Document revision history

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SC 160 II
LED Marine Lantern

Product Manual

Version: 1.3
Date: January 11th, 2021

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The document may be updated or changed without notice.

Contents

1. Introduction

The SC 160 II is a self-powered medium-range LED lantern for buoys and minor beacons with up to 10 NM Range with best-in-class optical performance for fixed and floating structures. The lantern includes solar panels, battery and charge controller. This lantern is designed for harsh marine environments and for long uninterrupted operation.

Features

- **Range up to 10 NM (Tc=0,74), 14 NM (Tc=0,85) depending on geographical location**
- **Standard IALA colours Red, Green, White, Yellow**
- **Rugged injection moulded aluminium housing and UV resistant polyethylene body**
- **Programmable with all SABIK wireless programmers, Bluetooth® Control mobile app up to 50m radius**
- **Integrated flasher with day-light switch and solar charger**
- **Integrated event log for 365 days**
- **Standard VRLA battery and ventilated battery compartment**
- **Solar modules covered with tempered glass**
- **Adjustable intensity and range**
- **Available with narrow (5°) or wide (10°) vertical divergence**
- **Optionally integrated GPS Synchronization**
- **Optionally integrated GSM Remote Monitoring**
- **Low power consumption, ideal for solar powered systems.**
- **Flasher with day light switch is integrated in lantern**

Technical specifications table

Specification	Value
Lens visual/Mechanical diameter	160mm
Lens material	UV stabilized Acrylic
Light Source	High power Light Emitting Diodes (LEDs)
Unit Life Time	Up to 10 years
Weight	35 kg
Operating temperature range	-20° – +55°C
Solar modules	3 x 11W
Battery	VRLA GEL-Type, 60Ah/12V
Solar panel charger	Integrated 16 Ampere PWM charger
Power consumption SC 160	13W – 16W
Optical centre height above mounting surface	610mm

Specification	Value
Height x Width	669mm x 500mm
Degree of protection	IP 68 / IP 66 (battery enclosure)
Installation	3 x M12 on 330mm diameter

1.1. Optical performance

Optical performance

Maximum fixed intensity SC 160 II N	5° @ 50% peak intensity FWHM			
	White	Red	Yellow	Green
	1850 cd	1150 cd	1200 cd	1000 cd
Power Consumption	16W	13W	16W	16W

Maximum fixed intensity SC 160 II W	10° @ 50% peak intensity FWHM			
	White	Red	Yellow	Green
	1100 cd	620 cd	720 cd	620 cd
Power Consumption	16W	13W	16W	16W

2. Product Indentification and Options

Product label

Every Sabik unit is supplied with a product label.
(The picture is only an example)

Option matrix for SC 160 II

Product	Options included	Description
SC 160 II OPT 9L	LightGuard GSM + GPS	Integrated GSM/GPS based monitoring including internal GSM/GPS antennas
SC 160 II OPT 4L	GPS sync	Integrated GPS sync including GPS antenna
SC 160 II OPT 1L	Optical feedback	Integrated LED performance measurement
SC 160 II OPT 11L	Battery control card	Control card for secondary (emergency) battery

.

SC 160 II	SC 160N II Narrow Beam (5° @ 50% peak intensity)	SC 160W II Wide beam (10° @ 50% peak intensity)	Beam Colour
	SC 160 II NVW	SC 160 II WVW	White
	SC 160 II NVR	SC 160 II WVR	Red
	SC 160 II NVG	SC 160 II WVG	Green
	SC 160 II NVY	SC 160 II WVY	Yellow

3. Mechanical

The optical lens is made of UV-resistant Acrylic and lantern housing is made of epoxy painted marine grade corrosion resistant aluminium.

There are no serviceable parts inside the optical unit. If the lantern is equipped with Sabik LightGuard, and you must install/change the SIM card or service parts inside the lantern – please contact Sabik for instructions.

The lantern is fitted with a detachable bird deterrent spike.

The optical unit is fully waterproof and pressure tested at factory before shipment.

Pressure equalisation is arranged through a PTFE membrane, mounted on the bottom of the optical head.

3.1. Dimensions and Mounting

The SC 160 II unit is suitable for fixed and floating installations (buoys). The mounting flange supports installation on structures using 3 x M12 bolts on a 330mm diameter, a common mounting arrangement for marine lanterns.

The mounting bolt holes are isolated to prevent galvanic contact with the mounting platform. One of the holes provides earthing connection (PE).

A separate bracket is available for a standard 200mm installation.

3.2. Aligning
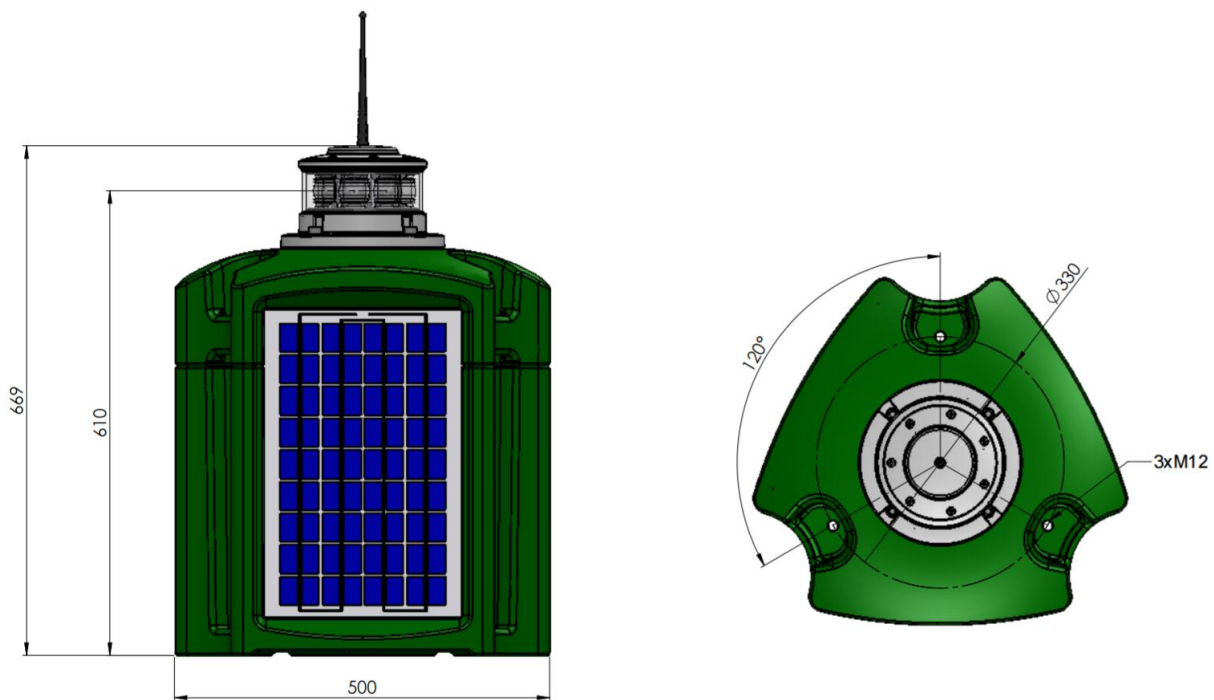
No special aligning is needed. On fixed installations just ensure, that the base is levelled.

4. Electrical

The SC 160 II lantern is operated using built in solar panels, charger and battery. The integrated lantern (VP160) is protected against reverse polarity and short-circuit protected.

4.1. Solar Charger

A programmable solar panel regulator is integrated in the lantern, enabling the lantern to control solar panel charging directly without the need to install an external charger. **The charger is pre-configured by Sabik.**

Recommended charging parameters	Value	Description
Cut-in Voltage	13.8 V	Start charging voltage.
Cut-out Voltage	14.2 V	Stop charging voltage
Minimum Battery Voltage	10.0 V	
Re-connecting Hysteresis	1.0 V	Re-start charging when voltage dropped by this amount.
Temperature Compensation	30 mV/°C	
Charging Mode	PWM	Pulse Width Modulated charging.

4.2. Battery

Battery Specification	Value
Type	VRLA AGM Lead-Acid
Nominal Battery Voltage	12 V
Nominal Battery Capacity	60 Ah
Minimum Discharge Voltage	10.0 V

5.   Programming

Programming the lantern can be done using Bluetooth application for Android or iPhone, Sabik easyProgrammer, Sabik PDA Programmer or Programmer Lite (USB).

IR port and photocell

The combined infrared communication port and Photocell (ambient light sensor) is located in the base of the light unit.

Programming is done by pointing the programmer at the IR port.

The photocell senses daylight and starts/stops the flashing cycle accordingly.

 In the following chapters, you will find programming instructions.

5.1. Bluetooth Control App

The Product is designed for programming and controlling Sabik Bluetooth® enabled lanterns using a simple user-friendly interface. The Android or iPhone app can be downloaded and installed to Bluetooth® 4.0 (Bluetooth® Smart) capable smart phone. The useable range between lantern and phone is usually more than 10m (the range is depending on type of lantern) and maximum up to 50m. The energy consumption of the Bluetooth® chip is very low. These instructions are for Android devices but the instructions for iPhone are very similar.

Standard Features and requirements

The lantern settings can be read to your phone for monitoring purposes. If you have the access rights you also can make changes and send them to the lantern. You cannot store the settings on your phone.
The app requires a minimum of iPhone 4s or a Bluetooth® 4.0 (Bluetooth® Smart) capable Android phone with operating system 4.3 or higher.

5.1.1. Installation

Download

The app can be downloaded from Apple (http://store.apple.com) or Google (https://play.google.com) for free. Observe, that you may have to register yourself before downloading. The app is free of charge.

Installation

Follow the instructions on Google Play or Apple Store.

Registration

For the application to be able to work, you have to register your application using a valid user name and a password. Please contact your dealer to obtain these. This procedure has only to be done once.

5.1.2. Launching the application

After the installation, you should find an icon for the Bluetooth® app. You may relocate it if necessary.
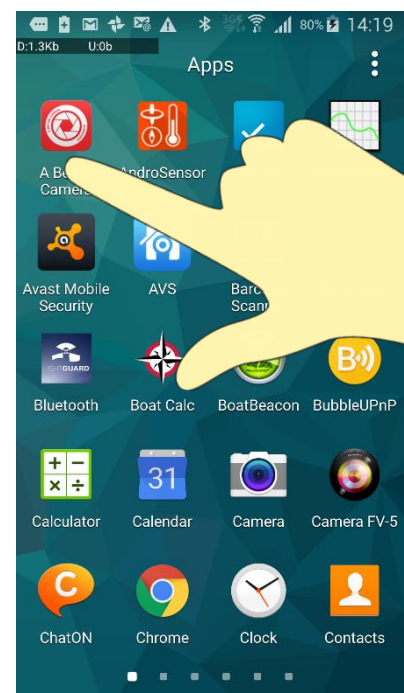
5.1.3. Login and selecting lantern
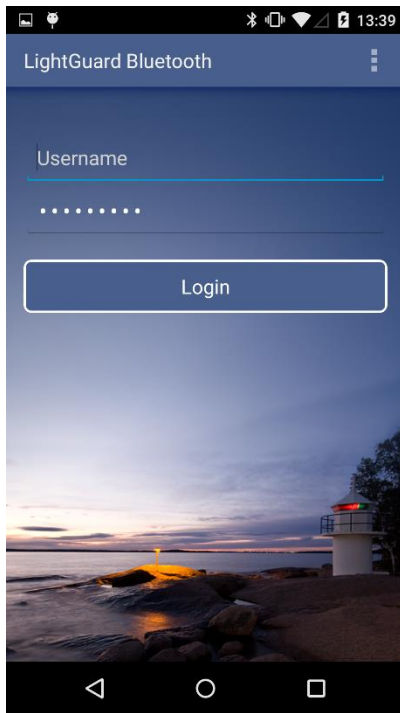
Fill in your user name and password and tap "Login".

-if you don't have a user name and password, please contact your dealer to obtain these.

This information is stored in your device so the next time you will be logged in just by tapping the "Login" button
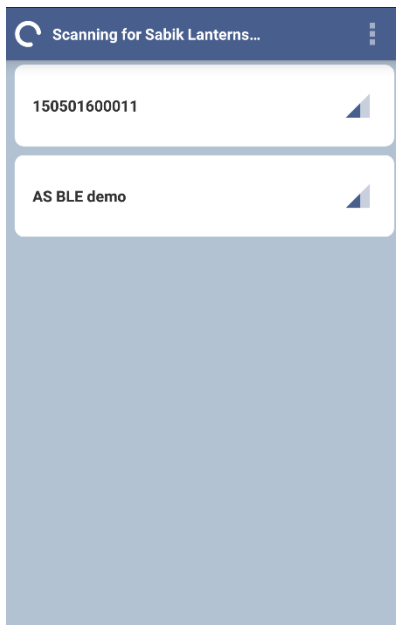
Now the app will search for Sabik lanterns within Bluetooth® range and display them in a list. Any lantern which is connected to another user will not be shown in the list. The lantern serial number is the default Bluetooth® name. This name can be changed using the application. This default serial number is also printed on the lantern. Tap on the name to select it.
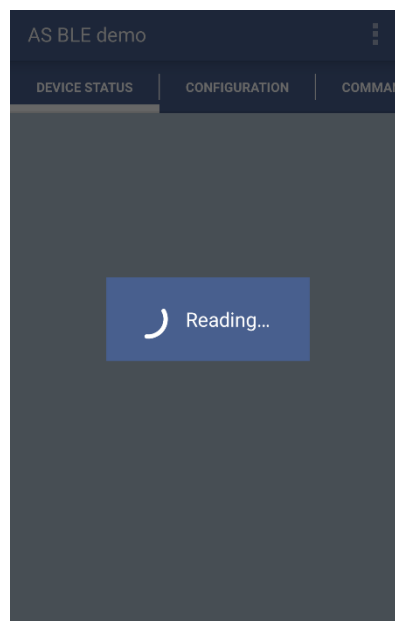
5.1.4. User interface
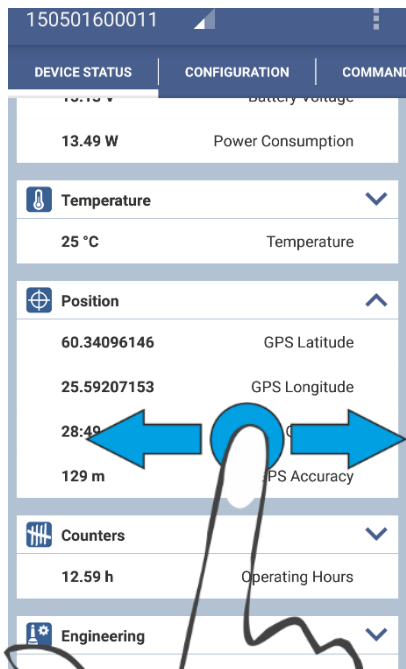
The interface labels are loaded from the lantern, so only the parameters relevant to this lantern are displayed.
For instance, if there is no GPS function in the lantern, none are displayed in the application. The pages shows the standard settings.

The user interface is divided into screens. (DEVICE STATUS, CONFIGURATION, COMMANDS and ABOUT) To select a screen, swipe the screen to the right or left or tap a screen tab.
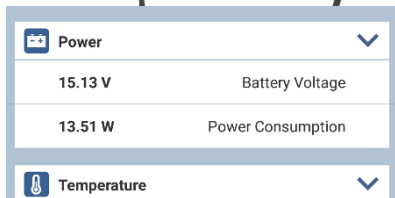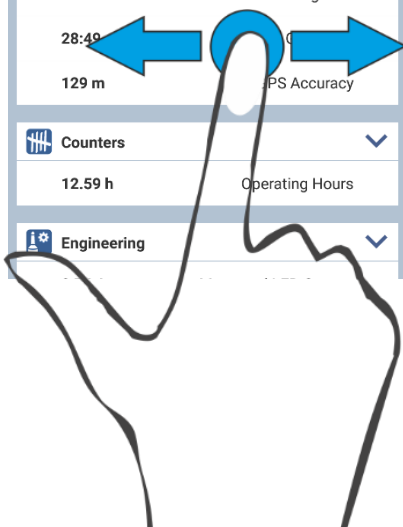
The Screens are divided into expandable blocks (Light, Power, Temperature etc.).
For advanced settings, you have to expand the blocks. To expand a block just tap the ∨ symbol near the right edge
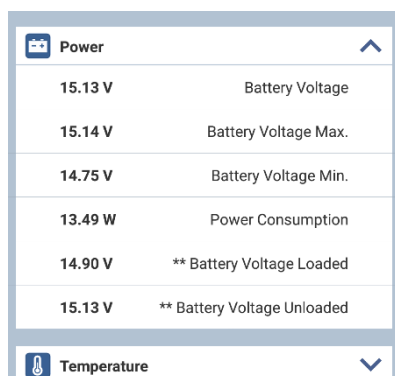
Expanded view for advanced settings. Tap the ∧ symbol to collapse.
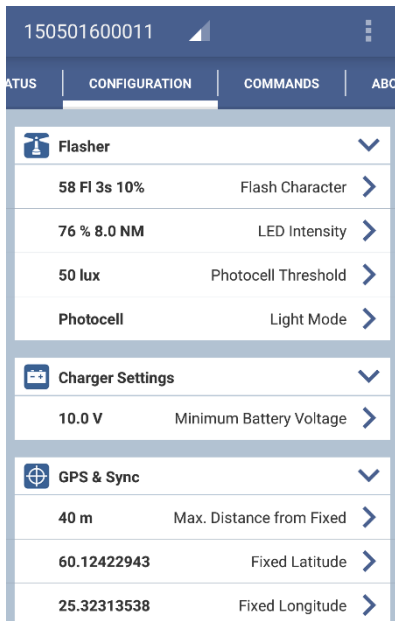
On the **CONFIGURATION** page, you can change the lanterns configuration by tapping the small >-shaped symbol on the right side of the setting's name. If needed, expand the block to see the advanced settings.
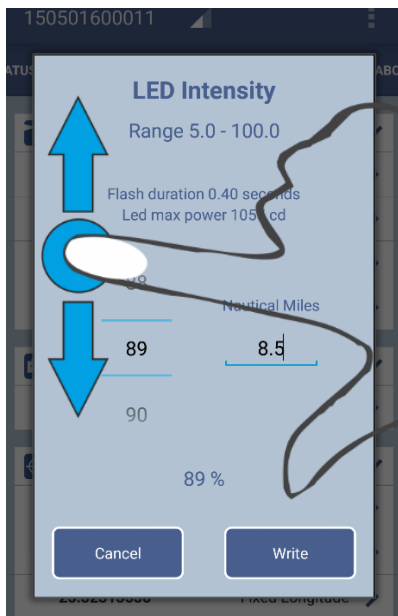
When, for example, LED Intensity is selected, you will be able to adjust the intensity by writing the range (in NM) or adjusting the intensity in percent. You can write the percentage or select it by swiping the numbers up or down.

Tap Cancel to cancel or Write to send the updated value to lantern. The edited parameter is immediately stored in the lantern and the new value flashes briefly after it has verified by the lantern.
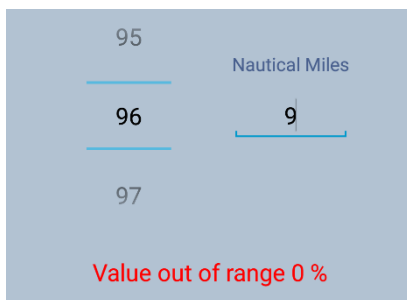
If the set value is too high or low, a warning message is shown and the value cannot be stored.

5.1.5. Pages

On the pages you will find information about the lantern, change settings and send commands. Observe that if your lantern do not have a specific module installed, then there is no information about that module.

DEVICE STATUS

Here you will find information about the Light, Power, Temperature, Position, Counters and Engineering values. You cannot make any changes to the lantern from this page. Observe, that some values/settings may not be available in your lantern.

Light

Light Status:	Shows the current light status, Active/Idle
Lantern Health Status:	Any possible error or warning is shown in the health status
Photocell Value:	Shows the real-time photocell value
Day-to-Night:	Latest transition time from day mode to night mode
Night-to-Day:	Latest transition time from night mode to day mode

Power

Battery Voltage	Real time battery voltage
Battery Voltage Max	Maximum battery voltage during the last 24h
Battery Voltage Min	Minimum battery voltage during the last 24h
Battery Voltage Avg	Average battery voltage during the last 24h
Power Consumption:	Real time power consumption (measured only when light is lit)

Temperature

Temperature	Real time temperature
Max. Temp. 24h	Maximum temperature during the last 24h
Min. Temp. 24h	Minimum temperature during the last 24h
Avg. Temp 24h	Average temperature during the last 24h

Position (If GPS module installed)

GPS Latitude	Latest measured latitude position
GPS Longitude	Latest measured longitude position
GPS Time	Time of last fix
GPS Accuracy	GPS horizontal dilution of precision

Counters

Operating Hours	Total illumination time
Power Cycle Counter:	Indicates the number of times power has been removed from lantern
System Reset Counter:	Number of reboots

Engineering

Measured LED Current
Measured LED Voltage
Lantern Tilt Angle
LED Max Intensity

5.1.6. Configuration

On this page you can review and change the values of the Flasher, Charger, GPS & Sync, Tilt and Impact, Dated Shutdown and Bluetooth® Settings. Tap Write button to send new values to the lantern. The advanced settings are shown in *italics*

Flasher

Flash Character:	Select a standard flash character or create a custom flash character.
LED Intensity:	Change LED Intensity based on intensity percent value or distance (NM)
Photocell Threshold:	Lantern operating ambient light threshold in lux
Light Mode:	Lantern operating mode (Photocell, Forced Idle, Forced Active or Day Lantern)

Advanced Settings
LED Current: ***Product specific setting that must not be changed!***
Photocell Hysteresis: *Hysteresis setting for turning off the lantern (lux)*
Astro Offset Sunrise: *Offset for turning lantern off when in Astro mode (min)*
Astro Offset Sunset: *Offset for turning lantern on when in Astro mode (min)*
Lantern Type: *Lantern Installation Type (Stand alone, Primary or Standby)*
Event log: *Enable (Yes) or disable (No) the Event log*

Charger Settings

Minimum Battery Voltage: Minimum Voltage level for light operation.
Advanced Settings
Cut In Voltage: *Set minimum voltage for start charging.*
Cut Out Voltage: *Set voltage for charger to stop charging.*
Charging Mode: *Set charging mode (On/Off or PWM charging)*
Battery Hysteresis: *Battery reconnecting hysteresis (V)*
Battery Temp. Compensation: *Charging temperature compensation (-mV/°C)*
Boost Charge Hysteresis: *Set boost charge compensation (V)*

GPS & Sync

Max Distance from fixed: Max drift distance from GPS fix (meters)
Fixed Latitude: Set fix Latitude
Fixed Longitude: Set fix Longitude
GPS Check-up Interval: Set position check-up interval (min).
GPS Check-up Duration: Set position check-up duration (min)
Sync Setting: Set lantern Sync mode (Off, Cable, GPS or Cable and GPS)
Advanced Setting
Sync Delay: *Set Sync Delay (sec)*

Tilt and Impact

Tilt angle Limit: Set maximum allowed tilt angle (deg) before shutdown occurs.
Advanced Setting
Shutdown if tilted: *Set lantern to shut down if tilted (Yes or No)*

Dated Shutdown

Dated Shutdown Enabled: Enable or disable dated shut down (Yes or No)

Advanced Settings
Shutdown Date: *Set date to shut down lantern*
Startup Date: *Set date to start up lanter*

Bluetooth Settings

Bluetooth Device name: Set lantern's Bluetooth name

Advanced settings
PIN Code Enabled: *Enable or disable lantern PIN code (give PIN code to change setting)*
PIN Code: *Set new PIN Code*

5.1.7. Commands

On the COMMANDS page you can do a lantern test and download the event log.

Test Lantern

The Test command runs the lantern for 3 minutes.

Download event log

This command will download the full event log to your phone. You can now save it or share it.

5.1.8. About

Device

Product Code
Serial number

Advanced settings
Bluetooth Firmware
Lantern Software Version
GPS Software Version
GPS Hardware Version

5.1.9. Create a custom Flash Character; Step by Step Instructions
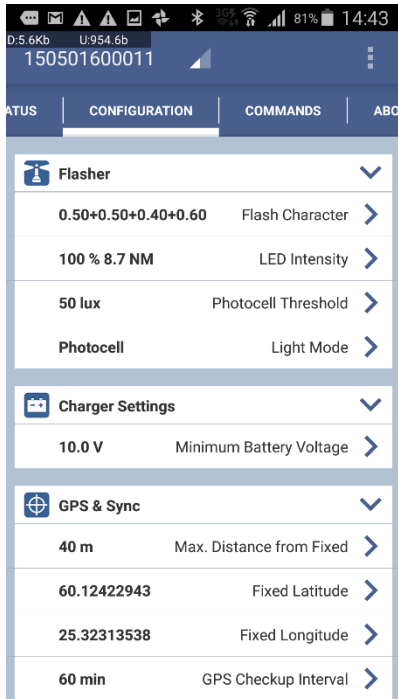
1. Select CONFIGURATION page
2. Tap on > symbol to the right of Flash Character

3. Select an existing Character from the list as a starting point and
4. tap "Edit Flash Signal" to customize the character.
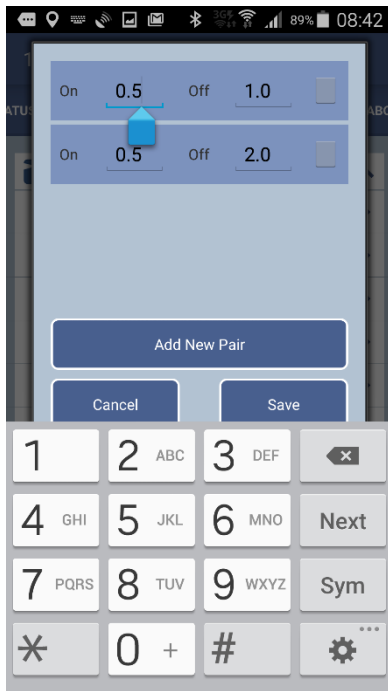
5. Change the On/Off timing. If needed add a new On/Off Pair or delete an existing pair by tapping the gray X. Tap Save, when done.

6. The new character will be saved as Custom.

5.2. Other programming options

5.2.1. Sabik easyProgrammer

Sabik easyProgrammer is a stand-alone simple programmer for lanterns with an infrared-Interface.

With the aid of Sabik easyProgrammer PC software, you can download/upload information to/from the handheld programmer to a Windows based personal computer. This is done using the SABIK Infrared USB interface (sold separately).

Refer to the separate easyProgrammer user guide for more information.

5.2.2. PC USB-interface and SABIK Programmer Lite

Refer to the separate user guide for more information
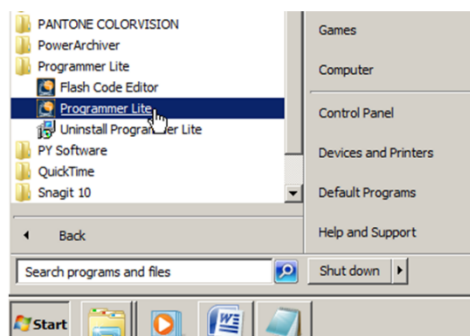
Programmer Lite Main window
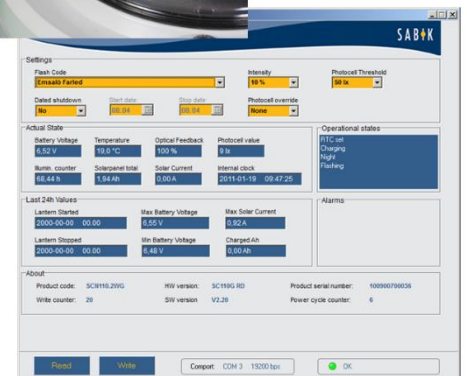
6.   Periodic Maintenance

The SC 160 is a robust lantern, which requires no maintenance, except for periodical lens cleaning. To maintain a good light output and achieve a long service life, it is advisable to visually inspect the lantern whenever visiting the site.

Mechanical inspection and maintenance:
- Clean the metal parts on the lantern
- Check the lens and clean it with a damp cloth (Do NOT use any solvents!)
- Check the mounting bolts and the plastic washers for damage and replace if necessary.
- Check and clean the roof and bird spike if necessary
- Check the lantern for leakage (condensation through the lens)

Functional inspection and maintenance:
- Check that the lantern turns on by covering the ambient light photocell
- Check visually that the LEDs are equal and uniform intensity when lit
- Read controller values with a programmer and check the status (note that values can also be saved in the PDA programmer)
- Check battery voltage with the programmer. If battery voltage is low, replace the battery

7.   Replacing the light unit

There are no user serviceable parts inside the light unit. For servicing/changing of the light source, SIM card or GPS/GSM unit – please contact Sabik or distributor near you.

First unscrew the four hex bolts using an 8mm Allen (hex) key.

Remove and disconnect the light unit.

7.1.   Replacing the battery and/or solar panel

VP160 AIS

Connection box

Battery S12 60Ah

Solar module 11W

SC160 II Enclosure
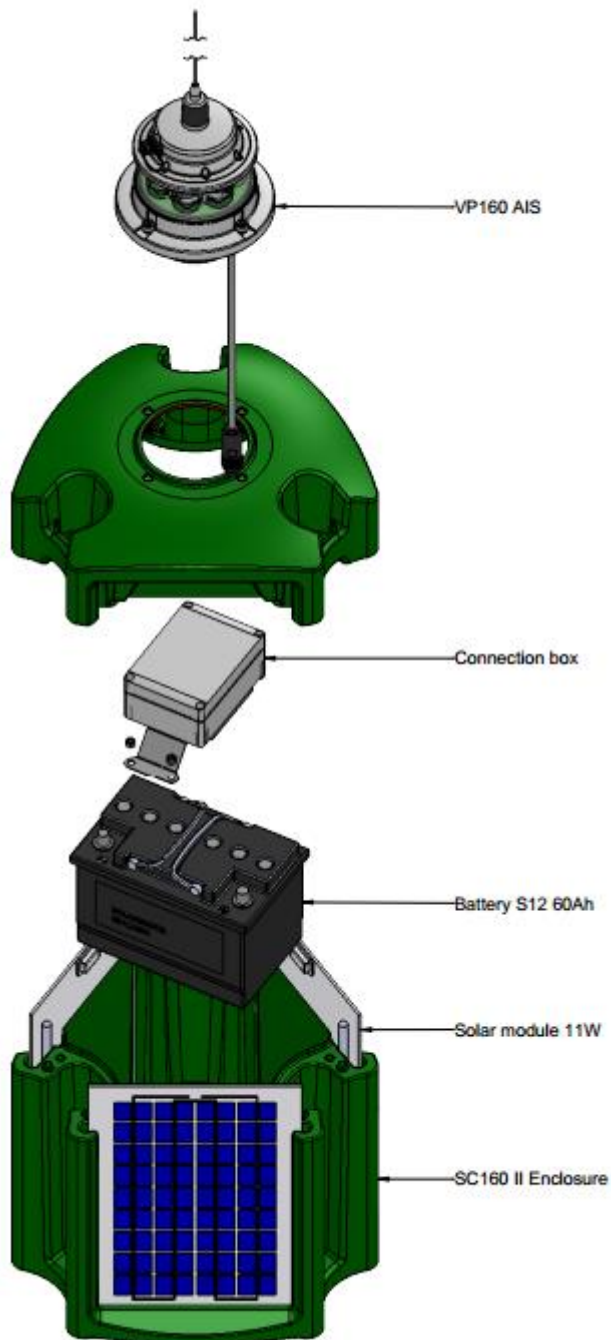
1. First unscrew the four hex bolts using an 8mm Allen (hex) key.
2. Lift up and disconnect the cable to the light unit (VP160).
3. Unscrew the 6 M8 bolts, using a 13mm wrench, to separate the lantern .
4. Remove the protective plastic cover.
5. Unscrew the 3
6. Unscrew the 4 M8 hex bolts, using a 8mm Allen (hex) key.
7. Lift the battery unit from the lantern
8. Disconnect and replace the battery

Carefully pull out the inside contents.

Use a 12mm wrench to disconnect the battery (+ and -) leads.

To change the solar panel, open the junction box and disconnect the leads.

Replace the panel(s) and re assemble the lantern.

Unscrew the four bottom plate screws holding the battery bracket using a 3mm Allen key and a 12mm wrench.

Replace the battery and re-assemble the lantern in reverse order.

8.   Troubleshooting (Q&A)

Q: I covered the photocell, but the lantern does not turn on.

A1: Read controller values with the programmer and check status. The battery voltage is below the minimum programmed value. Replace the battery.

A2: The dated shut-down feature may be enabled. Re-programme to disable shut-down feature

A3: Read controller values with the programmer and check status. The day light sensor setting or read value is abnormal. Re-programme if setting is wrong. Return the lantern for service if the read value is wrong.

A4: Read controller values with the programmer and check status. There is a LED failure error. Return the lantern for service.

Q: I covered the photocell, but the lantern does not turn on and I cannot read controller values with the programmer.

A: Check the battery cables for damage or short-circuit. Replace the battery.

Q: I covered the photocell, but the lantern does not turn on and I cannot read controller values with the programmer even though I replaced the battery.

A: Return the lantern for service.

Q: The lantern seems to work normally, but I cannot read it with the programmer.

A1: Locate the IR eye on your programmer and on the lantern. Place them facing each other.

A2: Try to shade out the sun and put the programmer close to the lens during read process.

A3: Try different angles when reading, the light beam might block out the IR sensor.

Q: There is moisture inside the lantern. Where is the leakage?

A1: Check that the PTFE vent is free and not blocked with bird droppings, which might prevent the lantern from breathing. Replace the vent if required.

A2: Return the lantern for service – the unit should not be opened in field conditions and attempts to repair should not be undertaken unless appropriate product training has been obtained.

9. Flash Character List

On the following pages you will find the Sabik easyProgrammer built-in flash character list.

Number	Flash Character	Duty cycle		Min ON Time	FL1	EC1	FL2	EC2	FL3	EC3	FL4	EC4	FL5	EC5	FL6	EC6	FL7	EC7	FL8	EC8	FL9	EC9
001	Fixed light	100,0%		-	-	-	-															
002	Fl(2) 10s	10,0%	2 Fl(2) 10s 10%	0,50	0,5	1	0,5	8														
003	Fl(2) 10s	10,0%	3 Fl(2) 10s 10%	0,50	0,5	1,5	0,5	7,5														
004	Fl(2) 10s	16,0%	4 Fl(2) 10s 16%	0,80	0,8	1,2	0,8	7,2														
005	Fl(2) 10s	20,0%	5 Fl(2) 10s 20%	1,00	1	1	1	7														
006	Fl(2) 10s	20,0%	6 Fl(2) 10s 20%	1,00	1	1,5	1	6,5														
007	Fl(2) 12s	8,3%	7 Fl(2) 12s 8%	0,50	0,5	1	0,5	10														
008	Fl(2) 12s	25,0%	8 Fl(2) 12s 25%	1,50	1,5	2	1,5	7														
009	Fl(2) 15s	13,3%	9 Fl(2) 15s 13%	1,00	1	2	1	11														
010	Fl(2) 5s	20,0%	10 Fl(2) 5s 20%	0,50	0,5	1	0,5	3														
011	Fl(2) 5s	40,0%	11 Fl(2) 5s 40%	1,00	1	1	1	2														
012	Fl(2) 6s	16,7%	12 Fl(2) 6s 17%	0,50	0,5	1	0,5	4														
013	Fl(2) 6s	26,7%	13 Fl(2) 6s 27%	0,80	0,8	1,2	0,8	3,2														
014	Fl(2) 6s	33,3%	14 Fl(2) 6s 33%	1,00	1	1	1	3														
015	Fl(2) 7s	28,6%	15 Fl(2) 7s 29%	1,00	1	1	1	4														
016	Fl(2) 8s	12,5%	16 Fl(2) 8s 13%	0,50	0,5	1	0,5	6														
017	Fl(2) 8s	25,0%	17 Fl(2) 8s 25%	1,00	1	1	1	5														
018	Fl(2+1) 10s	15,0%	18 Fl(2+1) 10s 15%	0,50	0,5	0,7	0,5	2,1	0,5	5,7												
019	Fl(2+1) 12s	20,0%	19 Fl(2+1) 12s 20%	0,80	0,8	1,2	0,8	2,4	0,8	6												
020	Fl(2+1) 12s	25,0%	20 Fl(2+1) 12s 25%	1,00	1	1	1	4	1	4												
021	Fl(2+1) 15s	20,0%	21 Fl(2+1) 15s 20%	1,00	1	2	1	5	1	5												
022	Fl(2+1) 6s	15,0%	22 Fl(2+1) 6s 15%	0,30	0,3	0,4	0,3	1,2	0,3	3,5												
023	Fl(3) 12S	12,5%	23 Fl(3) 12S 13%	0,50	0,5	2	0,5	2	0,5	6,5												
024	Fl(3) 10s	15,0%	24 Fl(3) 10s 15%	0,50	0,5	1,5	0,5	1,5	0,5	5,5												
025	Fl(3) 10s	30,0%	25 Fl(3) 10s 30%	1,00	1	1	1	1	1	5												
026	Fl(3) 12s	20,0%	26 Fl(3) 12s 20%	0,80	0,8	1,2	0,8	1,2	0,8	7,2												
027	Fl(3) 15s	6,0%	27 Fl(3) 15s 6%	0,30	0,3	1,7	0,3	1,7	0,3	10,7												
028	Fl(3) 15s	10,0%	28 Fl(3) 15s 10%	0,50	0,5	1,5	0,5	1,5	0,5	10,5												
029	Fl(3) 20s	7,5%	29 Fl(3) 20s 8%	0,50	0,5	3	0,5	3	0,5	12,5												
030	Fl(3) 9s	26,7%	30 Fl(3) 9s 27%	0,80	0,8	1,2	0,8	1,2	0,8	4,2												
031	Fl(4) 10s	20,0%	31 Fl(4) 10s 20%	0,50	0,5	1	0,5	1	0,5	1	0,5	5										
032	Fl(4) 10s	32,0%	32 Fl(4) 10s 32%	0,80	0,8	1,2	0,8	1,2	0,8	1,2	0,8	3,2										
033	Fl(4) 12s	26,7%	33 Fl(4) 12s 27%	0,80	0,8	1,2	0,8	1,2	0,8	1,2	0,8	5,2										
034	Fl(4) 15s	13,3%	34 Fl(4) 15s 13%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	8,5										
035	Fl(4) 15s	26,7%	35 Fl(4) 15s 27%	1,00	1	1	1	1	1	1	1	8										
036	Fl(4) 20s	10,0%	36 Fl(4) 20s 10%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	13,5										
037	Fl(5) 20s	20,0%	37 Fl(5) 20s 20%	0,80	0,8	1,2	0,8	1,2	0,8	1,2	0,8	1,2	0,8	11,2								
038	Fl(5) 20s	25,0%	38 Fl(5) 20s 25%	1,00	1	1	1	1	1	1	1	1	1	11								
039	Fl(6) 15s	20,0%	39 Fl(6) 15s 20%	0,50	0,5	1	0,5	1	0,5	1	0,5	1	0,5	1	0,5	7						
040	FL-*	75,0%	40 FL-* 75%	1,00	5	1	1	1														
041	FL-**	70,0%	41 FL-** 70%	1,00	5	1	1	1	1	1												
042	Fl 1.5s	20,0%	42 Fl 1.5s 20%	0,30	0,3	1,2																
043	Fl 1.5s	33,3%	43 Fl 1.5s 33%	0,50	0,5	1																
044	Fl 10s	5,0%	44 Fl 10s 5%	0,50	0,5	9,5																
045	Fl 10s	10,0%	45 Fl 10s 10%	1,00	1	9																
046	Fl 10s	15,0%	46 Fl 10s 15%	1,50	1,5	8,5																
047	Fl 12s	10,0%	47 Fl 12s 10%	1,20	1,2	10,8																
048	Fl 15s	6,7%	48 Fl 15s 7%	1,00	1	14																
049	Fl 2.5s	12,0%	49 Fl 2.5s 12%	0,30	0,3	2,2																
050	Fl 2.5s	20,0%	50 Fl 2.5s 20%	0,50	0,5	2																
051	Fl 2.8s	10,7%	51 Fl 2.8s 11%	0,30	0,3	2,5																
052	Fl 2s	10,0%	52 Fl 2s 10%	0,20	0,2	1,8																
053	Fl 2s	15,0%	53 Fl 2s 15%	0,30	0,3	1,7																
054	Fl 2s	20,0%	54 Fl 2s 20%	0,40	0,4	1,6																
055	Fl 2s	25,0%	55 Fl 2s 25%	0,50	0,5	1,5																
056	Fl 2s	35,0%	56 Fl 2s 35%	0,70	0,7	1,3																
057	Fl 2s	40,0%	57 Fl 2s 40%	0,80	0,8	1,2																
058	Fl 3s	10,0%	58 Fl 3s 10%	0,30	0,3	2,7																
059	Fl 3s	16,7%	59 Fl 3s 17%	0,50	0,5	2,5																
060	Fl 3s	23,3%	60 Fl 3s 23%	0,70	0,7	2,3																
061	Fl 3s	33,3%	61 Fl 3s 33%	1,00	1	2																
062	Fl 4.3s	30,2%	62 Fl 4.3s 30%	1,30	1,3	3																
063	Fl 4.4s	9,1%	63 Fl 4.4s 9%	0,40	0,4	4																
064	Fl 4s	12,5%	64 Fl 4s 13%	0,50	0,5	3,5																
065	Fl 4s	20,0%	65 Fl 4s 20%	0,80	0,8	3,2																
066	Fl 4s	25,0%	66 Fl 4s 25%	1,00	1	3																
067	Fl 4s	37,5%	67 Fl 4s 38%	1,50	1,5	2,5																
068	Fl 5s	6,0%	68 Fl 5s 6%	0,30	0,3	4,7																
069	Fl 5s	10,0%	69 Fl 5s 10%	0,50	0,5	4,5																
070	Fl 5s	20,0%	70 Fl 5s 20%	1,00	1	4																
071	Fl 5s	25,0%	71 Fl 5s 25%	1,50	1,5	4,5																
072	Fl 6s	8,3%	72 Fl 6s 8%	0,50	0,5	5,5																
073	Fl 6s	10,0%	73 Fl 6s 10%	0,60	0,6	5,4																
074	Fl 6s	16,7%	74 Fl 6s 17%	1,00	1	5																
075	Fl 6s	30,0%	75 Fl 6s 30%	1,50	1,5	3,5																
076	Fl 7.5s	10,7%	76 Fl 7.5s 11%	0,80	0,8	6,7																
077	ISO 10S	50,0%	77 ISO 10S 50%	5,00	5	5																
078	ISO 2S	50,0%	78 ISO 2S 50%	1,00	1	1																
079	ISO 4S	50,0%	79 ISO 4S 50%	2,00	2	2																
080	ISO 5S	50,0%	80 ISO 5S 50%	2,50	2,5	2,5																

Number	Flash Character	Duty cycle		Min ON Time	FL1	EC1	FL2	EC2	FL3	EC3	FL4	EC4	FL5	EC5	FL6	EC6	FL7	EC7	FL8	EC8	FL9	EC9
081	ISO 6S	50,0%	81 ISO 6S 50%	3,00	3	3																
082	ISO 8S	50,0%	82 ISO 8S 50%	4,00	4	4																
083	ISO 3S	50,0%	83 ISO 3S 50%	1,50	1,5	1,5																
084	LFL 10S	20,0%	84 LFL 10S 20%	2,00	2	8																
085	LFL 10S	30,0%	85 LFL 10S 30%	3,00	3	7																
086	LFL 10S	40,0%	86 LFL 10S 40%	4,00	4	6																
087	LFL 12S	16,7%	87 LFL 12S 17%	2,00	2	10																
088	LFL 15S	26,7%	88 LFL 15S 27%	4,00	4	11																
089	LFL 5S	40,0%	89 LFL 5S 40%	2,00	2	3																
090	LFL 6S	33,3%	90 LFL 6S 33%	2,00	2	4																
091	LFL 8S	25,0%	91 LFL 8S 25%	2,00	2	6																
092	LFL 8S	37,5%	92 LFL 8S 38%	3,00	3	5																
093	MO(A) 10S	20,0%	93 MO(A) 10S 20%	0,50	0,5	0,5	1,5	7,5														
094	MO(A) 15s	16,7%	94 MO(A) 15s 17%	0,50	0,5	1,5	2	11														
095	MO(A) 6s	21,7%	95 MO(A) 6s 22%	0,30	0,3	0,6	1	4,1														
096	MO(A) 8s	40,0%	96 MO(A) 8s 40%	0,80	0,8	1,2	2,4	3,6														
097	MO(B) 15S	20,0%	97 MO(B) 15S 20%	0,50	1,5	0,5	0,5	0,5	0,5	0,5	0,5	10,5										
098	MO(U) 10S	15,0%	98 MO(U) 10S 15%	0,30	0,3	0,7	0,3	0,7	0,9	7,1												
099	MO(U) 10S	20,0%	99 MO(U) 10S 20%	0,40	0,4	0,6	0,4	0,6	1,2	6,8												
100	MO(U) 10S	25,0%	100 MO(U) 10S 25%	0,50	0,5	0,5	0,5	0,5	1,5	6,5												
101	MO(U) 15S	16,7%	101 MO(U) 15S 17%	0,50	0,5	0,5	0,5	0,5	1,5	11,5												
102	MO(U) 15S	17,3%	102 MO(U) 15S 17%	0,60	0,6	0,3	0,6	0,3	1,4	11,8												
103	MO(U) 15S	22,0%	103 MO(U) 15S 22%	0,70	0,7	0,5	0,7	0,5	1,9	10,7												
104	MO(U) 15S	23,3%	104 MO(U) 15S 23%	0,70	0,7	0,7	0,7	0,7	2,1	10,1												
105	MO(U) 15S	23,3%	105 MO(U) 15S 23%	0,75	0,75	0,45	0,75	0,45	2	10,6												
106	MO(U) 15S	35,5%	106 MO(U) 15S 36%	1,15	1,15	0,73	1,15	0,73	3,03	8,21												
107	MO(U) 15S	39,3%	107 MO(U) 15S 39%	1,30	1,3	0,7	1,3	0,7	3,3	7,7												
108	MO(U) 15S****	21,0%	108 MO(U) 15S**** 21%	0,75	0,75	0,15	0,75	0,15	1,65	11,55												
109	MO(U) 15S*	15,0%	109 MO(U) 15S* 15%	0,45	0,45	0,45	0,45	0,45	1,35	11,85												
110	MO(U) 15S**	17,0%	110 MO(U) 15S** 17%	0,55	0,55	0,35	0,55	0,35	1,45	11,75												
111	MO(U) 15S***	18,0%	111 MO(U) 15S*** 18%	0,60	0,6	0,3	0,6	0,3	1,5	11,7												
112	MO(U) 10S	10,0%	112 MO(U) 10S 10%	0,20	0,2	0,8	0,2	0,8	0,6	7,4												
113	OC 10S	70,0%	113 OC 10S 70%	7,00	7	3																
114	OC 10S	75,0%	114 OC 10S 75%	7,50	7,5	2,5																
115	OC 15S	66,7%	115 OC 15S 67%	10,00	10	5																
116	OC 3S	66,7%	116 OC 3S 67%	2,00	2	1																
117	OC 3S	83,3%	117 OC 3S 83%	2,50	2,5	0,5																
118	OC 4S	75,0%	118 OC 4S 75%	3,00	3	1																
119	OC 5S	60,0%	119 OC 5S 60%	3,00	3	2																
120	OC 5S	80,0%	120 OC 5S 80%	4,00	4	1																
121	OC 5S	90,0%	121 OC 5S 90%	4,50	4,5	0,5																
122	OC 6S	66,7%	122 OC 6S 67%	4,00	4	2																
123	OC 6S	75,0%	123 OC 6S 75%	4,50	4,5	1,5																
124	OC 6S	83,3%	124 OC 6S 83%	5,00	5	1																
125	Q 1.2S	25,0%	125 Q 1.2S 25%	0,30	0,3	0,9																
126	Q 1.2S	41,7%	126 Q 1.2S 42%	0,50	0,5	0,7																
127	Q 1.2S	50,0%	127 Q 1.2S 50%	0,60	0,6	0,6																
128	Q 1S	20,0%	128 Q 1S 20%	0,20	0,2	0,8																
129	Q 1S	30,0%	129 Q 1S 30%	0,30	0,3	0,7																
130	Q 1S	40,0%	130 Q 1S 40%	0,40	0,4	0,6																
131	Q 1S	50,0%	131 Q 1S 50%	0,50	0,5	0,5																
132	Q 1S	80,0%	132 Q 1S 80%	0,80	0,8	0,2																
133	Q(2) 10S	10,0%	133 Q(2) 10S 10%	0,50	0,5	1,5	0,5	7,5														
134	Q(2) 10S	12,0%	134 Q(2) 10S 12%	0,60	0,6	0,4	0,6	8,4														
135	Q(2) 5S	12,0%	135 Q(2) 5S 12%	0,30	0,3	0,7	0,3	3,7														
136	Q(2) 6S	10,0%	136 Q(2) 6S 10%	0,30	0,3	0,7	0,3	4,7														
137	Q(2) 6S	11,7%	137 Q(2) 6S 12%	0,35	0,35	0,7	0,35	4,6														
138	Q(3) 10S	9,0%	138 Q(3) 10S 9%	0,30	0,3	0,7	0,3	0,7	0,3	7,7												
139	Q(3) 10S	10,5%	139 Q(3) 10S 11%	0,35	0,35	0,65	0,35	0,65	0,35	7,65												
140	Q(3) 10S	18,0%	140 Q(3) 10S 18%	0,60	0,6	0,6	0,6	0,6	0,6	7												
141	Q(4) 10S	12,0%	141 Q(4) 10S 12%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	6,7										
142	Q(4) 12S	10,0%	142 Q(4) 12S 10%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	8,7										
143	Q(4) 15S	9,3%	143 Q(4) 15S 9%	0,35	0,35	0,7	0,35	0,7	0,35	0,7	0,35	11,5										
144	Q(4) 20S	10,0%	144 Q(4) 20S 10%	0,50	0,5	0,5	0,5	0,5	0,5	0,5	0,5	16,5										
145	Q(4) 6S	26,7%	145 Q(4) 6S 27%	0,40	0,4	0,6	0,4	0,6	0,4	0,6	0,4	2,6										
146	Q(5) 10S	15,0%	146 Q(5) 10S 15%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	5,7								
147	Q(5) 20S	7,5%	147 Q(5) 20S 8%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	15,7								
148	Q(5) 20S	12,5%	148 Q(5) 20S 13%	0,50	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	15,5								
149	Q(5) 7S	21,4%	149 Q(5) 7S 21%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	2,7								
150	Q(6) 10S	18,0%	150 Q(6) 10S 18%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	4,7						
151	Q(6)+LFL 15S	25,3%	151 Q(6)+LFL 15S 25%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	2	7				
152	Q(6)+LFL 15S	21,0%	152 Q(6)+LFL 15S 21%	0,35	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	1,05	7,95				
153	Q(6)+LFL 15S	37,3%	153 Q(6)+LFL 15S 37%	0,60	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	2	5,8				
154	Q(9) 15S	18,0%	154 Q(9) 15S 18%	0,30	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	0,7	0,3	6,7
155	Q(9) 15S	21,0%	155 Q(9) 15S 21%	0,35	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	0,65	0,35	6,65
156	Q(9) 15S	36,0%	156 Q(9) 15S 36%	0,60	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	4,8
157	VQ 0.5S	30,0%	157 VQ 0.5S 30%	0,15	0,15	0,35																
158	VQ 0.5S	40,0%	158 VQ 0.5S 40%	0,20	0,2	0,3																
159	VQ 0.6S	33,3%	159 VQ 0.6S 33%	0,20	0,2	0,4																
160	VQ 0.6S	50,0%	160 VQ 0.6S 50%	0,30	0,3	0,3																

Number	Flash Character	Duty cycle		Min ON Time	FL1	EC1	FL2	EC2	FL3	EC3	FL4	EC4	FL5	EC5	FL6	EC6	FL7	EC7	FL8	EC8	FL9	EC9
161	VQ(3) 5S	9,0%	161 VQ(3) 5S 9%	0,15	0,15	0,35	0,15	0,35	0,15	3,85												
162	VQ(3) 5S	12,0%	162 VQ(3) 5S 12%	0,20	0,2	0,3	0,2	0,3	0,2	3,8												
163	VQ(3) 5S	18,0%	163 VQ(3) 5S 18%	0,30	0,3	0,3	0,3	0,3	0,3	3,5												
164	VQ(6)+LFL 10S	32,0%	164 VQ(6)+LFL 10S 32%	0,20	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	2	5				
165	VQ(6)+LFL 10S	38,0%	165 VQ(6)+LFL 10S 38%	0,30	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	2	4,4				
166	VQ(9) 10S	13,5%	166 VQ(9) 10S 14%	0,15	0,15	0,35	0,15	0,35	0,15	0,35	0,15	0,35	0,15	0,35	0,15	0,35	0,15	0,35	0,15	0,35	0,15	5,85
167	VQ(9) 10S	18,0%	167 VQ(9) 10S 18%	0,20	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	0,3	0,2	5,8
168	VQ(9) 10S	27,0%	168 VQ(9) 10S 27%	0,30	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	4,9
169	Q(2) 7S	14,3%	169 Q(2) 7S 14%	0,50	0,5	1	0,5	5														
170	Fl(2) 5s	12,0%	170 Fl(2) 5s 12%	0,30	0,3	0,4	0,3	4														
171	Fl(2) 10s	10,0%	171 Fl(2) 10s 10%	0,50	0,5	0,7	0,5	8,3														
172	Fl(5) 20s	12,5%	172 Fl(5) 20s 13%	0,50	0,5	1	0,5	1	0,5	1	0,5	1	0,5	13,5								
173	Fl(2) 10s	20,0%	173 Fl(2) 10s 20%	1,00	1	2	1	6														
174	Fl 4s	10,0%	174 Fl 4s 10%	0,40	0,4	3,6																
175	Fl(2) 5s	16,0%	175 Fl(2) 5s 16%	0,40	0,4	0,6	0,4	3,6														
176	Mo(A) 8s	30,0%	176 Mo(A) 8s 30%	0,40	0,4	0,6	2	5														
177	Fl 2.5s	40,0%	177 Fl 2.5s 40%	1,00	1	1,5																
178	Fl(3+1) 20 s	10,0%	178 Fl(3+1) 20 s 10%	0,50	0,5	1,5	0,5	1,5	0,5	4,5	0,5	10,5										
179	Fl(3+1) 20 s	12,0%	179 Fl(3+1) 20 s 12%	0,60	0,6	1,4	0,6	1,4	0,6	4,4	0,6	10,4										
180	Fl(3+1) 20 s	13,0%	180 Fl(3+1) 20 s 13%	0,65	0,65	1,35	0,65	1,35	0,65	4,35	0,65	10,35										
181	Fl(3+1) 20 s	14,0%	181 Fl(3+1) 20 s 14%	0,70	0,7	1,3	0,7	1,3	0,7	4,3	0,7	10,3										
182	Fl(3+1) 20 s	16,0%	182 Fl(3+1) 20 s 16%	0,80	0,8	1,2	0,8	1,2	0,8	4,2	0,8	10,2										
183	Fl(2) 7s	14,3%	183 Fl(2) 7s 14%	0,50	0,5	1,5	0,5	4,5														
184	Fl(3) 9s	16,7%	184 Fl(3) 9s 17%	0,50	0,5	1,5	0,5	1,5	0,5	4,5												
185	LFL 11s	18,2%	185 LFL 11s 18%	2,00	2	9																
186	Fl(6+1) 15s	33,3%	186 Fl(6+1) 15s 33%	0,50	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	2	7				
187	Mo (0) 12s	37,5%	187 Mo (0) 12s 38%	1,50	1,5	0,5	1,5	0,5	1,5	6,5												
188	Mo (0) 15s	30,0%	188 Mo (0) 15s 30%	1,50	1,5	0,5	1,5	0,5	1,5	9,5												
189	Q 1S	25,0%	189 Q 1S 25%	0,25	0,25	0,75																
190	Q (3) 4.6s	19,6%	190 Q (3) 4.6s 20%	0,30	0,3	0,7	0,3	2	0,3	1												
191	Fl 7.5s	6,7%	191 Fl 7.5s 7%	0,50	0,5	7																
192	Fl (4) 11s	18,2%	192 Fl (4) 11s 18%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	4,5										
193	FL (3) 21s	7,1%	193 FL (3) 21s 7%	0,50	0,5	1,5	0,5	4,5	0,5	13,5												
194	FL (3) 6s	25,0%	194 FL (3) 6s 25%	0,50	0,5	0,5	0,5	0,5	0,5	3,5												
195	FL(3)10s	15,0%	195 FL(3)10s 15%	0,50	0,5	0,5	0,5	0,5	0,5	7,5												
196	FL(9)15s	30,0%	196 FL(9)15s 30%	0,50	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	6,5
197	OC(2)6s	66,7%	197 OC(2)6s 67%	1,00	3	1	1	1														
198	OC(3)8s	62,5%	198 OC(3)8s 63%	1,00	3	1	1	1	1	1												
199	OC(4)10s	60,0%	199 OC(4)10s 60%	1,00	3	1	1	1	1	1	1	1										
200	FL(2)6s	16,7%	200 FL(2)6s 17%	0,50	0,5	1,5	0,5	3,5														
201	FL(1)8s	6,3%	201 FL(1)8s 6%	0,50	0,5	7,5																
202	FL(3)15s	6,0%	202 FL(3)15s 6%	0,30	0,3	1,7	0,3	1,7	0,3	10,7												
203	FL(2)5s	8,0%	203 FL(2)5s 8%	0,20	0,2	0,8	0,2	3,8														
204	FL(2)4s	25,0%	204 FL(2)4s 25%	0,50	0,5	1	0,5	2														
205	FL(2)4.5s	13,3%	205 FL(2)4.5s 13%	0,30	0,3	1	0,3	2,9														
206	FL(3)10s	15,0%	206 FL(3)10s 15%	0,50	0,5	1,5	0,5	1,5	0,5	5,5												
207	FL(3)15s	10,0%	207 FL(3)15s 10%	0,50	0,5	1,5	0,5	1,5	0,5	10,5												
208	Mo(B)16s	25,0%	208 Mo(B)16s 25%	0,50	1,5	0,5	0,5	0,5	1,5	0,5	0,5	10,5										
209	Q 1s	15,0%	209 Q 1s 15%	0,15	0,15	0,85																
210	Fl(2+1) 10s	18,0%	210 Fl(2+1) 10s 18%	0,60	0,6	0,6	0,6	1,8	0,6	5,8												
211	MO(U) 15S	13,3%	211 MO(U) 15S 13%	0,40	0,4	0,5	0,4	0,5	1,2	12												
212	Q 1.2S	16,7%	212 Q 1.2S 17%	0,20	0,2	1																
213	Q(3) 10S	6,0%	213 Q(3) 10S 6%	0,20	0,2	1	0,2	1	0,2	7,4												
214	Q(6)+LFL 15S	44,0%	214 Q(6)+LFL 15S 44%	0,60	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6	3	4,8				
215	VQ(3) 5S	12,0%	215 VQ(3) 5S 12%	0,20	0,2	0,4	0,2	0,4	0,2	3,6												
216	VQ(6)+LFL 10S	48,0%	216 VQ(6)+LFL 10S 48%	0,30	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	3	3,4				
217	VQ(9) 10S	18,0%	217 VQ(9) 10S 18%	0,20	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	5
218	OC (3) 12S	62,5%	218 OC (3) 12S 63%	1,50	4,5	1,5	1,5	1,5	1,5	1,5												
219	OC(4) 12S	66,7%	219 OC(4) 12S 67%	1,00	5	1	1	1	1	1	1	1										
220	FL(3) 12S	25,0%	220 FL(3) 12S 25%	1,00	1	1,5	1	1,5	1	6												
221	FL(4) 15S	26,7%	221 FL(4) 15S 27%	1,00	1	1,5	1	1,5	1	1,5	1	6,5										
222	FL(5) 20S	25,0%	222 FL(5) 20S 25%	1,00	1	1,5	1	1,5	1	1,5	1	1,5	1	9								
223	MO(A)	33,3%	223 MO(A) 33%	1,00	1	1	3	7														
224	FL(5) 20S SADO	12,5%	224 FL(5) 20S SADO 13%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	1,5	0,5	11,5								
225	FL(4) 15S	13,3%	225 FL(4) 15S 13%	0,50	0,5	2	0,5	2	0,5	2	0,5	7										
226	FL(5) 20S	12,5%	226 FL(5) 20S 13%	0,50	0,5	2	0,5	2	0,5	2	0,5	2	0,5	9,5								
227	Q(6)+LFL 15S	28,0%	227 Q(6)+LFL 15S 28%	0,20	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	3	4,8				
228	Q(9) 15S	12,0%	228 Q(9) 15S 12%	0,20	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	0,2	1	0,2	5,2
229	VQ(6)+LFL 10S	42,0%	229 VQ(6)+LFL 10S 42%	0,20	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	0,2	0,4	3	3,4				
230	OC 2s	62,5%	230 OC 2s 63%	1,25	1,25	0,75																

Number: Flash character number used by Sabik.

Flash Character: Flash character name.

Duty Cycle: Light on time (seconds) in percent.

Min flash duration: Shortest light on time in one cycle.

FL1...FL9: Light on times in one cycle (seconds).

EC...EC9: Light off times in one cycle (seconds).