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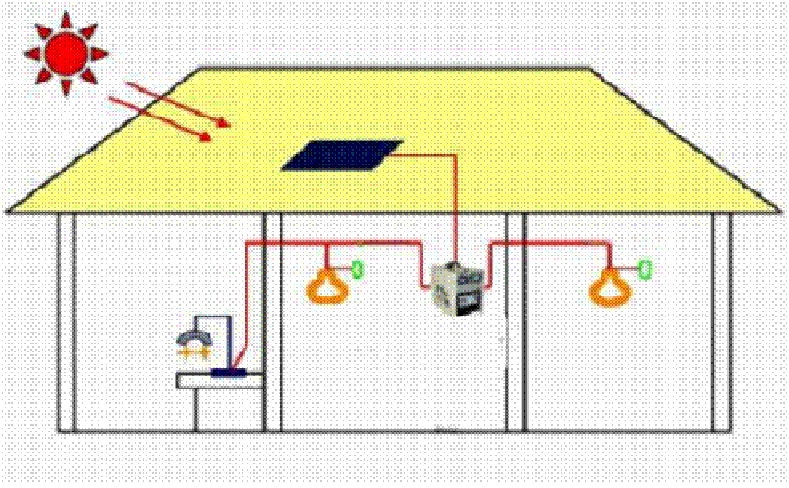
U-Tron®

Version 2

Solar Home Packages

Technical and Installation Guide



Designed, developed and manufactured by

U-Tron (Beijing) Electronics Co. Ltd.

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U-Tron®

Version 2

KEY APPLICATION

- Home Lighting
- Garage and Barn Lights
- Camping Lights
- Garden Lights
- Christmas Outdoor Lights
- Underground Lights
- Remote Area Lighting

Message from the President

We at U-Tron make each and every one of our products with pride and integrity. If you follow the instructions carefully, we guarantee the system will give you trouble-free operations for many years. If, however, you encounter any issues with our products, please contact me at: raja@u-tron.com and I will ensure you receive thorough and appropriate assistance within 24 hours.

Sincerely,

Raja Magasweran

What did I buy?

If you have ordered and purchased the Solar Home System with the DriBox option, please use this manual which will guide you through the installation process. DriBox versions are versatile and portable. They are easy to expand and easy to wire. The expansion boxes are for the Battery packs. You may also purchase other expansion boxes from U-Tron or any local hardware stores.

If you purchased the system that includes the metal cabinets, please skip the explanations about the DriBox and follow the cabinet installations.

There are 3 versions of the packages; they only differ in the number of Solar Panels, Battery capacity and the number of light bulbs. The controller and the connection box will be the same across the 3 systems.

If you have bought the standard version and expansion boxes as well, please familiarize yourself with the contents and understand the variations.

At the end you are just going to "plug-&-play" and enjoy the abundance of energy pouring at you from our sun.

Welcome to the world of free energy!

Contents in the Boxes

Contents	Individual Part Numbers
2 x 20W Solar Panel	6830-100-SP20
1 x 10A Controller	6830-121-C10
4 x 12Ah Battery (if purchased)	6830-130-B12
3 x Helios LED Bulbs (3.5 W DC)	6850-P03-CR4E27-DC
3 x Cable with E27 Socket and Switch	6830-190-E27HS
2 x Extendable Solar Panel Cables	6830-101-SPCBL
1 x DriBox Compartment	6830-500-330
1 x Connector Box (7 outlet 12VDC + 1 Cigarette Lighter Socket for USB charger)	6830-600-B1
1 x USB assortment plugs of popular connectors for Cell Phones and Tablets.	6830-700-B1
Installation Brackets (if purchased)	8830-100-CSTM BRCKETS
Installation Materials	This manual

Technical Specifications
Solar Panels:

OTHER OPTIOANL MODELS ORDERING PART NUMBERS

6830-100-SP40

6830-100-SP60

6830-100-SP80

6830-100-SP120

Solar Panel 20 Watts with U-Tron Expansion Cable

This is the standard solar panel
Part Number: 6830-100-SP20

Technical Specifications	
Material	Mono/Polycrystalline Silicone
Maximum power of each panels	20 Watt
Dimension 20 Watts Panel	540mm*360mm*30mm
Dimension 80 Watts Panel	758mm*670mm*35mm
Weight	1.2 Kg each 20Watt
Optimum operating voltage (Vmp)	17.2V
Optimum operating current (Imp)	3.49A
Open-circuit voltage (Voc)	21.6V
Short-circuit current (Isc)	3.86A
Operating temperature	-40°C - 85°C
Maximum system voltage	600V DC
Power tolerance	± 3%

Solar Panel 80 Watts

Instead of ordering four solar panels of 20 watts each,

you can also choose to order one 80-watt solar panel.

Technical Specifications
LED Helios Bulbs

KEY MODELS

6850-P03-R2WE27

U-Tron's ruggedized Helios Series LED light bulbs uses high power Cree LEDs that bring a healthy light to your home while saving energy. They can be retrofitted easily to virtually any light fitting that uses E27, Bayonet or GU10 lamp holders.
Cool White is a bright color, especially fit for reading lights and other applications that desire full lighting.

Technical Specifications	
Power	3.5/5.5 Watts
Voltage	12V
Lumen 3.5W Bulb	280
Lumen 5.5W Bulb	467.5
CCT	2700-3000K (Warm White) 5000-6000K (Cool White)
Efficacy 3.5W Bulb	80
Efficacy 5.5W Bulb	85

Warning: Never plug into AC outlets! Bulbs will explode.

12 Volt Helios LED Bulb 3.5W

Part Number: A-6850-P03-CR4E27-DC (Cool)
Part Number: A-6850-P03-CQ5E27-DC (Warm)

12 Volt Helios LED Bulb 5.5W

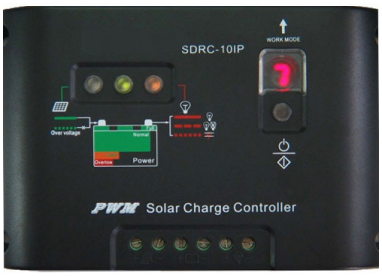
Part Number: A-6850-P04-CR4E27-DC (Cool)
Part Number: A-6850-P04-CQ5E27-DC (Warm)

Technical Specifications
Batteries

- Higher energy density
- High purity lead calcium alloy, maintenance-free and minimizes water loss
- High strength terminals with high conductivity are advanced at high current discharging
- Excellent deep cycle property, longer service life.

Technical Specifications	
Nominal Voltage	12V
Rated Capacity	12Ah
Sealed Type	Sealed
Maintenance Type	Free
Height	98mm
Length	151mm
Width	98mm
Weight	4.1Kg

Technical Specifications
Solar Controller



10A Controller; Ordering Part Number: 6830-121-C10

- 12/24V automatic recognition
- Highly efficient Series PWM charging which increases the battery lifetime and improves the solar performance
- Digital LED menu, only one key to adapt all settings simply
- Intelligent timer function with options between 1-15 hours
- Gel, sealed and flooded battery type options.
- Electronic protection against: overheating, overcharging, over discharging, overload and short circuit.

Technical Specifications	
Nominal Voltage	12V
Rated Capacity	12Ah
Sealed Type	Sealed
Maintenance Type	Free
Height	98mm
Length	151mm
Width	98mm
Weight	4.1Kg

- For Operating information please see page 18 on this document.

Technical Specifications
Conntion Box

10A Controller 10 Ampere; Ordering Part Number: 6830-121-C10

- 12/24V automatic recognition
- Highly efficient Series PWM charging which increases the battery lifetime and improves the solar performance
- Digital LED menu, only one key to adapt all settings simply
- Intelligent timer function with options between 1-15 hours
- Gel, sealed and flooded battery type options
- Electronic protection against: overheating, overcharging, over discharging, overload and short circuit

Technical Specifications	
Nominal Voltage	12V
Rated Capacity	12Ah
Sealed Type	Sealed
Maintenance Type	Free
Height	98mm
Length	151mm
Width	98mm
Weight	4.1Kg

- For Operating information please see page 10 on this document.

Cable with E27 Socket Features:

- Cable can be extended to 3 meters.
- Equipped with on/off switch
- E27 Socket
- The length of the cable can be custom ordered
- Part Number: 6830-190-E273MHS

DriBox Features:

- The design incorporates a very simple hinged clamp mechanism that can be easily opened or closed to allow access and closure immediately without the need to release or tighten screws. The lid also features an innovative waterproof interface which moulds around cables when clamped to the box, giving you complete peace of mind.
- Weatherproof box
- Stylish simple design
- Dimensions:
  Length: 330mm Width: 230mm Height: 140mm

Installation Information

Cigarette Lighter Socket

U-Tron provides a Cigarette Lighter Socket, exactly the same as found in your car. You can bring all your gadgets that you use in the car with your cables. We do not provide a USB socket, but by plugging your charger into the socket, you can use any product that is made for use in the car.

Cigarette Lighter Socket

Multi-plug Cigarette Charger

Solar Panel Assembly

U-Tron provides matching cables with each pane. They will interconnect to form a larger capacity panels without causing power loss.

- The first panel will have one end open – attach the supplied terminator to protect from water leaks.
- Each panel will have a mating cable and connectors.
- The last panel will have an open end cable which connects into the DriBox. If you need to add more length to the cable please use the IP68 interconnect box to protect from water leaking.

Upgrades:

Our Standard Solar Home Package can be upgraded by adding more output capacity or batteries.

2x 12Ah Battery **6830-500-285** Dimension: Length: 285mm Width: 150mm Height: 110mm	285 
4 x 12Ah Battery **6830-500-330** Dimension: Length: 330mm Width: 230mm Height: 140mm	330 

Installation of each component:

- **Installing your Solar panels.**

According to your geographical location, solar panels should be installed facing north or south in a sunny place and tilted to face the sun as long as possible through out the day. Avoid any trees and buildings that can block the sunlight. We advise you to set them on the ground if you have a land around your home. Some put them on the roof and some put them on poles. Arrangements are up to you and the conditions around your home.

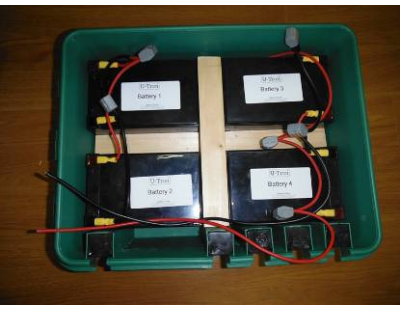
- **Wiring the solar panels**

Wiring the panel is easy if you are using our supplied cables. If you are using your own cables, please make sure the wires are at least 12AWG to avoid loss of current. Always use RED for (+) Positive and BLACK (or BLUE) for (–) Negative. This way, we are all following common standards and troubleshooting will be easier. On the solar panel there is a connector box, when opened there are clearly marked + and – signs, never cross connect any of the panels. If you are using multiple panels they must be connected in parallel. See the U-Tron Cable which has a T connector with male and female connectors at the end. One end will be connecting to the next Panels' female connector and the 1st panel's un-used end (male) should be covered with the a female terminator plug (supplied).

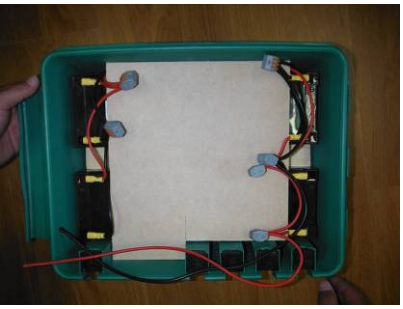
Warning: Never short the 2 leads coming from the solar panels as they are already full of energy and can start fires or cause bodily injury.

The other end of the cable should be connected to the solar controller, but wait until the batteries are installed and connected to the controller before applying the solar charging. The charging indicator light will flash when the solar panel is charging.

- **Connecting the Batteries**



The batteries are pre-assembled, disconnected and packed separately for shipping convenience. Locate the positive and negative leads on the batteries and by following the same standards we established earlier (RED is + and BLACK or BLUE is –), arrange the batteries and insert the connectors. Now all your batteries are connected in a parallel connection. We have made some adjustments in the thickness of the wire to unbalance the batteries' voltage so the last battery on the loop will also get enough charge during the charging cycle.



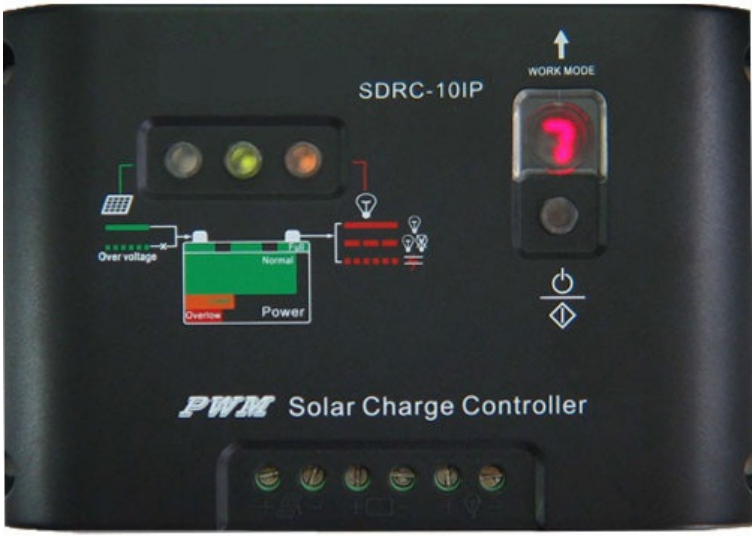
If you are supplying your own batteries, please ensure you following the common rules as to the wire color code established earlier. Again, make sure your batteries are 12 Volt DC and 20Ah or better. You can use GEL, Acid, sealed or other types that can last over 10000 cycles. If your batteries are not the same size as we designed, (H98 x L151 x W98 mm and 4.1Kg), you may have to set them out side the DriBox. The internal wirers can be extended outside as long as you can keep them away from wet areas. (We can't guarantee serviceability if the batteries are set outside the DriBox but we advise you to obtain a metal box that can fit your battery from any local hardware store. If you are purchasing your own wires, again please make sure they are red and black and at least 12 AWG thickness.

- **Connecting the bulbs**

Connect the lights to the connector box and run the wires over the silicon gel on the DriBox. When the cover is on top, the DriBox will protect the inside from any water entering and damaging the components. The box is suitable as long as it's not emerged inside the water. Never leave the box outside in the rain for extended periods of time.

Turn on the main power switch on the connector box and the individual switches and your lights should be working, unless the programming is altered in the controller box.

Programming the Solar Controller



- **Programming the Solar Controller**

This U-Tron 6830-121-C10 - 12V, 10Amp controller comes with every standard solar system. The method used to connect the panels, batteries and loads are clearly marked on the cover with symbols of positive and negative also indicated on the outer box.

- **Technical Information for the Controller box**

Descriptions:	Specifications
Working voltage	12V and 24V DC
Rated solar input	10A
Rated load 5/10A	10A
25% Current overload (min)	1
Load disconnect	11.1V
Load reconnect	12.6V
Equalization voltage (10 minutes)	14.6v
Boost voltage (10 minutes)	14.4v
Float voltage	13.6v
Temp Comp. (mV/℃)	-30mV
Temperature:	-35℃ to +55℃

Quick Start Instructions

This section provides a brief overview of how to get started using the controller. However, please review the entire manual to ensure best performance and years of trouble-free service.

Make sure the PV and load currents will not exceed the ratings of the controller being installed.

It is recommended that the connections be made in order from 1 to 6. (See the following picture)

Use with 12V or 24V batteries only

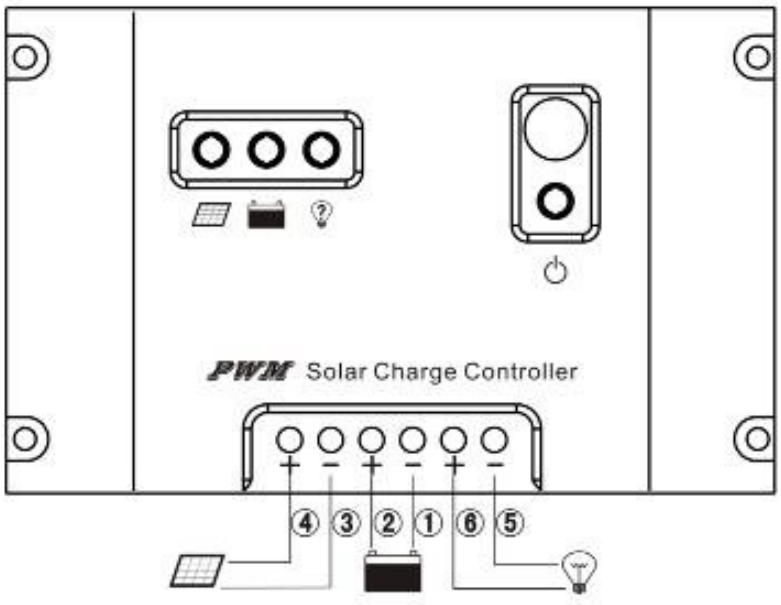
Use with 12V or 24V systems only

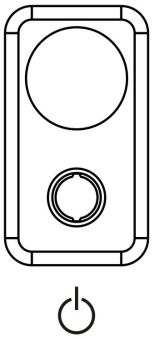
Connect the BATTERY first. Use care that bare wires do not touch the metal case of the controller.

Connect the SOLAR (PV array) next. The green LED indicator will light if sunlight is present.

Connect the LIGHT last. If the red LED indicator lights, the battery capacity is low and should be charged before completing the system installation

Press the BUTTON as 6 or 7 to verify if the system is working properly.





Lighting Control Options

Press the power switch for 5 seconds, and select the desired LIGHTING CONTROL option. The LED is on, which confirms you have selected the right option.

The controller requires 10 minutes of continuous transition values before it starts to work. These constraints avoid false transitions due to lightning or dark storm clouds.

Leave off for 10 minutes for the controller to start to work.

- **A detail description follows below:**

Number 0:	Dusk-to-Dawn, light is on all night
Number 1:	Light is turned on after sundown for 1 hour
Number 2:	Light is turned on after sundown for 2 hours
Number 3:	Light is turned on after sundown for 3 hours
Number 4:	Light is turned on after sundown for 4 hours
Number 5:	Light is turned on after sundown for 5 hours
Number 6:	Light is turned on after sundown for 6 hours
Number 7:	Light is turned on after sundown for 7 hours
Number 0.:	Light is turned on after sundown for 8 hours
Number 1.:	Light is turned on after sundown for 9 hours
Number 2.:	Light is turned on after sundown for 10 hours
Number 3.:	Light is turned on after sundown for 11 hours
Number 4.:	Light is turned on after sundown for 12 hours
Number 5.:	Light is turned on after sundown for 13 hours
Number 6.:	Lights remain turned off, ON/OFF mode
Number 7.:	Test mode, lights on after it detects no light, lights off after it detects light.

Red blinks when the load is short-circuit.

Please note: the output will cut off once there is an overload or short circuit. Disconnect all the equipment and reconnect, press the button and the controller will resume working after 10 seconds. If not, leave for up to 24 hours and try again.

- **LED INDICATOR**

  Green ON when solar is charging battery

  Green blink when the system over voltage

  Green ON when battery level is in the right range

  Green slowly flashing when battery level is full

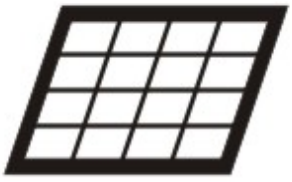
  Yellow ON when battery level is low

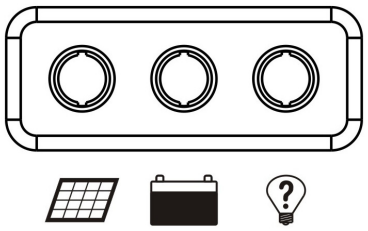
  Red ON when the loads cut off

  Red ON when the output is on.

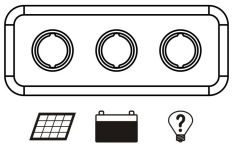
  Red slowly flashing when there is an overload

(The load amps is 1.25 times of rated current for 60 seconds, or the load amps is 1.5 times of rated current for 5 seconds)





TROUBLE SHOOTING



The charging LED indicator is off when it is daytime.

The green charging LED should be on if it is day time.

Check that the proper battery type has been selected.

Check that all wire connections in the system are correct and tight. Check the polarity (+ and -) of the connections.

Measure the PV array open-circuit voltage and confirm it is within normal limits. If the voltage is low or zero, check the connections at the PV array itself. Disconnect the PV from the controller when working on the PV array.

Measure the PV voltage and the battery voltage at the controller terminals. If the voltage at the terminals is the same (within a few tenths of volts), the PV array is charging the battery. If the PV voltage is close to the open circuit voltage of the panels and the battery voltage is low, the controller is not charging the batteries and may be damaged.

- **Charging LED indicator is blinking**

First check the operating conditions to confirm that the voltage is higher than specifications. Consider the temperature compensation of the controller's PWM set point. For example, at 0℃ the controller will regulate at about 15.0 volts.

Check that all wire connections in the system are correct and tight.

If the Load LED indicator is blinking, or flashing or on red, the load is not operating properly.

Check that the load is turned on. Check that no system fuses are defective.

Check connections to the load, and other controller and battery connections. Make sure voltage drops in the system wires are not too high.

If the LED indicator is blinking and there no output, check if the load is short-circuit. Disconnect the load, and press the switch button – the controller will return to work after 10 seconds.

If the LED indicator is flashing and there is no output, check if the load is over the rated power. If so, reduce the load, and press the switch button, the controller will return to work after 10 seconds.

INSPECTION AND MAINTENANCE

The following inspections and maintenance tasks are recommended at least once per year for best controller performance:

Confirm that the correct battery type has been selected.

Confirm that the current levels of the solar array and load do not exceed the controller ratings.

Tighten all the terminals. Inspect for loose, broken, or burnt wire connections. Be certain no loose strands of wire are touching other terminals.

Press the TEST button (number: 6 or 7) to verify the lights are working.

Check that the controller is securely mounted in a clean environment. Inspect for dirt, insects and corrosion.

Check the air flow around the controller is not blocked.

Protect from sun and rain. Confirm that water is not collecting under the cover.

Check that the controller functions and LED indicators are correct for the system conditions at that time.

Make sure the PV array is clean and clear of debris and snow. Confirm the array is oriented correctly for the installation location.

Installation tips:

Here are three tips on dealing with the question of whether you should or shouldn't take a look at installing a system to generate solar energy for your home. By using these tips, you can potentially save thousands of dollars in energy costs during the year. Just imagine how much happier you and your family would be, knowing how the home generation and use of solar power helps the environment.

Tip number one: Get knowledgeable on the topic.

If you just say, "Hey, let's install some solar panels!", you could be in for a rude awakening. What you need to realize is that there are 2 ways to go about installing solar panels. The first method can be *very* expensive, and calls for hiring a contractor to buy and install a complete solar energy system.
The second way is to do it yourself. This is not as problematic as it might seem, and there are several very good DYI solar energy guides available for less than $50. The most important factor here with either option is to do your research!

Tip number two: Don't feel you have to get it all done at the same time.

One thing to keep in mind is that you do not need to run your whole house on solar power from the beginning, especially, as mentioned earlier, if you do not or cannot set up your whole place all at once. A do-it-yourself system can, for example, be installed to heat your hot water only. Depending on where you live, this can save you a bundle right there, and it is a project that can be done in a weekend.

With solar panels, the more you have, the more power can be stored to run facilities. After you have your hot water running with solar panels, you can expand out at your own pace. It is a very doable project.

Tip number three: Be creative and search for places in your home where you can start using solar energy first.

If you live in a house, look at all the facilities that use electricity. If you

have a pool for example, or a hot tub, these are two of the perfect uses for the sun. Many newer units can be purchased with the solar heating and powering system already installed. If you have an older unit, a simple DIY solar panel system will work.

Your outdoor lighting system is another great candidate for solar power usage. Technology has advanced and solar batteries are great. On the subject of batteries, do not forget to buy solar powered electronics such as solar-powered bluetooth headsets, cell phones and MP3 players. Of course, these tips only touch the surface. Luckily, we live in the internet age where the correct information is just a simple search away. There is so much guidance out there on how to install solar energy for your home and save tons of money as well as helping the environment at the same time.

Maintenance

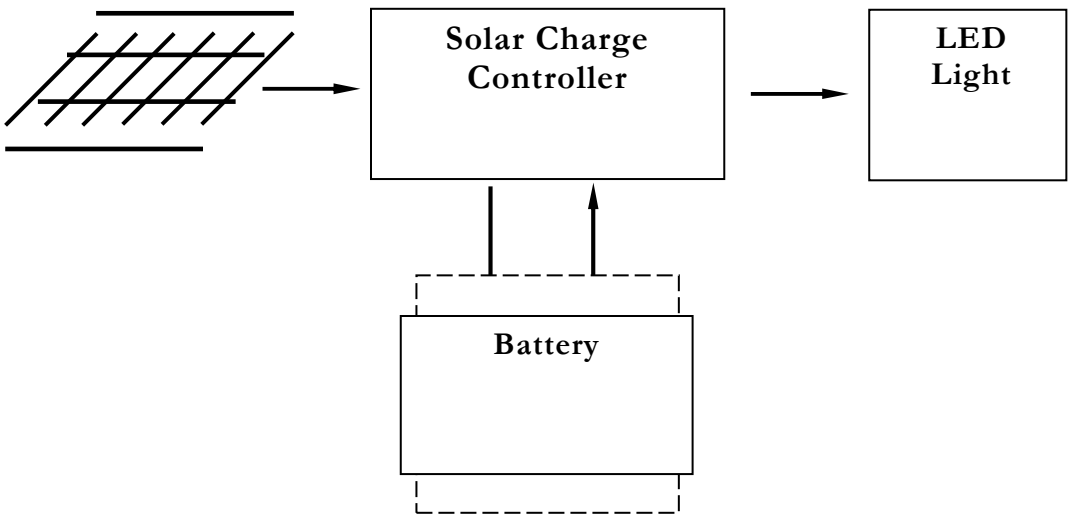
1. The solar panel should be installed to orientate the sun and fixed firmly. Make sure the solar panel is clean and rotating and inserts the connector solidly.
2. Please turn off the switch or use a small light to conserve electricity if going out of the house.
3. Please turn off the switch after using to save the battery power. Observe the charge indicator and voltage meter in a timely manner and pay attention to the charging status. Please use low-block lighting to save electricity when the power is down.

Note:

1. The system is special. People must use our LED lights and cannot use other non-matching light. It does not accommodate other electrical connections – such may cause equipment damage.

2. Due to the high-power consumption of mobile phone chargers, it is better to choose a clear day to charge your cell phone, and not to charge many phones in a day.

3. The power switch at the back-end of control box must be shut off when the system is not being used.



Warranty

U-Tron (Beijing) Electronics Co. Ltd., warrants the products listed bellow for a period of 36 months from the date of shipment to be free from defects in material or workmanship and to be of the kind and quality designated or specified in the purchase agreements. If any products does not meet the above warranty and the buyer promptly files a warranty claim, U-Tron shall do the following:

U-Tron shall provide a 12-month "**No Questions Asked**" replacement of any faulty units at no charge to the customer. The time limit for exchange shall not exceed 30 days from the time a claim is filed by the buyers. The buyers shall return the faulty units within 30 days of filing the claim. The method of shipping back the faulty units to U-Tron shall be decided at that time by U-Tron and all shipping charges shall be borne by U-Tron.

At the end of the 12-month period U-Tron shall provide an additional free **extended warranty** for another 24 months. During these 24 months, U-Tron shall repair or replace and re-certify every faulty unit reported. Shipping charges for sending the units to U-Tron shall be the responsibility of the buyers and the shipping charges to return the repaired goods to the buyer shall be borne by U-Tron. Time limit for repairs shall not exceed 60 days.

U-Tron, at their own option can elect to provide replacement units at any desired percentage to be warehoused and logged by the buyers for the timely service of the extended warranty replacements. When the warranty expires, the bad units and unused units shall be shipped back to U-Tron unless otherwise stipulated in the contract or purchase agreements. If the warehoused quantities become 90% used up or nearing the end of stock, the buyers shall ship back the faulty units to U-Tron. U-Tron shall rotate the spare parts inventory within 60 days of receiving the units from the buyers.

All warranty claim items shall by shipped to the buyers regardless of geographical location, by air freight to the nearest airport. Any returning items can be shipped by sea or air freight at the option of U-Tron. If the customer fails to return the said faulty units with in the timeframe as instructed, it will be considered sold and U-Tron reserve the rights to bill the customer for its full value.

U-Tron shall not bare any responsibilities with the buyers' customer claims or shall not bare any other expenses incurred other than the cost of units themselves. Customer site un-installation and re-installation of any faulty units shall not be the responsibilities of U-Tron.

The warranties set forth herein shall be voided if the units have been 1) repaired or altered by any un-authorized person 2) subjected to misuse, negligence and accidents or operated in other than normal operation and use. 3) Connected, installed or modified in a manner that is not in accordance with U-Tron instructions.