SCALE AQ

Orbit LED

Content

ScaleAQ is a leading global technology provider that supplies and manufactures complete sites for aquaculture industry in more than 40 countries. The company has approximately 800 employees and offices in Norway, Scotland, Poland, Iceland, Chile, Canada, Tasmania and Vietnam. Through focus on sustainability and biology, ScaleAQ has taken a clear role in ensuring the development of technology on the terms of biology and the environment. We do this by producing and delivering technology, infrastructure and services in a solid, sustainable and innovative way.

Orbit LED

INNOVATION AND DEVELOPMENT: Constant development needs to happen at all levels of the organization. In ScaleAQ we are continuously tweaking and optimizing existing products. In addition, we do targeted development of new products based on existing solutions and long-term projects to bring brand new concepts to the aquaculture industry.

As a company we want to use our position and insight in the industry to contribute on all levels alongside our customers and partners. Our R&D department collect ideas from across the entire organization as well as from customers to establish great projects, products and systems. That is what we have done in the development of our Orbit LED lamps with associated control system. We have utilized our own experiences, customer preferences and existing research, in the development of what we believe are markets' best underwater lamp.

Sexual maturation

Orbit LED's natural light spectrum and downward facing light direction expose the fish in such a way that one reduces the possibility of sexual maturation.

Reduced lice

The downward facing light can create a natural tendency for the fish to swim bellow the "lice belt" and reduce the lice infestation.

Power costs

LED lamps replace the traditional metal halide lamps, as they offer a number of benefits, including lower energy consumption, higher efficiency, the ability to dim, as well as longer lifetime.

Solid

The Orbit LED lamps from ScaleAQ are based on durable and solid solutions. Through several years of optimizations, we are today confident about our proven solutions at all levels.

Maintenance

Through conscious material choices and thoughtful design, we minimize the maintenance of the equipment. The strong LEDs of the light keep the optical cover free of fouling.

Lifetime

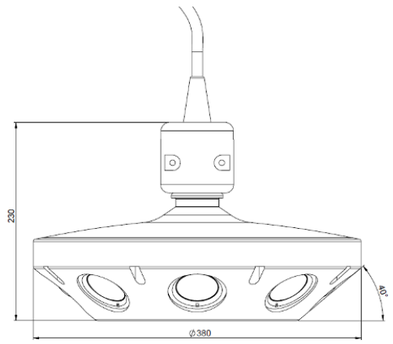
Many of the same factors that give Orbit LED low maintenance also give our equipment a long life. The LEDs have a lifespan of 50,000 hours.

Technical specifications

During the development of this lamp, we have broght with us our industry-leading experience from the design and production of our high-tech underwater cameras. The technical design of the lamp consists of decades of experience and knowledge from the aqua-culture industry.

ScaleAQ has more than 40 years of experience in aquaculture technology and equipment. Orbit LED 415 W *can* help reduce sexual maturation and lice infestation. At the same time, the fish are not stressed by the lamps thanks to the flicker-free LEDs that are supported by slow ramp up. When connected to the control system, it provides unique opportunities to take advantage of the photoperiodic lighting. The downward-facing light provides efficient light distribution by delivering light where the fish swim. Even under high current conditions in the pen, the lamp maintains the directional luminous flux. This can help keep the fish below the lice belt.

- Optimal and uniqe light distribution downward to where the fish are. Less light pollution upwards
- A robust construction to withstand the harch conditions of the sea
- Dimming
- Easy to install
- User friendly software



Tension relief

Durable cable with orange TPU material

Fastening point for carabiner hooks from the tension relief

Housing in two parts, CNC-machined POM and aluminium

Optical cover in glass

High quality LEDs

Specifications	
Ingress protection	IP68 (submerged with a maximum depth of 40 m)
Light source	LED
Material	POM, aluminium, glass
Power	415 W
Luminous flux	41 000 lm
Luminaire efficacy	100 lm/W
Maintenance of Lm output	50 000 hours (L70)
Optics	Optimal and unique light distribution for highest utilization and efficiency
Optical cover	Glass
Mains voltage	100-250 VAC / 50-60 Hz
Weight luminaire	14 kg
Electrical cable length	50 m
Connector	Orbit LED Control cabinet
No. of lamps per control cabinet	1–8
Communication control cabinet	Wireless
Control system input	RS485
User interface	ScaleAQ LED Software
Certificates	CE, IP68
Standard	NS9415, NYTEK
Diameter	380 mm
Height	300 mm
Light control set ups	Manual mode, Schedule mode, Luxmeter auto mode
Light intensity	Possible to dim, manual, schedule and luxmeter mode

Electronics

Orbit LED is a smart light. The lamp has integrated control electronics that are designed to give the user unique flexibility. Processor with memory ensures gradual ramp-up with adjustable time. Together with our software, the user gets access to high end lighting control in a sensible and easy way.

Software

- Standalone software
- Automatic detection
- Three modes: Manual, Schedule, Lux Auto

Superior lighting technology that improves operation

The software offers both automatic, manual and user-programmable control modes. The lux automatic mode uses a light sensor located on the pen that adjusts the light based on the amount of daylight at the location. Manual mode acts as a light switch, while the user-programmable mode allows the user to create their own desired light plans to support the fish on location in a customized and optimal way, or for different scenarios. The lights communicate wirelessly between pen and barge or land-based offices.

Manual Mode

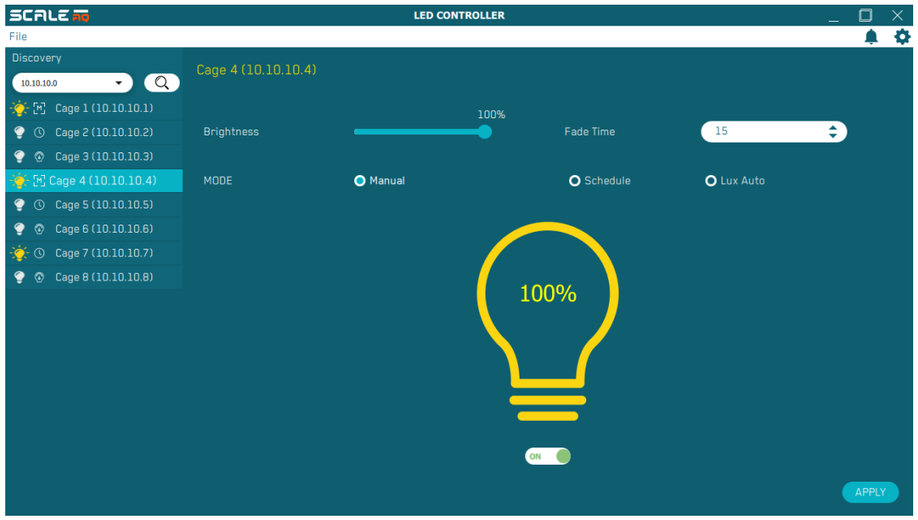
- On/off
- Brightness
- On/off dimming time

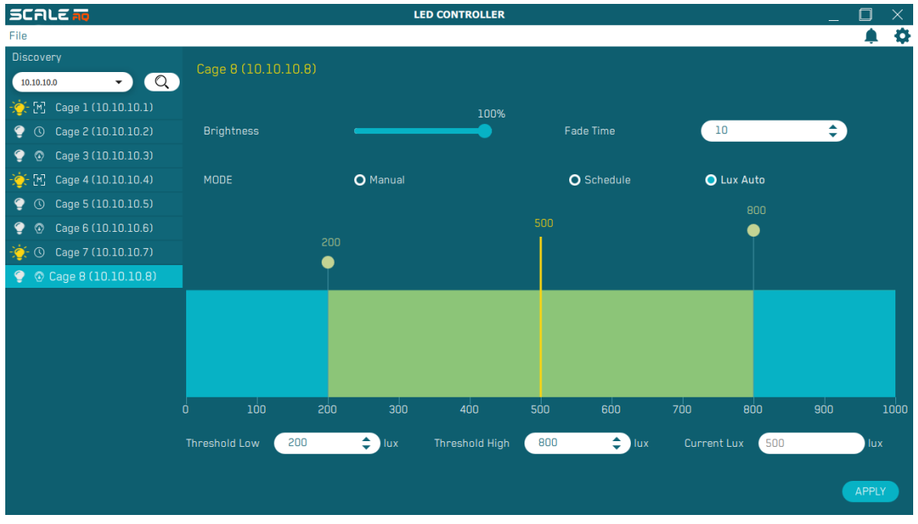
Schedule Mode

- Schedule
- Built-in battery that keeps a track on time and date in the event of power failure
- Time and date are synchronized automatically with the software

Lux Auto Mode

- Uses a light sensor located on the pen that adjusts the light based on the amount of daylight at the location
- Lower power consumption
- Brightness
- On/off dimming time





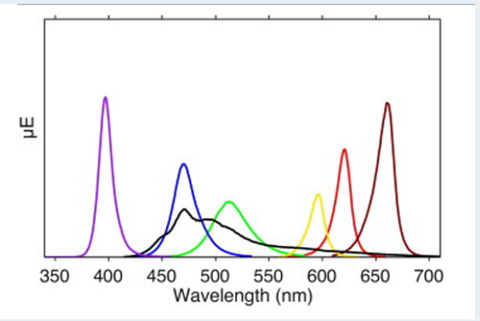
Biology

All light sources at all frequencies will reduce sexual maturation in salmon. Of all available lamp technologies, LED technology is the most energy efficient. When it comes to frequency spectrum, the available research indicates that the intensity of the light is the most important factor.

- Light intensity is the most important factor, any differences in spectrum will be eliminated close to the lamps.
- Good coverage of a net pen will most likely give the best result, as individual fish vary substantially in volume use and area preferences.
- Directional lights *may* give a stronger stimulus to keep fish below lamps than omnidirectional.
- A «natural» spectrum close to lamps may give the fish an impression of beiing close to surface, and *might* keep them deeper more of the time
- Practical aspects of deployment, how the units handle current, and operational durability is a very important aspect of choosing the right lights.

Light spectrum

“All light colours, except deep red, significantly affected swimming depth, with a trend of increased effect at lower wavelength colours”.



Normalised irradiance spectrums for lamp colours: white (black line) (peak at 470 nm, range: 425–700 nm), violet (400 nm, 370–430 nm), blue (470 nm, 440–515 nm), green (495 nm, 475–560 nm), yellow (595 nm, 575–610 nm), red (620, 590–640 nm) and deep red (660, 620–680 nm).

Directional lights for improved sealice control?

Large individual differences in response magnitude and pattern. Still substantial amount of time above light depth (8 m).

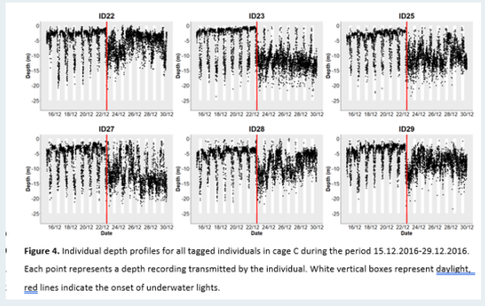


Figure 4. Individual depth profiles for all tagged individuals in cage C during the period 15.12.2016-29.12.2016. Each point represents a depth recording transmitted by the individual. White vertical boxes represent daylight, red lines indicate the onset of underwater lights.

Individual depth profiles for all tagged individuals in cage C during the period 15.12.2016–29.12.2016. Each point represents a depth recording transmitted by the individual. White vertical boxes represent daylight, red lines indicate the onset of underwater lights.

Light to prevent maturation

“Scientific data suggest that light-intensity is the main light-property affecting biological potency” 12% of pen volume irradiated above 0,012 W/m² as a rule of thumb. All light sources and frequencies prevented maturation, LED most energy efficient.

Sustainability

The world faces major challenges in finding sustainable food sources for its rapidly growing global population. Worldwide demand for seafood is growing. Aquaculture is one of the most sustainable ways to produce food.

ScaleAQ aims to be a knowledge-based advisor to the aquaculture industry, and our products include documentation and follow-up that helps to ensure our customers can create added value. This is done through efficiency, reporting and increasing levels of information.

Good environmental, social and governance (ESG) principles are key to all activities undertaken by ScaleAQ, and we have tied our work to the UN's Sustainable Development Goals. For the team at ScaleAQ, sustainability is about the future. We have to take care of the earth's limited resources. We have to manage them in the best possible way without destroying opportunities for future generations.

Overall, our objectives are:

- We will reduce our own footprint and strive towards increased circularity in **our own value chain.**
- We will help our **customers** to become more sustainable by means of new and existing products and solutions, as well as by providing advice.
- We will assume a clear **industry** role in the area of sustainability by means of increased engagement with wider **society**.

Orbit LED

- Quality provides long lifetime. Orbit LED therefore has a robust design.
- The LEDs in the Orbit LED are replaceable. This way, one can utilize the lamp over a longer period of time with minimal reinvestment and environmental footprint.
- Control by dimming during the day using a luxmeter reduces power consumption and the environmental footprint.
- LED lamps replace the traditional metal halide lamps, as they offer several benefits, including lower energy consumption, higher efficiency, the ability to dim, as well as longer lifetime.

Product overview

Orbit LED White

Standard white LED **443164**

Orbit LED Green

Green LED **445271**

V5 cabinet

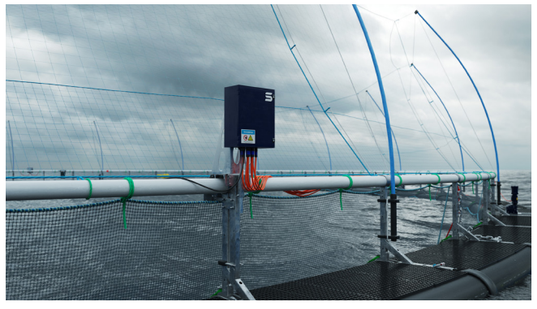
Control cabinet for lights **443590**

Each cabinet can operate 8 lights

Orbit LED Software

Software **445303**

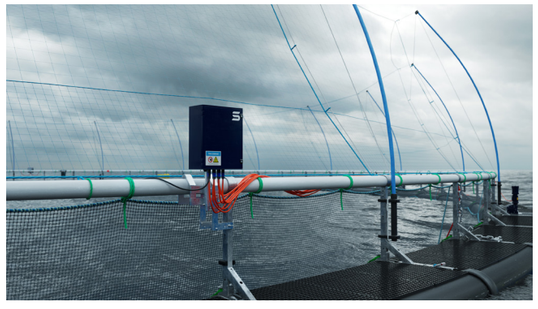
If wireless network is not available on the barge / control center, Orbit Singe AirMax Antenna is required. This is mounted on the barge so that the software can communicate with the LED control cabinets if a wireless solution is used.



Bracket for Aqualine pens

Consists of the following components:

Universal steel stanchion pen bracket	**447948**
Universal steel stanchion base plate	**447947**
Mounting bracket for base plate	**447424**
Base plate pipe support	**447426**



Orbit Bracket for other pens

Consists of the following components:

Orbit bracket for ring with clamp	**442778**
Aluminium pipe 1500 × 40 mm	**405504**

Service

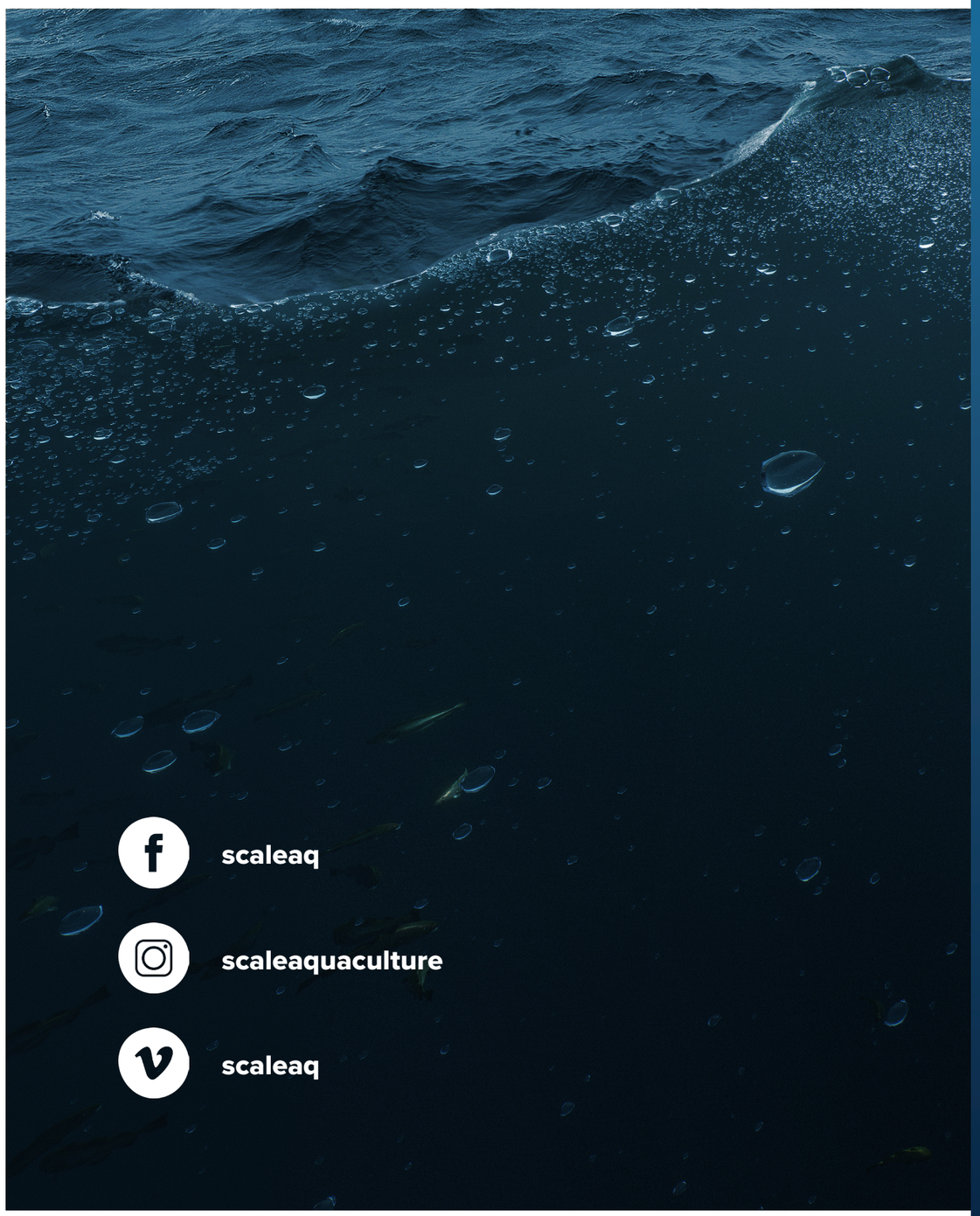
As a world class producer for and supplier to the aquaculture industry, it is really important to us that we offer our customers a service they can rely on. We are familiar with the local conditions and our service technicians have practical experience of both onshore and offshore operations, as well as an in-depth knowledge of our products. Our service technicians are equipped with their own service vehicles/boats in order to ensure that new and existing facilities alike are fitted, maintained and serviced. All service history is recorded in our service program.

ScaleAQ's service agreements provide full cost control without any unpleasant surprises. Regular service and preventive maintenance ensures predictability and continuous production at all aquaculture facilities. We have certified service technicians with high levels of expertise. Our service agreements are customized to each specific customer.

SERVICE AGREEMENT: LED-LIGHTS

Included:

- Full service prior to each deployment (equipment is sent to service center).
- Testing of all components, as well as insulation testing, continuity testing, pressure testing.
- Maintenance and list of necessary repairs incl. price of implementation.
- Assembly (including training) and disassembly.
- Support agreements available by request.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