

LHC

Sabik Lighthouse Controller

Product Manual



Document Revision History

[illegible]

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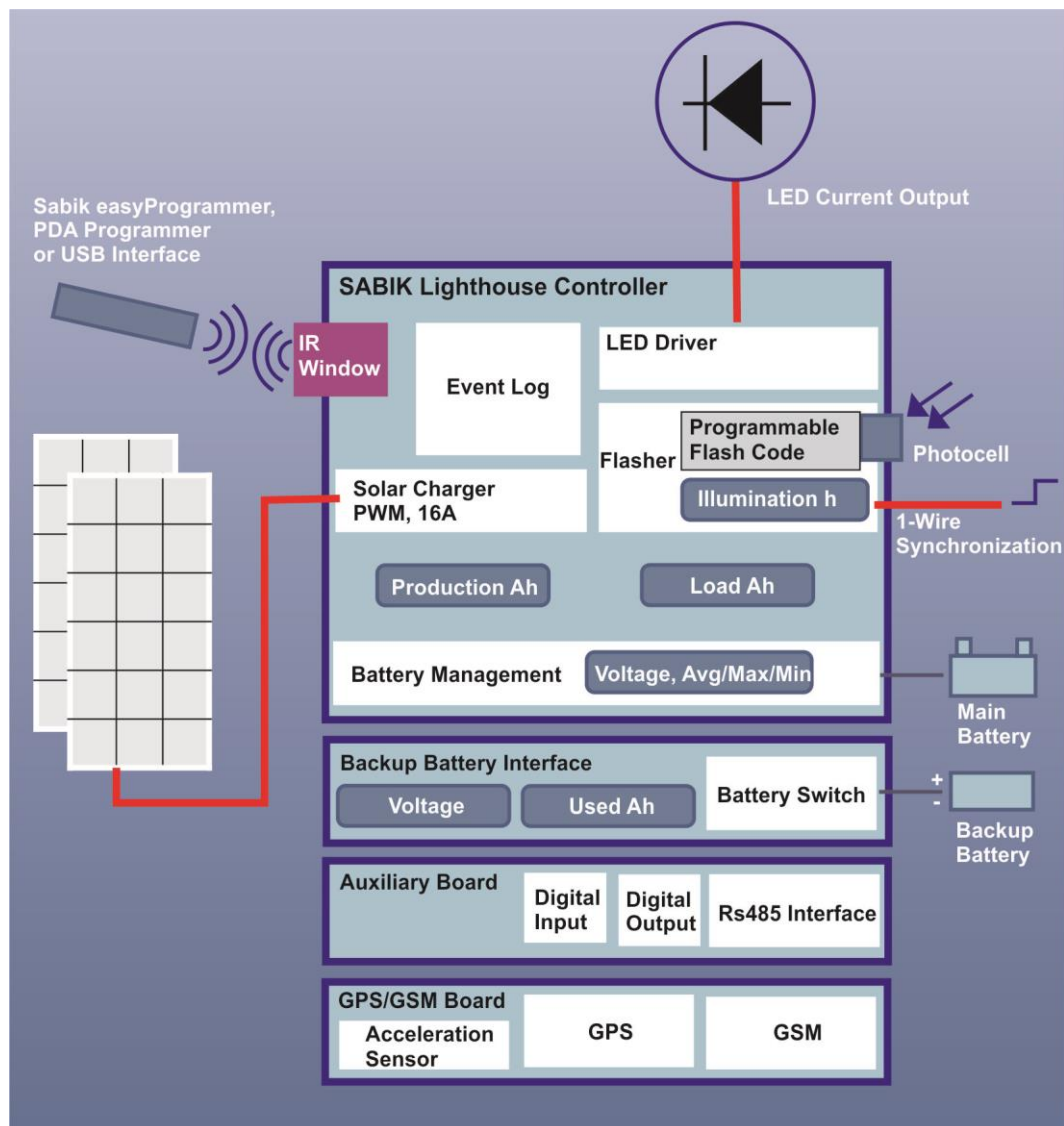
1. Introduction

Sabik Light House Controller (LHC) is a new generation LED lantern controller. LHC comes with all the proven solutions invented by Sabik for the previous generation controllers.

The Sabik LHC is capable of controlling an external LED light source. It also gives a wide range of monitoring.

The LHC is intended for installation in a weather protecting box with cabling to an external LED unit, batteries and solar panel (s). The drawing below describes the functions and connections.

Sabik can provide the controller installed in a weather proof cabinet.



2. Technical Details

2.1. Standard Features

Low energy consumption in all operating stages (daytime idle, night-time active and between flashes).

Idle mode power consumption never exceeds 12 mW (1 mA @ 12VDC)

Nominal LED current adjustable from 0,3A to 1,5A

LED intensity range setting from 5 % to 100 %

Wireless infrared communication link for configuration and maintenance

Daytime sensor calibrated in lux with user configurable levels

16 amp. PWM solar panel charger with temp sensor and user controllable levels

Event log/black box that logs and stores all status changes in the lantern

Power output to LEDs measured, enabling accurate power management of light

Size: Width 200mm, Height 80mm, Depth 70mm

Weight: ca 1,05 kg

2.2. Optional Features

New generation of GSM monitoring with integrated GPS receiver as plug-in units

Power consumption of GSM monitoring less than 25 mW (2 mA) in average

Optical Feedback system

Tilt switch

Secondary battery switch enables lantern to run on two battery sources, second (not rechargeable, primary battery) acting as hot standby.

3. Delivery contents

3.1. Standard delivery options



Sabik LHC



Set of screws and plugs for the enclosure.

Plug and screw set



Ambient light sensor with cable (3m).

Ambient light sensor with cable

3.2. Optional accessories



GSM Rod Antenna (delivered with the optional GPS/GSM module).

GSM rod antenna



GPS antenna with cable (delivered with the optional GPS/GSM module).

GPS antenna assembled



GSM antenna with cable (5m) and pole mount. Optional accessory.

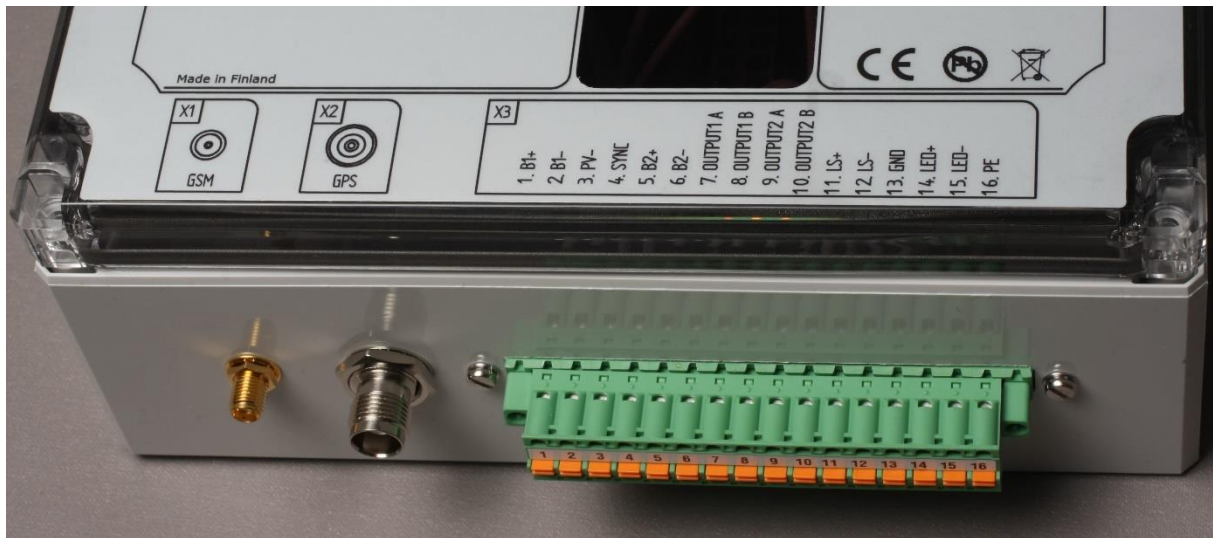
GSM antenna with pole mount

4. Installation

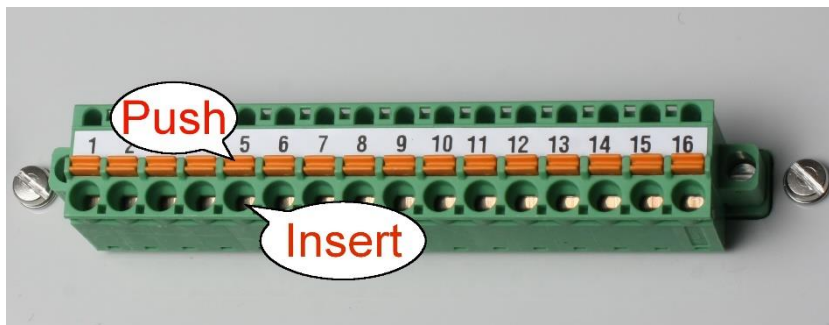
4.1. Mechanical Installation

The Sabik LHC should be installed in a weather-proof cabinet using 4 screws (or bolts) max diameter 4,5mm. 4 screws are supplied for the lid. The GPS and GSM antennas should be installed outside metal cabinets.

4.2. Electrical Installation



Connectors



Connect the needed wires using a small flat headed screwdriver.

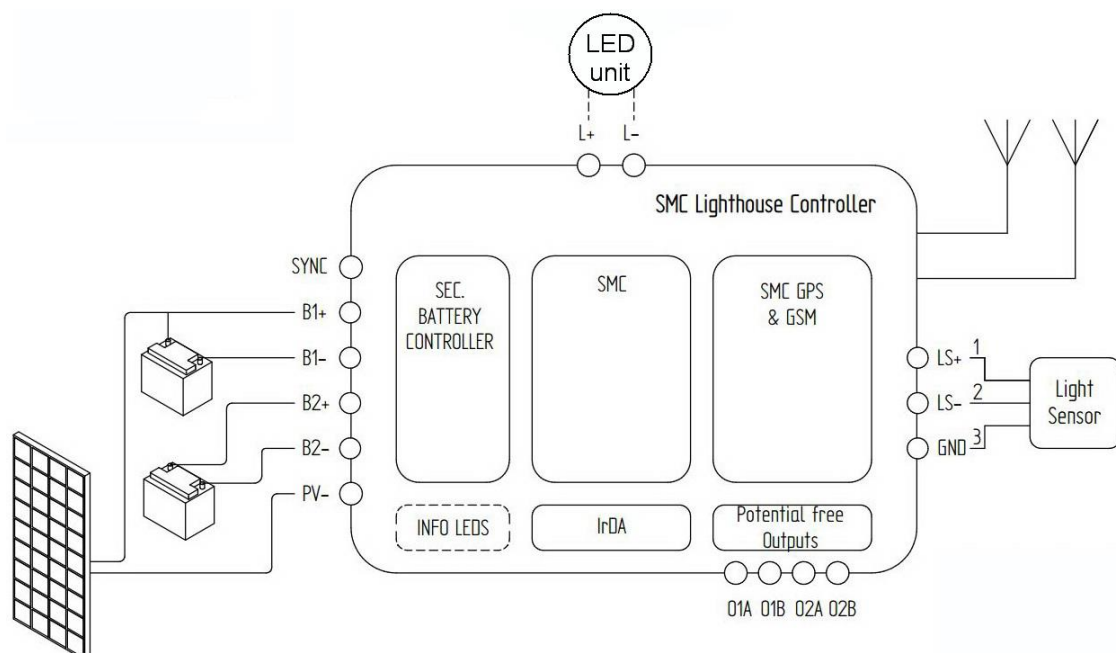


If the LHC is supplied with a GSM/GPS module, connect the antennas here.

4.3. Connections

No	Label	Connection	Explanation
X1	GSM	External GSM Antenna	External GSM Antenna
X2	GPS	GPS Antenna	External GPS Antenna
X3 1	B1+	Main Battery +	Rechargeable battery
X3 2	B1-	Main Battery -	
X3 3	PV-	Solar Panel	Solar panel negative connection
X3 4	SYNC	Synchronization	Wired Synchronization
X3 5	B2+	Backup Battery +	Primary cell (not rechargeable)
X3 6	B2-	Backup Battery -	
X3 7	Out 1A	Output 1A +	PhotoMOS relay LOD (Light On Demand) or Alarm output. A + must be connected to a higher potential than B -
X3 8	Out 1B	Output 1B -	
X3 9	Out 2A	Output 2A +	PhotoMOS relay LOD (Light On Demand) or Alarm output. A + must be connected to a higher potential than B -
X3 10	Out 2B	Output 2B -	
X3 11	LS+	Wire 1	External light sensor connection
X3 12	LS-	Wire 2	
X3 13	GND	Wire 3	
X3 14	LED+	LED+	Connect LED unit
X3 15	LED-	LED-	
X3 16	PE	PE	Protected Earth (PE)

4.4. Wiring Diagram

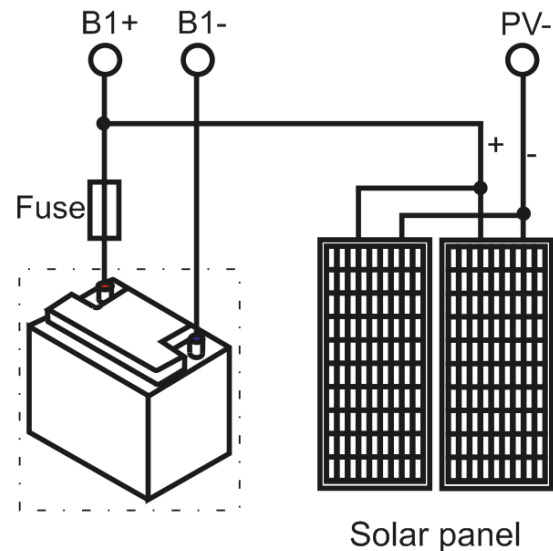


4.5. Solar Charger

A programmable solar panel regulator capable of handling up to 16A is integrated, enabling the LHC to control solar panel charging directly without the need to install an external charger. The charger settings are programmable by the user enabling the LHC to be connected to various types of batteries and also battery voltages.

The solar panel charger is a series charging regulator with temperature compensation (built-in sensor). The solar panel output is controlled by Pulse Width Modulation (PWM) in order to optimize the charging process. In the tables below you can find the typical settings for both lead acid and open cell nickel cadmium types of batteries in 12 and 24 volt systems.

For other types of batteries and other types of nominal voltages, please consult your battery manufacturer for the corresponding values. Please note that the parameters of the solar panel is not visible in the easyProgrammer.



Charger Settings 12V system

Charger Setting	Settings, 12V System	
	VR Lead Acid (default)	Nickel Cadmium
Cut In Voltage	13,8 Volts	14,8 Volts
Cut Out Voltage	14,4 Volts	15,2 Volts
Temperature Compensation	-10 mV/°C	-10 mV/°C

Charger Settings 24V system

Charger Setting	Settings, 24V System	
	VR Lead Acid	Nickel Cadmium
Cut In Voltage	27,6 Volts	29,6 Volts
Cut Out Voltage	28,8 Volts	30,4 Volts
Temperature Compensation	-10 mV/°C	-10 mV/°C

4.6. Various Power Supplies

In this section a number of application examples are provided to assist choosing the right configuration.

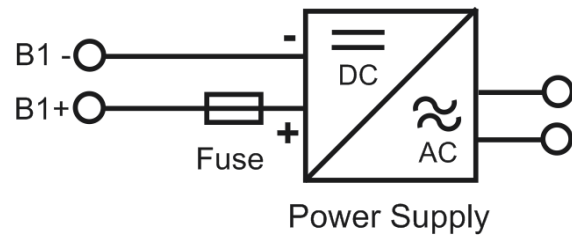
4.6.1. Solar Battery With Photovoltaic

The maximum allowed solar panel current is 16A and must not be exceeded. It is recommended to install a 16 A fuse as close to the battery as possible. Long cables will result in an energy loss due to the voltage drop in the cable. If the charging current exceeds 8A, use 2,5mm² cables.

For correct charging functionality, the corresponding solar panel charging parameters should be set in accordance with the battery technology used. See chapter 4.5 for recommended values for lead acid and Nickel Cadmium batteries.

4.6.2. Other DC Power Supply

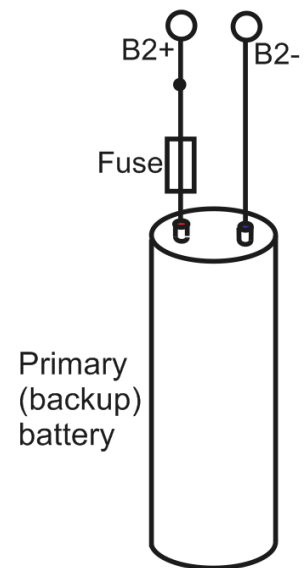
When using AC/DC main operated power supplies, special attention should be paid to make sure that the power supply selected is capable of powering the unit. Especially the ripple, the transient current capability and inductance should be checked against the requirement of the lantern.



4.6.3. Primary Battery

In some installations, a dual battery system may be desired. One main battery acting as the main power supply source and one backup (primary – non rechargeable) battery, only to be utilized in case of main power source failure. The LHC will automatically switch to the primary battery when the main power source fails or voltage drops below pre-set value. If powered by solar system, the controller will still keep on charging the main battery while consuming from the back-up battery. As soon as battery voltage in the main battery has recovered or the battery has been replaced, the controller will switch back to the main battery.

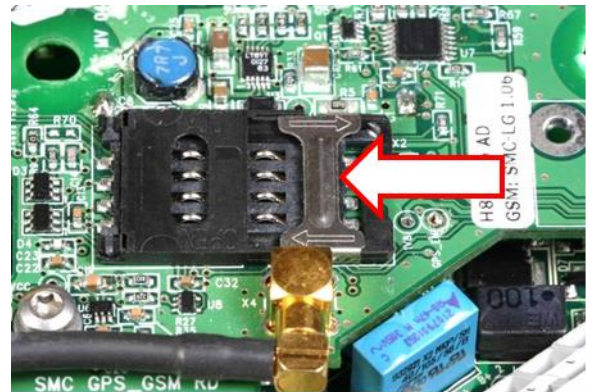
Please note that both power sources must be disconnected from the LHC if the main battery is replaced.



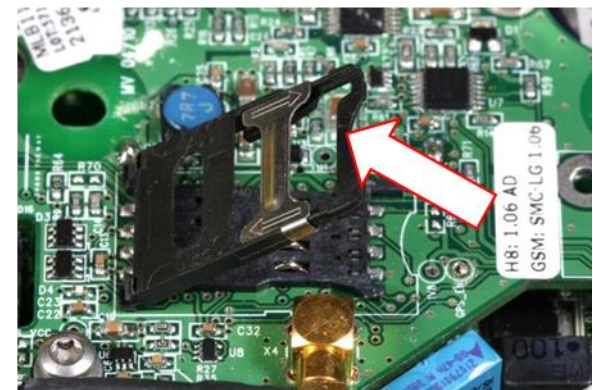
4.7. Insert/Change GSM SIM card

Ensure, that you have grounded yourself before touching any electronics!

Slide the SIM card holder metallic part to OPEN.



Lift up the holder



Insert/replace the card.



Press the holder down and slide the SIM card lock in order to secure the SIM card.



Complete the procedure by closing the enclosure without damaging any gaskets.

5. Programming

Programming the lantern can be done using Sabik easyProgrammer, Programmer Lite (USB), or Sabik PDA programmer by pointing the programmer at the IR window. In the following chapters, you will find programming instructions.

5.1. Sabik easyProgrammer Quick Guide

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

With the aid of 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).



1. Insert batteries (3 standard size AAA)
2. Start programmer: Press green ENTER for at least 2sek.
3. Set/Check Date and time settings: Select ADVANCED -> DATE/TIME

To check/change existing lantern settings

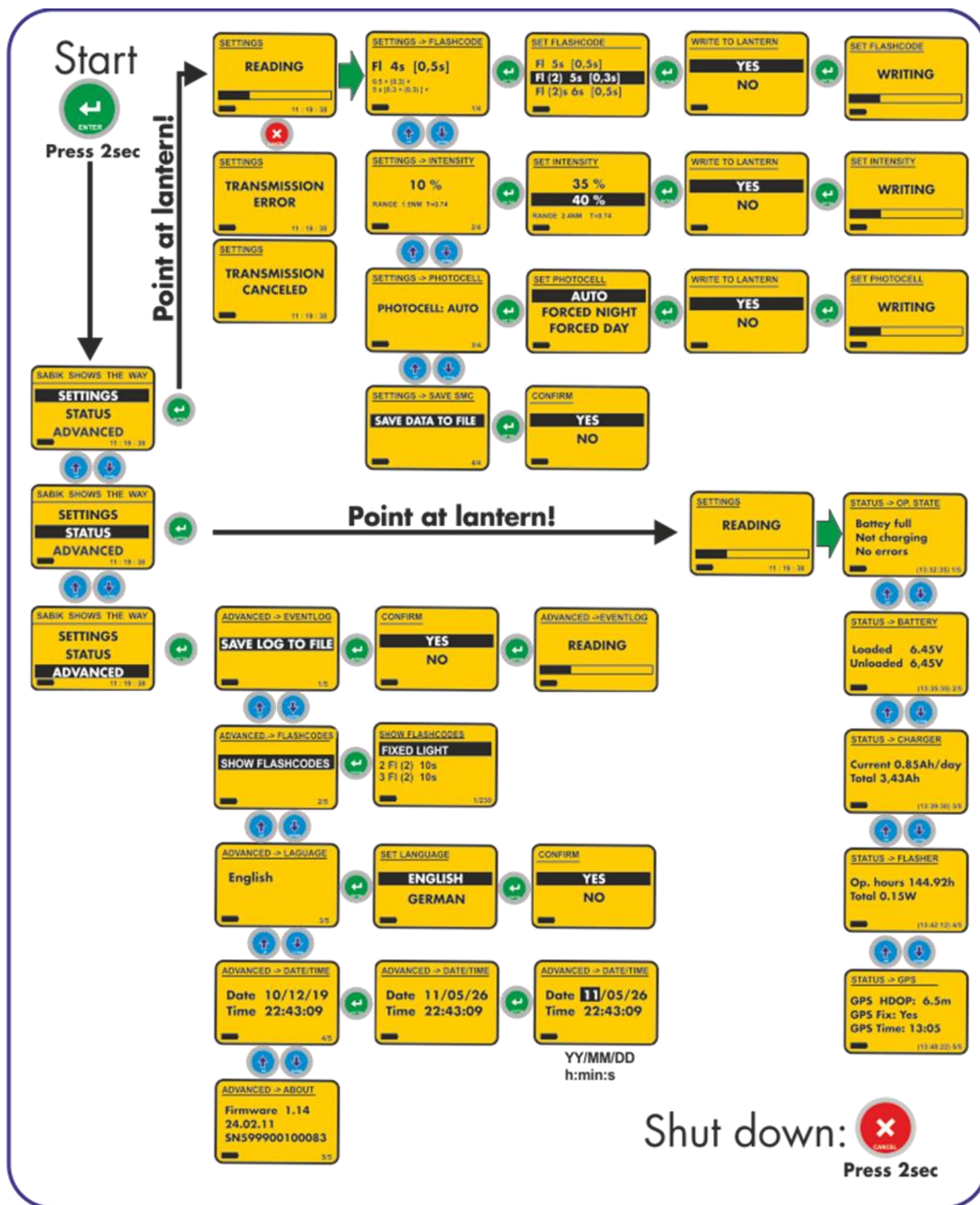
1. Select SETTINGS and press green ENTER
2. Point at lantern's IR diode to read lantern's settings. The programmer beeps twice, when reading is completed.
3. To change existing settings, press DOWN/UP keys to select, and press ENTER to change setting. Press ENTER again to write to lantern.

To set a new flash code

1. Select SETTINGS and press green ENTER
2. Point at lantern's IR diode to read lantern's settings.
3. Press ENTER and select Flash code from the list (pressing and holding UP or DOWN keys you can scroll thru the list).
4. Press ENTER and select YES to send the new flash code to the lantern.

Please refer to the easyProgrammer flow chart below and the product manual for more detailed information.

5.1.1. Sabik EasyProgrammer Flowchart



5.1.2. EasyProgrammer Flash Character List

Updated 2014-07-02.

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

Number: Flash character number used by Sabik.

Flash Character: Flash character name.

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

Min ON Time: 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).

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	FI(2) 10s	10,0%	2 FI(2) 10s 10%	0,50	0,5	1	0,5	8														
003	FI(2) 10s	10,0%	3 FI(2) 10s 10%	0,50	0,5	1,5	0,5	7,5														
004	FI(2) 10s	16,0%	4 FI(2) 10s 16%	0,80	0,8	1,2	0,8	7,2														
005	FI(2) 10s	20,0%	5 FI(2) 10s 20%	1,00	1	1	1	7														
006	FI(2) 10s	20,0%	6 FI(2) 10s 20%	1,00	1	1,5	1	6,5														
007	FI(2) 12s	8,3%	7 FI(2) 12s 8%	0,50	0,5	1	0,5	10														
008	FI(2) 12s	25,0%	8 FI(2) 12s 25%	1,50	1,5	2	1,5	7														
009	FI(2) 15s	13,3%	9 FI(2) 15s 13%	1,00	1	2	1	11														
010	FI(2) 5s	20,0%	10 FI(2) 5s 20%	0,50	0,5	1	0,5	3														
011	FI(2) 5s	40,0%	11 FI(2) 5s 40%	1,00	1	1	1	2														
012	FI(2) 6s	16,7%	12 FI(2) 6s 17%	0,50	0,5	1	0,5	4														
013	FI(2) 6s	26,7%	13 FI(2) 6s 27%	0,80	0,8	1,2	0,8	3,2														
014	FI(2) 6s	33,3%	14 FI(2) 6s 33%	1,00	1	1	1	3														
015	FI(2) 7s	28,6%	15 FI(2) 7s 29%	1,00	1	1	1	4														
016	FI(2) 8s	12,5%	16 FI(2) 8s 13%	0,50	0,5	1	0,5	6														
017	FI(2) 8s	25,0%	17 FI(2) 8s 25%	1,00	1	1	1	5														
018	FI(2+1) 10s	15,0%	18 FI(2+1) 10s 15%	0,50	0,5	0,7	0,5	2,1	0,5	5,7												
019	FI(2+1) 12s	20,0%	19 FI(2+1) 12s 20%	0,80	0,8	1,2	0,8	2,4	0,8	6												
020	FI(2+1) 12s	25,0%	20 FI(2+1) 12s 25%	1,00	1	1	1	4	1	4												
021	FI(2+1) 15s	20,0%	21 FI(2+1) 15s 20%	1,00	1	2	1	5	1	5												
022	FI(2+1) 6s	15,0%	22 FI(2+1) 6s 15%	0,30	0,3	0,4	0,3	1,2	0,3	3,5												
023	FI(3) 12S	12,5%	23 FI(3) 12S 13%	0,50	0,5	2	0,5	2	0,5	6,5												
024	FI(3) 10s	15,0%	24 FI(3) 10s 15%	0,50	0,5	1,5	0,5	1,5	0,5	5,5												
025	FI(3) 10s	30,0%	25 FI(3) 10s 30%	1,00	1	1	1	1	1	5												
026	FI(3) 12s	20,0%	26 FI(3) 12s 20%	0,80	0,8	1,2	0,8	1,2	0,8	7,2												
027	FI(3) 15s	6,0%	27 FI(3) 15s 6%	0,30	0,3	1,7	0,3	1,7	0,3	10,7												
028	FI(3) 15s	10,0%	28 FI(3) 15s 10%	0,50	0,5	1,5	0,5	1,5	0,5	10,5												
029	FI(3) 20s	7,5%	29 FI(3) 20s 8%	0,50	0,5	3	0,5	3	0,5	12,5												
030	FI(3) 9s	26,7%	30 FI(3) 9s 27%	0,80	0,8	1,2	0,8	1,2	0,8	4,2												
031	FI(4) 10s	20,0%	31 FI(4) 10s 20%	0,50	0,5	1	0,5	1	0,5	1	0,5	5										
032	FI(4) 10s	32,0%	32 FI(4) 10s 32%	0,80	0,8	1,2	0,8	1,2	0,8	1,2	0,8	3,2										
033	FI(4) 12s	26,7%	33 FI(4) 12s 27%	0,80	0,8	1,2	0,8	1,2	0,8	1,2	0,8	5,2										
034	FI(4) 15s	13,3%	34 FI(4) 15s 13%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	8,5										
035	FI(4) 15s	26,7%	35 FI(4) 15s 27%	1,00	1	1	1	1	1	1	1	8										
036	FI(4) 20s	10,0%	36 FI(4) 20s 10%	0,50	0,5	1,5	0,5	1,5	0,5	1,5	0,5	13,5										
037	FI(5) 20s	20,0%	37 FI(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	FI(5) 20s	25,0%	38 FI(5) 20s 25%	1,00	1	1	1	1	1	1	1	1	1	11								
039	FI(6) 15s	20,0%	39 FI(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	FI 1.5s	20,0%	42 FI 1.5s 20%	0,30	0,3	1,2																
043	FI 1.5s	33,3%	43 FI 1.5s 33%	0,50	0,5	1																
044	FI 10s	5,0%	44 FI 10s 5%	0,50	0,5	9,5																
045	FI 10s	10,0%	45 FI 10s 10%	1,00	1	9																
046	FI 10s	15,0%	46 FI 10s 15%	1,50	1,5	8,5																
047	FI 12s	10,0%	47 FI 12s 10%	1,20	1,2	10,8																
048	FI 15s	6,7%	48 FI 15s 7%	1,00	1	14																
049	FI 2.5s	12,0%	49 FI 2.5s 12%	0,30	0,3	2,2																
050	FI 2.5s	20,0%	50 FI 2.5s 20%	0,50	0,5	2																
051	FI 2.8s	10,7%	51 FI 2.8s 11%	0,30	0,3	2,5																
052	FI 2s	10,0%	52 FI 2s 10%	0,20	0,2	1,8																
053	FI 2s	15,0%	53 FI 2s 15%	0,30	0,3	1,7																
054	FI 2s	20,0%	54 FI 2s 20%	0,40	0,4	1,6																
055	FI 2s	25,0%	55 FI 2s 25%	0,50	0,5	1,5																
056	FI 2s	35,0%	56 FI 2s 35%	0,70	0,7	1,3																
057	FI 2s	40,0%	57 FI 2s 40%	0,80	0,8	1,2																
058	FI 3s	10,0%	58 FI 3s 10%	0,30	0,3	2,7																
059	FI 3s	16,7%	59 FI 3s 17%	0,50	0,5	2,5																
060	FI 3s	23,3%	60 FI 3s 23%	0,70	0,7	2,3																
061	FI 3s	33,3%	61 FI 3s 33%	1,00	1	2																
062	FI 4.3s	30,2%	62 FI 4.3s 30%	1,30	1,3	3																
063	FI 4.4s	9,1%	63 FI 4.4s 9%	0,40	0,4	4																
064	FI 4s	12,5%	64 FI 4s 13%	0,50	0,5	3,5																
065	FI 4s	20,0%	65 FI 4s 20%	0,80	0,8	3,2																
066	FI 4s	25,0%	66 FI 4s 25%	1,00	1	3																
067	FI 4s	37,5%	67 FI 4s 38%	1,50	1,5	2,5																
068	FI 5s	6,0%	68 FI 5s 6%	0,30	0,3	4,7																
069	FI 5s	10,0%	69 FI 5s 10%	0,50	0,5	4,5																
070	FI 5s	20,0%	70 FI 5s 20%	1,00	1	4																
071	FI 5s	25,0%	71 FI 5s 25%	1,50	1,5	4,5																
072	FI 6s	8,3%	72 FI 6s 8%	0,50	0,5	5,5																
073	FI 6s	10,0%	73 FI 6s 10%	0,60	0,6	5,4																
074	FI 6s	16,7%	74 FI 6s 17%	1,00	1	5																
075	FI 6s	30,0%	75 FI 6s 30%	1,50	1,5	3,5																
076	FI 7.5s	10,7%	76 FI 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																

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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	FI(2) 5s	12,0%	170 FI(2) 5s 12%	0,30	0,3	0,4	0,3	4														
171	FI(2) 10s	10,0%	171 FI(2) 10s 10%	0,50	0,5	0,7	0,5	8,3														
172	FI(5) 20s	12,5%	172 FI(5) 20s 13%	0,50	0,5	1	0,5	1	0,5	1	0,5	1	0,5	13,5								
173	FI(2) 10s	20,0%	173 FI(2) 10s 20%	1,00	1	2	1	6														
174	FI 4s	10,0%	174 FI 4s 10%	0,40	0,4	3,6																
175	FI(2) 5s	16,0%	175 FI(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	FI 2.5s	40,0%	177 FI 2.5s 40%	1,00	1	1,5																
178	FI(3+1) 20 s	10,0%	178 FI(3+1) 20 s 10%	0,50	0,5	1,5	0,5	1,5	0,5	4,5	0,5	10,5										
179	FI(3+1) 20 s	12,0%	179 FI(3+1) 20 s 12%	0,60	0,6	1,4	0,6	1,4	0,6	4,4	0,6	10,4										
180	FI(3+1) 20 s	13,0%	180 FI(3+1) 20 s 13%	0,65	0,65	1,35	0,65	1,35	0,65	4,35	0,65	10,35										
181	FI(3+1) 20 s	14,0%	181 FI(3+1) 20 s 14%	0,70	0,7	1,3	0,7	1,3	0,7	4,3	0,7	10,3										
182	FI(3+1) 20 s	16,0%	182 FI(3+1) 20 s 16%	0,80	0,8	1,2	0,8	1,2	0,8	4,2	0,8	10,2										
183	FI(2) 7s	14,3%	183 FI(2) 7s 14%	0,50	0,5	1,5	0,5	4,5														
184	FI(3) 9s	16,7%	184 FI(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	FI(6+1) 15s	33,3%	186 FI(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	FI 7.5s	6,7%	191 FI 7.5s 7%	0,50	0,5	7																
192	FI (4) 11s	18,2%	192 FI (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	FI(2+1) 10s	18,0%	210 FI(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																

End of list -----

5.2. Configuration using PC USB-interface and SABIK Programmer Lite



Installation of application

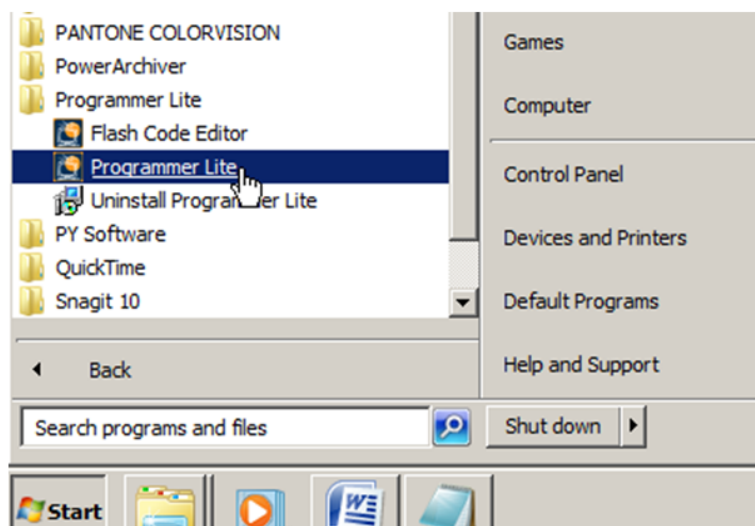


Refer to Sabik Programmer Lite manual for installation of drivers and application.

Launching the application

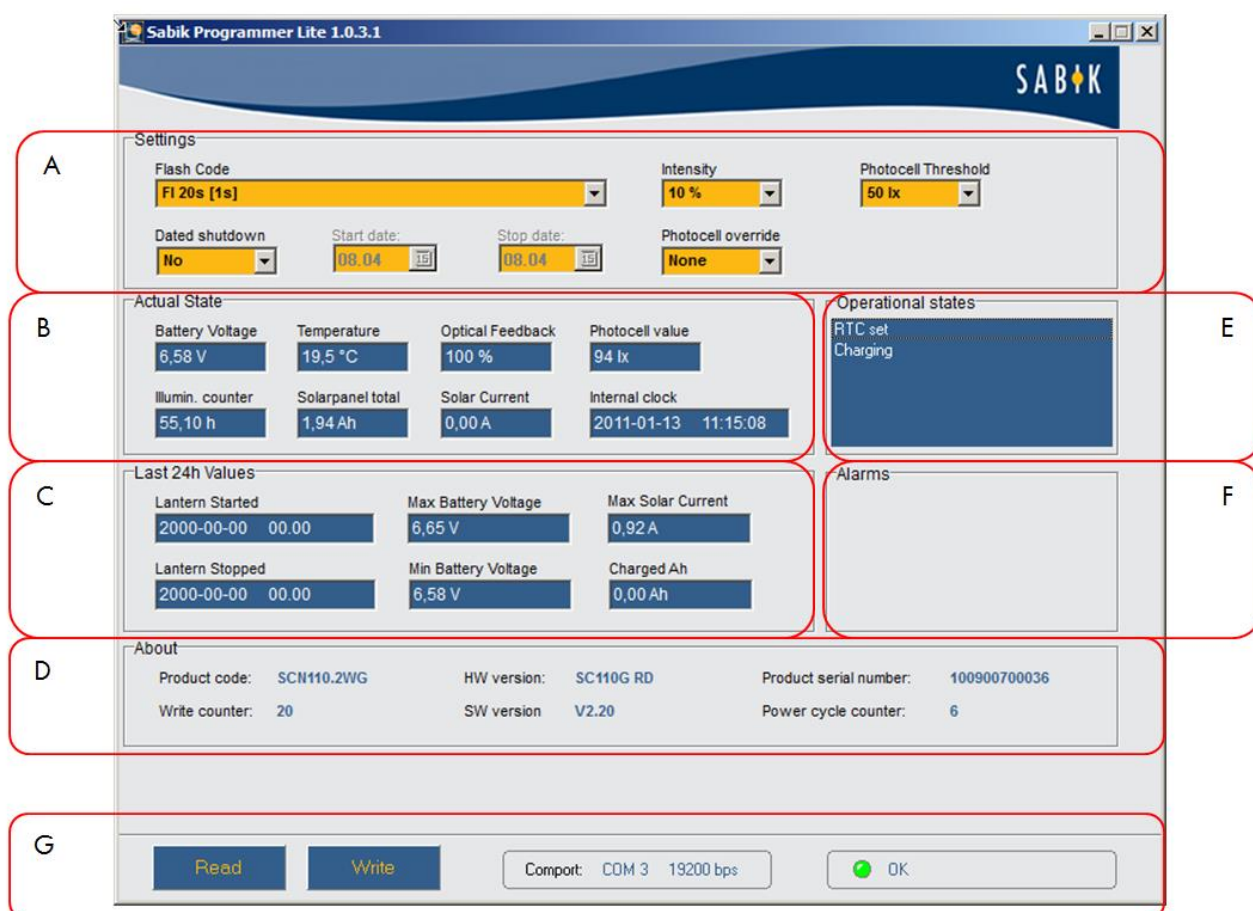
Sabik programmer software can be launched in two ways:

1. Select Programmer Lite from your Start menu or
2. If a shortcut is created on your desktop, double-click on it.



Programmer Lite Main window

When the application is launched, the Main window will appear:



The Main window consists of the following areas:

A. Settings

Flash Code Drop-down list. This list can be edited with the **Flash Code Editor ***.

Intensity Drop-down list. % of maximum value.

Photocell Threshold defines when the flasher starts, selectable 5 – 200 lx

Dated Shutdown. When Yes selected, please specify Start and End dates for, when the lantern is in Idle state.

Photocell override state:

- None: The lantern senses light level and starts/stops flashing.
- Day: The lantern does not flash, even if it is dark.
- Night: The lantern flashes all the time.

B. Actual State displays real values read from the flasher (lantern)

Battery voltage. Volts

Temperature inside lantern. °C

Optical Feedback. If the lantern has OFBS system installed, this value displays the current light level in % of the original value.

Photocell value Current illumination level

Illumination Counter Total time of lantern illumination

Solar Panel Total Solar panel Current Ah

Solar Current Solar panel charging current

Internal clock date and time

C. Last 24h values (read from flasher)

Lantern Started

Lantern Stopped

Maximum Battery Voltage

Minimum Battery Voltage

Maximum Solar Current

Charged. Ah

D. About

Misc. info about the lantern

E. Operational states display

displays the current operational state of lantern.

F. Alarms Display

displays if alarms has occurred.

G. Status bar

Read button reads data from flasher

Write button sends settings to flasher

*The **Flash Code Editor** is a separate application. See the Flash Code Editor instructions provided by Sabik.

COM port settings

To manually select a COM port, double-click Comport –label text, and after that right-click COM port setting to select available port. Right click baud rate to select baud rate.

Connection: USB interface connection and communication status indicator

Yellow = Ready for communication (Click Read or Write button)

Green light = Communication Success

Red light = Communication failed (Timeout)

5.3. Sabik Programmer for WM (PDA Programmer)

The following features are available:

- Wireless communication (IR)
- Event log up to 3 years
- Lantern data stored in PDA memory
- Flexible GUI adjustments for administrators and users
- Data integrity protection

The view of the Programmer may vary depending on platform.

Refer to the Sabik Programmer for WM manual for more information.



6. LightGuard GSM Module

6.1. Introduction

This chapter describes the functions handled by the GSM modem software in the integrated LightGuard module.

6.2. System

The modem communicates with the SMC via a serial interface and using the Modbus protocol. Data from I/Os, GPS, acceleration sensor, current sensor photocell etc. are collected by the microcontroller on SMC and provided for the modem via the Modbus table.

6.3. Key Functionalities

The LightGuard GSM Software has the following key functionalities:

- Provide status information as SMS on event e.g. Power up, Light ON/OFF, fail, low battery, off location, collision
- Provide status information as SMS on interval e.g. at 12:00 every day
- Provide status information as SMS based on a Poll (SMS Command)
- Provide station configuration data as SMS based on change of Configuration or Poll
- Monitor position; Calculate exact position and Off-Location
- Light-On-Demand
- Leading Light Remote shutdown

6.4. Program Cycle

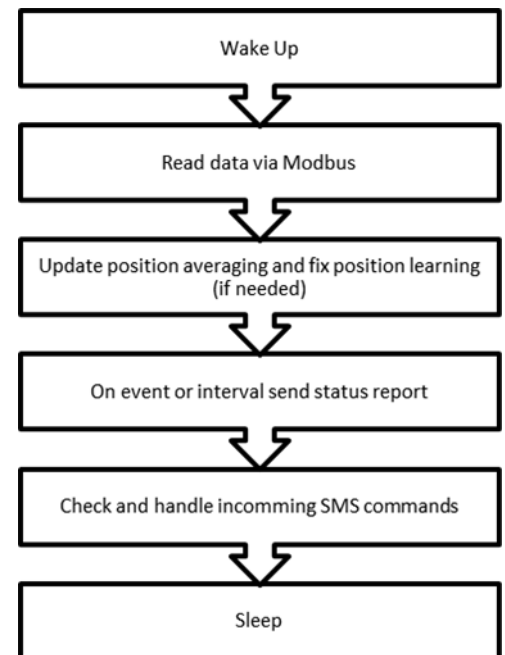
It is essential to reduce the power consumption to a minimum therefore the modem will be in sleep mode most of the time. On incoming SMS, interrupt from the SMC and on 10 minutes interval it will wake up and run the program sequence illustrated on the right.

6.5. Safe guarding functions

The SMC Microcontroller can cycle the power to the modem if the modem stops communication with the SMC over a longer period of time. In case of the modem software “hanging” or the modem being permanently logged-out of the GSM network the microcontroller must be able to reset the modem. If due to modem malfunction: microcontroller, IO fail or fast changing process data the number of SMS sent by the modem increases rapidly the modem or the Microcontroller must stop the transmission.

6.6. Storage Mode

SMC can be set to a special storage mode where power consumption of the lantern is reduced to the absolute minimum. In this mode the GSM modem will not send any SMS or average the position (i.e. switch-on the GPS module).



7. DETAILED FUNCTION DESCRIPTION

7.1. Overview

All important configuration values needed for the remote monitoring section are stored in the non-volatile memory area of the SMC. These values can be read and written via Sabik Programmers or by using SMS commands.

7.2. SMS Command Structure

The command structure for all commands is:

Configure:

COMMAND[=<value 1>[,<value 2>]]

Poll Configuration:

COMMAND?

[] .. optional value

< > configuration value

, separate multiple values

? get configuration

7.3. Default address and report type for automatic messages

The default address can be the subscriber number of a WebScada server or it can be the number of a normal mobile phone. The report format can be configured to send a human readable text report if WebScada is not used.

Command	Function	Usage	Possible response
SDA	Set Default Address	sda? sda[=<number>] <number> valid MSISDN (e.g.+4916012347)	SDA: +4916012347
SRT	Set Report Type, M2M or Text based	srt? srt=<type> <type> 0: WebSCADA Base64 format (default) 1: text message	-

7.4. Status Report on Event and on Interval

- Event report is sent in case of major operational changes or errors. If Event monitoring is enabled the modem reads the Status registers and on bit change a SMS status report is transmitted to subscriber default address. If interval mode is enabled a daily SMS status report is transmitted to the subscriber default address. The time when the report is transmitted is defined in the Report Time register as Local Time.

Command	Function	Usage	Possible response
ERM	Configure event report mode	erm? erm=<mode> <mode> 0 OFF DISABLED: off 1 ALARM: on alarm only 2 WARNING: on warnings and alarms 3 ALL: on info, alarm and warning	ERM: ERROR ERM: <mode>
IRM	Configure interval report mode	irm? irm=<time> <time> 0: no message on interval 1-24: local time to send report (e.g. 12 = 1200h)	IRM: ERROR IRM: <time>

7.5. Configuration Report

- If the station configuration changes, the updated configuration will be sent to WebSCADA automatically. If Report type is set to Text report the modem will not send any report.

7.6. Position Monitoring

- The position monitoring is used to determine whether the buoy is on location or not. If the buoy is off location the LightGuard will transmit status message ASAP with OLI set high.
- The SMC or LightGuard Basic will calculate the average position and filter out bad readings. The duration of the averaging is configured with the GPS Duration of Averaging and the interval of turning on the GPS is defined in the GPS Positioning Interval register.
- A separate command can be used to set the maximum allowed deviation from the fix location. The fix position can be adjusted or set using the FIX command. If the FIX command is used without the longitude and latitude arguments the LightGuard will start a position monitoring session and use the averaged position

as the new fix location. The duration of the session is defined with the GPS command.

- NOTE! To avoid excessive communication is a situation where the buoy is positioned on the edge of the radius three out of location positions is needed to raise the OLI flag.

Command	Function	Usage	Possible response
GPS	Configure GPS positioning interval and duration	gps? gps=<interval>,<duration>	
DEV	Configure deviation	dev? dev=<deviation> <deviation> max. allowed distance from fixed position in meter	
FIX	Set the fix position of the lantern. If no attribute is used the LG will search for a new fix position.	fix? fix[=<longitude>,<latitude>] <longitude> GPS longitude in ddd.ddddd <latitude> GPS latitude in dd.ddddd	FIX: ERROR FIX: <longitude>,<latitude>
LTZ	Configure the Local Time Zone	ltz? ltz=<zone>	

7.7. Limit the maximum number of sent SMS per day

- The number of SMS that the LightGuard is allowed to send per day can be restricted using the configuration command LSMS.

Command	Function	Usage	Possible response
LSMS	Limit number of SMS per day	lsms? lsms=<limit> <limit> number of allowed SMS per day (e.g. 50)	LSMS: ERROR LSMS: <limit>

7.8. Diagnostic Report

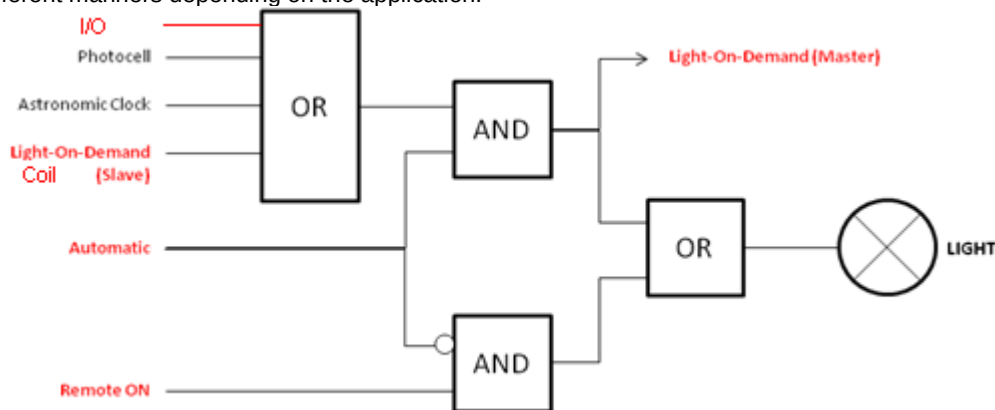
- To analyze the functionality of the unit the user can use a number of commands to poll different diagnostic data.

Command	Possible response
VER	The modem sends a message that displays the versions of the various components in the lantern: LG SMC MK II Version SMC Firmware: 02.27 GPS Hardware: 03.00 GPS Firmware: 01.09 GSM Software: 0.0.6 GSM Firmware: 421
TEL	The modem sends a message that displays the basic status of the SMC: SMC STATUS ACT.TIME: 1526 LIGHT: OFF FLASH CODE: 1.00+(1.00) BAT.LOADED: 0.0 BAT.UNLOADED: 12.3 SOLAR CURR.: 0.0 SOLAR AH: 0 TEMP.: 25
TEL1	The modem sends a message that displays the GPS monitoring data: GPS MONITORING

Command	Possible response
	FIXED LONG: 53.600131 FIXED LAT: 011.418727 LONG AVG.: 53.600093 LAT AVG.: 011.418694 PDOP AVG.: 02.59 FIXES: 143 DIST: 23 OLI: FALSE
CTEL	The modem sends a message that displays the basic configuration of the SMC. SMC CONFIG LED CURR.: 0.75 LED INT.: 015 FIXED LIGHT: NO FORCED: OFF CUT IN: 14.50 CUT OUT: 14.50 CODE: 0.30+(2.70) DUTY CYCLE: 10 PERIOD LEN: 3.0
RRTC	The modem sends a message that displays the current time and date of the internal clock: 2011/08/31,11:15:34
RSSI	The modem sends a message that displays the "receive GSM signal strength indicator" RSSI: 0: -113 dBm or less 1: -111 dBm 2 to 30: -109 to -53 dBm 31: -51 dBm or greater 99: not known or not detectable
RSMS	The modem resets the SMS counter

7.9. Light Remote Control, Light on Demand

- The basic function of the SMC and LightGuard is to automatically control the light ON/OFF depending on the Photocell or the Astronomic Clock. With the LightGuard GSM the light can also be remotely controlled in different manners depending on the application.

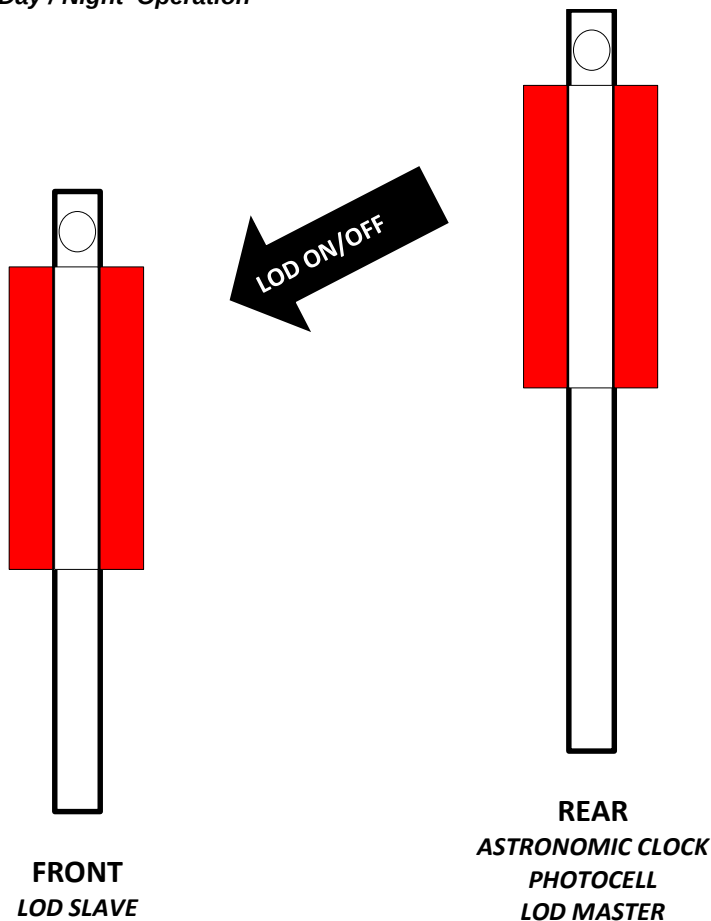


- By default **Automatic** mode is enabled, a change of Automatic to Manual mode will result in an SMS Status Report send to the e.g. WebSCADA. In automatic mode the light will activate on Photocell, Astronomic Clock or Light-On-Demand.
- Light-On-Demand** can be used by mariners to activate the light for certain duration of time, in that case the LightGuard GSM acts as a LOD-Slave. For the chaining of lights the LightGuard GSM can be a LOD-Master which can control another light by LOD Commands.
- If Manual mode is set, the light can only be activated by remote control.

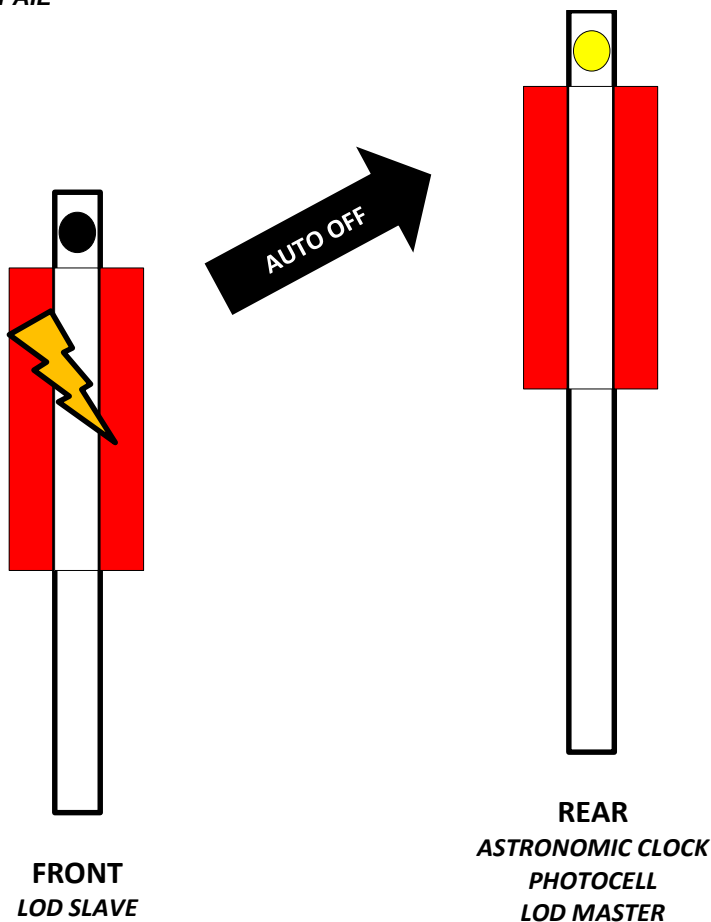
The Leading Light Scenario:

- For leading lights it is important that both front and rear light is active at the same time. If only one of the lights are flashing it can mislead the mariners. See the examples below.

• **Day / Night Operation**



• **FAIL**



- (Both lights are in Automatic Mode)

• **NIGHT**

1. Rear light activated by the Astronomic Clock, Photocell or and **LOD** command from remote.
2. The Rear light sends a **LOD ON** command to the Front light.
3. The Front light is activated by the **LOD** command.

• **DAY**

1. Rear light is deactivated and sends a **LOD OFF** command to the Front light.
2. The Front light is deactivated by the **LOD** command.

- (Both lights are in Automatic Mode, and operating)

• **FAIL**

1. The Front light fails and Automatic mode is disabled.
2. The Front light sends an **BEACON OFF** command to the Rear light.
3. The Rear light automatic mode is disabled and the light is inactivated.

- (Now both lights can only be activated by **REMOTE ON/OFF**)

• **REPAIR**

- After repair of the defect light a **BEACON AUTO** command must be sent to both lights for them to enter normal operation.

Command	Function	Usage	Possible response
LDM	Configure the Light On Demand function	ldm? ldm=<mode> <mode> 0, OFF, DISABLED: off 1, SLAVE: light on demand slave 2, MASTER: light on demand master	LDM: ERROR LDM: DISABLED LDM: SLAVE LDM: MASTER
LOD	Activate the Light On Demand function	lod=<mode>[,<duration>[,<intensity>]] <mode> 0, OFF: off 1, ON: on <duration> time in minutes that light on demand is active <intensity> intensity of the light during light on demand	LOD: ERROR LOD: OK
CDA	Configure Control Default Number, the subscriber number of the optional partner light	cda? Cda[=<number>] <number> valid MSISDN (e.g. +491601234567)	CDA: ERROR CDA: <number>

7.10. Status Indication LED

Flash Code	Status
None	Modem is in idle state.
0.1s + (1.9s)	SIM card failure.
0.1s + (0.9s)	MODBUS communication in progress.
0.1s + (0.1s) + 0.1s + (0.6s)	
0.1s + (0.1s)	
1.0s + (1.0s)	
Fixed	

7.11. Power Saving Functions

- There are two different power modes that the modem can switch between. In ACTIVE MODE the modem is fully operating and consumes about 15 mA @ 13.6 V. If no tasks have to be performed it will automatically switch to SLEEP mode. In this mode all serial interfaces (i.e. UART's, SPI, USB and I2C) are switched-off but the modem is still able to receive and send SMS. In sleep state the module consumes ca. 0.2 mA @ 13.6 V.

7.12. Real Time Clock

The modem has an internal Real Time Clock module that is not backed up. Therefore it has to be synchronized frequently with time information from SMC. Sometimes it's necessary to set the real time clock manually (e.g. GPS signal not available).

If the modem receives the SRTC SMS command it will automatically synchronize its own RTC with the time information of the SMS and update the timestamp of SMC or LG Basic via MODBUS command.

- **SMS command syntax**
- SRTC
- **Example**

Command	Possible response
SRTC	2010/07/22,09:21:45

- Polling the actual timestamp of the modem is possible via RRTC command.

- **SMS command syntax**
- RRTC
- **Example**

Command	Possible response
RRTC	2010/07/22,14:21:34

7.13. GSM / GPRS Interface

- The receive signal strength of the GSM interface is monitored continuously. The user can poll the indicator anytime by the following commands.

- **SMS command syntax:**
- RSSI
- **Example**

Command	Possible response
RSSI	GSM RSSI: 15

- **GSM Received Signal Strength Indicator:**

Indicator	Receive Signal Strength
0	-113 dBm or less
1	-111 dBm
2 to 30	-109 to -53 dBm
31	-51 dBm or greater
99	Not known or not detectable.

- **GPRS network connection status**
- Prior to updating the application via DOTA it is necessary to know if the modem is logged into the GPRS network. Using the CGREG command provides the possibility to monitor the GPRS network registration status.
- **SMS command syntax:**
- CGREG
- **Response**

- GPRS Status: <stat>

Value	Description
<stat>	GPRS network registration status 0: not registered, not searching for new network 1: registered in home network 2: not registered, searching for new network 3: registration denied 4: unknown 5: registered, roaming

8. Periodic Maintenance

- Check that the LED unit turns on by covering the photocell
- 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

9. Order Data

Description	Type	Product Number
LightGuard@BASIC Basic device with integrated GPS receiver	LightGuard Basic GPS	10001333
LightGuard@BASIC Basic device with integrated GPS receiver	LightGuard Basic GPS	10001333
LightGuard@BASIC Basic device with integrated GPS receiver	LightGuard Basic GPS	10001333
Sabik can provide the controller installed in a weather proof cabinet.	Cabinet with wiring	