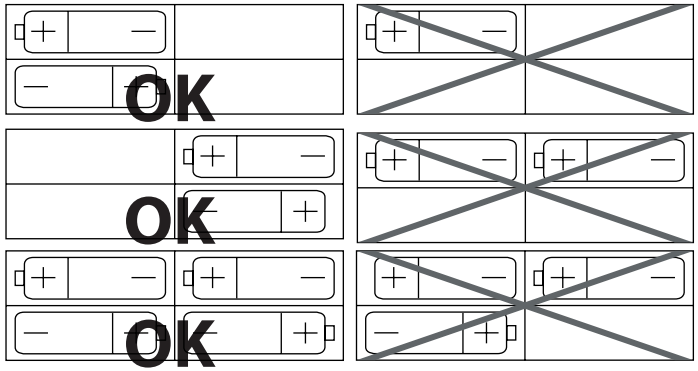
QuickStart Guide

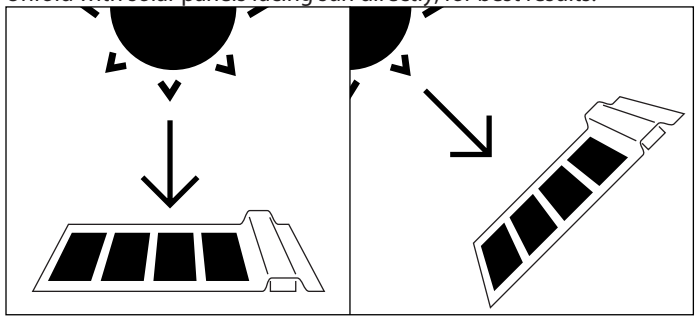
1. Battery Use

Insert 2 or 4 rechargeable (NiMH or NiCad) AA batteries. (Note +/- ends.) **CAUTION:** Never charge Alkaline batteries, they could leak and become dangerous. ***Spin batteries and push pointed battery end (+) forward to ensure good contact for charging.***



2. Sun Placement

Unfold with solar panels facing sun directly, for best results.



3. Charging Lights

(See manual for details)

Blinking Light(s) ___ ___ ___ ___ ___ ___ (Batteries are charging.)

Solid Lights _____ (Batteries are fully charged.)

Rapid Pulse Lights ●● ●● ●● ●● ●● ●● (No battery, low battery, battery is backwards, or other battery problem.)

No Lights Wait 5 minutes. Replace batteries if no lights appear.

Troubleshooting: ***Spin batteries and push pointed battery end (+) forward to ensure good contact for charging.***

4. Charge Times

OK to leave batteries in charger after fully charged. Not recommended to leave batteries in charger for long-term battery storage.
2 Batteries : Full charge in about 4 hours of full sun.
4 Batteries : Full charge in about 8 hours of full sun.

Feedback? Write us at AAfeedback@iowathinfilm.com

Contact Information:
www.iowathinfilm.com
Iowa Thin Film Technologies
2337 230th St.
Boone, IA 50036

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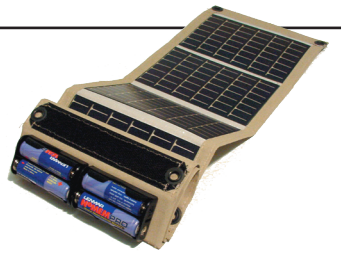
PowerFilm®

Solar Powered Battery Chargers

The World's Most Lightweight Solar Technology

AA Foldable Solar Charger

Users Manual



Introduction:

Welcome to solar charging. Before you use the charger please read the section on use below.

Use:

Place 2 or 4 rechargeable (NiMH or NiCd) AA batteries into the battery holder found on the back of the battery charger.

Spin batteries and push pointed battery end (+) forward to ensure good contact for charging.

CAUTION: Never charge Alkaline batteries, they could leak and become dangerous. If you are charging only two batteries make certain to use holders above and below (not beside) each other.

Place the unit with the solar module facing the sun, to collect as much light as possible. Unfold with solar panels facing sun directly, for best results.

Charging Lights: **Blinking Light(s)** ___ ___ ___ ___ ___ ___ (Batteries are charging.)

Solid Lights _____ (Batteries are fully charged.)

Rapid Pulse Lights ●● ●● ●● ●● ●● ●● (No battery, low battery, battery is backwards, or other battery problem.)

No Lights Wait 5 minutes. Replace batteries if no lights appear.

Troubleshooting: ***Spin batteries and push pointed battery end (+) forward to ensure good contact for charging.***

There are two charging lights, one for each pair of batteries.
2 batteries : Full charge in about 4 hours of full sun.
4 batteries : Full charge in about 8 hours of full sun.
It is ok to leave batteries in charger after fully charged. Not recommended to leave batteries in charger for long-term storage.

Advanced Use:

Matching batteries:
For best performance, battery pairs that were used together and have the same level of charge should be recharged together.

The batteries are recharged the most efficiently and gently if the two batteries in each holder are matched. The goal in matching batteries is to select batteries which will finish charging at the same time. This is accomplished the most easily by recharging completely discharged batteries of the same capacity. Alternatively one may label new batteries in pairs, and use and recharge them always in the same pairs.

Using this battery charger, mismatched pairs of batteries may be recharged, but this may increase the time necessary to recharge. It may also reduce the life of the batteries.
Matching criteria in the order of importance are:

State of charge (How full is the battery?)
Capacity (How many mAh are listed on the case?)
Age (How old and worn is this battery?)
Make (Who made this battery?)

The more of these criteria match, the sooner the batteries will be done charging. Additionally, the battery lifetime is extended.

Estimating Charge Time:

The charging time depends mainly on how full the batteries are, their capacity, and the light intensity.

In full sunlight this charger will charge 400mAh into a pair of batteries in one hour. To find the time needed to charge a pair of batteries divide the capacity listed on the side of the battery by 400mAH. This gives the time needed to charge an empty pair of batteries. If the batteries are only partially discharged, charging them will take less time. For example half full batteries will take half as long. If two sets of batteries are charged, the total time required is the sum of the individual times.

examples:

1 pair of discharged 2000mAh batteries: 2000mAh/400mAh = 5 hours
1 pair of 1600mAh batteries, half full: (1600mAh/2)/400mAh= 2 hours
Both of the above pairs together: 5 hours + 2 hours = 7 hours

Estimating solar intensity:
Solar intensity affects the time needed to charge a set of batteries. The brighter the sun is the faster the batteries will charge.

Warranty Information:

Powerfilm Limited Warranty:

Iowa Thin Film Technologies, Inc. (ITFT)warrants to the original purchaser that the product is free from defects in material and workmanship for a period of 1 year. The duration of the Limited Warranty is from the date of initial purchase from ITFT. The foregoing warranty does not apply to any products which have been subject to misuse, unauthorized modifications, neglect, improper testing, attempts to repair, or have been damaged by accident, fire, or other hazard. ITFT's sole obligation and liability shall be, at ITFT's choice, either to supply replacement products, or to credit the amount due, provided that the warranty procedure has been followed. Disclaimer of warranties: Except as expressly set forth in this agreement the products are provided on an "as is" basis, and ITFT makes no warranty in connection with the subject matter of this agreement, and hereby disclaims any and all implied or statutory warranties, including all implied warranties of title, non-infringement, quiet enjoyment, accuracy of data, merchantability and fitness for a particular use or purpose. To the extent that a party may not, as a matter of applicable law, disclaim any implied warranty, the scope and duration of such warranty shall be the minimum permitted under such law.

No Warranty Pass-Through. ITFT grants no warranty pass-through for any ITFT product. The Customer shall not pass through to its customers or any third party the warranties made by ITFT and will expressly indicate to its customers that they must look solely to them (not ITFT) in connection with any problems, warranty claims or other matters arising in relation to the modules.

Warranty Claims Process:

Original proof of purchase, which is evidence that the product is within the warranty period, MUST be presented to obtain warranty service.

If you have a warranty claim to make please contact Iowa Thin Film Technologies to obtain a return authorization number. Please fax your return authorization request to the Accounting Department at 515-292-1922 or email to AAchargerwarranty@iowathinfilm.com. After you have received a return authorization number from ITFT, send the product with your return address, freight pre-paid, with the return authorization number, the original proof of purchase from Iowa Thin Film Technologies, and a clear description of the defect to:

ITFT Warranty Service
2337 230th Street
Boone, IA 50036 USA

How long can I store fully charged batteries, and expect them to be ready for use?

Some NiMH batteries loose as much as half their charge in one month. If you want to get the full capacity, recharge batteries if they have been sitting for a while.

What is memory effect, and how do I avoid it?

Memory effect is a dip in the output voltage that makes partially charged batteries seem empty. Batteries will display this behavior if they have repeatably been recharged after being only partially discharged.

If you suspect your batteries have memory effect try discharging them completely, one cell at a time, then recharging them. Flashlights work well for discharging batteries.

You can avoid memory effect by occasionally discharging your batteries completely.

NiMH batteries are less prone to memory effect than NiCad, and will usually not display memory effect.

Technical Specifications:

Charging current:
- 400mA for 2 batteries
- 200mA for 4 batteries

Weight:
- without batteries: 3.4 oz (96 grams

Recommended Batteries:
- AA NiMh 1600 - 2100mAH

Other usable batteries:
- AA NiMH or NiCd
- AAA NiMH or NiCd (use AAA to AA size adapter)

Energy Available at Various Light Conditions:

(Relative to Full Sun)

Full sun-panel square (perpendicular) to sun	100%
Full sun-panel at 45 degree angle to sun	71%
Light overcast	60-90%
Heavy overcast	20-30%
Inside window, single pane, double strength glass, window and module square to sun	91%
Inside window, double pane, double strength glass, window and module square to sun	84%
Inside window, single pane, double strength glass, window module at 45 degree angle to sun	64%
Indoor office light - at desk top	0.4%
Indoor light - store lighting	1.3%
Indoor light - home	0.2%

Troubleshooting:

There are batteries in the holder, but the charger says the holder is empty:

Try to roll and wiggle the batteries to make sure you have good contact.
Check the polarity of the batteries.
Wait five seconds – it takes the unit up to five seconds to recognize a pair of batteries.
Try a different pair of batteries. One of the batteries may be bad.

Why is the charger trickle charging my batteries?

The batteries were deep discharged. The charger is attempting to recover the batteries. Once the batteries have recovered, the charger will automatically switch to regular charging.

I placed the charger in the sun, but the sun keeps going away!

Try to account for the way the sun will move when you select a place for the battery charger.

The sun is not out!

The charger will charge batteries on an overcast day, but more slowly. As long as the charging lights are blinking slowly the batteries are being charged.

The batteries have been charging, but it is dark now. Can I use them?

Yes, you can remove batteries from the charger before they are full, and use them. Once you put them back into the charger it will resume charging them as soon as the light is bright enough. Just remember that partially charged batteries will discharge (go flat) sooner, and plan accordingly.

Can I leave batteries in the charger over night?

Yes. The charger will not discharge your batteries. Once it gets bright enough in the morning the charger will start to charge the batteries.

Can I use the charger to 'top off' batteries?

Yes.

The batteries are hot! What should I do?

If the batteries feel uncomfortable to touch, remove the charger from the sun! Once you feel comfortable touching the batteries remove them from the charger. If only one battery in a pair is hot, then it is full. The other battery in the pair is not full yet.
A slight increase in battery temperature during charging is normal.

Can I use a mirror to get more sunlight onto the charger?

No. Exceeding the natural sun light intensity by a significant amount may cause the charger and batteries to fail due to overheating, or degrade the solar cells.
The easiest way to maximize solar intensity is to set the charger perpendicular to the sun. You do this by setting the charger to give you the largest shadow.

My charger got wet. Is it ruined?

No, most likely not. If the charger got damp with morning dew, wipe off the excess moisture, then simply allow it to dry.
If the charger got submerged, remove all batteries, wash off any salt or mud, then wipe excess moisture off and allow the charger to dry. Additionally clean any corrosion of the contacts in the battery holders.
If the charger was submerged for a long time (hours) with batteries in it, circuit components and battery holder contacts may be heavily corroded due to electric currents. This may make the charger unusable.

Can I charge Alkaline batteries?

No. While they will seem to charge ok, pressure buildup inside the batteries may damage them, and cause them to leak during use.

I have an odd number of batteries. Can I charge a single battery and use a nail in the other holder?

No. The battery charger would trickle charge such a combination, and it would take over ten times as long as a regular set of batteries to charge.

If I accidentally put the batteries in backwards what happens?

If both batteries are backwards, the charger will ignore the batteries, and treat them as an empty holder.
If only one battery is backwards there is a chance that the charger will attempt to trickle charge the pair. If the batteries are left like this for a long period of time (10 minutes) the battery left backwards may get damaged.

If I leave fully charged batteries in the charger what happens?

The charger will keep the batteries topped off. Some battery manufacturers recommend against trickle charging batteries for long periods - on the order of several days.