endoscopy
support
services, inc.
®


# MLS-1F

## LED Light Source for Flexible Endoscopes

# OPERATIONS MANUAL

*Rev. R4-042021*

# PREFACE

Thank you for purchasing the **ESS MLS-1F** LED Light Source which utilizes solid-state illumination technology. The **MLS-1F** is intended for applications that require a handheld light source which features high output, efficient, compact, and lightweight illumination. The **MLS-1F** utilize eco-friendly LED lighting technology, exhibits instant-on and electronic intensity dimming capability with long operating lifetime. The **MLS-1F** is equipped with an ACMI threaded nut (collar) that fits the bare posts of virtually all rigid endoscope light guide posts and similar endoscope light posts.

**Please read this operating manual in its entirety before using the product.**

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# 1.Introduction

## System Symbol Descriptions

| | | | |
|---|---|---|---|
|  | **Caution** |  | **Hazard Warning** |
|  | **Caution: Hot Surface** |  | **Bright Light** |
|  | **Manufacturer** |  | **Important Information** |
|  | Do not dispose of this product as unsorted municipal waste. Prepare this product for reuse or separate collection as specified by Directive 2002/96/EC of the European Parliament and the Council of the European Union on Waste Electronic and Electrical Equipment (WEEE). If this product is contaminated, this directive does not apply. | | |

## Warnings & Precautions

Please be sure to handle **MLS-1F** with care at all times. The electrical and optical components may be damaged by physical trauma, extreme temperatures, or fluid invasion.

This manual describes the proper procedures for using the **MLS-1F**. This also contains pertinent information on the proper care and handling during use and storage.

Please read this entire manual carefully before using the **MLS-1F**. If you have any questions concerning the material contained in this manual or the operation or safety of the equipment, please contact **ESS Service Department** at **1 (845) 277-1700 x214** or **service@endoscopy.com**.

Check all items upon receipt to assure damage has not occurred during shipment. Verify compatibility of all components and accessories used with the **MLS-1F**.

Since the **MLS-1F** uses proprietary components, there are no user serviceable or replaceable parts inside the unit. **DO NOT DISASSEMBLE (will void warranty)!**

Avoid storing or using the **MLS-1F** in areas of heavy traffic where it may sustain physical damage.

**Unit *MAY* get hot**. Provide adequate ventilation to prevent overheating.

**DO NOT IMMERSE** or store liquids above or on the **MLS-1F**.

Any changes or modifications made to the **MLS-1F** that are not expressly approved by ESS, Inc. will void the warranty.

The high intensity light at the front of the **MLS-1F** and at the tip of the endoscope will create bright light. To minimize risk of injury, avoid direct viewing or contact.

This equipment is not suitable for use in the presence of flammable mixtures.

# 2. MLS-1F Description, Specifications & Accessories

## MLS-1F Body Diagram and Descriptions

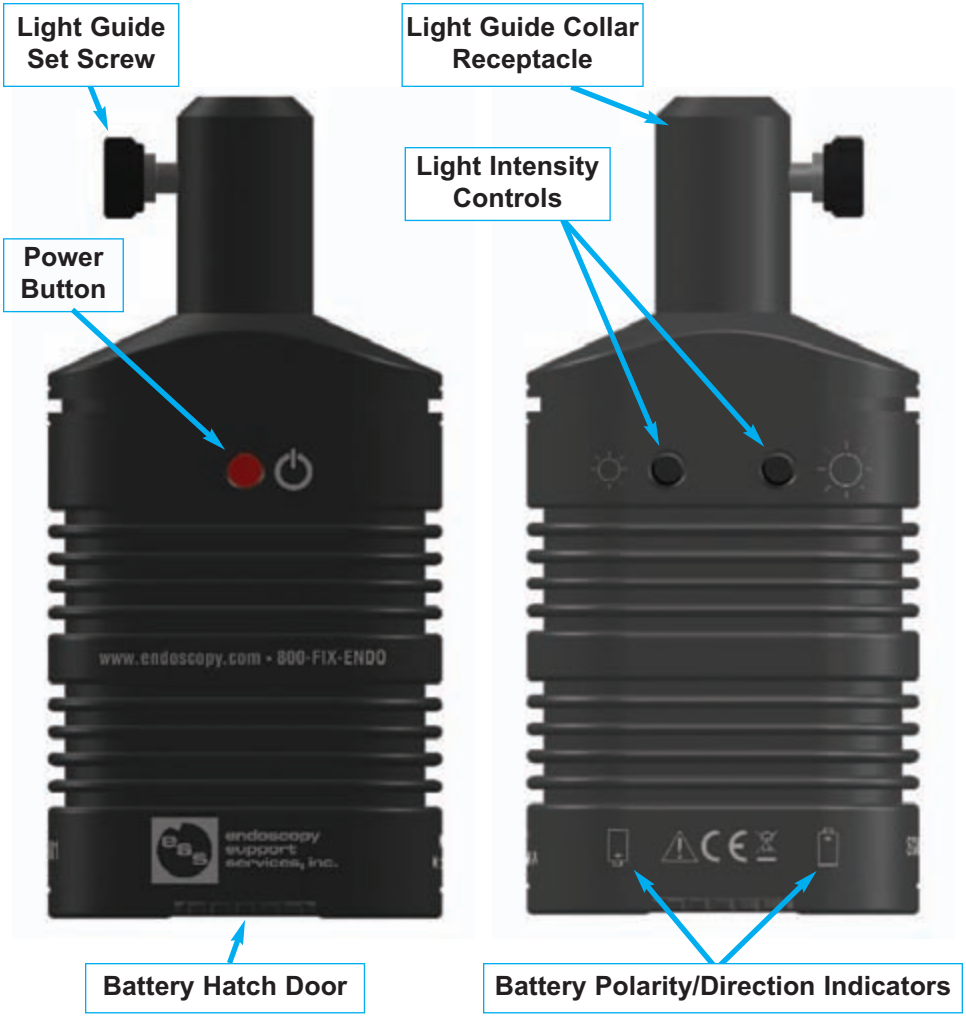



*Figure 1: MLS-1F Body Diagram; Collar Receptacle*

**Light Guide Collar Receptacle:** The Olympus-style sleeve with set screw allows the **MLS-1F** to attach to the user's endoscope. Slide the **MLS-1F** onto the scope's light guide probe until it stops, then tighten the Set Screw to attach the **MLS-1F** to the endoscope . Loosen the set screw and slide off to remove.

**Power Button:** The power button toggles the ON/OFF of the **MLS-1F**. Press and release the button to turn on, and again to turn off (do NOT "hold" the button.)

**Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp. May be harmful to the eye(s).**

**Light Intensity Buttons:**

Pressing button next to this symbol decreases the intensity of the light.

Pressing button next to this symbol increases the intensity of the light.

**Battery Hatch Door:** The battery hatch seals the battery and electronics within the body of the **MLS-1F**.

## SPECIFICATIONS

| | |
|---|---|
| **Dimensions** | |
| Length: | 24MM (0.95") |
| Width: | 46MM (1.8") |
| Height: | 96MM (3.8") |
| Weight: | 135.2g (4.8 oz.) |
| **Illumination System** | |
| Type: | Light Emitting Diode (LED) |
| Color Temperature: | 5700 K |
| LED Power: | 3 Watts |
| **Power System** | |
| Power Source: | Battery Powered (2 x RCR123A) |
| Battery Type: | (2) Lithium Ion RCR123A 3.0V, 900mAh minimum |
| Battery Life at Full LED Power: | 60 minutes |
| Battery Charge Time: | 4 hours |
| Battery Recharge Cycles: | 500 charge cycles |
| **Environment** | |
| Operating Ambient Temperature Range: | 10 ºC to 40ºC (50°F to 104°F) |
| Storage Temperature Range: | -15 ºC to 55ºC (-5°F to 131°F) |
| Humidity: | 0 – 95% RH |
| Mode of Operation: | Continuous |

# 3. MLS-1F Operation, Batteries and Charger

## MLS-1F Operation

The **MLS-1F**'s internal LED operates on two (2) rechargeable Lithium-Ion (RCR123A) batteries and provides approximately **60 minutes** of continuous operation when used with new or fully charged batteries.

### Battery Installation

1. At the bottom of the **MLS-1F**'s battery hatch door, rotate the locking knob counterclockwise until the line on the knob is pointing **90°** from the indentation mark on the hatch. Remove the hatch (*refer to figure 2*).

2. Insert the batteries into the unit using the Battery Polarity/Direction Indicators as a guide. The negative terminal of each battery should be in contact with the spring on each circuit board (*refer to figure 3*). Attach the hatch door then rotate the locking knob clockwise until the line on the knob is pointing toward the indentation mark.

   ***Note: For added safety, the battery hatch door may only be inserted into the MLS-1F body in one direction. If the door does not easily slide into the case, rotate the hatch door 180°. This ensures the battery polarity cannot be reversed.***

3. To remove batteries, rotate the battery hatch door knob counterclockwise a quarter turn until it stops, remove the door and allow the batteries to slide out.


***Figure 2 - Bottom view***

***Figure 3 - MLS-1F battery installation***

### Installing MLS-1F to User's Endoscope

1. Loosen the set screw of the **MLS-1F** by turning the knob **counter-clockwise** (look through the receptacle with the unit OFF to make sure the screw tip is not impeding the opening in any way.)

2. Hold the **MLS-1F** so that the main body fits comfortably in one hand. Gently slide the **MLS-1F** onto the light guide probe until it comes to a stop (*figure 4*).

3. Tighten the set screw turning knob **clockwise**. DO NOT OVER-TIGHTEN, as this may cause a severe indentation in your scope's light guide probe and/or strip the set screw threading. It should just be tight enough so the **MLS-1F** does not easily slide off the probe.

**Using the MLS-1F**

1. Turn the **MLS-1F** ON by pressing the Power ON/OFF button (*refer to figure 5*).

2. Adjust light intensity as needed (*refer to figure 6*).

**Upon power up, the MLS-1F drives the LED to full intensity. Avoid looking directly at the LED or the distal tip of the endoscope when turning ON.**

Pressing button next to this symbol **decreases** the intensity of the light.

Pressing button next to this symbol **increases** the intensity of the light.

3. After use, turn the **MLS-1F** OFF by pressing the power button to conserve power.

4. Remove the **MLS-1F** from the endoscope by loosening the set screw (*figure 5*) **counter-clockwise** and sliding the **MLS-1F** off the light guide post.

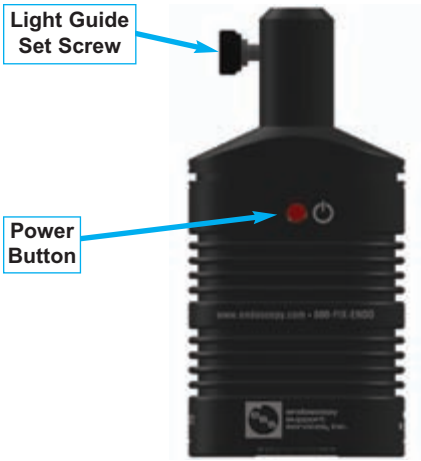



*Figure 5*

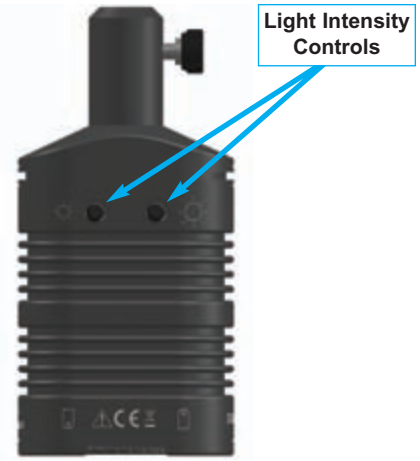



*Figure 6*

## Batteries and Charger (Included)


*Figure 7: USB Smart Battery Charger & Li-Ion Batteries*

## Battery

| | |
|---|---|
| Standard Part Number: | RCR123A (Circuit Protected) |
| Battery Type: | Lithium-Ion (Li-Ion), rechargeable |
| Output Voltage: | 3.7V |
| Capacity: | 750mAh |
| Manufacturer/Part Number: | Tenergy Item #34253 |
| Battery Recharge Cycles: | 500 charge cycles |
| Battery Charge Time: | Up to 4 hours |


*Figure 8: RCR123A Li-Ion Rechargeable Battery*

**WARNING**

- USE ONLY APPROVED BATTERIES.
- Use only pairs of fully charged batteries. Do not mix newly charged and depleted batteries.
- Never mix rechargeable battery with non-rechargeable batteries.
- Do not incinerate, disassemble, overcharge or short circuit the battery.
- Do not expose the battery to high temperatures above 122ºF/50ºC.

The batteries should be removed from the **MLS-1F** if it will not be used for an extended time.

## Charging the batteries

1. Connect charger to a powered USB port or adapter. LCD on the charger will turn on to indicate it's properly powered.
2. Insert 1 ~ 2 battery into the slot, make sure + / - are correctly used.
3. Charging will auto start,
   – Battery type screen will show the battery type being detected.
   – (CHARGE) will show on the [status] screen.
4. When charging is done, (FUL) will be displayed on the digital screen of the LCD.
5. Remove battery after it's fully charged.

### Reverse / Bad Cell / Short Circuit

Reverse the battery polarity, incorrectly inserting the battery, inserting alkaline battery or short circuit will result in charging failure, the "Error" icon will be shown on the LCD display and capacity gauge for the corresponding slot will flash rapidly. Should this occur, please reposition / replace / remove the battery from the slot.

## CHARGER: Features, Quick Reference, Specifications

### Charger Features

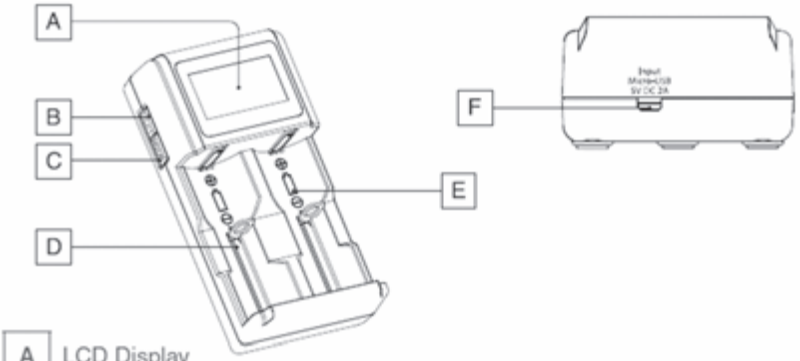
- Manufacturer supplied charger is a 2-bay battery smart charger with MCU control which features:
  – Independent charging channels;
  – Constant current and constant voltage charging;
  – Ensures the quality and safety of charging process.

- Two-color LEDs indicate charging status.

- Each LED indicates the corresponding channel.


*Figure 9: Tenergy Li-Ion 2-bay Battery Smart Charger*

## • QUICK REFERENCE •




| | | |
|---|---|---|
| A | LCD Display | |
| B | SLOT BUTTON | Press to switch charging status between slot 1 and 2 |
| C | MODE BUTTON | Press to change charging speed (Li-ion. LiFePO4, IMR only) |
| B + C | Active / Deactivate LiFePO4 Mode | |
| D | Charging slot 1 | |
| E | Charging slot 2 | |
| F | Micro USB input port 5V DC 2A | |

### Mechanical Dimensions

**Length: 130mm**
**Width: 68mm**
**Height: 38.5mm**
**Weight: 130g**

### Electrical Characteristics

**Input/Output Characteristics of Charger**

| | |
|---|---|
| Input: | 5V DC 2A |
| Output: | 4.2V DC 500mA/1 000mA (Li-ion/I MR) |
| | 3.7V DC 500mA/1 000mA (LiFePO4) |
| | 1.48V DC 500mA (Ni-MH/Ni-CD) |
| Status Display: | Backlit LCD |
| Built-In Protections: | Short-circuit, Reverse Polarity, Bad Cell Detection, Safety Timer |

**Compatible Rechargeable Battery**

Ni-MH / Ni-Cd: AA / AAA / AAAA / CID / Sub C
IMR / Li-ion / LiFeP04: 18650, 26650, 22650, 18490,18350, 17670, 17500, 14500, 10440, 16340

## Important Safety Instructions

1. **SAVE THESE INSTRUCTIONS & CAREFULLY FOLLOW THEM, TO REDUCE THE DANGER RISK OF FIRE OR ELECTRIC SHOCK.**

2. This charger is intended for Ni-MH, Ni-CD, Li-ion, and LiFePo4 rechargeable batteries only. Attempting to charge non-rechargeable batteries may cause personal injury and damage to the charger.

3. Do not expose charger to water or moisture. For indoor usage only.

4. Remove from power when not in use.

5. Do not operate the charger if it has been subjected to shock or damage. Take it to a qualified serviceman for repair.

6. Do not disassemble the charger. Incorrect reassembly may result in a risk of electric shock or fire.

7. Unplug the charger from USB port before attempting any maintenance or cleaning. Use damp cloth to clean the surface - **DO NOT IMMERSE INTO WATER**.

8. Before scrapping your charger, remove batteries from the unit and recycle or dispose the batteries safety.

9. This appliance is not recommended for children under 8 years old or persons with reduced physical, sensory, or mental capabilities. Adult supervision is recommended to prevent hazards that may be involved.

10. **DO NOT LET CHILDREN PLAY WITH THE APPLIANCE, IT IS NOT A TOY.**

11. **Cleaning and user maintenance shall not be made by children without adult supervision.**

DO NOT use charger to charge other types of batteries.
DO NOT operate the charger when the temperature is higher than 40°C. We recommend operating when the temperature is lower than 35°C. Batteries may get warm during charging.
USE ONLY Tenergy Battery #34253 or compatible Tenergy battery.
DO NOT use charger and batteries in any acidic, alkaline or corrosive environment.
DO NOT expose charger to rain, snow, water, gas, oil, etc.
DO NOT short circuit charging terminals.

Do not expose charger to fire, water or moisture.
To avoid electrical shock, do not disassemble the charger.
No user-serviceable parts inside the charger.
Follow local regulations for disposal of electrical components or batteries.

## Slot / Mode


When 2 batteries are charging at the same time, press **SLOT** to select the charging slot (1) or (2). Then you can view the individual charging information (ie. Battery Type, Charging Status, Charging current, Charging voltage and Charging time) for the selected charging slot.


To change charging speed: Default charging speed is 500mA, this can be increased to 1000mA for Li-ion, IMR, and LiFeP04 batteries, to do that, simply press **MODE** button once. Digital screen will show the updated charging current. (1000mA charging current is NOT available for NIMH and NICO).

**Note:** 2A USB power source is needed to charge 2x Li-ion battery at 1000mA speed setting

**Tip:** It is safe to use 1A current option for Li-ion, IMR and LiFeP04 batteries as long as its capacity is higher than 1000mAh, for capacity 1000mAh or below, please stay with the default charging current 500ma for better battery life span.

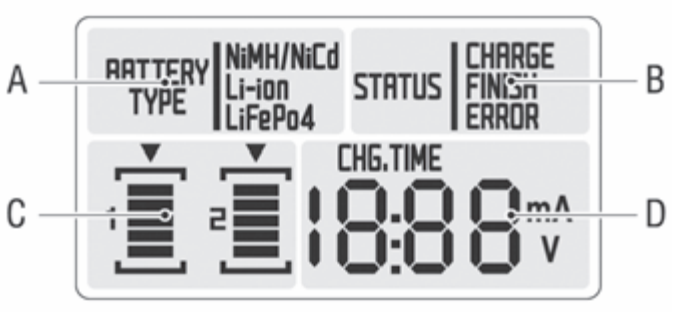

**Activate / Deactivate LiFeP04 charging mode:**

To properly charge a LiFEpo4 battery (please check label on battery to identify if it's LiFeP04), LiFeP04 charging mode will need to be manually activated.

***To do that:***

1. Press "**SLOT**" and "**MODE**" buttons together.
2. Battery type screen will show [**LiFeP04**].
3. LiFeP04 charging mode is enabled
4. To get out of LiFeP04 charging mode, press 2 buttons together again.

## LCD Reference




## A - Battery Charging Type Detection

| | |
|---|---|
| **NiMH / NiCd**<br>**Li-ion** | **It will be shown by Auto Detection** |
| **LiFePo4** | **It will be shown ONLY when the SLOT & MODE buttons are pressed, please read SLOT / MODE before use.** |

## B - Charging Status

| | |
|---|---|
| **CHARGE** | **Charging starts** |
| **FINISH** | **Charging is finished** |
| **ERROR** | **Charging is failed ( See more in Reverse/ Bad Cell/Short Circuit)** |

## C - Battery Gauge

Indicates the selected charging slot ( 1 ) or ( 2 )

Charging starts and the first block will be flashing

Charging is finished and all blocks are shown

Charging is failed and the whole icon will be flashing

## D - Time, Voltage, Current & Finish

| | | |
|---|---|---|
| Time |  | Shows the time spent for charging |
| Voltage |  | Shows the charging voltage |
| Current |  | Shows the charging current |
| Finish |  | Charging finish (FULL) |

**Time, voltage and current will be shown alternatively by 5 sec interval.**

# 4. Care and Maintenance

## MLS-1F Cleaning

The MLS-1F is rated for water resistance. The MLS-1F is rated for slight water contact and mild detergent cleaning solutions only. However, it should NOT BE IMMERSED in water or cleaning solutions for any prolonged periods of time. After cleaning, remove MLS-1F from cleaning solution, dry and store the device in a clean and dry environment.

Failure to comply with the following may result in damage to the MLS-1F and will void the product warranty.

Use caution when cleaning the **MLS-1F**; some methods may be harmful and could result in extensive damage. Manual cleaning is the recommended method. Certain cleaning agents may damage the device's materials. Only use water with a mild detergent such as a nonabrasive hand or dishwashing soap. Do not immerse the **MLS-1F** in an ultrasonic cleaner.

Ensure that the battery hatch door is fully tightened on the O-ring seal to prevent liquid intrusion into the battery compartment.

Never use any organic solvents to clean the **MLS-1F**, other than isopropyl alcohol.

## Drying the MLS-1F

If the MLS-1F comes in contact with liquid, rinse with isopropyl alcohol and then dry with compressed air, commercial compressed gas canisters or dry damp cloth.

*Note: Air dry is highly recommended to reduce contamination of the optical components and reduce the possibility of oxidation of the materials used in the construction of the MLS-1F.*

Do not allow the **MLS-1F** to remain in liquid cleaning solution for a prolonged period of time.

In addition, thoroughly dry the battery hatch door seal around the O-ring, with compressed air or by thoroughly wiping any excess liquid from this area, prior to removing the battery hatch door. This will prevent any trapped fluid from entering the battery compartment and exposing the electronics to fluids.

Ensure there is no trapped liquid between the battery hatch door and body prior to removing the battery hatch door.

**Battery hatch door area: keep clear of liquids when opening to prevent fluids from entering battery compartment.**

# 5. Troubleshooting

| PROBLEM | POSSIBLE CAUSE | ACTION |
|---|---|---|
| Loss of Illumination | Battery charge is low | Replace batteries with freshly charged batteries. |
| | Batteries cannot supply sufficient current at this power setting | Replace batteries with freshly charged batteries. |
| | | Verify batteries have been installed in the correct orientation. |
| | | Reduce the light intensity and continue using the current battery. Recharge the batteries as soon as possible. |
| | Battery mismatch | Make sure both batteries are the same type and freshly charged. |
| MLS-1F Light output flashing | Battery charge is low | Reduce the light intensity and continue using the current battery. |
| | This is normal behavior indicator when the battery charge is low. Remaining run time is about 2 minutes. | Recharge the batteries as soon as possible. |
| Light Guide does not attach properly to the endoscope | The endoscope has an adapter on its light post | Remove the adapter and try attaching again. |
| | The endoscope and MLS-1F do not have a compatible coupling system | Switch to a different MLS-1F with the proper adaptor |
| Light intensity is low | Foreign material or film on LED output taper | VERY carefully clean the LED surface from visible contamination with a cotton swap and isopropyl alcohol. Do not use acetone or other solvents. |
| MLS-1F becomes hot after prolonged use at full power | MLS-1F has been left on for more than 30 minutes at full power. | Turn the MLS-1F to a lower intensity setting if the examination must continue past 30 minutes. |
| | | Turn the MLS-1F OFF for a few minutes to permit adequate cool down of the body. |

# 6. Limited Warranty

**ESS Inc.** warrants the **MLS-1F LED Light Source**, when new, to be free of defects in material and workmanship and to perform in accordance with the manufacturer's specifications when subject to normal use and service for **a period of one (1) year from the date of purchase from ESS or an authorized agent**. ESS will either repair or replace any components found to be defective or at variance from the manufacturer's specifications within this time at no cost to the customer. It shall be the purchaser's responsibility to return the instrument to the authorized distributor, agent, or service representative.

All non-warranty repairs will be warranted to be free from defects in materials and workmanship **for a period of ninety (90) days from the date of the invoice**.

This limited warranty does not cover the breakage or failure due to tampering, misuse, neglect, accidents, improper installation, modification, shipping, or to improper maintenance, service, fluid invasion and cleaning procedures. This limited warranty is also void if the instrument is not used in accordance with the manufacturer's recommendations or if required service is performed by anyone other than ESS or an authorized agent. The purchase date determines limited warranty requirements. No other express or implied limited warranty is given.

Suitability for use of the device for any procedure shall be determined by the user. ESS Inc. shall not be liable for incidental or consequential damages of any kind.

# 7. Agency Approvals

The **MLS-1F** has been tested to, and found in conformance with, the following standards:

EN50581:2012

2006/95/EC (93/68 EEC) – Low Voltage Directive

IEC 62471:2006 LED Photobiological safety lamp standard, categorized as Risk Group 2 (Moderate risk).

2011/65/EU – RoHS Directive

WEEE

# 8. Vendor Information

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