

Green Force

Modular Lighting Systems

User Manual



Picture: Gery Beeckmans



Reliable **Flexibility**

A thing of beauty is a joy forever!

John Keats (1795–1821)



Quadristar Titanium XPGH Diamond Edition
Polished titanium covered with 348 diamonds.

Green Force lighting systems are designed and manufactured by Leys Inc. which has over half a century experience in drawing, constructing and subcontracting spare components for offshore, aircraft and nuclear industry. Unlike any other lighting system, Green Force lighting systems are designed and manufactured according to the highest industrial standards, using the latest technology and machinery available on the market. One feature distinguishes it even more from all other systems, it's unmatched modularity.

Green Force modular lighting systems consist of compact but yet powerful battery packs that can be combined with a broad range of light heads, capable of withstanding the roughest conditions. Once fully charged, Green Force battery packs can provide the diver with several hours of burn time before a recharge forces itself up. This extensive autonomy and low power consumption prove themselves extremely useful when charging possibilities are limited.

Managing Director

Luc Leys

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Picture: Petra Acova

PWM Technology

Green Force uses PWM technology to control the LED light heads.

When using PWM or **Pulse Width Modulation** the light is switched on and off extremely fast. The ratio to on and off determines the amount of energy that flows through the LED. When switched off, no current flows through the LED and no energy is wasted. Depending on the type of PWM technology, the LED's are switched on and off about 25.000 to 300.000 times each second. This is faster than the human eye can register so only the average is registered. This technique also allows dimming the LED's in circumstances where the maximum power is not required. Even this application does not cause any loss of energy and will increase the burn time.

Pulse Width Modulation is controlled by a microprocessor which:

- Enables a perfect battery management which also prevents damage by deep discharge.
- Controls the LED's at maximum capacity without overload.
- Protects the light head against overheating by constantly measuring the temperature and by reducing the current when necessary. This makes the Hybrid LED lights perfect for use above water like (camping or hiking).
- Offers extra options such as dimming.

Green Force Hybrid

Green Force Hybrid LED light heads can be used in combination with Alkaline, NiMH or Lithium battery packs that may range from 4 to 18 Volts. This makes these light heads extremely versatile.

- PWM with microprocessor - Multi-voltage 4 to 18V
- 100% and 50% dimmable
- Watertight TOS connection
- Thermal/overheating protection (can be used on land)
- 'Bring Me Home' mode
- Battery deep discharge protection
- Equipped with newest technology LED's available
- At least one hour of burn time on Hybrid battery packs

Green Force TOS*

*** Triple O-Ring Sealing System**

All Green Force light heads and umbilicals are equipped with the proven TOS (Triple O-ring Sealing System). This system ensures maximum safety and durability.

Temperature Protection

Your Green Force dive light can also be operated out of the water. However, the microprocessor will reduce the power when the temperature rises and possibly it will even shut down the light to protect the LEDs from overheating.

End of battery life

At the end of the battery life (when the batteries are discharged) the Green Force dive light will go into 'Bring Me Home mode' (BMH mode) to protect the batteries from deep discharge. The light will reduce the power to a level that is sufficient to monitor your instruments while making a safe ascend. Do not restart the torch while in BMH mode, this will possibly lead to reduced battery life expectations as it could bring your rechargeable batteries to a deep discharge state.

Maintenance of your dive light

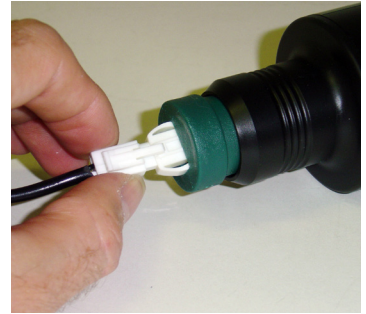
Green Force dive lights obtain their water tightness by means of durable NBR O-rings. These O-rings are extremely important and require your special attention. The O-rings must be maintained with great care, they have to be free of impurities and cracks and should slightly be greased with silicone grease. The grease reduces friction and allows the O-ring to settle in its correct place. Do not use too much grease as it could accumulate dirt and sand particles and could lead to water entry. Never use hard or sharp metal tools to remove O-rings, you could permanently damage the sealing surface or the O-ring itself. O-rings should be cleaned with a soft cloth that does not shed fluff, and then be lightly greased with silicone grease. Stretch the O-ring a bit and let it slide between your fingers to detect any damage. After every use the condition of the O-rings should be checked. If there is any doubt about the condition, and preferably after approximately every 200 dives, it is advisable to replace the sealing O-rings. After each dive, it is highly recommended to rinse your torch externally with fresh water. While rinsing, make sure that the dive light is sealed with the light head (and umbilical) connected to the battery pack to prevent the water from entering. It is recommended to separate the components (light head, umbilical and battery) of your Green Force dive light when stored for longer periods so the O-rings of the TOS connection cannot deform permanently.

Flexi Battery Packs

Charging your Flexi battery pack:

- Do not charge batteries when the ambient temperature is over 40° Celsius.
- Do not charge batteries into direct sunlight.
- Only use the charger indoors and do not expose it to humidity.
- Never cover the charger while charging.
- Every battery is subject to self-discharge and will suffer deep discharge when not charged regularly (every 6 months).
- You can recharge the NiMH battery pack from any charge state. It is not advised to discharge the battery completely before each charge.

Charge your Flexi battery pack before first use! Remove (unscrew) the light head or umbilical (optional) from the battery pack and replace it with the Green Force charging plug. Connect the charger cable to the charging plug (the plug is protected against reversed polarity and can only be connected one way) and connect the charger to the mains (AC 100V to 240V, 50/60Hz). Once connected a red and green LED will light up. When the charging process is started only the red LED will be lit up. The Green Force charger will detect when the battery is fully charged. At this moment the green LED will be lit up and the charging process will be stopped. You can disconnect the battery and the charger from the mains at this point.



Remove (unscrew) the light head or umbilical (optional) from the battery pack and replace it with the Green Force charging plug. Connect the charger cable to the charging plug (the plug is protected against reversed polarity and can only be connected one way).

When not being used, you can store the battery pack in a dry area to minimize the self discharge. Recharge the batteries after each use and at least every 6 months when not being used for extended periods.

Not charging your battery pack regularly can lead to deep discharge and your battery cells will suffer from irreparable damage and capacity loss. Deep discharged batteries are not covered by warranty.

Hybrid Battery Packs

The Green Force Hybrid battery packs (except for the Hybrid 2) can be fitted with rechargeable AA size NiMH batteries or with AA size Alkaline batteries. The Hybrid 8 can also be fitted with a Green Force NiMH rechargeable pack (10 cells) which delivers even more power (2.2Ah).

Putting batteries in a Hybrid 2 battery pack:

Open the battery pack by removing (unscrewing) the light head. Insert the 18650 battery cells. **Please mind the polarity.** Reversed polarity will damage the light head. The positive pole of the battery has to make contact with the light head. Screw the light head back in place (make sure the o rings are clean and slightly greased) using little force. Applying too much force you will damage the thread.

Putting batteries in a Hybrid 8 or Hybrid 12 battery pack:

Open the battery pack by unscrewing the bottom part (counterclockwise). Insert 8 AA Alkaline or NiMH battery cells in the battery holder. **Please mind the polarity.** Reversed polarity will damage the light head. Mind the markings engraved in the battery holder. Slide the battery holder (contact plate first) into the battery pack so that the contact plate makes contact with the light head. Put (screw) the bottom lid back in place (make sure the o ring is clean and slightly greased).

Charging your Hybrid battery pack:

- Do not charge batteries when the ambient temperature is over 40° Celsius.
- Do not charge batteries into direct sunlight.
- Only use the charger indoors and do not expose it to humidity.
- Never cover the charger while charging.
- Every battery is subject to self-discharge and will suffer deep discharged when not charged regularly (every 6 months).
- You can recharge the NiMH battery pack from any charge state. It is not advised to discharge the battery completely before each charge.

Charging batteries of a Hybrid 2 battery pack:

Charge the batteries before first use! Remove (unscrew) the light head from the battery pack and remove the battery cells. Connect the charger to the mains (AC 100V to 240V, 50/60Hz) or the DC 12V-24V cigarette lighter plug (optional) and insert the batteries in the slots. **Please mind the polarity.** Reversed polarity may damage the batteries and/or the charger.

There are two kinds of 18650 batteries available, Li-Ion (3.7V) and LiFePO4 (3.2V). You cannot mix these batteries as the chargers are different. It is not

Hybrid Battery Packs

possible to charge LiFePO₄ with a Li-Ion charger and vice versa. Trying to do so could result in irreparable damage to the cells and/or charger.

The charger is equipped with 2 charging slots. It is possible to charge only one or two cells. Each slot is equipped with a two color LED: red light means 'charging', green light means 'battery charged'. Charging will usually take 2 to 4 hours. When not in use you can store the batteries in a dry area to minimize the self discharge. Recharge the batteries after each use and at least every 6 months when not in use.

Charging batteries of a Hybrid 8 or Hybrid 12 battery pack:

You can fit the Hybrid 8 and Hybrid 12 battery packs with rechargeable NiMH AA batteries and charge them with the Hybrid charging kit (optional). The Hybrid 8 battery pack can also be equipped with a 10 cell battery pack (optional) that has more capacity (2.2Ah).

Never connect the battery pack to a charger when the battery pack is fitted with non-rechargeable batteries (Alkaline, Lithium metal, Zink Cobalt, ...).

Charge the NiMH batteries before first use! Remove (unscrew) the light head or umbilical (optional) from the battery pack and replace it with the Green Force charging plug. Connect the charger cable to the charging plug (the plug is pro-

tected against reversed polarity and can only be connected one way) and connect the charger to the mains (AC 100V to 240V, 50/60Hz). Once connected a red and green LED will light up. When the charging process is started only the red LED will be lit up. The Green Force charger will detect when the battery is fully charged. At this moment the green LED will be lit up and the charging process will be stopped. You can disconnect the battery and the charger from the mains at this point.

When not being used, you can store the battery pack in a dry area to minimize the self discharge. Recharge the batteries after each use and at least every 6 months when not being used for extended periods.

Not charging your battery pack regularly can lead to deep discharge and your battery cells will suffer from irreparable damage and capacity loss. Deep discharged batteries are not covered by warranty.

Using your Green Force Dive Light



Your Green Force dive light is equipped with a rotary on/off system. Whether your Green Force light is connected to a Green Force battery pack or to a Green Force umbilical, turn the light head clockwise to switch on the light and turn the light head counter clockwise to switch off the light.

Attention:

- Regularly check condition of sealing O-rings.
- Clean and grease the sealing O-rings every time the light head is removed.

Controlling the power*



*** not available on Dynamic Power Mode and Dynamic Beam light heads**

All Green Force light heads (except for DPM and DB light heads) can be used in 100% and 50% power mode. As the Green Force dive lights have a rotary on/off system, selecting these 100% and 50% power modes is to be done using the rotary on/off system.

When switching on the Green Force dive light it will automatically start up in 100% power mode. In order to activate the 50% power mode, the dive light has to be switched off and then immediately switched on again within 5 seconds after it has initially been switched on.

If the dive light has been switched on for more than 5 seconds, it will activate the 100% power mode at the next startup.

Green Force Dynamic Power Management

Green Force DPM technology (Dynamic Power Management) automatically adjusts the level of illumination according to the amount of light that is really required. Objects at close range do not require full power illumination, while objects at a distance and emergency situations do require full power illumination. The DPM technology continuously (fully automatically) adjusts the level of illumination, hence providing up to 6 times more burn time with the same battery. A dive light equipped with the DPM technology can also be used in a fixed (non-adjustable) full, medium and low power mode. These modes are activated in an extremely simple, yet reliable way. Only one manipulation (rotary switched on) of the light head is required and no repeatedly actions/steps are to be taken.



Flexi Kit 3 in 1 DPM

Hybrid Kit 3 in 1 DPM

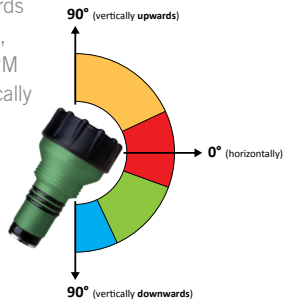


picture: Hedwig Dieraert

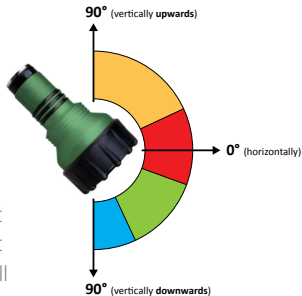


Flexi II with Heptastar DPM (umbilical/handle)

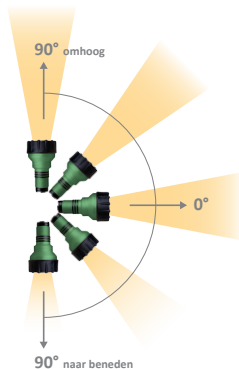
When holding the light head upwards (orange zone) while switching it on, it will start up in DPM mode. In DPM mode, the light head will automatically decrease power when the light beam is aimed downwards (green or blue zone) and will increase power when the light beam is aimed upwards (red and orange zone).



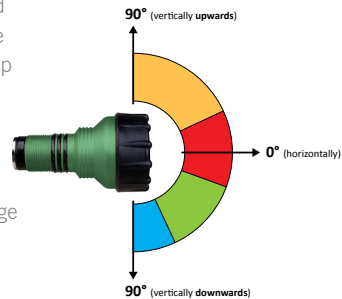
When holding the light head downwards at a 45° angle (green zone) while switching it on, it will start up in medium power mode. DPM mode will not be activated and aiming the light beam upwards or downwards will not change the power.



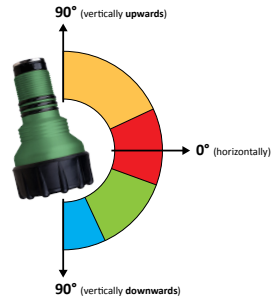
- DPM mode
- full power
- medium power
- low power



When holding the light head horizontally (red zone) while switching it on, it will start up in full power mode. DPM mode will not be activated and aiming the light beam upwards or downwards will not change the power.



When holding the light head fully downwards (blue zone) while switching it on, it will start up in low power mode. DPM mode will not be activated and aiming the light beam upwards or downwards will not change the power.



Green Force Dynamic Beam

Green Force DPM technology (Dynamic Power Management) automatically adjusts the level of illumination according to the amount of light that is really required. Objects at close range do not require full power illumination, while objects at a distance and emergency situations do require full power illumination. The DPM technology continuously (fully automatically) adjusts the level of illumination, hence providing up to 6 times more burn time with the same battery. A dive light equipped with the DPM technology can also be used in a fixed (non-adjustable) full, medium and low power mode. These modes are activated in an extremely simple, yet reliable way. Only one manipulation (rotary switched on) of the light head is required and no repeatedly actions/steps are to be taken.



Flexi Kit 3 in 1 DB

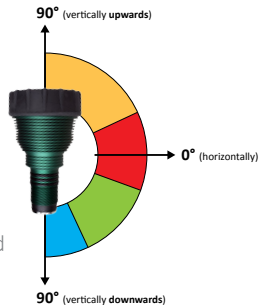


picture: Hedwig Dieraert



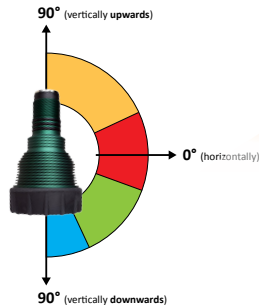
Flexi II with Heptastar DB (umbilical/handle)

When holding the light head upwards (orange zone) while switching it on, it will start up in DB mode. In DB mode, the light head will automatically switch to 100% spot light when the light head is aimed upwards or horizontally (orange and red zone) and to 100% flood + 50 % spot light when the light head is aimed downwards (green and blue zone).

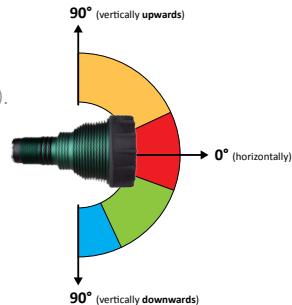


- DB mode (auto)
- Spot light
- Flood light
- Spot + flood light

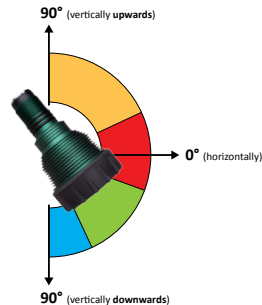
When holding the light head downwards (blue zone) while switching it on, it will start up in 100% flood mode (permanently). DB mode will not be activated and aiming the light head upwards or downwards will not change the flood light.



When holding the light head horizontally (red zone) while switching it on, it will start up in 100% spot mode (permanently). DB mode will not be activated and aiming the light head upwards or downwards will not change the spot light.



When holding the light head downwards at a 45° angle (green zone) while switching it on, it will start up in 100% flood + 100% spot mode (combined). DB mode will not be activated and aiming the light head upwards or downwards will not change the flood + spot light.



Green Force Diamond 600 Backup Light



Diamond 600-18650



Diamond 600-AA



The Green Force Diamond 600-AA is included in the Hybrid and Flexi 3 in 1 Kits.

The Green Force Diamond 600 backup lights make up a separate line within the Green Force product line. These Diamond torches are true backup lights and are available in 2 versions: powered by 1 single Lithium 18650 cell or by 3 Alkaline AA cells.

- PWM with microprocessor
- Voltage 4,2V
- 100%, 66%, 30%, strobe and SOS
- Watertight TOS connection
- One hour burn time on 100%
- Thermal protection
- Battery deep discharge protection
- Equipped with newest technology LEDs available
- **NOT COMPATIBLE with Flexi or Hybrid battery packs!**



Diamond 600-18650

Green Force Diamond 600 Backup Light

Charging the Diamond 600-18650

The Diamond 600-18650 runs on a single Lithium 18650 battery. This battery should be installed with the + pole facing the light head of the Diamond (see indication). Only use the charger supplied with the Diamond 18650 to charge this battery. Insert the battery in the charger according to the marks on the charger. While charging, the charging indicator light will turn red. When the battery is fully charged, the charging indicator light will turn green.

Charging the Diamond 600-AA

The Diamond 600-AA runs on 3 AA sized batteries (Alkaline or rechargeable NiMH). These batteries should be installed with the + pole facing the light head of the Diamond (see indication). When using rechargeable NiMH batteries, read and follow the guidelines provided by the NiMH battery supplier.

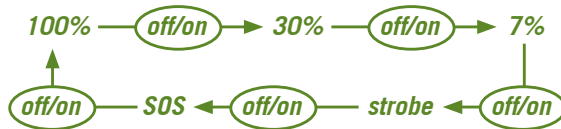


Using your Green Force Diamond 600

To switch on the Diamond 600-AA or 600-18650 dive light, screw the light head into the battery pack (clockwise). To switch off the dive light, simply unscrew the light head 1 turn.



Switching between modes (100%, 30%, 7%, strobe & SOS). To switch between different modes, turn the dive light off and immediately back on. Every time the dive light is switched off and back on, it will automatically pass on to the next mode.



Depth Rating & Warranty

Depth rating:

All Green Force products are rated to a maximum depth of 250m.

Warranty:

All Green Force products, except the articles states hereunder, are covered by 3 years manufacturer's warranty on parts and labor. Batteries and umbilical's are covered by one year manufacturer's warranty.

Warranty is only granted on products presented with a valid proof of purchase.

The warranty is limited to the original buyer and cannot be transferred. The owner commits himself to use the product according to the instructions and to maintain it properly according to the general rules. Irrespective of any damage that may be suffered, the guarantee is limited to the repair or possible replacement of the Green Force product.

Recycling:

Please consider the environment and don't throw used batteries into the regular waste. Use the regional installed battery waste program by all times. At the end of life of your torch please use the regional installed Waste Electrical and Electronic Equipment program so this product can be recycled properly.

Manufacturer:

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