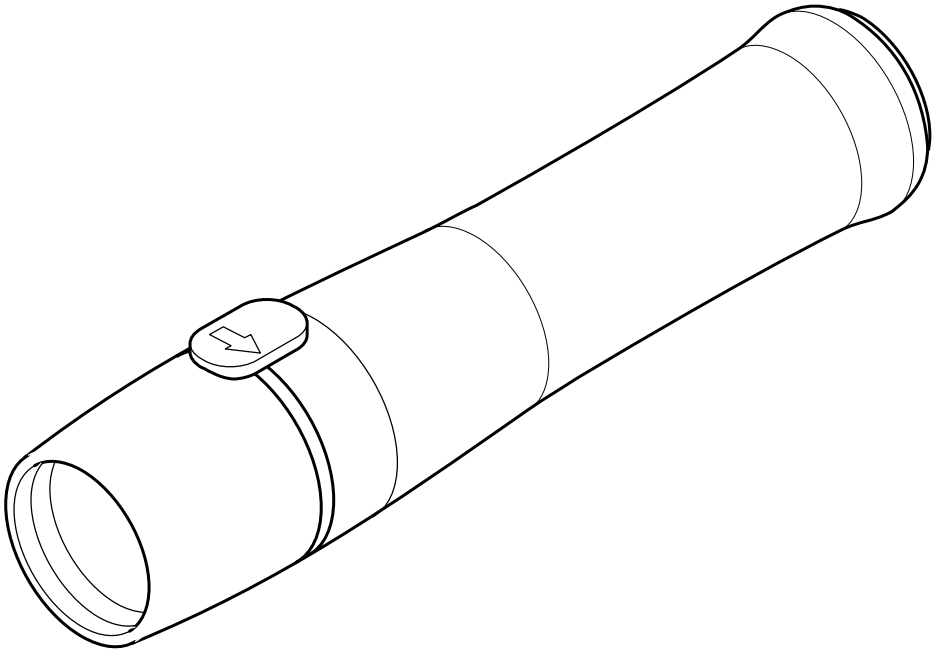
Instructions for use

Hartenberger

Underwater Power Tube Lamps



mini electronic
medi electronic

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

Warning !

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

The use of the underwater lamp **mini and medi electronic** 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 year. The rechargeable cells have a guarantee against manufacturers defects and material failure for 6 months. 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 mini electronic and medi electronic underwater tube 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

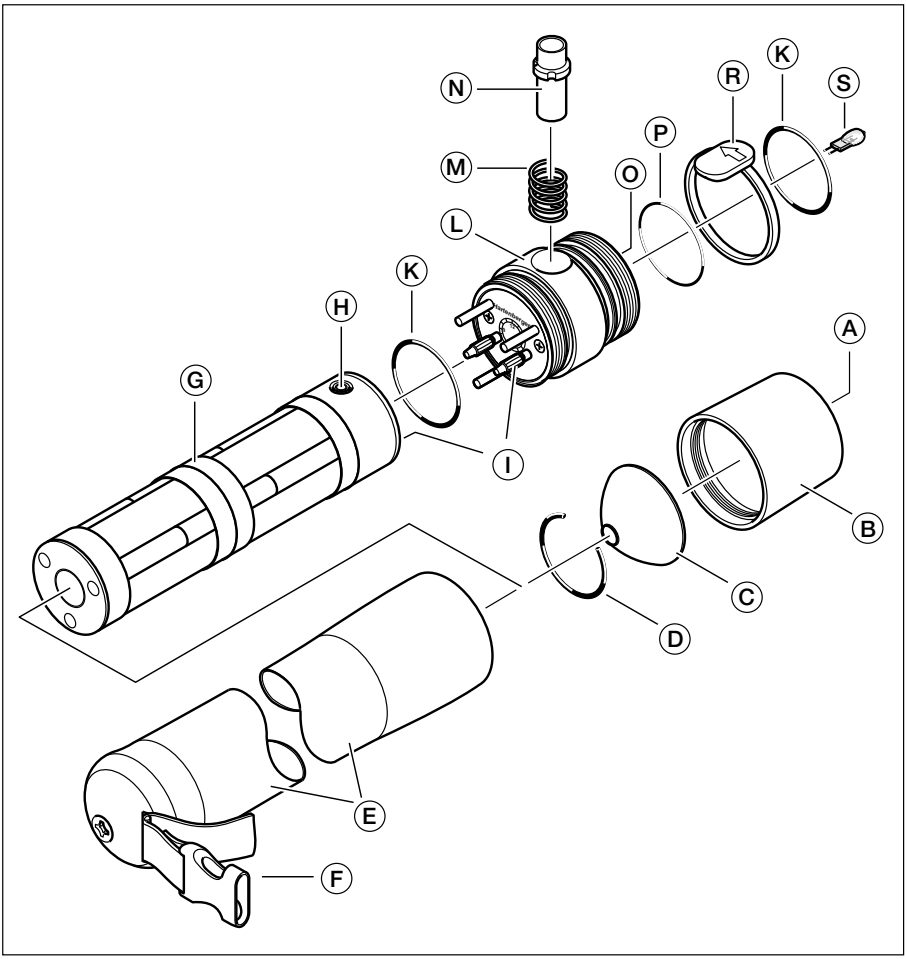


Abb. 1: housing/cell pack

Ⓐ FRONT SEAL / FRONTGLASS PLATE

Ⓑ FRONT HOUSING
The front housing accommodates the glass plate. This glass plate with the O-Ring is pressed into the housing during the assembly by the manufacturer. The O-Ring can only be replaced by an authorised workshop.

Ⓒ REFLECTOR
The reflector is fixed into the housing with a removable O-Ring.

Ⓓ O-RING
O-Ring 37 x 3 50° hardness

Ⓔ REAR HOUSING

The rear housing encloses the rear components of the lamp, forms a hand grip and can have a lanyard secured to the fitting. During charging, the rear housing must be removed.

Ⓕ HAND STRAP

The hand strap can be used to secure the lamp to the wrist. The quick release buckle can be attached to further accessories for attaching the lamp to the diver's equipment.

Ⓖ CELL PACK

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

Ⓗ CHARGING SOCKET

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

Ⓘ PLUG-IN CONNECTION

The Plug in connection serves as an electrical and mechanical connection between the power pack and the electronic controls.

Ⓚ O-RING

37 x 3 50° hardness

Ⓛ SWITCH MODULE

The switch module is the base element of the tube lamps. It contains the electronics, the magnetic switch and the halogen bulb fitting. The seals are produced with the front and rear O-Rings.

Ⓜ SPRING MAGNETIC SWITCH

Ⓝ MAGNETIC SWITCH

The magnetic switch controls all the electronic functions of the control unit. The tube lamp mini and medi electronic have a four step electronic dimmer. The switch can also activate the distress signal function according to the Morse alphabet; SOS (3 x dot, 3 x dash, 3 x dot).

Ⓞ PLUG IN CONNECTION

Connector G4 for the halogen bulb.

Ⓟ O-RING

37 x 1,6 50° hardness.

Ⓡ MECHANICAL TRANSPORT LOCK

If the mechanical transport lock positioned on the top from the magnetic switch, the electronic is deactivated.

Ⓢ HALOGEN BULB

The plug in connection serves as an electrical and mechanical connection between the power pack and the electronic control panel.

TECHNICAL SPECIFICATIONS

APPROX. BURN TIME INCL. WARNING BLINKS IN MINUTES

Type	**mini electronic** (2.1Ah)		**medi electronic** (4.0Ah)	
Halogenbulb 6V	**10W**	**20W**	**10W**	**20W**
Time of use at 50% setting	160	**80**	280	**140**
Time of use at 75% setting	120	**60**	200	**100**
Time of use at 100% setting	80	**40**	130	**65**
Time of use at 125% setting	60	**30**	100	**50**

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

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

The burn time of a lamp is dependant on the state of charge of the NMH cells, the ambient water temperature and the type of bulb. The water temperature greatly affects the burn time.

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

The ambient water temperature is a large factor in the capacity of NMH cells. For example, in water temperatures of between 4 and6 °C, (40 - 45 °F) the burn time will be at best 80% of the stated capacity.

An annual drop in capacity of 5%-10% is normal wear and tear.

DIMENSIONS/WEIGHT/PRESSURE PROOF

Type	Length & Diameter	approx. weight on Land	approx. weight in water	Resistance to water Pressure
mini	193mm x 43/48mm (7½“ x 1½“/1¾“)	0.6 kg (1lb 5oz)	0.3 kg (10½oz)	200 meters (650 feet)
medi	245mm x 43/48 mm (9½“ x 1½“/1¾“)	0.8 kg (1lb 12oz)	0.4 kg (14oz)	200 meters (650 feet)

FRONT GLASS PLATE

The mini and medi electronic tube lamps have a tempered glass plate as standard. This glass plate has a temperature shock resistance of 150°C (300°f). 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).

SWITCH MODULE

The switch module forms the base of the mini and medi electronic tube lamps. The front and rear seals result from blue coloured Viton O-Rings with dimensions 37mm x 3 mm and a shore hardness of 50°. The switch is housed in a hole in the switch module and controls the micro processor electronics. The switch works by changing the magnetic field, and therefore there is no penetration of the housing. This makes the switch module free of mechanical wear. In order to have a long problem free life expectancy of the switch, we recommend that after each use, the switch is quickly pressed in and released whilst the module is held in clean fresh water. This will ensure that the switch and the hole it is housing in are free from contamination and foreign particles.

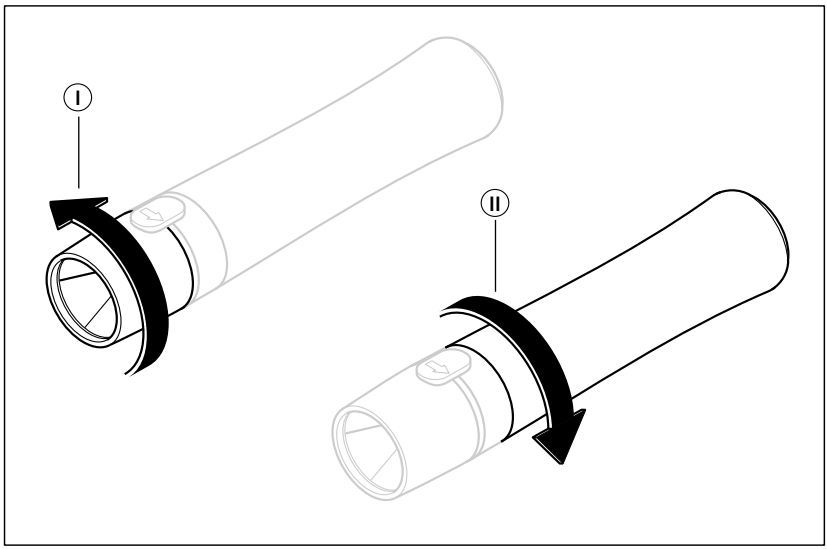


Abb. 2: OPENING THE FRONT AND REAR HOUSING

FRONT HOUSING

OPENING THE FRONT HOUSING

The rear housing is opened by unscrewing it from the switch module anti-clockwise, (thread length approx. 7 mm [¼"]). The front housing must then be pulled straight off and away from the switch module to prevent possible contact and/or damage to the halogen bulb.

CLOSING THE FRONT HOUSING

Before closing the front 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-Ring 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. The front housing is screwed clockwise onto the switch module. It should be tightened by hand only until the parts are mated together.

MAINTENANCE OF THE GLASS PLATE/FRONT SEAL

The front glass plate is pressed into the front housing by the manufacturer with the blue Viton O-Ring. This O-Ring should be replaced approx. every 5 years by an authorised workshop. Regularly inspect the O-Ring for signs of deterioration. If cracks or damage is seen then the O-Ring should be replaced.

REMOVAL AND REPLACEMENT OF THE HALOGEN BULB

The halogen bulb is accessed by opening the front housing. Do not touch the glass of the halogen bulb with your fingers. This may result in the contamination of the bulb with residue from the fingers and will result in a reduction of the performance of the bulb. Use a clean dry lint free cloth to grasp the bulb and pull it out of its socket. The replacement bulb can be pushed into the socket until a resistance is felt. The bulb should be sitting centrally in its socket to ensure that an even beam of light is produced. After bulb replacement the lamp can be assembled, check the correct function of the lamp after assembling the lamp.

TRANSPORTSICHERUNGSRING

Nach Abschrauben der vorderen Verschraubung und Entfernen des O-Rings der vorderen Abdichtung lässt sich der Transportsicherungsring vorsichtig nach vorne abziehen (Achtung! den Ring nicht verformen. Im nicht eingebauten Zustand kann der Ring beim Zusammendrücken zerbrechen). Unterhalb des Transportsicherungsrings befindet sich ein O-Ring (37 x 1.6 50° shore Härte) als mechanische „Bremse“. Den O-Ring ausbauen und auf Verschmutzung bzw. Beschädigung überprüfen. Den O-Ring gegebenenfalls reinigen oder austauschen. Vor dem Zusammenbau alle Teile dünn mit Silikonfett benetzen. Der Einbau erfolgt in umgekehrter Reihenfolge.

REAR HOUSING

OPENING THE REAR HOUSING

The housing is opened by unscrewing it from the switch module anti-clockwise, (thread length approx. 7 mm [¼“]). To prevent possible damage to the cell pack, hold the lamp vertical with the rear housing upwards, unscrew the housing and pull it up.

CLOSING THE REAR HOUSING

Before closing the rear 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-Ring 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. The rear housing is screwed clockwise onto the switch module. It should be tightened by hand only until the parts are mated together.

HAND STRAP

The screw securing the hand strap is glued into position and no attempt should be made to remove it.

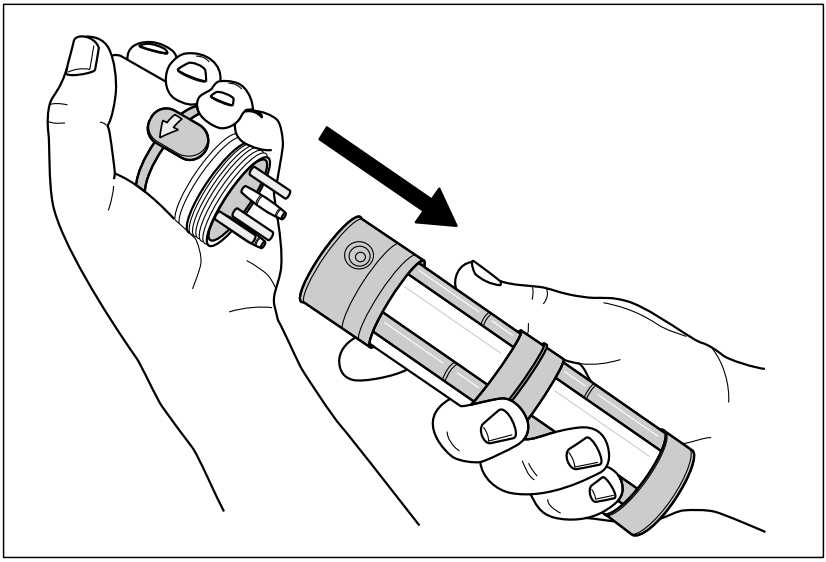


Abb. 3: REMOVAL OF THE CELL PACK

REMOVAL OF THE CELL PACK

After removing the rear housing, the cell pack can then be unplugged by simply pulling it away from the switch module. The cell pack has a charging socket and 5 plugs which serve as mechanical and electrical connections to the switch module.

REFITTING THE CELL PACK

Hold the switch module fitting with the pins pointing upwards. The cell pack can then be plugged onto the fittings. Make sure that the locating pin will be correctly located in the orifice of the cell pack base. This ensures that the cell pack cannot be incorrectly connected.

PREPARATION FOR USE

BEFORE THE LAMP IS USED FOR THE FIRST TIME.

Before the first use, the NMH cells must be charged. (See Charging page 14)

Hartenberger underwater tube 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.

We recommend that the first under water use be conducted without the power pack to check the seal of the housing.

BEFORE EACH USE

The 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 threads, sealing surfaces and O-Rings must be checked for integrity and cleanliness. (See closing the housings page 7and 8).

If the bulb has been removed for transport, it should be refitted into the socket.

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

ACTIVATING/DEACTIVATING THE ELECTRONICS **(OLD MODEL 1996-1999)**

Before the tube lamp is used, the electronic lock must be deactivated:
Depress the switch to the maximum range and hold it there until the lamp gives 1 short flash. immediately after this flash, release the switch and press it 3 times quickly to the max. range within 3 seconds. The switch should not be touched until the lamp flashes again.
If the lamp is not used within 1 hour, the electronic lock will be activated automatically.

The electronic lock can also be activated manually:
Depress the switch to the maximum range and hold it there until the lamp gives 1 short flash. immediately after this flash, release the switch and press it 3 times quickly to the max. range within 3 seconds. The switch should not be touched until the lamp flashes again. After the lamp flashes, the electronic lock is activated.

ACTIVATING/DEACTIVATING THE ELECTRONICS
(NEW MODEL / MECHANICAL LOCK)

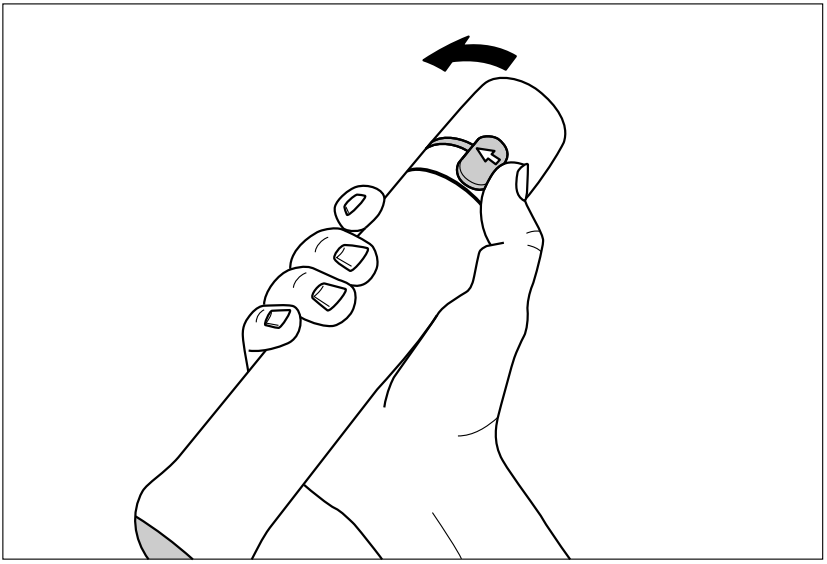


Abb. 4: The mechanical lock

Before using the tube lamp, the mechanical lock for the on/off switch must be unlocked:

Hold the lamp in your right hand. Using the right thumb, slide the mechanical lock in the direction of the arrow (to the left). The unlocked magnetic switch will now spring out and after waiting approx. 1 second, can be used to operate the lamp.

To lock the switch back into the transport position, reverse the steps above. The switch is pressed down to the end of it's movement (without undue force) with the right thumb. The mechanical lock can now be pushed over to the right (against the direction of the arrow) with the left hand. The transport lock with click into this position and hold the switch down during transport.

After pressing down and locking the switch, the electronics will shut down the lamp after a few seconds making it safe to transport.

ELECTRONIC CONTROL

The electronics are controlled by the magnetic switch.
The further the magnetic switch is depressed, the brighter the lamp illuminates. This increase in brightness is in 4 steps (50%, 75%, 100%, 125%).
To maintain the set brightness, the magnetic switch must remain in this position for 2 second. The lamp will flash and this confirms the selection of this setting. The switch can now be released. To remove the setting, depress the magnetic switch to the set position, the lamp will flash and the switch can be depressed and released for variable settings.
The use of the lamp with reduced power settings saves power and will extend

the burn time. If the lamp is used constantly at a reduced setting (50%), the bulb may develop a grey shadow on the glass of the bulb. If a reduced power setting is constantly required, it is recommended that a bulb be fitted with less wattage.

OVER-VOLTAGE / DIMMER

The HLX bulbs which we use have a much greater efficiency than standard halogen bulbs. Using a 6 cell power pack, we have a power supply of 7,2 volts. This allows the 6 v bulb to be operated continually with an overvoltage of approx. 6,8 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.

SOS DISTRESS SIGNAL

The electronic control allows the lamp to generate an SOS distress signal in the form of Morse alphabet flashes.
To activate the SOS distress signal, quickly depress the magnetic switch 3 times to the maximum range within 1 second. Do not touch the magnetic switch for 3 seconds and the lamp will start automatically generating the SOS signal. The distress signal mode can be exited by depressing the magnet switch.
The SOS distress signal will have a duration of approximately 3 times the duration of the lamp if it were to be operated at 125%. When the cells are virtually discharged, the flashes will reduce in intensity.
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.

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 20 watt halogen bulb at 125% power, this will be approximately 3 minutes after the 3 blinks.

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 50% 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 50% power setting.
The cells are almost certainly damaged should this mode of operation be selected.

AFTER EACH 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 19.

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.

TRANSPORT

ELECTRONIC LOCK

Before transport, the lamp should be protected against inadvertent use. See electronics. Page 11.

Warning !

During extended unattended periods of transportation, the halogen bulb must be removed from the socket.

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.

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 14).

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-EFFEKT

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.

PREPARATION FOR CHARGING

Warning !

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).

Warning !

The ambient temperature should not exceed 45°C (110°F). The power pack must be removed for charging. (See Page 8).If the area to be used for charging is contaminated with dust or dirt, then we recommend that the housing is subsequently closed protecting the O -Rings and the sealing surfaces.

The charging socket is located on the side of the power pack unit.

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 MINI AND MEDI ELECTRONIC

Check the compatibility of the charger with the power pack.
First insert the charging cable plug into the charging socket on the side of 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. Before attempting to plug the charger into the mains, check the voltage selector located on the lower side of the charger for the correct mains voltage. (115 / 230v).
The charger can be plugged into the mains. The charger will indicate a charging process by illuminating a red diode lamp (LED).

The charging time for the mini electronic is approx 5 hrs.
The charging time for the medi electronic is approx 9 hrs.

After the cells are fully charged, the charger will switch over automatically to a trickle charge and the LED will blink for approx. 10 seconds on and approx. 20 seconds off. If the charger is disconnected form the mains supply then internal timer will reset and the complete charging process will start again. Full or partially discharged cells can be recharged without any damage occurring. Any excess energy will then be converted into heat and because the cells are charged outside of the housing, this heat is dissipated into the environment.

The NMH cells have a natural discharge, which according to the ambient temperature can be up to 60% in one month! For this reason we recommend that the cells are charged at least once a month.

Achtung !

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 I/6

Check the compatibility of the charger with the power pack.
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 5 and 7 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 1,1 amps.

Charging time mini electronic approx. 2.0 hrs.
Charging time medi electronic approx. 4.0 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 is functioning properly.
Blinks Red	The cells are fully charged and maintained with a trickle charge.
Blinks Red fast (3 x per seconds)	The cells are fully discharged ore broken.
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

Check the compatibility of the charger with the power pack.
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 mini electronic approx. 1.5 hrs.
Charging time medi electronic approx. 2.5 hrs.

The charger is activated by plugging it into the mains supply.
The function of the charger is monitored via 2 light emitting diodes (LED' s) 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 slig ht 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	X	
Visual inspection of lanyard for signs of damage or deterioration	Before each use	X	
Visual inspection of the front housing O-Ring, clean and lubricate as necessary	After the housing is opened, at least annually	X	
Visual inspection of the rear housing O-Ring, clean and lubricate as necessary	After the housing is opened	X	
Replace front and rear housing O-Rings	Annually or after 200 dives, which ever comes first.	X	
Replace Front Glass O-Ring	Every 5 years		X

RECORD OF DATES WHEN MAINTENANCE WORK WAS CARRIED OUT

Front Glass O-Ring 38x3	Front screw fitting Ring 38x3,0	Rear screw fitting O-Ring 38x3,0	Halogen Bulb replaced

Notes/Comments

FAULT DIAGNOSIS

Problem	Cause	Action to be taken
Water enters the housing: 1. A few drops are present. 2. Housing is flooded with fresh water.	Defective or contaminated O-Ring.	***Abort the dive as soon as is safely possibly. Open the lamp.** 1. Dry the lamp and power pack with a clean cloth. 2. Dry the power pack and return it to the manufacturer
3. Housing is flooded with Saltwater.		3. Rinse the lamp and power pack with ample fresh water. Dry the housing and the power pack and return it to the manufacturer.
Front sealing ring is difficult to screw on/off.	1. Front thread contaminated.2. Threads damaged	1. Clean and lubricate front thread.2. Return lamp to manufacturer/dealer.
Lamp does not illuminate.	1. Electronic circuits have automatically switched the lamp off 2. Cells discharged. 3. Defective Bulb.	1. Conduct Reset procedure in accordance with the instructions on page 15.2. Charge Cells.3. Replace bulb in accordance with the instructions on page 8
Charger LED does not illuminate.	1. No Mains.2. Charging cable not plugged in.3. Bad contact on charging plug.4. Incorrect Voltage setting	1. Check mains supply.2. Plug in charging cable.3. Check charging plug security.4. Unplug the charger, reset the voltage selector, wait approx. 3 minute and resume charging.

*** Warning ! 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, puncture the 0-ring of the front glass plate with a needle or a small screwdriver and allow excess pressure to escape. Never look directly into the front glass! If the increase in pressure is too high, they can come flying out explosively.

CONDUCT RESET:

If the magnetic switch has a problem or when the halogen bulb is removed, the entire electronic circuitry will turn over to a self protection mode. The lamp cannot be inadvertently activated or operated in this condition. The reset can be carried out using the following procedure: Do not touch the magnetic switch. Remove the cell pack from the switch module. After approx. 1 minutes refit the cell pack. (The cell pack must be charged).

SPARE PARTS

O-Ring	Dimensions	Elasticity	Material
Glass	37 x 3,0	50° shore Härte	Viton blue
Front Screw Fitting	37 x 3,0	50° shore Härte	Viton blue
Rear Screw Fitting	37 x 3,0	50° shore Härte	Viton blue
Reflector unit	37 x 3,0	50° shore Härte	Viton black
Transport Security Ring	37 x 1,6	50° shore Härte	Viton black

Bulb	Power Output	Socket	Lifetime (hours)
Halogen Bulb	10W	G 4	ca. 100
Halogen Bulb HLX	20W	G 4	ca. 100

ACCESSORIES

NEOPRENE SLEEVES

Neoprene sleeves (black) for the housing offer protection during transport.

QUICK RELEASE HOLDER

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

SPARE CELL PACKS

For rapid turn -around between dives.
Spare cell pack mini electronic 7.2V/2.1Ah
Spare cell pack medi electronic 7.2V/4.0Ah

Verbrauchte Akkumulatoren gehören nicht in den Hausmüll und müssen an entsprechenden Sammelstellen entsorgt werden.

Hartenberger

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