DMS Series

All-in-one single-string step-up constant current MPPT charge controller

3.2V/6.4V(40W/80W)

Instructions for Use

Version: 1.01   Subject to change without notice

Product model	Applications
DMS40	All-in-one single-string step-up constant current MPPT charge controller
DMS40-C	All-in-one single-string step-up constant current MPPT charge controller with IoT function (connected to external communication module)

1. Features

◆ MPPT technology, providing a tracking efficiency of up to 99.5% and a charge conversion efficiency of up to 96%

◆ Both single-string and 2-string lithium iron phosphate / ternary lithium battery are applicable, operating parameters can be set by remote control.

◆ A single-string or two-string lithium battery can be charged by a conventional Vmp=17V PV panel.

◆ Very low sleep current for more power saving and long-distance transportation and storage.

◆ 10-period programmable load power/time control.

◆ Lithium battery charge and discharge high and low temperature protection, withoperating tempe-rature settable.

◆ A variety of intelligent power modes are available for choice, with load power adjustable automatic-ally according to the battery level.

◆ High precision digital step-up constant current control algorithm, ensuring high efficiency and high constant current accuracy.

◆ Wireless remote communication, allowing for setting/reading parameters, reading status, etc.

◆ Multiple protections such as LED short-circuit/open-circuit/limited power protection, etc.

◆ Extensible to IoT remote communication monitoring function.

◆ Full aluminum housing, IP67 waterproof rating, applicable to a variety of harsh environments.

Note: In order to improve charging efficiency, the controller does not have battery reverse polarity protection. It is strictly prohibited to reverse the battery when wiring! ! !
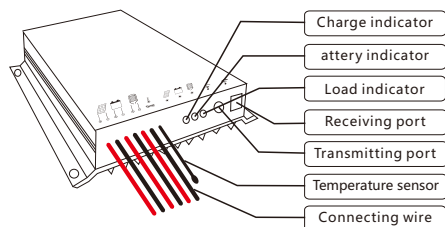
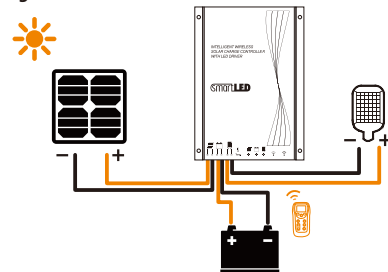## 2. Appearance and wiring diagram

1) Model identification:

DMS   40   -C

Maximum load power   IoT function available

Product series model code, All-in-one single-string step-up constant current MPPT charge controller

2) External view:

- Charge indicator
- attery indicator
- Load indicator
- Receiving port
- Transmitting port
- Temperature sensor
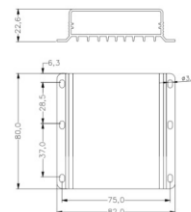- Connecting wire

3) Wiring diagram:

A. Wiring sequence: Firstly connect the load, then the battery and finally the solar panel.
B. It is prohibited to have the battery end of the controller reversed! !

3. Dimensions

DMS40/DMS40-C dimensions：
Overall dimensions: 82*80*22.6mm
Mounting dimensions: 28.5*75
Mounting hole diameter: φ3.5

4. Status indication

1. DMS40 controller has three red indicators

LED indicator	Indication content	Status	Function	Remote control system status
	Charge indicator	Steady on	Solar panel voltage is higher than light control voltage	Idle
		Off	Solar panel voltage is lower than light control voltage	Idle
		Slow flash	In charging	Charging
		Quick flash	BMS protection or full charge, or BAT overvoltage, or PV panel overvoltage, or over temperature (ambient temperature) or power/ current limited charging	Full charge, BAT overvoltage, PV overvoltage, over temperature, over current
	Battery indication	Steady on	Battery works properly	Idle
		Off	Battery is not connected or lithium battery protection board overdischarge protection	
		Quick flash	Battery over-discharge	Over discharge
	Load indication	Steady on	Load is turned on	Discharging
		Off	Load is turned off	Idle
		Slow flash	LED load is open circuited	Open circuit
		Quick flash	LED load is short circuited	Short circuit

5. LED intelligent power control

The SR-DMS40 controller is available in various intelligent power modes for selection according to the actual battery capacity, the number of rainy days and other factors. The specific intelligent power modes are: High, Moderate, Low, Auto, USE (user-defined), No (off).

1) Intelligent power levels:

High -The battery capacity at the starting point of power derating is high, and the load lighting time is the longest. It is suitable for use in areas with more rainy days or poor lighting conditions;

Moderate-The battery capacity at the starting point of power derating is moderate, and the load lighting time is moderate. It is suitable for the scenarios where both brightness and the number of rainy days are considered;

Low-The battery capacity at the starting point of power derating is low, and the load lighting time is the shortest. It is suitable for scenarios with high lighting requirements;

Auto-Intelligent Power Mode automatically selects high/moderate/low levels based on parameters such as charge levels and power consumption of the day; for example, in summer, the charge level is large, it runs in low power mode, and the lighting effect is better; in winter, the charge level is small, it runs in high power mode, the load works in the power saving mode and can hold in more rainy days.

USE (user-defined)-The user is allowed to set the derating start voltage, the derating end voltage, and the minimum load current value for the intelligent power;

No(off)-The intelligent power mode is turned off, and the load power is output according to the power of the set time period.

2) Intelligent power curve:
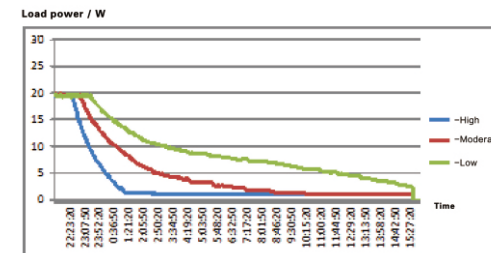
6. MPPT charge introduction

Maximum Power Point Tracking (MPPT for short) is an advanced charging technology. The MPPT controller can detect the generation power of the solar panel in real time and track the maximum voltage and current value (VI), allowing the system to charge the battery at the maximum efficiency. Compared with traditional PWM controller, the MPPT controller can maximize the power of the solar panel, so that it can provide a larger charging current. Generally, the MPPT controller can increase the energy utilization by 15% to 20% compared with the PWM controller.

The peak voltage (Vpp) of the solar panel is about 17V while the voltage of the single-string lithium battery is about 2.5-4.2V. If the PWM controller is used, the solar panel voltage is always at 2.5-4.2V, and does not fully contribute its maximum power. MPPT controller can overcome this problem. It constantly adjusts the input voltage and current of the solar panel to achieve the maximum input power.

In addition, the maximum power point often changes due to different ambient temperature and lighting conditions. The MPPT controller adjusts the parameters from time to time according to different conditions, so that the system is always near the maximum power point.

7. Sleep and wakeup

1) Enter sleep mode

A. Press the [OFF] button on the CU remote control. The controller turns off all external control devices, and enters sleep state with very low power consumption to avoid lithium battery feed due to long time no use;

B. When detecting lithium battery over-discharge or 10-minute continuous open circuit/short circuit of load, the controller automatically enters sleep mode to save battery power.

2) Wake up from sleep mode

A. If [Yes] is selected for the [PV wakeup] function, after the controller enters sleep mode, the PV panel connected can wake it up and conduct charging during the day with good conditions for charging, and the loads can be automatically turned on at night.

B. If [No] is selected for the [PV wakeup] function, after the controller enters sleep mode, the PV panel connected can wake it up and conduct charging during the day with good conditions for charging, while the controller will continue to enter sleep mode at night.

Notice:
A. [PV Wakeup] function can be selected by CU remote control, the default setting is [Yes].
B. Wireless remote communication can only be awakened by PV charging.
The sleep and wakeup states are switched as follows:

Controller sleep and wakeup mode	Sleep	Wakeup	Charging	Discharging	Status of LED indicators after sleep
CU-ALL5	OFF button	–	–	–	All are off
Load open circuited/short circuited	Automatically enter sleep mode after 10 minutes	–	–	–	All are off
Battery over-discharge	Automatically enter sleep mode after 10 minutes	–	–	–	The battery indicator flashes once every 10 seconds.
PV wake up [Yes]	–	PV charging for 10 seconds	Can charge normally during the day	Automatically lights up for 10 seconds after wake-up. Test whether the load is normal. It can discharge normally at night.	–
PV wake up [No]	–	PV charging for 10 seconds	Can charge normally during the day	Automatically lights up for 10 seconds after wake-up. Test whether the load is normal. It does not discharge at night and continues to sleep.	–

8. Protections

Water ingress protection
IP rating: IP67
Lithium battery BMS overcharge protection
When the controller detects that the BMS is overcharged, the controller stops charging immediately, preventing the high voltage of the photovoltaic terminal from being applied to both ends of the BMS for a long time, causing the BMS to be damaged by high voltage.
Lithium battery low temperature charging protection
When ambient temperature drops to the set value, the controller stops charging to prevent irreversible damage to the lithium battery due to low temperature charging.
High temperature protection
When ambient temperature is higher than the set value, the controller stops charging and discharging to prevent damage to the lithium battery from due to excessive temperature.
PV input terminal overvoltage protection
When the voltage at the PV panel input terminal is too high, the controller will automatically cut off the PV input.
PV input reverse polarity protection
When the polarity of the PV array is reversed, the controller will not be damaged. After correcting the wiring error, it will continue to work properly.
Load power limit protection
When the power of LEDs that the customer uses is too large, or the load current is adjusted to be excessive, the controller will limit the load power output to less than the rated power, to ensure that the controller and LED load will not be damaged.
Load short circuit protection
When a short circuit occurs, the controller immediately cuts off the load output to prevent damage to the controller. After the load short-circuit condition is released, the controller automatically resumes output within 1 minute (if it has been short-circuited for a long time, it will automatically resume output once every 1 hour), or press and hold the test button on the remote control (CU or mini2) for 10s to automatically resume output.
Load open circuit protection
When the load wiring is suddenly disconnected as LED is normal on, the controller will not be damaged.
Night reverse-current protection
At night, the battery is prevented from discharging through the PV panel.

9. Common exceptions and solutions

Exceptions	Causes	Solutions
Remote control cannot work	Remote control password is wrong, or remote control mode (infrared or wireless) is not selected correctly, or Wireless remote control distance setting is too short or the remote control battery is low	B1. Press the "+" and "-" keys at the same time to bring up the [Remote Control Settings] interface and set the correct password. B2. Press the "+" and "-" keys at the same time to bring up the [Remote Control Settings] interface, and then select [Infrared Remote Control] or [Wireless Remote Control]. C1. Press the "+" and "-" keys at the same time to bring up the [Remote Control Settings] interface, and then increase the [Remote Distance] before testing. D1. Please replace 2 AA (No. 5) batteries
There is no response when the controller is connected to battery, the indicator light is off and the remote control has no response.	A. Battery is problematic in power supply B. Controller goes to sleep mode	A1. Check if the battery wiring is intact. A2. Check if there is voltage on the battery terminal and whether the protection board is activated. If there is no voltage on the battery terminal, it indicates that the protection board has provided protection, and the battery can be charged to be activated. B1. Press the "ON" button on the remote control to activate the controller. B2. Connect the solar board to charge the battery.
Normal charging during the day, but the load does not light up at night, and the LED indicator on the controller does not light up.	A. Controller is in sleep state	A1. Press the "ON" button on the remote control to activate the controller. A2. Select <PV Wakeup> to "Yes", and the controller will be activated automatically after charging during the day.
The battery indicator flashes quickly, and the load LED does not light up	A. Battery is low	A1. Check if the solar panel is charging normally and if the solar panel is blocked. A2. Check if the battery and solar panel wiring are disconnected or loose.
Load lighting time is short	Battery is low or load power is excessive	A1. Check if the solar panel is charging normally and if the solar panel configuration is correct. A2. Check if the lithium battery has a single-cell protection. A3. Turn on the "smart power" option B1. Check if the controller current setting is correct and if the load power is normal.
Load lighting current does not reach the set value	A. Load current is regulated in intelligent power mode B. LED power exceeds the rated value	A1. Turn "smart power" off and test load current B1. Set the current to be smaller or replace the lamp with fewer LEDs in series.

Note: For detailed parameters and status information, please refer to the CU-ALL manual.

10. Technical parameters

Items	Values	Adjustable	Default
Model	DMS40		
Controller type	MPPT charging, load step-up constant current		
System voltage	Single string, 2-string lithium iron phosphate or ternary lithium battery		
Static power consumption	≤40mA/3.2V；≤20mA/6.4V		
Sleep loss	Sleep power consumption		
Load current	50mA～4000mA	√	330mA
Load voltage	5～35V		
Number of LEDs in series	V f=3.0V： 3 ～ 10　V f=6.0V： 1 ～ 5		
Maximum load power	40W/3.2V；80W/6.4V		
Load conversion efficiency	80% ～ 94%		
Load current accuracy	< 3%		
Intelligent power	High, Moderate, Low, Auto, USE, No	√	Medium
Load working period	9-Period + Pre-dawn lighting		
Period adjustment range	1 min		
Power adjustment range	1%		
Maximum charge current	20A		
Solar input voltage	< 30V (conventional 36cell panel)		
Solar input power	≤80W/3.2V；≤160W/6.4V		
Over voltage	Charge voltage + +1V		
Charge voltage	02.50 ～ 08.40V settable	√	3.60V
Charge return voltage	02.50 ～ 08.40V settable	√	3.40V
Over discharge voltage	02.50 ～ 08.40V settable	√	2.50V
Over discharge return voltage	02.50 ～ 08.40V settable	√	3.20V
Light control voltage	1V ～ 7V	√	2V
Light control delay	5s～60s/2min～60min	√	5s
Operating temperature	-35℃ ～ +65℃		
IP rating	IP67		
Protections	Solar panel reverse polarity protection, solar panel over-voltage protection, lithium battery overcharge and over-discharge protection, lithium battery BMS overcharge detection protection, over temperature protection, load short circuit and load over-current protection, etc.		
Weight (g)	260		
Controller size (mm)	80*82*23.5		