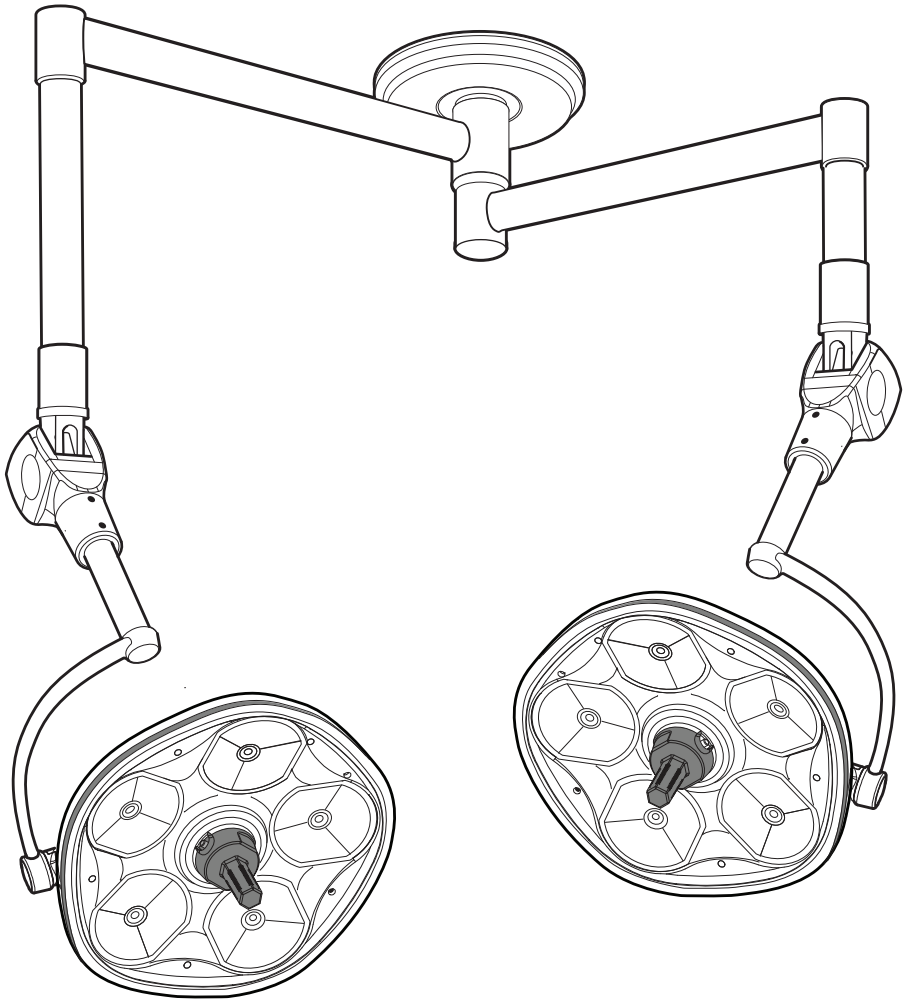
SKYTRON®

OWNER'S MANUAL



SKYTRON® LUMOS

LUMOS SURGICAL LIGHTS
L5, L5TV, L5TVS

Read this manual before operating this light! This information is necessary for the safe and efficient operation of the equipment.

TEC-B-0230 REV0
03/08/2022

Distributed by:

US - SKYTRON
5085 Corporate Exchange Blvd. S.E.
Grand Rapids, MI 49512 (616) 656-2900
www.skytron.com

Manufactured by:

DKK Dai-Ichi Shomei Co., LTD
32-26 Sakashita 1-Chome
Itabashi-Ku, Tokyo 174-0043
JAPAN

The base language for this document is ENGLISH. Any translations must be from the base language document.

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Although current at the time of publication, SKYTRON'S policy of continuous development makes this manual subject to change without notice. If current manuals are required, contact your local SKYTRON representative or contact SKYTRON directly at the distribution addresses listed above.

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SECTION 1. SAFETY INFORMATION

1-1. Special User Attention

Initial use should not begin until after the users have been instructed by the manufacturer's authorized representative.

Prior to use, all personnel that will operate the surgical light must be instructed in its proper operation by a clinical in-service protocol administered by a Skytron representative.

A routine program should be implemented by the facility for proper usage instructions for all personnel that may operate the surgical light.

When operating the surgical light, all hospital personnel should be aware that sensible care must be taken to maintain patient safety and keep the surgical light fixture functioning at peak efficiency.

1-2. Safety Precautions

The following is a summary of WARNINGS, and CAUTIONS indicated in this manual. These precautions are found throughout the manual where they are applicable. Carefully read the manual before proceeding to operate or service the equipment.

WARNING

WARNING with a safety alert symbol indicates a hazardous situation that, if not avoided, could result in death or serious injury.

No modification of this product is allowed.

Equipment is not suitable for use in the presence of an ANESTHETIC FLAMMABLE MIXTURE with oxygen or nitrous oxide.

DO NOT allow sterilizable handles or light camera covers to be touched by non-sterile personnel.

To ensure patient safety, DO NOT connect an additional multiple socket outlet or extension cord to the system.

To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth ground.

To avoid personal injury, DO NOT attempt to clean lighthead, camera head, or wall control unless power is turned off at wall control (power cord disconnected for portable stand light).

An improperly cleaned device may inhibit the ability of the sterilization process to achieve the proper sterility assurance.

Always follow OSHA/EASHW blood-borne pathogens standards for protective clothing, including gloves, masks, and eye protection when cleaning the handles and camera covers.

Always adhere to the correct AAMI and enzymatic cleaning manufacturer's recommendations.

California Proposition 65 Warning: This product may contain a chemical known to the State of California to cause cancer, or birth defects, or reproductive harm.

This equipment/system is intended for use by healthcare professionals only. As with all electrical medical equipment, this equipment may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures such as re-orienting or relocating the Lumos Light unit or shielding the location.

CAUTION

CAUTION with the safety alert symbol indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Always inspect product before use to ensure safe and correct operation. Any product deemed to be malfunctioning should be removed from service and labeled inoperable. Refer all service to a qualified SKYTRON service representative.

The sterilizable focus/positioning handle or camera cover is provided for light positioning by sterile personnel. DO NOT allow contact with non-sterile personnel.

Be sure the sterilizable handle or camera cover is properly secured before use. An improperly installed handle or camera cover could fall out, causing possible injury to the patient or surgical staff.

Turn off the light system at the power switch or turn off the camera alone via the camera control screen and allow the camera to cool before handling.

To ensure patient safety, DO NOT touch any component of the system and patient simultaneously.

Make sure camera and camera cover are securely locked in the lighthead before moving it into use position.

Make sure counterweight and sterilizable handle are securely locked in the lighthead before moving it into use position.

The L5TVS is equipped with locking casters. Make sure the casters are unlocked prior to moving the fixture to avoid the risk of damage or personal injury.

Risk of tipping! The lighthead must be in the lowered position before transporting. To avoid injuries or equipment damage, DO NOT push with excessive force, lean on, or rest on the lighting fixture.

DO NOT forcibly overcome a hurdle. If needed, use a ramp and have a firm grasp on the support post handles to maintain balance. A lack of balance would cause a risk of falling.

DO NOT look directly into the surgical light or place highly reflective surfaces in the path of the light beam. There is a risk of impaired vision.

Due to the high output capability of the lightheads, it may be required to decrease the intensity to reduce the risk of excessive heat in the surgical site when positioning multiple lightheads together to form a single spot.

To avoid equipment damage and personal injury, use extreme care to avoid collisions with personnel and/or equipment. Damage could result to the surgical lights causing parts to fall into the surgical area.

DO NOT look directly into the surgical light or place highly reflective surfaces in the path of the light beam. There is a risk of impaired vision.

Use of incompatible cleaning agents will cause damage to the fixture. Avoid the use of cleaning solutions which contain high concentrations of alcohol, ethylene glycol, phenol, iodophors, or glutaraldehyde based disinfectants. Staining, pitting, discoloration and diffuser cracking or personal injury may occur if these are used.

CAUTION

CAUTION without the safety alert symbol, is used to address practices not related to personal injury but with a possibility of damage to equipment.

Sterilizable focus/positioning handles and camera covers are subject to normal wear and tear. Always examine the handles for wear or damage to ensure proper and safe operation with the surgical light.

The camera must be turned off at the main switch or through the control screen when installing or removing the camera to prevent damage.

DO NOT attempt to focus or position the lighthead using the camera body. Damage to the camera rotation motor may result.

Be careful not to accidentally push the camera release button on the engagement head above the camera cover, as this will cause the camera to disengage from the lighthead.

Avoid pulling or attempting to move the stand light by the focus/positioning handle. The fixture may become unstable and damage may occur.

Exercise caution when moving the stand light to avoid obstacles such as power cords or other items in the pathway. DO NOT transport over rugged or unstable flooring that may damage the casters.

Improper use, transport procedures, or storage of the stand light may result in damage to the support post or balance mechanism. Check to be sure there is no horizontal movement of the balance mechanism within the support post before each use.

DO NOT use the sterilizable focus/positioning handle or camera cover on the lighthead to pull or push the stand light base. These adjustments should be done using the positioning handles on the support post.

Sterilizable focus/positioning handles and camera covers are subject to normal wear and tear. Always examine them for wear or damage to ensure proper and safe operation with the surgical light.

Do not press hard on the LCD screen or it will crack.

DO NOT use steam, extremely hot water (over 150°F [65°C]), or high pressure water sprays to clean the equipment.

DO NOT pour any liquids directly on the fixture or wall control.

DO NOT apply or spray cleaning agents directly on the lighthead, camera head, or wall control.

If the equipment emits unusual noises during operation, stop using it and contact a SKYTRON service representative.

The design of the Lumos Series lighting fixture and camera system does not utilize internal user serviceable parts. Service must be performed by SKYTRON authorized service technicians using SKYTRON authorized replacement parts and service techniques.

NOTICE

Indicates important information not related to personal injury.

2-1. Intended Use

WARNING

Equipment is not suitable for use in the presence of an ANESTHETIC FLAMMABLE MIXTURE with oxygen or nitrous oxide.

SKYTRON Lumos Series surgical lights are intended to be used by medical personnel to provide local surgical site illumination to any part of the patient's body. The Lumos series surgical light is suitable for all types of surgical procedures. The clinical settings include, but are not limited to: The Operating Room, Labor and Delivery, Emergency Department, Trauma, Intensive Care Unit, Minor Procedure Room, etc. This is inclusive of all patients requiring surgical intervention.

2-2. Installation

SKYTRON's Installation Manual specifies the unpacking, installation and testing of the Lumos Light. Review the Installation Manual prior to beginning the installation of the light. Review local electric codes including the Occupational Health and Safety Act for any requirements that pertain to the proper and successful installation of this light.

2-3. Environmental Conditions

	During Transport and Storage*	During Use (For Dry Locations)
Ambient Temperature	14° to 140° F (-10° to 60°C)	60° to 85°F (15° to 30°C)
Relative Humidity	10% to 85% (No Condensation)	30% to 60% (No Condensation)
Atmospheric Pressure	20.7 inHg to 31.3 inHg (700 hPa to 1060 hPa)	20.7 inHg to 31.3 inHg (700 hPa to 1060 hPa)

**In original packaging materials.*

2-4. Fail Safe Compliance

In order for dual or triple lighthead systems to maintain fail safe compliance, a battery back up (UPS) or generator back up power system must be provided in the Mains wiring prior to the wall control which will restore power in five (5) seconds or less. Not SKYTRON supplied.

2-5. Certification

LIGHT FIXTURE CERTIFIED BY ETL TO THESE STANDARDS:

Medical electrical equipment - Part 1: General requirements for basic safety and essential performance - ANSI/AAMI ES60601-1: 2005 / C1: 2009 / A2: 2010;

Medical electrical equipment - Part 1: General requirements for basic safety and essential performance - CAN/CSA-C22.2 No. 60601.1: 2008 COR 2 2011;

Medical electrical equipment - Part 2-41: Particular requirements for the basic safety and essential performance of surgical luminaires and luminaires for diagnosis - IEC 60601-2-41 (2nd Ed. 2009-08);

Medical electrical equipment - Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability - IEC 60601-1-6 (3rd Ed. 2010-01);

Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic compatibility – Requirements and tests- IEC 60601-1-2:2014 Ed.4.

2-6. Device Classification

Regulatory classification	This product is classified by the following regulatory bodies as: FDA: Class 2 Medical Device.
Degree of protection provided by the enclosure	IPX0
Degree of protection against electric shock	Class I medical equipment. No applied parts.
Method of operation	Continuous Operation

2-7. Equipment Labels and Specifications

The lighthead data labels contain the lighthead model number, LED Source, electrical specifications, and product serial number.

2-7-1. Lighthead Labels

SKYTRON® GRAND RAPIDS, MI • 616.656.2900
LUMOS

LIGHTHEAD ELECTRICAL RATING

INPUT 48V DC 135VA
CAT.NO. L5 TV
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SKSSHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

SKYTRON® GRAND RAPIDS, MI • 616.656.2900
LUMOS

LIGHTHEAD ELECTRICAL RATING

INPUT 48V DC 104VA
CAT.NO. L5
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SKSSHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-7-2. BOM Labels

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

CAT.NO. B3-725-45 L5TV BOM
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

CAT.NO. B3-725-45-1 L5 BOM
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-7-3. LCD Controller Label

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

LCD CONTROLLER ELECTRICAL RATING

INPUT 48V DC 24VA
CAT.NO. B9-725-01
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-8. Power Supply Labels

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

POWER SUPPLY (A) ELECTRICAL RATING

INPUT 100V-240VAC 175VA-207VA 50/60Hz
OUTPUT 48V DC
FUSE 3.15A x 1 T3.15AH,250V 5 x 20mm
CAT.NO. L5PS
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

POWER SUPPLY (B) ELECTRICAL RATING

INPUT 100V-240VAC 175VA-207VA 50/60Hz
OUTPUT 48V DC
FUSE 3.15A x 1 T3.15AH,250V 5 x 20mm
CAT.NO. L5PS-B
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-9. Video Converter Label

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

VIDEO CONVERTER ELECTRICAL RATING

INPUT 48V DC 10VA
CAT.NO. L5VC
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-9-1. Radial Arm UDI Label

SKYTRON® GRAND RAPIDS, MI · 616.656.2900

SERIES Lumos
DEVICE ID (01)10841736123161
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-9-2. Camera UDI Label

SKYTRON® GRAND RAPIDS, MI · 616.656.2900
LUMOS

Precision HD Camera for Lumos B1-725-56
DEVICE ID (01)10841736123178
SERIAL NO. (21)YYYY-MM-xxxx

DAI-ICHI SHOMEI CO., Ltd.
32-26 SAKASHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-9-3. Stand Base UDI Label

SKYTRON® GRAND RAPIDS, MI • 616.656.2900
LUMOS

STAND BASE ELECTRICAL RATING

INPUT	100V-240VAC 190VA-230VA 50/60Hz
OUTPUT	48V DC 3.5A
FUSE	3.15A x 2 T3.15AH,250V 5 x 20mm
DEVICE ID	(01)10841736123161
SERIAL NO.	(21)YYYY-MM-xxxx
WEIGHT	75Kg

DAI-ICHI SHOMEI CO., Ltd.
32-26 SKSSHITA 1-CHOME,
ITABASHI-KU, TOKYO 174-0043 JAPAN

2-9-4. Power Supply and Stand Base Warning Label

CAUTION: CONSULT MANUAL FOR FURTHER INSTRUCTIONS
AVERTISSEMENT: CONSULTER LE MANUAL POUR DE PLUS AMPLES INFORMATIONS

INDICATES DANGEROUS VOLTAGE 100V～240V, 50/60Hz
INDIQUE UN NIVEAU DE TENSION DANGEREUX, 100 V, 240 V, 50/60Hz

WARNING - FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE.
AVERTISSEMENT. Pour continuer de protection Contre au risque de feu, replacer seutrment avec La même caractère classè comme de fusèe.

T3.15AH 250V

2-9-5. Support Post Warning Labels

2-10. Label Symbols

Symbol	Description
	With the word WARNING, indicates a hazardous situation that, if not avoided, could result in death or serious injury.
	With the word CAUTION, indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
	Indicates Consult instructions for use.
	Indicates AC power supply.
EC REP	Indicates authorized representative in the European community
	Indicates Manufacturer.
	Indicates Dangerous Voltage 100-240V ~, 50/60Hz.
	Tipping hazard! To avoid injuries or equipment damage, DO NOT push with excessive force, lean on, or rest on the lighting fixture.

2-11. Lumos Series Model Description

Model ID Definitions	
L	Denotes Lumos series
5	Denotes lighthead with 5 LED pods
5TV	Denotes camera ready lighthead with 5 LED pods and center mounted video camera **Only one camera system can be provided per fixture.**
S	Denotes mobile stand version with 5 LED pods, cord connected
LFS	Denotes flat screen mount capable of mounting flat panel displays not covered by this listing.
EH	Denotes variable length hub and extended arms
Fixture	Consists of all components
HY	Denotes hybrid model
B	Denotes boom model

The 11 Basic Lumos Model Configurations		
L5	LFSL5	L5TV
L55	LFSL55	L5TV5
L555	LFSL5TV5	L55TV5
L5TVS	LFSL55TV5	

Model numbering logic for all available configurations	
Standard Arm Models	Standard arm models consist of up to a maximum of three arms. Standard arm models preceded by the letter “L” followed by the lighthead models 5, 5TV*, as applicable. The position of the number after the letter “L” coincides with the location on the arm in order from the top down.
	Rules: 1. There will never be more than three lightheads per fixture. 2. There will never be more than one camera ready lighthead per fixture
Variable Length Arm	Variable Length Arm Models consist of up to a maximum of two arms. Variable Length Arm models are preceded by the letter “L” followed by the light head model 5, 5TV*. Followed by the letters EA followed by the length of the upper arm in millimeters separated by “/” followed by the length of the lower arm in millimeters. The position of the number after the letter “L” coincides with the location on the arm in order from the top down.
	Rules: 1. Maximum of two light heads per fixture
Variable Length Hub	Variable Length Hub Models consist of up to a maximum of two arms. Variable Length Hub models are preceded by the letter “L” followed by the light head model 5,5TV*, followed by the letter EH (if applicable), followed by the length of the upper arm in millimeters separated by “/” followed by the length of the lower arm(s) in millimeters.
	Rules: 1. Maximum of two light heads per fixture

LFS Models	LFS models consist of up to a four-arm system. LFS models are preceded by the letters LFS for the upper arm followed by the letter “L” followed by the lighthead models 5, 5TV*, as applicable for the lower arms. The position of the number after the letter “L” coincide with the location on the lower arms arm (up to three) in order from the top down.
	Rules: 1. There will never be more than one camera ready lighthead per fixture
Variable Length Hub LFS Models	Variable Length Hub LFS models consist of up to a four-arm system. Variable Length Hub LFS models are preceded by the letters LFS followed by the letter “L” followed by the lighthead models 5, 5TV*, as applicable. The position of the number after the letter “L” coincide with the location on the lower arms (up to three) in order from the top down. Followed by the letter H.
	Rules: 1. There will never be more than one camera ready lighthead per fixture
HY Models:	HY models consist of one arm positioned in the lowest location of the arm set. HY arm models are preceded by the letters “L” followed by the model number 5, 5TV*.
	Rules: 1.Maximum of one light head per fixture
Boom Models	Boom models consist of up to a two-arm system. Boom models are preceded by the letters “L” followed by the light head model 5, 5TV*, followed by the length of the upper arm in millimeters separated by “/” followed by the length of the lower arm followed by the letter B after the length of the lowest arm in millimeters.
	Rules: 1. Maximum of one LFS arm per fixture 2. Maximum of two light heads per fixture

***Only one camera system can be provided per fixture.**

2-12. Electrical Requirements

SKYTRON Lumos Series Surgical Lights require that electrical connections are made by a licensed electrician in accordance with state, local, and national electrical codes using UL (Underwriters Laboratory) recognized materials.

3-1. Introduction

Lumos surgical lights are available as single, dual, or triple light models. Each light consists of five modules containing LEDs (light emitting diodes) and optical color corrective reflectors. LEDs offer low heat radiation and increased illumination longevity.

Lightheads can also be equipped with an optional camera.

Light and camera controls are managed using a wall mounted touch control panel, or directly using the lighthead itself.

3-1-1. Light Controls Overview

Controls are managed at a touch panel wall control or at the light.

- **Light Intensity:** Set intensity to 0, 1, 2, 3, 4, or 5.
  - **Set intensity at wall control**
  - **Set intensity at touch pad on the sterilizable handle / camera cover**
- **Color Temperature**: 3800K, 4100K, 4500K, or 5000K.
- **Field Diameter:** Small, Medium, or Large. Field diameter gives a larger or smaller light diameter in the focused range.
- **Individual Light focus:** Turn the sterilizable handle or camera cover to focus the light.
- **Sterilizable positioning handle / camera cover**
- **Non-sterile positioning grips**
- **Pre-programmed Presets** (up to 10)
- Configurable control panel preferences
  - Feedback beep for handle or touch panel
  - Brightness
  - Sleep mode settings

3-1-2. Camera Controls Overview

- Zoom in or out
- Rotate image
- White balance
- Freeze frame
- Focus camera
- AE - Adjust iris width or shutter speed,

3-1-3. Light Articulation Point Overview

Lights are easily moved to desired positions without drift:

- Fixtures offer infinite 360° rotation at the following articulation points:
  - Single point ceiling mount hub.
  - End of the radial support arm.
  - The balance mechanism, which includes drift-free vertical movement
  - Pitch and roll at the yoke
- Variable length arm and Variable length hub models are available for custom applications. These fixtures have 340°rotation (maximum).
- Ceiling mount lightheads have 110° vertical travel

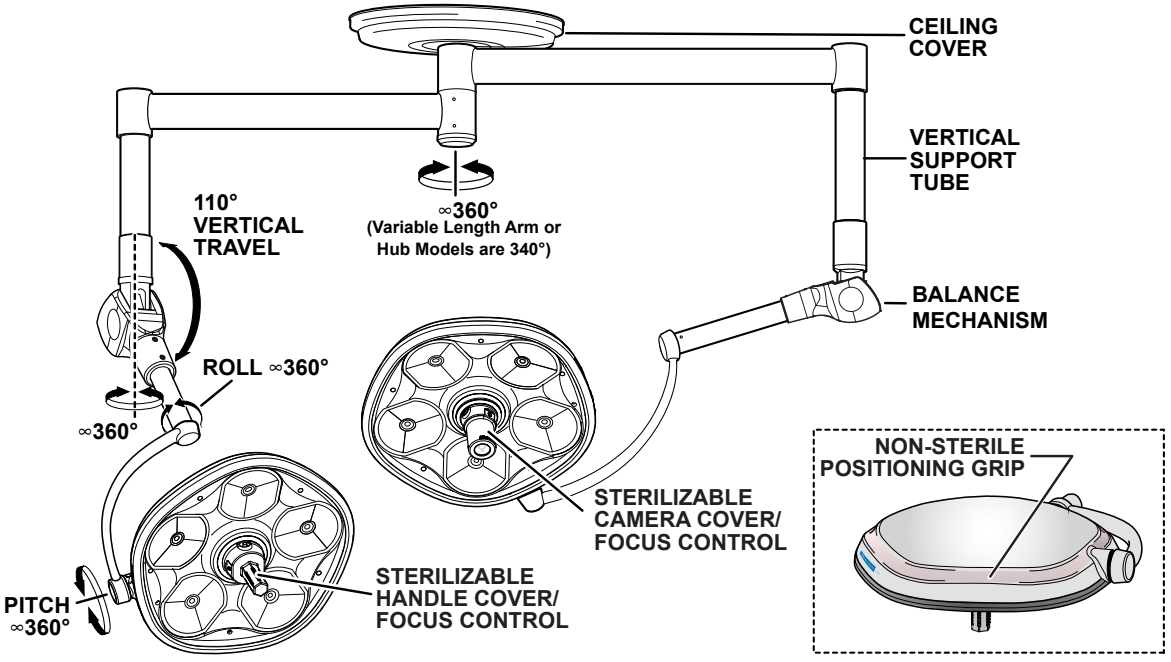


Figure 1. Light fixture rotation capabilities

3-2. Lighthead Features and Controls

- **Non-Sterile Positioning Grip:** Used for gross positioning.

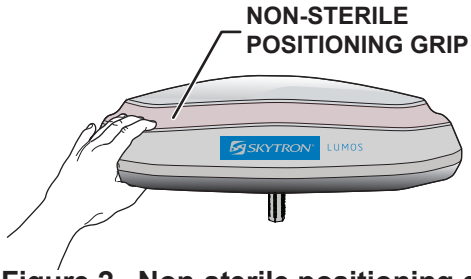


Figure 2. Non-sterile positioning grip

- **Sterilizable positioning handle / camera cover:** Used for fine positioning (Figure 3).
- **Intensity Control (Figure 3)** on the handle / camera cover for cycling through all intensity controls: 0, 1, 2, 3, 4, and 5.
- **Adjustable focus using the handle / camera cover (Figure 3):** Turn the handle or camera cover to focus light beams from all of the pods into a single spot for optimal lighting.
- **Release button (Figure 3):** Push to remove the sterilizable handle or camera cover.

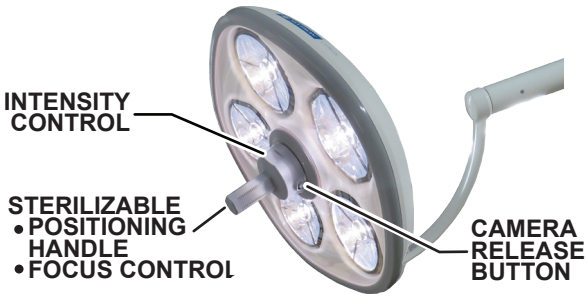


Figure 3. Light with standard handle

- **Camera ready lighthead (Figure 4):** Light can have a Precision HD camera in place of the focus/positioning handle. The sterilizable cover covers the camera and is used for sterile positioning and light focus.

Figure 4. Light with camera cover

WARNING

DO NOT allow sterilizable handles or light camera covers to be touched by non-sterile personnel.

3-3. Camera Overview

SKYTRON'S Camera System is used with Lumos camera ready lightheads (Figure 3) to produce High Definition (HD) quality video and images of medical procedures and examinations.

- **Interchangeable Design:** The camera can be removed and installed wherever other Lumos camera ready systems are available.
- **Precision HD Camera:** A lighthead handle mounted, super compact color HD camera with zoom (10X Optical, 16X Digital) with a high speed, auto focus lens, and flexible outputs for video conferencing, and broadcasting.
- **Counterweight:** Installed when camera is removed to maintain proper light balance.
- **Sterilizable Camera Cover:** Installs over the camera and is used for sterile positioning and light focus.

3-4. Touch Panel Controls

A wall mounted touch control interface and a switch is located in the room with the Lumos ceiling mounted lighthead(s), providing centralized control for operating the lighthead(s).

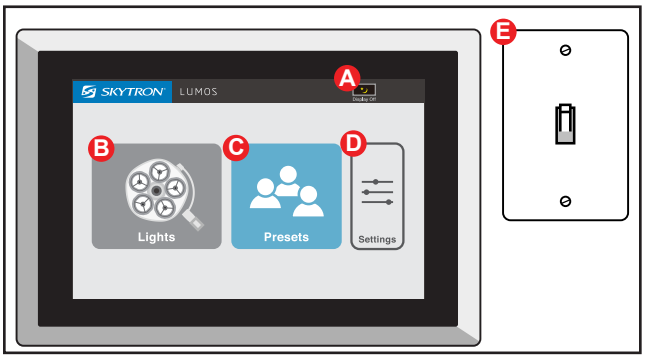


Figure 5. Wall control basics

A. **Display Off:** Activate "Sleep Mode"
B. **Lights:** Access light and camera controls to manually alter light or camera settings.
C. **Presets:** Create or select from pre-programmed light settings, so lights and camera settings can be selected with the touch of a button.

D. **Settings:** Access the settings page to edit

- Beep volume: adjust volume for light and touch panel touch alerts
- Brightness: adjust touch panel brightness
- Sleep mode: Toggle sleep mode on or off and set the inactive time

E. **Main Power On/Off Switch (Customer Supplied):** Turn power on or off for fixture and touch panel.

F. Additional Navigation Buttons Not Shown Here

- **Return to Home Screen** 
- **Return to previous screen** 

4-1. Configure Control Settings

1. Turn the control panel on using the switch, and wait for the loading screen to change to the home screen.

Figure 6. Loading screen

2. At the Home screen, touch Settings (Figure 7).
3. Program the desired control settings (Figure 7).

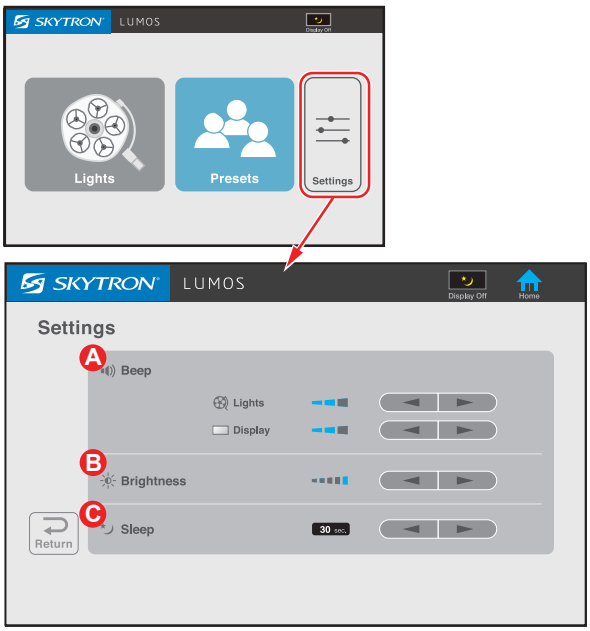


Figure 7. Control settings

A. **Beep:** Use the left/right buttons to adjust volume for the touch control response on the light or the display.
B. **Brightness:** Use the left or right button to adjust the display screen brightness.
C. **Sleep:** Use the left or right button to adjust the time-out setting. The screen will turn off if it is inactive for longer than the set time.

5-1. Step-By-Step Operation Overview and Reference Guide

Review the steps below for general operation and references to detailed instructions for each step.

1. **Attach the Camera, if necessary:** See section "5-13-2. Attach the Camera Before or During a Session" on page 19
2. **Perform visual checks:** See section 5-2 on page 16.
3. **Install the sterilizable handles and camera covers:** See section 5-3 on page 16 .
4. **Turn on the main switch and touch panel:** 5-4 on page 16
5. **Establish light settings.**
   - **Select the desired preset:** 5-7 on page 17
   - **Set custom light settings:** 5-8 on page 17
   - **Set custom camera settings:** 5-13-5 on page 21
6. **Position the lights to the desired locations:** See "SECTION 9. POSITIONING & ILLUMINATION TECHNIQUE" on page 32
7. **Adjust focus and intensity at the light:** See 5-9 on page 18 and 5-11 on page 18
8. **When finished, turn power off with the main switch for the fixture including touch panel** 5-12 on page 18
9. **Remove the camera, if necessary, and install the counterweight:** "5-13-3. Remove the Camera After or During a Session" on page 20
10. **Clean the lights and camera head:** 10-1 on page 36 and 10-2 on page 37

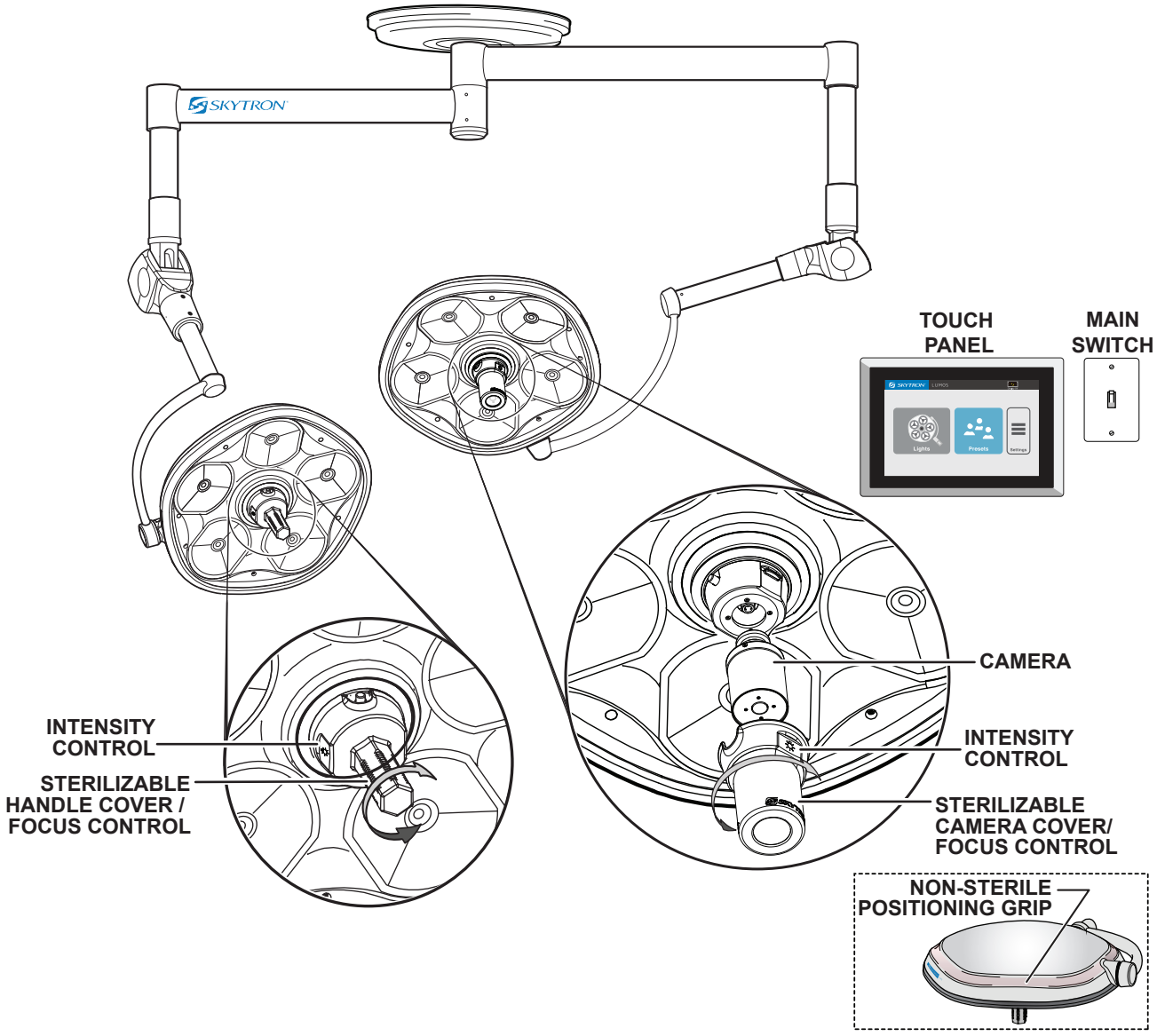


Figure 8. Light and arm components

5-2. Visual Checks Before Start-Up

CAUTION

Always inspect product before use to ensure safe and correct operation. Any product deemed to be malfunctioning should be removed from service and labeled inoperable. Refer all service to a qualified SKYTRON service representative.

- Check light emission from each lighthead.
- Check for cracks, damaged, or broken diffuser. Avoid use if such damage is evident.
- Check operation of the wall intensity control.
- Check mechanical movements by rotating and articulating each joint. Ensure proper operation and emittance of light throughout the range of movement.
- For camera ready lightheads make sure the camera system have been properly and securely installed.

5-3. Install the Sterilizable Handle / Camera Cover

When the surgeon is ready to use the light, install the sterilizable focus/positioning handle or camera cover using the following procedure.

CAUTION

The sterilizable focus/positioning handle or camera cover is provided for light positioning by sterile personnel. DO NOT allow contact with non-sterile personnel.

CAUTION

Sterilizable focus/positioning handles and camera covers are subject to normal wear and tear. Always examine the handles for wear or damage to ensure proper and safe operation with the surgical light.

1. Align the handle / camera cover with the engagement ring and push it on (Figure 9).
2. Twist the handle / camera cover back and forth (Figure 9) until it clicks.
3. Pull the handle / camera cover to ensure it is secure (Figure 9).

Figure 9. Sterilizable handle installation

CAUTION

Be sure the sterilizable handle or camera cover is properly secured before use. An improperly installed handle or camera cover could fall out, causing possible injury to the patient or surgical staff.

5-4. Remove the Sterilizeable Handle / Camera Cover

1. Push the release button on the side of the sterilizeable handle or camera cover.

Figure 10. Push release button

2. Pull the handle off.

5-5. Turn the Main Power and On or Off

The main power switch is a customer supplied switch for the light and control panel. When the main power is on, power is supplied to the lights and control panel.

- Flip the main switch to the ON position and wait 15 seconds for the touch panel to turn on. The panel and lights are ready to use.

- Flip the switch to the OFF position to remove power from the touch panel.

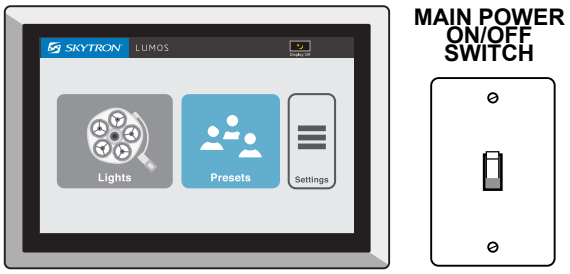


Figure 11. Control panel & main power switch

5-6. Activate or Awaken from Sleep Mode

- **Set automatic sleep mode timeframe:** Set this from the Settings screen (See "4-1. Configure Control Settings" on page 14).
- **Manually activate sleep mode:** Touch "Display Off" at the top of the screen.
- **Awaken the screen from sleep mode:** Touch the blank screen.

5-7. Select Light Presets

1. Turn on the main switch and touch the screen to activate it.
2. Touch the Presets button
3. Touch the desired preset option.

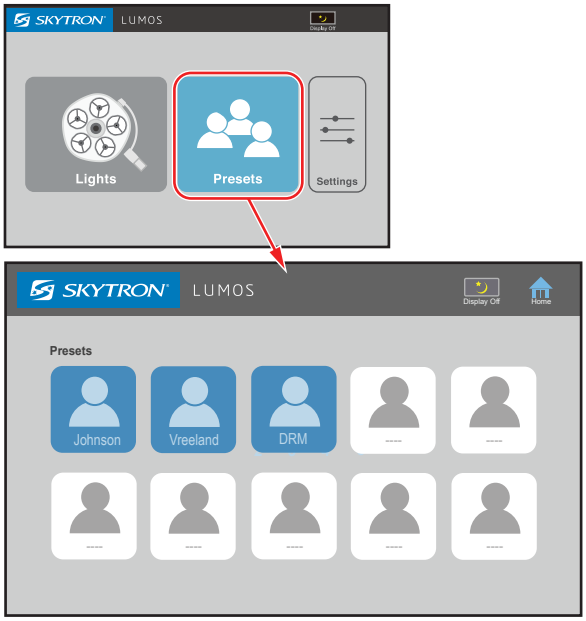


Figure 12. Preset options screen

5-8. Select Custom Settings with the Touch Panel

From the light control screen, users can:

- Set each light to different settings or synchronize lights to have the same settings.
- Set the light intensity
- Set the light field diameter
- Access camera settings
- Set color temperature

Figure 13. Light settings controls

A. Synchronized or Individual Light Settings

- Touch to toggle Sync on and off:

Sync	Sync	Settings apply to all lights.
De-Sync	Sync	Lights are set individually using tabs at the top of the screen.

- When not synchronized, touch a tab to establish settings for an individual light

B. Light Intensity: Touch the desired light intensity between 0, 1, 2, 3, 4 or 5.

C. Field Diameter: Touch the desired diameter size for the focused beam of light.

D. Color Temperature: Touch the desired light temperature of 3800K, 4100K, 4500K, or 5000K

E. Camera: Touch to access camera settings for the selected light(s). This symbol is only present if a camera is installed in a camera ready lighthead.

5-9. Fan Malfunction Notification

The fan malfunction notification icon will appear at the top and center of the control screen if the fan malfunctions.

1. Touch the Notification Icon if it appears at the top and center of the control screen.

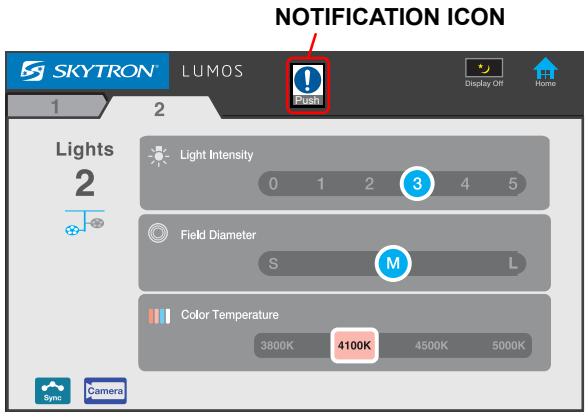


Figure 14. Notification button location

2. Follow the instruction on the screen and contact Skytron service.
   - Returns to the previous screen after 3 seconds.
   - The fan malfunction notification icon will remain at the top of the screen unit service has resolved the error.

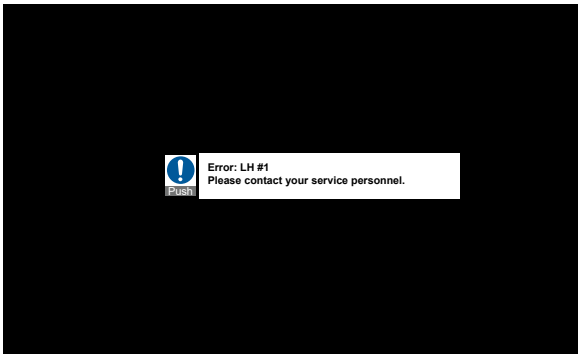


Figure 15. Error notification

5-10. Adjust Light Focus

With the light on, rotate the sterilizable handle/ camera cover clockwise or counter-clockwise until all of the light beams converge on the surgical site forming a single homogenous spot of light.

Figure 16. Adjust light focus

5-11. Adjust Intensity from the Sterilizable Handle / Camera Cover

Touch the touch sensitive pad on the sterilizable handle or camera cover to cycle through intensity settings from 0 to 5.

Figure 17. Adjust intensity at handle

5-12. Shutdown Procedure

To shut the light system down after use:

1. Return the lighthead to its full up position.
2. Turn the main power switch to the OFF position.

5-13. Camera Use and Settings

NOTICE

When a camera is removed it must be replaced with a counterweight to maintain proper lighthead balance.

Remove the counterweight to install the camera.

Camera system is for recording purposes only, not intended for use in diagnosis or treatment.

5-13-1. Step-By-Step Camera Operation Overview and Reference Guide

The order of camera use should proceed as follows:

1. **Decide if a camera will be used:**
   - **If a camera will be used:** remove the counterweight and attach the camera at the beginning of a session while the main power switch is off. See "5-13-2. Attach the Camera Before or During a Session" on page 19.
   - **If a camera will not be used:** Make sure the counterweight is in place.
2. **Turn the main switch on:** "5-5. Turn the Main Power and On or Off" on page 16.
3. **Manage camera settings:** See "5-13-5. Manage Camera Settings" on page 21
4. **Remove or attach the camera during a session. if necessary:**
   - Remove: See "5-13-3. Remove the Camera After or During a Session" on page 20
   - Reattach: See "5-13-2. Attach the Camera Before or During a Session" on page 19
5. **Turn the main switch off:** "5-5. Turn the Main Power and On or Off" on page 16.
6. **Remove the camera at the end of the session and reinstall the counterweight:** See "5-13-3. Remove the Camera After or During a Session" on page 20

⚠CAUTION

Turn off the light system at the power switch or turn off the camera alone via the camera control screen and allow the camera to cool before handling.

To ensure patient safety, DO NOT touch any component of the system and patient simultaneously.

CAUTION

The camera must be turned off at the main switch or through the control screen when installing or removing the camera to prevent damage.

DO NOT attempt to focus or position the lighthead using the camera body. Damage to the camera rotation motor may result.

Be careful not to accidentally push the camera release button on the engagement head above the camera cover, as this will cause the camera to disengage from the lighthead.

5-13-2. Attach the Camera Before or During a Session

1. Remove the sterilizable handle cover from the counterweight, if present (See Section 5-3 on page 16).
2. Hold the counterweight firmly, press the camera release button, and remove the counterweight.

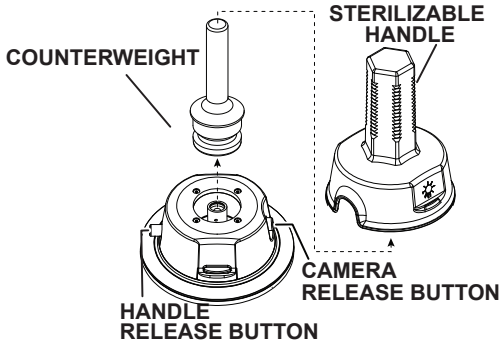


Figure 18. Remove the counterweight

3. Make sure main power or camera power is off depending on when the camera is installed:
   - **If attaching at the beginning of a session**: The MAIN POWER must be off.

NOTICE

The camera MUST BE installed at the beginning of a session BEFORE the main switch is on or camera controls will be unavailable.

   - **If reattaching during a session:** Turn the camera off at the control screen (See "5-13-5. Manage Camera Settings" on page 21)
4. Attach the camera:

   (a) Hold the camera firmly.

   (b) Carefully push it straight into the engagement head (Figure 19).

   (c) Twist it until there is a click sound.

   (d) Pull on it to ensure it is firmly engaged.

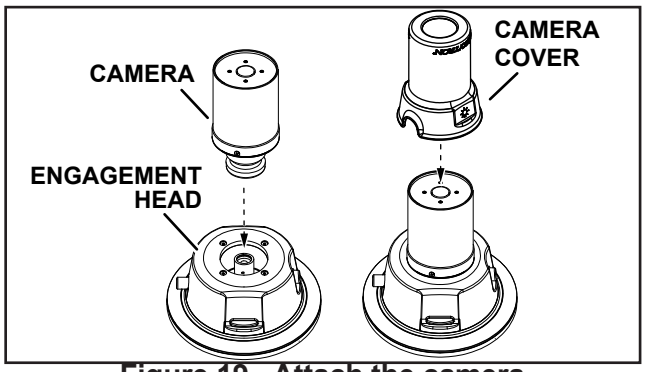


Figure 19. Attach the camera

5. Install the sterilizable camera cover, then pull on it to ensure it is securely attached (See Section 5-3 on page 16).

CAUTION

Make sure camera and camera cover are securely locked in the lighthead before moving it into use position.

5-13-3. Remove the Camera After or During a Session

1. Turn the camera off.
   - If removing the camera at the end of a session: The MAIN POWER must be off.
   - If removing the camera during a session: Turn the camera off at the control screen (See "5-13-5. Manage Camera Settings" on page 21)
2. Remove the sterilizable camera cover. (See Section 5-3 on page 16).
3. Remove the camera
   (a) Hold the camera firmly.
   (b) Press the camera release button on the engagement head (Figure 20).
   (c) Carefully pull the camera straight out of the engagement head.

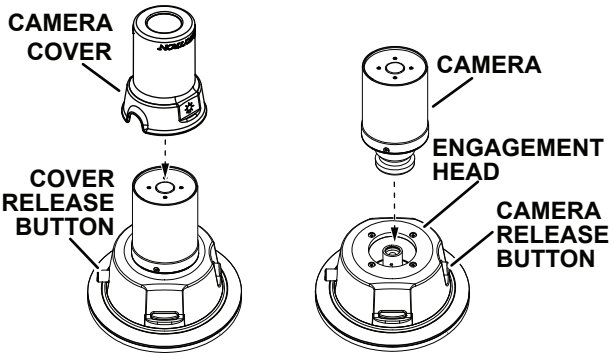


Figure 20. Remove the camera

4. Insert the counterweight into the engagement head then pull on it to ensure it is securely locked.

NOTICE

When a camera is removed it must be replaced with a counterweight to maintain proper lighthead balance.

5. Attach the sterilizable handle cover then pull on it to ensure it is securely locked (See Section 5-3 on page 16).

CAUTION

Make sure counterweight and sterilizable handle are securely locked in the lighthead before moving it into use position.

5-13-4. Remove / Attach the Counterweight

The counterweight must be attached to the engagement head when the camera is removed, otherwise the lighthead will not be properly balanced. Remove the counterweight when attaching the camera.

- **To remove the counterweight:** Remove the sterilizable handle (if present), then push the handle release button and pull the counterweight out.
- **To attach the counterweight:**
  (a) Hold the counterweight firmly.
  (b) Carefully push it straight into the engagement head (Figure 21).
  (c) Twist it until there is a click sound.
  (d) Pull on it to ensure it is fully engaged.
  (e) Attach the sterilizable handle.
  (f) Pull it to ensure it is also securely attached.

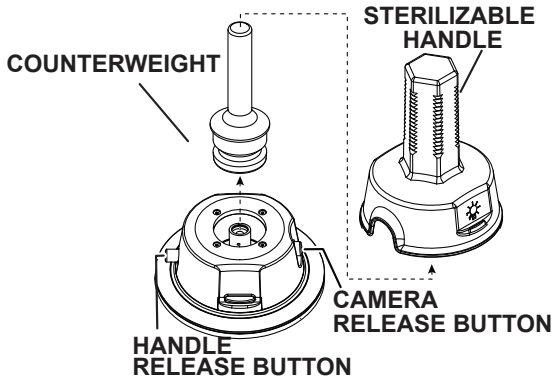


Figure 21. Remove the counterweight

CAUTION

Make sure counterweight and sterilizable handle are securely locked in the lighthead before moving it into use position.

5-13-5. Manage Camera Settings

The camera control screen provides controls for:

- Turning the camera off or on (camera must be off when removing or reattaching it during a session)
- Manual or Digital Zoom
- Camera rotation
- Freeze
- Setting Screen Access:
  - Auto or One-Push White Balance
  - Manual or Auto Focus
  - Manual or Iris & Shutter Adjustment

1. Access the Light Settings Control screen by touching the lights icon or accessing a preset.
2. Touch the Camera icon.

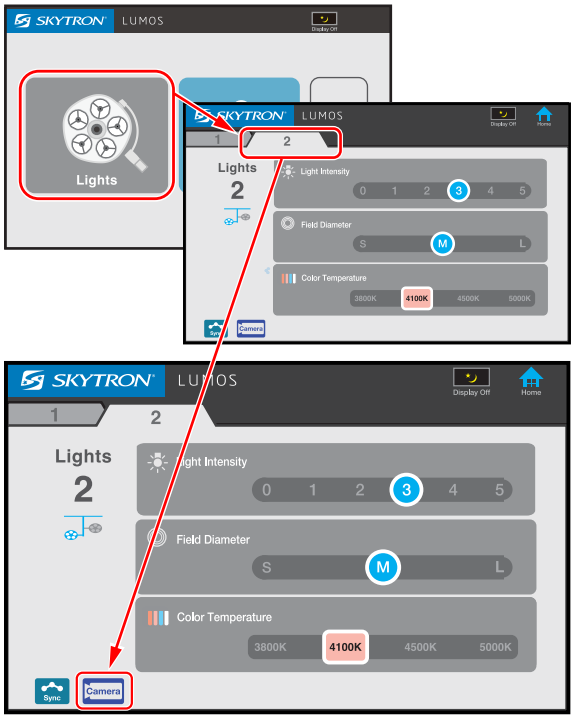


Figure 22. Open camera controls

3. Zoom, rotate, freeze the image or access additional settings from the Camera Control screen.

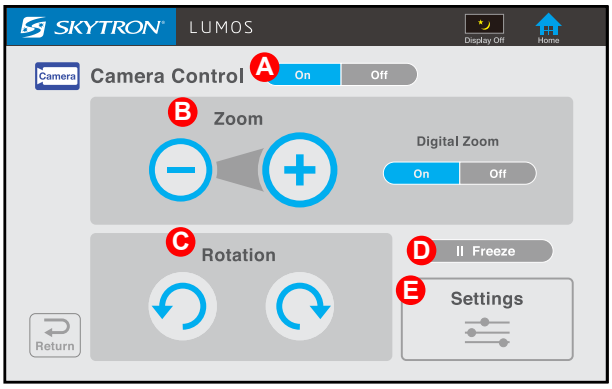


Figure 23. Camera controls

A. Turn camera on or off.

- **Long press Off to turn the camera off (Do this before removing or attaching the camera during a session).**
- **Long press On to turn the camera on.**

NOTICE

When the camera OFF, the camera controls are grayed out and unavailable. Turn the camera back on to reactivate them. Reactivation takes about ten seconds.

B. Zoom toggle:

- Touch the - or + to zoom out or in
- Toggle Digital Zoom on or off

C. Rotate: Touch the clockwise or counterclockwise button to rotate the image

D. Freeze:

- Touch the freeze button to view the image as a "snapshot" of the monitor
- Touch the freeze button again to resume normal operation.

E. Access additional camera settings.

4. Control white balance, focus, or brightness (AE).

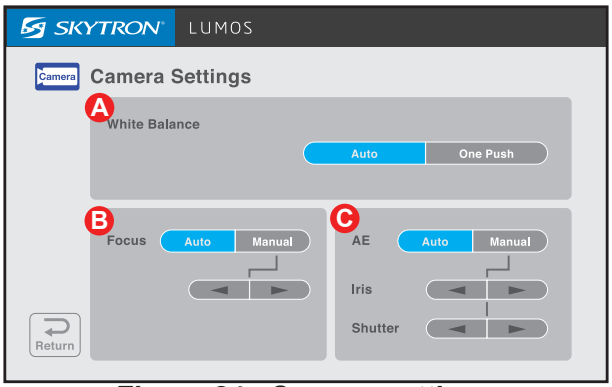


Figure 24. Camera settings

A. White Balance toggle:

- Auto: white balance (WB) is controlled automatically (WB AUTO indicator is illuminated)
- One Push: This manually sets the white balance for the camera

B. Focus toggle:

- Auto: When toggled to auto, camera automatically focuses on the subject
- Manual: When toggled to Manual, touch the left and right arrow buttons to manually adjust the focus.

C. AE (brightness) toggle:

- Auto: When toggled to auto, both IRIS and SHUTTER functions operate automatically
- Manual: When toggled to manual, touch the left and right arrow buttons to adjust the iris (aperture) diameter or shutter speed.

The Lumos Touch Pad can be configured with up to ten settings for one-touch light configuration. This section describes how to:

- Register a new preset
- Change settings on an existing preset
- Un-register an existing preset

6-1. Register a New Preset

Register up to ten pre-programmed settings to use

1. Touch Presets from the Home Page

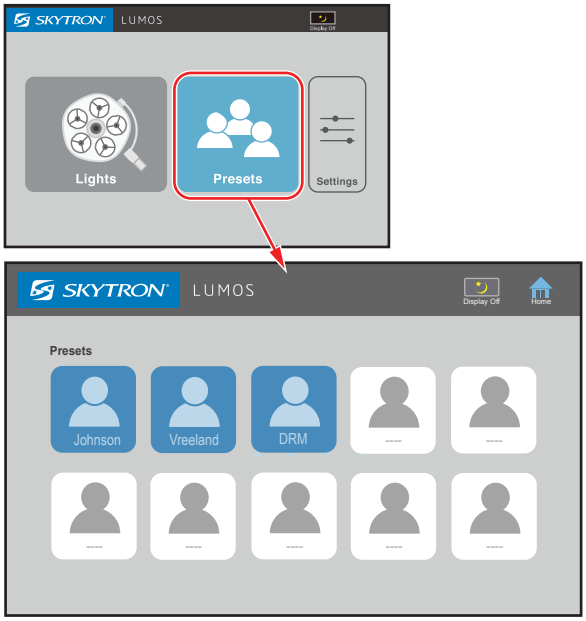


Figure 25. Preset options screen

2. Touch a blank unregistered button to open it.

Figure 26. Preset name screen

3. Use the key pad to enter a preset name.

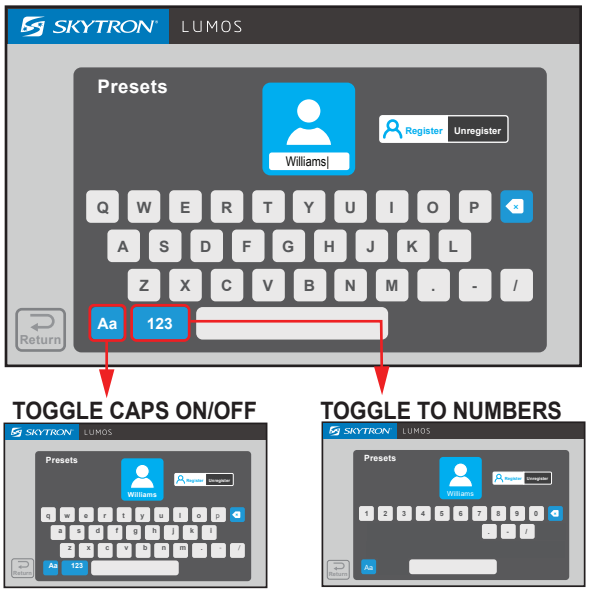


Figure 27. Preset name screen

4. Touch the Register button to proceed to the next page.

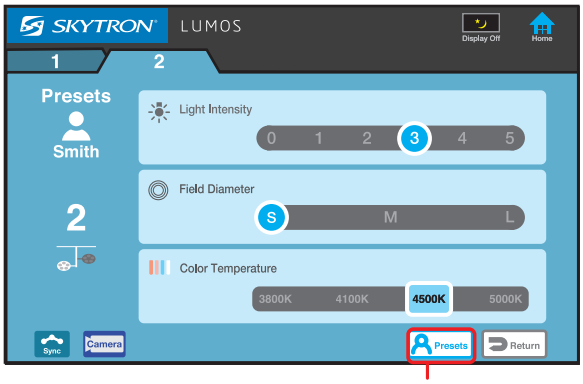
Figure 28. Preset settings page

5. Configure light settings
   - Toggle light sync on or off.

Sync On	Sync	Settings apply to all lights.
Sync Off	Sync	Light set individually using tabs at the top of the screen

   - Set Light Intensity, Field Diameter, and Color Temperature.

6. Touch the Presets button to save the preset. It will make a double beep.



SAVE SETTINGS

Figure 29. Save settings

6-2. Change Settings to an Existing Preset

NOTICE

When managing light settings in preset mode the screen background will be blue. Otherwise the background will be gray.

To change the light settings for an existing preset:

1. Touch Presets from the Home Page

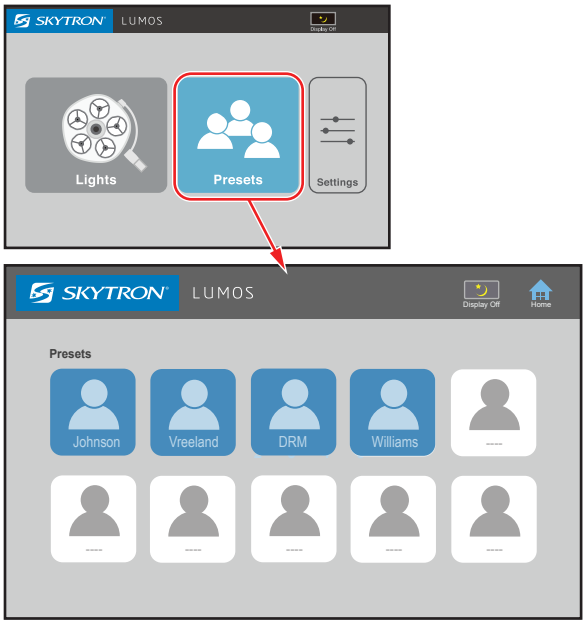


Figure 30. Preset options screen

2. Touch the preset in need of changes.

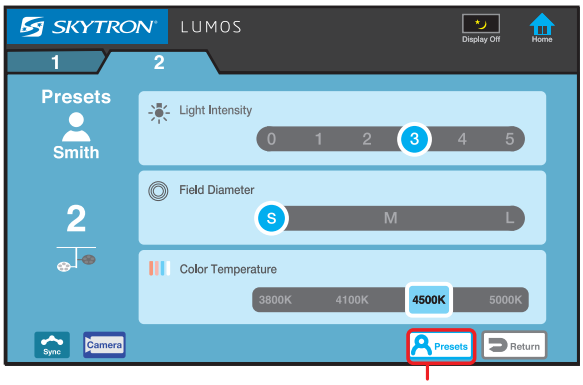
SAVE SETTINGS
(ONLY APPEARS IF CHANGES ARE MADE)

Figure 31. Update a preset

3. Make the desired changes to the settings.
   - Toggle light sync on or off.

Sync On	Sync	Settings apply to all lights.
Sync Off	Sync	Lights are set individually using tabs at the top of the screen

   - Set Light Intensity, Field Diameter, and Color Temperature.
4. Touch the Presets button to save the preset. A double beep will confirm it is saved.
   - Changes will not be made permanent unless Presets is pressed.



SAVE SETTINGS

Figure 32. Save settings

6-3. Un-Register a Preset

1. Touch Presets from the Home Page

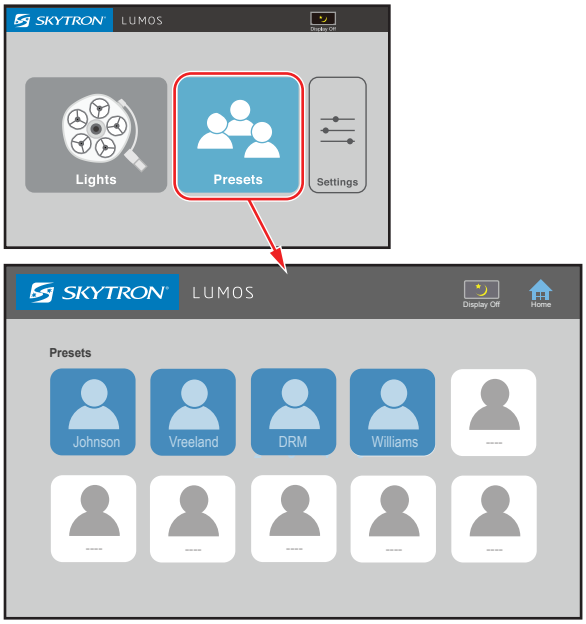


Figure 33. Preset options screen

2. Long press the preset that needs to be un-registered.

Figure 34. Preset options screen

3. Long press the Unregister button. The screen will return to the presets page and show that the preset has been removed.

Figure 35. Unregister button

7-1. Introduction

The Portable Stand Light consists of a single Lumos TV lighthead with 5 LED pods mounted on a portable stand. The lighthead has the same rotational positioning and focus capabilities as the ceiling mounted light which includes infinite 360° rotation at the pitch and roll axis points. 90° vertical travel is provided at the support post.

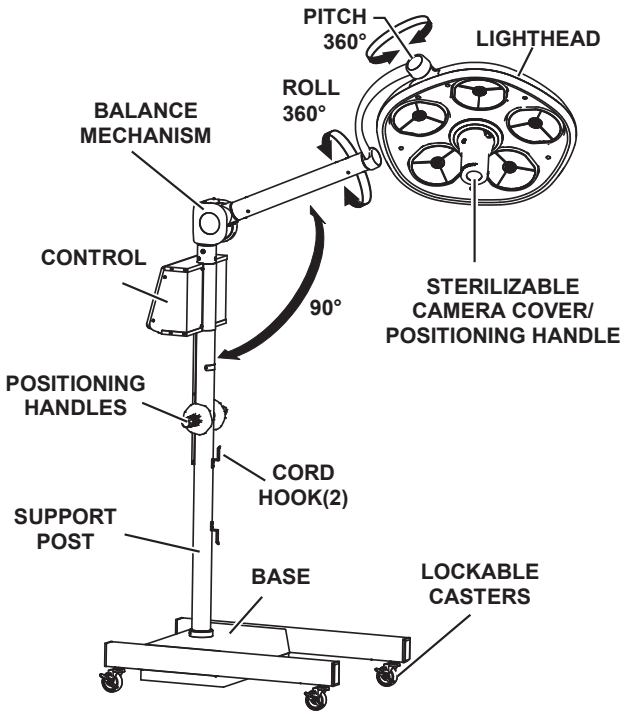


Figure 36. Lumos portable stand features

LCD light control, cord hook,and positioning handles are provided on the support post. The base contains the main switch, the power cord,and safety fuses.

The lighthead has a multi-function center handle (sterilizable focus/positioning handle) that is removable and sterilizable (Figure 37). The sterilizable focus/positioning handle allows focus control, lighthead positioning, and intensity adjustment. This allows all final adjustments or changes to be precisely controlled by the surgeon.

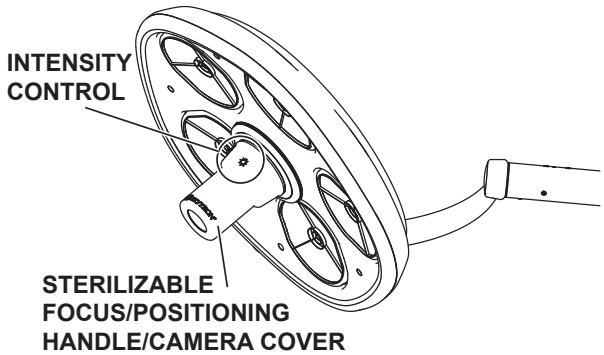


Figure 37. Focus Adjustments

Use the touch sensitive pad on the side of the positioning handle to adjust intensity.

- Pressing the pad to cycle the intensity control through all levels, including 0.

NOTICE

When the lowest intensity is reached, the control will next cycle to full intensity.

7-2. Power Requirements

The Lumos portable stand mounted light requires a properly grounded 100-240VAC, 50/60Hz electrical power supply. The stand is equipped with a 13 foot (4 m) long, 16-3 SJT power cord with a hospital grade plug. The power cord and the main switch are located at the rear of the base.

7-3. Prior to Operation

⚠ CAUTION

Always inspect product prior to use to ensure safe and correct operation. Any product deemed to be malfunctioning should be removed from service and labeled inoperable. Refer all service to a qualified SKYTRON service representative.

7-3-1. Visual Checks

Prior to start-up, perform a visual inspection of the following:

- Check light emission from lighthead.
- Check for cracks, damaged, or broken diffuser. Avoid use if damage is evident.
- Check the operation of the intensity control on the sterilizable handle and the LCD controller.
- Check mechanical movements by rotating and articulating each joint. Ensure proper operation and emittance of light.
- If the Notification Button appears please contact a Skytron representative.

7-3-2. Positioning and Transporting

If necessary, move the light to the desired location or position using the following steps:

1. Ensure the lighthead is in a lowered position. DO NOT transport the light unless it is in the lowered position.
2. Ensure that the power cord is wrapped around the cord hooks and secured.

⚠ CAUTION

The L5TVS is equipped with locking casters. Make sure the casters are unlocked prior to moving the fixture to avoid the risk of damage or personal injury.

3. Unlock all four wheel casters.

⚠ CAUTION

Risk of tipping! The lighthead must be in the lowered position before transporting. To avoid injuries or equipment damage, DO NOT push with excessive force, lean on, or rest on the lighting fixture.

⚠ CAUTION

DO NOT forcibly overcome a hurdle. If needed, use a ramp and have a firm grasp on the support post handles to maintain balance. A lack of balance would cause a risk of falling.

4. Position yourself behind the support post, and use the positioning handles to position or transport the fixture.

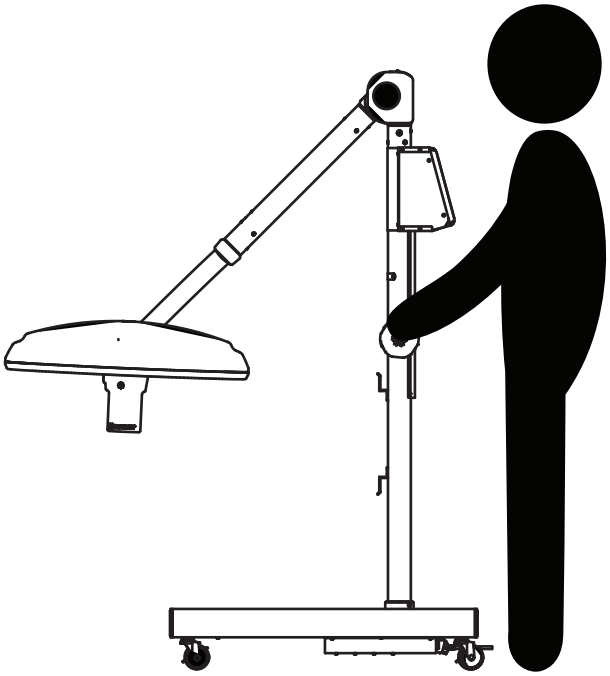


Figure 38. Positioning and Transporting

CAUTION

Avoid pulling or attempting to move the stand light by the focus/positioning handle. The fixture may become unstable and damage may occur.

Exercise caution when moving the stand light to avoid obstacles such as power cords or other items in the pathway. DO NOT transport over rugged or unstable flooring that may damage the casters.

5. For maximum stability, position the stand so the legs will be facing the surgical area. The stand should be positioned in such a way that it is clinically functional but will not interfere with operating room staff or equipment.
6. Once the light is in the desired position, lock all four wheel casters to secure the fixture in that position.

CAUTION

Improper use, transport procedures , or storage of the stand light may result in damage to the support post or balance mechanism. Check to be sure there is no horizontal movement of the balance mechanism within the support post before each use.

7-4. Portable Stand Light Operation

WARNING

Equipment not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH OXYGEN OR NITROUS OXIDE.

To ensure patient safety, DO NOT connect an additional multiple socket outlet or extension cord to the system.

To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth ground.

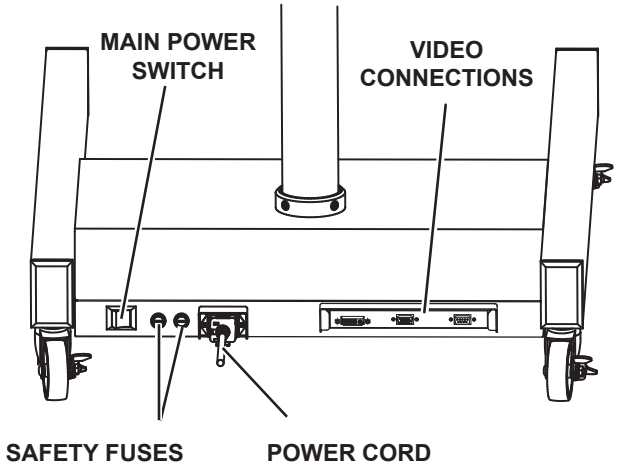


Figure 39. Base Features

1. Plug the power cord into a properly grounded, circuit protected electrical outlet. DO NOT use a 3P-2P conversion adapter when inserting the plug into an outlet.

NOTICE

The power cord is the mains power supply. Unplug cord to disconnect power to the fixture. DO NOT position the fixture where it makes it difficult to detach the power cord.

2. Plug a video connection into an output on the base (Figure 39). Outputs include DVI, RBG, and Y/Pb/Pr (Figure 40).

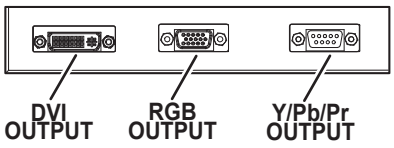


Figure 40. Video Outputs

3. Power on the fixture using the MAIN POWER switch on the base (Figure 39).
4. Adjust the intensity of the lighthead with the LCD controller on the support post (Figure 41). The light has 6 levels of intensity including 0.

NOTICE

When installed, lighthead intensity can also be adjusted at the sterilizable focus/positioning handle or the camera cover.

CAUTION

DO NOT look directly into the surgical light or place highly reflective surfaces in the path of the light beam. There is a risk of impaired vision.

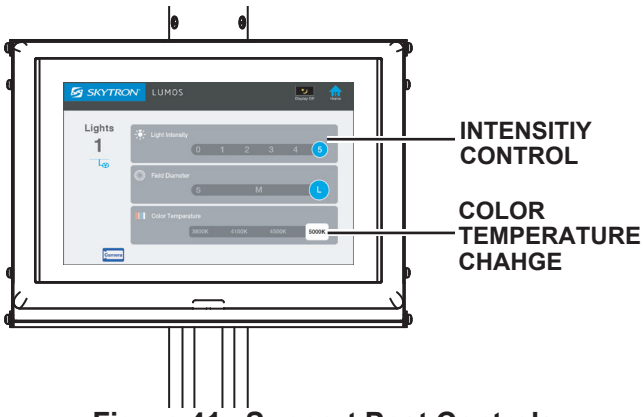


Figure 41. Support Post Controls

5. Push the desired light temperature button: 3800K, 4100K, 4500K, or 5000K
6. When the surgeon is ready to use the light, install the sterilized focus/positioning handle or camera cover.

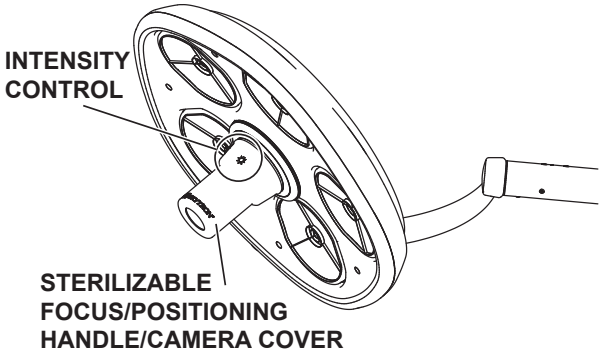


Figure 42. Sterilizable Focus/Positioning Handle

CAUTION

DO NOT use the sterilizable focus/positioning handle or camera cover on the lighthead to pull or push the stand light base. These adjustments should be done using the positioning handles on the support post.

NOTICE

The sterilizable focus/positioning handle or camera cover is provided for light positioning to be done by sterile personnel. DO NOT allow non-sterile personnel to touch the handle.

7. Insert the handle or camera cover into the engagement head.

⚠ CAUTION

Be sure the sterilizable focus/positioning handle or camera cover is properly secured before using the lighthead. An improperly installed handle or camera could fall out, resulting in possible injury to patient or surgical staff.

8. Push the handle or camera cover in until it is locked and pull the handle or camera cover outward to be certain that it is locked. To remove the handle/camera cover, push the release button and pull it out.

CAUTION

Sterilizable focus/positioning handles and camera covers are subject to normal wear and tear. Always examine them for wear or damage to ensure proper and safe operation with the surgical light.

9. Adjust the focus by moving the sterilizable focus/positioning handle or camera cover until all of the light beams converge on the surgical site forming a single bright spot of light.

7-5. Shutdown

When the light is no longer required, perform the following: turn off the power at the main switch on the rear of the base, or unplug the power cord cable.

8-1. Introduction

The LUMOS series combines flat screen monitor mounting with a Lumos surgical lighting system from a single ceiling mount:

- The LFSL5 model allows a single flat screen monitor mount to be combined with up to three separate lightheads.

The LFS radial arm allows up to 90" [2286mm] of reach for the flat screen monitor with up to 340° (max) of rotation capability at the ceiling mount. Vertical travel of up to 46" [1168mm] or 80° is provided.

Two sterilizable positioning handles (SKYTRON PN B1-530-05) are provided for final monitor positioning or for changes required during the procedure.

NOTICE

The system can support and balance a monitor weight of up to 20 pounds [9 kg]. Exceeding the weight will result in poor balance and performance.

8-2. Step-By-Step LFS Adjustment Overview

1. Position the flat screen monitor - See "Flat screen Monitor Positioning" on page 30.
2. Adjust the vertical tension - See "LFS Arm Vertical Tension Adjustment" on page 30.
3. Adjust the pitch axis - "LFS Arm Pitch Axis Adjustment" on page 31.
4. Make fine adjustments as needed - "Make Fine Adjustments as Needed" on page 31.

8-3. Flat screen Monitor Positioning

The upper radial arm of the flat screen monitor mount should be pre-positioned on the opposite side of the table from the surgeon at approximately 90° from the table center line.

The lower arm should be positioned under the upper arm. In this position, the monitor can easily be moved up or down the full length of the table without interfering with the lightheads. The monitor can be pushed up out of the way until it is needed.

Prior to the start of the procedure, the sterilizable handles can be installed on the flat screen mount. To install a sterilizable handle, simply insert it into the receptacle and turn clockwise until tight.

8-4. LFS Arm Vertical Tension Adjustment

Check the vertical tension adjustment of the height adjustable arm for its capacity to support the flatscreen monitor throughout its range of motion. The monitor should move freely yet maintain its selected position without drifting. If the monitor drifts, adjust the vertical tension as follows (Figure 43):

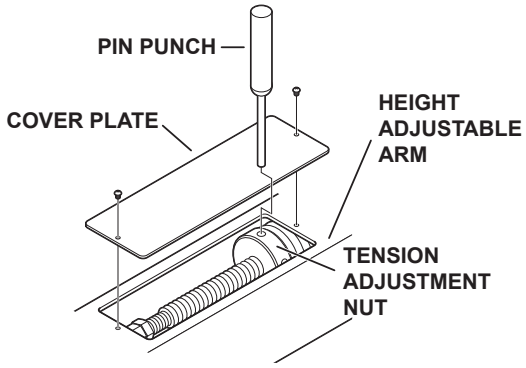


Figure 43. Vertical Tension Adjustment

5. Remove two (2) screws securing the cover plate to the top of the height adjustable arm to access the tension adjustment nut. Set the screws and cover plate aside.
6. Insert a 1/8" (3mm) pin punch into a hole in the tension adjustment nut and turn the nut as required to achieve proper tension.
   - Turn tension adjustment nut clockwise to increase tension.
   - Turn tension adjustment nut counter-clockwise to decrease tension.
7. When the adjustment is complete, replace the access cover using the two (2) screws removed in Step **1**.

8-5. LFS Arm Pitch Axis Adjustment

Check the adjustment for the flatscreen monitor pitch axis. The monitor should move freely yet maintain its selected position without drifting. If the monitor drifts, adjust the pitch axis tension as follows:

If a coarse adjustment is needed (Figure 44):

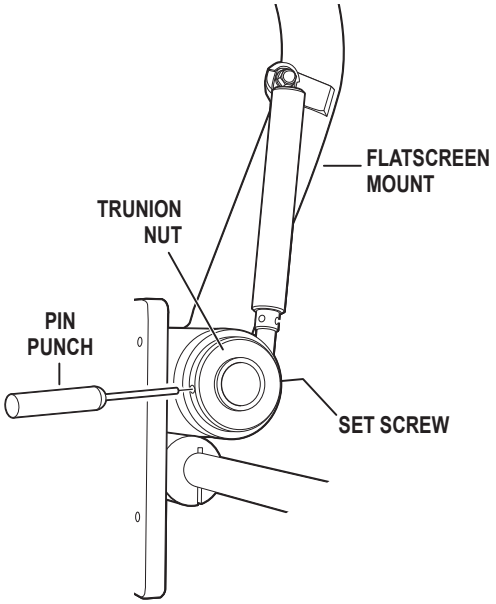


Figure 44. Pitch Axis (Coarse Adjustment)

1. Loosen the set screw on the trunnion nut.
2. Insert 1/8" (3mm) pin punch in the hole opposite the set screw location and adjust the trunnion nut as required.
   - Turn trunnion nut clockwise to increase tension.
   - Turn trunnion nut counterclockwise to decrease tension.
3. Re-tighten the set screw on the trunnion nut when the adjustment is complete.

8-6. Make Fine Adjustments as Needed

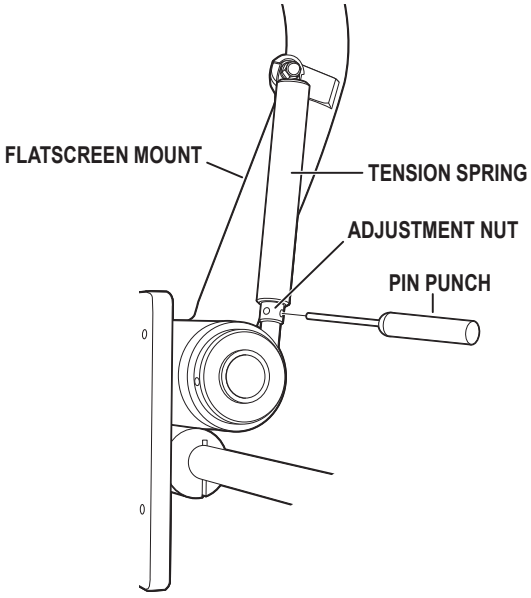


Figure 45. Pitch Axis (Fine Adjustment)

1. Rotate the monitor downward until the adjustment nut is visible on the tension spring assembly.
2. Use a pin punch to turn the adjustment nut until proper tension is achieved.
   - Turn adjustment nut clockwise to increase tension.
   - Turn adjustment nut counterclockwise to decrease tension.

9-1. General

⚠ CAUTION

Due to the high output capability of the lightheads, it may be required to decrease the intensity to reduce the risk of excessive heat in the surgical site when positioning multiple lightheads together to form a single spot.

To avoid equipment damage and personal injury, use extreme care to avoid collisions with personnel and/or equipment. Damage could result to the surgical lights causing parts to fall into the surgical area.

DO NOT look directly into the surgical light or place highly reflective surfaces in the path of the light beam. There is a risk of impaired vision.

To maximize the benefit from your SKYTRON surgical lighting system, follow this guide for lighthead positioning. Personnel trained in proper lighting techniques can plan and set up the lighting arrangements prior to the arrival of the patient. Factors to consider when pre-positioning surgical lights include:

- Specific procedure to be done
- Patient position during procedure
- Position of surgical team
- Location of instrument trays or tables
- Location of IV stands
- X-ray equipment and personnel
- Anesthesia equipment and personnel
- Angulation and size of surgical cavity

9-2. Handle Locations

- Grasp the non-sterile grips found along the upper ridge of the light to move it.

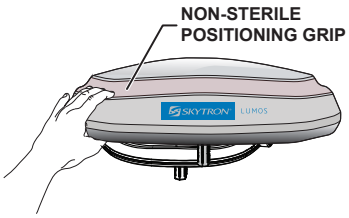


Figure 46. Side light view positioning grips

- Grasp the sterilizable handle or camera cover on the underside of the light to move it.

Figure 47. Sterilizable handle / camera cover

9-3. Surgical Table Placement

For most procedures the surgical table should be located with its center point directly under the light fixture's ceiling mount.

9-4. Pre-Positioning The Lighthead

Surgical light positioning requirements change not only from procedure to procedure, they also change from surgeon to surgeon. Final light positioning and adjustment will be directed or done directly by the surgeon.

The objective of pre-positioning is to require a minimum of final adjustments after arrival of the patient.

Use extreme care when pre-positioning lightheads. Bumping lightheads into one another, into walls, or other equipment may alter LED alignment which affects proper focus adjustment.

The lightheads can be most effectively positioned by using the following steps:

1. Grasp the sterilizable handle or the Non-Sterile grip and pull the lighthead down to shoulder height.
   - Keep the lighthead at approximately a 45° angle to easily position the support yoke.
2. Using the sterilizable handle or the Non-Sterile grip, rotate the lighthead around the vertical support until the lighthead is close to a 90° angle to the radial arm.

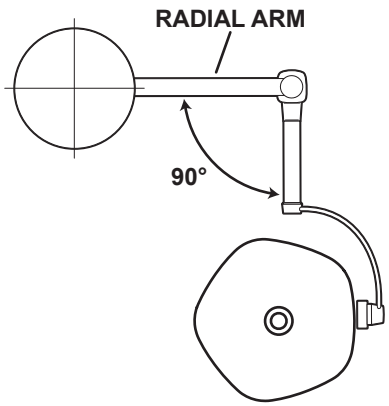


Figure 48. Pre-Positioning

3. Place the radial arm in the desired position by pushing or pulling the lighthead by the positioning handles as you walk around the surgical table.
4. See Figure 49 to approximate the desired radial arm position for locating the lighthead over the patient.

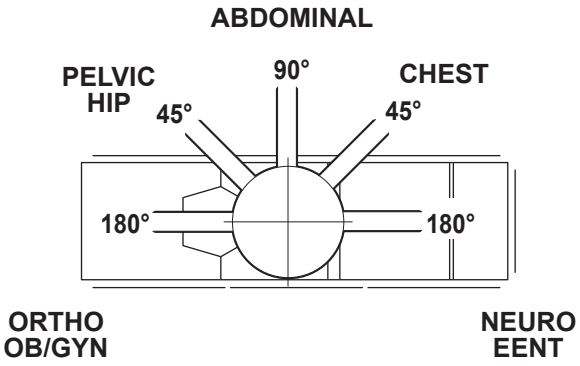


Figure 49. Main lighthead radial arm positioning

5. With the radial arm in proper position, rotate the lighthead to the desired position and install the sterilizable focus/positioning handle or sterilizable camera cover (for lightheads with Precision HD handle camera). Refer to sterilizable focus/positioning handle or sterilizable camera cover installation procedure (pg. 16).
6. Grasp the sterilizable handle or the Non-Sterile grip place the lighthead at an angle and move the lighthead to its full up position.

NOTICE

Maximum illumination, shadow reduction, and possible obstruction by the surgeon or surgical staff are also major concerns for lighthead positioning. The following examples are offered as a basic guide for lighthead placement for dual lighthead or triple lighthead fixtures. Ancillary equipment must be positioned so it does not obstruct the lighthead(s) in any way.

9-4-1. Neurosurgical, Head, and Neck

For Neurosurgical, head, and neck illumination, position the radial arm parallel for lighthead 1 to the table center line (Figure 50).

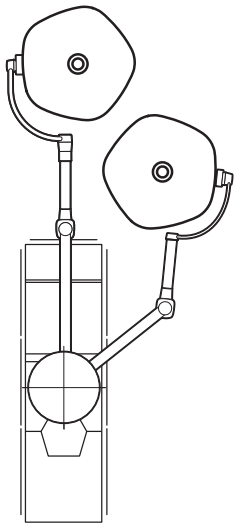


Figure 50. Positioning for head and neck

Position the lighthead behind the surgeon. Tilt the lighthead to the desired position using pitch axis movement. This will allow the multiple light sources of the lighthead to pass around the head and shoulders of the surgeon and at the same time permit adequate head clearance for the surgeon.

Tilt the lighthead to position the focus control knob where it can be easily reached by non-sterile personnel.

Position lighthead 2 to the left or right according to surgeon preference. This allows a second light source to come from another angle which will help eliminate obstructions or shadows.

9-4-2. Torso Area

For most chest and abdominal procedures, position lighthead 1 directly over the surgical site (Figure 51).

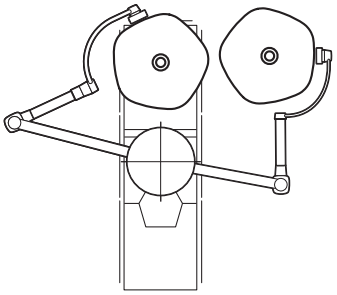


Figure 51. Positioning for torso area

Position the radial arm on approximately a 45° angle from the surgical table center line. This position will locate the sterilizable focus/positioning handle or camera cover on the lighthead where it can easily be reached by the surgeon. Position lighthead 2, depending on lighting needs, to augment lighthead 1.

In some cases, such as cholecystectomies and total abdominal hysterectomies, the surgical cavity may be angled. In cases such as this, lighthead 1 should be angled so that the face of the lighthead is perpendicular to the bottom of the surgical cavity (Figure 52).

Figure 52. Positioning for torso area (angled surgical cavity)

Some procedures, such as hip procedures, require both lightheads to be on the same side of the table for greater lateral illumination (Figure 53).

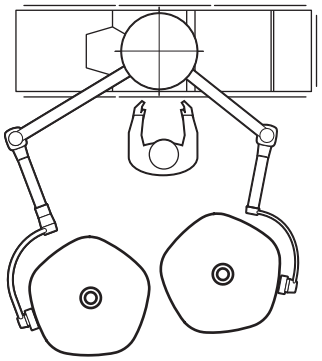


Figure 53. Torso area positioning (hip procedures)

In this position the lightheads are behind and adjusted to project light over the head and shoulders of the surgeon. Both lightheads are easily reached for adjustment by non-sterile personnel.

9-4-3. Perineum

Lighthead 1 should be positioned at the end of the table for perineal procedures (Figure 54). Locate the radial arm directly in line with the center line of the table. Once the surgeon has assumed a seated position, the lighthead can be pulled down, angled, and adjusted to provide the necessary illumination over the surgeon's head and shoulders.

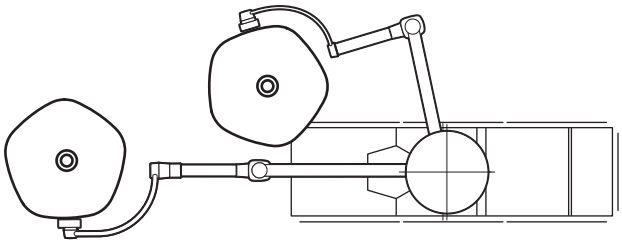


Figure 54. Perineum positioning

Lighthead 2 should be positioned approximately 90° from the other radial arm. Position lighthead 2 to the right or left of lighthead 1 according to surgeon preference.

9-5. Triple Lighthead Positioning

There are two basic positioning strategies that can be used to obtain the best illumination possible.

- The first is to align all three lightheads to the center line of the table.
- The second is to cluster the lights in a circular arrangement over the surgical site with each lighthead about 120° away from each other.

The whole cluster should be positioned to minimize interference with the head and shoulders of the surgical staff.

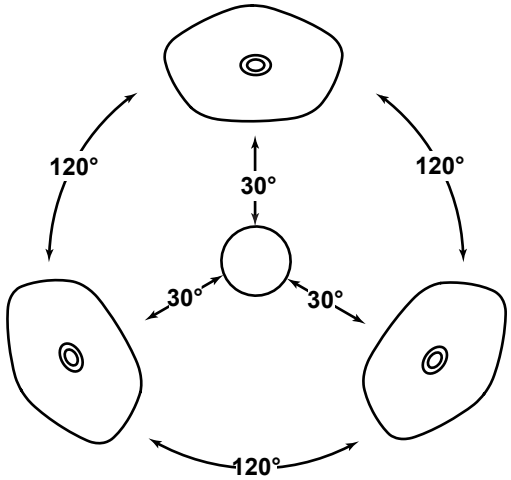


Figure 55. Positioning triple lightheads

When an angled cavity is to be illuminated, at least one of the lightheads should be positioned to be perpendicular to the bottom of the cavity.

For head and perineal work, the lights should be positioned as they would for a dual system but with a satellite on each side of the surgeon.

For most surgical procedures the lighthead will be properly focused with all the light beams converged in one spot at the bottom of the surgical cavity.

9-6. Other Illumination Considerations

Close attention to surgical light intensity during the case as well as good quality general illumination in the room will help to minimize eye fatigue of surgical personnel.

10-1. Cleaning and Disinfecting the Lighthead and Touch Panel

It is required practice to maintain the appearance and function of your Lumos Series lighting fixture by the means of daily cleaning practices. Moving parts and their respective finishes will perform optimally when they are routinely cleaned and dirt or corrosion are removed routinely to avoid build up which may restrict articulation and prohibit ease of movement.

⚠ WARNING

To avoid personal injury, DO NOT attempt to clean lighthead, camera head, or wall control unless power is turned off at wall control (power cord disconnected for portable stand light).

CAUTION

Do not press hard on the LCD screen or it will crack.

DO NOT use steam, extremely hot water (over 150°F [65°C]), or high pressure water sprays to clean the equipment.

7. Daily or between cases, the lighthead exterior, camera head, and wall control should be wiped down with a mild cleaning agent which will not affect the painted or acrylic parts.

CAUTION

DO NOT pour any liquids directly on the fixture or wall control.

DO NOT apply or spray cleaning agents directly on the lighthead, camera head, or wall control.

⚠ CAUTION

Use of incompatible cleaning agents will cause damage to the fixture. Avoid the use of cleaning solutions which contain high concentrations of alcohol, ethylene glycol, phenol, iodophors, or glutaraldehyde based disinfectants. Staining, pitting, discoloration and diffuser cracking or personal injury may occur if these are used.

8. Avoid using spray cleaners. Avoid the application of cleaners using methods that produce extreme saturation. Leakage of fluids into the interior of the lighthead, camera head, or wall control may cause corrosion of electrical components.

10-1-1. General Cleaning Instructions

- ***Painted Surfaces:*** Wipe exterior painted surfaces with a cloth dampened with a mild cleaning agent and dried with a soft, lint-free cloth. DO NOT use harsh cleaners on painted surfaces.
- ***Stains:*** Most stains can be prevented by immediately removing the liquid or substance.
- ***Rubber and Plastic Components:*** Clean rubber moldings, grips, covers, and plastic handles with a mild soap and water solution. Rinse with clear water and dry with a soft, lint-free cloth.

10-1-2. Disinfecting Instructions

Ensure the power has been turned off to the light unit. Only use disinfectant products that are certified from the manufacturer for compatibility with the following materials:

- Acrylic
- Silicones
- Stainless Steel

Always consult with the manufacturer of the disinfectant product for proper application and use. Always spot test on an inconspicuous area before use.

In Between Case Disinfection:

1. Clean all areas where gross debris is evident. Surfaces should be wiped with a disinfecting agent on a wipe in accordance with the manufacturer's instructions.
2. After the disinfecting agent has been allowed the required contact time, wipe the acrylic diffuser surface with a clean, dry cloth to remove residue and prevent staining.

Special Precaution Case Disinfection / Daily Terminal Cleaning:

1. Clean all areas where gross debris is evident. Surfaces should be wiped with a disinfecting agent containing a 1:10 dilution of bleach solution applied on a wipe in accordance with the manufacturer's instructions for use.
2. After the disinfecting agent has been allowed the required contact time, wipe the acrylic diffuser surface surfaces with a clean, dry cloth to remove residue and prevent staining.

10-2. HD Camera Cleaning Instructions

1. Remove the camera from the lighthead - hold it while pressing the release button.
2. Wipe the camera body with a mild cleaning solution and a cloth, then wipe dry with a clean dry cloth. Avoid wiping the diffuser unless necessary.
3. Use a clean lint-free cloth to remove dust, dirt, and other particles from the lens. Then use compressed air to blow away small dust particles. DO NOT use sprays.
4. Insert the camera into the lighthead and slightly twist it clockwise to fully lock. Pull down on the camera to ensure it is secure.

10-3. Sterilization

The sterilizable center focus and positioning handles and camera covers for the Skytron surgical lights are made of heat and impact resistant plastic that will stand up to the rigors of manual washing, mechanical washers, and sterilization equipment.

The following cleaning methods are based on AAMI/ISO guidelines for reusable medical devices to assure that health care facilities properly and safely reprocess the devices.

⚠ WARNING

An improperly cleaned device may inhibit the ability of the sterilization process to achieve the proper sterility assurance.

Always follow OSHA/EASHW blood-borne pathogens standards for protective clothing, including gloves, masks, and eye protection when cleaning the handles and camera covers.

Always adhere to the correct AAMI and enzymatic cleaning manufacturer's recommendations.

10-3-1. Manual Cleaning Procedure

1. Rinse each individual item under cold tap water for one minute.
2. Prepare enzymatic cleaning solution according to manufacturer's instructions.
3. Soak in cleaning solution according to manufacturer's instructions.
4. Clean each individual item while submerged, with a soft bristle brush for one minute.
5. Rinse each individual item under cold tap water for one minute.
6. Dry thoroughly using a soft, lint free cloth.
7. Visually inspect for remaining debris.
8. Visually inspect for cracks or other visible damage and removed from service if any defect is present.

10-3-2. Mechanical Cleaning Procedure

1. Manually clean the items prior to mechanically cleaning.
2. Place manually the washed items in the washer tray.
3. Place the tray into the washer.
4. Follow the supplier's instructions for the enzymatic cleaner and neutral detergent for mechanical washer cycle parameters.
5. Visually inspect for remaining debris.
6. Visually inspect for cracks or other visible damage and removed from service if any defect is present.

10-3-3. Steam Pre Vacuum Procedure

1. Manually and mechanically clean items before sterilizing them with the steam pre Vacuum procedure.
2. Load items into an approved sealable container.
3. Load the container into the sterilizer.
4. Run the sterilization cycle at 270°F [132°C] for four minutes.
5. Visually inspect for remaining debris.
6. Visually inspect for cracks or other visible damage and removed from service if any defect is present.

10-4. Ultraviolet (UV) Radiation

Surface disinfection of surfaces using UV-C radiation devices can cause damage to the optical acrylic diffusers resulting in discoloration, opacity, surface cracks, and crazing. Discoloration of fixture construction materials and finishes may also occur from heavy concentrations and prolonged usage. Consult with the UV-C radiation device for proper material compatibility.

If UV-C radiation devices are in use, the following precautions will reduce the likelihood of damages:

1. Follow the above instructions in 10-1 for disinfecting the acrylic diffuser.

2. Rotate the light fixture so the polycarbonate diffuser is facing the ceiling prior to turning on the UV-C radiation device.
3. DO NOT place the UV-C device directly under the OR light. Ensure the recommended distance from source to surface is followed.

10-5. Operator Maintenance

CAUTION

If the equipment emits unusual noises during operation, stop using it and contact a SKYTRON service representative.

The design of the Lumos Series lighting fixture and camera system does not utilize internal user serviceable parts. Service must be performed by SKYTRON authorized service technicians using SKYTRON authorized replacement parts and service techniques.

10-5-1. User Inspections

User's are responsible for the thorough inspection of the equipment prior to and after each use. Should any problems or deficiencies arise, the results must be reported to the facilities maintenance personnel. The safety of personnel and patients relies on the proper and routine maintenance of this equipment.

User performed inspections prior to and after each use should observe for the following conditions or problems and report to the SKYTRON authorized representative.

- Missing warning or usage labels
- Excessive wear, gouges, damaged handles, missing covers, and other physical problems
- Drifting out of position
- Difficulty during routine positioning requiring excessive push/pull force
- Missing or loose screws and fasteners
- Electrical burns
- Evidence of high temperature traces indicating a possible concentration of heat
- Accumulation of lint
- Evidence of ingress of fluid

10-6. Troubleshooting

When attempting to troubleshoot a light malfunction, first determine if the malfunction is electrical or mechanical, then use the appropriate chart to help determine the cause of the malfunction. Corrective actions requiring light fixture repairs, replacement, and adjustment must be performed by SKYTRON authorized service technicians.

10-6-1. Electrical Malfunctions

Problem	Possible Cause	Corrective Action
Lighthead will not operate	Circuit breaker is off.	Turn on the circuit breaker.
	MAIN POWER switch at wall control is in the OFF position.	Place MAIN POWER switch in ON position.
	The power supply / mobile stand base safety fuse is blown*.	Contact SKYTRON representative.
Light flickers	Note articulation process and the component within the fixture being positioned	Contact SKYTRON representative.
	Brush block or slip ring contractor worn or damaged.	Contact SKYTRON representative.
	Loose or broken conductor in lighting fixture.	Contact SKYTRON representative.
	Nearby device generating EMC energy which disrupts lighting fixture.	Relocate nearby device or light fixture so they are out of range of the EMC source.
Light does not function on desired intensity level	Damaged LCD Wall Control.	Contact SKYTRON representative.
	Defective lighthead control printed circuit board (PCB).	Contact SKYTRON representative.
Light intensity status indicator on a light intensity control touch pad fails to illuminate	Damaged light intensity control membrane touch pad.	Contact SKYTRON representative.
	Defective lighthead control printed circuit board (PCB).	Contact SKYTRON representative.
Low light output intensity or poor beam pattern	Lighthead supply voltage is low.	Contact SKYTRON representative.
	Lighthead has exceeded 40,000 hours of useful LED life.	Contact SKYTRON representative.
	Focus mechanism and focus pattern out of adjustment.	Contact SKYTRON representative.
	Damaged acrylic diffuser assembly.	Contact SKYTRON representative.

10-6-2. Mechanical Malfunctions

Problem	Possible Cause	Corrective Action
Suspension arms drift up or down	Sterilizable focus/positioning handle, camera unit, and/or sterilizable camera cover not installed.	Install sterilizable focus/positioning handle, camera unit, and/or sterilizable camera cover as required.
	Balance mechanism spring is out of adjustment.	Contact SKYTRON representative.
Fixture components drift out of position	Fixture mounting plate is not level.	Contact SKYTRON representative.
	Axis friction is out of adjustment.	Contact SKYTRON representative.

*Turn main power switch off (disconnect power cord on portable stand light) prior to replacing fuse. Replace fuse with 3.15A 250V size 5 x 20, time lag only.

10-7. Maintenance Procedures

Maintenance procedures should be done semi-annually or sooner as needed. This device requires periodic inspection administered by a SKYTRON authorized service representative.

a. All attaching hardware (e.g., screws, nuts) should be physically checked for tightness. Any missing hardware MUST be replaced.

b. Rotate the radial arm assembly around the ceiling mount to check for proper operation and the ability of the arm to remain in any position through the entire range of movement.

10-8. Routine Inspections

- Inspect MAIN POWER ON/OFF switch operation, LCD Controller operation, and handle/camera cover intensity control operation.
- Articulate the balance mechanism and rotate each articulation point while observing for lighthead function.
- Inspect operation of the sterilizable focus/positioning handle and camera cover.
- Inspect acrylic diffuser for damage or scratches.
- Clean and disinfect according to cleaning instructions.

10-9. Portable Stand Model Inspections

- Inspect caster/wheel assembly for excessive wear or damage.
- Inspect balance mechanism and support post connection point and Phillips screw fasteners. Observe any play or movement in the joint.
- Inspect support post and base hardware. Inspect rigidity of attachment point.
- Inspect power cord assembly. Avoid use if any damage is evident.
- Inspect positioning handles on support post.

10-10. Preventive Maintenance

Required maintenance must be performed by SKYTRON authorized service technicians using SKYTRON authorized replacement parts and service techniques.

SKYTRON Service Manuals are available upon request; however, non-authorized service personnel are required to complete applicable service training. For a syllabus, schedule, availability, cost and overview, log onto www.skytron.com and click TRAINING. If interested in attending a training session, contact your SKYTRON representative for sponsorship.

To obtain SKYTRON authorized service or preventive maintenance contracts, contact your nearest SKYTRON representative.

The specific items listed in the MAINTENANCE MATRIX (below) must be inspected and repaired or replaced as necessary. The suggested time intervals are intended as a guideline only and actual maintenance will vary by use and conditions. For optimal usage, safety, and longevity of the product, have it serviced only by a SKYTRON authorized service representative using SKYTRON authorized replacement parts and service techniques.

MAINTENANCE MATRIX

Component	6 Months	1 Year
Mounting Plate Hardware (Tighten/Torque)		X
Mounting Plate Level		X
Inspect Electrical Connections at Mounting Plate		X
Covers & Hardware	X	
Positioning Handle / Camera Cover		X
Overall Aesthetic Condition	X	
Product Caution & Warning Labels		X
Friction Brake Settings	X	
Camera Function (if applicable)	X	
Stand Model:		
Caster Wheel(s)	X	
Power Cord Assembly	X	
Fixture Ground Test	X	

The LEDs will operate approximately 40,000 hours before illuminance degrades to a level requiring replacement. The useful life will range between 7-10 years. Continued use of the surgical luminare after the expected operating life expectancy will result in diminished illuminance values, reducing intensity and affecting color temperature.

10-11. End of Useful Life and Disposal

The end of the useful life for the SKYTRON surgical light is 10 years under normal operating conditions, service parts are available for this period.

Please contact your SKYTRON authorized representative for disposal of surgical light products or parts in accordance with current environmental regulations for medical products.

10-12. Environmental Protection

WARNING

California Proposition 65 Warning: This product may contain a chemical known to the State of California to cause cancer, or birth defects, or reproductive harm.

Ensure the proper disposal methods whenever disposing of old or damaged surgical light parts. Always follow compliance to regulatory standards pertaining to federal, state, and local regulations.

Part Number	Description
B1-530-40	Sterilizable positioning handle
B1-725-56	Precision HD camera
B1-530-50	Sterilizable camera cover for Precision HD camera

SECTION 12. OPTICAL CHARACTERISTICS

Lighthead Model Color Temperature		L5 @3800K	L5 @4100K	L5 @4500K	L5 @5000K
Central Illumination (Lux)		160,000	160,000	160,000	160,000
Light Diameter d_{50}	Lg. Spot Size	160.8 mm			
	Mid. Spot Size	122 mm			
	Sm. Spot Size	65.75 mm			
Light Diameter d_{10}	Lg. Spot Size	216 mm			
	Mid. Spot Size	160.5 mm			
	Sm. Spot Size	99.8 mm			
Ratio of Irradiance to Illuminance	Lg. Spot Size	3.8	3.64	3.64	3.64
	Mid. Spot Size	3.69	3.63	3.63	3.63
	Sm. Spot Size	3.8	3.7	3.7	3.7
Total Irradiance	Lg. Spot Size	607.8	581.7	581.7	581.7
	Mid. Spot Size	590.3	580.3	580.3	580.3
	Sm. Spot Size	606.9	592.7	592.7	592.7
UV Energy (200-400)	Lg. Spot Size	0.0044	0.0059	0.0059	0.0059
	Mid. Spot Size	0.005	0.0058	0.0058	0.0058
	Sm. Spot Size	0.0043	0.006	0.006	0.006
Color Temp		3800	4100	4500	5000
Chromacicity Coordinates	X	0.3857	0.3743	0.3611	0.3481
	Y	0.3651	0.3588	0.3513	0.3439
CRI		95		96	
No. 9		84	83		86
L1 (mm)	Lg. Spot Size	384			
	Mid. Spot Size	295			
	Sm. Spot Size	150			
L2 (mm)	Lg. Spot Size	230			
	Mid. Spot Size	199			
	Sm. Spot Size	150			
Depth of Illumination (mm)	Lg. Spot Size	578			
	Mid. Spot Size	494			
	Sm. Spot Size	300			
L1 W/Focus (mm)	Lg. Spot Size	550			
	Mid. Spot Size	520			
	Sm. Spot Size	223			
L2 W/Focus (mm)	Lg. Spot Size	283			
	Mid. Spot Size	282			
	Sm. Spot Size	312			
Depth of Illumination W/Focus (mm)	Lg. Spot Size	833			
	Mid. Spot Size	802			
	Sm. Spot Size	535			
One Mask	Lg. Spot Size	63%			
	Mid. Spot Size	64%			
	Sm. Spot Size	64%			
Two Masks	Lg. Spot Size	46%			
	Mid. Spot Size	47%			
	Sm. Spot Size	48%			
Tube	Lg. Spot Size	90%			
	Mid. Spot Size	92%			
	Sm. Spot Size	92%			
Tube and One Mask	Lg. Spot Size	52%			
	Mid. Spot Size	54%			
	Sm. Spot Size	54%			
Tube and Two Masks	Lg. Spot Size	40%			
	Mid. Spot Size	43%			
	Sm. Spot Size	44%			

E_C Illuminance at 1 meter distance from light source without obstruction.

E_e E_e is the measure of radiant power over a specified area. It is expressed in watts per square meter [W/m^2]

d_{10} Diameter of a circle around the light field center (point of Illuminance) where the Illuminance reaches 10% of E_C.

d_{50} Diameter of a circle around the light field center (point of Illuminance) where the Illuminance reaches 50% of E_C.

Electromagnetic Compatibility (EMC)

Although this equipment conforms to the intent of the 2004/108/EC EMC Directive, all medical equipment may produce electromagnetic interference or be susceptible to electromagnetic interference. The following are guidance and manufacturer's declarations regarding EMC for the Lumos Light.

- The Lumos Light needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the following pages.

WARNING

This equipment/system is intended for use by healthcare professionals only. As with all electrical medical equipment, this equipment may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures such as re-orienting or relocating the Lumos Light unit or shielding the location.

- Portable and Mobile RF communications equipment can affect the performance of the Lumos Light. Please use the guidelines and recommendations specified in Tables 4 and 6 (IEC 60601-1-2, Edition 4.0).
- Other Medical Equipment or Systems can produce electromagnetic emissions and therefore can interfere with the functionality of the Lumos Light. The Lumos Light should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the Lumos Light should initially be observed to verify normal operation in the configuration in which it will be used.
- The electrical cables, external power supplies, and accessories listed or referenced in this manual have been shown to comply with the test requirements listed in the following tables. Care should be taken to use only manufacturer-recommended cables, power supplies, and electrical accessories with the Lumos Light. If a third-party supplier offers cables, external power supplies, and electrical accessories for use with the Lumos Light and they are not listed or referenced in this manual, it is the responsibility of that third-party supplier to determine compliance with the standards and tests in the following tables.
- The use of electrical cables and accessories other than those specified in this manual or referenced documents may result in increased electromagnetic emissions from the Lumos Light or decreased electromagnetic immunity of the Lumos Light.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
The Lumos Light is intended for use in the electromagnetic environment specified below. The customer or the user of the Lumos Light should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF Emissions CISPR 11/EN 55011	Group 1	The Lumos Light 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.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
RF Emissions CISPR 11/EN 55011	Class A	The Lumos Light is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. **WARNING: This equipment/system is intended for use by healthcare professionals only. This equipment/ system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the Lumos Light or shielding the location.**
Harmonic Emissions IEC/EN 61000-3-2	PASS	
Flicker Emissions IEC/EN 61000-3-3	PASS	

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and Lumos Lights

The Lumos Light is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Lumos Lights can help prevent electromagnetic interference by maintaining a minimum distance between the portable and mobile RF communications equipment (transmitters) and the Lumos Lights as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter in watts (W)	**Separation distance according to frequency of transmitter (m)**		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance ***d*** in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where ***P*** is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.
NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and Manufacturer's Declaration – Immunity All ME Equipment and ME Systems

Guidance and Manufacturer's Declaration – Immunity

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

Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment Guidance**
ESD IEC/EN 61000-4-2	±8kV Contact ±15kV Air	±8kV Contact ±15kV Air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the r/h should be at least 30%
EFT IEC/EN 61000-4-4	±2kV Mains ±1kV I/O's	±2kV Mains ±1kV I/O's	Mains power quality should be that of a typical commercial or hospital environment.

Guidance and Manufacturer's Declaration – Immunity All ME Equipment and ME Systems			
Guidance and Manufacturer's Declaration – Immunity			
Surge IEC/EN 61000-4-5	±1kV Differential ±2kV Common	±1kV Differential ±2kV Common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage Dips/ Dropout IEC/EN 61000-4-11	>95% Dip for 0.5 Cycle >95% Dip for 1 Cycle 30% Dip for 25/30 Cycles >95% Dip for 250/300 Cycles	>95% Dip for 0.5 Cycle >95% Dip for 1 Cycle 30% Dip for 25/30 Cycles >95% Dip for 250/300 Cycles	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Lumos requires continued operation during power mains interruptions, it is recommended that the Lumos be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) Magnetic Field IEC/EN 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be that of a typical commercial or hospital environment.
Note: U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and Manufacturer's Declaration – Immunity ME Equipment and ME Systems			
Guidance and Manufacturer's Declaration – Immunity			
The Lumos Light is intended for use in the electromagnetic environment specified below. The customer or the user of the Lumos Light should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Intended Electromagnetic Environment**
Conducted RF IEC/EN 61000-4-6	3 V 0.15 MHz-80 MHz 6 V1) in ISM between 0.15 MHz and 80 MHz2) 80 % AM at 1 kHz	3 V 0.15 MHz-80 MHz 6 V1) in ISM between 0.15 MHz and 80 MHz2) 80 % AM at 1 kHz	PROFESSIONAL HEALTHCARE FACILITY ENVIRONMENT
Radiated RF IEC/EN 61000-4-3	3 V/m 80 MHz – 2.7 GHz 80 % AM at 1 kHz	3 V/m 80 MHz – 2.7 GHz 80 % AM at 1 kHz	PROFESSIONAL HEALTHCARE FACILITY ENVIRONMENT
1) r.m.s. before modulation is applied. **2) The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz**.			

Guidance and Manufacturer's Declaration – Immunity to RF wireless communications equipment ME Equipment and ME Systems
Guidance and Manufacturer's Declaration – Immunity
The Lumos Light is intended for use in the electromagnetic environment specified below. The customer or the user of the Lumos Light should assure that it is used in such an environment.

Test Frequency	Band [1]	Service [1]	Modulation [2]	Maximum Power	Distance	Immunity Test Level
MHz	MHz			W	Meters	(V/m)
385	380 - 390	TETRA 400	Pulse modulation [2] 18 Hz	1.8	0.3	27
450	430 - 470	GMRS 460, FRS 460	FM [3] ± 5 kHz deviation 1 kHz sine	2	0.3	28
710 745 780	704 - 787	LTE Band 13, 17	Pulse modulation [2] 217 Hz	0.2	0.3	9
810 870 930	800 - 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation [2] 18 Hz	2	0.3	28
1720 1845 1970	1700 - 1900	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation [2] 217 Hz	2	0.3	28
2450	2400 - 2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation [2] 217 Hz	2	0.3	28
5240 5500 5785	5100 - 5800	WLAN 802.11a/n	Pulse modulation [2] 217 Hz	0.2	0.3	9

NOTE If necessary to achieve the IMMUNITY TEST LEVEL, the distance between the transmitting antenna and the ME EQUIPMENT or ME SYSTEM may be reduced to 1 m. The 1 m test distance is permitted by IEC 61000-4-3.

[1] For some services, only the uplink frequencies are included.

[2] The carrier shall be modulated using a 50 % duty cycle square wave signal.

[3] As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

Date	Revision	Revision History
03/08/2022	0	Initial Release

5085 Corporate Exchange Blvd. S.E.
Grand Rapids, MI 49512 • 616.656.2900 • FAX 616.656.2906