



SL-C510

Compact 5-9NM Solar Marine Lantern

INSTALLATION & SERVICE MANUAL



Version No.	Description	Date	Approved
1.0	Manual Launch	March 2019	M.Nicholson
1.1	Update to Lantern Data	August 2020	M.Nicholson
1.2	Update to Battery Charging	October 2020	M.Nicholson
1.3	SATCOM update	May 2021	M.Nicholson

Table of Contents

Introduction	Page 4
Operating Principle	Page 4
Technology	Page 4
SL-C510 Model	Page 5
Installation	Page 7
Viewing Lantern Settings	Page 9
Summary of Lantern Status	Page 10
Programming the Lantern	Page 11
SealitePro® Bluetooth® Guide	Page 11
SealitePro® Bluetooth® Controller Functions	Page 12
Accessing the SealitePro® App for the first time	Page 14
SealitePro® Password Reset Procedure	Page 17
Lantern Status	Page 19
Solar Calculations	Page 20
Programming Options	Page 23
Manufacturing Data	Page 32
SealitePro® Troubleshooting	Page 36
Optional IR Remote Control	Page 38
Optional GPS Synchronisation	Page 47
Optional Iridium Satellite Monitoring & Control	Page 48
Optional GSM Monitoring & Control System	Page 49
Lantern Status	Page 50
Lantern Thermal Management	Page 51
Lantern Data	Page 51
Thermal Limit Operation	Page 52
Appendix	Page 53
Flash Codes	Page 53
Maintenance & Servicing	Page 60
Trouble Shooting	Page 63
Sealite LED Light Warranty	Page 63



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 ISO9001:2015 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 maximize its operating function.

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 multiple ultra-bright LED's (Light Emitting Diodes) 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 Flash 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 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 consistent and superior quality.

Optical Performance

Sealite manufactures a range of marine LED lenses moulded from multi-cavity dies. The company has superior in-house lens manufacturing capabilities to support 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.

SL-C510

Compact 5-9NM Solar Marine Lantern

The SL-C510 is a robust, completely self-contained 5-9 NM Solar LED Lantern specifically designed to withstand the tough marine environment to provide years of reliable, low maintenance service. The 3 & 4 hole bolt pattern base fits directly onto existing 200mm bolt pattern industry standard mounts for ease of installation.

The four (4) premium-grade solar modules are integrated into the assembly, and mounted to collect sunlight at all angles.

The base and top of the lanterns are made from composite moulded polymer with UV-stabilised rubber corners and gaskets providing a superior IP68 – the best in the industry. A handle is incorporated into the chassis for safe lifting.

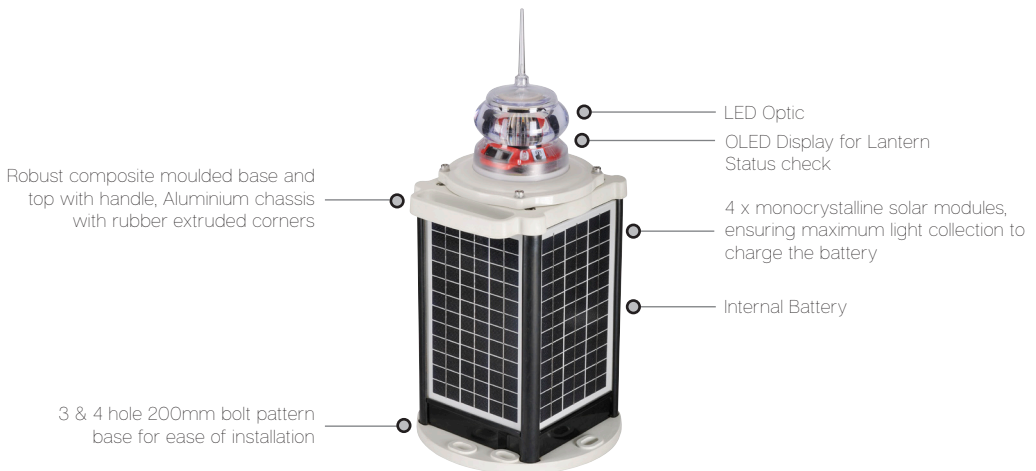
The tough, polycarbonate lens is specifically designed for use with LEDs and incorporates an environment-friendly spike to deter unwelcome bird life. The lens design also ensures that vessel operators clearly see the light from above when passing the AtoN. The design incorporates a conveniently located OLED (Organic Light-Emitting Diode) screen with touchpad allowing maintenance personnel to check the diagnostics of the lantern with the touch of a button.

Completely programmable via the new Bluetooth® connected SealitePro® mobile application, the SL-C510 can be configured and monitored from a distance up to 50 metres. An in-built solar calculator confirms the lanterns ability to operate at the set location, ensuring optimal operating performance.

The SL-C510 is available with GPS Synchronisation as standard. Two (2) or more lights can be synchronised to flash in unison via an internal GPS module.

The SL-C510 may also be fitted with Satellite Communications Module or GSM Module – enabling users to access real-time diagnostic data and change lantern settings. The system can also be configured to send out alarm messages to designated phone numbers. Users can also have alarms and reports sent to designated email addresses.

All this is backed by Sealite's industry leading 3-year warranty.





Product Components

The following components come as standard with each lantern:

- SL-LA510 lantern
- SL-SBA 510 Chassis
- Quick Start Guide

Optional

- IR programmer remote

These components are securely packaged within protective wrap, in a carton and shipped to you.

Please check that ALL of these components are included with your order and contact your Sealite representative as soon as possible if anything is missing.

Installation

Charging the Battery

For optimal performance, new lanterns must be left in full sun for 1-2 days with the lantern head connected to the battery to charge. Prior to installation, ensure battery voltage is >13V before placing into service.

Preferred Installation Location

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

Lantern Installations Settings

The lantern can be programmed via 2 methods,

1. Bluetooth® connectivity via the SealitePro® App (recommended);
2. Via the optional Sealite IR Controller (optional);

The SealitePro® and Sealite IR Controller Instructions are included in this manual.

Lantern Operation

The lantern is activated by connecting the 4-Pin Connector between the battery and the regulator. Flash Codes and Intensity settings need to be set via the SealitePro® App or the Sealite IR Controller.

1. Remove the four socket-head screws on the top of the lens assembly and lift the SL-C510 (light head) assembly from the solar chassis.
2. Join the 4-Pin connector together to join the battery and the solar panels to the light head. The battery is disconnected to reduce discharge during transportation and for long term storage.
3. Feed all wiring back inside the solar chassis and make sure the O-ring is properly placed.
4. Replace the SL-C510 (light head) assembly and the four (4) socket head screws. Sealite recommends that the light head be tightened onto the solar chassis base using a general purpose "grip tool", similar in shape to a screwdriver, however with the appropriate hex key head fitted. The torque setting applied to each of the four (4) hex bolts, be applied sufficient enough, to ensure that the light head base is secured firmly, but not over tightened with excessive force.

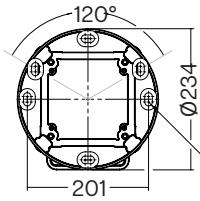
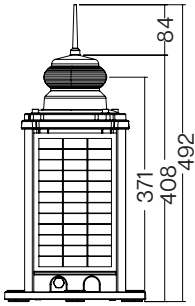
To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used.

Applying a higher torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.

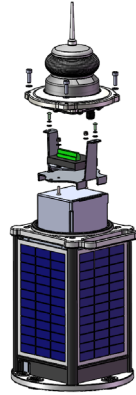
9. To test, place a dark cover (towel or jacket) on top of the light to activate sensor. The light will come on within thirty seconds.
10. Ensure that the unit is bolted to an even, flat surface.



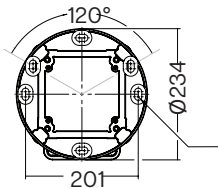
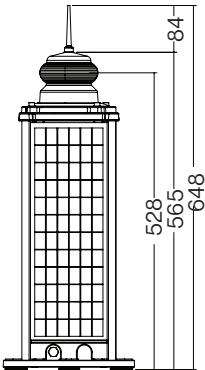
SL-C510
Compact
Chassis



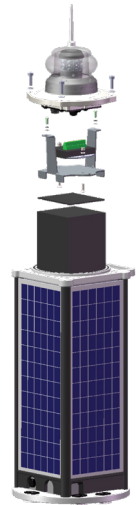
Slot 12.6 x 21.75
6 Locations



SL-C510
Extended
Chassis



Slot 12.6 x 21.75
6 Locations



Viewing Lantern Settings

The SL-C510 models are equipped with a very low power consumption OLED display, providing a quick and easy lantern status and diagnostic checks by maintenance staff.

To activate the OLED display simply touch the indicated location. Once activated, the OLED will display in sequence the following information:

- Product Version;
- Product Model;
- Lantern Operational Mode;
- Lantern Flash Character;
- Lantern Intensity;
- Battery Voltage;
- Lantern Status;
- Lantern Hibernation Status and settings;
- Lantern last accessed date;

The OLED system will continue to display the lantern settings/status in a sequential manner unless the Touch Pad is activated for a second time, this action will allow the OLED display to stop on the information showing at the Touch Action. To visualise the remaining information simply "Tap" the Pad again then the system will display the next set of information.

When the Touch Pad device is inactive for more than three minutes the OLED display will enter in sleep mode and can only display the lantern settings/status if the Pad device is activated again.


NOTE – The OLED display and Touch Pad components are designed to provide lantern settings/status readings only, the lantern programming can be achieved by one of the Sealite lantern programming methods, the information is available in this product manual.





Info Tab

The following summary indicates the data that can be visualized on the Lantern OLED Display.

Display	Description
Sealite  V1.08	Displays the manufacture revision number.
Operation Mode Standby	Indicates the lantern current operation mode: Standby - The lantern is configured in a minimum current state; Always on – The daylight sensor is disabled and lantern set to operate day/night time; Dusk till Dawn – The daylight sensor is monitored and the lantern will only operate at night time.
Flash Code:0F4 0.2 1.3	Indicates the lantern current Flash Code. This information provides Sealite's Flash Code in Hex decimal and the on/off flash duration. Please refer to the provided list of Flash Codes included in the appendix.
Range / Intensity High (100%)	Displays the lantern operating intensity in percentage. The SL-C510 can provide four different intensity levels in percentage or with a step size of 3.125% (or 1/32%) nautical miles when set by range. <ul style="list-style-type: none"> • Low (25%) • Medium (50%) • Medium High (75%) • High (100%)
Battery Voltage 12V	Indicates the lantern real-time battery voltage level.
Status OK	Displays the lantern current operating status. This include the information for: <ul style="list-style-type: none"> • Battery health conditions; • LED fault
Hibernation Disabled	Indicates if the Hibernation Mode is enabled or disabled. In the case of enabled the unit will indicate the hibernation start and finish dates (day/month).
Last Visit 10 MAR 2019	Indicates the last time the light has been accessed either via touch pad or SealitePro® App.
Test LED Test Off	On first touch test on, or when screen off, the screen will go into Test Mode for 5 seconds.

Programming the Lantern

SealitePro® Bluetooth® Guide

The SealitePro® application is used to communicate with Sealite lighting products that have Bluetooth® technology fitted. To note, only one device may be connected at any one time.

The Bluetooth® control offers the following main functionality:

- Lantern Information
- Lantern Status
- Solar Calculations
- Programming Options
- Power Monitoring
- Manufacturing Data
- Advanced Operations

The SealitePro® Application is available on both Android® and iOS devices. Most functions between platforms are identical and the majority of the screenshots in this manual were taken showing an iOS device screen. Where the Android® device differs, both visual options have been provided.



Bluetooth® Controller Functions

The Sealite SL-C510 Bluetooth® Control System accessible via the SealitePro® App is divided into seven simple sections as outlined below and displayed on the App home screen;

Lantern Information

- Lantern Identification
- Lantern Type
- Lantern Name
- Bluetooth Authentication
- Lantern Colour
- Lantern Peak Intensity
- Lantern Battery Option

Lantern Status

- Battery Voltage
- Status Flags
- Lantern Geolocation

Solar Calculations

- Solar Calculator Options
- Solar Charge
- Autonomy

Programming Options

- Operating Mode
- Flash Code
- Intensity
- Sync Offset
- GPS Mode
- Hibernation
- Lux Level
- GSM Power

Power Monitoring

- Load Current
- Load Current – Last Hour
- Load Current – Yesterday
- Charge Current
- Charge Current – Last Hour
- Charge Current - Yesterday

Manufacturing Data

- Hardware
- Board Serial Number
- Manufacture Date
- Software Version

Advanced Operations

- Test LED
- Perform Factory Reset



Accessing the SealitePro® App for the first time

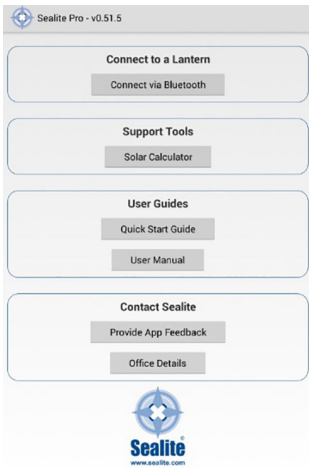
Opening the SealitePro® App on an Android® or iOS Device

Download the SealitePro® App from Google Play (search for “Sealite” in the store) on an Android® Tablet or Smartphone or via the App store on an iOS tablet or phone. Open the App to prompt the Sealite Bluetooth control system.



Start Menu

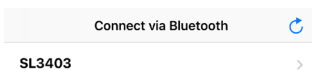
- Connect via Bluetooth - connect to a lantern.
 - Support Tools - Solar Calculator to conduct simulations based on lantern settings and locations.
NOTE – This feature provides lantern simulations only in regard to battery autonomy on solar radiation. Changes may be applied through “Connect via Bluetooth” option only.
 - User Guides – Quick Start Guide and User Manual
- Contact Sealite / Us – Provide product feedback and contact Sealite



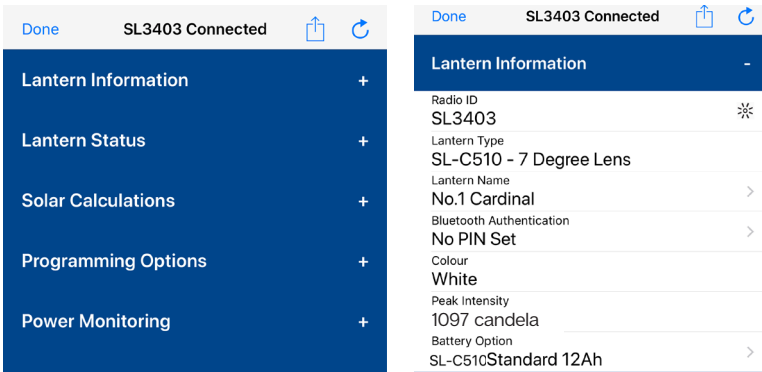
Scan for Lanterns

When the “Connect via Bluetooth” option is selected, the App will automatically scan for lanterns equipped with Bluetooth within range.

- Select the lantern which requires setting or verification.



Expand the “Lantern Information” section if collapsed.

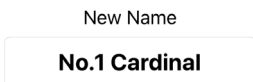
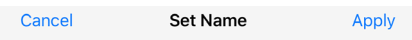


Identify Bluetooth Radio ID

When “Identify” on the Tablet or phone is selected, the connected lantern will flash quickly (10 times). For iOS, identify is represented by a flash / burst icon.

Set the Lantern Name

1. Press “Name” to change the lantern name. A user defined name, comprising up to 16 alpha- numeric characters (and -, \$, # @) can be typed into the dialogue box. It is recommended that the lantern be programmed with a unique name.
2. Press apply and then Set to confirm.

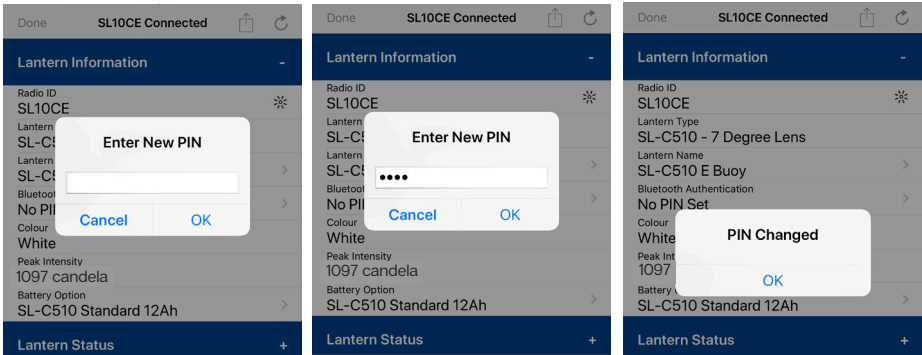




Create Security Access PIN

The factory default does not set the lantern with a Security PIN.

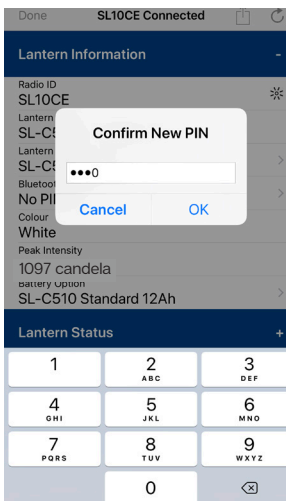
1. To set a PIN, select "Authentication Level" ("Bluetooth Authentication for iOS") then enter a New PIN and press "OK". A confirmation of the PIN will be prompted.
2. Re-enter the same PIN and press "OK".



Modify Current Security Access PIN

1. To set a new Security Access PIN select "Authentication Level" ("Bluetooth Authentication for iOS") and type the current Security PIN.
2. After validation the App will request for the current PIN to be re-entered. After confirmation enter the new Security PIN then confirm the new PIN.

Note - If the Security PIN is lost, see Password Reset Procedure. Also note that PIN '0000' is reserved and will result in the lantern having no PIN.



SealitePro® Password Reset Procedure

In the event where the password set is unknown the procedure below should be followed:

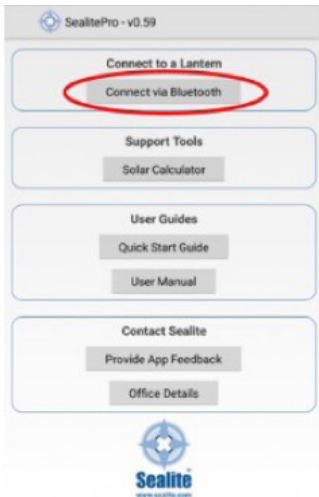
Step 1 – Disconnect the power supply from the light head:

- Remove the four socket-head screws on the top of the lens assembly and lift the SL-C510 (lantern head) assembly from the solar chassis.
- Disconnect the 4-Pin connector that joins the battery to the light head, then immediately re-connect the battery and the lantern again.

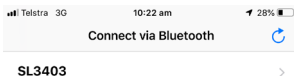
Step 2 – Connect to the lantern using the SealitePro®:

Once the light head and battery are re-connected ensure the following procedure is conducted within one minute. Otherwise the process at step 1 will need to be completed.

- Connect to a lantern by pressing “Connect via Bluetooth®”



- Select a lantern displayed on the “Connect via Bluetooth” screen.



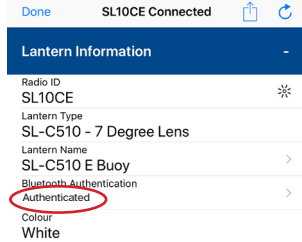
Where examples are identified side by side, the left is applicable to Android® devices and the right image to iOS devices.



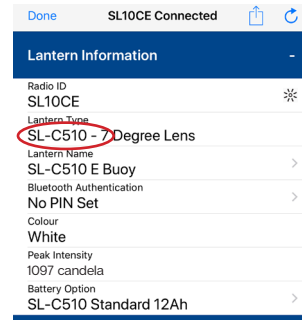
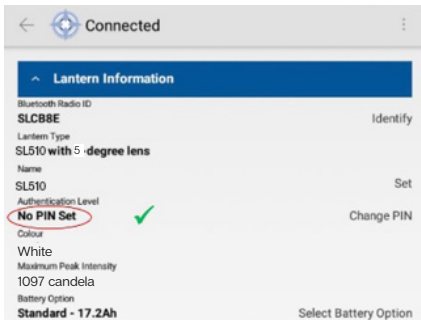
- (c). Expand the “Lantern Information” drop down menu then press select “Authentication Level” (“Bluetooth Authentication for iOS”).

NOTE – If “User Authenticated” under “Authentication Level” or Bluetooth Authentication appears the limited time that allows to modify the PIN has expired.

Therefore, start the process again at Step 1;



- (d). If “No PIN Set” appears under Authentication Level, please press Change PIN;



- (e). Enter a New PIN and press “OK”. A prompt to confirm PIN will appear. Re-enter the same PIN and press “OK”.
- (f). One the procedure is complete, ensure the 4 socket head screws are replaced to secure the light head and solar chassis.

• **Colour Menu**

Displays the lantern colour (White, Red, Green, Blue or Yellow)

• **Peak Intensity Menu**

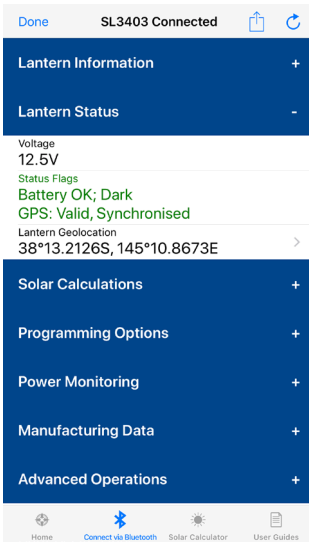
Displays the Lantern Maximum Intensity in candelas (cd) based on the LED Colour.

• **Battery Option**

This section displays the battery size capacity in Ampere hour (Ah) and is configurable.

Lantern Status

From the “Lantern Status” section the user can verify the current lantern status



- **Voltage**

The battery health status.

- **Status**

Displays the battery health status, the current light sensor state and if the GPS is enabled, synchronised or off station. Any warning states will cause the status to be shown in amber or red.

- **Lantern Geolocation**

Displays the lantern coordinates and allows the location to be plotted on a map.



Solar Calculations

This function estimates the lantern autonomy based on the lanterns current settings and geolocation.

• Solar Calculator Options

The SL-C510 has options to be fitted with SATCOM and GSM modules to allow multiple lanterns synchronisation and monitoring. The SealitePro® App offers the user the option to modify the GPS and GSM by enabling or disabling the operation. In addition, it offers different levels of transmissivity conditions for accurate solar calculations.

Cancel **Calculation Options** Apply

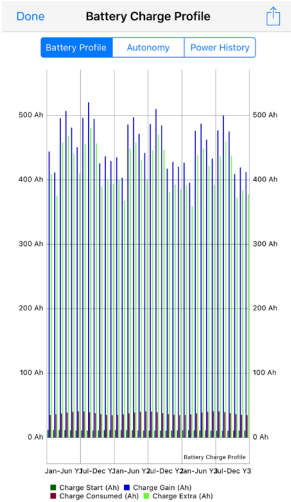
GPS Enabled

GSM Installed

Transmissivity $\frac{0.68}{0.7411}$
0.85

• Solar Charge

This function estimates whether the collected solar charge is sufficient to replenish battery consumption and will indicate if the unit is viable for the selected location.

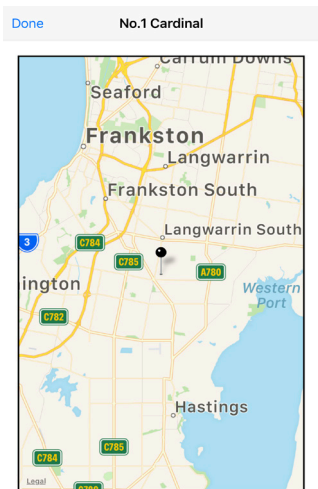
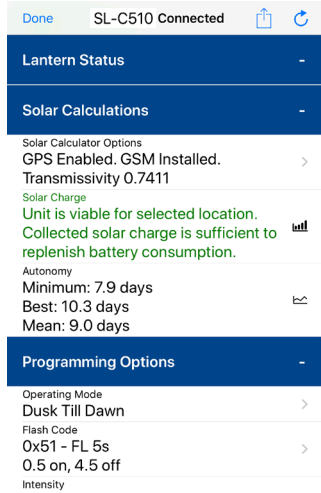


• **Autonomy**

This function estimates the lantern autonomy based on the lantern settings and geolocation.

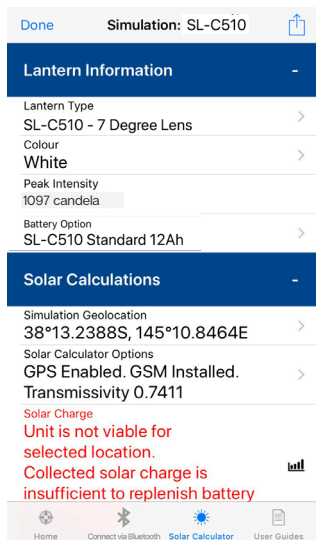
• **Option 1**

Use the current GPS location to establish the lantern autonomy.



• **Option 2**

An alternate method for setting the calculator is by using the “Solar calculator” function. Select your product from the option(s) available, then select “Simulation Geolocation”.





Set Autonomy Location - Select a location globally to estimate the lantern autonomy if installed at that location

Solar Calculations

Simulation Geolocation
38°13.2136S, 145°10.8478E

Solar Calculator Options
GPS Enabled. GSM Installed.
Transmissivity 0.7411


Solar Charge
Unit is not viable for selected location.
Collected solar charge is insufficient to replenish battery

Cancel **Set Autonomy Location** Apply

Armenia Maryborough

Australia **Melbourne**

Austria Melton



Use GPS

The autonomy will be shown in amber or red if the configuration is not recommended.

Programming Options

Operating Mode:

To change the Operating Mode, press the Operating Mode field and then select one of three available options:

- **Standby** - The lantern is configured in a minimum current state in which the LEDs are always off and the internal GPS is disabled.
- **Always on** – The daylight sensor is disabled, and the lantern operates according to the set flash character and intensity levels.
- **Dusk till Dawn** – The daylight sensor is monitored, and the lantern will only operate at night time.

Once the Operating Mode is selected press "Set / Apply" to confirm the change. As factory default the lantern is always set to Dusk till Dawn mode.





Flash Code

Sealite marine lanterns may be set to any of the 256 IALA recommended flash characters which are user-adjustable on site.

SEALITE® code reference is listed by the number of flashes. For the latest version of this document visit www.sealite.com or email info@sealite.com

Symbols

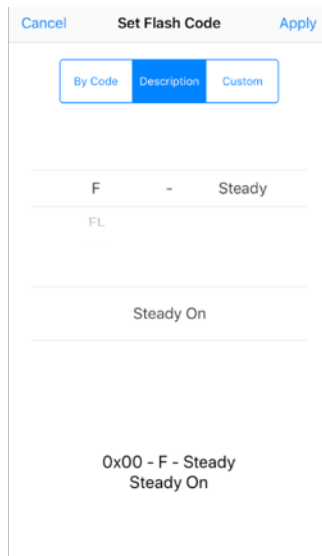
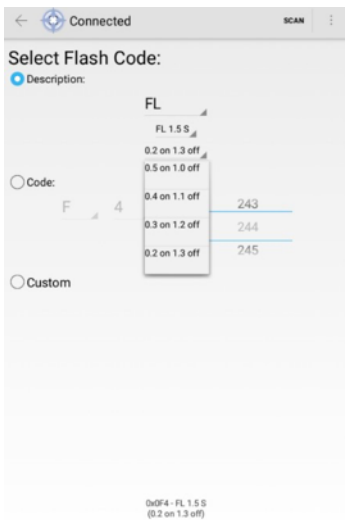
- FL** Flash followed by number Eg. FL 1 S, one flash every second
- F** Fixed
- Q** Quick Flash
- VQ** Very Quick Flash
- OC** Occulting; greater period on than off
- ISO** Isophase; equal period on and off
- LFL** Long Flash Long
- MO** Morse code () contains letter

To start the Flash Code settings press on the Flash Code field:

There are three ways to modify the lantern Flash Code:

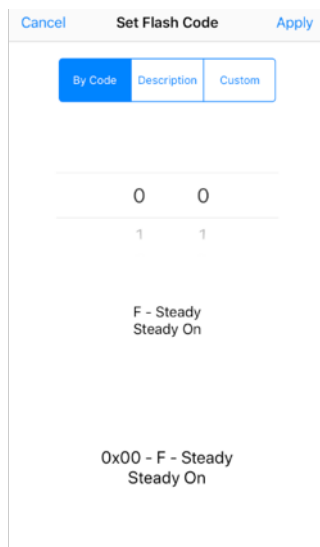
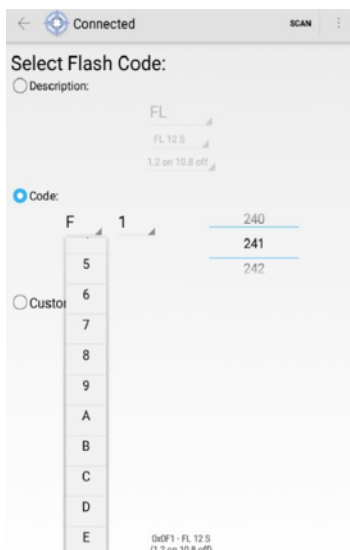
1. **Description:** Modify the Flash Code by selecting the type and length (on/off) of the flash. Once the Flash Code is established press “Set / Apply” to confirm the change.

Please Note – The number of flashing combinations are limited, for more information please check the Sealite Flash Code table provided in the Appendix Section.

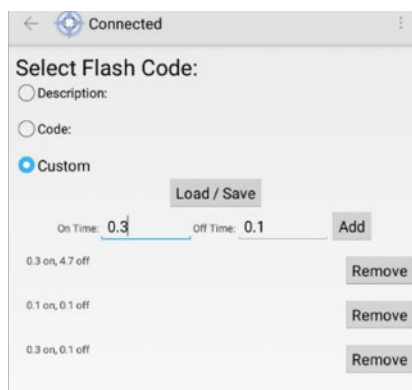
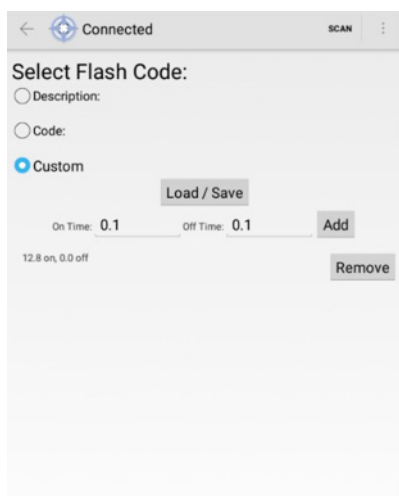


2. **Code** – Select the Flash Code from the Sealite Flash Code table provided in the Appendix section. Once the Flash Code is established press “Set / Apply” to confirm the change.

Please Note – The number of flashing combinations are limited. For more information please check the Sealite Flash Code table.



3. **Custom** – Create sequences of custom Flash Codes by nominating the on/off times. Once the Flash Code is established press “Set/Apply” to confirm the change. To add multiple flashing configurations, press “add” for each configuration.





Cancel **Set Flash Code** Apply

By Code	Description	Custom
Load		Save
On Time: 0.3	Off Time: 0.1	Add
<input type="button" value="-"/> <input type="button" value="+"/>	<input type="button" value="-"/> <input type="button" value="+"/>	
<input type="radio"/> Steady On x1	<input type="button" value="-"/> <input type="button" value="+"/>	<input type="checkbox"/>

Custom
Steady On

Cancel **Set Flash Code** Apply

By Code	Description	Custom
Load		Save
On Time: 0.3	Off Time: 0.1	Add
<input type="button" value="-"/> <input type="button" value="+"/>	<input type="button" value="-"/> <input type="button" value="+"/>	
<input type="radio"/> 0.3 on, 0.1 off x1	<input type="button" value="-"/> <input type="button" value="+"/>	<input type="checkbox"/>
<input type="radio"/> 0.3 on, 0.1 off x1	<input type="button" value="-"/> <input type="button" value="+"/>	<input type="checkbox"/>
<input type="radio"/> 0.3 on, 0.1 off x1	<input type="button" value="-"/> <input type="button" value="+"/>	<input type="checkbox"/>

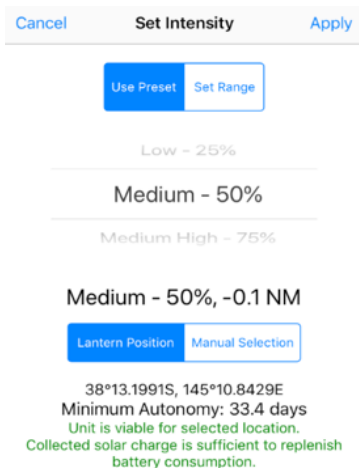
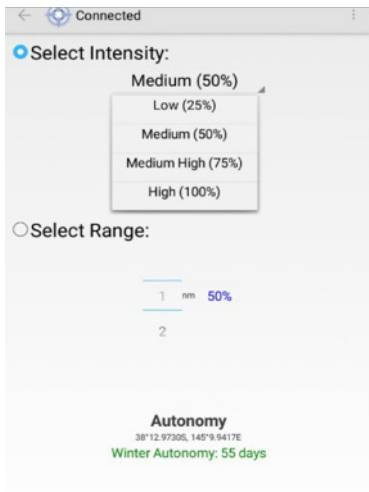
Custom
0.3 on, 0.1 off x3

Intensity

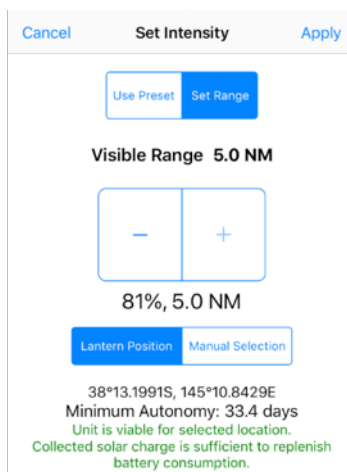
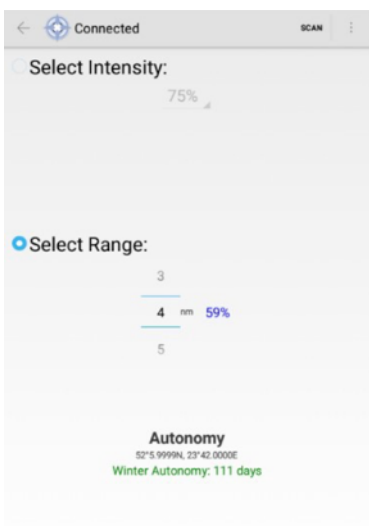
The lantern intensity level can be set by either defining the operating range of the lantern (in nautical miles) or by entering the available percentage intensity level. When Schmidt Clausen is applied, the lantern will automatically adjust the intensity level based on the entered range and Flash Code setting. The intensity level is automatically adjusted each time a new range is set.

NOTE: This does not apply for changing Flash Code - the user must re-set the intensity.

Select Intensity – Choose one of four intensity values - 25%, 50%, 75% or 100%.



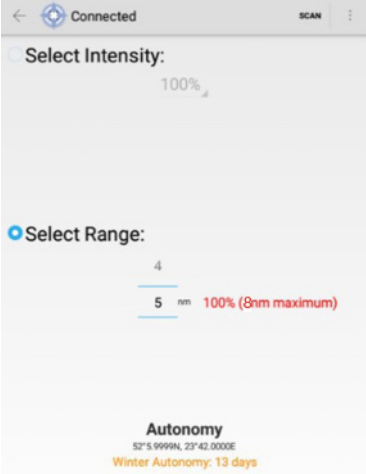
Select Intensity – Choose one of Nautical Miles ranges available.





NOTE – If an intensity level is selected that is beyond the specification of the lantern, the entered figure will be displayed in red, with the lantern automatically configuring to the maximum possible of 100%.

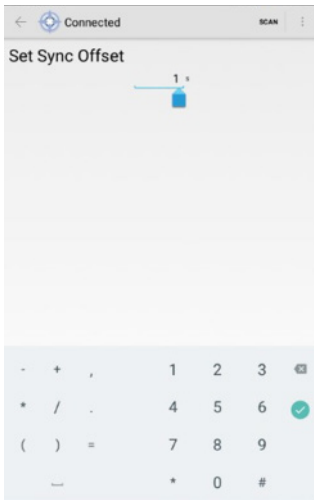
In addition, once the intensity is selected the winter autonomy will be recalculated.



Sync Offset

This panel is used to set a Flash Code delay. The built-in GPS receiver and advanced software of the Sealite synchronised lanterns allow for the adoption of Sync Offset channel marking – a unique system that cascades the flash synchronisation of channel lanterns in a uni or bi-directional flash pattern. By default, this figure is set to zero.

Press Sync Offset type a value in seconds and then press “Set / Apply” to confirm the change.





GPS Mode

The lanterns come fitted with a GPS module, and provide the user with the ability to install independently operating lanterns that all flash in Synchronisation. No additional power supplies, aerials or control systems are required and with its microprocessor-based system, the GPS is specifically designed to provide maximum reliability and performance over a wide range of environmental conditions.

On the SealitePro® App the user has the option to modify the GPS mode by selecting to enable or disable the GPS operation.



Cancel Set GPS Mode Apply

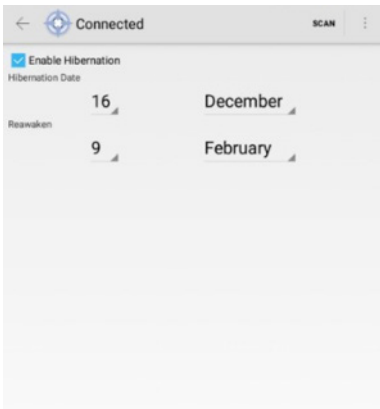
Off

On

Hibernation

Hibernation Mode maximizes conservation of the battery power by disabling the light (will not activate at night) and shutting off the GPS receiver to rely on the internal clock for date checking.

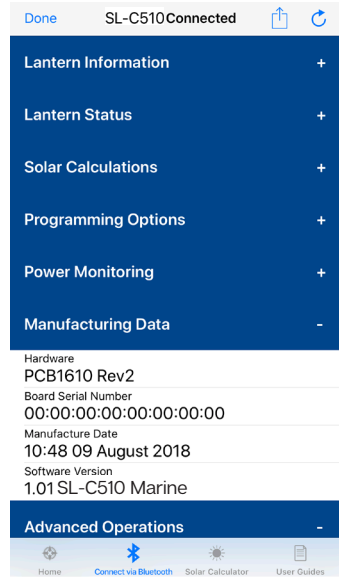
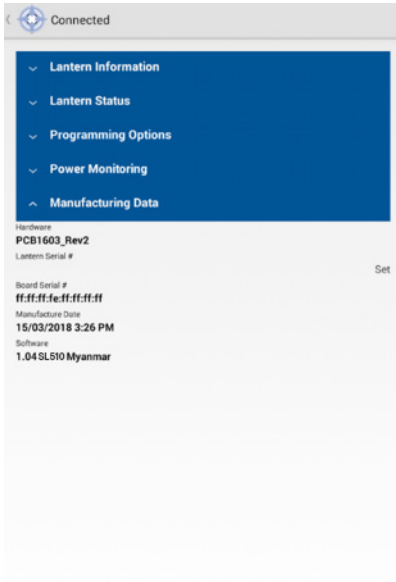
Hibernation Mode can be set by programming a start date and end date via the SealitePro® To enable the Hibernation Mode, tick on the top left box then select the Hibernation start date and Reawaken date. Press "Set / Apply" to confirm the settings.





Manufacturing Data

When connected via Bluetooth, data about the lantern hardware will appear on the “Manufacturing Data” tab. From this drop-down tab the user will be able to verify the information that identifies the lantern’s internal electronic hardware and firmware versions. Moreover, the Lantern Printed Circuit Board Serial number is identified.



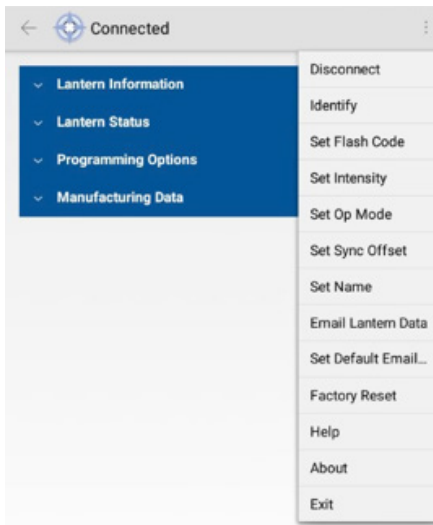
Let's try a practical example

If Bluetooth connection is established, data about the lantern battery charge and load current will appear on the "Power Monitoring" tab. From this drop-down tab the user will be able to verify the amount of battery charge that the lantern was able to capture in the previous 24 hours. In addition, the information of load current through the system can be monitored.

Quick Access Tab

The SealitePro® App also allows a quick access tab offering the user access to the main setting functions of the lantern, applicable to Android® devices only.

By touching the menu button, a drop down menu will pop showing the setting functions available.



In addition, the quick access tab offers other additional functions:

- **Disconnect:**

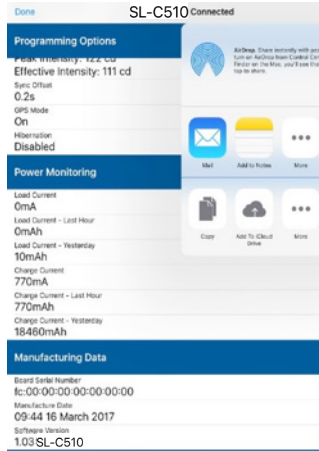
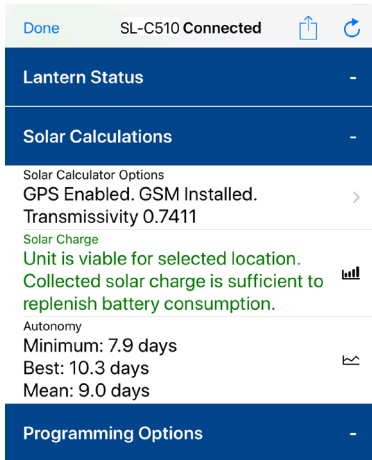
By touching "Disconnect" it will automatically disconnect the control device from the lantern.

- **Email Lantern Data:**

This function allows to send the lantern configuration and status via email.

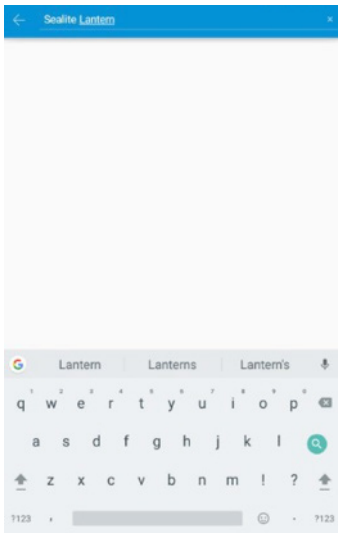
- **Email Lantern Data:**

This function allows to send the lantern configuration and status via email.



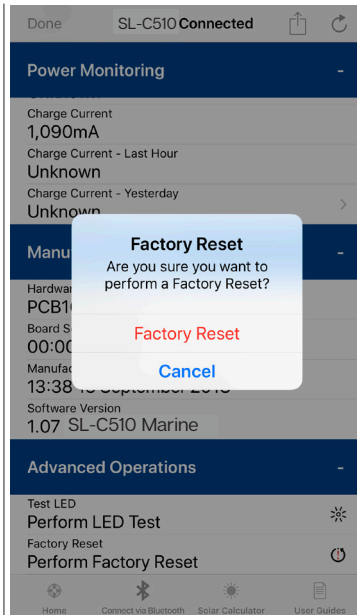
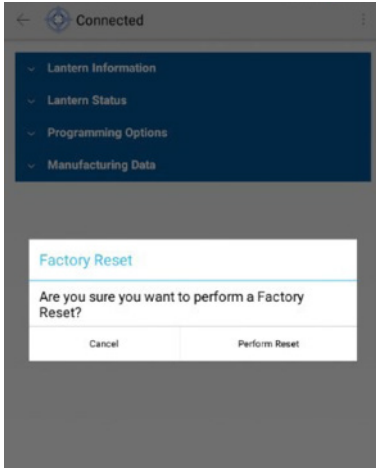
• **Set Default Email* Note Android® only**

This option allows to search for an existing contact on the device to use as the default recipient of configuration and status emails.



• Factory Reset:

This feature will reset automatically all previously lantern settings to a Factory Reset. If the option is selected, a confirmation message will display to confirm. Select "Perform Reset" to confirm the reset. Please Note – Applying the Factory Reset will also reset the Security Pin if one was set by the user.





SealitePro[®] Troubleshooting

Questions

Answer

I purchased a lantern fitted with a GPS for synchronisation. However, it appears not to work.

If the GPS is not functioning ensure the GPS is enabled. Select "Programming Options" then check under GPS mode. If "off" appears, the GPS is disabled. Tap on "Set", then select "Normal" to enable the GPS.

Can you use the Solar Calculator under "Support Tool" to verify a Lantern Autonomy then set the lantern configuration from there?

No. The actual lantern settings can only be performed through "Connect via Bluetooth". Any solar calculation simulation performed under support tools, can be reflected on the actual lantern settings.

Do I need to create a PIN when I first start using the lantern?

No. The lantern will operate without setting a Security PIN. However, it is highly recommended by Sealite for customers to set a unique PIN from the moment the lantern starts to operate.

When I try to download SealitePro[®] from Google Play, I see the message "Device not compatible".

SealitePro[®] may not be installed on an Android[®] device running Ice Cream Sandwich (version 4.0.4) or lower. The Google Play store will stop you from attempting to install SealitePro[®] if your device is incompatible. SealitePro[®] requires a device running Android[®] KitKat (version 4.4) to communicate with Sealite Bluetooth lanterns. SealitePro[®] may be installed on devices running Android[®] Jelly Bean (version 4.1-4.3) however, the 'Connect via Bluetooth' option will not be available.

I have installed SealitePro[®] but the 'Connect via Bluetooth' option is disabled.

SealitePro[®] requires a device equipped with Bluetooth 4.0 or above. If no Bluetooth device is detected, the 'Connect via Bluetooth' option will be disabled. SealitePro[®] also requires a device running Android[®] KitKat (version 4.4) to communicate with Sealite Bluetooth lanterns. If SealitePro[®] is installed on a device running Android[®] Jelly Bean (version 4.1-4.3) then the 'Connect via Bluetooth' option will not be available.

When I start SealitePro[®], I see the message "Bluetooth Permissions Denied. Please enable all permissions. Go to Settings?"

SealitePro[®] requires permission from Android[®] to access various features of the mobile device, such as use of the Bluetooth module. Some versions of Android[®] enforce these permissions to be granted when SealitePro[®] is installed. Later versions require the user to manually grant these permissions. If the message above is shown, then the latter scenario has occurred. Please answer 'Yes' to the prompt and SealitePro[®] will attempt to open the 'Settings' page. A list of installed Apps should appear. Find SealitePro[®] in the list and press it. At the bottom of the screen should be an 'App permissions' section. Click on this and enable all permissions presented. Then press the 'Back' button until SealitePro[®] reappears.

If the above process does not open the 'Permissions' settings correctly, this will have to be performed manually. Return to the device home screen, then open the 'Settings' App and select 'Installed Apps'. Select SealitePro[®] from the list and follow the instructions above.

Please consult your device user guide to find out how to access and grant App permissions if the settings cannot be found.

Questions

Answer

When I press 'Connect via Bluetooth', I see the message 'An App/ SealitePro® wants to turn on Bluetooth'.

Connecting to a lantern via Bluetooth requires that the mobile device has Bluetooth turned on. If this message appears it is because the device's Bluetooth module is turned off. Press 'Allow' and SealitePro® will attempt to turn the Bluetooth device on. If required, you may turn Bluetooth off when finished through the device's 'Settings' App. If you press 'Deny' then connection will be cancelled.

When I select 'Connect via Bluetooth', the device performs a scan but tells me that no lanterns were found.

Several conditions may occur that will prevent lanterns from being discovered.

1. Verify that a Bluetooth-equipped Sealite lantern is nearby and powered on.
2. Verify that no other mobile device is connected to the lantern via Bluetooth. Bluetooth supports only one connection at a time, therefore if another device is connected it must be disconnected before the lantern appears in a scan result.
3. Turn the Bluetooth feature of the mobile device off and on again. This may be performed through the Android® Notification Bar of some devices or through the Settings App. See your device user manual for full instructions.
4. Some Android® devices require Location Services to be enabled before they will 'see' Bluetooth lanterns. Location Services may be enabled through the Android® Notification Bar of some devices or through the Settings App. See your device user manual for full instructions.
5. Turn the lantern off and then on again.
6. Ensure your device is within its Bluetooth range.

If the problem persists, please contact Sealite for assistance.

I have connected to a lantern via Bluetooth, but the message "Lantern Comms Failure. Retrying..." keeps appearing.

Try disconnecting from the lantern, then rescanning and connecting. It is possible that the lantern is at the edge of the Bluetooth range, or maybe the data connection is unreliable. If the problem persists, please contact Sealite for assistance.



Optional IR Remote Control

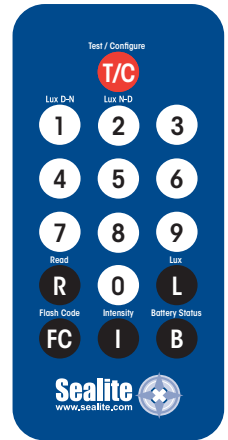
The IR programmer is used to communicate with Sealite lighting products that have an IR sensor fitted. The remote control is used for the following functions:

- **Flash Code:** Read the current flash code, configure a new flash code.
- **Lamp Intensity:** Read the current lamp intensity, configure a new intensity level.
- **Ambient Light Thresholds:** Read the current light thresholds, configure new ambient light thresholds.
- **Perform a battery health check.**

On receiving a valid key signal from the IR Programmer, the light will flash once.

The user should wait until the light responds to each keypress before pressing another key. If there is no response to the keypress after 3 seconds, it has not been detected by the light and the key can be pressed again.

If an invalid key is detected, the light will flash quickly 5 times. In this case, the command will have to be restarted.



IR Controller Functions

Test Mode / Configure



Pressing the T/C button up to 5 seconds places the light in Test Mode. The light will flash once in response to the T/C button being pressed and then turn off.

Normal Operation

The light will return to normal operation once it has not detected a valid key press for 30 seconds. The light will flash once to indicate it is returning to normal operation.

Read

Pressing the Read followed by one of the configuration keys shall cause the light to flash the configured value.

Example Key Sequences:

The light flashes the 'IR Remote' number belonging to the currently set Flash Code. Refer to the Flash Code tables to match the 'IR Remote' flash number to the Flash Code.

The light flashes the current intensity setting: 1 flash for 25%, 2 for 50%, 3 for 75% and 4 for 100%.

The light flashes the current battery status.

The light flashes the sunset level in Lux, followed by a 2 second gap, followed by the sunrise level. Levels are in the range of 1 to 5.

Flash Code



This key sets the Flash Code on the light.



Example Key sequence:

This sets the Flash Code to value 123. The light responds by flashing the Flash Code value.



Flash Code Numbers

The lamp flashes numbers as follows: Hundreds, Tens, Ones. A value of 125 will be flashed as: 1 flash, followed by a delay, 2 flashes, followed by a delay, 5 flashes.

The flash for number 0 is one long flash.

For example if the current Flash Code is set to 51 via the AB switches, the lamp will flash number 081. For a Flash Code set to 01, the lamp will flash 001.

Intensity



This function sets the light intensity. Valid intensity values are 1 for 25%, 2 for 50%, 3 for 75% and 4 for 100%.

Example Key sequence:



This sets the light intensity to 25%.

Battery Status



This function reads the battery status. The response from the light is High Voltage: 4 flashes, Good Voltage: 3 flashes, Low Voltage 2 flashes, Cutoff Voltage or below: 1 flash.



Lux



This key sets the ambient light threshold levels.
The format is where 'x' is the desired setting from the table below.



There are 5 programmable lux levels which are set together for the sunset and sunrise transitions.

Level	Sunset (Dusk)	Sunrise (Dawn)
1	65	100
2*	100	150
3	150	240
4	240	370
5	370	600
6	250	320
* Default / Factory Preset		

Example key sequence:

Assume the current Lux settings are at the factory preset values of 2.



This sets the ambient light level to be lower than the default 100 lux. The light will turn on when its surroundings are darker.

The light responds by acknowledgement with a long flash.



Error / Acknowledge Indication

If the key sequence is invalid, or an out of bounds value is attempted to be set, the light flashes 5 times for 1 second. (The command then needs to be sent from the start.)

Example key sequence: (Set the intensity level to 5 – undefined.)



The light flashes 5 times for 1 second.

When a key sequence has been entered successfully the light will respond acknowledgement with a long 1 second flash.

Configuration Settings

The intensity and Flash Codes can be changed using the switches on the lamp circuit board or with the IR Remote Control. The lamp intensity and Flash Code settings are set to the last detected change, carried out with the IR Remote Control or by changing the switch positions.

· Example #1: If the intensity is set at 100% with the intensity switches and is then set to 50% using the IR Remote Control, the intensity setting will change to 50%. If the intensity is then set to 75% using the switches, the new intensity value will be 75%.

In order to change intensity settings using the IR Remoter Control, the lamp must be powered. The lamp can detect a change in switch settings if they are changed while the light is powered down.

· Example #2: The Flash Code is set according to the switch settings: A=5, B = 1. The operator changes the Flash Code to 65 (A=4, B=1) using the IR Remote Control. The new Flash Code is now configured to A=4, B=1. The lamp is powered down and the operator changes the flash code switches to A=3, B=1 and powers on the light. The new Flash Code is now A=3, B=1.

If the Flash Code is read from the light using the IR Remote Control, the lamp will flash 49 which is the corresponding number for switches A=3, B=1.

Use the IR Remote Control to read the current lamp intensity setting and Flash Code.

Operational Mode (Advanced users)

The lantern has three modes of operation: Always on, Standby Mode and Dusk-to-Dawn mode. These modes can be selected either via the IR Remote Control or via the GSM module (if fitted).

- **In Always On mode**, the daylight sensor is disabled, and the lantern will remain ON.
- **In Standby mode**, the lantern is turned off and the daylight sensor is disabled. This mode does not affect the operation of the GSM module.
- **In Dusk-to-Dawn**, the daylight sensor is enabled.

B **I** **1** **T/C** Always on mode

B **I** **2** **T/C** Standby mode

B **I** **3** **T/C** Dusk-to Dawn mode

Hibernation Mode (Advanced users)

L **I**

For situations where the lantern is put into storage for a known period, the IR Remote Control can be used to configure the lantern into Hibernation Mode for a user programmable date range.

Hibernation Mode maximises conservation of the battery power by disabling the light (will not activate at night) and shutting off the GPS receiver to rely on the internal clock for date checking. The IR sensor is still monitored in Hibernation Mode. Power consumption is only improved by physically disconnecting the battery supply.

Hibernation Mode is defined by a start date and end date that are programmed into the lantern via the IR Remote Control.

Using the IR Remote Control

The lantern must be in Test Mode prior to pressing any of the following key sequences. However, the lantern will return to Normal Operation if it has not detected a valid key press for a period of 15 seconds. When the lantern exits from Test Mode it will either enter Dusk to Dawn mode, Hibernation Mode, or Storage Mode, if enabled.



Store Hibernation Mode Date Range

The following details the key press sequence that defines the start and end dates of Hibernation Mode: where **ddmm** is the numerical representation of the month (01=January, 08=August) of the start date,



and **DDMM** is the numerical representation of the end date.

E.g 9th of December is represented by the number sequence 0912. The lantern will acknowledge and respond by flashing a long flash. This operation only stores the start & end dates into the lantern's memory and Hibernation Mode still must be enabled to commence its operation.

Enable Hibernation Mode

Pressing the following key sequence will enable (turn on) Hibernation Mode:

The lantern will respond with a single flash.



The lantern will take a new GPS reading, determine the calendar month, and then enter Hibernation Mode and depending on the current calendar month setting, will either Hibernate or enter Dusk-to Dawn mode.

By default, Hibernation Mode is disabled. Note you can only use this command once a valid hibernation start & end date has been stored in the lantern.

Disable Hibernation / Mode

Pressing the following key sequence will disable (turn off) both Hibernation Mode and Seasonal Hibernation:



The lantern will respond with a single long flash.

Momentarily Wake Up from Hibernation Mode



Pressing the T/C button will wake up the lantern, at which point the lantern will remain awake for a further 15 seconds to process other commands from the IR Controller. If no IR commands are received for a period of 15 seconds, the lantern will return to Hibernation Mode.

Read Stored Hibernation Dates

By pressing the following key sequence the lantern will respond with the stored start and end dates for Hibernation:



Read Hibernation

By pressing the following key sequence the lantern will respond with status of Hibernation Mode.



Where:

- A single long flash = Hibernation Mode is Enabled
- Two quick flashes = Hibernation Mode is Disabled.

User Case Example: Configuring the lantern for Hibernation

In this example, we want the lantern to hibernate each year from Dec 10th, through to February 15th, and the lantern is located inside a storage warehouse.

The required key sequence is:

Command	IR Controller Key Press
Store the Hibernation Date Range	L I 1 0 1 2 1 5 0 2 T/C
Enable Hibernation	L I 1 T/C

Storage Mode (Advanced users)

For situations where the lantern is put into storage but with access to daylight, the IR Remote Control can be used to configure the lantern into Storage Mode.

This mode manually forces the lantern to turn off, but with access to daylight it will still charge battery pack. However the lantern will not keep track of the date.

In Storage Mode, the GPS is disabled however the lantern will still respond to IR commands.

The lantern will automatically enter Storage Mode, if it is hibernating and it has not detected any light for 20 hours.

Enter Storage Mode

By pressing the following key sequence the lantern will enter Storage Mode:



The lantern will leave storage mode when exposed to daylight or if the power switch is turned OFF and ON again.



IR Controller Security PIN

The IR Controller allows to create a four-digit numbers security access PIN, this will prevent accessing or modifying the SL-510 settings. Once the Security PIN is set this it will lock the lantern immediately.

In order to access the light settings, the Unlock PIN command needs to be used, this will allow access to the light settings for 30 minutes then the light will re-lock again. If the entered Security PIN does not match, the lantern will respond with 5 quick flashes indicating the PIN is incorrect.

Pressing the following key sequence will set the light Security PIN:



Where: X = 0 to 9-digit numbers



Pressing the following key sequence will unlock the light for 30 minutes:

Where: X = 0 to 9-digit numbers

Clear or set a new IR Security PIN



To clear the security access PIN the light requires to be switched off then on. The action will allow to enter the following key commands to clear the existing Security PIN:

Once the security access PIN is cleared a new PIN can be entered using the Security PIN set command.

NOTE: The above key command requires to be entered within four minutes, once the time elapses the light will PIN lock again.

GPS Synchronisation

The SL-C510 lanterns are fitted with GPS and provide the user with the ability to install independently operating lanterns that all flash in synchronisation.

No additional power supplies, aerials or control systems are required, and with its microprocessor-based system, the GPS option is specifically designed to provide maximum reliability and performance over a wide range of environmental conditions.

Operating Principle

Each light operates independently and requires no operator intervention. A minimum of 4 satellites need to be in view for the built-in GPS receiver to collect time data. At dusk, the light sensor will turn the light on. If time data is available, the light will come on synchronised to every other light with the same selected flash code.

Synchronisation is achieved using an internal algorithm based on the highly accurate time base and time data received from the satellites. The satellite data is provided from several earth stations using atomic clocks as the time base. Continuous self-checking ensures that the light will continue to run in synchronisation.

Light Activation

At power-up the microprocessor checks that the internal GPS module is programmed correctly and can provide valid time base and time data.

Once outside with a clear view of the sky, valid data should become available within 20 minutes.

Daylight Operation

During daylight hours the microprocessor is in idle mode to reduce power consumption. Time data continues to be updated once per second. The microprocessor will automatically exit the idle mode as soon as dark conditions are detected.

Dark Operation

When dark conditions are detected the light:

- Checks for valid time data and is turned on after a delay based on the current time and the length of the selected flash code;
- If valid time data is not detected the light will turn on after approximately 10 seconds. This light will not be synchronised;
- If the light turns on unsynchronised it will continually check for valid time data. Once valid data is found the light will automatically synchronise.

Note: Lights will not synchronise if they are set to different flash codes.



Optional Iridium® Satellite Monitoring & Control System

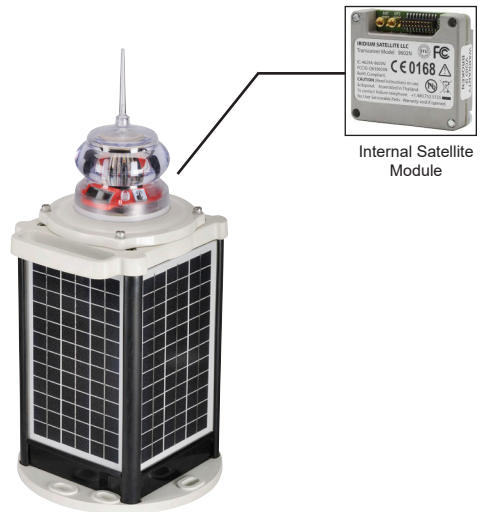
The SL-C510 may also be fitted with Satellite Monitoring and Control – enabling users to access real-time diagnostics data and change lantern settings via your portable device or desktop. The Star2M Portal can also be configured to send out alarm SMS text messages to designated cellular telephone numbers. The user can also have alarms and reports sent to designated email addresses.

Please contact Sealite for further information regarding satellite monitoring and control via the Star2M Portal. Alternatively, visit the Star2M website at star2m.com.

FEATURES

- Monitor lantern status using any cell-phone, email address or Sealite's secure web portal, Star2M;
- Reports alarm conditions to designated cell-phone numbers (SMS text) & email addresses or within the Star2M portal;
- View daily/monthly/yearly lantern diagnostics or receive the information via email;
- Enables proactive maintenance scheduling;
- Lantern only responds to authorised users;
- Low cost monitoring;
- Worldwide functionality.

For details on the advanced functionality that can be achieved via Sealite's satellite enabled marine lanterns, visit star2m.com or speak with your Sealite representative.



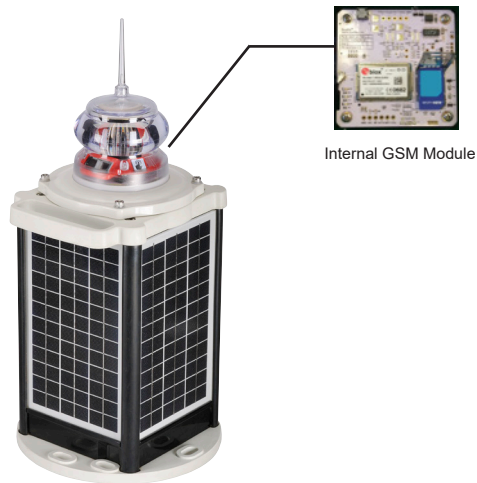
SL-C510 model with Optional Satellite Module

Optional GSM Monitoring & Control System

The SL-C510 may also be fitted with GSM Cell-Phone Monitoring and Control – enabling users to access real-time diagnostics data and change lantern settings via cell-phone. The system can also be configured to send out alarm SMS text messages to designated cellular telephone numbers. The user can also have alarms and reports sent to designated email addresses. Please contact Sealite for further information and instructions.

FEATURES

- Monitor lantern status using any cell-phone, email address or Sealite's secure web portal;
- Reports alarm conditions to designated cell-phone numbers (SMS text) & email addresses;
- View daily/monthly/yearly lantern diagnostics or receive the information via email;
- Enables proactive maintenance scheduling;
- Lantern only responds to authorised users;
- Low cost monitoring;
- Worldwide functionality.



SL-C510 model with Optional GSM Module



Lantern Status

Two status LED's on the main printed circuit board provide the operator with an indication of the lantern status. There is one red and one yellow status LED. The red status LED is used to indicate the health of the lantern's power system. The yellow status LED is used to indicate the operational status of the lantern. These indicator LED's can be viewed at the base of the lens.

All Sealite boards are fitted with two Indicator LED's. Use the table below to help determine operational status.

Yellow LED	Lantern Status	Lantern	Comment
OFF	Normal	OFF	Lantern is in Daylight and in Dusk till Dawn mode or in Standby Mode
Flashing ON 0.15 seconds OFF 0.15 seconds	Normal	OFF	Light is activating and will turn on after detecting 30 seconds of continuous darkness.
Flashing 2 x quick flashes every 2 seconds (Heartbeat)	Normal	ON	Lantern is in Normal operating condition. It is not connected to any GPS synchronisation.
Flashing ON 1.5 seconds OFF 1.5 seconds	Normal	ON	Normal operating condition. Lantern is synchronised to GPS-enabled lanterns.
Flashing 1 x quick flash every 2 seconds	Normal	ON	Lantern is 're-syncing' with GPS. The lantern re-sync's with the GPS every 15 minutes.
Flashing 2 x quick flashes every 11 seconds	Normal	ON	Lantern is a Hard Wire Synchronisation Slave.

Red LED	Lantern Status	Lantern	Comment
OFF	Normal	ON	Normal Battery Voltage
Flashing once every 1.6 seconds	Battery Voltage is 12 – 12.5V	ON	Battery Voltage is between 12 – 12.5V
Flashing twice every 2 seconds	Battery Voltage is 11.5 – 12V	ON	Battery Voltage is between 11.5 – 12V
Flashing 3 x times every 2 seconds	Battery Voltage is 10.0 – 11.5V	ON	Battery Voltage is between 10.0 – 11.5V
Flashing 4 x times every 2.5 seconds	Battery Voltage is less than 10.0V	ON	Battery Voltage is at less than 10.0V
Fixed-on	Flat Battery (<10V)	OFF	Flat Battery cut-off is now operational and the lantern will be off. Battery must receive charge (above 12V) and lantern must see daylight for at least 1 minute before resuming normal operation.
Flashing ON 1.5 seconds OFF 1.5 seconds	Battery Voltage is above 13.5V	ON	Battery Voltage is above 13.5V. this may indicate a problem with the solar regulator.

Lantern Thermal Management

The lantern incorporates a dynamic intensity module as part of the thermal management system that ensures it operates within the thermal design window. In practice the thermal management system limits the lanterns average power consumption by automatically adjusting the intensity to prevent overheating.

The Thermal Management system does so by multiplying the flash character duty cycle with the lantern intensity and compares this figure to the Thermal Limit. All the SL-C510 models have the same Thermal limits for all colours. If the figure (called the “multiplier”) is greater than the Thermal Limit the intensity is then adjusted to ensure the Thermal Limit is not exceeded.

This Thermal Limit will come into effect if you select a flash characteristic with a heavy-duty cycle and set a very high intensity. Under these conditions the lantern will automatically reduce its intensity so that it is operating within the thermal design window. Note, this intensity limit will not be reached for the clear majority of applications.

Lantern Data

The following tables detail the electrical power consumption of the SL-C510-5D and 10D lanterns:

SL-C510-5D

	Red	Green	White	Yellow	Blue
Peak Power (W)	10.6	15	13.1	13.1	13.4
Max power at Thermal Limit (%)	40.6	40.6	40.6	40.6	40.6
Max power at Thermal Limit Multiplier* (W)	4.3	6.1	5.3	5.3	5.4
Peak Intensity (cd)	620	690	1150	570	310

SL-C510-10D

	Red	Green	White	Yellow	Blue
Peak Power (W)	10.6	15	13.1	13.1	13.4
Max power at Thermal Limit (%)	40.6	40.6	40.6	40.6	40.6
Max power at Thermal Limit Multiplier* (W)	4.3	6.1	5.3	5.3	5.4
Peak Intensity (cd)	460	440	650	320	200

* See Thermal Limit Operation for full description.



Thermal Limit Operation

Automatically the lantern calculates the MULTIPLIER and compares it to the maximum power Thermal Limit. If the calculated value exceeds maximum power thermal limit, then the intensity is reduced to the highest intensity step to ensure that it is not exceeded.

a) Power is a measure of the rate in which electrical energy is transferred within an electrical circuit and is measured in Watts (W). For DC (Direct Current) electrical circuits it is expressed as:

Power (Watts) = Voltage (Volts, V) x Current (Amps, A) where volts & current are instantaneous values.

b) Peak Power is the maximum power rating of a lantern. In an instant of time, this is the maximum power the lantern will consume. It is determined when all a lantern's features are on and the LEDs intensity is at 100%.

c) Average Power is a measure of Power over a period of time. In raw terms, it expressed as

Average Power (Watts) = Peak power (Watts) x MULTIPLIER (%),

Where the:

MULTIPLIER (%) = Flash Character duty cycle (%) x Intensity level (%)

d) The SL-C510 lantern intensity setting are available in 32 steps from 0% to 100% with a step size of 3.125% (or 1/32%)

Appendix

Flash Codes

The Sealite SL-C510 may be set to any of 256 IALA recommended flash settings which are user-adjustable onsite.

SEALITE® code reference is listed by number of flashes

For the latest version of this document visit www.sealite.com,
or email info@sealite.com

Symbols

FL	Flash followed by number Eg. FL 1 S, one flash every second
F	Fixed
Q	Quick Flash
VQ	Very Quick Flash
OC	Occulting; greater period on than off
ISO	Isophase; equal period on and off
LFL	Long Flash Long
MO	Morse code () contains letter

For example, VQ (6) + LFL 10 S means 6 very quick flashes followed by a long flash, during a 10-second interval.

The amount of power your lantern draws through the night depends on the duty cycle, i.e. the amount of time on as a proportion to the timing cycle. For example, 0.5 seconds on and 4.5 seconds off equals a 10% duty cycle.

It is best to operate at the lowest duty cycle appropriate to the actual needs of the application.



MARK DESCRIPTION	RHYTHM
Port Hand & Starboard Marks:	Any, other than Composite Group Flashing (2+1)
Preferred Channel Starboard:	Composite Group Flashing (2+1)
Preferred Channel Port:	Composite Group Flashing (2+1)
North Cardinal Mark:	Very quick or quick
East Cardinal Mark:	Very quick (3) every 5 seconds or quick (3) every 10 seconds
South Cardinal Mark:	Very quick (6) + long flash every 10 seconds or quick (6) + long flash every 15 seconds
West Cardinal Mark:	Very quick (9) every 10 seconds or quick (9) every 15 seconds
Isolated Danger Mark:	Group flashing (2)
Safe Water Mark:	Isophase, occulting, one long flash every 10 seconds or Morse Code "A"
Special Marks:	Any, other than those described for Cardinal, Isolated Danger or Safe Water Marks

HEX CODE	IR Controller	FLASH CODE	ON	OFF
A B				
0 0	000	F (Steady light)		
D 3	211	VQ 0.5 S	0.2	0.3
- -	274	VQ 0.5 S	0.25	0.25
E 3	227	VQ 0.6 S	0.2	0.4
F 3	243	VQ 0.6 S	0.3	0.3
7 3	115	Q 1 S	0.2	0.8
8 3	131	Q 1 S	0.3	0.7
9 3	147	Q 1 S	0.4	0.6
A 3	163	Q 1 S	0.5	0.5
8 4	132	Q 1 S	0.8	0.2
B 3	179	Q 1.2 S	0.3	0.9
- -	293	FL 1.2 S	0.4	0.8
9 4	148	Q 1.2 S	0.5	0.7
C 3	195	Q 1.2 S	0.6	0.6
F 4	244	FL 1.5 S	0.2	1.3
1 0	16	FL 1.5 S	0.3	1.2
0 5	5	FL 1.5 S	0.4	1.1
0 4	4	FL 1.5 S	0.5	1.0
2 0	32	FL 2 S	0.2	1.8
3 0	48	FL 2 S	0.3	1.7
4 0	64	FL 2 S	0.4	1.6
5 0	80	FL 2 S	0.5	1.5
6 0	96	FL 2 S	0.7	1.3
7 0	112	FL 2 S	0.8	1.2
1 2	18	ISO 2 S	1.0	1.0
8 0	128	FL 2.5 S	0.3	2.2
9 0	144	FL 2.5 S	0.5	2.0
D 6	214	FL 2.5 S	1.0	1.5
1 5	21	FL 3 S	0.2	2.8

HEX CODE	IR Controller	FLASH CODE	ON	OFF
A B				
A 0	160	FL 3 S	0.3	2.7
2 5	37	FL 3 S	0.4	2.6
B 0	176	FL 3 S	0.5	2.5
3 5	53	FL 3 S	0.6	2.4
C 0	192	FL 3 S	0.7	2.3
D 0	208	FL 3 S	1.0	2.0
2 2	34	ISO 3 S	1.5	1.5
5 4	84	OC 3 S	2.0	1.0
E 2	226	OC 3 S	2.5	0.5
4 6	70	OC 3.5 S	2.5	1.0
4 5	69	FL 4 S	0.2	3.8
5 5	85	FL 4 S	0.3	3.7
E 0	224	FL 4 S	0.4	3.6
F 0	240	FL 4 S	0.5	3.5
6 5	101	FL 4 S	0.6	3.4
0 1	1	FL 4 S	0.8	3.2
1 1	17	FL 4 S	1.0	3.0
2 1	33	FL 4 S	1.5	2.5
3 2	50	ISO 4 S	2.0	2.0
3 6	54	OC 4 S	2.5	1.5
F 2	242	OC 4 S	3.0	1.0
3 1	49	FL 4.3 S	1.3	3.0
8 5	133	FL 5 S	0.2	4.8
4 1	65	FL 5 S	0.3	4.7
- -	279	FL 5 S	0.4	4.6
5 1	81	FL 5 S	0.5	4.5
9 5	149	FL 5 S	0.9	4.1
6 1	97	FL 5 S	1.0	4.0
7 1	113	FL 5 S	1.5	3.5

HEX CODE		IR Controller	FLASH CODE	ON	OFF
A	B				
4	2	66	ISO 5 S	2.5	2.5
8	2	130	LFL 5 S	2.0	3.0
0	3	3	OC 5 S	3.0	2.0
1	3	19	OC 5 S	4.0	1.0
2	3	35	OC 5 S	4.5	0.5
C	6	198	FL 6 S	0.2	5.8
B	5	181	FL 6 S	0.3	5.7
C	5	197	FL 6 S	0.4	5.6
8	1	129	FL 6 S	0.5	5.5
9	1	145	FL 6 S	0.6	5.4
A	1	161	FL 6 S	1.0	5.0
7	5	117	FL 6 S	1.2	4.8
B	1	177	FL 6 S	1.5	4.5
5	2	82	ISO 6 S	3.0	3.0
9	2	146	LFL 6 S	2.0	4.0
6	4	100	OC 6 S	4.0	2.0
3	3	51	OC 6 S	4.5	1.5
4	3	67	OC 6 S	5.0	1.0
-	-	280	FL 7 S	0.4	6.6
A	4	164	FL 7 S	1.0	6.0
9	6	150	FL 7 S	2.0	5.0
5	6	86	OC 7 S	4.5	2.5
D	5	213	FL 7.5 S	0.5	7.0
C	1	193	FL 7.5 S	0.8	6.7
E	5	229	FL 8 S	0.5	7.5
B	4	180	FL 8 S	1.0	7.0
6	2	98	ISO 8 S	4.0	4.0
A	2	162	LFL 8 S	2.0	6.0
6	6	102	OC 8 S	5.0	3.0

HEX CODE		IR Controller	FLASH CODE	ON	OFF
A	B				
-	-	294	OC 8 S	6.0	2.0
B	2	178	LFL 8 S	3.0	5.0
F	5	245	FL 9 S	0.9	8.1
C	4	196	FL 9 S	1.0	8.0
7	6	118	OC 9 S	6.0	3.0
0	6	6	FL 10 S	0.2	9.8
1	6	22	FL 10 S	0.3	9.7
-	-	281	FL 10 S	0.4	9.6
D	1	209	FL 10 S	0.5	9.5
2	6	38	FL 10 S	0.8	9.2
E	1	225	FL 10 S	1.0	9.0
1	4	20	FL 10 S	1.5	8.5
C	2	194	LFL 10 S	2.0	8.0
D	2	210	LFL 10 S	3.0	7.0
7	2	114	ISO 10 S	5.0	5.0
2	4	36	LFL 10 S	4.0	6.0
8	6	134	OC 10 S	6.0	4.0
5	3	83	OC 10 S	7.0	3.0
6	3	99	OC 10 S	7.5	2.5
-	-	303	FL 11 S	1.0	10.0
-	-	302	FL 12 S	1.0	11.0
F	1	241	FL 12 S	1.2	10.8
D	4	212	FL 12 S	2.5	9.5
3	4	52	LFL 12 S	2.0	10.0
0	2	2	FL 15 S	1.0	14.0
4	4	68	LFL 15 S	4.0	11.0
7	4	116	OC 15 S	10	5.0
A	6	166	LFL 20 S	2.0	18.0
E	4	228	FL 26 S	1.0	25.0



HEX CODE		IR Controller	FLASH CODE	ON	OFF	ON	OFF
A	B						
0	A	10	FL (2) 4 S	0.5	1.0	0.5	2.0
E	B	235	VQ (2) 4 S	0.2	1.0	0.2	2.6
1	A	26	FL (2) 4.5 S	0.3	1.0	0.3	2.9
2	A	42	FL (2) 4.5 S	0.4	1.0	0.4	2.7
3	A	58	FL (2) 4.5 S	0.5	1.0	0.5	2.5
-	-	277	FL (2) 4.6 S	0.3	0.3	0.3	3.7
F	9	249	FL (2) 5 S	0.2	0.8	0.2	3.8
2	C	44	FL (2) 5 S	0.2	1.2	0.2	3.4
4	A	74	FL (2) 5 S	0.4	0.6	0.4	3.6
-	-	282	FL (2) 5 S	0.4	1.1	0.4	3.1
0	7	7	FL (2) 5 S	0.5	1.0	0.5	3.0
1	7	23	FL (2) 5 S	1.0	1.0	1.0	2.0
-	-	257	FL (2) 5 S	0.3	1.0	0.3	3.4
9	B	155	Q (2) 5 S	0.3	0.7	0.3	3.7
2	9	41	Q (2) 5 S	0.5	0.5	0.5	3.5
-	-	305	FL (2) 5 S	0.5	0.7	0.5	3.3
5	A	90	FL (2) 5.5 S	0.4	1.4	0.4	3.3
7	8	120	FL (2) 6 S	0.3	0.6	1.0	4.1
A	A	170	FL (2) 6 S	0.3	0.9	0.3	4.5
6	A	106	FL (2) 6 S	0.3	1.0	0.3	4.4
7	A	122	FL (2) 6 S	0.4	1.0	0.4	4.2
-	-	283	FL (2) 6 S	0.4	1.2	0.4	4.0
9	9	153	FL (2) 6 S	0.5	1.0	0.5	4.0
2	8	40	FL (2) 6 S	0.8	1.2	0.8	3.2
-	-	256	FL (2) 6 S	0.8	0.8	0.8	3.6
3	7	55	FL (2) 6 S	1.0	1.0	1.0	3.0
3	9	57	Q (2) 6 S	0.3	0.7	0.3	4.7
-	-	295	LFL + FL 6 S	3.0	1.0	1.0	1.0
-	-	273	FL (2) 6.5 S	0.5	1.0	0.5	4.5
-	-	283	FL (2) 7 S	0.4	1.2	0.4	5.0
-	-	311	FL (2) 7 S	0.5	1.5	0.5	4.5
A	9	169	FL (2) 7 S	1.0	1.0	1.0	4.0
7	B	123	FL (2) 8 S	0.4	0.6	2.0	5.0
8	A	138	FL (2) 8 S	0.4	1.0	0.4	6.2
-	-	285	FL (2) 8 S	0.4	1.7	0.4	5.5
4	7	71	FL (2) 8 S	0.5	1.0	0.5	6.0
-	-	297	FL (2) 8 S	0.5	0.5	1.5	5.5
8	8	136	FL (2) 8 S	0.8	1.2	2.4	3.6
5	7	87	FL (2) 8 S	1.0	1.0	1.0	5.0
4	C	76	OC (2) 8 S	3.0	2.0	1.0	2.0
5	C	92	OC (2) 8 S	5.0	1.0	1.0	1.0
F	B	251	VQ (2) 8 S	0.2	1.0	0.2	6.6
-	-	286	FL (2) 9 S	0.4	1.7	0.4	6.5
9	A	154	FL (2) 10 S	0.4	1.6	0.4	7.6
-	-	287	FL (2) 10 S	0.4	2.2	0.4	7.0
6	7	103	FL (2) 10 S	0.5	1.0	0.5	8.0
7	7	119	FL (2) 10 S	0.5	1.5	0.5	7.5
6	9	105	FL (2) 10 S	0.5	2.0	0.5	7.0
-	-	298	FL (2) 10 S	0.5	0.5	1.5	7.5
8	7	135	FL (2) 10 S	0.8	1.2	0.8	7.2
B	9	185	FL (2) 10 S	1.0	1.0	1.0	7.0
9	7	151	FL (2) 10 S	1.0	1.5	1.0	6.5
4	9	73	Q (2) 10 S	0.6	0.4	0.6	8.4
B	A	186	FL (2) 12 S	0.4	1.0	0.4	10.2
C	9	201	FL (2) 12 S	0.5	1.0	0.5	10.0
D	9	217	FL (2) 12 S	1.5	2.0	1.5	7.0
A	8	168	FL (2) 15 S	0.5	1.5	2.0	11.0
A	7	167	FL (2) 15 S	1.0	2.0	1.0	11.0
8	B	139	Q (2) 15 S	0.2	0.8	0.2	13.8
C	A	202	FL (2) 20 S	1.0	3.0	1.0	15.0
D	A	218	FL (2) 25 S	1.0	1.0	1.0	22.0

HEX CODE		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF
A	B								
7	9	121	Q (3) 5 S	0.5	0.5	0.5	0.5	0.5	2.5
5	9	89	VQ (3) 5 S	0.2	0.3	0.2	0.3	0.2	3.8
0	C	12	VQ (3) 5 S	0.3	0.2	0.3	0.2	0.3	3.7
E	9	233	VQ (3) 5 S	0.3	0.3	0.3	0.3	0.3	3.5
-	-	308	FL (3) 5 S	0.3	0.7	0.3	0.7	0.3	3.7
0.3	3.7	60	FL (3) 6 S	0.5	1.0	0.5	1.0	0.5	2.5
2	B	43	FL (2+1) 6 S	0.3	0.4	0.3	1.2	0.3	3.5
HEX CODE	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	
A	B								
A	B	171	Q (3) 6 S	0.3	0.7	0.3	0.7	0.3	3.7
F	A	250	FL (3) 8 S	0.5	1.0	0.5	1.0	0.5	4.5
-	-	301	FL (3) 8 S	1.5	0.5	0.5	0.5	0.5	4.5
-	-	266	Q (3) 9 S	0.5	0.5	0.5	1.0	0.5	6.0
0	B	11	FL (3) 9 S	0.3	1.0	0.3	1.0	0.3	6.1
-	-	306	FL (3) 9 S	0.5	1.5	0.5	1.5	0.5	4.5
B	7	183	FL (3) 9 S	0.8	1.2	0.8	1.2	0.8	4.2
B	8	184	FL (3) 10 S	0.3	0.7	0.3	0.7	0.9	7.1
C	8	200	FL (3) 10 S	0.4	0.6	0.4	0.6	1.2	6.8
-	-	290	FL (3) 10 S	0.4	0.8	0.4	0.8	0.4	7.2
C	B	203	FL (3) 10 S	0.5	0.5	0.5	0.5	0.5	7.5
C	7	199	FL (3) 10 S	0.5	1.5	0.5	1.5	0.5	5.5
D	B	219	FL (3) 10 S	0.6	0.6	0.6	0.6	0.6	7.0
-	-	278	FL (3) 10 S	0.9	1.1	0.9	1.1	0.9	5.1
D	7	215	FL (3) 10 S	1.0	1.0	1.0	1.0	1.0	5.0
-	-	261	FL (3) 10 S	0.35	0.65	0.35	0.65	0.35	7.65
3	8	56	FL (2+1) 10 S	0.5	0.7	0.5	2.1	0.5	5.7
8	9	137	OC (3) 10 S	5.0	1.0	1.0	1.0	1.0	1.0
B	B	187	Q (3) 10 S	0.3	0.7	0.3	0.7	0.3	7.7
D	8	216	FL (2 + 1) 10 S	0.5	0.5	0.5	0.5	1.5	6.5
-	-	288	FL (3) 12 S	0.4	2.1	0.4	2.1	0.4	6.6
1	B	27	FL (3) 12 S	0.5	1.5	0.5	1.5	0.5	7.5
E	A	234	FL (3) 12 S	0.5	2.0	0.5	2.0	0.5	6.5
E	7	231	FL (3) 12 S	0.8	1.2	0.8	1.2	0.8	7.2
B	6	182	FL (3) 12 S	1.0	1.0	1.0	3.0	1.0	5.0
4	8	72	FL (2+1) 12 S	0.8	1.2	0.8	2.4	0.8	6.0
5	8	88	FL (2+1) 12 S	1.0	1.0	1.0	4.0	1.0	4.0
-	-	272	FL (3) 12.5 S	0.5	1.0	0.5	1.0	0.5	9.0
-	-	289	FL (3) 13 S	0.4	2.1	0.4	2.1	0.4	7.6
-	-	296	LFL + FL(2) 13 S	6.0	1.0	2.0	1.0	2.0	1.0
1	8	24	FL (2+1) 13.5 S	1.0	1.0	1.0	4.0	1.0	5.5
-	-	307	FL (3) 14.5 S	0.5	1.0	1.5	3.0	0.5	9.0
F	7	247	FL (3) 15 S	0.3	1.7	0.3	1.7	0.3	10.7
9	D	157	FL (3) 15 S	0.4	1.0	0.4	1.0	0.4	11.8
0	8	8	FL (3) 15 S	0.5	1.5	0.5	1.5	0.5	10.5
-	-	259	FL (3) 15 S	0.5	2.0	0.5	2.0	0.5	9.5
-	-	260	FL (3) 15 S	1.0	1.0	1.30	1.0	1.0	10.0
F	8	248	FL (2+1) 15 S	0.6	0.3	0.6	0.3	1.4	11.8
0	9	9	FL (2+1) 15 S	0.7	0.5	0.7	0.5	1.9	10.7
1	9	25	FL (2+1) 15 S	0.7	0.7	0.7	0.7	2.1	10.1
6	8	104	FL (2+1) 15 S	1.0	2.0	1.0	5.0	1.0	5.0
-	-	265	FL (2+1) 15 S	1.3	0.7	1.3	0.7	3.3	7.7
-	-	264	FL (2+1) 15.75 S	0.55	0.35	0.55	0.35	1.45	12.5
1	C	28	VQ (3) 15 S	0.1	0.5	0.1	0.5	0.1	13.7
-	-	313	FL (2) + LFL 16 S	2.0	2.0	2.0	2.0	6.0	2.0
4	B	75	FL (3) 20 S	0.5	3.0	0.5	3.0	0.5	12.5
3	B	59	FL (3) 20 S	0.5	1.5	0.5	1.5	0.5	15.5
-	-	263	FL (3) 20 S	0.5	2.0	0.5	2.0	0.5	12.0
5	B	91	FL (3) 20 S	0.8	1.2	0.8	1.2	0.8	15.2
6	B	107	FL (3) 20 S	1.0	1.0	1.0	1.0	1.0	15.0



HEX CODE		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B										
-	-	271	VQ (4) 2 S	0.10	0.13	0.10	0.13	0.10	0.13	0.10	1.21
B	F	191	VQ (4) 4 S	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.3
B	D	189	Q (4) 6 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	2.7
8	D	141	Q (4) 6 S	0.4	0.6	0.4	0.6	0.4	0.6	0.4	2.6
-	-	299	FL (1+3) 8 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	3.5
-	-	309	FL (4) 7 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	3.7
1	D	29	FL (4) 10 S	0.5	1.0	0.5	1.0	0.5	1.0	0.5	5.0
2	D	45	FL (4) 10 S	0.8	1.2	0.8	1.2	0.8	1.2	0.8	3.2
F	E	254	Q (4) 10 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	6.7
-	-	300	FL (4) 10 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
-	-	312	FL (4) 11 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	4.5
B	E	190	FL (4) 12 S	0.3	1.7	0.3	1.7	0.3	1.7	0.3	5.7
4	F	79	FL (4) 12 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	8.5
C	E	206	FL (4) 12 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	5.5
3	D	61	FL (4) 12 S	0.8	1.2	0.8	1.2	0.8	1.2	0.8	5.2
A	D	173	Q (4) 12 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	8.7
4	D	77	FL (4) 15 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	8.5
8	E	142	FL (4) 15 S	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8.0
7	D	125	FL (4) 15 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	10.5
D	E	222	FL (4) 16 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	9.5
-	-	314	FL (3+1) 18 S	1.5	1.5	1.5	1.5	1.5	4.5	1.5	4.5
-	-	304	FL (4) 19 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	15.7
C	D	205	FL (4) 20 S	0.3	3.0	0.3	3.0	0.3	3.0	0.3	9.8
5	D	93	FL (4) 20 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	13.5
0	D	13	FL (4) 20 S	0.5	1.5	0.5	1.5	0.5	4.5	0.5	10.5
3	F	63	FL (4) 20 S	1.5	1.5	1.5	1.5	1.5	1.5	1.5	9.5
0	F	15	Q (4) 20 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	16.5
-	-	263	FL (4) 20 S	0.5	2.0	0.5	2.0	0.5	2.0	0.5	12.0
E	E	238	Q (4) 28 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	24.5
6	F	111	FL (4) 30 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	26.5

HEX CODE		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B												
D	D	221	Q (5) 7 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	2.7
-	-	310	Q (5) 9 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
E	D	237	Q (5) 10 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	5.7
E	8	232	FL (5) 12 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	3.5
-	-	276	FL (5) 16 S	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	7.5
5	F	95	FL (5) 20 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	15.5
9	F	159	FL (5) 20 S	0.8	1.2	0.8	1.2	0.8	1.2	0.8	1.2	0.8	11.2
9	E	158	FL (5) 20 S	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.0

HEX CODE		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B												
F	D	253	Q (6) 10 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	4.7
A	F	175	FL (6) 15 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	9.7
7	F	127	FL (6) 15 S	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	7.0

HEX CODE	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
A	B																
6	E	110	VQ (6) + LFL 10 S	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	2.0	5.0
7	E	126	VQ (6) + LFL 10 S	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.0	4.4
2	F	47	Q (6) + LFL 15 S	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	2.0	7.0
2	E	46	Q (6) + LFL 15 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	2.0	7.0
3	E	62	Q (6) + LFL 15 S	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2.0	5.8
-	-	258	FL (6 + 1) 15 S	0.35	0.65	0.35	0.65	0.35	0.65	0.35	0.65	0.35	0.65	0.35	0.65	1.05	7.95
-	-	292	FL (6) + LFL 15 S	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	2.0	5.8
-	-	262	FL (6) + LFL 15 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.0	7.0
8	F	143	VQ (6) + LFL 15 S	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.0	9.4

HEX CODE	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
A	B																		
-	-	275	FL (3+5) 12.2 S	0.9	0.3	0.9	1.0	0.9	0.3	0.3	0.3	0.3	1.0	0.3	0.3	0.3	0.3	4.5	-
4	E	78	VQ (9) 10 S	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	5.8
5	E	94	VQ (9) 10 S	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	4.9
1	F	31	Q (9) 15 S	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	0.8	0.2	6.8
0	E	14	Q (9) 15 S	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	0.7	0.3	6.7
-	-	267	Q (9) 15 S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.5
1	E	30	Q (9) 15 S	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	4.8
-	-	291	FL (9) 32.92 S	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	0.8	0.4	22.9

HEX CODE	IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B											
MORSE CODE () INDICATES LETTER												
7	8	120	MO (A) 6 S	0.3	0.6	1.0	4.1					
7	B	123	MO (A) 8 S	0.4	0.6	2.0	5.0					
8	8	136	MO (A) 8 S	0.8	1.2	2.4	3.6					
B	8	184	MO (U) 10 S	0.3	0.7	0.3	0.7	0.9	7.1			
C	8	200	MO (U) 10 S	0.4	0.6	0.4	0.6	1.2	6.8			
D	8	216	MO (U) 10 S	0.5	0.5	0.5	0.5	1.5	6.5			
9	8	152	MO (A) 10 S	0.5	0.5	1.5	7.5					
8	9	137	MO (D) 10 S	5.0	1.0	1.0	1.0	1.0	1.0			
A	8	168	MO (A) 15 S	0.5	1.5	2.0	11.0					
F	8	248	MO (U) 15 S	0.6	0.3	0.6	0.3	1.4	11.8			
0	9	9	MO (U) 15 S	0.7	0.5	0.7	0.5	1.9	10.7			
1	9	25	MO (U) 15 S	0.7	0.7	0.7	0.7	2.1	10.1			
7	D	125	MO (B) 15 S	1.5	0.5	0.5	0.5	0.5	0.5	0.5	10.5	



Maintenance & Servicing

Designed to be almost maintenance-free, the SL-C510 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 three 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 12 volts under 100mA load and ensure all terminals are clear of foreign matter.
3. **O-Ring Check-** Inspect the condition of the O-ring for damage, wear or if it is brittle. Replace if necessary. The O-ring should be a rubber texture to ensure a complete and even seal.

Replacing the Battery

The SL-C510 have an internal battery compartment, which provides the user with the ability to change the battery after years of operation. Contact Sealite should a replacement battery required.

1. Remove the four socket-head screws on the top lens assembly and separate the SL-C510 lens assembly from the body/base section.
2. Remove 2 x M4 cap screws & washers from the top of the chassis.
3. Disconnect the light head and battery via the 4-Pin connector.
4. Lift the upper battery bracket out of the SL-C510.
5. Remove the old battery from the chassis.
6. Discard old battery in a safe manner.
7. Reconnect the new battery.
8. Place battery back inside lantern body, and position the upper battery bracket in the top of the chassis.
9. Secure using 2 x M4 cap screws & washers.
10. Feed all wiring back inside lantern body, and make sure the O-ring is properly placed at the top of the lantern body. Reconnect the 4-Pin connector.
11. Place the top lens assembly back onto the lantern body and replace 4 socket head screws. Half tighten all 4 socket head screws, and then fully tighten each socket head screw to ensure an even seal. To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.
12. To test, place dark cover (towel or jacket) on top of light to activate sensor, light will come on. Care must be taken to observe the polarity of each wire before they are connected. To ensure waterproofing of the unit, make sure that there is an even seal.

Long Term Battery Storage

If the SL-C510 is to be placed in storage for an extended period please follow the below information. The sealed lead acid batteries inside the lights must always be stored in a fully charged state. Always make sure to disconnect the light head from the solar unit. All batteries will discharge over time and the rate of discharge is dependent on temperature. If the light is being stored in temperatures greater than 40°C the battery will discharge faster. Please check battery regularly and recharge if necessary. Re-connect the light head and battery and place unit in the sun for 2-4 days.

Solar Panel Replacement

The SL-C510 is built around an internal aluminium chassis. The solar panels can be by the user replaced in the unlikely event that one is broken or damaged during the product's life.

Follow the steps below or contact support@sealite.com for more details:

1. Remove 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers and disconnect the light head from the chassis.
2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers. Remove the upper battery bracket containing regulator.
3. Disconnect the battery.
4. Remove 4 x M6 x 35 socket head cap screws, to remove the top casting from the chassis.

Note: Be careful not to damage the O-rings on each of these screws. If replacements are required please use standard 6.0x1.0mm O-ring.

5. Slide the rubber corner out of the chassis, it may be necessary to lubricate the edges of the solar panels with grease or oil based lubricant if this is difficult to remove.
6. Unscrew the affected panel wires from the regulator and remove the solar panel from the chassis.
7. Clean any silicon off the chassis from the solar panel junction box hole and add a new seal to ensure the solar panel is watertight when assembled.
8. Repeat the process in the reverse order to replace a new pane.

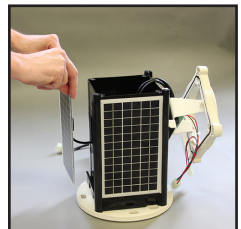
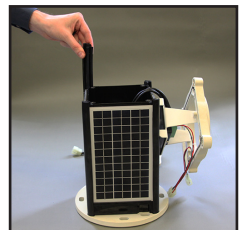
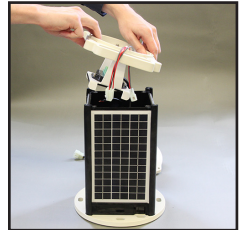
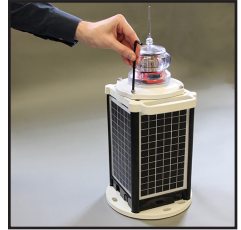
Note:

Make sure the O-rings on the top casting and 4 x M6 x 35 socket head cap screws are coated in silicon grease before re-assembling. To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used.

Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Sealite representative.

The replacement of a solar panel should only be performed by a confident technician.

Sealite cannot guarantee the chassis will remain waterproof, if service is not performed by Sealite staff. To test for any leaks remove the gore vent and pressurise the assembled light to 1.5psi.





How to Change the Regulator

1. Remove the 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers, then disconnect the light head from the chassis.
2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers then remove the upper battery bracket containing the regulator.
3. Disconnect the battery.
4. Take note of the wire colours and location in the regulator.
5. Disconnect the wires from the regulator.
6. Remove the 2 x M4 CSK screws, 2 x M4 nylock nuts and 2 x M4 penny washers that retain the regulator to the top battery bracket and remove the regulator.
7. Fit the new regulator using the 2 x M4 CSK screws, 2 x M4 penny washers and 2 x M4 nylock nuts.
8. Connect the solar positive wires to the S points on the regulator.
9. Connect the solar negative wires to the S points on the regulator.
10. Connect the battery positive wires to the B point on the regulator.
11. Connect the battery negative wire to the B point on the regulator.
12. Reconnect the battery.
13. Refit the battery top bracket into the solar unit using the 2 x M4 x 20 socket head cap screws.
14. Ensure the top O-ring is sitting correctly into the top casting. Refit the light head and tighten the M6 x 20 socket head cap screws with the 4 x M6 nylon washers evenly.

DO NOT OVERTIGHTEN.



Use the label to ensure correct location of wires during assembly



SL10 AMP Regulator shown when correctly fitted

Trouble Shooting

Problem	Remedy
Lantern will not activate.	<ul style="list-style-type: none">• Ensure Lantern is in darkness;• Wait at least 60 seconds for the program to initialise in darkness;• Ensure battery terminals are properly connected;• Ensure battery voltage is above 12volts;• Check the status of the LED's on the base of the PCB to determine what type of fault the light is acting (see Lantern Status section of this manual).
Lantern will not operate for the entire night.	<ul style="list-style-type: none">• Expose the lantern to direct sunlight and monitor operation for several days.• Sealite products typically require 1.5hours 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;• Reducing the light output intensity or duty cycle (Flash Code) will reduce current draw on the battery;• Ensure solar module is clean and not covered by shading during the day.

Sealite LED Light Warranty

Refer to Sealite website: sealite.com



We believe technology improves navigation™

sealite.com info@sealite.com

Sealite Pty Ltd
Australia
+61 (0)3 5977 6128

Sealite Asia Pte Ltd
Singapore
+65 6908 2917

Sealite United Kingdom Ltd
UK
+44 (0) 1502 588026

Sealite USA LLC
USA
+1 (603) 737 1311