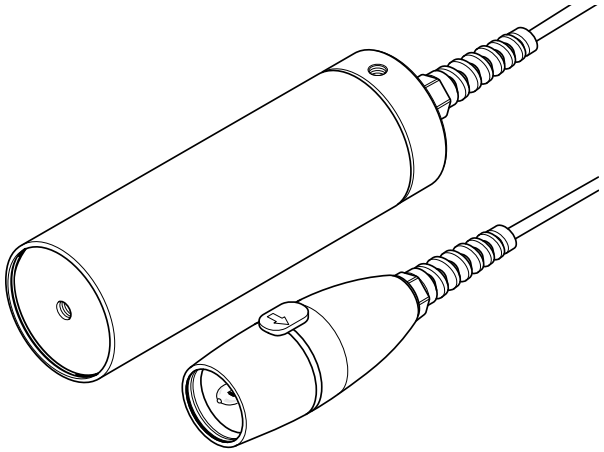
BETA VERSION ***Instructions for use***

Hartenberger

Underwater Tech-Lamp



Tech maxi

CONTENTS

WARNING SIGNS 2
SAFETY WARNING 3
GUARANTEE 3
APPLICATIONS 3
TECHNICAL SPECIFICATIONS SWITCH-MODUE/ILUMINANT-MODULE 4
TECHNICAL SPECIFICATIONS CELL-TANK 5
TECHNICAL DATA 6
SWITCH-MODULE 7
ILLUMINANT-MODULE 8
CELL-TANK 10
PREPARATION FOR USE 12
USING THE UNDERWATER LAMP 12
TRANSPORT 16
STORAGE 16
CHARGING 17
CHARGER OFF-SHORE 1/12 19
CHARGER OFF-SHORE II 20
CARE AND MAINTENANCE 21
FAULT DIAGNOSIS 22
SPARE PARTS 23
ACCESSORIES 23

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 ***maxi 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 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.

Warning !

The manufacturer's warranty expires if the these instructions for use are not followed and strictly adhered to. If the lamp is tampered with or dismantled in part or full by an unauthorised workshop or technician, the warranty automatically expires, such tampering includes but is not limited to; loosening and/or tightening screws, the removal/damage of original seals. When purchasing the lamp make sure that the original manufacturer's seals are intact
(1x housing electronics, 1 x cell electronics, charger off-shore II).

Warning !

If the lamp is tampered with and/or if unauthorised (from the manufacturer) parts/components (e.g. cells, electronics components, non-original chargers,) are used or installed in the lamp, this results in a change of original design and the warranty is automatically invalid.
The manufacturer is also released from any product liability.

APPLICATIONS

The *Tech maxi* 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.

TECHNICAL SPECIFICATIONS SWITCH-MODUE/ILUMINANT-MODULE

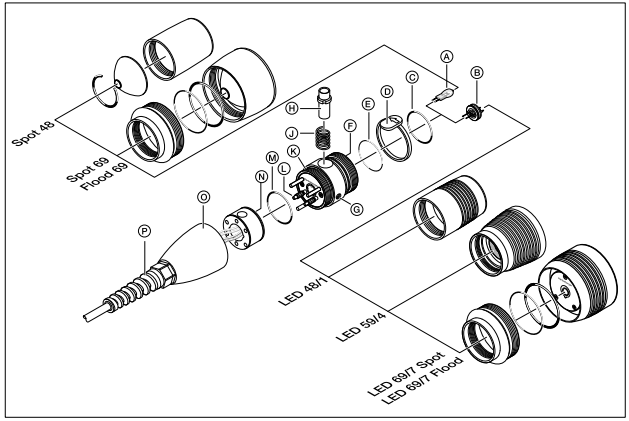


Fig. 1: Switchmodul with Halogen/LED Illuminantmodul

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

Ⓑ PLUG MODULE FOR LED OPERATION
The LED plug module (G 6.35) is plugged in to the halogen bulb socket when the lamp is to be used with LEDs..

Ⓒ O-RING
Das Schaltmodul wird zu beiden Seiten jeweils mit einem O-Ring gedichtet (37 x 3 50° shore Härte). Alle Flächen, die mit den O-Ringen in Berührung stehen, werden als Dichtflächen bezeichnet.

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

Ⓔ O-Ring
37 x 1,6 50° hardness.

Ⓕ PLUG IN CONNECTION
Connector G6.35 for the halogen bulb or LED-Spring contact.

Ⓖ Thread
Thread M6 to fix as an Goodman-Handle.

Ⓗ MAGNETIC SWITCH
The magnetic switch controls all the electronic functions of the control unit.

Ⓘ SPRING MAGNETIC SWITCH

Ⓚ SWITCH MODULE
The switch module is the base element of the Tech-Lights. It contains the electronics, the magnetic switch and the halogen bulb fitting. The seals are produced with the front and rear O-Rings.

Ⓛ 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

Ⓝ PLUG IN CONNECTION

Ⓞ REAR SCREW FITTING SWITCH_MODULE
Die hintere Verschraubung des Schaltmoduls beinhaltet den elektrischen Steckkontakt zur Verbindung mit dem Schaltmodul und die druckwasserdichte Verschraubung mit Verbindungskabel zum Akkutank.

Ⓟ DRUCKWASSERDICHTE VERSCHRAUBUNG
Druckwasserdichte Verschraubung zur Abdichtung des Verbindungskabels.

TECHNICAL SPECIFICATIONS CELL-TANK

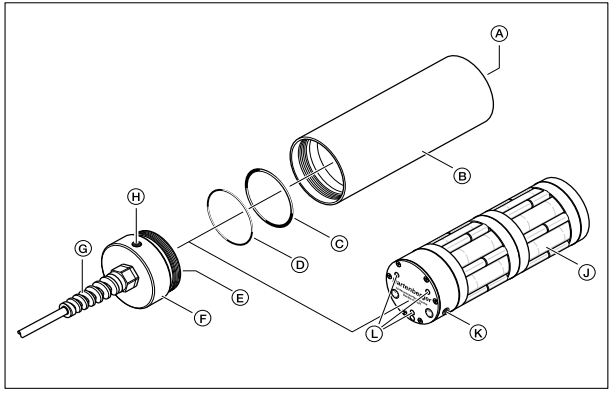


Fig. 2: Housing cell-pack

Ⓐ REAR FITTING WITH M6 THREAD
Der hintere Gehäuseverschluss erfolgt durch eine Bodenplatte, die durch einen eingepressten O-Ring (58 x 3 50° shore Härte) abgedichtet wird.

Ⓑ HOUSING / BODY
The housing / body is sealed with the aluminium-plate and the rear screw fitting.

ⒸⒹ O-RINGS
48x3,0 and 48x1,6 50° hardness

Ⓔ PLUG-IN CONNECTION CELL-PACK-HOUSING
The Plug in connection serves as an electrical and mechanical connection between the power pack and the electronic controls.

Ⓕ SCREW FITTING
The screw fitting must be unscrewed to access the rechargeable cell pack for charging.

Ⓖ DRUCKWASSERDICHTE VERSCHRAUBUNG
Druckwasserdichte Verschraubung zur Abdichtung des Verbindungskabels.

Ⓗ THREAD M6
Gewinde M6 zum Einschrauben z.B. einer Ringschraube

Ⓙ 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 (Chinch) is plugged into the charging socket for charging purposes.

Ⓛ PLUG-IN CONNECTION CELL-PACK
The Plug in connection serves as an electrical and mechanical connection between the power pack and the electronic controls.

TECHNICAL DATA

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

Illuminant	Halog. 50W	LED 14W	LED 21W	LED 25W	*HID 10W
Time of use at 50%	**120 Min.**				
Time of use at 75%	**80 Min.**				
Time of use at 100%	**65 Min.**	**200 Min.**	**150 Min.**	**125 Min.**	**240 Min.**
Time of use at 125%	**45 Min.**			**.**	

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

Illuminant	Halog. 50W	LED 14W	LED 21W	LED 25W	*HID 10W
Time of use at 50%	**140 Min.**				
Time of use at 75%	**120 Min.**				
Time of use at 100%	**80 Min.**	**240 Min.**	**180 Min.**	**150 Min.**	**280 Min.**
Time of use at 125%	**60 Min.**			**.**	

* discharge bulb 10W; the electronic module uses approx. 15Watts. The illumination is equivalent to a 30Watt 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 70-80% of the stated capacity.
Halogen bulbs available in retail outlets often need up to 10% more power as stated. The stated burn times will therefore be shortened.

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

Bei niedrigen Umgebungstemperaturen empfehlen wir die Verwendung des optional erhältlichen Lithium-Mangan-Akkumulators. Die entnehmbare Kapazität beträgt dann noch über 95%.

Warning !

Die UW-Leuchte Tech maxi ermöglicht auch die Verwendung eines 100W Halogenbrenners. Der Betrieb mit 100W Leistung im Dauerbetrieb erzeugt eine hohe Erwärmung des Lampenkopfs. Bei schlechter Wärmeableitung kann die Temperatur kritische Werte erreichen.

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.

Es besteht die Gefahr des Gasens der Zellen und damit Explosionsgefahr. Bei einer Leistungsentnahme von mehr als 50W empfehlen wir keinen Dauerbetrieb der Leuchte. Bei fast entladenem Akkumulator sollten auch kurzzeitig keine Leistungen von mehr als 50W entnommen werden.

Der optional erhältliche Lithium-Mangan-Akkumulator besitzt eine wesendlich bessere Hochstrombelastbarkeit und wird deshalb bei Dauerbetrieb mit hohen Leistungen empfohlen.

ABMESSUNGEN / GEWICHT / DRUCKFESTIGKEIT

	Länge x Durchmesser	Gewicht an Land	Gewicht im Wasser	Druckfestigkeit
Schaltmodul / spot48	150mm x 48 mm	0,3 kg	0,1 kg	200 m
Akkutank	200mm x 69mm	1,5 kg	0,6 kg	200 m

SWITCH MODULE

The switch module forms the base of the Tech-Lights. 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.

TRANSPORTSICHERUNGSRING

Nach Abschrauben der vorderen Verschraubung (Leuchtmittelmodul, siehe Unten) 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 Zusammen-drücken 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.

ÖFFNEN DER HINTEREN GEHÄUSEVERSCHRAUBUNG

Beim Abschrauben der hinteren Gehäuseverschraubung gegen den Uhrzeigersinn (ca. 7 mm Gewindelänge) wird das Anschlusskabel um einige Umdrehungen verdrillt und unterliegt einer mechanischen Belastung. Nach dem Öffnen der Verschraubung lässt sich die elektrische Steckverbindung vom Lampenkopf abziehen.

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.
Beim Zusammenstecken der elektrischen Verbindung von Schaltelektronik und Verbindungskabel ist darauf zu achten, dass die Führungszapfen und die Kontaktstifte des Schaltmoduls in die entsprechenden Bohrungen der Steckverbindung eingreifen.
Vor dem Verschließen der hinteren Gehäuseverschraubung muss das Kabel der elektrischen Steckverbindung ca. 2 Umdrehungen gegen den Uhrzeigersinn verdrillt werden. Die Verschraubung im Uhrzeigersinn schließen und ohne Kraftanstrengung bis zum Anschlag anziehen.

LEUCHTMITTELMODULE

Für das Schaltmodul der UW-Leuchte ***Tech maxi*** werden unterschiedliche Leuchtmittelmodule angeboten. Bei Verwendung von 12V Halogen-Leuchtmitteln mit 30, 50 oder 100W (Stecksockel G 6.35) können Lampenköpfe mit schmalem Abstrahlwinkel (spot) oder breitem Abstrahlwinkel (flood) aufgeschraubt werden. Bei Verwendung von LED Leuchtmitteln wird anstelle des Halogen-Leuchtmittel eine Adapterplatine G6.35 (Doppel-Platine) mit Federkontakten in den Lampensockel eingesteckt und ein entsprechendes LED-Modul aufgeschraubt (See page 4, Fig1 and page 9, Fig. 3).

OPENING THE FRONT HOUSING (Leuchtmittelmodul)

Vor dem Abschrauben des Leuchtmittelmoduls muss sich der Transportsicherungsring mit der Schalterabdeckung über dem Magnettastknopf befinden, andernfalls kann der Magnettastknopf herausfallen.

The front 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.
Der Magnettastknopf muss dabei leicht heruntergedrückt werden, damit dieser nicht durch den Transportsicherungsring eingeklemmt wird.

REMOVAL AND REPLACEMENT OF THE HALOGEN BULB/LED-ADAPTOR

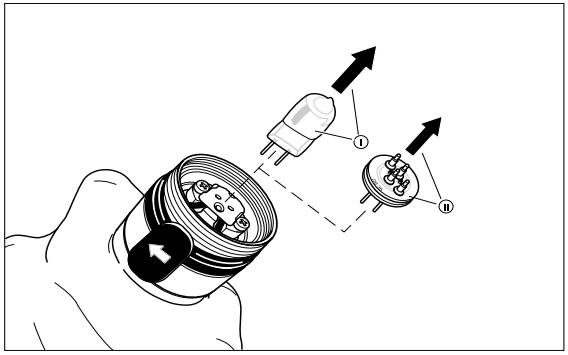


Fig. 3: Halogen-bulb / LED spring-adaptor dismount / mount

The halogen bulb / LED spring-adaptor is accessed by opening the front housing.

RISK OF INJURY THROUGH BURNING!

The halogen bulb remains very hot for an extended period of time after use!
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. If the light beam is uneven or the beam is not focused correctly, the halogen bulb can be extracted from the fully inserted position in the socket approx. 1mm.

MAINTENANCE OF THE REFLECTOR

If the reflector mirror becomes dirty or is contaminated, it must be cleaned with a soft, dry cloth. Remove the front housing cover and then the reflector can be removed. First remove the O-ring (∅ 3mm, 50° hardness) using a blunt tool such as a tooth pick or similar, care must be taken not to damage the O-ring. Once the reflector has been cleaned, the O-ring can be refitted into the groove between the reflector and the housing cover, make sure the O-ring sits correctly into the groove, a blunt tool can be used for pressing the O-ring into the groove.

LED MODULE

The optional LED-Module (**L**ight-**E**mitting-**D**iodes) replaces the standard halogen bulb and front cover/reflector. The module is connected electrically by plugging the G6.35 connector into the halogen bulb socket. (see fig. 5, II). The electronic arrangement prevents incorrect fitting/connection. If the lamp does not function properly, remove the plug module, rotate it 180° and refit it into the halogen bulb socket. Take care not to short circuit the contacts.
If an LED module with poor heat radiation is installed, the LEDs are in danger of overheating and the performance will automatically be reduced to approx. 25%.

FRONT GLASS PLATE

The halogen illuminant module have a tempered borosilicatglass 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).

FRONT GLASS COVER

The O-ring seals the front glass plate in the cover and is specially pressed into the cover by the manufacturer. This O-ring must be replaced every 5 years, or earlier if it is shows sign of deterioration (such as cracking). This job may only be carried out by an authorised workshop.

CELLTANK

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.

REMOVAL OF THE POWER PACK

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 3 pins serve as a mechanical and electrical connection for the components.

The Lithium-Manganese-Cell-Pack have a special micro controller monitoring electronic with five LED´s on the backside. If you press the button on the backside, you can check the capacity of the cell-pack (each LED approx. 20%)

REFITTING THE POWER PACK

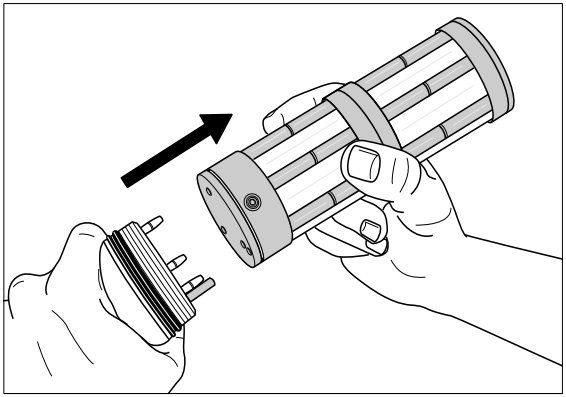


Abb. 4: Removal of the power pack

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.

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 (48x3,0 and 48x1,6) 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.

ABDICHTUNG DES HINTEREN GEHÄUSEVERSCHLUSSES

Die hintere Bodenplatte wird werkseitig mit einem O-Ring eingepresst. Dieser muss ca. alle 5 Jahre (bei äußeren Verschleißzeichen, wie z.B. Risse, auch früher) vom Hersteller oder von einer autorisierten Fachwerkstatt erneuert werden. Ein M6 Gewinde dient als Befestigungspunkt z.B. für eine Ringschraube zur Befestigung einer Sicherungsleine.

Warning !

Die Gewindetiefe beträgt max. 4mm. Ein tieferes Einschrauben oder eine übermäßige Gewaltanwendung kann zu Undichtigkeiten und damit zur Zerstörung des Akkutanks führen. Eine senkrecht auf das Gewinde ausgeübte Zugkraft von 10kg ist zulässig.

PREPARATION FOR USE

BEFORE THE LAMP IS USED FOR THE FIRST TIME

Before the first use, the cells must be charged (See page 12) ***Hartenberger*** underwater lamps are manufactured to a high degree ofprecision 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 7).

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 power pack inside the housing.

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 7).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**

Warning !

When the lamp is turned on, direct the beam away from yourself and others. Do not point the beam directly at others. If there is a defect on the lamp, the front glass plate may be forced out of the front of the housing with explosive force.

TRANSPORT SAFETY LOCK

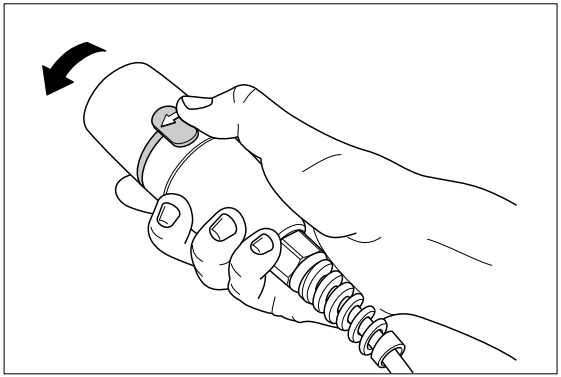


Fig. 4: Transports safety lock

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.

The transport safety ring should be removed from the magnetic switch immediately before the lamp is used.

USE OF THE SWITCH MODULE WITH HALOGEN OR LED ELEMENTS

The switch module is activated by the magnetic button.
Modules manufactured from 2009 onwards have two switch programmes available.

Programme A

Is activated by connecting the battery pack to the canister head whilst the On/Off button lock is deployed over the black On/Off button (Button is depressed)
(the magnetic button does not protrude beyond the switch module).
Function:
The further the magnetic button is pressed in, the brighter the lamp becomes. The

brightness increases in 4 stages (50%, 75%, 100% 125%).To retain the current brightness, simply hold the magnetic button at the set position for approx.. 1-2 seconds. The lamp will blink 1 short flash to signal that the brightness has been set and the button can be released. If the magnetic button remains pressed in after the lamp blinks, the lamp will switch off after approx. 3 seconds. To switch the lamp back on, release the magnetic button and then press the button in again to the desired setting.
To change the brightness of the lamp, press the magnetic button in to the current setting, the lamp with confirm with a short flash, then a new brightness setting can be set using the procedure above.

Programme B

Is activated by connecting the battery pack to the canister head whilst the On/Off button lock is rotated away from black On/Off button (Button protrudes)
(the magnetic button protrudes beyond the switch module).
Function:
Each short press of the magnetic button (approx. ½ second), increases the brightness of the lamp by 25%. When the maximum brightness (125%) is reached, the lamp blinks 1 quick flash and then the lamp goes back down the brightness scale in 25% steps.
The lamp can be switched on and set to the maximum brightness by pressing the magnetic button longer (approx. 1-2 seconds). When the lamp is set to the maximum brightness, it can be switched off by pressing the magnetic button again for approx. 1-2 seconds.

SOS-EMERGENCY SIGNAL (HALOGEN OR LED ELEMENTS)

The electronic module has the capability to generate an emergency SOS distress signal using the morse alphabet (continuous 3x short - 3x long - 3x short flashes).
Activating the SOS signal in Programme A
Press the magnetic button in fully 3 times with a period of approx. 2 seconds then release the magnetic button and do not press it in any more before the SOS signal starts (after approx. 2 seconds).
Activating the SOS signal in Programme B
Press the magnetic button in fully. After approx. 2 seconds the lamp will blink a short flash. Now press the magnetic button in fully 3 times with a period of approx. 2 seconds then release the magnetic button and do not press it in any more before the SOS signal starts (after approx. 2 seconds).
The SOS signal can be stopped simply by pressing the magnetic button in again. The duration of the SOS signal is approx. 3 times longer than the normal burn time of the lamp. The SOS signal will get darker when the cell is almost fully discharged.
Only use the SOS distress signal in an emergency. As soon as the signal starts to get dark, we would recommend switching the signal off and only switching it back on when help is in sight.

OVER-VOLTAGE / DIMMER (HALOGEN- /LED-ILLUMINANT)

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 continusly with an over-voltage of approx. 13,6 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 dissipation 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 not reduced. 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 rating halogen bulb is recommended.

LOW LEVEL CAPACITY WARNING (HALOGEN-/LED-ILLUMINANT)

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 100% 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 increase the wear and tear on the cells and reduce their life expectancy.

DISCHARGE WARNING (HALOGEN-/LED-ILLUMINANT)

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 (HALOGEN-/LED-ILLUMINANT)

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.

USE OF THE SWITCH MODULE WITH HID BULB/ELECTRONIC (optional)

Als Spezialausführung ist das Schaltmodul mit einer Vorschaltelektronik für Gasentladungsbrenner (HID) erhältlich. Dieses Schaltmodul ist nicht mit einem Halogen- oder LED- Leuchtmittel zu verwenden.
Die Schaltelektronik wird durch den Magnettastknopf aktiviert.
Dazu muss dieser für ca. 3 Sekunden niedergedrückt werden. Nach dem Zünden/Aufleuchten des Gasentladungsbrenners muss der Taster losgelassen werden. Wird der Taster nach dem Aufleuchten weiterhin niedergehalten, schaltet die Elektronik den Brenner wieder aus.
Ein Ausschalten während des Betriebs erfolgt durch ca. 3 Sek. langes Niederdrücken des Magnettastknopfs.
Die Schaltelektronik verhindert jedoch unmittelbar nach dem Einschalten ein sofortiges Ausschalten bzw. nach dem Ausschalten ein sofortiges Einschalten. Die Verzögerung liegt bei ca. 8 Sekunden. Dadurch wird die Lebensdauer des Gasentladungsbrenners deutlich verlängert.

Ein häufiges Ein- und Ausschalten reduziert die Lebensdauer des Gasentladungsbrenners. Wir empfehlen daher den Gasentladungsbrenner

nur im Dauerbetrieb zu benutzen.
Der Gasentladungsbrenner ist empfindlich gegen seitliche Erschütterungen (Schlag oder Fall).

LOW LEVEL CAPACITY WARNING (HID-ILLUMINANT)

Beim Betrieb der Leuchte mit Gasentladungsbrenner wird dieser ca. 3 Min. vor dem Ende der absoluten Akkukapazität ausgeschaltet.
Es besteht die Möglichkeit, die Lampe nochmals in Betrieb zu nehmen.
Ein Wiedereinschalten der Leuchte kann jedoch zu einem erhöhten Verschleiß bzw. zu einer Schädigung des Akkumulators führen.

DISCHARGE PROTECTION (HID-ILLUMINANT)

Nach dem Abschalten der Restkapazitätswarnung empfehlen wir die Leuchte nicht mehr einzuschalten. **In einem absoluten Notfall und unter Abwägung aller Risiken kann der Gasentladungsbrenner jedoch wieder in Betrieb genommen werden.** Nach spätestens 3 Min. schaltet der Tiefentladeschutz die Leuchte dann endgültig aus.

Warning !

Je länger die Leuchte wieder in Betrieb genommen wird, um so größer ist die Gefahr, dass der Akkumulator geschädigt wird (Gasen der Zellen und Explosionsgefahr).

AFTER EACH USE

Warning!

After the dive is completed, examine the lamp for signs of flooding or water ingress as soon as possible. To carry out this check, hold the lamp upside down with the glass plate pointing down and look at the glass plate from the side for any signs of moisture/water ingress.
After each use, the lamp should be thoroughly rinsed in clean, fresh water. During this rinsing, operate the switch.
When the lamp is operating, the temperature in the housing will increase and a slight overpressure will form inside the housing. If the housing is opened immediately after use, this slight overpressure will cause excessive friction on the threads of the covers and/or the O-ring seals, the cover will be difficult to open. For this reason we recommend that the lamp is left unopened (unless flooding has occurred) for several minutes after it is switched off.
The cells should be charged as soon as possible after use.

TRANSPORT

TRANSPORT LOCK

After use, the transport lock must be initiated to prevent inadvertent operation of the lamp. To lock the switch back into the transport position, 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.**).**
Damit beim Transport der Leuchte eine Abschaltung des Halogenbrenners gewährleistet ist, müssen starke mechanische und magnetische Einwirkung auf die Transportsicherung vermieden werden.

Warning !

If the lamp is to be transported or stored without direct supervision, the halogen bulb must be removed from the socket and stowed (see page 10). This is a precaution in case a defective electronic module turns the lamp

on. This heat generated by the halogen bulb my cause damage to items adjacent to the lamp/glass/bulb.

STORAGE

Warning !

For extended periods of storage, the cell pack should be removed and stowed and the housing should be closed.
Place the cell pack on a suitable surface (non sensitive) and store in a dry environment between 10° - 20°C (50 – 68°F). Under no circumstances should the lamp be subjected to temperatures above 45°C (110°F).

- The rechargeable **Nickel-Metal-Hydride-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 full charged approximately once a month when the lamp is not in use.**
- If a **Lithium-Manganese-Cell-Pack** is continuously stored at full charge and increased temperatures, the cell pack will suffer from an irreversible reduction of capacity of more than 10% per year. **If the cell pack is to be stored for an extended period of time, the cell pack should be stored with a capacity of 50-60%.** The irreversible loss of capacity due to natural loss of capacity over time can be reduced to as little as 3% with good care and attention. The lithium manganese cells are subject to a very small natural discharge (depending on the ambient temperature this is approx. 4-8% per month, and the electronic in the lamp that monitor the conditions result in approx. 3% discharge per month).
  If the cell pack is stored for extended periods of time, it should be recharged every 4-6 months to approx. 50-60% capacity.
  A completely discharged cell pack is protected by the electronic monitoring that prevents further charging. In this case, return the cell pack to the manufacturer for evaluation.
  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

GENERAL INFORMATION CONCERNING CHARGING RE-CHARGEABLE CELLS

The rechargeable cells used in this lamp have been declared as gas and acid/alkali sealed. For this reason the electrolyte in the cells cannot escape and the cells can be charged regardless of their environment. This positive feature has been stated by the cell manufacturer but an exception to this cannot be ruled out.
Rechargeable cells can, if defective, produce an internal pressure in the cell during charging/discharging (use) that may cause the over pressure device integrated in the cell to open. This in turn will allow electrolyte to escape from the cell. Electrolyte is an aggressive alkali and also conducts electrical current, this will destroy the cell over time. The resulting electrolysis will create an over-pressure inside the housing of the lamp.
For this reason, rechargeable cells should not be charged within a closed underwater housing on repeated occasions.

MEMORY-EFFECT

The so-called memory effect will occur when re-chargeable cells are regularly charged in a partly discharged state (for example this occurs when a wireless telephone is placed in the charging station every evening). The popular rule of thumb to only charge re-chargeable cells when they are completed discharged is applicable to NC (nickel cadmium) or NMH (nickel metal hydride) cells. This rule does not apply to underwater lamps with high discharge currents, in this case, the regular full discharge has a negative effect on the cells. The lithium manganese cells used in this lamp do not have a memory effect.

Warning !

Regularly discharging a multi cell power pack may damage the voltage features of individual cells within the cell pack, thus causing an unbalance within the cell pack that in turn may cause the weakest (and therefore the most susceptible) cell to fail prematurely. The more often the cell pack is discharged to the pint where the discharge protection cuts in, the greater the chance that an individual cell will fail within the cell pack.

PREPARATION FOR CHARGING

Warning !

For the charging procedure you will need a 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 40°C (104°F).
Note that a defective electronic module may cause the lamp to turn on during charging. Damage to adjacent material caused by the resulting heat generated by the halogen bulb must be avoided.
For this reason we recommend that the cell-pack is removed during charging. 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.

Warning !

Achten Sie auf Korrosions- und Oxidationsbildung am Akkueinschub (austretende Flüssigkeit, „Blasenbildung“ unter dem Schutzüberzug des Akkus, mehliger bzw. weißer Belag zwischen den Zellen oder im Gehäuse, Korrosion an der Ladesteckdose und den Steckkontakten). In diesen Fällen darf der Akku nicht geladen werden, es besteht Explosionsgefahr !
Die komplette Leuchte zur Überprüfung an den Hersteller senden (Akkueinheit und Gehäuse getrennt verpacken !).

NON-ORIGINAL CHARGERS

Warning !

Only chargers that have been approved by the manufacturer in advance of use may be used for charging the lamp. Using non-approved chargers, voids the manufacturer’s warranty.
Use of non-original chargers may damage the electronic module that monitors the cell pack condition. The cells can overheat and/or be damaged. (Risk of explosion !).
Use of chargers that are not previously approved by the manufacturer is an alteration to the original design.
This voids the warranty and any releases the manufacturer of any responsibility and liability for subsequent damage and/or injury.

CHARGER OFF-SHORE I/12

Use only manufacturer approved cells, do not connect any non-approved cells.

The charger off-shore 1/12 is suitable for charging the ***Tech maxi***.
The max. charging current is approx. 1.0 Amps.
The charging time for the ***Tech maxi*** is approx. 4.5 hours.
The charger uses the latest technology with a wide range input voltage rating and accepts any voltage between 100 and 250V and frequencies between 45 and 65 Hz. It is not necessary to mechanically pre-select the local voltage.
All ***Hartenberger*** cell packs with 10-12 cells (12 – 14.4V) are identified by the charger when connected and will have an optimal; efficient charge.

Firstly, plug the charging plugs into the charging socket of the cell pack. Be careful not to use undue force when plugging the plugs in and ensure the plugs are inserted straight to avoid damage.

Take care to avoid short circuiting the contacts with metal or conductive objects. Ensure that the charger has suitable cooling to avoid over heating especially if it is operated in extreme conditions.

The charger is activated by plugging the charger into a standard mains socket that meets the voltage/hertz specifications on the charger. The charger is fitted with a standard „Euro“ plug adapter when delivered and a range of adapters for the common international mains sockets are also supplied. The correct adapter should be fitted onto the charger after removing the “Euro” plug adapter before attempting to plug the charger into a non “Euro” mains socket.
All the functions of the charger are shown via the LED on the charger.

Functions shown via the LED when charging NC or NMH cells:

LED on	Mains power is connected, the cells are being charged.
LED off	Mains power is not connected and/or cells are not being charged.
LED flashes slowly	Trickle charge, cells are 100% charged.
LED flashes quickly	Cells are discharged completely.

Functions shown via the LED when charging Lithium Manganese cells:

LED on	Mains power is connected, the cells are being charged.
LED off	Mains power is not connected. Cells are not connected. Cells are charged Cells are discharged completely.

The charging process of the *Tech maxi* with lithium manganese cells is monitored by the electronics in the cell pack. These electronics cut off the charging current when the cells are fully charged.

CHARGER OFF-SHORE II

Use only manufacturer approved cells, do not connect any non-approved cells.

The charger off-shore II is suitable for charging the High-Tech-Lamp ***Tech maxi.***
The max. charging current is approx. 1.8 Amps.
The charging time for the ***Tech maxi*** is approx. 2.5 hours.
The charger uses the latest technology with a wide range input voltage rating and accepts any voltage between 100 and 250V and frequencies between 45 and 65 Hz. It is not necessary to mechanically pre-select the local voltage.
All ***Hartenberger*** cell packs with 5-12 cells (6 – 14.4V) are identified by the charger when connected and will have an optimal efficient charge.
First connect the charger to the mains by plugging in the mains cable. All the functions of the charger are displayed via 2 LEDs.

LED 1 - Functional display

Green	Mains supply connected, charger is functioning correctly.
Red	Mains supply connected, charger is overloaded or defective.
Off	No mains supply connected.

Firstly, plug the charging plugs into the charging socket of the cell pack. Be careful not to use undue force when plugging the plugs in and ensure the plugs are inserted straight to avoid damage.

Take care to avoid short circuiting the contacts with metal or conductive objects. Ensure that the charger has suitable cooling to avoid over heating especially if it is operated in extreme conditions.

LED 2 functional display when charging NC or NMH cells:

Red	No cell pack connected (pause).
Green blinks	Fast charge to 100 % of the cell pack capacity.
Off	Trickle charge, cell pack is 100% charged.

LED 2 functional display when charging lithium manganese cells:

Red	No cell pack connected (pause). Cell pack is fully discharged Cell pack is 100% charged
Green blinks	Fast charge until the cells reach 100%.

The charging process of the *Tech-maxi* with lithium manganese cells is monitored by the electronics in the cell pack. These electronics cut off the charging current when the cells are fully charged.

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)

Action to be taken	Interval	By Owner	Workshop
Examine cable, wrist strap / hand line for integrity/damage	vor jedem Tauchgang	X	
Visual inspection of the switch-module housing, O-Ring, clean and lubricate as necessary	Every time the housing is opened latest after 12 months or 100 times use	X	
Rinse under and around the switch with fresh water while moving the switch	After each dive	X	
Replace the O rings from the switch-module fitting	Every 12 months or 100 times use or earlier if damaged	X	
Replace the O rings from the cell-pack fitting	Every 12 months or 100 times use or earlier if damaged	X	
Replace the O rings under the front glass	Every 500 dives or every 5 years at the latest or earlier if damaged		X
Replace the O rings under the cell-pack seals for covers and openings	Every 500 dives or every 5 years at the latest or earlier if damaged		X
Replace illuminant	Halogen-Bulb ca. 100 hours HID-Bulb ca. 700 hours LED-Modul ca. 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

O-Ring front glass	O-Ring switch module	O-Ring cell tank	Illuminant
Notizen:			

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	**Tauchgang so schnell wie möglich beenden, Lampe öffnen und den Akku von der Elektronik trennen !** 1. Dry the housing and power pack with a clean cloth 2. Dry the housing and 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.
Magnetic switch sticking	Sand or salt residue in the mechanism	Clean the magnetic switch with fresh water
Lamp does not illuminate	1. Cells are discharged 2. Bulb is defective	1. Charge cells 2. Replace halogen bulb
Housing screw covers are hard to unscrew	1. Housing cover threads/O-rings are contaminated 2. Threads damaged	1. Clean and lubricate housing covers and/or 0-rings 2. Return lamp to manufacturer
LED charger does not illuminate	1. No Mains. 2. Charging cable not plugged in. 3. Bad contact on charging plug.	1. Check mains supply 2. Plug in charging cable. 3. Check charging plug security

*** Warning !**

Danger of explosion if flooding occurs !
If water ingresses into the housing, oxidation will occur and the resulting gas/pressure build up may cause an explosion.
Never look directly towards the lamp glass plate. In the event of rapid pressure build up inside the housing, the glass may explode out of it´s fitting.
If the housing cover cannot be opened, the cable fittings must be unscrewed and removed.

Warning !

There is a possibility that the flooding may also create an aggressive chemical solution that may cause injury such as burns if it comes into contact with the skin, eyes, etc. or if it is ingested. Inhalation of the gases should also be avoided.

SPARE PARTS

Leuchtmittel	Leistung	Fassung	Betriebsstunden
Halogen Bulb HLX	12V/30W	G 6,35	ca. 100
Halogen Bulb HLX	12V/50W	G 6,35	ca. 100
Halogen Bulb HLX	12V/100W	G 6,35	ca. 100
HID Bulb HLX	10W HID	Spezial-Sockel	ca. 700

O-Ringe switch-module	Dimensions	Elasticity	Material
Screw Fitting	37 x 3,0	50° shore Härte	Viton blue
Transport safety ring	37 x 1,6	50° shore Härte	Viton black
O-Ringe cell-tank	**Dimensions**	**Elasticity**	**Material**
Screw Fitting	48 x 3,0	50° shore Härte	Viton blue
Screw Fitting	48 x 1,6	50° shore Härte	Viton blue

ACCESSORIES

ILLUMINANT-MODULE

Actual information under www.hartenberger.de

CARRYING BAG SWITCH-MODULE

Transportbag Nylon in black.

CARRYING BAG CELL_TANK

Transportbag Nylon in black.

CARRYING BAG CHARGER OFF-SHORE 1/12

Transportbag Nylon in black.

CARRYING BAG CHARGER OFF-SHORE II

Transportbag Nylon in black.

GOODMAN HANDLE

Verstellbares Handgriffstück zum einfachen Tragen des Lampenkopfs auf dem Handrücken (Goodman-Handle)

SPARE CELL-PACK

Cell packs 14,4V/4,5Ah NMH (14,4V/5,4Ah Lithium Manganese) for quick replacement of a discharged/defective cell pack.
Unserviceable cells/cell packs should not be thrown in the normal rubbish. These cells should be disposed of through the correct channels to prevent danger to the environment and/or injury. Do not throw the cells into a fire, there is a danger of explosion and/or injury.

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