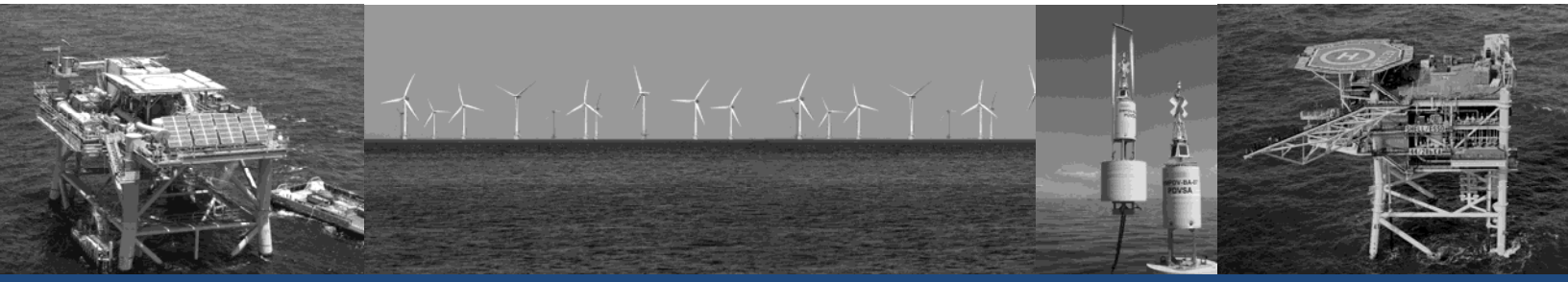
# EXHIBIT N

# NAVIGATIONAL AID EQUIPMENT SPECIFICATIONS

Pharos Marine Automatic Power

*Global Quality, Global Solutions*



# FA-249 LED MARINE LANTERN

The FA-249 Marine Lantern is a rugged, compact and lightweight signal lantern particularly suited for buoys, fixed platforms, bridges, barges, low-powered warning lights and others.

Adapted from the original FA-249 marine lantern due to its widespread use and excellent reputation as a buoy lantern, this state of the art LED system is constructed to withstand the mechanical stresses of service on buoys and includes a number of features designed to endure harsh marine elements while maintaining structural integrity and reducing the need for maintenance.

## Features

- A Qualified Product to U. S. Coast Guard Specification 205
- Extremely high flux LEDs mounted on a STABRITE LED array system, driven by specially designed electronics
- LED array available in 1X6, 1X4, 1x8, 3X4 configurations
- Proven lantern design with the flexibility to use the same housing and lens system for both LED and lampchanger systems, and ability to retrofit LED's into existing installations
- A 3-piece lens mounting system of molded Lexan with stainless steel thumb screws that fully compresses the lens gasket and provides strong positive closure of the lantern
- Ability to accommodate an external photocell, solar array cable and battery cable
- Factory-preset flash characteristics to customer specifications
- 15+1 special programmable position (AM-8 LED Flasher/Controller Unit)
- 255+1 special programmable position (AM-6 LED Flasher/Controller Unit)
- High-efficiency TracSwitcher current controls; 82% of the battery current reaches the LED array on flash; 2 mA idle current between flashes
- Software programmable: Photocell, low voltage disconnect, special flash rhythm, specialized current settings and solar charge control voltage setting
- Optional 365 day timer (AM-6)
- Optional Uniflash®-series GPS synchronizing system, terminal strips, etc
- Optional remote monitoring

**CORPORATE HEADQUARTERS & MANUFACTURING OPERATIONS**
**Houston, TX**
Phone: +1-713-228-5208
Fax: +1-713-228-3717
sales@automaticpower.com

## U.S. LOCATIONS

**PMAPI GULF OF MEXICO**
**Gray, LA**
Rene "Boogie" LeBlanc
Phone: +1-985-223-8700
Fax: +1-985-223-8710
rleblanc@automaticpower.com

**PMAPI WEST COAST**
**Novato, CA**
Pete Dolan
Phone: +1-415-382-6296
Fax: +1-415-382-6299
pdolan@automaticpower.com

## INTERNATIONAL LOCATIONS

**AB PHAROS MARINE PTE LTD**
**Singapore**
Phone: +65-6747-9325
Fax: +65-6746-0478
sales@pharos-api.com

**PHAROS MARINE LTD**
**MANUFACTURING OPERATIONS**
**London, UK**
Phone: +44-20-8538 1100
Fax: +44-20-8577 4170
sales@pharosmarine.com

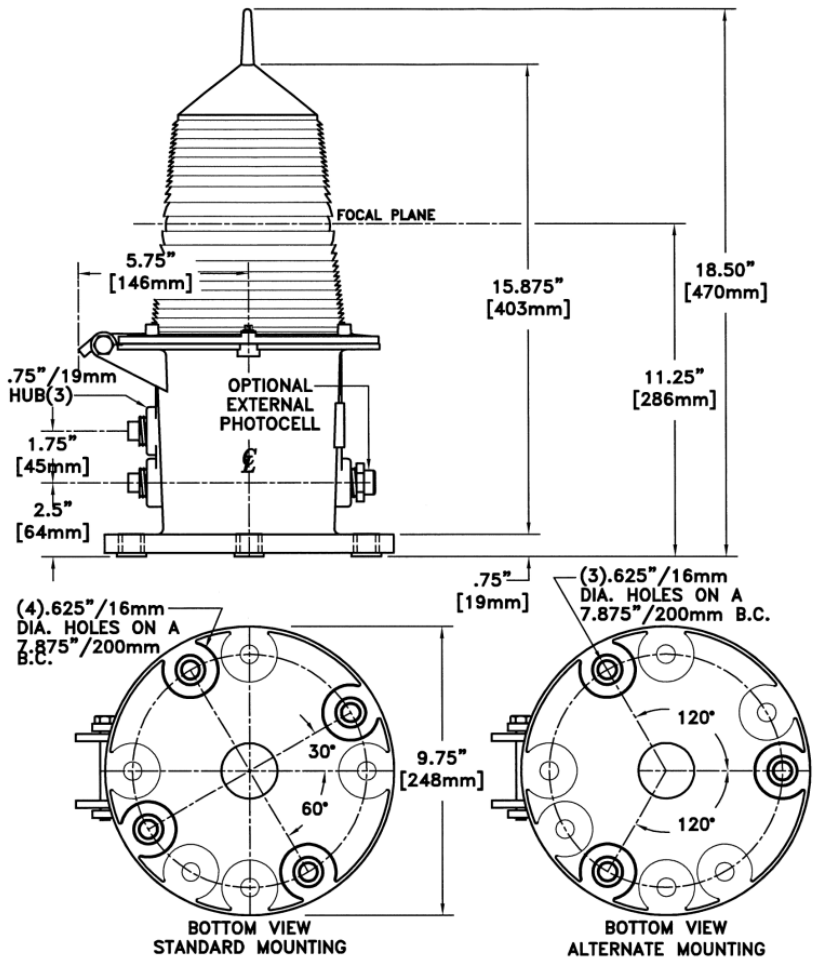
**SIMS SYSTEMS LTD**
**MANUFACTURING OPERATIONS**
**Great Yarmouth, UK**
Phone: +44-1493 659271
Fax: +44-1493 601882
info@sims-systems.com

**www.automaticpower.com**

## SPECIFICATIONS

| | |
|---|---|
| **Height:** | 470mm (18.5") |
| **Weight:** | 2.22 kg (4.9 lbs.) |
| **Input Voltage:** | Available in 6, 12, 24 VDC or 120, 230 VAC |
| **Power Consumption:** | Maximum Average Power of 5.5W |
| **Available Colors:** | Clear, Red, Green, Amber |
| **Lens Type:** | 155 mm 360° Visibility Acrylic Fresnel Lens |
| **Visibility:** | Varies by configuration |
| **Vertical Divergence:** | Varies by configuration |
| **Monitor and Control:** | Optional |
| **Synchronization:** | Uniflash®-Series GPS Synchronizing (Optional) |
| **Lantern Housing:** | Molded Lexan® Lens Ring and Base |
| **Mounting:** | (4) 16 mm (5/8") Holes on a 200 mm (7 ⅞") Bolt Circle<br>3-Hole Mounting Pattern Also Available |
| **Operating Temperature:** | -20°C to + 55°C |
| **Ingress Rating:** | IP-56 |
| **Certificates:** | **FM Approved**<br>NI/I/2/ABCD/T6 Ta = +54°C; T5 Ta = +65°C; T4A Ta = +85°C<br>NI/I/2/IIC/T6 Ta = +54°C; T5 Ta = +65°C |

*Specifications subject to change without notice.



# TYPICAL PERFORMANCE

**3X4 LED Array**

Candela @ Battery Power

| Red | Green | White | Yellow |
|---|---|---|---|
| 48Cd @ 3W | 84Cd @ 4.1W | 116Cd @ 4.1W | 52Cd @ 4.5W |
| 144Cd @ 7.5W | 191Cd @ 9.6W | 298Cd @ 9.5W | 149Cd @ 10.8W |
| 214Cd @ 12.6W | 291Cd @ 17.7W | 477Cd @ 17.2W | 218Cd @ 17.9W |
| 273Cd @ 18.5W | 343Cd @ 24.4W | 617Cd @ 24.2W | 257Cd @ 26W |

Vertical Divergence: 16° @ 50%; 22° @ 10%

Maximum average power 6.4W; optional 12W and 23W heat sink available

**1X8 LED Array**

Candela @ Battery Power

| Red | Green | White | Yellow |
|---|---|---|---|
| 224Cd @ 3.1W | 312Cd @ 4.8W | 338Cd @ 3W | TBA |
| 421Cd @ 5.8W | 518Cd @ 9.4W | 1013Cd @ 9.8W | TBA |
| 595Cd @ 9.8W | 710Cd @ 16.1W | 1572Cd @ 16.6W | TBA |
| 793Cd @ 14.2W | 852Cd @ 23.5W | 2330Cd @ 35W | TBA |

Vertical Divergence: 7° @ 50%; 15 @ 10%

Maximum average power 6.4W; optional 12W and 23W heat sink available

**1X6 LED Array**

Candela @ Battery Power

| Red | Green | White | Yellow |
|---|---|---|---|
| 114Cd @ 2.3W | 158Cd @ 2.9W | 243Cd @ 3W | 175Cd @ 3.4W |
| 222Cd @ 4.6W | 285Cd @ 6.8W | 522Cd @ 7.1W | 338Cd @ 7.4W |
| 354Cd @ 7.9W | 386Cd @ 12.2W | 812Cd @ 12.7W | 474Cd @ 14.2W |
| 420Cd @ 10.7W | 442Cd @ 18.5W | 1055Cd @ 18.8W | 511Cd @ 17.8W |

Vertical Divergence: 6° @ 50%; 12° @ 10%

Maximum average power 6.4W’ optional 12W heat sink available

**1X4 LED Array**

Candela @ Battery Power

| Red | Green | White | Yellow |
|---|---|---|---|
| 65Cd @ 1.6W | 95Cd @ 1.9W | 120Cd @ 2W | 85Cd @ 2.2W |
| 140Cd @ 3.6W | 176Cd @ 4.7W | 268Cd @ 4.8W | 138Cd @ 4.3W |
| 212Cd @ 6.4W | 234Cd @ 8.3W | 400Cd @ 8.5W | 173Cd @ 6.6W |
| 276Cd @ 9.5W | 276Cd @ 11.4W | 517Cd @ 12.5W | 195Cd @ 8.9W |

Vertical Divergence: 7° @ 50%; 15° @ 10%

Maximum average power 6.4W; optional 12W heat sink available

Pharos Marine Automatic Power

BROCHURE

# PMAPI-SC35

## *Self Contained LED Marine Lantern*

3 - 6.3 NM at 0.74T / 3.5 - 7.8 NM at 0.85T

## OVERVIEW

The PMAPI-SC35 is a weather protected solar powered self-contained marine lantern with an LED light source that can be combined with optional GPS or IO port. It can be used as an independent operation for extensive time periods. The high intensity LEDs on a metal core PCB for maximum useful life, with flexible electronic configurations. You can use on/off shore platforms, port and harbor, aquaculture, fixed or floating structures.

## KEY FEATURES

- Configurations: SS (Standard Solar) & LS (Large Solar)
- Rugged, weather-resistant construction materials: High impact resistant polycarbonate for ice, ultraviolet exposure, salt air and seawater spray at a wide range of ambient temperatures
- High intensity, energy efficient fan beam LED array: Maximum visible range up to 7.8NM at 0.85T pending flash character in optimal conditions
- IR Remote: Powering on & off, set / retrieve configuration parameters such as flash pattern, effective intensity, day/night control, etc.
- IALA approved colors: Single color LED engine - white, yellow, red or green
- Serviceable: Battery pack is easily disconnected and replaced
- Integrated bird deterrent: No additional accessories required
- Longevity - Estimated average service life of 10 years

## PERFORMANCE FEATURES

- Intensity control: Effective lantern intensity set on Schmidt-Clausen method
- Flash character control: 256 programmable flash characters and 2 custom flash characters
- Day/Night transition level settings: Programmable for active at all times or only after sunset. Day / Night level settings (sunset / sunrise transition) can be field programmed
- Calendar control - Programmable season on/off date
- Input protection - Lantern power input from the battery is reversed polarity protected for field repair or light head replacement
- Ripple delay - 0.05 to 12.7 seconds & master/slave sync options
- Storage mode - Automatic storage mode with adjustable automatic wake up
- Programmable sleep and test modes
- Battery low voltage cutoff
- Battery voltage and internal temperature LED flashing reports, triggered by commands from the IR remote control (unit will flash 1 1 9 sequences for a 11.9 V battery for example)
- Battery voltage and internal temperature could be interrogated during day time, even when the lantern is off by the photocell control system.
- Dynamic compensation circuitry for the candela low output, based on internal temperature, LED flash duration and LED color, to always keep the same programmed output intensity

## OPTIONAL FEATURES

- GPS Synchronisation: Optional internally mounted hardware will allow the lantern to flash in-sync with other PMAPI and third party lanterns that are GPS synced
- External I/O port: Allows connection to an external monitoring device or for hardwired synchronisation to other lanterns
- Charging port: Charge / recharge the battery prior to installation

## PHYSICAL SPECIFICATIONS

| | |
|---|---|
| Operating temperature range (°C) | -30°C to +°50C |
| Operation humidity (%) | 100 |
| IP Rating | IP68* |
| Body material | UV stable polycarbonate |
| Lens material | Acrylic |
| Mounting | 3 - 4 hole, Ø 200mm |

## DIMENSIONS

| | | | |
|---|---|---|---|
| Width (mm / in) | | | 242mm / 9.53” |
| Depth (mm / in) | | | 242mm / 9.53” |
| | **SC35-SS** | **SC35-LS1** | **SC35-LS2** |
| Height (mm/in) | 405 mm / 15.94 in | 596 mm / 23.45 in | 596 mm / 23.45 in |
| Weight (kg/lb) | 5.89 kg / 13 lb | 7.53 kg / 16.6 lb | 11.52 kg / 25.4 lb |

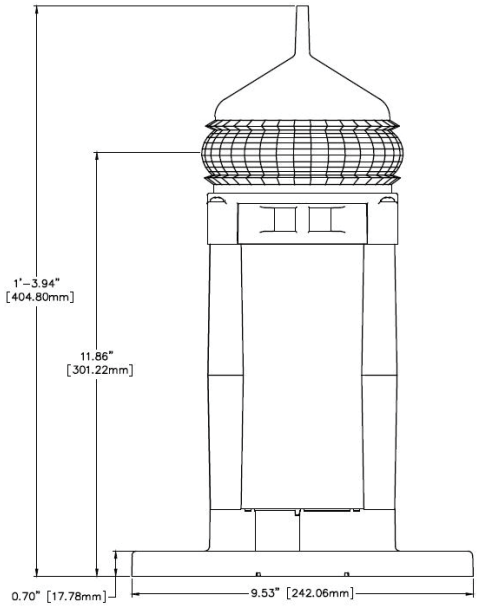
## STANDARDS

| | |
|---|---|
| EMI/EMC | EN55015:2013 radiated and conducted emissions*<br>EN61547:2009 Immunity<br>FCC 47 CFR Section 15 Class A* |
| Optical Test | IALA Recommendation E-122 (2001) and E-200-3 Part 3 (2008) |
| Colour | IALA Recommendation E-200-1 Part 1 |
| Daylight | IALA Recommendation 1038 |
| Power Supply | IEC60945 Section 7 normal and peak voltage, and reverse polarity protection |
| Ingress | P68 to IEC60529 |
| Shock | MIL-STD-202G Method 213B Cond. H* |
| Vibration | MIL-STD-202G Method 204D Cond. B* |
| Immersion | MIL-STD-202G Method 104A Cond. B withstands immersion to 1m depth* |

## ELETRICAL SPECIFICATIONS

| | |
|---|---|
| Battery nominal voltage | 12V |
| Battery autonomy | 20 DAYS |
| Battery type | Lead Crystal |
| Battery capacity | 12 Ah or 24Ah (2x12) |
| Standby power | 3.8mA Day current<br>5mA Night off current |
| Solar model type | Monocrystalline |
| Solar panel orientation | 90° in azimuth |
| Solar output | 8W (2x4) or 16W (4x4) |

- **Battery autonomy is more than 20 days at 30% duty cycle flash pattern at 43cd effective intensity setting (Data based on SS version)
- Specifications taken at standard indoor conditions
- Solar module characteristics taken from manufacturer data




Class A, B and C compliant in accordance with USCG 8th District 33 CFR Part 67 for artificial island and structures, and 33 CFR Part 66 for 3 and 6.3 NM private navigation aids.

## OPTICAL SPECIFICATIONS

| **LED COLOR** | **WHITE** | **YELLOW** | **RED** | **GREEN** |
|---|---|---|---|---|
| Light source | 12 White LEDs | 12 White LEDs | 12 White LEDs | 12 White LEDs |
| Visible range (NM)[1] | 3 - 6.3 | 3 - 6.3 | 3 - 6.3 | 3 - 6.3 |
| Effective intensity range (cd) [2] | 10 - 180[3] | 10 - 180[3] | 10 - 180[3] | 10 - 180[3] |
| Horizontal divergence | 360° | 360° | 360° | 360° |
| Vertical divergence at 50% intensity | ± 3.5° | ± 3.5° | ± 3.5° | ± 3.5° |
| Peak intensity (cd)F | 325 | 325 | 325 | 325 |

[1] Visible range based on IALA standards at atmospheric transmissivity of 0.74
[2] Effective intensity computed from Blondel Rey method
[3] Maximum Effective Intensity limited by ambient temperature and flash length. See PHAROS-SC35 Standby Calculator for expected performance.

**All values are subject to change without notice.*

**Pharos Marine Automatic Power, Inc.**
Houston, TX - USA
sales@automaticpower.com
Phone: +1-713-228-5208

**Pharos Marine Automatic Power**
Gray, LA - USA
rleblanc@automaticpower.com
Phone: +1-985-223-8700

**Pharos Marine Automatic Power, Ltd.**
London, UK
sales@pharosmarine.com
Phone:+44-20-8538-

**AB Pharos Marine Pte.**
Singapore
sales@pharos-api.com
Phone: +65-6747-9325

Sealite®
www.sealite.com

# SL15

## with User-Adjustable Flash Settings
## 1-2nm+ Solar Marine Light
## Installation & Service Manual

Version 3.2

Sealite
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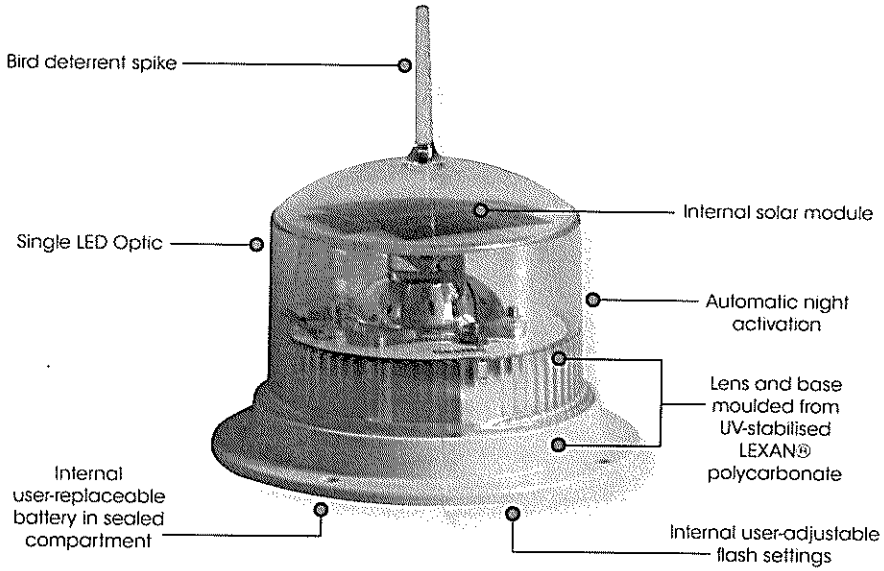
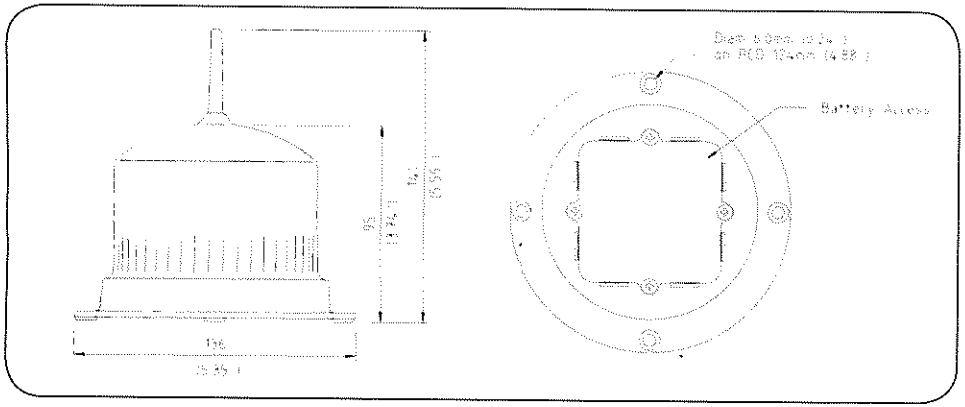
# SL15
## with User-Adjustable Flash Settings
## 1-2nm+ Solar Marine Light





## Table of Contents



| Version No. | Description | Date | Approved |
|---|---|---|---|
| 1.0 | Manual re-launch | June 2009 | K. Paton |
| 2.0 | Flash Adjustment | July 2009 | K. Paton |
| 2.1 | Logo Update | May 2010 | K. Paton |
| 2.2 | Warranty Update | July 2010 | K. Paton |
| 3.0 | Update: New Design | Sept 2011 | J. Dore |
| 3.1 | General update | June 2012 | J. Dore |
| 3.2 | Update: Replacing the battery | July 2012 | J. Dore |

## Introduction

**Congratulations! By choosing to purchase a Sealite lantern you have become the owner of one of the most advanced LED marine lanterns in the world.**

Sealite Pty Ltd has been manufacturing lanterns for over 25 years, and particular care has been taken to ensure your lantern gives years of service.

As a commitment to producing the highest quality products for our customers, Sealite has been independently certified as complying with the requirements of ISO9001:2008 quality management system.

Sealite lanterns comply with requirements of the US Coast Guard in 33 CFR part 66 for Private Aids To Navigation.

By taking a few moments to browse through this booklet, you will become familiar with the versatility of your lantern, and be able to maximise its operating function.

Please remember to complete the Sealite warranty registration card accompanying your lantern.

## Operating Principle

The solar module of the lantern converts sunlight to an electrical current that is used to charge the battery. The battery provides power to operate the lantern at night.

The flasher unit has very low current requirements. A microprocessor drives an ultra bright LED through a DC/DC converter, which enables the LED's to operate within the manufacturer's specifications. The battery is protected from over-charging within the circuit to ensure maximum battery life.

On darkness, the microprocessor will initiate a program check and after approximately 1 minute begin flashing to the set code

## Technology

***Sealite is the world's fastest growing manufacturer of marine aids to navigation. We employ leading mechanical, optical, hardware & software engineers to create innovative products to service the needs of our customers worldwide, and offer the widest range of solar-powered LED lanterns in the marketplace.***

### Electronics

Sealite employs leading in-house electronic engineers in the design and development of software and related circuitry. All individual electronic components are sourced directly by Sealite procurement staff ensuring that only the highest quality components are used in our products.

### LED Technology

All marine lanterns use the latest advancements in LED (Light Emitting Diode) technology as a light source. The major advantage of LED's over traditional light sources is well established in that they typically have an operational life in excess of 100,000 hours, resulting in substantial savings to maintenance and servicing costs.

### Precision Construction

Commitment to investing in the design and construction of injection-moulded parts including optic lenses, light bases and a range of other components ensures that all Sealite products are of a consistent & superior quality.

### Optical Performance

Sealite manufactures a range of marine LED lenses moulded from multi-cavity dies. Complex shapes such as the SL70, BargeSafe™ and 16-segment multi-focus lenses are a testament to the company's superior in-house lens manufacturing capabilities and outstanding optical performance.

### Award-winning, Patented Technology

Several United States and Australian patent registrations are held on Sealite's range of innovative designs, with other regional patents pending in Canada, United Kingdom and Europe.



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www.sealite.com
SL15 with User-Adjustable Flash Settings
1-2nm+ Solar Marine Light

# SL15 Model

***The Sealite SL15 1-2nm+ LED compact light incorporates some of the most advanced technology available. Made from tough, durable polycarbonate and using the latest high-intensity LEDs, no expense has been spared in the design and development of this lantern. Installation takes just minutes, and a permanent ON/OFF, accessible through the battery compartment, switch allows for easy storage. The SL15 is designed to be maintenance-free and have a service life of over 3 years.***

## SPECIFICATIONS •

| | |
|---|---|
| **Light Characteristics** | |
| Light Source | 1 LED |
| Available Colours | Red, Green, White, Yellow, Blue |
| Maximum Available Intensity (cd)† | Red - 6.2 Green - 7.6 White - 6.8 Yellow - 5.9 |
| Visible Range (nm) | 1-2+ |
| Horizontal Output (degrees) | 360 |
| Vertical Divergence (degrees) | 7 |
| Reflector Type | Single LED Optic |
| Available Flash Characteristics | 16 user-adjustable IALA flash characteristics (other flash patterns available on request) |
| Intensity Adjustments | 32 automatic step-down settings based on power demand of flash code selection |
| LED Life Expectancy (hours) | >100,000 |
| **Electrical Characteristics** | |
| Current Draw (mA) | Refer to Sealite Power Calculator |
| Circuit Protection | Integrated |
| Nominal Voltage (v) | 3.6 |
| Autonomy (days) | >50 (14 hour darkness, 12.5% duty cycle) |
| Temperature Range | -40 to 80°C |
| **Solar Characteristics** | |
| Solar Module Type | Multicrystalline |
| Output (watts) | 0.45 |
| Solar Module Efficiency (%) | 14 |
| Charging Regulation | Microprocessor controlled |
| **Power Supply** | |
| Battery Type | High grade NiMH - Environmentally friendly |
| Battery Capacity (Ah) | 1.6 |
| Nominal Voltage (v) | 3.6 |
| Battery Service Life | Average 5 years |
| **Physical Characteristics** | |
| Body Material | LEXAN® Polycarbonate - UV-stabilised |
| Lens Material | LEXAN® Polycarbonate - UV-stabilised |
| Lens Diameter (mm/inches) | 98 / 3 7/8 |
| Lens Design | Single LED Optic |
| Mounting | 4 x 6mm mounting holes |
| Height (mm/inches) | 141 / 5 1/2 |
| Width (mm/inches) | 136 / 5 3/8 |
| Mass (kg/lbs) | 0.5 / 1 1/8 |
| Product Life Expectancy | Up to 12 years |
| **Certifications** | |
| CE | EN61000-6-3:1997. EN61000-6-1:1997 |
| Quality Assurance | ISO9001:2008 |
| Waterproof | IP68 |
| **Intellectual Property** | |
| Patents | US Pat. No. 6,667,582. AU Pat. No. 778,918 |
| Trademarks | SEALITE® is a registered trademark of Sealite Pty Ltd |
| **Warranty *** | 3 years |
| **Options Available** | • ON/OFF switch<br>• Custom flash patterns<br>• 50mm pole mount adapter plate |

• Specifications subject to change or variation without notice
* Subject to standard terms and conditions
† Intensity setting subject to solar availability

CE

## Installation

### Charging the Battery

***New lanterns should be left in the sun for 1-2 days to ensure battery is charged before placing in service. Please note, lantern will re-charge even when switch is turned to 'OFF' position.***

### Preferred Installation Location

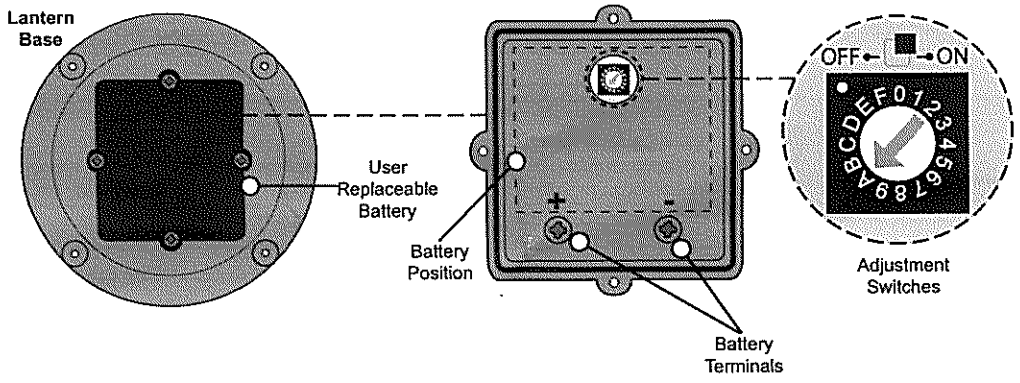
*For best lantern performance, ensure solar modules are not covered and are in clear view of the sky with no shadows.*

1. The SL15 will be supplied preset to the requested flash code.
2. The light can be directly positioned in your desired location. Secure it, utilising the 4 x holes in the flange. Ensure the light is bolted to an even, flat surface.

## Flash Codes

### Adjusting the Flash Code

1. Remove the 4 x battery cover screws and lift the cover and battery out of the compartment to expose the adjustment plug.
2. Unscrew the adjustment plug.
3. Using a small flat bladed screwdriver adjust the Flash Code to the desired setting.
4. Cover the light, in darkness, for at least 30 seconds to activate the light sensor. Make sure the light is flashing correctly.
5. Uncover the light and wait at least 30 seconds to make sure the light turns off in daylight.
6. Insert the adjustment plug and replace the battery.
7. Replace the cover and secure using the 4 x screws. Do Not over tighten screws.
8. Position the light in your desired location and secure, utilising the 4 x holes in the flange. Ensure the light is bolted to an even, flat surface.







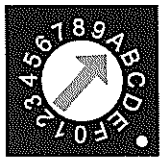

### Selecting an Intensity/Power Setting

Using the latest technology in software, the SL15 automatically adjusts the Intensity Setting when Flash Code is set.

### Selecting a Flash Code- Rotary Switch

All SL15 Lights are fitted with a rotary switch. Turning the small arrow to the appropriate number or letter will set the code (see '*Flash Codes*' section of this manual). The unit may take up to one minute to activate a new flash code. A comprehensive list of available flash codes is listed In the '*Flash Code Table*' section of this manual.

Rotary Switch




## Flash Code Table

| SWITCH POSITION | FLASH SETTING | | DUTY CYCLE |
|---|---|---|---|
| | ON (sec) | OFF (sec) | |
| 0 | Steady On | | 100% |
| 1 | 0.5 | 1.0 | 33% |
| 2 | 0.5 | 3.5 | 12.5% |
| 3 | 1.0 | 3.0 | 25% |
| 4 | 0.5 | 5.5 | 8.5% |
| 5 | 0.3 | 0.7 | 30% |
| 6 | 0.3 (On), 0.7 (Off), 0.3, 0.7, 0.3, 0.7, 0.3, 15.7 | | 6.5% |
| 7 | 0.3 | 1.7 | 15% |
| 8 | 0.3 | 2.2 | 12% |
| 9 | 0.5 | 2.0 | 20% |
| A | 0.3 | 2.7 | 10% |
| B | 0.5 | 2.5 | 16.5% |
| C | 0.7 | 2.3 | 23.5% |
| D | 0.5 | 4.5 | 10% |
| E | 1.0 | 4.0 | 20% |
| F | Custom Flash Code Position | | |

Note: If a Specific Flash Code has to be pre-set at the factory it will be found at Switch Position F

## Maintenance and Servicing

Designed to be maintenance free, the SL15 requires minimal attention, though the following maintenance and servicing information is provided to help ensure the life of your Sealite product.

1. Cleaning Solar Panels - occasional cleaning of the solar panels may be required. Using a cloth and warm soapy water, wipe off any foreign matter before rinsing the panels with fresh water.
2. Battery Check - inspection of batteries should be performed every two years (minimum) to ensure that the charger, battery and ancillary electronics are functioning correctly. Using a voltage meter, check that the battery voltage is at least 3.6 volts under 50mA load, and ensure all terminals are clear of foreign matter.

### Replacing the battery

The SL15 lantern is the only compact marine lantern with a double sealed battery compartment. This provides the user with the ability to change the battery after years of operation.

1. Remove the 4 x battery cover screws and lift the cover and battery out of the compartment to expose the adjustment plug.
2. Unscrew the adjustment plug.
3. Use a small flat bladed screwdriver to turn unit OFF.
4. Unscrew positive and negative battery leads.
5. Discard old battery in a safe manner. Please remember to recycle where possible.
6. Reattach positive and negative leads to new battery and then place back into case.
7. Switch lantern 'ON' via internal switch.
8. Cover the light, in darkness, for at least 30 seconds to activate the light sensor. Make sure the light is flashing correctly.
9. Uncover the light and wait at least 30 seconds to make sure the light turns off in daylight.
10. Insert the adjustment plug and replace the battery.
11. Replace the cover and secure using the 4 x screws.

***Care must be taken to observe the polarity of the battery before the leads are re-connected, and ensure the replacement battery is correctly fitted. Always discard old batteries in a safe manner.***

### Long Term Storage Instructions (>4 weeks)

If light is required to be stored for longer than 4 weeks, please turn the light off using the internal ON/OFF switch (or external ON/OFF switch where fitted).

1. Remove the 4 x battery cover screws and lift the cover and battery out of the compartment to expose the adjustment plug.
2. Unscrew the adjustment plug.
3. Using a small flat bladed screwdriver switch the ON/OFF switch to the OFF position.
4. Insert the adjustment plug and replace the battery.
5. Replace the cover and secure using the 4 x screws. Do Not over tighten screws.
6. Repeat these steps to re-activate your light when it is removed from storage.



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SL15 with User-Adjustable Flash Settings
1-2nm+ Solar Marine Light

## Trouble Shooting

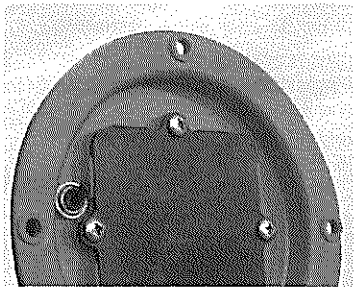
| Problem | Remedy |
|---|---|
| Lantern will not activate. | • Ensure internal switch (or external switch where fitted) is set to the 'ON position.<br>• Ensure lantern is in darkness.<br>• Wait at least 45 seconds for the program to initialise in darkness.<br>• Ensure switch setting is on a valid code (See *Flash Codes* section of this manual).<br>• Ensure battery terminals are properly connected.<br>• Ensure battery voltage is above 3.6 volts. |
| Timing codes will not change. | • Turn rotary switch several times to ensure contacts are clear. |
| Lantern will not operate for the entire night. | • Expose lantern to direct sunlight and monitor operation for several days. Sealite products typically require 1.5 hours of direct sunlight per day to retain full autonomy. From a discharged state, the lantern may require several days of operational conditions to 'cycle' up to full autonomy.<br>• Ensure solar module is clean and not covered by shading during the day. |

Latest products and information available at www.sealite.com

## SL15 Optional Configurations

### ON/OFF Switch (SL15-SW)

An optional external ON/OFF switch can be installed on request (additional charges will apply).



### Custom Flash Patterns

Other flash patterns are available on request.



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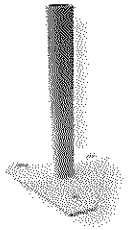
SL15 with User-Adjustable Flash Settings
1-2nm+ Solar Marine Light

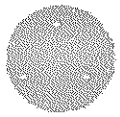
## SL15 Accessories

**MC/02**
Post mounting plate to suit standard base SL15
50mm ID



**MC/04**
Post mounting stand
50mm OD post, 3-hole 200mm OD base pattern

**MC/05**
90 degree wall mounting stand
50mm OD



**MC/09**
Buoy mounting plate to affix SL15 lantern to SLB600, SLB610 & SLB700 buoys

# Sealite LED Light Warranty V2.1

## Activating the Warranty

Upon purchase, the Sealite Pty Ltd warranty must be activated for recognition of future claims. To do this you have two (2) options:

1. **Postal Registration** - please complete the Sealite Warranty Registration Card and return to Sealite within 30 days of your purchase.
2. **Online Registration** - please complete the Online Registration Form at; www.sealite.com

***Sealite Pty Ltd will repair or replace your LED light in the event of electronic failure for a period of up to three years from the date of purchase.***

***The unit must be returned to Sealite freight prepaid.***

## Warranty Terms

1. Sealite Pty Ltd warrants that any Sealite marine products fitted with telemetry equipment including but not limited to AIS, GSM, GPS or RF ("Telemetry Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
2. Sealite Pty Ltd warrants that any BargeSafe™ Series of LED barge light products ("BargeSafe™ Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
3. Sealite Pty Ltd warrants that any LED area lighting products ("Area Lighting Products") but not including sign lighting products will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of twelve (12) months from the date of purchase by the original purchaser.
4. Sealite Pty Ltd warrants that any LED sign lighting products ("Sign Lighting Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser.
5. Sealite Pty Ltd warrants that any Sealite marine lighting products other than the Telemetry Products, BargeSafe™ Products, and Area Lighting Products ("Sealite Products") will be free from defective materials and workmanship under normal and intended use, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser.
6. Sealite Pty Ltd will repair or replace, at Sealite's sole discretion, any Telemetry Products, BargeSafe™ Products, Area Lighting Products or Sealite Products found to be defective in material and workmanship in the relevant warranty period so long as the Warranty Conditions (set out below) are satisfied.
7. If any Telemetry Products, BargeSafe™ Products, Area Lighting Products or Sealite Products are fitted with a rechargeable battery, Sealite Pty Ltd warrants the battery will be free from defect for a period of one (1) year when used within original manufacturer's specifications and instructions.

## Warranty Conditions

This Warranty is subject to the following conditions and limitations;

1. The warranty is applicable to lanterns manufactured from 1/1/2009.
2. The warranty is void and inapplicable if:
   a. the product has been used or handled other than in accordance with the instructions in the owner's manual and any other information or instructions provided to the customer by Sealite;
   b. the product has been deliberately abused, or misused, damaged by accident or neglect or in being transported; or
   c. the defect is due to the product being repaired or tampered with by anyone other than Sealite or authorised Sealite repair personnel.



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3. The customer must give Sealite Pty Ltd notice of any defect with the product within 30 days of the customer becoming aware of the defect.
4. Rechargeable batteries have a limited number of charge cycles and may eventually need to be replaced. Typical battery replacement period is 3-4 years. Long term exposure to high temperatures will shorten the battery life. Batteries used or stored in a manner inconsistent with the manufacturer's specifications and instructions shall not be covered by this warranty.
5. No modifications to the original specifications determined by Sealite shall be made without written approval of Sealite Pty Ltd.
6. Sealite lights can be fitted with 3rd party power supplies and accessories but are covered by the 3rd party warranty terms and conditions.
7. The product must be packed and returned to Sealite Pty Ltd by the customer at his or her sole expense. Sealite Pty Ltd will pay return freight of its choice. A returned product must be accompanied by a written description of the defect and a photocopy of the original purchase receipt. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and authorised dealer and the price paid by the purchaser. On receipt of the product, Sealite Pty Ltd will assess the product and advise the customer as to whether the claimed defect is covered by this warranty.
8. Sealite Pty Ltd reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.
9. Input voltage shall not exceed those recommended for the product.
10. Warranty does not cover damage caused by the incorrect replacement of battery in solar lantern models.
11. This warranty does not cover any damage or defect caused to any product as a result of water flooding or any other acts of nature.
12. There are no representations or warranties of any kind by Sealite or any other person who is an agent, employee, or other representative or affiliate of Sealite, express or implied, with respect to condition of performance of any product, their merchantability, or fitness for a particular purpose, or with respect to any other matter relating to any products.

## Limitation of Liability

To the extent permitted by section 68A of the Trade Practices Act 1974 (Cth), the liability of Sealite Pty Ltd under this Warranty will be, at the option of Sealite Pty Ltd, limited to either the replacement or repair of any defective product covered by this Warranty. Sealite will not be liable to Buyer for consequential damages resulting from any defect or deficiencies.

## Limited to Original Purchaser

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not extend to any subsequent purchaser of the product.

## Miscellaneous

Apart from the specific warranties provided under this warranty, all other express or implied warranties relating to the above product is hereby excluded to the fullest extent allowable under law. The warranty does not extend to any lost profits, loss of good will or any indirect, incidental or consequential costs or damages or losses incurred by the purchaser as a result of any defect with the covered product.

## Warrantor

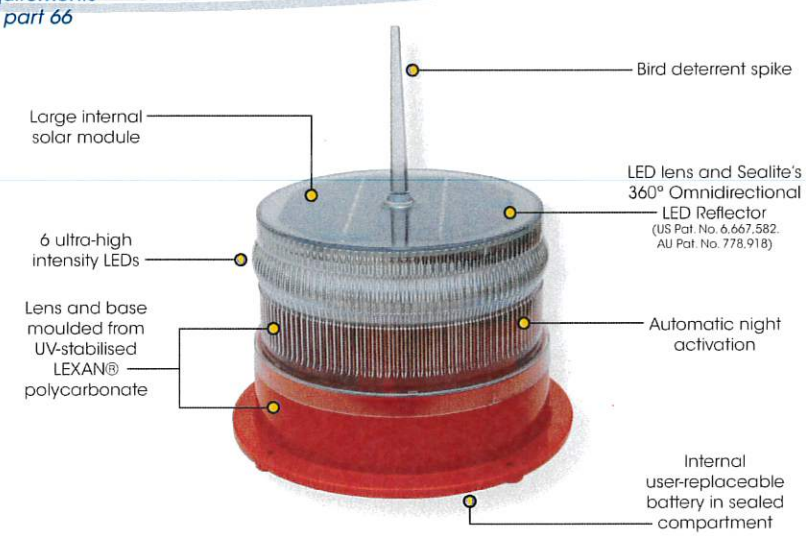
Sealite Pty Ltd has authorised distribution in many countries of the world. In each country, the authorised importing distributor has accepted the responsibility for warranty of products sold by distributor. Warranty service should normally be obtained from the importing distributor from whom you purchased your product. In the event of service required beyond the capability of the importer, Sealite Pty Ltd will fulfil the conditions of the warranty. Such product must be returned at the owner's expense to the Sealite Pty Ltd factory, together with a photocopy of the bill of sale for that product, a detailed description of the problem, and any information necessary for return shipment.

# SL60

## 2-3nm+ Solar Marine Lantern

*This equipment complies with requirements of the U.S. Coast Guard in 33 CFR part 66*

Shown with optional 200mm OD base pattern (SL60-LB)




## The Sealite Advantage

- **256 IALA flash patterns, user-adjustable without the need for external devices**
- **User-replaceable battery in sealed battery compartment**
- **NiMH battery for long service life & wide temperature range**
- **4 user-adjustable intensity settings**
- **ON/OFF storage switch**
- **IP68 waterproof**

### The Sealite SL60 is the world's most popular and versatile 2-3nm+ solar marine light.

Made from tough, durable polycarbonate and using the latest high intensity LEDs, no expense has been spared in the design and development of this lantern.

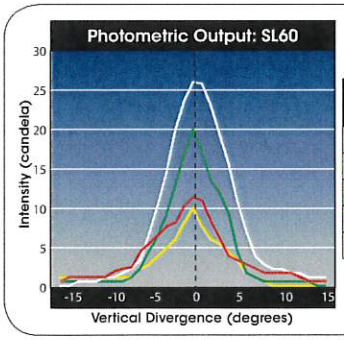
The SL60 can be installed in minutes, and requires no operator intervention. The flash characters are easily adjusted onsite by the user, and the lantern has a permanent ON/OFF switch for easy storage.

During daylight hours the solar module will charge the battery and the lantern will automatically begin operation at dusk - once the ambient light threshold drops sufficiently.

The sealed battery compartment allows the battery to be replaced after years of service - don't throw the light away at the end of the battery service life.

### Optional 200mm OD Base Pattern

The SL60 is available with optional large 200mm OD base pattern to suit installation requirements.




| Maximum Available Intensity (cd) | |
|---|---|
| | SL60 |
| RED | 11.4 |
| GREEN | 20.0 |
| WHITE | 26.0 |
| YELLOW | 10.0 |


Sealite
www.sealite.com

w: www.sealite.com
e: info@sealite.com

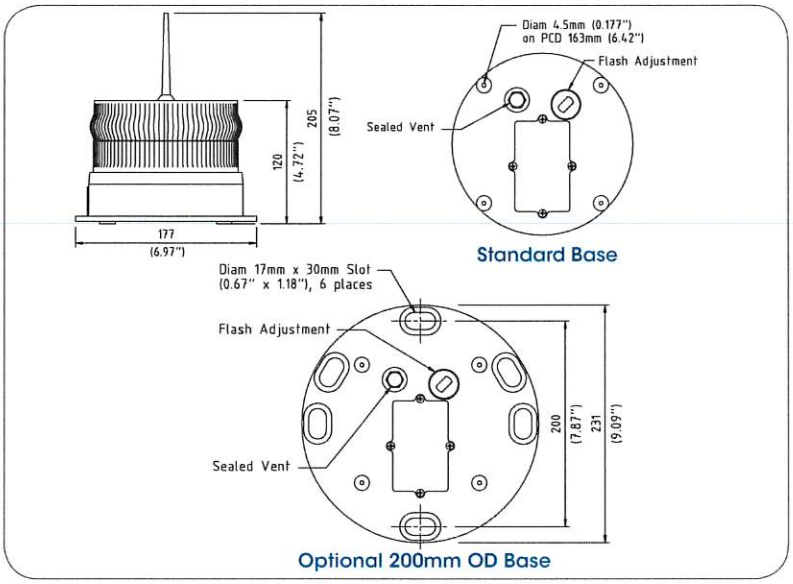
**Sealite Pty Ltd**
AUSTRALIA
t: +61 (0)3 5977 6128
f: +61 (0)3 5977 6124

**Sealite USA, LLC**
Gilford, NH, USA
t: (603) 737 1311
f: (603) 737 1320

# SL60

## 2-3nm+ Solar Marine Lantern

User-replaceable battery




Sochi, Russia

Cadiz, South of Spain

## SPECIFICATIONS •

| | |
|---|---|
| **Light Characteristics** | |
| Light Source | 6 ultra-high intensity LEDs |
| Available Colours | Red, Green, White, Yellow, Blue |
| Maximum Available Intensity (cd)† | Red - 11.4 Green - 20.0 White - 26.0 Yellow - 10.0 |
| Visible Range (nm) | 2-3+ |
| Horizontal Output (degrees) | 360 |
| Vertical Divergence (degrees) | 9 |
| Reflector Type | Omnidirectional 360° LED Reflector (US Pat. No. 6,667,582. AU Pat. No. 778,918) |
| Available Flash Characteristics | Up to 256 IALA recommended (user adjustable) |
| Intensity Adjustments | Adjustable in 25% increments |
| LED Life Expectancy (hours) | >100,000 |
| **Electrical Characteristics** | |
| Current Draw (mA) | Refer to Sealite Power Calculator |
| Circuit Protection | Integrated |
| Nominal Voltage (v) | 3.6 |
| Autonomy (days) | >20 (14 hour darkness, 12.5% duty cycle) |
| Temperature Range | -40 to 80°C |
| **Solar Characteristics** | |
| Solar Module Type | Multicrystalline |
| Output (watts) | 1.4 |
| Solar Module Efficiency (%) | 14 |
| Charging Regulation | Microprocessor controlled |
| **Power Supply** | |
| Battery Type | High grade NiMH - Environmentally friendly |
| Battery Capacity (Ah) | 4 |
| Nominal Voltage (v) | 3.6 |
| Battery Service Life | Average 5 years |
| **Physical Characteristics** | |
| Body Material | LEXAN® Polycarbonate - UV-stabilised |
| Lens Material | LEXAN® Polycarbonate - UV-stabilised |
| Lens Diameter (mm/inches) | 150 / 5 7/8 |
| Lens Design | External optics with interior flute design |
| Mounting | 4 x 4.5mm mounting holes |
| Height (mm/inches) | 205 / 8 1/8 |
| Width (mm/inches) | 177 / 7 |
| Mass (kg/lbs) | 0.9 / 2 1/8 (SL60-LB 1 / 2 1/4. SL60/8Ah 1 / 2 1/4. SL60-LB/Ah 1.1 / 2 1/2. SL60-LB/16Ah 1.5 / 3 1/3) |
| Product Life Expectancy | Up to 12 years |
| **Certifications** | |
| CE | EN61000-6-3:1997 EN61000-6-1:1997 |
| Quality Assurance | ISO9001:2008 |
| Waterproof | IP68 |
| **Intellectual Property** | |
| Patents | US Pat. No. 6,667,582. AU Pat. No. 778,918 |
| Trademarks | SEALITE® is a registered trademark of Sealite Pty Ltd |
| **Warranty *** | 3 years |
| **Options Available** | • 8Ah battery<br>• 16Ah battery<br>• 200mm OD base<br>• 50mm pole mount adapter plate |

• Specifications subject to change or variation without notice
* Subject to standard terms and conditions
† Intensity setting subject to solar availability

CE


Sealite
www.sealite.com

w: www.sealite.com
e: info@sealite.com

**Sealite Pty Ltd**
AUSTRALIA
t: +61 (0)3 5977 6128
f: +61 (0)3 5977 6124

**Sealite USA, LLC**
Gilford, NH, USA
t: (603) 737 1311
f: (603) 737 1320

# MLED-120E

## Marine Lantern

TIDELAND SIGNAL CORPORATION

**Tideland's MLED-120E is offered in a series of marine lantern products to meet the varied needs of Port and Harbour Authorities. MLED-120E marine lanterns are designed to operate in all marine environments. Utilising high gain internal refracting lenses, these lanterns produce a maximum efficiency light achieving performance ranges of 3 to 6 NM.**

Shown are the MLED-120E marine lanterns: yellow (four tier LED), white (one tier LED); red (two tier LED), and green (three tier LED).

## FEATURES:

- DA-65 LED array is available in one, two, three or four tier configurations, each tier consists of 30 high-intensity LEDs precision mounted to internal refracting ring
- Arrays operational life approaching 100,000 hours
- Available in all approved IALA colours
- Arrays are colour coded for easy identification when unlit
- 256 preprogrammed flash codes
- High efficiency DC to DC converter
- Reverse polarity protection
- Robust surge protection
- Monitor and control access
- Expanded PTFE provides protection against dust and liquid contaminants along with equalisation of ambient pressure for lantern integrity
- Mounting plate separable from lens housing for easy installation and maintenance

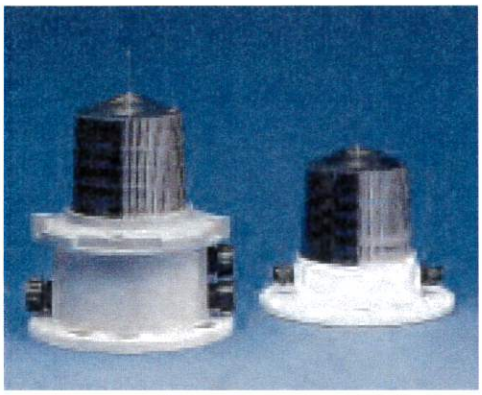
**Optional Feature:**

- Tideland Signal's SyncMaster circuitry enables two or more MLED-120E lanterns to flash in unison without interconnecting cables or radio links between lanterns. The DA-65 array incorporates a GPS antenna receiver with Tideland's MicroPower OMNIBUS® II in a modified version. By utilising the Universal Time Coordinated (UTC) signal from Global Positioning System (GPS) satellite network, the GPS receiver signal is fed into the SyncMaster circuit ensuring every MLED-120E starts its flash sequence at precisely the same time.

# MLED-120 Bridge and Barge

## FEATURES:

- Available in AC and DC versions: DC array can operate either fixed or flashing, the AC version operates fixed flash only
- Wide divergence lens provides the perfect light, especially high bridge applications
- All standards established by the Authority for sectored lenses are provided
- Provides all the same features as the MLED-120E marine lantern
- Optional synchronisation module



Shown are the MLED-120 bridge and barge marine lanterns with sectored lenses. Available in either E-Base housing (right) or multiple cable entry version (left).

## SPECIFICATIONS

### MLED-120E

Power
- Input Voltage ..... 10 to 36 VDC
- Input Power (lights on)
  - Green/White/Red/Yellow ..... 2.5 Watts/LED tier

Quiescent Current ..... 7.7 mA
Vertical Divergence ..... 7° at 50% Peak Intensity; 14° at 10% Peak Intensity
Horizon Uniformity ..... ±12.5% (1 Tier) to ±8.5% (4 Tier)
Operating Temperature ..... -40°C to +55°C
Relative Humidity ..... 100% Condensing
Colours Available ..... White, Red, Yellow, Green and Blue
Weight ..... 0.8 kg (1.8 lb)

### MLED-120E SyncMaster (Option)

Power
- Input Voltage .....10 to 36 VDC (Optional: 120/240 VAC)
- Input Power (lights on)
  - Green/White/Red/Yellow ..... 2.5 Watts/LED tier

Quiescent Current ..... 9.7 mA
Vertical Divergence ..... 7° at 50% Peak Intensity; 14° at 10% Peak Intensity
Horizon Uniformity ..... ±12.5% (1 Tier) to ±8.5% (4 Tier)
Operating Temperature ..... -40°C to +55°C
Relative Humidity ..... 100% Condensing
Colours Available ..... White, Red, Yellow, Green and Blue
Weight ..... 1.0 kg (2.2 lb)

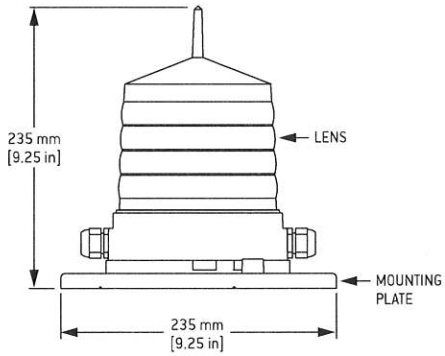
### MLED-120 Bridge and Barge Lanterns

Power
- Input Voltage .....10 to 36 VDC (Optional: 120/240 VAC)
- Input Power (lights on)
  - Green/White/Red/Yellow ..... 2.5 Watts/LED tier

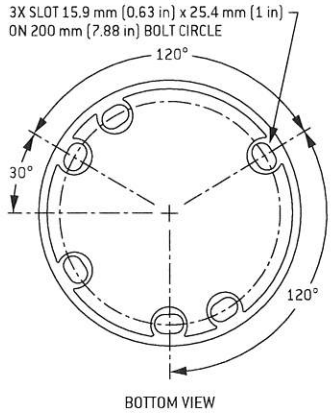
Quiescent Current ..... 7.7 mA
Vertical Divergence ..... 7° at 50% Peak Intensity; 14° at 10% Peak Intensity
Horizon Uniformity ..... ±12.5% (1 Tier) to ±8.5% (4 Tier)
Operating Temperature ..... -40°C to +55°C
Relative Humidity ..... 100% Condensing
Colours Available ..... White, Red, Yellow, Green and Blue
Weight
- E-Base ..... 0.8 kg (1.8 lb)
- Optional Base ..... 1.6 kg (3.5 lb)

NOTE: Specifications are subject to change.

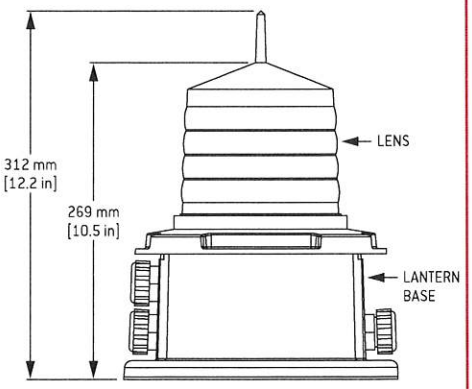
CE




MLED-120E




Bolt Pattern




MLED-120 with Optional Base for use with Multiple Cables


**TIDELAND SIGNAL CORPORATION**
**CORPORATE HEADQUARTERS**
P.O. Box 52430
Houston, Texas 77052-2430, USA
4310 Directors Row
Houston, Texas 77092 USA
PH: + 1 713-681-6101
FAX: + 1 713-681-6233
E-MAIL: hq@tidelandsignal.com

P.O. Box 52370, O.C.S.
Lafayette, Louisiana 70505-2370, USA
PH: + 1 337-269-9113
FAX: + 1 337-269-9052
E-MAIL: lafayettesales@tidelandsignal.com

TIDELAND SIGNAL CANADA LTD.
#2170–21331 Gordon Way
Richmond, B.C., Canada V6W 1J9
PH: + 1 604-247-0988
FAX: + 1 604-247-0987
E-MAIL: sales@tidelandsignalcanada.com.

TIDELAND SIGNAL PTE. LTD.
Crystal Time Building
16 Tannery Lane #04-00
Singapore 347778
PH: + 65 6333-0078
FAX: + 65 6333-0079
E-MAIL: sales@tidelandsignal.com.sg

TIDELAND SIGNAL LIMITED
Unit B, Kendal House
Victoria Way
Burgess Hill, Sussex, RH15 9NF, UK
PH: + 44 (0) 1444 872240
FAX: + 44 (0) 1444 872241
E-MAIL: sales@tidelandsignal.ltd.uk

TIDELAND SIGNAL LTD. (UAE)
FZS1 BB03, JAFZA South
Jebel Ali Free Zone, Dubai, U.A.E.
PH: + 971 4-886-0180
FAX: + 971 4-886-0181
E-MAIL: sales@tidelandsignal.ltd.uk

**WEB SITE: www.tidelandsignal.com**


INMETRO ANAB MGMT. SYS. RvA C 046
ISO 9001
Certificate Number: 30061

Tideland Signal Corporation maintains ISO 9001:2000 accreditation. It is company policy to provide products and services that meet the highest standards of quality in the industry.

Membership Organisations

AISM IALA · IAPH · RTCM · NAM National Association of Manufacturers · CIRM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