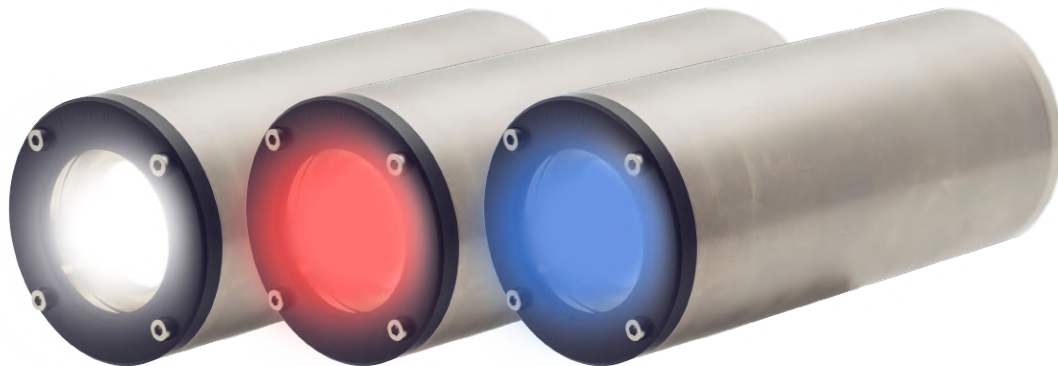# Aquorea Mk3 LED

User Manual
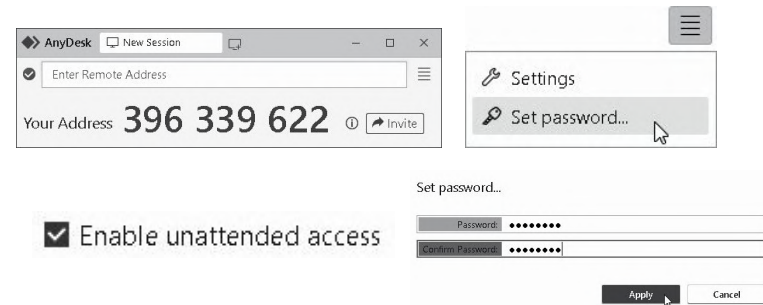
Version: 2.1
Updated: 2022-05-02

Support

Installing TeamViewer for remote support

1. Ensure the LAN functionality in TeamViewer is enabled (go to Extras > Options > General > Incoming LAN connections). Using TeamViewer over LAN allows for much faster operation and better quality. SubC recommends using a LAN connection whenever possible.
2. You can obtain TeamViewer 8 software from here
   Install and open Teamviewer on your computer. You will see a window similar to the one below.
3. Make note of your ID and password fields.
4. Contact support@subcimaging.com and provide them with your codes; they now have remote access and can help with any issues that may arise.

Installing AnyDesk for remote support

1. Download Anydesk from https://anydesk.com/. Once downloaded, open the AnyDesk.exe file.
2. Once the program is running, you will see a window similar to the one to the right. Make note of your address.
3. Click the settings button and choose the option to Set Password from the list.
4. A new window will appear, check the option "Enable unattended access".
5. Type in a password twice and click the Apply button.
6. Contact support@subcimaging.com and provide them with your address and password; they now have remote access and can help with issues that may arise.

Subsea Equipment Precautions & Maintenance

**TW:** ADR
Mech: BL
PM: CC

Updated:
2021-02-14

Please read this manual carefully before setting up and using your unit. SubC disclaims all risks and liabilities related to your failure to follow or adhere to any of the below instructions or advisories. The electronic version of this document is the controlled copy. Therefore, all printed versions of this document are uncontrolled.

1. SubC equipment is designed to work at various depth ratings on unmanned vehicles. Designs are tested to their full pressure rating. Production units are pressure-tested to a nominal rating to ensure no leaks. **If using our equipment on vehicles containing people, you do so at your sole risk as SubC equipment is not certified for direct human contact underwater.** Manned submersibles require equipment to have additional pressure-testing to ensure safety.

2. The equipment has been designed for subsea usage. Observe the operating temperature specifications before prolonged usage in air (do not operate for >10 minutes in air). Run equipment in water.

3. The power supply is polarized. Ensure the correct polarity is used before plugging into the unit. There are many built-in protections on the bulkhead pins, however, incorrect electrical connections may still damage the internal electronics. See your equipment datasheet for correct wiring. Some equipment has a custom pinout selected at point of sale. Check your documentation before powering.

4. Water **should not** come in contact with the pins on the bulkheads. When not in use, use dummy plugs. If water touches the pins, use contact cleaner and compressed air to remove the water.

5. Before attaching the connector to the equipment, be certain that the pins are aligned, clean and lightly lubricated with appropriate silicone o-ring grease (Ultimate o-ring lubricant for example http://www.ablesealanddesign.com).

6. All fasteners on the equipment are metric. They should be hand-tightened during regular maintenance.

7. **Caution:** LED flashing may cause **seizures** in people who are susceptible

O-Ring Lubricant

Best practices for assembling your system

Greasing the Connector/Dummy Plug (**ABOVE WATER - DRY MATE ONLY**)

A. Connectors must be greased with Molykote 44 Medium (or equivalent) before every mating. **Check the MSDS for your type of o-ring lubricant before use.**

B. A layer of grease corresponding to minimum 1/10 of socket depth should be applied to the female connector

C. The inner edge of all sockets should be completely covered, and a thin transparent layer of grease left visible on the face of the connector

D. After greasing, fully mate the male and female connector in order to secure optimal distribution of grease on pins and in sockets

E. To confirm that grease has been sufficiently applied, de-mate and check for grease on every male pin then re-mate the connector


Recommended level of grease

System Hookup
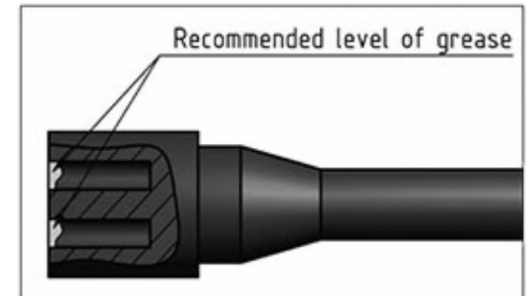
Best practices for assembling your system

For the fundamentals of how to capture excellent underwater photos and detailed video, check out our Underwater Photography Guide:
http://ftp.subcimaging.com/docs/SubC_Underwater_Photography_Guide.pdf

1. **SubC products are designed to run in water.** There is built-in thermal protection in our equipment, however, we cannot guarantee performance in air.

2. The camera, LED, and laser should be attached to a solid mounting point with either stainless steel hose clamps OR a machined clamp. In between the mount point and the equipment, use some neoprene rubber, electrical tape, or similar insulation material to prevent corrosion from dissimilar metal contact.

3. To limit particle backscatter, the LED should be positioned as far away from the camera as possible in the system while also angling the light so that there is sufficient overlap. The Rayfin camera field of view is 80 degrees diagonal and the LEDs beam angle is also matched at 80. So the light should be slightly further from the scene than the camera, which is easily achievable. If it isn't set up properly, you may end up with dark corners in the images.

4. When connecting the cables to the equipment, use o-ring lubricant. See page about o-ring lubricant.

Steel mount
Neoprene Rubber
Camera

80°   80°
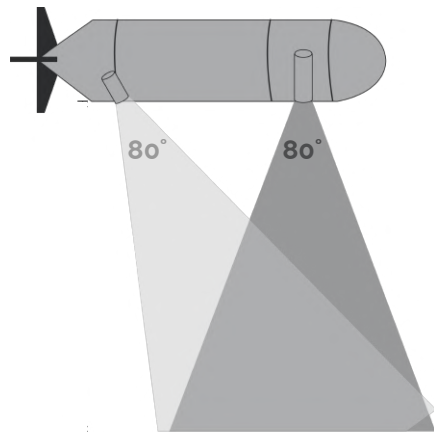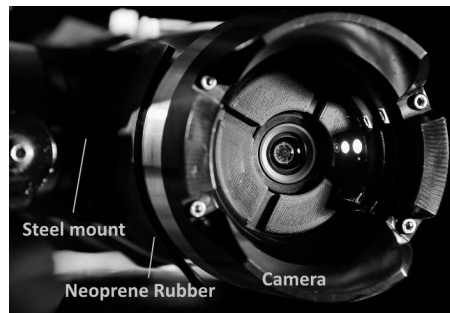
Aquorea LED Intensity Versus Beam Angle

- The following plots illustrate the LED intensity and light coverage of the Aquorea at various beam angles ranging from 0°-80°.
- The intensity plot on the left shows the LED intensity as a percentage of the maximum intensity measured for the Aquorea.
- The plot on the right shows the percentage of the total light output of the Aquorea that is contained within each beam angle. For example, the 60° circular beam contains 82.7% of the total light output of the LED, this is the sum of the total light output contained between 0-60°.
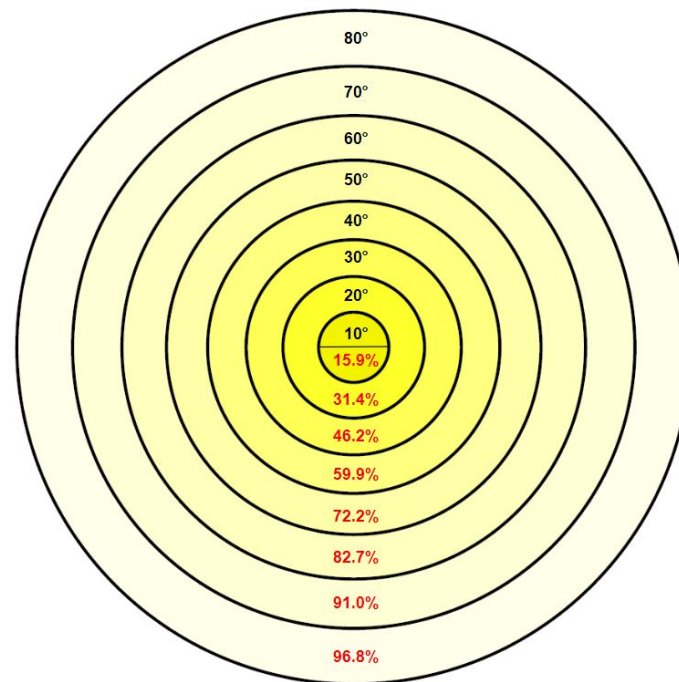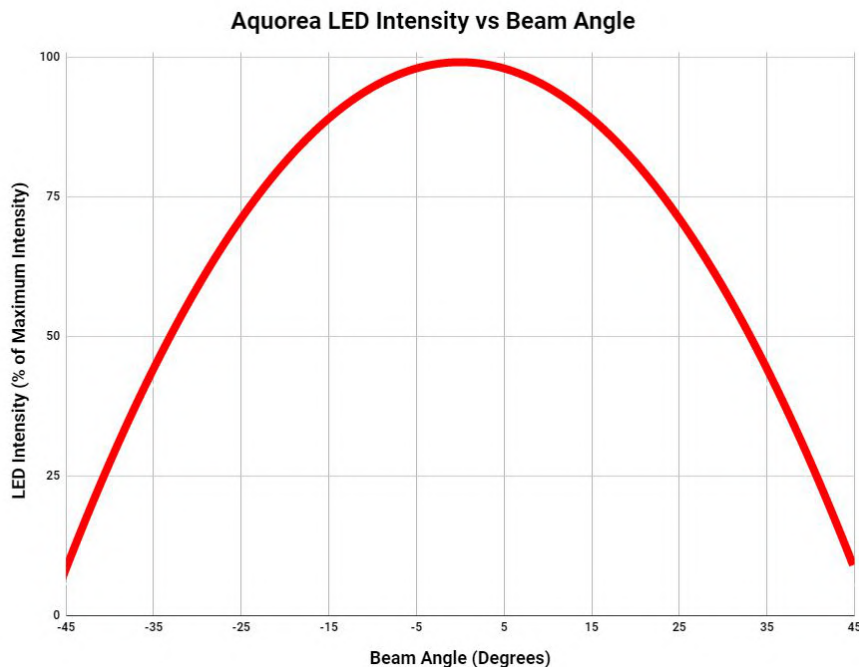
Datasheets (links)

Aquorea Mk3 LED White

Aquorea Mk3 LED Color

Quickstart & Setup

SubC Accessory Quickstart Kit

Normally, SubC LEDs and lasers are powered and controlled via SubC cameras. In instances where SubC LEDs and lasers are sold separately from the camera, we have a quickstart kit for bench testing prior to integration with your system.

The Quickstart Kit includes:

- MCIL5F with a breakout to power and serial connectors

- USB to RS-485 converter

- AC-DC power supply (24VDC @ 5Amps)

- AC power cable matching your region (US, UK, Europe, Asia)

- Hard shell carrying case with pluck foam

Aquorea Mk3 LED

MCIL5F with breakout to power and serial

USB to RS-485

AC-DC power supply

Hard shell carrying case

Region specific AC cable

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Aquorea Mk3 Quickstart

PC with Termite serial software

1. Review the datasheet (white /color) for the pinout of your LED.
2. Plug the USB to RS-485 device into the PC.
3. An installer for Termite is included on the USB stick. Direct link here. Install Termite on the PC. Open it and click Settings.
4. Select the Port for the RS-485 device and 115200 Baud Rate. Set it to Append CR-LF and click OK.
5. Plug a MCIL5F cable into back of Aquorea Mk3.
6. Plug a RS-485 connector into the DB9 of the MCIL5F whip.
7. Plug a 24VDC power supply into the MCIL5F whip.
8. The LED will power on at its previous power setting.
9. Adjust the brightness with **~device set lamp:**### (0 - 100)%.
10. For more commands, refer to the Control API in the manual.

24VDC power supply

MCIL5F whip

USB to RS-485

Required Components	
Aquorea LED	MCIL5F whip with DC and serial breakout
Windows PC	AC-DC power supply (24VDC)
USB to RS-485 device	USB stick with Termite serial program

Camera + LED Seperate Power Sources

Aquorea LED   **Aquorea LED**   **Rayfin**

MCBH5M   MCBH5M   MCBH5M MCBH5M DBH13M

Pin 3-5 (signals)

Pin 3-5 (signals)

Ethernet Camera Cable

LED Y Splice cable   LED Y Splice cable

Pin 1-2 (power)   Pin 1-2 (power)

LEGEND

→	HD-SDI
→	Analog Sync Signal
—	RS-485
—	RS-232
•—•	Fiber
—	ROV Power (15 - 28Vdc)
—	5Vdc

BH Type Purpose	Bulkhead

Device

Device name	Underwater cable

■—■

Power Requirement

Rayfin = 12Watts (max)
2x Aquorea = 48W or 120W (selectable) each
Total = 110 to 250 Watts @24v
(not constant power draw, these are maximum values)

System Pod

Ethernet + 20-30V

Ethernet + 20-30V

LED 5A @ 20-30V

LED 5A @ 20-30V

If powered from the Rayfin directly, the LEDs are limited to 2A each. To output as much light as possible, power the LEDs directly from the system. and have them set up the 5A limit. The strobe and serial signals come from the camera.

The DC supply for the LEDs should be at least 12A (10A + 20% buffer)

The current limit is an Advanced setting: SetCurrentLimit(5.0) which is sent from the Rayfin Advanced control panel OR through an API call.

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Control API

LED Control API - Comms Commands

Addressing (multi-drop)
Commands can be sent to a particular LED by appending "|" (pipe) and the device's serial number (e.g. ~device set lamp target:100|SUBC20150)

Serial settings
Baud Rate: 115200
Byte Size: 8
Parity: None
Stop Bits: 1
Flow Control: None

All commands start with a '~' (tilde) character and end with a '\n' (newline). Commands are <u>not</u> case-sensitive and the order of command words does not matter.

~comms set driver baud:#	Set baud rate of all controller ports. Can be an index from list below or literal baud rate. **0** = 9600 **1** = 115200 **2** = 57600 **3** = 19200 **4** = 4800 **5** = 250000
~comms set auto echo:#	If enabled, auto echo inserts an echo character at the beginning of every line so all serial output is visible in SubC software.
~comms print status	Print all comms status information.
~comms ping	Echos "@ping". Can be used to test serial operation.

LED Control API - Device Commands

~device print fault	Prints all system faults and all presently asserted alarms.
~device clear alarm	Clears all asserted alarms.
~device set lamp:###	Sets lamp target value between (0-100)% of the current limit.
~device print lamp	Prints the commanded lamp value between 0-100% of the current limit.
~device set lamp target:###	Sets lamp target value from (0-100)% of the maximum driver output.
~device print lamp target	Prints the commanded lamp value between 0-100 (may not be the actual light output).
~device print lamp output	Prints the actual lamp value between 0-100.
~device set strobe target:###.#	Sets the strobe value from (0-100)% of the maximum driver output.
~device print strobe target or **~device print strobe**	Prints the commanded strobe value between 0-100.
~device print strobe output	Prints the actual strobe value between 0-100.

All commands start with a '~' (tilde) character and end with a '\n' (newline). Commands are <u>not</u> case-sensitive and the order of command words does not matter.

LED Control API - Device & LED Commands

TW: ADR
Mechanical: BL
Production: JMH
Electrical: CC

Updated:
2021-04-25

~device print temperature	Print the temperature of all system thermistors (see also ~sensor print temperature).
~device set current limit:#.##	Set the current limit in Amps. Valid arguments are **2** and **5**; Also responds with the lamp maximum command (0-100).
~device print current limit	Print the current limit in Amps.
~device print voltage	Print the measured supply voltage and capacitor voltage.
~device print capacitor threshold voltage	Print the capacitor threshold voltage.
~device print led type	Print the type of LED and driver connected to the controller.

All commands start with a '~' (tilde) character and end with a '\n' (newline). Commands are <u>**not**</u> **case-sensitive and the order of command words does not matter.**

LED Control API - Sensor Commands

TW: ADR
Mechanical: BL
Production: JMH
Electrical: CC

Updated:
2021-04-25

Command	Description
~sensor print status	Print all sensor status information.
~sensor print temp	Print current temperature, the high and low records and the target temperature.
~sensor print temp high	Print the record high temperature.
~sensor print temp low	Print the record low temperature.
~sensor print temp target	Print the target temperature or "nan" (not a number) if temperature regulation is disabled.
~sensor print runtime	Print the total product uptime.
~sensor print humidity	Print the current humidity.
~sensor alarm clear	Clear all currently asserted alarms.
~sensor alarm suppress	Toggles alarm warning messages. Alarms default to unsuppressed after a power cycle.
~sensor set timer:#	Set the sensor update interval in seconds between **1** and **60**. Default is **10.**
~sensor set timer mode:#	Set sensor update mode: **0** = silent **1** = continuous **2** = on change (default).

All commands start with a '~' (tilde) character and end with a '\n' (newline). Commands are <u>not</u> case-sensitive and the order of command words does not matter.

# Options

For Natural Marine Behavior Surveys

SubC Imaging has created a system that incorporates our field-proven smart cameras and the **Red** Aquorea lighting to create a toolset that can view underwater life without disturbing their natural patterns and behavior.

When the camera is used in conjunction with the Aquorea with Red lighting it offers superior underwater low light capability, undetectable by marine life.

The long wavelength red light is quickly absorbed and extinguished by the uppermost layers of water. Because of this fact, natural selection preferred sea creatures with more blue/green cones vs red.
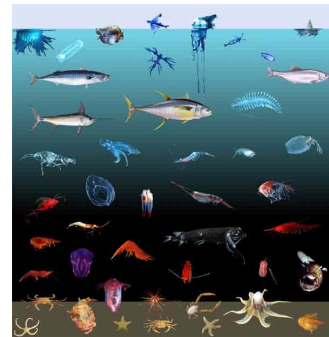
Sample - Cod Traps

This gives ROV operators and Marine Scientists another capable tool for viewing and working in the harsh ocean environments.

Light penetration in open ocean.

Light penetration in coastal waters.
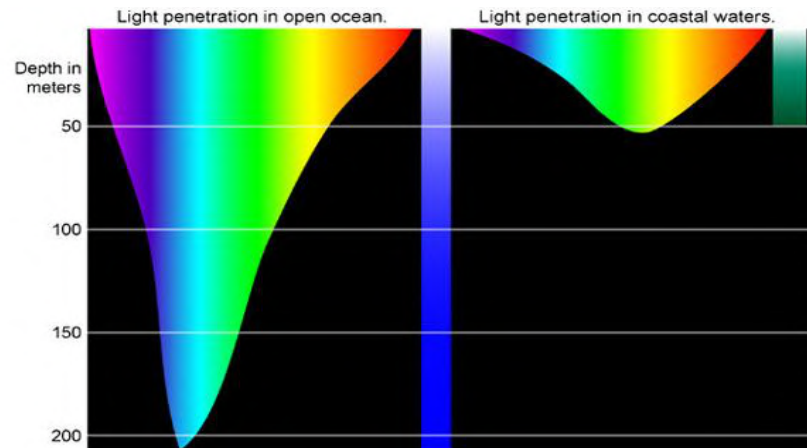
Typical ocean creature eye spectral response
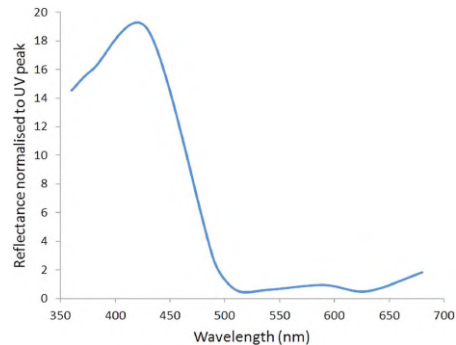
Coloration of animals related to depth

Aquorea Mk3

User Manual

As leaders in our field, our goal is to provide complete imaging solutions to the subsea professionals. Our first step is always a simple conversation about the nature of your project and how our solutions can help you achieve success.

If you're interested in learning more about our products and services, please reach out to: support@subcimaging.com