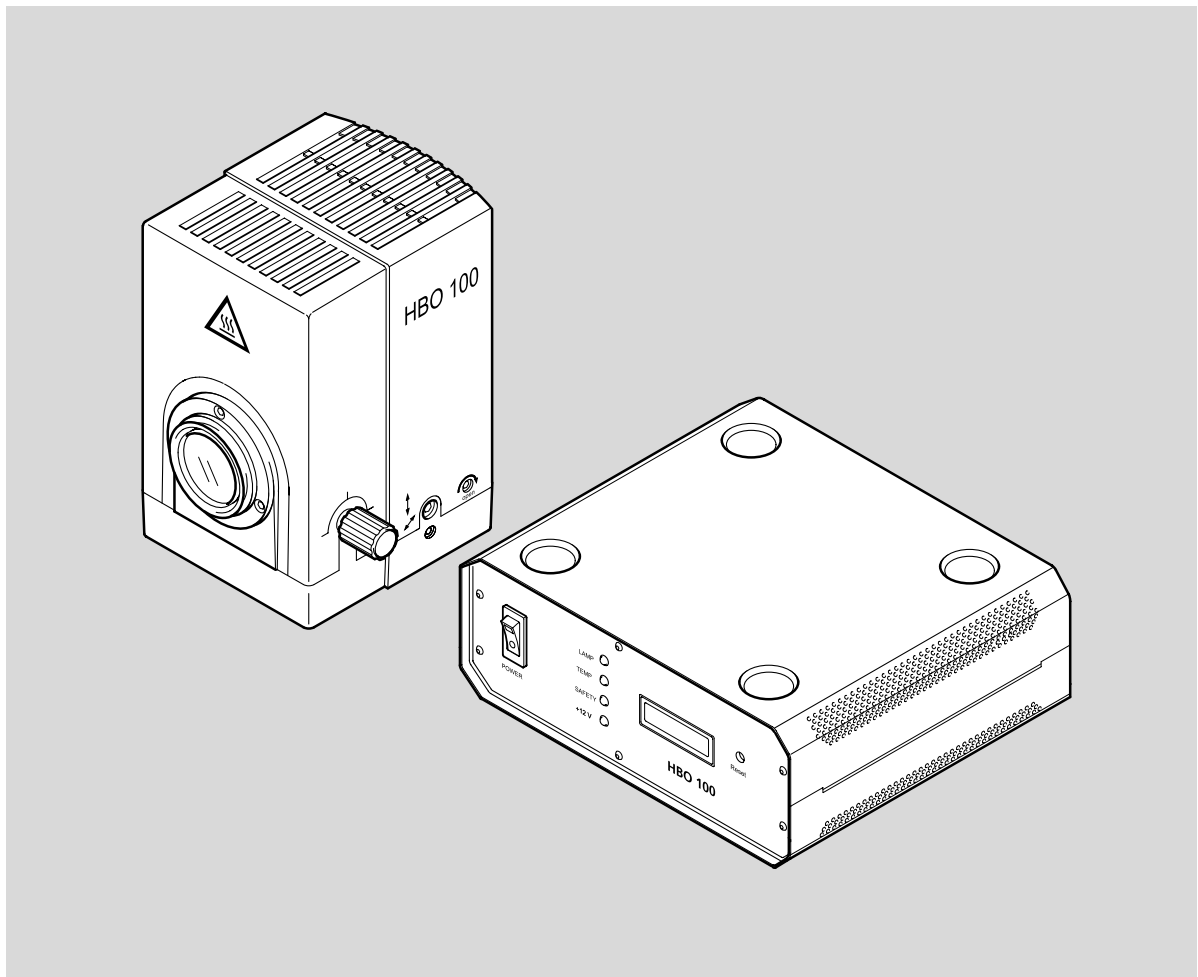


HBO 100

Microscope Illuminating

System



Operating Manual



Knowledge of this manual is required for the operation of the instruments. Would you therefore please make yourself familiar with the contents of this manual and pay special attention to hints concerning the safe operation of the instrument.

The specifications are subject to change.

© Unless expressly authorized, forwarding and duplication of this document, and the utilization and communication of its contents are not permitted. Violations will entail an obligation to pay compensation.

All rights reserved in the event of granting of patents or registration of a utility model.

Published by: **Carl Zeiss MicroImaging GmbH**

P.O.B. 4041, 37030 Göttingen, Germany

Phone: +49 (0) 551 5060 660

Fax: +49 (0) 551 5060 464

E-mail: micro@zeiss.de

www.zeiss.de

Number of this manual: 46-0063 e

Date of issue: 03/01/2006

Contents

1	Notes on Safety	4
1.1	General	4
1.2	Regulations concerning Instrument Safety and Electromagnetic Compatibility (EMC)	4
1.3	Notes on Unpacking, Transport and Storage	5
1.4	Hints on Use	5
1.5	Hints on Maintenance and Care	6
1.6	Advice on lamp breakage.....	6
1.7	Hints on Disposal	7
1.8	Hints on Warranty.....	7
2	Instrument Description	8
2.1	Components of the Microscope Illuminating System	8
2.2	Technical Data of the Microscope Illuminating Systems	9
3	Start-Up	11
3.1	Lamp Insertion and Change	11
3.2	Start-Up of HBO 100 Microscope Illuminating System	13
3.3	Focusing and Centering the HBO 100 Microscope Illuminator (423010)	14
3.4	Focusing and Centering the HBO 100 Microscope Illuminator, self-adjusting (423011-9901)	15
3.5	Setting Offset Values on HBO 100 Microscope Illuminator, self-adjusting (423011-9901)	16
3.6	Inserting the Collector Attachment	17

Illustrations

Fig. 1	HBO 100 Microscope Illuminating System (manual adjustment)	8
Fig. 2	HBO 100 Microscope Illuminating System, self-adjusting.....	8
Fig. 3	Line spectrum of the HBO 100/103 mercury short-arc lamps.....	10
Fig. 4	Inserting the HBO 103 lamp	11
Fig. 5	Rear of transformer for HBO 100	13
Fig. 6	Front of transformer for HBO 100.....	13
Fig. 7	Lamp arc and mirror image.....	14
Fig. 8	Adjusting elements of HBO 100 for manual adjustment.....	14
Fig. 9	Adjustment of HBO 100, self-adjusting.....	15
Fig. 10	Keys for setting offset values for the adjustment of lamp arc and mirror image... ..	16
Fig. 11	Inserting the collector attachment	17

1 Notes on Safety

1.1 General

Please make yourself familiar with the contents of these operating instructions before attaching and starting up the HBO 100 Microscope Illuminating System. Additional information is available from our maintenance service or from authorized agencies.

The HBO 100 Microscope Illuminating System should be used with Zeiss microscopes exclusively.

The HBO 100 Microscope Illuminating System may only be handled by trained personnel.

To ensure that the illuminating system functions properly with the microscope, the appropriate microscope manual must be observed.

In addition, observe the manual "*HBO 100 – Electronic ballast*".

Special regard must be paid to the notes on instrument safety included in this manual.

The data sheets from the lamp manufacturers must be observed when the HBO 103 lamps are operated.

To guarantee the safe operation and function of the HBO 100 Microscope Illuminating System, it is necessary under any circumstances to take the precautions and observe the warnings contained in the operating instructions.

The following warning and information symbols are used in this manual:



CAUTION!

Non-observance of the safety notes constitutes a hazard for the user.



CAUTION!

Dangerous electrical voltage.



CAUTION!

Disconnect the instrument from the line before opening it!



CAUTION!

Hot surface.



CAUTION!

Non-observance of the safety notes constitutes the risk of damage to the instrument.



NOTE!

Notes which must be observed when using the HBO 100 Microscope Illuminating System.

1.2 Regulations concerning Instrument Safety and Electromagnetic Compatibility (EMC)

The HBO 100 Microscope Illuminating System has been designed, produced and tested in compliance with EN 61010, Part 1 (VDE 0411). It was delivered in a technically safe and perfect state.

The illuminating system meets the requirements of EC directives 73/23 and 89/336 and the EMC legislation, as amended on September 18, 1998.

Radio-noise suppression complies with EN 55011, Class B, noise immunity with EN 61326.

Compliance with the EC directives mentioned is documented by the CE certificate.

1.3 Notes on Unpacking, Transport and Storage



The lamps may be removed from the package only if the protection mask (Cat. No. 417009) and the safety gloves with artery protection (Cat. No. 417008) are worn.

For safety reasons, a safety holder is inserted in the microscope illuminator instead of the bulb during transport.

Both the HBO 100 microscope illuminator and the HBO 103 lamp must be transported in their original packaging.

This packaging must be kept for storage and disposal.

The transport and storage temperatures to be observed correspond to those of the microscope stands.

1.4 Hints on Use



- When they are hot, the lamps are under high internal pressure.
They may only be inserted in the microscope illuminator if a safety mask and safety gloves (see *chapter 1.3*) are worn.
- The HBO 103 lamps are under high pressure during operation; they must always be operated in closed lamp housings!
- The light of the HBO 103 short-arc lamps contains a high amount of UV light:
 - ➔ Never look directly into the lamp or in reflected light
 - ➔ Wear safety glasses (sunglasses) when operating the lamps
 - ➔ Cover inspection openings with filters
- The UV radiation of the lamps produces little quantities of harmful ozone.
Take care to ventilate the working room with fresh air.
- Both the HBO 100 microscope illuminator and the HBO 103 lamps must be protected from impact and humidity. Always keep the ventilation slats clear and ensure that no objects enter the instrument through the ventilation slats.
- If the lamp bulb has broken, observe the information provided by the lamp manufacturer.



Instead of the HBO 103 lamp, its predecessor HBO 100 can also be used.

1.5 Hints on Maintenance and Care

To ensure perfect function of the microscope illuminating system, it is necessary to use only components and spares marketed or approved by us. When in doubt, please contact our service staff.

With the exception of the work described in this manual, the user must not perform any repairs or changes himself.

We would like to emphasize that all other changes and repairs must be performed by specially authorized personnel.

Defective instruments or components may only be repaired and maintained by our service department.



- After expiry of the **average operating time** (see *data sheets from the lamp manufacturers*), the lamps must be exchanged to avoid the **risk of explosion!** The operating time of the HBO 103 can be checked on the display of operating hour meter of the relevant transformer. (Fig. 6)
With increasing service life, dirt will deposit on the lamp bulb so that homogeneous illumination of the object field is no longer ensured.
- The lamps must be exchanged as described in *chapter 3.1*.
- Before each lamp exchange, make sure to allow the HBO 100 microscope illuminator to cool down sufficiently long in order to reduce the pressure; wait at least for **15 minutes!**
- Always disconnect the instrument from the line before each lamp exchange or any other work inside the instrument.

- Clean the housing of the microscope illuminator when it is dirty.



Do not use any solvents.

Soak a cleaning cloth in a mixture of water and washing-up liquid, remove the dirt and dry the housing using a clean cloth.

1.6 Advice on lamp breakage

If the HBO lamps have reached their rated lifetime or their bulbs show advanced blackening, they should be replaced because of the increasing risk of explosion.

If lamps are operated properly, lamp explosion is very unlikely.

For the rare case, that an HBO lamp bursts and the mercury (Hg) contained in the bulb is released, we recommend to follow this procedure:

- First of all, the persons being nearby should **instantly** leave the place to avoid inhaling mercury vapor.
- Air the laboratory thoroughly (for approx. 30 minutes)!
- Every lamp housing of a higher-power lamp should be equipped with an individual exhaust device that is not connected to the domestic air-conditioning system to avoid that mercury vapor enters this system.
- Once the lamp housing has cooled down, collect any mercury residues precipitated inside the lamp housing by using an adsorbent available from a chemicals supplier.

1.7 Hints on Disposal



Used HBO 103 lamps and defective microscope illuminators should not be treated like domestic waste; they should be disposed of in their original packaging in accordance with the legal regulations.

When in doubt, please contact the Carl Zeiss microscopy service.

1.8 Hints on Warranty

The instrument manufacturer is not liable for damage caused by unauthorized operation, particularly the removal and exchange of components, or the use of accessories from other manufacturers. This forfeits all the claims against warranty.

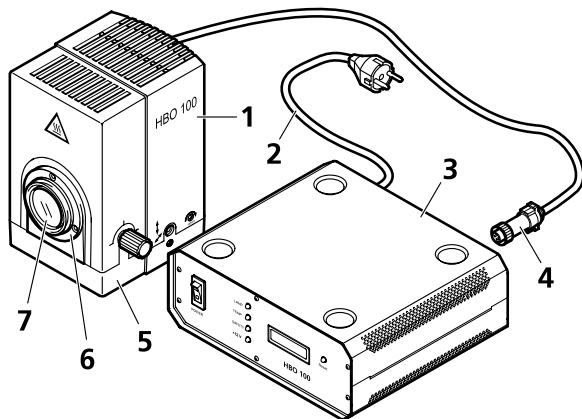
2 Instrument Description

2.1 Components of the Microscope Illuminating System

The HBO 100 Microscope Illuminating System is available in a manually and a self-adjusting version.

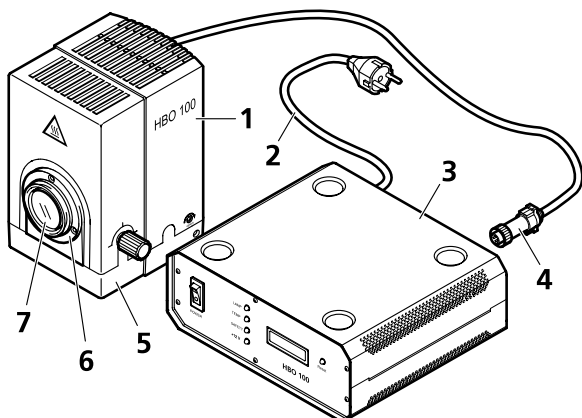
The microscope illuminating systems include the following components (Fig. 1/ Fig. 2):

- Illuminator with:
dovetail for attachment to the microscope, integrated collector, heat-protection filter
- HBO 103 W/2 mercury vapor short-arc lamp (Osram)
- Transformer for HBO 100
- line cable with earth-contact plug
or
line cable with American flat plug



1 Lamp, top part
2 Line cable
3 Transformer for HBO 100
4 Connecting cable
5 Lamp, bottom part
6 Dovetail
7 Heat-protection filter

Fig. 1 HBO 100 Microscope Illuminating System (manual adjustment)



1 Lamp, top part
2 Line cable
3 Transformer for HBO 100
4 Connecting cable
5 Lamp, bottom part
6 Dovetail
7 Heat-protection filter

Fig. 2 HBO 100 Microscope Illuminating System, self-adjusting

	HBO 103
Microscope Illuminators	HBO 100 illuminator 423010
	HBO 100 illuminator, self-adjusting 423011-9901
Lamp	Mercury vapor-short-arc lamp HBO 103 W/2 380301-9350-000
Transformer	Transformer for HBO 100 432604-9901
Line cable	Line cable with earth-contact plug 380137-6750-000
	Line cable with American flat plug 380137-6740-000

Table: Catalogue numbers

2.2 Technical Data of the Microscope Illuminating Systems

Lamp housing	<p>HBO 100 illuminator Cat. No. 423010</p> <p>HBO 100 illuminator, self-adjusting Cat. No. 423011-9901</p>
Length	165 mm
Width	166 mm
Height	205 mm
Connection to stand	dovetail
Connection to transformer	Cable with special plug
Transformer	<p>Transformer for HBO 100 Cat.No. 432604-9901</p>
Line connection	100-240 V AC
Line frequency	50-60 Hz
Power consumption	155 VA
Fuse	F1/F2 2x T 2 A/H
Lamp	Mercury vapor short-arc lamp
For the technical data of the lamps please see the information provided by the manufacturer. Recommended:	<p>OSRAM Type HBO 103 W/2 Cat. No. 380301-9350-000</p>
Average life of the lamps	<p>OSRAM</p> <p>Type HBO 100 W/2 200 h</p> <p>Type HBO 103 W/2 300 h</p>

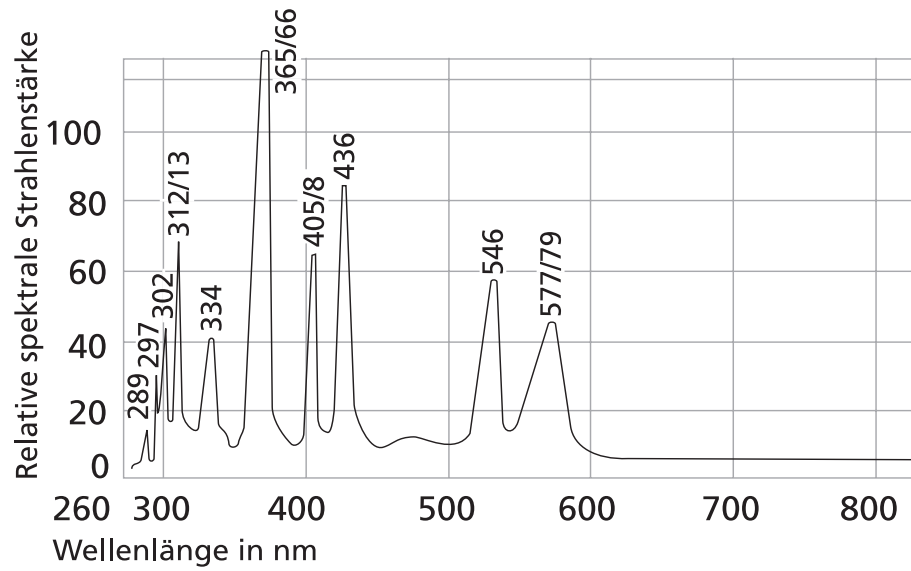
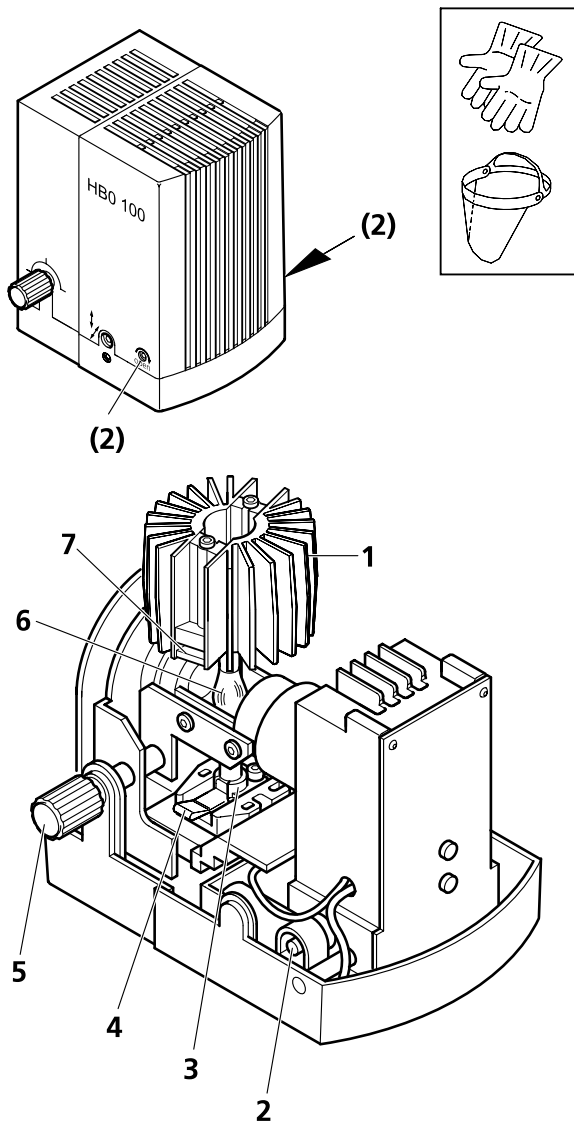


Fig. 3 Line spectrum of the HBO 100/103 mercury short-arc lamps

3 Start-Up

3.1 Lamp Insertion and Change



- Before inserting the lamp, make sure the illuminating system has been **disconnected** from line power.
- The lamps may only be changed when they are cooled down; allow the microscope illuminator to cool down for at least 15 minutes to avoid the **risks of burns and explosion!**
- The lamp may only be removed from the packaging and inserted in the microscope illuminator if a protection mask and safety gloves are worn (see chapter 1.3).
- All clamping adjustments must be performed carefully; strong heat during operation may result in loose contacts.

Fig. 4 Inserting the HBO 103 lamp

Procedure:

- Switch off the transformer.
 - Disconnect the microscope illuminator cable from the transformer.
 - Allow the microscope illuminator to cool down for 15 minutes.
 - Wear protection mask and safety gloves.
 - Remove microscope illuminator with cooled-down lamp from the microscope.
 - Turn control knob (Fig. 4/5) to move collector to mid position.
 - Turn both fixation screws (Fig. 4/2) in the direction indicated by the arrow as far as it will go; remove top part of lamp upward.
 - Operate clamping lever (Fig. 4/7) at heat sink (Fig. 4/1) and withdraw heat sink upward from the safety holder (in commissioning) or from the lamp (Fig. 4/6).
 - Put heat sink down beside the illuminator. For this, you need not disconnect the electric connection to the heat sink.
 - Push clamping lever at lamp base (Fig. 4/4) down, to release the lamp lock; remove the defective lamp or the safety holder (Fig. 4/6) from the lamp mount (Fig. 4/3) in the bottom part of the illuminator. Release the lever.
 - Dispose of the defective lamp in accordance with the relevant regulations (see section 1.7 – *Hints on Disposal*).
- Push clamping lever at lamp base (Fig. 4/4) down and insert the new lamp into the mount in the bottom part of the illuminator (as far as it will go); release the lever to clamp and center the lamp.



Do not exert any force when inserting the lamp.

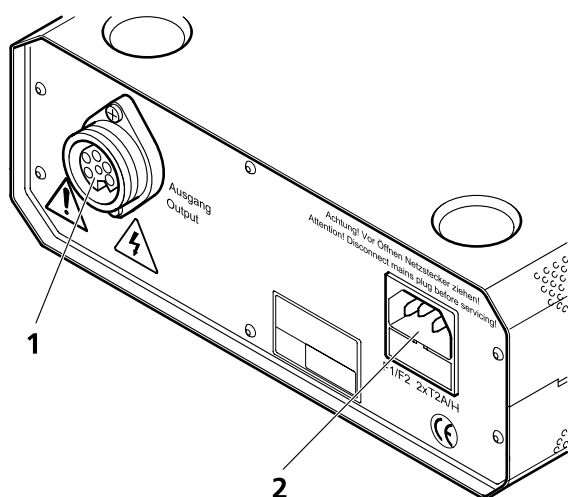
- Take the heat sink (Fig. 4/1), push down its clamping lever (Fig. 4/7) and put the heat sink onto the lamp (Fig. 4/6). Release the clamping lever. By doing so, the electric connection is established and the heat sink clamped.



Do not exert any force to the lamp, when attaching the heat sink.

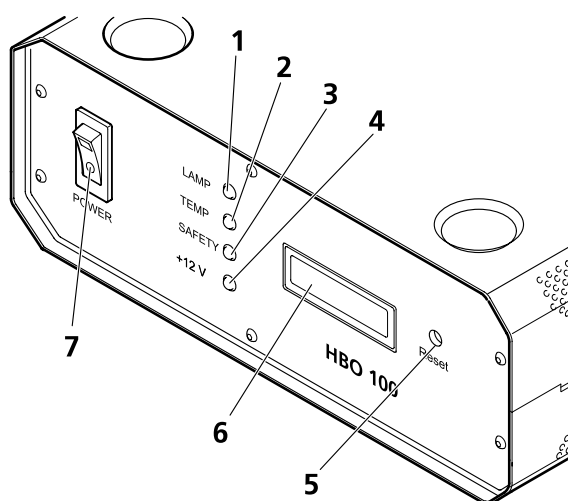
- Put the top part of the illuminator onto the bottom part.
- Turn both fastening screws (Fig. 4/2) on the bottom part of the illuminator oppositely to the direction indicated by the arrow as far as it will go.
- Turn the control knob of the collector back to mid position, if necessary.

3.2 Start-Up of HBO 100 Microscope Illuminating System



1 Connector for HBO 100 illuminator
2 Power connector

Fig. 5 Rear of transformer for HBO 100



1 LED LAMP
2 LED TEMP
3 LED SAFETY
4 LED +12V
5 Reset key
6 Display of operating hour meter
7 POWER switch with integrated power indicator LED

Fig. 6 Front of transformer for HBO 100



Do not look directly into the lamp or its reflected light.

Procedure:

- Install the HBO 100 microscope illuminator on the microscope (see Operating Manual of microscope).
- Connect the microscope illuminator to the transformer as described in the supplied operating instructions:
Fig. 5
- Connect the transformer to the power outlet using the provided power cable.
- Switch on the microscope illuminator using the power switch at the front of the transformer; the lamp will ignite automatically:
Fig. 6

Function of the luminescence diodes:

- "POWER" Lights when instrument is switched on.
- "LAMP" Lights when the lamp has been ignited and is lighting.
- "TEMP" Lights when the temperature inside the transformer is within the permissible range.
- "SAFETY" Lights when the safety circuit of the lamp housing is closed.
- " +12V " Lights when the additional voltage of the transformer is within the permissible range.

Operating hour meter/"Reset" key:

Pressing the "Reset" key will reset the operating hour meter to "0". This must be done after every lamp change. To avoid resetting the meter by mistake, the key can be actuated only with an appropriate tool (e.g. a small screwdriver).

3.3 Focusing and Centering the HBO 100 Microscope Illuminator (423010)



Do not look directly into the lamp or its reflected light.

- Switch on the lamp. Let it warm up for more than 5 minutes.
- On the microscope, activate the adjusting aid.
- Turn control knob of collector (Fig. 8/3) into mid position and generate a focused image of the lamp arc/mirror image (Fig. 7).

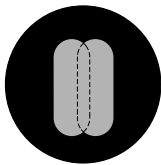
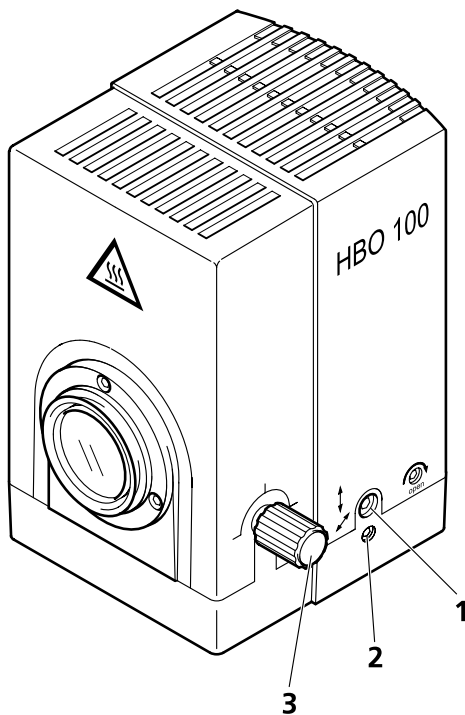


Fig. 7 Lamp arc and mirror image

Both images shall be

- at about the same level and
- closely side by side or half overlapping (Fig. 7)

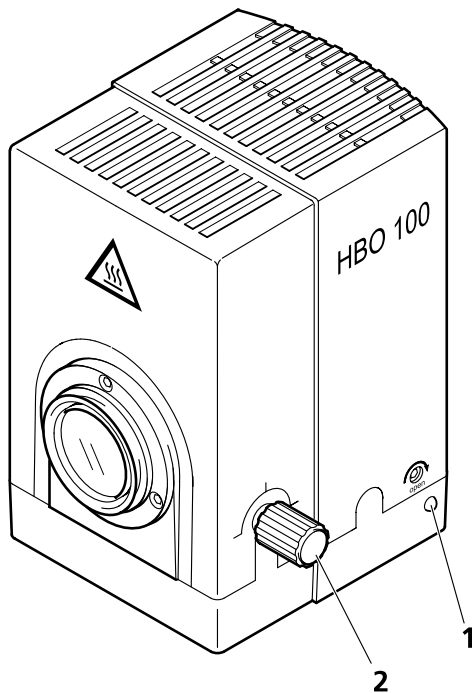
- If this is not the case, adjust lamp arc and mirror image accordingly by means of the screws for vertical (Fig. 8/1) and horizontal adjustment (Fig. 8/2).
- Deactivate the adjusting aid again.



- 1 Screw for vertical adjustment
- 2 Screw for horizontal adjustment
- 3 Collector control knob

Fig. 8 Adjusting elements of HBO 100 for manual adjustment

3.4 Focusing and Centering the HBO 100 Microscope Illuminator, self-adjusting (423011-9901)



- 1 LED key
- 2 Collector control knob

Fig. 9 Adjustment of HBO 100, self-adjusting

Automatic adjustment of the HBO 100 requires the collector to be set to mid position.

- Turn the collector control knob (Fig. 9/2) into mid position.

After the transformer of the connected HBO 100 microscope illuminator was switched on, the five minutes warm-up phase begins.

The LED key (Fig. 9/1) lights orange during warm-up.

After the five minutes are over, automatic adjustment is started.

The LED key flashes green during the adjustment.

The adjustment is finished after about 40 seconds. The LED key lights permanently green then.

If the adjustment failed, the LED key lights red.

- In this case, you can start automatic adjustment manually by a short pressure (approx. one second) of the LED key (Fig. 9/1).

If the adjustment fails again, check whether the lamp has been inserted correctly in the base of the HBO 100 (pushed in as far as it will go). For this, refer to *Section 3.1*.

3.5 Setting Offset Values on HBO 100 Microscope Illuminator, self-adjusting (423011-9901)

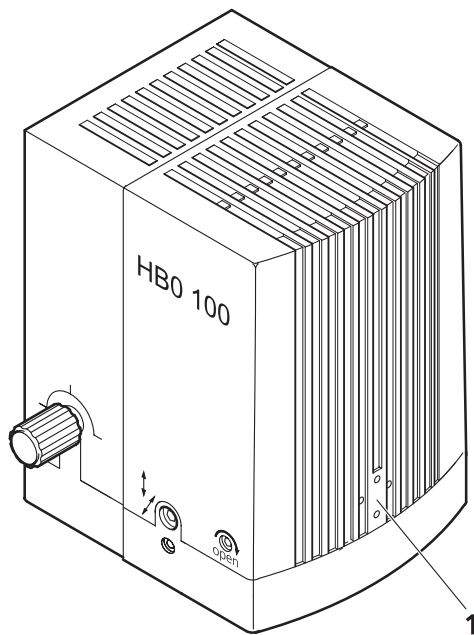


Fig. 10 Keys for setting offset values for the adjustment of lamp arc and mirror image

On the self-adjusting illuminator, the position of the lamp arc and its mirror image may be individually customized, if required, by the adjustment of offset values.

After the automatic adjustment (see Section 3.4), LED key (Fig. 9/1) lights permanently green.

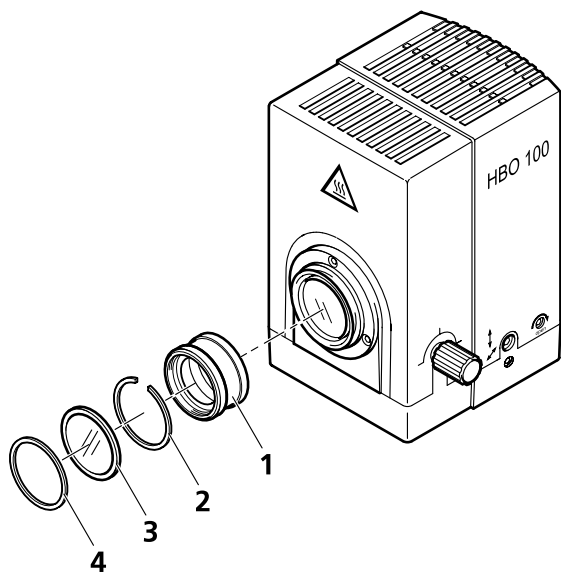
By briefly pressing the recessed keys on the rear side of the illuminator housing (Fig. 10), the motors for arc positioning are moved in steps to the left, right, top or bottom within a limited range.

During positioning, the LED key flashes alternately green and orange. If you do not press any key for more than 20 seconds, the currently set value will be stored.

Not every key pressure will directly lead to a movement of the motors: The intensity change detected by the sensors must exceed a certain threshold, before the position is readjusted. Therefore, it may be necessary to press a key repeatedly.

To reset the factory adjustment, the top button of the keypad must be pressed for ten seconds.

3.6 Inserting the Collector Attachment



- 1 Collector attachment
- 2 Spring ring
- 3 Heat protection filter
- 4 Clamping ring

Fig. 11 Inserting the collector attachment

- Pull out clamping ring (Fig. 11/4).
- Remove heat protection filter (Fig. 11/3).
- Screw the collector attachment into the lamp as far as it will go (Fig. 11/1). The retaining ring on the collector attachment must point to the outside.
- Clamp the collector attachment by inserting the spring ring (Fig. 11/2). The spring ring engages in the groove of the lamp.
- Insert heat protection filter and lock it by means of the clamping ring.

