INSTALLATION AND MAINTENANCE MANUAL

Idema Underwater lights

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For a thorough introduction of Your AKVA product, we ask that all users read this entire manual. If questions occur, contact us!

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In no event shall AKVA group ASA be liable for incidental or consequential damages arising from use of this document or of the software and hardware described in this document.

This document can also be read and downloaded from our web site, see www.akvagroup.com/products/user-manuals

Table of contents

1 Safety

Safety for the users of our equipment is of primary focus when AKVA group ASA develop new products and product manuals.

We therefore strongly recommend that everyone that uses the equipment, all that perform any type of repairs, service or other maintenance to the product, and all that work in areas where the product is installed read this entire manual and at most thoroughly, this safety chapter.

This recommendation is based on both personnel safety as well as a desire to keep the products in order and avoid damages if the safety instructions are not followed.

1.1 Safety symbols

These safety symbols are used in this manual:

Information

Show caution, danger of minor personnel injuries and damages to equipment

Warning - may cause personnel injuries

Danger! Will cause dangerous situations and danger for personnel

1.1.1 Other symbols used in this manual

Go to or see page or chapter for further instructions or more information

1.2 Receiving new equipment

Always check that the delivery is complete according to the service note. If the order is not complete or if any other errors are discovered, contact AKVA group immediately. Contact information is found in appendix D in the back of this manual. AKVA group ASA provides a 1 year warranty covering manufacturing defects. The warranty is effective upon date of shipment to original recipient. Poor treatment of the system due to negligence of preventive recommendations or from improper usage of power sources is reason for a void of the warranty.

1.3 Personnel safety equipment

Antiskid footwear and safety garments, such as safety vest, are mandatory for working on or by the cage edge.

1.4 Suspensions

Make sure that ropes are not in touch with other equipment or other ropes inside the cage, such as the rotor spreader, camera or sensor suspensions and cables. This avoids interfering damages during bad weather and gnawing.

1.5 Luminaire and glass

Always control that the luminaire is complete and free of any damage before it is used. The luminaire must be fully submerged in water prior to ignition.

1.6 Cable

The cable must be damage free when it is connected to power. The cable must not have any bends, tears or breaks after installation.

The cable is not designed to lift the luminaire. This applies to handling on land and after the luminaire has been installed. Always use lifting ropes with the underwater lights.

1.7 Injuries

Never lighten the luminaire in surface position or above water.
Never look straight at a lightened luminaire, that may cause eye damage.
Overheated glass can start to crack if it is exposed to rapid cooling.

1.8 Relevant standards

1.8.1 General standards

Mandate for electric equipment published by the Product and el-safety Inspectors (NO: Forskrift om elektrisk utstyr utgitt av Produkt- og elektrisitetstilsynet) (ISBN 82-91057-17-0).

1.8.2 Safety standards

EN 60598-2-1 (Luminaires part 2: Particular requirements Section 1 – Fixed General Purpose Luminaries)
EN 60598-1+A1 (Luminaires, General requirements and tests)

1.8.3 EMC standards

EN 55015 (Limits and methods of radio disturbance characteristics of electrical lighting and similar equipment)

EN 61000-3-2 (Limits for harmonic current emissions (equipment input current <16A per phase))

EN 61000-3-3 (Limits, Limitation of voltage changes, voltage fluctuations and flicker in public low voltage supply systems, for equipment with rated current $3L 16 A per phase and not subject to conditional connection.)

EN 61547 (Specification for equipment for general lighting purposes, EMC immunity requirements)

1.9 Oil inside the BlueLed 100W and 400W

Please note that the luminaire is filled with silicon oil.

2 Introduction

This user manual is part of the equipment delivered with Idema Underwater Lights. Keep this manual for as long as Your AKVA equipment is in use, and make sure that all changes done to the equipment are being noted in the back of this manual.

Thank you for choosing AKVA group ASA as supplier for your fish farming light system. Do not hesitate contacting us if you need more information regarding installation, use or maintenance for your product.

With four house brands, AKVA group ASA is a world leading supplier of technical aquaculture equipment. Since 1980 we have developed and produced fish farming equipment, both for cages at sea and for land based hatcheries. AKVA represents an industrial standard, which is presumed to be the key to the future. Research, project management, fast deliveries and customer follow-up have been our focus to ensure that we contribute to a positive development within the aquaculture industry. Our goal is to deliver the best possible and most cost efficient equipment in order to keep preserving sustainable aquaculture.

We have a wide variety of products, including plastic and steel cages, high pressure washers, net washers, boats, feed barges, feeding systems, cameras, sensor systems, under water lighting, software for aquaculture and recycling systems.

We practice continuous product development to improve the equipment's safety, functions, manner of operation and working reliability. This manual enables users to install and maintain the underwater lights in a safe and economical way. All of our products are pre-installed, tested and delivered from our own production department or by approved collaborators. This means

that our customers have total control of potential components, grouping collocation, testing and deliveries.

Having our own production site gives all of our customers excellent service in case anything should go wrong, or if any assistance is required. AKVA holds most of the parts for our products in stock, and our service staff is available by telephone or on location in order to assist whenever necessary. Our production staff consists of productive people with great expertise to produce best possible products. Safety, both for the users and for the equipment, is our main focus while developing products and product manuals.

This entire manual, and especially the safety chapter must be read and understood before commencing any work on the equipment

Before installation, use, repairs or maintenance is performed with or on the underwater lights, we recommend proper training from AKVA service personnel. This entire manual must be read and understood, and installation and maintenance must be performed as described here in order to ensure reliable operations and expected operating time for the product.
The manual will answer most day to day questions and it gives a thorough description of how to install and maintain the Idema Underwater Lights.

3 Information

3.1 How to use this manual

This manual describes how installation and maintenance of the Idema Underwater Lights should be done for the safest possible procedures. This entire manual must be read and understood by all users prior to the installation.

! *It is crucial that all employees are aware of any dangers and all other safety factors that may affect the both installation and maintenance of underwater lights, considering both user and equipment*

Before the first chapter is a table of contents. The headlines work as links to their respective chapters and pages in the .pdf-file.

Chapter 1 is the most important chapter of the manual. Here are all safety precautions, warnings and other safety information that ensures safe maintenance. For the safety chapter to have any impact, all users must read and understand its contents.

Chapter 2 provides general information about the AKVA group organization and how we work as well as instructions that must be followed before using the equipment. This current chapter provides information and technical specifications on the different underwater lights provided by AKVA group.

The following chapters, 4-6, provide instructions to how the various lamps should be suspended and connected. Chapter 7 describes how to maintain the lamps, as well as ffrequency table and registration forms are found here.

Three appendixes are found in the back of the manual: Index, with links to the rest of the manual in the .pdf-document, a deviation form for all deviations with the system, and pages for notes about new and extra information regarding the equipment are also in the back of the manual.

3.2 Why use underwater lights?

Natural light affects the fish's perception of season and controls important biological processes like smoltification, pubertiming, growth rate as well as feed utilization. Artificial light contributes to influence these processes so that they occur at the optimal time for the commercial operations.

Idema Underwater Lights are often used for salmon, trout, cod and other fast growing species in large cage farms. Light treatment is also successfully used on smolt and juvenile in tanks and cages of different types and sizes. Correct use of Underwater Lights in aquaculture ensures reduced amounts of mature fish in addition to much faster growth and more effective feed exploitation.

Lights installed in various depths ensures a perfect light spread. Accurate and even light spread in the biomass is vital in tanks with high density and humus loaded water.

High quality Underwater Lights have excellent light spread, simple bulb replacement, functional design and a rugged constructions. Power connection for underwater lights are standard IP67 plug which enables simple installation. Cable length is standard 35 and 55 meters, both shorter and longer cables may be provided.

3.3 The Idema Underwater lights

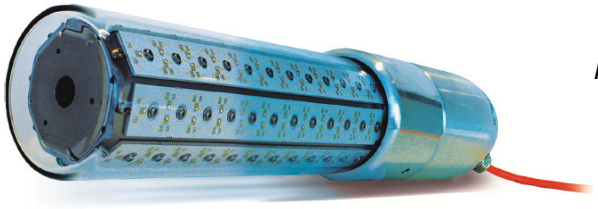
3.3.1 BlueLed

This light has blue light rays, the highest penetration in seawater, and therefore the greatest efficiency. LED (Light Emitting Diode) is often called "eternity light" and is the most cost effective light solution on the market – and a perfect match to a diesel generator. The light diodes have extremely long duration with a expected service life of up to 70.000 hours, and after 100.000h the effect has decreased only 10%!
This means; no bulb changing for many years ahead.

Recommended use: Tanks and smaller cages.

3.3.2 BlueLed 400W

This is a light with blue light rays is our newly developed luminaire for the sea cages. This Nemco approved luminaire is utilizing the newest High Intensity LED technology with eight times more effective light source than the BlueLED 100W.
The blue color has proven to be the most efficient when it comes to effect on biology in the fish. LED luminaires can provide more effective output from each luminaire compared to other lamp technologies. It saves cost on power generators, uses less power and uses less copper in the installations. All this in addition to a long service life of the luminaire and the fact that after 100.000h the effect of LED has decreased only 10%!



Recommended use: Medium and large cages.

3.3.3 SubLite Integra 250/400

The smallest member of the SubLite family. The light can be offered in two luminosities for smolt, juvenile and smaller locations. This model is often used in cod farming with lights placed at various depths for a smooth distribution of light all over the cage. The light bulb and the electronic control device are integrated in the housing compartment and have a service time in the region of 5.000 hours.

Recommended use: Tanks, smaller and medium cages

3.3.4 SubLite Integra 1000 W

Our bestselling light for salmon farms and the most rugged light unit in the market. It is placed at various depths and the powerful light ensures an excellent spread. The light bulb and the electronic control device are integrated in the housing and are easy to install. This unit also has a service life in the region of 5.000 hours.

Recommended use: Medium and large cages

3.3.5 Standard 2000 W

The most powerful solution we offer. It provides extra strong lighting in large cages where there is a need for strong light conditions without using a lot of separate units. It features solid construction with a separate connection box and a service life in the region of 5.000 hours.

Recommended use: Large cages

3.4 Technical specifications

3.4.1 Blue light

Specifications	BlueLed 100W	BlueLed 400W
Operating Voltage	230 VAC/50Hz (24DC)	230 VAC/50Hz (60DC)
Starting current 0,5 second	1,0A (230W)	1,8A (400W)
Starting current 1 second	2,5A (115W)	1,8A (400W)
Operating current (2 minutes)	0,5A (106W)	2,15A (480W)
Total efficiency	115W	480W
Service life with even color	appr. 70.000 hours	appr. 70.000 hours
Light source	1080 LED	184 LED
Color temperature	20.000 K	20.000 K (480 nm Blue)
Luminosity	-	-
Weight, light housing	8,5kg	11kg
Weight with cable	14kg (appr.2L oil)	19kg (appr.2L oil)
Weight connection box	-	-
Size, length + Ø	641mm + 120mm	641mm + 120mm
Main housing material	Aluminum 6082 T6	Aluminum 6082 T6
Main housing density	2,7g/cm3	2,7g/cm3
Material in connection box	-	-
Pyro Borocilicate glass 3.3	ISO 3585-2,23g/cm3	ISO 3585-2,23g/cm3
Cable, standard length	PUR 3G1,5 35m or 55m	PUR 3G1,5 35m or 55m
Cooling fluid	Silicone oil	Silicone oil
Recommended use	Tanks + smaller cages	Medium and large cage

3.4.2 Day light

Specifications	Integra 250/400W	Integra 1000W	Standard 2000W
Operating Voltage	230 VAC/50Hz	230 VAC/50Hz	230 VAC/50Hz
Starting current (0,5 second)	2,45A (563W)/ 3,0A (690W)	8,0A (1840W)	13,0A (2990W)
Starting current (1 second)	1,9A (437W)/2,0A (460W)	6,4A (1472W)	12,1A (2783W)
Operating current (2 minutes)	1,3A(299W)/ 1,8A (414W)	5A (1150W)	9,35A (2150W)
Total efficiency	275W / 460W	1065W	2070W
Service life with even color	appr. 5.000 hours	appr. 5.000 hours	appr. 5.000 hours
Light source	HQI-T 250D/ HQI-T 400D	QI-T 1000D	HQI-T 2000D
Color temperature	5300K / 6100K	6000K	4400K
Luminosity	20.000lm/ 35.000lm	85.000lm	190.000lm
Weight, light housing	7kg / 10kg	21.6kg	11kg
Weight with cable	11kg / 14kg	28kg	17kg
Weight connection box	-	-	19.2kg
Size, length + Ø	648mm + 140mm	818mm + 180mm	642mm + 140mm
Main housing material	POM 1,41g/cm3	POM 1,41g/cm3	POM 1,41g/cm3
Main housing density	DIN 53479 - L15	DIN 53479 - L15	DIN 53479 - L15
Material in connection box	-	-	Fire coated aluminum
Pyro Borocilicate glass 3.3	ISO 3585 2,23g/cm3	ISO 3585 2,23g/cm3	ISO 3585 2,23g/cm3
Cable, standard length	PUR 3G1,5 35m or 55m	PUR 3G1,5 35m or 55m	PUR 3G1,5 35m or 55m
Cooling fluid	-	-	-
Recommended use	Tanks + medium and small cages	Medium and large cages	Large cages

3.5 Recommended light for Salmon cages

For when using halogen bulbs:

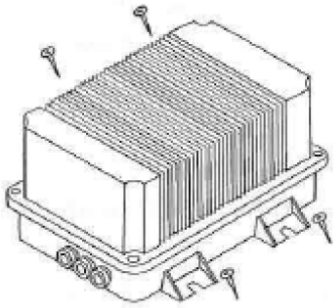
Size cage	Surface areal	Light by 3W/m2
90m cage	654m2	1935W - 2000W
120m cage	1146m2	3438W - 4000W
157m cage	1962m2	5886W - 6000W

4 Suspension for connection box

Antiskid footwear and safety garments, such as safety vest, are mandatory for working on or by the cage edge

4.1 For SubLite Standard 2000W

Do not mount the SubLite Standard 2000W connection box inside sealed cabinets



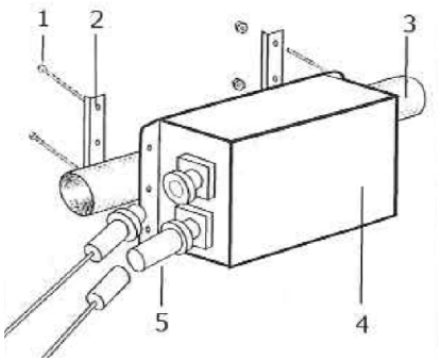
Sealing in the connection box can cause overheating.

Due to its weight it is recommended that the connection box is mounted horizontally as shown in the figure.

4.2 For SubLite Integra 250W/400W/1000W

Can also be hung by the hand rail.

1 Insert the bolts from the back side
2 Mounting brackets behind the pipe
3 Rail
4 Connection box
5 Under water light cable.



5 Power connection SubLite

Antiskid footwear and safety garments, such as safety vest, are mandatory for working on or by the cage edge

If the installation contains long cable stretches, make sure that the voltage is over 200 VAC where the luminaire is connected

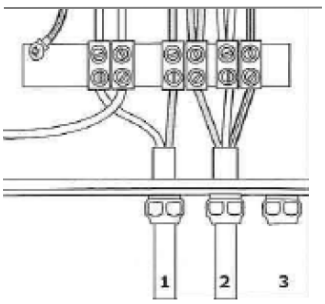
The Idema Under Water Lights should only be used with a 230 VAC 50 HZ power connection.

Connection termination:

1 OUT to light

2 230V AC in

3 Possible to continue transfer of 230 V.



Please note that the luminaire must only be connected to the armature contact on the connection box, and not to the main power

In the 2000W connection box, there is only termination inside the box.

Idema Underwater Lights are connected to power via one of two methods:

a Directly from barge to cage

b From barge to closest cage, with distribution from cage to cage (three-phased).

All light power cables are made of PUR and can be delivered with 35 or 55 meter lengths.

6 Luminaire suspensions

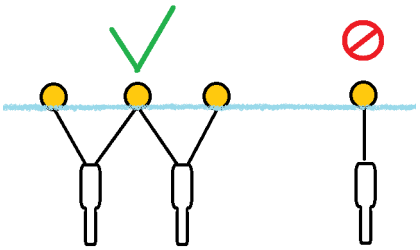
Antiskid footwear and safety garments, such as safety vest, are mandatory for working on or by the cage edge

Always use lifting ropes when suspending the luminaire. The lights must never be hung by the cables

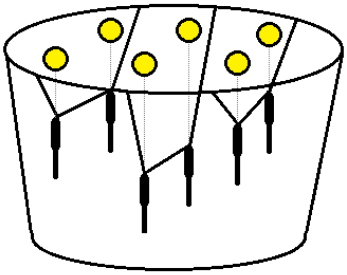
By using correct suspensions and connections, these products will provide desired function for several years ahead.

The luminaire must be suspended in a way that does not allow it to rotate around its own axis.

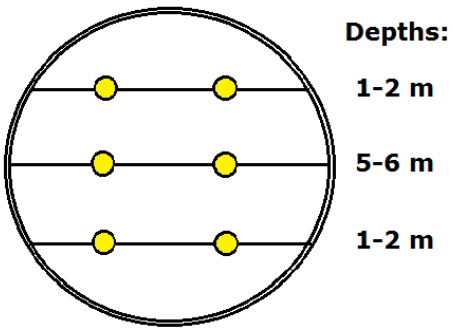
They can be suspended as a V:



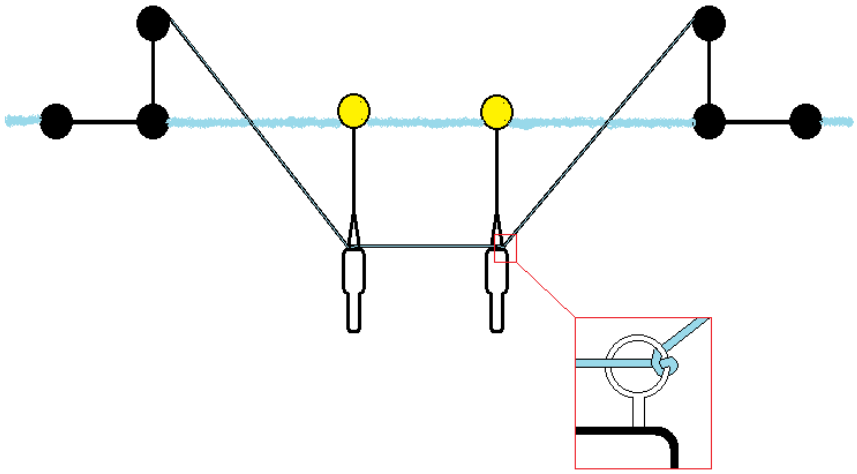
Or they may be stabilized with u-shaped suspensions:



Seen from above

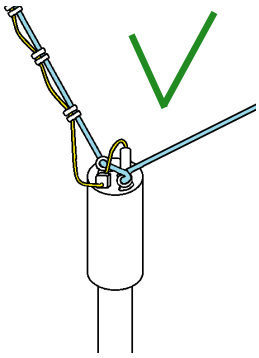


The lifting rope must be fastened steadily to the lamp, either with two ropes or with a stabilization rope that runs through both eye bolts off the lamp, stabilized with a knot:

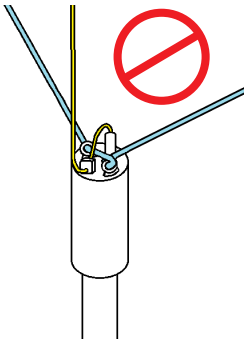


Use tape or strips to fasten the cable to the rope:

Correct method:



Incorrect method:



Make sure that the cables are not too tightly attached. They need to hang flexibly to avoid strain caused by movements in the luminaire. If the cable is fastened wrongly, and the cable is pulled off the luminaire or the bushing nipple, the luminaire will leak and the light may be damaged. Make sure that the cables does not have any cracks or breaks during mounting, as this can cause further damage to the cable and weaken the effect of the lamp and reduce its life span.

! *Suspension errors will not give warranty rights*

7 Service and maintenance

Antiskid footwear and safety garments, such as safety vest, are mandatory for working on or by the cage edge

For maintenance and service, all lamps must be brought to the barge or on land

Material and design choices for the underwater lamps are made to ensure simple maintenance.

To secure the best possible functionality and use of underwater lights, regular external cleaning is recommended.

Use a mild scrub or a brush to remove fouling, sprout, shells and other filth that is stuck on the outside of the luminaire and cable. External maintenance must be executed regularly.
AKVA recommend taking out the luminaries for check-ups and necessary maintenance once a month, and more often during the hot sprout seasons.

The external parts (glass, POM and PUR) can be disinfected if the lamp is being moved to a new location, or after diseases have been controlled in cages or tanks. We recommend that the parts are rinsed with fresh water after disinfecting.

Expected service life for the LED bulbs is in the region of more than 70.000 hours, or 8 to 10 years.
The SubLite lights are designed to last for at least 5000 hours, and AKVA recommends that the light bulbs are changed after two seasons in the sea as shown in chapter 7.1. When changing bulb it is recommended that the o-rings are changed as well.

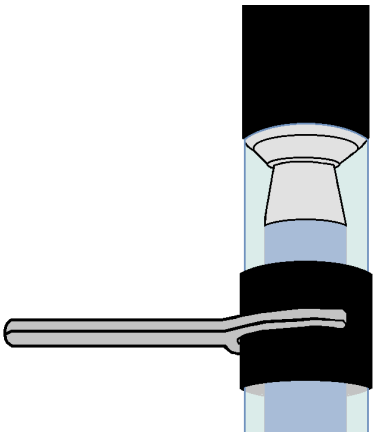
For internal maintenance beyond changing bulb and o-rings, contact AKVA group for a consultation. Contact information is found in appendix D in the back of this manual.

7.1 Change light bulb

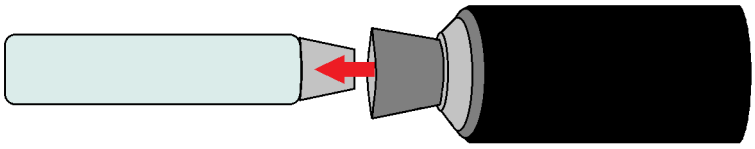
7.1.1 SubLite Standard 2000W

1 Place the hooked spanner in the holes of the tension nut. Hold the luminaire still and remove the tension nut

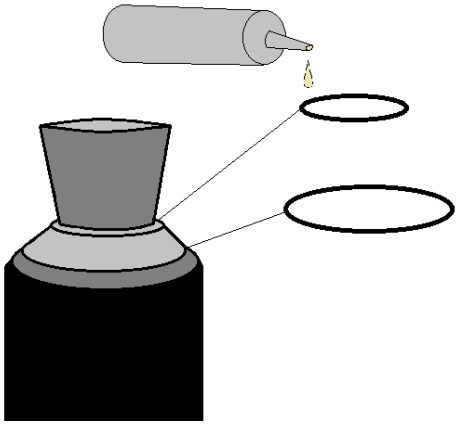
2 Pull off the glass



3 Lay the luminaire flat and replace the bulb

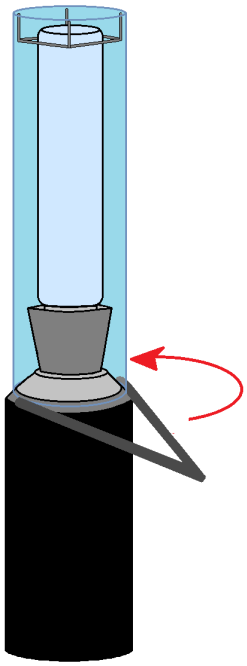


4 Lubricate the o-rings with Super Lube (or another type of teflon or silicon grease)



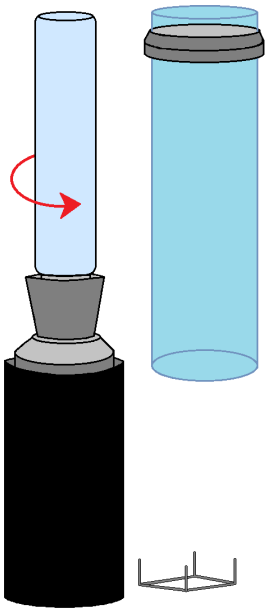
5 Carefully push the glass into the luminaire.
The bulb positioner must be placed in the bottom of the glass. Make sure that no impurities lies on the o-rings or on the glass, and ensure that the o-ring lies firmly against the glass all the way around. Hold the luminaire still and fasten the tension nut using the hooked spanner.

7.1.2 SubLite Integra 250W/4000W/1000W

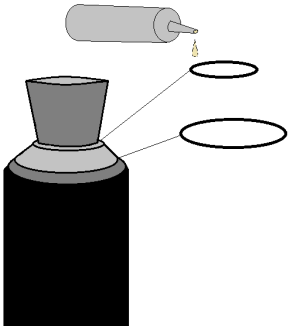


1 Place the taps of the hooked spanner in the holes of the tension nut. Carefully screw the tension nut counter-clockwise to open

There might be gas/pressure inside the lamps glass, so make sure that the opening is never directed towards a person when opening the tension nut



2 Lift off glass and tension nut and change the bulb. Avoid touching the new bulb with bare hands, to avoid finger marks on the glass. Wipe with methylated spirit when the bulb has been changed



3 When changing the bulb you should also change o-rings. The o-rings must be lubricated with Super Lube. Make sure that the glass and the o-rings are clean and free from any dirt prior to fastening the tension nut

4 Before fastening the tension nut, also assure that it is correctly positioned in the threads, and that the bulb positioner is placed correctly between the glass and the bulb.

7.2 Change male contact BlueLED 100W and 400W

Replacement of the male contact must only be performed by an authorized electrician.

7.3 Change anodes – BlueLED 400W

Use a 5mm Unbraco key to release the screws, then remove and change the anodes. Refasten the screws.

7.4 Overview for maintenance, service intervals

Activity	Hours	Month	Year	Comments
Outside cleaning		1		Clean every 14th day during growth season
Change light bulb BlueLed 100W SubLite Integra 250/400W SubLite Integra 1000W Standard 2000W	 70000 5000 5000 5000			 When required After use for two seasons After use for two seasons After use for two seasons
Change anode (BlueLed 400W)				When required
Change male contact (BlueLed 100W and 400W)				When required

7.5 Maintenance registration

Make copies of this form before filling it out

Sign after the task is performed

Date	Lamp ID	Task performed	Signature

7.6 Record of changed o-rings, luminaire and other parts

Make copies of this form before filling it out

Sign after the part/luminaire is changed

Date	Part	Reason	Comment	Signature

Appendix A - Index

Appendix B - Deviation form

Make copies of this form before filling it out

Deviation no.:	

Unit:	**Producer:**	**Prod.no.:**	**Purchase year:**

Deviation description:
Follow up proposition:
Date and signature, declarer:

Follow up directed:
Status:
New action for deviation no.:
Date and signature, follow up:

Appendix C - Notes

Appendix D - Contact information

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