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Version No.	Description	Date	Author	Reviewed	Approved
1.0	Manual Launch	Feb 2018	Y. Chambers, B. Paduraru, A. Dixon	Y. Chambers.	M. Nicholson.

Specifications

SL-C415-AIS

Light Characteristics	LED
Light Source	Red, Green, White, Yellow, Blue
Available Colours	Red - 121 Green - 88 White - 156 Yellow - 95
Typical Maximum Flashing Intensity (cd)†	AT @ 0.74: 3-5+
Visible Range (NM)	AT @ 0.85: 3.5-6.3+
Horizontal Output (degrees)	360
Vertical Divergence (degrees)	>7
Available Flash Characteristics	Up to 256 IALA recommended (user adjustable)
Intensity Adjustments	Multiple intensity settings
LED Life Expectancy (hours)	>100,000
Electrical Characteristics	
Current Draw (mA)	Refer to Sealite Power Calculator
Circuit Protection	Integrated
Nominal Voltage (V)	12
Autonomy (nights)	>60 (14 hour darkness, 12.5% duty cycle)
Temperature Range	-40 to 80°C
Solar Characteristics	
Solar Module Type	Multicrystalline
Output (watts)	24 (4 x 6watt)
Charging Regulation	Microprocessor controlled
Power Supply	
Battery Type	Gel SLA
Battery Capacity (Ah)	24
Nominal Voltage (V)	12
Physical Characteristics	
Body Material	7-stage powder-coated aluminium chassis with UV-stabilised rubber corners & gaskets
Lens Material	LEXAN® Polycarbonate – UV-stabilised
Lens Diameter (mm/inches)	98 / 3 ^{7/8}
Lens Design	Single LED Optic
Mounting	3 & 4 hole 200mm bolt pattern
Height (mm/inches)	433 / 17
Width (mm/inches)	233 / 9 ^{1/5}
Mass (kg/lbs)	9.4 / 20 ^{3/4}
Product Life Expectancy	Up to 12 years
Certifications	
CE	EN61000-6-3:2007. EN61000-6-1:2007
IALA	Signal colours compliant to IALA E-200-1
Quality Assurance	ISO9001:2015
Waterproof	IP68
Intellectual Property	
Trademarks	SEALITE® is a registered trademark of Sealite Pty Ltd
Warranty *	3 years
Options Available	50mm pole mount adapter plate IR Programmer External ON/OFF Switch External Battery Charging Port GPS Synchronisation: enable/disable 5° Lens



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

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 maximise 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 an ultra bright LED through a DC/DC converter, which enables the LED 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. The company has superior in-house lens manufacturing capabilities to support outstanding optical performance.

Award-winning, Patented Technology

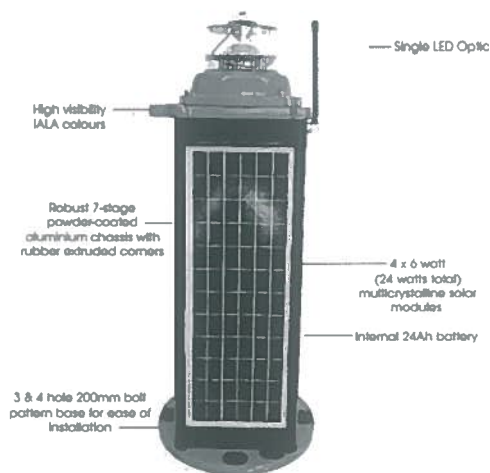
Several United States and Australian patent registrations are held on Sealite's range of innovative designs, with other regional patents pending in Canada, United Kingdom and Europe.

SL-C415-AIS Model

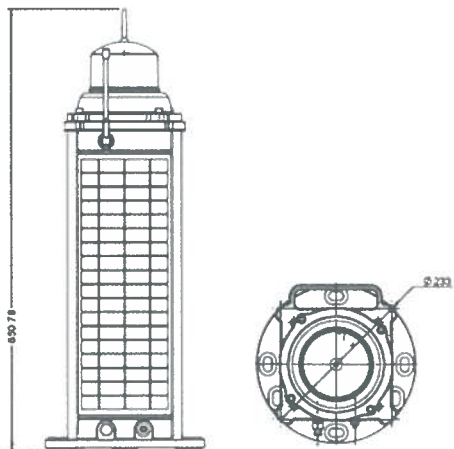
The robust design of this self-contained light ensures up to 12 years of reliable service with minimal ongoing maintenance. Specifically designed to survive the harshest environment the SL-C415 feature seven stage powder coated aluminium Top, Base and Internal Aluminium Chassis. The corners are made from UV stabilised rubber.

All components are user-replaceable in the unlikely event of damage. The high impact resistant polycarbonate lens ensures even light visibility. The three and four-hole bolt pattern will fit directly onto any 200mm OD mount.

The SL-C415-AIS model are fitted with a GPS unit to synchronise flashing lights over any distance. These models have an IR sensor which allows it to be operated via Sealite's IR remote control. All this is backed by Sealite's industry leading 3-year warranty.



SL-C415-AIS Model



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 toggle 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.

Lantern Operation

Lantern is activated by connecting the battery terminals. Flash setting needs to be set prior to activation.

1. Remove the four socket-head screws on the top lens assembly and open.
 2. Remove the bung in the base of the light head.
 3. Adjust the Intensity setting using the DIP switches (detailed below)
 4. Adjust the rotary switches (A and B) to desired flash setting (see 'Selecting a Flash Code' section of this manual).
 5. Replace the bung in the base of the light head.
 6. Connect the 4-pin connector together to power up the unit.
 7. The unit is now ready for normal operation, once placed in darkness.
 8. Close the light head, and replace 4 socket head screws. Sealite recommend 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 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 dark cover (towel or jacket) on top of light to activate sensor, light will come on within oneminute.
 10. Ensure that the unit is bolted to an even, flat surface.

Item	Description	Quantity
1	SL-C415-AIS Base	1
2	SL-C415-AIS Lens Assembly	1
3	Battery 12v 24Ah	1
4	Battery Clamp	1
5	Washer M4	2
6	M4 Cap Screw	2
7	O-Ring, ID 145 x 4.0	1
8	Socket Head Screw M6 x 20	4
9	Mounting Insert	6

Programming the Lantern

PC Configuration Tool

The lantern is pre-programmed to the customer's specific requirements for convenience (eg. flash, intensity setting etc). The SL-C415-AIS Lantern are extremely intelligent lanterns with a number of features which can be programmed directly via a user-friendly computer program (as supplied on USB drive with every lantern).

To change/update the settings of your lantern, please read the following instructions.

1. Run the Programming Software

The programming software may be run directly from the USB drive provided, or you may copy the software to your computer hard-drive for future use.

Running the Programming Software from the USB Drive

- Connect the USB drive to your computer
- Navigate to the USB drive folder & double-click the file called "LanternConfig.exe". A new window will appear displaying the PC Configuration Tool.

Saving the Programming Software to Computer Hard-Drive

- Connect the USB drive to your computer
- Navigate to the USB drive folder
- Copy the file called "LanternConfig.exe" and the ".dll" files
- Navigate to the hard-drive location where you would like to save this program, and then right-click and select "paste". A copy of the programming software will now be saved to your computer hard-drive (to add the programmer to your computer desktop for ease of future access, right-click and select "Send to desktop")
- Double-click the file called "LanternConfig.exe". A new window will appear displaying the PC Configuration Tool

PLEASE NOTE: other documents have been saved on the USB drive for your information & convenience including the latest product specifications sheet and an electronic version of the installation and service manual. You may wish to view these documents to read more about the innovative features and benefits of the SL-155 Series of lanterns.

IMPORTANT: the Sealite PC Configuration Tool is designed for Windows Platforms only.

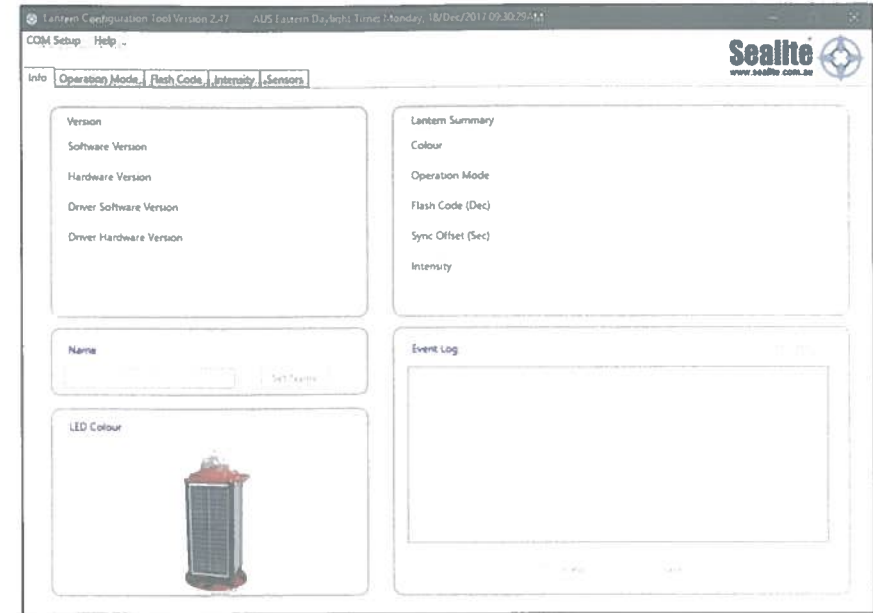


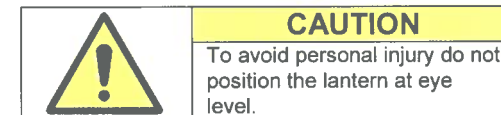
Image 1. Sealite PC Configuration Tool

1. Connect the Lantern to the PC

First disconnect the Lantern Data cable from the AIS and connect the programming cable to the Computer

Now that the programming software has been run, you will need to connect the lantern to your computer & power supply so that it can receive programming commands.

Once connection is made, the software automatically determines the colour and preprogrammed settings of the lantern.



2. Connecting the Lantern to the Computer

Then connect the other end of the Lantern programming cable to the PC USB port..

3. Establish the Programmer-to-Lantern Computer Connection (COM Port)

Now that the lantern is connected to the computer and the Sealite PC Configuration software has been run, the user must create the programmer-to-lantern connection.

The COM Port is the hardware port which the computer accesses when communicating with the lantern.

- Click the "COM Setup" at the top left of the PC Configuration Tool to open the "Serial Port" dialogue box
- In the "Serial Port" dialogue box select the appropriate COM port from the drop down field for "Port Name"
- Check the "Open Port" check box to open the port
- Click the "OK" button to initiate the connection

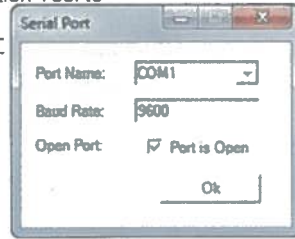


Image 2. Serial Port dialogue box

The Sealite PC Configuration Tool will then attempt to connect/interrogate the lantern.

Correct Connection Established

If the connection is established data about the lantern configuration will appear on the "Info" tab under the headings "Version" & "Lantern Summary" (eg. Lantern Colour, Flash Code, Intensity etc).

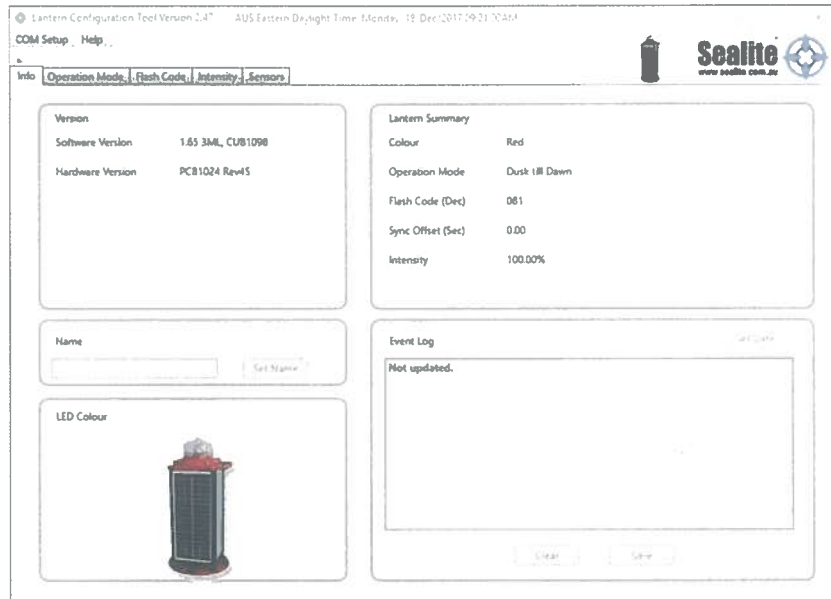


Image 3. Sealite Configuration Tool "Info" tab – showing COM Port connection established. Version & Lantern Summary information

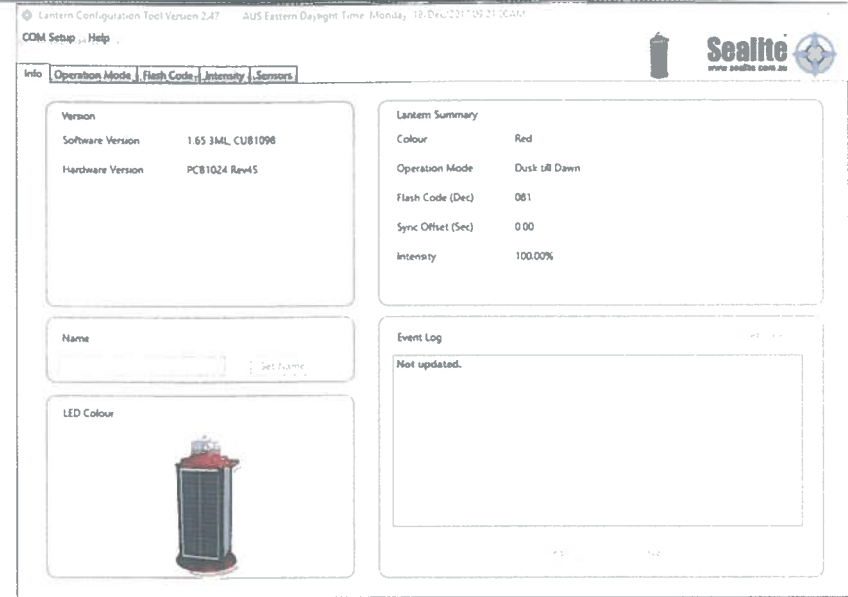
Connection NOT Established

If the connection is not available, the Sealite PC Configuration Tool will not display any lantern specific information under the headings "Version" & "Lantern Summary". If this error occurs, please check the following:

- Reconnect the lantern to the computer
- Check that the lantern power supply has sufficient charge (eg. battery is charged), and then reconnect it to the lantern
- Re-run the Sealite PC Configuration Tool and follow the information in step 3. The connection should now become established.

The Sealite lantern is now ready to be programmed to your specific requirements.

Info Tab



Provides a summary of the lantern configuration settings, hardware and software versions, and event log.

Version

is an information panel that identifies the Lantern's internal electronic hardware and firmware versions.

Lantern Summary

is an information panel that displays a summary of the key lantern settings: colour, operation mode, Peak Intensity setting, Advance Operational Mode, Flash Code, Flash Sync offset and Intensity setting. Refer to the Information, Operation Mode Flash Code, and Intensity Tabs for a description of these parameters.

Name

A user defined name, comprising alphanumeric characters (and -, \$, #, @) can be typed into dialogue box and by pressing and stored within the lantern's non-volatile memory by pressing the 'Write Name' button.

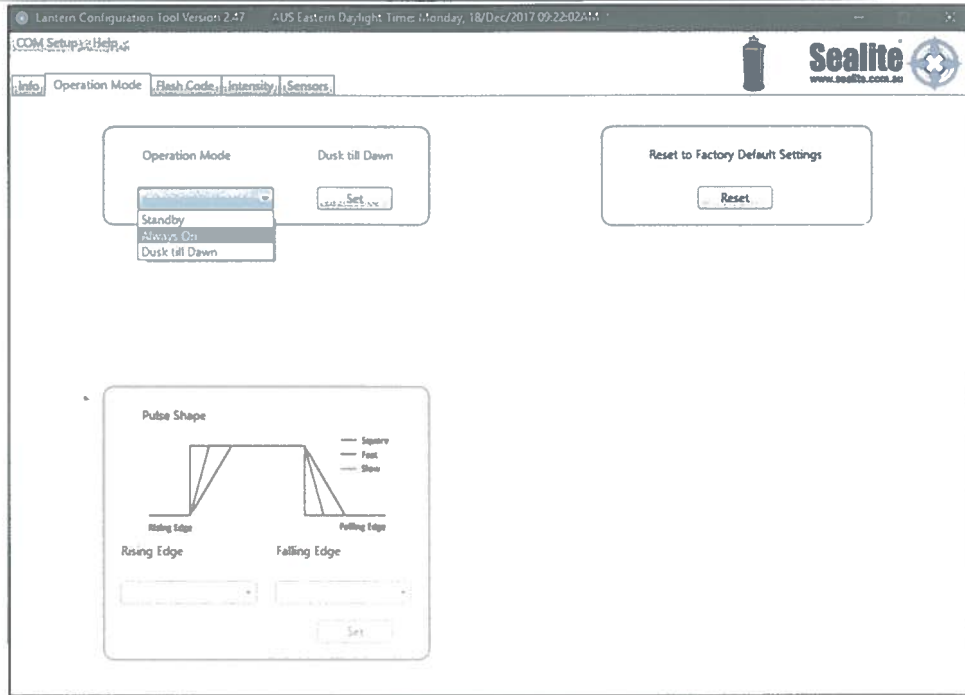
LED Colour

A generic picture of the lantern model and colour that the software tool is communicating with is displayed in this panel.

Event Log

This feature is not available with the SL-C415 Lantern.

Operational Mode Tab



Defines the lanterns mode of operation of which there are three possibilities:

Operational Mode

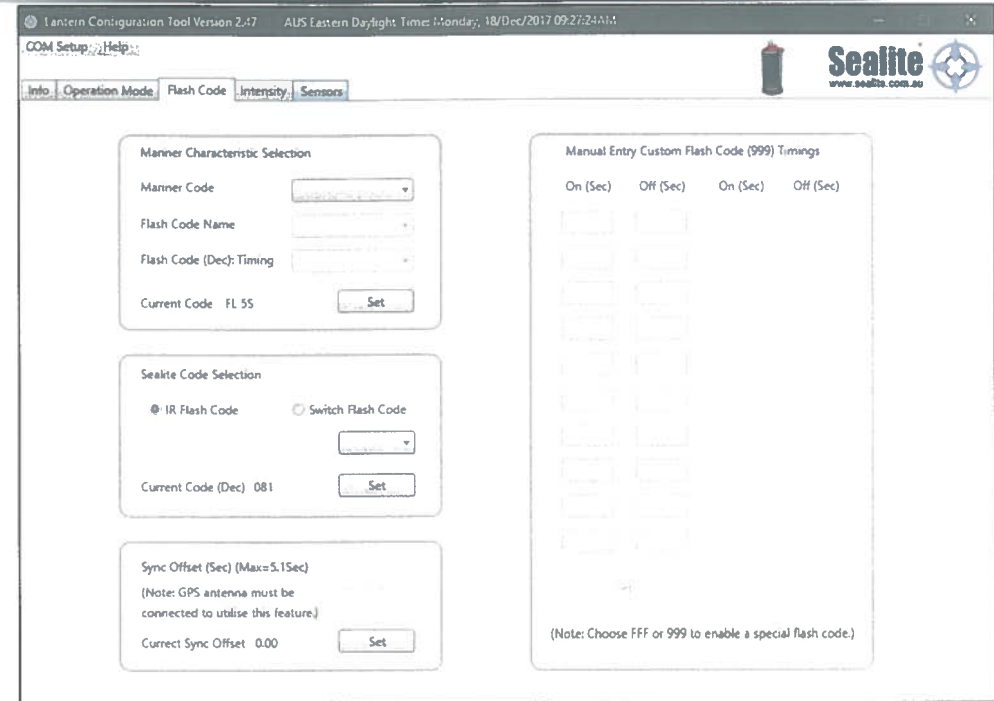
Standby
The lantern is configured in a minimum current state in which the LEDs are always off and the internal GPS (if installed) is disabled.

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.

Adv Op Mode
This is an advanced user mode and typically only used if the lantern is to be used as a special navigational aid such as emergency wreck mark. However this feature is not available with the SL-C415-AIS Lantern.

Flash Characters Tab



Mariner Characteristic Selection

The flash character is defined by first selecting the Mariner code, then the Flash code name and finally timing.

Sealite Code Selection

This is an alternative method to define the lantern flash code by using either the Sealite IR remote control numerical figure or if known the Sealite rotary switch flash character. Refer to the IR remote control section for valid flash characters.

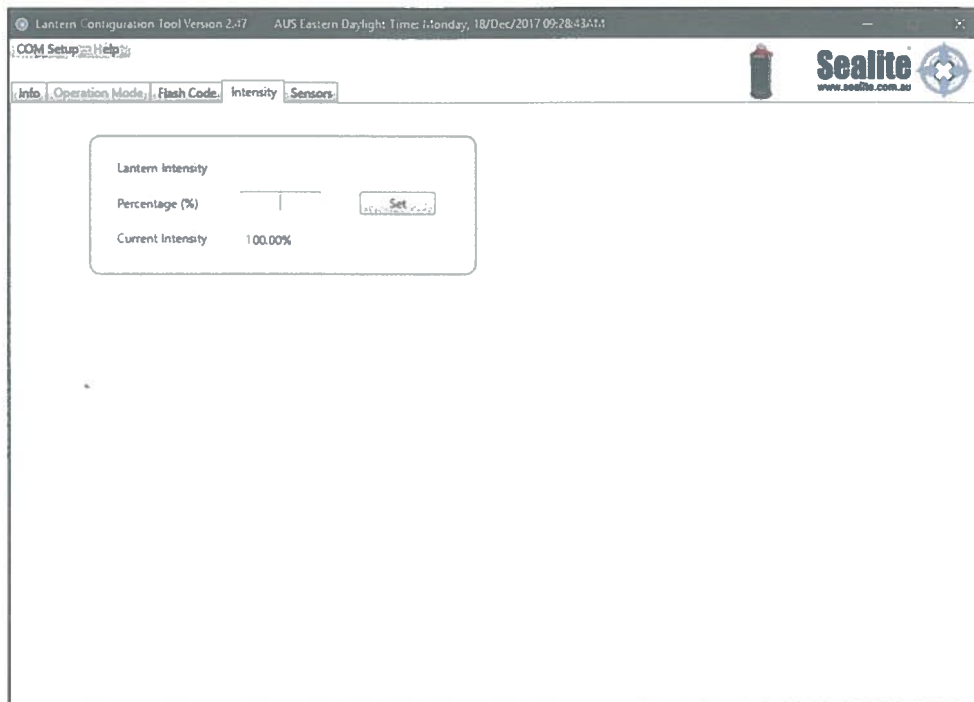
Sync Offset

This panel is used to set a fixed delay to the commencement of the flash character. The built-in GPS receiver and advanced software of the Sealite synchronised lanterns allow for the adoption of SeaFlare™ 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.

Manual Entry Custom Flash Character

This feature is not supported on SL-C415-AIS Lantern.

Intensity Tab



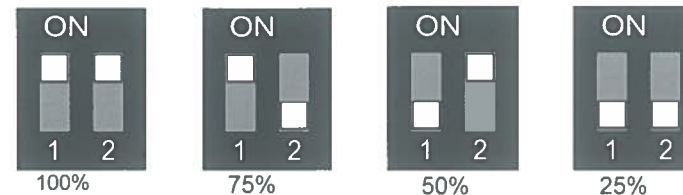
The lantern intensity level can be set by either by defining the operating range of the lantern (in nautical miles) or by entering a desired peak candela or a percentage of maximum peak intensity level.

If an intensity level is selected that is beyond the specification of the lantern, the entered figure will be displayed in red coloured text, and the lantern will be configured to its maximum.

Manually Selecting an Intensity/Power Setting

Intensity/power settings on Sealite lanterns operate via DIP switches, located near the rotary switches on the flasher unit. The intensity/power settings may be used to reduce the power consumption and intensity of the lantern. Setting the lantern to 25% intensity will reduce the power consumption to 25% of the normal 100% setting and the range by 20% - 40% depending on the maximum intensity. Refer to Sealite power calculator to confirm reduced range. This setting may be used to adjust the current draw of the light to local sunlight conditions.

The following diagrams indicate intensity/power settings: -



Intensity Setting	Power	White cd	Green cd	Red cd	Yellow cd
100%	120mA	176	88	121	95
75%	94mA	132	66	90	71
50%	64mA	88	44	60	48
25%	35mA	44	22	30	24

Model	Total power used per night (mAh)	Solar Panel Charge (mA)		Number of full sunlight hours required to break even (the amount of time it will take for the solar to replace what the light took out overnight)
SL-C415-AIS	/	554	=	

If the number of Full Sunlight hours is less than 2.5-3.0 hours, please consider reducing the intensity (Power) or reducing the Duty Cycle.

Automatic Intensity Reduction for Fixed-On Character

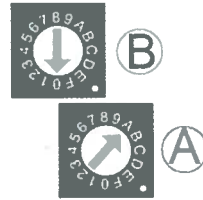
- When the flash code is configured to 00 or 'Steady On', the maximum intensity is set to 50%. If a higher intensity is previously set when the lamp is on, the intensity will automatically fall to the 50% setting when flash code 00 is configured.
- The intensity settings available for lamps with a flash code set to 00 are 25% and 50%. The lamp will flash an error condition if an intensity setting greater than 50% is selected with the IR Remote Control.
- If the flash code is changed from 00 to another value, the maximum allowable intensity reverts back to 100%.

Manually Selecting a Flash Code - Rotary Switches A & B

All lanterns have 2 rotary switches marked A and B on the flasher unit. Turning the small arrows to the appropriate number or letter will set the code. The unit may take up to one minute to activate a new flash code. A comprehensive list of available flash codes is listed on in the 'Flash Codes' section of this manual.

Example:

SWITCH		FLASH CODE	ON	OFF
A	B			
A	0	FL 3 S	0.3	2.7



Note – if setting the lantern to a demanding duty-cycle such as steady-on, the power setting must be reduced to ensure reliable operation

Flash Codes

Sealite marine lanterns may be set to any of 256 IALA recommended flash settings which are user-adjustable onsite without the need for external devices.

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 E.g. 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.

Recommended Rhythm for Flashing Light - IALA Regions A and B

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

SWITCH	IR Controller	FLASH CODE	ON	OFF
A	B			
0	0	0	F (Steady light)	
D	3	211	VQ 0.5 S	0.2 0.3
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
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
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 1
8	0	128	FL 2.5 S	0.3 2.2
9	0	144	FL 2.5 S	0.5 2
D	6	214	FL 2.5 S	1 1.5
1	5	21	FL 3 S	0.2 2.8
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 2
-	-	335	FL 3.5 S	0.7 2.8
2	2	34	ISO 3 S	1.5 1.5
5	4	84	OC 3 S	2 1
E	2	226	OC 3 S	2.5 0.5
4	6	70	OC 3.5 S	2.5 1
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 3
2	1	33	FL 4 S	1.5 2.5
3	2	50	ISO 4 S	2 2
3	6	54	OC 4 S	2.5 1.5
F	2	242	OC 4 S	3 1
3	1	49	FL 4.3 S	1.3 3
8	5	133	FL 5 S	0.2 4.8
4	1	65	FL 5 S	0.3 4.7
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 4

SWITCH	IR Controller	FLASH CODE	ON	OFF
A	B			
7	1	113	FL 5 S	1.5 3.5
4	2	66	ISO 5 S	2.5 2.5
8	2	130	LFL 5 S	2 3
0	3	3	OC 5 S	3 2
1	3	19	OC 5 S	4 1
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 5
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 3
9	2	146	LFL 6 S	2 4
6	4	100	OC 6 S	4 2
3	3	51	OC 6 S	4.5 1.5
4	3	67	OC 6 S	5 1
A	4	164	FL 7 S	1 6
9	6	150	FL 7 S	2 5
5	6	86	OC 7 S	4.5 2.5
D	5	213	FL 7.5 S	0.5 7
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 7
6	2	98	ISO 8 S	4 4
A	2	162	LFL 8 S	2 6
6	6	102	OC 8 S	5 3
B	2	178	LFL 8 S	3 5
F	5	245	FL 9 S	0.9 8.1
C	4	196	FL 9 S	1 8
7	6	118	OC 9 S	6 3
0	6	6	FL 10 S	0.2 9.8
1	6	22	FL 10 S	0.3 9.7
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 9
1	4	20	FL 10 S	1.5 8.5
C	2	194	LFL 10 S	2 8
D	2	210	LFL 10 S	3 7
7	2	114	ISO 10 S	5 5
2	4	36	LFL 10 S	4 6
8	6	134	OC 10 S	6 4
5	3	83	OC 10 S	7 3
6	3	99	OC 10 S	7.5 2.5
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 10
0	2	2	FL 15 S	1 14
4	4	68	LFL 15 S	4 11
7	4	116	OC 15 S	10 5
A	6	166	LFL 20 S	2 18
E	4	228	FL 26 S	1 25
6	1	97	FL 5 S	1 4

SWITCH	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
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
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
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
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
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
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
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
4	7	71	FL (2) 8 S	0.5	1.0	0.5 6.0
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
9	A	154	FL (2) 10 S	0.4	1.6	0.4 7.6
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
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

SWITCH	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	2.5
5	9	89	VQ (3) 5 S	0.2	0.3	0.2	0.3	3.8
0	C	12	VQ (3) 5 S	0.3	0.2	0.3	0.2	3.7
E	9	233	VQ (3) 5 S	0.3	0.3	0.3	0.3	3.5
3	C	60	FL (3) 6 S	0.5	1.0	0.5	1.0	2.5
2	B	43	FL (2+1) 6 S	0.3	0.4	0.3	1.2	3.5

SWITCH		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
0	B	11	FL (3) 9 S	0.3	1.0	0.3	1.0	0.3	6.1
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
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
D	7	215	FL (3) 10 S	1.0	1.0	1.0	1.0	1.0	5.0
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
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
1	8	24	FL (2+1) 13.5 S	1.0	1.0	1.0	4.0	1.0	5.5
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
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
1	C	28	VQ (3) 15 S	0.1	0.5	0.1	0.5	0.1	13.7
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
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

SWITCH		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B										
B	F	191	VQ (4) 4 S	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
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
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
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
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

SWITCH		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
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
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

SWITCH		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
A	B												
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

SWITCH		IR Controller	FLASH CODE	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	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	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	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	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	2.0	5.8
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	2.0	9.4

SWITCH		IR Controller	FLASH CODE	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	
A	B																	
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	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	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	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	6.7
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	4.8

SWITCH		IR Controller	FLASH CODE	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

GPS Synchronisation

The SL-C415-AIS model come with GPS fitted as standard, and provides 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 a number of 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 is able to 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 different flash codes are selected.

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. These are positioned near the Flash Code Rotary Switches. 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 11seconds	Normal	ON	Lantern is a Hard Wire Synchronisation Slave.

Red LED	Lantern Status	Lantern	Comment
OFF	Normal		Normal Battery Voltage
Flashing once every 1.6 seconds	Battery Voltage is 12 – 12.5V		Battery Voltage is between 12 – 12.5V
Flashing twice every 2 seconds	Battery Voltage is 11.5 – 12V		Battery Voltage is between 11.5 – 12V
Flashing 3 x times every 2 seconds	Battery Voltage is 10.0 – 11.5V		Battery Voltage is between 10.0 – 11.5V
Flashing 4 x times every 2.5 seconds	Battery Voltage is less than 10.0V		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		Battery Voltage is above 13.5V. This may indicate a problem with the solar regulator.

Optional IR Remote Control

The IR remote 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 Remote, 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.



Sealite IR Controller / Universal Remote Compatibility

If you lose your Sealite IR Controller, the following Universal Remote Controller has been tested for compatibility: RCA Type RCR312WR programmed for Philips TV Type Code 10054

Sealite Key	Universal Remote Key
T	Power
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
0	0
R	Channel+
L	Mute
FC	Volume+
I	Volume-
B	Channel-

IR Controller Functions

Test Mode / Configure



Pressing the T/C button for 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:

R FC T/C 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.

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

R B T/C The light flashes the current battery status.

R L T/C 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 9.

Flash Code



This key sets the flash code on the light.

Example Key sequence:

FC 1 2 3 T/C

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.

Example Key sequence:



Operational Mode

Sets the Lanterns Operation mode:

- Dusk to Dawn ,
- Always On,
- Standby

Dusk to Dawn Mode: at Dusk the light sensors will turn on the light and then synchronise to every other light with the same selected flash code.

Always On: the light sensor is disabled and the light is turned on and then synchronised to every other light with the same selected flash code.

Standby Mode: manually forces the lantern to turn off, disables the GPS but with access to daylight it will still charge the battery pack.



Read Operation Mode



Set Operation Mode to Always on



Set Operation Mode to Standby Mode



Set Operation Mode to Dusk to dawn

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	64	100
2*	100	150
3	150	240
4	240	370
5	370	600
* 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.

Hibernation Mode (Advanced users)



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 bettered 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 respond by flashing an acknowledge 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:



and 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 / Hibernation Modes

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



and the lantern will respond with a single long flash.

The Lantern will disable Hibernation Mode and enter Dusk-to-Dawn Mode.

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 Mode Status

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 and it will not have access to daylight, the IR Remote control can be used to configure the lantern into Storage Mode.

You have four minutes to put it a dark environment otherwise it will exit this mode

The lantern will not respond to IR commands. To exit this mode, expose the lantern to daylight for at least 15seconds.

The lantern will automatically enter Storage Mode if 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.

Automatic Identification System

The SL-C415 AIS AtoN is a self contained device supporting both Type 1 (transmit only) and Type 3 (transmit and receive) operation. It is designed for installation in exposed locations on physical AtoN structures. The AIS AtoN can be supplied with an optional sensor interface platform which interfaces to sensors (such as weather instruments) and transmits measured data via AIS messages to surrounding vessels and shore stations.

The AIS AtoN module has an exceptionally low power consumption making it suitable for installation on floating Aids to Navigation with solar charged power systems. The lowest power consumption is achieved when operating as a Type 1 AIS AtoN transmitting only position information. Further description of Type 1 and Type 3 operation is provided below.

AIS AtoN Type 1

A Type 1 AIS AtoN is a transmit only device using the FATDMA (Fixed Access Time Division Multiple Access) access scheme. This requires that the AIS AtoN is configured with fixed AIS time slots in which it will transmit AIS messages. Mobile AIS stations operating in the area where a Type 1 AIS AtoN is installed need to be aware of the time slots allocated to the AIS AtoN. The slots allocated to the AIS AtoN are 'reserved' by AIS Base Station transmissions covering the area in which the AIS AtoN is installed.

This mode of operation therefore requires that an AIS base station is operating in the same area as the AIS AtoN and is configured to make the necessary slot reservations.

AIS AtoN Type 3

Type 3 AIS AtoN has transmit and receive capability and can therefore use either the FATDMA or RATDMA (Random Access Time Division Multiple Access) access schemes. The RATDMA scheme allows the AIS AtoN to internally allocate slots for transmission of AIS messages without reservation from an AIS Base Station.

AIS receive capability also allows a Type 3 AIS AtoN to be configured and queried for status via AIS messages sent from a shore station (known as VDL configuration). An extension of VDL configuration is 'Chaining' where configuration and query commands are passed along a 'chain' of AIS AtoN stations to a distant station beyond the range of direct communication with a shore station.

Supported AIS Messages

The transceiver supports the following AIS message types.

ITU-R M.1371-4 Message number	Description	Transmitted / Received by AtoN Transceiver	Application
6	Binary addressed message	Transmitted and received	The transceiver uses message 6 to send binary data (relating to connected sensors and systems) to a specific shore station. The transceiver can also receive addressed binary messages for the purpose of configuration and control.
7	Binary acknowledge message	Transmitted and received	This message is transmitted to acknowledge receipt of a binary message. The transceiver can also receive acknowledgements relating to its own addressed binary transmissions.
8	Binary broadcast message	Transmitted	The transceiver uses message 8 to broadcast binary data (relating to connected sensors and systems) to all other AIS stations in range.
12	Addressed safety related message	Transmitted	The transceiver can be configured to transmit an addressed safety related message to a specific shore station to alert the operator to an off position, vessel proximity or built in test failure condition.
13	Acknowledgement of received addressed safety related message	Received	The transceiver receives message 13 in acknowledgement of its transmission of message 12.
14	Safety related broadcast message	Transmitted	The transceiver can be configured to transmit a broadcast safety related message to all AIS stations in range to warn of an off position, vessel proximity or built in test failure condition.
20	Data link management message	Received	When operating as a Type 3 transceiver slot reservations made by a shore station using message 20 will be observed by the transceiver.
21	Aids to Navigation report	Transmitted	This is the primary message transmitted by the transceiver. It contains the position, identification and status of the transceiver.
25	Single slot binary message	Transmitted and received	This message can be used for remote (over the air) configuration of the transceiver and configuration of a 'chain' of transceivers.

Supported AIS Messages

The main installation and commissioning steps are:

1. Mount the transceiver in a suitable location on the physical Aid to Navigation
2. If using an external VHF antenna, install the VHF antenna according to the manufacturer's instructions
3. Connect any sensor interfaces and light / RACON monitoring signals
4. Connect power to the transceiver
5. Configure and commission the transceiver via USB (note that this step can be carried out on shore prior to installation in a remote location)

Description of the proAtoN Programming Software Tool

The proAtoN PC application is supplied on the CD packaged with the transceiver. The application provides features for configuration of the transceiver and confirming correct operation before deployment. The main features of the application are:

- Configuration of essential transceiver parameters such as MMSI, name and dimensions
- Configuration of reporting schedules
- Configuration of virtual and/or synthetic AtoN reporting schedules
- Configuration of other messaging features
- GNSS diagnostics
- System diagnostics and alarm display
- Configuration of the source for external equipment status information

The SL-C415-AIS AIS AtoN supports VDL configuration and chaining. For further information please contact Sealite for support.


Installing the proAtoN PC Software Tool

The proAtoN should be installed from the CD supplied with the transceiver. The steps to complete the installation are as follows:

1. Insert the CD into your PC
2. Navigate to the proAtoN folder on the CD
3. Double click the 'setup.exe' item to start the installation process
4. Follow on screen instructions to complete the installation

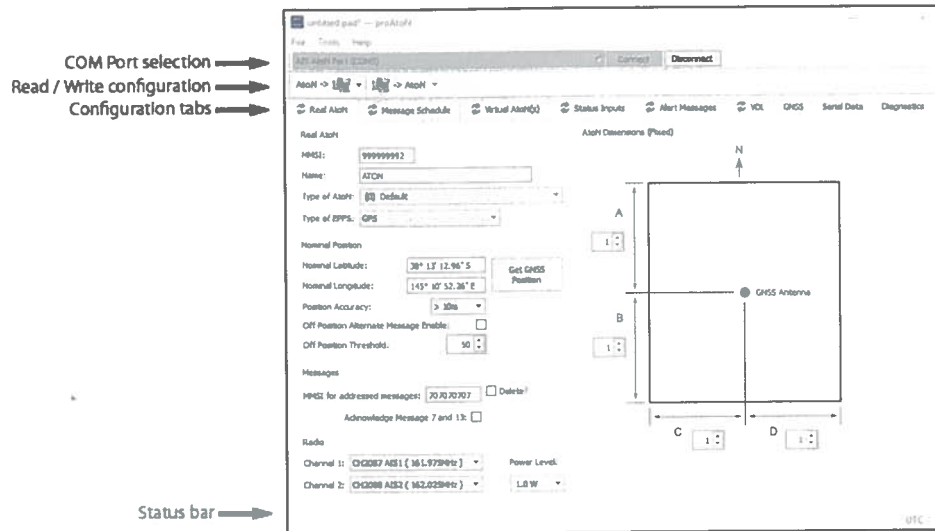
Following successful installation, the application can be launched from the proAtoN folder in the Windows start menu.

USB device drivers for the transceiver are installed automatically during installation of proAtoN. **Note:** the transceiver model is powered from USB Port while connected to the computer.

	CAUTION
	Do not connect Lantern power when configuring the AIS Module. The VHF transmission may damage your computer

Application Layout

The basic layout of the proAtoN application is illustrated in the following figure:



COM Port selection

When connected via USB the COM port associated with the transceiver will be listed in the selection drop down. To connect to the transceiver select the 'AIS AtoN Port' option from the drop down and click the 'Connect' button.

Read / Write configuration

Clicking the left hand button will transfer current configuration information from the transceiver to proAtoN. Clicking the right hand button will configure the transceiver with the information currently displayed in proAtoN. It is possible to select transfer of configuration information relating only to the currently selected tab, or to all tabs by clicking the drop down arrow to the right of each button. The default operation for each button is to read or write data relating to the selected tab only. It is highly recommended that prior to deploying the AtoN the "Send all Configuration" option is used on the write button.

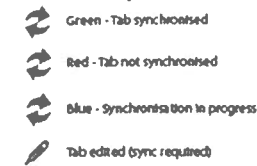
Configuration tabs

The configuration and status of the transceiver is displayed through a number of tabs.

- **Real AtoN tab**
Configuration of AtoN MMSI, name, type, dimensions, position and radio parameters.
- **Message schedule tab**
Configuration of FATDMA or RATDMA message schedules.
- **Virtual AtoN tab**
Configuration of virtual and/or synthetic AtoN transmissions.
- **Status input tab**
Configuration of the source for AtoN status information

When connected to a transceiver a synchronisation status icon is displayed alongside the title of each

tab. This icon indicates the current synchronisation status of the information displayed in that tab with the internal configuration of the transceiver. The synchronisation status icons are illustrated as:



Synchronisation is achieved by either writing the configuration displayed in proAtoN to the transceiver (click the write configuration button), or reading the current configuration from the transceiver for display in proAtoN (click the read configuration button).

Status bar

The status bar displays the current connection status of the application (bottom left) and the current GPS time (if available, bottom right).

Transceiver Configuration

The following sections describe the configuration options available and their effect on the behaviour of the transceiver. Configuration of an AIS AtoN transceiver requires knowledge of the local AIS environment and may require interaction with shore infrastructure. Familiarity with the current IALA guidelines on the use of AIS Aids to Navigation (IALA A-126) is assumed.

Configuration of 'Real' AtoN Parameters

The following parameters associated with the 'real' AIS AtoN transceiver should be configured via the 'Real AtoN' tab:

MMSI

The MMSI number associated with the 'real' AtoN. Typically the MMSI number for a 'real' AtoN station follows the format 99MID1XXX where MID is the appropriate national MID and XXX is a number unique to this station.

Name

The name of the AtoN station as broadcast to other AIS users. Up to 34 characters are available for the name.

Type of AtoN

Select from a list of possible types of AtoN. The types are as defined by IALA in IALA A-126.

Type of EPFS

Select the type of EPFS (Electronic Position Fixing System) used by the transceiver. Note this selection does not affect the hardware configuration, only the contents of the 'Type of EPFS' field in transmitted AtoN position reports. The transceiver is equipped with a GPS module by default. Alternatively for a fixed or shore based transceiver a surveyed position type can be selected. Note that when the surveyed position is selected the surveyed position is broadcast to other AIS users and GNSS position information is ignored.

Nominal position

Enter the nominal or charted position of the AtoN. This is the position transmitted to other AIS users for a fixed AtoN when the 'Surveyed' EPFS type is selected. For all other configurations this position is used to perform 'off position' calculations only; the actual GNSS position is broadcast to other users.

- The application can average the current GNSS position over 5 minutes and use this value for the nominal position. Click the 'Get GNSS position' button to the right of the latitude and longitude fields to begin this process.

- The position accuracy can only be entered when the type of EPFS is set to 'Surveyed'. The accuracy should be set in accordance with the accuracy of the surveyed position.

Off position alternate message enable

The current GNSS position is compared to the nominal position according to the algorithm defined in IALA A-126 Annex A, Example 1. The off position threshold distance is specified in metres. If the transceiver determines that it is 'off position' then the alternate reporting schedule for message #21 (index 2) is enabled. For example, the alternate reporting schedule could be configured to decrease the reporting interval if the AtoN has drifted off position. The off position flag in message #21 is set when off position regardless of this setting.

The transceiver off position algorithm is always operational and compares the current GPS position to the nominal position of the transceiver.



It is essential that valid nominal position is entered and that a reasonable off position threshold is entered. If the default nominal position 00° 00' 00.00"N / 000° 00' 00.00"E is left unchanged then the transceiver will always be 'off position' resulting in the GPS receiver being permanently enabled. This will lead to significantly increased power consumption and the 'off position' flag in the Aids to Navigation report will be set.

MMSI for addressed messages

This is the destination MMSI used for all addressed message types generated by the transceiver. This is usually the MMSI of a shore station collecting status information from the transceiver. It is also possible to enable the acknowledgement of received binary messages (via message #7 or #13).

Dimensions

The dimensions of the AtoN should be entered to the nearest metre. Guidance on the appropriate configuration of dimensions for various types of AtoN can be found in IALA A-126.

Radio channels

Selection of alternative radio channels for AIS transmission and reception is possible, however in most cases the default channels (AIS1 and AIS2) should be used.

Transmitter power level

The transmitter power level for the transceiver can be selected as 1W, 2W, 5W or 12.5W. The default value of 12.5W is appropriate for most scenarios.

AIS Message Schedule Configuration

The layout of the message schedule tab is illustrated below:

Add new message schedules

Current messages and schedules

Message ID	Index	Access Scheme	Channel 1 Start UTC	Channel 1 Start Slot	Channel 1 Interval	Channel 2 Start UTC	Channel 2 Start Slot	Channel 2 Interval
21	1	FATDMA	01:00	100	2250 Slots	03:00	300	2250 Slots
21	2	FATDMA	01:00	100	1750 Slots	03:00	300	1750 Slots
21	1	FATDMA	00:00	700	2250 Slots	04:00	800	2250 Slots

Deactivate or remove selected schedule

Default messages

An AIS AtoN position report is made using AIS message #21. This message occupies two AIS slots. The default configuration shown in proAtoN includes two message #21 schedule configurations. The first configuration, index 1, is the primary position reporting schedule for the transceiver. The second, index 2, is the alternate position reporting schedule selected when the 'off position' monitor is enabled and the AtoN is determined to be off position (see section 7.3.1). If the alternate 'off position' schedule is not required it can be deactivated by selecting the associated row in the message schedule table and clicking the 'Deactivate' button. When deactivated the alternate schedule will be greyed out.

Adding additional messages to the schedule

Additional binary data messages can be added to the schedule table by selecting the required message type from the drop down at the top of this tab, then clicking the 'Add' button. The available message types are:

- Message #8** - for broadcast of binary data to all other stations in range. The binary data may be provided by the extended sensor interface (if present) or third party equipment connected to the transceiver. See section 8 for further information.
- Message #6** - for transmission of binary data to an individual destination MMSI. The destination MMSI is set on the 'Real AtoN' tab. The binary data may be provided by the extended sensor interface (if present) or third party equipment connected to the transceiver.
- Message #12** - for transmission of text messages to an individual destination MMSI. The destination MMSI is set on the 'Real AtoN' tab. This schedule is used for transmission of alert messages.
- Message #14** - for broadcast of text messages to all other stations in range. This schedule is used for transmission of alert messages.

Up to four separate schedules are available for each binary message type. Each individual schedule has an index from 1 to 4 which is used to identify that schedule (for example, message #8 index 2).

Access scheme selection

The access scheme for each message must be selected as either FATDMA or RATDMA. The

selection is made by selecting the required row in the schedule table, then clicking on the current access scheme in that row. A drop down menu will then appear in that location allowing selection of the required access scheme.

FATDMA Schedule configuration

Using the FATDMA (Fixed Access TDMA) access scheme the actual slot for each transmission made by the transceiver is specified. There are 2250 slots per minute (or frame) on each AIS channel. The scheduled slots must be reserved for the transceiver by an AIS base station operating in the same area using AIS message #20. Further information on FATDMA reservations and slot allocation schemes can be found in IALA A-124, Appendix 14.

The parameters required for an FATDMA schedule are as follows.

Channel 1 start UTC

This is the hour and minute for transmission on channel 1. This specifies the AIS frame (minute) within a day in which the start slot for channel 1 resides.

Channel 1 start slot

This is the slot number for the first transmission on channel 1. The slot number can range from -1 (transmission disabled on this channel) to 2249. Note that each message #21 transmission occupies two slots and associated base station slot reservations must therefore reserve two slots.

Channel 1 interval

This is the interval in slots between transmissions on channel 1. The interval can range from 0 to 3240000 slots, which equates to an interval of one day. Typically, the interval is set to 13500 slots (6 minutes) on each channel which results in an overall interval of 3 minutes.

Channel 2 start UTC

This is the hour and minute for transmission on channel 2. This specifies the AIS frame (minute) within a day in which the start slot for channel 2 resides. Typically the channel 2 start time is offset by 3 minutes from the start time used for channel 1. With a 6 minute reporting interval on each channel this results in a transmission every 3 minutes on alternating channels.

Channel 2 start slot

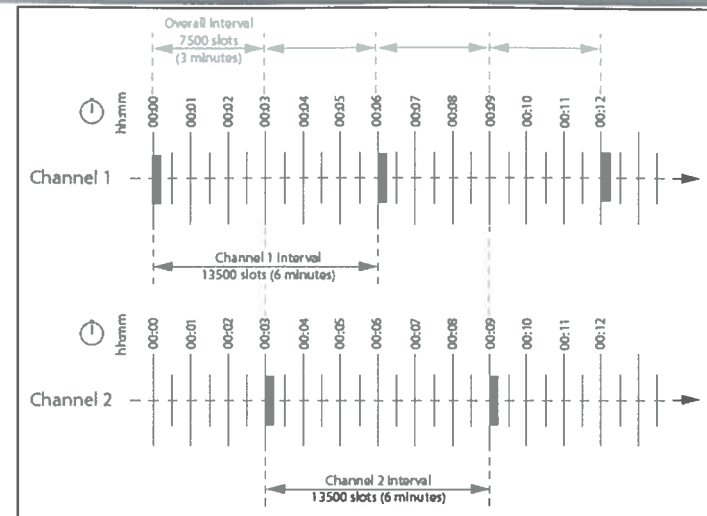
This is the slot number for the first transmission on channel 2. The slot number can range from -1 (transmission disabled on this channel) to 2249. Note that each message #21 transmission occupies two slots and associated base station slot reservations must therefore reserve two slots.

Channel 2 interval

This is the interval in slots between transmissions on channel 2. The interval can range from 0 to 3240000 slots, which equates to an interval of one day. Typically the interval is set to 13500 slots (6 minutes) on each channel which results in an overall interval of 3 minutes.

Example FATDMA schedule

A typical transmission schedule requires that the AIS AtoN transceiver transmit AIS message #21 every three minutes on alternating channels. The transmission schedule is presented diagrammatically in the following figure:



This schedule can be configured using the following values:

- Channel 1 start UTC = 00:00 (the first frame of every hour)
- Channel 1 start slot = 0 (the first slot in the frame, so slots 0 and 1 are used by the message #21 transmission)
- Channel 1 interval = 13500 slots (this equates to a 6 minute interval as there are 2250 slots per minute)
- Channel 2 start UTC = 00:03 (the third frame of every hour)
- Channel 2 start slot = 0 (the first slot in the frame, so slots 0 and 1 are used by the message #21 transmission)
- Channel 2 interval = 13500 slots (this equates to a 6 minute interval as there are 2250 slots per minute)

The transceiver is now configured to report message #21 on channel 1 every 6th minute, and on channel 2 every 6th minute, but offset by three minutes from channel 1. This results in a transmission of message #21 every three minutes on alternating channels. The actual start slot selected for each channel will depend on the FATDMA allocations in the area of operation.

RATDMA Schedule configuration

Using the RATDMA (Random Access TDMA) access scheme the time for each transmission made by the transceiver is specified. The transceiver will determine the actual slots used for transmission based on internal knowledge of the AIS environment gained from the AIS receivers. The parameters required for an RATDMA schedule are as follows.

Channel 1 start UTC

This is the hour and minute of the frame in which transmission will occur on channel 1. The slot used within this frame will be determined by the transceiver.

Channel 1 interval

This is the interval in minutes between transmissions on channel 1. A typical value is 6 minutes.

Channel 2 start UTC

This is the hour and minute of the frame in which transmission will occur on channel 2. The slot used

within this frame will be determined by the transceiver.

Channel 2 interval

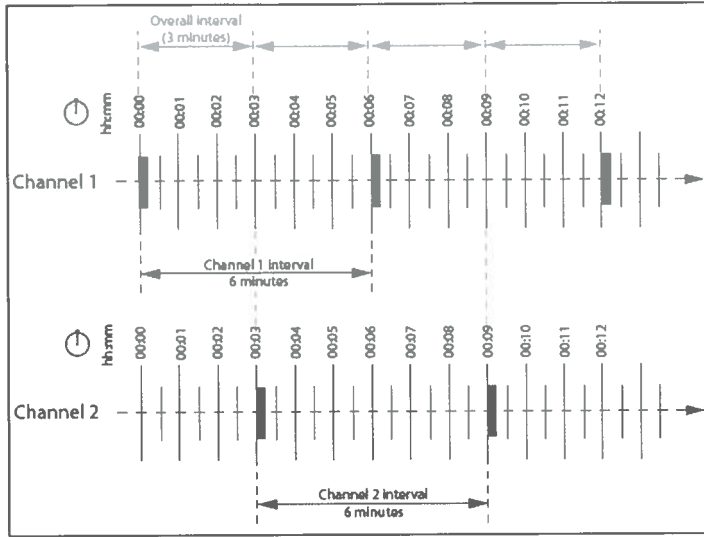
This is the interval in minutes between transmissions on channel 1. A typical value is 6 minutes.

Example RATDMA schedule

A typical transmission schedule requires that the AIS AtoN transceiver transmit AIS message #21 every three minutes on alternating channels. The transmission schedule is presented diagrammatically in the following figure:

This schedule can be configured using the following values:

- Channel 1 start UTC = 00:00 (the first minute of every hour)
- Channel 1 interval = 6 minutes
- Channel 2 start UTC = 00:03 (the third minute of every hour)
- Channel 2 interval = 6 minutes



The transceiver is now configured to report message #21 on channel 1 every 6th minute, and on channel 2 every 6th minute, but offset by three minutes from channel 1. This results in a transmission of message #21 every three minutes on alternating channels. The exact timings of the transmissions within the selected minute will vary as the transceiver selects available slots using RATDMA.

Virtual AIS AtoN configuration

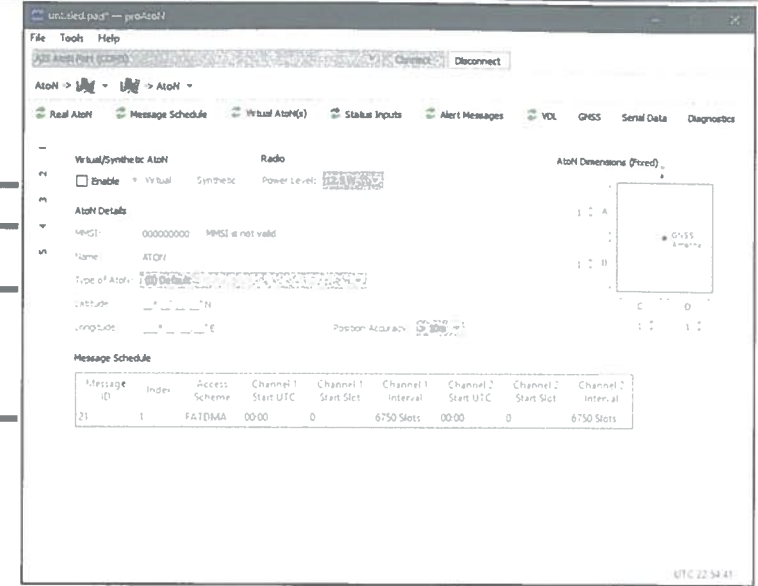
The transceiver can be configured to transmit position reports for up to five virtual or synthetic Aids to Navigation. This configuration is carried out using the Virtual AtoN(s) tab in proAtoN. Within this tab there are sub-tabs relating to each of the five virtual or synthetic AtoNs. The sub-tabs are visible at the left hand edge of the window. The layout of the virtual AtoN configuration tab is provided in the following illustration:

Enable virtual AtoN and select type

Virtual AtoN subtabs

Virtual AtoN details

Virtual AtoN schedule



Virtual AIS AtoN configuration

Each virtual AtoN required must be separately enabled by checking the 'Enable' checkbox. The type of virtual AtoN can then be selected.

Virtual AtoN

A virtual AtoN is transmission of message #21 for an Aid to Navigation that does not physically exist. A virtual AtoN may be used to mark a temporary hazard to navigation, e.g., a wreck. For further information on the use of virtual AtoNs please refer to IALA A-126, IALA O-143 and IALA guideline 1081.

Synthetic AtoN

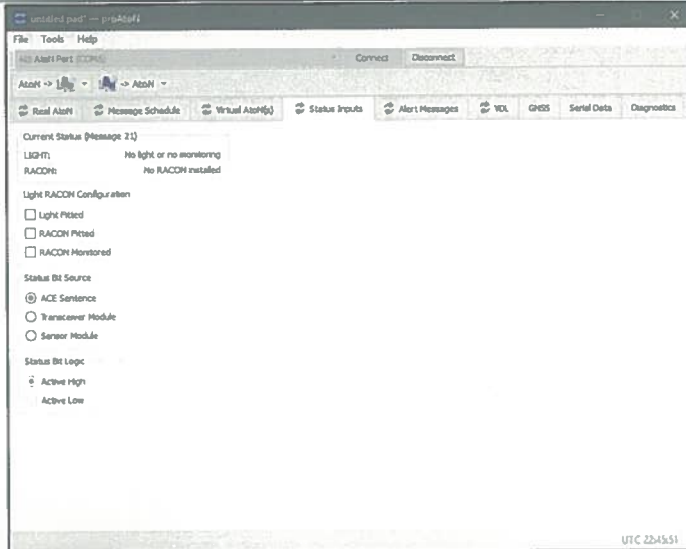
A synthetic AtoN is transmission of message #21 from an AIS station located remotely from the physical Aid to Navigation. An example of use is to provide an AIS AtoN target for a buoy or mark that is not capable of supporting AIS AtoN hardware.

Virtual AIS AtoN Schedule

The transmission schedule for a virtual or synthetic AtoN must be configured in the same way as that for the 'real' AtoN. The TDMA access scheme, start times and intervals must be configured in the virtual AtoN tab.

When an FATDMA schedule is used it is important to ensure the slot allocations used for the virtual and real AtoNs are different in every case. Also note that two consecutive slots are used for each virtual AtoN report.

Status Input Configuration Tab



AIS AtoN position reports (message #21) contain status information encoded as a bit sequence. The status bits contain the basic operational state of a connected light and RACON along with the overall health of the transceiver itself. Connection of a light and/or RACON is optional and requires equipment with a suitable health output.



CAUTION

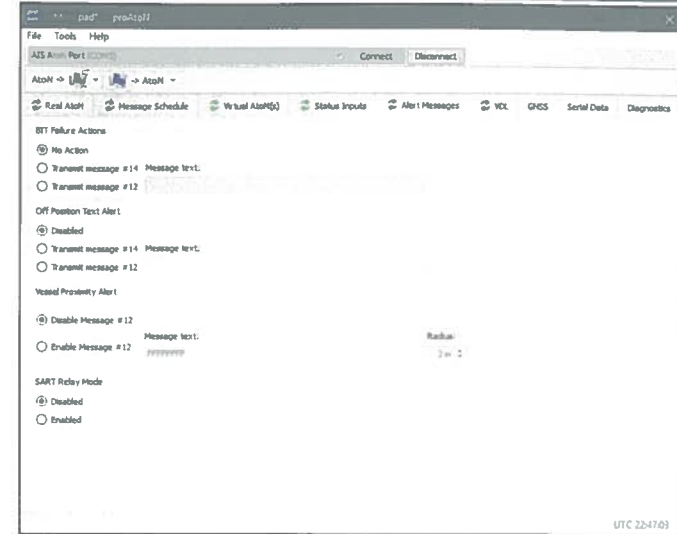
Do not modify these settings as the lantern comes preconfigured for reporting Lantern status via Message 6.

Alert Messages Tab

The transceiver can be configured to transmit text messages for three different alert conditions.

- An addressed or broadcast text message can be transmitted when the transceiver detects a Built In Integrity Test (BIIT) failure.
- An addressed text message can be transmitted to an approaching vessel if the vessel comes within a configurable distance of the transceivers location. This function is only available with Type 3 variants and with full time receiver operation.
- An addressed or broadcast text message can be transmitted when the transceiver determines that it is off position. This message is in addition to use of the alternate schedule for off position reporting (if the alternate schedule is enabled) and does not replace that function.

The layout of the alert messages configuration tab is illustrated in the following picture:



BIIT failure actions

This section allows configuration of the text message to be transmitted on detection of a Built In Integrity Test failure (BIIT failure). Such a failure may indicate a problem with the transceiver and it may be prudent to warn vessels not to rely on the information provided by the transceiver in this situation. Note that the health of the transceiver is always transmitted as part of the standard Aids to Navigation position report (message #21), however the status contained in that message may not be shown on all display systems. The available actions on BIIT failure are:

- No action - no message is transmitted on detection of a BIIT failure
- Transmit message #14. A broadcast text message is transmitted on detection of a BIIT failure. The text content of the message must be defined in the 'Message text' box.
- Transmit message #12. An addressed text message is transmitted on detection of a BIIT failure. The destination for the addressed message is configured on the 'Real AtoN' tab.

In addition to configuration of the BIIT failure action a schedule for the associated message must be configured in the 'Message schedule' tab.

- Message #14 Index 1 must be configured if the message #14 action is selected.
- Message #12 Index 1 must be configured if the message #12 action is selected.

Vessel proximity alert

This section allows configuration of the text message to be transmitted on detection of vessel breaching a defined radius (or guard ring) around the transceiver. This message can be used to warn approaching vessels of potential collision with the AtoN. The addressed message is automatically sent to all vessels that breach the guard ring radius.

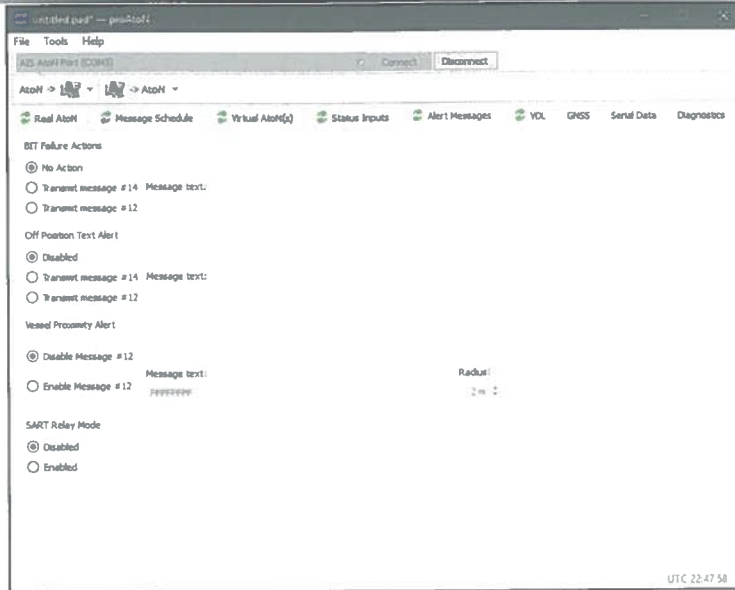
The available vessel proximity alert actions are:

- Disable message #12 - the vessel proximity alert function is disabled
- Enable message #12 - the function is enabled and the text content of the message to be transmitted must be defined in the 'Message text' box. The guard ring radius for the proximity alert must also be configured in the 'Radius' box; note that the value is set in metres.

In addition to configuration of the vessel proximity alert a schedule for the associated message must be configured in the 'Message schedule' tab.

- Message #12 Index 2 must be configured if the message #12 action is selected.

Off Position Alert



This section allows configuration of the text message to be transmitted when the transceiver detects that it is off position. The settings for off position detection are made on the 'Real AtoN' tab. The configuration of an alternative off position message #21 reporting schedule is independent of the configuration of this text alert.

The available off position alert actions are:

- Disabled - no text message is transmitted when the transceiver determines that it is off position
- Transmit message #14. A text message is broadcast when the transceiver detects that it is off position. The text content of the message must be defined in the 'Message text' box.
- Transmit message #12. An addressed text message is transmitted on detection of an off position condition. The destination for the addressed message is configured on the 'Real AtoN' tab.

In addition to configuration of the off position alert a schedule for the associated message must be configured in the 'Message schedule' tab.

- Message #14 index 2 must be configured if the message #14 action is selected
- Message #12 index 3 must be configured if the message #12 action is selected

Transceiver Diagnostics

The proAtoN application provides a number of features to assist with installation of an AIS AtoN and diagnosis of fault conditions. These features are available through the GNSS, Serial Data and Diagnostics tabs in proAtoN. Configuration using proAtoN.

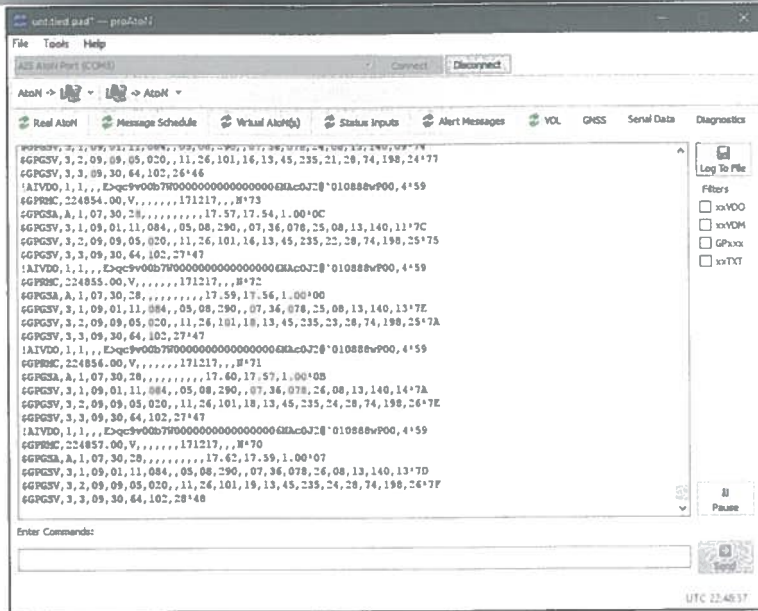
GNSS Tab



The GNSS tab shows the status of the GNSS receiver built into the transceiver. This provides an indication of the quality of the GNSS satellite signals being received along with the current position of the transceiver. At least four satellites with a carrier to noise ratio in excess of 40 dB Hz are required for an acceptable position fix. Relocating the transceiver or connecting an external GNSS antenna can help improve the signal quality and resulting position accuracy.

The internal GNSS receiver supports SBAS (Satellite Based Augmentation Service) to enable improved accuracy and integrity of GNSS position fixes. The availability of SBAS depends on the installation location of the transceiver (the WAAS SBAS service covers most of the US and the EGNOS service covers Europe).

Serial Data Tab

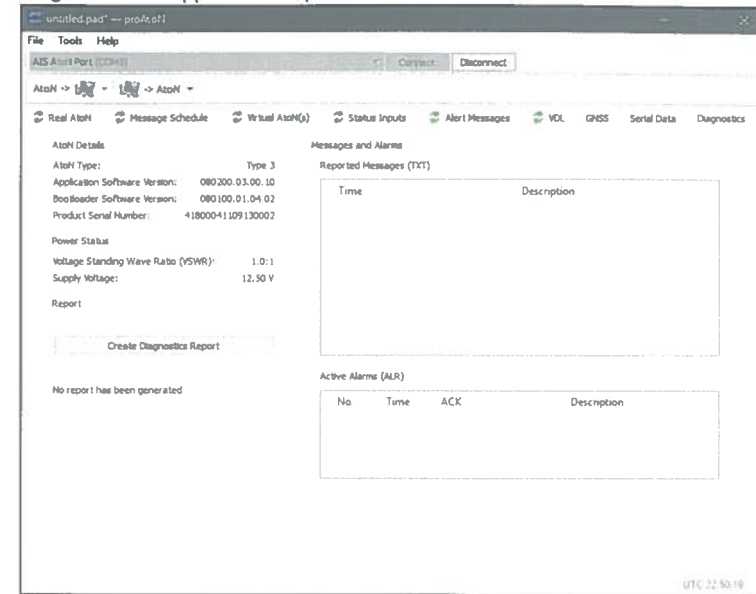


The serial data page shows all data output from the transceiver in NMEA0183 / IEC61162-1 format. It is also possible to send NMEA0183 / IEC61162-1 commands to transceiver if required for technical support or custom configuration. A facility to record the data to a file is provided by clicking the 'Log to File' button.

Certain sentence types can be filtered out of the output window by checking the relevant sentence type in the 'Filters' section of this tab.

Diagnostics Tab

The Diagnostics tab provides system version and status information. This information may be required when requesting technical support for the product.



AtoN Details

- The connected AtoN Type is displayed as Type 1 or Type 3
- The application and bootloader software versions for the connected AtoN are displayed
- The serial number of the connected AtoN is displayed
- The VHF antenna VSWR (Voltage Standing Wave Ratio) as measured at the last AIS transmission is displayed. This value is for indication only. A value better than 3:1 is expected for a good antenna system. The alarm limit for antenna VSWR is set to 5:1. A perfect antenna would give a VSWR of 1:1.
- The system supply voltage is displayed in volts. The supply voltage must be between 9.6V and 32.6V for correct operation. The supply voltage alarm will activate outside of this supply voltage range.

Report Generation

Clicking the 'Generate' button will produce full report of the transceiver status. This report may be requested by technical support personnel. After clicking the button select a suitable file name and location for the report file before clicking save.

Report Messages

During operation the transceiver will output a variety of status messages relating to the current operating state. These messages are for information only and do not represent a fault condition.

IMPORTANT: Please make sure the AIS is connected to the Light head, including the Serial Cable, the GPS and VHF Antennas, before deploying the lantern.

Message text	Description / Resolution
TX attempt failed (msg 6 no payload re-broadcast data)	A transmission of message #6 has failed as the payload data required for this message was not provided (by either the extended sensor interface, or an external system). The likely cause is a configuration error relating to data capture.
TX attempt failed (msg 8 no payload re-broadcast data)	A transmission of message #8 has failed as the payload data required for this message was not provided (by either the extended sensor interface, or an external system). The likely cause is a configuration error relating to data capture.
TX attempt failed (msg 12 no payload re-broadcast data)	A transmission of message #12 has failed as the payload data required for this message was not provided (by either the extended sensor interface, or an external system). The likely cause is a configuration error relating to data capture.
TX attempt failed (msg 14 no payload re-broadcast data)	A transmission of message #14 has failed as the payload data required for this message was not provided (by either the extended sensor interface, or an external system). The likely cause is a configuration error relating to data capture.
Standby blocked: Off position algorithm	The transceiver can't enter standby (low power) mode because the 'off position' algorithm has detected an off position condition. Moving the transceiver within the configured operating radius will resolve this.
Standby Blocked: Acquiring GPS	The transceiver can't enter standby (low power) mode because it is currently acquiring a GNSS position fix. Standby operation will resume when a fix is acquired.
Standby disabled	Standby mode (low power operation) is disabled by configuration.
Standby Blocked: USB connected	The transceiver will not enter standby (low power) mode whilst the USB interface is connected to a PC.
Standby Blocked: Shell running	The transceiver will not enter standby (low power) mode whilst the configuration shell is active.
Standby Blocked: Receivers enabled	The transceiver can't enter standby mode if the current configuration requires that the receivers are active.
Exiting standby	Information only on exit of standby mode.
Entering standby for xx seconds	Information only on entry to standby mode.

Active Alarms

The transceiver incorporates BIIT (Built In Integrity Test) routines which continuously monitor key operating parameters. Should an integrity test fail the failure will be indicated in the active alarms area.

Alarm text	Description / Resolution
Tx Malfunction	A transmitter malfunction has been detected - please contact your supplier.
Antenna VSWR exceeds limits	The VHF antenna VSWR is above the permitted limit. Check the VHF antenna, cable and connections are sound. The VSWR measured at the last transmission is displayed on the proAtoN diagnostics tab.
Rx Channel 1 malfunction	A receiver malfunction has been detected - please contact your supplier.
Rx Channel 2 malfunction	A receiver malfunction has been detected - please contact your supplier.
EPFS failure	No position is available from the internal GNSS receiver - please contact your supplier.
DGNSS input failed	No data is available from the external source of differential GNSS correction data. Please check connections, baud rate and equipment configuration.
Supply voltage	The transceiver power supply voltage is outside of the permitted range. The measured supply voltage is displayed on the proAtoN diagnostics tab.
Low forward power	The transmitter forward power is below a preset limit - please contact your supplier.
Synchronisation lost	Timing information is not available from the internal GNSS receiver - please contact your supplier.

Maintenance & Servicing

Designed to be almost maintenance-free, the SL-C415-AIS Lantern 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, and replace if necessary. The o-ring should be a rubber texture to ensure a complete and even seal.

Replacing the Battery

The SL-C415-AIS lantern has an internal battery compartment, which provides the user with the ability to change the battery after years of operation.

1. Remove the four socket-head screws on the top lens assembly and separate the SL-C415-AIS 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 4Pin connector.
4. Lift the upper battery bracket out of the SL-C415-AIS Lantern.
5. Remove the old battery from the chassis.
6. Contact Sealite if you require a battery.
7. Discard old battery in a safe manner.
8. Reconnect the new battery.
9. Place battery back inside lantern body, and position the upper battery bracket in the top of the chassis.
10. Secure using 2 x M4 cap screws & washers.
11. 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.
12. 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.
13. 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-C415-AIS lantern 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 the ON/OFF switch is in the OFF position.

If an ON/OFF switch is not fitted please 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-C415-AIS Lanterns are built around an internal aluminium chassis. The solar panels can be 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](mailto: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

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 6x1.0mm o-ring.



4. 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.
5. Unscrew the affected panel wires from the regulator and remove the solar panel from the chassis.

6. 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.

7. Repeat the process in the reverse order to replace a new panel.

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 it 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 CSSK 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 CSSK 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.

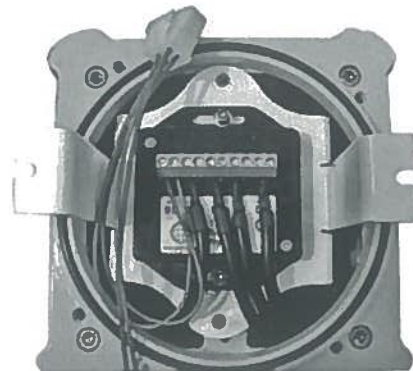
DO NOT OVERTIGHTEN.

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.



Use the label to ensure correct location of wires during assembly

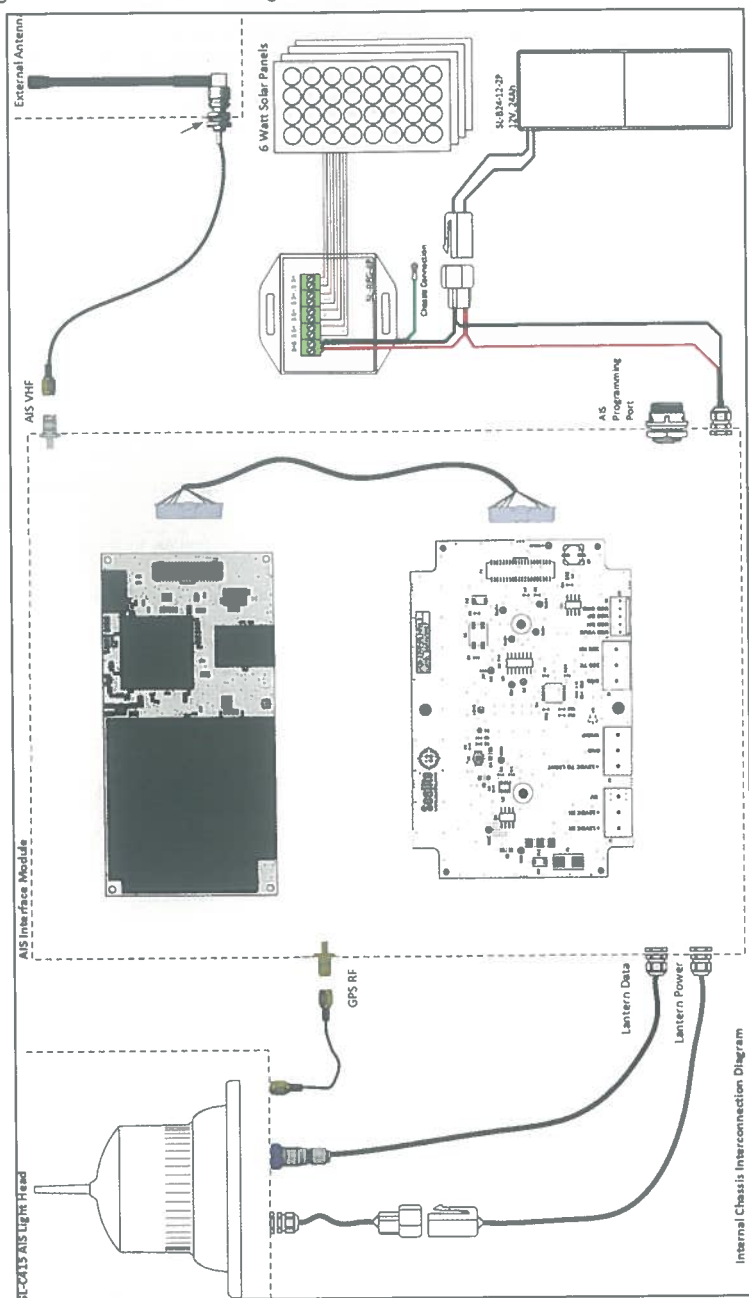


SL10 AMP Regulator shown when correctly fitted

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 switch setting is on a valid code (not unused flash code). • Ensure battery terminals and light head are properly connected. • Ensure battery voltage is above 12volts. • Check the Status LED's on the base of the PCB to determine what type of fault the light is activating.
Flash Codes will not change.	<ul style="list-style-type: none"> • Turn rotary switches several times to ensure contacts are clear.
Lantern will not operate for the entire night.	<ul style="list-style-type: none"> • Expose lantern to direct sunlight and monitor operation for several days. <i>Sealite products typically require 2.5 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.</i> • 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.
Unable to communicate with lantern via USB	<ol style="list-style-type: none"> 1. Connect the USB drive provided by Sealite to the PC and open to view files. 2. Double-click on the file: ???Configx.xx.exe (note, version number may vary) 3. Extract the executable file 4. Connect the lantern to a power source 5. Connect the lantern to the PC 6. Click "COM Setup" 7. Select the appropriate COM Port from the drop down menu in the "Serial Port" dialogue box 8. Ensure the "Open Port" check box is selected and "Port is Open" is displayed 9. Click "Ok" 10. Lantern should be connected and ready for programming
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 lantern is connected to a 12volt power supply
Programming settings will not change	<p>Check programming cable is properly connected to both lantern and computer, and check that the lantern is connected correctly to a power source (and that the power source is charged eg. battery)</p>

The following illustrates the internal wiring of the SL-C415-AIS Lantern.



Sealite LED Light Warranty V2.2

Activating the Warranty

Upon purchase, the Sealite Pty Ltd warranty must be activated for recognition of future claims. To do this you need to register on-line. 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, as per the terms & conditions below.**

Sealite Pty Ltd will repair or replace any ancillary or accessory products in the event of failure for a period of up to one year from the date of purchase, as per the terms & conditions below. The unit(s) 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 ancillary products and accessories, not mentioned in other clauses in this section, 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. Buoy products are covered by a separate 'Sealite Buoy Warranty'.

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.
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 acts and regulations applicable in the country of manufacture, 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.

Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor.
Sealite products are subject to certain Australian and worldwide patent applications.