to the three threaded holes.
- ▶ Push the cross-stage all the way back to the fence in direction of the column.
- ▶ Re-insert the glass plate back into the standard stage.

3.3 Focusing drive column

- ▶ Unscrew the adapter plate (1.2) from the base using the supplied Allen key.
- ▶ Attach your focusing drive column to the bottom with the three Allen screws (2).
- ▶ Re-attach the adapter plate to its original position.

3.4 Intermediate adapter assembly

Mount the supplied adapter between the column and microscope carrier, to balance the enlarged distance between focusing drive and optical axis.

- ▶ Attach the adapter (3) to the focusing drive for the pins to lock in recess.
- ▶ Attach the adapter using the supplied Allen key.

3.5 Equipment assembly

After mounting the adapter to the focusing drive, the microscope carrier, optics carrier, and the entire equipment can be assembled as usual.

3.6 Connecting the cold light-source to the TL RC™ base

- ▶ Push the appropriate end of the cold light guide into the base back-side.
- ▶ For further information about the use of cold light sources refer to the instructions supplied separately.

3.7 Connecting the power cable (TL RCi™)

- ▶ Make sure the power switch (4.1) on the base is turned to „0“.
- ▶ Insert the power cable into the mains socket (4.2), and then connect it to a grounded outlet.

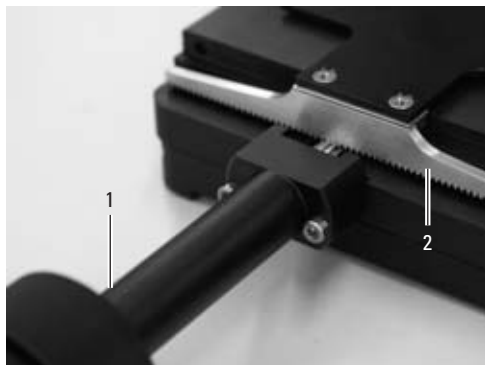


Fig. 6 Rear side of the IsoPro™ cross-stage

- 1 Axis with controls
- 2 Gear rod, mounted to cross-stage

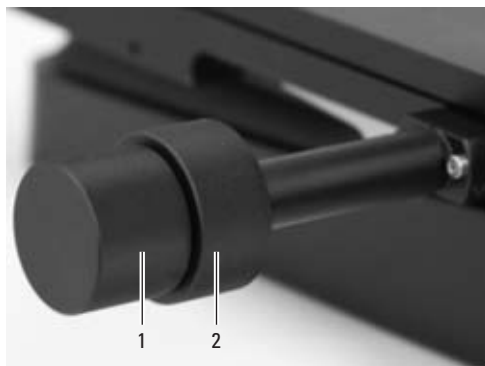


Fig. 7 Cross-stage controls

- 1 Control button for x-direction movement
- 2 Control button for y-direction movement

Operation

4.1 Switch for adjusting the relief contrast

Use the two switches (8.1 and 8.2) on the left side of the transmitted-light base TL RC™/TL RCI™ to actuate the two integrated flaps. The outer switch (8.1) controls the inverted relief contrast. The inner switch (8.2) controls the positive relief contrast. Depending on the flap position, part of the opening of the integrated Fresnel lens is covered causing different contrast effects. Phase structures typically appear as spatial, relief images – like hills in a positive relief contrast and as recesses in inverted relief contrast.

The contrast can be increased without relief by adjusting the two diaphragms to 45°. A slot shaped illuminated area appears. The slot can be moved over the entire field of view and quickly switched between positive and negative relief view by precise tilting of the path-folding mirror. The dynamic effect makes it simple to distinguish phase structures from amplitude structures.



Depending on the properties of the object (refractive index to environment) and your own sensitivity, it may occur that you need to operate the switches for the positive and inverted relief contrast in reverse. These switches are described below.

I.e. instead of the top switch (8.1), the bottom switch (8.2) controls the inverted relief contrast. Instead of the bottom switch (8.2), the top switch (8.1) controls the positive relief contrast.

4.2 Path-folding mirror

The built-in path-folding mirror features a flat and a concave side and can be rotated and moved. The concave side was specifically designed for the optical features of objectives with high

numeric aperture. Using the black rotary knob (8.1) on the left side of the transmitted light base you can turn and push the path-folding mirror back and forth.

The concave recess at the grip shows the concave side of the mirror and allows the intuitive operation without eye contact at anytime.



Depending on the angle and position of the mirror the angle of light incidence changes on the specimen level so that you can move between a transmitted light bright field, through oblique illumination to dark field like illumination.

The black rotary knob (8.1) on the left side of the transmitted-light base is used:

- To rotate the path-folding mirror from the flat to the concave side
- For slight tilting, to steer the light beam more steeply or flatly through the object level
- To shift the path-folding mirror (forward/backward)

4.3 Operating the cross-stage IsoPro™

- ▶ To move the stage in X direction rotate the outer knob (7.1)
- ▶ To move the stage in Y direction rotate the inner ring around the knob (7.2)

4.4 Light intensity and color temperature

4.4.1 Transmitted-light base TL RC™



Please observe the user manual and in particular the safety regulations of the manufacturers of the light guide and cold light source.

- ▶ Turn on the cold light source according to the manufacturer's user manual and connect, activate, and adjust the light intensity.

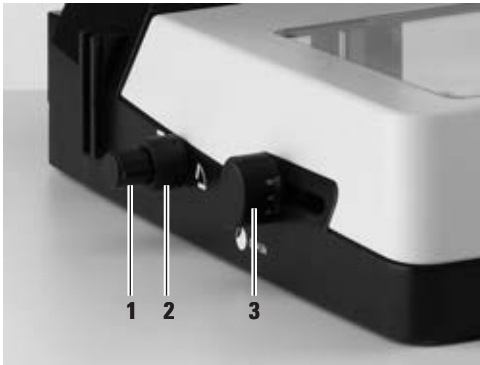


Fig. 8

- 1 Switch to control the inverted relief contrast
- 2 Switch to control the positive relief contrast
- 3 Path-folding mirror

4.4.2 TL RCI™ transmitted-light base

The TL RCI™ transmitted-light base has two electronic potentiometers to control the dye intensity (9.1), and dye temperature (9.2) separately.

- ▶ Adjust the dye intensity using the front potentiometer (9.1) to match your requirements.
- ▶ With the rear potentiometer (9.2), set the dye temperature to match the color impression to your requirements.

The dye temperature control also serves as electronic shutter:

- ▶ For process interruption, press the potentiometer (9.2).
- ▶ To switch on the illumination, press the potentiometer again. The electronics return to the previously selected settings.

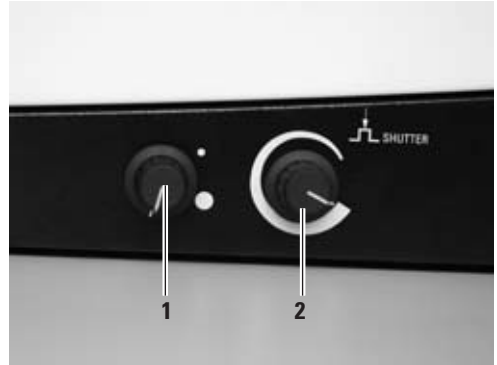


Fig. 8

- 1 Potentiometer Control of IsoCol™ illumination intensity
- 2 Potentiometer Control of dye temperature

4.5 Leica USB mouse (TL RCI™ only)

The Leica USB mouse controls the IsoCol™ and the dimming function of the TL RCI™ base .

- ▶ Connect the mouse (5) to the appropriate USB port of the base (4.4).
 - By default, the scroll wheel of the mouse is assigned to the IsoCol™ control.
- ▶ Scroll away from the user to increase the illumination intensity in IsoCol™ mode.
- ▶ Scroll towards the user to decrease the illumination intensity in IsoCol™ mode.
- ▶ Click the scroll wheel briefly to switch the illumination on or off.
- ▶ To switch between the IsoCol™- and dimming mode and back, click on and hold the scroll wheel for more than 2 seconds.
 - The intensity in the dimming mode changes analog to the IsoCol™ mode.

4.6 Methods with transmitted light

4.6.1 Vertical bright field illumination

Suitable for colored amplitude preparations with sufficient contrast.

- ▶ Both switches should be placed in horizontal position.
- The flaps are open.
- ▶ Using the black rotary knob (8.3) on the left-hand side of the transmitted-light base, shift the path-folding mirror towards the column until it hits the stop.
- ▶ According to the aperture of the used objective rotate either the plane or concave side of the path-folding mirror toward the top.
- ▶ Turn the path-folding mirror to the notch position at 45°.

The light beams are steered vertically through the object. The outcome of this is an exact bright field with maximum brightness.

4.6.2 Inclined transmitted light

Suitable for semitransparent, opaque objects such as foraminifera and fish eggs.

- ▶ Both switches should be placed in horizontal position.
- The flaps are open.
- ▶ Turn the path-folding mirror (8.3) so that the light beams fall through the object diagonally.
- ▶ Shift the path-folding mirror until the required information is visible.

4.3 Asymmetrical dark-field illumination

- ▶ Both switches should be placed in horizontal position.
- The flaps are open.
- ▶ Rotate the path-folding mirror (8.3) so that the light beams pass flatly through the object.

The flatter the light rays are deflected into the objects the darker the background appears. A transmitted light similar to a dark field is created. Contours, fine edges and structures are brightly emphasized by diffraction of the light on the dark background.

4.6 Relief display

Starting position

- ▶ Using the black rotary knob (8.3) on the right-hand side of the transmitted-light base, shift the path-folding mirror towards the column until it hits the stop.
- ▶ Turn the path-folding mirror to the notch position at 45°.

4.6.1 Positive relief contrast

- ▶ Both switches should be placed in horizontal position.
- The flaps are open.
- ▶ Rotate the inner switch (8.2) close to the upright position.
- The bottom flap is closed. There is positive relief contrast. The phase structures act like hills.
- ▶ Intensify or weaken the effect by tilting the path-folding mirror.

4.6.2 Negative relief contrast

- ▶ Rotate the inner switch (8.2) close to the horizontal position.
- The bottom flap is open.
- ▶ Rotate the upper switch (8.1) close to the upright position.
- The top flap is closed. There is negative relief contrast. Phase structures appear as recesses.
- ▶ Intensify or weaken the effect by tilting the path-folding mirror (8.3).

4.6.3 Dynamic relief contrast

- ▶ Place both switches in about a 45° degree position.
- The flaps are set to 45°. A slot shaped illuminated area appears. The slot can be moved over the entire field of view and can be quickly switched between positive and negative relief view by precise tilting of the path-folding mirror (8.3). The dynamic effect makes it simple to distinguish phase structures from amplitude structures.

4.6.4 Limitations

The relief methods give good results from medium zoom up to a high level of magnification and with the 1×, 1.6× and 2× objectives. In the bottom half of the zoom scale and with weaker objects, it may occur that the object field is not homogeneously lit. We recommend using the transmitted-light base with objectives of 1× and higher and not with objectives with long focal distances.

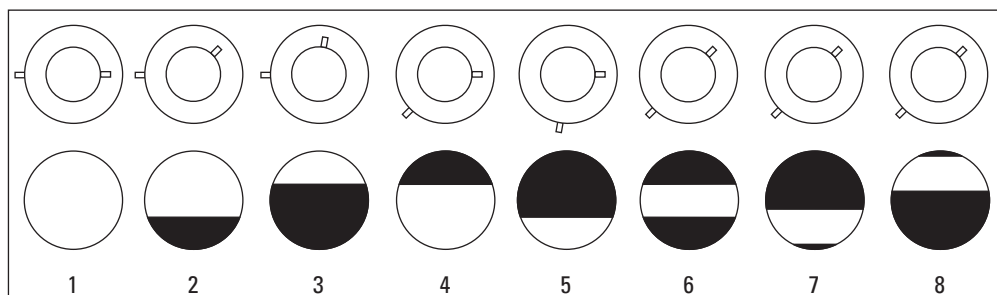


Fig. 10 Switch positions to control the transmitted light

- 1 Switch position with transmitted light: Both flaps are open
- 2 Switch position with positive relief contrast, medium
- 3 Switch position with positive relief contrast, strong
- 4 Switch position with inverted relief contrast, medium
- 5 Switch position with inverted relief contrast, strong
- 6 Switch position with increased contrast without relief contrast
- 7 Switch position with increased contrast without relief contrast, path-folding mirror tilted
- 8 Switch position with increased contrast without relief contrast, path-folding mirror tilted

4.7 Filter

TL RC™ and TL RCI™ transmitted-light bases can be equipped with up to three filters simultaneously, that are available as accessory (see Expansion Diagram page 18/19). The individual filters are also available to customers upon special request.

- ▶ Turn off the light source or press (TL RCI™) the switch for the shutter (9.2).
- ▶ Retrieve the empty filter from an available filter location at the filter holder.
- ▶ Insert the desired filter.
- ▶ Activate the light source again.

4.8 Changing the halogen lamp (TL RCI™)



It is absolutely necessary that you unplug the power cord from the base before changing the lamp in order to prevent possible electrical shock!



The halogen lamp is getting very hot during operation. Keep the base turned off for about 10 minutes to allow for cooling and in order to prevent burns!

- ▶ Loosen the two bolts at the cooling element (11.1).
- ▶ Carefully pull out the entire cooling element, including the lamp.
- ▶ Remove the lamp holder (11.2) by pulling it from the guide rail.
- ▶ Carefully pull off the lamp including its socket from the holder.
- ▶ Remove the lamp (11.3) out of the socket.



Never touch the new halogen lamp with bare fingers since this will significantly reduce the life expectancy of the lamp!

- ▶ Push the new lamp into the socket.
- ▶ Perform all above identified steps in reverse order.

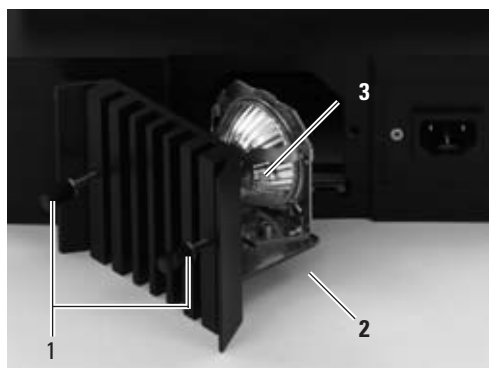


Fig. 11 TL RCI™ transmitted-light base open lamp housing

- 1 Screws for loosening the cooling fins
- 2 Lamp holder
- 3 Halogen lamp 12V/20W

Care, maintenance

In this chapter we would like to explain and help you understand the careful handling of your valuable instrument, and provide you with some tips for proper maintenance and cleaning.

We guarantee the quality You are using a precision instrument with many performance features.

As appropriate for such instruments we guarantee the quality of our products. This guarantee covers all manufacturing and material defects of the original equipment, but not any damages that are the result of inappropriate use or negligence.

Please handle your valuable optical instrument with appropriate care. If you do so you will be able to enjoy many decades of accurate service by this equipment without any deterioration. This is the reputation of our equipment.

Should your equipment, however, no longer provide accurate service, please contact your authorized service representative, your Leica distributor or directly Leica Microsystems (Switzerland) Ltd., CH-9435 Heerbrugg.



Protect your instruments

- Protect from moisture, fumes, acids, bases and corrosive materials. Do not store any chemicals in close proximity of the instrument.



- Protect from inappropriate use or handling. Never use off-brand electrical connectors or wires; never disassemble optical systems or mechanical components, if no particular reference is made to that purpose in the instructions.



- Protect from oil and grease. Slide surfaces and mechanical components shall never be lubricated.



