# VPII
# Integrated Buoy Lantern

*Installation, Operation and Programming Manual*

## Version: 1.0
## Date: November 16, 2023

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**VP2 Ice-Buoy Lantern**

# Contents

# 1.    Introduction

**Standard features**

- Designed for moderate ice conditions
- Wide 10° vertical divergence
- Up to 600 cd peak intensity at 9 W power
- Flasher with free programmable character
- Programmable Effective Intensity
- Daylight sensor (lux)
- Accurate integrated power measurement system
- Wireless Bluetooth™ programming

**Optional features**

- Dated Shut-down
- GSM LTE-M LightGuard Remote Monitoring
- GPS Synchronisation
- GPS Position Check-up
- Event-log

# 2.    Technical details

## 2.1.    Optical Performance

The luminous intensity is adjustable between full intensity (400-600cd) and minimum intensity (7-11 cd). The effective visual range is from 2.5 to 8 nautical miles depending on light colour and flash character. The maximum luminous intensity and power consumption for the two different lenses are listed in the tables below:

| Wide  Lens<br>10° FWHM (± 10%) | Nominal Luminous Intensity and<br>Power Consumption (± 10%) |
|---|---|
| **Color** | |
| **Green** | 600 cd @ 9W |
| **Red** | 400 cd @ 7W |
| **White** | 600 cd @ 9W |
| **Yellow** | 400 cd @ 9W |

(FWHM = Full Width, Half Maximum)

The actual visual range of the lantern is depending on the effective intensity, flash length and intensity setting of lantern. The effective intensity and hence the range of a single flash character is calculated in accordance to the IALA recommendation R0204.

In the lantern configuration device (Sabik Control Bluetooth App), the effective intensity is automatically calculated and displayed depending on settings selected by user. The base for this calculation is the luminous intensity stored in the lantern at the factory test at Sabik's in-house photometric range.

The main optical specifications are listed in the table below:

| Specification | Value |
|---|---|
| **Lens vertical divergence** | 10° Full Width at half maximum |
| **Production tolerances of divergence** | ±1° |
| **Lens material** | UV stabilized polycarbonate |
| **Light colours** | Red/Green/Yellow/White in accordance with IALA recommendation |

## 2.2.   Power Consumption

The lantern is designed for primary battery use and maintains a high overall efficiency over a wide range of supply voltages. Daytime idle consumption and consumption between flashes is minimized.

| Specification | Value |
|---|---|
| **Standard  configuration** | |
| **Input voltage range** | 8…32 VDC |
| **Max power consumption** | 7 – 9 W at full intensity (depending on LED color) |
| **Daytime idle consumption** | 0.5 mA @ 12 VDC |
| **Consumption between flashes** | 1.0 mA @ 12 VDC |
| | |
| **Options** | |
| **GPS module installed** | Average ≈1 mA @ 12 VDC |
| **GSM module installed** | Average ≈1 mA @ 12 VDC |
| **Tilt angle monitoring** | 0.35 mA @ 12 VDC |

The lantern intensity and hence power consumption can be adjusted between 1% and 100% depending on range required. The overall daily power consumption is depending on duty cycle of character, intensity setting and setting of daylight sensor (when to turn on/off).

When calculating the daily power consumption also the consumption between flashes and the consumption of any of the options installed should be considered.

*Example of daily power consumption, no options:*

**Q:** A RED VP2 lantern set to 50% intensity and Fl 3s (0.3+<u>2.7</u>=3s), 14 hours operation

**A:** Daily consumption = 50% x 7W x (0.3/3s) x 14h +

   (1-0.3/3s) x 0.012W x 14h + 0.006W x 10h = 4.9 Wh + 0.1512 Wh + 0.06 Wh = 5.1Wh

*Total daily (24h) consumption = <u>5.1Wh</u>*

## 2.3. Mechanical

The VP2 lantern is designed to be integrated on the top of a spar buoy, therefore requiring a dedicated fitting of the top part of the buoy. The lantern can be installed on both plastic and steel buoys.

| Specification | Value |
|---|---|
| | |
| Weight of unit | 3.5 kg |
| Base material | Marine grade aluminium |
| Total height above surface | 100 mm |
| Lantern diameter | 212 mm |
| Mounting | 4 pcs M10 bolts at radius 180mm (bolts included) |

The lantern is fully waterproof, and pressure tested at factory before shipment. Breathing is arranged through a PTFE membrane mounted on the underside of the lantern, enabling the lantern to equalize pressure without the risk of letting the moisture into the lantern.
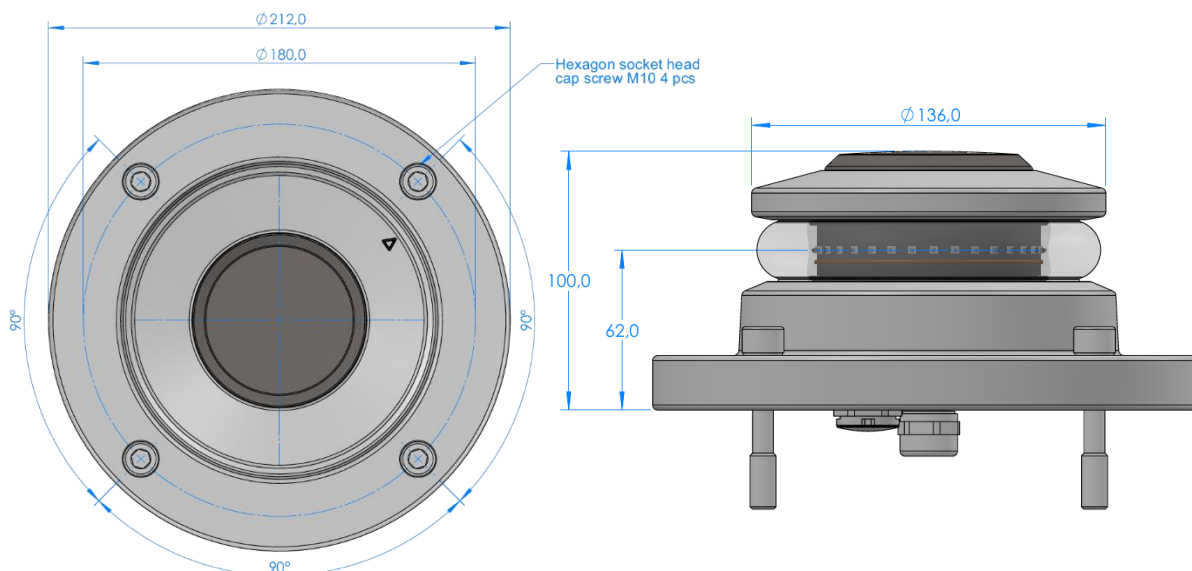


*Figure 1- General Dimensions of the lantern*

## 2.4.	Electrical

The VP2 buoy lantern is mainly operated on plastic ice spar buoys where a primary battery option is the only power system available. In section 4.2 the connection of various type of power supplies are explained.

## 2.5.	Light Sensor

The light sensor is located inside the optical lens. The position of the sensor is indicated by a small, engraved triangle in the hat.



Ambient Light Sensor

The light sensor measures ambient luminance level (lux). It is calibrated for twilight illumination levels and limited to 250 lux. The factory default setting is to switch on the light at 15 lux and off at 60 lux. The built-in light sensor can be utilized even if the lantern is set to steady burning light, as it is able to get a reading between two light pulses (the LED's are powered using pulse width modulation). However, if the full 100% intensity is required while on steady light, the lantern will automatically reduce this by about 5% to enable the light sensor to get a reading between the PWM pulses.

## 2.6.  EMC

The lantern is tested for EMC in accordance with EU Directive 2014/30/EU Electromagnetic Compatibility Directive, and meets the following test standards:

- IEC 61000-4-2/7.1
- IEC 61000-4-3
- IEC 61000-4-4/7.2
- IEC 61000-4-5/7.8
- IEC 61000-4-6/7.2
- IEC 61000-4-11/7

**NOTE!** On plastic buoys special care should be taken to ground the top of the buoy in order to prevent a high electrostatic charge to build up over time. By adding grounding connection from lantern mounting to the submerged part of the buoy this can be prevented.


## 2.7.  Environmental

The lantern is designed for moderate ice conditions and is able to withstand static ice pressure. It may be submerged for periods of up to weeks if the buoy is submerged under ice.

| Specification | Value |
|---|---|
|  |  |
| **Temperature range** | -40°C to +60°C ambient temperature |
| **Ingress protection** | Equivalent to IP68 (1 meter submersion) |
| **Maximum Ice Force** | 2 kN |

The lantern design has been proven in field as well as tested with forces up to 2 kN.

# 3. Optional Modules

## 3.1. Dated shut-down

The dated shut-down feature is a software dependent option, which can be enabled with the Sabik Bluetooth™ Control App. By setting a shut-down date and a start-up date in the controller, the lantern can be switched off to save power during times when channels/fairways are closed. This function requires GNSS module to be present (Option 4 or Option 9L).

## 3.2. LTE-M LightGuard Monitoring

With the LightGuard module Remote Monitoring features are integrated in the lantern. The LightGuard Module uses the GSM Network to send Status messages to the Sabik LightGuard Monitor system. A subscription is required.

The following key monitoring features are available:

- **Alarm and Status reporting** – The LightGuard Module can be setup to report on Day/Night change and at a certain time intervals. The reports are sent automatically to the LightGuard system and includes the important lantern health information e.g. battery voltage, power consumption, error status, temperature, operating hours, daylight-sensor status.
  In case of a fail: low battery voltage, light failure etc. the LightGuard module will report immediately.

- **Out of Position Alarm** – LightGuard will monitor its position and send a report if the buoy moves outside the programmed geofence. A high accuracy GNNS module with advanced averaging algorithm is used to maximize the position accuracy. A typical position accuracy is about +/- 3 meter.

- **Synchronizing** – the light can be synchronized with other lights equipped with same option.

## 3.3. GNSS (GPS) synchronization only

The GNSS synchronization feature is an additional hardware and a software dependent option. By adding the GNSS module and enabling the synchronization with the Sabik Bluetooth™ Control App, lanterns can be synchronized via satellite. By altering the synchronization offset, a running light or sequential light pattern can be created. If LightGuard remote monitoring option is installed, the GNSS will also be utilized for the position monitoring.

## 3.4. Event-log

The lantern store main events which can be retrieved by service technician using the Sabik Bluetooth™ App. All day / night transitions as well as any alarms will be stored in the lantern, and is available to download using Bluetooth™ at any point. The lantern has capacity for a minimum of one year of events. The data is stored in a non-volatile memory independent on external power supply.

# 4. Commissioning

This chapter describes how to install and configure the lantern.

## 4.1. Configure Light Colour

The lantern can emit three different colours and there are two colour combination models, Red-Green-White or Red-Green-Yellow. The exact model of the lantern can be read from the product code, RGW or RGY.

The light colour is set with the Bluetooth™ Control App. Instruction on the usage is described in more detail in section 4.4. It´s possible to lock the light color with DIP switches located underneath the venting plug.

**NOTE!** If the light colour is selected with the DIP switches (only one colour ENABLED), it´s not possible to configure the light colour using the Bluetooth™ App.

## 4.2. Various Power Supplies

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

### 4.2.1. Primary Battery

Even though the minimum operating voltage of the lantern is 8V, it should not be connected to a primary battery with a nominal voltage of less than 12V to allow for voltage drop when cells being discharged.

If the primary battery used does not have an internal fuse an external one must be included in the system.
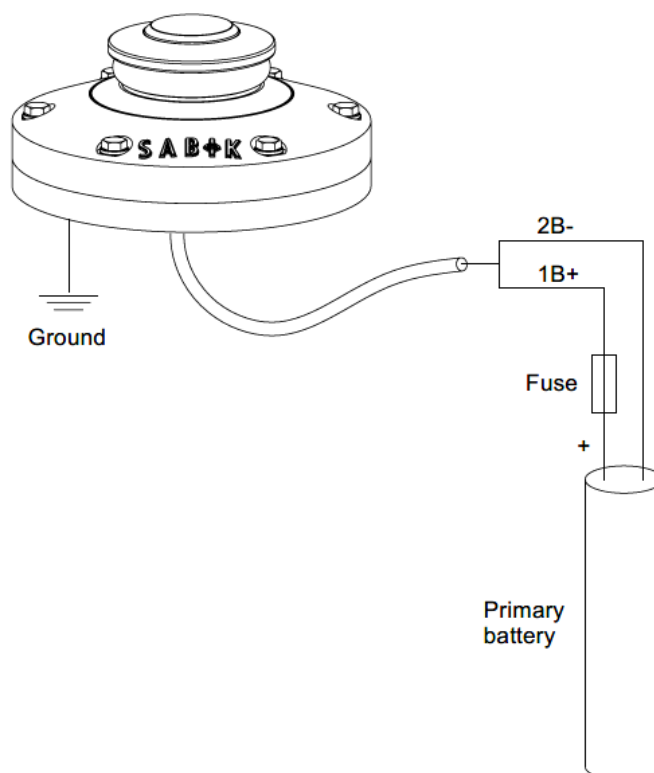
### 4.2.2. Other DC Power Supply

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

## 4.3.     Insert SIM Card (Only lanterns with GSM Module)

The lantern uses 4FF SIM Card size (Nano SIM) which will be provided by Sabik. Third party SIM´s will not work properly with the lantern.



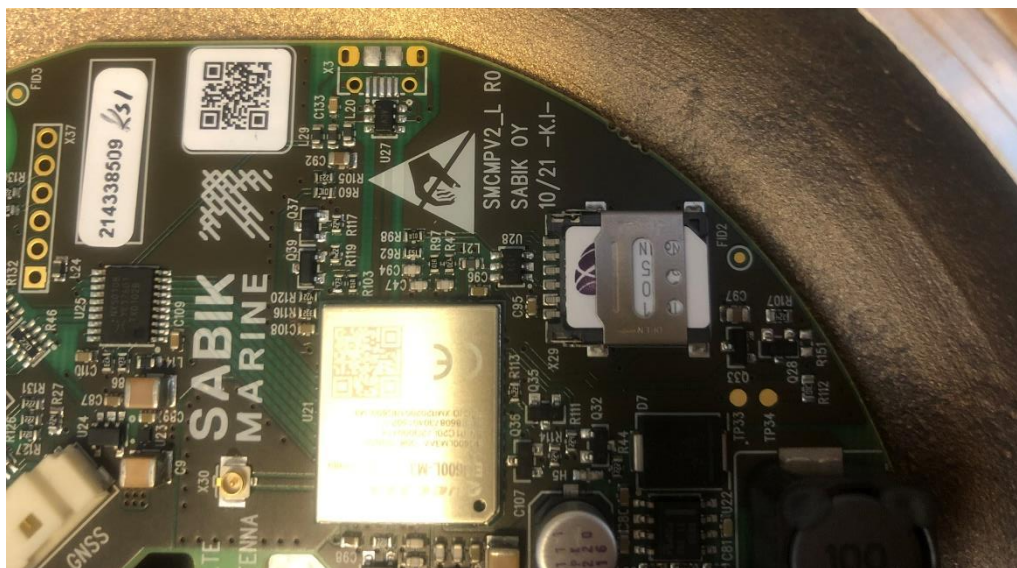*Figure 2 – Swipe left to unlock and lift up the SIM card holder and place SIM card in the holder*



*Figure 3 – Close the SIM card lock and slide it to the right in order to secure the SIM card*

## 4.4.    Programming

The lantern is equipped with Bluetooth as standard. A legacy infrared port is provided underneath the venting plug. The infrared port is compatible with Sabik easyProgrammer.

**Bluetooth Control App**





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

**Standard Features and requirements**

The lantern settings can be read to your phone for monitoring purposes. If you have the access rights you also can make changes and send them to the lantern. You cannot store the settings on your phone.

The app requires a minimum of iPhone 4s or a Bluetooth® 4.0 (Bluetooth® Smart) capable Android phone with operating system 4.3 or higher.

**Installation**

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

**Installation**
Follow the instructions on Google or Apple Store

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

## 4.4.1. Launching the application

After the installation, you should find an icon for the Bluetooth® app. You may relocate it if necessary.
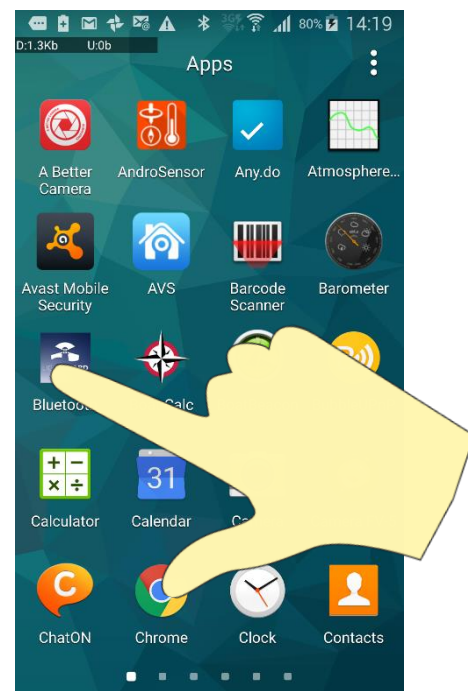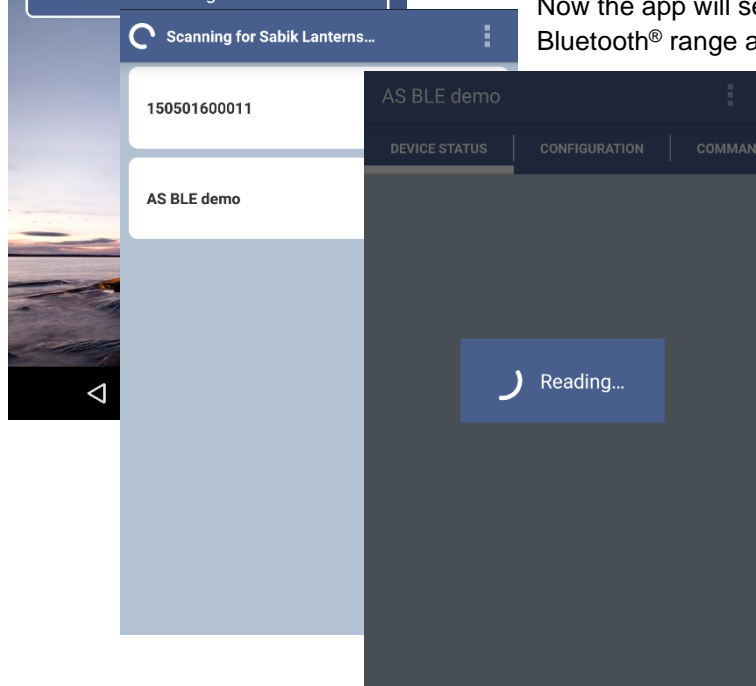


## 4.4.2. Login and selecting lantern
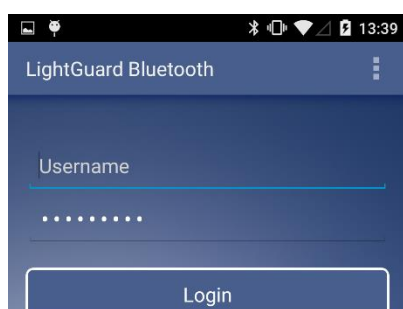


Fill in your user name and password and tap "Login".

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

This information is stored in your device so the next time you will be logged in just by tapping the "Login" button

Now the app will search for Sabik lanterns within Bluetooth® range and display them in a list. Any lantern which is connected to another user will not be shown in the list. The lantern serial number is the default Bluetooth® name. This name can be changed using the application. This default serial number is also printed on the lantern. Tap on the name to select it.

## 4.4.3. User interface
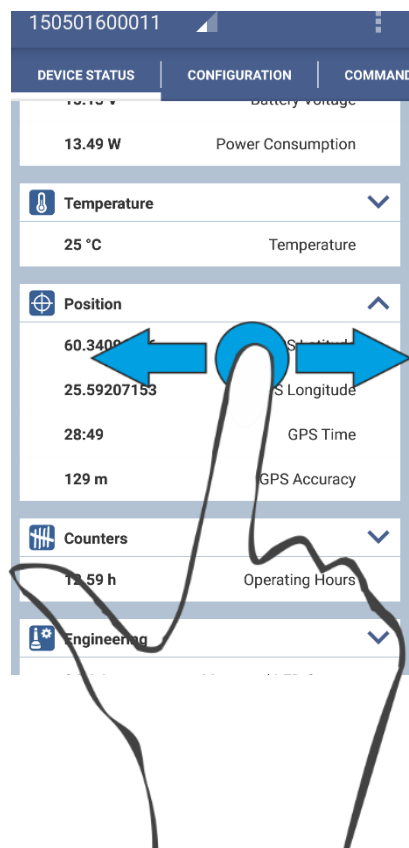


The interface labels are loaded from the lantern, so only the parameters relevant to this lantern are displayed.
For instance, if there is no GPS function in the lantern, none are displayed in the application. The pages shows the standard settings.
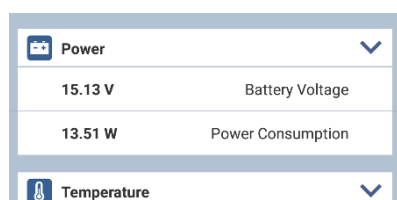
The user interface is divided into screens. (DEVICE STATUS, CONFIGURATION, COMMANDS and ABOUT) To select a screen, swipe the screen to the right or left or tap a screen tab.



The Screens are divided into expandable blocks (Light, Power, Temperature etc.).For advanced settings, you have to expand the blocks. To expand a block just tap the ⌄ symbol near the right edge
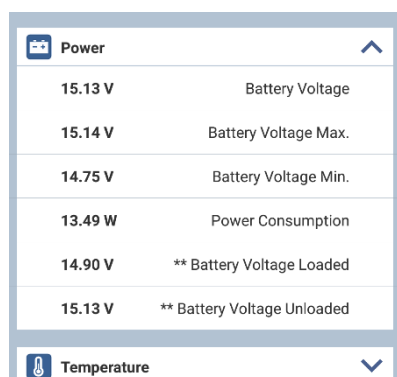


Expanded view for advanced settings. Tap the ⌃ symbol to collapse.

On the **CONFIGURATION** page, you can change the lanterns configuration by tapping the small >-shaped symbol on the right side of the setting's name. If needed, expand the block to see the advanced settings.



When, for example, LED Intensity is selected, you will be able to adjust the intensity by entering the effective intensity. The corresponding peak intensity will be calculated automatically depending on the selected flash character. If another flash character is later selected, the peak intensity will be recalculated to match the programmed effective intensity.

Tap Cancel to cancel or Write to send the updated value to lantern. The edited parameter is immediately stored in the lantern and the new value flashes briefly after it has verified by the lantern.
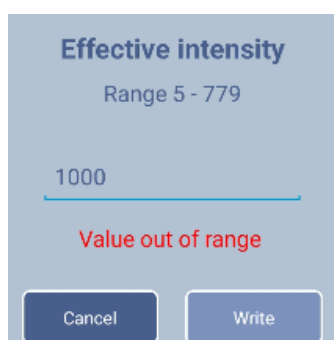


If the set value is too high or low, a warning message is shown and the value cannot be stored.

## 4.4.4. Pages

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

# DEVICE STATUS

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

## Light

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

## Power

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

## Temperature

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

## Position (If GPS module installed)

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

## Counters

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

## Engineering

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

# CONFIGURATION

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

## Flasher

Flash Character:             Select a standard flash character or create a custom flash character.
Effective Intensity:         Change LED Effective Intensity (cd)
Photocell Threshold:         Lantern operating ambient light threshold in lux
Light Mode:                  Lantern operating mode (Photocell, Forced Idle, Forced Active or Day Lantern)
*Advanced Settings*
*LED Current:*               **Product specific setting that must not be changed!**
*Photocell Hysteresis:*      *Hysteresis setting for turning off the lantern (lux)*
*Astro Offset Sunrise:*      *Offset for turning lantern off when in Astro mode (min)*
*Astro Offset Sunset:*       *Offset for turning lantern on when in Astro mode (min)*
*Lantern Type:*              *Lantern Installation Type (Stand alone, Primary or Standby)*
*Event log:*                 *Enable (Yes) or disable (No) the Event log*

## Charger Settings

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

## GPS & Sync

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

## Tilt and Impact

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

## Dated Shutdown

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

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

## Bluetooth Settings

Bluetooth Device name:    Set lantern's Bluetooth name

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

# COMMANDS

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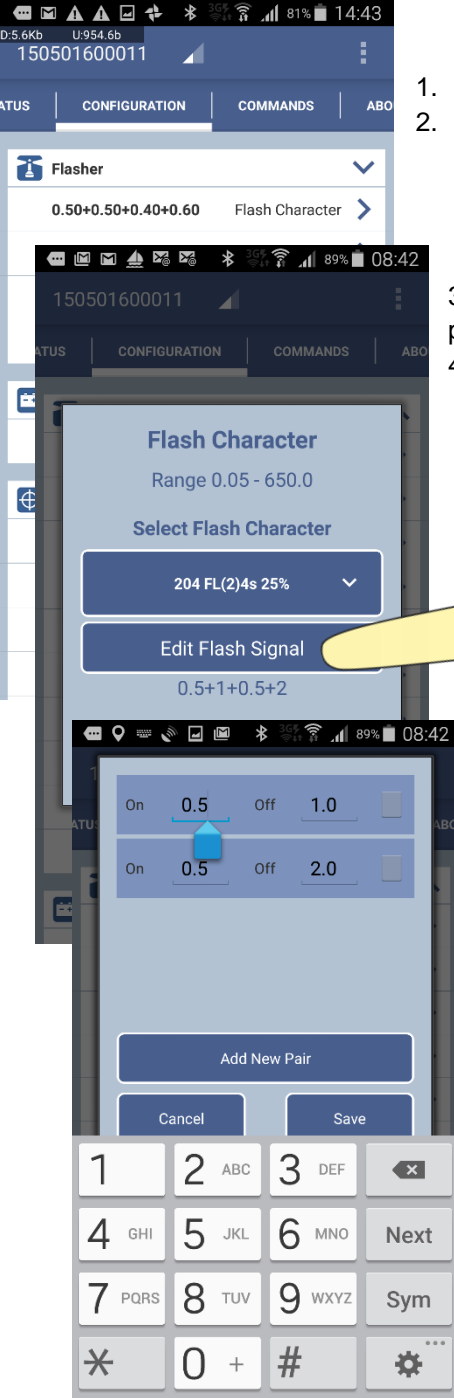
**Test Lantern**

The Test command runs the lantern for 3 minutes.

**Download event log**

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

## 4.4.5. Create a custom Flash Character; Step by Step Instructions



1. Select CONFIGURATION page
2. Tap on > symbol to the right of Flash Character



3. Select an existing Character from the list as a starting point and
4. Tap "Edit Flash Signal" to customize the character.



5. Change the On/Off timing. If needed add a new On/Off Pair or delete an existing pair by tapping the gray X. Tap Save, when done.

6. The new character will be saved as Custom.

# 5. Periodic Maintenance

The VP2 is a robust lantern designed to withstand heavy abuse and requires no maintenance, except for battery replacement and lens cleaning. To maintain a good light output and achieve a long service life, it is advisable to inspect the lantern whenever visiting the buoy.

**Mechanical inspection and maintenance:**

- Check the lantern for leakage and replace gaskets if necessary
- Clean the metal parts on the lantern
- Check the lens and clean it with a damp cloth (Do NOT use any solvents!)
- Check the mounting bolts and the plastic washers for damage and replace if necessary.

**Functional inspection and maintenance:**

- Check that the lantern turn on by covering the lens
- Check that the LEDs have equal intensity
- Check that the lantern turn off by removing the cover (there is an about 30s time hysteresis)
- Read status values using the Sabik Bluetooth™ App.
- Check battery voltage with the App. If battery voltage is low, replace the battery

# 6.    Troubleshooting

**Q:** There is water or moist inside the buoy. Where is the leakage?

**A1:** The bolts are loose or nylon washers damaged. Tighten the bolts. (Do NOT over tighten!)

**A2:** Open the lantern and check for damage on the O-ring and surface. Replace the O-ring if there are signs of damage.

**A3:** Remove the lantern including the flange from the buoy and check for damage on the gasket and the surfaces that are between the buoy and the flange. Replace the gasket if there are signs of damage.

**A4:** Check the PTFE membrane and replace if necessary.


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

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

**A2:** Read controller values with the App and check status. There is a lamp failure error. Return the lantern for service.

**A3:** Read controller values with the App and check status. The day light sensor value is... Return the lantern for service.

**A4:** The dated shut-down feature may be enabled.


**Q**: I covered the lens, but the lantern does not turn on and I cannot find the lantern in the Sabik Control App.

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


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

**A:** Return the lantern for service.

# 7. Document revision history

| Manual Revision | Description of Change | Date manual released | Made by |
|---|---|---|---|
| 1.0 | Initial version | 16 Nov 2023 | JoL |
| | | | |
| | | | |
| | | | |
| | | | |

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# 8. Appendixes

## 8.1. Explosion view

OPT 9: LightGuard GSM + GPS   Drawing number: M133403
OPT 4: GPS sync              Drawing number: M133410

Item 5 for VP2 RGY colours
Item 28 for VP2 RGW colours

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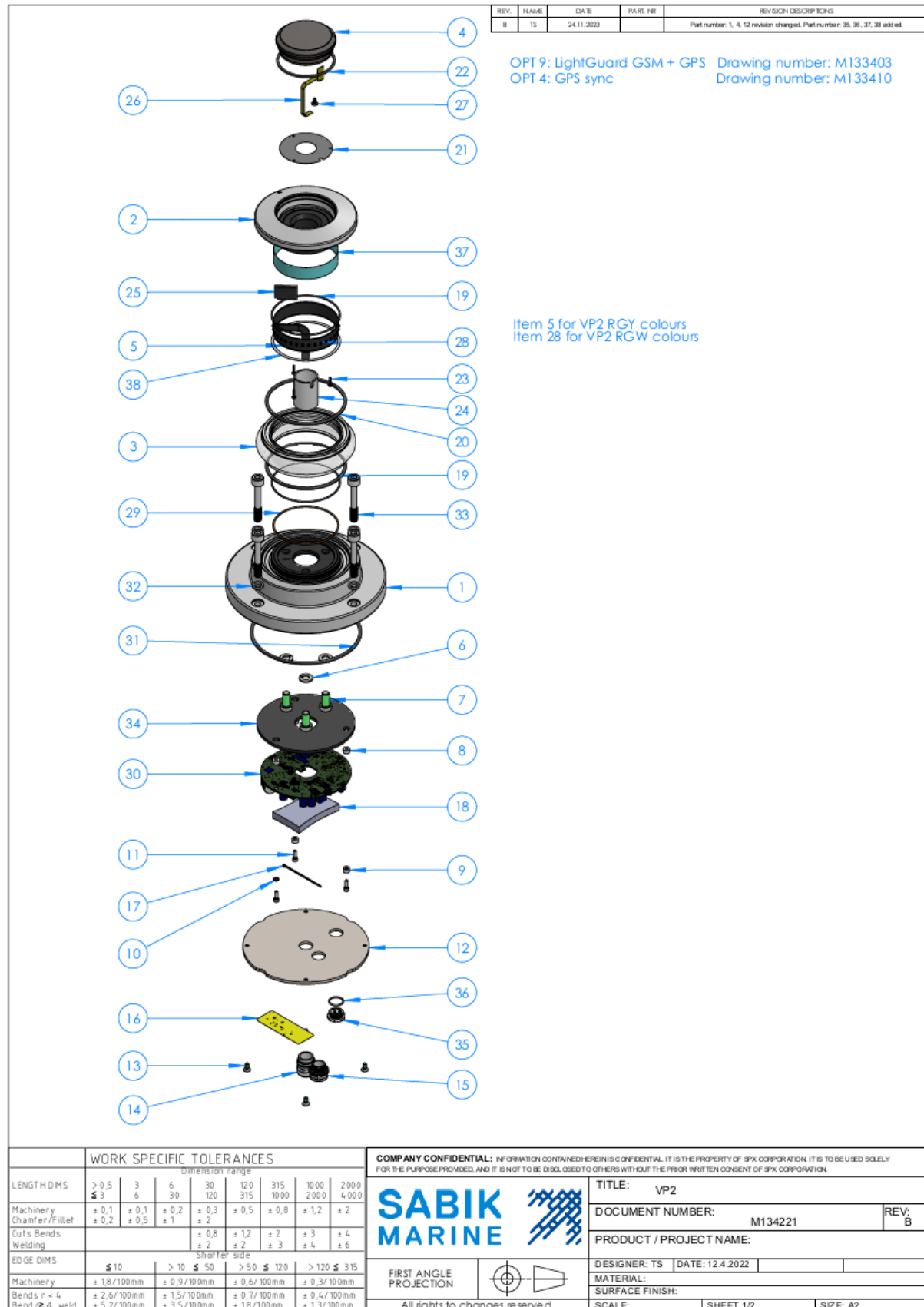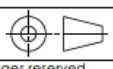
## 8.2. Part List

| Part | Document Number | Sabik code | Title | Material | Manufacturer | Manufacturer PN | Revision | Qty |
|---|---|---|---|---|---|---|---|---|
| 1 | M134207 | | VP2 Upper flange | Valu AlSi12 | | | C | 1 |
| 2 | M134205 | | VP2 Hat | Alu 6082-T6 | | | 0 | 1 |
| 3 | M131581 | | MPV2 Lens | PC | | | A | 1 |
| 4 | M132501 | | MPV2 Hat plug basic | Polyasetal | | | B | 1 |
| 5 | M133420 | | MPV2 led card (RGY) | | | | | 1 |
| 6 | M100170 | 634400 | Spring lock washer M10 DIN127 | A4 | | | - | 3 |
| 7 | M101131 | 619294 | Hexagon socket head cap screw DIN7984 M10x20 | A4 | | | - | 3 |
| 8 | M132443 | | Round unthreaded spacer 4,8mm | PVC | Essentra | SS8-4.8MML | - | 3 |
| 9 | M132543 | | Insulating cup washer | Nylon | Essentra | 16CW008043 | | 2 |
| 10 | M100289 | 634301 | Spring lock washer M4 DIN127 | A4 | | | - | 1 |
| 11 | M100291 | | Hexagon socket head cap screw M4x12 DIN912 | A4 | | | - | 3 |
| 12 | M134260 | | VP2 Cover plate | A4 | | | B | 1 |
| 13 | M100101 | 616494 | Hexagon socket countersank head screw M5x10 DIN 7991 | A4 | | | - | 4 |
| 14 | M100066 | 591100 | Cable gland M20x1,5 | NI/MS | | | - | 1 |
| 15 | M133436 | | Venting system M20x1,5 (TL10) | PA | Bimed | SBVPE-11-WN (TL10) | - | 1 |
| 16 | M132790 | | SMC MPV 2.0 label, 80x30mm | 3M 7983 | | | A | 1 |
| 17 | M100184 | | Cable ties | | Panduit | PLT.6SM-C0 | - | 1 |
| 18 | M100538 | 820143 | Damp desiccant bag 10g | Silica gel | | | - | 1 |
| 19 | M101652 | 651397 | O-ring 88,62x1,78 70shA | NBR | | | - | 2 |
| 20 | M131586 | | O-ring 100x4 EPDM | EPDM | Tisan | 10007 | | 2 |
| 21 | M132450 | | MPV2 GPS Insulation sheet | Omay U42B 0,25mm + LA25 | | | B | 1 |
| 22 | M133373 | | O-ring 72,0x3 | EPDM | Tisan | 03594 | | 1 |
| 23 | M100431 | | Torx screw 3x12 WN1452 | A2 | Wurth elektronik | WM1402312 | 0 | 3 |
| 24 | M132550 | | MPV2 Insulation pipe | PVC | | | A | 1 |
| 25 | M132552 | | MPV2 Card insulation | Solukumi POR 300/100 3,0mm | TT Gasket | | A | 2 |
| 26 | M132454 | | BTMPV2-F/BTMPV2-T | | | | | 1 |
| 27 | M132447 | | Push fastener Nylon | Nylon | Essentra | 468811 | | 1 |
| 28 | M132453 | | MPV2 led card (RGW) | | | | | 1 |
| 29 | M132587 | | O-ring 84x2 FPM 80sh | FPM | | | 0 | 1 |
| 30 | M132530 | | SMCMPV2 | | | | | 1 |
| 31 | M135606 | | O-Ring 140x4 | EPDM | Tisan | 09307 | | 1 |
| 32 | M100074 | 820606 | Washer 10,4x15x3 | PTFE White | | | 0 | 4 |
| 33 | M100075 | 820608 | Hexagon socket head cap screw M10x60 DIN912 A4 | A4 | | | - | 4 |
| 34 | M132549 | | MPV2 SMC insulation sheet | Solukumi POR 300/100 FR 4,0mm | TT Gasket | | A | 1 |
| 35 | M101026 | | LSI Lens | PC UV-resistant | Greenfox | | B | 1 |
| 36 | M101066 | | O-ring 17,17x1,78 Perox vulk. EPDM | EPDM | Tisan | 8526 | - | 1 |
| 37 | M132577 | | MPV2 Thermally conductive adhesive transfer tape | | Elgood | | 0 | 1 |
| 38 | M132590 | | MPV2 Led card insulation sheet | Omay U42B | | | A | 1 |

### WORK SPECIFIC TOLERANCES

| | Dimension Range | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LENGTH DIMS | > 0,5 ≤ 3 | 3 6 | 6 30 | 30 120 | 120 315 | 315 1000 | 1000 2000 | 2000 4000 |
| Machinery Chamfer/Fillet | ± 0,1 ± 0,2 | ± 0,1 ± 0,5 | ± 0,2 ± 1 | ± 0,3 ± 2 | ± 0,5 | ± 0,8 | ± 1,2 | ± 2 |
| Cuts Bends Welding | | | | ± 0,8 ± 2 | ± 1,2 ± 2 | ± 2 ± 3 | ± 3 ± 4 | ± 4 ± 6 |

| EDGE DIMS | ≤ 10 | > 10 ≤ 50 | Shorter side > 50 ≤ 120 | > 120 ≤ 315 |
|---|---|---|---|---|
| Machinery | ± 1,8/100mm | ± 0,9/100mm | ± 0,6/100mm | ± 0,3/100mm |
| Bends r < 4 | ± 2,6/100mm | ± 1,5/100mm | ± 0,7/100mm | ± 0,4/100mm |
| Bend.r≥ 4 , weld | ± 5,2/100mm | ± 3,5/100mm | ± 1,8/100mm | ± 1,3/100mm |

**SABIK MARINE**

FIRST ANGLE PROJECTION

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TITLE: VP2

DOCUMENT NUMBER: M134221   REV: B

PRODUCT / PROJECT NAME:

DESIGNER: TS   DATE: 12.4.2022

MATERIAL:

SURFACE FINISH:

SCALE:   SHEET 2/2   SIZE: A2

## 8.3. Product Codes

**VP2-ccc-10D-OPT**      **Standard version**
**VP2TRP-ccc-10D-OPT**  **Timber Rafting Protection cage included**

ccc                        = RGW or RGY, R=RED, G=GREEN, W=WHITE and Y=YELLOW
10D                        = Vertical divergence 10D=10°
OPT                        = 4L for GNSS synchronization
OPT                        = 9L for LTE-M (GSM) LightGuard remote monitoring and GNSS sync