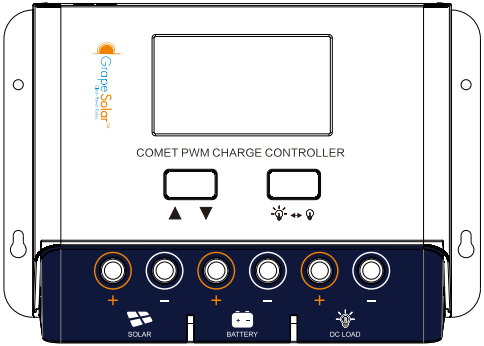


Grape Solar Charge Controller
(GS-PWM-COMET-40)

User Manual



Dear users

Thank you for choosing our product. Before using the product, please read this manual carefully.

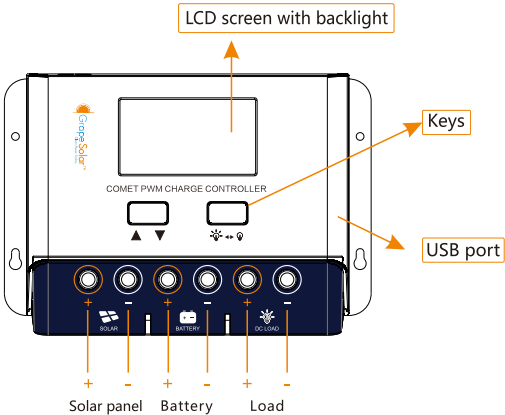
Version : V1.01

The above information is subject to change without prior notice.

Product Features

- 1. Auto-recognition of 12V and 24V batteries.
- 2. Charging program options for sealed, GEL and flooded lead-acid batteries and lithium batteries are available.
- 3. Three-stage charging with periodic equalization to prevent sulfation and increase battery service life.
- 4. Automatic temperature compensation of charging parameters, except if Lithium battery type is selected.
- 5. Large selection of load control modes to provide flexibility and compatibility with a wide range 12 or 24V devices.
- 6. Overcharge, over-discharge, overload, short-circuit, and reverse polarity protection are included for safety, and reliability.
- 7. User-settable parameters and on-board memory provide flexibility, and ensure your preferences are remembered at the next startup.
- 8. A large and readable dot matrix LCD screen, simple design, and readable buttons make first-time set-up easy.
- 9.TVS lightning protection for grounded circuits.
- 10. One-second slow start/stop of load for added safety.

Panel Structure



State Indicators

LCD Icon	Indicated Object	State	Meaning
	Day recognition	Steady on	Day time
	Night recognition	Steady on	Night time
	Solar panel	Steady on	Solar panel indication
BOOST	Charging state	Steady on	Boost charging
FLOAT		Steady on	Floating charging
EQUALIZE		Steady on	Equalizing charging
	Battery	Quick flashing	Battery overvoltage
		Slow flashing	Battery over discharge
	Battery SOC	4 dashes	100%
		3 dashes	75%
		2 dashes	50%
		1 dash	25%
		0 dash	0%
	Load	Steady on	Load turned on
		Steady on	Load turned off
		Quick flashing	Overload or short-circuit protection

Dusk to Dawn, Timed, and Manual Load Modes

- 1. **Dusk to Dawn Light Control (Mode 0):**
the load terminals are switched on 10 minutes after nighttime voltage drop, and off again at dawn.
- 2.**Timed Light Control (Mode 1 through 14):**
the load terminals are switched on 10 minutes after nighttime voltage drop, and stay on for <mode #> hours.
- 3. **Manual Mode (Mode 15):**
the load terminals are switched on and off with the light control button on the controller.
- 4.**Off Mode (Mode 16):**
the load terminals cannot be switched on with the button or timer functions.
- 5.**Always On Mode (Mode 17):**
the load terminals will always be on while a battery is connected and not over-discharged. (default cutoff is 11V)
- 6.The USB Ports will always be active in 12 or 12V configurations and is rated at 1A@5V.

LCD Display	Mode	LCD Display	Mode
0	Dusk to dawn light control mode	9	Dusk to dawn light control + timed light control (9 hour)
1	Dusk to dawn light control + timed light control (1 hour)	10	Dusk to dawn light control + timed light control (10 hour)
2	Dusk to dawn light control + timed light control (2 hour)	11	Dusk to dawn light control + timed light control (11 hour)
3	Dusk to dawn light control + timed light control (3 hour)	12	Dusk to dawn light control + timed light control (12 hour)
4	Dusk to dawn light control + timed light control (4 hour)	13	Dusk to dawn light control + timed light control (13 hour)
5	Dusk to dawn light control + timed light control (5 hour)	14	Dusk to dawn light control + timed light control (14 hour)
6	Dusk to dawn light control + timed light control (6 hour)	15	Manual mode (default)
7	Dusk to dawn light control + timed light control (7 hour)	16	Off mode
8	Dusk to dawn light control + timed light control (8 hour)	17	Always on mode

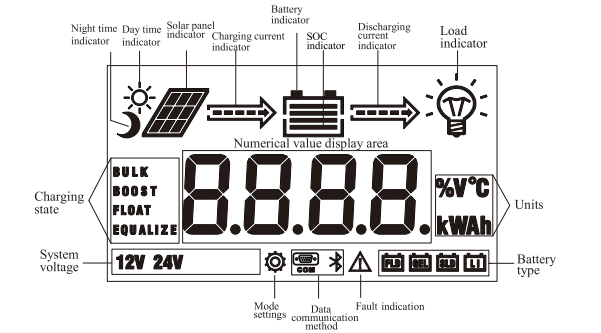
How to Change Load Mode Settings

- In the load mode menu, long press for 2s, and the number (e.g. 15) will begin to flash. Press to adjust the mode (from 0 to 17), and then long press again for 2s to complete and save the setting.
- Note: 1. After parameter adjustment, if is not pressed and held long enough for exiting, the system exits to the main menu after 12s, and the parameter that was set is not saved.
2. When the system is saving data, the screen may shake slightly. This is normal and the user may ignore it.

Safety Advice

- 1) When connected to a 24V system, solar panel terminal voltage may pose a shock hazard. Use gloves, insulated tools, and work in dry environments when making or dismantling connections.
- 2) Reverse connection of the battery will cause a reverse voltage at the load terminals. The controller will not be damaged, but the connected device may be.
- 3) In a 24 volt system, reverse connection of both panel and battery may cause damage to the controller, however, reverse connection of one or the other will not.
- 4)Batteries contain large amounts of energy. Use fuses or breakers in wiring, and take care not to short circuit the terminals which can cause injury.
- 5)Keep the battery away from sparks and open flame because batteries can emit flammable gas during charging.
- 6) Keep solar panels, charge controller, and batteries away from unsupervised children for safety.
- 7) Follow safety precautions provided by the battery manufacturer, especially with respect to maximum charging currents.
- 8)Inverters place a very high load on the battery. Do not connect inverters to the Load Control output.

LCD Screen Illustration



Browsing Menu on LCD Screen

- 1).Continuously press ,the screen will display the following in order: "main menu"---"solar panel voltage"---" solar panel current"---"battery capacity"---"battery voltage"---"discharging current"---"charging amp-hrs"---" discharging amp-hrs"---" temperature inside controller"---" load mode"---" load mode settings"---"error code", and then back to "main menu". If the keys are not operated for 12s, the system will automatically return to display the "main menu".

Setting Menu on LCD Screen

2) When "load mode" is displayed, long press **[VΔ]** to enter into the load mode setting. Press **[←→]** to adjust the mode, and long press **[VΔ]** for 2s to save and exit; or else, the system will not save the setting that was just made and automatically exit the setting interface after 12s.

Battery Types, Charging Voltages (Lithium Battery)
Over-Discharge Return and Over-Discharge Voltage Settings

In the non-load mode menu:
1) When **[VΔ]** is long pressed, the first interface entered is for battery type setting, and the flashing one is the battery type currently selected. Press **[←→]** to select among FLD/GEL/SLD/LI.
2) After selection, short press **[VΔ]** to enter into over-discharge return and over-discharge voltage settings; or the first to enter charging voltage setting menu for lithium battery.
3) After parameters have been set, long press **[VΔ]** for 2 s to save and exit.

Parameters shall be set according to the following rule: over-discharge voltage < over-discharge return voltage ≤ under-voltage warning < floating charging voltage < boost charging return ≤ equalizing charging voltage < overcharge voltage; and two adjacent values shall have a difference greater than 0.5 V.

Charging and Discharging Overload Protection and Recovery Time

In the charging and discharging overload protection mechanism, the relation between overload current and protection time is as follows: An overload current 1.25 times of the rated current initiates a delay of 30s before starting protection; similarly, 1.5 times, 5s and 2 times, 1s.

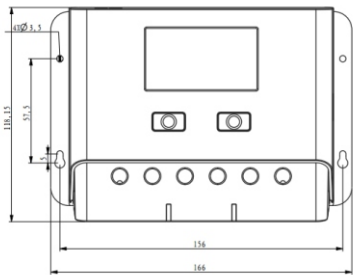
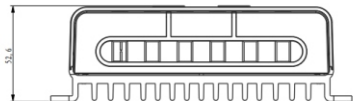
Overload recovery: automatic recovery after 1 minute.

Load Short Circuit and Recovery

Short-circuit automatic recovery time: 1st time, 5 s; 2nd time, 10 s; 3rd time, 15 s; 4th time, 20 s; 5th time, 4 hours or automatic recovery the next day; or long press **[←→]** to make the load resume output.

Installation Instructions and Precautions

- The controller shall be installed securely, and its dimensions are as follows:**
GS-PWM-COMET-40 External dimensions: 166.0×118.2×52.6(mm)
Installation dimensions: 156×57.5 (mm)
- Installation hole diameter: 3.5 (mm)**



GS-PWM-COMET-40

3. Precautions:
① If it is 12V system, the bottom left corner of LCD display will show '12V'; 24V system will show '24V'.
② The first step is to connect the battery. If the connection is made correctly, the controller screen will be lit up; otherwise, check whether the connection is correct.
③ The second step is to connect the solar panel. If sunlight is present and strong enough (the solar panel voltage is greater than battery voltage), the sun icon on the LCD screen is on; otherwise, check whether the connection is correct (it's recommended that the operation be performed under the debugging mode).
④ The third step is to connect the load. Connect the load leads to the controller's load output terminal, and the current shall not exceed the controller's rated current.
⑤ As the controller will generate heat during operation, it's recommended that the controller be installed in an environment with good ventilation conditions.
⑥ Choose cables with large enough capacity for connection, in case too much loss incurred on the lines causes the controller to misjudge.
⑦ This is a common negative design controller, and if the system needs to be grounded, you can either ground the battery pack only instead in the negative pole, or fasten a grounding wire along with the screw in one of the install holes.
⑧ It's important to fully charge the battery regularly. At least once full charging every month is recommended, and failure to do that may cause permanent damage to the battery. Only when in-flow energy outpaces out-flow energy can the battery be charged fully. Users shall bear this in mind when configuring the system.
⑨ Check whether the controller's each connection terminal is tightened securely; if not, it may suffer damage when large current passes.

Error Code List

Code on LCD screen	Corresponding error
E0	No error
E1	Battery over discharge
E2	Battery overvoltage
E3	Undervoltage warning
E4	Load short circuit
E5	Load overload
E6	Temperature too high inside controller
E8	Charging current too high
E10	Solar panel input voltage is too high

Common Problems and Solutions

Symptoms	Causes and Solutions
LCD screen does not light up	Check whether the battery is correctly connected.
Incomplete display or no renewal on LCD screen	Check whether the ambient temperature is too low and whether the display recovers when the temperature rises.
No charging with sunlight present	Check whether the solar panel is correctly connected and contact is good and reliable. Check whether the solar panel voltage falls below the battery voltage.
The sun icon does not light up, while the solar panel icon does. The battery voltage is normal, but there is no output.	The load will be switched on automatically after 10 minutes (set by the user).
The battery icon flashes quickly, and there is no output.	System overvoltage. Check whether the battery voltage is too high.
The battery icon flashes slowly, and there is no output.	The battery is over-discharged, and will recover when recharged adequately.
The load icon flashes quickly, and there is no output.	The load's power exceeds the rated value or it's short-circuited. After removing the problem, long press the key or wait until it recovers automatically.
The load and the encircling light ring stays lit, and there is no output.	Check whether the power-consuming device is connected correctly and reliably.
Other symptoms	Check whether wiring is sound and reliable, and system voltage is correctly recognized.
The charging and discharging amp hrs displays: 9999.K Ah	The decimal point flashes indicating that the displayed value has reached its upper limit. Long press [←→] to reset it.

Grape Solar Technical Support
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Parameter Details

Model	GS-PWM-COMET-40				Remarks
Rated current	40A				
System voltage	Automatic recognition of 12V/24V				Default: automatic identification
	Manual setup				
Rated power	12V/600W;24V/1200W				
No-load loss	< 22mA/12V ; < 16mA/24V				The higher the system voltage, the lower the no-load loss.
Max. Solar energy input voltage	<55V				
Max. voltage at the battery end	<34V				
Battery type	Parameters				Default SLD
	Flooded FLD	Sealed SLD	GEL GEL	Lithium LI	
Overvoltage protection	16.0V				
Equalizing charging voltage	14.8	14.6	-	-	×1/12V ; ×2/24V ;
Boost charging voltage	14.6	14.4	14.2	14.4	
Floating charging voltage	13.8	13.8	13.8	-	
Charging recovery voltage	13.2V				
Over-discharge recovery voltage	12.5V (settable with the keys)				
Over-discharge voltage	11.0V (settable with the keys)				
Equalizing charging interval	30 days	-	-	-	
Equalizing charging time	1H	-	-	-	
Boost charging time	2H				
Temperature compensation	-3.0mV/°C/2V				
Light control voltage	Light control on 5V, light control off 6 V (light control on plus 1 V)				×1/12V ; ×2/24V ;
Light control judgment time	10 minutes				
USB function	Yes				
Bluetooth function	optional				
Operating temperature	-25°Cto+ 55°C;				
Over temperature protection	When temperature is above 60°C , charging function is turned off, and the function is recovered when temperature is below 55°C ; When temperature is above 70°C , load starting function is turned off, and the function is recovered when temperature is below 60°C				
IP protection rating	IP30				
Net weight	700g				
Protection functions	Battery plate reverse connection protection, a battery reverse connection protection, charging battery board short circuit protection, charging the battery open circuit protection, charging over current protection, overload protection, load short-circuit protection controller and over temperature protection.				
Dimensions	166.0×118.2×52.6(MM)				