Marco-Certified Quality assures you of the very finest vision products, offering advanced technology, industry-leading durability and enhanced productivity for your practice. Marco-Certified Quality is your mark of confidence.
**CONTENTS**

General Description ........................................1
Installation .....................................................1
Slit Lamp Illumination Techniques .................................2
Basic Slit Lamp Examination ........................................4
Optional Accessories ...........................................4
Care and Maintenance ...........................................5
Main Illumination Bulb Replacement ...............................5

**GENERAL DESCRIPTION**

The Ultra series of slit lamps from Marco is the result of many years of extensive product research and delicate engineering. The Ultra series introduces a quantum leap in optical technology and manufacturing techniques in a more ergonomic and modern design. Each slit lamp maintains an attractive, sophisticated appearance with a variety of features suited for many individual preferences.

Optically, you will enjoy the very latest in materials and lens coating technology that filters light more efficiently, resulting in a 20% increase in optical resolution and clarity. This end-result is a dramatic and significant breakthrough in total image quality.

Many options are available on specific Ultra slit lamps, including observation tubes and a variety of video cameras.

This instruction manual provides a detailed breakdown of each Ultra model slit lamp component, information on how to install the slit lamps, basic slit lamp illumination and examination techniques, and general care and maintenance. Please use this instruction manual as an overall reference guide. For more detailed information, contact your authorized Marco distributor or Marco Ophthalmic directly.

**INSTALLATION**

The installation of each model Ultra series slit lamp follows the same basic procedure. Please review the following assembly instructions carefully during set-up:

1. Turn the slit lamp box upside down and lift it off the styrofoam inner packing. Leave the packing upside down.
2. Remove the top lid of the styrofoam packing.
3. Remove the table top and install on an instrument stand. If mounting on a previously assembled instrument table, make sure the appropriate mounting bracket has been installed.
4. Turn the styrofoam packing completely over and open the top lid.
5. Install the patient headrest and remove the accessory kit. Make sure to run the headrest cables through the headrest bracket. On the models 5 and G5, install the patient handrests (Optional on models G2, G4, and 2b).

6. Separate the middle section of the styrofoam packing. Remove the slit lamp base assembly and carefully insert the slide bar. Attach the gear rollers to each end of the slide bar, place the base on the table top and “snap in” the rack covers. On the models 2b, 5, and G5, install and secure the tower light source.

7. Remove the oculars (G2, G4, G5) and mount on the microscope head, tightening the thumb screw securely. If installing a model 2b or 5, mount the microscope head to the microscope arm using the attached angled screw. Please be certain to align this screw carefully to avoid stripping the threads in the microscope head.

8. Attach the fixation device to the fixation LED and insert the cap that covers the hole on the slit lamp base (these components are found in the accessory box).

9. Attach all electrical connections to the transformer and plug the instrument into a standard 110v/60hz grounded outlet.
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SLIT LAMP ILLUMINATION TECHNIQUES

The slit lamp examination is a smooth, continuum of various special illumination techniques. The various techniques will be described as static positions in order to set them up with your new Marco Slit Lamp Biomicroscope. Once the appearance of each structure with each illumination technique has been recognized, the mechanics of setting up these techniques will fade from the procedure. It will become automatic.

Diffuse Illumination (Diagram 1)

1. The illumination system is set with the widest slit width and the longest slit aperture. The biomicroscope is placed on 10x magnification. The angle between these two subsystems should be about 45˚.

2. This procedure is used to give an overall view of the eye. It is not used for detailed viewing of specific areas but rather for locating areas to be viewed in detail. It is good for locating corneal scars, folds, tear, vascularization, or edema.

Indirect Illumination (Diagram 6)

1. The illumination system is centered. The angle between the illumination system and the biomicroscope can be from 45˚ to 50˚.

2. This procedure is used for the observation of the corneal transparency, or the lack thereof. Corneal scars, pigmentation, edema, deposits or folds can be seen. This is an excellent technique for locating any corneal opacity. The abnormalities interface with the internally reflected light causing the abnormality to appear whiter.

Direct Focal Illumination (Diagram 3, 4 and 5)

1. The illumination system is centered. The angle between the illumination system and the biomicroscope can be from 45˚ to 50˚.

2. Three basic illumination techniques may be obtained by varying the width and the aperture size of the light.

The optic section is obtained by using the widest slit width and the narrowest possible slit width. With each of these illumination techniques the biomicroscope is focused on the structure of regard.

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**Sclerotic Scatter Illumination (Diagram 2)**
1. The biomicroscope is placed on 10x magnification and focused on the structure of regard.
2. This procedure is used for the observation of the corneal transparency, or the lack thereof. Corneal scars, pigmentation, edema, deposits or folds can be seen. This is an excellent technique for locating any corneal opacity. The abnormalities interfere with the internally reflected light causing the abnormality to appear whiter.

**Direct Focal Illumination (Diagram 3, 4 and 5)**
1. The illumination system is centered. The angle between the illumination system and the biomicroscope can be from 45° to 50°.
2. The optic section (Diagram 3) is used to view the cornea, the lens, and the iris. It is useful for determining the depth of foreign bodies or opacities. It is also useful for visualizing the contour of the iris, conjunctiva, or cornea or note lumps or growths.

**Indirect Illumination (Diagram 6)**
1. The biomicroscope may be on 10x or 16x magnification. The illumination is adjacent to the structure being viewed.
2. This illumination technique is useful for studying iris or fine vessels of the cornea.

**Retro-Illumination (Diagram 7)**
1. The biomicroscope may be on 10x or 16x magnification and should be focused on the opacity being observed. The illumination system is “out of clic” and moved to the side of the observed corneal abnormality so that the light reflects off the iris. The reflected light returns from the iris and retro-illuminates the opacity.

**Specular Reflection Illumination (Diagram 8)**
1. The illumination system is centered and positioned about 30° to the side of the patient’s line of sight. The biomicroscope may be on 10x or 16x magnification and focused on the corneal epithelium or endothelium. The biomicroscope is positioned about 30° to the opposite side of the patient’s line of sight. For the lens surfaces, the total angle will be about 30° or 40°, and the patient’s line of sight will bisect this angle. As the surface focused upon is viewed, that surface is viewed in specular reflection.
2. Specular reflection of the corneal epithelium appears as a mirror-like reflection. The integrity of the surface is easily evaluated. specular reflection of the corneal endothelium appears as a small brown patch of hexagonal cells with black spaces that vary in number and size. This surface will present excrescences in corneal gatarr and Fuchs’ dystrophy. The crystalline lens has an anterior surface which appears like a silver orange peel when seen in specular reflection. Changes in this surface are readily seen. The posterior subcapsular opacification can be evaluated with this illumination technique.
BASIC SLIT LAMPP EXAMINATION

The basic examination of the eye consists of a systematic evaluation of each major structure. Any logical sequence can be used during the basic slit lamp examinations. The following is a step-by-step example of an organized slit lamp examination. Once the basic techniques have been mastered, procedures may be modified to suit personal needs.

1. Have the patient place his/her chin on the chinrest and the forehead against the forehead band. Adjust the height of the patient’s head with the headrest elevation control to the point where the eye corresponds with the eye level marker on the headrest upright. The slit lamp table should be positioned in such a way to assure patient comfort and stability.

2. Place the magnification knobs on the lowest power. Set the illumination system about 45˚ to the temporal side of the eye intended for examination. Turn on the slit lamp and adjust the intensity to the lowest setting possible that provides adequate levels of illumination. Adjust the slit width to a medium width, and the slit height to the maximum height available. Select white light with the filter wheel.

3. Position the slit lamp light by moving the slit lamp base, so that the medium-width slit comes into focus on the patient’s outer canthus. Look into the biomicroscope. Make fine adjustments in height and focus with the joystick.

4. Begin a gross survey of the ocular adnexa by moving along the upper lid toward the medial canthus. Survey the lid margin, lashes and the lid proper. While crossing the midline of the eye, swing the illumination system to the opposite side of the biomicroscope. A general rule to follow: when viewing the temporal half of the eye, the illumination system should be on the temporal side of the biomicroscope. Conversely, while viewing the nasal half, move the illumination system to the nasal side of the biomicroscope. After reaching the medial canthus, lower the slit lamp with the joystick and survey the lower lid until arriving at the lateral canthus again.

5. Having surveyed the outer aspects of the lids, invert the lids—one at a time—and repeat the same general pattern. The upper lid should be inverted with one hand. This will take some practice before the technique is mastered. The lower lid is simply pulled down with the thumb. Survey the conjunctival lining of lids and the tarsal plates.

6. Once the lids have been surveyed, remain at the lateral canthus. Move the slit lamp with the medium-width slit until the slit is on the temporal limbus. The cornea will have the characteristic glow of the sclerotic scat illumination technique. The cornea may be viewed by looking over the biomicroscope, not through it. Scan for corneal abnormalities. Any abnormalities noted may be carefully surveyed while moving across the cornea.

7. Now look through the biomicroscope and notice a parallelepiped section of the limbus. Using the joystick move across the cornea slowly. Carefully review any abnormalities noted in step number 7. Remember to swing the illumination system to the nasal side crossing the midline. Survey the entire cornea.

8. Once the cornea has been surveyed, move to the medial limbus. Begin a survey of the iris from this position. Move slowly across the iris noting any bumps, vascularization, unusual pigmentation, or abnormalities.

9. The final structure to be surveyed during a basic examination is the crystalline lens. Beginning at the temporal edge of the pupil, survey in two directions; laterally and inward. Examine the anterior and posterior aspects of the crystalline lens in specular reflection, and examine the lens cortex with a parallelepiped section.

10. Repeat the process on the other eye.

OPTIONAL ACCESSORIES

All Marco Ultra slit lamps accept standard application tonometers. The models G2, G4, and G5 have the capability of mounting assistantcope kits and video accessories.

MAIN ILLUMINATION BULB REPLACEMENT

1. Always turn the unit off before replacing the bulb. Loosen the thumb screw located on the lamp housing and remove the lamp cover (2B, 5; G5 lamp covers are located on top, G2, G4 covers are located in front). Please be careful of a hot bulb and socket.

2. Slide the retaining ring to one side of the lamp socket.

3. Pull the lamp socket and bulb out from the lamp housing.

4. Remove the old bulb and insert a new halogen bulb being careful not to touch the bulb directly with your fingers. Use a tissue or some other soft material.

5. Secure with the retaining ring and replace the lamp housing.

FIGURE 2

CARE AND MAINTENANCE

Marco Slit Lamp Biomicroscopes should be given the care required of all precision instruments. The plastic dust cover should be used whenever the instrument is not in use. Periodic dusting with the soft dust cloth or brush is recommended. Frequent transportation of the instrument may shorten bulb life but will not damage the instrument itself. With a little care, the Marco Slit Lamp Biomicroscope will remain in fine condition and provide you with continuous service as you care for your patients.

Maintenance of the base unit is recommended after 5 to 8 years of normal use, and cleaning of the gliding plate is recommended periodically. The gliding plate, as well as the table top, may be cleaned with alcohol or household cleaner. The condensing lenses and mirrors, should be kept dust-free always.
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ULTRA SLIT LAMP BIOMICROSCOPE
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