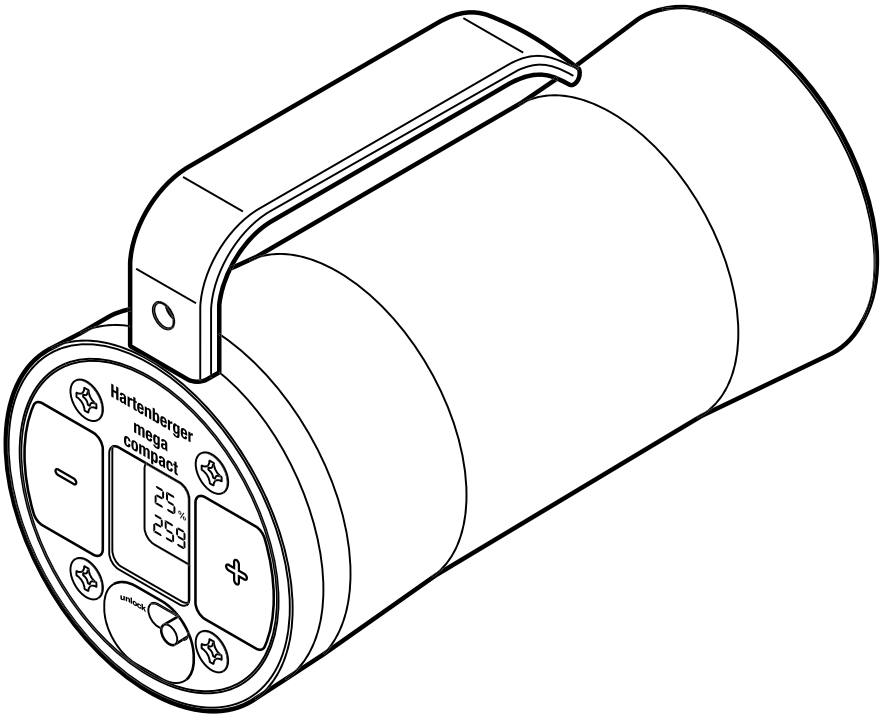
*Instructions for use*

# *Hartenberger*

## *Underwater Hand Lamp*




## *mega compact*
## *mega compact D2*

**CONTENTS**



## *WARNING SIGNS*

**If not adhered to the parts of this instruction for use, which are marked with the above warning sign, there is a danger of property damages, physical damages or death.**

**Warning !**

**If not adhered to the parts of this instruction for use, which are marked with the addition "Warning", there is a great danger of property damages, physical damages or death.**

## *SAFETY WARNING*

**Before attempting to use the underwater lamp, carefully read and adhere to these instructions for use.**

The use of the underwater lamp *mega compact* calls for the same amount of care and conscientiousness as is necessary in order to practice diving in a safe manner. If the instructions are not followed, there is a great danger of personal injury as well as injury to property (danger of explosion).

***GUARANTEE***

When these instructions for use and the care and maintenance guidelines are adhered to, we will guarantee all mechanical parts made from steel, aluminium, glass and plastic for a period of 5 years against manufacturers defects and material failure. All electronic parts are guaranteed for a period of 2 years. The rechargeable cells have a guarantee against manufacturers defects and material failure for 6 months. If the accumulators are dealt with and handled correctly (see page 11), they are covered by our 2 year guarantee. Halogen bulbs and O-ring seals are expendable items and are therefore not covered by the guarantee. Any unauthorised work on the lamp, i.e. the removal or tightening of screws, or the removal of the guarantee seals, will make the guarantee invalid.

***APPLICATIONS***

**The *mega compact* and *mega compact D2 (HID)* underwater lamps are for use in underwater lighting applications.**
**Using the lamp in an environment other than water can lead to an overheating and consequently to a danger of explosion.**
**In special cases please ask the manufacturer for release.**

***ARTICLE DESCRIPTION***

HOUSING MEGA

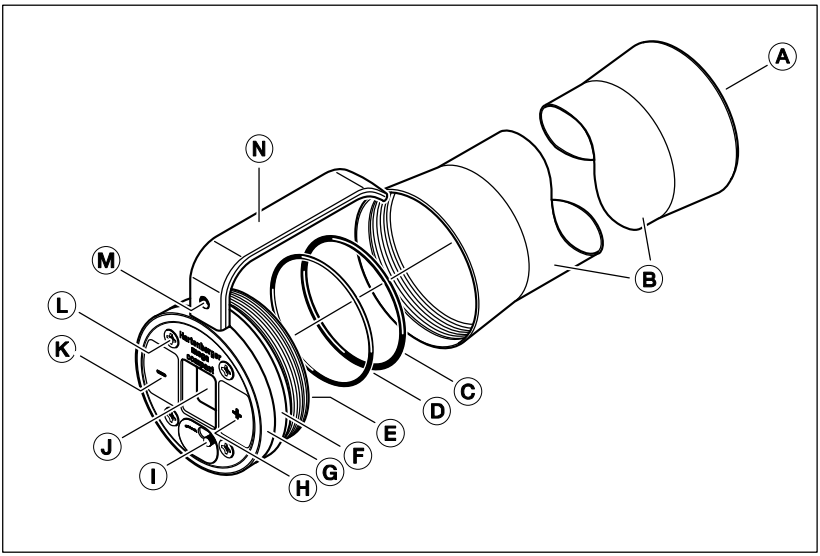



Abb. 1: housing

Ⓐ FRONT SEAL / FRONT GLASS PLATE
The front glass plate with the 0-Ring is pressed into the housing during the assembly by the manufacturer. It can only be opened by an authorised workshop.

Ⓑ HOUSING / BODY (MEGA UND MEGA D2)
The housing / body is sealed with the glass plate and the rear screw fitting.

Ⓒ Ⓓ O-RINGS
68 x 3,0 and 68x2,0 mm 50° hardness

Ⓔ PLUG-IN CONNECTION
The plug in connection serves as an electrical and mechanical connection between the power pack and the electronic control panel.

Ⓕ REAR SCREW FITTING
The rear screw fitting must be unscrewed to access the rechargeable cell pack for charging and/or to replace the halogen bulb.

Ⓖ REAR COVER
The rear cover must be removed to allow the pressure switches to be cleaned (see page 23).

Ⓗ Ⓚ BUTTON PAD (SWITCHES + AND -)
The – (left) and + (right) switches select all the electronic controls and features.

Ⓘ TRANSPORT LOCK

With the transport lock positioned to the right in the lock position, the + switch is deactivated preventing inadvertent use or activation.

Ⓙ LCD DISPLAY

The LCD display shows the current programme mode, the state of charge of the cells, the current power setting and the resulting remaining burn time. The serial number, date of manufacture and more can also be viewed in the LCD Display

Ⓛ COVER SCREW

The 4 cross head cover screws serve to secure the rear cover, the two switches and the transport lock.

Ⓜ HOLE FOR A LANYARD

The hole in the handle provides an attachment point for a lanyard for better security during use and may prevent loss of the lamp.

Ⓝ HANDLE

The handle provides a good hold on the lamp, even when wearing thick neoprene gloves or mittens. If required for video mounting, the handle can be drilled and an M8 thread cut for mounting to video rigs, (this feature is standard on the video models).

POWER PACK MEGA

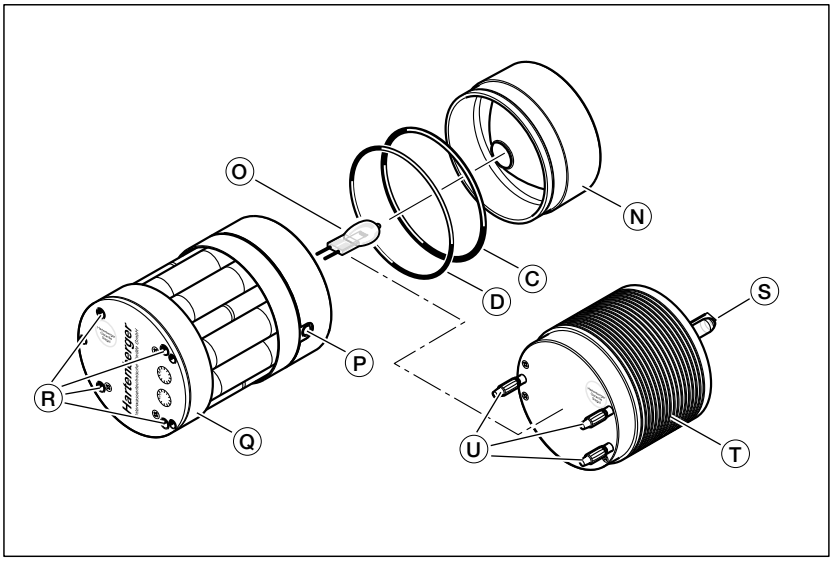



Abb. 2: power pack

Ⓝ REFLECTOR MODULE

The reflector module is located on the power pack or the gas discharge module. Flood for video / Spot for illumination.

ⓒⓓ SPARE O-RINGS
Two spare O-rings for the rear screw fitting are stowed under the reflector module.

Ⓟ CHARGING SOCKET
The plug from the charger is plugged into the charging socket for charging purposes.

Ⓠ CELL PACK
The cell pack is a plug-in unit and can be replaced within seconds with a second unit.

Ⓡ PLUG-IN CONNECTION
The plug-in connection serves as an electrical and mechanical connection between the power pack and the electronic control panel.

Ⓞ HALOGEN BULB
The halogen bulb is pushed into a standard socket (Type 6,35) and can easily be replaced.

Ⓢ D2 GAS DISCHARGE XENON BULB
Curves of light as opposed to a glowing bulb produce a particularly efficient source of light.

Ⓣ GAS DISCHARGE ELECTRONICS
Electronic module provides the necessary power conversion for gas discharge applications.

Ⓤ PLUG PINS
The three plug pins have been designed so that a short circuit or false connection of the gas discharge electronics onto the cell pack is not possible.

## *TECHNICAL SPECIFICATIONS*

APPROX. BURN TIME INCL. WARNING BLINKS IN MINUTES WITH NMH CELL PACK 14,4V / 4,5AH

| **Halogen Bulb / D2 HID** | **30W** | **50W** | **100W*** | **D2 35W**** |
|---|---|---|---|---|
| Time of use at 25% | 390 | **260** | 120 | |
| Time of use at 50% | 210 | **130** | 60 | |
| Time of use at 75% | 150 | **95** | 40 | 90 |
| Time of use at 100% | 110 | **65** | 30 | 70 |
| Time of use at 125% | 80 | **48** | 22 | |

The heavily printed figures represent the burn times with the standard bulbs as delivered.

**Warning !**

*** The nickel metal hydride cells are on the limit of their capabilities when used with a 100 watt halogen bulb. A reduced life expectancy can be expected.**

**discharge bulb 35W; the electronic module uses approx. 43Watts. The illumination is equivalent to a 100Watt halogen bulb.

The burn time of a lamp is dependant upon water temperature, state of cell charge and the type of bulb.

New NMH Cells only reach their full capacity after 2-3 charging cycles.

The water temperature greatly affects the burn time. For example, in water temperatures of between 4 and 6 °C, (40 - 45 °F) the burn time will be at best 90% of the stated capacity.
An annual drop in capacity of 5%-10% is normal wear and tear.

Halogen bulbs available in retail outlets often need up to 10% more power as stated. The stated burn times will therefore be shortened.

DIMENSIONS/WEIGHT/PRESSURE PROOF

| | Length & Diameter | weight on land | weight in water | Resistance to water Pressure |
|---|---|---|---|---|
| **mega compact** | 185mm x 89mm<br>7” x 3½” | 1,6 kg<br>3 lbs 8 oz | 0,4 kg<br>14 oz | 100m<br>330 ft |
| **mega compact D2** | 235mm x 89mm<br>10” x 3½” | 1,9 kg<br>4 lbs 10 oz | 0,4 kg<br>14 oz | 100m<br>330 ft |

FRONT GLASS PLATE

The mega compact lamps have a tempered borosilicat-glass plate as standard. This glass plate has a temperature shock resistance of 300°C (570°F). It is therefore possible to use the lamps above and under water. A rapid cooling of a heated front glass is no problem (for example if used temporarily above water in order to orientate oneself on the surface of the water).

***REAR SCREW FITTING***

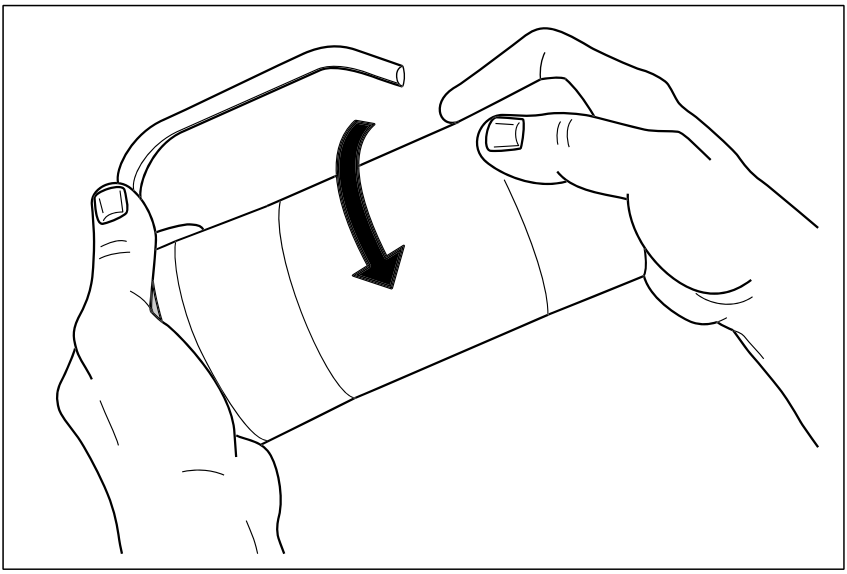


Abb. 3: Openning the screw fitting

OPENING THE SCREW FITTING

The housing is opened by unscrewing the fitting anti-clockwise, (thread length approx. 10 mm [3/8“]). Whilst opening the housing, it should be held in an upright position, thus preventing the power pack from inadvertently falling out.

CLOSING THE HOUSING

Before closing the housing, all threads, sealing surfaces and seals must be checked for integrity and cleanliness. Should the sealing surfaces and/or components be contaminated, then the O-rings and its groove should be thoroughly cleaned. Should the sealing surfaces and/or components be damaged, then all damaged parts should be replaced. If the O-ring is removed, care must be taken not to damage the groove in which the O-ring sits. A soft blunt tool should be used for the removal of the O-ring, i.e. a wooden tooth pick. Before the components are refitted it is recommended that a thin coating of silicone grease is applied as lubrication. It is recommended that after such work has been carried out, that the seal/integrity of the housing is first checked underwater without the power pack fitted. The housing is then closed by screwing the components clockwise together. The screw fitting should be tightened by hand only until the parts are mated together.

***POWER PACK***

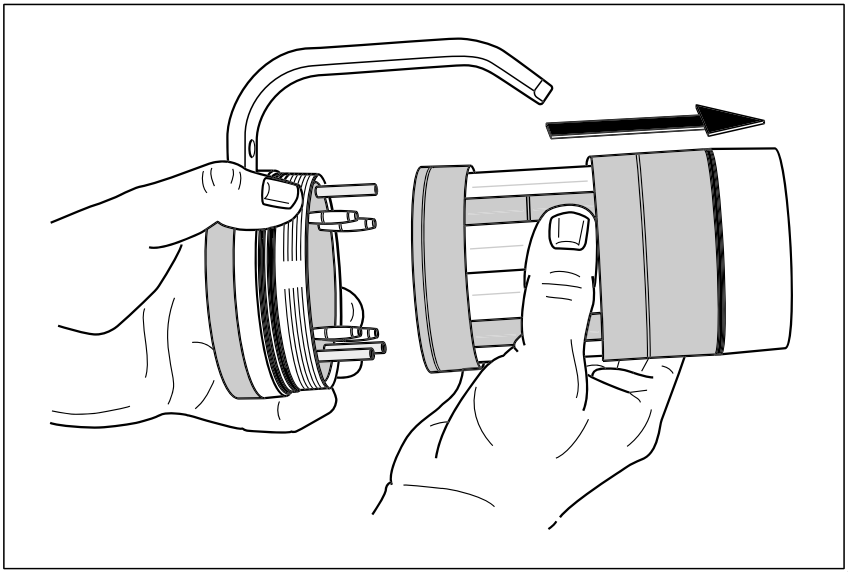


Abb. 4: Removal of the power pack

REMOVAL OF THE POWER PACK

The power pack consists of the cell pack and the reflector. After unscrewing the housing from the rear screw fitting, the power pack can then be unplugged by simply pulling it away from the rear screw fitting. The 4 pins serve as a mechanical and electrical connection for the components. Warning! When using the gas discharge technology, first remove the gas discharge module from the power pack before removing the cellpack from the electronics. The assembly is the reverse procedure.

REFITTING THE POWER PACK

Hold the rear screw fitting with the pins pointing upwards. The power pack can then be plugged onto the fitting. Make sure that the locating pin (located next to one of the connecting pins), will be correctly located in the orifice of the power pack base. This ensures that the power pack cannot be incorrectly connected.

REFLECTOR MODULE

The reflector module can simply be pulled off the front end of the power pack (or gas discharge module). Caution must be taken to ensure that the reflector unit is not removed skew.

This may result in damage to the halogen or gas discharge bulb. The 2 O-rings located on the reflector module can be used as spare O-rings for the housing (68mm x 3.0 mm and 68mm x 2.0mm).

POWER PACK

On the front end of the power pack there are 3 contact pins located for the plug on gas discharge module, the socket for the halogen bulb and two stowage housings for spare halogen bulbs. The charging socket is located behind an

opening on the outside of the power pack. On the rear side of the power pack are the 4 contact plugs for the electronic module.

SPARE HALOGEN BULB(S)

Under the reflector module in the front of the power pack there are two stowage housings for spare halogen bulbs. These are accessed by turning open the heat protector shield (II).

**Danger to be seriously burned !**

**After using the lamp, the reflektor module, the bulb and the heat protection shield remains hot for some time after the lamp has been turned off. The lamp should never be operated without the heat protector shield in the correct position.**

REMOVAL / REFITTING THE BULB

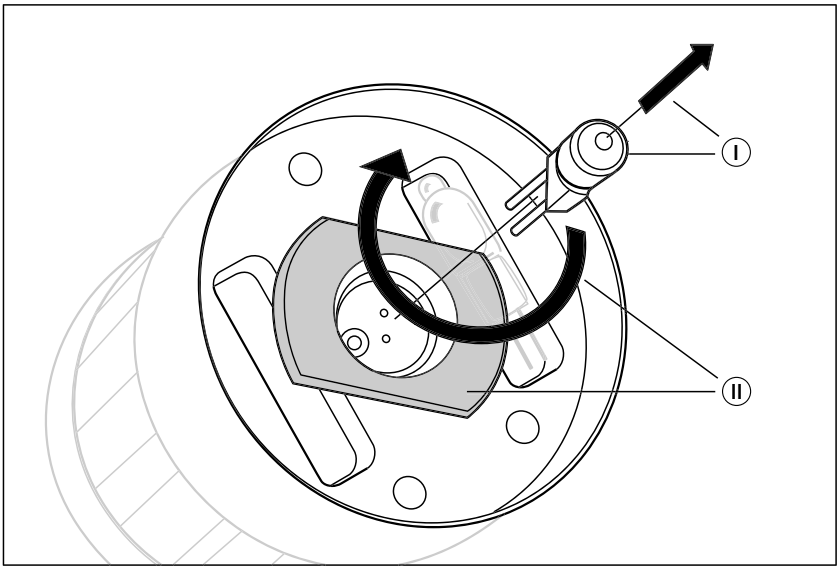



Abb. 5: Removal/Refitting the bulb

Do not touch the halogen bulb with your bare fingers. Residue on your fingers can remain on the glass during normal use may form carbon. This will reduce the efficiency of the bulb. Use a clean cloth or tissue to remove the bulb from the socket. When refitting or replacing the bulb, ensure that it is located all the way into the socket. To produce an even illumination, it is imperative to ensure that the bulb sits upright in the socket. Assemble the lamp and check for correct operation. The xenon gas discharge bulb should only be replaced by the manufacturer. Self assembly is possible but voids the warranty.

## *PREPARATION FOR USE*

BEFORE THE LAMP IS USED FOR THE FIRST TIME

Before the first use, the cells must be charged (see page 17). Hartenberger underwater lamps are manufactured to a high degree of precision and each lamp is tested to a water pressure of 10 bars. The condition of the lamp and in particular the housing and sealing rings should however be checked before the first use (see page 8).

**Warning !**

**Due to damage during transportation or hidden material defects, leakage can occur (not the fault of the manufacturer). To check if the housing is pressure tight, the first dive should be carried out without the housing insert, i.e. empty.**

BEFORE EACH USE

The rechargeable NMH cells will slowly discharge naturally when not in use, (depending on the ambient temperature up to 60 % discharge in one month!). **We recommend therefore that the cells are charged one day before each use.**

Before each use, the front threads, sealing surfaces and O-ring must be checked for integrity and cleanliness. (See Closing the housing, page 8). If the bulb has been removed for transport, it should be refitted into the socket. Refit the halogen bulb in the socket or the gas discharge module in the sockets, which may have been removed for transportation. Only release the **transport lock** to the unlocked position immediately before use. (See page 17).

## *USING THE UNDERWATER LAMP*

**Warning !**

**Water inside the housing (especially sea water) can have fatal consequences after some reaction time. Therefore, during the use of the lamp please check repeatedly, whether water has found its way inside. Do this by holding the lamp on the slant pointing down, thus the ray of light pointing away from the body. Then look at the front glass from the side. If there is water inside the housing, bring the dive to an end by following the diving rules and open the housing as soon as possible** (see page 22).

SWITCH UNIT

The switch electronics and the power pack are both controlled by microprocessors. This provides a large range of features and functions. A large emphasis has been placed on simply, user-friendly intuitive operation. The entire electronics are controlled via two switches, left minus (-) and right plus (+).

PROGRAMME MODE

To operate the lamp, individual preferences can be selected in different programmes (except for use with D2 gas discharge module).The programme set appears in the top right hand corned of the display when both switches are pressed simultaneously. (A, B, C, or T). If both switches (+/-) remain pressed, the programme will change approx. every 3 seconds to the next programme, (A, B, C, T, A, B, C, T,...). Releasing the switches will store the last displayed programme in the power pack. After replacing a power pack, the stored programme will be activated.

**Program A:** Lamp only ON/OFF

**Program B:** Lamp dimmer in 5 stages of 25% from 25% to 125%

**Program C:** Lamp dimmer infinitely variable in 5% steps from 25% to 125%

**Program T:** Lamp is only ON as long as the switches are pressed

DESCRIPTION OF THE SWITCH UNIT

**Program A:**

By pressing the plus (+) switch, the lamp is turned on to 125% power. The minus (–) switch turns the lamp off.

**Program B:**

Each time the + switch is pressed for approx. ½ second, the lamp power will increase 25%. The – switch operates in the same way to reduce the power 25%. When the lamp has reached the maximum or minimum power setting and the switch is pressed again, the lamp will blink once to show that the end of the scale has been reached. If the + switch is pressed for approx. 1 second, the lamp is turned on to its max. (125%) power setting. The – switch pressed for approx. 1 second will turn the lamp off.

**Program C:**

If the + switch is pressed continuously, the lamp will increase the power (in 5% steps) until the maximum power is reached (125%) when the lamp will blink once. Pressing the – switch continuously will reduce the power in 5% steps to the minimum power setting of 25% when the lamp will blink once.
If the – switch is pressed for only approx. ½ second, the lamp will turn off. Pressing the + switch for only approx. ½ second will turn the lamp on to its last power setting.

**Programm T:**

In programme T, the lamp stays on as long as the + switch is pressed for sending Morse signals. The power is 125%.

**Program D2 Gas discharge module**

The micro processors immediately recognise that the gas discharge module is in place. No manual adjustment is necessary. Pressing the + switch will activate the electronics to 100% power. Thanks to a special technology, the gas discharge xenon bulb, which normally cannot be dimmed, can be operated at 75% power. If the – switch is pressed for only approx. ½ second, the lamp will switch over to 75% power setting. Pressing the – switch again for only approx. ½ second will turn the light off. If the – switch is pressed long for approx. 1 second, the light will turn off from the 100% power setting. A feature of the gas discharge technology is the long warm up phase. In the first 45 seconds of operations the gas discharge bulb needs approx. 80% more power than when it has reached its working temperature. For this reason, it is recommended to use the gas discharge technology for continued operation. Constantly turning the lamp on and off will also reduce the life expectancy of the bulb.

DIGITAL DISPLAY

The percentage power setting of the halogen bulb is shown in the top line of the display. The resulting remaining burn time at this setting is shown in minutes in the lower line of the display. The remaining burn time can vary up to 1 or 2 minutes due to technological reasons. Despite the prognosed remaining burn time being calculated with a high degree of technological data, the time shown may vary within a few minutes. When using the gas discharge module, the

warm up phase produces high variances in the remaining burn time due to the high power drain. The remaining burn time is extended as the power drain reduces. For this reason, the remaining burn time display blinks during the warm up phase then using the gas discharge module. When the lamp is turned off, there is only a display in the bottom line which shows the charge state of the cells in %. The background display lighting is deactivated 15 minutes after the lamp is turned off. The display can be activated by pressing either the + or the – switch.

LOW LEVEL CAPACITY WARNING

When the lamp blinks 3 times, the user is warned of the immanent end of the burn time of the lamp. When the lamp is being used with the standard 50 watt halogen bulb at 125% power, this will be approximately 3 minutes after the 3 blinks. If applicable, you should abort the dive as fast as possible and turn the lamp off (reduce the power setting).

**Further use of the lamp will cause increase the wear and tear on the cells.**

DISCHARGE WARNING

**Warning !**

**At the latest, the lamp should be turned off and no longer operated when it starts to blink continuously. Further use of the lamp will damage the cells and should only be practised in an emergency.**

The duration of blinking with the standard halogen bulb set at 100% power is approx. 1-2 minutes. If the lamp is switched over to 25% power, then approx. 3 minutes of continuous light is available. After this, the light will go into a blinking mode once again.

DISCHARGE PROTECTION

**Warning !**

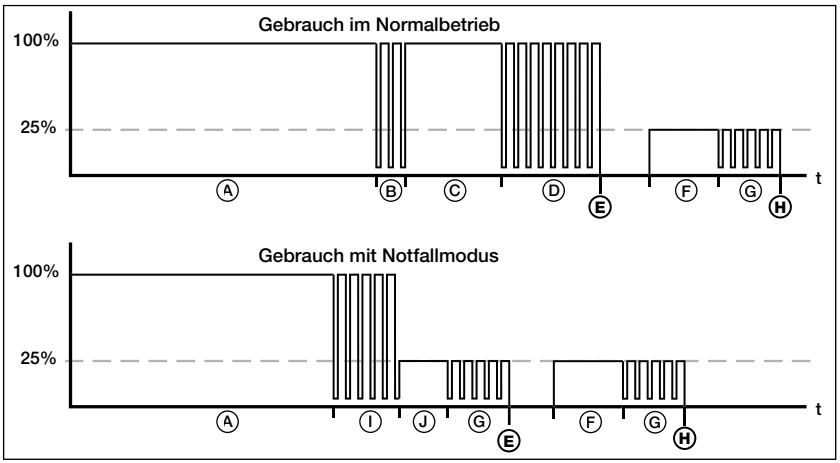
**The discharge protection will turn shut down the lamp after the continuous blinking. In the case of an emergency where light is necessary, the lamp (if possible after a short pause) can be reactivated and will automatically turn on at 25% power setting. The cells are almost certainly damaged should this mode of operation be selected.**

EMERGENCY MODE

Under certain unforeseeable circumstances such as extended periods of storage, high levels of self discharge or ageing of the cells, there can be a discrepancy between the remaining burn time in the display and the actual remaining burn time. In this case, the electronics will immediately recognise the imminent end of the burn time and that the display is showing an incorrect value. When the lamp is being used with a standard halogen bulb, the user will be warned by the lamp blinking 6 times and subsequently automatically switching over to 25% power. The remaining burn time is approx. 2 minutes. The display blinks continuously until the lamp is turned off. In gas discharge operation, the lamp blinks 6 times and the power is reduced to 75%. The remaining burn time is approx. 1 minute, after which the lamp will turn off automatically.

**After the lamp has operated in emergency mode, a reference cycle is recommended (see page 15). During this cycle the lamp can calculate the actual cell capacity and calibrate the remaining burn times.**

WARNINGS




Ⓐ Use with normal brightness setting

Ⓑ Low charge warning, 3 flashes

Ⓒ Remaining burn time approx. 3 minutes

Ⓓ Low discharge protection warning with continuous flashing

Ⓔ Lamp shuts down in discharge protection mode

Ⓕ Lamp may be turned back on to 25% brightness setting

Ⓖ Continuous flashing

Ⓗ Lamp shuts down

Ⓘ Emergency mode signalled with 6 flashes

Ⓙ Remaining burn time approx. 1 minute

RECALL MODE

The micro processors in the switch electronic and the power pack correspond and exchange data with each other to allow a variety of functions and data storage. Some of this data can be recalled via the switches and shown in the display. The recall is then made by depressing the – switch and keeping it pressed. After approx. 4 seconds, the display will appear with all numbers as O.

(ready for commands) While the left – switch is kept depressed, short actuation of the right + switch will call up the following data each one after the other:

| **Command** | | **1st line** | **2nd line** | |
|---|---|---|---|---|
| **1** | Digit serial number | 1xx | xxx | Num |
| **2** | Date of manufacture | 2 | MM.J | |
| **3** | Manual set up of cell status to 100% | 3 | 100 | % |
| **4** | Reference cycle for cell capacity | 4 | rEF | |
| **5** | Actual temperature | 5 | xx | °C |

| | | | | |
|---|---|---|---|---|
| **6** | Max. Temperature value | 6 | xx | °C |
| **7** | No of charge cycles (every connection) | 7 | xxx | Num |
| **8** | No of full charges above 90% | 8 | xxx | Num |
| **9** | No of discharges to continuous blinking (0%) | 9 | xxx | Num |
| **10** | No of discharges up to shut down | 10 | xxx | Num |
| **11** | No of reactivations after shut down | 11 | xxx | Num |
| **12** | Total duration of use | 12 | xxx | Std. |
| **13** | Maximum charging current | 13 | xx.x | A |

EXTENSION OF THE WARRANTY

The current EEC regulations call for a 6 month warranty of rechargeable cells. If the cells in your lamp are handled with care the average life expectancy is 4 - 6 years or 300 – 500 charge/discharge cycles. Incorrect handling of the cells will shorten this life expectancy drastically. The data stored in the electronics serves as a reference and can be analysed in the interest of the consumer to extend the warranty. Should the power pack fail within 2 years after purchase, and the data in the memory shows correct handling of the cells, a warranty repair or a fair offer will be made.

DISPLAY CORRECTION

If the display does not show 100% charge status after a correct charging cycle (charger has turned itself off and the cells are warm), then a re-calibration of the state of charge display is recommended to establish a 100% state of charge in the display. In the previous section of data recall, the 3rd recall function is the 100% manual reset in the display. When the left – switch is released during this function in the display, the charge status will automatically be set to 100%.

REFERENCE CYCLE

After numerous charge/discharge cycles or extended periods of storage, it is possible that the remaining burn time in the display does not correspond to the actual remaining burn time. At the latest when the lamp goes into emergency mode (as previously described), a reference cycle should be carried out. The lamp must be fully charged and fitted with a 50 Watt halogen bulb. Remove the unit from the housing. The recall mode is then selected by pressing the left – switch and then pressing the right + switch until „rEF“ appears in the display (recall function no 4). Release the left – switch. In this moment, the lamp will turn on to 125%. Stand the lamp on its rear end until it turns itself off (after approx. 50 minutes). Do not touch any other switches.

**Warning !**

**During this cycle when the lamp is standing on its end, a great deal of heat will be dissipated from the bulb.**

Caution is to be exercised. After the lamp has turned itself off, the correction factor will appear in the display which is then used for future remaining burning time calculation so that future values in the display will be as accurate as possible.

SOS-EMERGENCY SIGNAL (NOT POSSIBLE WHEN USING THE D2 GAS DISCHARGE BULB)

The electronic provides the facility to send an emergency signal SOS according to the Morse alphabet (3 x short, 3 x long, 3 x short). This is activated by pressing the + switch so long that the maximum power is selected, then

keeping the + switch pressed for a further 4 seconds. After the SOS feature is selected, lamps in the B or C mode can adjust the power of the signal using the +/ - switches. The remaining duration of the emergency signal is shown in the display and is approx. 2-3 times longer than the continuous use remaining burn time of the halogen lamp being used. When the power pack is almost completely discharged, the brightness will be reduced. To deactivate the SOS signal, press the – switch for approx. 3 seconds. To initiate a pause in the SOS signal, both switches +/ - are pressed together. A short press of the + switch will reactivate the SOS mode to the previous setting.

**This feature should only be used in an emergency. Should you require the SOS distress signal in an emergency, we recommend that the signal is turned off when the intensity of the flashing reduces, and to turn the SOS signal back on should help be sighted.**

OVER-VOLTAGE / DIMMER

The HLX bulbs which we use have a much greater efficiency than standard halogen bulbs. Using a 12 cell power pack, we have a power supply of 14,4 volts. This allows the 12v bulb to be operated continually with an over-voltage of approx. 12,8 volts. The electronics switch the bulb on slowly thus preventing the coil in the bulb from burning out. The resulting increase in brightness is approx. 30% more than the stated power. The micro controller can accurately monitor the energy disserpation to the bulb and ensures a continuous colour temperature over the entire discharge process and operation. The life expectancy of the bulb of approx. 100 hours is reduced because of the over-voltage to approx. 70 hours. Using the lamp at reduced power settings saves energy and extends the burning time in a single charge cycle. Permanently operating the lamp at reduced power settings will however produce a grey coating on the bulb's glass. If reduced brightness is required on an extended basis, then a lower power halogen bulb is recommended.

GAS DISCHARGE MODULE D2

In addition to the standard halogen bulb, the mega compact can also be used with a gas discharge xenon bulb. After removing the reflector and the halogen bulb, the gas discharge module (including electronic control and xenon bulb) can be plugged into the front of the power pack. The 3 contact pins prevent cross poling. The reflector is then fitted to the gas discharge module. For use with the gas discharge module, a 5,5 cm (2") housing extension is required. The brightness of the 35 watt gas discharge xenon bulb is approx. equivalent to a 100 watt halogen bulb. The power drain of the gas discharge xenon bulb including the ignition and transformer is less than that of a 50 watt halogen bulb. The 4500° Kelvin colour temperature of the gas discharge xenon bulb is however much bluer than the warm 3600° Kelvin temperature of the halogen bulb. The ideal applications for gas discharge technology include industrial applications, cave diving, etc. A "holiday diver" will almost certainly miss the red spectrum of the gas discharge light. The gas discharge bulb allows operation with 100% and 75% of the available power. Further dimming is not technically possible. After turning the xenon bulb on, it takes about 45 seconds to reach its full brightness. During this so called ignition and warm up phase, the power drain is much higher than when the bulb has reached its working temperature. Although the electronics allow the lamp to be switched off and then immediately afterwards switched back on, it is recommended to leave the lamp on for the entire duration of the dive. The life expectancy is approx. 2000 hours although

this will be drastically reduced when the lamp is frequently switched on and off. The SOS emergency signal mode is not possible with the xenon gas discharge module.

***AFTER EACH USE***

After use, the lamp must be thoroughly rinsed in clean fresh water. During the rinsing, the switches must be frequently operated to ensure contamination (salt water and/or sediment) is rinsed out of the mechanism.
The cells should be charged as soon as possible after use.

**Warning!**

**Check the lamp immediately after the dive for evidence of a possible flooding of the housing. Should the housing have flooded then refer to the problem diagnosis on page 22.**

***TRANSPORT***

TRANSPORT LOCK

**During transport, the + switch must be secured against inadvertent operation. For this purpose, the transport lock is moved to the right into the "lock" position. The + switch should now not be able to be pressed. (Please check!).**

**Warning!**

**During extended unattended periods of transportation, we recommend removing the halogen bulb from the socket.**
**The gas discharge module can be re-plugged onto the cell pack after approx. 160° rotation, thus preventing it from being activated. Caution: In this configuration, one of the plugs is located in one of the halogen bulb stowage housings, danger of breaking glass.**

***STORAGE***

The lamp should be stored in a fully charged condition with the housing closed securely. An ideal storage temperature is between 15 and 25°C, (60 and 75°F). Under no circumstances should the lamp be subjected to temperatures above 45°C (110°F). The rechargeable cells will slowly discharge when not in use, (depending on the ambient temperature up to 60% discharge in one month!). **We recommend therefore that the cells be charged approximately once a month when the lamp is not in use. Do not keep connected the charger permanently with the cells in the trickle charge mode.** For extended periods of storage, the power pack should be removed from the housing and stored separately in a suitable cool dry place, (see preparation for charging page 18).

**Regularly check the cells for signs of corrosion or gas leakage, (the protective skin showing signs of bubbling, floury or white residue between the cells or in the housing, corrosion around the charging socket). Should you discover signs of leakage or corrosion, return the lamp immediately to the manufacturer.**

***CHARGING***

INTRODUCTION IN THE CHARGING OF NICKEL METAL HYDRIDE CELLS

Nickel Metal Hydride (NMH) cells are generally described as being gas tight cells. The position of the cells during the charging process is therefore irrelevant as no electrolyte can escape. There is however no supplier of cells that will guarantee this feature for the entire life of the cells! During the charging or discharging process, the NMH cells may produce and over pressure inside, opening the integrated over pressure relief valve. Should this occur, the

electrolyte, or Hydrogen can escape from the cells. Because the electrolyte is a very aggressive acid, and additionally conducts electricity, this may lead to the galvanic corrosion of the cells, and a destruction as a result of the contact with the acid. The escaping hydrogen can combine with oxygen in the air and form a highly explosive gas. A single cell the size of a standard D cell battery can produce up to 25 litres, (1 cu ft) of gas! It is for this reason that nickel metal hydride cells should always be removed form a housing before they are recharged. Only then is the safe use and longest possible life of the cells guaranteed.

MEMORY EFFECT

The so called Memory Effect is the common term for the reduction in the capacity of the cells as a result of charging the cells in a partially discharged condition. (e.g. a wireless telephone hand set has a battery life of 24 hours, but is replaced on the station and therefore charged after 3 hours). The common technique for overcoming this is to fully discharge the cells before charging. We regard this as being more harmful for underwater lamps with 10 cells. The constant discharge down to the cut-off voltage limit can overload individual cells and disrupt the balance within the matched cell pack. This may result in an individual cell “dropping out“. We recommend that for every 10 to 20 cycles where the cells are partially discharged, that the lamp is fully discharged until the Low Level Capacity Warning (when the lamp blinks 3 times). The more often the cells are taken to their maximum capacity, the higher the strain on the individual cells. NMH cells are considerably less sensitive to this memory effect than Nickel Cadmium cells.

PREPARATION FOR CHARGING

**For the charging procedure you will need a clean, dry working area with a mains socket nearby. Charge the cells in an environment which is as dry and clean as possible, with a resistant work surface. (Sealed cells can also leak under poor conditions).**

The ambient temperature should not exceed 45°C (110°F). The power pack must be removed for charging. (See page 9). If the area to be used for charging is contaminated with dust or dirt, then we recommend that the cell pack should be removed from the rear screw fitting, and that the housing is subsequently closed protecting the O-rings and the sealing surfaces which would otherwise be exposed to possibly contamination. Stand the power pack in an upright position with the reflector down. This will avoid the collection of dirt and/or dust on the reflector and halogen bulb. The charging socket is located on the side of the power pack unit.

When using the gas discharge technology, first remove the gas discharge module from the power pack before removing the cell pack from the electronics. The assembly is the reverse procedure.

THE USE OF GENERIC CHARGERS

**Warning !**

**Chargers other than those supplied by Hartenberger for use with this lamp must be checked by a qualified electrician for compatibility before attempting to use them. The guarantee will be lost due to improper use. Improper use may lead to the leakage of electrolyte and/or hydrogen gas. The guarantee will be lost due to improper use.**

### *CHARGER OFF-SHORE I/12*

This charger utilises the latest in electronic charger technology with a wide range input voltage (100v - 250v) with frequencies of between 45 - 65 Hz. (There is no need to manually select the input voltage). All Hartenberger power packs with 10 and 12 cells (Nickel Cadmium or Nickel Metal Hydride) will be automatically recognised by the charger, and charged as fast as possible. The charging current can reach 1,0 amps.
Charging time approx. 5 hrs.

The charger cable should first be plugged into the charging socket. The charger is activated by plugging it into the mains supply. (There are adapters for the most common types of mains plugs which can be easily slotted onto the charger). All the functions of the charger are monitored via a LED.

Signal from the LED:

| | |
|---|---|
| Red | Input voltage is present, the charger isfunctioning properly. |
| Blinks Red | The cells are fully charged and maintained with a trickle charge. |
| Blinks Red fast | The cells are fully discharged (starting regeneration). |
| Out | No mains voltage present. |

Do not use overdue force when fitting the plug into the socket. Avoid any chance of short circuiting the contacts of the plug or the power pack. The charger has an integrated mechanism protecting it against overheating and large fluctuations in mains voltage. Should the protection cut in, the charging process will be interrupted. After the mains plug has been removed from the mains socket for a few minutes, the charger will then be ready for use again. Care must be taken to achieve adequate cooling in extreme environments.

**Warning!**

**Do not operate the lamp immediately after the charging cycle is completed.**
**Do not point the lamp at yourself or in the direction of other persons.**

### *CHARGER OFF-SHORE II*

This charger utilises the latest in electronic charger technology with a wide range input voltage (110v - 250v) with frequencies of between 45 - 65 Hz. (There is no need to manually select the input voltage). All Hartenberger power packs with between 5 and 12 cells will be automatically recognised by the charger, and charged as fast as possible.
The charging current can reach 1,8 amps.
Charging time approx. 5 hrs

The charger is activated by plugging it into the mains supply.
The function of the charger is monitored via 2 light emitting diodes (LEDs) with varying colours and flashes.

**LED I :**

| | |
|---|---|
| Green | Input voltage is present, the charger is functioning properly. |
| Red | Input voltage is present, the charger is overloaded or defective. |
| Out | No input voltage present. |

The charger cable should now be plugged into the charging socket in the power pack. Do not use overdue force when fitting the plug into the socket. Avoid any chance of short circuiting the contacts of the plug or the power pack.

**LED II :**

| | |
|---|---|
| Red | No Cells are connected (interruption). |
| Green | blinking Rapid charge up to approx. 95% of capacity. |
| Green | Trickle charge with a reduced current. |
| Out | Maintenance charge, Cells are fully charged. |

All the functions of the charger are monitored by a controller in the charger. This monitoring has a time lag when the function of the charger changes, and may lead to a slight delay in the LED's reacting, (1-5 seconds). The charger has an integrated mechanism protecting it against overheating and large fluctuations in mains voltage (LED I turns red). Should the protection cut in, the charging process will be interrupted. After the mains plug has been removed from the mains socket for a few minutes, the charger will then be ready for use again. Care must be taken to achieve adequate cooling in extreme environments.

**Warning!**

**Do not operate the lamp immediately after the charging cycle is completed.**
**Do not point the lamp at yourself or in the direction of other persons.**

## *CARE AND MAINTENANCE*

HOUSING

We recommend that from time to time the housing surface is impregnated with silicone. The chance of calcium depositing on the surface of the lamp is reduced and the scratch resistance properties of the housing surface are also improved. (Action to be taken, Interval, By Owner, Workshop)

| **Action to be taken** | **Interval** | **By Owner** | **Workshop** |
|---|---|---|---|
| Impregnate Housing surface After repeated use | After several dives | X | |
| Visual inspection of the rear screw fitting O-Rings, clean and lubricate as necessary | After the housing is opened | X | |
| Thoroughly rinse and clean pressure switches with fresh water | After each dive | X | |
| Replace rear screw fitting O-Rings | annually or after 100 dives, which ever comes first | X | |
| Replace Front Glass O-Ring | 4-5 years | | X |
| Replace Halogen Bulb | Life expectancy approx. 100 hours | X | |
| Replace HID Bulb | Life expectancy approx. 2000 hours. | | X |
| Replace NMH Cell Pack | Life expectancy up to approx. 500 charging cycles | X | |

RECORD OF DATES WHEN MAINTENANCE WORK WAS CARRIED OUT

| Rear screw fitting O-Rings replaced | Front Glass O-Ring replaced | LCD Display O-Ring replaced | Halogen Bulb replaced |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Notes/Comments: | | | |
| | | | |
| | | | |
| | | | |

***FAULT DIAGNOSIS***

| Problem | Cause | Action to be taken |
|---|---|---|
| Water enters the housing:<br>1. A few drops are present.<br>2. Housing is flooded with fresh water.<br>3. Housing is flooded with Saltwater. | Defective or contaminated O-Ring. | *** Abort the dive as soon as is safely possibly. Open the lamp.**<br>1. Dry the lamp and power pack with a clean cloth.<br>2. Dry the power pack and return it to the manufacturer<br>3. Rinse the lamp and power pack with ample fresh water and return the lamp to the manufacturer. |
| Switches sticking | Sand or salt residue in the mechanism | Clean the switches (see below) |
| Lamp does not illuminate. | 1. Cells are discharged<br>2. Bulb is defective | 1. Charge cells<br>2. Replace halogen bulb |
| Gas discharge (HID) lamp does not switch on | 1. Cells are discharged<br>2. Bulb is defective | 1. Charge cells<br>2. Test the lamp with halogen bulb. If lamp works, D2 gas discharge lamp or ignition is defective, return to manufacturer. |
| Housing screw covers are hard to unscrew | 1. Housing cover threads/O-rings are contaminated<br>2. Threads damaged | 1. Clean and lubricate housing covers and/or O-rings<br>2. Return lamp to manufacturer |
| LED does not illuminate. | 1. No Mains.<br>2. Charging cable not plugged in.<br>3. Bad contact on charging plug. | 1. Check mains supply<br>2. Plug in charging cable.<br>3. Check charging plug security |

*** Attention! Danger of explosion!**

**If water got into the housing, it is possible that in the cause of oxidation the interior pressure is increased to a dangerous extent. If the rear screw fitting cannot be opened, unscrew the rear cover of the +/- switches. Puncture the O-ring of the LCD display with a needle or a small screwdriver and allow excess pressure to escape.**
**Never look directly into the LCD display / front glass! If the increase in pressure is too high, they can come flying out explosively.**

CLEANING THE SWITCHES

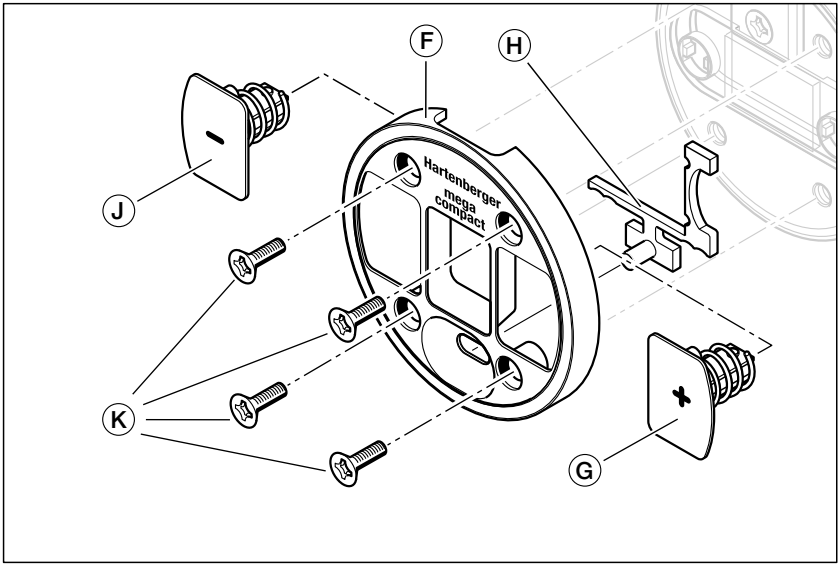



Abb. 6: switches

CLEANING THE SWITCHES

If the switches start to stick, they must be cleaned by rinsing the lamp under fresh clean water for an extended period. Operate the switches under running water to restore the correct function. If this is not successful, the switches must be removed by removing the entire rear cover. This work can be carried out by a technially trained lay person. Unscrew the 4 cross head screws and carefully remove the rear cover. The 2 switches and the transport lock can now be removed together with their springs which are located underneath. Sand granulkes and salt crystals can be removed by rinsing the switches. Assemble in the reverse order. Grease the screws with silicone grease and refit them tightening them good hand tight.

***SPARE PARTS***

| O-Ring | Dimensions | Elasticity | Material |
|---|---|---|---|
| Glass | 68 x 3,0 | 50° shore Härte | Viton blue |
| Window LCD | 56 x 3,0 | 50° shore Härte | Viton blue |
| Screw Fitting | 68 x 3,0 | 50° shore Härte | Viton blue |
| Screw Fitting | 68 x 2,0 | 50° shore Härte | Viton blue |
| Reflector unit | 68 x 3,0 | 50° shore Härte | Viton blue |
| Reflector unit | 68 x 2,0 | 50° shore Härte | Viton blue |
| Heat protection shield | 20 x 2,0 | 50° shore Härte | Viton red |

| Bulb | Power Output | Socket | Lifetime (hours) |
|---|---|---|---|
| Halogen Bulb HLX | 30W | G 6,35 | ca. 100 |
| Halogen Bulb HLX | 50W | G 6,35 | ca. 100 |
| Halogen Bulb HLX | 100W | G 6,35 | ca. 100 |
| D2 Xenon Gas (HID) | 35W | special D2 | ca. 2000 |

***ACCESSORIES***

NEOPRENE SLEEVES
Neoprene sleeves for the housing offer protection and a reduction in weight in the water and are available in the colours yellow and black.

CARABINER CLIPS
For securing the lamp to a suitable point on the diving equipment.

SPARE CELL PACKS
For rapid turn-around between dives, a spare 14,4v / 4,5Ah cell pack.

FLOOD REFLECTOR MODULE
For film or video use for an even illumination over the entire beam.

SPOT REFLECTOR MODULE (STANDARD)
Reflector unit with a narrow beam for penetrating illumination

ELECTRONIC MODULE MEGA D2 WITH MEGA D2 HOUSING
To modify a standard mega (Halogen bulb) to gas discharge D2 technology.

HOUSING MEGA (HALOGEN)
To modify the Mega D2 (gas discharge) to halogen technology.

HOUSING MEGA VIDEO AND MEGA D2 VIDEO
Housing mega and mega D2 with neutral buoyancy

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