

# **USER'S GUIDE**

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# ***LEONICS***<sup>®</sup>

## **SOLAR OBSTRUCTION LIGHT SYSTEM**

Authorized Distributor

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## SAFETY INSTRUCTIONS

Please read and follow this user's guide carefully and completely.

**Important:** Please keep this user's guide for reference in order to use SOLAR OBSTRUCTION LIGHT SYSTEM properly and safely. This user's guide contains safety instructions, introduction, installation, operation and troubleshooting.

If SOLAR OBSTRUCTION LIGHT SYSTEM does not operate properly, please contact us, nearest LEONICS service center for assistance, send e-mail to support@leonics.com, or visit us at www.leonics.com.

For your convenience and quick reference for our service, please fill the requested information in the blanks below.

Model : \_\_\_\_\_

Serial Number : \_\_\_\_\_

Purchase date : \_\_\_\_\_

Purchase from : \_\_\_\_\_

### CAUTION

Risk of electric shock, DO NOT remove cover of the charge controller. No user serviceable part inside, please refer servicing to qualified service personnel.

### 1.1 Electrical Safety

- 1.1.1 Do not work alone where there are electrically hazardous conditions.
- 1.1.2 Contact with live conductors will cause burns and dangerous electric shock.
- 1.1.3 Only qualified electricians should install or service this unit, PV panel and batteries.
- 1.1.4 Properly install and ground (  ) the equipment in accordance with the instruction manual.
- 1.1.5 Periodically check your cable, terminal and power source to make sure that they are in good condition.
- 1.1.6 To reduce risk from electric shock, disconnect all power source before connecting / disconnecting the batteries or loads or when maintaining or servicing this unit.
- 1.1.7 Do not touch any metal parts of the connection while it is operating.

## 1.2 Safety instruction for installation and operation

- 1.2.1 Before installing or using this unit, read all instructions and caution markings on the charge controller, PV panel, battery and all sections of this user guide.
- 1.2.2 Do not remove the dome of obstruction lamp.
- 1.2.3 This unit has ventilation grills. Ensure that sufficient ventilation is provided. DO NOT block the ventilation grills.
- 1.2.4 Use insulated tools to reduce your risk of electric shock.
- 1.2.5 Remove all jewelry or other metal objects such as rings, necklace, bracelets and watches when installing this product.
- 1.2.6 Use extreme caution when working on tall structures.

## 1.3 Safety instruction for PV panel

- 1.3.1 To reduce the risk of shock, disconnect the PV panel, or cover it with an opaque cloth or material before making electrical connections or servicing the system.
- 1.3.2 Ensure correct polarity connection of PV panels.

## 1.4 Safety Instruction when working with batteries

- 1.4.1 Ensure the area around the battery is well ventilated.
- 1.4.2 Never smoke or allow a spark or flame near batteries.
- 1.4.3 Be extra cautious to reduce the risk of dropping a metal tool onto battery. It might spark or short circuit battery or other electrical parts that may cause an explosion.
- 1.4.4 Remove all metal items, like rings, bracelets and watches when working with batteries.
- 1.4.5 Have someone within range of your voice or close enough to come to your aid when you work near batteries.
- 1.4.6 Wear complete eye protection and clothing protection. Avoid touching your eyes while working near batteries.
- 1.4.7 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least 20 minutes and get medical attention immediately.
- 1.4.8 Never charge a frozen battery.
- 1.4.9 When connecting batteries, always verify proper voltage and polarity.
- 1.4.10 Always recycle old batteries. Contact your local recycling center for proper disposal information.

## INTRODUCTION

### 2.1 General

SOLAR OBSTRUCTION LIGHT SYSTEM consists of obstruction lamp, solar panel, charge controller and battery in the same enclosure. The obstruction lamp operates by solar energy which is designed for obstruction light and complies with the ICAO<sup>1</sup> standards and recommended practices design type A, which is used for remote, night time and hazardous obstacle marking of tall structures such as buildings and telecommunication masts that are higher than 45 metres.

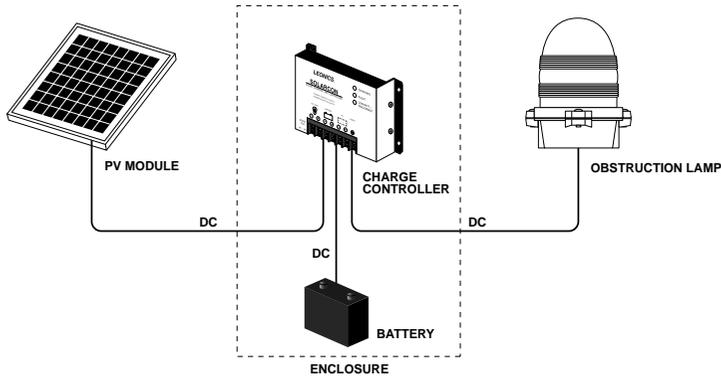
The obstruction light is developed to replace an incandescent lamp by using Ultra LED technology that consumes low power (~ 3 watt) with an approximate 100,000 hours lifespan. By using an 8-bit microprocessor, the obstruction light controller with charge controller can control the obstruction lamp in 2 pattern modes: flashing and steady ON (option) and high efficiency 3-stage battery charging.

<sup>1</sup> International Civil Aviation Organization Standard and Recommended Practices: Aerodromes Annex 14-Volume 1, 3<sup>rd</sup> Edition, July 1999, Chapter 6.

### 2.2 Features

- Advanced microprocessor control with 3 stage charging
- Automatic ON-OFF obstruction lamp
- Use the obstruction lamp same as normal type with long life time MTBF more than 100,000 hours
- Polycarbonate dome with lens (ASTM : UV stabilized)
- Die-cast aluminium housing with yellow polyester powder coating
- Transient suppression to IEEE C62.41-1991 CAT. C1: 6kV / 3kA
- Over charge and over discharge protection
- Reverse polarities protection for PV and battery
- Low battery shutdown with alarm
- Protection class typical IP65
- Good for remote area or the area that could not find electrical supply

### 2.3 Operation

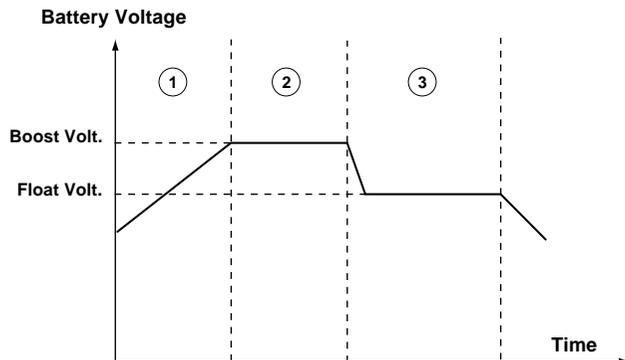


During the daytime, the solar module generate DC power from solar energy and the charge controller control charging current from solar module to storage battery. At night time or when there is insufficient sunlight for 10 minutes, the charge controller automatically supply DC power from battery to the obstruction lamp.

OPERATING STATUS	BATTERY VOLTAGE	BLINK RATE
Normal mode	more than 12.3 V	~ 60 times/min.
Economy mode	11.8 - 12.3 V	~ 40 times/min.
Low battery alarm mode	10.8 - 11.8 V	~ 12 times/min.

Note: If the battery voltage is less than 10.8 Volt, the obstruction lamp will stop operating, and it will resume again when battery charging voltage is up to 12.5 volt.

### 2.4 3 Step charging characteristic



#### 2.4.1 Step 1 : Bulk charge

Battery is being charged up with maximum current, the voltage of the battery increase gradually. When the battery voltage reaches the Boost charging voltage the charge controller goes to next step.

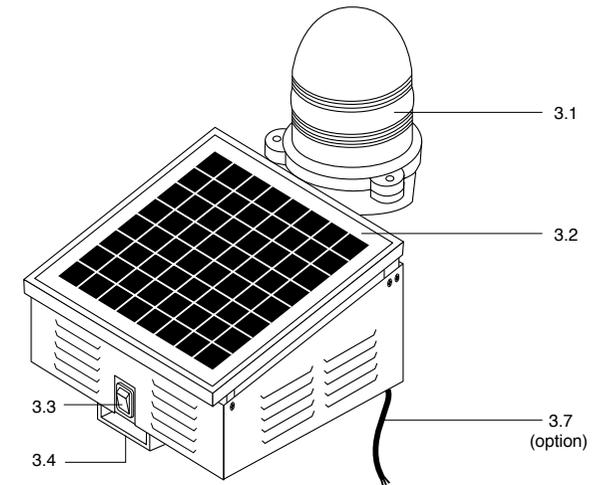
#### 2.4.2 Step 2 : Boost charge

Battery continues to be charged at constant voltage. The charging voltage is held constant at Boost charging voltage, providing the battery to nearly full charge at a slow and safe for about 5 hours, then goes to next step.

#### 2.4.3 Step 3 : Float charge

Voltage is reduced and held constant at Float charging voltage level in order to prevent damage and keep battery at a full charge until the end of day.

### SOLAR OBSTRUCTION LIGHT SYSTEM PARTS



#### 3.1 Obstruction lamp

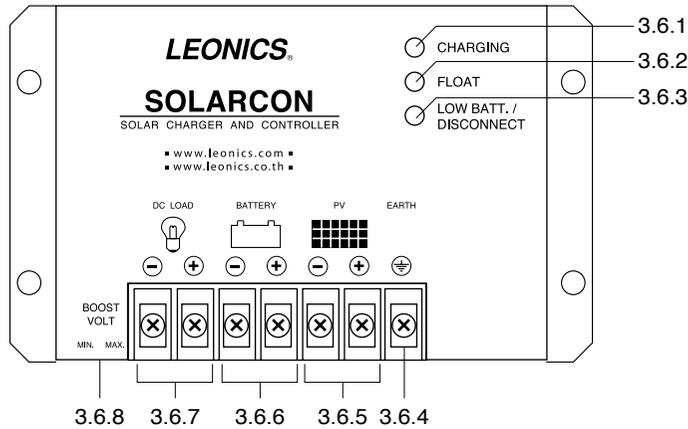
**3.2 Solar photovoltaic module :** The 12 Vdc solar photovoltaic module with fixed 15° tilt angle.

**3.3 Power Switch :** For turn ON-OFF the solar obstruction light system.

**3.4 U-beam :** For mounting on plate or pole structures.

**3.5 Battery :** The 12 Vdc battery is in the enclosure.

**3.6 Charge controller :** The charge controller is in the enclosure that use for control charging battery and supplying power to obstruction lamp.



3.6.1 **CHARGING** : Indicator light indicated the charge controller is charging battery.

3.6.2 **FLOAT** : Indicator light indicated full charged battery.

3.6.3 **LOW BATT./DISCONNECTED** : Indicator light indicated battery capacity is nearly empty or the obstruction lamp is disconnected from the charge controller.

3.6.4 **EARTH** (⊕) terminal :The terminal for connecting to ground system.

3.6.5 **PV terminal** :The terminal for connecting to PV module.

3.6.6 **BATTERY terminal** :The terminal for connecting to battery

3.6.7 **DC LOAD terminal** :The terminal for connecting to obstruction lamp.

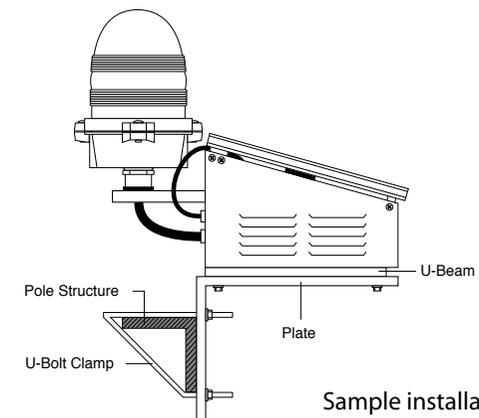
3.6.8 **BOOST VOLTAGE** : Adjustable voltage for variable boost voltage level to charge batteries.

**3.7 Remote alarm signal cable (Option)** :The dry contact cable with Normally Close (NC), Normally Open (NO) and Common (COM) signal use for sending lamp failure or battery replacement alarm.

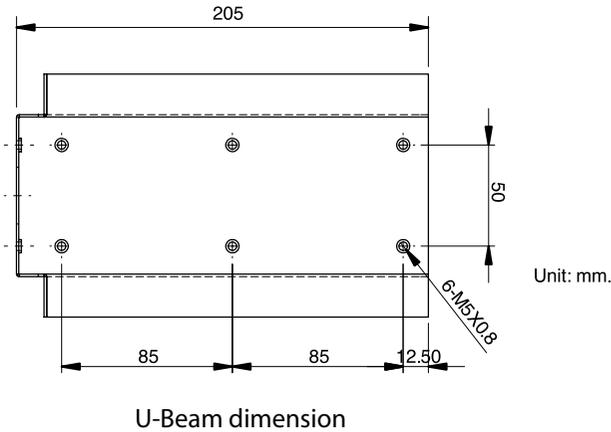
Table of indicator lights and operation of solar charge controller

Indicator	OFF	BLINK			LIT
		ON 0.6s, OFF 1.4s	ON 0.1s, OFF 1.9s	ON 1s, OFF 1s	
CHARGING (green)	Not operating	-	The solar charge controller has not started charging battery due to low solar ray intensity.	The solar charge controller is charging battery at boost charge or float charge voltage level.	Battery is charged until its voltage reaches boost charge voltage level or the solar charge controller is charging battery at bulk charge voltage level.
FLOAT (yellow)	-	-	-	-	The solar charge controller is charging battery at float charge voltage level or the battery is fully charged.
LOW BATT/ DISCONNECT (red)	Normal operating	Battery voltage is low.	Low battery voltage disconnect condition and continuous audible alarm simultaneously.	-	High battery voltage and continuous audible alarm simultaneously.

## INSTALLATION AND OPERATION



Sample installation on pole structure



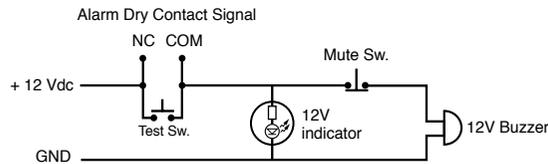
### 4.1 Installation

- 4.1.1 Before installing this unit, read all instructions and caution markings on the product and accessories and all sections of this user's guide.
- 4.1.2 Place the solar module on the suitable direction for your country side. The suitable direction for Thailand is south.
- 4.1.3 Mount the SOLAR OBSTRUCTION LIGHT SYSTEM by clamping with pole structure as shown on the previous page.

**Caution :** Use extreme caution when working on tall structures.

- 4.1.4 Connect the remote alarm dry contact signal cable (if available) to the controller device or alarm device such as PLC or buzzer.

#### Sample of connection



**Remark:** Dry contact power rating is 5A 250Vac / 5A 30Vdc

- 4.1.5 Turn on the POWER switch.

### 4.2 Operation

SOLAR OBSTRUCTION LIGHT SYSTEM will operate automatically dusk till dawn or when there is insufficient sunlight for 10 minutes. And it will start to charging battery at daytime or when there is sufficient sunlight.

The remote alarm dry contact signal cable is optional for warning to replace the new SOLAR OBSTRUCTION LIGHT SYSTEM or new battery.

### 4.3 Replacement battery

**Remark:** Warranty is void if the warranty sticker is teared or removed.

- 4.3.1 Turn off the POWER switch and remove the solar obstruction light system.
- 4.3.2 Remove the solar module by unscrew on solar module strip.
- 4.3.3 Remove the inside cover plate of charge controller and battery.
- 4.3.4 Disconnect the battery cable.
- 4.3.5 Unscrew battery strip and remove the battery.
- 4.3.6 Replace the new battery and rescrew the battery strip in place.

**Note :** Replace the new battery with the same rating as the old battery of SOLAR OBSTRUCTION LIGHT SYSTEM.

- 4.3.7 Connect battery cable from battery to charge controller. Ensure correct polarity connection.
- 4.3.8 Replace the cover plate of charge controller and battery.
- 4.3.9 Replace the solar module and rescrew in place.
- 4.3.10 Mount the SOLAR OBSTRUCTION LIGHT SYSTEM at the same place and turn on the POWER switch.

## TROUBLESHOOTING

In case of any queries or concerns that are not referenced in this guide, please contact a LEONICS service center, LEONICS local distributor or e-mail your queries to support@leonics.com

**Remark:** Warranty is void if the warranty sticker is teared or removed. And if the SOLAR OBSTRUCTION LIGHT SYSTEM is altered, repaired, and/or modified in any way or any attempt by non-authorized personnels, the warranty is void, too.

Symptoms	Possible causes	Solutions
Obstruction light does not operate at night time or when there is insufficient sunlight and user receive remote alarm dry contact signal (if available).	The POWER switch is OFF	Check the POWER switch. It should be ON all the time unless when it has to maintenance.
	The obstruction lamp is deteriorate.	Remove the SOLAR OBSTRUCTION LIGHT SYSTEM and send back to service center.
	Low battery voltage or battery deteriorate.	
	The cable disconnect from terminal.	

## SPECIFICATIONS

LAMP TECHNOLOGY	ultra bright Light Emitting Diode (LED)
POWER CONSUMPTION / SET	3 Watt
ICAO STANDARD LOW INTENSITY	type A*
IP PROTECTION	IP 65
LAMP OPERATING VOLTAGE (Nominal)	12 Vdc
LAMP AVERAGE LIFE (MTBF)	more than 100,000 hours
LIGHT INTENSITY (Type)	> 10 cd
ICAO REQUIREMENT (+10°)	≥ 10 cd
LED COLOR	aviation Red (dominate wave length = 626 nm)
SOLAR PANEL	5 Wp
SOLAR CHARGE CONTROLLER	12 V 6 A
FLASHING (Factory preset)	40-60 times per minute (steady ON is optional)
BATTERY	7 Ah, sealed lead acid (Ni-Cd option)
AUTOMATIC OPERATION	dusk to dawn
REMOTE ALARM (Option)	dry contact (lamp failure or battery replacement alarm)

\* International Civil Aviation Organization Standard and Recommend Pratices: Aerodromes Annex 14-Volume 1, 3<sup>rd</sup> Edition, July 1999, Chapter 6.