Marine Lanterns
Self-contained Lanterns
Monitoring & Control
Power Systems

Marine Products

Self-contained M850 on a port buoy in Turkey
VP LED lantern on an ice buoy in the archipelago of Finland
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To Our Valued Customers,

I am pleased to help introduce the 2018 edition of Sabik Marine’s product catalogue. Carmanah Technologies and Sabik have enjoyed a long history together, with success that continues to grow. As part of our continued growth strategy, the Carmanah and Sabik team were proud to expand the Sabik Marine family by acquiring two companies in 2017.

In January 2017, we acquired the EKTA marine aids to navigation assets from Cybernetica AS of Estonia, which will help ensure Sabik remains a dominant supplier within Europe. Then, in August 2017, we purchased New Zealand’s Vega Industries. Vega’s best-in-class PEL light solutions, among other cutting-edge technologies, will also play a vital role in expanding Sabik’s position in the industry.

With the addition of new businesses comes new technologies. Both EKTA and Vega have strengthened our product portfolios and expanded the technology we work with—which is clear on the following pages, where EKTA’s line is included. Stay tuned for the inclusion of Vega products in our next catalogue.

Sabik is committed to providing the best quality, most comprehensive single-source solutions for marine aids to navigation, and doing so with the best possible customer service. Together with our new acquisitions, we are even more equipped to maintain and enhance our commitment to making Sabik Marine the best provider of marine aids to navigation in the world.

I remain delighted and excited for the future of our marine division and the industry overall. Thank you for considering our products and services—as always, we are grateful for your business. You can expect to see more development of innovative solutions that maintain our high standards of quality and robustness, ensuring we provide you with products you can rely on in any application.

John Simmons
CEO
Carmanah Technologies Corporation

Foreword

In a niche business segment like Marine Aids to Navigation, a manufacturer can only prevail by continually delivering value to the customer. The market is slowly changing, and as a manufacturer we need to be able to adapt to new requirements and adopt new ideas. Autonomous ships are being developed, e-Navigation is already utilized in various ways, new inland water routes are being developed for transportation and new arctic routes are being discussed.

Since the foundation of our company, we have always been committed to deliver the most comprehensive and efficient range of marine Aid to Navigation signal products. We also need to be agile and respond quickly to changes in the environment and last, but not least, we need to maintain the customer’s confidence in our products and our service.

The marine signal is today mainly viewed as a backup to the on-board navigation equipment on the ship, except for the most challenging turns in the fairways. Therefore, we need to have focus on this in our product development and in our technology roadmaps. To put it simply, we need to provide the best value for money.

With the power of consolidation of the four strong manufacturers, we are now better positioned than ever to take on all of these challenges. We have an excellent fleet of products, and a great team of true industry professionals eager and willing to help you. Despite all the changes we have made in the last couple of years, your closest Sabik Marine sales contact persons has mainly stayed the same, so you have a familiar person to call or email in case you need advice.

Connectivity has been one of our focus areas for the last couple of years and continues to be so for the future. With the fleet of unique technologies developed by our various product development teams, we now have several integrated communication systems we can offer in almost all of our products. With the shift in direction where the visual AtoN is now considered more the secondary system for navigation, the AtoN owner wants to maintain this backup system efficiently and cost effectively; and this calls for connectivity. Bluetooth, mobile and satellite networks combined with cloud based servers enables owners to deliver bottom line savings with managed connected systems.

Our team is committed in providing you with the best-in-class solutions to your projects in this challenging and competitive industry. Our aim is continue investing into customer relations and marketing & distributor materials to assist you better in your business. We have always been forerunners in technological development and soon we will have some new, exciting product launches to announce. Stay tuned on our website and social media channels as well as subscribe to our newsletter to be among the first ones to hear the news.

Our “Marine Signals 2018-2019” catalogue presents you the current product offering of the Sabik, Carmanah and EKTA product brands.

We also want to take this opportunity to thank you for your valued cooperation and wish you all the success in your business. We are looking forward to showing the way to the future with you.

Lars Mansner
Managing Director
Sabik Marine

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Carmanah Technologies Corporation

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Lars Mansner
Managing Director
Sabik Marine
Sabik Marine is the world’s leading manufacturer of marine signals. Our mission is to enhance safety for traffic; on waterways, on roads and on railways. We are also one of the leading manufacturers of railway signals in the Northern Europe. Sabik Marine has operations in Finland, Canada, Germany, UK, Singapore, Estonia and Russia.

WE SHOW THE WAY

SABIK MARINE is a leader in technology and our R & D engineers continuously re-develop and enhance our existing products and solutions further as well as bringing new innovations to the industry. Safety remains our main driver. Our reliable systems defy the harshest environmental conditions from boreal snow and drifting ice to monsoons and hurricanes. Our high-quality products withstand severe temperature fluctuations and months without daylight, never faltering and thus effectively preventing possible hazardous incidents. By innovating new technologies and implementing these in our products, often the first to do so, Sabik Marine is ultimately showing the way for the industry. We contribute to the development of industry standards and technologies by actively participating in the international committee work of IALA (The International Association of Marine Aids to Navigation and Lighthouse Authorities).

After Carmanah Technologies acquisition of Sabik in 2015, the growth of SABIK MARINE, Carmanah’s Marine Division, continued with the further acquisitions of EKTA in Estonia and Vega Industries in New Zealand in 2017. SABIK MARINE is now the largest supplier of marine signals in the world with the most comprehensive range of marine signaling solutions. Our global team of marine aids-to-navigation professionals can bring extensive knowledge and know-how to your projects with years of experience in this industry. Our global distribution network, including over 100 distributors, covers all the continents and serves our end-customers locally in all longitudes and latitudes.

Carmanah Technologies produces a portfolio of products focused on energy optimized LED and solar technologies. We design, develop and distribute energy efficient LED solutions for infrastructure including: signaling systems for the marine aids to navigation, airfield ground lighting, offshore wind marking, aviation obstruction and traffic markets. Since 1996, we have earned a global reputation for delivering strong and effective products for industrial applications that perform reliably in some of the world’s harshest environments. Our LED and solar power systems provide durable, dependable, efficient and cost-effective solutions which have been deployed in over 400,000 installations in 110 countries.

Marine Products

Our product range consists of a wide selection of self-contained and high performance signal lanterns which can be tailored to meet customized requirements. The merger of Sabik, Carmanah, Vega and Ekta marine products enables us to offer a unique combination of low mix high volume self-contained solar lights and high mix low volume long range and special lights. Almost all of our lanterns can incorporate connectivity solutions such as remote monitoring and control.

Our product range includes:

- Self-contained lanterns
- Buoy lanterns
- Heavy-duty ice buoy lanterns
- Range lights
- Beacons
- Sector lights
- Directed Sector lights
- Lock and bridge signals
- Remote monitoring and control
- AIS equipment

Solutions & Services

Our comprehensive range of marine signaling systems includes also power supplies and structures. Our advanced monitoring and programming tools; LightGuard Monitor and Bluetooth® Control take marine navigation experience to a completely new level.

Our services and solutions offering consists of:

- Ice buoys
- Power supply systems
- Communication systems
- Turn-key solutions
- Installation, training and commissioning

This catalogue “Marine Signals 2018-2019” presents you the product offering of our Sabik, Carmanah and Ekta brands for the marine industry.
Advanced LED technology has changed signaling technology conclusively. Solutions and services are developing all the time to serve customers in the marine aids to navigation industry better and better. Sabik Marine offers the world’s most comprehensive range of marine LED lanterns. Our selection of Carmanah, Sabik and Ekta branded customizable products include:

- buoy lanterns
- ice buoy lanterns
- medium and long range beacon lanterns
- range lights
- sector lights
- light tubes for structure illumination
- self-contained lanterns
- marker lights for aquaculture farms

Sabik Marine lanterns are well-known for their optical performance, reliability, modularity and functionality. We are constantly developing our products to serve our customers better. By selection our lantern you not only get a reliable lantern but also a complete selection of intelligent solutions. Our customers have the ability to choose the right features for their specific needs so they can operate their aids to navigation efficiently and at lower lifetime cost.
LED 110

Marine LED lantern for buoys and small beacons

LED 110 is a maintenance free short range LED lantern. Using the latest in high power LED technology, Sabik’s intelligent electronics and our especially designed efficient optics, we have been able to achieve an excellent performance for the lantern. LED 110 is made from polycarbonate for durability and low weight.

- Range up to 4 NM at $T_c = 0.74$ (5 NM at $T_c = 0.85$)
- Standard IALA colours Red, Green, White and Yellow
- Produced of durable polycarbonate plastic
- Integrated flasher with day light switch and 2A solar charger
- Internal calendar; light can be switched off for winter
- Adjustable intensity and range
- Vertical divergence $8^\circ \pm 1^\circ$ of peak intensity
- Programmable with Sabik standard IR programming devices
- Integrated event log (Black box function) for 365 days
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring

Lens
Bird deterrent top design.

Optical lens
New efficient omnidirectional lens.

PTFE breathing
Vent for pressure release in the bottom of the lantern.

Programming with PC
Using Sabik USB interface.

Cable entry
From side or bottom of the lantern.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

Installation
The bottom plate of the LED110 supports installation on structure using 3 or 4 x M12 on a 200 mm diameter or 3 x M8 on a 150 mm diameter.
**Technical Specification LED 110**

### Optical performance

| Maximum fixed intensity | LED 110 | 40 cd | 40 cd | 50 cd | 45 cd |

### Main Technical Specification

- **Lens visual/Mechanical diameter**: 166 mm
- **Lens material**: UV stabilized Polycarbonate
- **Body material**: UV stabilized Polycarbonate
- **Light source**: High Power Light Emitting Diode (LED)
- **Vertical divergence**: 8° @ 50% (±1°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 2 kg
- **Temperature range**: -40°...+60°C
- **Degree of protection**: IP 67
- **Supply Voltage**: 9 – 30 VDC
- **Power consumption**: Max 1,3 watt

---

**Order Overview LED 110**

**Option matrix**

- **OPT 9S: LightGuard GSM + GPS**: Integrated GSM based monitoring including GSM/GPS antennas
- **OPT 4S: GPS sync**: Integrated GPS sync including GPS antenna
- **OPT 1S: Optical Feedback System**: Integrated LED performance measurement
- **Shock & Tilt Sensor**: Integrated 3-axis G sensor for tilt and shock sensing

**Product codes**

- **LED 110 wide lens**
- **LED 110 WW**
- **LED 110 WR**
- **LED 110 WG**
- **LED 110 WY**

**Product code example: LED 110WR.4S**

- **LED 110WR** is Sabik code for LED 110 with wide lens in red
- **4S** is a selection of option 4 GPS synchronization

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**Marine Lanterns**

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**Datum-Geändert:**

**Material:**

**Bezeichnung:**

**Zeichnungsnummer:** 1 von 2110-100205-101-0

**Datum-Erstellt:** 05.02.2010

**Maßstab:** 1:4

**Geprüft:**

---

**Gezeichnet:** MZ

---

**Datum-Geändert:** 05.02.2010
LED 155

Marine LED lantern for buoys and minor beacons

LED 155 is a general purpose LED lantern commonly used on both fixed and floating structures. The lantern is modular in design. It can be configured with two different vertical divergencies and 1-3 tiers depending on operational requirements.

- Range up to 8 NM at Tc = 0.74 (12 NM at Tc = 0.85)
- Standard IALA colours Red, Green, White, Yellow and Blue/Yellow
- Rugged aluminium housing for installation in harsh marine environments
- Extremely low power consumption, suitable for solar and battery operation
- Integrated flasher with day-night switch
- Integrated 16A solar panel charger using pulse width modulation
- Adjustable intensity and range
- Available with narrow (6°) or wide (10°) vertical divergence
- Programmable with Sabik standard IR programming devices
- Integrated event log for 365 days
- Optionally integrated GPS synchronization
- Optionally integrated GSM Remote monitoring

**Marine Lanterns**

**White**

**Red**

**Green**

**Yellow**

**Simplex**

**Duplex**

**Triplex**

**LED 155**

Marine LED lantern for buoys and minor beacons

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- Standard IALA colours Red, Green, White, Yellow and Blue/Yellow
- Rugged aluminium housing for installation in harsh marine environments
- Extremely low power consumption, suitable for solar and battery operation
- Integrated flasher with day-night switch
- Integrated 16A solar panel charger using pulse width modulation
- Adjustable intensity and range
- Available with narrow (6°) or wide (10°) vertical divergence
- Programmable with Sabik standard IR programming devices
- Integrated event log for 365 days
- Optionally integrated GPS synchronization
- Optionally integrated GSM Remote monitoring
### Order Overview LED 155

#### Option matrix

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPT 1</td>
<td>Optical Feedback System &lt;br&gt;Integrated LED performance measurement</td>
</tr>
<tr>
<td>OPT 4</td>
<td>GPS sync &lt;br&gt;Integrated GPS sync including GPS antenna</td>
</tr>
<tr>
<td>OPT 9</td>
<td>LightGuard GSM + GPS &lt;br&gt;Integrated GSM based monitoring including GSM/GPS antennas</td>
</tr>
<tr>
<td>OPT 10</td>
<td>LightGuard GSM &lt;br&gt;Integrated GSM based monitoring including GSM antenna</td>
</tr>
<tr>
<td>OPT 11</td>
<td>Control card &lt;br&gt;Control card for secondary battery</td>
</tr>
<tr>
<td>OPT 12</td>
<td>Aux card with I/O &lt;br&gt;Aux card including I/O ports</td>
</tr>
<tr>
<td>OPT 13</td>
<td>Aux card with RS485 and I/O &lt;br&gt;Aux card including RS485 and I/O ports</td>
</tr>
<tr>
<td>Shock &amp; Tilt Sensor</td>
<td>Integrated 3 axis G sensor for tilt and shock sensing</td>
</tr>
</tbody>
</table>

#### Optical performance LED 155

- Maximum fixed intensity, narrow lens (fixed structures)
  - Single tier (standard): 6 W, 100 cd, 120 cd, 150 cd, 180 cd
  - Two tiers (duplex): 12 W, 300 cd, 360 cd, 420 cd
  - Three tiers (triplex): 18 W, 540 cd, 600 cd, 660 cd

- Maximum fixed intensity, wide lens (floating structures)
  - Single tier (standard): 6 W, 120 cd, 120 cd
  - Two tiers (duplex): 12 W, 240 cd, 240 cd
  - Three tiers (triplex): 18 W, 360 cd, 360 cd

#### Main Technical Specification LED 155

- **Lens visual/Mechanical diameter**: 160 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: Light Emitting Diodes (LEDs)
- **Vertical divergence**: 6° or 10° @ 50% (±1°) and 10° or 20° @ 10% (±2°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 3.9 kg for single tier unit
- **Temperature range**: -40°...+60°C
- **Supply Voltage**: 10–32 VDC
- **Power consumption**: Max 6 watts/tier
- **Degree of protection**: IP68

#### Optical performance LED 155 B/Y

- **Nominal 5 W**: 45 cd, 45 cd
- **Maximum fixed intensity**: 200 cd, 240 cd, 320 cd
- **Single tier (standard)**: 6 W, 100 cd, 120 cd
- **Two tiers (duplex)**: 12 W, 180 cd, 240 cd
- **Three tiers (triplex)**: 18 W, 240 cd, 300 cd

#### Main Technical Specification LED 155 Blue/ Yellow wreck mark

- **Lens visual/Mechanical diameter**: 160 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: Light Emitting Diodes (LEDs)
- **Vertical divergence**: 10° @ 50% (±1°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 4.2 kg
- **Temperature range**: -40°...+60°C
- **Supply Voltage**: 10–32 VDC
- **Power consumption**: Max 6 watts

---

**Product code example:** LED 115-3NR.9

- **LED 155 3** is Sabik code for a three-tier LED 155
- **NR** is the code for a Narrow Red lens
- **9** is a selection of option 9 GSM monitoring together with GSM/GPS antennas

#### Order Overview LED 155 B/Y

Wreck marking lantern blue/yellow
VP LED
Ice buoy LED lantern

The VP LED is a LED lantern designed to be used in moderate ice conditions. It has a proven record of surviving the crushing pressure and dynamic forces of ice. VP LED is mainly used on plastic ice spars and buoys when a lightweight unit is important.

- Marine grade aluminium housing
- Designed to be fully waterproof, can sustain extensive submersion
- Integrates firmly into buoy top and presents a very low profile to lateral forces from ice
- Lantern can be removed for battery replacement
- Range up to 6 NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Extremely low power consumption, ideal for primary battery operation
- Integrated flasher with day light switch
- Adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Integrated 365 day event log
- Optionally integrated GPS synchronization
- Optionally integrated GSM Remote monitoring

Bird spikes
Stainless steel as standard. Easy to replace.

Service
The lantern forms a waterproof service door to the buoy. The primary battery can be replaced by removing the lantern.

Aluminium body
The marine grade aluminium housing with epoxy painting is corrosion resistant and will survive a lot of abuse from ice.

Polycarbonate lens
The low profile optical lens is designed to give minimum exposure to ice forces. Lens is supported by the lantern structure sufficient to protect the unit in arctic conditions.

Waterproof
The lantern is also protected against humidity from inside the buoy. Should the buoy leak, the lantern is still protected. Pressure vent enables breathing.

GPS
GPS unit and antenna integrated in the lantern hat for wireless synchronization and for position monitoring. The integrated GPS antenna is moulded and survives ice pressure.

GSM
GSM unit and antenna integrated in the lantern hat for remote monitoring and control. For more information please see the LightGuard Section.

Additional cable entry
Equipped as standard with two cable entries. If a second entry is needed, e.g. for a solar module, a standard M20 cable gland can be fitted.
Technical Specification VP LED

Optical performance
Maximum fixed intensity
At full power 6 W 160 cd 160 cd 240 cd 120 cd

Main Technical Specification
- Lens visual/Mechanical diameter: 160 mm
- Lens material: UV stabilized Polycarbonate
- Light source: Light Emitting Diodes (LEDs)
- Vertical divergence (wide lens)
  - 10° @ 50 % of peak intensity
  - 20° @ 10 % of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 3.2 kg
- Temperature range: -40°...+60°C
- Supply Voltage: 10 – 32 VDC
- Solar Panel Charger: 16 ampere PWM charger
- Power consumption: Max 6 watts/tier
- Degree of protection: IP 68

Order Overview VP LED

Option matrix
- OPT 1: Optical Feedback System
- OPT 4: GPS sync
- OPT 5: LightGuard GSM + GPS
- OPT 9: LightGuard GSM
- OPT 10: Control card
- OPT 11: Control card with I/O
- OPT 12: Control card with RS485 and I/O
- OPT 13: Control card with RS485 and I/O
- Shock & Tilt Sensor

N = Narrow (6° @ 50 % of peak intensity)  W = Wide (10° @ 50 % of peak intensity)

- Red: VP LEDNR
- Yellow: VP LEDNY
- Green: VP LEDNG
- White: VP LEDNW

Product code example: VP LEDNW.13
- VP LED is Sabik code for a buoy lantern
- NW is the code for a Narrow lens in white
- 13 is a selection of option 13 Aux card with RS485 and I/O

Order Overview

VP LED B/Y

Wreck marking lantern blue/yellow

Product codes
- VP LED BLUE/YELLOW WRECK MARK 980107
MPV LED

Heavy duty ice buoy LED lantern

The MPV LED is a LED lantern designed to be used in most severe ice conditions, and is capable of surviving the crushing pressure and dynamic forces of ice in winter conditions.

- Rugged bronze alloy housing for installation in harsh marine environments
- Designed to be fully water proof – can withstand submersion down to 100 meters
- Integrates firmly into buoy top – presents a very low profile to lateral forces from ice
- Enables battery replacement through lantern without removing the lantern from buoy
- Visual range from 2 to 6 NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Extremely low power consumption; ideal for primary battery operation
- Integrated flasher with day light switch
- Adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Integrated 365 day event log
- Optionally integrated GPS synchronization
- Optionally integrated GSM Remote monitoring

Bird spikes
Stainless steel as standard. Easy to replace.

Hinged
The primary battery can be changed easily as hinged flanges allow the lantern to open safely in sea conditions. The lantern acts as the water proof door to the battery cabin.

Bronze Alloy
The special bronze alloy is corrosion resistant and will survive continuous abuse from moving ice blocks.

Polycarbonate lens
The low profile optical lens is designed to give minimum exposure to ice forces and is supported by the lantern structure sufficient to protect the unit in arctic conditions.

GPS
GPS unit and antenna integrated in the lantern for wireless synchronization and for position monitoring. The integrated GPS antenna is moulded and survives ice pressure.

GSM
GSM unit and antenna integrated in the lantern for remote monitoring and control. For more information please see the LightGuard Section.

Additional cable entry
Equipped as standard with two cable entries. If the second entry is needed e.g. for a solar module, a standard M20 cable gland can be fitted.

OFBS
The Optical Feedback System (OFBS) enables built-in monitoring of LED degradation over time.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

Installation
The lantern is integrated with the buoy top for maximum support against lateral forces.

Marine Lanterns
**Technical Specification MPV LED**

**Main Technical Specification**

- Lens visual/Mechanical diameter: 160 mm
- Lens material: UV stabilized Polycarbonate
- Light source: Light Emitting Diodes (LEDs)
- Vertical divergence (wide lens): 10° @ 50% (±1°) of peak intensity
- 20° @ 10% (±2°) of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 25 kg
- Temperature range: -40°...+60°C
- Supply Voltage: 10 – 32 VDC
- Solar Panel Charger: 16 ampere PWM charger
- Power consumption: 6 watts
- Degree of protection: IP 68

**Optical performance**

- Maximum fixed intensity: At full power 6 W 120 cd 160 cd 240 cd 120 cd

**Order Overview MPV LED**

**Option matrix**

<table>
<thead>
<tr>
<th>OPT</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPT 1: Optical Feedback System</td>
<td>Integrated LED performance measurement</td>
<td></td>
</tr>
<tr>
<td>OPT 4: GPS sync</td>
<td>Integrated GPS sync including GPS antenna</td>
<td></td>
</tr>
<tr>
<td>OPT 9: LightGuard GSM + GPS</td>
<td>Integrated GSM based monitoring including GSM/GPS antennas</td>
<td></td>
</tr>
<tr>
<td>OPT 10: LightGuard GSM</td>
<td>Integrated GSM based monitoring including GSM antenna</td>
<td></td>
</tr>
<tr>
<td>OPT 11: Control card</td>
<td>Control card for secondary battery</td>
<td></td>
</tr>
<tr>
<td>OPT 12: Aux card with I/O</td>
<td>Aux card including I/O ports</td>
<td></td>
</tr>
<tr>
<td>OPT 13: Aux card with RS485 and I/O</td>
<td>Aux card including RS 485 and I/O port</td>
<td></td>
</tr>
<tr>
<td>Shock &amp; Tilt Sensor</td>
<td>Integrated 3-axis G sensor for tilt and shock sensing</td>
<td></td>
</tr>
</tbody>
</table>

**W = Wide (10° @ 50 % of peak intensity)**

- Red: MPV LED1WR
- Yellow: MPV LED1WY
- Green: MPV LED1WG
- White: MPV LED1WW

**Product code example: MPV LED1WG.4**

- MPV LED1 is Sabik code for a MPV LED
- WG is the code for a wide lens in green
- 4 is a selection of option 4 GPS synchronization
LED 160

Full range lantern for fixed and floating installations

This all-round LED 160 lantern has world-class optical performance with options for buoys and fixed installations. Three different lantern options available covering a range from 3 NM up to 12NM (Tc = 0.74)

- Standard IALA colours Red, Green, White, Yellow and Blue
- Best in class optical performance
- New designed rugged injection moulded aluminium housing
- Field installation easy thanks to the integrated junction box with 3 cable entries
- Extremely low power consumption, suitable for solar and battery operation
- Integrated 16A solar panel charger
- Adjustable intensity and range
- The lantern is available in two different versions. LED 160 with Narrow 5° and with Wide 10° vertical divergence, and the LED 160H with a 2.5° vertical divergence.
- Programmable with Sabik standard IR programming devices
- Optionally integrated GPS synchronization
- Optionally integrated GSM/GPS remote monitoring
- Can be programmed and controlled up to 50 meters distance with Bluetooth® Control
- Available with integrated AIS (Refer page 140)
Main Technical Specification

- **Lens visual/Mechanical diameter**: 160 mm
- **Lens material**: UV stabilized Acrylic
- **Light source**: High Power Light Emitting Diodes
- **Vertical divergence**: 2.5°@50% of peak intensity (FWHM)
  - 5°@50% of peak intensity (FWHM)
  - 10°@50% of peak intensity (FWHM)
- **Weight**: 3.3 kg
- **Temperature range**: -40° – +60°C
- **Supply Voltage**: 10 – 32 VDC
- **Solar Panel Charger**: 16 ampere PWM charger
- **Power consumption**: 13W – 16W
- **Power consumption LED 160H**: 36 W
- **Degree of protection**: IP 67

**Option matrix**

- **Optical feedback**
  - OPT 1L: Integrated LED performance measurement
- **GPS sync**
  - OPT 4L: Integrated GPS sync including GPS antenna
- **LightGuard GSM + GPS**
  - OPT 9L: Integrated GSM/GPS based monitoring including GSM/GPS antennas
- **Battery control card**
  - OPT 11L: Control card for secondary (emergency) battery
- **Automatic Identification System**
  - OPT AIS: Lantern with integrated AIS type 1
  - OPT AIS 3: Lantern with integrated AIS type 3
  - Refer page 140

**Order Overview LED 160**

**Optical performance**

- **Maximum fixed intensity LED 160H (2.5° @ 50% of top intensity)**
  - Max power 36 W
  - 4300 cd

- **Maximum fixed intensity LED 160N (5° @ 50% of top intensity)**
  - 1150 cd
  - 1200 cd
  - 1200 cd
  - 1200 cd
  - Power consumption 13 W
  - 16 W
  - 16 W
  - 16 W

- **Maximum fixed intensity LED 160W (10° @ 50% of top intensity)**
  - 550 cd
  - 850 cd
  - 550 cd
  - 1100 cd
  - Power consumption 12 W
  - 16 W
  - 16 W
  - 16 W

**Product codes**

- **LED 160H**: High intensity lantern
- **LED 160N**: Lantern with narrow lens designed for fixed structures
- **LED 160W**: Lantern with wide lens designed for buoys

**Colour**

- **LED 160HW**: white
- **LED 160NW**: red
- **LED 160NG**: green
- **LED 160NY**: yellow
- **LED 160WB**: blue

**Product code example: LED 160NG.9L**

- **LED 160NG** is Sabik code for LED 160 with narrow lens in green
- **9L** is a selection of option 9 integrated GSM/GPS monitoring
LED 350

High intensity LED lantern for fixed installations

LED 350 is a high performance omni-directional LED precision beacon with a range up to 15 NM (Tc = 0.74). 10 NM range with white achieved with less than 10 watts.

- High light efficiency; 175 candela/watt
- Supplied with 1-7 tiers, max 14 700 cd luminous intensity white
- Standard IALA colours Red, Green, White, Yellow
- Rugged aluminium housing for installation in marine environment
- Extremely low power consumption, suitable for solar and battery operation
- Integrated flasher with day light switch and a 16A solar panel charger
- Field adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Integrated 365 day event log
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring
- Optionally available with tamper proof serial number
- Equipped with Bluetooth programming

**Bird spikes**
Stainless steel bird deterrents as standard. Easy to replace. Offers great protection against large birds like cormorants. Spike designed to prevent injury to service technicians.

**Level indicator**
The lantern can easily be levelled in field using the integrated bubble level indicator.

**IR port and photocell**
Combined infrared communication port and photocell is located on the base of the lantern.

**Additional cable entry**
Equipped as standard with two cable entries. If the secondary entry is needed e.g. for a solar module standard M20 cable gland can be fitted.

**Simplex Combinations**
The LED 350 lantern can also be combined with the LED 155 buoy lantern in order to increase short distance visibility.

**Installation**
The bottom plate of the LED 350 supports installation on structure using 3 x M12 bolts or 4 x M12 bolts on a 200 mm diameter.

**Grounding plug**
The base plate has a grounding plug as standard to enable good protection against electromagnetic interference.

**Sabik Easy Programmer**
User friendly and compact wireless two-way programmer.

**Triplex**
Multiple tiers up to 7 tiers for high intensity.

**Bluetooth® Control**
Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.

**External baffles**
The lantern can be optionally supplied with multiple colours using external radial baffles between the colours. This enables warning sectors to be integrated in the same lantern.

**Simplex Combinations**
The LED 350 lantern can also be combined with the LED 155 buoy lantern in order to increase short distance visibility.

**External baffles**
The lantern can be optionally supplied with multiple colours using external radial baffles between the colours. This enables warning sectors to be integrated in the same lantern.

**Simplex Combinations**
The LED 350 lantern can also be combined with the LED 155 buoy lantern in order to increase short distance visibility.
### Marine Lanterns

#### Optical performance

<table>
<thead>
<tr>
<th>Tier</th>
<th>Maximum Fixed Luminous Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-tier, 12 W</td>
<td>1.400 cd 1.400 cd 2.100 cd 1.500 cd</td>
</tr>
<tr>
<td>2-tiers, 24 W</td>
<td>2.800 cd 2.800 cd 4.200 cd 3.000 cd</td>
</tr>
<tr>
<td>3-tiers, 36 W</td>
<td>3.200 cd 4.200 cd 6.000 cd 4.500 cd</td>
</tr>
<tr>
<td>4-tiers, 48 W</td>
<td>5.600 cd 5.600 cd 8.400 cd 6.000 cd</td>
</tr>
<tr>
<td>5-tiers, 60 W</td>
<td>7.000 cd 7.000 cd 10.500 cd 7.500 cd</td>
</tr>
<tr>
<td>6-tiers, 72 W</td>
<td>8.400 cd 8.400 cd 12.600 cd 9.000 cd</td>
</tr>
</tbody>
</table>

#### Main Technical Specification

- **Lens visual/ Mechanical diameter**: 350 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: Light Emitting Diodes (LEDs)
- **Vertical divergence**: 1.5° @ 50% (±0.3°) and 3° @ 10% (±0.5°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 10 kg for single tier unit, add 2 kg for each tier
- **Temperature range**: -40°...+60°C
- **Supply Voltage**: 10 – 32 VDC
- **Solar Panel Charger**: 16 amperes PWM charger. Solar production (Ah) is logged
- **Power consumption**: 12 watts / tier
- **Degree of protection**: IP 67

#### Order Overview LED 350

**Option matrix**

- **OPT 1**: Optical Feedback System
  - Integrated LED performance measurement
- **OPT 4**: GPS sync
  - Integrated GPS sync excluding GPS antenna
- **OPT 7**: External GPS
  - External GPS antenna for OPT 4
- **OPT 9**: LightGuard GSM + GPS
  - Integrated GSM based monitoring including GSM antennas
- **OPT 10**: LightGuard GSM
  - Integrated GSM based monitoring including GSM antenna
- **OPT 11**: Control card
  - Control card for secondary battery
- **OPT 12**: Aux card with I/O
  - Aux card including I/O ports
- **OPT 13**: Aux card with RS485 and I/O
  - Aux card including RS 485 and I/O port
- **Shock & Tilt Sensor**: Integrated 3-axis G sensor for tilt and shock sensing
- **External baffles**: External baffles when unit is supplied with coloured sectors

**Product code example: LED 350 3W.10**

- **LED 350 7** is Sabik code for a seven-tier LED 350
- **W** is the code for a lens in white
- **10** is a selection of option 10 integrated GSM antenna
LED 350H
High Power LED lantern for fixed installations

A LED beacon capable of visual ranges up to 18 NM (Tc = 0.74) 30 NM (Tc = 0.85). LED 350H is designed to substitute rotating beacons with a considerably smaller power consumption.

- Up to 15,000 cd luminous intensity per tier at only 100 watts
- Can be supplied with up to 5 tiers. Max luminous intensity an impressive 75,000 cd
- Rugged aluminium housing for installation in marine environments
- Low power consumption, suitable for solar and battery operation
- Integrated flasher with daylight switch and a 16 A solar panel charger
- Field adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Integrated 365 day event log
- Optionally integrated GPS synchronization
- Optionally integrated GSM Remote monitoring
- Equipped with Bluetooth programming

**LED 350H Features:**
- **Up to 15,000 cd luminous intensity per tier at only 100 watts**
- **Can be supplied with up to 5 tiers. Max luminous intensity an impressive 75,000 cd**
- **Rugged aluminium housing for installation in marine environments**
- **Low power consumption, suitable for solar and battery operation**
- **Integrated flasher with daylight switch and a 16 A solar panel charger**
- **Field adjustable intensity and range**
- **Programmable with Sabik standard IR programming devices**
- **Integrated 365 day event log**
- **Optionally integrated GPS synchronization**
- **Optionally integrated GSM Remote monitoring**
- **Equipped with Bluetooth programming**
**Technical Specification LED 350H**

**Optical performance**

<table>
<thead>
<tr>
<th>Maximum fixed luminous intensity</th>
<th>1-tier, 100 W</th>
<th>2-tier, 200 W</th>
<th>3-tier, 300 W</th>
<th>4-tier, 400 W</th>
<th>5-tier, 500 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,500 cd</td>
<td>8,000 cd</td>
<td>16,000 cd</td>
<td>24,000 cd</td>
<td>32,000 cd</td>
<td>40,000 cd</td>
</tr>
<tr>
<td>8,000 cd</td>
<td>16,000 cd</td>
<td>24,000 cd</td>
<td>32,000 cd</td>
<td>40,000 cd</td>
<td>40,000 cd</td>
</tr>
<tr>
<td>15,000 cd</td>
<td>30,000 cd</td>
<td>40,000 cd</td>
<td>60,000 cd</td>
<td>75,000 cd</td>
<td>75,000 cd</td>
</tr>
</tbody>
</table>

**Main Technical Specification**

- **Lens visual/Mechanical diameter**: 350 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: High Power Light Emitting Diodes (LEDs)
- **Vertical divergence**: 1.5° @ 50 % (≤ 0.3°) and 3° @ 10 % (≤ 0.5°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 12 kg for single tier unit, add 4 kg for each tier
- **Temperature range**: -40°...+60°C
- **Supply Voltage**: 20 – 32 VDC
- **Solar panel charger**: 16 ampere PWM charger. Solar panel production (Ah) is logged
- **Power consumption**: 100W/tier
- **Degree of protection**: IP 67

**Order Overview LED 350H**

**Option matrix**

- **OPT 1**: Optical Feedback System
  - Integrated LED performance measurement
- **OPT 4**: GPS sync
  - Integrated GPS sync excluding GPS antenna
- **OPT 7**: External GPS
  - External GPS antenna for OPT4 and OPT9
- **OPT 9**: LightGuard GSM + GPS
  - Integrated GSM based monitoring including GSM antennas
- **OPT 10**: LightGuard GSM
  - Integrated GSM based monitoring including GSM antenna
- **OPT 11**: Control card
  - Control card for secondary battery
- **OPT 12**: Aux card with I/O
  - Aux card including I/O ports
- **OPT 13**: Aux card with RS485 and I/O
  - Aux card including RS 485 and I/O port
- **Shock & Tilt Sensor**
  - Integrated 3-axis G sensor for tilt and shock sensing

**Product codes**

<table>
<thead>
<tr>
<th>Colour</th>
<th>white</th>
<th>red</th>
<th>green</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 350H 1 tier</td>
<td>LED 350H 1W</td>
<td>LED 350H 1R</td>
<td>LED 350H 1G</td>
</tr>
<tr>
<td>LED 350H 2 tier</td>
<td>LED 350H 2W</td>
<td>LED 350H 2R</td>
<td>LED 350H 2G</td>
</tr>
<tr>
<td>LED 350H 3 tier</td>
<td>LED 350H 3W</td>
<td>LED 350H 3R</td>
<td>LED 350H 3G</td>
</tr>
<tr>
<td>LED 350H 4 tier</td>
<td>LED 350H 4W</td>
<td>LED 350H 4R</td>
<td>LED 350H 4G</td>
</tr>
<tr>
<td>LED 350H 5 tier</td>
<td>LED 350H 5W</td>
<td>LED 350H 5R</td>
<td>LED 350H 5G</td>
</tr>
</tbody>
</table>

**Product code example: LED 350H 3W.7-9**

- **LED 350H 3W** is Sabik code for a three-tier LED 350H with lens in white
- **7-9** is a selection of OPT7 and OPT9

**LED 350H 12V**

LED 350H is also available with supply voltage 10-18 VDC for one and two layer lanterns. There is no internal solar panel charger integrated in this 12V model lantern.

**Product codes for 12VDC white lantern**

- **1 LAYER**: LED 350H 1W 12V
- **2 LAYERS**: LED 350H 2W 12V
ODSL 200
Omnidirectional LED sector light

ODSL 200 omnidirectional sector light is an innovative, compact new sector light with accurate sector borders. This light is equipped with a replaceable LED optical unit. The range of the light, depending on colour and flash character, is between 6 and 10 NM (Tc = 0,74).

- Sectors are fully verified at Sabik’s photometric range prior to delivery
- Field installation is easy thanks to a rotation mechanism in the base
- Precision alignment, at site, can be done with a gun sight (has to be ordered separately)
- After installation sector alignments remain unchanged even if the LED optical unit is replaced
- Light can be delivered with an external weather cover
- The standard sector light is available as a 3, 6 or 12 layer model
- Small area of uncertainty between the sectors, typically less than 0,5°
- Integrated flasher with daylight switch and a 16 amperes solar panel charger
- Programmable with Sabik standard IR programming devices
- This light can be equipped with remote monitoring, synchronization and optical feedback
- Patented omni-directional LED sector light technology
- Equipped with Bluetooth programming

Installation
The bottom plate supports installation on structures using 3 x M12 bolts or 4 x M12 bolts on a 200mm diameter.

Optics
Optics designed for high intensity LEDs.

Protection
Weather cover as option. Protects the lantern in outdoor installations.

High protection degree
The PTFE breathing vent for pressure release in the bottom of the LED optical unit.

Equipped with Bluetooth programming
Bluetooth control - Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.

Sectors are fully verified at Sabik’s photometric range prior to delivery
Field installation is easy thanks to a rotation mechanism in the base
Precision alignment, at site, can be done with a gun sight (has to be ordered separately)
After installation sector alignments remain unchanged even if the LED optical unit is replaced
Light can be delivered with an external weather cover
The standard sector light is available as a 3, 6 or 12 layer model
Small area of uncertainty between the sectors, typically less than 0,5°
Integrated flasher with daylight switch and a 16 amperes solar panel charger
Programmable with Sabik standard IR programming devices
This light can be equipped with remote monitoring, synchronization and optical feedback
Patented omni-directional LED sector light technology
Equipped with Bluetooth programming

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

PTFE breathing vent
Pressure release in the bottom of the LED optical unit.

IR port and photocell
Combined infrared communication port and photocell is located on the base of the lantern.

OPSL 200 omnidirectional sector light is an innovative, compact new sector light with accurate sector borders. This light is equipped with a replaceable LED optical unit. The range of the light, depending on colour and flash character, is between 6 and 10 NM (Tc = 0,74).
Technical Specification ODSL 200

Optical performance
Maximum fixed intensity per tier and colour
Max power 3.5 W

<table>
<thead>
<tr>
<th>Tier</th>
<th>250 cd</th>
<th>250 cd</th>
<th>600 cd</th>
</tr>
</thead>
</table>

When using weather cover reduce 6% intensity.

Main Technical Specification
- Lens visual/Mechanical diameter: 200 mm
- Lens material: UV stabilized Acrylic
- Light source: High Power Light Emitting Diodes
- Vertical divergence: 2°@50% of peak intensity (FWHM)
- Unit lifetime: Up to 10 years
- Weight lantern: 3-tier 10.5 kg, 6-tier 13.4 kg, 12-tier 22.4 kg
- Weight including weather cover: 3-tier 14 kg, 6-tier 17.4 kg, 12-tier 26.4 kg
- Height: 3-tier 577 mm, 6-tier 727 mm, 12-tier 1027 mm
- Temperature range: -40° – +60°C
- Supply Voltage: 10 – 32 VDC
- Solar panel charger: 16 amperes PWM charger
- Power consumption: 3.5 watts/tier
- Degree of protection: IP 67

Order Overview ODSL 200

Option matrix
- OPT 4: GPS sync
  Integrated GPS sync with external GPS antenna
- OPT 7: External GPS
  External GPS antenna for OPT4 and OPT9
- OPT 9: LightGuard GSM + GPS
  Integrated GSM based monitoring with external antennas
- OPT 10: LightGuard GSM
  Integrated GSM based monitoring with external GSM antenna

Product codes
- ODSL 200
- ODSL 200 3, 3 layer lantern
- ODSL 200 6, 6 layer lantern
- ODSL 200 12, 12 layer lantern
- ODSL 200 WEATHER COVER
- ODSL 200 3WC, 3 layer weather cover
- ODSL 200 6WC, 6 layer weather cover
- ODSL 200 12WC, 12 layer weather cover

Gun sight for exact alignment
821035
E8592
LED Projector sector light signal, up to 17 M range

The E8592 is a high-performance, power efficient marine LED Projector sector lantern with composite beam of three signal colours featuring nearly identical luminous intensities. Sector configuration is tailored to customer requirements at the factory. All E859X Lanterns provide factory configured Day and Night mode luminous intensities selectable by a single digital input, supporting fast PWM control necessary for generating navigational signals at reduced intensities, as well as for utilizing Fixed-and- Flashing (FFL) rhythmic characters or Slow Flash Front (SFF). The field proven E8592 design can be offered with optional Opposite-Isophase sector signal control for producing rhythmic characters reducing the latency of spatial awareness update for the mariners: the white sector signal is active during the eclipse in the coloured sectors and vice versa, resulting in immediate awareness about leaving the white sector without the usual delay caused by the common eclipse. A two-tiered design with two additional sectors providing alternating flashing on sector boundaries is available as E8596.

- Power efficient Day/Night light signalling system for port entry lights or leading line systems replacement
- IALA colours Red, Green, White with application-specific luminous intensities nearly uniform up to 40 kcd
- Factory-customized sector configuration with precision of ≤ 0.05° (3’)
- Sector with 3° to 6° with total subtense of approximately 13°
- Vertical divergence either 1.8° or 3°
- Boundary resolution typically better than 2°
- Robust light signal unit that can be equipped with a Sabik SMC Flasher or with external Ekta control and monitoring system
- Day and Night mode luminous intensities configured in hardware, peak value depending on selected colour and horizontal divergence
- Internal optical LED performance diagnostics with condition output
- Available with optional Opposite-Isophase sector signal control

- Easy to install – requires only simple procedures for aiming the composite beam vertically
- No maintenance needed where sprinkling of the lens by wave particles or dirt can be avoided
Marine Lanterns

**Technical Specification E8592**

![Image of Marine Lanterns]

**Order Overview E8592**

**Option matrix**

- Sector lights for IALA Region A: E8592.RWG
- Sector lights for IALA Region B: E8592.GWR

**Accessories**

- Bird deterrent rod set (incl. screws): E854.050
- Cable Connector, 90deg, female 6 + PE-position: C016.30F006.100.10
- Programmable Flasher, integrated: E9272
- Programmable Flasher with GPS, integrated: E9272.G
- TelFiCon™-Flasher for complete AtoN telematics, integrated: E9272

**Product codes**

Since this product is usually ordered in AtoN site specific configuration, simple ordering codes covering all possible alternatives are not available.

**Product code example: E8592.RWG.T3**

- Projector sector light for IALA Region A with integrated TelFiCon™-Flasher E9272

---

**Main technical specification**

<table>
<thead>
<tr>
<th>Optical performance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sectors</td>
<td>3 (R, W, G)</td>
</tr>
<tr>
<td>Typical peak luminous intensity of the light signal per colour</td>
<td>40,000 cd</td>
</tr>
<tr>
<td>Nominal range, Night / Day (T=0.74)</td>
<td>up to 17 M / 2.3 M</td>
</tr>
<tr>
<td>Subtense angle coverage per sector (total approximately 13°)</td>
<td>≤3° ≤3° ≤6°</td>
</tr>
<tr>
<td>Vertical divergence, typical</td>
<td>1.8° 3° 3°</td>
</tr>
<tr>
<td>Power consumption in flash</td>
<td>≤15W ≤45W ≤80W</td>
</tr>
<tr>
<td>Achievable boundary resolution</td>
<td>≤0.04° (2&quot;)</td>
</tr>
<tr>
<td>Range of beam adjustment in field conditions, H / V</td>
<td>±6° / ±2°</td>
</tr>
</tbody>
</table>

| Light source | High Power Light Emitting Diodes (LED) |
| Vertical divergence | 1.8° or 3° (FWHM) |
| Lens material | optical glass |
| Enclosure material | polycarbonate optical unit potted in resin on aluminium bottom plate, marine grade aluminium protective cover, painted steel mounting plate |

### Operating environment

- Operating temperature: -40 °C to +65 °C
- Power supply voltage: 12 VDC (10 ... 24 V)
- Power consumption in flash: up to 80 W depending on configuration
- Degree of ingress protection: IP 67
- Overall height (excl. bird deterrents): 250 mm
- Focal plane height: 140 mm
- Installation: 5 x #10-14 on 200 mm circle
MARINE LANTERNs

E8593

LED Projector sector light signal, up to 21 M / 4 M daytime range

The E8593 is a high performance, power efficient medium intensity marine LED Projector sector lantern with beam configuration tailored to customer requirements at the factory. All E859X Lanterns feature factory configured Day and Night mode luminous intensity selectable by a single digital input, supporting fast PWM control necessary for generating navigational signals at reduced intensities, as well as for utilizing Fixed-and-Flashing (FFL) rhythmic characters or Slow Flash Front (SFF). The field proven E8593 design can be offered with optional Opposite-Isophase sector signal control for producing rhythmic characters reducing the latency of spatial awareness update for the mariners: the white sector signal is active during the eclipse of coloured sectors and vice versa, resulting in immediate awareness about leaving the white sector without the usual delay caused by the common eclipse. A two-tiered design with two additional sectors providing alternating flashing on sector boundaries is available as E8595.

- Power efficient Day/Night light signalling system for port entry lights or leading line systems replacement
- IALA colours Red, Green, White with application-specific luminous intensities nearly uniform up to 250 kcd
- Factory-customized sector configuration with precision of \( \leq 0.05^\circ \) (3’)
- Sector width up to 2.5° with total subtense of approximately 7.5° or 2.5°
- Vertical divergence either 1.2° or 2.5°
- Boundary resolution typically better than 8'
- Robust light signal unit that can be equipped with a Sabik SMC Flasher or with external Ekta control and monitoring system
- Day and Night mode luminous intensities configured in hardware as required - down to 10% by current and further by implementing PWM
- Internal optical LED performance diagnostics with condition output
- Available with optional Opposite-Isophase sector signal control
- Optionally available in “smart” version with externally integrated flasher and telematics controller with triaxial acceleration sensor integrated on the Lantern for Structural Health Monitoring of the AtoN mast
- Easy to install – requires only simple procedures for aiming the composite beam vertically
- No maintenance needed where sprinkling of the lens by wave particles or dirt can be avoided

Marine Lanterns
Product codes
Since this product is usually ordered in AtoN site specific configuration, simple ordering codes covering all possible alternatives are not available.

Product code example: E8593.GWR.F2.G1
• Projector sector light for IALA Region B with integrated Flasher E8672 and GPS capability
The E8594 is a high-performance, power efficient high intensity marine LED Projector sector lantern with beam configuration tailored to customer requirements at the factory. All E859X Lanterns feature factory configured Day and Night mode luminous intensity selectable by a single digital input, supporting fast PWM control necessary for generating navigational signals at reduced intensities, as well as for utilizing Fixed-and-Flashing (FFL) rhythmic characters or Slow Flash Front (SFF). The field proven E8594 design can be offered with optional Opposite-Isophase sector signal control for producing rhythmic characters reducing the latency of spatial awareness update for the mariners: the white sector signal is active during the eclipse of coloured sectors and vice versa, resulting in immediate awareness about leaving the white sector without the usual delay caused by the common eclipse. Same two-tiered design with two additional sectors providing alternating flashing on sector boundaries is available as E8595.

**E8594**

LED Projector sector light signal, up to 23 M / 5 M daytime range

- Power efficient Day/Night light signalling system for port entry lights or leading line systems replacement
- IALA colours Red, Green, White with application-specific luminous intensities up to 500 kcd
- Factory-customized sector configuration with precision of ≤ 0.06° (3’)
- Sector width up to 2.5° with total subtense of approximately 7.5°
- Vertical divergence 1.2°
- Boundary resolution typically better than 8’
- Robust light signal unit that can be equipped with a Sabik SMC Flasher on with external Exta flasher control and monitoring system
- Day and Night mode luminous intensities configured in hardware as required - down to 10% by current and further by implementing PWM
- Internal optical LED performance diagnostics with condition output
- Available with optional Opposite-Isophase sector signal control
- Optionally available in “smart” version with externally integrated flasher and telematics controller
- Triaxial acceleration sensor integrated on the Lantern for Structural Health Monitoring of the AtoN mast
- Easy to install - requires only simple procedures for aiming the composite beam vertically
- No maintenance needed where sprinkling of the lenses by wave particles or dirt can be avoided

**Rifle sights**

Alignment is performed by looking through the aperture in the right side of the heat sink.

Two-tiered lens design

Powerful sector signals with alternating flashing sector configuration capability.

Significant sail surface

Installation quality and mast structure stability are of particular importance at high wind locations.

Abundant heat sinks

Efficient dissipation of heat ensures reliable long term operation.

**Marine Lanterns**
Product codes

Since this product is usually ordered in AtoN site specific configuration, simple ordering codes covering all possible alternatives are not available.

Product code example: E8594.GWR.F2.G1

- Projector sector light for IALA Region B with integrated Flasher E8672 and GPS capability

Order Overview E8594

Option matrix

<table>
<thead>
<tr>
<th>Option Matrix</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector lights for IALA Region A</td>
<td>E8594.RWG</td>
</tr>
<tr>
<td>Sector lights for IALA Region B</td>
<td>E8594.GWR</td>
</tr>
<tr>
<td>Sector lights with alternating flashing for IALA Region A</td>
<td>E8595.RWG</td>
</tr>
<tr>
<td>Sector lights with alternating flashing for IALA Region B</td>
<td>E8595.GWR</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird deterrent rod set (incl. screws)</td>
<td>B264.050</td>
</tr>
<tr>
<td>Cable Connector, 90deg, female 6 + PE-position</td>
<td>C016.30F006.100.10</td>
</tr>
<tr>
<td>Programmable Flasher, integrated</td>
<td>E8672</td>
</tr>
<tr>
<td>Programmable Flasher with GPS, integrated</td>
<td>E8672.G</td>
</tr>
<tr>
<td>TeFiCon™-Flasher for complete AtoN telematics, integrated</td>
<td>E9272</td>
</tr>
</tbody>
</table>

Main technical specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sectors</td>
<td>3 (R, W, G)</td>
</tr>
<tr>
<td>Typical luminous intensity of the light signal per colour</td>
<td>500 000 cd</td>
</tr>
<tr>
<td>Nominal range</td>
<td>up to 23 M / 5 M</td>
</tr>
<tr>
<td>Subtense angle per sector (total approximately 75°)</td>
<td>≤ 1.2° ≤ 2.5°</td>
</tr>
<tr>
<td>Power consumption in flash</td>
<td>≤ 90W ≤ 180W</td>
</tr>
<tr>
<td>Vertical divergence (FWHM)</td>
<td>1.2°</td>
</tr>
<tr>
<td>Achievable boundary resolution</td>
<td>ε 0.13° (8'… 9')</td>
</tr>
<tr>
<td>Range of beam adjustment in field conditions, H / V</td>
<td>≤ 180° / 2°</td>
</tr>
</tbody>
</table>

Optical performance

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light source</td>
<td>High Power Light Emitting Diode (LED) clusters</td>
</tr>
<tr>
<td>Vertical divergence (FWHM)</td>
<td>1.2°</td>
</tr>
<tr>
<td>Lens material</td>
<td>optical glass</td>
</tr>
<tr>
<td>Enclosure material</td>
<td>polycarbonate optical unit potted in resin on aluminium bottom plate, marine grade aluminium sides and protective cover, painted steel mounting plate</td>
</tr>
<tr>
<td>Weight</td>
<td>&lt; 92 kg</td>
</tr>
<tr>
<td>Operating environment</td>
<td>-40 °C to +65 °C</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 VDC (10 ... 24 V)</td>
</tr>
<tr>
<td>Power consumption in flash</td>
<td>up to 180 W depending on configuration</td>
</tr>
<tr>
<td>Degree of ingress protection</td>
<td>IP 67</td>
</tr>
<tr>
<td>Overall height (excl. bird deterrents)</td>
<td>528 mm, width 333 mm, depth 1326 mm</td>
</tr>
<tr>
<td>Focal plane height</td>
<td>205 mm</td>
</tr>
<tr>
<td>Installation</td>
<td>3 x 14mm on 200 mm circle</td>
</tr>
</tbody>
</table>
Marine Lanterns

**LS 100**

**LED Range Light**

The LS 100 LED signal is designed for applications requiring short and medium range directional light, such as range lights and port traffic signals.

- Small and compact lantern
- Intensity adjustable in three steps from 25% to 100%
- Fully waterproof housing with PTFE vent for breathing
- Visual range from 2 to 12 NM (TC = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Low power consumption, ideal for solar system
- External Sabik SMC Flasher can be connected to the light
- Optional external GPS synchronization
- Optional external GSM Remote monitoring

**Sun shield**

Protects lens from dust and bird droppings, and improves contrast in daytime.

**Mounting pedestal**

The optional adjustable pedestal in AISI 316 stainless steel enables an easier alignment of the pencil beam with assistance of a precision gun sight.

**Installation**

The mounting pedestal has an integrated holder for an eye sight tool.

**Polycarbonate lens**

The optical lens consists of 24 pcs miniature Fresnel elements creating a high efficiency precision beam.

**Sabik LHC Controller**

When remote monitoring or more functionality is needed, like flash character, intensity setting etc. Sabik LHC Controller can be used together with the light.

**LS 100**

LED Range Light

The LS 100 LED signal is designed for applications requiring short and medium range directional light, such as range lights and port traffic signals.

- Small and compact lantern
- Intensity adjustable in three steps from 25% to 100%
- Fully waterproof housing with PTFE vent for breathing
- Visual range from 2 to 12 NM (TC = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Low power consumption, ideal for solar system
- External Sabik SMC Flasher can be connected to the light
- Optional external GPS synchronization
- Optional external GSM Remote monitoring
**Technical Specification LS 100**

**Main Technical Specification**

- **Lens visual/Mechanical diameter**: 100 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: Light Emitting Diodes (LEDs)
- **Lens divergence (horizontal and vertical)**: 4° @ 50% (± 1°) of peak intensity, 8° @ 10 % (± 2°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 1.5 kg with integrated flasher
- **Temperature range**: -40°…+60°C
- **Supply Voltage**: 9 – 28 VDC
- **Power consumption**: R/Y: 3.5 W | W/G: 2.5 W

**Optical performance**

<table>
<thead>
<tr>
<th>Maximum fixed intensity</th>
<th>3,000 cd</th>
<th>3,000 cd</th>
<th>4,000 cd</th>
<th>4,000 cd</th>
</tr>
</thead>
<tbody>
<tr>
<td>At full power</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Order Overview LS 100**

**Option matrix**

<table>
<thead>
<tr>
<th>LHC Controller</th>
<th>Used as external flasher</th>
</tr>
</thead>
</table>

**Product codes**

<table>
<thead>
<tr>
<th>LS 100 STANDARD without LEDFLASHER</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS 100W</td>
<td>white</td>
</tr>
<tr>
<td>LS 100W</td>
<td>red</td>
</tr>
<tr>
<td>LS 100G</td>
<td>green</td>
</tr>
<tr>
<td>LS 100Y</td>
<td>yellow</td>
</tr>
</tbody>
</table>
LO 200M
Medium/High Intensity LED Range Light

The LO 200M signal is designed for applications requiring medium and long range directional light, such as range lights and port entry signals.

- High intensity precision range light
- Equipped with a high intensity power LED and especially designed optics
- Robust aluminium IP 66 housing
- Visual range up to 14NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Extremely low power consumption, suitable for solar and battery operation
- Vertical divergence 8° @ 50% of top intensity
- Integrated flasher with 16 A solar panel charger
- Adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring
- Equipped with Bluetooth programming

Aluminium housing
The lantern enclosure is made from marine grade aluminium.

Sun shield
Protects lens from dust and bird droppings. Improves contrast in daytime use.

Installation
The lantern can easily be installed on any flat surface with four M10 size bolts.

PTFE breathing
Vent for pressure release in the back of the lantern.

Optics
Optics suitable for high intensity LED.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

Precision alignment
A gun sight can be utilized for precision alignment to the center line of the range.

Level indicator
The integrated level indicator makes horizontal levelling easy.

Light beam adjustment
The direction of the light beam can be adjusted with 3 bolts. The 3 axis adjustment system enables both vertical and horizontal alignment.

Bluetooth® Control
Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.
Technical Specification LO 200M

Optical performance

<table>
<thead>
<tr>
<th>Optical performance</th>
<th>LO 200M</th>
<th>LO 200MR</th>
<th>LO 200MG</th>
<th>LO 200MY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum fixed intensity</td>
<td>7000 cd</td>
<td>7000 cd</td>
<td>13000 cd</td>
<td>13000 cd</td>
</tr>
<tr>
<td>At full power</td>
<td>7000 cd</td>
<td>7000 cd</td>
<td>13000 cd</td>
<td>13000 cd</td>
</tr>
</tbody>
</table>

Main Technical Specification

- Lens visual/Mechanical diameter: 203 mm (8”)
- Lens material: UV stabilized Polycarbonate
- Light source: Light Emitting Diodes (LEDs)
- Lens horizontal divergence: 6° @ 50 % (± 1°) of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 8 kg
- Temperature range: -40°...+60°C
- Supply Voltage: 9 – 32 VDC
- Power consumption: 4W at full intensity
- Degree of protection: IP 66

Order Overview LO 200M

Option matrix

- OPT 4: GPS sync
- OPT 5: External GPS
- OPT 9: LightGuard GSM + GPS
- OPT 10: LightGuard GSM
- OPT 11: Control card
- OPT 12: Aux card with I/O
- OPT 13: Aux card with RS485 and I/O
- Shock & Tilt Sensor

- Integrated LED performance measurement
- External GPS antenna
- Integrated GSM based monitoring including GSM/GPS antennas
- Integrated GSM based monitoring including GSM antenna
- Control card for secondary battery
- Aux card including I/O ports
- Aux card including RS 485 and I/O port
- Integrated 3-axis G sensor for tilt and shock sensing

Product codes

- LA 200MW: white
- LA 200MR: red
- LA 200MG: green
- LA 200MY: yellow

Product code example: LO 200MR.4

- LO 200MR is Sabik code for LO 200M in red
- 4 is a selection of option 4
LO 200
High Intensity LED Range Light Signal

The LO 200 signal is designed for applications requiring medium and long range directional light, such as range lights and port entry signals.

- High intensity precision range light
- Intensity adjustable from 5% to 100%
- Housing fully waterproof with PTFE vent for breathing
- Visual range up to 15 NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Low power consumption, ideal for solar system
- Flasher with daylight switch integrated with the lantern
- Integrated 16 ampere PWM solar panel regulator when flasher is integrated
- Programmable with Sabik standard IR programming devices
- Optionally internal GPS synchronization
- Optional night time reduction if operated day and night
- Equipped with Bluetooth programming

**Aluminium housing**
The lantern enclosure is made from marine grade aluminium.

**Sun shield**
Protects lens from dust and bird droppings. Improves contrast in daytime use.

**Light beam adjustment**
The direction of the light beam can be adjusted with 3 bolts. The 3 axis adjustment system enables both vertical and horizontal alignment.

**Installation**
The lantern can easily be installed on any flat surface with four M10 size bolts.

**Polycarbonate lens**
The optical lens consists of 120 pcs miniature Fresnel elements creating a high efficient precision beam.

**Sabik Easy Programmer**
User friendly and compact wireless two-way programmer.

**Bluetothen® Control**
Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.

**PTFE breathing**
Vent for pressure release in the back of the lantern.

**Precision alignment**
A gun sight can be utilized for precision alignment to the center line of the range.

**Level indicator**
The integrated level indicator makes horizontal levelling easy.

**LO 200**
High Intensity LED Range Light Signal

- High intensity precision range light
- Intensity adjustable from 5% to 100%
- Housing fully waterproof with PTFE vent for breathing
- Visual range up to 15 NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- Low power consumption, ideal for solar system
- Flasher with daylight switch integrated with the lantern
- Integrated 16 ampere PWM solar panel regulator when flasher is integrated
- Programmable with Sabik standard IR programming devices
- Optionally internal GPS synchronization
- Optional night time reduction if operated day and night
- Equipped with Bluetooth programming

**Aluminium housing**
The lantern enclosure is made from marine grade aluminium.

**Sun shield**
Protects lens from dust and bird droppings. Improves contrast in daytime use.

**Light beam adjustment**
The direction of the light beam can be adjusted with 3 bolts. The 3 axis adjustment system enables both vertical and horizontal alignment.

**Installation**
The lantern can easily be installed on any flat surface with four M10 size bolts.

**Polycarbonate lens**
The optical lens consists of 120 pcs miniature Fresnel elements creating a high efficient precision beam.

**Sabik Easy Programmer**
User friendly and compact wireless two-way programmer.

**Bluetothen® Control**
Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.

**PTFE breathing**
Vent for pressure release in the back of the lantern.

**Precision alignment**
A gun sight can be utilized for precision alignment to the center line of the range.

**Level indicator**
The integrated level indicator makes horizontal levelling easy.
### Technical Specification LO 200

**Optical performance**

<table>
<thead>
<tr>
<th>Maximum fixed intensity</th>
<th>20.000 cd</th>
<th>20.000 cd</th>
<th>25.000 cd</th>
<th>20.000 cd</th>
</tr>
</thead>
<tbody>
<tr>
<td>At full power 12/15 W</td>
<td>20.000 cd</td>
<td>20.000 cd</td>
<td>25.000 cd</td>
<td>20.000 cd</td>
</tr>
</tbody>
</table>

**Main Technical Specification**

- Lens visual/Mechanical diameter: 203 mm (8”)
- Lens material: UV-stabilized Polycarbonate
- Light source: Light Emitting Diodes (LEDs)
- Lens divergence (horizontal and vertical):
  - 4° @ 50% (± 1°) of peak intensity
  - 8° @ 10% (± 2°) of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 8 kg
- Temperature range: -40°C to +60°C
- Supply Voltage: 9 – 32 VDC
- Power consumption: 15 watts red/yellow, 12 watts green/white at full intensity
- Degree of protection: IP 66

### Order Overview LO 200

**Option matrix**

- **OPT 4: GPS sync**: Integrated GPS sync excluding GPS antenna
- **OPT 7: External GPS**: External GPS antenna for OPT 4 and OPT 9
- **OPT 8: LightGuard GSM + GPS**: Integrated GSM based monitoring including GSM antennas
- **OPT 10: LightGuard GSM**: Integrated GSM based monitoring including GSM antenna
- **OPT 11: Control card**: Control card for secondary battery
- **OPT 12: Aux card with I/O**: Aux card including I/O ports
- **OPT 12: Aux card with RS485 and I/O**: Aux card including RS 485 and I/O port
- **Shock & Tilt Sensor**: Integrated 3-axis G sensor for tilt and shock sensing

**Product codes**

<table>
<thead>
<tr>
<th>Product</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO 200W</td>
<td>white</td>
</tr>
<tr>
<td>LO 200R</td>
<td>red</td>
</tr>
<tr>
<td>LO 200G</td>
<td>green</td>
</tr>
<tr>
<td>LO 200Y</td>
<td>yellow</td>
</tr>
</tbody>
</table>

**Product code example: LO 200G.11**

- **LO 200G** is Sabik code for LO 200 in green
- **11** is a selection of option 11 Control Card
LO 200H
High Intensity LED Range Light Signal

The LO 200H signal is designed to be used as a long range directional light, a port entry signal or a lock traffic signal where long range and high visibility are required. Thanks to the high luminous output, this light can also be used in applications requiring daytime visibility.

The lantern housing forms a solid single-piece heat sink for the high power LEDs, offering the best possible thermal management and ensuring a long lifetime.

- High intensity precision range light equipped with high power LEDs
- Intermediate horizontal and vertical beam of 8° (FWHM)
- Integrated sun shield to protect lens from dirt and improve contrast
- Integrated 3-axis alignment of beam for easy installation
- Aluminium housing fully waterproof with PTFE vent for breathing
- Visual range up to 18 NM (Tc = 0.74)
- Standard IALA colours Red, Green, White and Yellow
- The range light has an integrated LED driver, but no flasher or photocell
- For additional functionality, the Sabik LHC unit can be connected to the lantern
- The range light is delivered with an acid-proof steel mounting mechanism

 Aluminium housing
The aluminium housing is equipped with cooling elements on the back side of the enclosure.

 Sun shield
Protects lens from dust and bird droppings. Improves contrast in daytime use of the lantern.

 Installation
The lantern can easily be installed on a flat surface with four M10 size bolts.

 Light beam adjustment
The direction of the light beam can be adjusted with 3 bolts. The 3 axis adjustment system enables both vertical and horizontal alignment.

 Cable entry
Cable entry and PTFE breathing vent are from the back of the lantern.

 Sabik LHC Controller
When remote monitoring or more functionality is needed, like flash character, intensity setting etc. Sabik Lighthouse Controller can be used together with the light.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.
### Technical Specification LO 200H

#### Main Technical Specification

- **Lens visual/Mechanical diameter**: 200 mm (8")
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: High Power Light Emitting Diodes (LEDs)
- **Lens divergence** (horizontal and vertical):
  - 8° @ 50 % (± 1°) of peak intensity
  - 15 @ 10% (± 2°) of peak intensity
- **Unit lifetime**: Up to 10 years
- **Weight**: 10 kg
- **Temperature range**: -40°…+60°C
- **Supply Voltage**: 20 – 30 VDC
- **Power consumption**: 50 watts
- **Degree of protection**: IP 66

#### Optical performance

<table>
<thead>
<tr>
<th>Maximum fixed intensity</th>
<th>50,000 cd</th>
<th>70,000 cd</th>
<th>100,000 cd</th>
<th>50,000 cd</th>
</tr>
</thead>
<tbody>
<tr>
<td>At full power 50 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Option matrix

- **Sabik LHC, External marine flasher**
  - **LHC Flasher c/w photocell**
  - **980091**
    - LHC controller with photocell, GPS sync inst.
    - antenna, holder and coax cable
  - **980090**
    - LHC controller with GPS/GSM, GPS and GSM
    - antenna, holder and coax cable
- **LHC external IP 66 300x400x130 polycarbonate enclosure with terminals**

### Product codes

<table>
<thead>
<tr>
<th>Product</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO 200HW</td>
<td>white</td>
</tr>
<tr>
<td>LO 200HR</td>
<td>red</td>
</tr>
<tr>
<td>LO 200HG</td>
<td>green</td>
</tr>
<tr>
<td>LO 200HY</td>
<td>yellow</td>
</tr>
</tbody>
</table>
E8554

LED range light signal for leading lights, up to 24 M range

The E8554 is a robust high-performance, long life marine LED range lantern with several standard beam configuration alternatives available. The field proven E8554 design is foreseen with life cycle extension capability by replacing the LEDs after ten to twelve years for improved power efficiency. An E8554 Lantern supports fast PWM control necessary for generating navigational signals at reduced intensities, as well as for utilizing Fixed-and-Flashing (FFL) rhythmic characters or Slow Flash Front (SFF).

- Standard IALA colours Red, Green, White
- Factory-customized luminous intensity with peak value depending on selected colour and horizontal divergence
- Uniquely uniform beam width “flat top” horizontal profile, 3.5° to 30° FWHM
- Vertical divergence ≥ 3.8° (FWHM)
- Focal height 216 mm
- Internal redundant arrays and constant current electronics, dual power/signal receptacles as standard
- Stainless steel outer frame and pedestal, aluminium heat sink / back plate

- Day and Night mode luminous intensities are currently configured by flasher by adjusting PWM duty cycle, hard-wired D/N intensities for external selection a future option
- Optionally available without the pedestal for building LED clusters for high-intensity leading lines
- A 4x4 matrix of 24 lenses of machined optical grade UV-stable acrylic
- UV resistant, field-replaceable polycarbonate front cover
- Robust light unit for redundant AtoN systems without programmable parts inside
- Two built-in light sensors for redundant control systems

- High power LEDs and custom optics
- Flexible platform for several horizontal divergence alternatives.
- Integrated light sensors
- Redundant leading light systems may use either integrated or additional light sensors.
- Field-replaceable protective screen
- UV-stable polycarbonate front cover with integrated PUR seal is a commercially available spare part.

Vertical beam tilting arrangement
The light module can be tilted inside the protective frame within the limits of ±6°.

Pedestal
Combination of three and four Ø16 mm mounting holes on a 200 mm ring. Horizontal beam alignment within ±8° is possible by turning the light unit on the pedestal.

“Flat top” horizontal profile
Uniquely uniform nearly up to 50% FWHM

Sighting Scope mount
Mechanical interface for attaching an optional Sighting Scope.

Bird Deterrents
Stainless steel as standard.

Optional integrated flasher
Alternatives range from simple robust flashers to fully programmable Flashers with GPS synchronization and calendar based seasonal operation.

Marine Lanterns
Technical Specification E8554

Main technical specification
- Power supply voltage: 12 VDC (9…27 or 36 V)
- Power consumption in flash: Up to 132 W depending on configuration
- Light source: High Power Light Emitting Diode (LED)
- Vertical divergence: ≥ 3.8° (FWHM)
- Lens material: UV stabilized Acrylic
- Operating environment: -40 °C to +55 °C
- Degree of ingress protection: IP 67
- Weight: 12.2 kg (13 kg with integrated Flasher)
- Overall height (excl. bird deterrents): 382 mm
- Installation: 5 x Ø16, 4 x Ø16, on 200 mm circle

Order Overview E8554

Option matrix
- Range lantern with white signal: E8554.W.N.X
- Range lantern with green signal: E8554.G.N.X
- Range lantern with red signal: E8554.R.N.X
- Range lantern with blue signal: E8554.B.N.X
- Range lantern with yellow signal: E8554.Y.N.X
- Marking N specifies the horizontal divergence of the light signal
- Marking D indicates a dual configuration of the Lantern
- Marking F indicates an integrated flasher, identifying the type (F2=EB67X)
- Marking G indicates a flasher with GPS synchronization (Gn=EB67X.G)
- Marking T indicates an integrated telematics module (TelFiCon™-Flasher)

Accessories
- Transparent UV-stable polycarbonate front cover: EKJ 86-T
- Bird deterrent rod set (incl. screws): B864.050
- Cable Connector, 90deg, female 6 + PE position: C016 35F06 100 10
- Sighting scope set (with carrying case): B53.000
- Programmable Flasher, integrated: EB672
- Programmable Flasher with GPS, integrated: EB672.G

Product codes
Product ordering code consists of symbols describing the light signal colour, horizontal divergence, external wiring of the internal redundant LED arrays (dual as standard, single when supplied with integrated flasher or on special order).

Product code example: E8554.G.20.F2.G1
- Green range light signal with ≥20° horizontal FWHM
- with integrated flasher EB672 and GPS capability
LT 1000

LED Light Tube

LT 1000 LED Light tube is designed to replace traditional floodlights. The light is distributed directly towards the mariner instead of illuminating the structure. Only a fraction of energy is required compared to traditional floodlights.

- Maintenance free LED light tubes for illuminating fixed aids to navigation
- Housing fully waterproof with PTFE vent for breathing
- Standard IALA surface colours Red, Green, White and Yellow in accordance with E-108 Recommendation
- Low power consumption, ideal for solar systems
- Can be used standalone or with control unit
- With the control unit the intensity can be adjusted from 15 % to 100 %
- Control unit also includes integrated solar panel regulator and photocell
- Configuration and field maintenance with Programmer Mk2 or laptop computer

Waterproof
Completely sealed design, PTFE vent for breathing.

Robust
Designed for marine environment.

Uniformity
LT 1000 optical design creates an even and balanced light distribution with no blind spots.

Array
When the light tubes are mounted in arrays on the surface of the AtoN structure the light creates a good visual impression of the illuminated area. This allows the mariners to easily detect the structure.

Leading lights
Light tubes can be used to enhance the visibility of a leading line. Mounted vertically on the daytime panels, the leading light becomes very conspicuous in built-up areas with a lot of background light.

Installation
The LED tube can be installed on any flat surface with four bolts. Rubber gaskets around mounting bolts allow thermal expansion.

White
Red
Green
Yellow

Marine Lanterns
**Technical Specification LT 1000**

**Main Technical Specification**

- **Dimensions**: 1180 x 145mm
- **Lens tube material**: UV stabilized Acrylic
- **End terminal material**: Marine grade anodized aluminium
- **Light source**: Light Emitting Diodes (LEDs)
- **Viewing angle**: 150°
- **Unit lifetime**: Up to 10 years
- **Weight**: 2.5 kg
- **Temperature range**: -40°…+60°C
- **Supply Voltage**: 9 – 30 VDC
- **Power consumption**:
  - High setting = max 3 watts
  - Low setting = max 0.5 watt

**Optical performance**

Maximum Illuminance

- At full power 3 W: 100 cd/m²
- At full power 1 W: 100 cd/m²
- At full power 0.5 W: 100 cd/m²

**Order Overview LT 1000**

**Option matrix**

- Supply cables with connector
  - 2 m
  - 6 m
  - 10 m

**Product codes**

- **LT 1000 0.5W**
  - Power 0.5W
  - Colour: white
- **LT 1000 3W**
  - Power 3 W
  - Colour: red
- **LT 1000 1W**
  - Power 1 W
  - Colour: green
- **LT 1000 1Y**
  - Power 1 W
  - Colour: yellow

**CONTROL BOX**

- 980269

**LT-1000 CABLE**

- LT-1000 CABLE 2M: 715620-2
- LT-1000 CABLE 6M: 715620-6
- LT-1000 CABLE 10M: 715620-10

**Installation Example**
SBFL 160
Marker Light for Aquaculture Farms

SBFL 160 is a marker light especially developed for aquaculture farms. The unit is designed to meet requirements regarding night and day time visibility as well as radar visibility. It can also be installed directly on floats for aquaculture farms. The marker light consists of a yellow buoy tube with integrated alkaline battery, LED lantern, light reflectors as well as internal radar reflector. The partly integrated, robust lantern has very low power consumption and is equipped with GPS synchronization.

- Adjustable intensity and range
- Standard range 3 NM at Tc = 0.74 (4.5 NM at Tc = 0.85)
- Standard IALA yellow colour light
- Equipped with internal radar reflector
- Energy sources: Alkaline main battery
- Vertical divergence 8° @ 50% (±1°) of peak intensity
- GPS synchronization as standard
- Optionally integrated GSM/GPS remote monitoring
- Remote monitoring with LightGuard Monitor can be added as an option
- Mounting mechanism can be customized for different floats
- Sabik Easy programmer can be used for programming the lantern and for reading the status of the lantern and battery
- Advanced Bluetooth® Control up to 50m available for android and iOS smart phones

**Main Technical Specification**

- Lantern intensity setting: 17 cd
- Max lantern intensity: 40 cd
- Vertical divergence: 8° @ 50% (±1°) of peak intensity
- Buoy material: UV resistant Polyethylene
- Lantern material: UV resistant Polycarbonate
- Weight without adapter plate: 33 kg
- IP: 67
- Degree of protection, lantern: IP 67
- Lantern programming: Wireless with Sabik Easy programmer or with an advanced Bluetooth android mobile app
- Primary battery 220 Ah
- Changing interval > 1.5 years

**Product codes**

- SBFL 160-1.7YBS: Marker light with 220Ah primary battery + sync
- SBFL 160-1.7YTS: Marker light with 230/12V power supply and 12Ah back-up battery + sync

**Product code for mechanical fixing**

- 841011: Mechanics for buoy installation

**Product code for lanterns**

- VPL 110Y4: Lantern for SBFL marker light with synchronization

**Product code for battery**

- 950168: 220 Ah primary battery

**Product code for Programmer**

- 980332: Sabik Easy Programmer
  - Bluetooth® app for android and iOS mobile phones available
SBFH 160
Hybrid Marker Light for Aquaculture Farms

SBFH 160 is a hybrid marker light especially developed for aquaculture farms. It is designed to meet requirements regarding night and day time visibility as well as radar visibility. It can also be installed directly on floats for aquaculture farms. This hybrid marker light has an unique hybrid system including a solar panel and an integrated rechargeable battery. During the dark winter months an alkaline battery is used as a power supply. The partly integrated, robust lantern has very low power consumption and is equipped with GPS synchronization.

- Adjustable intensity and range
- Standard range 3 NM at Tc = 0.74 (4.5 NM at Tc = 0.85)
- Standard IALA colours
- Equipped with internal radar reflector
- Energy sources: main NiMH battery and solar panel as main and Alkaline battery as back-up.
- Vertical divergence 8° @ 50% (±1°) of peak intensity
- GPS synchronization as standard
- Optionally integrated GSM/GPS remote monitoring
- Remote monitoring with LightGuard Monitor
- Mounting mechanism can be customized for different floats
- Sabik Easy programmer can be used for programming the lantern and for reading the status of the lantern and battery
- Advanced Bluetooth® Control up to 50m available for android and iOS smart phones

Main Technical Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lantern intensity setting</td>
<td>17 cd</td>
</tr>
<tr>
<td>Max lantern intensity</td>
<td>40 cd</td>
</tr>
<tr>
<td>Vertical divergence</td>
<td>8° @ 50% (±1°) of peak intensity</td>
</tr>
<tr>
<td>Buoyy material</td>
<td>UV resistant Polyethylene</td>
</tr>
<tr>
<td>Lantern material</td>
<td>UV resistant Polycarbonate</td>
</tr>
<tr>
<td>Weight without adapter plate</td>
<td>35 kg</td>
</tr>
<tr>
<td>Degree of protection, lantern</td>
<td>IP 67</td>
</tr>
<tr>
<td>Lantern programming</td>
<td>Wireless with Sabik Easy programmer or with an advanced Bluetooth android mobile app</td>
</tr>
<tr>
<td>Primary battery 220 Ah</td>
<td>Changing interval &gt; 1.5 years</td>
</tr>
</tbody>
</table>

Product codes

- **SBFH 160-1.YB5S** Hybrid marker light with integrated rechargeable battery and a 220 Ah battery as back up + sync

Product code for mechanical fixing

- **B41011** Mechanics for buoy installation

Product code for lanterns

- **HBL 110Y4** Hybrid lantern for SBFL marker light with synchronization

Product code for battery

- **950168** 220 Ah primary battery

Product code for Programmer

- **980332** Sabik Easy Programmer

Bluetooth® app for android and iOS mobile phones available
Sabik Marine Controller Functionality

Sabik Marine Controller (SMC) is the lantern integrated controller (flasher). The SMC comes with all the proven solutions invented by Sabik for the previous generation controllers. A wide range of innovative functions are included and we are setting a new standard for efficiency of flashers.

SMC is a versatile controller with a whole range of functions integrated as standard and a variety of add-on options.

Key features include:
- Low energy consumption in all operating stages (daytime idle, night-time active and between flashes). Consumption never exceeds 12 mW (1 mA @ 12VDC)
- Intensity dynamics from 5% to 100%
- Wireless infrared communication link for configuration and maintenance
- Daytime sensor calibrated in lux with user configurable levels
- 16 A PWM solar panel charger with temperature sensor and user configurable 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

Options include:
- 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 for most of the Sabik lanterns
- Tilt switch
- Secondary battery switch enables lantern to run on two battery sources, one acting as hot standby.

User interfaces:
- New Bluetooth® Control app available for android and IOS mobile phones
- Easy Programmer for configuration. Collected data can be uploaded to a PC.
- Windows based software for configuration and maintenance
Sabik Marine Controller Feature

<table>
<thead>
<tr>
<th>Feature</th>
<th>Standard</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide input voltage range</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– range of up to 10 - 32 V enables operation with all kinds of DC power supplies</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– stable output intensity within the whole input voltage range</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pulse Width Modulated (PWM) solar panel charger</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– 16 ampere (200 watts) charging current</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Solar panel production Ampere Hour meter</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– measures and logs the total solar panel production and daily min/max current</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Event log</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– stores all main events in memory</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– events include lantern start/stop, errors, change of setting, power failure</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– protected by a four week back up battery (capacitor)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Black box</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– same unit as the Event log, events stored in a non volatile Flash memory</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Secondary battery interface</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– an auxiliary board enabling hot switch to a standby battery if the main battery fails</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Cable sync</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– one wire cable sync, where all lanterns are masters and/or slaves</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Output power measurement</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– measurement of power output to LED load is recorded</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Operating hours counter</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– stores the lantern »mileage« in a non volatile memory</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Wireless infrared communication port</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– IR port with secured two-way communication protocol</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– programming with Windows software or Windows Mobile device (PDA)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Intensity setting</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– Can be adjusted from 5 % to 100 %</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Optical Feedback Monitoring</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– auxiliary OPBS sensor card that monitors LED degradation over time</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– available to most lanterns</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Auxiliary card</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– enables connection of two external I/Os</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– can be used as a digital alarm output</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– RS 485 port integrated for connection to host system (MODBUS)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Tilt switch</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>– switches off the light when the lantern is tilted over in close to horizontal position (Buoy in storage or under the ice)</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Bluetooth® Control

- Programming range up to 50m @50μA
- Connected within one second, no pairing required
- Lantern settings PIN-code protected
- Requires BLE 4.0 (Android 4.3+ or iPhone)
- Available for Android and iOS

Sabik Easy Programmer

- User friendly and compact in size
- Integrated infrared port
- Two-way communication
- Lantern data can be downloaded to a PC

Product code

Sabik Easy programme
980332

Sabik IR interface and Windows program

- USB to IR interface for Windows computer with USB port
- Lantern configuration
- Delivered as a set with a one meter long USB extension cable and software on memory stick

Product code

Sabik IR interface and Windows program
980336
Self-contained solutions are now even more comprehensive than before thanks to constant development of LEDs, solar panels and battery technologies. Self-contained lanterns with an integrated light and solar power supply are an ideal solution for the operator. These solutions are hassle-free with no installation needed on the field.

Our comprehensive range of self-contained lanterns cover visual ranges from 1 to 10 NM for omnidirectional lanterns and up to 14NM for directional lights. The capacity of the integrated solar system will limit the range and duty cycle for any given location. The larger the energy package, the higher the latitude where the solution can be used.
M550
Solar Powered
LED Marine Lantern,
1 to 3 NM Range

Leveraging custom optics, high-efficiency solar panels, and premium materials, this miniature solar LED marine lantern offers up to three times the range at half the size of its M502 predecessor. Now with replaceable, recyclable batteries this lantern provides excellent value and reliable operation over the long term. Battery life expectancy is five years with product life up to 15 years and a three-year warranty. Ideal for marine aids-to-navigation, marina lighting, dock lighting, and port lighting. To view performance in your installation location, visit www.sabik-marine.com ->Marine Selector Tool

- 40 user-adjustable flash patterns and programmable intensities
- Replaceable, recyclable, high-temperature-rated NiMH AA batteries
- Automatic Light Control (ALC) 2.0; achieve optimal intensities throughout the year
- Premium grade, UV resistant polycarbonate body and lens material
- IP 68 rated
- Ventilated battery compartment

Solar Modules
High-efficiency cells embedded in shatterproof polyurethane.

Bird Deterrent
Stainless steel bird deterrent available as accessory. Fits up to four per lantern.

Installation
Simple installation using 2 x M6 bolts on a 127 mm diameter. No additional mounting hardware required.

Pole Mount
Easily adjusts to 2 3/8 inch, 60mm or 1 7/8 inch, 48 mm pole dimensions.

Batteries
Replaceable and recyclable NiMH batteries with extreme temperature range and 5-year life expectancy.

IR Controller
Check battery status, change flash code, adjust light intensity and turn lantern off with optional mini IR (Infrared) programmer.

External Switch
Optional external ON/OFF switch.

Bird Deterrent
Stainless steel bird deterrent available as accessory. Fits up to four per lantern.

Installation
Simple installation using 2 x M6 bolts on a 127 mm diameter. No additional mounting hardware required.

Pole Mount
Easily adjusts to 2 3/8 inch, 60mm or 1 7/8 inch, 48 mm pole dimensions.

Batteries
Replaceable and recyclable NiMH batteries with extreme temperature range and 5-year life expectancy.

IR Controller
Check battery status, change flash code, adjust light intensity and turn lantern off with optional mini IR (Infrared) programmer.

External Switch
Optional external ON/OFF switch.
Technical Specification M550

Main Technical Specification

- **Construction**: Premium grade, UV resistant polycarbonate lens/head and polycarbonate/polysiloxane co-polymer base.
- **Lens visual/Mechanical diameter**: 102 mm
- **Lens material**: UV stabilized polycarbonate
- **Light source**: High Flux Surface Mount LED
- **Solar module**: High efficiency cells
- **Battery**: NiMH AA batteries
- **Degree of ingress protection**: IP 68
- **Weight**: Flange Mount: 0.37 kg (0.8 lbs)  
  Pole Mount: 0.40 kg (0.9 lbs)
- **Overall height**: 58 mm (flange mount), 96 mm (pole mount)
- **Overall width**: 155 mm dia.
- **Installation**: 2 x M6 on 128 mm dia.

Order Overview M550

**Option matrix**

- **M550 Flange Mount - Switched**: 2-bolt mount with ON/OFF switch
- **M550 Flange Mount - Unswitched**: 2-bolt mount, No ON/OFF switch
- **M550 Pole Mount**: Pole mount. No ON/OFF switch

**Accessories**

- 69935 Pole Mount Replacement/Conversion Kit
- 70943 Flange Mount Replacement/Conversion Kit
- 70937 Switched Kit (compatible with Flange Mount only)
- 70955 Replacement NiMH batteries
- 69934 Bird Deterrent (single)

**Product codes**

<table>
<thead>
<tr>
<th>Colour</th>
<th>M550 Flange unsswitched</th>
<th>M550 Flange switched</th>
<th>M550 Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>M550RF</td>
<td>M550RF-S</td>
<td>M550RP</td>
</tr>
<tr>
<td>green</td>
<td>M550GF</td>
<td>M550GF-S</td>
<td>M550GP</td>
</tr>
<tr>
<td>white</td>
<td>M550WF</td>
<td>M550WF-S</td>
<td>M550WP</td>
</tr>
<tr>
<td>yellow</td>
<td>M550YF</td>
<td>M550YF-S</td>
<td>M550YP</td>
</tr>
<tr>
<td>blue</td>
<td>M550BF</td>
<td>M550BF-S</td>
<td>M550BP</td>
</tr>
</tbody>
</table>

**Optical performance**

- **Maximum fixed intensity**: 16 cd, 22 cd, 29 cd, 25 cd, 8 cd

**Note**: Peak IALA intensity dependent on location. To view performance in your installation location, visit www.carmanahmarine.com/selector.
M650H
Self-contained LED lantern for buoys and minor beacons, 2 to 4 NM Range

The M650H is a cost effective, self-contained, high-performance, low-maintenance and easy-to-install solar LED marine lantern. The M650H features a replaceable battery pack that extends the service life beyond five years, reducing the total cost of ownership. Applications include: marine aids-to-navigation marking, marine lighting, dock lighting, and port lighting. To view performance in your installation location, visit www.sabik-marine.com ->Marine Selector Tool

- Standard IALA colours Red, Green, White, Yellow, Blue
- High-efficiency solar cells with bypass and blocking diode function. Maximum power point tracking (MPPT) for optimal energy collection
- Premium grade UV resistant, polycarbonate/polysiloxane co-polymer body and lens material
- Colour-specific temperature corrected LED drivers provide consistent intensity under all operating conditions
- IP 68 rated. Double O-ring sealing with waterproof vent
- SLA battery
- Ventilated battery compartment
- Adjustable intensity and range
- Vertical divergence > 8º (FWHM)
- Programmable with On-Board User Interface, USB port, or optional wireless IR-Programmer
- Integrated event-log
- Optional ON/OFF switch
- Optional external charger
- Optionally integrated GPS synchronization

Bird Deterrent
Stainless steel as standard. Tool-less installation and replacement.

Solar Modules
High-efficiency cells with bypass and blocking diode function. Maximum power point tracking (MPPT) for optimal energy collection.

SLA Battery
Tool-less replaceable and recyclable best-in-class battery pack with extreme temperature range and 5-year life expectancy. On-board battery status feedback of Good, Charge, Low or Replace. True battery voltage shown.

On-Board User Interface
Configure lantern parameters and features and access status reports.

650 Device Manager Software
Connect Windows based PC via USB port to configure parameters, view detailed information about the lantern, change transition settings, change passcodes, and update firmware. Multi-level access for advanced features.

IR Controller
Check battery status, change flash code, set ship mode and turn lantern off with optional IR (infrared) controller.

Installation
Supports installation on structure using 3 x M6 bolts on a 150 mm diameter.

Bottom Cover Removal Tool
Available as accessory.

Barge Application
For barge application, sector plates with open sectors of 112.5º, 135º and 225º.

Colour Indicator
Protective bumper indicates LED colour.
Technical Specification M650H

**Main Technical Specification**

- **Lens visual/Mechanical diameter**: 165 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: High Power Light Emitting Diode (LED)
- **Vertical divergence**: >8° (FWHM)
- **Solar module**: High efficiency cells; bypass and blocking diodes; MPPT
- **Battery**: Sealed Lead Acid
- **Degree of ingress protection**: IP 68
- **Weight**: 1.58 kg
- **Overall height**: 169 mm
- **Overall width**: 176 mm dia.
- **Installation**: 3 x M6 on 150 mm dia.

**Optical performance**

<table>
<thead>
<tr>
<th>Maximum fixed intensity</th>
<th>37 cd</th>
<th>45 cd</th>
<th>60 cd</th>
<th>52 cd</th>
<th>15 cd</th>
</tr>
</thead>
</table>

NOTE: Peak IALA intensity dependent on location. To view performance in your installation location, visit www.carmanahmarine.com/selector.

**Order Overview M650H**

**Option matrix**

- M650H Switched
- M650H Unswitched
- M650H Switched GPS
- M650H Unswitched GPS

**Accessories**

- 57003 650 Bird Deterrent – Additional (1 ships with each lantern)
- 57392 650 Bottom Cover Replacement Pack Switched
- 57393 650 Bottom Cover Replacement Pack Unswitched
- 59198 650 Bottom Cover Removal Tool
- 57383 650 Battery Replacement Pack
- 59188 650 International Wall Charger Assembly
- 57394 650 USB Cable
- 69899 IR (Infrared) Programmer

**Product codes**

<table>
<thead>
<tr>
<th>Colour</th>
<th>M650H unswitched</th>
<th>M650H switched</th>
<th>M650H unswitched GPS</th>
<th>M650H switched GPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>M650R</td>
<td>M650R-S</td>
<td>M650R-GPS</td>
<td>M650R-SGPS</td>
</tr>
<tr>
<td>green</td>
<td>M650G</td>
<td>M650G-S</td>
<td>M650G-GPS</td>
<td>M650G-SGPS</td>
</tr>
<tr>
<td>white</td>
<td>M650W</td>
<td>M650W-S</td>
<td>M650W-GPS</td>
<td>M650W-SGPS</td>
</tr>
<tr>
<td>yellow</td>
<td>M650Y</td>
<td>M650Y-S</td>
<td>M650Y-GPS</td>
<td>M650Y-SGPS</td>
</tr>
<tr>
<td>blue</td>
<td>M650B</td>
<td>M650B-S</td>
<td>M650B-GPS</td>
<td>M650B-SGPS</td>
</tr>
</tbody>
</table>
M660
Self-contained LED lantern for buoys and minor beacons, up to 4 NM Range

The M660 is a high-performance, long life, easy-to-use and cost effective self-contained solar LED marine lantern. The M660 features a Li-ion battery pack that extends the service life of the lantern up to eight years. M660 has four different mounting options and can be programmed and controlled with Bluetooth® Control. To view performance in your installation location, visit Marine Selector Tool in www.sabik-marine.com ->Marine Selector Tool

• Standard IALA colours Red, Green, White, Yellow, Blue
• Ventilated battery compartment
• Adjustable intensity and range
• Vertical divergence > 8º (FWHM)
• High-efficiency solar cells. Maximum Power Point Tracking (MPPT) for optimal energy collection
• Premium grade UV resistant, polycarbonate/polysiloxane co-polymer body and lens material
• IP 68 rated. O-ring sealing with waterproof vent.
• Li-ion battery, optional dual pack
• Programmable with Bluetooth® Control and IR-Programmer
• Optional ON/OFF switch, external charger and charging port

Bird Deterrents
Stainless steel as standard.

Solar Modules
High-efficiency cells. Maximum Power Point Tracking (MPPT) for optimal energy collection.

Li-ion
Replaceable Li-ion battery pack with extreme temperature range and up to 8-year life expectancy.

Colour Indicator
Lantern body indicates LED colour.

Installation
Four different mounting options Dual bolt circles standard (150 and 200 mm, 3 holes). Two pole mounting options.

Pole Mount
Pole mount by removing adapter, 70 diameter and 72 diameter (nominal, sched 40).

Bluetooth® Control
Lantern can be programmed and battery status checked up to 50 meters distance with an app for Android and iOS.

IR Controller
Set intensity, change flash code, check battery status, set ship mode and turn lantern off with optional IR (Infrared) controller.

External Switch
An optional external switch can be installed.
Technical Specification M660

Optical performance

| Maximum fixed intensity | 40 cd | 42 cd | 71 cd | 52 cd | 18 cd |

NOTE: Peak IALA intensity dependent on location. To view performance in your installation location, visit www.carmanahmarine.com/selector.

Main Technical Specification

- Lens visual/Mechanical diameter: 177 mm
- Lens material: UV stabilized Polycarbonate
- Light source: High Power Light Emitting Diode (LED)
- Vertical divergence: >8° (FWHM)
- Solar module: High efficiency cells; MPPT
- Battery: Li-ion (IEC 61233)
- Degree of ingress protection: IP 68
- Weight: 0.8 kg
- Overall height (excl. bird deterrents): 105 mm
- Installation (adapter): 3 x M6 on 150mm and 3 x M12 on 200mm
- Installation (pole mount): 70 or 72 diameter

Order Overview M660

Option matrix

- M660 Switched: ON/OFF switch
- M660 Unswitched: No ON/OFF switch
- M660 Dual Battery: Dual Battery Pack
- M660 Charge Port: With Charge Port

Accessories

- 69934: 660 Bird Deterrent – Single
- 79848: Spare adapter (incl. screws)
- 79273: Optional switch
- 79399: 660 Battery Replacement Pack
- 69885: 660 International Wall Charger Assembly
- 69899: IR (Infrared) Programmer
- 79834: 660 Standard Bolt Kit
- 79400: 660 Dual Battery Replacement Pack

Product codes

<table>
<thead>
<tr>
<th>Colour</th>
<th>M660 switched</th>
<th>M660 switched</th>
<th>M660 dual battery</th>
<th>M660 charge port</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>M660R</td>
<td>M660R-S</td>
<td>M660R-2B</td>
<td>M660R-C</td>
</tr>
<tr>
<td>green</td>
<td>M660G</td>
<td>M660G-S</td>
<td>M660G-2B</td>
<td>M660G-C</td>
</tr>
<tr>
<td>white</td>
<td>M660W</td>
<td>M660W-S</td>
<td>M660W-2B</td>
<td>M660W-C</td>
</tr>
<tr>
<td>yellow</td>
<td>M660Y</td>
<td>M660Y-S</td>
<td>M660Y-2B</td>
<td>M660Y-C</td>
</tr>
<tr>
<td>blue</td>
<td>M660B</td>
<td>M660B-S</td>
<td>M660B-2B</td>
<td>M660B-C</td>
</tr>
</tbody>
</table>

Product code example: M660RSC2B

- **M660R** is Sabis/Carmanah code for M660 in red
- with a selection of switched with charge port and dual battery
M850
Solar Powered LED
Marine Lantern, 3 to 6+ NM Range

The M850 combines a compact, high-efficiency solar engine with premium components and a rugged design for best-in-class performance at an optimal price. This lantern is suitable for use in most solar locations. To view performance in your installation location, visit www.sabik-marine.com ->Marine Selector Tool

- Option for standard or wide divergences (for fixed or floating applications)
- Multiple cost-effective battery pack options suitable for a wide variety of installation locations
- Built-in calendar function for automatic de-activation during off-season months
- Top-mounted 4-character LED display with simple "tap to activate" functionality
- Premium grade, UV resistant polycarbonate lens material
- Environmentally friendly, super durable powder-coated aluminium chassis
- Adjustable intensity and range
- IP 68 rated
- GPS synchronized flash option
Technical Specification M850

Order Overview M850

Option matrix

<table>
<thead>
<tr>
<th>Model</th>
<th>Colour Options</th>
<th>Battery</th>
<th>Lens</th>
<th>Control</th>
<th>Charge Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>M850</td>
<td>Red</td>
<td>60X</td>
<td>Standard (8°)</td>
<td>GPS Sync</td>
<td>With External Chargeport</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>96E</td>
<td>Wide (10°)</td>
<td>Non-GPS Sync</td>
<td>Without External Chargeport</td>
</tr>
</tbody>
</table>

Accessories

71757   M800 Series Standard Bolt Kit
71884   M800 Series Security Bolt Kit (drivers not included)
53288   M800 Series Security Key
53289   M800 Series Security Socket
69885   M800 Series AC/DC 12V-2.5A Charger, International Plug Adapters
69934   Bird Deterrent (single)
69954   M800 Series Battery Replacement Kit - 60 Wh
69955   M800 Series Battery Replacement Kit - 96 Wh

HEAD KIT M800 Series Head Replacement Kit (please specify colour at time of order)

HEAD KIT GPS M800 Series GPS Head Replacement Kit (please specify colour at time of order)

69889   Remote Control

Product codes

<table>
<thead>
<tr>
<th>Colour</th>
<th>Model (with battery)</th>
<th>Model (with battery)</th>
<th>Model (with battery)</th>
<th>Model (with battery)</th>
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<tbody>
<tr>
<td>red</td>
<td>M850R-60X</td>
<td>M850R-96E</td>
<td>M850R-60XGPS</td>
<td>M850R-96EGPS</td>
</tr>
<tr>
<td>green</td>
<td>M850G-60X</td>
<td>M850G-96E</td>
<td>M850G-60XGPS</td>
<td>M850G-96EGPS</td>
</tr>
<tr>
<td>white</td>
<td>M850W-60X</td>
<td>M850W-96E</td>
<td>M850W-60XGPS</td>
<td>M850W-96EGPS</td>
</tr>
<tr>
<td>yellow</td>
<td>M850Y-60X</td>
<td>M850Y-96E</td>
<td>M850Y-60XGPS</td>
<td>M850Y-96EGPS</td>
</tr>
</tbody>
</table>

Optical performance

Maximum fixed intensity

<table>
<thead>
<tr>
<th>Model</th>
<th>Minimum</th>
<th>Standard</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>M850</td>
<td>239 cd</td>
<td>290 cd</td>
<td>445 cd</td>
</tr>
<tr>
<td></td>
<td>339 cd</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Peak IALA intensity dependent on location. To view performance in your installation location, visit www.carmanahmarine.com/selector.

Main Technical Specification

Lens visual/Mechanical diameter

111 mm

Construction

Premium grade, UV resistant polycarbonate lenshead and polycarbonate/polysiloxane co-polymer base

Light source

High Flux Surface Mount LEDs with colour-specific temperature-corrected LED driver

Vertical Divergence

8° or 10° (FWHM)

Solar modules

High-efficiency cells; MPPT

Battery

Multiple replaceable, recyclable battery options (refer to options matrix)

Degree of ingress protection

IP 68 immersion

Weight

4.5 kg M850 60X
5.3 kg M850 96E

Overall height

226 mm

Overall width

235 mm dia.

Installation

3, 4 or 5 x M12 on 200 mm dia.
M860
Solar Powered LED
Marine Lantern,
4 to 7+ NM Range

With a durable, large-format solar engine, the M860 is engineered for consistent, reliable performance at remote installations and in challenging insolation locations. This is a premium and full-featured lantern that is suitable for achieving longer ranges in challenging insolation locations. To view performance in your installation location, visit www.sabik-marine.com ->Marine Selector Tool

- Option for standard or wide divergences (for fixed or floating applications)
- Multiple cost-effective battery pack options suitable for a wide variety of installation locations
- Built-in calendar function for automatic de-activation during off-season months
- Top-mounted 4-character LED display with simple “tap to activate” functionality
- Premium grade, UV resistant polycarbonate lens material
- Environmentally friendly, super durable powder-coated aluminium chassis
- Adjustable intensity and range
- IP 68 rated
- GPS synchronized flash option
- Remote monitoring options available

Top-mounted Display
Easily check light settings with a “tap-to-activate” digital display.

Infrared Programmer
Check battery state of charge, program flash codes, set intensities and more.

Optical Assembly
Durable, UV resistant optical lens with options for standard (3°) or wide (10°) divergence.

Scalable Battery Pack
Multiple replaceable, recyclable battery pack options for reliable, cost-effective performance in a variety of installation locations.

Visible Colour Indicator
LED colour is clearly indicated by the colour of the lantern head.

External Charge Port
Optional charge port in the lantern base allows for easy overnight charging via wall plug.

Installation
Supports installation on structure using 3 x M12 bolts, 4 x M12 bolts, or 5 x M12 bolts on a 200 mm diameter. Standard and security bolt kits are available.

External Charge Port
Optional charge port in the lantern base allows for easy overnight charging via wall plug.

Installation
Supports installation on structure using 3 x M12 bolts, 4 x M12 bolts, or 5 x M12 bolts on a 200 mm diameter. Standard and security bolt kits are available.

Bird Deterrent
Stainless steel bird deterrents. Five deterrents supplied with option for up to ten per lantern.

Solar Modules
High efficiency cells protected by rugged powder-coated aluminium extrusion.

Monitoring
Optional integrated satellite modem and antenna for remote monitoring. For more information, please see the LightGuard section.

Infrared Programmer
Check battery state of charge, program flash codes, set intensities and more.

Optical Assembly
Durable, UV resistant optical lens with options for standard (3°) or wide (10°) divergence.

Scalable Battery Pack
Multiple replaceable, recyclable battery pack options for reliable, cost-effective performance in a variety of installation locations.

Visible Colour Indicator
LED colour is clearly indicated by the colour of the lantern head.

External Charge Port
Optional charge port in the lantern base allows for easy overnight charging via wall plug.

Installation
Supports installation on structure using 3 x M12 bolts, 4 x M12 bolts, or 5 x M12 bolts on a 200 mm diameter. Standard and security bolt kits are available.

Bird Deterrent
Stainless steel bird deterrents. Five deterrents supplied with option for up to ten per lantern.

Solar Modules
High efficiency cells protected by rugged powder-coated aluminium extrusion.

Monitoring
Optional integrated satellite modem and antenna for remote monitoring. For more information, please see the LightGuard section.
Self-contained

Technical Specification M860

Optical performance
Maximum fixed intensity
M860
239 cd
290 cd
445 cd
320 cd

NOTE: Peak IALA intensity dependent on location. To view performance in your installation location, visit www.carmanahmarine.com/selector.

Main Technical Specification
Lens visual/Mechanical diameter
111 mm

Construction
Premium grade, UV resistant polycarbonate lens/head and polycarbonate/polysiloxane co-polymer base

Light source
High Flux Surface Mount LEDs with colour-specific temperature-corrected LED driver

Vertical Divergence
8º or 10º (FWHM)

Solar modules
High-efficiency cells; MPPT

Battery
Multiple replaceable, recyclable battery options (refer to options matrix)

Degree of ingress protection
IP 68 immersion

Weight
6.4 kg M860 96E
10.2 kg M860 200BC

Overall height
329 mm

Overall width
235 mm dia.

Installation
3, 4 or 5 x M12 on 200 mm dia.

Order Overview M860

Option matrix

<table>
<thead>
<tr>
<th>Model</th>
<th>Colour Options</th>
<th>Battery</th>
<th>Lens</th>
<th>Control</th>
<th>Charge Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>M860</td>
<td>Red 96E</td>
<td>Standard (8°)</td>
<td>GPS Sync</td>
<td>With External Chargeport</td>
<td></td>
</tr>
<tr>
<td></td>
<td>White 200BC</td>
<td>Wide (10°)</td>
<td>Non-GPS Sync</td>
<td>Without External Chargeport</td>
<td></td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>71757</td>
<td>M860 Series Standard Bolt Kit</td>
</tr>
<tr>
<td>71884</td>
<td>M860 Series Security Bolt Kit (drivers not included)</td>
</tr>
<tr>
<td>53288</td>
<td>M860 Series Security Key</td>
</tr>
<tr>
<td>53289</td>
<td>M860 Series Security Socket</td>
</tr>
<tr>
<td>69885</td>
<td>M860 Series AC/DC 12V-2.5A Charger, International Plug Adapters</td>
</tr>
<tr>
<td>69934</td>
<td>Bird Deterrent (single)</td>
</tr>
<tr>
<td>69955</td>
<td>M860 Series Battery Replacement Kit - 96 Wh</td>
</tr>
<tr>
<td>69956</td>
<td>M860 Series Battery Replacement Kit - 200 Wh</td>
</tr>
<tr>
<td>69886</td>
<td>M860 Series Head Replacement Kit (please specify colour at time of order)</td>
</tr>
<tr>
<td>69887</td>
<td>M860 Series GPS Head Replacement Kit (please specify colour at time of order)</td>
</tr>
<tr>
<td>69888</td>
<td>Remote Control</td>
</tr>
</tbody>
</table>

Product codes

<table>
<thead>
<tr>
<th>Colour</th>
<th>M860 96E (with 96Wh battery)</th>
<th>M860 200BC (with 200Wh battery)</th>
<th>M860 96E GPS (with 96Wh battery)</th>
<th>M860 200BC GPS (with 200Wh battery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>M860R-96E</td>
<td>M860R-200BC</td>
<td>M860R-96EGPS</td>
<td>M860R-200BCGPS</td>
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<tr>
<td>green</td>
<td>M860G-96E</td>
<td>M860G-200BC</td>
<td>M860G-96EGPS</td>
<td>M860G-200BCGPS</td>
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<tr>
<td>white</td>
<td>M860W-96E</td>
<td>M860W-200BC</td>
<td>M860W-96EGPS</td>
<td>M860W-200BCGPS</td>
</tr>
</tbody>
</table>
**HBL 110**

Unique Hybrid LED lantern

HBL 110 is a robust lantern with an outer polycarbonate cover to be used integrated into buoy applications. It has a unique hybrid system including a solar panel and an integrated rechargeable battery. During the dark winter months an alkaline battery is used as a backup. This hybrid solution also saves time and money as batteries can be changed less often and there is less need for maintenance visits. This lantern has very low power consumption and is equipped with GPS synchronization. LightGuard remote monitoring can be added as an option and advanced Bluetooth® Control app is also available for android and iOS mobile phones.

- **Adjustable intensity and range**
- **Integrated flasher with day and night switch**
- **Standard range**: 4 NM at $T_c = 0.74$ (5 NM at $T_c = 0.85$)
- **Available in standard IALA colours**
- **Vertical divergence**: $8^\circ @ 50\%$ ($\pm 1^\circ$) of peak intensity
- **GPS synchronization as standard**
- **Remote monitoring with LightGuard Monitor**
- **Programmable with Sabik standard IR programming devices**
- **Advanced Bluetooth® Control up to 50 m available for android and iOS smart phones**

**Lens**  
Sabik especially designed optical unit with outer polycarbonate cover.

**Bird spikes**  
Stainless steel bird deterrents as standard. Easy to replace.

**Solar panel**  
High efficient solar panel on the top of the lantern.

**PTFE breathing**  
PTFE breathing vent for pressure release in the bottom of the lantern.

**Programmed**  
Lantern can be programmed and battery status monitored with the Sabik user friendly and compact Easy Programmer.

**Innovative Bluetooth® app**  
Lantern can be controlled and battery status checked up to 50 meters distance with standard android and iOS mobile phones.
Technical Specification HBL 110

Order Overview HBL 110

Option matrix
- LightGuard GSM + GPS
- OPT 9H
- Optical Feedback System
- OPT 1H
- Shock & Tilt Sensor

Optical performance
- Maximum fixed intensity:
  - HBL 110: 40 cd 50 cd

Main Technical Specification
- Lens visual/Mechanical diameter: 166mm
- Lens material: UV stabilized Polycarbonate
- Light source: High Power Light Emitting Diode (LED)
- Vertical divergence: 8° @ 50% (±1°) of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 2.6 kg
- Controller: Sabik SMC flasher
- Temperature range: -40°…+60°C
- Degree of protection: IP 67
- Battery Voltage NiMH: 6,0 VDC
- Battery capacity NiMH: 26 Ah
- Solar power: 1,5W

HBL 110 (GPS sync as a standard) Colour
- HBL 110W4 white
- HBL 110R4 red
- HBL 110G4 green
- HBL 110Y4 yellow

Product code for Programmer
- 980332 Sabik Easy Programmer
- Bluetooth mobile app for android and IOS available

Order Overview VPL 110

A component lantern without a solar panel and battery

VPL 110 (GPS sync as a standard) Colour
- VPL 110W4 white
- VPL 110R4 red
- VPL 110G4 green
- VPL 110Y4 yellow
Self-contained

SC 110
Marine self-contained LED light for buoys, beacons, marinas and aquaculture farms

SC 110 is a durable short range LED lantern built from polycarbonate and including an integrated solar power system. This lantern is delivered with Nickel metal hydride battery. It has more than 6 years lifetime. The lantern is available in 2 and 3 NM versions.

- Range up to 4 NM (Tc = 0.74)
  4.5 NM (Tc = 0.85)
- Standard IALA colours Red, Green, White, Yellow
- Produced of durable polycarbonate plastic
- Available with Lithium-ion or NiMH batteries
- Internal calendar, light can be switched off for winter
- Adjustable intensity and range
- Vertical divergence 8° @ 50% (±1°) of peak intensity
- Programmable with Sabik standard IR programming devices
- Integrated event log (Black box function) for 365 days
- The lantern is delivered in sleep mode. It automatically wakes up when unpacked and light is detected
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring

Lens
Bird deterrent top design.

Solar panels
Optionally 1 (2NM) or 4 (3NM) solar panels.

Battery
Optionally NiMH or LiFePO4 batteries.

Programming with PC
Using Sabik USB interface.

Storage charging
With external charger.

Installation
The bottom plate of the SC 110 supports installation on structure using 3 or 4 x M12 on a 200 mm diameter or 3 x M8 on a 150 mm diameter.

PTFE breathing
Vent for pressure release in the bottom of the product.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

White
Red
Green
Yellow

SC 110
Marine self-contained LED light for buoys, beacons, marinas and aquaculture farms

SC 110 is a durable short range LED lantern built from polycarbonate and including an integrated solar power system. This lantern is delivered with Nickel metal hydride battery. It has more than 6 years lifetime. The lantern is available in 2 and 3 NM versions.

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  4.5 NM (Tc = 0.85)
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- Available with Lithium-ion or NiMH batteries
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- Adjustable intensity and range
- Vertical divergence 8° @ 50% (±1°) of peak intensity
- Programmable with Sabik standard IR programming devices
- Integrated event log (Black box function) for 365 days
- The lantern is delivered in sleep mode. It automatically wakes up when unpacked and light is detected
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring

Lens
Bird deterrent top design.

Solar panels
Optionally 1 (2NM) or 4 (3NM) solar panels.

Battery
Optionally NiMH or LiFePO4 batteries.

Programming with PC
Using Sabik USB interface.

Storage charging
With external charger.

Installation
The bottom plate of the SC 110 supports installation on structure using 3 or 4 x M12 on a 200 mm diameter or 3 x M8 on a 150 mm diameter.

PTFE breathing
Vent for pressure release in the bottom of the product.

Sabik Easy Programmer
User friendly and compact wireless two-way programmer.

White
Red
Green
Yellow
**Technical Specification SC 110**

**Order Overview SC 110**

**Option matrix**
- OPT 1S: Optical Feedback System
- Integrated LED performance measurement
- OPT 4S: GPS sync
- Integrated GPS sync including GPS antenna
- OPT 9S: LightGuard GSM + GPS
- Integrated GSM based monitoring with GSM/GPS antennas

**Product codes**

<table>
<thead>
<tr>
<th>Product codes</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCN 110 up to 3 NM self-contained with NiMH battery</td>
<td>white</td>
</tr>
<tr>
<td>SCN 110.2 WW</td>
<td>white</td>
</tr>
<tr>
<td>SCN 110.2 WR</td>
<td>red</td>
</tr>
<tr>
<td>SCN 110.2 WG</td>
<td>green</td>
</tr>
<tr>
<td>SCN 110.2 WY</td>
<td>yellow</td>
</tr>
<tr>
<td>SCN 110 up to 4 NM self-contained with NiMH battery</td>
<td>SCL 110 up to 4 NM self-contained with LiFePO4 battery</td>
</tr>
<tr>
<td>SCN 110.3 WW</td>
<td>SCL 110.3 WW</td>
</tr>
<tr>
<td>SCN 110.3 WR</td>
<td>SCL 110.3 WR</td>
</tr>
<tr>
<td>SCN 110.3 WG</td>
<td>SCL 110.3 WG</td>
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<tr>
<td>SCN 110.3 WY</td>
<td>SCL 110.3 WY</td>
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**Main Technical Specification**

<table>
<thead>
<tr>
<th>Feature</th>
<th>up to 3 Nautical miles</th>
<th>up to 4 Nautical miles</th>
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<tbody>
<tr>
<td>Lens visual/ Mechanical diameter</td>
<td>166 mm</td>
<td></td>
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<tr>
<td>Lens material</td>
<td>UV stabilized Polycarbonate</td>
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</tr>
<tr>
<td>Light source</td>
<td>High Power Light Emitting Diode (LED)</td>
<td></td>
</tr>
<tr>
<td>Vertical divergence</td>
<td>8° @ 50% (×1°) of peak intensity</td>
<td></td>
</tr>
<tr>
<td>Unit lifetime</td>
<td>Up to 10 years</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2.5 kg</td>
<td>4.2 kg</td>
</tr>
<tr>
<td>Controller</td>
<td>Sabik SMC flasher</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°...+60°C</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 67</td>
<td></td>
</tr>
<tr>
<td>Battery Voltage NiMH</td>
<td>6.0 VDC</td>
<td></td>
</tr>
<tr>
<td>Battery Voltage LiFePO4</td>
<td>6.4 VDC</td>
<td></td>
</tr>
<tr>
<td>Battery capacity NiMH</td>
<td>8.6 Ah</td>
<td>26 Ah</td>
</tr>
<tr>
<td>Solar power</td>
<td>1.5W</td>
<td>4.5W</td>
</tr>
</tbody>
</table>
**SC 160 I**

**Self-contained LED lantern for buoys and beacons**

SC 160 I is a self-contained medium range LED lantern 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.

- **Range up to 8 NM (Tc=0.74) 11 NM (Tc=0.85) depending on geographical location**
- **Standard IALA colours Red, Green, White, Yellow**
- **Lantern made of rugged injection moulded aluminium housing and UV resistant polyethylene body**
- **Integrated flasher with day-light switch and solar charger**
- **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**
- **Programmable with Bluetooth® Control mobile app up to 50 m radius**
- **Other wireless programming options available such as Sabik Easy Programmer or PC/USB interface**
- **Integrated event log for 365 days**
- **Optionally integrated GPS synchronization and GSM Remote monitoring**
- **Available with AIS**

**Installation**

The bottom plate of the SC 160 I supports installation on structures with 3 x M12 bolts on a 330 mm diameter.

**Solar Modules**

Solar modules with tempered glass front integrated in the PE-housing.

**Remote monitoring**

GSM unit and antenna integrated in the lantern for remote monitoring and control. For more information, please see the LightGuard Section.

**VRLA Battery**

Maintenance free lead acid battery with a designed lifetime of 7 years.

**AIS Option**

Lantern can be equipped with integrated AIS transponder type 1 or type 3.

**Bird spike**

Bird spike with thread to be installed in the center of the lantern top.

**Sabik Easy Programmer**

User friendly and compact wireless two way programmer.

**Bluetooth® Control**

Lantern can be programmed and battery status checked up to 50 meters distance with an app for Android and iOS.

**Programming with PC**

Using Sabik USB interface.
Technical Specification SC 160 I

Main Technical Specification

- **Lens visual/Mechanical diameter**: 160 mm
- **Lens material**: UV stabilized acrylic
- **Light source**: High Power Light Emitting Diodes (LEDs)
- **Vertical divergence options**: 5°@50% of peak intensity (FWHM), 10°@50% of peak intensity (FWHM)
- **Solar modules**: 3 x 10 W
- **Battery**: VRLA GEL-Type, 32Ah/12V
- **Weight**: 27 Kg
- **Overall height**: 583 mm
- **Overall width**: 431 mm dia.
- **Power consumption**: 13W - 16W
- **Installation**: 3 x M12 on 330 mm dia.

Option matrix

- Optical feedback
  - OPT 1L: Integrated LED performance measurement
- GPS sync
  - OPT 4L: Integrated GPS sync including GPS antenna
- LightGuard GSM + GPS
  - OPT 9L: Integrated GSM/GPS based monitoring including GSM/GPS antennas
- Battery control card
  - OPT 11L: Control card for secondary (emergency) battery
- Automatic Identification System
  - OPT AIS: OPT AIS 1: Lantern with integrated AIS type 1
  - OPT AIS 3: Lantern with integrated AIS type 3

Refer page 140

Order Overview SC 160 I

Optical Performance

- **Maximum fixed intensity SC 160 IN (5° @ 50% peak intensity FWHM)**
  - 150 cd
  - 220 cd
  - 320 cd
  - 150 cd
  - 220 cd

- **Power consumption**: 13 W, 16 W, 16 W

- **Maximum fixed intensity SC 160 IW (10° @ 50% peak intensity FWHM)**
  - 620 cd
  - 720 cd
  - 620 cd
  - 1100 cd

- **Power consumption**: 13 W, 16 W, 16 W

Ordering Information:

- **SC160 I with VRLA Battery**
  - N = Narrow (5° @ 50% peak intensity)
  - W = Wide (10° @ 50% peak intensity)
  - Red: SC160-1NVR, SC160-1WVR
  - Yellow: SC160-1NYV, SC160-1WY
  - Green: SC160-1NVG, SC160-1WG
  - White: SC160-1NVW, SC160-1WW

Example: SC160-1WVW.11

- **SC160-1WVW** is the code for SC160 I with VRLA battery and wide lens in white
- **11** is a selection of option 11 Control Card for secondary (emergency) battery

Self-contained
SC 160 II

Self-contained LED lantern for buoys and beacons

SC 160 II is a self-contained LED lantern with best in class optical performance for fixed and floating structures with longer range. The lantern includes solar panels, battery and charge controller. This lantern is designed for harsh marine environments and for long uninterrupted operation.

- Range up to 10 NM \((T_c=0.74)\)
  14 NM \((T_c=0.85)\) depending on geographical location
- Standard IALA colours Red, Green, White, Yellow
- Lantern made of rugged injection moulded aluminium housing and body of UV resistant polyethylene
- Integrated flasher with day-light switch and solar charger
- Standard VRLA battery and ventilated battery compartment
- Adjustable intensity and range
- Available with narrow \((5^\circ)\) or wide \((10^\circ)\) vertical divergence
- Programmable with Bluetooth Control mobile app up to 50 m radius
- Other wireless programming options available such as Sabik Easy Programmer or PC/USB interface
- Integrated event log for 365 days
- Optionally integrated GPS synchronization and GSM Remote monitoring
- Auxiliary connector for external charger or external solar module
- Available with AIS option

Bird spike
Bird spike with thread to be installed in the center of the lantern top.

Solar Modules
Solar modules with tempered glass front integrated in the PE-housing.

Remote monitoring
GSM unit and antenna integrated in the lantern for remote monitoring and control. For more information, please see the LightGuard Section.

VRLA Battery
Maintenance free lead acid battery with a designed lifetime of 7 years.

Sabik Easy Programmer
User friendly and compact wireless two way programmer.

AIS Option
Lantern can be equipped with integrated AIS transponder type 1 or type 3

Installation
Mounting holes with metal inserts.

Auxiliary connector
Auxiliary connector enables external charging or additional solar modules.

Programming with PC
Using Sabik USB interface.

Bluetooth® Control
Lantern can be programmed and battery status checked up to 50 meters distance with an app for android 4.4. or above and for iOS.

Bird spike
Bird spike with thread to be installed in the center of the lantern top.

Solar Modules
Solar modules with tempered glass front integrated in the PE-housing.

Remote monitoring
GSM unit and antenna integrated in the lantern for remote monitoring and control. For more information, please see the LightGuard Section.

VRLA Battery
Maintenance free lead acid battery with a designed lifetime of 7 years.

Sabik Easy Programmer
User friendly and compact wireless two way programmer.

AIS Option
Lantern can be equipped with integrated AIS transponder type 1 or type 3

Installation
Mounting holes with metal inserts.

Auxiliary connector
Auxiliary connector enables external charging or additional solar modules.

Programming with PC
Using Sabik USB interface.

Bluetooth® Control
Lantern can be programmed and battery status checked up to 50 meters distance with an app for android 4.4. or above and for iOS.

Bird spike
Bird spike with thread to be installed in the center of the lantern top.

Solar Modules
Solar modules with tempered glass front integrated in the PE-housing.

Remote monitoring
GSM unit and antenna integrated in the lantern for remote monitoring and control. For more information, please see the LightGuard Section.

VRLA Battery
Maintenance free lead acid battery with a designed lifetime of 7 years.

Sabik Easy Programmer
User friendly and compact wireless two way programmer.

AIS Option
Lantern can be equipped with integrated AIS transponder type 1 or type 3

Installation
Mounting holes with metal inserts.

Auxiliary connector
Auxiliary connector enables external charging or additional solar modules.

Programming with PC
Using Sabik USB interface.

Bluetooth® Control
Lantern can be programmed and battery status checked up to 50 meters distance with an app for android 4.4. or above and for iOS.
Technical Specification SC 160 II

Main Technical Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lens visual/Mechanical diameter</td>
<td>160 mm</td>
</tr>
<tr>
<td>Lens material</td>
<td>UV stabilized acrylic</td>
</tr>
<tr>
<td>Light source</td>
<td>High Power Light Emitting Diodes (LEDs)</td>
</tr>
<tr>
<td>Vertical divergence (FWHM)</td>
<td>5°@50% of peak intensity</td>
</tr>
<tr>
<td>Solar modules</td>
<td>3 x 11 W</td>
</tr>
<tr>
<td>Battery</td>
<td>VRLA GEL-Type, 60Ah/12V</td>
</tr>
<tr>
<td>Weight</td>
<td>35 Kg</td>
</tr>
<tr>
<td>Overall height</td>
<td>689 mm</td>
</tr>
<tr>
<td>Overall width</td>
<td>500 mm dia.</td>
</tr>
<tr>
<td>Power consumption</td>
<td>13W - 16W</td>
</tr>
<tr>
<td>Installation</td>
<td>3 x M12 on 330 mm dia.</td>
</tr>
</tbody>
</table>

Optical Performance

<table>
<thead>
<tr>
<th>Maximum fixed intensity SC 160 IIN (5° @ 50% peak intensity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 cd</td>
</tr>
<tr>
<td>Power consumption</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum fixed intensity SC 160 IIW (10° @ 50% peak intensity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>620 cd</td>
</tr>
<tr>
<td>Power consumption</td>
</tr>
</tbody>
</table>

Order Overview SC 160 II

Option matrix

- Optical feedback
  - OPT 1L: Integrated LED performance measurement
- GPS sync
  - OPT 4L: Integrated GPS sync including GPS antenna
- LightGuard GSM + GPS
  - OPT 9L: Integrated GSM/GPS based monitoring including GSM/GPS antennas
- Battery control card
  - OPT 11L: Control card for secondary (emergency) battery
- Automatic Identification System
  - OPT AIS: OPT AIS 1: Lantern with integrated AIS type 1
  - OPT AIS 3: Lantern with integrated AIS type 3
  - Refer page 140

Example: SC160-2WVR.4

- SC160-2WVR is the code for SC160 II with VRLA battery and wide lens in red
- 4 is a selection of option 4L GPS sync including GPS antenna
SCLS 100
Self-contained LED Light with 10 NM Range

SCLS 100 is a self-contained range light for use on fixed structures. The light is a complete package including solar panels battery and charge controller. The light is made for long uninterrupted operation.

- Range up to 10 NM (T<sub>c</sub>=0,74)
  15 NM (T<sub>c</sub> = 0,85)
- Standard IALA colours Red, Green, White, Yellow
- Light module of rugged aluminium housing and body of UV resistant polyethylene
- Light horizontally and vertically adjustable in the field
- Integrated flasher with day-light switch and solar charger
- Standard VRLA battery. Other battery options on request.
- Ventilated battery compartment
- Solar modules with tempered glass in front
- Adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Optionally integrated GPS synchronization
- Optionally integrated GSM remote monitoring
- Optionally auxiliary connector for external charger or external solar module

Aluminium housing
Rugged housing with sunshield.

Installation
The bottom plate of the SC-LS100 supports installation on structure using 3 x M10 bolts on a 330 mm radius.

Adjustable
Field adjustable in both horizontal and vertical direction.

Solar Modules
Solar modules with tempered glass front wall integrated with the PE-housing.

Auxiliary connector
(Optionally) enables external charging or additional solar modules.

VRLA Battery
Maintenance free lead acid battery with a designed lifetime of 7 years.

Programming with PC
Using Sabik USB interface.

Sabik Easy Programmer
User friendly and compact wireless two way programmer.
Technical Specification SCLS 100

**Main Technical Specification**

- **Lens visual/Mechanical diameter**: 100 mm
- **Lens material**: UV stabilized Polycarbonate
- **Light source**: Light Emitting Diodes (LEDs)
- **Vertical divergence**: 4° @ 50 % (±1°) and 8° @ 10 % (±2°)
- **Solar modules**: 3 x 11 W
- **Battery**: VRLA GEL-Type, 60Ah/12V
- **Weight**: 37 Kg
- **Overall height**: 756 mm
- **Overall width**: 500 mm dia.
- **Installation**: 3 x M10 on 330 mm dia.
- **Power consumption**: At full power 3 W

**Optical performance**

- Maximum fixed intensity:
  - At full power 3 W 3.000 cd
  - 3.000 cd
  - 5.000 cd
  - 4.000 cd

**Order Overview SCLS 100**

**Option matrix**

- **OPT 1: Optical Feedback System**: Integrated LED performance measurement
- **OPT 4: GPS sync**: GPS sync including GPS antenna
- **OPT 7: External GPS**: External GPS antenna
- **OPT 9: LightGuard GSM + GPS**: Integrated GSM based monitoring including GSM/GPS antennas
- **OPT 10: LightGuard GSM**: Integrated GSM based monitoring including GSM antenna
- **OPT 11: Control card**: Control card for secondary battery
- **OPT 12: Aux card with I/O**: Aux card including I/O ports
- **OPT 13: Aux card with RS485 and I/O**: Aux card including RS485 and I/O port
- **Shock & Tilt Sensor**: Integrated 3-axis G sensor for tilt and shock sensing

**SCLS100 with VRLA Battery**

- **Red**: SCLS 100R
- **Green**: SCLS 100G
- **Yellow**: SCLS 100Y
- **White**: SCLS 100W

Enclosure colour gray by default. Other colours have to be ordered separately.
SCLO 200M
Self-contained LED light with 14 NM Range

- Range up to 14 NM (Tc=0.74)
  22 NM (Tc=0.85)
- Standard IALA colours Red, Green, White and Yellow
- Light module of rugged aluminium housing and body of UV resistant polyethylene
- Light horizontally and vertically adjustable in the field
- Integrated flasher with day-light switch and solar charger
- Ventilated battery compartment
- Solar panels well protected with tempered glass in front
- Adjustable intensity and range
- Programmable with Sabik standard IR programming devices
- Light can be programmed and controlled up to 50 meter distance with a smart phone using Sabik Bluetooth Control
- Optionally integrated GPS synchronization
- Optionally integrated GSM/GPS remote monitoring

Aluminium housing
The light enclosure is made from marine grade aluminium.

Sun shield
Protects lens from dust and bird droppings

PTFE
Vent for pressure release in the back of the lantern.

Precision alignment
A gun sight can be used for precision alignment to the center line of the range.

Light beam adjustment
The direction of the light beam can be adjusted with 3 bolts. The 3 axis adjustment system enables both vertical and horizontal alignment.

Level indicator
The integrated level indicator makes horizontal levelling easy.

Sabik Easy Programmer
User friendly and compact wireless two way programmer.

Bluetooth® Control
Lantern can be programmed and controlled up to 50 meters distance with standard android and iOS mobile phones.

Installation
The bottom plate supports installation on structure using 3xM10 Bolts on a 330mm radius.

Solar Modules
Solar modules with tempered glass front well integrated with the PE-Housing.

VRLA Battery
Maintenance free Lead acid battery with a designed lifetime of 7 years.

Auxiliary connector
Enables external charging or additional solar module.
Technical Specification SCLO 200M

Optical performance

<table>
<thead>
<tr>
<th>Maximum fixed intensity</th>
<th>At full power</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7000 cd</td>
</tr>
<tr>
<td></td>
<td>7000 cd</td>
</tr>
<tr>
<td></td>
<td>7000 cd</td>
</tr>
<tr>
<td></td>
<td>13000 cd</td>
</tr>
</tbody>
</table>

Main Technical Specification

- Lens visual/Mechanical diameter: 203 W
- Lens material: UV stabilized Polycarbonate
- Light source: Light Emitting Diodes (LEDs)
- Vertical divergence: 8° @ 50% (+/-1°) of peak intensity
- Unit lifetime: Up to 10 years
- Weight: 39 kg
- Overall height: 870 mm
- Overall width: 500 mm dia
- Power consumption: 4W at full intensity
- Light unit degree of protection: IP 66
- Solar Modules: 3 x 11W
- Battery: VRLA GEL-Type, 60Ah/12V
- Installation: 3 x M10 on 330 mm dia

Order Overview SCLO 200M

Option matrix

- OPT 4: GPS sync
- OPT 7: External GPS
- OPT 9: LightGuard GSM + GPS
- OPT 10: LightGuard GSM
- OPT 11: Control card
- OPT 12: Aux card with I/O
- OPT 13: Aux card with RS485 and I/O
- Shock & Tilt Sensor: Integrated 3-axis G sensor for tilt and shock sensing

Product codes

- Product
- Colour
- SCLO 200MW
- white
- SCLO 200MR
- red
- SCLO 200MG
- green
- SCLO 200MY
- yellow

Product code example: SCLO 200MR.7-9

- SCLO 200MR is Sabik code for SCLO 200M in red
- 7-9 is a selection of option 7 with external GPS antenna and option 9 with GSM/GPS monitoring
Remote monitoring has become standard for monitoring and control of aids-to-navigation. The new communication technologies make integration of reliable remote monitoring and control even on minor aids-to-navigation possible. Real-time information about the state of operation of aids-to-navigation increases safety and enables a more efficient planning of maintenance resources.

The ability to remotely monitor and control your LED lanterns and signals also saves costs and time when unnecessary trips to field can be avoided.

Our product line for remote monitoring and control is called LightGuard Monitor. It can be supplied integrated in Sabik lights or installed on existing aids-to-navigation. We also offer Bluetooth® Control for advanced programming of your lantern up to 50 meters away.
**LightGuard**

Remote Monitoring and Control of Aids to Navigation

LightGuard is the Carmanah/SABIK product family for remote monitoring and control of all kinds of fixed and floating Aids-to-Navigation. LightGuard is based on extensive experience with different remote monitoring technologies and approaches. The key elements in the LightGuard concept are:

- **Reliable**
  Fewer interfaces, fewer problems!
  LightGuard monitoring is either directly integrated to the controller of the lantern or it uses current monitoring to determine the status of the light

- **Simple to Install**
  LightGuard can be delivered fully integrated into most Carmanah/Sabik lights. Other manufacturers’ lanterns and previous generations of Sabik lanterns can be monitored with LightGuard by monitoring the current to the lantern. No serial interfacing or communication protocols are needed

- **Simple to use**
  In most cases no special configuration is necessary. If configuration is needed, it can easily be done with a user friendly Windows software. With the software it is possible to print or save documentation of the configuration made

- **Reporting**
  LightGuard can report valuable information about the AtoN to e-mail addresses and to your LightGuard system

**LightGuard Functions** (availability depending on LightGuard product)

- **LightFunction**
  Basic information about the state of the light; active or inactive

- **Flash Code**
  On flashing beacons the LightGuard can report the actual flash code running based on the measured supply current to the light

- **Energy**
  Ampere-hour counting; lantern consumption and solar system production

- **Position**
  The exact position of the AtoN is calculated with an algorithm to achieve a precision within 2 meters

- **Off Location**
  Alarm if the AtoN moves outside of the defined boundaries

- **Astronomical Clock**
  Sunrise and sunset times of the location are used to either activate the light or to monitor the photocell

- **Binary Report**
  Binary messages including detailed status information sent to LightGuard Base station for presentation on e.g. LightGuard Monitor

**Current Sense**

LightGuard measures and analyses the current to the lamp detecting the Lamp active, the Flash Code, Power, Consumption and Filament operation Time.

**LightGuard Basic**

Monitors the operation of any light by current detection

**LightGuard Basic for monitoring just the light function**

**LightGuard Basic with the light function**

**LightGuard Basic for monitoring the light function**

**WebGuard Remote monitoring Software**

- Alarming
- Light Status
- Accessible with browser

**LightOn 13.2 V**

Don’t worry

**SMS Report**

Receive text messages on mobile phone with AtoN status information and use the mobile phone to send commands to the AtoN
LightGuard Monitor
Intelligent Remote Control

LightGuard Monitor is an intelligent web-based software solution for monitoring fixed and floating aids to navigation.

Optionally, it can also be used to monitor marine traffic using real-time AIS data on a real ENC chart. For the purposes of fleet management, specific ships can be permanently marked thus enabling them to be tracked easily. LightGuard Monitor is therefore also suitable for monitoring shipping and temporary navigation lights on offshore wind farm construction sites.

The state-of-the-art, web-based interface means that it can be used on any Internet enabled desktop computer, laptop or tablet regardless of the hardware and the operating system installed.

We have also developed the LightGuard Monitor app for mobile access to the data of your monitored stations. SMC-enabled SABIK lights facilitate two-way communication via GSM.

With a special superuser access, it is then possible to set up, program or test new stations. Carmanah lights enable one-way communication via GlobalStar satellite. You decide whether your data is stored on a secure SABIK server, a local server close by or even on your own server. With a primary server and a secondary server, there are always two spare data stores no matter what.

- Fixed or floating AtoNs with LightGuard outstation hardware installed
- Data is transmitted via GSM or Satellite to land based communication network
- All data is delivered to the LightGuard server
- LightGuard Monitor issues alarm messages to officer on duty in case of an critical event
- LightGuard Monitor uses a web-based software interface to display the determined data on a PC or tablet or displays them on a smartphone

List view:
The list view uses simple symbols to show the most important details at a glance, such as alarm, light on/off and the status of communication.

Status report:
Selecting a station provides you with a detailed status report with chart views without losing sight of all the other stations.

Map display:
In addition to having all stations clearly displayed in a list, they can also be displayed with the status symbols on different charts.

Search and sort:
Well designed search and sort functions enable fast access to specific stations, for example to all stations with a reported alarm.

Map selection:
A variety of chart views can be selected for displaying stations, these include e.g. marine charts with a variable degree of image detail or satellite images.

Security:
A password prompt protects the software against unauthorized access attempts. A 2-factor authentication process for login provides a further level of security.
LightGuard Basic

LightGuard Basic is a compact remote monitoring outstation unit for floating and fixed AtoNs. The unit monitors light operation and identifies the flash code by measuring the light current. Light synchronization is available with integrated GPS position monitoring. Additional digital input and analogue input can be used to monitor external equipment such as RACON, door switch or batteries. A digital power output can be used to control a light or even to generate the flash code.

- Easy installation
- Waterproof enclosure
- Mount on wall, rail or mast
- Lantern monitoring by current measurement
- Low power consumption
- GPS synchronization
- Position monitoring
- Communication by GSM
- Integrated GPS and GSM antennas
- Digital I/Os for external equipment

Main Technical Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>9-36 VDC</td>
</tr>
<tr>
<td>Supply Current (12V DC, typical)</td>
<td>50 mA continuous operation</td>
</tr>
<tr>
<td></td>
<td>20 mA low current</td>
</tr>
<tr>
<td>BEACON Out (Flash Code)</td>
<td>2 A / 55 V DC, Galvanic Isolated</td>
</tr>
<tr>
<td>Digital Out 1 (Sync Pulse / PWM)</td>
<td>100 mA / 60 VDC Galvanic Isolated</td>
</tr>
<tr>
<td>Digital Out 2 (Status / Alarm)</td>
<td>100 mA / 60 VDC Galvanic Isolated</td>
</tr>
<tr>
<td>Analogue In</td>
<td>0 to 30 VDC</td>
</tr>
<tr>
<td>Current Input</td>
<td>0.05 – 5 A</td>
</tr>
<tr>
<td>Digital Input</td>
<td>60 VDC max. Galvanic Isolated</td>
</tr>
<tr>
<td>Serial Port</td>
<td>1 x RS232/ 9600 Baud, 1 x RS485/ 9600 Baud (MODBUS RTU slave)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>Operating: -25 to 55 °C, Storage: -40 to 85 °C</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP66</td>
</tr>
<tr>
<td>EMC</td>
<td>IEC 60945, IEC61000-4-2/3/4/6/11</td>
</tr>
</tbody>
</table>

Product Codes

- LGB-GPS LightGuard Basic with GPS (for synchronization)
- LGB-GSM LightGuard Basic with GPS and GSM modem for data transmission
Sabik lanterns with integrated AIS

Automatic Identification System

- Products that can be supplied with integrated AIS are LED 160 AIS, SC 160 I AIS and SC 160 II AIS
- Available in two models Type 1 (FATDMA) and Type 3 (RATDMA)
- Real time monitoring of the AtoN installation using VHF Maritime mobile band
- AIS transponder integrated in the top part of the lantern
- Integrated GPS antenna and VHF antenna included
- Extremely low power consumption when used as Type 1 <45mW with 1 message/3 minutes (about 0.09 Ah/day)
- Support both message 21 and message 6
- Support for up to 10 virtual AtoNs

Sabik Bluetooth® Control

Mobile application for programming and control of marine lanterns

SABIK BLUETOOTH® CONTROL is an advanced mobile app for programming and control of the marine lantern. You can read and program the lantern even from 50 meters distance.

- Saves time and costs of the maintenance trips
- Easy and safe to check the status of the lantern from the vessel or quay
- Convenient and fast to check the battery status of the products in the warehouse
- No need for a separate programmer, only a smartphone with the app
LightGuard AIS for AtoN

The LightGuard AIS (LGA) unit is a fully compliant AIS transponder suitable for all aids to navigation installations. Housed in a rugged triple protected housing suitable for the harsh marine environment, it can be deployed on exposed location on buoys and fixed structures. The unit comes with GPS antenna integrated in the housing but an external GPS antenna can be connected if required.

The unit is supplied with a standard stainless steel mounting bracket making the installation to a buoy or a beacon structure easy.

- Rugged enclosure with IPx6 and IPx7 degree of protection
- Integrated GPS antenna in enclosure
- Lowest power consumption on the market in both Type 1 and Type 3 configuration
- Integrated interface to lantern (health and ON/OFF) and racon (health)
- Optional sensor board for met/hyd sensors
- Support messages #6, #7, #8, #12, #13, #14, #20, #21, #25
- Support up to 10 messages
- Wide voltage range from 10 to 32 VDC
- Approved by the Federal Maritime and Hydrographic Agency (BSH)

### Functionality

The unit is available in both Type 1 (transmit only via FATDMA channel access) and Type 3 (transmit and receive using RATDMA channel access) configuration. The LGA unit supports all the standard AIS message types. Advanced functions such as chaining and VDL configuration are also supported.

In standard configuration it can be directly interfaced to a Sabik lantern for updating the lantern health and ON/OFF status in the message 21.
**Technical Specification** LightGuard AIS for AtoN

**Main Technical Specification**

**PHYSICAL**
- Height: 284 mm
- Diameter: 180 mm
- Weight: 1.3 kg without cables and mounting bracket

**ELECTRICAL**
- Supply voltage: 10 to 32 VDC (absolute min and max)
- Average Power consumption @ 12 VD:
  - Type 1 (FATDMA channel access): < 45 mW (0.09 Ah/day) with 1 msg/3 minutes
  - Type 3 (RATDMA channel access): < 400 mW (0.8 Ah/day) with 1 msg/3 minutes
  - Typical added consumption for optional sensor board: < 50 mW (0.1 Ah/day) with one input active (consumption varies with I/O’s and functionality)

**Transmission power output levels**
- 1 W, 2 W, 5 W and 12.5 W

**Configuration interface**
- USB

**Interfaces to external equipment (standard)**
- Integrated I/O interface (max 3.3 V) for:
  - Light ON/OFF status
  - Light health status
  - Radar health status

**Interfaces to external equipment (with sensor board)**
- 10 user configurable input/output signals
- 2 isolated analogue inputs
- 2 non-isolated analogue inputs
- 1 current sense loop (lamp current)
- 2 relay driver outputs
- A bi-directional NMEA0183 serial port
- An input only NMEA0183 serial port

**ENVIRONMENTAL**
- Degree of protection: IPx6 and IPx7 for water ingress
- Operating temperature: -25°C to +55°C

**STANDARDS**
- Applicable equipment standards:
  - IEC62320-2
  - ITU-R M.1371-4
  - IEC61162-1
  - IEC61162-2
  - IEC61108-1
  - IEC60945

**Supported messages**
- #6 – Binary addressed message
- #7 – Binary acknowledge message
- #8 – Binary broadcast message
- #12 – Addressed safety related message
- #13 – Acknowledgement of received addressed safety related message
- #14 – Safety related broadcast message
- #20 – Data link management message
- #21 – Aids to Navigation report
- #25 – Single slot binary message

**Approvals**
- BSH approved

**INCLUDED IN PACKAGE**
- AtoN transceiver
- Stainless steel mounting bracket and fixing
- Bird deterrent components
- Power and data cable 2 meters
- Sensor interface cables included for AIS unit with sensor board
- Product manual and CD with programming software

**Order Overview** LightGuard AIS for AtoN

**Product code** | **Description**
--- | ---
LGA T1 | LightGuard AIS transponder Type 1 (Transmit only)
LGA T1S | LightGuard AIS transponder Type 1 (Transmit only) with sensor board
LGA T3 | LightGuard AIS transponder Type 3 (Transmit and receive)
LGA T3S | LightGuard AIS transponder Type 3 (Transmit and receive) with sensor board

**Option code** | **Description**
--- | ---
970211 | USB AIS ATON Configuration cable
- | Sensor cable
Reliable power supply is essential for lighted aids-to-navigation. We design and deliver power supplies to serve the powering needs of lanterns for almost any location.

The energy sources range from primary batteries to solar/photovoltaic, combined with storage batteries and mains electricity.

This section presents a careful selection of components needed to build the most reliable power supplies.
Solar Modules

Photovoltaic Modules for Aids-to-Navigation

These high performance modules are developed and optimized for off-grid photovoltaic systems. The modules have a proven record in hundreds of AtoN installation from arctic to tropic conditions. They have a high reliability in harsh marine environments.

- Long-life industrial quality design
- Stable frame construction
- Stable aluminium frame with mounting and grounding holes
- Carefully selected polycrystalline solar cells to reach top performance
- Wired in bypass diodes to reduce potential loss of power and damage from partial array shading
- Junction box with installation friendly cable fittings
- Designed to meet the environmental requirements of IEC61215

Polycrystalline Modules

<table>
<thead>
<tr>
<th>Type/Order Code</th>
<th>SNG24</th>
<th>SNG37</th>
<th>SNG50</th>
<th>SNG75</th>
<th>SNG100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Power</td>
<td>24 W</td>
<td>37 W</td>
<td>50 W</td>
<td>75 W</td>
<td>100 W</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>18.1 V</td>
<td>18.4 V</td>
<td>18.4 V</td>
<td>18.3 V</td>
<td>18.2 V</td>
</tr>
<tr>
<td>Nominal Current</td>
<td>1.32 A</td>
<td>2.01 A</td>
<td>2.71 A</td>
<td>4.09 A</td>
<td>5.50 A</td>
</tr>
<tr>
<td>Open Circuit</td>
<td>22.3 V</td>
<td>22.5 V</td>
<td>22.7 V</td>
<td>22.8 V</td>
<td>22.9 V</td>
</tr>
<tr>
<td>Short Circuit</td>
<td>1.41 A</td>
<td>2.14 A</td>
<td>2.88 A</td>
<td>4.39 A</td>
<td>5.84 A</td>
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<td>Max. Tolerance of P</td>
<td>+10%/-5%</td>
<td>+10%/-5%</td>
<td>+10%/-5%</td>
<td>+10%/-5%</td>
<td>+10%/-5%</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>18.1 V</td>
<td>18.4 V</td>
<td>18.4 V</td>
<td>18.3 V</td>
<td>18.2 V</td>
</tr>
<tr>
<td>Nominal Current</td>
<td>1.32 A</td>
<td>2.01 A</td>
<td>2.71 A</td>
<td>4.09 A</td>
<td>5.50 A</td>
</tr>
<tr>
<td>Dimensions</td>
<td>540x340 mm</td>
<td>420x670 mm</td>
<td>540x670 mm</td>
<td>775x670 mm</td>
<td>1005x670 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>2.4 kg</td>
<td>3.5 kg</td>
<td>4.4 kg</td>
<td>6.0 kg</td>
<td>8.0 kg</td>
</tr>
<tr>
<td>Max. System Voltage</td>
<td>1000 V</td>
<td>1000 V</td>
<td>1000 V</td>
<td>1000 V</td>
<td>1000 V</td>
</tr>
<tr>
<td>Module Technology</td>
<td>Glass-foil laminate with aluminium frame</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module Design</td>
<td>Cover material: high transparent solar glass (tempered), 4mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encapsulation: EVA - Solar Cells - EVA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Back material: Tedlar - Polyester - Tedlar, white</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. and Type of cells</td>
<td>36 pcs. Polycrystalline cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cables/Connection</td>
<td>Plus and minus connectors in junction box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bypass Diodes</td>
<td>2 pcs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>-40...+60 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hail Resistance</td>
<td>25 mm hailstones with 83 km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Resistance</td>
<td>Wind speed 130 km/h with safety factor 3 (corresponds 2,400 Pa)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualification</td>
<td>IEC 61215</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**PS 30 and PS 120**

Main Power Supplies

Sabik Power Supplies are power converters, which are especially designed to give good electrical protection for lanterns.

The range includes two different sizes 30 VA and 120 VA, both installed in polycarbonate enclosures.

- Two different sizes available 30W and 120W
- Input voltage 100-240VAC output 12VDC (optionally 24VDC)
- Equipped with current and over voltage protection
- Enclosure suitable for both indoor and outdoor use
- Enclosure equipped with two M20 cable glands

**Main Technical Specification**

<table>
<thead>
<tr>
<th>Type/Order Code</th>
<th>PS 30</th>
<th>PS 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>100 – 240 VAC</td>
<td>100 – 240 VAC</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>12 VDC (optionally 24 VDC)</td>
<td>12 VDC (optionally 24 VDC)</td>
</tr>
<tr>
<td>Max Output Power</td>
<td>30 W</td>
<td>120 W</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Polycarbonate color RAL 7035</td>
<td>Polycarbonate color RAL 7035</td>
</tr>
<tr>
<td>Weight</td>
<td>2.1 kg</td>
<td>2.5 kg</td>
</tr>
<tr>
<td>Size of enclosure (WxLxD) mm</td>
<td>160x240x121</td>
<td>175x250x150</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 66</td>
<td>IP 66</td>
</tr>
</tbody>
</table>

**UPS 12**

Uninterruptible Power Supply

Uninterruptible Power Supply installed together with lead batteries (gel, AGM or vent) is a solution to give a back up for the lantern if the mains power fails. The UPS unit is installed in a polycarbonate enclosure.

- Enclosure equipped with a sophisticated battery charger
- Suitable for battery sizes 25-150 Ah
- Input voltage 180-250VAC
- Output voltage 12VDC (optionally 24VDC)
- Equipped with current and over voltage protection
- Enclosure suitable for both indoor and outdoor use

**Main Technical Specification**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>180 – 250 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage</td>
<td>12 VDC (optionally 24 VDC)</td>
</tr>
<tr>
<td>Max Output Power</td>
<td>120 W</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Polycarbonate color RAL 7035</td>
</tr>
<tr>
<td>Weight</td>
<td>4.5 kg</td>
</tr>
<tr>
<td>Size of enclosure (WxLxD) mm</td>
<td>300x300x130</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 66</td>
</tr>
</tbody>
</table>
Batteries

Alkaline Primary Batteries

- Lifting handle
- Lifting eye for cranes
- Operates in a vacuum
- Optional accessories available

Sabik’s range of alkaline buoy batteries have been developed to be used as a single power supply for a light signal on floating or fixed devices in marine environment.

The battery is made of alkaline cells containing 0 % lead or cadmium, classified as environmental friendly. The batteries can be disposed off at regular waste disposal stations. A manufacturer’s environment certificate available on request.

The housing is made of corrosion free polyethylene. Both the top and the bottom are welded to the pipe forming a completely waterproof package.

The batteries are supplied with double insulated PVC connection cables. They can even be supplied to be used submerged.

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The battery is made of alkaline cells containing 0 % lead or cadmium, classified as environmental friendly. The batteries can be disposed off at regular waste disposal stations. A manufacturer’s environment certificate available on request.

The housing is made of corrosion free polyethylene. Both the top and the bottom are welded to the pipe forming a completely waterproof package.

The batteries are supplied with double insulated PVC connection cables. They can even be supplied to be used submerged.

Order Overview Batteries

**Standard Batteries in polyethylene tube**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Capacity</th>
<th>Weight</th>
<th>L x B</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL 14-18</td>
<td>18 V</td>
<td>200 Ah</td>
<td>20 kg</td>
<td>140 x 690 mm</td>
</tr>
<tr>
<td>AL 18-12</td>
<td>12 V</td>
<td>220 Ah</td>
<td>25 kg</td>
<td>140 x 760 mm</td>
</tr>
<tr>
<td>AL 18-15</td>
<td>15 V</td>
<td>300 Ah</td>
<td>50 kg</td>
<td>180 x 760 mm</td>
</tr>
<tr>
<td>AL 18-7.5</td>
<td>7.5 V</td>
<td>300 Ah</td>
<td>30 kg</td>
<td>180 x 1010 mm</td>
</tr>
<tr>
<td>AL 40-24</td>
<td>24 V</td>
<td>600 Ah</td>
<td>120 kg</td>
<td>400 x 515 mm</td>
</tr>
<tr>
<td>AL 23-18</td>
<td>18 V</td>
<td>780 Ah</td>
<td>42 kg</td>
<td>200 x 760 mm</td>
</tr>
<tr>
<td>AL 25-15</td>
<td>15 V</td>
<td>600 Ah</td>
<td>60 kg</td>
<td>230 x 760 mm</td>
</tr>
<tr>
<td>AL 25-18</td>
<td>12 V</td>
<td>850 Ah</td>
<td>79 kg</td>
<td>242 x 1010 mm</td>
</tr>
<tr>
<td>AL 25-12</td>
<td>18 V</td>
<td>720 Ah</td>
<td>85 kg</td>
<td>242 x 850 mm</td>
</tr>
<tr>
<td>AL 40-12</td>
<td>12 V</td>
<td>1620 Ah</td>
<td>125 kg</td>
<td>400 x 512 mm</td>
</tr>
</tbody>
</table>

Other types are available upon request. Technical specifications are subject to changes without prior notice.

**Main Technical Specification**

- **Housing**: Polyethylene pipe, welded ends
- **Lifting handle**: Plastic, metal handle upon request
- **Connections**: Screw connections or plugs
- **Cables**: Double insulated PVC cable
- **Temperature Range**: From -30° C to +50° C
- **Environment**: For marine environment
- **Cell type**: Alkaline Heavy Metal free Alkaline primary
- **Self discharge**: About 5 % per year
- **Storage temperature**: x 0…+ 20° C

**Standard Batteries in metal case**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Capacity</th>
<th>Weight</th>
<th>L x B</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL 26-21</td>
<td>21 V</td>
<td>160 Ah</td>
<td>17 kg</td>
<td>140 x 140 mm</td>
</tr>
</tbody>
</table>

Other types are available upon request. Technical specifications are subject to changes without prior notice.
Sonnenschein Solar Batteries

Valve regulated lead acid batteries for solar systems

The Sonnenschein Solar battery range is very powerful and reliable in rough application conditions. The batteries are used in fixed and floating solar powered Aids to Navigation worldwide.

- Lifetime expectancy in excess of 7 years
- 800 cycles according to IEC 896-2
- Recyclable
- Maintenance-free (no topping up)
- Gel technology with grid plate providing longer lifetime than AGM or flooded batteries
- Proof against deep discharge
- Gel battery with considerably reduced risk of acid spills
- Robust mechanical design, built-in handles for easy handling

Main Specifications/Order Overview

<table>
<thead>
<tr>
<th>Type/Order Code</th>
<th>Nom. voltage</th>
<th>Nominal capacity C100</th>
<th>Discharge current I100</th>
<th>Length (l)</th>
<th>Width (b/w)</th>
<th>Height up to top of cover (h1)</th>
<th>Height incl. connectors (h2)</th>
<th>Weight approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S12/6.6 S</td>
<td>12</td>
<td>6.60</td>
<td>0.06</td>
<td>152</td>
<td>65.5</td>
<td>94.5</td>
<td>98.4</td>
<td>2.60</td>
</tr>
<tr>
<td>S12/17 G5</td>
<td>12</td>
<td>17.0</td>
<td>0.17</td>
<td>181</td>
<td>76.0</td>
<td>–</td>
<td>167</td>
<td>6.10</td>
</tr>
<tr>
<td>S12/27 G5</td>
<td>12</td>
<td>27.0</td>
<td>0.27</td>
<td>187</td>
<td>77.0</td>
<td>–</td>
<td>128</td>
<td>9.60</td>
</tr>
<tr>
<td>S12/32 G6</td>
<td>12</td>
<td>32.0</td>
<td>0.32</td>
<td>197</td>
<td>132</td>
<td>–</td>
<td>160</td>
<td>11.1</td>
</tr>
<tr>
<td>S12/41 A</td>
<td>12</td>
<td>41.0</td>
<td>0.41</td>
<td>210</td>
<td>175</td>
<td>–</td>
<td>175</td>
<td>14.6</td>
</tr>
<tr>
<td>S12/60 A</td>
<td>12</td>
<td>60.0</td>
<td>0.60</td>
<td>261</td>
<td>136</td>
<td>208</td>
<td>230</td>
<td>19.0</td>
</tr>
<tr>
<td>S12/85 A</td>
<td>12</td>
<td>85.0</td>
<td>0.85</td>
<td>353</td>
<td>175</td>
<td>–</td>
<td>190</td>
<td>26.8</td>
</tr>
<tr>
<td>S12/90 A</td>
<td>12</td>
<td>90.0</td>
<td>0.90</td>
<td>330</td>
<td>171</td>
<td>213</td>
<td>236</td>
<td>30.0</td>
</tr>
<tr>
<td>S12/130 A</td>
<td>12</td>
<td>130</td>
<td>1.30</td>
<td>286</td>
<td>269</td>
<td>208</td>
<td>230</td>
<td>39.0</td>
</tr>
<tr>
<td>S12/230 A</td>
<td>12</td>
<td>230</td>
<td>2.30</td>
<td>516</td>
<td>274</td>
<td>216</td>
<td>238</td>
<td>67.0</td>
</tr>
</tbody>
</table>
The Sunica Ni-Cd batteries are the first choice for solar systems when performance in cold conditions, a long lifetime, and a low life cycle cost is the target. The battery chemistry is ideal for solar applications with a very low daily discharge and only one major discharge per year in the winter. The modular design offers good flexibility to build battery banks to suit customer needs. The Sunica batteries have a proven track record of performance since the 1970’s in demanding industrial applications.

- **Lifetime expectancy in excess of 20 years, up to 8000 cycles to 15 %**
- **Battery design and gas recombination pocket optimised for photovoltaic applications**
- **Limited maintenance, typically once every four years**
- **Excellent performance in temperatures below -20°C (-4°F)**
- **Temperature range -50°C to +70°C (-58°F to 158°F)**
- **Resistant to over- and undercharging and complete discharge**
- **No premature capacity loss (sulphation) when cycled at low state of charge**
- **Large capacity range 45 Ah ~ 1110 Ah**
- **Used batteries are returned to manufacturer for 100 % recycling**

---

### Main Specifications/Order Overview

<table>
<thead>
<tr>
<th>Type/Order Code</th>
<th>Capacity</th>
<th>Height</th>
<th>Widths</th>
<th>Length per block</th>
<th>Weight</th>
<th>Internal resistance</th>
<th>Cell connections</th>
<th>Bolt per pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>S 1.2 V 50</td>
<td>50</td>
<td>65</td>
<td>15.9</td>
<td>195</td>
<td>7.1</td>
<td>0.25</td>
<td>6 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 100</td>
<td>100</td>
<td>85</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>0.39</td>
<td>12 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 150</td>
<td>150</td>
<td>105</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>0.55</td>
<td>18 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 200</td>
<td>200</td>
<td>150</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>0.71</td>
<td>24 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 250</td>
<td>250</td>
<td>200</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>0.87</td>
<td>30 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 300</td>
<td>300</td>
<td>260</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.03</td>
<td>36 M10</td>
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</tr>
<tr>
<td>S 1.2 V 350</td>
<td>350</td>
<td>320</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.19</td>
<td>42 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 400</td>
<td>400</td>
<td>400</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.35</td>
<td>48 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 450</td>
<td>450</td>
<td>470</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.51</td>
<td>54 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 500</td>
<td>500</td>
<td>500</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.67</td>
<td>60 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 550</td>
<td>550</td>
<td>570</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>1.83</td>
<td>66 M10</td>
<td></td>
</tr>
<tr>
<td>S 1.2 V 600</td>
<td>600</td>
<td>600</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>2.00</td>
<td>72 M10</td>
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</tr>
<tr>
<td>S 1.2 V 650</td>
<td>650</td>
<td>650</td>
<td>15.9</td>
<td>195</td>
<td>7.7</td>
<td>2.17</td>
<td>78 M10</td>
<td></td>
</tr>
</tbody>
</table>

---

### Technical Specifications

- **Resistance**: Due to the optimum optimised carbon particle, the internal resistance is very low. The battery performance is affected by this resistance.
- **Sulfation**: The battery is resistant to long periods of partial charge. The internal resistance may rise, but performance falls only slightly.
- **Efficiency of Discharge**: The battery can be discharged over a long period. The life time of the battery is correspondingly long.
- **Gassing**: The battery is equipped with a gas vent that evacuates the hydrogen. Gas formation is very small.
- **Volume**: The internal volume is large enough for the battery to operate safely at low temperatures.
- **Polarity Bolt**: The battery uses standard bolts for connection, which is cost-effective and simple.

---

### Battery Characteristics

- **Panasonic Sunica Batteries**
  - **Rated Capacity**: 50 Ah to 250 Ah
  - **Internal Resistance**: Low
  - **Gassing**: Low
  - **External Dimensions**: Various sizes available
  - **Material**: Ni-Cd
  - **Operating Temperature**: -20°C to 50°C

---

### Power Systems

- **Sonic Ni-Cd Batteries for Solar Systems**
- **Proven Track Record**: Since the 1970s
- **Performance in Cold Conditions**: Long lifetime
- **Low Cycle Cost**: Cost-effective solution for solar systems

---

### Table

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Capacity (Ah)</th>
<th>Height (in)</th>
<th>Widths (in)</th>
<th>Length (in)</th>
<th>Weight (kg)</th>
<th>Internal Resistance (mΩ)</th>
<th>Bolt per Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUN+ 50</td>
<td>50</td>
<td>65</td>
<td>15.9</td>
<td>195</td>
<td>1.03</td>
<td>0.25</td>
<td>6 M10</td>
</tr>
<tr>
<td>SUN+ 100</td>
<td>100</td>
<td>85</td>
<td>15.9</td>
<td>195</td>
<td>1.19</td>
<td>0.39</td>
<td>12 M10</td>
</tr>
<tr>
<td>SUN+ 150</td>
<td>150</td>
<td>105</td>
<td>15.9</td>
<td>195</td>
<td>1.35</td>
<td>0.55</td>
<td>18 M10</td>
</tr>
<tr>
<td>SUN+ 200</td>
<td>200</td>
<td>150</td>
<td>15.9</td>
<td>195</td>
<td>1.51</td>
<td>0.71</td>
<td>24 M10</td>
</tr>
<tr>
<td>SUN+ 250</td>
<td>250</td>
<td>200</td>
<td>15.9</td>
<td>195</td>
<td>1.67</td>
<td>0.87</td>
<td>30 M10</td>
</tr>
<tr>
<td>SUN+ 300</td>
<td>300</td>
<td>260</td>
<td>15.9</td>
<td>195</td>
<td>1.83</td>
<td>1.03</td>
<td>36 M10</td>
</tr>
<tr>
<td>SUN+ 350</td>
<td>350</td>
<td>320</td>
<td>15.9</td>
<td>195</td>
<td>2.00</td>
<td>1.19</td>
<td>42 M10</td>
</tr>
<tr>
<td>SUN+ 400</td>
<td>400</td>
<td>400</td>
<td>15.9</td>
<td>195</td>
<td>2.17</td>
<td>1.35</td>
<td>48 M10</td>
</tr>
<tr>
<td>SUN+ 450</td>
<td>450</td>
<td>470</td>
<td>15.9</td>
<td>195</td>
<td>2.34</td>
<td>1.51</td>
<td>54 M10</td>
</tr>
<tr>
<td>SUN+ 500</td>
<td>500</td>
<td>500</td>
<td>15.9</td>
<td>195</td>
<td>2.50</td>
<td>1.67</td>
<td>60 M10</td>
</tr>
<tr>
<td>SUN+ 550</td>
<td>550</td>
<td>570</td>
<td>15.9</td>
<td>195</td>
<td>2.67</td>
<td>1.83</td>
<td>66 M10</td>
</tr>
<tr>
<td>SUN+ 600</td>
<td>600</td>
<td>600</td>
<td>15.9</td>
<td>195</td>
<td>2.84</td>
<td>2.00</td>
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<td>SUN+ 650</td>
<td>650</td>
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<td>195</td>
<td>3.01</td>
<td>2.17</td>
<td>78 M10</td>
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<tr>
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<td>2.34</td>
<td>84 M10</td>
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<tr>
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<tr>
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<td>800</td>
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<tr>
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<td>850</td>
<td>15.9</td>
<td>195</td>
<td>3.69</td>
<td>2.84</td>
<td>102 M10</td>
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</tbody>
</table>
SBE 86/SBE86SS
Battery Enclosure with mechanical support

SBE Battery enclosures with support is a robust solution developed for marine environments. The enclosures are produced of hot moulded fiberglass reinforced polyester or stainless steel (AISI 304). Both enclosures are durable and produced from corrosion resistant materials.

- The enclosures can carry different battery technologies e.g. lead-acid, nickel-cadmium
- The enclosures are ventilated
- Support has a hot-dip galvanized surface treatment
- The enclosure together with the support makes the design extremely robust
- Installation friendly because the support can be pre-installed to the wall
- Door equipped with »DIN 3mm« locks, the door can be padlocked

Installation
Support structure with a variety of installation options.

Lock
The door can be padlocked.

Control unit
Space for control unit in upper part of the enclosure.

Ventilator
The enclosure is equipped with two ventilators.

Main Technical Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Enclosure</td>
<td>800 x 600 x 300 mm (hwxwxd)</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 34</td>
</tr>
<tr>
<td>Battery installation area</td>
<td>560x250mm</td>
</tr>
<tr>
<td>Weight</td>
<td>GRP 27 kg / Stainless steel 43 kg</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C to +140°C</td>
</tr>
</tbody>
</table>
**SBE 68SS**

Battery Enclosure with mechanical support

SBE Battery enclosure with support is a robust solution developed for marine environments. The enclosure is produced of durable and corrosion resistant stainless steel (AISI 304).

- The enclosure can carry different battery technologies e.g. lead-acid, nickel-cadmium
- The enclosure is ventilated
- Support made of corrosion resistant stainless steel
- The enclosure together with the support makes the design extremely robust
- The new detachable support is installation-friendly: The support can be pre-installed on the wall and the enclosure lifted single-handed.
- Door equipped with DIN 3-Key locks, the door can be padlocked
- New support mechanism enables installing even into uneven surfaces

---

**Main Technical Specification**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Enclosure</td>
<td>600 x 800 x 300 mm</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 34</td>
</tr>
<tr>
<td>Battery installation area</td>
<td>760 x 250 mm</td>
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<tr>
<td>Weight</td>
<td>47 kg</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C...+140°C</td>
</tr>
</tbody>
</table>

---

**Installation**

Support mechanism enables installing even into uneven surfaces.

**Space**

Orientation of the enclosure offers more space for the batteries.

**Lock**

The door can be padlocked.

**Ventilator**

The enclosure is equipped with ventilators.
We provide tailored solutions to customise our high-quality lanterns to meet specific customer requirements. This way we can guarantee a correct and simple use of the many components needed for the correct marking of waterways. Mechanical and electrical interfaces are planned and adapted in close cooperation with our subcontractors and other project partners.

- Project management
- Aids to navigation design
- Electrical design and documentation
- Mechanical design, support structures
- Control systems
- Power management and supply
Quality and Environmental Policy

We are in the business of increasing and maintaining safety on land and sea. Reliability is at the core of our operations. As such, safety is and remains our main driver. Through our long experience and vigorous testing we provide high quality products made to defy the harshest environmental conditions, such as strong winds and high waves, drifting ice, hail, severe temperature fluctuations and months without daylight, never faltering and thus effectively preventing possible hazards.

Customer satisfaction is our second core value. Our success is only possible if our customers can rely on repeat performance. We continuously develop our products to be technically, functionally and economically competitive and of the highest quality in the industry. We are committed to meeting and even exceeding the expectations of our customers to ensure their satisfaction with our products.

Continuous learning and development underscores our business. We believe that technical skills and knowledge of our staff play a central role in satisfying the ever growing needs of our customers. We highly value personnel who are motivated towards continuous improvement and we support career ongoing development and training for our technical and support staff.

We are able to execute to high standards by rigorously testing all equipment. We test lanterns for their optical performance as well as for the technical requirements set by the customer, by the industry and by our own internal standards. Carmanah and Sabik are both members of IALA and Sabik Marine actively participates in the work of IALA and in national technology development activities.

We are continuously developing our products to be technically, functionally and economically competitive and of the highest quality in the industry. These performance improvements also contribute to sustainability. Lower energy consumption results in longer service intervals, longer battery replacement intervals, less need to visit remote sites, and smaller power supply components. All of this leads to a lower life-cycle cost.

Sabik Optical measurement range

Our commitment to quality is demonstrated by the fact that we measure the optical performance of all lanterns leaving the factory. Our optical measurement ranges are used for quality control but also as tools for continuous improvement. Data of each measured lantern are stored and can be retrieved for control and development purposes.
# NOMINAL RANGE FOR NIGHT TIME

Table 1 Night time nominal range table (rounded off to the nearest nautical mile)

<table>
<thead>
<tr>
<th>Range (NM)</th>
<th>Intensity T=0.74 (cd)</th>
<th>Intensity T=0.85 (cd)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>4</td>
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<td>25</td>
<td>778327</td>
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</tr>
</tbody>
</table>

# NOMINAL RANGE FOR DAY TIME (Bright, overcast weather condition)

Table 2 Day time nominal range table (rounded off to the nearest nautical mile)

<table>
<thead>
<tr>
<th>Range (NM)</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
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<td>25050</td>
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<td>3</td>
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<td>8</td>
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<tr>
<td>9</td>
<td>4180000</td>
</tr>
<tr>
<td>10</td>
<td>6970000</td>
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</tbody>
</table>