



Solar Lighting Overview:

The primary function of the Polistar solar lighting system is to provide **stand-alone security level lighting** for shelters. The kit operates on 12 VDC and is for lighting only. It does not provide sufficient power for 110AC devices, including other light fixtures, fans, etc.

Solar Kits:

Three kits are available: **1) a single lamp (4.5 Watt) kit** for small shelters (transit size, e.g. REK 6x12); **2) a single lamp (9 Watt) kit** for larger shelters, e.g. REK 16x24; **3) and a double lamp (9 Watt x 2) kit** for longer shelters, e.g. REK 20x34. Kits include the solar photovoltaic (PV) cell, cell mount hardware, L.E.D. lamp unit, battery controller/lamp driver, storage battery(s), battery enclosure, required wiring, earth ground rod, fasteners and misc. materials.

Lighting Output:

The amount of light provided by the solar lamp will vary by the mounted height of the lamp fixture. The actual illuminance provided by a system will typically be on the level of approximately 10 lumens or 1 foot candle, **a lighting level roughly equivalent to the ambient light available at twilight.**

System lighting is controlled by a combination Lamp Driver / Solar Controller which controls lamp operation and battery charging. Lamp on-off cycle times are preprogramed, and is typically 8 hr. total duration per 24 hr. day, split between late evening and early morning. System controller will automatically adjust to seasonal changes in daylight hours.

Kit Components:

Lamp unit: The L.E.D. lamp unit is encased in a rugged metal low profile enclosure. The lamp contains three 1.5 watt L.E.D. emitters for the 4.5 watt lamp, or six 1.5 watt emitters for the 9 watt lamp, and is protected by a polycarbonate lens.

PV Cell : The PV cell is a UL and CSA listed crystalline module. Size of the cell will be determined by the kit size and also location.

PV Cell Mounting: **Standard mounting of the PV panels is direct surface mount attachment to the roofing.** This method is suitable when the orientation of a shelter roof allows an unobstructed view of the winter sun trajectory. This mounting may not be optimal, or even suitable, if the sun transit is obscured to the PV cell. The efficiency of a PV cell is directly related to the positioning of the cell relative to due South and to the angle of the winter sun above the horizon. For example, a shelter sited in Cincinnati, Ohio should have the PV cell mounted so that it is at a 49 degree angle above the Southern horizon (rule of thumb is latitude (Cincinnati is 39°) plus 10°). Any angle greater or lesser will reduce the amount of current the cell can provide, in the least solar efficient winter months. If the shelter roof does not have a South facing orientation or the roof angle is low, other mounting options should be considered. Direct exposure to the sun can also be impacted by trees or other obstacles near the shelter.

Systems are designed so the PV cell can charge the batteries sufficient to power the system three days under very subdued light conditions. If the PV cell cannot provide sufficient power, the duration of lamp lighting may be affected, reducing system effectiveness. In the event of low battery power, the lamp driver will sense the low battery condition and reduce light output to extend the period of lighting coverage.

Flat to roof PV
cell mounting



Alternative PV Cell Mount Options: To improve cell positioning and efficiency, two other mounting options are available. The first is an **angle mount** which positions the cell at an angle (1 - 60 degrees) to the roof. The second alternative is the **strut and mast**, which mounts the PV cell to a frame mounted mast allowing 360 degree radial and 90 degree elevation positioning flexibility.



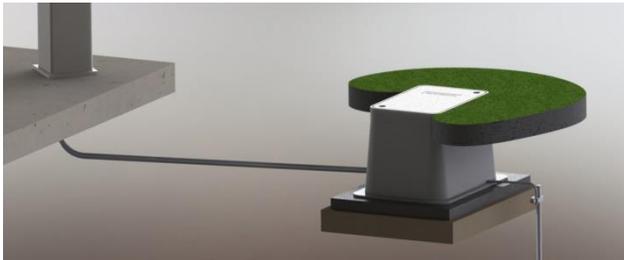
At Left: Angle
PV cell mount

At Right:
Strut and
mast PV cell



Controller Box: The controller box houses the system controller and lamp driver and is the system hub. The box has a hinged, lockable door and is column mounted below the truss. The footing of this column must have a PVC conduit to allow wire passage to the battery vault.

Battery(s) and Enclosure: Kits will either have one or two batteries, the battery size varying with system requirements. The AGM (Absorbed Gas Mat) storage battery provided is the battery of choice for solar installations, it is a very safe and efficient technology, the latest in battery technology. AGM batteries are fully sealed, totally liquid and gel free, and capable of withstanding moist environments, including full immersion. The enclosure is an inconspicuous in-ground vault with a tamper resistant cover marked "ELECTRICAL".



Typical battery vault installation showing conduit, vault w/ base & cover and ground rod.

Wiring: Wiring is provided for connection between all components. Wire access and hand cutouts are provided in frame members to facilitate system wiring. 5' of flex conduit is provided with the kit to enclose wiring between the PV cell and roofing penetration and then between roofing and structure. Rigid conduit is also provided for the wire run between wired column footing and battery vault. If wiring is not run within structural members it must to be enclosed in conduit (not provided). A PVC sweep 90 or similar conduit (not provided) must be provided through the footing of the wired column, the mounting location of the system controller. It is through this conduit that wire to the battery vault will be run.

Solar Kit Warranties:

P.V. Cell: 20 Yr.

Battery: 2 yr. replacement and 3 additional pro-rated (5 total)

Code compliance and Installation:

As a 12 Volt (low voltage) stand-alone system, installation by certified electricians is not required but is recommended. Component parts (electrical) are UL & CSA (Canada) approved.

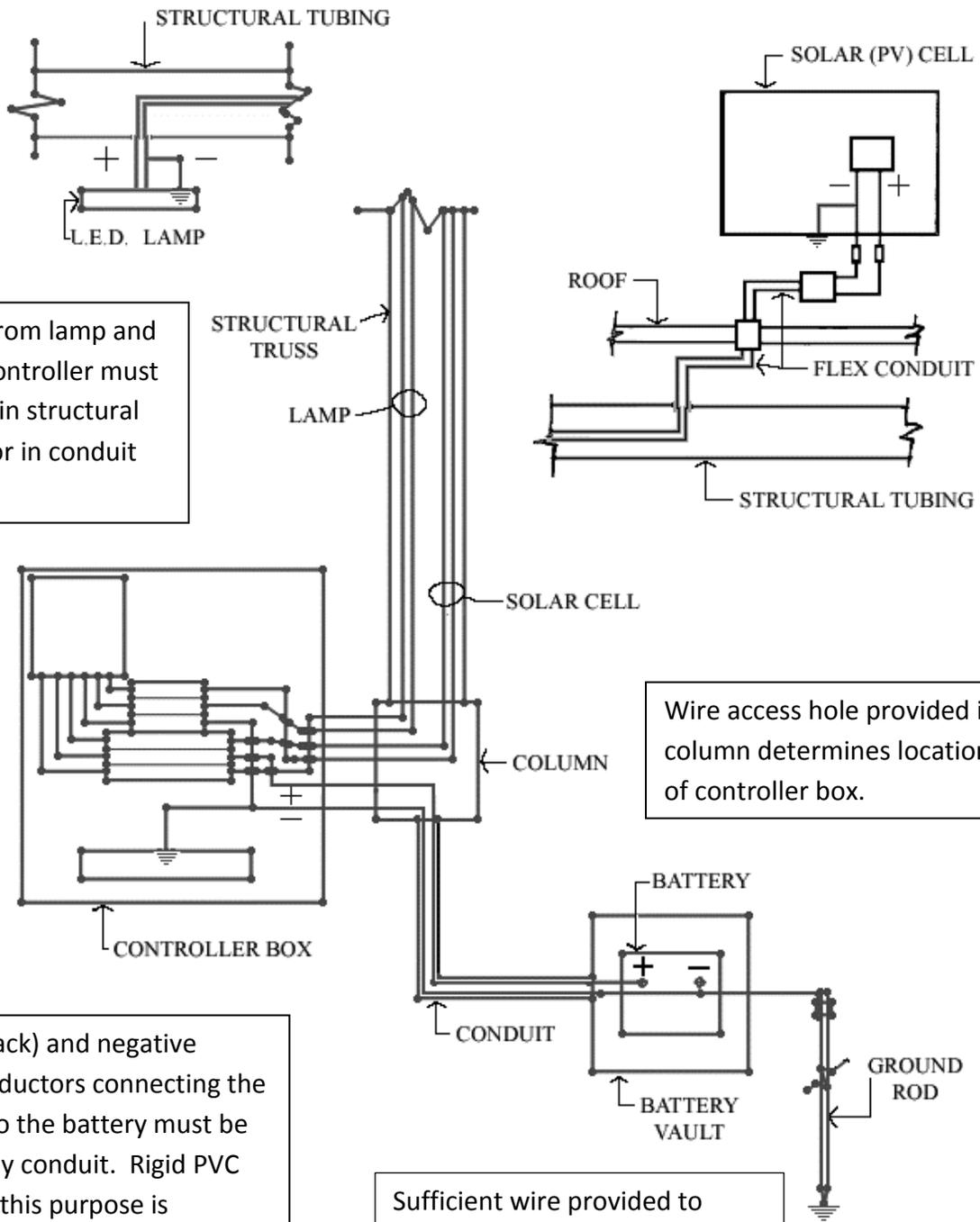
LEED Credits:

New Construction/Energy and Atmosphere/On-Site Renewable Energy/ EAc2 is a category that may, in some cases, apply. Credits are based on ability of the system of offset building energy costs.

Also, SS Credit 8/ Light Pollution Reduction applies in cases where lighting within shelters (shielded) replaces outdoor (unshielded) security lighting.

System Schematic:

Wire and hand access holes are provided at lamp and PV cell mount locations.



Wire runs from lamp and PV cell to controller must be run within structural members, or in conduit (by others).

Wire access hole provided in column determines location of controller box.

Positive (black) and negative (green) conductors connecting the controller to the battery must be protected by conduit. Rigid PVC conduit for this purpose is provided.

Sufficient wire provided to locate battery vault up to 6' away from wired column and ground rod within 2' of battery.