INSTRUCTION FOR USE
Photo slit lamp
BX 900®
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BX 900®


Introduction
Thank you for choosing a HAAG-STREIT device. Provided you comply carefully with the regulations in this instructions for use, we can guarantee the reliable and unproblematic use of our product.

Purpose of use
A slit lamp biomicroscope is intended for use in eye examination. It is used to aid in the diagnosis and documentation of diseases or trauma which affect the structural properties of the eye.

Contraindication
There is no absolute contraindication for tests with this device. Appropriate professional judgement and caution are necessary.

WARNING!
Read the instruction manual carefully before commissioning this product. It contains important information regarding the safety of the user and patient.

NOTE!
Federal law restricts this device to sale by or on the order of a physician or licensed practitioner.

WARNING!
This device is equipped with high intensity light emitting diodes. Excessive exposure of patients in treatment with certain medication may lead to phototoxic adverse reactions, due to higher photosensitivity.

Contents

1. Safety ................................................................................................................................... 4
   1.1 Areas of application of the device .............................................................................. 4
   1.2 Ambient conditions ................................................................................................. 4
   1.3 Shipment and unpacking .......................................................................................... 4
   1.4 Installation warnings ............................................................................................... 4
   1.5 Operation, environment .......................................................................................... 4
   1.6 Light toxicity ............................................................................................................ 5
   1.7 Disinfection .............................................................................................................. 5
   1.8 Warranty and product liability ................................................................................ 5
   1.9 Description of symbols .......................................................................................... 5

2. Introduction ....................................................................................................................... 6
   2.1 Overview .................................................................................................................... 6
   2.2 Photo components ................................................................................................... 6
   2.3 Lens barrel ............................................................................................................... 8
   2.4 Camera housing ........................................................................................................ 8
   2.5 Flash unit FU 01 ........................................................................................................ 8
   2.6 LED illumination ....................................................................................................... 8
   2.7 Overview of the LED illumination unit upper part .................................................. 8
   2.8 Blue filter ................................................................................................................ 8
   2.9 Shutter ..................................................................................................................... 8
   2.10 Periphery or background illumination .................................................................... 8
   2.11 Power supply .......................................................................................................... 8

3. Device assembly / installation ......................................................................................... 9
   3.1 Instrument base with weight compensation facility .............................................. 9
   3.2 Setting the weight compensation facility ............................................................... 9
   3.3 Switching on the compensation facility .................................................................. 9
   3.4 Switching off the compensation facility ................................................................. 9
   3.5 Regulating the clearance of the slit width control .................................................. 9
   3.6 Attaching/removing a camera ............................................................................... 9

4. Commissioning ................................................................................................................. 10
   4.1 Switching on the device ......................................................................................... 10
## Operation

5.1 Setting the eyepieces .................................................. 10
5.2 Preparing the patient ................................................. 10
5.3 Operating the instrument ........................................... 10
5.4 Periphery or background illumination (flash) ......... 11
5.5 Photo diaphragm pre-selection .................................. 11
5.6 Setting the filters & diaphragms .............................. 11
5.7 Fixation star ............................................................ 11
5.8 Microscope and eye piece ......................................... 12
5.9 Operating the Flash unit FU 01 .............................. 12
5.9.1 Error messages for flash unit FU 01 .................. 12

## Decommissioning

6.1 Device Check ........................................................ 14
6.2 Changing the flash tube ........................................ 14
6.3 Servicing .............................................................. 15
6.4 Replacing the fuses ............................................... 15
6.4.1 Mains fuses ...................................................... 15
6.4.2 Flash unit fuse: ................................................ 15
6.5 Cleaning and disinfection ....................................... 15
6.6 Replacing the illumination mirror ....................... 15
6.7 Dust cover ........................................................... 15

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1. Safety

DANGER!
Failure to comply with these instructions may result in material damage or pose a danger to patients or users.

WARNING!
These warnings must absolutely be complied with to guarantee safe operation of the product and to avoid any danger to users and patients.

NOTE!
Important information: please read carefully.

1.1 Areas of application of the device

The device is intended to use in professional health care facility environment, like doctor’s practices, hospitals and optometrists and opticians premises, except near of HF surgical equipment and in RF shielded rooms of ME-systems for magnetic resonance imaging. Some portable radio frequency equipment, like cell phones or RF telephone equipment including antennas may interfere medical devices. Such equipment has to be kept in a distance of more than 30 cm (12 inches) from any part of the instrument. Inobservance of this precaution may lower the correct function of the instrument.

1.2 Ambient conditions

Transport: Temperature from −40°C to +70°C
Air pressure from 500 hPa to 1060 hPa
Relative humidity from 10% to 95%

Storage: Temperature from −10°C to +55°C
Air pressure from 700 hPa to 1060 hPa
Relative humidity from 10% to 95%

Use: Temperature from +10°C to +35°C
Air pressure from 800 hPa to 1060 hPa
Relative humidity from 30% to 90%

1.3 Shipment and unpacking

* Before you unpack the appliance, check whether the packaging shows traces of incorrect handling or damage. If this is the case, notify the transport company that has delivered the goods to you. Unpack the equipment together with a representative of the transport company. Make a report of any damaged parts. This report must be signed by you and by the representative of the transport company.

* Leave the device in the packaging for a few hours before unpacking it (condensation).

* Check the appliance for damage after it is unpacked. Return defective appliances in the appropriate packaging.

* Store packaging material carefully so that it can be used for potential returns or when moving.

* The slit lamp and head rest must be installed on an electrically insulated, fireproof table top.

* The rail covers (a) prevent the slit lamp from tilting.

* Are the connection parts of the accessories in the correct position (screw connections, quick-release fasteners)?

1.4 Installation warnings

WARNING!
Do not modify this equipment without authorization of the manufacturer. Installation and repairs may only be performed by trained specialists.

* Any third-party device must be connected in compliance with the EN 60601-1 standard.

* Only original HS replacement parts may be used.

* The device must not be stacked or placed in close proximity to other electronic devices.

1.5 Operation, environment

DANGER!
Never use the device in potentially explosive environments where volatile solvents (alcohol, petrol, etc.) and flammable anaesthetics are in use.

WARNING!
The device must be switched off after every use. Otherwise there is a risk of overheating when a protective dust cover is used.
NOTE!
This equipment must only be operated by qualified personnel. The owner is responsible for their training. This device may only be used in accordance with the instructions in "Purpose of use".

1.6 Light toxicity

WARNING!
• The light from this instrument may be dangerous. The risk of eye damage increases with the radiation period and number of pulses. Exposure at maximum output of longer than 90 seconds with the LED illumination and 90 pulses with the flash source will exceed the hazard guideline value.
• Using a 90 D lens reduces the exposure time to 9 seconds and the number of pulses to 10.

NOTE!
• The radiation times and number of total pulses of all light sources are cumulative.
• If the intensity of any of the light sources is reduced to 50% of the maximum intensity, the illumination time or number of pulses to reach the guideline value for radiation for the light source in question is doubled. This linear relationship can be used to determine the illumination time to reach the guideline value for radiation for the combination of slight sources at various brightness settings.
• The guideline value for the evaluated irradiation of the retina is 10 J/cm².
• Nevertheless, we recommend keeping the intensity of the light reaching the patient's retina to the minimum possible for the respective diagnosis. Children, aphakes and people suffering from eye conditions are most at risk.
• An increased risk may also occur if the retina is exposed to the same or a similar device with a visible light source within 24 hours. This specially applies if the retina has been photographed with a flashbulb in advance.

1.7 Disinfection

NOTE!
The device does not need to be disinfected. For more information on cleaning, please refer to the 'Maintenance' section.

1.8 Warranty and product liability

• Haag-Streit products must be used only for the purposes and in the manner described in the documents distributed with the product.
• The product must be treated as described in the 'Safety' chapter. Improper handling can damage the product. This would void all guarantee claims.
• Continued use of a product damaged by incorrect handling may lead to personal injury. In such a case, the manufacturer will not accept any liability.
• Haag-Streit does not grant any warranties, either expressed or implied, including implied warranties of merchantability or fitness for a particular use.
• Haag-Streit expressly disclaims liability for incidental or consequential damage resulting from the use of the product.
• This product is covered by a limited warranty granted by your seller.

For USA only:
• This product is covered by a limited warranty, which may be reviewed at www.haag-streit-usa.com.

1.9 Description of symbols

- Follow instruction for use
- Read the instructions for use attentively
- Notes on disposal, see the 'Disposal' chapter
- Date of manufacture
- Manufacturer
- Serial number
2. Introduction
The slit lamp comprises an illumination part and a binocular microscope. The entire device can be moved in front of the eyes using the instrument base. The illumination offers a range of setting possibilities for making the practically invisible areas of the eye visible. There is also a range of accessories available for the slit lamp to allow special diagnosis possibilities in addition to the general examinations.
2.3 Lens barrel
Lens barrel for 35mm photography (38). Image taken by the right beam path of the microscope. Object image size: see Table b, Chapter 7.8, pg 17.

2.4 Camera housing
Not every camera housing (39) can be connected. HAAG-STREIT selects suitable camera models and makes the necessary adjustments. The photo slit lamp is only guaranteed to function properly if cameras recommended by HAAG-STREIT are used. Please consult your local partner for information on the supported cameras.

2.5 Flash unit FU 01
WARNING!
This device must only be operated by qualified and trained personnel.

Face plate
45. Flash intensity high with LED
46. Symbols with LED (See chapter “Error messages flash unit”)
47. Flash test (In order to test the flash, press the release button (44) or the test button (47).)
48. Flash intensity
49. Flash intensity normal
50. Main switch ON (lights up) / OFF

2.6 LED illumination
* The LED illumination head is made up of an LED illumination unit, a power supply, an optical light guide set for periphery or background lighting and an illumination control.
* The two-core connection cable between the power supply and illumination head transmits both the supply current for the LED as well as signals for communication between the power supply and illumination.
* The light intensity of the slit and periphery/background illumination can be regulated continuously (without increments) using the illumination controllers. These can be connected using a longer connection cable on the PS-LED power supply.

2.7 Overview of the LED illumination unit upper part
51. LED illumination LI 01-plus with periphery or background lighting
52. Flash tube connection
53. Flash tube
54. Filter wheel for constant illumination (LED) blue filter
55. Optical light guide connection for slit and periphery/background illumination
56. Filter/diaphragm wheel for periphery/background illumination (flash) This wheel is used to control the intensity of the flash periphery/background illumination and blue filter; see 5.4

2.8 Blue filter
The rotating wheel (54) is used to pivot the blue filter. Marking points at the same height = blue filter is on.

2.9 Shutter
57. The shutter cable must be connected to the illumination head. This ensures that a shutter closes when the flash is triggered, in order to protect the LED from the intense radiation of the flash.

2.10 Periphery or background illumination
58. Periphery/background illumination (swiveling)

2.11 Power supply
NOTE!
- Observe the respective HAAG-STREIT instructions for use. (For further information, please contact your HAAG-STREIT dealer).
- This device may only be operated with PS-LED and PS-LED HSM 901 power supplies from HAAG-STREIT.
3. **Device assembly / installation**

The initial installation of the device is conducted by an authorized service technician. The following adjustments can be conducted by the end user:

- Regulating the clearance of the slit width control
- Attaching/removing a camera
- Adjusting the weight compensation

**WARNING!**

- Do not modify this equipment without authorization of the manufacturer. Installation and repairs may only be performed by trained specialists. Contact your HAAG-STREIT representative for installation, repairs and modification work on the system. The contact details are available at www.haag-streit.com.
- Only original HS replacement parts may be used.

### 3.1 Instrument base with weight compensation facility

The weight of additional accessories mounted on the microscope can be compensated using counterbalance springs. This keeps the height adjustment of the slit lamp easy.

### 3.2 Setting the weight compensation facility

Turn the control lever (27) to its lowest position and then slacken it slightly by a quarter turn. Swivel the microscope and illumination to the side. Apply 1-3 springs depending on the accessory.

### 3.3 Switching on the compensation facility

Turn anticlockwise until the screws (12) are completely released.

### 3.4 Switching off the compensation facility

Turn the screws (12) clockwise until you meet resistance. Verify whether the microscope arm springs back downwards if you push it upwards with your hand. This will only happen if the load is already at maximum. Generally, as many counterbalance springs should be deactivated as necessary until this spring action occurs. The weight compensation facility is set correctly once the illumination and microscope with the mounted accessories weigh slightly more than the counterbalance springs.

### 3.5 Regulating the clearance of the slit width control

The small screw in the center of the right control knob (A) allows you to regulate the friction of the turning movement of these adjusting knobs. Turning it slightly to the right (in) makes it harder, turning it left (out) makes it easier. It should at least be set so hard that the slit cannot close on its own.

### 3.6 Attaching/removing a camera

78. Lens barrel
79. Mirror and diaphragm component
80. Camera
81. Eyepiece
Remove the camera cover, attach the spacer ring to the camera and place the camera on the lens barrel. If the camera is removed, the connection to the lens barrel should be closed off with the cap intended for this purpose.

**NOTE!**
Consult your Haag-Streit representative for information on the supported cameras and their connection rings.

### 4. Commissioning
Connect the PS-LED power supply and FU 01 flash unit to the mains.

#### 4.1 Switching on the device
- Throw the rocker switch on the PS-LED power supply and the main switch on the FU 01 flash unit 01 I = 'ON'. The green lights on the rocker switches will light up when the device is switched on.
- Turn the rotating knob on the illumination control to a position between ‘1’ and ‘10’.

### 5. Operation

#### 5.1 Setting the eyepieces

**NOTE!**
The eyepieces must be individually set prior to the first examination in accordance with the refraction of the examiner. Insert the provided focus test rod (82) in place of the protective cover (83) and turn its black projection surface at a right angle to the microscope axis. Return the illumination and microscope to the central position (0°).

Insert the 12.5x eyepiece with double crosshair into the right eyepiece mounting in the binocular tube. The depth of the double crosshair on the reticle corresponds to the film/chip level. The setting is performed from the (+) side to the (-) side at low magnification until the double crosshair comes into sharp focus.

**WARNING!**
- The device must be switched off after every use. Otherwise there is a risk of overheating when a protective dust cover is employed.
- The slit lamp BX 900 may only be operated with the HS Flash Unit FU 01.
- The slit illumination may only be operated with the flash tube inserted.
- The images should only be used for documentation purposes. Only the image in the eyepiece may be used for diagnosis.

- Each eyepiece should be set individually by turning the knurled ocular refraction ring with dioptre scale until the projected slit can be seen in focus. The setting is performed from the (+) side to the (-) side at low magnification

- The sliding occluders (84) are used to set the correct working distance for the examiner from the eyepiece.
- Examiners who do not wear glasses: Pull the occluders out as far as they will go.
- Examiners who do wear glasses: Push the occluders in as far as they will go.

#### 5.2 Preparing the patient
- In order to attain a solid basis for the forehead and chin to rest on, the table height should be selected such that the patient sits bent over forward.
- Parts which come into contact with the patient should be cleaned with a dry cloth prior to every use.
- To ensure that only the part of the eye being examined is illuminated, the slit height should be set accordingly in order to avoid objectionable radiation.
- The lamp must be switched off after every examination.

#### 5.3 Operating the instrument
- Use the turn screw to set the chin rest in such a way that the patient’s eyes are at the same height as the black mark on the sides of the head rest.
- Adjust the eyepieces (41) in accordance with the examiner’s refraction by turning the knurled rings and set the eye distance.
- Switch on the illumination by pressing the switch on the power supply.
- Adjust the height of the slit lamp by turning the control lever (27) until the luminous aigrette is at eye level.
- The magnification of the stereo microscope is changed using the rotary knob on the magnification changer (5).
- The rigidly held control lever (27) gently inclined towards the examiner can be used to push the entire device until the slit appears approximately focused on the cornea. This initial setting is verified with the naked eye. Fine tuning is performed by tilting the control lever while observing via the stereo microscope (18).
- The slit width is set left or right with the rotating knob (11), as is the angle between the stereo microscope and illumination.
- The slit image can be set vertically, horizontally or as diagonal as required by
turning the illumination facility on the handle (15) (locking points at 45°, 90° and 135°; stops at 0° and 180°; scale in 5° increments).

* To ensure that unimpeded binocular fundus examination is also possible at lateral angles of between 3° and 10°, a short mirror is used, the illumination turned 90° using the locking screw (15) and tilted in 5° steps using the latch (23), and the illumination and microscope turned to the central position (0°).

* Front-lens glasses and contact glasses are used to examine the ocular fundus.

**Diffused illumination:**
* Connecting the diffusor upstream creates diffused illumination (14). This allows monitoring of the overview and can be used to capture the overview.

**Indirect illumination:**
* For observation in regredient light (indirect illumination), the centering screw (22) is loosened in order to move the slit image out of the center of the visual field. Tightening the screw centers the slit image again.

**Tilting the slit:**
* The latch (23) can be used to tilt the illumination in 5° steps. In this way, a diagonal ray of light from below is generated when the slit is oriented horizontally. The slit orientation allows a reflection-free examination with contact glasses (fundus and gonioscopy) and magnifying glasses.

**5.4 Periphery or background illumination (flash)**

When the flash is triggered, the light is transferred to the background illumination by a light guide.

![100% open, 50% open, 25% open, 10% open, 5% open, 0% open, Blue filter]

**5.5 Photo diaphragm pre-selection**

85. Rotating knob for diaphragm pre-selection

You may select between levels 1 through 5, each with an increasingly smaller aperture. The size of the interval is equivalent to one f-stop.

- Level 1 = largest aperture
- (smallest depth of field)
- Level 5 = smallest aperture
- (largest of field)

86. Rotating knob for diaphragm actuation

Turning one of the two knobs on the right and left allows you to close the diaphragms to the preset aperture during observation in order to get a preview of the expected depth of field.

**5.6 Setting the filters & diaphragms**

a. Open
b. Grey filter (10%)
c. Red removal filter
d. Reserve opening for filter optionally ø15 mm (0/–0.2), thickness 2.5 mm
e. Fixation star
f. Apertures of 8, 5, 3, 2, 1 and 0.2 mm ø
g. Display of slit length in mm
h. Blue filter

![Filter Options: 100%, 50%, 25%, 10%, 5%, 0%, Blue Filter]

**5.7 Fixation star**

* Turning the diaphragm disc as far as it will go to the left switches on the fixation star and the symbol “S” appears in the window. This star is projected onto the fundus at the back of the eye in certain examinations and is visible to the patient at the same time, who is asked to focus on the hole in the center of the star. This allows the examiner to see where the patient's vision is most focused.

* A typical application of the fixation star is during laser treatments close to the macula. Similarly, it is also possible to identify microstrabismus with the projection of the fixation star. The fixation star is usually used with a red removal filter.
5.8 Microscope and eyepiece
87. Front lens
88. Rotary knob displaying the set magnification
89. 5-level magnification changer (Galilei system)
90. Knurled ring for bayonet connector
91. Binocular tube with convergent view, pupil distance can be set from 52 to 78 mm
92. Eyepiece 12.5x / field of vision ø 16 mm
93. Index (white point)
94. Knurled ring with dioptre scale for setting the refraction of the examiner (± 7 D)
95. Sliding occluder (for people who wear glasses)

5.9 Operating the Flash unit FU 01
Capture frequency 'normal'
- Captures 1 to 10 in a 1-second cycle
- Captures 11 to 20 in a 2-second cycle
- Captures 21 to 30 in a 3-second cycle

NOTE!
A pause of 210 seconds will follow.

Capture frequency 'high'
- Captures 1 to 10 in a 1-second cycle
- Captures 11 to 15 in a 2-second cycle
- Captures 16 to 20 in a 3-second cycle
- Captures 21 to 30 in a 5-second cycle

NOTE!
A pause of 210 seconds will follow.

5.9.1 Error messages for flash unit FU 01

<table>
<thead>
<tr>
<th>Symbols</th>
<th>LED</th>
<th>Sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait</td>
<td></td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Red</td>
<td>Long beep</td>
</tr>
<tr>
<td>•</td>
<td>Red</td>
<td>Long beep</td>
</tr>
</tbody>
</table>

Folding mirror inoperative
- Connect cable
- Make sure that the plug is seated properly

Camera not ready
- Switch on camera
- Empty image memory
- Take camera out of sleep mode
- Connect cable
- Make sure that the plug is seated properly

Flash inoperative
- Close flash slider
- Change flash tube
- Connect cable

NOTE!
Once the error in question has been rectified, the visual warning signal is deleted by pressing the release button. The device will then be back in operation.

NOTE!
All red LEDs are flashing (electronic defect)
- Contact your HAAG-STREIT representative!

6 Decommissioning
Throw the rocker switch on the PS-LED power supply and the main switch on the FU 01 flash unit 01 I = OFF. The green lights on the rocker switches will stop illuminating when the device is switched off.

NOTE, GENERAL ALARM!
Disconnect the power supply from the mains if you do not intend to use it for an extended period of time.

7 Technical data
7.1 Slit illumination

NOTE!
Detailed information regarding the radiation can be provided on request.
7.5 Flash illumination Flash unit FU 01

Spectral range slit flash illumination 400 to 750 nm
Spectral range background flash illumination 400 to 750 nm

**NOTE!**
Detailed information regarding the radiation can be provided on request.

- **Flash capacitor capacity**
  - 'normal' 200 Ws
  - 'high' 400 Ws

- **Flash frequency**
  - See Chapter 5.9 'Flash Unit FU 01'

- **Mains connection**
  - a) 115 V, 60 Hz
  - b) 230 V, 50 Hz

- **Mains fuses**
  - a) 2 x T10AH, 250V
  - b) 2 x T6.3AH, 250V

- **Flash unit fuse**
  - 1 x T5AL, 250V

- **Power consumption**
  - 25 VA, peak 2.6 kVA

7.6 Mirror and diaphragm component

- **Pre-set diaphragms**
  - 5 different diaphragms

- **Max. depth of focus on object**
  - see Table (a)

- **Depth of focus in air**
  - This depends on the diaphragm and magnification settings. In the transparent media of the eye, the values increase by approx. 35% (refractive index of the eye media).

- **Filters**
  - Blue, red removal (green), gray (10%).

**NOTE!**
(Further information available in the LED illumination LI 900 instructions for use)

<table>
<thead>
<tr>
<th>Table a</th>
<th>Field of depth of field (+/- in mm) with diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6.3x</td>
<td>1.3</td>
</tr>
<tr>
<td>10x</td>
<td>0.5</td>
</tr>
<tr>
<td>16x</td>
<td>0.2</td>
</tr>
<tr>
<td>25x</td>
<td>0.1</td>
</tr>
<tr>
<td>40x</td>
<td>0.05</td>
</tr>
</tbody>
</table>
### Table b

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Object size with chip size</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3 x</td>
<td>0.63 x 23.2 x 34.6 mm</td>
</tr>
<tr>
<td>10 x</td>
<td>1 x 14.6 x 21.9 mm</td>
</tr>
<tr>
<td>16 x</td>
<td>1.6 x 9.3 x 13.8 mm</td>
</tr>
<tr>
<td>25 x</td>
<td>2.5 x 5.8 x 8.7 mm</td>
</tr>
<tr>
<td>40 x</td>
<td>4 x 3.7 x 5.5 mm</td>
</tr>
</tbody>
</table>

**Field of view of the object**

Circle: The field of view of the object observed through the microscope’s eyepiece.

Rectangle: Area of photograph.

### 7.7 Lens barrel

**Focal length:** f 170 mm

### 7.8 Camera

**NOTE!**

The camera is to be set to a shutter time of 1/60 s in MANUAL operating mode. The instruction for use for the camera must be followed for this purpose.

### 8 Maintenance

**WARNING!**

* Do not modify this equipment without authorization of the manufacturer. Installation and repairs may only be performed by trained specialists. Contact your HAAG-STREIT representative for installation, repairs and modification work on the system. The contact details are available at www.haag-streit.com.

* Only original HS replacement parts may be used.

The LED illumination can be operated maintenance-free for its entire service life.

### 8.1 Device Check

In order to correctly check the slit lamp, proceed as follows:

- Insert test rod into the radial movement bearing, whilst at the same time aligning the surface to the microscope at a right angle
- Set slit length to 8 mm
- Set illumination strength to 50%
- Set magnification to max. in the microscope.
- Set the eyepieces in such a way that the test rod is in sharp focus. Turn the eyepiece from the (+) to the (-) side.
- The structure of the test rod must be in sharp focus in all magnifications.
- Close slit edges to approx. 0.5 mm. The borders must be in sharp focus here.
- Completely open slit edges and turn the test rod by 45°, the sharp area must be in the centre of the test rod.

#### 8.1.1 Testing the flash unit

In order to test the flash, press the release button (44) or the test button (47).

### 8.2 Changing the flash tube

**WARNING!**

* After turning off the FU 01 flash unit, wait at least 15 seconds before opening the slide!

* Do not touch the glass body of the flash tube.

96. Coupling slide

97. Protective plug

98. Flash tube

- Slide the coupling slide upwards.
- If the split lamp is new, remove the protective plug from the flash tube housing.
- Remove the defective flash tube.
- Insert the tube without touching the glass.
- Slide the coupling slide back downward until it stops in place.

**NOTE!**

Only original HS flash tubes may be used.
8.3 Servicing
To ensure a long service life, the device should be cleaned weekly as described in the ‘Cleaning’ chapter and covered with a dust cover when not in use. We recommend having the device inspected by an authorized service technician annually. In order to guarantee optimal operational integrity, the device must undergo periodic maintenance. The length of the maintenance interval depends on use, but may not exceed 3 years.

8.4 Replacing the fuses

**WARNING**
- The mains cable must be disconnected from the mains before the cover is screwed on.
- Only fuses of the type indicated in the technical data may be used.

* Remove the cover (99) by loosening the two screws (100).

8.4.1 Mains fuses:
* Remove the mains plug (102), remove the fuse holder (103) and replace the fuses (fuse type according to the technical data).
* Insert fuse holder (103) and attach mains plug (102).

8.4.2 Flash unit fuse:
* Remove the mains plug (102), remove the fuse holder (101) and replace the fuses (fuse type according to the technical data).
* Insert fuse holder (101) and attach mains plug (102).

* Close the cover (99) by applying the two screws (100) and plug the mains cable into the mains.

8.5 Cleaning and disinfection
The Haag-Streit slit lamps and their accessories can, if required, be carefully wiped down with ready-for-use disposable 70% ethanol disinfectant wipes. Surface-friendly disinfectants (containing aldehyde or aldehyde-free) are also permitted, such as Kohrsolin FF.

**WARNING!**
- The preparation instructions provided do not apply to tonometer measuring prisms!
- Tonometer measuring prisms must be prepared in accordance with a different manual
- Do not use sprays
- Observe the manufacturer’s safety instructions
- Do not use any cloths that drip.
- Wring out any soaked cloths before use when necessary
- Ensure that no liquid penetrates the device
- Comply with the stipulated exposure time
- Clean optical surfaces after disinfection with a very soft cloth

**NOTE!**
IP code: IPX0 (device is not protected against liquids)

8.6 Replacing the illumination mirror
The mirror can be most easily accessed if the microscope is turned away from the illumination and the illumination inclined two points.

**WARNING!**
Only use mirrors with a LOT number.

8.7 Dust cover
We recommend protecting the slit lamp with a dust cover when not in use.

A. Appendix
A.1 Accessories / spare parts

**WARNING!**
- Do not modify this equipment without authorization of the manufacturer.
- Installation and repairs may only be performed by trained specialists.
- Contact your HAAG-STREIT representative for installation, repairs and modification work on the system. The contact details are available at www.haag-streit.com.
- Only original HS replacement parts may be used.
B. Legal regulations

- The BX 900 photo slit lamp was developed and designed taking the EN 60601-1, EN ISO 10939 and EN ISO 15004-2 standards into account.
- The EN 60601-1 standard must be observed when using different medical and/or non-medical electrical devices in combination.
- Compliance of the BX 900 slit lamp with the Directive 93/42/EEC is confirmed by the CE-designation.
- The BX 900 slit lamp satisfies the electromagnetic compatibility requirements of EN 60601-1-2. The device has been designed to maintain the emissions of electromagnetic interference at a level which does not exceed the statutory guidelines and which does not affect other devices in its vicinity.
- The device also has the immunity stipulated by the standard.
- Statutory accident regulations are to be observed.

C. Classification

<table>
<thead>
<tr>
<th>Standard EN 60601-1</th>
<th>Photo slit lamp BX 900 acc. to protection class I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating mode:</td>
<td>Continuous operation</td>
</tr>
<tr>
<td>CE Directive 93/42/EEC</td>
<td>Class I</td>
</tr>
<tr>
<td>FDA</td>
<td>Class II</td>
</tr>
</tbody>
</table>

D. Disposal

Electrical and electronic devices must be disposed of separately from household waste! This appliance was made available for sale after the 13th August 2005. For correct disposal, please contact your HAAG-STREIT representative. This will guarantee that no hazardous substances enter the environment and that valuable raw materials are recycled.

E. Observed standards

<table>
<thead>
<tr>
<th>EN 60601-1</th>
<th>EN 60601-1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN ISO 10939</td>
<td>EN ISO 15004-2 *</td>
</tr>
</tbody>
</table>

* When the flash illumination is used, the emission exceeds the Group 2 limit of parameter “weighted retinal visible and infrared thermal radiance, LVIR-R” as specified by EN ISO 15004-2: 2007 but does not exceed the limit “retinal thermal” as specified by ICNIRP 2013. Since this retinal exposure limit is not exceeded in case of normal operation, the device can be regarded as safe for the patient’s eye when operated within the limits specified by Haag-Streit.
F. Information and manufacturer's declaration concerning electromagnetic compatibility (EMC)

F.1 General
The BX 900 slit lamp system fulfills the requirements on electromagnetic compatibility according to EN 60601-1-2:2007 (IEC 3. Edition) + EN 60601-1-2:2015 (IEC 4. Edition). The instrument is built so that the generation and emission of electromagnetic interference is limited to the extent that other devices are not disturbed in their use in accordance with the regulations and so that the instrument itself is suitably immune to electromagnetic interference.

**WARNING!**
- Electrical medical devices and systems are subject to special EMC measures and must be installed in accordance with the EMC instructions contained in this accompanying document.
- The operation of other lines or equipment than those listed may lead to higher emissions or may reduce the device's resistance to interference.
- Third-party devices may only be connected in compliance with the EN 60601-1 standard.

F.2 Emitted interference (standard table 1)

**Guidance and manufacturer's declaration – electromagnetic emissions**
This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Emission test</th>
<th>Compliance</th>
<th>Electromagnetic environment - guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emissions CISPR 11</td>
<td>Group 1</td>
<td>This product uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td>
</tr>
<tr>
<td>RF emissions CISPR 11</td>
<td>Class B</td>
<td>This product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.</td>
</tr>
<tr>
<td>Emission of harmonics according to EN 61000-3-2</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>Voltage fluctuations / flicker emissions according to EN 61000-3-3</td>
<td>Fulfilled</td>
<td></td>
</tr>
</tbody>
</table>
### F.3 Immunity (standard table 2)

The information is based on the requirements of EN 60601-1-2:2007 (IEC 3rd edition).

#### Guidance and manufacturer’s declaration – electromagnetic immunity

This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity test standard</th>
<th>EN 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment – guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD) EN 61000-4-2</td>
<td>± 6 kV contact</td>
<td>± 8 kV contact</td>
<td>± 15 kV air</td>
</tr>
<tr>
<td></td>
<td>± 8 kV air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical fast transient / burst EN 61000-4-4</td>
<td>± 2 kV for power supply lines</td>
<td>± 2 kV for power supply lines</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge EN 61000-4-5</td>
<td>± 1 kV for symmetrical voltages ± 2 kV for asymmetrical voltages</td>
<td>± 1 kV for symmetrical voltages ± 2 kV for asymmetrical voltages</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage dips, short interruptions and voltage variations on power supply lines EN 61000-4-11</td>
<td>&lt; 5% (U_i) (&gt; 95% drop in (U_i)) for ½ cycle &lt; 40% (U_i) (&gt; 60% drop in (U_i)) for 5 cycles &lt; 70% (U_i) (&gt; 30% drop in (U_i)) for 25 cycles &lt; 5% (U_i) (&gt; 95% drop in (U_i)) for 5 s</td>
<td>&lt; 5% (U_i) (&gt; 95% drop in (U_i)) for ½ cycle &lt; 40% (U_i) (&gt; 60% drop in (U_i)) for 5 cycles &lt; 70% (U_i) (&gt; 30% drop in (U_i)) for 25 cycles &lt; 5% (U_i) (&gt; 95% drop in (U_i)) for 5 s</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. If the user of this product requires continued function even in the event of interruptions in the energy supply, this product should be powered from an uninterruptible power supply or a battery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency (50/60Hz) magnetic field EN 61000-4-8</td>
<td>3 A/m</td>
<td>30 A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</td>
</tr>
</tbody>
</table>

**NOTE:** \(U_i\) = the AC mains voltage prior to application of the test level.
F.4 Immunity for non-life support devices (standard table 4)
The information is based on the requirements of EN 60601-1-2:2007 (IEC 3rd edition).

Guidance and manufacturer’s declaration – electromagnetic immunity
This product is intended for use in the electromagnetic environment specified below. The customer or the user of this product should assure that it is used in such an environment.

Electromagnetic environment – guidance
Portable and mobile RF communications equipments should be used no closer to any part of this product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.

<table>
<thead>
<tr>
<th>Immunity test standard</th>
<th>EN 60601 test level</th>
<th>Compliance level</th>
<th>Recommended distance(\text{D} )</th>
</tr>
</thead>
</table>
| Conducted RF EN 61000-4-6 | 3 V\text{rms}  
150 kHz – 80 MHz | 10 V\text{rms}  | \( \text{D} = 0.35\sqrt{P} \) |
| Radiated RF EN 61000-4-3 | 3 V/m  
80 MHz – 2.7 GHz | 5 V/m  
80 MHz – 2.7 GHz | \( \text{D} = 0.7\sqrt{P} \)  
80 MHz – 800 MHz  
\( \text{D} = 1.4\sqrt{P} \)  
800 MHz – 2.7 GHz |

Where \( P \) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and \( D \) is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey\(^a\), should be less than the compliance level in each frequency range\(^b\). Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1: At 80 MHz and 800 MHz the higher frequency applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which this product is used exceeds the applicable RF compliance level above, this product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating this product.

b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

c. Possible shorter distances outside the ISM bands do not contribute to improved application in this table.
F.5 Safe distances for non-life support devices (standard table 6)
The information is based on the requirements of EN 60601-1-2:2007 (IEC 3rd edition).

Recommended safe distances between portable and mobile HF communication devices and this device.

This product is designed to be operated in an electromagnetic environment in which radiated HF interference is controlled. The customer or user of this product can help to prevent electromagnetic interference by maintaining minimum distances between portable and mobile HF communication systems (transmitters) and this product, as recommended below in accordance with the maximum output of the communication system.

<table>
<thead>
<tr>
<th>Nominal output of the transmitter (W)</th>
<th>150 kHz – 80 MHz</th>
<th>80 MHz – 800 MHz</th>
<th>800 MHz – 2.7 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.035</td>
<td>0.07</td>
<td>0.14</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.44</td>
</tr>
<tr>
<td>1</td>
<td>0.35</td>
<td>0.7</td>
<td>1.4</td>
</tr>
<tr>
<td>10</td>
<td>1.1</td>
<td>2.2</td>
<td>4.4</td>
</tr>
<tr>
<td>100</td>
<td>3.5</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

For transmitters with a nominal output not listed in the table above, the distance \( D \) can be calculated in meters (m) using the equation for the respective column, in which \( P \) is the nominal output of the transmitter in watts (W) according to the specifications of the transmitter manufacturer.

**NOTE 1:** At 80 MHz and 800 MHz the higher frequency applies.

**NOTE 2:** To calculate the recommended safe distance of transmitters in the frequency range of 80 MHz to 2.7 GHz an additional factor of \( 10/3 \) was used to reduce the probability of a mobile/portable communication device causing interference if inadvertently brought into the patient area.

**NOTE 3:** These guidelines may not apply in all situations. Electromagnetic wave propagation is influenced by absorption and reflection of buildings, objects and people.
Should you have any further questions, please contact your HAAG-STREIT dealer at:
http://www.haag-streit.com/contact/contact-your-distributor.html