

Nuvo Surgical Light

User, Installation, & Maintenance Manual

Model V1350 Series



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Nuvo Surgical Light

User, Installation & Maintenance Manual

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Additional copies of this manual can be obtained from Nuvo.

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1.0 User Information

Intended Use

The Nuvo Surgical Light is intended to provide a field of illumination in surgical, diagnosis or treatment applications. The single light head configuration is intended for minor surgical, diagnosis, and/or treatment applications and may be used in the situation where the treatment or procedure can be interrupted. The dual and triple light head configurations may be used in operating rooms for all surgical applications and where a fail safe condition is required; alternatively, two singles, or a dual plus a single, are often installed.

Introduction

This manual provides the information required for normal operation of the Nuvo Surgical Light from Nuvo. Before operating the Nuvo Surgical Light, be sure that you have read and understood in detail the contents of this manual. It is important that you read and strictly adhere to the aspects of safety contained in this manual.

Product Overview



Positioning

Suspension arms rotate continuously
Lighthead rotates continuously
Sterile Handle Control
Drift free positioning
Reduction of visual Clutter
Minimal airflow disturbance

Illumination Performance

Lighting control from inside the sterile field
Computer modeled reflector
Shadow-free Illumination
Excellent color rendition
Low heat output

Maintenance Features

Built-in backup lighting
Spare bulb storage in wall control box
Sterile Handle Control is easily sterilizeable.

Positioning

The Nuvo Surgical Light provides the surgeon with a suspension system that is perfectly balanced and can be guided effortlessly into any position.

The upper and lower suspension arms can rotate continuously around the ceiling mount. The longer upper arm allows both arms to be positioned independently without interfering with one another.

The counterbalance arms also rotate continuously around their vertical extensions. These extension pieces are custom sized according to the ceiling height, assuring adequate head clearance.

The yoke assembly, which holds the light head, turns continuously around the end of the counterbalance arm. The light head pivots 320° inside the arms of the yoke.

The combination of these individual elements allows medical personnel to move the light freely into an infinite variety of positions using only slight pressure on the Sterile Handle Control. Once positioned, the system remains stable, without drifting, allowing focus to remain where it belongs...on the patient.



Illumination Performance

- The Sterile Handle Control gives the user full command of the Nuvo Surgical Light. Positioning, intensity, and pattern size can all be easily controlled from *inside the sterile field*. A second set of intensity controls is conveniently located on a wall mounted panel.
- The Nuvo Surgical Light's compact, 23" (58.4 cm) diameter light head combination provides *color-correct, shadow free illumination* well suited to a wide variety of procedures.
- The perfectly-honed inner reflective surface of the light head features 1890 reflective facets computer designed for maximum light intensity and shadow reduction.
- With the generation of so many individual light rays, a large percentage of the projected light can be blocked before any shadow is evident.
- Deep cavity illumination negates the need to refocus midway through a procedure. The minimum depth of field, without refocusing, is 20" (50.8 cm).
- Each light head delivers 137,000 lux (12700 foot candles) and the color temperature of the lamp has been optimized at 4300°K to ensure the color clarity of the surgical site.
- The use of a custom designed IR filter reduces emitted IR to a 3.8 $\mu\text{W}/\text{cm}^2$ average. This low heat output ensures maximum comfort during long procedures.

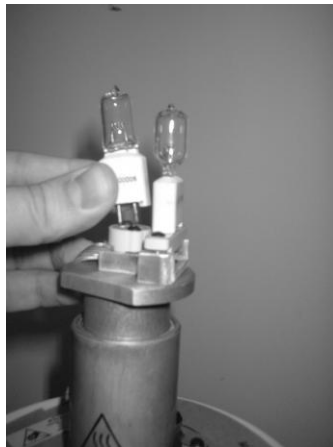
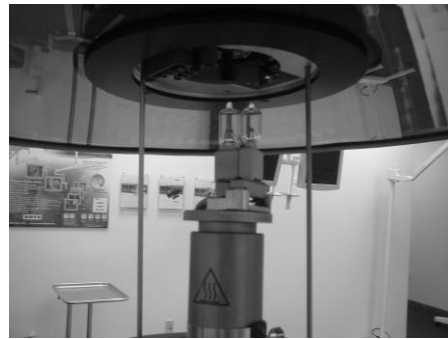


Easy Maintenance Features

Backup Lighting and Bulb Replacement

To assure that the Nuvo Surgical Light will offer peak performance on demand, each Light head is equipped with two bulbs. In the event that the primary bulb burns out during normal operation, the backup will take over immediately. The changeover happens so quickly that it is transparent to the user.

The quartz tungsten-halogen bulbs employed in the lamp provide as many as 1000 hours of uninterrupted light before they need to be replaced. Spare bulbs are conveniently housed in the wall control box. When necessary, fast, simple bulb replacement can be accomplished in minutes *between cases* and without the need for special tools.



Cleaning and Sterilization

Special attention has been given to the aesthetics of the Nuvo Surgical Light. The smooth, clean lines are visually appealing and aid in the prevention of dust particle build-up. Enhanced streamlining greatly reduces air turbulence over the surgical field.

The Sterile Handle Control is compatible with a wide range of sterile covers. It can also be easily removed for steam sterilization or cold sterilization.

Instructions for Use



WARNING:

Do not operate the light if the glass filter is broken or removed. Operation without the glass filter or with a broken glass filter could cause high levels of ultraviolet and infrared radiation resulting in injury to the patient or user.

To identify a broken glass filter, inspect for the following:

1. Changes in the light pattern.
2. Loose particles under the lens.
3. Rattling noise when moving the light.



WARNING:

Not for use in areas of explosion hazard. This apparatus is neither approved nor certified for use in areas where combustible or explosive gas mixtures are likely to occur.

The light can be turned on or off by the use of the push button located at the center of the sterilizable handle, or by the push button mounted on the wall control unit (both operate in the same order). The push button on the sterilizable handle overrides the wall control unit, thereby enabling medical personnel to operate the light in the general vicinity of the sterile area.

The push button turns the light ON/OFF, and also controls the intensity level of the light. When the light is turned on, LED's located on the side of the sterile handle collar, and on the wall control, illuminates to indicate the intensity level.

To Turn ON:

Push the button in once, and release. The blue LED's located on the side of the handle collar, and on the wall control, illuminate to indicate the intensity level.

NOTE:

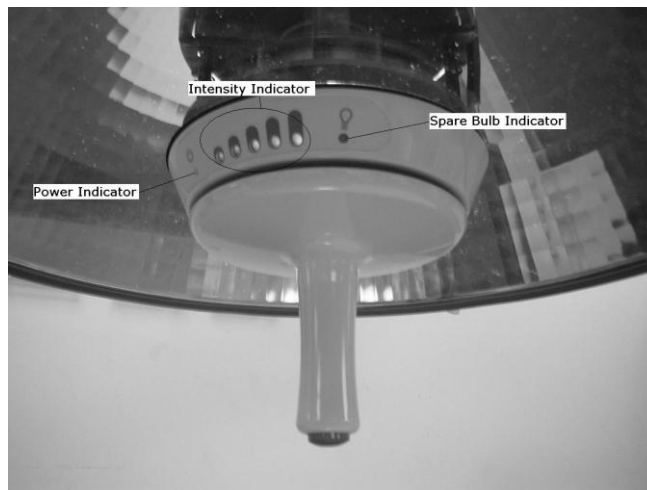
After a power outage, the light automatically comes on at the intensity level that it was at when the power was disconnected.

**To Decrease/Increase Brightness Intensity:**

Push the button in once, and release. Each time the button is pushed, the level of intensity is decreased, until only one blue LED is illuminated. The brightness intensity goes back to full intensity if the button is pushed and released again.

NOTE:

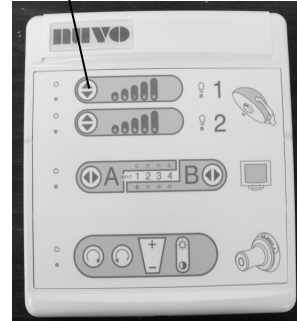
If the button is depressed and held for three seconds, the light goes off.



On / Off
Button

To Turn OFF:

Push the button in, and hold for three seconds.
The light goes off and all five blue LED's located
on the side of the handle collar go off.



To Change the Light Pattern:

Grasp the handle, and rotate clockwise
to enlarge the light pattern. Rotate
counterclockwise to reduce the light
pattern.

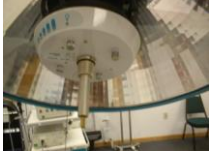




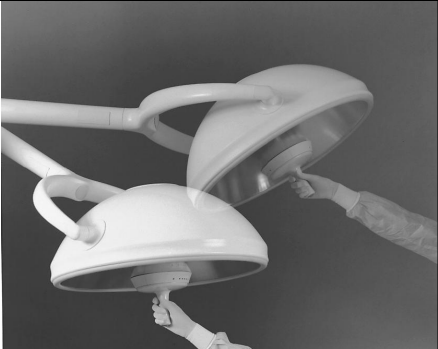
To Remove the Sterile Handle and Reinstall:

To Remove:

1. Grasp the handle, and rotate
counterclockwise. Remove handle.



<p><u>To Install:</u></p> <ol style="list-style-type: none"> 1. Inspect the O-ring for wear or aging and replace if necessary. 2. Install the handle onto the light core 3. Rotate the handle clockwise until fully seated 	 <p>Step: 1</p>	 <p>Step: 2</p>
--	--	---

<p><u>To Position the Lighthouse:</u></p> <p> CAUTION:</p> <p>Do not hang equipment or other unauthorized items on any part of the light such as the arms and yoke. This could cause the light to drift unnecessarily. Damage to equipment can occur</p>	 <p>Using Central Sterile Handle</p>
---	--

Grasp either the central sterile handle or one of the four non-sterile handles set into the lighthouse cover, and position the lighthouse assembly in the desired position. A nominal 2 lb to 4 lb (2.7 N·m to 5.4 N·m) force on either handle produces up and down movement of the suspension arm and counterbalance arm.

NOTE:

When positioned at any point, the lighthouse assembly moves quietly and smoothly throughout its range of maneuverability without drifting.



Using Non-sterile Handle

Lamps

Two quartz tungsten-halogen lamps are provided for each light head assembly. Only one lamp is energized at a time. The primary lamp is on the optical center of the light head, while the backup lamp is displaced slightly from the optical center.

Yellow spare bulb light located on the wall control and on the lamp control assembly illuminate when the primary lamp is not working. If the yellow lamp is on, replace the primary bulb as soon as possible.



CAUTION:

Use only Nuvo lamp S2Q00006. If other lamps are used, damage to equipment can occur and performance will be compromised.

Lamp Removal and Installation:



WARNING:

The lamp is HOT while in operation. Make sure sufficient time is allowed for the lamp to cool completely before removal, or personal injury can occur.



CAUTION:

Make sure the light head assembly is supported when loosening the four thumbscrews. Damage to equipment can occur if not done properly.



CAUTION:

Do **not** touch the lamp bulb. Always grasp the ceramic base, being careful not to touch the glass of the bulb. Touching the glass could result in damage to the bulb and could decrease the bulb life. If bulb is touched use alcohol pad to wipe off.

To Remove:

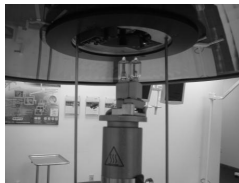
1. Grasp the sterilizable handle, and rotate counterclockwise. Remove the handle.
2. Support the light head by temporarily holding the light head assembly by the yoke or by one of the four non-sterile handles set into the light head cover.
3. Loosen the four thumb-screws from the light head assembly.
4. Gently lower the light core assembly, leaving it hanging from the four tether rods.
5. Remove and replace the lamp.



Step: 1



Step: 3



Step: 4



Step: 5

To Reinstall:

1. Raise the lamp control assembly, and secure with the four thumbscrews.
2. Inspect the O-ring for wear or aging and replace if necessary.
3. Install the handle, and rotate clockwise until fully seated. Refer to previous steps.

Cleaning/Sterilization

Cleaning: Using enzymatic detergents aids in the decontamination process. All detergents should be measured carefully and used in accordance with the manufacturer's instructions.

Care should be taken to avoid the use of cleaning materials that contain high concentrations of alcohol or chlorine as these may lead to premature aging of the lens.

Sterilization: Sterilization can be accomplished by using any FDA approved sterile liquid (USA only). In areas outside the USA, individual facility policies addressing the use of sterile liquids should be employed.

Sterilizable Handle

After every surgical operation:

- Remove the handle from the light head
- Wipe with a disposable cloth
- Clean and disinfect in a suitable cleaning and disinfecting machine
- Sterilize the handle

The sterilizable handle can be sterilized three ways:

- Cold by using cleaners recommended for hospitals and authorized by a competent health authority.
- Steam
- Flash in either gravity displacement or pre-vacuum sterilizers.

The minimum flash exposure times are shown in the following table: (Or refer to local codes / facility your procedures.)

Handle Cleaning and Sterilization

Sterilize Cycle	Temperature	Exposure Time	Dry Time
Gravity Displacement	270-274° @30psi (132-134° C @207 kPa)	4 min	1 min Flash 20-25 wrapped
Pre-Vacuum	270-274° @30psi (132-134° C @207 kPa)	4 min	1 min Flash 20-25 wrapped

The sterilized handle should only be fitted immediately before use.

NOTE:

Service Life of Sterilizable Handle: Frequent sterilization causes natural degradation to the replaceable handle. If signs of material fatigue such as cracking or discoloration occur, the handle should be replaced.

Optional Sterile Handle Covers

The sterile handle accepts the use of the Devin® LiteGlove flexible light handle cover, or equivalent products from Medical Action or DeRoyal.

To install the handle cover, take the cover from its packaging. Unfold the cover as needed. Install the cover over the sterilizable handle.

NOTE:

Care must be taken to prevent the cover from interfering with the intensity control button located on the sterilizable handle.



Handle without the cover installed.



Handle with cover installed.

1. Devin® is a registered trademark of Devin Industries, Inc.

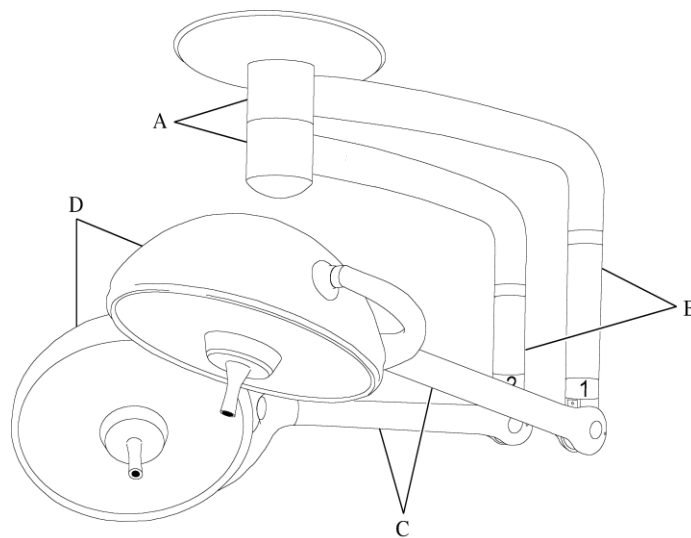
2.0 Installation of the Nuvo Surgical Light

Introduction

This part of the User, Installation & Maintenance manual describes how to install the Nuvo Surgical Light. Prior to installation, carefully read through and understand all of the installation instructions for the Nuvo Surgical Light components: the suspension arm assemblies (A), with vertical tubes (B) and the counterbalance arm assemblies (C) with lighthead/yoke assemblies (D) (see figure below), and ceiling Control / transformer Box (see figure 12 on) and Wall Control Box (see pages 20 through page 22).

This User, Installation & Maintenance manual is for all models of the Nuvo Surgical Light: 100V, 120V, 220V, and 230/240V.

Figure 2.0.1. Nuvo Surgical Light Components



WARNING:

Only facility-authorized personnel should install the Nuvo Surgical Light. Installation performed by unauthorized personnel could result in personal injury or equipment damage

NOTE:

The Nuvo surgical Light must be wired to an emergency power circuit, so in the event of power interruption, there will be a change over to emergency operation within 5 seconds

Checklist

Before installing please check the following:

- Height of finished ceiling, and floor to ceiling clearance requirements are met.
- Contractor supplied ceiling structure is installed and leveled correctly.
- Ceiling structure meets moment and vertical load requirements.
- Ceiling structure will not deflect significantly when load is applied.
- Clearance requirements for locating the control box above the finished ceiling are met.
- Conduit from the wall control box to the ceiling control box.
- Access to power is available.

NOTE:

The hole in the ceiling should not exceed 18" diameter on center of the light hub. The ceiling shroud is 20" diameter.

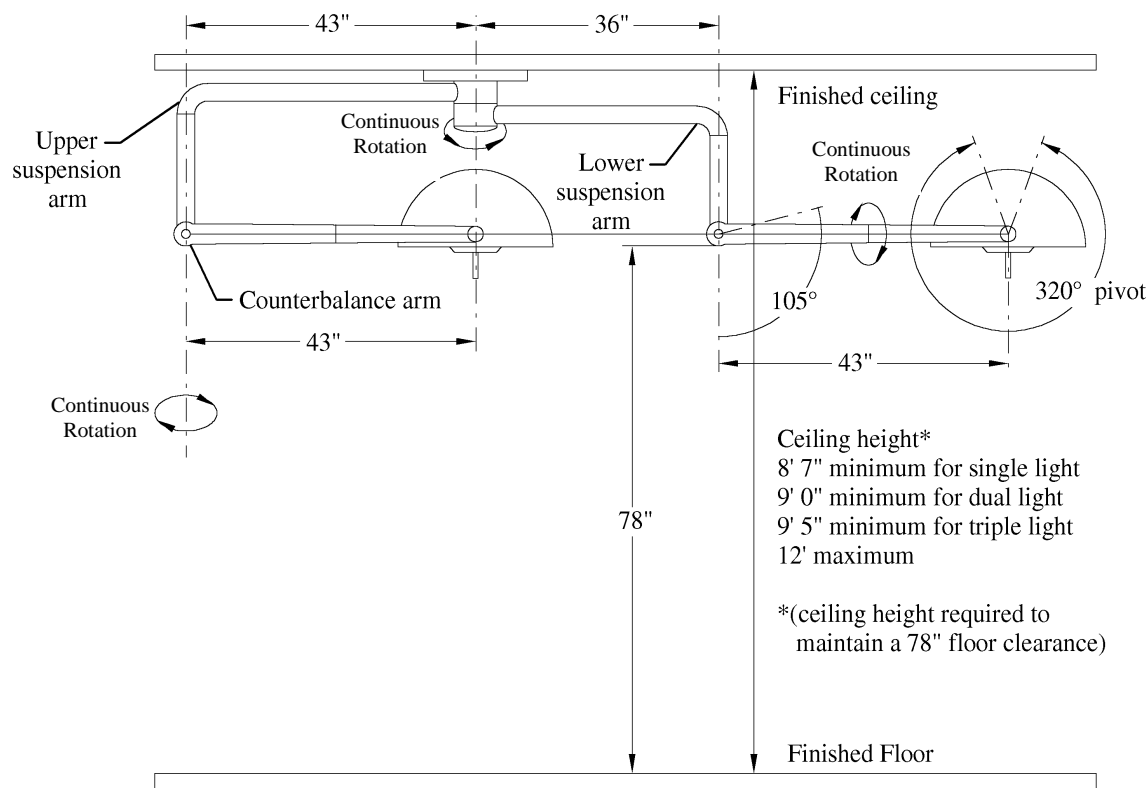
Nuvo Surgical Light Installation

Tools required:	1/2"(12.7 mm) drive ratchet	15/16"(24 mm) deep socket
	Allen™ ¹ wrench set	Phillips head screwdriver
	Precision level	Tape
	(2) Step ladders	3/4"(19 mm) wrenches
	3/4"(19 mm) deep socket	15/16"(24 mm) wrenches
	Jeweller's screwdriver	<u>True RMS Multimeter</u>
	Portable lift with blocks, 350 lb (160 kg) capacity	

¹ Allen™ is a trademark of Industrial Fasteners, Inc.

Before you install the light, check the **Clearances**.

Figure 2.02. Circular Motion Range



Conversion Table from inches to Centimeters.

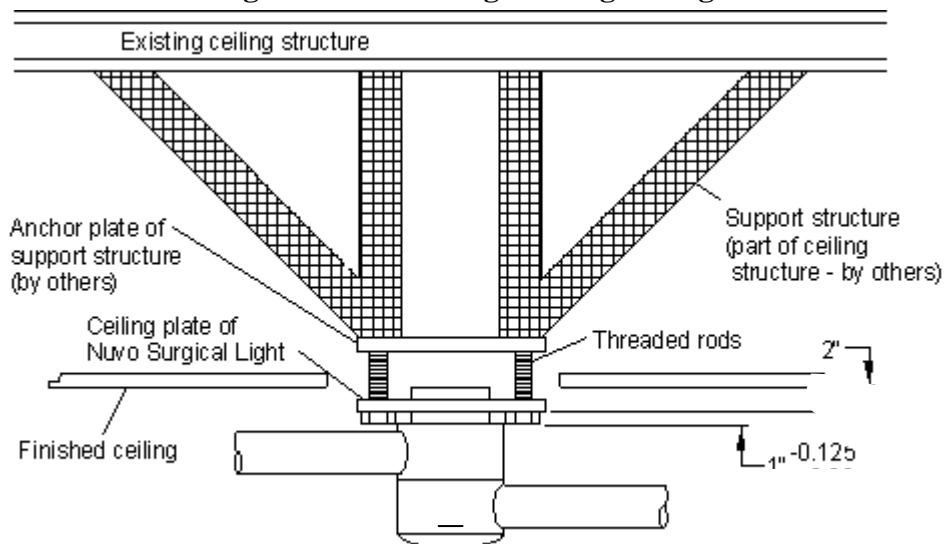
78"	= 198 cm
43"	= 109 cm
36"	= 91 cm
8' 7"	= 257 cm
9' 0"	= 274 cm
9' 5"	= 287 cm
12'	= 366 cm

2.1 Check the Ceiling Structure

Ceiling Bearing Strength

The medical facility is required to supply a ceiling structure that is capable of sustaining the load requirements for the contractor installed lighting system. To accomplish this, it may be necessary to contract with an architect and certify that the Nuvo Surgical Light can be installed safely. The following table shows calculated worst case load conditions for mounting single, dual, and triple lighthead configurations. Worst case is defined as having all arm, monitor, and lighthead assemblies on the same side of the ceiling plate with the lightheads fully extended from the ceiling plate. Improper installation could result in personal injury or equipment damage. The contractor-installed ceiling structure and mounting studs must be capable of supporting the following moment loads and vertical weights (see figure 2.1.1 and table 2.1.1):

Figure 2.1.1. Ceiling Bearing Strength



Ceiling Bearing Strength

Table 2.1.1. Load Requirements for the Nuvo Surgical Light

Configuration	Moment Load	Vertical Load
Single Lighthead	410 ft-lb (556 N-m)	155 lb (71 kg)
Single Lighthead – Monitor Ready	720 ft-lb (976 N-m)	275 lb (125 kg)
Dual Lighthead	795 ft-lb (1078 N-m)	260 lb (118 kg)
Dual Lighthead – Monitor Ready	1105 ft-lb (1498 N-m)	380 lb (172 kg)
Triple Lighthead	1160 ft-lb (1573 N-m)	365 lb (166 kg)



WARNING:

The contractor-installed ceiling structure must not deflect more than 0.062" (1.57mm) when the load is applied. Improper installation could result in personal injury or equipment damage.



WARNING:

Verify the minimum finished ceiling height requirement of 8' 7" (262 cm) for a single light, 9' (274cm) for a dual light, and 9' 5" (287 cm) for a triple light.

Ceiling control / Transformer Box

Select a suitable location to mount the Ceiling Control Box (if not installed previously) within 50 feet (15.24 meters) of the Nuvo Surgical Light. The selected location should provide room for a technician to be able to remove the cover and access the voltage adjustment.

Typical locations include:

- above the ceiling next to an access panel,
- above the ceiling next to a removable lighting fixture,
- above the ceiling of an adjacent hallway with removable panels,
- in an electrical cabinet on the wall either inside or adjacent to the OR

The control box for single and dual lights measures 8½"(22 cm) x 16"(41 cm), and for a triple light 8½"(22 cm) x 21 ¼(54 cm). Sufficient room above the box is required to remove the cover and adjust the voltage. A total height of at least 18" is preferred.

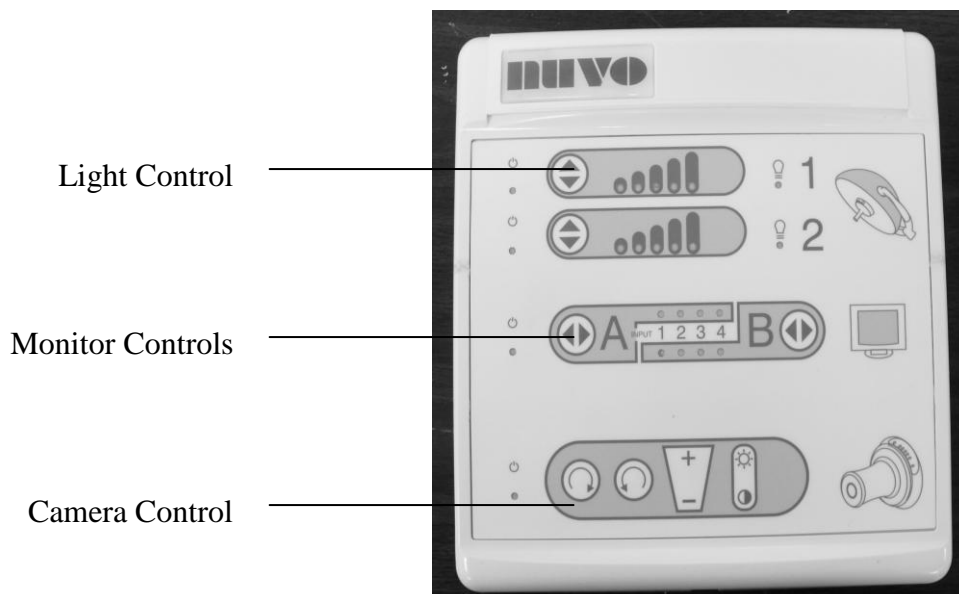
If the ceiling control / transformer box is to be located more than 4' (four feet) from the mounted light hub, an extension cable must be ordered. These extension cables are available in 6', 12', 18', 25' and 48' lengths.

Wall Control Box

The wall control box measures 10" x 10 1/2"(25.4 cm x 26.7 cm) square and is 1 3/4"(4.4 cm) deep. It connects to a standard two gang 4"(10.2 cm) x 4"(10.2 cm) back box recessed into the wall at approximately 60" from the floor. A location where this control will be readily accessible to the circulating nurse should be selected. The wiring harness (35' 10.67 meters Standard), (50' 15.24 meters optional) is then routed from the wall box to the ceiling control box.

Single, dual, or triple light configurations can be operated from a single wall control box. The wall control contains a discrete set of controls for each lighthead in the configuration. Each is numbered to correspond to the labels on the suspension arms.

Figure 2.1.2. Wall Control Box



2.2 Ceiling Mounting Plate Alignment Installation

1. Check the serial numbers on the shipping containers to make sure that the correct Nuvo Surgical Light is in the correct room.
2. Make sure that the contractor-installed ceiling structure has been properly installed and leveled (see figure 5)
3. Use one of the following mounting hole pattern measurements (see figure 9) to position the threaded studs (F) for installation of the suspension arm assemblies (A):
 - Threaded stud circle diameter of 10 5/8" (26.99 cm) for 6 mounting holes

NOTE:

For installation with 6 threaded rods, use a minimum threaded rod size of 1/2"(12.7 mm) diameter x 13 threads/inch, heat-treated, 4140 alloy steel that is corrosion resistant with a black oxide finish, 125,000 psi tensile strength, and Rockwell C hardness 28-32.

- Threaded stud circle diameter of 14 1/2" (36.83 cm) for 4 mounting holes (Preferred)

NOTE:

For installation with 4 treaded rods, use a minimum threaded rod size of 5/8"(15.88 mm) diameter x 11 threads/inch, heat-treated, 4140 alloy steel that is corrosion resistant with a black oxide finish, 125,000 psi tensile strength, and Rockwell C hardness 28-32.

Mounting Plate Alignment Installation

Table 2.2.1 Recommended Ceiling Mounting Plate Configuration Installation Parts

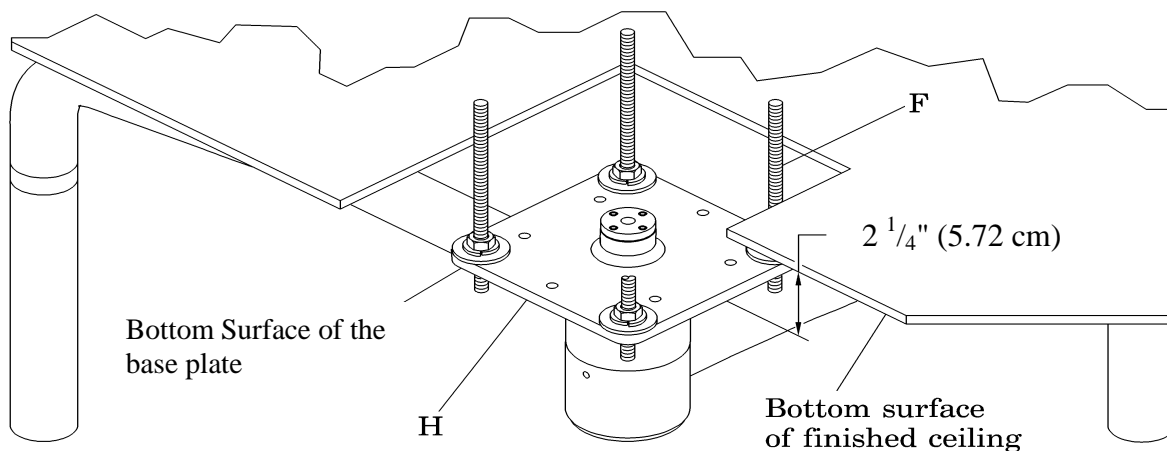
Part Description	Quantity
Anchor plate	1
5/8"(1.6 cm) Threaded rod (min. length 8"(20.3 cm)) (max. length 14"(35.6 cm))	4
5/8"(1.6 cm) x 1 1/2"(3.8 cm) hardened washer	16
5/8"(1.6 cm) nut	16

NOTE:

The ceiling structure, treaded rods, nuts, lockwashers, and washer are to be supplied by others.

4. Ensure that the suspension arm assembly ceiling base plate (H) will be installed with the bottom surface $2\frac{1}{4}"$ (5.72 cm) below the bottom of the finished ceiling. Or $2\frac{7}{8}"$ (7.11 cm) from the bottom of the finished ceiling to the bottom of the threaded rod (F) to ensure access to the leveling nuts on both sides of the ceiling base plate (H) (see figure 2.2.1).

Figure 2.2.1. Base Plate Alignment

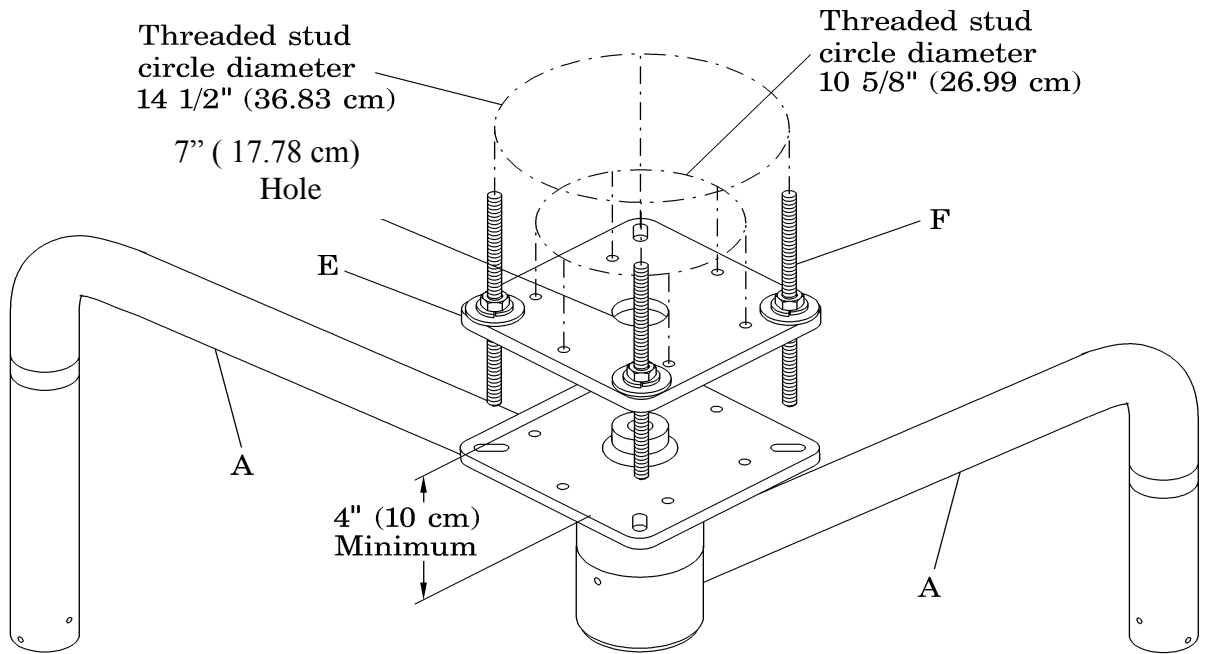


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2.3 Base Plate Alignment Installation

5. Make sure that the studs will protrude no more than 1" (2.6cm) from the bottom surface of the suspension arm assembly ceiling base plate (H) to allow clearance for the ceiling shroud. The minimum distance between plates after installation is 4" (10cm), and the maximum distance is 7" (18 cm). The threaded rods must protrude below the finished ceiling by 2 ⁷/₈" (7.11 cm)

Figure 2.3.1. Mounting Pattern



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NOTE:

When mounting the ceiling base plate to the anchor plate, Nuvo recommends that the installation contractor use the four slotted bolt pattern holes.

Suspension Arm Assembly Installation



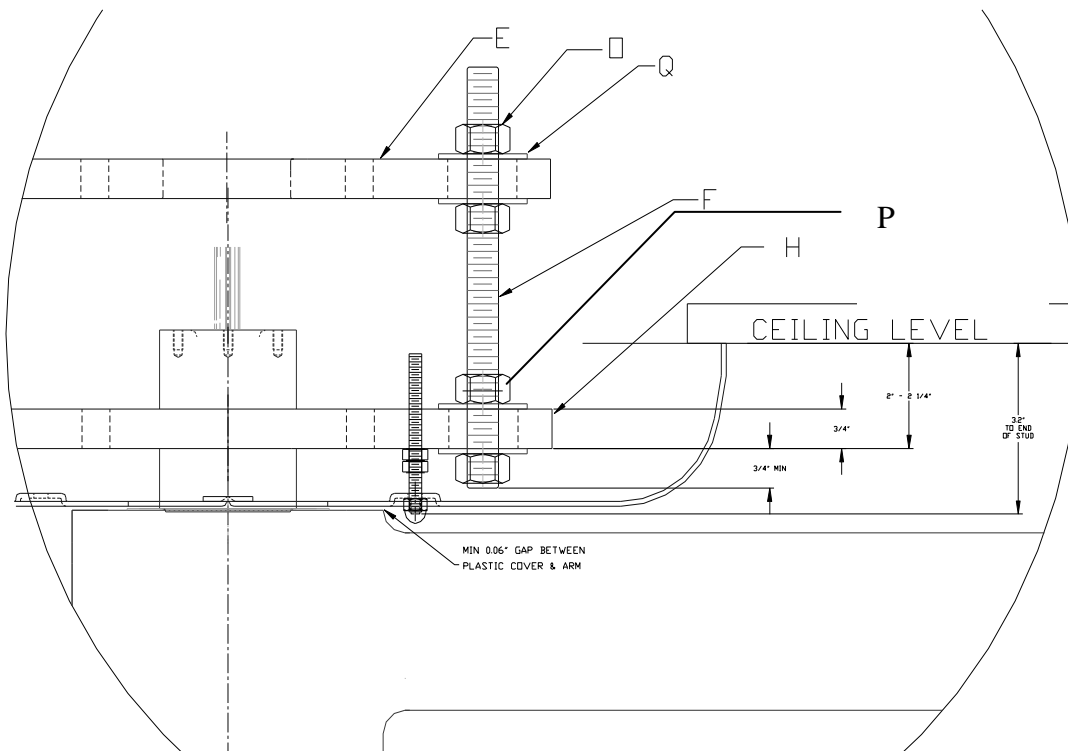
WARNING:

Use a lift capable of safely raising the suspension arm assembly to the ceiling mounting point. Failure to use an appropriate lift could result in personal injury or equipment damage.

Weights of Suspension systems are: (without light heads attached)	Single	105 lb (47.6 kg)
	Single – Monitor Ready	135 lb (61.2 kg)
	Dual	155 lb (70.3 kg)
	Dual – Monitor Ready	185 lb (84 kg)
	Triple	205 lb (93 kg)

1. Remove the top cover of the shipping container, and remove the bag of loose hardware.
2. Place the suspension arm assembly (A) (see figure 6) on the portable lift.
3. Install the threaded rods (F) (figure 6) so they protrude below the finished ceiling by $2\frac{7}{8}$ " (7.11 cm)

Figure 2.3.2. Suspension Arm Assembly



Suspension Arm Assembly Installation

4. Install the serrated flanged nuts (P) (figure 7) on the threaded studs (F) below the field installed mounting plate.



WARNING:

Follow safety precautions provided by the lift manufacturer when lifting the suspension arm assembly. Improper operation could result in personal injury or equipment damage.



WARNING:

Do not work under unsupported lift fixtures. Personal injury could occur.

5. Install the serrated flanged nuts (P) upside down on the threaded studs (F), below the nuts installed in step 4, flush to the finish ceiling.
6. Raise the suspension arm assembly (A) up to the ceiling.
7. Support the lift with blocks, as needed, while working under the raised suspension arm assembly (A).
8. Lift the suspension arm assembly (A) until the base plate (H) contacts the flanged nuts.
9. Install the lower washers (Q) and nylon locknuts (O) on the threaded studs (F) to level the ceiling mounting plate (H).
10. Tighten the nuts (P&O) on the top and bottom of the ceiling base plate (H) and on the top and bottom of the anchor plate (E) using a pair of $\frac{3}{4}$ " (19 mm) or $\frac{15}{16}$ " (24 mm) wrenches or sockets.

Torque to: 80-107 ft-lb (.04-.05 kgf/cm²) for $\frac{1}{2}$ " nuts
 160-200 ft-lb (.08-.10 kgf/cm²) for $\frac{5}{8}$ " nuts



CAUTION:

The ceiling plate must be level in two directions. Improper operation of the suspension arm assembly could result in equipment damage.

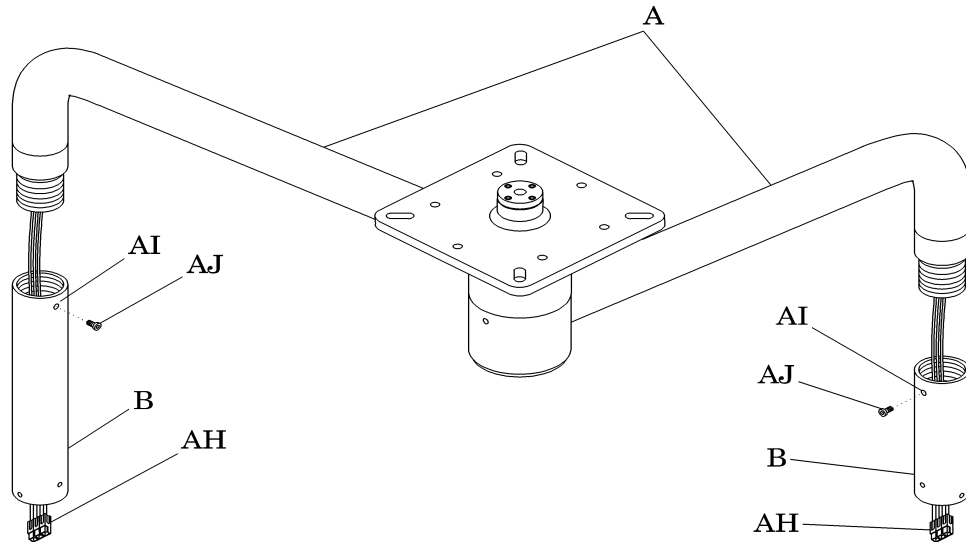
11. Check the mounting plate (H) for level in two directions (90° from each other) using a precision level.
12. Adjust and tighten the nuts (O) again, anchoring the suspension arm assembly (A), using a pair of $\frac{3}{4}$ " (19 mm) or $\frac{15}{16}$ " (24 mm) wrenches.
13. Make sure the bottom surface of the base plate (H) maintains a distance of $2\frac{1}{4}$ " (5 cm) below the finished ceiling line.
14. Remove the blocks under the lift.
15. Remove the lift from under the suspension arm assembly (A)

2.4 Vertical Tube Installation

The suspension system may have the vertical tubes pre-installed at the Nuvo factory, if this is the case then this section does not apply.

1. Remove the vertical tubes (B) from the shipping container, and all of the parts included with the vertical tube kit box (see figure 2.4.1).

Figure 2.4.1. Vertical Tube Installation



i239b020

2. Ensure that the vertical tubes (B) you are installing are the proper length for the Nuvo Surgical Light installation that you are performing (see table 2.4.1).

Table 2.4.1. Finished Ceiling Height				
Type	8' 7"(262 cm) - 8' 11"(272 cm)	9' 0"(274 cm) - 9' 4"(284 cm)	9' 5"(287 cm) - 9' 9"(297 cm)	9' 10"(300 cm) - 10' 2"(310 cm)
	Tube Length	Tube Length	Tube length	Tube Length
SINGLE LIGHT	5"(12.7 cm)	10"(25.4 cm)	15"(38.1 cm)	20"(50.8 cm)
DUAL LIGHT	N/A	5" & 10"	10" & 15"	15" & 20"
TRIPLE LIGHT	N/A	N/A	5", 10" & 15"	10", 15" & 20"

NOTE:

The longest vertical tube should be installed on the suspension arm assembly closest to the ceiling. The shorter vertical tube should be installed on the suspension arm assembly closest to the floor.

Vertical Tube Installation

3. Test fit the threads on each vertical tube (B) by temporarily screwing it onto the appropriate suspension arm assembly (A).

NOTE:

The threads may need to be cleaned if the vertical tubes do not screw onto the suspension arm assemblies smoothly, and without any binding.

4. Ensure that the wiring (AH) extending from the suspension arm assemblies (A) is long enough to go through the vertical tube (B), and extend slightly out of the end of the vertical tube (B) when it is screwed onto the suspension arm assembly (A) all of the way.
5. Screw the vertical tube (B) onto the suspension arm assembly (A) until it bottoms out.
6. Unscrew and back-off the vertical tube (B) until the hole (AI) in the vertical tube (B) lines up with the threaded hole in the suspension arm assembly (A).

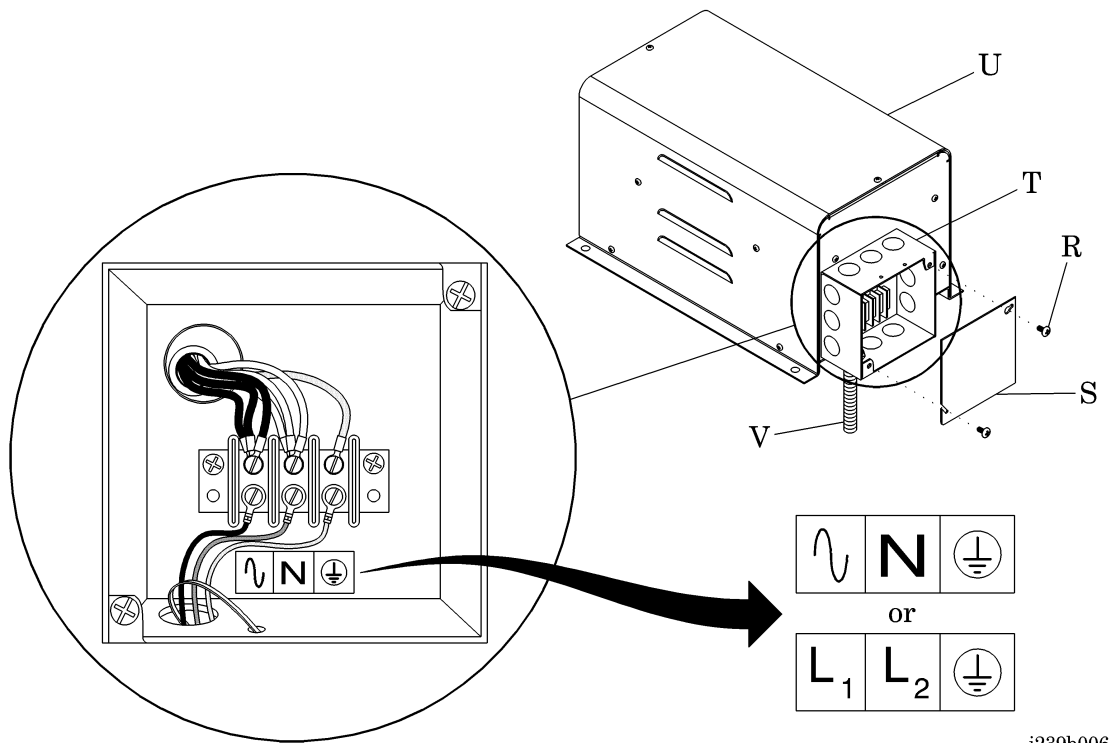
NOTE:

This procedure should give you approximately 1/32" (0.8mm) of clearance between the rotating tube and the stationary portion of the arm.

7. Test the rotation of the suspension arm assemblies (A), and ensure the arm moves smoothly without any binding.

2.5 Ceiling Control / Transformer Box Installation

Install the ceiling control / transformer box assembly (U) to the building structure in accordance with the customer's specifications (see figure 2.5.1) if not previously installed.



i239b006

Figure 2.5.1. Ceiling Control / Transformer Box Installation



WARNING:

Ensure that electrical power is removed from the correct branch circuit. Failure to remove applied power could result in personal injury or equipment damage.

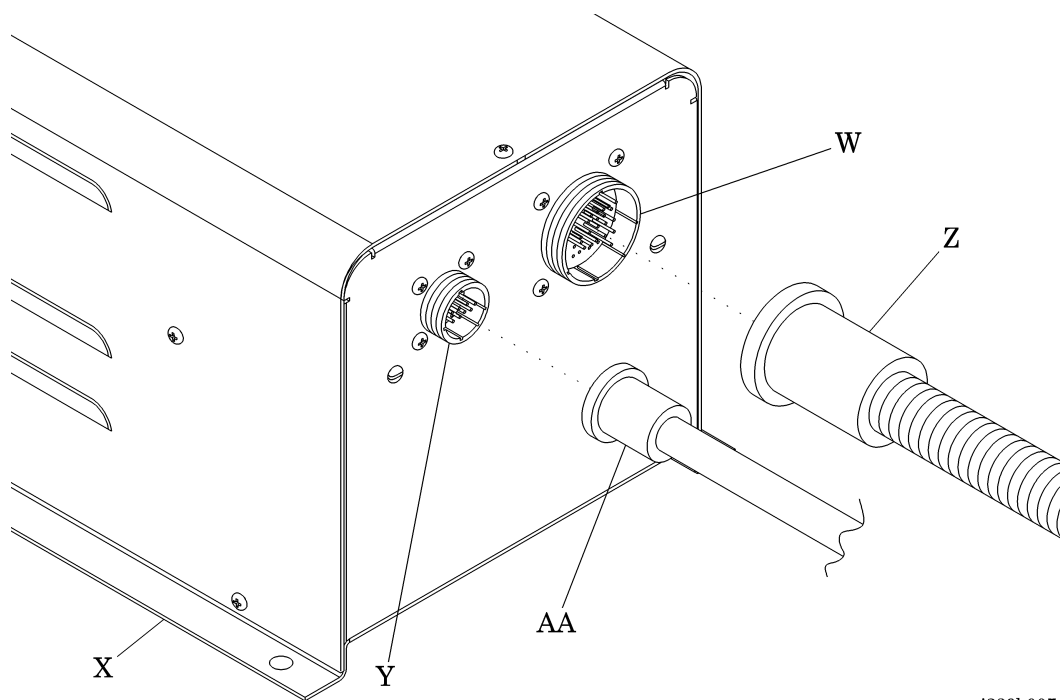
Electrical connections to the ceiling control box to be completed by a **certified electrician**.

1. Remove the screws (R) and cover (S) from the junction box (T) using a Phillips head screwdriver.
2. Remove a knockout on the junction box (T) for the main voltage connection in accordance with the local codes.
3. Set the associated facility circuit breaker to OFF. Lock out and tag the circuit breaker.
4. Connect the facility wiring conduit (V) to the ceiling control / transformer box (T) in accordance with the as-built wiring schematic drawings and all required electrical codes.
5. Using the conduit strain relief, secure the incoming wires.
6. Place the cover back on the junction box, and tighten the screws.

Ceiling Control / Transformer Box Electrical Wiring Installation

Connect the suspension arm assembly wiring (Z) or extension cable if used to connector (W) and, if applicable, the optional wall control wiring cable (AA) to the connector (Y) on the control box (X) in accordance with the as-built wiring schematic drawings (see figure 2.5.2).

Figure 2.5.2. Wiring Connections



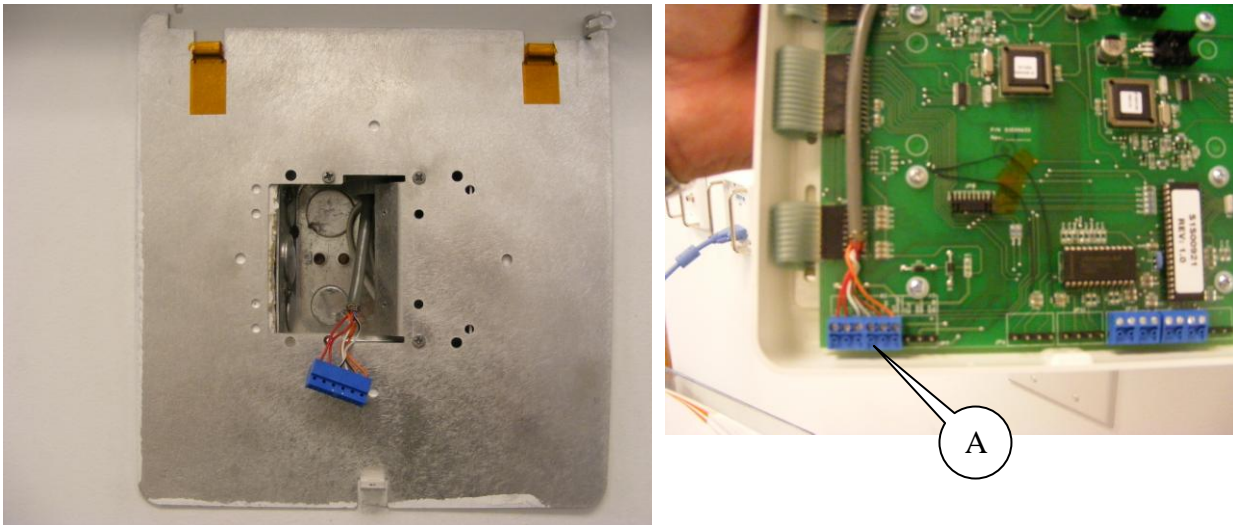
i239b007

2.6 Optional Wall Control Box Installation

If included and not pre-installed, install the wall control box following the steps below:

- a. Ensure the circuit breaker is still off.
- b. Attach the mounting plate to a 2 gang wall box using the supplied screws.

Figure 2.6.1. Mounting Plate



- c. Connect the wall control harness from the ceiling control box. Match wire colors as shown at the side of the blue connector (A) at the bottom left (when looking at the back) of the pc board or table 2.6.1.

Table 2.6.1. Wire Chart

<i>LIGHT-1</i>			
From first terminal to last	COLOR	TYPE	GAGE
1	RED	BULK 9V (+V)	22
2	RED/BLACK	DC GROUND (grd)	22
3	WHITE/BLACK	SERIAL (ser)	22
<i>LIGHT-2</i> <i>If installed</i>			
4	WHITE	BULK 9V (+V)	22
5	ORANGE/BLACK	DC GROUND (grd)	22
6	ORANGE	SERIAL (ser)	22
<i>LIGHT-3</i> <i>If installed</i>			
7	BLUE	BULK 9V (+V)	22
8	GREEN	DC GROUND (grd)	22
9	GREEN/BLACK	SERIAL (ser)	22

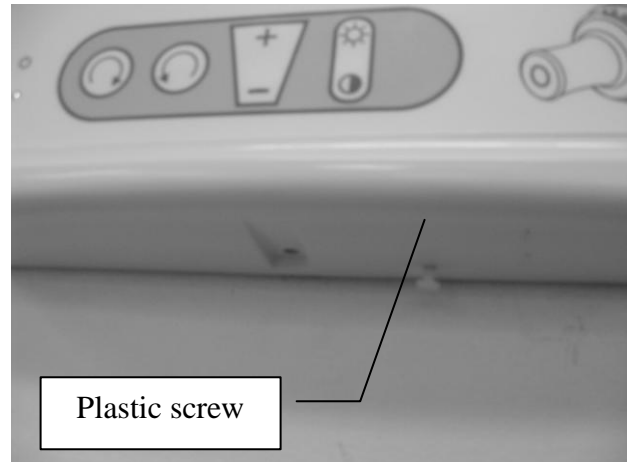
Wall Control Box Installation

- b. Install the wall control onto the mounting plate. Raise the top hinged panel and align the two rectangular holes with the tabs on the mounting plate. Press the panel against the plate and down. Ensure the control panel is flush. Secure with the plastic screw (figure 2.6.3).

**Figure 2.6.2. Mounting Control Panel
Onto Mounting Plate**



**Figure 2.6.3. Attaching Control Panel
with Plastic Screw**



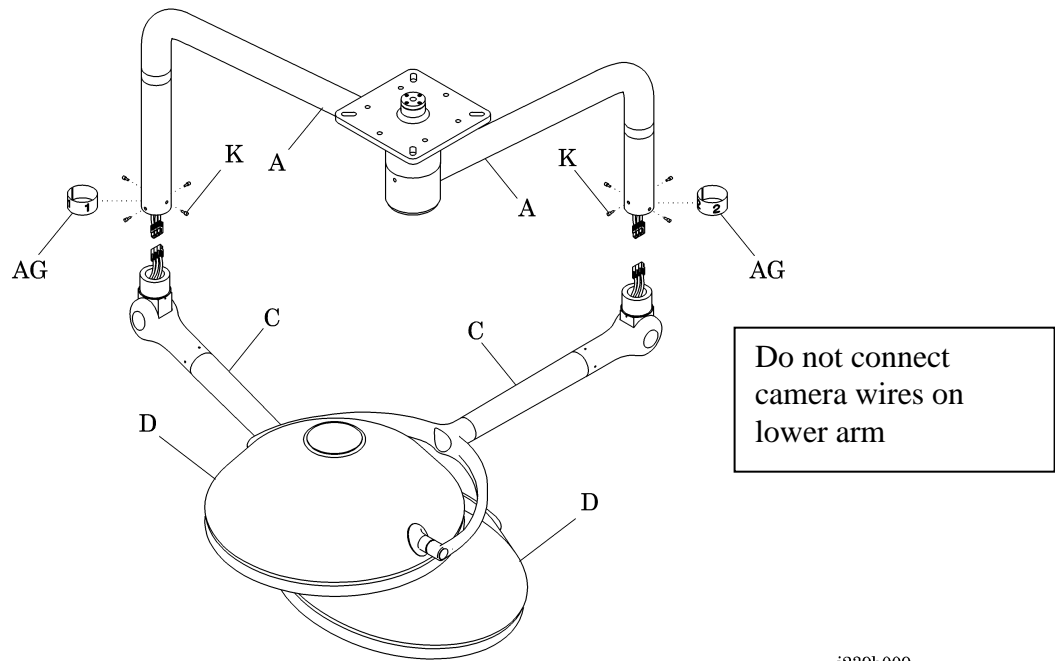
2.7 Counterbalance Arm Assembly Installation

NOTE:

The counterbalance arm assembly and lighthead / yoke assembly are shipped fully assembled and ready to install.

1. Ensure the circuit breaker is still off.
2. Place the counterbalance arm assembly (C) with the lighthead/yoke assembly (D) on the portable lift (see figure 2.7.1).

Figure 2.7.1. Counterbalance Arm Assembly



i239b009



WARNING:

Use a lift capable of safely raising the counterbalance arm assembly to the suspension arm assembly. Failure to use an appropriate lift could result in personal injury or equipment damage.

The lighthead and counterbalance arm assembly weighs 55 lb. (23 kg)



WARNING:

Follow lifting safety precautions provided by the lift manufacturer when lifting the counterbalance arm assembly. Improper operation could result in personal injury or equipment damage.

Counterbalance Arm Assembly Installation

3. Raise the counterbalance arm assembly (C) and lighthead/yoke assembly (D) up to the vertical tube assembly (B).
4. Support the lift with blocks while working under the raised counterbalance arm assembly (C)



WARNING:

Do not work under an unsupported load. Install appropriate temporary supports. Failure to do so could result in personal injury or equipment damage.

5. Raise the counterbalance arm assembly (C) until it is close enough to attach the wiring.
6. Connect the wiring from the suspension arm assembly (A) to the counterbalance arm assembly (C) using the keyed plug/connector.



WARNING:

Ensure that electrical power is removed from the facility wiring. Failure to remove applied power could result in personal injury or equipment damage.

NOTE:

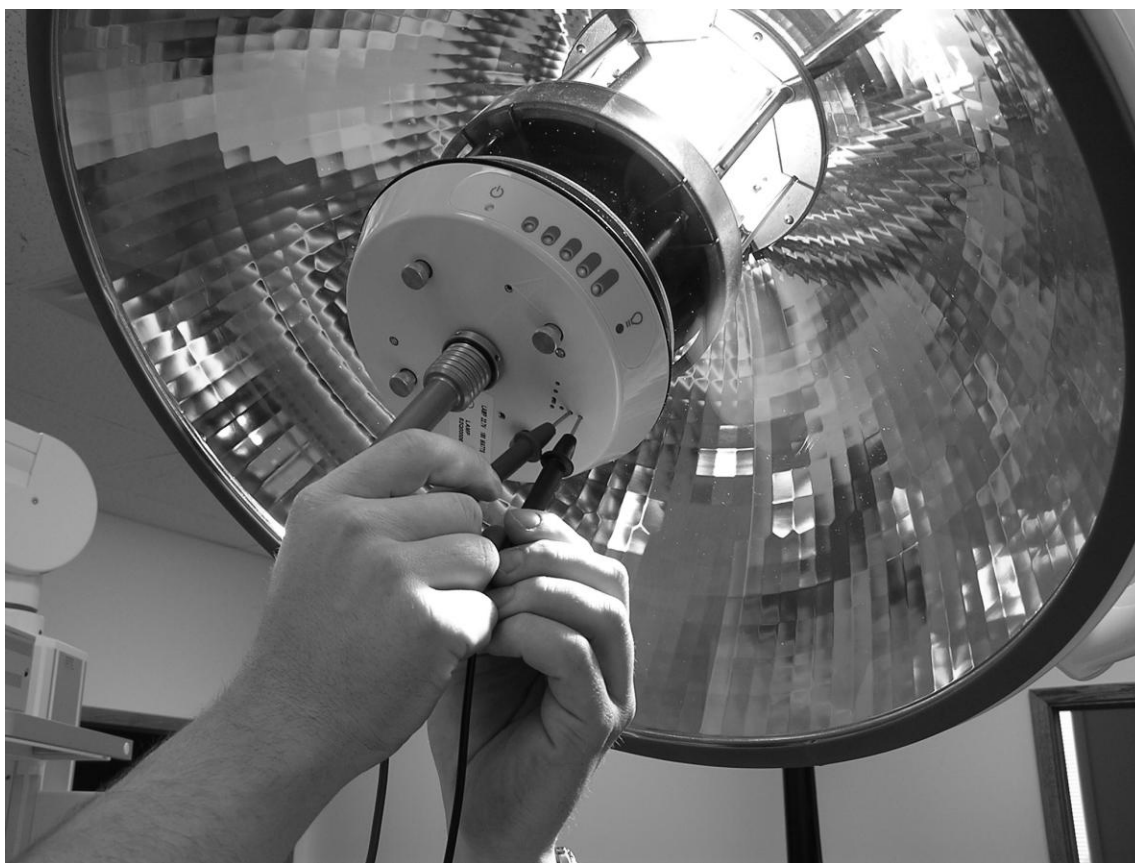
The suspension arm vertical tube mounting holes must align with the mounting holes on the counterbalance arm clevis to ensure proper installation of the mounting hardware. Rotate vertical tubes as required.

7. Install the counterbalance arm assembly (C) into the vertical tube assembly (B) by lifting the lighthead 15° toward the ceiling.
8. Install the screws (K) to secure the counterbalance arm assembly (C) to the vertical tube assembly (B), using the Allen™ wrench set. Light # 1 is the upper-most arm, # 2 is the next down (if dual), # 3 would be the bottom light (if triple).
9. Install the appropriate decal (AG) around the base of the vertical tube to cover the screws (K).
10. Install the lamps control assembly by inserting two long teather rods into opposite holes in the lamp assembly and two short thumb screws into the remaining holes.

2.8 Voltage Adjustment

1. Remove the tag and lockout on the circuit breaker.
2. Apply power to the Nuvo Surgical Light.
3. Turn on the light to the brightest setting.
4. Remove the sterilizable Control Handle from the lighthead assembly.
5. Using a **TRUE RMS** multi-meter on the AC setting, measure the voltage at the lighthead through the test port holes on the bottom of the light assembly (see figure 2.8.1) by inserting the multi-meter probes into the outer two holes for the primary light.

Figure 2.8.1. Voltage Measurement



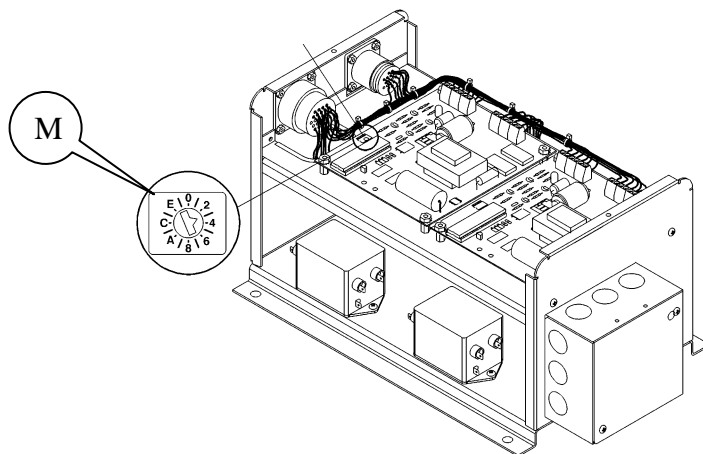
NOTE:

Voltage should be between 22.5V and 23.0V for both primary and secondary lamp sockets with the light at the # 5 (highest) intensity level.

Voltage Adjustment

6. If the voltage is within range, proceed to the "Operations Check". If the voltage is not within range, adjust the voltage as follows:
 - a. Remove power from light.
 - b. Remove the cover from the ceiling control / transformer box.
 - c. Locate the rotary dial (M) on the P.C. board (see figure 2.8.2).

Figure 2.8.2. Board Adjustment



CAUTION:

Do not change the setting more than one position at a time. Adjusting the voltage more than one position at a time can cause damage to the lamp and lighthouse assembly.

- d. Using a jeweller's screwdriver, turn the rotary dial to a lower number to lower the voltage, or turn the rotary dial to a higher number to increase the voltage.

Output Voltage Adjustment

0 1 3 4 5 6 7 8 9 A B C D E F
Low —————> High

NOTE:

The rotary dial will “click” into place when changing from one setting to another.

Voltage Adjustment

7. When adjusting the voltage, remember that the line voltage will fluctuate with periods of heavy or moderate usage.
8. Apply power to the light and switch to the brightest intensity.
9. Check the voltage at the lighthouse.
10. If the voltage is not within the 22.5V to 23.0V requirements, repeat step D until the voltage is within limits.



CAUTION:

Failure to have the proper voltage will result in a shortened life of the lamp, premature bulb failure, excessive heat, or low light levels. Ensure the proper voltage is at the lighthouse.

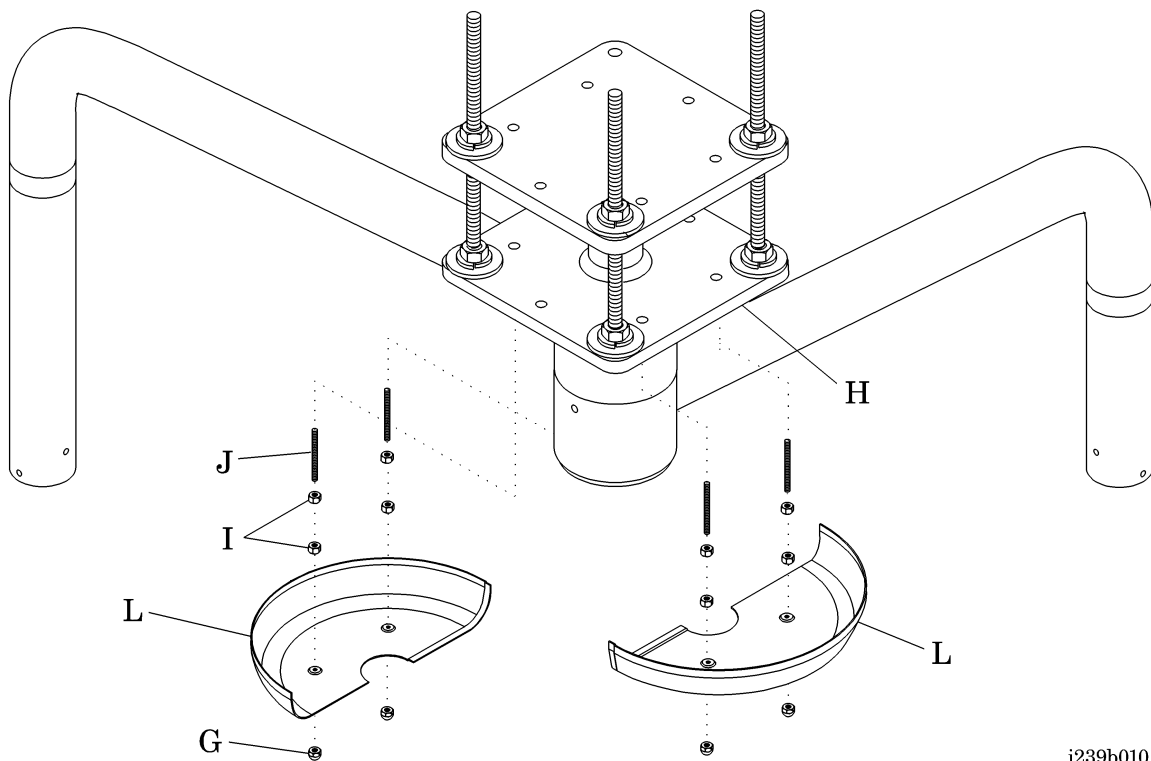
11. If the voltage cannot be adjusted to within limits, contact Nuvo technical support at: (800) 663-1152.

Repeat steps 1 through 11 for each lighthouse.

2.9 Ceiling Shroud Installation

1. Install the ceiling shroud (L) onto the bottom side of the suspension arm base plate (H) with threaded rods (J), nuts (I), and plastic acorn nuts (G).
2. When installing the threaded rods (J) and nuts (I), use two nuts on the threaded rod to act as a locking feature against the bottom of the plate (H). (see figure 2.9.1).

Figure 2.9.1. Ceiling Shroud Installation

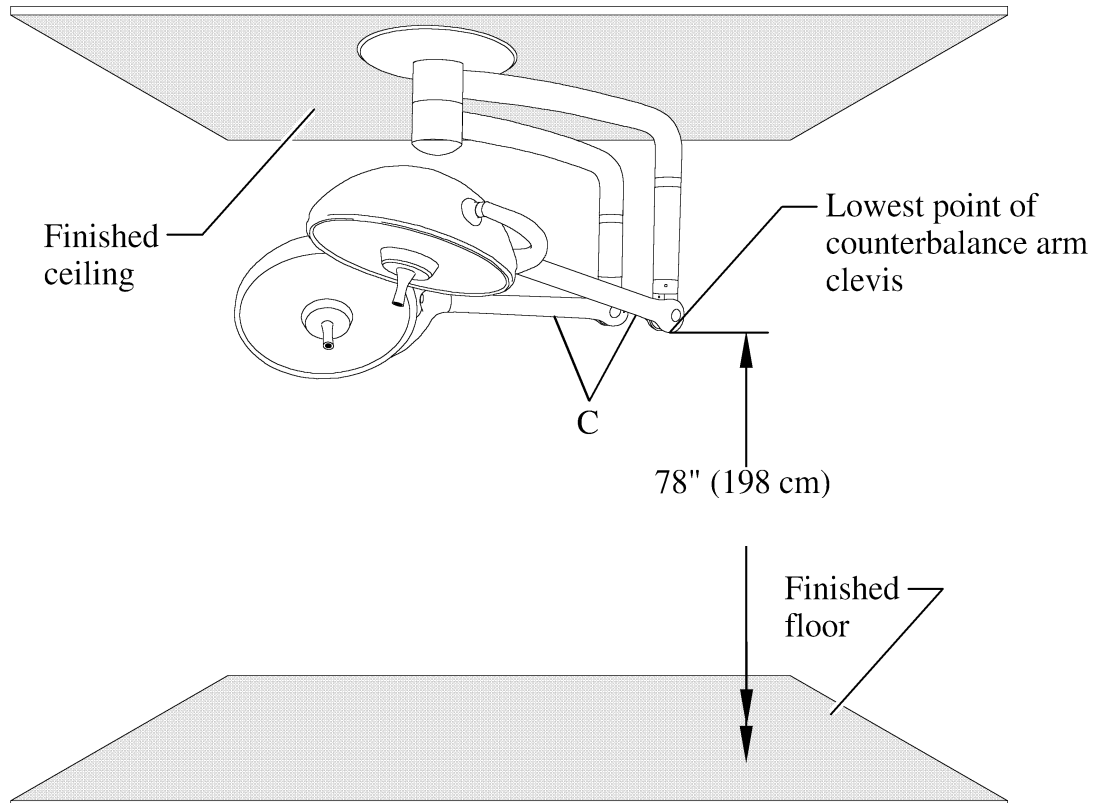


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2.1.0 Final Installation Verification

1. Make sure that the distance from the lowest point of the counterbalance arm clevis joint to the finished floor is approximately 78" (198 cm) to 82" (209cm) after completion of installation (see figure 18).

Figure 2.1.0.1. Height Verification



3.0 Preventive Maintenance

Semi-annual preventive maintenance must be performed by Nuvo personnel to ensure all features are functioning as originally designed.

Particular attention must be focused on safety features, including but not limited to:

- Lens cleanliness
 - Spring force (position force)
 - Thumbscrew tightness
 - IR filter glass condition
 - O-ring integrity
-

Operational Check

1. Do an operational check of each of the Nuvo Surgical Lights as follows:
 - a. Push the Hand Control button (on the base of the sterilizable handle) once. The Nuvo Surgical Light comes on at full intensity, and all five blue LEDs and the lamp indicator illuminate.
 - b. Push the Hand Control button again. The light intensity level decreases and one blue LED goes off every time the button is pushed.
 - c. Continue cycling the Hand Control button until the light intensity level cycles back to full intensity, and all five blue LEDs are illuminated.
 - d. Rotate the Hand Control clockwise to enlarge the light pattern diameter.
 - e. Rotate the Hand Control counter clockwise to reduce the light pattern diameter.
 - f. Push the Hand Control button, and hold in for 3 seconds. The Nuvo Surgical Light and all five LEDs go off.
 - g. Repeat, as required, for each lighthead.

Operational Check

2. Continue the operational check of the Nuvo Surgical Light as follows:

NOTE:

Less than 4.5 lb (20 N) force, applied to the sterilizable handle is sufficient to move the lighthead assembly, counterbalance arm assembly, and suspension arm assembly.

- a. Pivot the lighthead /yoke assemblies (D) (figure 14) through the full range of motion. The lighthead assemblies move quietly and smoothly, without drifting.
 - b. Raise and lower the counterbalance arm assemblies (C) through the full range of motion.
 - c. Rotate the suspension arm assemblies (A) 360° through the full range of motion.
3. If the Nuvo Surgical Light fails any of the tests, or requires any type of adjustments, perform troubleshooting or adjustments in accordance with the service manual.

4.0 Post-Installation Inspection

1. The installing contractor shall remove all fingerprints and smudges from all exposed surfaces in accordance with general cleaning procedures.
2. Remove the white tape that covers the joint on each light counterbalance arm.
3. The installing contractor is responsible for checking out the entire installation for proper operation after hook-up and installation of the Nuvo Surgical Light.

5.0 Maintenance

The lighthead rotates 320° within the yoke and the yoke assemblies rotate 360° continuously. The interior of the lighthead assemblies is designed to optimize the angle of the light. This reduces shadowing and delivers cleanly defined color-correct light.

The counterbalance arm assemblies rotate 15° above horizontal and 90° below horizontal at the clevis. The clevis assembly provides a brake to prevent “free wheeling” of the counterbalance arm and to provide “touch type motion control.”

The suspension arm assemblies rotate 360° continuously. They differ in length to permit passing without interference. The vertical tubes rotate 360° continuously and are custom sized to a specific ceiling height ensuring adequate head clearance.

The wall-control panel provides an additional on/off and intensity control as well as an indicator to relamp damaged bulbs. Spare bulbs can also be stored in the upper housing compartment. An individual control box supplies 22.7V AC and 9VDC power to each Nuvo Surgical Light and 9V DC power to each wall control panel P.C. board.

System Features

The Nuvo Surgical Light features include:

- Suspension arms rotate 360° continuous, clockwise, and counterclockwise
- Lightheads rotate 320° within the yoke
- Yokes rotate 360° continuous, clockwise, and counterclockwise about the counterbalance arm
- Counterbalance arms rotate 15° above horizontal and 90° below horizontal
- Lamp control assembly
- Light control inside sterile field
- Computer modeled reflector
- Shadow-free illumination
- Excellent color rendition
- Low heat output
- Back-up lighting
- Spare bulb storage in wall control box
- Easy to clean and sterilize

5.1 Operator Interface

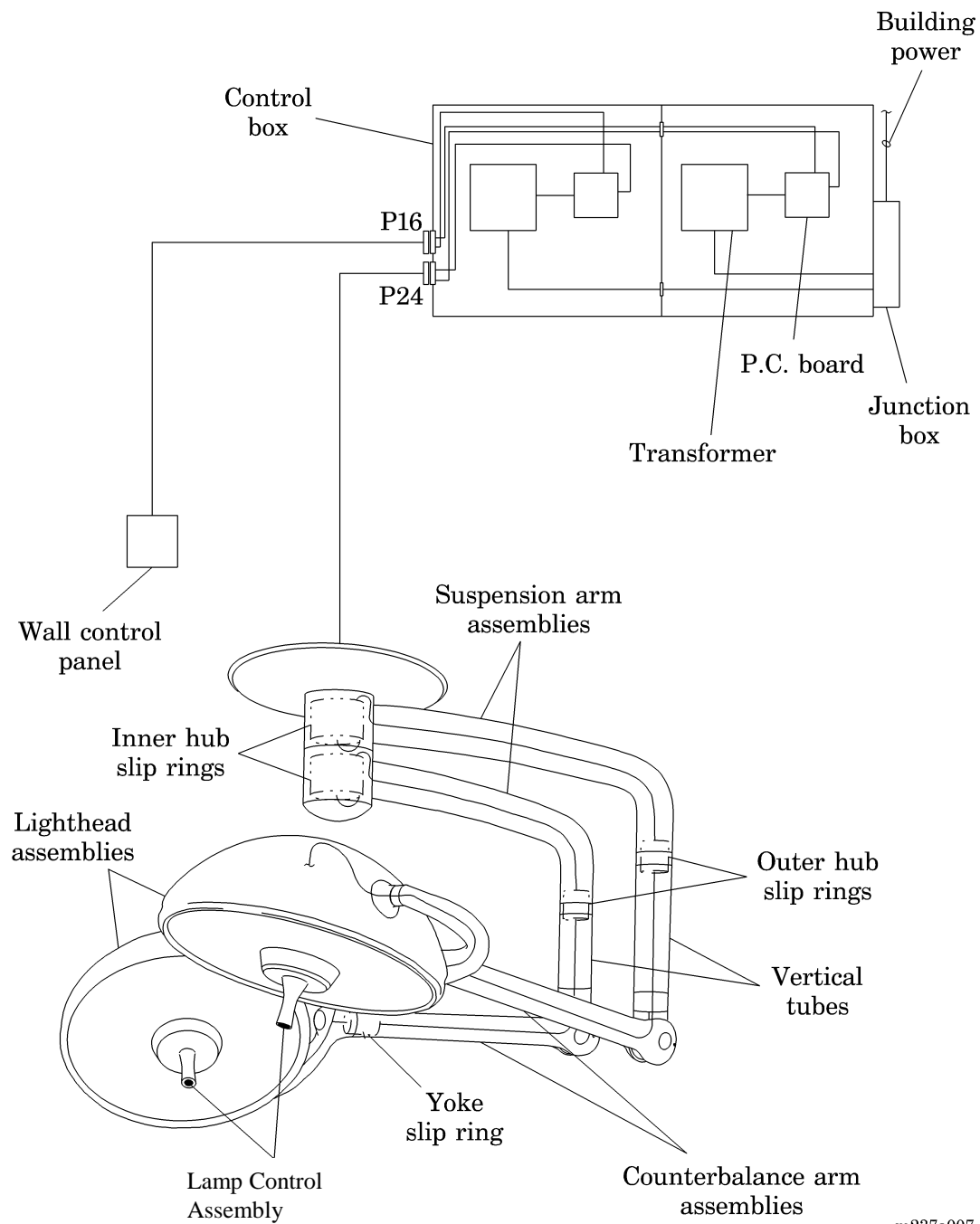
Figure 5.1.1 Wall Control Panel



m237b036

5.2 Electrical System

Figure 5.2.1 Electrical system Block Diagram



m237a007

**Figure 5.2.2. Transformer Control Box Wiring Diagram
(Dual Light)**

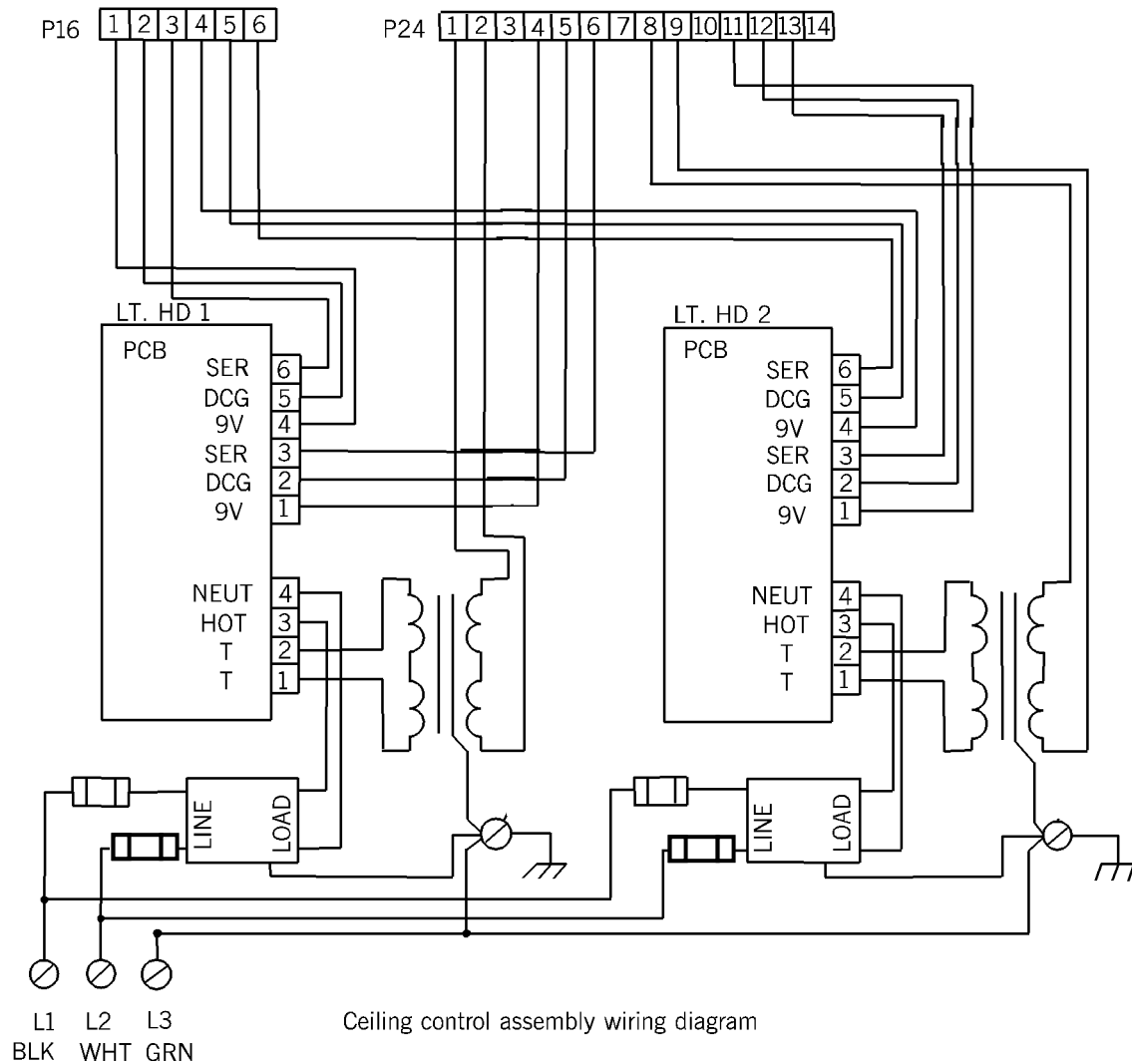
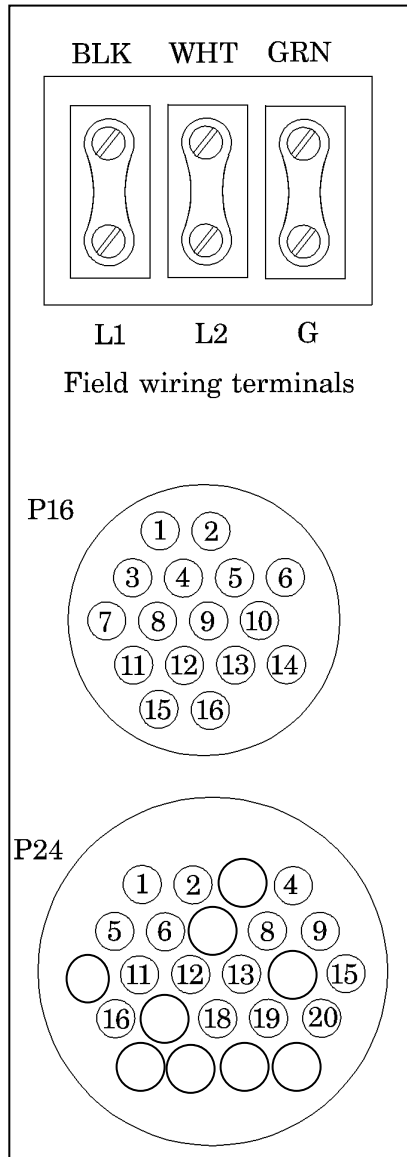


Figure 5.2.3 Ceiling Control Connectors



Field wiring terminals (input from hospital)

Connect AC hot (black) to L1
Connect AC neutral (white) to L2
Connect Green or green/yellow safety ground to G.

NOTE:

More recent units destined for North American facilities are shipped with a power cord with polarized 15A three prong plug attached.

P16 – Ceiling to wall control

1,2,3 for lighthouse #1
4,5,6 for lighthouse #2
7,8,9 for lighthouse #3
10 for chassis ground (green) shield

1,4,7: +9VDC (red) power to control
2, 5, 8: DC GND (black) (!!!Do not connect to chassis!!!)
3,6,9: serial communication

P24 – Ceiling to lighthouse control and lamps

1,2,4,5,6 to lighthouse #1
8,9,11,12,13 to lighthouse #2
15,16,18,19,20, to lighthouse #3
24 for central mount chassis ground (green)

(1,2) (8,9) (15,16): 24V AC to lamps
4,11,18: +9VDC (red) power to lighthouse control
5, 12, 19; DC GND (black) (!!! Do not connect to chassis!!!)
6, 13, 20: Serial communications

Figure 5.2.4. Slip Rings and Lighthouse Control Connector

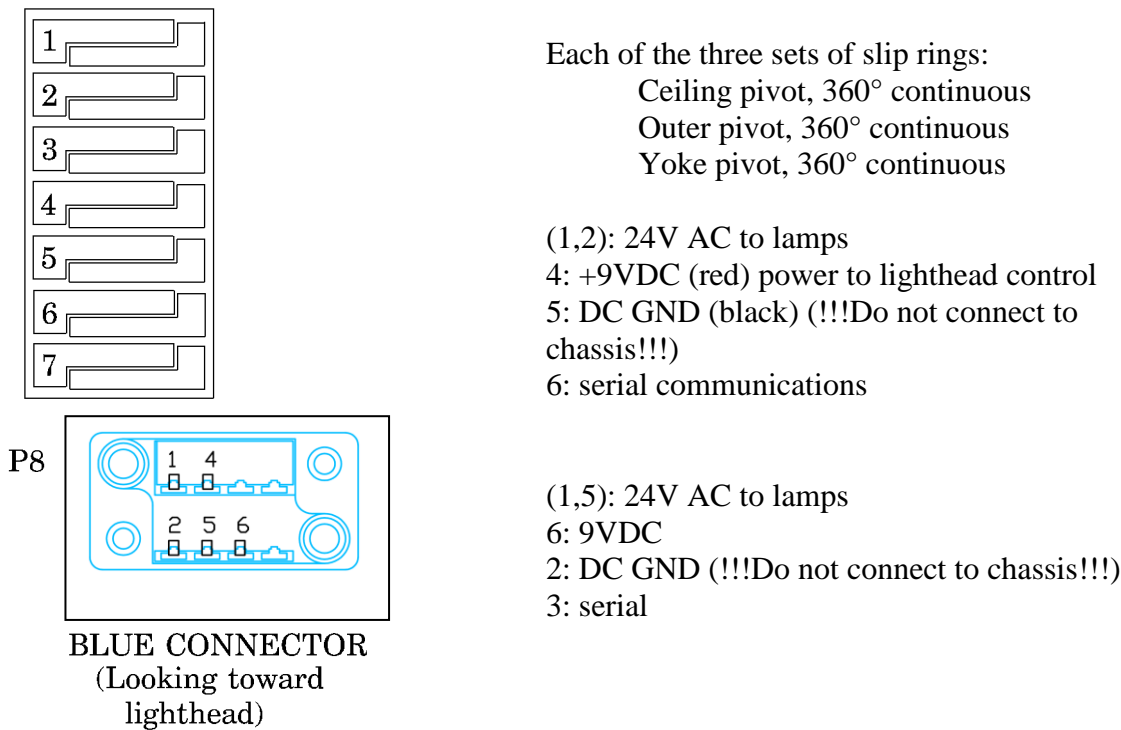
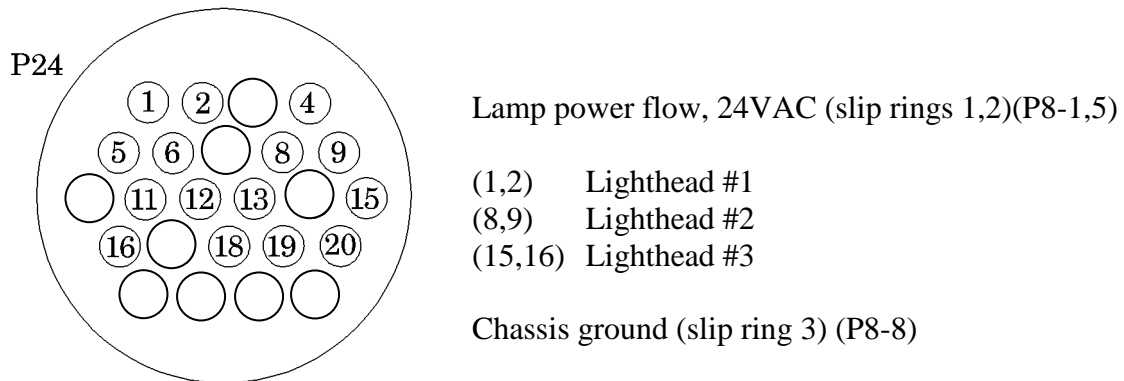


Table 5.2.1. Lamp Power Flow

Ceiling	Field wiring terminals	120VAC, 1.6 amps, 180 watts
	Main fuse	100 VAC, 2.0 amps, 180 watts
	Power line filter	220VAC, 0.9 amps, 180 watts
	Intensity regulator	230-260VAC, 0.8 amps, 180 watts
	XXXVAC to 24VAC transformer	
	P24 (black circular connector)	
Lighthouse	Ceiling pivot slip ring	24 VAC, 8 amps, 180 watts
	Outer pivot slip ring	
	Yoke pivot slip ring	
	P8 (blue connector)	
	Current monitor	
	Relay switch	
Lighthouse	Lamp	
	Backup Lamp	

Figure 5.2.5. Lamp Power Flow



Electrical Control Power Flow

P24 – Ceiling to Lighthouse

P16 – Ceiling to Wall

9VDC (red) (slip ring 4)

P16-1, P24-4	Lighthouse #1
P16-4, P24-11	Lighthouse #2
P16-7, P24-18	Lighthouse #3

DC GND (black) (slip ring 5)

P16-2, P24-5	Lighthouse #1
P16-5, P24-12	Lighthouse #2
P16-8, P24-19	Lighthouse #3

Serial communications (white) (slip ring 6)

P16-3, P24-6	Lighthouse #1
P16-6, P24-13	Lighthouse #2
P16-9, P24-20	Lighthouse #3

Figure 5.2.6. Electrical Control Power Flow

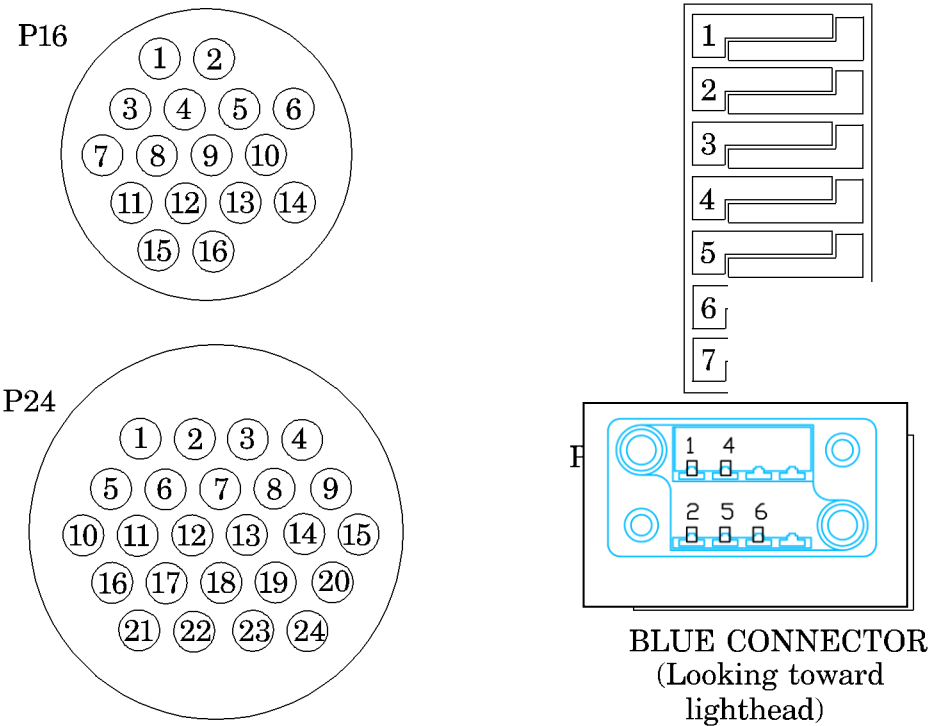


Figure 5.2.2. Transformer Control Box Wiring Diagram, 115 and 230 Volt

Figure 5.2.1. Electrical System Wiring Diagram

6.0 Troubleshooting Procedures

Getting Started

**WARNING:**

Only facility-authorized maintenance personnel should troubleshoot the Nuvo Surgical Light. Troubleshooting by unauthorized personnel could result in personal injury or equipment damage.

Begin each procedure in this chapter with step 1. Follow the sequence outlined (each step assumes the previous step has been completed). In each step, the normal operation of the product can be confirmed by answering **Yes** or **No** to the statement. Your response will lead to another step in the procedure, a repair analysis procedure (RAP), or a component replacement. If more than one component is listed, replace them in the given order.

Start with **Initial Actions** to begin gathering information about the problem.

Perform the **Function Checks** to isolate or identify a problem and to verify the repair after completing each corrective action (replacing or adjusting a part, seating a connector, etc.)

Perform the **Final Actions** after the Function Checks to verify the repair.

If troubleshooting procedures do not isolate the problem, call Nuvo Technical Support at (800) 663-1152 or (814) 899-4220.

6.1 Initial Actions

Use Initial Actions to gather information from operators concerning problems with the Nuvo Surgical Light. Note symptoms or other information concerning the problem that the operator describes. This information helps identify the probable cause.

1. Someone who can explain the problem is available.

Yes	No
↓	→

Go to “Function Checks” on page 52

2. Ask that person to demonstrate or explain the problem. The problem can be duplicated.

Yes	No
↓	→

Go to “Function Checks” on page 52.

Troubleshooting Procedures

3. The problem is a result of improper operator action

Yes	No
↓	→

Go to “Function Checks” on page 52.

4. Perform the “Function Checks” on page 52 to ensure proper operation of the Surgical Light.

6.2 Function Checks

1. Initial Actions have been performed

Yes No



Go to “Initial Actions” on page 51.

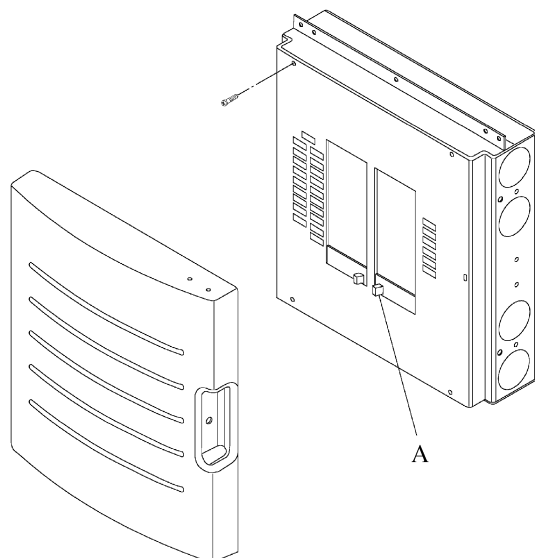
2. Power is applied to the Surgical Light as indicated by the power-on green LED.

Yes No



Check the building circuit breaker panel, and ensure the applicable circuit breaker (A) is in ON position (see figure 6.2.1).

Figure 6.2.1. Standard or Emergency Circuit Breaker Box



Troubleshooting Procedures

3. The Surgical Light comes on when pushing the button on the Hand Control.

Yes	No
↓	→

Go to RAP 6.4.

4. The Surgical Light comes on when pushing the button on the wall control.

Yes	No
↓	→

Go to RAP 6.5

5. The light intensity level can be adjusted properly from the Hand Control.

Yes	No
↓	→

Go to RAP 6.6.

6. The light intensity level can be adjusted properly from the wall control.

Yes	No
↓	→

Go to RAP 6.7.

7. The Surgical Light goes off when pushing and holding the button on the Hand Control for 3 seconds.

Yes	No
↓	→

Go to RAP 6.8.

8. The Surgical Light goes off when pushing and holding the button on the wall control for 3 seconds.

Yes	No
↓	→

Go to RAP 6.9.

9. The transformer control box is operating properly.

Yes	No
↓	→

Go to RAP 6.0.1.

10. The light does not drift horizontally at the suspension arms, vertically at the counterbalance arms, or rotationally.

Yes	No
↓	→

Go to RAP 6.0.2, 6.0.3, 6.0.4, or 6.0.5

11. Go to “Final Actions” on page 54.

6.3 Final Actions

1. Complete the required preventive maintenance procedures. See “Preventive Maintenance Checklist” section 3.0.
2. Complete all required administrative tasks.

6.4 Surgical Light Does Not Turn On Using The Hand Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. Verify both light bulbs are installed in the lamp control assembly.

Yes	No	
↓	→	
		Replace bulbs

2. Check the fuse mounted on the transformer control box. Is fuse in working condition?

Yes	No	
↓	→	
		Replace fuse

3. The Surgical Light operates properly after performing the following procedure:

- a. Remove the Lamp Control Assembly. See section 7.0 1&2.
- b. Turn the main power off then on. There should be voltage supplied to the lighthead, but only for a few seconds before it automatically switches off, therefore, this is a two person procedure.
- c. Verify a voltage reading of 14 to 24V AC true RMS within a minimum of 3 seconds at the blue connector (pins 1 and 5) of the lighthead core. (Note: Voltage range is due to light intensity setting).

Yes	No	
↓	→	
		Check the ceiling control internal wiring. Go to RAP 6.0.1

Troubleshooting Procedures

4. Check the lamps using the following procedure:

- a. Remove the Lamp Control Assembly and lamps. See section 7.0 # 1&2
- b. Verify the resistance of each lamp is less than 3 ohms.

Yes No
↓ →

Replace with new lamps. See User Information page 14.

5. Measure the primary lamp voltage through the access holes in the control housing using the following procedure: (see section 2.8. figure 2.8.1)

- a. Install the Lamp Control Assembly.
- b. Verify a voltage reading of 14 to 24V AC true RMS within a minimum of 3 seconds is available for the primary lamp. (Note: voltage range is due to range of light intensity settings).
- c. Verify a voltage reading of zero is available for the back-up lamp.

Yes No
↓ →

Replace the Lamp Control Assembly.

6. Go to “Final Actions” on page 54.

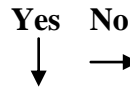
6.5 Surgical Light Does Not Turn On Using the Wall Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. The Surgical Light functions properly using the Hand Control



Check the transformer control box voltages and fuses'.
Go to RAP 6.0.1.

2. Check terminal to confirm insulator is not preventing good wire contact.
3. Check for continuity in the ceiling control to the wall control harness using the following procedure:
 - a. Disconnect the ceiling control connector P16 and wall control panel.
 - b. Continuity exists between pins 1 through 10 (as appropriate for single, dual or triple lights) of the ceiling control connector P16 and the wall control end of the wall control harness.

Looking at the terminal strip on the wall counting from 1 at the top to 9 on the bottom:

Table: 6.5.1

LIGHT - 1

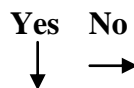
HOLE #	COLOR	TYPE	GA
1	RED	BULK 9V	22
2	RED/B	DC GND	22
3	WHITE/B	SERIAL	22

LIGHT - 2

HOLE #	COLOR	TYPE	GA
4	WHITE	BULK 9V	22
5	ORANGE/B	DC GND	22
6	ORANGE	SERIAL	22

LIGHT - 3

HOLE #	COLOR	TYPE	GA
7	BLUE	BULK 9V	22
8	GREEN	DC GND	22
9	GREEN/V	SERIAL	22



Repair or replace the transformer box to wall control harness

Troubleshooting Procedures

4. Check for continuity in the internal wall control harness using the following procedure:
 - a. Verify that there is one wall control P.C. board for each lighthouse.
 - b. Continuity exists between pins 1, 2, and 3 to unit # 1 pins P1-1, 2, and 3.
 - c. Continuity exists between pins 4, 5, and 6 to unit #2 pins P1-1, 2, and 3.
 - d. Continuity exists between pins 7, 8, and 9 to unit #3 pins P1-1, 2, and 3.
 - e. Verify the cable shield is not connected to any wall control P. C. boards.

Yes **No**
↓ →

Go to “Function Checks” on page 52.

- f. Install the ceiling control connector P16 and replace the affected wall control P.C. board.
5. Go to “Final Actions” on page 54

6.6 Intensity Level Does Not Adjust Properly Using the Hand Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. The Surgical Light primary lamp intensity operates properly after performing the following procedure:
 - a. Turn the main power off, then on, and observe the Lamp Control LEDs.
 - b. Verify that the primary lamp is on and at least one blue *intensity* LED is lit.
 - c. Verify that the green *ready* LED is lit.
 - d. Verify that the yellow *relamp* LED is off.
 - e. Verify that the 4 thumbscrews are snug tight locking in the Lamp Control assembly

Yes No
↓ →

Replace the Lamp Control Assembly.

2. The Surgical Light primary lamp intensity control operates properly after performing the following:
 - a. Press and release the hand Control push button several times
 - b. Verify the primary lamp intensity changes accordingly.
 - c. Verify the blue intensity LEDs show the correct intensity level.

Yes No
↓ →

Replace the Lamp Control Assembly

3. The Surgical Light back-up lamp intensity operates properly after performing the following procedure:
 - a. Lower the Lamp Control Assembly.
 - b. Remove the primary lamp, and install the Lamp Control Assembly
 - c. Turn the main power off, then on, and observe the Hand Control LEDs.
 - d. Verify that the back-up lamp is on and at least one blue intensity LED is lit.
 - e. Verify that the green ready LED is lit.
 - f. Verify that the yellow *relamp* LED is lit.

Yes	No
↓	→

Replace the Lamp Control Assembly.

4. The Surgical Light back-up lamp intensity control operates properly after performing the following:
 - a. With the primary lamp still removed, press and release the Hand Control push button several times.
 - b. Verify that the back-up lamp intensity changes accordingly
 - c. Verify that the blue intensity LEDs show the correct intensity level.

Yes	No
↓	→

Replace the Lamp Control Assembly.

6. Reinstall the primary lamp
7. Go to “Final Actions” on page 54.

6.7 Intensity Level Does Not Adjust Properly Using the Wall Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. The Surgical Light primary lamp intensity control operates properly after performing the following:
 - a. Turn the main power off, then on, and observe the wall control LEDs.
 - b. Verify the primary lamp is on and at least one blue *intensity* LED is lit.
 - c. Verify that the green *ready* LED is lit.
 - d. Verify that the yellow *relamp* LED is off.

Yes No
↓ →

Replace the wall control P.C. board. See section #2.6

2. The Surgical Light primary lamp intensity control operates properly after performing the following:
 - a. Press and release the wall control push button several times, and observe the wall control LEDs.
 - b. Verify that the primary lamp intensity changes accordingly.
 - c. Verify that the blue *intensity* LEDs show the correct intensity level.
 - d. Verify that the LED pattern is the same on both the wall control and the lighthead control.

Yes No
↓ →

Replace the wall control P.C. board. See See section #2.6

3. The Surgical Light back-up lamp intensity operates properly after performing the following procedure:
 - a. Lower the Lamp Control Assembly. See section 7.0 #3-7
 - b. Remove the primary lamp, and install the Lamp Control Assembly.
 - c. Turn the main power off, then on, and observe the wall control LEDs.
 - d. Verify that the back-up lamp is on and at least that one blue *intensity* LED is lit.
 - e. Verify that the green *ready* LED is lit.
 - f. Verify that the yellow *relamp* LED is lit.

Yes	No
↓	→

Replace the wall control P.C. board. See See section #2.6

4. The Surgical Light back-up lamp intensity control operates properly after performing the following:
 - a. With the primary lamp still removed, press and release the wall control push button several times.
 - b. Verify that the back-up lamp intensity changes accordingly.
 - c. Verify that the blue *intensity* LEDs show the correct intensity level.
 - d. Verify that the LED pattern is the same on both the wall control and the lighthead control.

Yes	No
↓	→

Replace the Lamp Control Assembly.

5. Reinstall the primary lamp.
6. Go to “Final Actions” on page 54.

6.8 Surgical Light Does Not Turn Off Using The Hand Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. The Surgical Light primary lamp goes off after performing the following procedure:
 - a. Press and hold the Lamp Control Assembly push button for 3 seconds.
 - b. Verify that the light goes off.
 - c. Verify that only the green ready LED is lit.

Yes No



Check the transformer control box's internal wiring. Go to RAP 6.0.1.

2. The Surgical Light back-up lamp goes off after performing the following procedure:
 - a. Lower the Lamp Control Assembly. See section 7.0 # 3-7
 - b. Remove the primary lamp.
 - c. Install the Lamp Control Assembly.
 - d. Press and hold the Hand Control push button for 3 seconds.
 - e. Verify that the light goes off.
 - f. Verify that the green ready LED is lit.
 - g. Verify that the yellow relamp LED remains lit.

Yes No



Replace the Lamp Control Assembly

3. Install both bulbs, Lamp Control Assembly, and the Sterilizable hand control.
4. Go to "Final Actions" on page 54.

6.9 Surgical Light Does Not Turn Off Using The Wall Control



SHOCK HAZARD:

Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

1. The Surgical Light primary lamp goes off after performing the following procedure:
 - a. Press and hold the wall control push button for 3 seconds.
 - b. Verify that the light goes off.
 - c. Verify that the green ready LED is lit.

Yes	No
↓	→

Replace the wall control P.C. board. See section 2.6

2. The Surgical Light back-up lamp goes off after performing the following procedure:
 - a. Remove the Lamp Control Assembly. See “Lamp Control Assembly” on page 4-6.
 - b. Remove the primary lamp, and install the Lamp Control Assembly.
 - c. Press and hold the wall control push button for 3 seconds.
 - d. Verify that the light goes off.
 - e. Verify that the green *ready* LED is lit.
 - f. Verify that the yellow *relamp* LED remains lit.

Yes	No
↓	→

Replace the wall control P. C. board. 2.6

3. Install both bulbs, Lamp Control Assembly, and Sterilizable Hand Control.
4. Go to “Final Actions” on page 54.

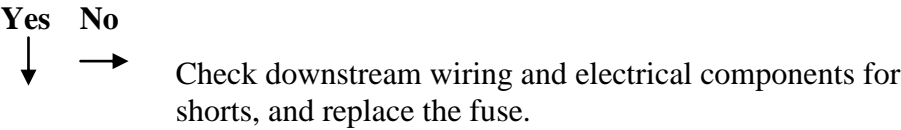
6.0.1 Transformer Control Box Does Not Function Properly



SHOCK HAZARD:

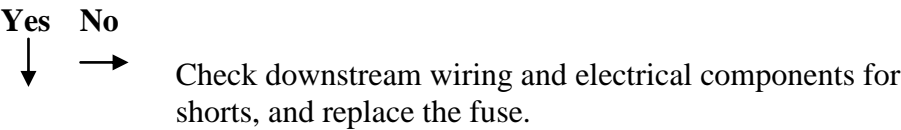
Use care when checking live voltages. Do not touch live terminals, wires, and ground. Failure to use caution will cause serious electrical shock injury.

- 1. Examine the main fuse (4 A, 250V, 3AG, slow blow on 120V boxes) and (2 A, 250V, 3AG, slow blow on 220 and 230-240V boxes), and measure resistance, verifying the fuse is good.



- 2. A voltage reading available at field wiring terminals L1 (hot) and L2 (neutral) as follows:

Nominal Mains Voltage	Measured Voltage
120V	108 to 132V
220V	198 to 242V
230-240V	207 to 264V



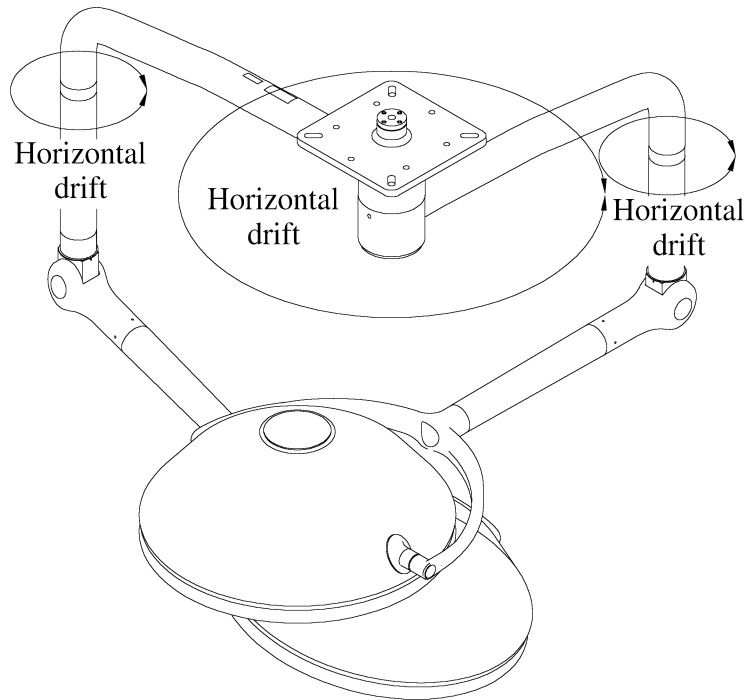
- 3. Replace the Ceiling / Transformer Control Box Assembly
- 4. Go to “Final Actions” on page 54.

6.0.2 Suspension Arm Drifts Horizontally

NOTE:

The Surgical Light must be completely assembled before any adjustments are made.

Figure 6.0.2. Suspension Arm Drift



1. Remove the ceiling shroud and using a spirit level check that the mounting plate is horizontal in all directions (see Suspension Arm Replacement).
2. Adjust the suspension arm brakes (see “Suspension Arm Adjustment”). This solves the problem.

Yes **No**
↓ →

Call Nuvo Technical Support at (800) 663-1152 or (814) 899-4220.

3. Go to “Final Actions” on page 54.

6.0.3 Counterbalance Arm Drifts Vertically

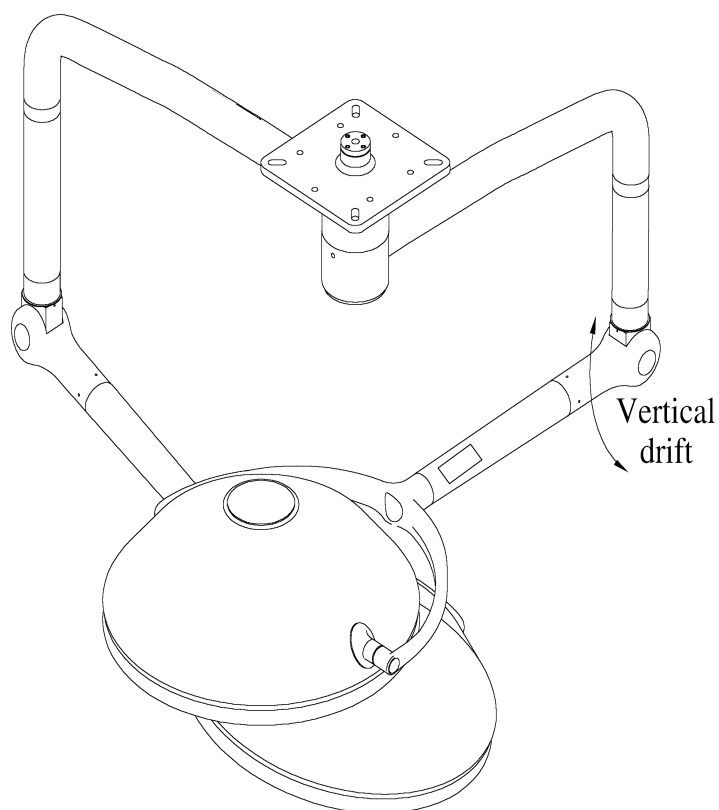
NOTE:

The Surgical Light must be completely assembled before any adjustments are made.

1. The counterbalance arm assembly is at rest after desired positioning (see figure 6.0.3).

Yes	No	
↓	→	Adjust the counterbalance arm spring tension (see “Counterbalance Arm Adjustment”).

Figure 6.0.3. Counterbalance Arm Drift



2. Go to “Final Actions” on page 54.

6.0.4 Yoke Contains Rotational Drift

NOTE:

The Surgical Light must be completely assembled before any adjustments are made.

1. The yoke assembly is at rest after desired positioning (see figure 6.0.4).

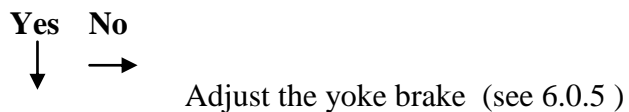
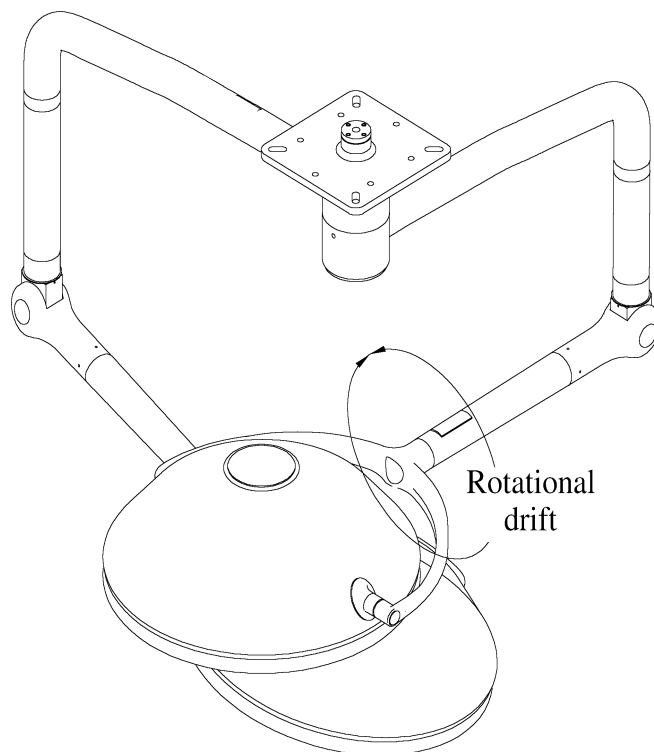


Figure 6.0.4. Yoke Drift



2. Go to “Final Actions” on page 54.

6.0.5 Lighthead Contains Rotational Drift

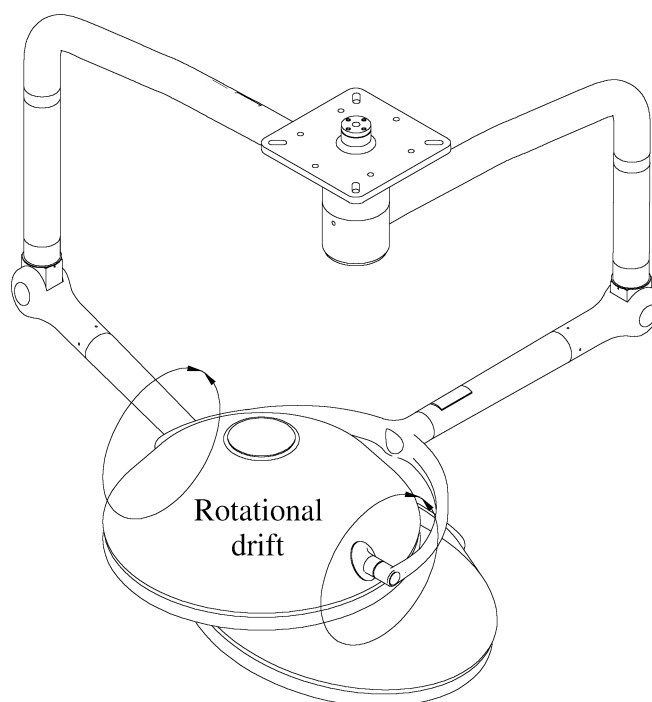
NOTE:

The Surgical Light must be completely assembled before any adjustments are made

1. The Lighthead assembly is at rest after desire positioning

Yes	No	
↓	→	Adjust the lighthead mounting hardware (see “Lighthead Assembly Adjustment” 7.5.1).

Figure 6.0.5. Lighthead Drift



2. Go to “Final Actions” on page 54

7.0 Lens Removal

Tools required:

5/64" AllenTM2 wrench

Removal



SHOCK HAZARD:

To minimize the risk of electrical shock or damage to equipment, disconnect all electrical power to the system before working on it. Failure to do so could result in personal injury or equipment damage.

1. Perform the following:
 - a. Locate the involved building standard/emergency circuit breaker panel.
 - b. Set the involved circuit breaker (A) to OFF (see figure 6.1.1).
 - c. Lock out and tag out the breaker.
2. Rotate the sterilizeable handle (A) counterclockwise (see page 14 step 1&2). Remove from the lamp control assembly (B).



WARNING:

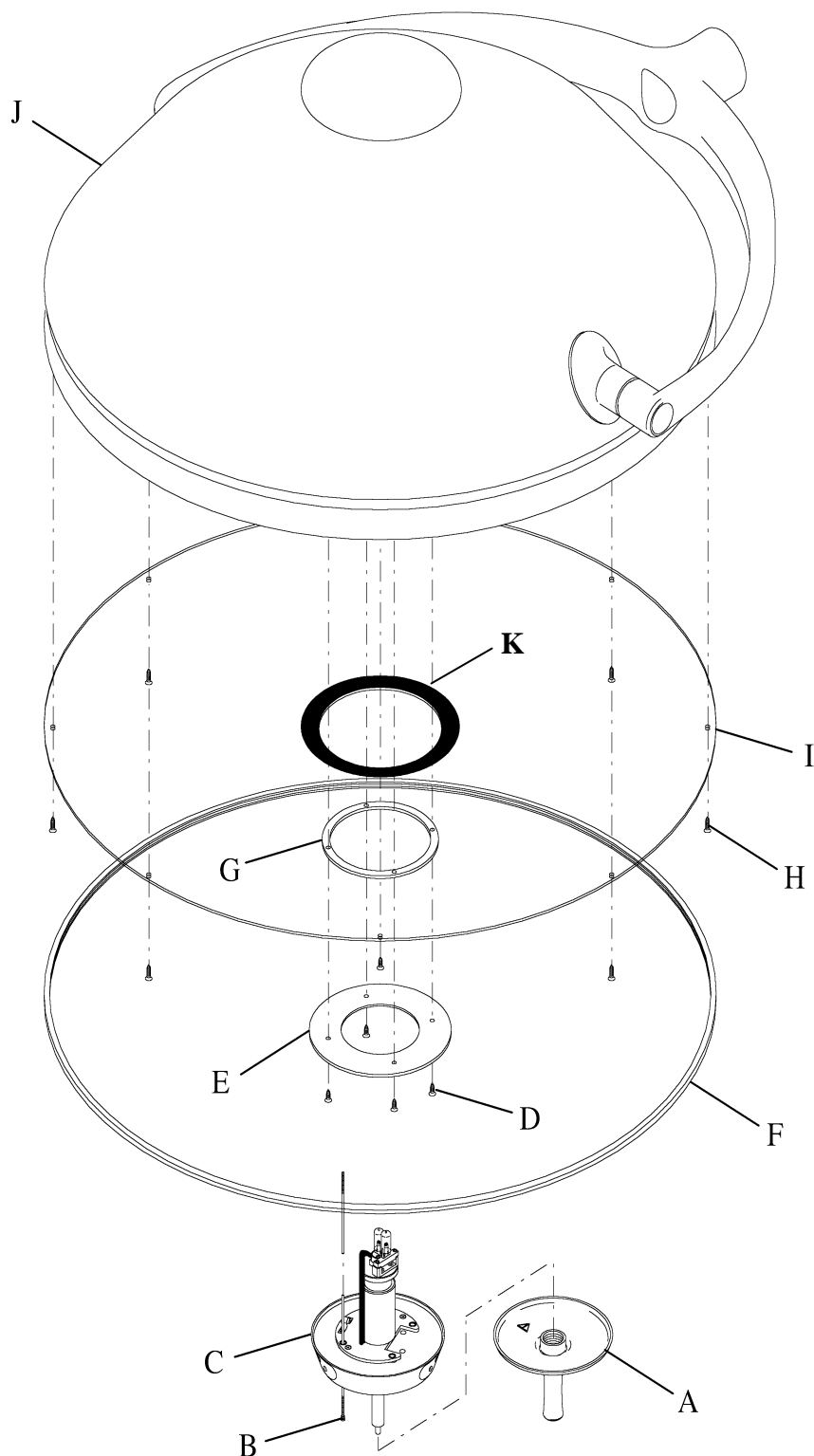
Make sure the lamp control assembly is supported before loosening the four tether rods. Failure to do so could result in personal injury or equipment damage.

NOTE:

The tether rods will not come out completely, but will drop 3/4" (19 mm) once loosened.

3. Loosen the four tether rods (B) on the lamp control assembly (C).
4. Slowly lower the lamp control assembly (C) evenly until it stops.
5. Continue counterclockwise rotation to free each tether rod from the lighthead assembly, and remove the lamp control assembly (C).
6. Using the 5/64" AllenTM wrench, remove the trim ring (F), screws (D), mounting plate (E), and guide plate (G).
7. Remove the screws (H) and the lens (I) from the lighthead housing (J).

Figure 7.0.1 Lens Removal



7.1 Replacement

1. Prepare the new lens (I) for installation as follows:
 - a. Install new light barrier (K) onto the lens (I) on the opposite side from the (8) counter bores mounting holes.
 - b. Assemble the Trim Ring onto the Lens. The lip with the slots goes on the opposite side of the lens from the counter bore side. Line up slots approximately centered on each hole of lens, and ensure that stretch of Trim Ring is evenly distributed around the perimeter.
 - c. Clean the lens face with P001114 Brilliance anti static cleaner.
2. Install the new lens (I), counterbore side up, on the lighthouse housing (J) and secure the lens with (8) P001096 6-32 x 1/2 BHC with nylon patch.
3. Install guide plate (G), mounting plate (E), and screws (D) to the lighthouse core (A). Fasten with (4) P000003 6-32 x 1/2 counter sink screws.
4. Install the lamp control assembly (C), and the four tether rods (B) into the lighthouse assembly.
5. Slowly raise the lamp control assembly (C) up to its original mounting position.
6. Tighten the four tether rods (B) to anchor the lamp control assembly (C).
7. Attach the Hand Control handle (A) to the lighthouse assembly and rotate clockwise until firmly seated.
8. Remove the lockout and out-of-service tags and set the circuit breaker to the ON position.

7.2 Counterbalance Arm Assembly

Tools required:	Allen ^{TM3} wrench set Portable lift with blocks	
Parts required:	(1) S2V00080	Number decal (#1)
	Or	
	(1) S2V00081	Number decal (#2)
	Or	
	(1) S2V00082	Number decal (#3)

Removal

NOTE: Removal and installation of the counterbalance arm assembly require 2 individuals, one at the clevis (knuckle) end of the counterbalance arm and one at the yoke (as in Fig. 7.2.1, below). Alternatively, an equipment lift may be used.



SHOCK HAZARD:

To minimize the risk of electrical shock or damage to equipment, disconnect all electrical power to the system before working on it. Failure to do so could result in personal injury or equipment damage.

1. Before removing the counterbalance arm assembly, perform the following:
 - a. Locate the involved building standard/emergency circuit breaker panel.
 - b. Set the involved circuit breaker to OFF.
 - c. Lock out and tag out the breaker.

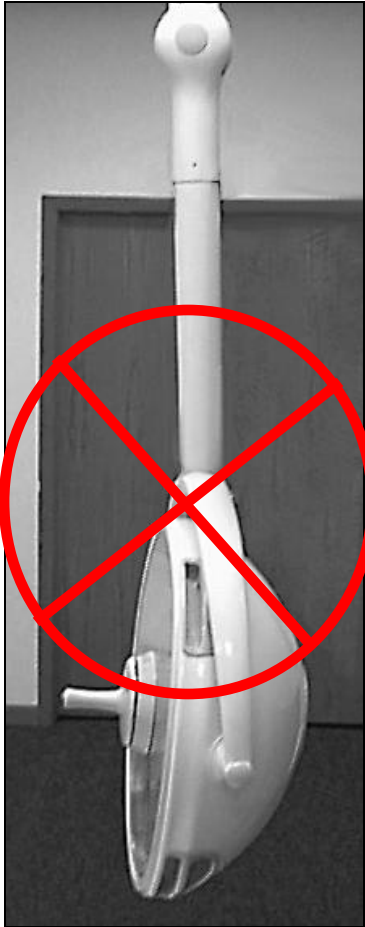


WARNING:

Do NOT remove the counterbalance arm while it is in the vertical position. The counterbalance arm is spring-loaded and removing it in the vertical position could result in personal injury or equipment damage. Refer to Figure 7.2.1 and Figure 7.2.2, below for correct and incorrect removal positioning.

Figure 7.2.1

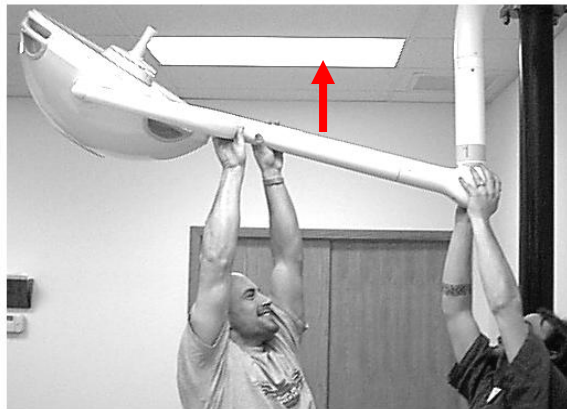
WRONG!



**NEVER Attempt REMOVAL of
COUNTERBALANCE ARM
While It Is In The VERTICAL
POSITION!**

Figure 7.2.2

CORRECT



WARNING:

If using an equipment lift, ensure that lift is capable of safely lowering the counterbalance arm assembly from the suspension arm assembly vertical tube. Failure to use an appropriate lift could result in personal injury or equipment damage.



WARNING:

If using a lift, follow lifting safety precautions provided by the lift manufacturer when lifting the counterbalance arm assembly. Improper operations could result in personal injury or equipment damage.



WARNING:

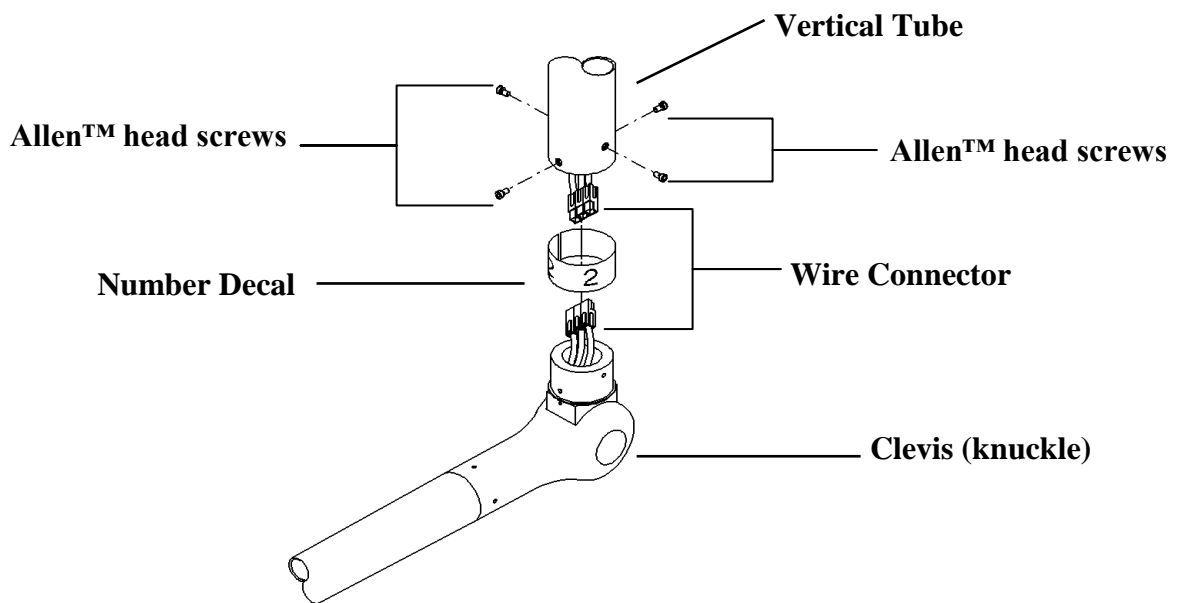
Do not work under unsupported lift fixtures. Personal injury could occur

Removal, Replacement, and Adjustment Procedures – Counterbalance Arm Assembly

To remove counterbalance arm/lighthouse, refer to Figs. 7.2.1 and 7.2.3, and do the following:

- **Be sure circuit breaker is turned off and ensure power is disconnected from light.**
 1. Raise light to the highest position and face the lighthouse toward the ceiling.
 2. Remove the number decal.
 3. Remove the four Allen™ head screws (5/16" x 5/8" FHCS; P/N P000405) located under the number decal.
 4. Push up on the yoke and slide the clevis (knuckle) from the vertical tube.
 5. Detach the wire connector located at the juncture of the knuckle and vertical tube.

Fig. 7.2.3 Counterbalance Arm Assembly: Clevis / Vertical Tube Juncture



Replacement

To replace counterbalance arm / lighthouse refer to Figs. 7.2.1 and 7.2.3, and do the following:

- **Be sure circuit breaker is turned off and ensure power is disconnected from light.**
 1. Place counterbalance arm horizontally with the lighthouse facing the ceiling.
 2. Reattach the wire connector located at the juncture of the knuckle and vertical tube.
 3. Insert the counterbalance arm into the vertical tube, ensuring that the wires are not pinched or damaged.
 4. Line up the counterbalance arm holes with those on the vertical tube by rotating the vertical tube while pushing up on the yoke.
 5. Install the four Allen™ screws.
 6. Lift up on the yoke, and tighten all the Allen screws. The Allen™ screws will not seat properly until the yoke is lifted and Allen™ screws are tightened.
 7. Turn on the circuit breaker, making sure the light functions properly.
 8. If the vertical tube is clean and dry and the light is functioning properly, place the appropriate number decal over the four Allen™ screws.

7.3 Brakes

Tools required: Allen™⁴ wrench set
Screwdriver
Step ladder

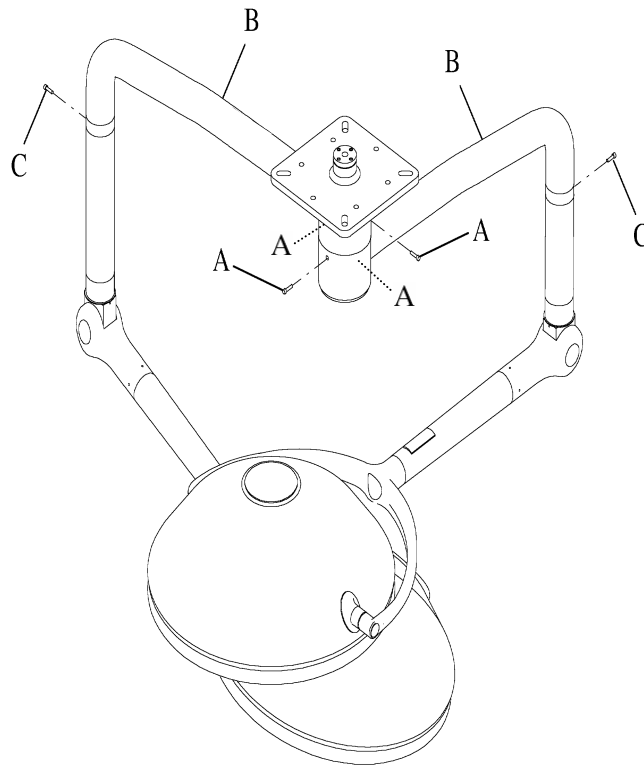
NOTE:

The Nuvo Surgical Light has five points of adjustment to compensate for drifting.

Suspension Arm Adjustment

1. Prior to making adjustments, confirm that the mounting plate is level.
2. Note that there are two types of adjustment to correct any drifting of the suspension arm assembly. (See points A & C, Figure 7.3.1, below.)

Figure 7.3.1. Suspension Arm Assembly Adjustment



3. To correct drift occurring at the inner hub of the suspension arm assembly (B), tighten the two (2) setscrews (A) on each arm by turning clockwise.
4. To correct drift occurring at the outer hub of the suspension arm assembly (B), tighten the setscrew (C) on each arm, by turning clockwise

⁴ Allen™ is a trademark of Industrial Fasteners, Inc.
SIM-S2Z0001 Rev 05

7.4 Counterbalance Arm Adjustment

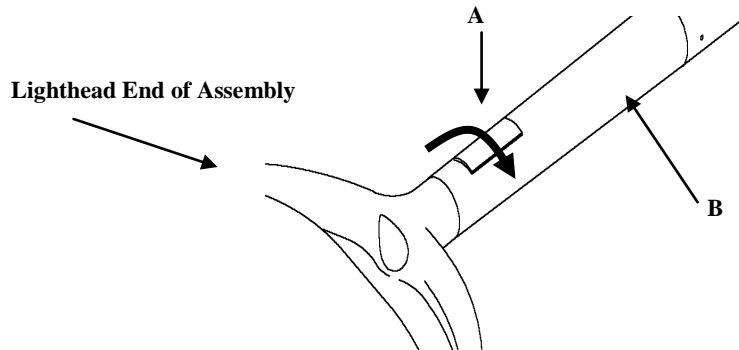
There are two points of adjustment to correct any drifting of the counterbalance arm assembly:

- Step one is to adjust the spring tension.
- Step two, if necessary, is to apply the brake.

The procedure for these adjustments is explained in numbers 1 through 5(b), below.

1. Remove the access cover (A) from the counterbalance arm assembly (B) as follows:
 - a. With the counterbalance arm at eye level and lighthouse end of assembly positioned to the left, as illustrated in Figure 7.4.1, below, move access cover (A) toward you over the arm assembly (B).
 - b. As you do so, access cover (A) will loosen. Lift (A) upward to remove.

Figure 7.4.1. Counterbalance Arm Assembly Adjustment: How to Remove Cover

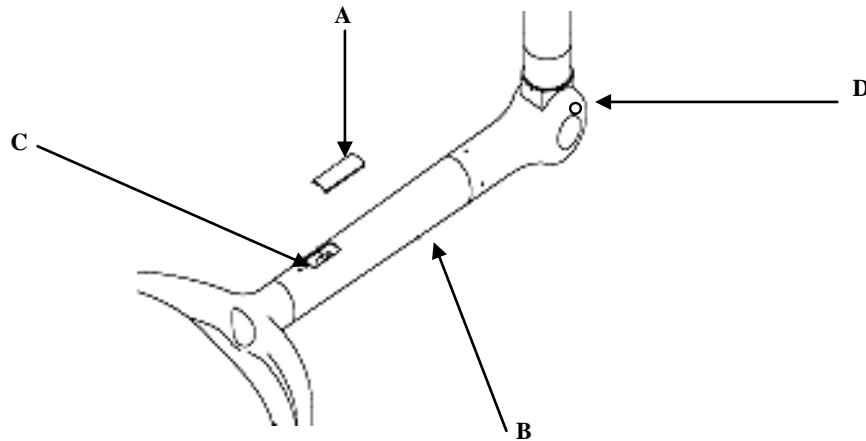


2. To correct downward drifting of the counterbalance arm assembly, do the following:
 - With the arm horizontal, and access cover (A) removed (as indicated in 1, above) tighten the spring tensioner nut (C) by turning it clockwise as viewed from the lighthouse.

Note that spring tensioner nut (C) is located within the arm assembly under access cover (A), as indicated in Figure 7.4.2, next page.

3. To correct upward drifting of the counterbalance arm assembly, do the following:
 - With the arm horizontal, loosen the spring tension nut (C) by turning it counter-clockwise as viewed from the lighthouse.

Figure 7.4.2. View Indicating Tension Nut & Brake Screw in Clevis Assembly



4. Replace access cover (A) as follows:

- a. Notice that access cover (A) is equipped with two metal tabs, one larger than the other. Insert the larger metal tab of access cover (A) into the side of the access cutaway that is closest to you.

Observe that there is a thin slot just beneath the hull of the access cutaway into which the larger metal tab will slide as you move the access cover toward you.

- b. Having inserted the larger metal tab as indicated above, move access cover (A) away from you until the smaller metal tab on (A) touches the opposite side of the access cutaway.

Observe that there is another thin slot just beneath the hull of the access cutaway into which the smaller metal tab will slide upon depressing the metal tab as indicated below.

- c. Using a flathead screwdriver, depress the shorter metal tab on (A) until the tab slips into the slot just beneath the hull of the access cutaway. Moving access cover (A) away from you while depressing the tab will facilitate insertion.

NOTE: Take care to maneuver access cover (A) carefully while depressing tab to avoid screwdriver slipping and causing personal injury or damage to equipment.

- 5 (a). On units built prior to December 1, 2004, the brake screw (D) is recessed into one side of the clevis assembly. (See previous page, Figure 7.4.2. and Figure 7.4.4, below)

To access the brake screw, the lighthead must be lowered to the vertical position.

With the lighthead positioned vertically (as in Figure 7.4.3, below.), do the following:

- Observe whether the recessed brake screw is a slotted or a hex screw.
- If the recessed brake screw is slotted, use a flathead screwdriver to rotate the brake clockwise until sufficient friction results to eliminate drift.
- If the recessed brake screw is a hex design, use a 3/16" Allen™ Wrench to rotate the brake clockwise until sufficient friction results to eliminate drift.



Figure 7.4.3: Lighthead (Vertically)

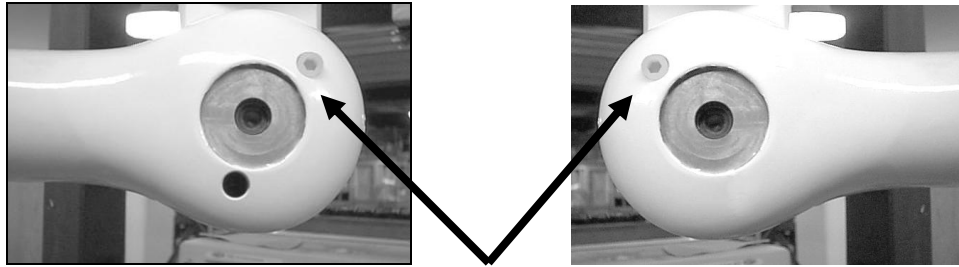


Figure 7.4.4: Recessed Brake Screw

5 (b). There are two external brakes, one on each side of the outer clevis. (See Figure 7.4.5, below.) To adjust, do the following:

- Position the lighthead vertically as described on previous page.
- To provide the required level of friction, tighten both external brakes equally using a 1/4" Allen™ Wrench,

Figure 7.4.5: Dual Brake Screws (Two Views)



Yoke Assembly Adjustment

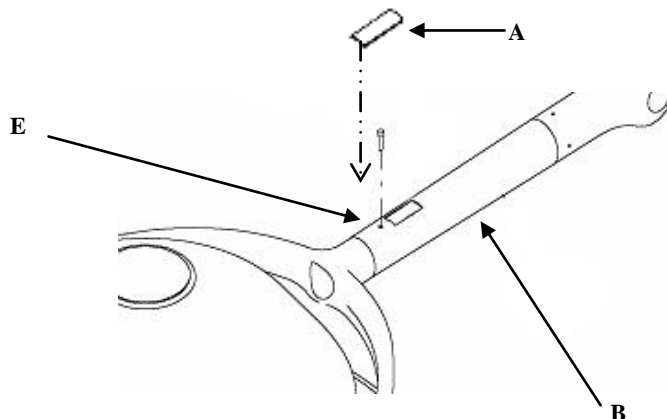
There is only one point of adjustment to correct yoke assembly drifting. (See Figure 7.4.6, below).

Correcting yoke drift is accomplished by adjusting a setscrew recessed BELOW the outer hull of the arm assembly (B), and accessed via the setscrew hole located UNDER access cover (A) NEXT TO the access cutaway, as illustrated in Figure 7.4.6, below.

Figure 7.4.6. Yoke Assembly Adjustment

ATTENTION: The yoke adjustment setscrew (E) is:

- Recessed **BELOW** outer hull of arm assembly.
- Accessed **THROUGH** the setscrew hole located **UNDER** access cover (A) and **NEXT TO** the access cutaway.

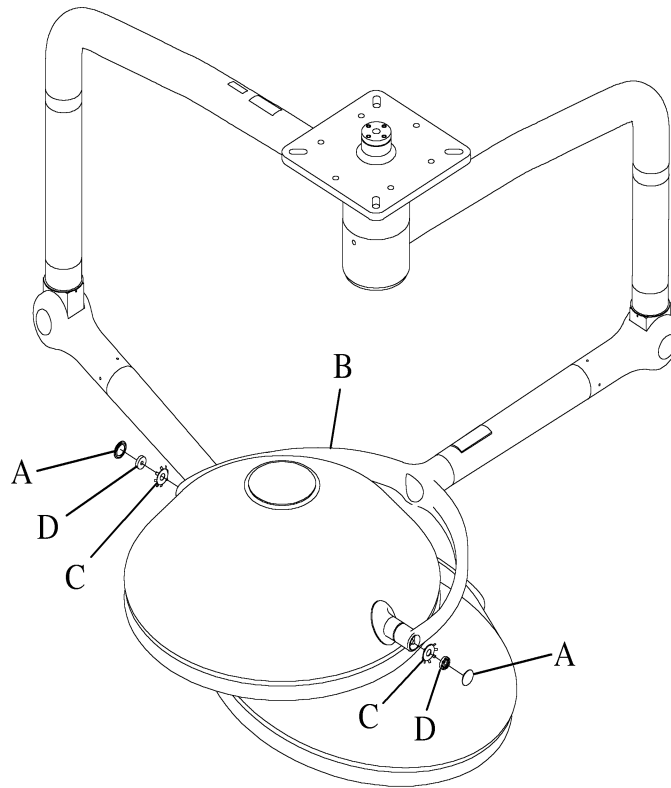


1. Remove the access cover (A) from the counterbalance arm assembly (B) as described under the "Counterbalance Arm Adjustment" section, number 1.
2. Using a 3/32" Allen™ Wrench, tighten the setscrew (E), by turning it clockwise to correct any rotational drifting of the yoke assembly.

7.5 Lighthead Assembly Adjustment

1. There are two points of adjustment to correct any drifting of the lighthead assembly (see figure 7.3.1).

Figure 7.5.1. Lighthead Assembly Adjustment



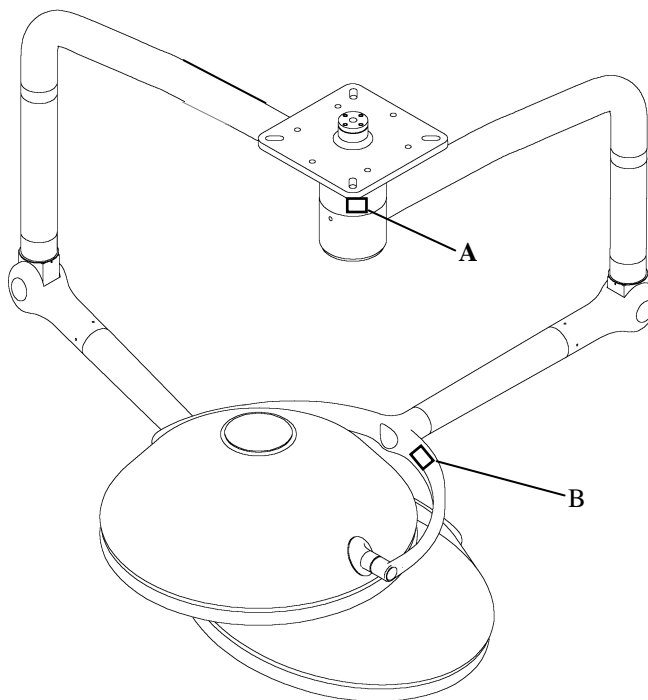
2. Remove the yoke caps (A) from both sides of the yoke assembly (B).
3. Release the lockwasher (C) that is retaining the locknut (D).
4. Tighten the locknut (D), by turning clockwise, to correct any rotational drifting of the lighthead assembly.
5. Reseat the lockwasher (C) to the retaining locknut (D).
6. Install the yoke caps (A).

8.0 Replacement Parts

Service Parts Ordering

Using the parts lists in this manual, identify the part number(s) you require. Find the product/model number label (A) and serial number label (B) (see figure 8.0.1).

Figure 8.0.1. Product Identification Label Location



Call Nuvo Technical Support at (800) 663-1152 with the following information:

- Customer name and location
- Purchase order number
- Product number
- Serial number
- Part number(s) and quantities
- Whether new parts or factory refurbished parts (when available) are requested

Nuvo also provides a fax number to promptly order parts, request part prices and availability, or follow up on a service order. The fax number is (814) 899-1410.

To order parts, a \$75.⁰⁰ minimum will prevent a charge for processing your order.

Terms:

- Net 30 days
- F.O.B. Erie, PA
- Prepaid shipping charges added to invoice
- All orders shipped UPS ground unless specified

Address all inquiries to:

Nuvo, Inc.
5368 Kuhl Road
Erie, PA 16510

NOTE:

To eliminate possible delays or incorrect billings, **do not** return any items without a Return Material Authorization (RMA) number. When a return is requested, an RMA packet is included with each order. This packet includes an RMA number, instructions and a shipping label. If an RMA number is not available, obtain one by phoning Nuvo Technical Support at (800) 663-1152.

Exchange Policy

The following are Nuvo's policies for in-warranty and out-of-warranty exchanges.

In-Warranty Exchanges:

In some cases, Nuvo will request that parts/products be returned for inspection. When this occurs, you are expected to return parts/products within 30 days of the exchange part. If you fail to return the inoperative parts/products within the 30 day period, Nuvo will invoice your facility for the full selling price of the parts/products.

NOTE:

The preceding billing procedure pertains **only** to parts/products that Nuvo requests to be returned.

In some cases, the invoice accompanying the parts will show the full selling price (only for Nuvo's internal use). Do not confuse this price with your price.

Do not return any parts without an RMA number. When parts/products have been requested to be returned, Nuvo will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Nuvo Technical Support at (800) 663-1152.

Out-Of-Warranty Exchanges:

You are expected to return the inoperative parts/products within 30 days of receipt of the exchange part. Nuvo will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Nuvo Technical Support at (800) 663-1152. If you fail to return the inoperative parts/products within 30 days, Nuvo will invoice your facility for the full selling price of the parts/products. Upon return of the inoperative parts/products, Nuvo will issue a credit for the discounted price.

Figure 8.0.2. Lighthouse/Counterbalance Arm Assembly

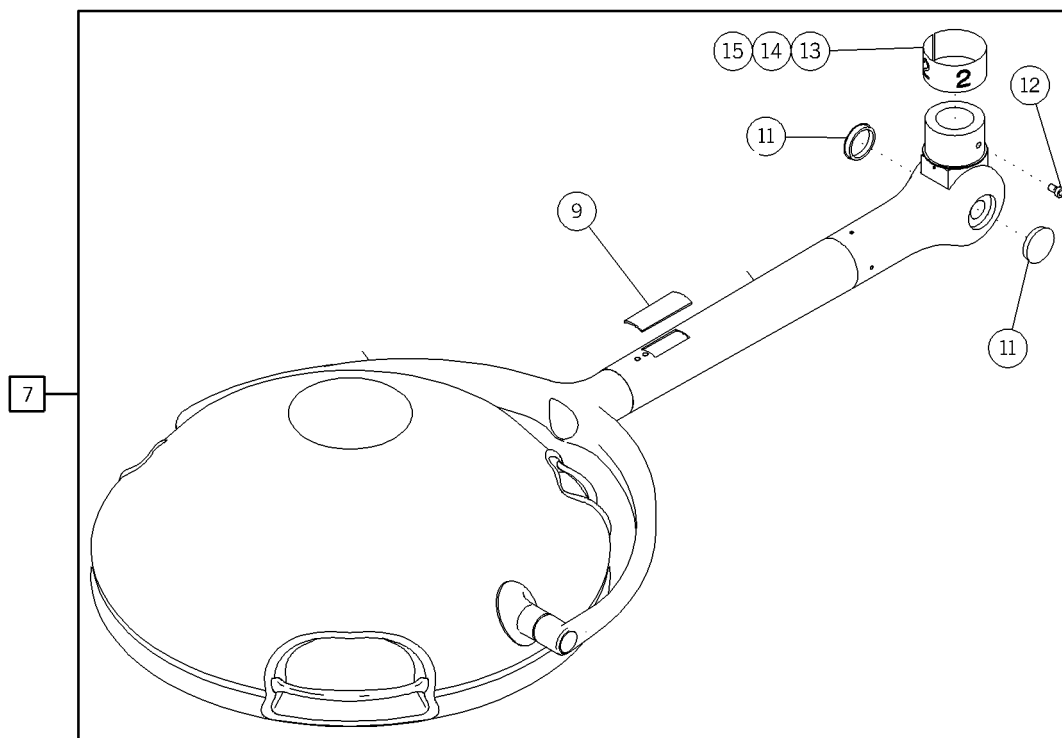


Table 8.0.1 Lighthouse/Counterbalance Arm Assembly

Item Number	Part Number	Quantity	Description
7	S2A00138	1	Lighthouse/yoke/counterbalance arm assembly
9	BSS1508	1	Counterbalance arm cover plate
11	BSS1434 *	2	Outer clevis cap
11	66976 *	2	Outer clevis cap
12	P000405	4	Cap Screw FHCS 5/16" x 5/8"
13	S2V00080	1	Label, "1"
14	S2V00081	1	Label, "2"
15	S2V00082	1	Label, "3"

Table 8.0.2 Suspension Arm Mount Assembly – Curved

Item Number	Part Number	Quantity	Description
	V1350D1C		Single Suspension Assembly
1	or V1350D2C	1	Dual Suspension Arm Assembly
	or V1350D3C		Triple Suspension Arm Assembly
2	P000039	2	Allen ^{TM5} head screw, #10-32 x 1/2"
	BSS2132		<u>Vertical Tube 5"</u> <i>Used on single suspension with ceiling heights of 8' 9" to 9' 1"</i>
	or BSS2137	1	<u>Vertical Tube 10"</u> <i>Used on Single and Dual suspension with ceiling heights of 9' 2" to 9' 6"</i>
3	or BSS2142		<u>Vertical Tube 15"</u> <i>Used on Single, Dual, and Triple suspension with ceiling heights of 9' 7" to 9' 11"</i>
	Or BSS2146		<u>Vertical Tube 20"</u> <i>Used on Single, Dual, and Triple suspension with ceiling heights of 10' 0"</i>
	BSS2132		<u>Vertical Tube 5"</u> <i>Used on Dual Suspension with ceiling heights of 9' 2" to 9' 6"</i>
			<i>Used on Triple suspension lower arm with ceiling heights of 9' 7" to 9' 11"</i>
4	or BSS2137	1	<u>Vertical Tube 10"</u> <i>Used on Dual and Triple suspension with ceiling heights of 9' 7" to 9' 11"</i>
			<i>Used on Triple suspension lower arm with ceiling heights of 10' 0"</i>
	or BSS2142		<u>Vertical Tube 15"</u> <i>Used on Dual and Triple suspension with ceiling heights of 10' 0"</i>
5	BSS1430	1	Hub cover
6	BSS1698	2	Shroud
7	P000644	8	Rod, threaded 1/4" – 20
8	P000631	4	Nut, hex 1/4" – 20
9	P000624	4	Nut, plastic acorn

⁵ AllenTM is a trademark of Industrial Fasteners, Inc.
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Table 8.0.3. Suspension Arm Mount Assembly – Straight Arms

Item Number	Part Number	Quantity	Description
10	V1350D1S	1	Single Suspension Arm Assembly
	or		
	V1350D2S	1	Dual Suspension Arm Assembly
	or		
	V1350D3S	1	Triple Suspension Arm Assembly
2	P000039	2	Allen ^{TM6} head screw, #10-32 x 1/2"
11			<u>Vertical Tube 5"</u> Used on Single Suspension with Ceiling heights of 8' 7" to 8' 11"
	BSS2132	1	
	or		
	BSS2137	1	<u>Vertical Tube 10"</u> Used on Single and Dual Suspension with Ceiling heights of 9' 0" to 9' 4"
	or		
	BSS2142	1	<u>Vertical Tube 15"</u> Used on Single and Dual and Triple Suspension with Ceiling heights of 9' 5" to 9' 9"
	or		
	BSS2146	1	<u>Vertical Tube 20"</u> Used on Single and Dual and Triple Suspension with Ceiling heights of 9' 10" to 10' 0"
12	BSS2132	1	<u>Vertical Tube 5"</u> Used on Dual Suspension with Ceiling heights of 9' 0" to 9' 6".
	or		Used on Triple suspension lower arm with ceiling heights of 9' 5" to 9' 9"
	BSS2137	1	<u>Vertical Tube 10"</u> Used on Dual and Triple Suspension with Ceiling heights of 9' 5" to 9' 9"
	or		Used on Triple Suspension lower arm with ceiling heights of 9' 10" to 10' 0"
	BSS2142	1	<u>Vertical Tube 15"</u> Used on Dual and Triple Suspension with Ceiling heights of 9' 10" to 10' 0"
5	BSS1430	1	Hub cover
6	BSS1698	2	Shroud
7	P000644	8	Rod, threaded 1/4" – 20
8	P000631	4	Nut, hex 1/4" – 20
9	P000624	4	Nut, plastic acorn

⁶ AllenTM is a trademark of Industrial Fasteners, Inc.
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Transformer Control Box Assemblies

Table 8.0.4. Transformer Control Box Assembly

Part Number	Quantity	Description
S2A00061	1	Transformer control box assembly, 120V, single light
S2A00062	1	Transformer control box assembly, 120V, dual light
S2A00063	1	Transformer control box assembly, 120V, triple light
S2A00064	1	Transformer control box assembly, 220V, single light
S2A00065	1	Transformer control box assembly, 220V, dual light
S2A00066	1	Transformer control box assembly, 220V, triple light
S2A00067	1	Transformer control box assembly, 230-240V, single light
S2A00068	1	Transformer control box assembly, 230-240V, dual light
S2A00069	1	Transformer control box assembly, 230-240V, triple light

Table 8.0.5. Lamp Control Assembly

Item Number	Part Number	Quantity	Description
1	S2A00036	1	Lamp control assembly with button control
1	or S2A00073	1	Lamp Control Assembly without button control
2	S2Q00006	2	Lamp
3	S2A00074	As Required	Sterilizable Handle with control button
3	or S2A00137	As Required	Sterilizable Handle without control button

Consumable Parts

- Lamp Bulbs
- Sterilizable Handle with Control Button
- Sterilizable Handle without Control Button
- Sterile Handle Covers

Part number S2Q00006**Part number S2A00074****Part number S2X00137****Part number S2X00171****Supplies**






- Anti Static Lens Cleaner






Part number P001114

Product Symbol Definition

The following symbols are used on the Nuvo Surgical Light:

Product Symbol Definition

	Description
	Type B applied part according to European Norm (EN) 60601-1
IPX0	According to International Electrotechnical Commission (IEC) 529 regarding the degree of protection against the harmful ingress of water.
	CAUTION: Consult accompanying documents
	Conforms to the European Medical Device Directive 93/42/EEC
	Identifying mains fuse
	Alternating current or voltage

	Description
	Light ready indicator (Indicator will be green when light is powered.)
	Wall Control Up/Down button for changing the light intensity levels
	Light intensity level indicators (Indicator will be blue in color to indicate the level of intensity.)
	Backup (Relamp) light indicator (If the yellow indicator is illuminated, the main bulb is not functioning and the backup (relamp) bulb is in use.)
	Wall Control lighthouse control selector (will be numbered 1, 2, or 3), Number coincides with the lighthouse on the light.

9.0

Technical Specifications

Dimensions for Product

Feature	Dimension
Counterbalance arm outer clevis to finished floor	78" (198 cm)
Suspension arm inner hub center line to outer hub center line	36" or 43" (91 cm or 109 cm)
Counterbalance arm pivot to lighthouse/yoke attachment	43" (109 cm)
Lighthouse diameter	23" (58 cm)
Articulation range - suspension arm pivot to hand control	79" (201 cm) with 36"(91 cm) suspension arm 86" (218 cm) with 43"(109 cm) suspension arm
Minimum ceiling height	Maintaining a 78" (198 cm) counterbalance arm outer clevis to finished floor
Single light	8' 7" (262 cm)
Dual light	9' 0" (274 cm)
Triple light	9' 5" (287 cm)

Environmental Conditions for Transport and Storage

Condition	Range
Temperature	-40°F(-40°C) to 158°F (70°C)
Relative humidity	95% non-condensing
Pressure	500 hPa to 1060 hPa

Mains Power Requirements

Rated Voltage	Rated Current Single	Rated Current Double	Rated Current Triple	Rated Frequency
100 V~	2.5 A~	5 A~	7.5 A~	50/60 Hz
120 V~	2 A~	4 A~	6 A~	50/60 Hz
220 V~	1.25 A~	2.5 A~	3.75 A~	50/60 Hz
230/240 V~	1 A~	2 A~	3 A~	50/60 Hz

Fuse Specifications

Condition	Range
Mains fuse (100/120 V models)	4 A, 250 V, ¼" x 1¼", UL 198G Slo-Blo® or equivalent
Mains fuse (220/230/240 V models)	2 A, 250 V, 5 x 20 mm, IEC127 Sheet III, Time Delay

a. Slo-Blo® is a registered trademark of Littelfuse, Inc.

Bulb Characteristics

Condition	Range
Bulb Type	Nuvo S2Q00006
Number of Bulbs	2 (Primary and Secondary)
Power	180 W
Voltage	22.7 V

Optical Characteristics

Condition	Range
Central Illuminance	12,700 Ft-Candles (137,000 lx)
Light Field Diameter	5.5" (15.0 cm) nominal
Depth of Illumination	28" (without adjusting the pattern)
Shadow Dilution	Yes, 11-28% small, 45-75% large
Correlated Color Temperature	4,300°K
Color Rendering Index	86
Heat-to-Light Ratio	3.8µW/cm ² -fc (3.78 milliwatts/m ² /lx)
Pattern Size	5.5" to 10" (14 to 25 cm)

Diameter @ 50% Illumination	6.3 in (160mm) Minimum
Diameter @ 10% Illumination	3.9 in (100mm) Minimum
Remaining Luminance @ 1m Small / Large Pattern with 1 mask	5121 / 2789 fc (55,122/ 30,021 lx), 33% Min.
Remaining Luminance @ 1m Small / Large Pattern with 2 mask	5410 / 1875 fc (28,233/ 20,182 lx), 46% Min.
Remaining Luminance bottom of standard tube	11144 / 3691 fc (119,953/39,730 lx), 96% Min.
Remaining Luminance bottom of standard tube with one mask	4821 / 2552 fc (51,893/ 27,470 lx), 41% Min.
Remaining Luminance bottom of standard tube with two mask	5121 / 1758 fc (55,122/ 18,923 lx), 44% Min.



Warning: It is possible to produce more than 1000 W/m² by overlapping the light fields of more than two (2) lights.

Ceiling Control / Transformer Installation

NOTE:

Table 3 shows the mains power requirement for power draw to input voltage and light configuration to help select the proper facility wiring connections.

Table 3. Power Requirements

Rated Voltage	Rated Current Single	Rated Current Double	Rated Current Triple	Rated Frequency
100 V~	2.5 A~	5 A~	7.5 A~	50/60 Hz
120 V~	2 A~	4 A~	6 A~	50/60 Hz
220 V~	1.25 A~	2.5 A~	3.75 A~	50/60 Hz
230/240 V~	1 A~	2 A~	3 A~	50/60 Hz

Classification and Standards

The Nuvo Surgical Light is designed and manufactured according to equipment classifications and the following standards.

Technical and Quality Assurance Standards	EN 60601-1 and amendments UL 2601-1 CSA® C22.2 No. 601.1 IEC 60601-2-41 (Draft)13 IEC 60601-1-2 EN ISO 9001 and EN 46001
Equipment Classifications per EN 60601-1	Class I equipment
Degree of Protection Against Electric Shock of the Applied Part	Type B
Classification according to Directive 93/42/EEC	Class I
Degree of Protection Against Ingress of Water	IPX0
Degree of Protection Against the Presence of Flammable Anaesthetic Mixtures	Ordinary equipment, not for use in a flammable atmosphere
Mode of Operation	Continuous operation

a. CSA® is a registered trademark of Canadian Standards Association, Inc.