

POWERTECH



**120W Folding Solar Panel
& Charge Controller
ZM-9176
User Manual**

USER MANUAL

Please ensure that you have read the product manual and instructions in full prior to use. Failure to do so may result in incorrect operation and therefore impact on the products performance.

PART LIST

1 x 120W Mono Crystalline Solar Panel with 12V/10A Charge Regulator.
(USB Version)

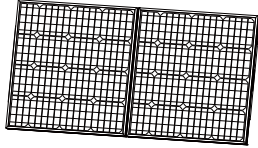
1 x 5m Extension Lead

1 x Alligator Clips

1 x Eye Terminal Connectors

1 x Heavy Duty Bag

PART LIST

Serial No.	Description of parts	Quantity
1	Mono-crystalline solar panel. Folding type with angle adjustable support. With built-in 12V/10A Charger Regulator. 	1 SET
2	5M battery lead with connecting clamps.	1 PC
3	Heavy Duty Bag.	1 PC

INSTALLATION GUIDE

Step 1:

Locate a clear sunlit area free from overhanging branches or heavy shade.

Step 2:

Unfold the solar panels, adjust the two supports to the suitable angle.

Step 3:

Always face the front side of solar panels toward the sun.

Wipe down the panels with a microfiber cloth to remove any dust or debris.

▲ Note:

To ensure maximum possible output we recommend that the solar panels are regularly re-aligned to follow the sun's movement.

Wipe the solar panel with microfiber cloth for maximum efficiency.

Folding Solar Kit Specifications

Type	Mono Crystalline Solar Cells
Peak Power	120W($\pm 5\%$) (60W each)
Rated Voltage	12V
Voltage @ Peak Power	17.6V
Current @ Peak Power	6.8A
Open Circuit Voltage	21.60V
Short Circuit Current	7.08A
Maximum system Voltage	1000V DC
Gross Weight	10.0 KGS
Panel Dimensions	664(W) x 631(H) x 75(D)mm (Folded) 1270(W) x 664(H) x 35(D)mm (Unfolded)

ABOUT THE REGULATOR

1. Safety Information

- Read all of the instructions in the manual before installation.
- DO NOT disassemble or attempt to repair the regulator.
- Disconnect the solar panel before installing or moving the regulator.
- Power connections must remain tight to avoid excessive heating from a loose connection.
- Only charge 12V batteries that comply with the parameters of regulator.
- Battery connection may be wired to one battery or a battery bank.

2. Overview

The 12V/10A regulator is a PWM charge regulator with USB output that uses the most advanced digital technique. Regulator features as follows:

- Support 3 charging options: AGM, Gel & Flooded lead acid battery
- Battery status LED indicator indicates battery situation
- The USB will provide power supply that can charge electronic equipment
- Battery type and load output can be set via button
- Extensive Electronic protection

3. Product Features

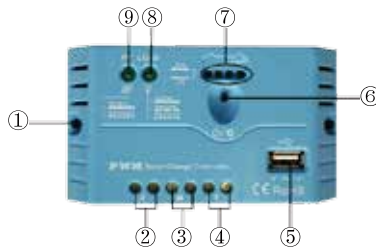


Figure 1 Product Feature

①	Mounting Hole $\Phi 4.5$	⑥	Button
②	PV Terminals	⑦	Battery status LED indicator
③	Battery Terminals	⑧	Load status LED indicator
④	Load Terminals	⑨	Charging status LED indicator
⑤	USB Output Port		

4. Wiring

(1) Connect components to the charge regulator in the sequence as shown in Figure 1 and pay attention to the “+” and “-”. When disconnecting the system, the order will be reversed.

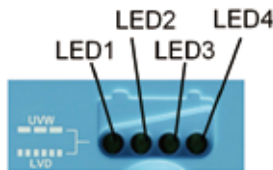
(2) After powering the regulator, check the Battery LED indicator on the regulator, it will be on solid green. Otherwise please refer to section 8. Always connect the battery first.

5. LED Indicators

(1) Charging and load status indicator

Indicator	Color	Status	Instruction
Charging status LED indicator	Green	On Solid	Charging
	Green	OFF	No Charging
	Green	Fast Flashing	Battery Over Voltage
Load status LED indicator	Green	On Solid	Load ON
	Green	OFF	Load OFF
	Green	Slowly Flashing	Load over load
	Green	Fast Flashing	Load short circuit

2) Battery status indicator



LED1	LED2	LED3	LED4	Battery Status
Slowly Flashing	x	x	x	Under voltage
Fast Flashing	x	x	x	Over discharge
Battery LED indicator status during voltage is up				
○	○	x	x	12.8V<Ubat<13.4V
○	○	○	x	13.4V<Ubat<14.1V
○	○	○	○	14.1V<Ubat
Battery LED indicator status during voltage is down				
○	○	○	x	12.8V<Ubat<13.4V
○	○	x	x	12.4V<Ubat<12.8V
○	x	x	x	Ubat<12.4V

NOTE: ① "○"LED indicator ON; "x"LED indicator OFF.

6. Setting Operation

(1) Load ON/OFF Setting

When the regulator is powered on, press the button to control the load output.

NOTE: The USB will output when the load is on.

(2) Battery Type Setting

Operation:

Step 1: Enter setting mode by pressing button for 5 seconds until the battery status LEDs are flashing.

Step 2: Select the desired mode by pressing button.

Step 3: The mode will be saved automatically without any operation for 5 seconds and LED will stop flashing.

Battery Type Indicator

LED1	LED2	LED3	Battery type
○	×	×	AGM/ Lead Acid (Default)
○	○	×	Gel
○	○	○	Flooded

NOTE: "○"LED indicator ON "×"LED indicator OFF

7. Protection

• Battery Over Voltage Protection

When the battery voltage reaches to the set point of Over Voltage Disconnect Voltage(OVD), the regulator will stop charging the battery to protect the battery from being over charged.

• Battery Over Discharge Protection

When the battery voltage reaches to the set point of Low Voltage Disconnect Voltage(LVD), the regulator will stop discharging the battery to protect the battery from being over discharged.

• Load Overload Protection

Load will be switched off when 1.25 times rated current overload happens. User has to reduce load appliance, then press the button or repower the regulator.

• Load Short Circuit Protection

Load will be switched off when load short circuit (≥ 3 times rated current) happens. User has to clear short circuit, then press the button or repower the regulator.

• High Voltage Transients Protection

The regulator is protected against small high voltage transients. In lightning prone areas, additional external suppression is recommended.

8. Troubleshooting

Faults	Possible reasons	Troubleshooting
LED Charging indicator turn off during daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV and battery wire connections are correct and tight
No LED indicator	Battery voltage maybe less than 8V	Measure battery voltage with the multi-meter. Min. 8V can start up the regulator
Charging status LED indicator Fast flashing	Battery Over Voltage	Check if battery voltage is higher than OVD, and disconnect the PV
LED1 Fast flashing	Battery over discharged	When the battery voltage is restored to or above LVR point (low voltage reconnect voltage), the load will recover
Load status LED indicator slowly flashing	Load over load	①Please reduce the number of electric equipments. ②Press the button or repower the regulator
Load status LED indicator fast flashing	Load short circuit	①Check carefully loads connection, clear the fault ②Press the button or repower the regulator.

9. Technical Specifications – Charge Controller

Nominal system voltage	12VDC
Rated charge current	10A
Rated discharge current	10A
Battery input voltage range	8V~16V
Max. PV open circuit voltage	30V
Self-consumption	12V≤5mA
Charge Circuit Voltage Drop	≤0.13V
USB Output Port	5VDC/1.2A
Working environment temperature	-35°C~+55°C
Humidity	≤95% N.C.
Mounting hole size	Φ4.5

Battery Voltage Control Parameters

Below parameters are in 12V system at 25 °C.

Battery Type	AGM	Gel	Flooded
Over Voltage Disconnect Voltage	16.0V	16.0V	16.0V
Charging Limit Voltage	15.0V	15.0V	15.0V
Over Voltage Reconnect Voltage	15.0V	15.0V	15.0V
Equalize Charging Voltage	14.6V	— —	14.8V
Boost Charging Voltage	14.4V	14.2V	14.6V
Float Charging Voltage	13.8V	13.8V	13.8V
Boost Reconnect Charging Voltage	13.2V	13.2V	13.2V
Low Voltage Reconnect Voltage	11.6V	11.6V	11.6V
Under Voltage Warning Reconnect Voltage	12.2V	12.2V	12.2V
Under Voltage Warning Voltage	12.0V	12.0V	12.0V
Low Voltage Disconnect Voltage	11.1V	11.1V	11.1V
Discharging Limit Voltage	10.6V	10.6V	10.6V
Equalize Duration	120 min.	— —	120 min.
Boost Duration	120 min.	120 min.	120 min.

10. Disclaimer

This warranty does not apply under the following conditions:

- Damage from improper use or use in an unsuitable environment.
- User disassembly or attempted repair the regulator without permission.

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