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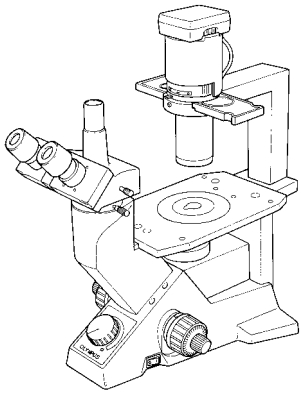
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OLYMPUS®



INSTRUCTIONS

CK30/CK40

CULTURE MICROSCOPE

This instruction manual is for the Olympus Culture Microscope Model CK30/CK40. To ensure the safety, obtain optimum performance, and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

AX7162

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IMPORTANT

The CK30 and CK40 Culture Microscopes have different system configurations. The differences are shown in the table below.

	CK30	CK40
Observation tube	Built-in binocular tube	Interchangeable*
Stage plate	–	Interchangeable**
CK40-RFL reflected light fluorescence attachment	Not mountable	Mountable

* The CH3-BI45 binocular tube, CH3-TR45 trinocular tube, and CK40-TBI Tilting binocular tube are all mountable. The CK40-EPA eyepoint adjuster can also be used, but not in combination with the CK40-TBI. The only usable intermediate observation tube is the CK40-EPA. Relief phase contrast observation is not available when the CK40-EPA is used.

** In addition to the standard stage plate, you can mount the CK40-CPG glass stage plate or IX-CP50 stage plate (ϕ50). Only 20X-or-less objectives should be used with the CK40-CPG.

⚠ SAFETY PRECAUTIONS

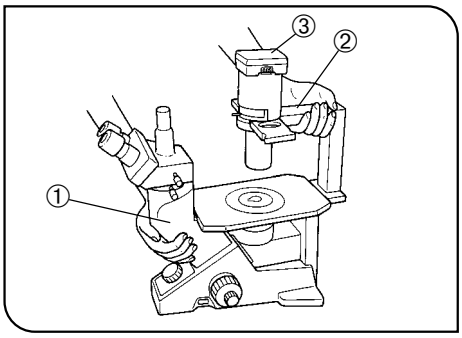


Fig. 1

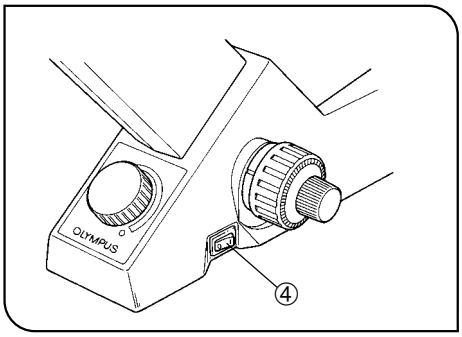


Fig. 2

1. Install the microscope on a stable, horizontal table. Make sure the table is sturdy enough to support the microscope's weight. (Weight: CK30 – approx. 8 kg (17.6 lb); CK40 – approx. 8.6 kg (18.9 lb))
2. When transporting the microscope, always hold the lower side ① of the observation tube and the illumination unit support ②.
3. If a culture solution or water is spilled on the stage, objective or observation tube, unplug the power cord and dry it off immediately. Failure to do so could cause equipment failure.
4. The surface of the lamp socket ③ on the lamp housing support can get extremely hot. Make sure you leave sufficient space around the lamp socket, especially above it, to dissipate heat. (Fig. 1)
5. To avoid potential shock hazards and burns when replacing the bulb, make sure the main switch is set to "O" (OFF), the power cord is unplugged from the outlet, and that the lamp and the area around the lamp socket have cooled sufficiently. (Fig. 2)

Applicable bulb	Halogen bulb, 6V 30WHAL (Philips 5761)

6. Be sure to use an Olympus-specified power cord. Safety and performance cannot be guaranteed otherwise.
7. Be sure to **ground** the unit. The designated electrical safety standard cannot be guaranteed otherwise.

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Safety Symbols

The following symbols are found on the microscope. Study the meaning of the symbols, and always use the equipment in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual. Improper use could result in personal injury and/or damage to the equipment.
I	Indicates that the main switch is ON.
O	Indicates that the main switch is OFF.

Warnings

Warning indications are placed where special precautions are required when handling and using the unit.

Warning indication position	Lamp socket [Warning against high temperature] 

1 Getting Ready

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impacts.
2. Do not expose the unit to direct sunlight, high temperature and humidity, dust or vibrations. (For operating conditions, refer to “8. Specifications” on page 26.)
3. Use the tension adjustment ring to adjust the tension of the coarse adjustment knob.
4. Use a flat-head screwdriver to set the voltage selector on the rear panel of the microscope body to the required voltage.

◎The selector is factory preset to the high-voltage side (110 – 120 V or 230 – 240 V).

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2 Maintenance and Storage

1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether (70%) and alcohol (30%).

★ **Do not use a mixture of ether (70%) and alcohol (30%) to clean the lower lens (made of optical plastic) of the eyepiece (NCWHK10X) because such solvents cloud the lens. If dust adheres to the lens, blow it off or wipe it away gently with a dry cloth.**

⚠ **Since solvents such as ether and alcohol are highly flammable, they must be handled carefully. Be sure to keep these chemicals away from open flames or potential sources of electrical sparks — for example, electrical equipment that is being switched on or off. Also remember to always use these chemicals only in a well-ventilated room.**

2. Many parts of the exterior are made of plastic. Wipe the unit with a clean cloth only. Do not use organic solvents to clean non-optical components. If smudges are difficult to remove, wipe them with a soft cloth slightly moistened with a diluted neutral detergent.
3. Be careful not to spill any liquid — such as a culture solution — on the unit. If you do spill anything, immediately set the main switch to "O" (OFF) and unplug the power cord. Then wipe away any liquid on the objectives or under the objectives.
4. If no objectives are mounted, be sure to cover the objective mounting threaded holes on the revolving nosepiece to prevent dust and spilled culture solution from getting on the lenses inside.
5. Never disassemble any part of the unit. Doing so could cause malfunctions or reduced performance.
6. When the unit is not in use, keep it covered with a dust cover. Make sure the lamp socket is cool before covering the unit.
7. Using a device that radiates ultraviolet light such as a germicidal lamp near the unit may discolor (yellow) parts of the unit's surface. The amount of discoloration depends on the radiation intensity of the ultraviolet light and the distance between the unit and radiation source. When not using the unit, cover it with the dust cover. We recommend that you also cover the unit with an impermeable sheet.

3 Caution

If the equipment is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

⚠ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

★ : Indicates that failure to follow the instructions could result in damage to equipment.

◎ : Indicates commentary (for ease of operation and maintenance).

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CONTENTS

1 NOMENCLATURE 1

2 ASSEMBLY 3

2-1 Assembly Diagram 3
2-2 Detailed Assembly Procedure 4

3 CONTROLS 9

4 SUMMARY OF OBSERVATION PROCEDURES 11

5 USING THE CONTROLS 12

5-1 Microscope Body 12
5-2 Stage 13
5-3 Observation Tube 14
5-4 Illumination Unit 17
5-5 Objectives 18

6 PHASE CONTRAST OBSERVATION 19

7 PHOTOMICROGRAPHY 23

8 SPECIFICATIONS 25

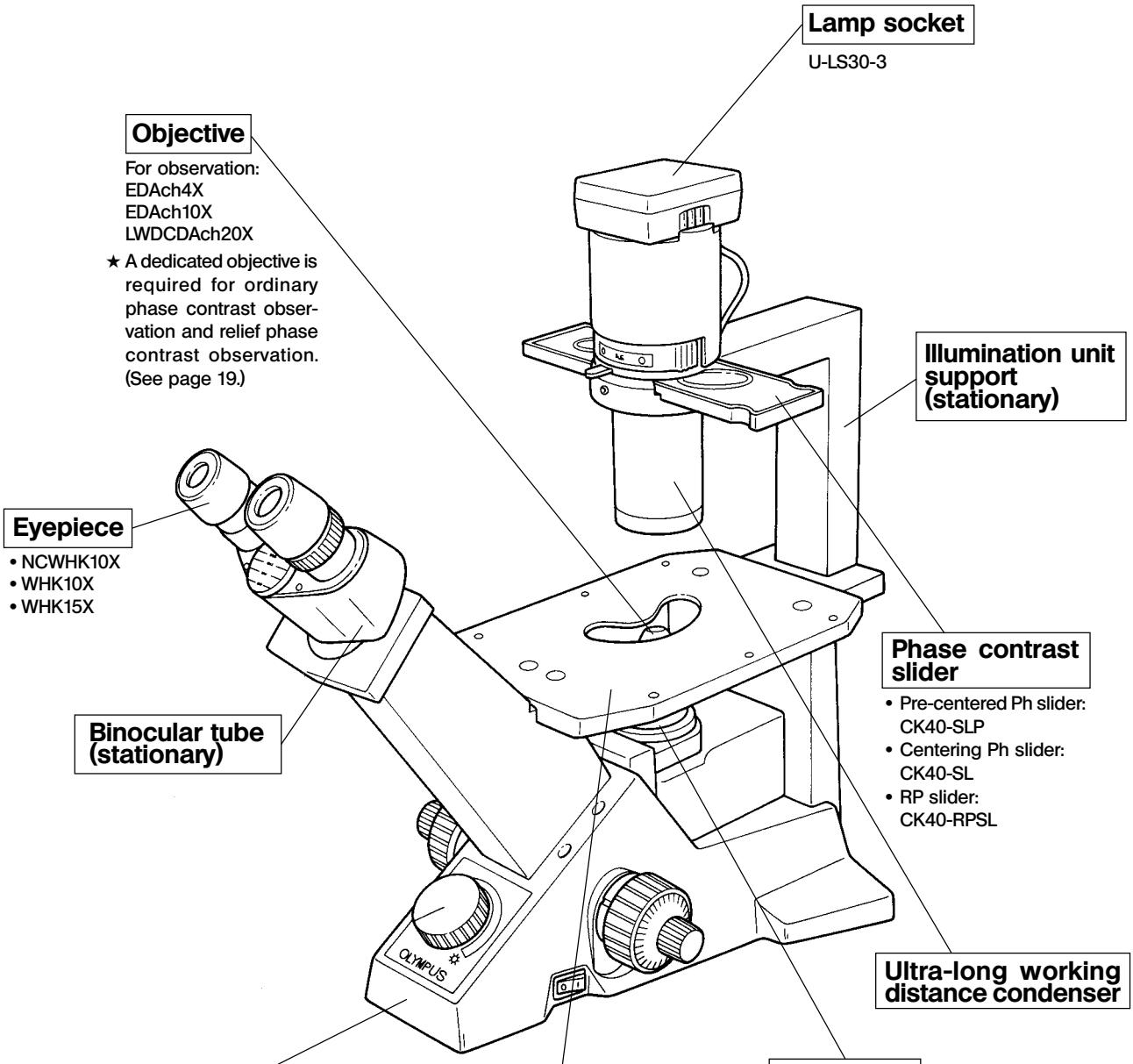
9 TROUBLESHOOTING GUIDE 27

■ PROPER SELECTION OF THE POWER SUPPLY CORD 30

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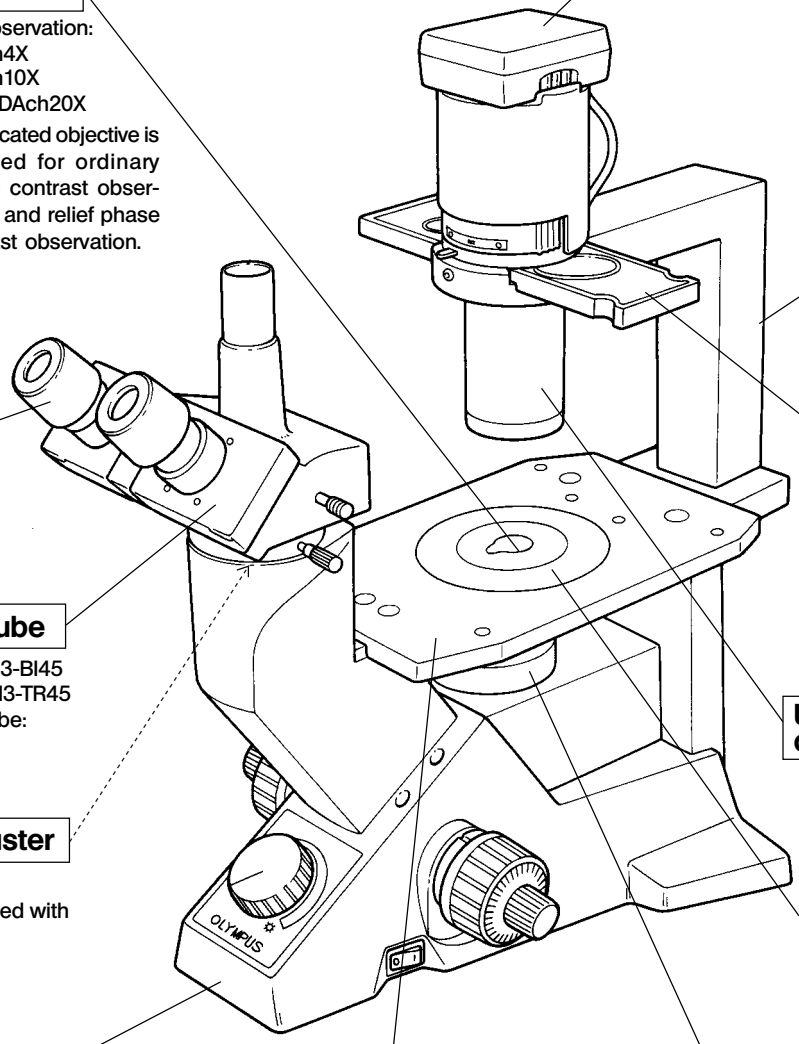
1 NOMENCLATURE

CK30



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CK40



Lamp socket
U-LS30-3

Objective
For observation:
EDAch4X
EDAch10X
LWDCDAch20X
★ A dedicated objective is required for ordinary phase contrast observation and relief phase contrast observation.

Illumination unit support (stationary)

Phase contrast slider
- Ph precentering slider: CK40-SLP
- Ph centering slider: CK40-SL
- RP slider: CK40-RPSL*

Eyepiece
- NCWHK10X
- WHK10X
- WHK15X

Observation tube
- Binocular tube: CH3-BI45
- Trinocular tube: CH3-TR45
- Tilting binocular tube: CK40-TBI

Ultra-long working distance condenser

Eyepoint adjuster
- CK40-EPA

★ Cannot be combined with the CK40-TBI.

Stage plate
- Standard stage plate
- Glass stage plate: CK40-CPG
- Stage plate (ϕ50): IX-CP50

Microscope body
CK40-F

Stage (stationary)
- Stage extension plate: CK2-SS
- Mechanical stage: CK40-MVR

Revolving nosepiece (stationary)
Quadruple revolving nosepiece

* Relief phase contrast observation is not possible with the CK40-EPA.

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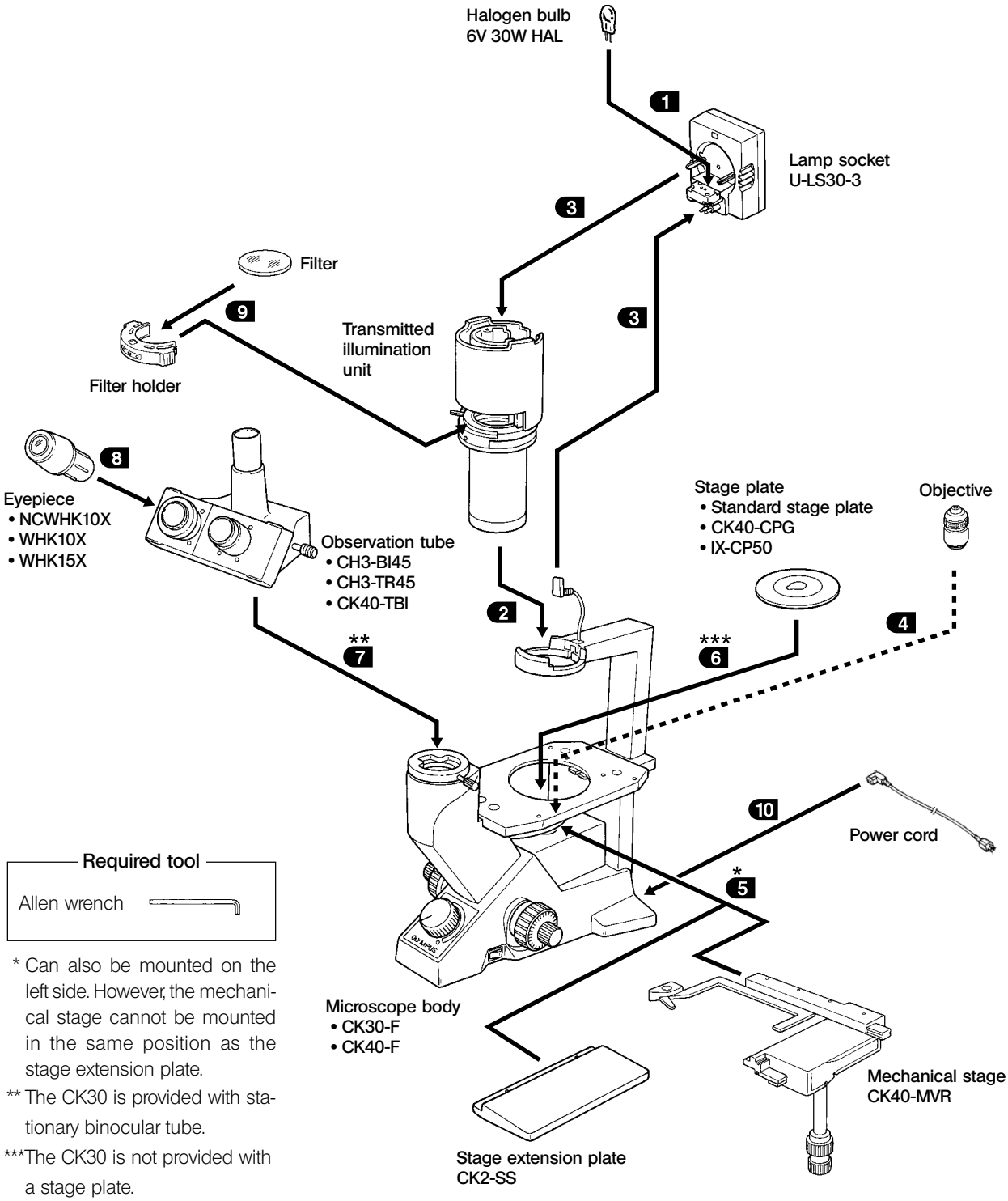
2 ASSEMBLY

2-1 Assembly Diagram

The diagram below shows the assembly sequence for the various modules. The numbers indicate the order of assembly.

★ When assembling the equipment, make sure that all parts are free of dust and dirt. Avoid scratching any parts or glass surfaces.

★ Keep the provided Allen wrench on hand. You will need it when replacing the modules.



Required tool

Allen wrench

* Can also be mounted on the left side. However, the mechanical stage cannot be mounted in the same position as the stage extension plate.

** The CK30 is provided with stationary binocular tube.

***The CK30 is not provided with a stage plate.

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2-2 Detailed Assembly Procedure

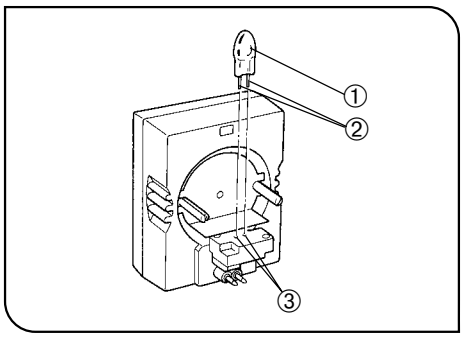


Fig. 3

1 Mounting and Replacing the Bulb (Fig. 3)

◎Use only the specified Philips 5761 halogen bulb, 6 V 30 W HAL.

⚠**To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.**

1. Hold the bulb ① with gauze or other protective material and insert the bulb pins ② into the lamp socket's pin holes ③ as far as they will go.

★**Insert the bulb gently. Squeezing too hard will damage the bulb.**

⚠**Bulb replacement during use or after use:**

The bulb and the lamp socket surfaces and vicinity will be extremely hot during use and right after use. Set the main switch to " ○ " (OFF) and disconnect the power cord from the wall outlet. Then allow the old bulb, lamp housing and vicinity to cool before replacing the bulb.

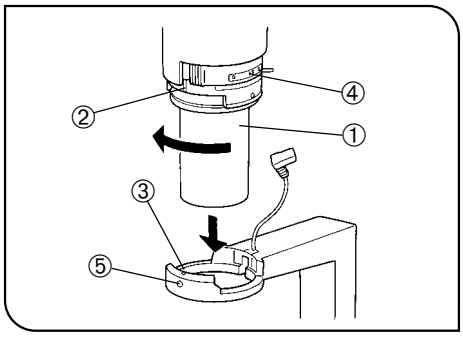


Fig. 4

2 Installing the Transmitted Illumination Unit (Fig. 4)

1. While aligning the indicator groove ② on the transmitted illumination unit ① with the notch ③ on the lamp housing support´s brace, insert the illumination unit ① gently into the support's brace.
2. Turn the illumination unit ① 90° clockwise so that " AS " on the filter holder faces directly to the front. Then tighten the clamping screw ⑤ using the Allen wrench provided with the microscope body to fix it securely.

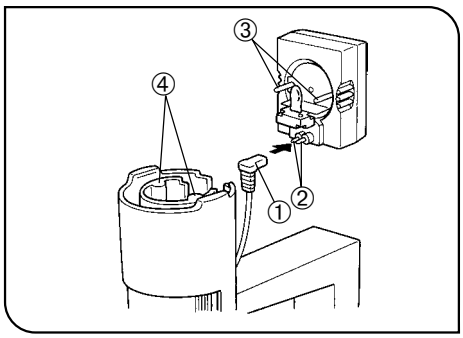


Fig. 5

3 Installing the Lamp Socket (Fig. 5)

1. Connect the plug ① with the socket pin ②. Then, while aligning the guide pins ③ with the condenser's guide holes ④, push the lamp socket gently onto the Illumination unit.

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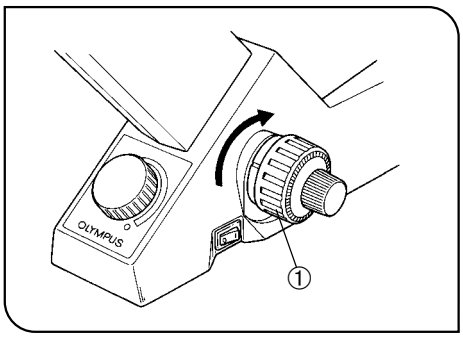


Fig. 6

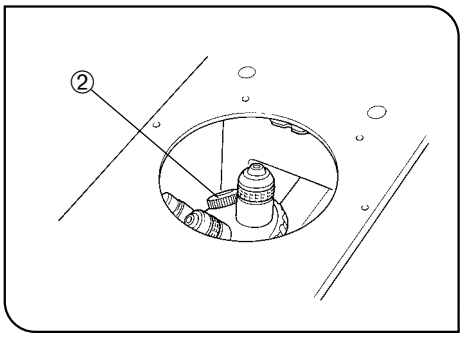


Fig. 7

4 Mounting the Objectives (Fig. 6 & 7)

★**First raise the revolving nosepiece slightly to remove the transportation pad on the nosepiece's base.**

◎Keep the transportation pad in a safe place. You will need it when the equipment is sent for repair or transported to another location.

1. Turn the coarse adjustment knob ① towards the back until the revolving nosepiece is set at its lower limit. (Fig. 6)
2. Screw the objective with the lowest magnification into the revolving nosepiece from the left side. Then turn the nosepiece clockwise and mount the remaining objectives in order of magnification — from low to high.

◎Mounting the objectives this way makes it easier to change magnification.

◎With the CK40, the objectives can be mounted through the opening on the stage.

★**Clean the objectives periodically. The objective tips on a culture microscope are susceptible to dust.**

★**Be sure to cover any unused threaded holes with the objective cap ② to prevent dirt and dust from getting inside. (Fig. 7)**

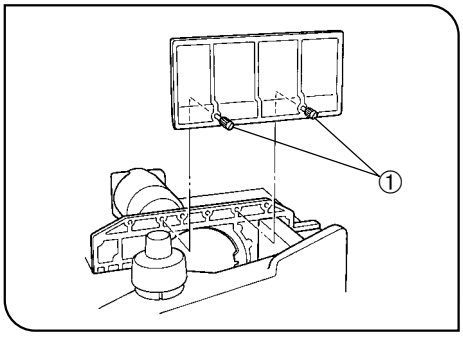


Fig. 8

5 Mounting the Stage Extension Plate/Mechanical Stage (Fig. 8)

◎The stage extension plate can be mounted on the left or right side of the stage to expand the stage surface. However, the stage extension plate and mechanical plate cannot be used simultaneously on the same side.

Mounting the CK2-SS Stage Extension Plate

Screw the clamping screws ① into the stage extension plate and then into the plain stage from above on the right side or from below on the left side. Tighten them with a coin or similar tool until the plate is securely attached.

Mounting the CK40-MVR Mechanical Stage

◎This can also be mounted on either the left or right side of the stage. Mount it in the same way as the stage extension plate.

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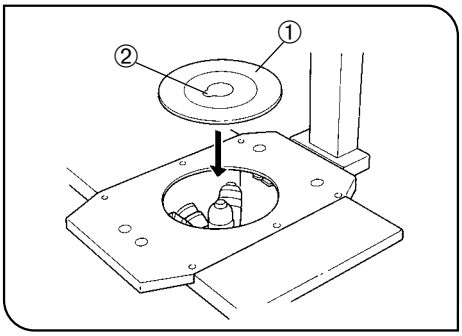


Fig. 9

6 Mounting the Stage Plate (CK40 Only) (Fig. 9)

Fit the standard stage plate ① into the opening on the stage.

★**Turn the standard stage plate so that the notch ② faces to the front for easy confirmation of an objective tip. When using the glass stage plate, set it in the direction so that its product code inscription " CK40-CPG " can be read from the front.**

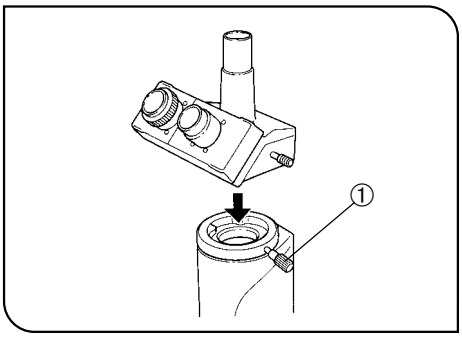


Fig. 10

7 Mounting the Observation Tube (CK40 Only) (Fig. 10 & 11)

Mounting the CH3-BI45/CH3-TR45

1. Loosen the observation tube clamping knob ①. (Fig. 10)
2. Insert the circular dovetail at the bottom of the observation tube into the mount opening on the microscope body. Adjust the observation tube until the binocular eyepieces face directly to the front, and then tighten the clamping thumbscrew. (Fig. 10)

Mounting the CK40-TBI

1. Loosen the observation tube clamping knob ① as much as possible without it coming off. (Fig. 11)
2. Carefully insert the relay lens tube ③ of the CK40-TBI ② into the observation tube mount opening. (Fig. 11)
3. Insert the circular dovetail at the bottom of the CK40-TBI ② into the mount opening on the microscope body. Adjust the observation tube until the binocular eyepieces face directly to the front, and then tighten the clamping knob. (Fig. 11)

★**Do not mount the observation tube on the microscope body at an extremely oblique angle. If you do, the observation tube's dovetail could hit the relay lens tube and damage it.**

★**Use in combination the CK40-TBI ② and relay lens tube ③ from the same package.**

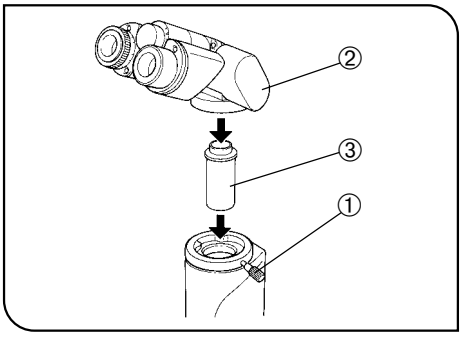


Fig. 11

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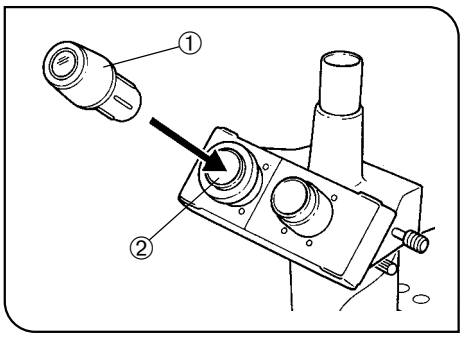


Fig. 12

8 Mounting the Eyepieces (Fig. 12)

Insert the eyepiece ① into the eyepiece sleeve ② on the observation tube.

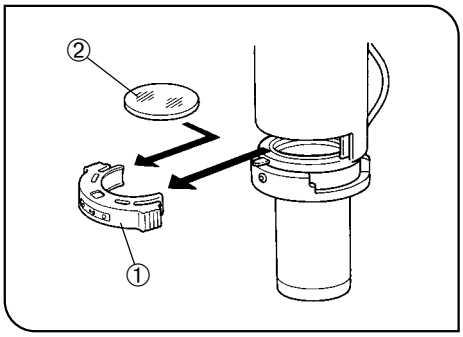


Fig. 13

9 Mounting the Filter (Fig. 13 & 14)

⚠ **Let the filter cool down sufficiently before replacing the filter.**

Remove the filter holder ① and mount the required filter ②.

★ **Push the filter down to the bottom as shown in Fig. 14 so that it does not tilt. If the filter is inclined or is not pushed down to the bottom, it may fall off the filter mount.**

◎ Filters can be stacked in the filter holder. You can mount as many as you like, as long as the total thickness does not exceed 11 mm.

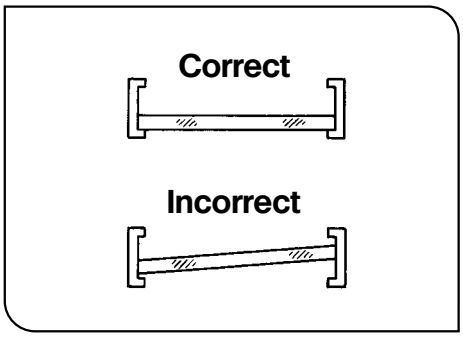


Fig. 14

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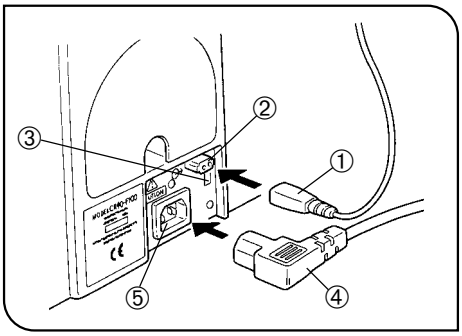


Fig. 15

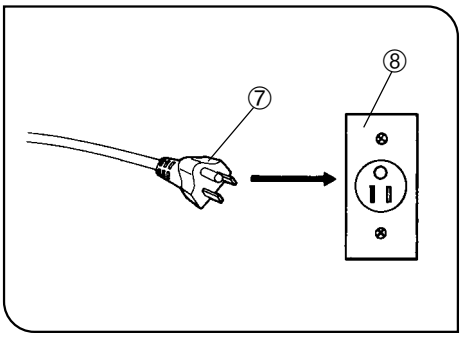


Fig. 16

10 Connecting the Lamp Cord Plug and Power Cord (Figs. 15 & 16)

⚠ **Do not subject the power cord to excessive force. Cables and cords are more susceptible to damage when bent or twisted.**

⚠ **Make sure the main switch ① is set to " ○ " (OFF) before connecting the power cord. (Fig. 15)**

1. Connect the lamp cord plug ① securely to the connector ② on the rear of the microscope body. (Fig. 15)

⚠ **Do not connect anything other than the lamp cord plug ① to the connector ②. Doing so will cause equipment failure.**

⚠ **Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual.**

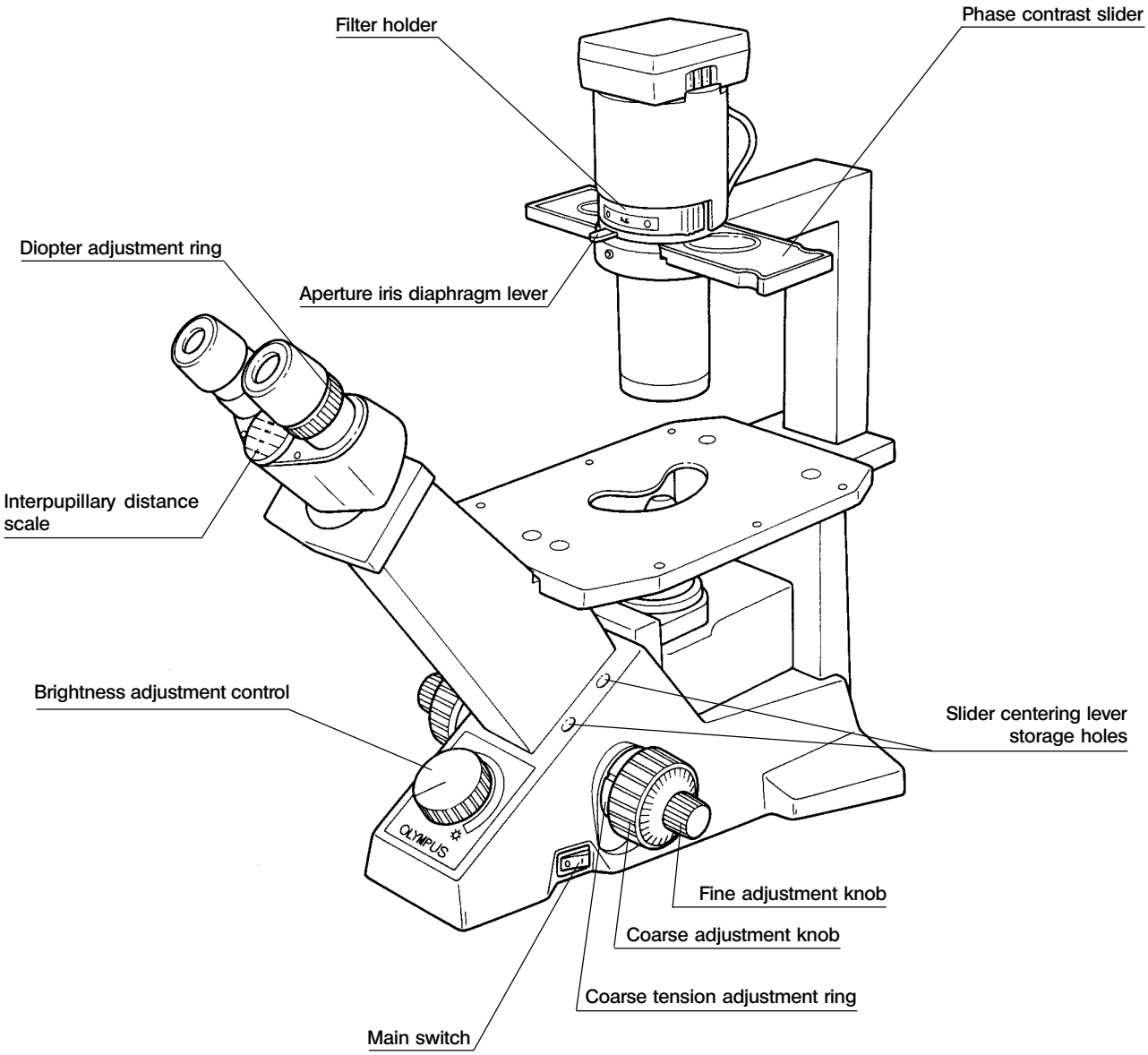
2. Be sure to set the input voltage selector ③ to the required voltage. Input voltage is factory-set to 110 – 120 V or 230 – 240 V.
3. Insert the power cord plug ④ securely into the connector ⑤. (Fig. 15)
4. Insert the power cord plug ⑦ securely into the wall outlet ⑧. (Fig. 16)

⚠ **Connect the power cord correctly and ensure that the ground terminal of the power supply and that of the wall outlet are properly connected. If the equipment is not grounded, Olympus can no longer warrant the electrical safety and performance of the equipment.**

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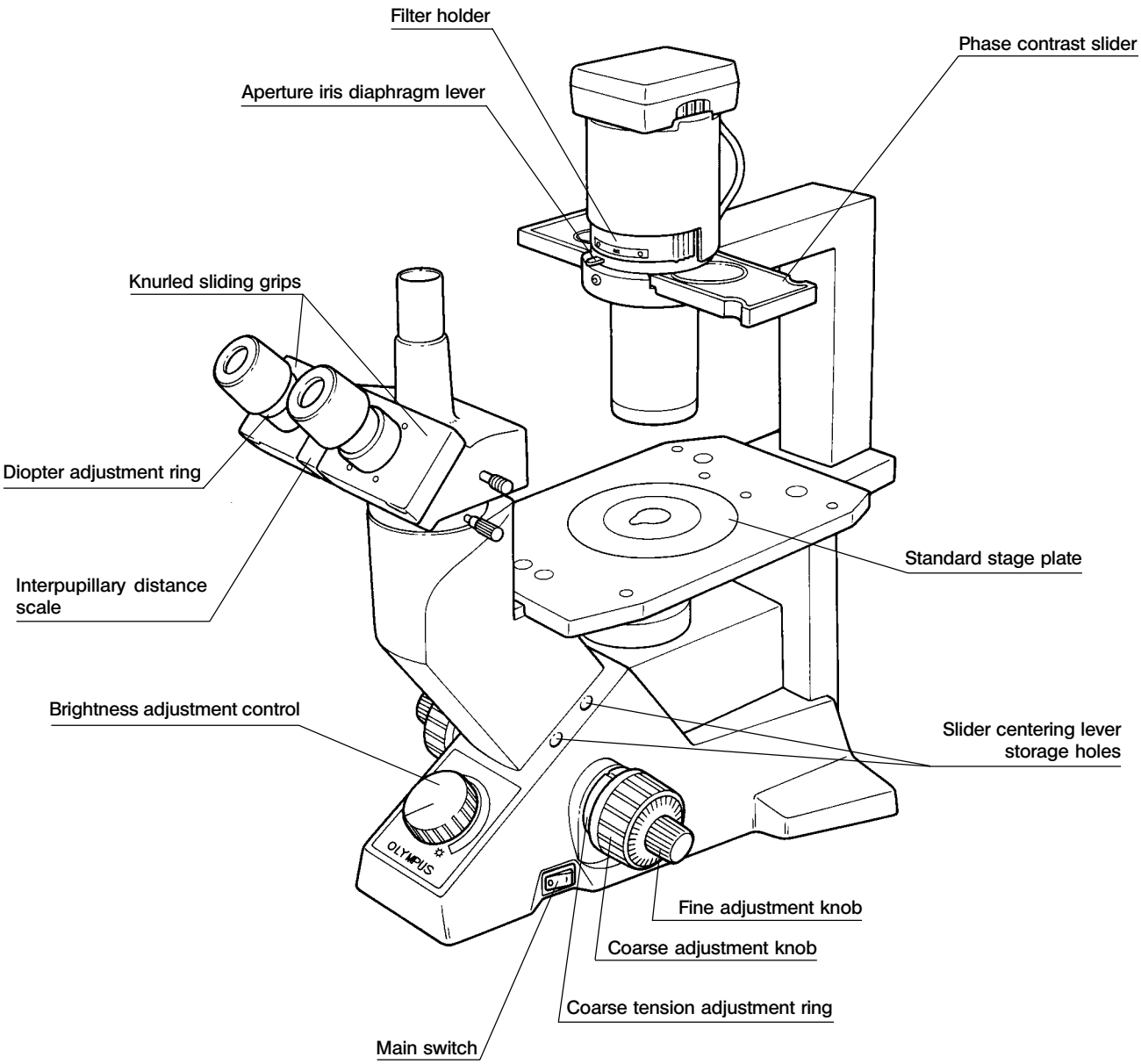
3 CONTROLS

CK30



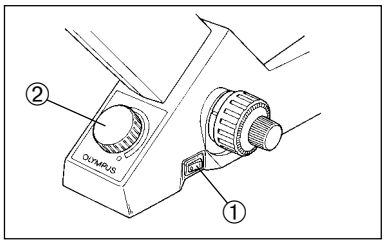
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CK40

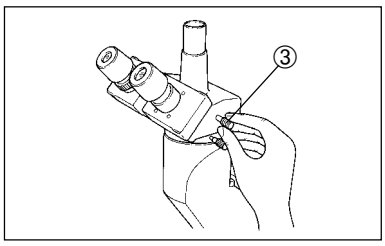


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4 SUMMARY OF OBSERVATION PROCEDURES

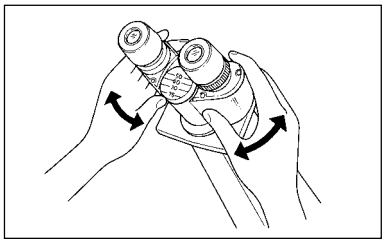


1. Set the main switch ① to " I " (ON) and turn the brightness adjustment control ② to obtain appropriate light intensity. (Page 12)

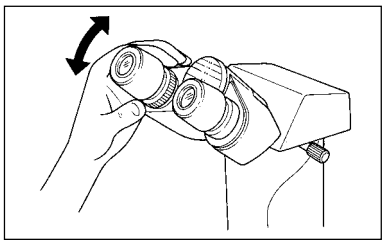


2. When using the CK40, push in the light path selector ③ on the trinocular tube to set the light path at 100% for binocular observation. (Page 15)

3. Place a specimen on the stage. (Page 13)
4. Turn the revolving nosepiece to bring the 10X objective into the light path. Be sure to turn the revolving nosepiece until it clicks.



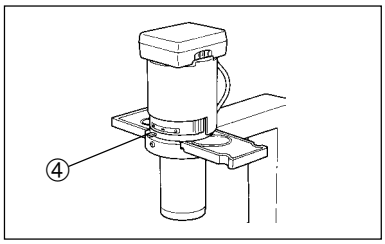
5. Adjust the interpupillar distance of the eyepieces. (Page 14)



6. Adjust the diopters of both eyepieces. (Page 15)

7. Bring the required objective into the light path and focus on the specimen.
8. When using the 40X objective provided with the correction collar, set the scale on the correction collar according to the thickness of the vessel bottom. (Page 18)

◎When performing phase contrast observation, refer to page 19 and subsequent pages for details.



9. When observing an undyed specimen with brightfield, stop down the aperture iris diaphragm ④. In phase contrast observation, set the aperture wide-open.
10. Bring the required filter into the light path. (Page 17)

In brightfield observation, use the LBD filter. In phase contrast observation, use the IF550 green filter as required.

◎When taking photographs, use of an infrared (IR) filter is recommended.

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5 USING THE CONTROLS

5-1 Microscope Body

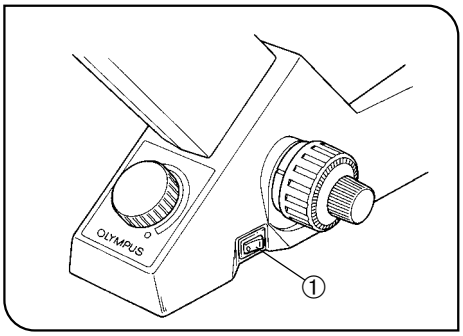


Fig. 17

1 Turning on the Light Source (Fig. 17)

Set the main switch ① on the side panel of the microscope body to " I " (ON).

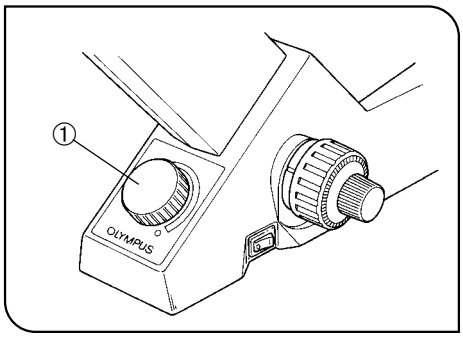


Fig. 18

2 Adjusting the Brightness Adjustment Control (Fig. 18)

Turn the brightness adjustment control ① clockwise to raise the voltage and increase the light intensity. Turn it counterclockwise to lower the voltage and decrease the light intensity.

◎ The service life of the bulb can be extended by using the bulb at a lower voltage.

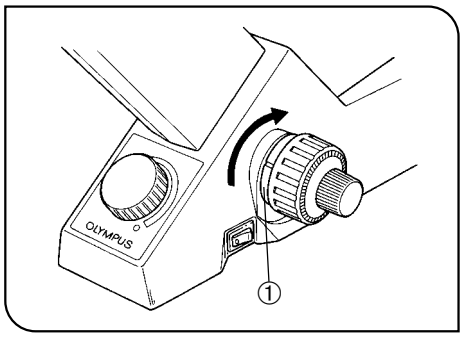


Fig. 19

3 Adjusting the Tension of the Coarse Adjustment Knob (Fig. 19)

★ Be sure to use the coarse tension adjustment ring ① to adjust the tension of the coarse adjustment knob.

How to adjust the tension

Turn the coarse tension adjustment ring ① with your fingers or using a flat-head screwdriver. When the ring is turned in the direction of the arrow, tension of the coarse adjustment knob increases. Turning the ring in the opposite direction decreases the tension.

If the revolving nosepiece descends on its own or if the specimen gets out of focus quickly even when brought into focus using the fine adjustment knob, it means that the tension of the coarse adjustment knob is too low. Turn the ring in the direction of the arrow to increase the tension.

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5-2 Stage

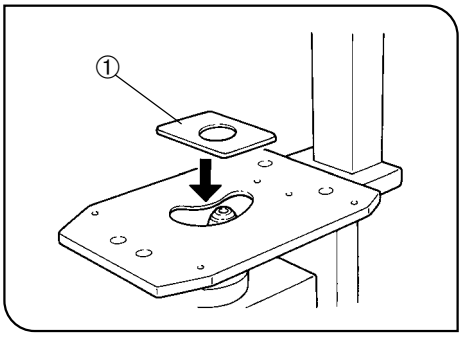


Fig. 20

1 Placing the Specimen (Fig. 20 & 21)

Put the specimen in the center of the stage.

★ **When the specimen is placed on slide glass, turn it over so that the cover glass faces the objective.**

When using a ϕ35 mm petri dish

◎When the standard stage plate is mounted on the CK40, the ϕ35 mm petri dish can be mounted directly on the stage.

1. When using the CK30, put the provided ϕ35 mm petri dish holder ① on the stage and mount the ϕ35 mm petri dish on the opening in the center.
2. To move the petri dish, slide the entire holder.

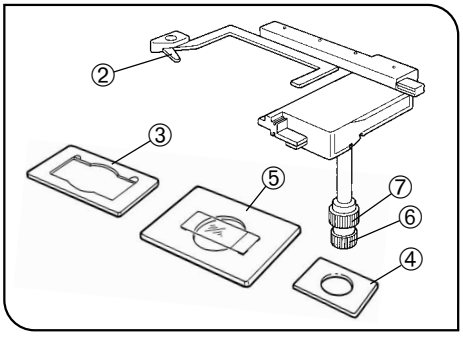


Fig. 21

Using the mechanical stage

1. When using an 96-well or 24-well micro-titre plate, extend the specimen holder to directly hold the micro-titre plate. (Fig. 21)
2. To hold any other type of plate, combine one of the following provided holders with the mechanical stage:
   - Terasaki holder ③ (AB4488) for Terasaki plate
   - Petri dish holder ④ (AD0675) for ϕ35 petri dish
   - Slide glass holder ⑤ (AB4489) for slide glass ϕ54 petri dish
3. Turn the transverse feeding ring ⑥ and longitudinal feeding ring ⑦ to move the specimen to the required position (stroke: 120 mm width, 78 mm length).

2 Moving the Specimen

Turn the feeding rings on the mechanical stage or move the specimen directly by hand to the required position.

★ **Be careful when changing objectives. When objectives are switched after observing the specimen with an objective with short working distance, the objective may interfere with the stage plate or petri dish holder.**

◎When using the CK40, the IX-CP50 stage insert plate (ϕ50) has a wide range of use without interference.

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5-3 Observation Tube

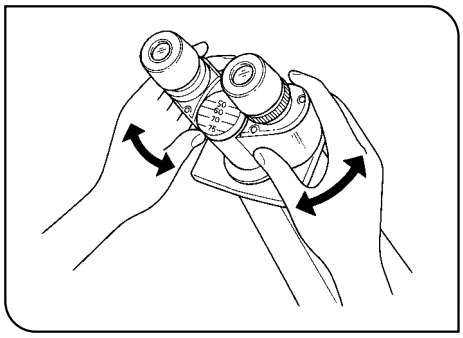


Fig. 22

1 Adjusting the Interpupillary Distance (Figs. 22 – 24)

When using the CK30

While looking through the eyepieces, move both eyepieces until the left and right fields of view coincide fully. (Fig. 22)
Make sure the two dots are horizontal. (Fig. 23)

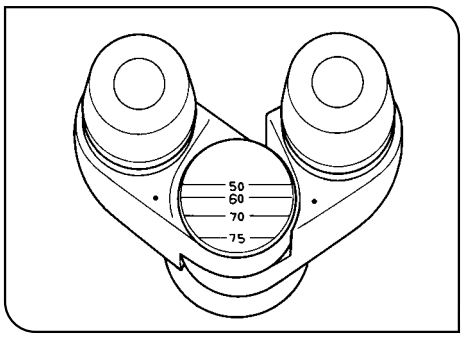


Fig. 23

◎Use the lines inscribed on the pivot to make the dots horizontal. The dots can be set anywhere between the inscribed interpupillary distances – 50, 60, 70 and 75 – as long as they are horizontal. (Fig. 23)
◎Make a note of the interpupillary distance for easy readjustment in the next observation.

When using the CK40

« Binocular tube and tilting binocular tube »

Follow the procedure in " When using the CK30 ".

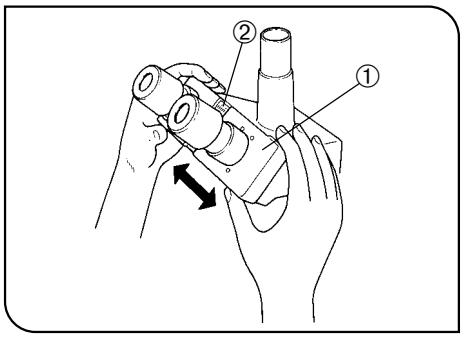


Fig. 24

« Trinocular tube »

1. While looking through the eyepieces, slide the knurled sliding grips ① until the left and right fields of view fully coincide. (Fig. 24)

◎The knurled sliding grips ① are coupled with the interpupillary distance scale ②. Make a note of the interpupillary distance for easy readjustment in the next observation. (Fig. 24)

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2 Adjusting the Diopter (Figs. 25 & 26)

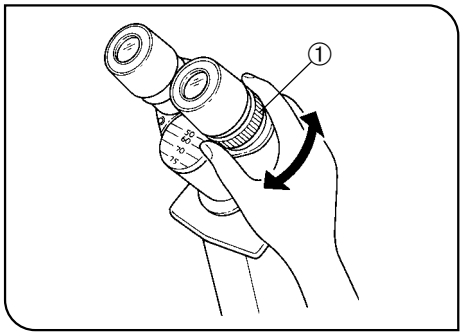


Fig. 25

When using the CK30

1. While looking through the left eyepiece with your left eye, turn the coarse and fine adjustment knobs to bring the specimen into focus.
2. While looking through the right eyepiece with your right eye, turn only the diopter adjustment ring ① to focus on the specimen. (Fig. 25)

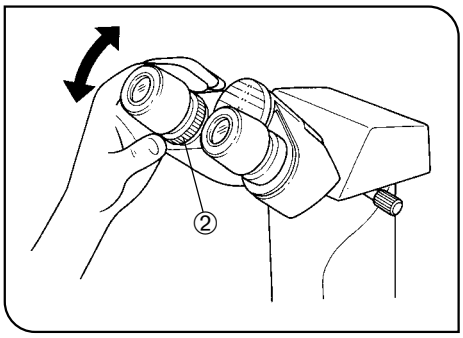


Fig. 26

When using the CK40

« Binocular tube and tilting binocular tube »

1. While looking through the right eyepiece with your right eye, turn the coarse and fine adjustment knobs to bring the specimen into focus.
2. While looking through the left eyepiece with your left eye, turn only the diopter adjustment ring ② to focus on the specimen. (Fig. 26)

« Trinocular tube »

Follow the procedure in “Binocular tube and tilting binocular tube”.

3 Selecting the Light Path for the Observation Tube (CH3-TR45 Only) (Fig. 27)

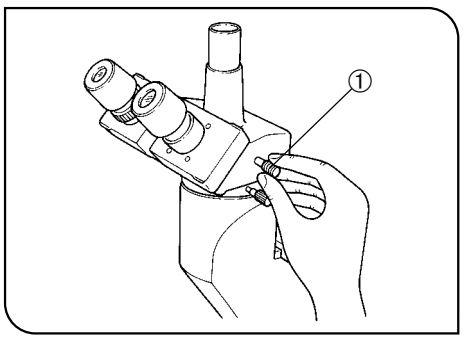


Fig. 27

◎Move the light path selector ① to select the required light path.

◎For normal observation, push in the light path selector. For video and photomicrography, pull out the selector.

Light path selector	Intensity ratio	Application
Pushed in	100% for binocular eyepieces	Observation of dark specimens
Pulled out	20% for binocular eyepieces, 80% for Video/photomicrography	Observation of bright specimens, and Video/photomicrography

★After extended exposure, ambient light in the room will enter through the observation tube and the eyepieces and may produce ghost images or flare. To block this extraneous light, dim the room or cap the eyepiece or the focusing telescope.

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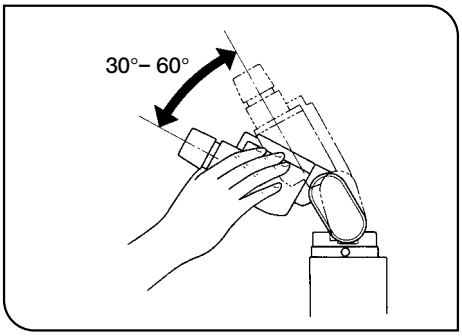


Fig. 28

4 Adjusting the Tilt (CK40-TBI Only) (Fig. 28)

◎The height and angle of the binocular tube can be adjusted to any position, giving you more freedom to find a comfortable observation posture.

Hold the binocular assembly with both hands and move it up or down until the tube is tilted in a way that you find comfortable and facilitates easy observation.

★**Do not attempt to force the binocular assembly past the upper or lower stop positions. Applying excessive force could destroy the mechanism.**

★**When using the CK40-TBI tilting binocular tube, the CK40-EPA eyepoint adjuster cannot be used.**

★**The connectable eyepiece is the NCWHK10X only. Combination with any other eyepiece will result in insufficient illumination at the periphery of the viewing field.**

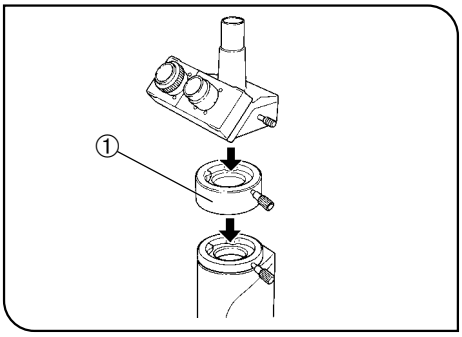


Fig. 29

5 Using the Eyepoint Adjuster (CK40 Only) (Fig. 29)

★**The CK40-TBI tilting binocular tube cannot be used with the CK40-EPA. Only the CK40-EPA eyepoint adjuster can be used as an intermediate observation tube.**

◎Mount the CK40-EPA eyepoint adjuster ① between the observation tube and mount opening on the microscope body to raise the eyepoint by 32 mm. The observation tube magnification is set at 1X by the built-in correction lens; therefore, no magnification correction is required.

★**The eyepoint adjuster cannot be used for relief phase contrast observation.**

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5-4 Illumination Unit

1 Using the Filter

◎Use filters as needed to increase the accuracy of observation and photomicrography. The LBD filter is especially recommended for observation and photomicrography since it achieves more neutral colors.

◎Filters can be stacked in the filter holder. (Maximum thickness: 11 mm)

Filter	Purpose
IF550	Monochrome contrast filter (green)
ND6, ND25	Light intensity adjustment filter (transmittance: 6%/25%)
LBD	Color temperature conversion filter (for observation/photomicrography)
IR cut filter (for CK40)	For exposure time compensation in photomicrography

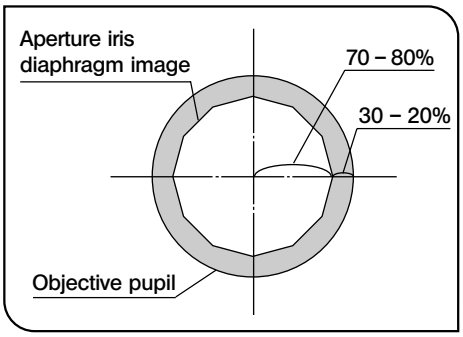


Fig. 30

2 Aperture Iris Diaphragm (Fig. 30)

◎ The aperture iris diaphragm determines the numerical aperture of the illumination system in brightfield observation. It enables you to adjust the depth of focus, contrast and resolution according to your requirements.

- To confirm the aperture iris diaphragm, remove the eyepiece when necessary (and insert the CT-5 if you have one). Then look into the eyepiece sleeve; you will see the field of view as shown in Fig. 30. Now adjust the aperture iris diaphragm lever as required.
- In general, when observing a dyed specimen, set the condenser aperture iris diaphragm to 70 – 80% of the N.A. of the objective in use. However, when observing a culture specimen – since it is not dyed – set the aperture iris diaphragm lever to " ⊛ ".

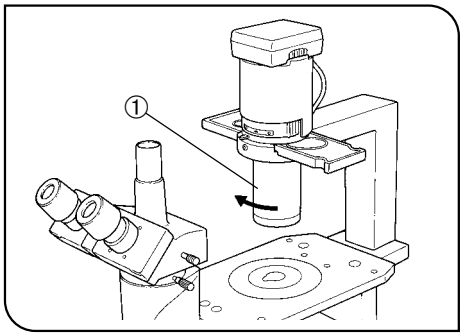


Fig. 31

3 Removing the Condenser Lens (Fig. 31)

◎To provide more operation space, turn the condensor's lower section ① clockwise (when viewed from above) and remove it. When you do this, however, keep in mind that proper illumination cannot be achieved. Remove the condenser lens only when using a large culture vessel.

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5-5 Objectives

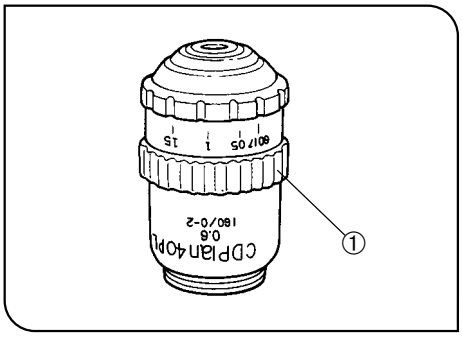


Fig. 32

1 Setting the Correction Collar (Fig. 32)

A culture microscope is designed to observe specimens contained in vessels of various bottom thicknesses. In order to achieve optimum objective performance of the culture microscope, the high N . A . objectives are provided with a correction collar ①. (Available on the LWDCDPlan40XPL-6 only.)

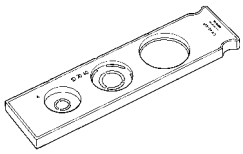
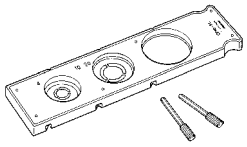
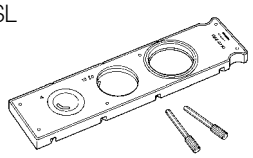
The correction collar is effective with a vessel bottom from 0 to 2 mm thickness.

1. If the thickness of the vessel bottom is known:
   Match the correction collar to the thickness of the vessel bottom using the collar scale provided.
2. If the thickness of the vessel bottom is unknown:
   The optimum position for the correction collar can be obtained from the image resolution. If a satisfactorily sharp image is not obtained after focus adjustment, rotate the correction collar to the right and left so that you can compare the images at both sides. Reset the collar to the better image, then starting from this position, further rotate the collar to the right and left until both images can be obtained for comparison. By repeating this procedure several times, you will find best position for the correction collar. Refocus after rotating the correction collar.

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6 PHASE CONTRAST OBSERVATION

The following three units are available for phase contrast observation. Mount a slider onto the microscope and replace the objectives with phase-contrast-compatible objectives.

Model name	Description	Compatible objectives
Ph precentering slider CK40-SLP 	• The light annuli are precentered, so no adjustment is required. (For 4X, for 10X/20X/40X & empty) • The empty opening can be used as a filter holder.	SPlan4XPL-6 DAch10XPL-6 LWDCDAch20XPL-6 LWDCDPlan40XFPL-6
Ph centering slider CK40-SL 	• The light annulus has to be centered. (For 4X, for 10X/20X & empty) • The empty opening can accommodate the CK2-RS40 light annulus for the 40X objective or can be used as a filter holder.	SPlan4XPL-6 DAch10XPL-6 LWDCDAch20XPL-6 LWDCDPlan40XPL-6
RP slider CK40-RPSL 	• The relief slit has to be centered. (For 4X, for 10X/20X & empty) • The empty opening can accommodate the CK40-RPS40 relief annuls for the 40X objective.	SPlan4XRP DAch10XRP LWDCDAch20XRP LWDCDPlan40XRP

★During relief phase contrast observation using the RP slider, part of the field of view may get dark when the lamp voltage is lowered. This happens because the viewing field´s brightness is affected by fluorescent light from the ceiling. Should this happen, turn off the room light or raise the lamp voltage of the unit. When a 10X objective is used, the edges of the field of view may become dark.

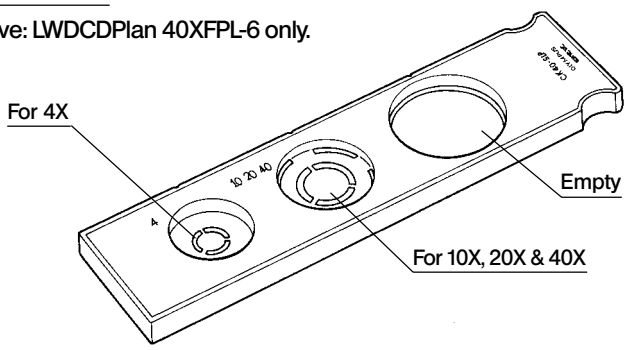
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1 Names of Parts

Phase Slider

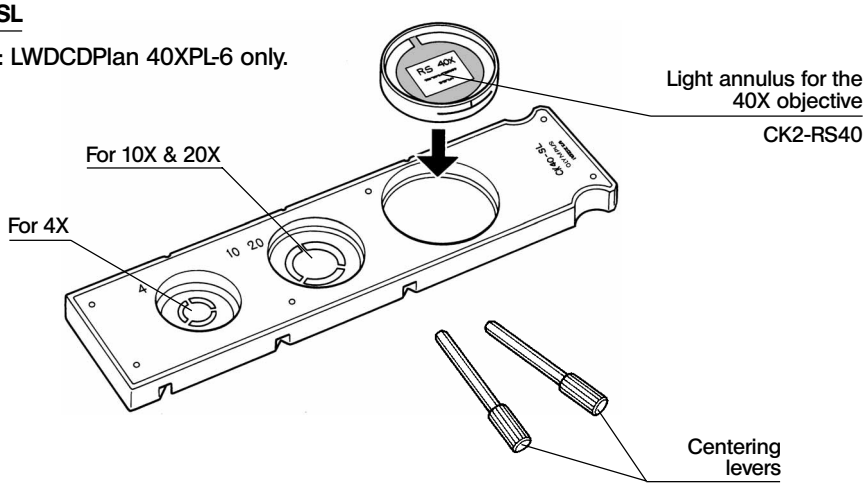
Ph precentering slider CK40-SLP

★Mountable 40X objective: LWDCDPlan 40XFPL-6 only.



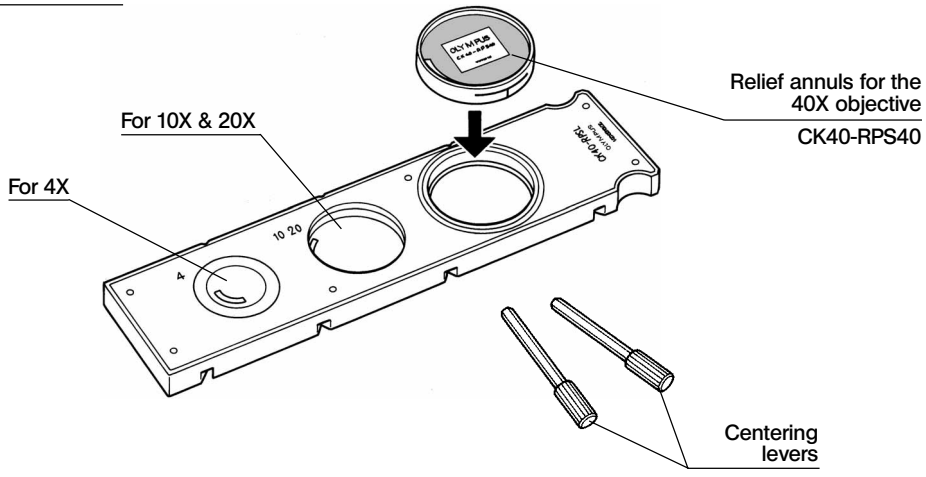
Ph centering slider CK40-SL

★Mountable 40X objective: LWDCDPlan 40XPL-6 only.



Relief PC Slider

RP Slider RP slider CK40-RPSL



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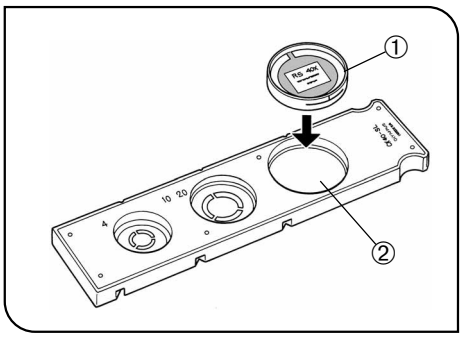


Fig. 33

2 Mounting the Light Annulus for the 40X Objective (Fig. 33)

◎When observing with the 40X objective, you must use a light annulus exclusively designed for the phase contrast slider you are using. The CK2-RS40 must be mounted on the CK40-SL and the CK40-RPS40 on the CK40-RPSL.

• Hold the 40X light annulus ① face up (printed side up) and fit it into the empty opening ②.

★**In relief phase contrast observation the direction of the specimen shadow varies depending on the opening direction of the relief slit. When mounting the CK40-RPS40, mount it in the direction shown in the figure on page 20 so that it is aligned with the 4X and 10X/20X relief slits.**

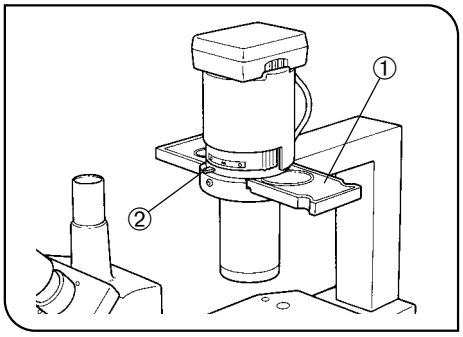


Fig. 34

3 Mounting the Phase Slider (Fig. 34)

1. Hold the phase slider ① face up (printed side up) with the finger hold on the right, and insert it into the illumination unit slot.
2. When performing phase contrast observation, always set the aperture iris diaphragm lever ② to " O " (wide-open).

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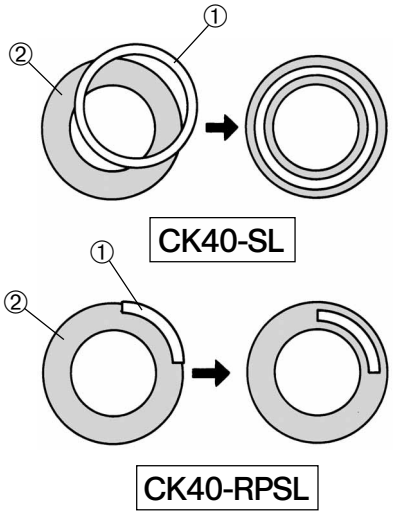


Fig. 35

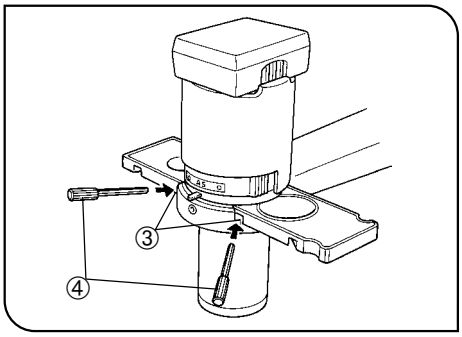


Fig. 36

4 Centering the Light Annulus or Relief Slit (Figs. 35 & 36)

★ **The CK40-SLP does not need to be centered.**

1. Place a specimen on the stage and bring it into focus.
2. Replace the objective in the sleeve which does not have a diopter adjustment ring with the CT-5 centering telescope.
3. Make sure the magnification of the objective in the light path matches that of the light annulus on the phase slider or that of the relief slit on the RP slider.
4. While looking into the centering telescope, turn the knurled dial to focus on the phase annulus ② of the objective corresponding to the light annulus or relief slit ①. (Fig. 35)
5. Insert the centering levers ④ into the two centering tapped holes ③ on the phase slider or RP slider. Tighten and loosen the centering levers until the light annulus or relief slit ① is superimposed on the phase annulus ②. (Figs. 35 & 36)
6. Repeat these steps to adjust the other objectives. Keep in mind, however, that 10X and 20X objectives share the same light annulus with the CK40-SL and CK40-RPSL Put an uncentered objective into the light path to make absolutely sure the light annulus or relief slit ① is not deviating from the phase annulus ②. If there is any deviation, perform the centering procedure again.

★ **Optimum performance cannot be achieved if the light annulus or relief slit is not properly centered,**

★ **Ghost images of the light annulus or relief slit may sometimes emerge. If this happens, superimpose the brightest image with the phase annulus.**

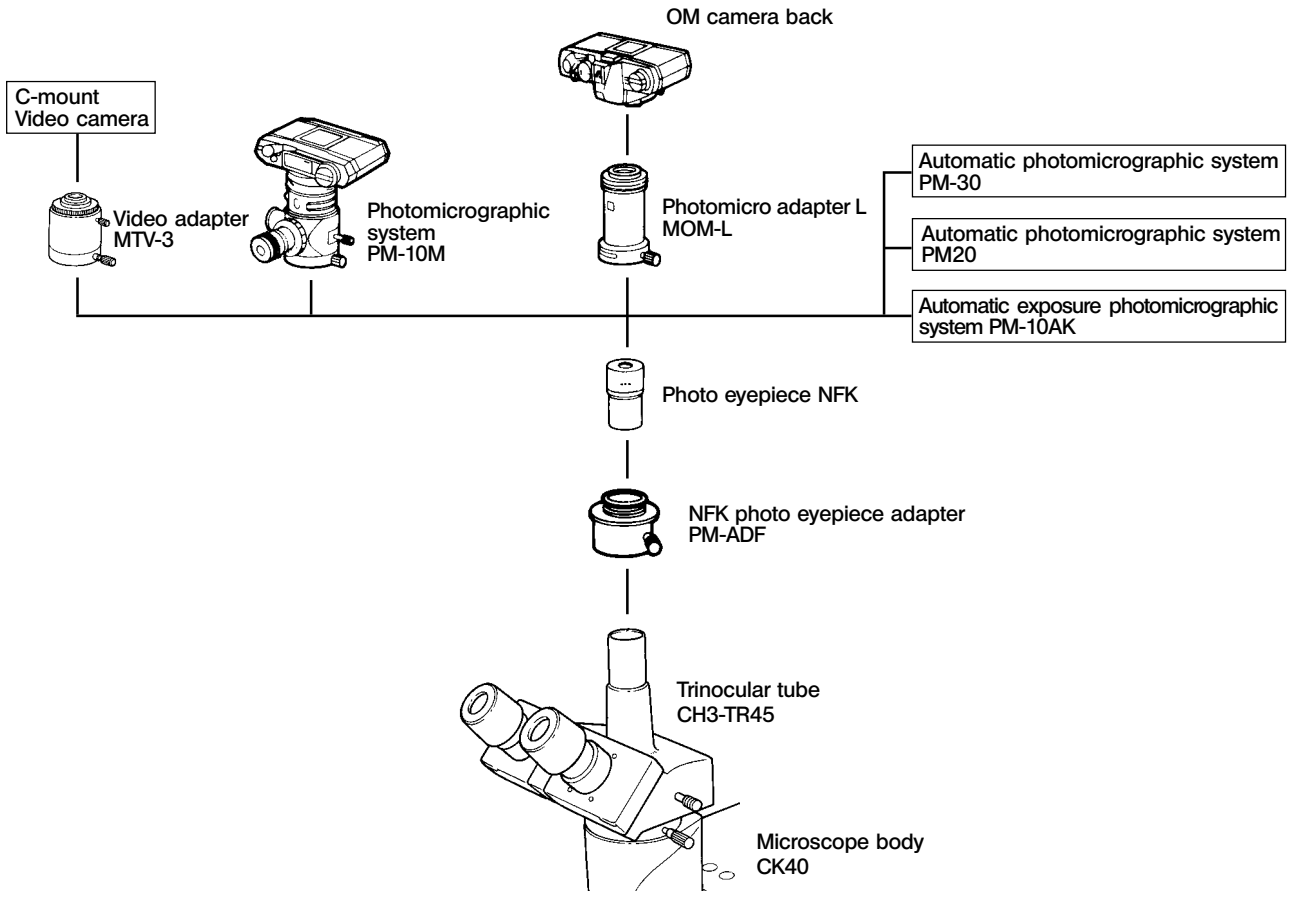
★ **When a thick specimen is moved or replaced, the light annulus or relief slit and the phase annulus may deviate. This can reduce image contrast. If this happens, repeat Steps 1 – 5 for readjustment.**

★ **The centering procedure may have to be repeated in order to get the best possible contrast if a specimen slide or the bottom surface of a culture vessel is not flat. Center the light annulus or relief slit using objectives in the order of lower to higher magnifications.**

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7 PHOTOMICROGRAPHY

7-1 Connecting to the Phtomicrographic Systems



◎Use the CH-TR45 trinocular tube when performing photomicrography.

★Use the 45HA heat absorbing filter when using the PM10, PM20, or PM30 photomicrogtraphic system.

★Pay attention to the design and weight of a CCD camera when selecting one to use with this system. Stability and ease of observation can be interfered with by inappropriate cameras.

1 Selecting the Light Path

Pull out he light path selector to choose the photomicrographic light path. For details, refer to " 3 Selecting the Light Path for the Observation head " in " 5-3 Observation head " on page 15.

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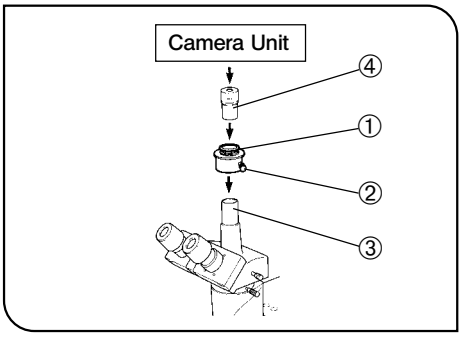


Fig. 37

2 Mounting the Camera Unit (Fig. 37)

1. Loosen the clamping screw ② of the PM-ADF NFK photo eyepiece adapter ①.
2. Attach the adapter ① to the CH3-TR45 trinocular tube ③ and tighten the screw ②.
3. Insert 3.3X or 5X NFK photo eyepiece ④ into the adapter ①.
4. Mount the camera unit directly on the adapter ①. Make sure the viewfinder on the camera unit faces sideways. If it faces to the front, the eyepieces will get in your way when you try to look into the camera unit's viewfinder. If the viewfinder of the PM30 faces sideways, it will interfere with the connection cable. To avoid this, mount the PM30 on the adapter at about a 30° angle with respect to the eyepieces.

When using the OM camera back

Mount the MOM-L photomicro adapter onto the OM camera back in the same way as you would an interchangeable lens.

- Use the 3.3X or 5X NFK photo eyepiece.
- Look into the viewfinder on the camera back to focus on the specimen.
- Photomicrographic magnification
  = Objective magnification X Photo eyepiece magnification.

★ **When taking microscopic pictures with an SLR camera back, mirror-lockup shock occurs. To minimize the camera-shake associated with this shock, select a longer exposure time to obtain clearer pictures. If it is not possible to select a longer exposure time, use the ND filter to reduce the light intensity.**

3 Focusing

Focusing is not coupled between the observation tube´s eyepiece and the film surface. Be sure to use the camera unit´s viewfinder to focus on the specimen when taking a photograph. For details, refer to the camera unit's instruction manual.

4 Color Temperature Adjustment

◎When taking color pictures using daylight type film, follow the procedures below.

1. Mount the 45LBD-2N color temperature conversion filter in the filter holder.
2. Turn the brightness adjustment control to set it at its maximum position. Illumination close to daylight will be obtained.

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8 SPECIFICATIONS

Item		Specifications	
		CK30	CK40
1. Optical system		LB optical system (finite-corrected system)	
2. Illumination		6 V 30 W HAL high-intensity halogen bulb Philips 5761 (Average service life: Approx. 100 hrs. when used as directed) Output rating: 6 V ∿ 30 VA Input rating: 100V area — 100/110-120 V ∿ 0.6 A, 50/60 Hz 200V area — 220/230-240 V ∿ 0.3 A, 50/60 Hz	
3. Focusing		Vertical movement of revolving nosepiece (stage is fixed) Coarse/fine adjustment knobs (provided with tension adjustment mechanism) Stroke (from focal point on stage surface): 7 mm upward and 2 mm downward	
4. Revolving nosepiece		Quadruple	
5. Observation tube	Binocular tube CH3-BI45	Equivalent of CH3-BI45 incorporated in microscope body	Tube inclination: 45° Interpupillary distance adjustment: 48 – 75 mm
	Trinocular tube CH3-TR45		Tube inclination: 45° Interpupillary distance adjustment: 53 – 72 mm
	Tilting binocular tube CK40-TBI		Tube inclination: 30° – 60° Interpupillary distance adjustment: 50 – 76 mm NCWHK10X objective can only be used
6. Eyepiece	NCWHK10X Field of view no. 18 WHK10X Field of view no. 20 WHK15X Field of view no. 12		
7. Objectives	For brightfield	EDAch4X EDAch10X LWDCDAch20X	N. A. 0.10 W.D. 29.0 mm N. A. 0.25 W.D. 6.3 mm N. A. 0.40 W.D. 5.4 mm
	For phase contrast	SPlan4XPL-6 DAch10XPL-6 LWDCDAch20XPL-6 LWDCDPlan40XPL-6 LWDCDPlan40XFPL-6	N. A. 0.13 W.D. 15.5 mm N. A. 0.25 W.D. 7.18 mm N. A. 0.40 W.D. 5.4 mm N. A. 0.55 W.D. 2.04 mm with correction collar N. A. 0.55 W.D. 2.04 mm
	For relief phase contrast	SPlan4XRP DAch10XRP LWDCDAch20XRP LWDCDPlan40XRP	N. A. 0.13 W.D. 15.5 mm N. A. 0.25 W.D. 7.18 mm N. A. 0.40 W.D. 5.4 mm N. A. 0.55 W.D. 2.04 mm

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Item	Specifications	
	CK30	CK40
8. Stage	Stage dimensions: 160 (W) X 250 (D) mm Stage extension plate dimensions: 70 (W) X 180 (D) mm Provided with ø35 mm petri dish holder (CK30 only)	
9. Mechanical stage	Traversing area: 120 (X) X 78 (Y) mm; coaxial low drive control knobs on right or left side of plain stage; provided with 3 culture vessel holder	
10. Condenser	Ultra-long-working distance condenser N.A. 0.3, W.D. 72 mm; detachable	
11. Dimensions and weight	236 (W) X 469 (D) X 476 (H) mm 8 kg (17.6 lb)	236 (W) X 371 (D) X 476 (H) mm 8.6 kg (18.9 lb)
12. Operating environment	• Indoor use • Altitude : Max. 2,000 m • Ambient temperature: 5°C to 40°C (41°F to 104°F) • Maximum relative humidity: 80% for temperatures up to 31°C (88°F) decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F), to 50% relative humidity at 40°C (104°F) • Main supply voltage fluctuations not to exceed ±10% of nominal voltage • Pollution Degree: 2 (in accordance with IEC664) • Installation/Overvoltage Category: II (in accordance with IEC664)	

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9 TROUBLESHOOTING GUIDE

Under certain conditions, performance of this unit may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact your local Olympus representative for assistance.

Trouble	Cause	Remedy	Page
1. Optical System			
a) Although the illumination is on, the field of view is dark.	The socket pin is not connected to the illumination unit.	Connect it securely.	4
	The bulb is burned out.	Replace it with a new one.	4
	The brightness adjustment control is set too low.	Set it to the appropriate position.	12
	Too many filters are stacked in the filter.	Reduce them to the minimum required number.	17
	The mounted lamp is not the one specified.	Use the specified 6 V, 30 W halogen lamp.	4
	The input voltage selector is not set at the required position.	Set it according to the line voltage.	8
b) The edges of the field of view are shaded, or the field of view brightness is uneven.	The revolving nosepiece is not clicked into position.	Turn the nosepiece slightly until it clicks into position.	11
	The filter is stopped halfway.	Push it in all the way.	7
	The phase slider is not installed properly.	Move the slider until it clicks into position.	–
c) Dust and smudges are noticeable in the field of view.	The specimen is dirty.	Replace it with a clean specimen.	–
	The eyepiece is dirty.	Clean the eyepiece.	iii
d) The image appears shiny.	The aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.	17
e) Resolution problems • Images are not sharp. • Contrast is wrong. • Image details lack definition.	The objective is not correctly positioned in the light path.	Turn the nosepiece slightly until it clicks into position.	11
	The aperture iris diaphragm is opened or stopped down too much.	Adjust the aperture properly.	17
	You are using an objective with a correction collar that has not been adjusted.	While focusing on the specimen, turn the collar until the image looks best.	18
	The condenser lens, objective, eyepiece, or specimen vessel is dirty.	Clean it.	iii
	The thickness of the specimen slide or the bottom of the culture vessel exceeds 2 mm.	Use one with a bottom thickness of 2 mm or less.	–
	You are using a brightfield objective.	Use a phase contrast objective.	19, 25
	The light annulus of the condenser does not match the phase annulus of the objective.	Use a light annulus that matches the phase annulus of objective.	19

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Trouble	Cause	Remedy	Page
e) Resolution problems • Images are not sharp. • Contrast is wrong. • Image details lack definition.	The light annulus and phase annulus are not centered.	When using the CK40-SL or CK40-RPSL center them correctly.	22
	The objective is not compatible with phase contrast observation.	Use one compatible with phase contrast observation.	19
	When the edge of the culture vessel is viewed, the phase annulus and light annulus deviate from one another.	Move the vessel until phase contrast effect is achieved. Also remove the slider and set the aperture iris diaphragm lever to " ⊛ ".	17
f) The image is partially out of focus.	The objective is not correctly positioned in the light path.	Turn the nosepiece slightly until it clicks into position.	11
	The specimen is not correctly placed on the stage.	Put it on the stage correctly.	13
	The optical performance of the culture vessel is poor (e.g., surface regularity).	Use one with good surface regularity.	–
2. Electric System			
a) The bulb flickers and the light intensity is unstable.	The line voltage fluctuates.	Use a voltage stabilizer.	–
	The bulb is almost burned out.	Replace it with a new one.	4
	The power cord is not connected securely.	Connect it securely.	8
3. Focusing			
a) The coarse adjustment knob is too diffcult to turn.	The coarse tension adjustment ring has been tightened too much.	Loosen it appropriately.	12
b) The image goes out of focus during observation.	The coarse tension adjustment ring has been loosened too much.	Tighten it appropriately.	12
4. Observation Tube			
a) The fields of view of the left and right eyepieces do not match.	The interpupillary distance is not correctly adjusted.	Adjust it correctly.	14
	The diopter is not corrected.	Correct the diopter according to your eyesight.	15
	You are not accustomed to binocular vision.	Do not try to gaze at the specimen right after looking into the eyepieces. Instead, look at the entire field of view. Or take your eyes away from the eyepieces briefly and look at something else, then look into the eyepieces again.	–

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Trouble	Cause	Remedy	Page
5. Photomicrography			
a) The picture is out of focus.	You are using the OM camera with the shutter speed set faster than 1/2 sec.	Use the ND filter and select a slower shutter speed.	24
b) The edges are blurred.	You are using an achromatic objective. This type of objective cannot bring edges into sharp focus.	Use a Plan objective when necessary.	–
c) The viewfinder image does not look sharp.	The correction collar of the LWDCDPlan 40XPL-6 is not adjusted.	Adjust the correction collar according to the thickness of the vessel bottom.	18
d) A room window or fluorescent lamp was also shot.	Stray light entered through the eyepieces or the camera's viewfinder.	Cap both eyepieces and the camera's viewfinder.	–

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PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to " Specifications " and " Certified Cord " below:

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	MITI	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		U.S.A.	UL	
Ireland	NSAI				

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Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	‹HAR›	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	‹VDE›	‹HAR›	30	10	10
Union Technique de l´Electricite´ (UTE)	USE	‹HAR›	30	10	30
Instituto Italiano del Marchio di Qualita´ (IMQ)	IEMMEQU	‹HAR›	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	‹HAR›	10	10	30
N.V. KEMA	KEMA-KEUR	‹HAR›	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	‹HAR›	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	‹ÖVE›	‹HAR›	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	‹DEMKO›	‹HAR›	30	10	30
National Standards Authority of Ireland (NSAI)	‹NSAI›	‹HAR›	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	‹HAR›	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	‹UNED›	‹HAR›	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	‹HAR›	30	30	70
Instituto Portages da Qualidade (IPQ)	np	‹HAR›	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	‹HAR›	10	30	90
Elektriska Inspektoratet	SETI	‹HAR›	10	30	90

Underwriters Laboratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

This device complies with the requirements of both directive 89/336/EEC concerning electromagnetic compatibility and directive 73/23/EEC concerning low voltage. The CE marking indicates compliance with the above directives.

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This publication is printed on recycled paper.
Printed in Japan 2001 11 M 030–①

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