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Trigon Caving and Mining Lamp.

Thank you for purchasing the Trigon caving and mining lamp. It is strongly recommended that you familiarise yourself with the operation of the lamp before using it underground. Please read these instructions carefully.

Description

This lamp utilises the latest Cree XM-L 2 U2 and XP-G technology to provide a lamp with a total light output of 2000 lumens as a beam, or 850 lumens as a "Daylight Mode" floodlight.

The lamp is fitted with 5 emitters, there are 2 Cree XM-L 2 emitters situate behind a 'binocular reflector' for general use, 2 Cree R5 XP-Gs 'tandem mounted' for floodlight, and a high efficiency/low power consumption "Emergency Light" together with a low battery alert and a back up circuit in the beams.

The Oldham headset has 3 switch positions:

Position #1: This will drive the twin XM-L2s at 3 different modes achieved by tuning rapidly on and off.

Standard Mode. This is for general use and is the recommended setting for most environments.
High Mode. This is for large roomy slate mines or caverns where more light is desirable
Turbo Mode. This is maximum power and is for looking up into high stopes or avens where a very high degree of lighting is desirable.

The electronics will memorise the last setting used so next time use it will automatically be on that setting. There is a back up circuit to the beams that will still work in the event of main driver electronics failure. It is not unusual for a slight delay when changing modes, back up then main driver an instant later.

Position #2: The second switch position will power the 2 Cree R5 XP-Gs at a level sufficient to illuminate evenly large chambers or formations etc where even lighting is desirable

Position #3: The third position will power the emergency light and low battery alert. Emergency Light will provide enough light to get out of anywhere and will burn for days in the event a mine explorer or caver becomes trapped.
For a battery test, hold your hand in front of the lamp and turn to this position.

Red light indicates battery down to 6.8 volts or less. Avoid Turbo mode completely and change power pack ASAP.
Battery will turn off completely at 5.4 volts under load. Load is greatest on high settings. This is a complete loss of light and is unavoidable with this type of high power lamp.

The electronics have a thermal shutdown built in which will shut down output to lowest setting, this will then flicker every 5 seconds until temperature falls and then resume last power setting. To clear, turn of the lamp or go to emergency light for short while to allow lamp to cool. Normal functioning will then resume.

It is highly recommended that a purchaser familiarises him/her self with the lamp before venturing underground. The lamp is very user friendly and only requires a small amount of switch rotation within the main switching ranges to change normal full power to turbo etc. In the event of a mode select malfunction, please turn off the lamp for a few seconds and then back on.

Please note that this lamp has 3 totally independent wiring systems for reliability, something that most other high performance LED caplamps don't have.

The 4 cell helmet battery pack is a 5 ampere hour Lithium Ion pack, the 2 cell a 2.5, both deliver a nominal voltage of 7.4 volts, however off the charger it will deliver just over 8.1 volts.

It attaches to the headset cable by means of a high quality XT60 connector that is securely attached to the cable and shrink wrapped. The connectors are corrosion proof gold plated.
The battery pack attaches to the helmet by means of a short loop of the 4mm shock cord supplied.

The battery cell is filled with silicone and sealed to prevent ingress of water.

DO NOT ATTEMPT ANY DISMANTLING OF THE HEADSET, UNDER NO CIRCUMSTANCES ATTEMPT TO OPEN A SEALED BATTERY CELL OR INTERFERENCE WITH ANY CABLE GLAND. THE BATTERY DISCONNECTS BY THE YELLOW PLUG

THE POWER PACKS CONTAIN BATTERIES. INTERFERENCE WITH THE CABLE GLAND SUCH AS AN ATTEMPT TO INCREASE OR DECREASE THE LENGTH OF THE CABLE CAN CAUSE A SHORT CIRCUIT INSIDE. SHORTING BATTERIES CAN CAUSE FIRE AND INJURY.

IF CARRYING IN A RUCKSACK OR BOOT OF A CAR, PLEASE CARRY THE BATTERY CELL DISCONNECTED. IF THE LAMP COMES ON IT CAN BECOME DAMAGED DUE TO OVERHEATING OR FULLY DISCHARGE THE POWER PACK. THIS CONSIDERATION APPLIES TO ALL HIGH POWER LED LAMPS.

DO NOT WANTONLY DISCHARGE AND THEN RECHARGE THE POWER PACKS, THEIR LIFE SPAN IS RELATED TO THE NUMBER OF DISCHARGE/CHARGE CYCLES. Li Ion does NOT suffer from 'memory effect'.

As can be seen, the pre existing Oldham reflector and bulb assembly have been completely removed and replaced by my LED circuit. The front seal is of neoprene and specially produced to my specification and replaces the original. The headset should be watertight under normal circumstances. If there is any sign of water inside, contact me the seller. This simply should not happen.

Estimated burn times

Switch #1	V In	I In	Watts In	Burn time (Hrs) 4 cell pack	Burn time (Hrs) 10 cell pack	**Lumens**
Standard	**7.4**	**0.17**	**1.26**	**31**	**70**	**200**
High	**7.4**	**0.62**	**4.58**	**6.4**	**16**	**700**
Turbo	**7.4**	**2.5**	**18.5**	**2.16**	**5.4**	**1900+**
Switch #2	**7.4**	**1.21**	**9.2**	**3.9**	**7.9**	**780**
Switch #3	**7.4**	**0.06**	**0.48**	**84**	**210**	**?**

Above burn times are estimated at nominal voltage and on the capacity of the battery and the draw of the lamp. In practice there will be a voltage drop on the battery under load which will cause the safety circuit to disconnect at a level below those shown above. Experiments have

shown that the real burn time of the 2 X XM-L2 emitters on a 4 cell pack at Standard Mode is about 30 hours same as above, but on the High mode its about 5 hours due to the drop on voltage under this load. Turbo use is only recommended for occasional use, it is however sustainable for quite some time without over temperature problems.

Recharging.

Connect the yellow connector on the power pack to the corresponding yellow connector on the charger, the crocodile clip goes onto the brass threaded pin on the power pack. Connect the 12V power adaptor jack plug to the round socket in the charger, plug in the 12V power adaptor and switch on.
On the charger, the red lamp indicates power on, the flashing green is “on charge” changing to constant green when fully charged.
In the event that the voltmeter does not read anything and the green light does not appear, the power packs Lithium Ion protection circuits are disconnected. These can be brought back on line by hitting the button on the charger. Charging will then commence.
The charger can be connected to a power pack as a voltage test at ant time, fully charged the meter should read over 8.2 volts on all cells. Charger is not suitable for underground use.

Charging is possible at any time as a ‘top up’, if left on overnight it is recommended that you switch off, pause a few seconds, and then back on in order to ensure that the cells are fully charged.
Fully charged the voltmeter should read above 8.1 volts on all cells with the charger switched off.

The power input for the charger is 12V DC. A car cigar lighter adaptor can be used to recharge from a vehicle equipped with a 12V battery.

In the event that there is no red power indicator on the charger then there is no power and the mains adaptor or other source will be at fault.

Expected Performance from Discharged Power Pack

The power packs are fitted with circuitry that prevents over discharge of the Lithium Ion cells and the subsequent damage. As the power packs become discharged it will eventually switch off to protect the cells. This will cause your lamp to go out abruptly. This is true of all lamps that use Li Ion power cells and is expected.
The emergency light may work on a discharged power pack, but on a much reduced light level. Switching it off and then back on again after a few minutes may restore full power and if so it will continue to burn bright for hours.

Condensation

Air contains a certain amount of water vapour which under certain conditions can cause condensation inside the glass, this NOT a sign of water ingress. It can easily be cleared by turning the lamp to full power and placing your hand over the glass to cause it to warm up

Guarantee.

All lamps carry a 12 month guarantee, subject to reasonable use. All lamps are based on modified Oldham headsets. These were originally designed for mining use and not for extended periods of full immersion. However, the headset should be considered reasonably water resistant and splash proof. The Li Ion battery pack is suitable for extended full immersion as it is filled with silicone and should therefore be considered fully waterproof, explosion proof and reasonably shockproof.

Maintenance

Basically, none required except keeping the connectors clean. The use of Vaseline or similar compound is recommended.
The individual Li Ion battery cells have protection circuits that will disconnect them at an ‘on charge’ voltage of just under 4.2 volts, and an ‘on discharge’ voltage of 2.7 volts. (8.4 volts and 5.4 volts to the lamp)

Obviously, if the lamp is used to the extent that the voltage dropped to near minimum, and then the lamp is put into storage, there is risk of the voltage dropping to below the minimum and thereby causing damage to the cells.

Fitting the battery pack to a helmet

Use 4mm shock cord supplied. You can use original hole for tie cord or make some new holes or whatever to suit helmet design. Pack can be fitted any way so as to set cable length

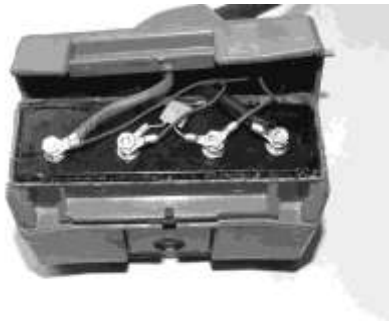
Above picture shows a battery pack securely mounted to a helmet in simples form. Use cable ties if required to secure the cable.

10 cell Belt mount power packs

These are based on recycled (new) Oldham MF battery cases and as such are half the height and one third the weight of the original.

The lid and terminals are similar to the original which was not intended for full immersion in water, however it is possible to do this provided the condition of the terminals is regularly checked for corrosion.

Using the Allen Key provided the lid securing clip is easily removed and the lid tilted slightly as shown in the picture, do not attempt to remove completely as this will strain the wiring. Carefully clean away any corrosion, (a wire brush or similar is useful), in any extreme case carefully remove the terminal affected, clean, and fit a new brass nut. Do not touch the base securing nut and be careful not to rotate the post.
The use of WD40 is recommended, as is Vaseline to prevent corrosion from forming.
The circuits are protected by a self resetting fuse.



4 Cell belt mount power packs are permanently sealed and require no attention, just as the helmet packs.

Updated manuals available on line from our website www.ledcaplamps.com