

LED Shadowless Lamp

User Manual

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Precautions, Warnings and Instructions

1. Please read the instructions carefully before using this product.
2. Strictly follow the steps in the installation manual for installation and debugging. When connecting to the power supply, please use a 5A isolator.
3. Please check the LED shadowless lamp frequently to prevent accidents.
4. Personnel not approved by the company, please do not disassemble the product and power circuit at will.
5. This product provides lifetime maintenance service, the operating lifetime is 10 years and 1 year for the free warranty (except for bulbs). Improper use and causing damage of the product is not included in the free warranty. Repairing without permission is prohibited, otherwise company will not provide free warranty. Please use the spare parts and accessories provided by the manufacturer to ensure the safety and maintenance.
6. Use soft cloth or sponge, damp cloth or detergent for cleaning, do not use hard brush, wire brush, or corrosive liquids, such as wet paint or acids on shadowless lamp surface.
7. After using the detergent, please wipe the shadowless lamp with a damp cloth, and then dry it with a dry cloth.
8. The surface of the glass cover is often cleaned with medical gauze to increase the illuminance. Water can be used; alcohol and organic solvents are prohibited.
9. Steam sterilization can be used for lamp handle, with 121°C in 30 minutes. Lamp cover and control pannel can be sterilized with 75% alcohol for 3 minutes or with 0.1% bromogeramine disinfectant for 30 minutes.
10. The spring arm of shadowless lamp is forbidden to hang other objects.
11. In order to ensure the normal use of this product, it is forbidden for non-professionals to open the lamp cover.
12. The operator should wear gloves when adjusting through the handle.
13. If the lamp bulb does not light up, turn off the power first, check whether the fuse is burnt out or not, and the fuse is positioned in the base shield, and change

it (fuse: F2AL250V, Φ 6.3mm, length 32mm).

14. The grounding wire should be well connected to the product grounding terminal. The

grounding symbol: 

15.  This symbol means to consult the accompanying documents.

16. In order to prevent static electricity, operator should lay the anti-static carpet and have an anti-static wristband, which is designed to safely ground operator working with sensitive components, preventing a build-up of static electricity.

1. Product Name and Models

Product Name: LED Shadowless Lamp

Product Models: LED700/700、LED700/500、LED700、LED500、D5、D3、TTOL-D5

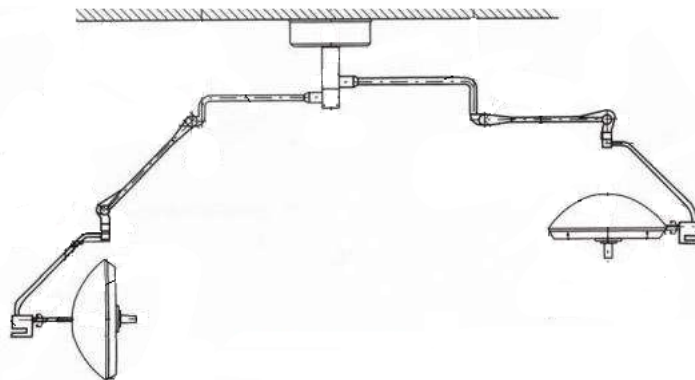
2. Application

Intended use: Professional Medical Lighting for Hospital, Clinic, Minor Surgery, Examination or Diagnosis, within suitable facilities designated for such purposes. This light system is mounted centrally in a room that access is available all around the operating environment.

Misuses: For any purpose or use at any facility other than that stated above. Caution shall be exercised when positioning the light head and avoid contact or collision with the patient, other medical professionals or other lights/equipment.

3. Structure and Components

LED Shadowless Lamp has 3 components: lamp base, Balancing Spring Arm and Lamp Head. Lamp head has single lamp head or double lamp head.



4. Specifications

4.1 Operation Environment

- a) Environmental Temperature Range: 5°C ~ 40°C ;
- b) Relative Humidity Range: ≤ 80% ;
- c) Atmospheric Pressure Range: 700hPa ~ 1060hPa ;
- d) Power Supply: ~ 220V, 50Hz ;

★ There should be no harmful gas, chemical precipitation and other flammable, explosive, corrosive media or places close to heat sources that seriously affect the use of the LED surgical shadowless lamp, make sure the ventilation is good, and keep dry of the equipment.

★ Cannot be used with high-frequency surgical equipment at the same time. Using the shadowless lamp closed to short-wave and microwave therapy equipment may cause the unstable output of the device.

4.2 Parameters

Please refer to Table 1, Table 2, Table 3, and Table 4 for the operating range, push and pull force, optical performance, and main safety features of the LED shadowless lamp.

Table1 Operating Range of LED Shadowless Lamp

Moving Range items	Model	
	LED700、D5	LED500、D3
Rotating Arm	360°	360°
Balancing Spring Arm (rotation)	360°	360°
Spring Arm (up & down)	80°	80°
Lamp Head Rotation	360°	360°
Large C-arm Handle	180°	180°
Small C-arm Handle	180°	180°

Table2 Push and Pull Force of LED Shadowless Lamp

Starting Force (N) items	Model	
	LED700、D5	LED500、D3
Lamp Head Handle Rotation	25	25
Handle Installation Force	10	10

Table3 Optical Performance of LED Shadowless Lamp

Lamp Head Specification Parameter	LED700、D5	LED500、D3	
	Central Illuminance (Ec)	40000lx<Ec<160000lx	
Spot Diameter (d ₁₀)	≥120mm		
Spot distribution d ₅₀ (mm)	≥60mm		
Shadowless Effect	Remaining central illuminance of single shutter (lx)	≥22000	≥10000
	Remaining central illuminance of double shutters (lx)	≥32000	≥23000

	Remaining central illuminance of cavity (lx)	≥ 60000	≥ 31000
	Remaining central illuminance of cavity with single shutter (lx)	≥ 19000	≥ 8000
	Remaining central illuminance of cavity with double shutter (lx)	≥ 20000	≥ 9000
Beam Spread		$\geq 800\text{mm}$	
CRI (Color Rendering Index)		$85 \leq Ra \leq 100$	
Color Temperature		$3000\text{K} \leq Tc \leq 6700\text{K}$	
Maximum Irradiance (W/m^2)		≤ 900	≤ 900





Table 4 Main Safety Features




Classification	Type of Protection Against Electric Shock	Class I
	Degree of Ingress protection	No applied part
	Ingress Protection Rating	IP40
	Degree of Safety for Usage	Do not use with flammable anesthetic gases mixed with air or nitrous oxide
	Operating Mode	Continue
Power	Rated Voltage and Frequency	AC220V 50Hz
	Rated Power	LED700/700、LED700/500、D5: 400VA; LED700、LED500、D3:200VA
	Fuse and Rated Voltage	F2AL250V AC220V

Note: The irradiance of the overlapping lighting area may exceed $1000\text{W}/\text{m}^2$, which may do harm to user's eyes. Please do not look directly at the spot of lamp.

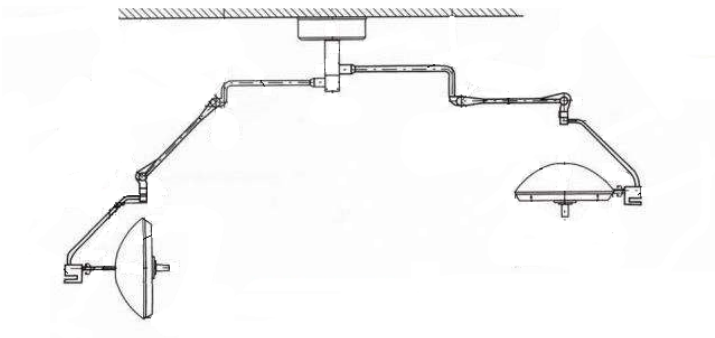
5. Label and Package Icons

Packaging and Labeling Explanation:

Symbol	Meaning	Symbol	Meaning
	Alternating Current		Grounding
	Afraid of Rain		Beware of Burns

	Fragile Product		Up
	<p>Note: Please consult the accompanying documents before use.</p> <p>Please avoid looking directly at the light source for a long time.</p>		

6. Usage Instruction



6.1 Installation

Installation Conditions

- 1) The places or environment provide good ventilation and sanitary condition.
- 2) The power supply voltage is AC 220V 50Hz, and the connection between the equipment and the network power supply must have more than twice the capacity.
- 3) The safety factor of the suspension system of this product is ≥ 20 (4 M12 screws are used to fix the product, the load of a single screw is $\geq 1500\text{kg}$, and the weight of the product is $\leq 120\text{kg}$).
- 4) The installation foundation of the LED surgical shadowless lamp must be able to withstand a load of 500kg to prevent the LED shadowless lamp from falling.
- 5) Installation Environment meets the electromagnetic compatibility requirements.

Installation Method

The installation process is guided by our company's professional and technical personnel.

Install and Remove Components

Handle Installation: make sure the positioning hole of handle is aligned with the buckle on the lamp head, and directly push the handle to the buckle.

Handle Removal: Press and hold the connection buckle, remove the

handle directly.

6.2 Operation



1, Long press the Power switch for 3 seconds to turn on the shadowless lamp. Use the control pannel to adjust the lighting. Press the brightness+ can increase the brightness, and press the brightness- to decrease the brightness. Press the +K can increase the color temperature, and press the -K to decrease the color temperature.

2. Rotate the focusing handle, adjust the spot size and focus depth to achieve the best lighting state for opertaion.

3. After each use, adjust the brightness and color temperature of the lamp to the weakest state, and long press the power button for 3 seconds to turn off the shadowless lamp.

6.3 Debugging

1. When adjusting each part, clockwise is to tighten and counterclockwise is to loosen. Each part can be rotated and positioned at a certain position flexibly and freely. If you have any questions, please contact the factory.
2. After installation, if the balancing arm and C-arm handles are not flexible or can not be positioned, use the 6mm hexagonal wrench to adjust the corresponding screw at the connection.
3. If the large C-arm handle and small C-arm handle are not flexible or can not be positioned, use the 4mm hexagonal wrench to adjust the corresponding screw at the connection.
4. If the small C-arm handle and lamp head are not flexible or can not be positioned, use the 4mm hexagonal wrench to adjust the corresponding screw at the connection.

5. If the vertical movement of balancing arm is not flexible or can not be positioned, use the 6mm hexagonal wrench to adjust the balancing spring.

7. Maintenance

LED Shadowless Lamp needs regular maintenance by professional personal. Refer to Table5 and make a record. If any problem occurred, please refer the manual accordingly. If the problem still can not be solved, please contact our factory in time.

Table5 Maintenance Period

Item	Frequency
Check the status of each connection part	every two months
Check the connection of power circuit	every two months
Check the flexibility of all the moving parts	every two months

8. Cleaning and Disinfection

Before cleaning and disinfection, turn off the power first. Make sure no liquid penetrate into the lamp. Do not use the wire brush or any other abrasive materials.

8.1 Handle Sterilization

Steam sterilization, Temperature: 121° C Time: 30 minutes.

8.2 Lamp Cover and Control Panel Sterilization

75% alcohol disinfection for 3 minutes or 0.1% bromogeramine disinfectant for 30 minutes.

9. Storage and Transportation

- The lamp should be stored in a well-ventilated room with less than 80% of humidity, temperature range is $5^{\circ}\text{C} \sim \pm 50^{\circ}\text{C}$, and no corrosive gases.
- Please use the original packaging during transportation. The lamp is fragile and easily scratched or damaged by sharp or hard

objects, well-packaging is needed.

10. Operating Lifetime

Production Date: refer label

Safety operating lifetime: 10 years (start from production date)

Handle lifetime: 15000 times (plug and unplug)

11. Other Description

11.1 The company may provide circuit diagrams, component list, calibration details as required, or necessary information that will assist technicians to repair equipment parts designated by the manufacturer.

11.2 Safety instructions for the environment

1. Disposal of packaging materials

- 1) Wooden box -- environmentally friendly and recyclable. Should be transported to designated recyclable materials storage points.
- 2) Styrene packaging and plastic bags -- hazardous to the environment and should be transported to designated non-recyclable material storage points for further processing.

2. Disposal of equipment

When the equipment has reached the end of its lifetime, it must be taken out of service. The dismantle equipment should be classified according to the different materials of the product components.

- 1) Metal parts -- environmentally friendly and recyclable. should be transported to the designated storage point.
- 2) Plastic parts -- harmful to the environment, should be transported to a designated non-recyclable material storage point for processing.
- 3) Glassware -- environmentally friendly and recyclable, should be transported to the designated storage point.
- 4) Electronic and electrical devices -- harmful to the environment and should be transported to designated storage point for processing.

12. Troubleshooting

Refer Table 6 for common faults and solutions.

NOTE: Any repairs of electrical circuit must be referred to qualified service personnel.

Table6 Common Faults and Solutions

No.	Situation	Solutions
1	Turn on the external power switch, the power indicator of the control panel will not light up	<ul style="list-style-type: none"> ● Check whether there is power supplied to the lamp socket base. ● Check the safety device, if the safety tube is burnt out, replace a new one of the same type.
2	Turn on the external power switch, the control panel can not be operated	<ul style="list-style-type: none"> ● Check the control power circuit. ● Check whether the color of the wire is connected correctly.
3	LED lamp do not work	<ul style="list-style-type: none"> ● Check the lifetime of bulb and fuse. ● Replace bulb or fuse.
4	LED lamp rotates non-stop	<ul style="list-style-type: none"> ● Installation is not in horizontal level or the brake part is too loose. ● Adjust the level to reinstall, or adjust the brake screw.
5	The brightness of lamp is not enough	<ul style="list-style-type: none"> ● The external voltage is low ● Check the voltage with multimeter
6	The vertical movement of lamp head can not be positioned	<ul style="list-style-type: none"> ● Balancing spring is loose or tight ● Open the cover and adjust the screw. Clockwise is for tighten, counterclockwise is for loosen.

13. Configuration List

No.	Name	Quantity	Remark
1	lamp base	1	
2	balancing arm	1 or 2	
3	lamp head	1 or 2	
4	handle	2	
5	certificate	1	
6	user manual	1	

7	warranty card	1	
8	packing list	1	

14. Electromagnetic Compatibility

1. Before installation and operation, please refer to the electromagnetic compatibility information.

2. Use the connection cable and switch provided by our company. The power cord used in this equipment has passed the "CCC" certification.

3. Warning: In addition to the connecting cables and switches provided by our company, using other manufacturers' accessories may lead to increased emissions or reduced immunity.

4. In order to ensure that the shadowless lamp can be used normally and that their emission is not increased and their immunity is not reduced, please use the connecting cables and related accessories provided by our company.

5. Using unspecified accessories, transducers or cables with the shadowless lamp may lead to an increasing emissions or a decrease in immunity.

6. The shadowless lamp should not be used with other devices with the same or similar operating frequency. If they must be used at the same time, you should observe and verify whether they can be operated normally.

7. When the beam is not blocked by anything, the central illuminance of each lamp head should reach 40000lx, and should not exceed 160000lx.

8. Portable and mobile radio frequency communication devices may affect the use of the lamp. Ensure the normal use of the lamp, it is recommended to stay away from portable and mobile radio frequency communication devices or keep them turned off.

9. Cable information

No.	Cable name	Length (m)	whether to shield
1	Power cable	1.5	No

Table 201

Guidance and Manufacturer' s Declaration—Electromagnetic Emissions		
Shadowless lamp is expected to be used in the electromagnetic environment specified as below, user should ensure the operating environment.		
Emission Test	Compliance	Electromagnetic Environment—Guidance
Radio Frequency GB 4824	1 group	Shadowless lamp use RF energy for its internalfunction. Therefore, the radio frequency emissions are very low and less likely to cause interference in electronic equipment nearby.
Radio Frequency GB 4824	Class A	Shadowless lamp are suitable for non-domestic and low voltage power indirect supply networks.
Harmonic Emission GB 17625.1	N/A	
Voltage fluctuation/flicker GB 17625.2	N/A	


Table 202

Guidance and Manufacturer' s Declaration—Electromagnetic Immunity			
The shadowless lamp is expected to be used in the electromagnetic environmmnet specified below, and the user should ensure that it is used in this electromagnetic environment.			
Immunity test	ICE60601 Testing	Test Level	Guidance—Electromagnetic Environment
Electrostatic Discharge (ESD) GB/T17626.2	± 6KV contact discharge	± 6KV contact discharge	The floor should be made of wood, concrete, or ceramic tiles. If the floor is covered with synthetic materials, the relative humidity should be at least 30%.
	± 8KV air discharge	± 8KV air discharge	
Electrical Fast Transient (EFT)	±2KV power line	±2KV power line	The network power supply should have the quality typical of commercial or

GB/T17626.4			hospital environments
Electrical Surge GB/T17626.5	$\pm 1KV$ line-to-line $\pm 2KV$ line-to-ground	$\pm 1KV$ line-to-line $\pm 2KV$ line-to-ground	The network power supply should have the quality typical of commercial or hospital environments
Temporary voltage drops, brief interruption, and voltage fluctuations on the power input line GB/T17626.11	<5% UT, lasting 0.5 cycles (95% voltage dip on UT) At 40% UT, lasting 5 cycles (60% voltage dip on UT) At 70% UT, lasting 25 cycles (30% voltage dip on UT) <5% UT, lasting 5 seconds (Voltage dip >90% on UT)	<5% UT, lasting 0.5 cycles (95% voltage dip on UT) At 40% UT, lasting 5 cycles (60% voltage dip on UT) At 70% UT, lasting 25 cycles (30% voltage dip on UT) <5% UT, lasting 5 seconds (Voltage dip >90% on UT)	The network power supply should have the quality typical of commercial or hospital environments It is recommended for user of shadowless lamp who require continuous operation during power interruptions to use an uninterruptible power supply (UPS) for power supply
Power frequency magnetic field (50Hz) GB/T17626.8	3A/m	3A/m	The power frequency magnetic field should have typical levels and characteristics found in commercial or hospital environments
Note: "UT" refers to the AC grid voltage before applying the test voltage			

Table 204

Guidance and Manufacturer's Declaration-Electromagnetic Immunity			
The shadowless lamp is expected to be used in the electromagnetic environment specified below, and the user should ensure that it is used in this electromagnetic environment.			
Immunity test	ICE60601 Testing	Test Level	Guidance-Electromagnetic Environment

<p>RF conduction GB/T17626.6</p>	<p>3V (RMS value) 150kHz~80MHz</p>	<p>3V (RMS value)</p>	<p>Portable and mobile RF communication devices should not be positioned closer to any part of the shadowless lamp than the recommended isolation distance, including cables. The calculation of the distance should use the formula corresponding to the transmitter.</p> <p>Recommended isolation distance:</p>
<p>RF radiation GB/T17626.3</p>	<p>3V/m 80MHz~2.5GHz</p>	<p>3V/m</p>	<p>$d=1.2\sqrt{P}$</p> <p>$d=1.2\sqrt{P}$ 80MHz~800MHz</p> <p>$d=2.3\sqrt{P}$ 800MHz~2.5GHz</p> <p>In the formula: P-Maximum rated output power of the transmitter provided by the transmitter manufacturer, measured in watts (W) d-Recommended isolation distance, measured in meters (m)</p> <p>The field strength of fixed RF transmitters, determined by surveying the electromagnetic field at location a, should be lower than the compliant levels in each frequency range b</p> <p>Interference may occur near devices marked with the following symbols</p> 

Note 1: For frequencies at 80MHz and 800MHz, the formula for the higher frequency range should be used.

Note 2: These guidelines may not be applicable to all situations. Electromagnetic propagation is influenced by the absorption and reflection of buildings, objects, and human bodies.

a. Fixed RF transmitters such as wireless (cellular/cordless) telephones, ground-based mobile radio broadcasts, have unpredictable field strengths that cannot be accurately determined theoretically. To assess the electromagnetic environment of fixed RF transmitters, an electromagnetic field survey should be conducted. If the measured field strength at the location of the surgical shadowless lamp exceeds the aforementioned RF compliance levels, the performance of the shadowless lamp should be observed to verify its proper operation. If abnormal performance is observed, supplementary measures may be necessary, such as repositioning or reorienting the surgical shadowless lamp.

b. Across the entire frequency range of 150kHz to 80MHz, the field strength should be below 3V/m.

Table 206

Recommended isolation distance between portable and mobile RF communication equipment and surgical shadowless lamp			
The shadowless lamp is intended to be used in an electromagnetic environment with controlled radiation disturbances. Based on the maximum output power of the communication equipment, users can prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication devices and this medical device.			
Maximum rated output power of the transmitter: W	The isolation distance corresponding to different frequencies of the transmitter		
	150kHz~80MHz $d=1.2\sqrt{P}$	80MHz~800MHz $d=1.2\sqrt{P}$	800MHz~2.5GHz $d=2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3

100	12	12	23
<p>For maximum rated output power of the transmitter not listed in the table, the recommended isolation distance (d) in meters (m) can be determined using the formula in the corresponding transmitter frequency column, where P is the maximum rated output power of the transmitter provided by the transmitter manufacturer, measured in watts (W).</p> <p>Note 1: For frequencies at 80MHz and 800MHz, the formula for the higher frequency range should be used.</p> <p>Note 2: These guidelines may not be applicable to all situations. Electromagnetic propagation is influenced by the absorption and reflection of buildings, objects, and human bodies.</p>			



Tootoo Meditech Co., Ltd.

Address: 3A, Phase II, Smart Home, Baolong Street, Longgang District,
Shenzhen, Guangdong, China

Tel: +86-755-28306385

Email: info@newtootoo.com

Web: www.newtootoo.com