

## MANUAL

### UNDERWATER LIGHTING GRALmarine LED DUO GL7 / K3

The two-piece **LED DUO GL7 / K3** torch consists of a lamp head with cable and a battery.  
Connection provided by hermetic connector (connecting and disconnecting only above water).  
Optional e/o cord connection (for connecting and disconnecting underwater).

#### This set comprises of:

- lamp head with cable
- goodman handle
- battery in waterproof housing
- battery charger

#### LED DUO GL7 / K3 LAMP HEAD:

- is a universal lamp used as the main lighting source during recreational diving, technical diving and underwater works
- construction:
  - head body is made of surface anodized aluminium
  - magnetic switch (without a pass through the housing) allows switching three, seven or ten LEDs by rotating the ring at the back of the head body, the switch works in both ways, working in positions: off – 3 LED – 7 LED – 10 LED - off
  - connection lamp head to the battery by high quality flexible cable; protected against bending with plastic covers (at the plug and head ends)
  - optional connection by e/o cord – this option is available only when using a battery with a switch (necessary to cut off the power supply before unplugging the cable); e/o cord cable polarization at the lamp head: "minus" in the output, "plus" on the pin (other connection may cause damage)
  - hermetic connector on the cable is protected against the admittance of water (eg. mechanical damage to the cable); the polarization of the plug: "minus" on the body, "plus" on the center pin (other connection may cause damage)
- lamp head, as the source of light, has seven Cree XML-2 diodes and three Cree XRE diodes, with a color temperature of 5500 - 6000 K
- requires 12 – 16,8 V power supply, use of higher or lower voltage can damage the lamp head
- tested to a depth of 150 meters, 300 meters on request

#### CONTAINER WITH BATTERY PACK:

- body built of anodized aluminium, with upper and lower lid of delrin
- in "delrin" version the entire container body is made of delrin
- has a pressure valve in the lower lid which protects against excessive pressure within the container
- on the upper lid there is one output (capacity 6.8 Ah) or two outputs (capacity 10.2 Ah, Ah 13.6, 23.8 Ah and 41 Ah) to connect with the lamp head; sealed to prevent the entry of water into the container when the plug is not properly inserted or when the output is not properly sealed with a blind plug
- in "sidemount" version (available for capacities: 10.2 Ah, 13.6 Ah, 23.8 Ah and 41 Ah), the upper lid has two outputs, one (optionally two) at an angle of 90°
- in the version with a switch there is a rotary ring for one output: turning positions: off / on
- has a belt mount on the tubular portion of the body (for capacities: 10.2 Ah, 13.6 Ah, 23.8 Ah and 41 Ah), for fastening with 50 mm wide tape, the belt mount is screwed from the inside of the container (no disassembly possible); the "delrin" and "sidemount" versions have no belt mount
- tested to a depth of 150 meters, 300 meters on request

#### BATTERY PACK:

- consists of Li-ION battery cells which feature small size and high capacity
- has a low self-discharge level (approx. 4% / month)
- has an electronic protection against: short circuit, overcharge and over-discharge (excessive discharge causes switching off of the battery)
- does not require full discharge before recharging
- can be charged at any time and at any level of discharge

## TERMS OF BATTERY USE:

- store in a dry and ventilated location within a temperature range of -20°C to +50°C, keep away from excessive heat and humidity
- temperatures above +60°C may cause internal damage to the battery pack
- after storage below 0°C it is necessary to acclimatize the battery pack at the minimum +10°C for 4 - 5 hours before use
- charging a frozen battery may cause internal damage to the battery pack
- discharging (usage) of the battery may take place within a temperature range of 0°C to +60°C
- battery can be stored after charging to a level of 50 - 70% (longer storage of the discharged battery leads to its degradation)
- when storing the battery, charge it at least once every six months
- charge the battery only with the supplied charger, with current not more than 5 A and voltage not more than 16,8 V
- avoid discharging the battery beyond the automatic power cut-off level
- polarization of the battery: "plus" inside the output, "minus" on the housing
  
- **it is strictly prohibited to:**
  - open the battery container
  - alter the battery container and the battery assembly
  - short-circuit the battery
  - throw the battery
  - place the battery into a fire or to store near an excessive heat source
  - connect the terminals with something other than original GRALmarine connectors (optional e /o cord, while maintaining the correct polarization)
  - connect other than the original GRALmarine lamp heads
  - charge the battery with a charger other than the one included in the set
  - dive or immerse in water with open outputs (blind plug or attached plug of the lamp head)
  - in versions with a switch: hitting, dismantling, disassembling the switch and storing the battery with the switch in position "on" – much faster self – discharging process

## BATTERY CHARGING:

- disconnect the lamp head cable from the battery
- plug the charger into an AC terminal of 110 - 230 V
- in a charger with LCD display it will turn blue and the text will appear; the correct charging voltage is 16,8 V
- in a charger without LCD display a red LED will appear
- insert the charger plug into the output on the battery container, if there is the LCD display it will show the percentage charge on a red background and start the charging process
- when the battery is fully charged the LCD display will switch to blue, indicating 100% charge, in a charger without a display – red LED will turn to green
- in case of strong discharge of the battery, the charger may blink (red / blue or red / green) when connected, remove the plug from the battery and re-connect, it may be necessary to repeat it twice / three times
- charge the batteries with switch by the non – switched output or by the switched, with switch in "on" position

## TERMS OF CHARGER USE:

- the charger is designed for indoor use, in sheltered conditions
- it should not be placed or used in conditions of excessive heat or humidity; charging must always be within a temperature range of 0°C to +40°C
- it is normal for the charger to become warm during use
- its fall or impact can damage sensitive electronic components
- it should not under any circumstances be opened or unscrewed – hazardous
- it should not be used with a damaged power cable
- charger is protected against short circuits and excessive charging time
- charger with a LCD display has a USB charging function - by a separate terminal on the body (eg. can be used to power a mobile phone), simply connect the cable to the USB terminal, the maximum current is 1 A, voltage 5 V

## OPERATING PRINCIPLES OF THE SET:

- **Preparation:**
  - check the battery charge level before diving
  - check for dirt or damage to the lamp head plug and the terminal(s) on the battery container
  - insert the plug into the terminal (do not screw), push and adjust for the correct placement of the o-rings
  - finger-tighten the nut
  - make sure that the second output (if present in the battery model) is protected by a blind plug and adequately secured
  - check whether the lamp head works by rotating the magnetic switch
  - always have an alternative source of light (backup)

# GRALmarine

## ➤ Maintenance after diving:

- rinse the reflector and the battery container with fresh water (before disconnecting the lamp head from the container, avoiding plug and output flooding)
- dry the set
- the head and the battery must absolutely be disconnected upon storage and transportation, to prevent accidental switching "on"
- clean regularly
- wipe the front glass of the head with a soft, moist cloth; do not use alcohol-based detergents (these cause dulling and cracking of the glass)

## ➤ IMPORTANT:

- periodically check the condition of the o-rings and threads, lubricate with silicone grease or silicone with Teflon
- never leave the head switched "on" or use above water: this can cause overheating, unsealing and damage to the reflector
- to provide a sealed hermetic connection, the reflector plug must be inserted and screwed into the battery output
- immersion of the container with batteries with an open output or unscrewed head plug may cause flooding and damage the battery
- do not open the battery container
- do not disassemble the lamp head
- care for mechanical damage: distortion of the head or battery container can cause flooding
- do not use any other source of power than the original GRALmarine batteries 14,4 V
- do not use any clamps or grips on the cable - this can damage the cable
- do not hang the lamp head on the cable - this can damage the cable or pull it out of the head
- mounting of carabiners, strings, etc. is possible only on the goodman handle or on the aluminium body of the lamp head
- do not disassemble the sledge used for fastening the goodman handle

## DEALING WITH USED AND DAMAGED EQUIPMENT:

Lighting gear used by divers can be recycled and freely returned to the dealer or manufacturer. Batteries are the main environmentally hazardous components. The other components such as aluminum and copper are a source of raw materials after recycling. For these reasons, diving equipment should not be disposed with general waste. In accordance with the law pertaining to the disposal of used electrical and electronic equipment:

Art. 73 - Any person disregarding the prohibitions of Art. 35, by not disposing [recyclable] equipment to the proper collecting entity, is subject to a fine.

Art. 74 - Any person disregarding the prohibitions of Art. 36, by disposing [recyclable] equipment with other waste, is subject to a fine.