



Portable Fast-Charge Solar Battery Charger

Features

- ◆ Maximum Power Point Tracking
 - Up to 30% more power
- ◆ No User Input Required
- ◆ Fully Ruggedized Design
- ◆ Over Temperature Protection
- ◆ Wide-Range DC Input Capable
- ◆ 12V or 24V Solar Panel Input - No Minimum/Maximum Solar Panel Wattage
- ◆ Polarized SAE plug to connect to solar panel
- ◆ Optional extension input cable for use with other solar panels or DC sources
- ◆ Optional “Y” adapter, to parallel multiple solar panels for maximum charge speed



Description

The MA-4025 Solar Charger is a portable solar battery charger capable of charging MA-4025 portable rechargeable batteries. The charger features advanced digital control, which enables automatic battery detection, maximum power point tracking (MPPT) of the solar panel, and value-added features such as a fixed DC input mode. The charger is able to operate from any solar panel configuration with $V_{\text{open circuit}} < 60\text{V}$. The charger directly plugs onto the top of the battery, and the only wiring needed is the connection to the solar panel or DC source using a polarized SAE plug. The implementation of high-speed MPPT delivers maximum charging current, even in low light or poor weather conditions. The simple LED interface informs the user when the batteries have been completely charged, and if there are any fault conditions.

Supported batteries	Chemistry
MA-4025/A	NiCd
MA-4025/D	NiCd



Absolute Maximum Ratings

	Parameters	Max.	Units
V_{in}	Input Voltage	65	V
V_o	Output Voltage	20	V
I_o	Output Current	4	A
T_A	Ambient Operating Temperature	60	°C
T_{STG}	Storage Temperature	85	°C

Table 1: Absolute Maximum Ratings

Recommended Operating Conditions

$T_A=25^{\circ}\text{C}$

	Parameters	Min.	Typ.	Max.	Units	Conditions
V_{in}	12V PV Panel Voltage	$V_o+1\text{V}$	20	28	V	(4)
	24V PV Panel Voltage	$V_o+1\text{V}$	40	56	V	(3)
	DC Input Voltage	20	-	60	V	
V_o	Output Voltage	10	-	20	V	
I_o	Output Current	0	-	4	A	
I_s	Self Consumption	-	30	-	mA	$V_{in}=20\text{V}$
		-	15	-	mA	$V_{in}=60\text{V}$
η	Converter Efficiency	-	94.2	-	%	$V_{in}=40\text{V}, V_o=15\text{V}, I_o=4\text{A}$ (1,3)
		-	92.5	-	%	$V_{in}=40\text{V}, V_o=15\text{V}, I_o=2\text{A}$ (2,3)
T_A	Ambient Operating Temperature	- 30	-	60	°C	
T_{STG}	Storage Temperature	- 50	-	85	°C	

Table 2: Electrical Characteristics

Notes:

- (1) Charging the MA-4025 battery with the rated max. charge current
- (2) Charging the MA-4025 battery with half the rated max. charge current
- (3) Using a “24V” PV array
- (4) Using a “12V” PV array



MA-4025 Solar Charger

Patent pending

Label on Top of Charger



Red LED
Green LED 1
Green LED 2

LED Status Information

<u>Red LED</u>	<u>Green LED 1</u>	<u>Green LED 2</u>	<u>Meaning</u>	<u>Action to take</u>
Off	Off	Off	Ready to connect	Connect battery
Off	Blinking slowly	Off	Analyzing battery chemistry	-
Off	Blinking ⁽¹⁾	Off	Charging	-
Off	Off	On	Finished charging	Disconnect battery
Blinking	Off	Off	Temporary Fault condition, Charger was not running before	The MA-4025 Solar is trying to reset faults. Monitor the MA-4025 Solar since it might not be able to clear the current fault which would lead to a latched fault.
Blinking	Blinking	Off	Temporary Fault condition, Charger was running before	The MA-4025 Solar is trying to reset faults. Monitor the MA-4025 Solar since it might not be able to clear the current fault which would lead to a latched fault.
On	-	-	Latched Fault, Charger not running	Check connections, make sure that operation of converter is within the maximum ratings, unplug and plug in again battery and source

Table 3: LED status information

Notes:

⁽¹⁾ Blinking speed is based on power delivered to the battery:

(~0.8 to 7) blinking cycles per second for an output current range of (~0.2 to 4) Amps



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Typical Charging Times

The charging times below are only valid with the solar panel's temperature and ambient at 25°C (77°F). Higher temperatures lead to a decreased power output which makes the charge time longer. The time shown here is approximate only and may be different depending on the condition of the battery and ambient temperature.

Battery	Chemistry	Capacity (Ah)	Max Charge Current	Solar Panel (Watts)	Typical Full Charge Time
MA-4025	NiCd	4.5	4A	62	1hr 15min

Table 4: Typical Charging Time

Dimensions and Weight

	Parameters	Typ.	Units
L	Length	118.1	mm
		4.65	inch
W	Width	68.6	mm
		2.70	inch
H	Height	44.2	mm
		1.74	inch
W	Weight	0.51	kg
		1.13	lbs

Table 5: MA-4025 Solar Dimensions and Weight

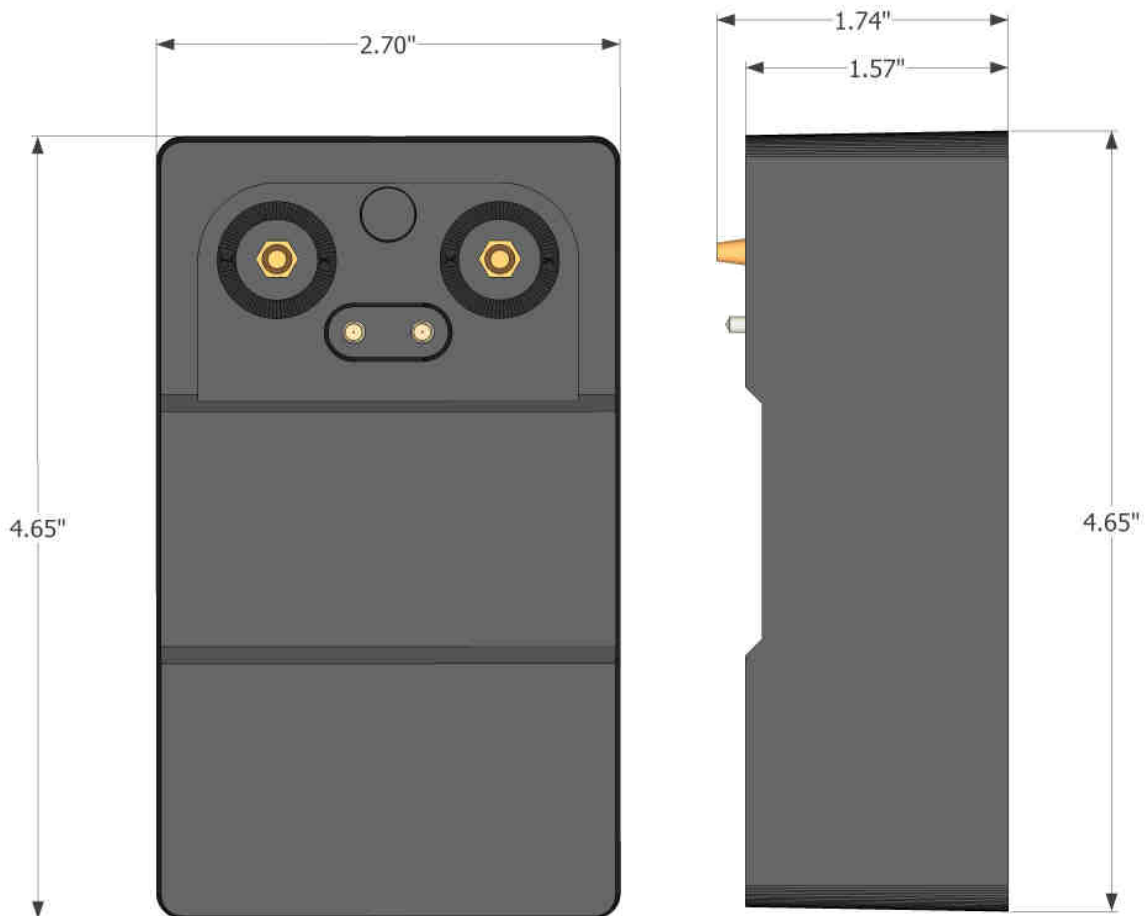


Figure 1: MA-4025 Solar Dimensions



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Patent pending

Application Example



Figure 2: MA-4025 Solar charging a Mathews MA-4025 battery using the Global Solar P3-62W/24V panel



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Recommended Solar Panels

Use only “12V” or “24V” PV Arrays

Global Solar Energy, Inc.

- P3 - 124W/12V, P3 - 124W/24V
- P3 - 62W/12V, P3 - 62W/24V
- P3 - 55W/12V
- P3 - 48W/12V, P3 - 48W/24V
- Can use solar panels in parallel with “Y” connector to increase maximum charge speed

Recommended Batteries

Mathews Associates, Inc.

- MA-4025/A, MA-4025/D