



## Solar Costa Rica

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### IMPORTANT INFORMATION FOR ALL BATTERY OWNERS

Rolls Surrette batteries have a long life expectancy and a generous manufacturer's warranty. However, they are not a maintenance-free product. The general maintenance described below is required in order to maintain a valid product warranty and to keep your batteries in top working order.

Some homeowners are personally involved in their system maintenance, or have a local staff member who is able to provide this level of care. If you are unable to carry out the maintenance described in this document, Solar Costa Rica can provide a maintenance contract.

#### WARNING: Risk of Acid Burns

- Always wear appropriate eye protection and rubber gloves when carrying out battery maintenance activities.
- Remove jewelry and secure long hair when working with batteries.
- Always assure adequate ventilation, especially when equalizing.

Keep baking soda on hand to neutralize any spills and wash skin thoroughly following any maintenance activities.

#### WARNING: Risk of Fire, Explosion, Electrocutation and Burns

- Never smoke near the battery bank
- Use extreme caution when using metal tools around batteries.

Do not allow any object or body part to contact two battery terminals at the same time. Short-circuiting a battery in this way (for example, by dropping a metal tool that falls across two terminals) may result in fire or explosion. Metal objects may become welded to the battery terminal. Acid mist may escape at high pressure, and the battery may be destroyed.

#### CLEANUP

If battery acid leaks or spills, use a solution of about 1/3 cup baking soda to one gallon of water to neutralize the acid, then wipe with a damp cloth to remove baking soda residue.



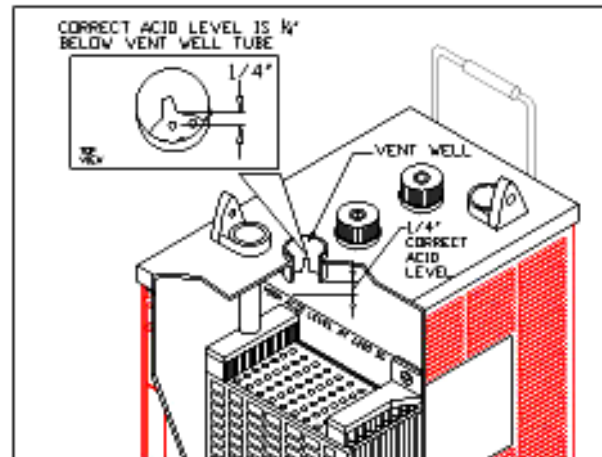
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### Maintenance Task: Check Acid Levels – MONTHLY

Check the level of the electrolyte fluid in each battery cell at least once a month. If you are going to equalize your batteries (see below for instructions) during this maintenance session, check the acid level, but see equalization instructions before adding any water.

Pop open each yellow Watermiser Cap and, using a flashlight, look inside to check the acid level in each cell. If the acid level is low, add enough distilled water to bring the levels back to  $\frac{1}{4}$ " to  $\frac{1}{2}$ " below the bottom of the vent well (the tube inside the battery cell, with slots on each side).



Distilled water can be purchased at many grocery stores and gas stations. If distilled water is not available, tap water (non-chlorinated) may be acceptable if it is not "hard" and does not contain high iron levels. Use of non-distilled water can cause mineral build-up in the battery cell, which can decrease the battery's lifespan and affect system performance.

### Maintenance Task: Check for Tightness and Corrosion – MONTHLY

Check that battery connections are tight. If the connections are loose, tighten them to the manufacturer's specifications.

Check the battery connections for corrosion. This includes the copper connecting bars, nuts, bolts and battery terminals. Loose battery terminals and lugs exposed to open air corrode rapidly. The corrosion appears as a white powder or granular foam on the terminals and any nearby exposed metal parts. If corrosion is found, follow the cleaning instructions below.

#### **WARNING: Risk of Acid Burns**

Use gloves and protective eyewear. The powder is a crystallized form of sulfuric acid. In case of skin contact, wash immediately. Most textiles that are exposed to this corrosive eventually dissolve so care should be taken to protect clothing as well.



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### Maintenance Task: Clean the Battery Bank – ANY TIME CORROSION IS FOUND

The most common cause of battery system failure is loose or corroded battery terminals and cable lugs.

Keeping your batteries and the battery enclosure clean will keep batteries operating efficiently. Battery posts must be clean in order to reduce the resistance between the battery post and cable connection. Dirty or corroded batteries can leak (waste) current and tend to run warmer, which further reduces the battery's efficiency. A buildup of dirt or oxidation may eventually cause the cable terminal to overheat during periods of high current draw.

If any white powdery residue is found between the battery cable lug and the battery terminal, the cable must be removed for cleaning, as follows:

#### Getting Ready

Gather cleaning and safety supplies before you begin.

#### Clothing

Battery acid is highly corrosive and any spills will leave holes. Old clothes should be worn, as well as rubber boots or old shoes. Remove watches and jewelry, and secure long hair.

#### Tools

- Insulated adjustable wrench or ratchet and sockets of the size needed to loosen and tighten battery terminals
- A brass brush, stiff enough to remove the corrosion (available at hardware stores)  
*After use, rinse the brush in a weak baking soda/water solution and store in a safe place. Do not use for any other purpose.*
- Protective eyewear
- Rubber gloves
- Bucket
- Baking soda (a box of baking soda should always be kept near the battery bank in case of a spill)
- Hand cleaner or soap and towels

#### Cleaning Solution

Prepare a cleaning solution by mixing about 1/3 cup of baking soda for each gallon of water.



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### Disconnecting Batteries for Cleaning

**WARNING: Risk of Fire, Explosion, Electrocutation and Burns**

Do not allow any object or body part to contact two battery terminals at the same time. Short-circuiting a battery in this way (for example, by dropping a metal tool that falls across two terminals) may result in fire or explosion. Metal objects may become welded to the battery terminal. Acid mist may escape at high pressure, and the battery may be destroyed.

Take a photograph or make a diagram of the battery bank before disconnecting anything. It is important that the system be reconnected in the same configuration after cleaning.

To disconnect the batteries safely:

1. Disconnect all loads and charging sources
2. Disconnect the Negative (-) battery cable first
3. Disconnect the Positive (+) battery cable last

### Cleaning Battery Terminals, Battery Bars, Nuts and Bolts

**CAUTION: Damage to batteries**

Never allow the baking soda solution to get inside the battery, as it will neutralize the acid, causing permanent damage.

Remove each copper connecting bar from the battery bank, taking care not to touch any two terminals at the same time.

Clean each battery terminal with a steel brush and a solution of about 1/3 cup of baking soda in one gallon of water. Scrub the copper connecting bars and stainless steel nuts and bolts with a steel brush, rinsing repeatedly in the bucket of cleaning solution until completely clean. Dry well and reconnect the batteries exactly as they were connected originally, tightening well.

If you are unsure about the configuration of the battery bars, do not guess. Connecting the terminals incorrectly may result in explosion and/or personal injury.

Once everything is reconnected, go back and re-tighten each connection.



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### Maintenance Task: Equalize the Batteries – EVERY 1 TO 3 MONTHS

Equalization is a critical maintenance task that will extend the life of your system.

- Batteries that cycle (are charged and discharged) frequently, for example off-grid systems where all electricity is drawn from the battery bank, will require more frequent equalization, perhaps as often as once a month.
- Backup systems that provide power on an emergency basis, but are not in constant use, can go for up to three months between equalization.

Before equalizing, check the acid levels in each battery (see diagram and description above). If the plates inside the battery are exposed, add just enough distilled water to cover them. Do not fill to the usual level before equalizing.

Leave the yellow Watermiser caps in the closed position to prevent splashing, but do not snap them shut, as gases will be released during the equalization process.

Equalize your batteries. The equalization procedure varies by system type. Ask us if you're not sure.

Check acid levels again, and add enough distilled water to bring the level in each cell up to ¼" to ½" below the bottom of the vent well, as you would during normal monthly maintenance.

Snap Watermiser caps securely shut and clean external cases with a damp cloth if necessary.

I have read and understand the maintenance procedures described in this document. I understand that my batteries must receive proper care in order to retain their manufacturer's warranty, and that failing to follow these instructions can result in severe personal injury and/or property damage.

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Signature