APHOS 16 SERIES

Deep Water Subsea Light

Instruction Manual

Document# : CA82-0019

V1.0

Table of Contents

WARNING:

PLEASE READ THIS BEFORE POWERING UP THIS PRODUCT

The enclosed LED light products are capable of output in excess of 40 Watts of optical power.

Currently, this optical beam is of higher power than any similar optical beams (Derived from LED) commercially available today.

There are therefore a number of new dangers that must be considered in handling these devices in order to prevent accidents or damage.

The 40W of optical power is emitted from a mechanical array of LEDS with a beam diameter of under four inches.

The Optical Power density of this emission is potentially hazardous, particularly when operated in air where individuals may be exposed to the radiation. Only people who are adequately trained and experienced in handling equipment of this type should do so.

The following guidelines should be followed for safe use of these lights:

- **Do not look in to the lights even at low power as they can be instantly ramped up to full power**
- **There is a risk of eye damage from direct exposure to the exiting light; care should be taken to prevent user exposure in Land based trials through suitable attenuators or mechanical mounts.**
- **Do not place any material close to the front of the light as it is capable of causing damage to light absorbing materials including plastics. DO NOT USE A LENS COVER TO BLOCK THE LIGHT AS IT IS LIKELY TO MELT TO THE SURFACE EVEN IN WATER.**
- **Some materials placed close to the light beam are potential fire hazards as optical radiation, absorbed sufficiently can potentially cause fire.**
- **Care should be taken with high power strobe operation as pulsed emission at certain frequencies can adversely affect some individuals and induce fits.**

Under the international standard, Photobiological safety of lamps and lamp systems IEC 62471 -2006, the individual LED lamps should be considered as an exposure hazard. The array of 16 such LED lamps in these devices should be considered above all exposure hazard limits as described in section 4.3 of this standard.

1. System Overview

The system supplied consists of

- 2 x Aphos 16 series Deep Water Lights

Figure 1. Aphos 16 series deep water light

- 2 x Aphos 16 series adjustable mounting Brackets

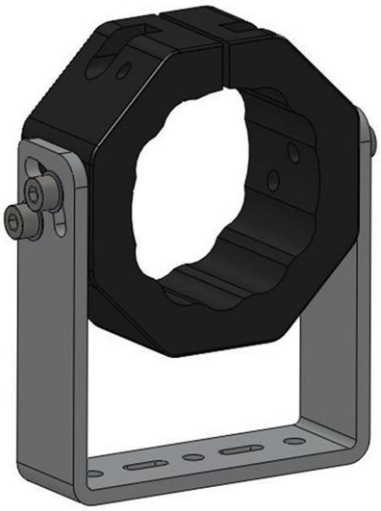


Figure 2. Aphos 16 series mounting bracket

- 2 x 3.1m subsea cables to be installed by user

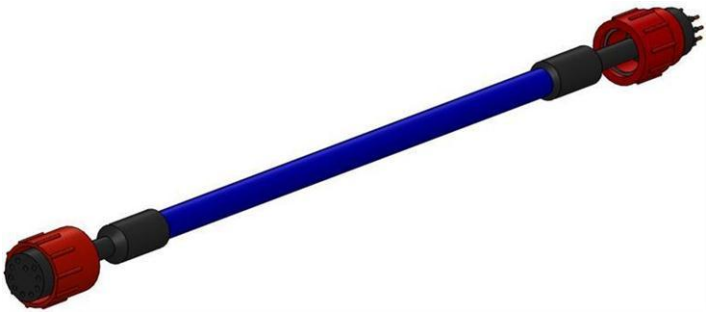


Figure 3. Aphos 16 series connection cable

2. Light Specification.

Light Power Output	
High Voltage DC Output	28,000 Lumens
Full Wave AC Output	28,000 Lumens

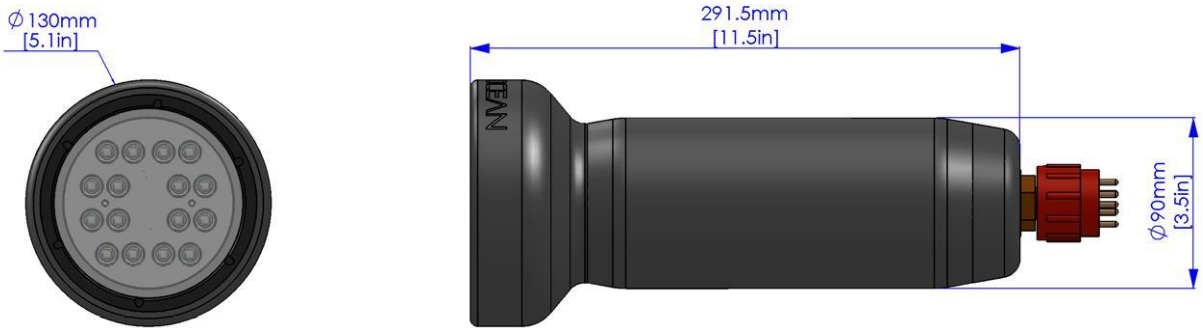
Lighting Parameters	
LED Colour	5,700K
Number of LED Channels	4
Optional Colour Tuning	Available upon request
Beam Angle	<30 degrees FWHM

Electrical Parameters	
High Voltage DC Input	180-375 Vdc
Full Wave AC Input	140-260 Vac up to 500Hz
Electrical Power Usage - Continuous Run	600W Max.
Inrush Current	<40A @ <5ms
Electrical Power Use - Strobe Operation	~60W @ 10% Duty Cycle (Proportional to Duty Cycle)

Optical Pulse	
Pulse Frequency	1Hz to 10,000Hz
Number of LED Channels	From 50 microseconds to continuous

Control	
DC Control	RS485
AC Control	RS485

Mass	
In Air	4.8kg (10.6lbs)
AC Control	<2.6kg (5.7lbs)



3. Light Dimensions

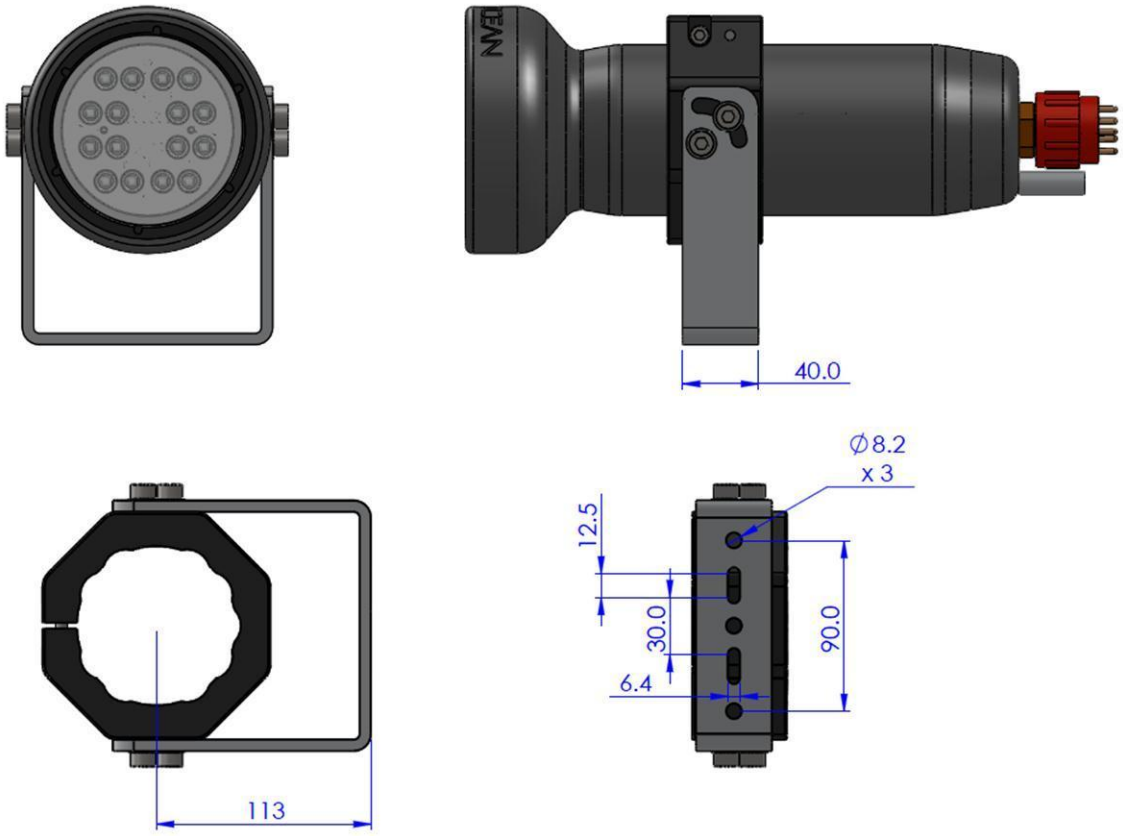


Figure 4. Aphos 16 series dimensions

4. Cable Specification and Wiring

4.1 Control Specification

The Aphos lights can be operated in a number of ways.

- On/Off at 100% power level - this required only connection of the power cores
- Full RS485 Control - All cores connected.
- Trigger operation- synchronising with a camera which has a trigger output.

Figure 6 shows a guide on wiring up the Junction box. The power cores can be connected up as normal to each individual light.

Great care should be taken that AC is not applied to any pins other than 1&2 as permanent damage can occur to the light.

The trigger can be joined together +ve to +ve and –ve to –ve.

RS485 connection is achieved by passing the signal through the lights in a multi drop pattern.

This sequence can be easily extended in the future. The termination resistor is required for reliable operation, If possible the ground of the incoming RS485 should be connected to pin 8 the –ve of the Trigger. This allows optimal operation of the network.

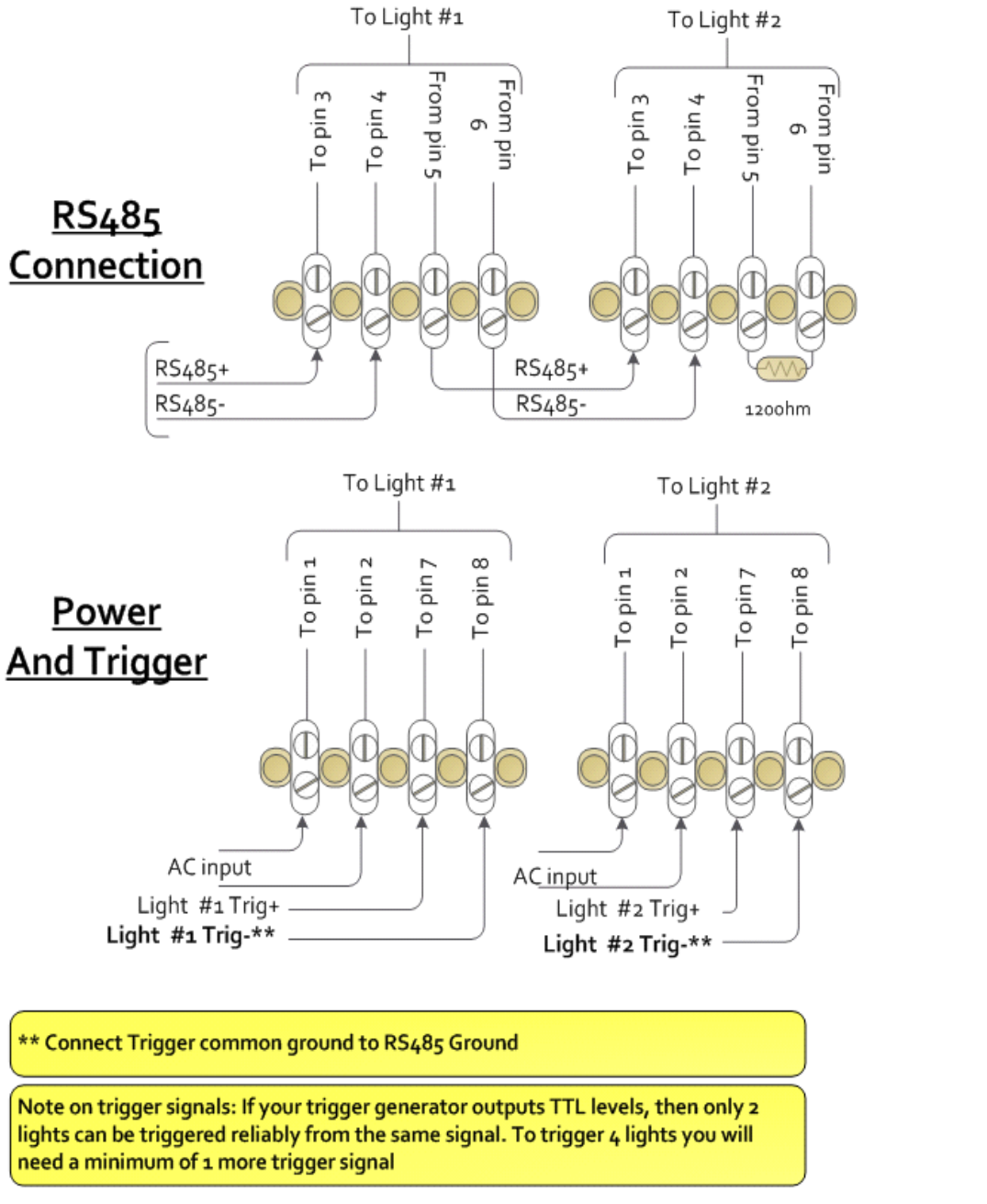


Figure 6. RS 485 Connection Diagram

5. User Setup Guide

The light can be operated in air or water, the unit has been designed to primarily operate in water as the high output of the LED will lead to the body of the unit heating up. If the unit is continually used in air, the internal temperature control system will step the power output down to prevent the unit overheating.

Please note that prolonged use of the light can result in the light becoming very hot to touch.

5.1 Hardware Setup

- Remove the Mounting Brackets from the Peli-case supplied.
- Align Brackets to the mounting point on the ROV.
- Tighten screws until the bracket is secured.
- Align Aphos series 16 unit to mounting bracket and tighten.
- If required, the angle of the unit can be altered by loosening the screw on the side of the bracket, adjust the position in the slot and re-tightening.

5.2 Software Setup

- The Software will be delivered electronically from an FTP type location. This location will be agreed separately.
- The latest version number should be installed. New versions will be uploaded when they are released and notification plus release notes will be sent to the Customer.
- An initial setup file is normally supplied to new users to enable quick start up. This is normally reflects the lights in the first order. This file is of the form xxxx.lscn. Once experienced the user can easily build such file themselves.
- Download the *CathxLightingControllerInstall_VX.X XXXX XXXX.zip* File
- Extract the *CathxLightingControllerInstall_ VX.X XXXX XXXX.msi* from the ZIP file and store it to a temporary Location.
- Run this file and proceed with the command prompts that appear on screen as follows.

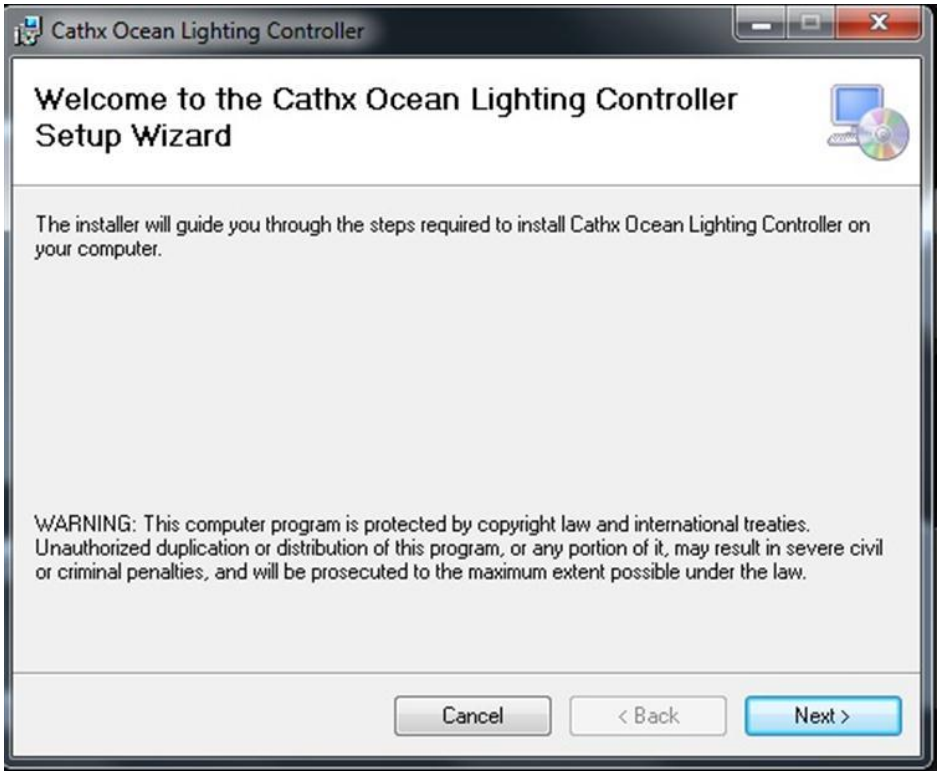


Figure 7. Welcome Window

Initial window, click next to proceed with installation

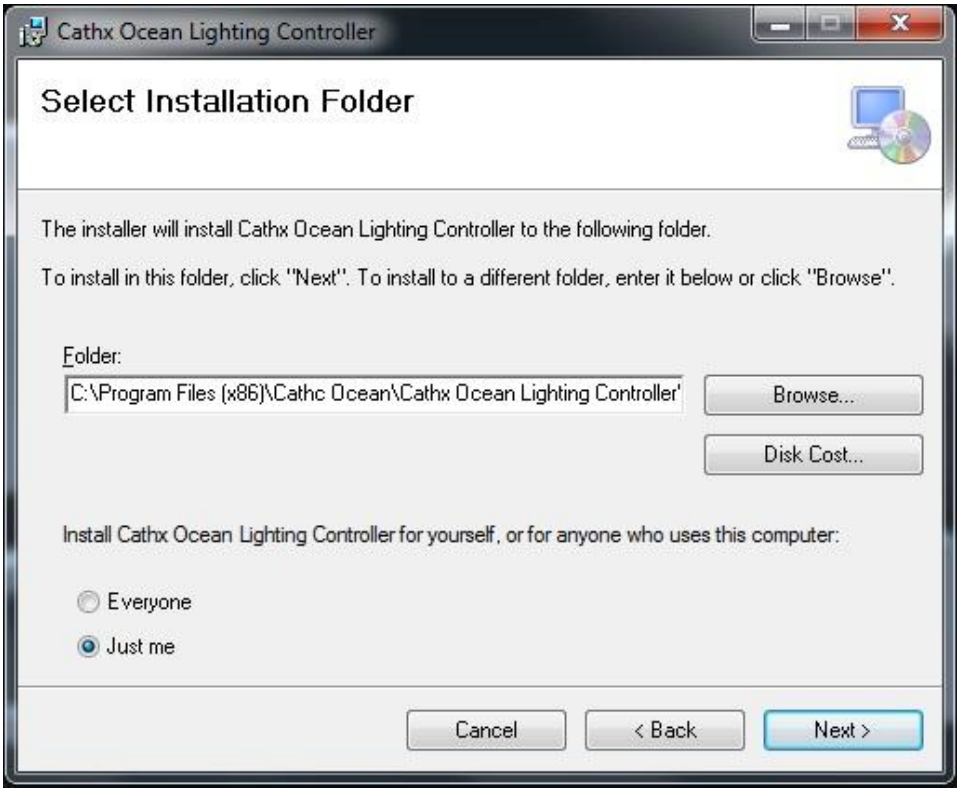


Figure8. Select Installation Folder Window

Select Installation Directory, to use default location click next

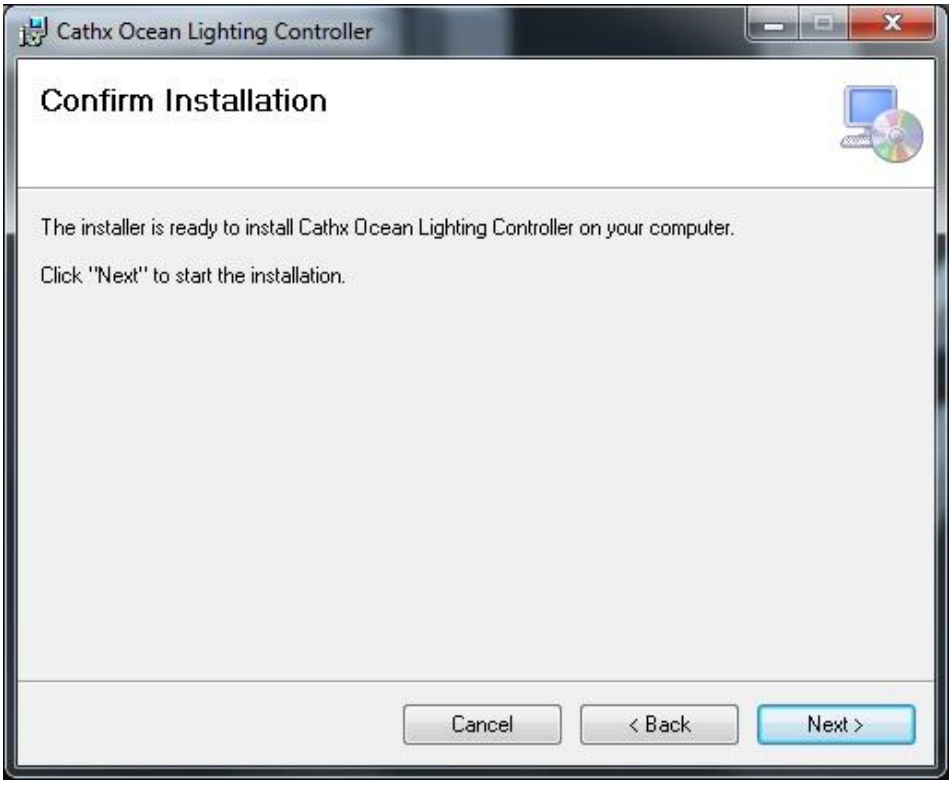


Figure 9: Confirmation Window

Confirm Installation, click next to proceed with installation

Figure 10. Progress Window

Software Installation, please wait while the Lighting Controller is being installed

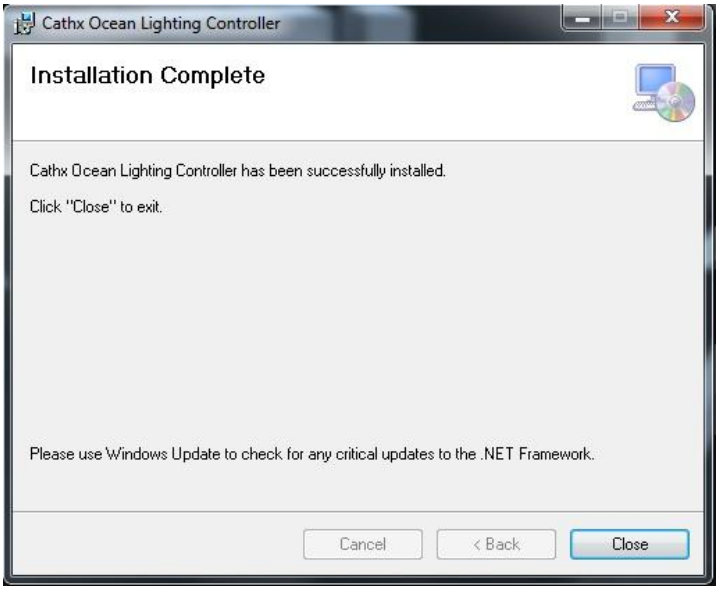


Figure 11. Completion window

Installation complete, click 'Close' to exit

Figure 12. Cathx Lighting Controller Icon

CathxOcean Lighting Controller icon will appear on desktop after installation, double click this icon to run software

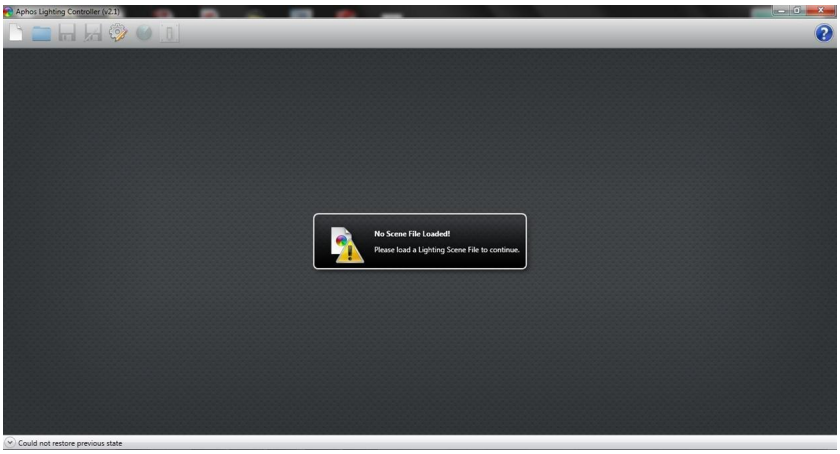


Figure 13. Initial software window

A window will appear asking the user to load a Lighting Scene File, the initial lighting file will be provided by Cathx Ocean and is available for download from the same location as the lighting software and user manual.

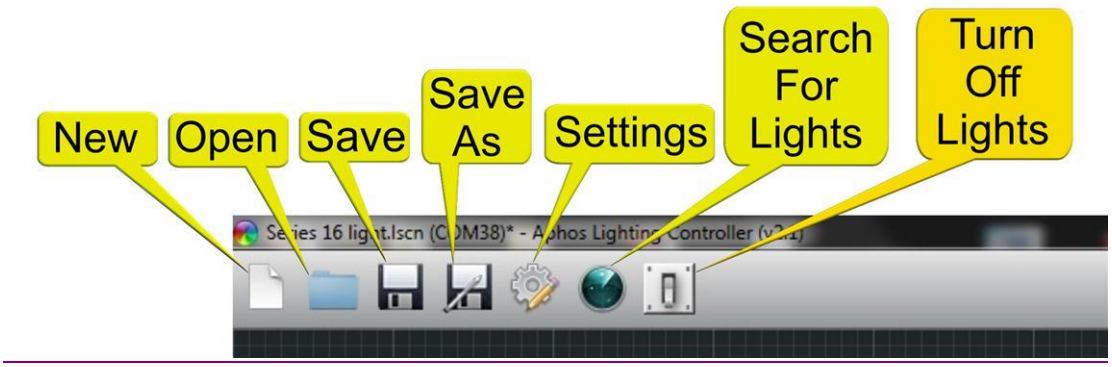


Figure 14. GUI Toolbar Overview Initial Software Window

The GUI toolbar contains the following features

New - To create a new file

Open - To open an existing file

Save - To save the current file

Save As - To save the current file with a specified name and directory

Settings - Enables Physical Connection from RS485 to Lights

Search For Lights - Enables software communication with connected lights

Turn Off Lights - Disables all lights connected

Enabling Physical Connection

As seen in fig. 15, click the settings button located on the toolbar. A pop up window will expand that allows the user to select which port the RS485-USB connector is located.

Select the detected ports button; this will illustrate the available ports for communication. User selects the desired COM for communication. Click on the '-select port-' drop own menu button. Select the COM that represents the RS485-USB connector on your PC.

After the port has been selected, select the update button located at the bottom right of the window. After this has been updated, click on the close symbol located at the top right of the window.

A line of communication has been enabled. The user can now proceed with operating the software.

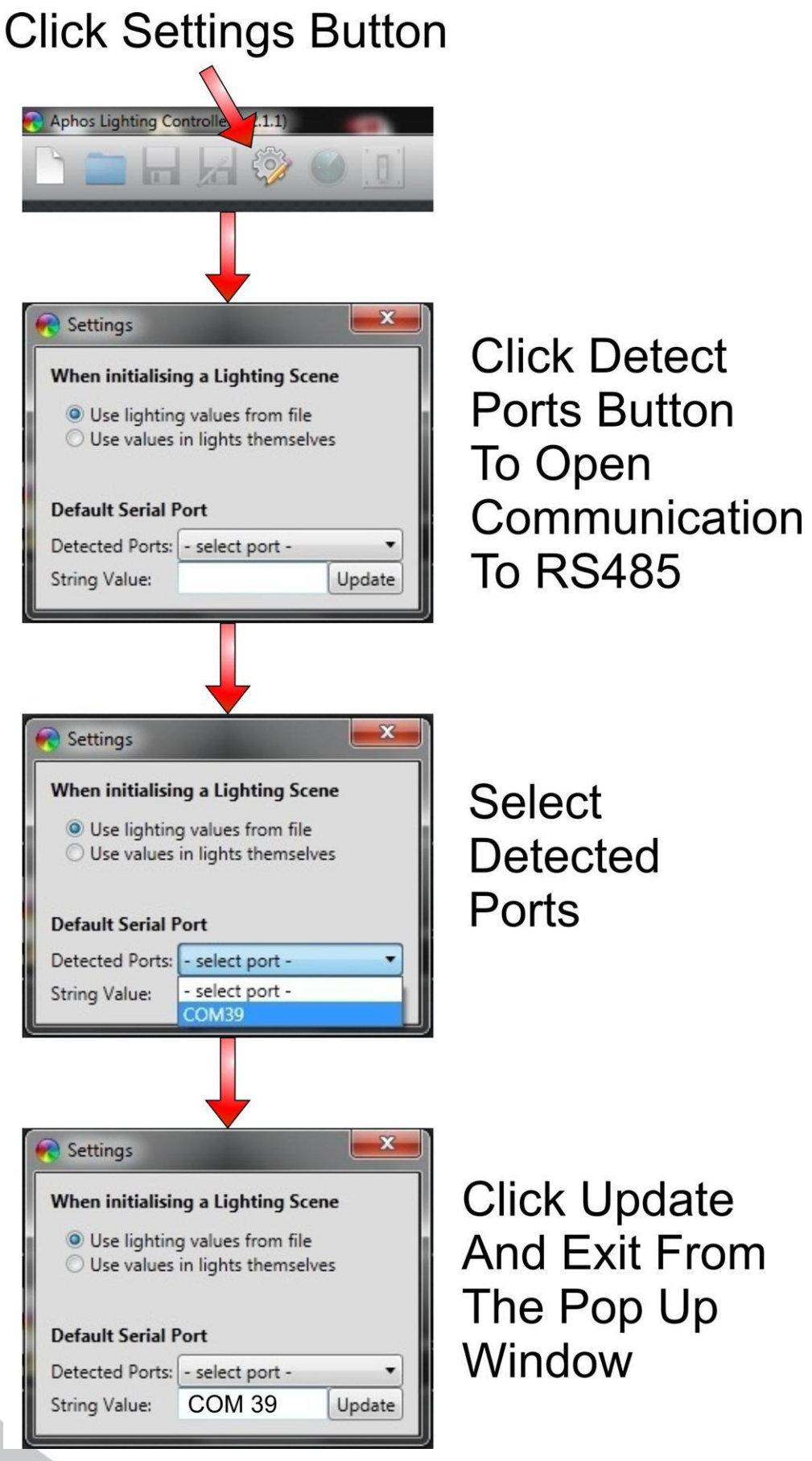


Figure 15. Enabling Physical Connection Process

Opening a scene file

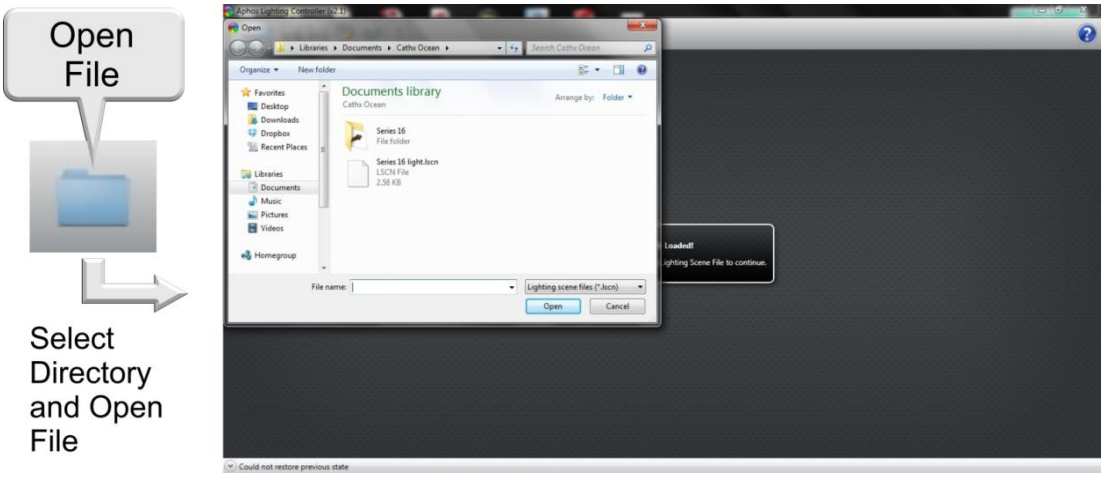


Figure 16. Lighting Scene File Opening Process

An initial lighting file (xxxx.lscn) is supplied from Cathx Ocean. To run the file with the Cathx Ocean Lighting Controller, perform the following

Download the file from the FTP location and save the lighting file to the desired location.

To Open File, please complete the following:

Select Open File icon, located on top control bar

Locate the directory where the file is stored

Select File

Click Open

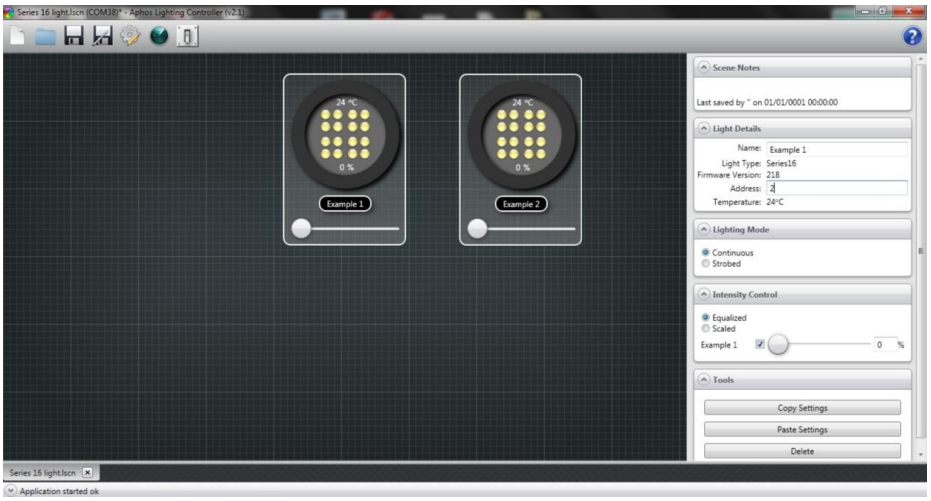


Figure 17. Software Window when ready for use

After these steps have been completed, the following image should appear on screen. The software is now ready for use. To operate the lights, go to the intensity control window, click the enable button to enable the selected light. Move the slider to change the lights intensity level.

5.3 Initial Operation without RS485 network

When powered without the use of an external control network (e.g. RS485) the light will automatically operate at 100% output. To achieve this, perform the following steps:

- Connect up the cable whip as detailed in section 4
- Assemble a light on to each cable end. Close up locking sleeves.
- Ensure Light is not pointed towards or close to someone.
- Apply power.

5.4 General Operation

The Aphos 16 series units are configured for on/off use at 100% power value.

The units are safe to use in either air or water. Prolonged use in air isn't possible due to heat output of high power leds. In order to operate or test the light in a continuous manner in air, it will be necessary to run a gentle stream of water over the body of the unit to dissipate the heat from the LED lighting array.

5.4.1 GUI Overview

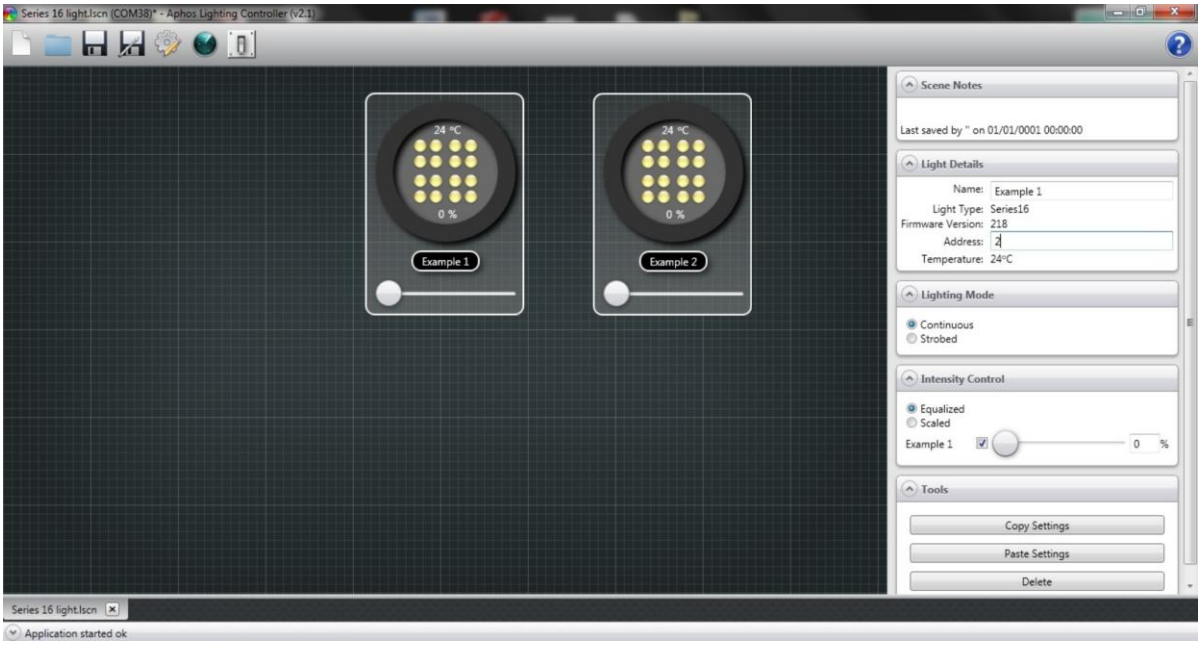


Figure 18. Software GUI

The graphical user interface of the software can be seen in fig. 18. The software allows multiple lights to be operated at any given time.

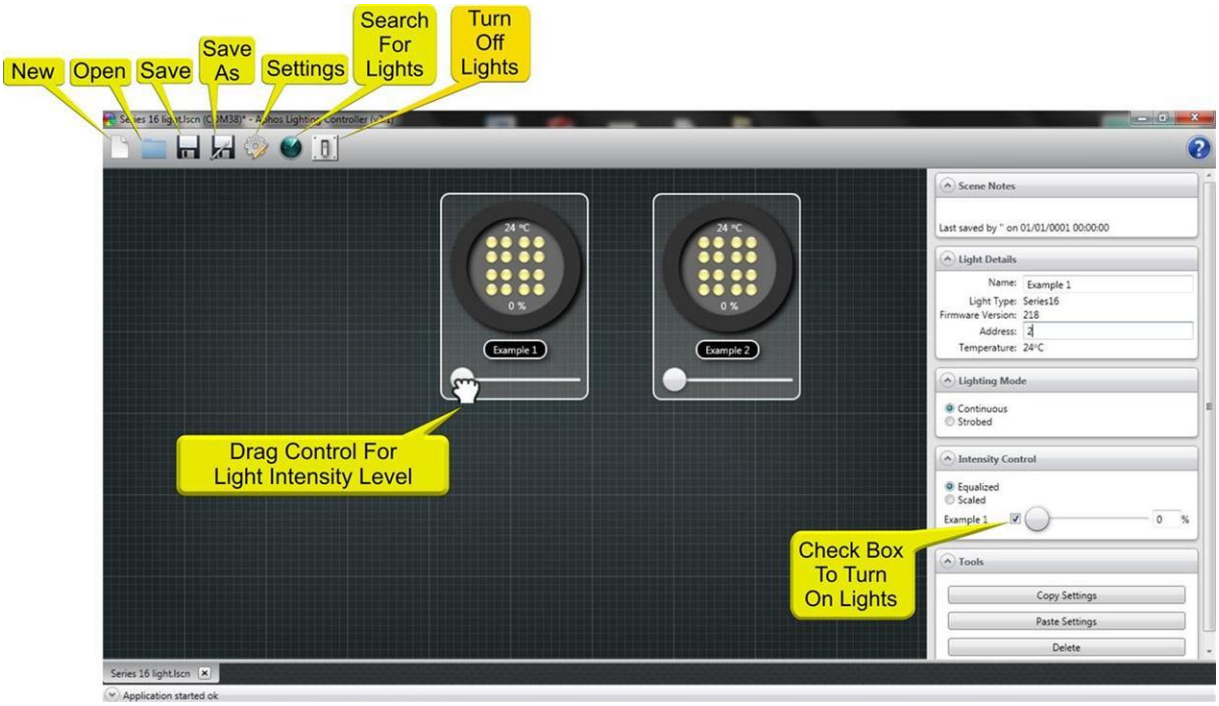


Figure 19. Software GUI overview

The various features of the GUI can be seen in fig. 19. To operate the lights, simply click on the check box as seen in the right hand window, fig. 19. To vary the light intensity level, simply drag the control bar of the intended light. Alternatively, the light intensity can be typed in the intensity control window on the right window.

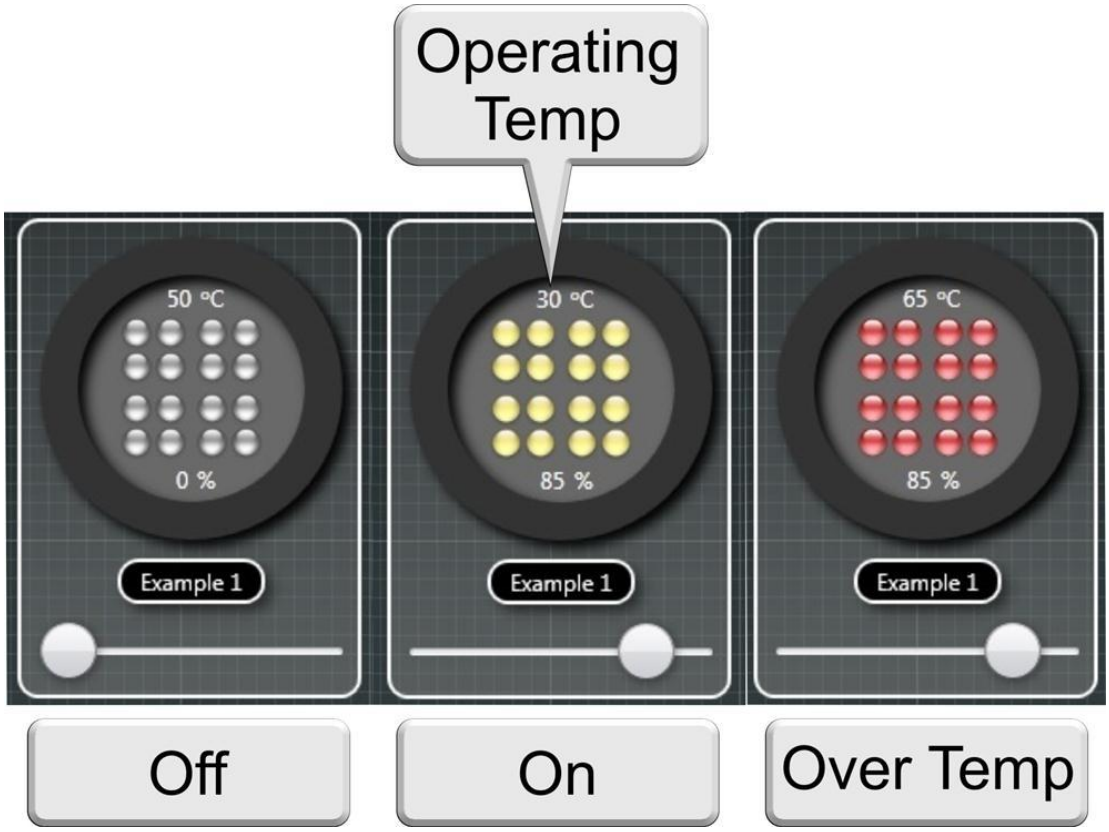


Figure 20. Light Status Icons

The lights can operate in three states - Off, On and Over Temperature. The off state can be activated by de-selecting the check box on the designated light as seen in the image at the top of the page. Inversely, the on state can be activated by selecting the check box. The unit has a built in thermal protection circuit to eliminate over heating, this will become active in temperatures greater than 60°C.

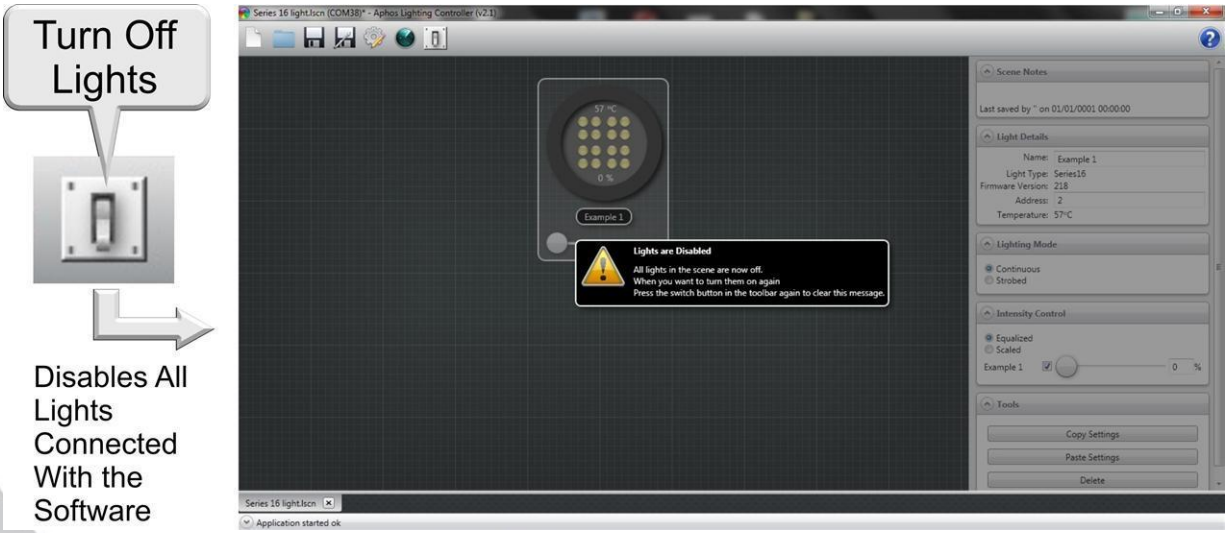
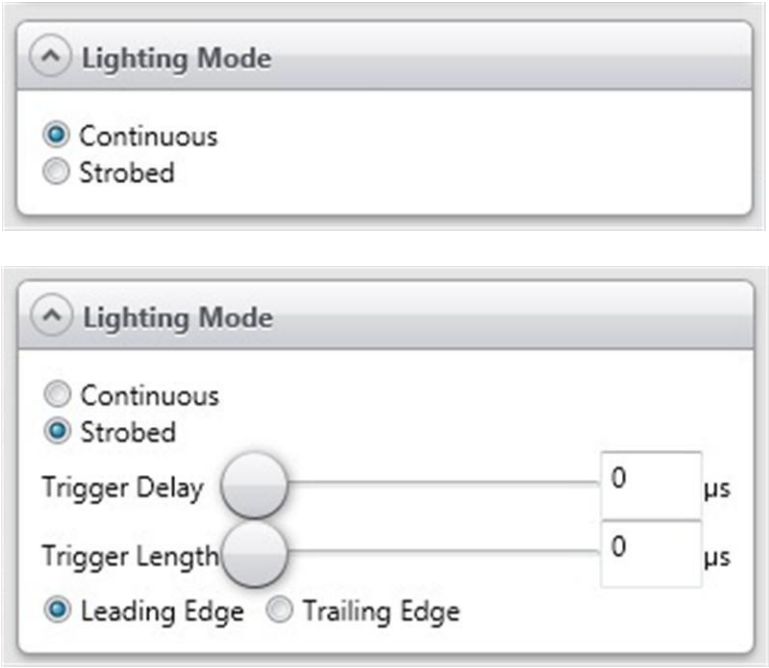


Figure 21. Turning off Lights

To disable all of the lights controlled by the GUI, simply click on the turn off lights icon at the top control bar.

5.4.2 Control Windows

Lighting can be operated in two Modes:



Continuous

Operating with a constant stream of light output

Strobed

In this mode, the lights are slaved to an external trigger. Once the trigger is detected, the lights will operate for a defined period of time. The trigger mode can be set to detect either a leading or trailing edge. The operating time in trigger mode is configurable using values entered within the control window seen opposite.

Figure 22. Lighting Mode Window

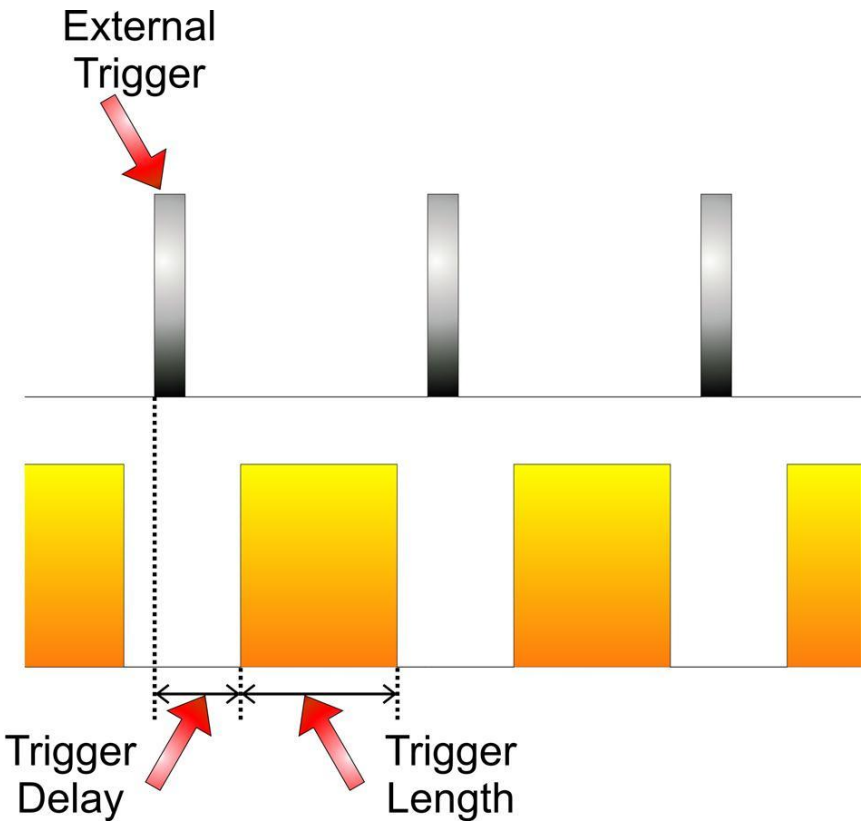
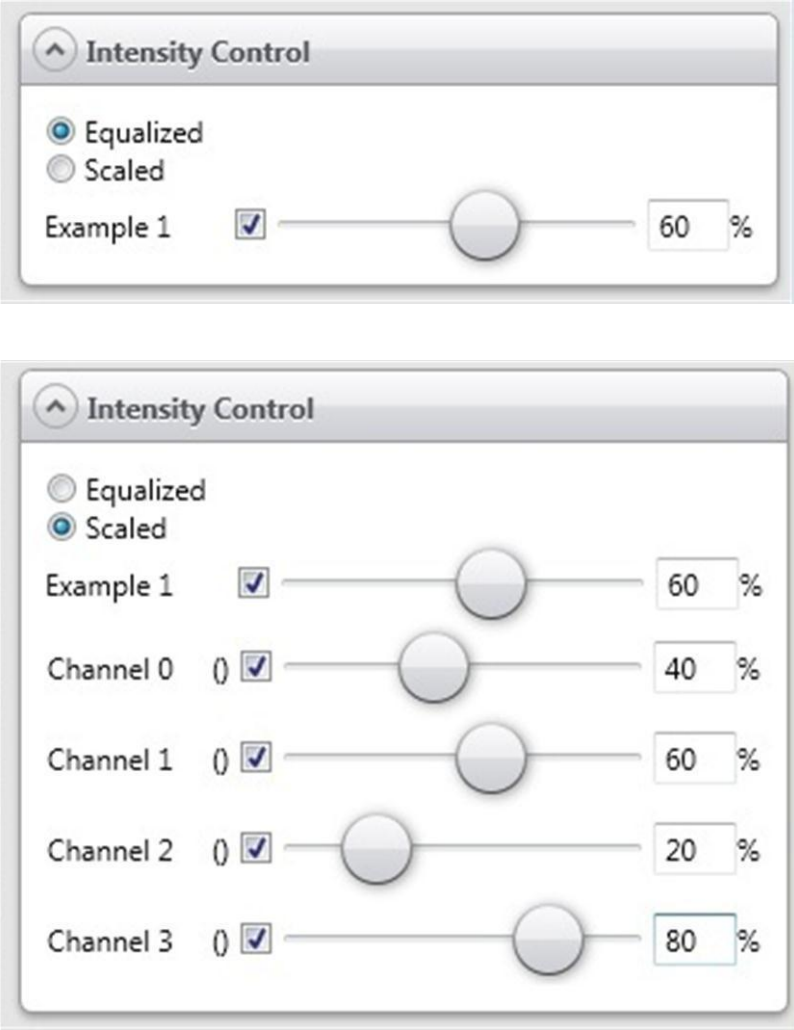


Figure 23. Strobe Timing Diagram

Light Output Intensity can be controlled in two fashions



Equalized

The light is output in 4 channels. In equalized control, all of these channels are of equal magnitude.

Scaled

In scaled mode, the output channels can be set in a relative scale to each other.

In this example, light intensity is set to 60%. The output channels are set at intervals of 20.

It can be considered that

Channel 0 = 60% x 40% = 24%

Channel 1 = 60% x 60% = 36%

Channel 2 = 60%x20% = 12%

Channel 3 = 60% x 80% = 48%

Output of a channel can be defined as -> Light intensity x Channel scale

Figure 24. Intensity Control Window

5.4.3 Creating New Lighting File

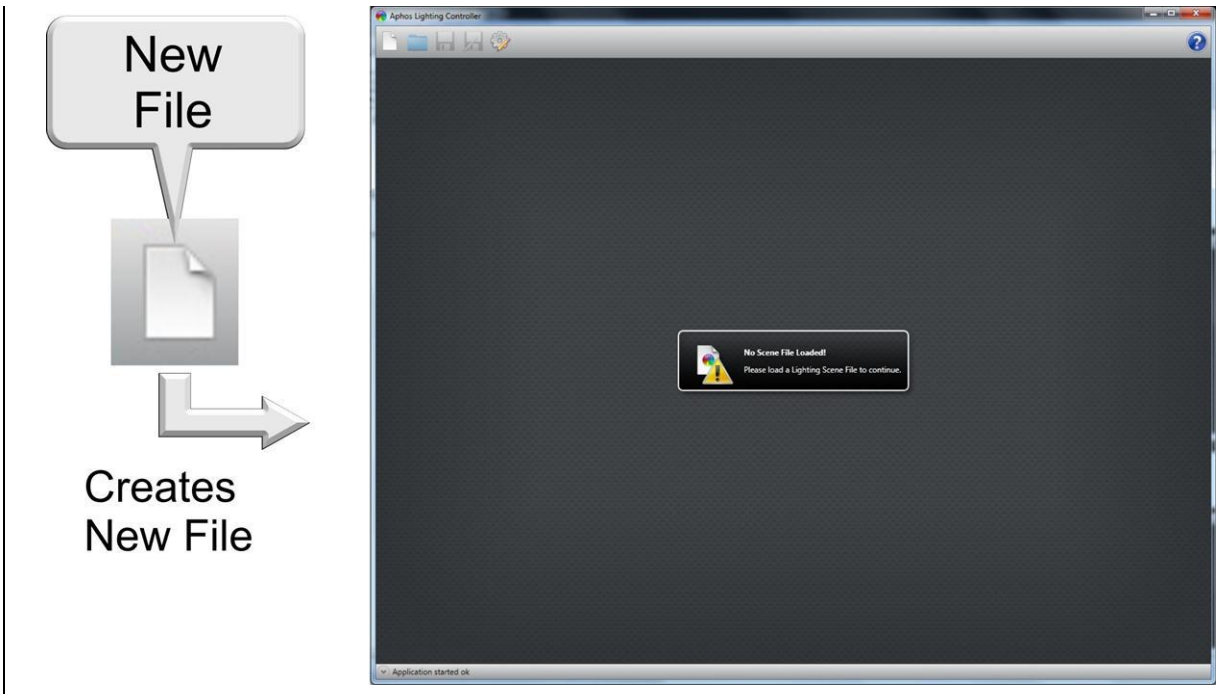


Figure 25. Creating New File

To create a new lighting file, open the Cathx Lighting Controller Program. Upon loading, the user will be presented with the image seen in fig. 25. To create a new lighting scene file, click on the new file icon on the top control bar.

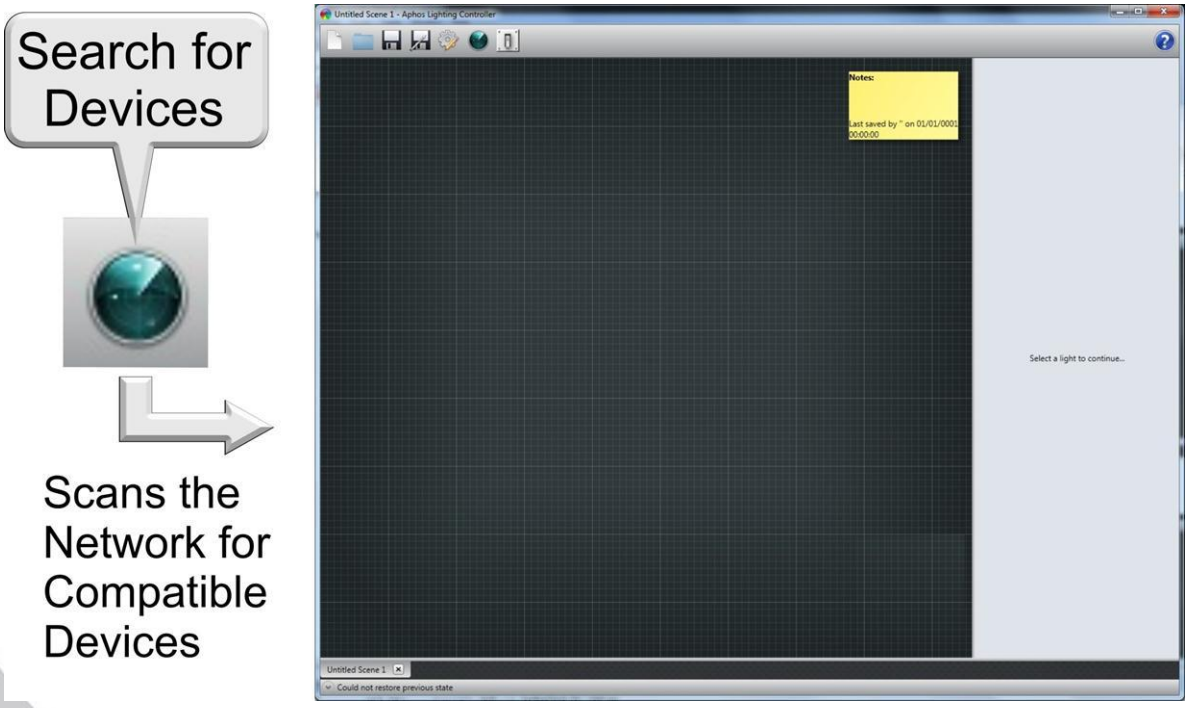


Figure 26. Search for available devices

After clicking the new file icon, select the search for device icon located on the top control bar. After selecting this, the program will enable communication with connected devices.

5.4.4 Opening an Existing Lighting File

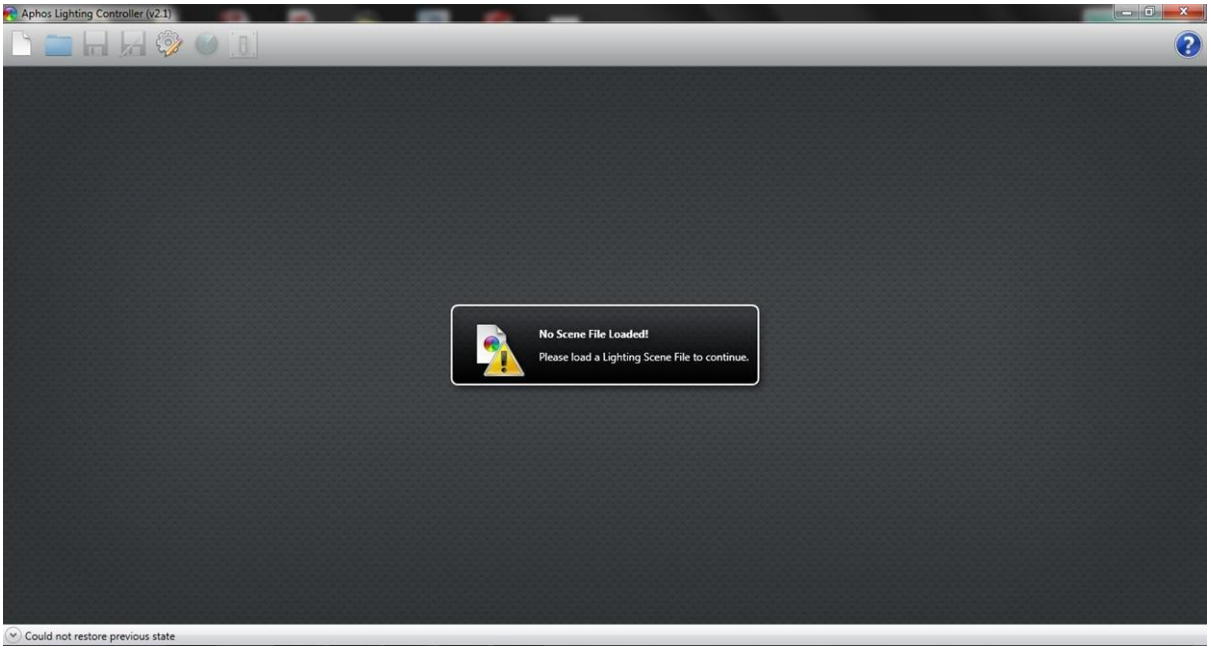


Figure 27. GUI without lighting scene

Window will appear asking the user to load a Lighting Scene File

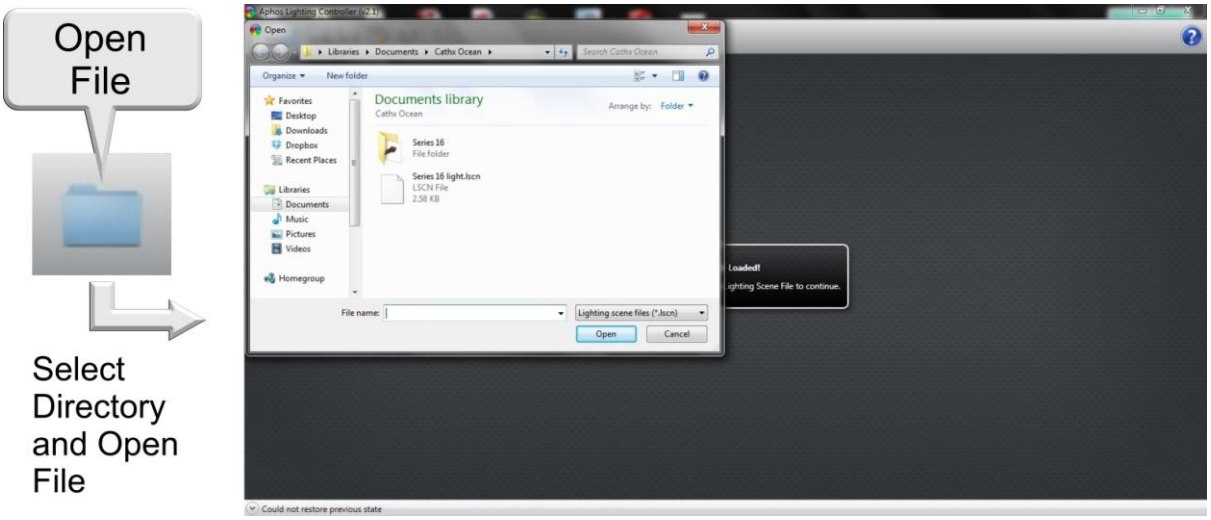


Figure 28. Opening Existing File

To Open File, please complete the following:

Select Open File icon, located on top control bar

Locate the file location

Select File

Click Open

6. Maintenance

6.1 Field Maintenance

The Aphos 16 series dive lights have been designed to operate maintenance free.

However, it is recommended as good practice to run a stream of fresh water over the unit to remove any saltwater or chemical deposits which may exist on the body.

6.2 Sacrificial Anode

A Sacrificial Zinc Anode has been fitted to the unit to reduce/eliminate the effects of Galvanic Corrosion. The Anode, as seen in the fig. 29 should be monitored periodically and replaced when necessary.

In some marine environments, the mixture of metals and electrical noise can result in an accelerated rate of Galvanic Corrosion. This effect varies from ROV to ROV and it is necessary to monitor the wear rate of the Anode periodically.

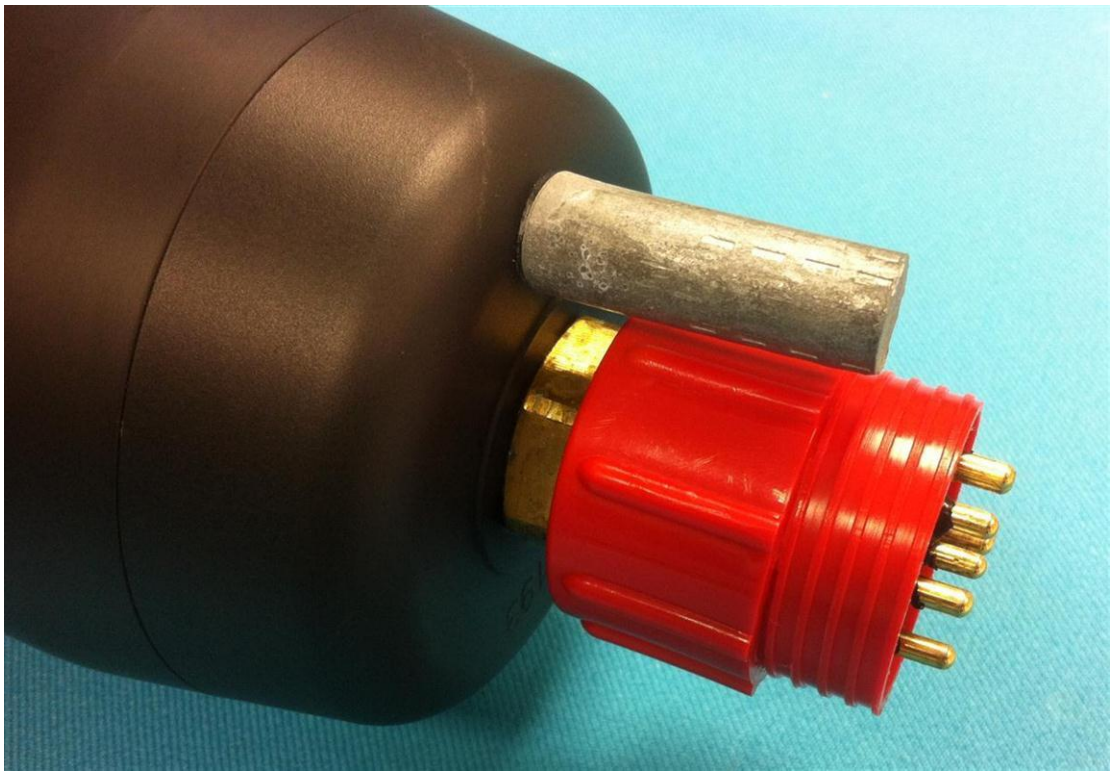


Figure 29. Sacrificial Anode

6.3 LED lighting array

The LED lighting array found on the Aphos 16 series is extremely reliable by nature.

They are also very sophisticated in terms of electronics and are not general field serviceable. If in the unlikely event that service is required on the LED lighting array, please contact info@cathxocean.com for technical advice.

7. Diffuser

7.1 Installation

The diffuser has been designed to allow for easy installation to the Aphos 16 series lights.

To install the unit, perform the following:

Figure 30. O Rings fitted on Light

Fit two (number of O rings) "O" rings over the front housing of the light body.

Figure 31. Diffuser Face to Light Body

Mate the internal face of the diffuser to the front face of the Aphos 16 series light.

Figure 32. First O Ring fitted to Diffuser Face

Stretch one O ring and locate inside the groove located on the front face of the Diffuser.

Figure 33. Installed Diffuser

Stretch the second O ring and locate into the unused groove on the front face of the Diffuser.

7.2 Removal

Take caution when removing the diffuser as the body of the light may be hot.

To detach the diffuser, simply unclip the "O" rings located in the front face of the diffuser, allowing for easy removal of the unit.

8. Document Revision History

Edited by	Details	Date Edited	Revision
Michael Walsh	Initial release	04/12/2012	1.0
Michael Walsh	Alteration to Footer	11/06/2013	2.0
Fergal Brennan	Deleted section on cable	14/06/2013	3.0