

The Linvatec LS7500 300 Watt Xenon Light Source Instruction Manual



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**Record the Model and Serial Numbers of the light source controller, and date received.
Retain for future reference.**

Controller Model No. _____ Serial No _____ Date _____

Table of Contents

Page

1.0 INTRODUCTION and OPERATION

1.1	Intended Use	1
1.2	System Features	1
1.3	General Warnings	1
1.4	Symbol Definitions	4
1.5	System Indicators	5
1.5.1	Front Panel	5
1.5.2	Back Panel	6
1.6	Installation and Operation	7

2.0 MAINTENANCE

2.1	Cleaning	8
2.2	Lamp Replacement	8
2.3	Fuse Replacement	10
2.4	Troubleshooting	11
2.5	Theory of Operation	13

Table of Contents

Page

3.0 TECHNICAL INFORMATION

3.1	Light Source	14
3.2	Lamp Module	14
3.3	Power Cord Requirements	15
3.4	Light Source Accessories	16

1.0 INTRODUCTION and OPERATION

It is recommended that personnel study this manual before attempting to operate or clean the Linvatec LS7500 Xenon 300 Watt Light Source. The safe and effective use of this equipment requires the understanding of and compliance with all warnings, cautionary notices, and instructions marked on the product and included in this manual. Improper use or set-up of the light source may cause damage not covered by the warranty.


1.1 Intended Use

The Linvatec LS7500 Xenon Light Source is intended to be used with an endoscope to provide illumination during endoscopic procedures.

1.2 System Features

- Ultraviolet and infrared filters to prohibit harmful radiation from entering the fiber optic cable.
- A fully adjustable shutter to attenuate light output intensity from 0-100%.
- Universal front panel receptacle that allows the light source to be utilized with many Light Guide Adapters (please refer to section 1.4.1 for specific details).
- Lamp life indicator on front panel to indicate the total hours of elapsed use.
- Stand-by feature blocks light from exiting light guide port until selected.
- Auto and manual shutter modes to increase / decrease lamp intensity via serial communication link.

1.3 General Warnings

1. This equipment is designed for use by medical professionals completely familiar with the required techniques and instructions for use of the equipment. **Read and follow all warning and cautionary notices and instructions marked on the product and included in this manual.**
2. Do not attempt to open or service the Light Source, as this may void your warranty. There are no user-serviceable parts inside. Removing the cover may introduce an electric shock hazard by exposing you to dangerous high voltages or other risks. If the system malfunctions, return it for service immediately. 
3. Dangerous voltages are present in many system assemblies. The unit should be used only in rooms that comply with recommendations concerning electrical safety when used for medical purposes (as stated in IEC 60601 Series, Title 21 CFR and UL 2601-1).
4. System installation shall be in accordance with the requirements of IEC 60601-1, The Standard for Safety Requirements of Medical Electrical Systems.
5. Patients should only be connected to applied parts complying with IEC 60601-1. Other equipment used in the system should comply with relevant IEC or ISO Standards.
6. Do not expose the Light Source to moisture, operate in wet areas, or place liquids on or above the unit.
7. Never insert foreign objects into the Light Source.

8. Do not block air vents. Provide at least four inches of free air space behind Light Source.
9. Prior to each use, the Light Source and all associated equipment must be inspected for proper operation.
10. Do not excessively bend or kink the instrument power cord. Always inspect cords for signs of excessive wear or damage. If wear or damage is found, discontinue use and replace immediately.
11. The fiber optic cable must be a Non-Conductive cable. It must be rinsed free of soaking/disinfectant solution and dried completely before plugging into the light source turret.
12. Disconnect product prior to applying cardiac defibrillation to patient.
13. Do not use in surgical procedures requiring direct illumination of the eye.
14. Do not look directly or indirectly at the lamp at any time. The lamp produces high intensity visible and ultraviolet radiation that may cause burns to skin or eyes.
15. To avoid burns, use caution when working with high temperature areas during endoscopic procedures. High energy radiated light guided through endoscopes may give rise to high temperatures in front of the light outlet and the tip of the instrument.
16. The bottom door of the unit must always remain closed during unit operation.
17. Always unplug the unit before opening the lamp access door.
18. Wear a face shield or protective safety eye glasses and inspection gloves when handling the lamp assembly.
19. Do not touch the lamp until it has completely cooled.
20. The lamp in this unit is filled with xenon gas at very high pressure. Do not subject the lamp to mechanical forces or rough handling that may fracture the lamp as this may result in an explosion.
21. Do not leave finger prints or any marks on the lamp reflector surface or the bulb. Oil on these areas, such as from fingers, will burn from the heat, possibly resulting in damage to the bulb.
22. Do not use in the presence of flammable anesthetics, gases, disinfecting agents, cleaning solutions, or any material susceptible to ignition due to electrical sparking.
23. Some disinfectants and cleaning agents vaporize to form explosive mixtures and, if such agents are used, the vapor must be allowed to disperse before the equipment is returned to use.
24. After each use, thoroughly clean the unit and accessories (See **“Cleaning” on page 8**).

25. Equipment grounding is vital to ensure safe operation. Plug the power cord into a properly earthed mains supply outlet whose voltage and frequency characteristics are compatible with those listed on the unit or in this manual. Do not use plug adapters or extension cords; such devices defeat the safety ground and could cause injury.
26. External equipment, that will be connected to signal input and signal output ports or other connectors, shall comply with relevant IEC standard (i.e., IEC 60950 for IT equipment and IEC 60601 series for medical electrical equipment). In addition, all such combinations - systems - shall comply with the standard IEC 60601-1 (Safety requirements for medical electrical systems).














Any person who connects external equipment to signal input and signal output ports or other connectors has formed a system and is therefore responsible for the system to comply with requirements of IEC 60601-1. If in doubt, contact a qualified technician or your local representative.








27. This equipment has been tested and found to comply with the limits for medical devices to the IEC 60601-1: 2000 2nd edition and IEC 60601-1-2 September 2001. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other device(s) in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this

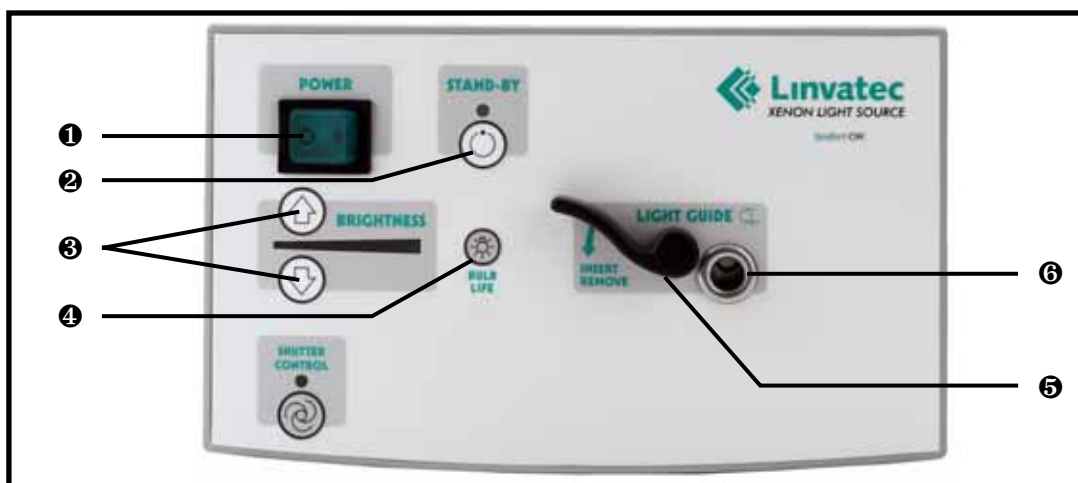
equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- 1) Reorient or relocate the receiving device.
- 2) Increase the separation between the equipment.
- 3) Connect the equipment into an outlet on a circuit different from that to which the other devices are connected.
- 4) Consult the manufacturer or field service technician for help.

1.4 Symbol Definitions

	Power “OFF”, disconnected from mains
	Power “ON”, connected to mains
	Stand-by.
	Attention, consult accompanying documents or contact a Linvatec representative.
	Caution - Electrical hazard, High voltage
	Caution - Hot surface
	Type BF equipment.
	Alternating Current.
	No user service recommended. Refer servicing to qualified Linvatec service personnel.
	Protective Earth (ground).
	Warning - For continued protection against risk of fire, replace only with same type and rating fuse.
	Mains fuse.
	Flammable Anesthetics - Risk of explosion if used in the presence of flammable anesthetics.

	Caution: Federal Law restricts this device to sale by or on the order of a physician.
	Bulb Life
	Light Guide
	Iso-potential Ground
	Brightness Decrease
	Brightness Increase
	Shutter Control



1.5 System Indicators

1.5.1 Front Panel

- ❶ **POWER Switch** — Rocker-style ON/OFF switch. Activates the light source's power.
- ❷ **STAND-BY Button** — Blocks light from exiting the light guide port, however, lamp remains illuminated. Light source returns to previous brightness level when stand-by condition is disabled. Unit defaults to stand-by mode when power is applied to the unit. LED will illuminate when in Stand-By mode.
- ❸ **BRIGHTNESS Buttons** — Increases / decreases light source output as indicated by number of illuminated green segments on bar graph.
- ❹ **BULB LIFE Button** — Press and hold to display 500 hour bulb life on LED graph. Release button to return to brightness indicator function. The LED graph is segmented as follows:

Each sequential LED represents 25 lamp hours. When less than 125 Hours, remaining LEDs will be Orange. When less than 50 hours, remaining LEDs will be Red. When Lamp Life has exceeded 500 hours, one LED will be Flashing Red.

- ❺ **LIGHT GUIDE Lever** — Utilized to open the "LIGHT GUIDE" receptacle for insertion / removal of a light guide. The lever is spring-loaded to hold the light guide during use.
- ❻ **Fiber Optic Cable Receptacle** — Accepts standard fiber optic light guide cables with the following Light Guide Adapter.
 - Wolf / Dyonics (Cat. #7455, Part #330019)
 - ACMI / Stryker (Cat. #7456, Part #330020)
 - Storz / Linvatec (Cat. #7457, Part #330021)
 - Olympus (Cat. #7458, Part #330022)

When the Stand-by option is engaged, the light guide port will illuminate green. When the Stand-by option is disengaged, the light guide port will illuminate blue.

NOTE: Only insert clean, dry, non-conductive fiber optic cables into the fiber optic cable receptacle.



1.5.2 Back Panel

- ❶ **Fan** — Provides cooling to the Light Source. Keep free of dust and dirt accumulation.
- ❷ **Mains Power Receptacle** — Accepts the power cable to provide AC power.
- ❸ **Fuse Compartment** — Contains the unit's fuses. To change fuses, reference "**Fuse Replacement**" on page 10.
- ❹ **Network** — Allows external control.
- ❺ **Upgrade** — Facilitates installation of future software upgrades.

1.6 Installation and Operation

1. Ensure there are no obstructions to the fan area and air vents with at least four inches of free space behind the light source.
2. Attach the AC power cord to the light source receptacle and to a properly earthed mains supply power outlet whose voltage and frequency characteristics are comparable with those indicated on the unit (i.e., receptacle marked “Hospital Grade” or “Hospital Only”).
3. Turn the light source on by pressing the “POWER” switch on the front panel to the on position. The “POWER” switch and lamp will illuminate and the fan will start. The light source does not require warm-up time before use.
4. Ensure the fiber optic light guide is free of any cleaning solution before connecting to the light source.
5. Depress the “LIGHT GUIDE” lever and insert the fiber optic light guide into the “LIGHT GUIDE” receptacle until it is fully seated. Release the lever.
6. Press the “STAND-BY” button to illuminate the light guide. The light source will go to the brightness level that was set when the unit was last powered off.
7. To adjust the light level, press the up / down “BRIGHTNESS” buttons on the front panel to increase or decrease intensity.
8. Press the “BULB LIFE” button to check the remaining life of the Xenon bulb.
9. When finished using the light source, press the “POWER” switch to the off position.

2.0 MAINTENANCE

2.1 Cleaning

The following maintenance procedures should only be performed by qualified service personnel. Read all warnings and cautionary notices carefully before performing any service procedures.

WARNINGS:

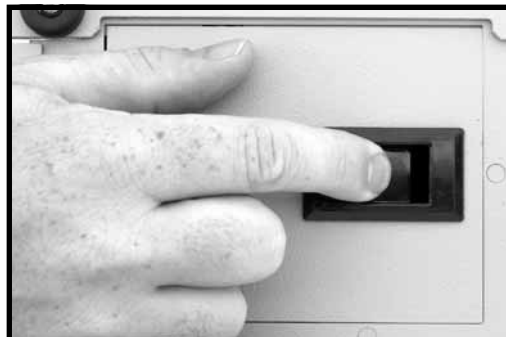
1. **The Xenon lamp is under extremely high pressure; do not leave finger prints or any marks on the lamp reflector surface or the bulb. Do not subject the lamp to mechanical forces or rough handling that could fracture the lamp.**

2. **Disconnect the main power cord before attempting any service to the lamp or lamp connections.**

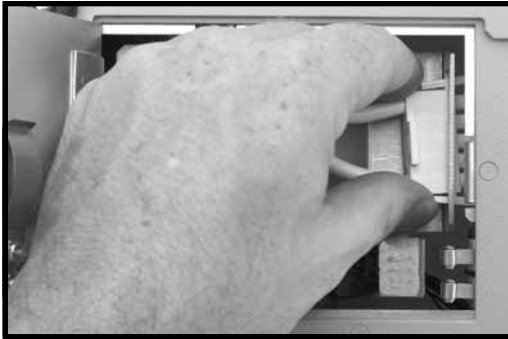
1. Unplug the light source and allow it and the fiber optic light guide to thoroughly cool before cleaning.
2. The interior of the light source housing must be kept free of dust and dirt around the air intake and outflow vents. The interior of the unit may be vacuumed or blown out using an air hose as required.
3. Wipe the exterior of the unit and fiber optic light guide with a clean, soft cloth dampened (not dripping) with a mild detergent. Wipe again with distilled or sterilized water. Dry with a clean, lint-free towel.

2.2 Lamp Replacement

1. Turn the "POWER" switch off.
2. Unplug the light source. Wait at least 15 minutes for the lamp to cool before proceeding.
3. Wear a face shield or protective safety eye glasses when handling the lamp. Do not leave finger prints or any marks on the lamp reflector surface or the bulb. Oil on these areas, such as from fingers, will burn from the heat and may cause damage to the bulb.
4. Turn the unit over and locate the lamp access door. Slide the latch on the lamp access door towards the front of the unit and pull the door open.

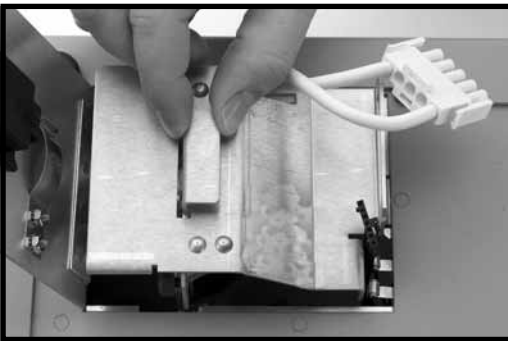


5. Remove the lamp holder plug from the lamp holder socket by squeezing the tabs on the side of the lamp holder plug and pulling out horizontally.



NOTE: The lamp extends past the reflector at the front. Do not place face down. Do not touch bulb. Take care not to damage bulb.

6. Remove the lamp holder assembly by grasping the lamp holder plate and pulling out vertically.



7. Insert the new lamp holder assembly by placing the metal mounting plate into the groove and sliding into place.
8. Place the lamp holder plug back into the socket, pressing firmly to ensure it is securely in place.

9. After installation is complete, close and secure the door.

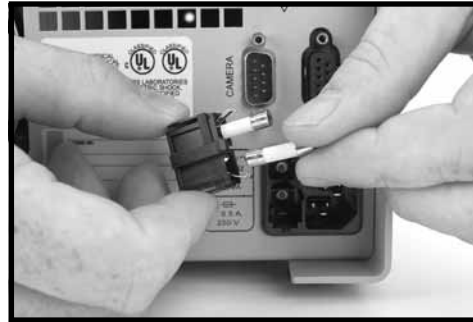
NOTE: Follow local governing ordinances and recycling plan regarding disposal of device components.

2.3 Fuse Replacement

1. Turn the “POWER” switch off and unplug the light source.
2. Using a small screwdriver or similar tool, gently release the retention tabs on both sides of the fuse drawer and slide it out.



3. Pull out existing fuses and replace only with factory supplied fuses as stated on the rear of the unit. Replace both fuses at the same time.



4. Return fuse drawer to compartment, making sure alignment tab is on top. Snap into place.

2.4 Troubleshooting

Symptom	Possible Cause	Corrective Action
Lamp will not ignite.	<ul style="list-style-type: none">◆ Power cord is not plugged in or is faulty.◆ “POWER” switch is not turned on.◆ Lamp access door inter-lock safety switch is not engaged.◆ Lamp assembly is not fully engaged.◆ Lamp is expired.	<ul style="list-style-type: none">◆ Plug power cord into receptacle and/or Light Source.◆ Replace power cord.◆ Place “POWER” switch in the on position. Switch will illuminate when unit is on.◆ The Light Source will not work with the lamp access door open. Assure door is completely closed and latched.◆ Verify lamp assembly is completely engaged on receptacle pins within Light Source chassis (see “Lamp Replacement” on page 8).◆ Check bulb life meter. Replace lamp.
Lamp fails to re-ignite.	<ul style="list-style-type: none">◆ Lamp got too hot.	<ul style="list-style-type: none">◆ Turn power off. Allow lamp to cool for five minutes. Turn power back on. If lamp does not ignite, replace lamp assembly.

Symptom	Possible Cause	Corrective Action
Low light output.	<ul style="list-style-type: none"> ◆ Brightness is set to minimum or too low of an output position. ◆ Fiber optic light guide lenses are dirty. ◆ Lamp life is almost expired. ◆ Light guide is not engaged properly. ◆ Lamp assembly is not fully engaged. ◆ Excessive amount of fiber optic light cables are broken. 	<ul style="list-style-type: none"> ◆ Increase lamp brightness. ◆ Clean light guide lenses. ◆ Check bulb life meter. Replace lamp. ◆ Check to ensure that the proper light source fitting is being used and that light guide is snapped into place. ◆ Verify lamp assembly is completely engaged on receptacle pins within Light Source chassis (see “Lamp Replacement” on page 8). ◆ Inspect light guide cables. If more than 30% of cables are broken (darkened), replace light guide.
Lamp is unstable (flashes).	<ul style="list-style-type: none"> ◆ Lamp life is almost expired. ◆ Lamp has discoloration 	<ul style="list-style-type: none"> ◆ Check bulb life meter. Replace lamp. ◆ Visually inspect lamp for discoloration. If discoloration is pronounced, replace lamp assembly.

2.5 Theory of Operation

The Xenon light source uses a replaceable short arc xenon lamp with an integral elliptical reflector. The lamp is designed to produce a very small high brilliance electric arc in a sealed xenon envelope to simulate the spectral content of sunlight for the best video camera performance. The arc also produces IR (heat) that is filtered by a hot mirror plate positioned between the lamp and the light guide connection. In addition, the lamp reflector acts as a filter by allowing IR energy to pass through its surface and not reach the focal point ahead of the lamp.

To operate an arc lamp, a special power supply is needed since the start-up process is not a simple matter of applying power. In the off condition the arc is very high impedance. Therefore, a high voltage (28KV min.) must be applied to develop a conduction path from the anode to the cathode. Following the very high voltage, an intermediate voltage is applied as the impedance of the arc path drops and the arc becomes larger. In the third phase of the start-up sequence the voltage falls to about 17 VDC as current regulation takes over to sustain the now fully developed arc. The unit continues to operate in this current regulated mode until the power is removed by the front panel "POWER" switch.

The temperature on the surface of the lamp anode reaches 350°C max., therefore, cooling is very important during operation. The lamp must be allowed to cool in accordance with the included instructions before any handling is attempted. The lamp is very fragile and can easily break explosively since the bulb is under high pressure.

The power supply is a switch mode type with a built-in, high voltage lamp ignitor and current regulator. The fans are powered from an auxiliary 12VDC power output of the main supply. An interlock switch in the lamp access door removes power from the fans and lamp supply when the door is open, but power remains connected to the fuses and the two EMI filters inside the unit. See the schematic diagram for details.

An EEPROM chip mounted on the lamp module tracks lamp life for easy and accurate front panel display. A microcontroller controls two serial communication ports, all front panel controls and indicators, shutter motor, and lamp life operation. The microcontroller board is powered by the auxiliary 12VDC from the lamp supply.

3.0 TECHNICAL INFORMATION

3.1 Light Source

I.E.C. Equipment Classification: Type BF, Class 1, continuous operation

Typical Operating Requirements:

Input Voltage: 100 - 240 VAC

Input Line Frequency: 50/60Hz

Power Consumption: 475 VA

Fuse: Fast Blow 6.5 Amps, 250 V

Intensity Control: Manual or Automatic

Weight: 12.5 lbs. (5.7 kg)

Dimensions: 9.85" (W) x 5.9" (H) x 16.7" (D)
25cm (W) x 15cm (H) x 42.4cm (D)

Power Cable Length: 6 ft. (2m)

ENVIRONMENTAL

Operating: **Ambient Temperature:** + 42° F to 86° F (+ 6° C to 30° C)

Relative Humidity: 30% to 85%

Atmospheric Pressure: 700hPa to 1060 hPa

Transport and Storage: **Ambient Temperature:** -40° F to 120° F (-40° C to + 49° C)

Relative Humidity: 10% to 100%

Atmospheric Pressure: 500 hPa to 1060 hPa

3.2 Lamp Module

Lamp Type: Osram Xenon Short Arc Lamp

Lamp Power: 300 Watts

Lamp Color Temperature: 6200°K

Lamp Life: 500 Hours Minimum

3.3 Power Cord Requirements

100/120 Volt (Linvatec Cat. No. C7104)

Use only a listed (UL, CSA) detachable power cord manufactured to the following specifications.

- Plug End
 - NEMA 5-15P hospital grade, 15 amps, 125V
- Receptacle End
 - IEC 320/CEE-22, 6 amps, 250V/15 amps, 125V
- Cord
 - UL style SJT, 14 AWG, 3 conductor

220/240 Volt (Linvatec Cat. No. C7105)

- Plug End
 - Molded straight PVC plug with double grounding system
 - DIN 49441, CEE 7/U11, 10/16A, 250V
 - CEBEC, DEMKO, KEMA, NEMKO, OVE, SEMKO, VDE, UTE, FEMKO
- Receptacle End
 - Molded straight PVC plug
 - DIN 49457, CEE 22/V, 10A, 250V
 - VDE, D, N, S, SEV, OVE, KEMA
- Cord
 - PVC, 7.2mm diameter
 - 10A, 250V
 - Conductors: 3 x 1 mm²
 - Conductor Colors - brown, blue, green/yellow stripe

NOTE: If the product is connected to a 240V system in the United States, then it must be connected to a center tap system.

There are no toxic components contained in the Xenon Light Source. After the useful life of the product, dispose of components and service parts properly.

3.4 Light Source Accessories

<u>Description</u>	<u>Part Number</u>
300 Watt Xenon Light Source	LS7500
300 Watt Replacement Bulb	LS7501
5mm Universal Light Guide Cable	C3278
3mm Universal Light Guide	C3279
Wolf, Dyonics Scope Fitting	7451
ACMI Scope Fitting	7452
Storz, Olympus Scope Fitting	7453
Wolf / Dyonics Light Source Fitting	7455
ACMI / Stryker Light Source Fitting	7456
Storz / Linvatec Light Source Fitting	7457
Olympus Light Source Fitting	7458



11311 Concept Boulevard

Largo, FL 33773-4908

(727) 392-6464

Customer Service: 1-800-237-0169

FAX: (727) 399-5256

International FAX: +1 (315) 735-6235

email: customer_service@linvatec.com

www.linvatec.com

Rx ONLY

EC Rep:
Linvatec Europe
B1070-Brussels, Belgium



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