



MAX New Series Solar Charge Controller

12/24,10/20A

User Manual

User Manual_MAX new series_V1.2_QF
CE, RoHS, ISO9001:2015
Subject to change without notice!

Solar Charge Controller MAX New Series User Manual

Dear Clients,

Thank you for purchasing our MAX new series solar controller. This product manual provides some important advice related to the controller, including installation, programming and troubleshooting. Please read this manual carefully before using this product.

1. Overview

Outstanding features:

- LCD display design, read operating data and working condition easily.
- 12/24V system voltage or auto-recognition.
- Built-in over-temperature protection mechanism; charging and discharging stop when the temperature exceeds the set value.
- Flexible System battery selection: FLD, GEL, AGM and Lithium.
- Equipped with lithium battery activation function.
- Lead-acid battery charging in four stages: fast charge, boost charge, equalization charge, float charge.
- PWM charging is programmable to prevent system failure caused by BMS.
- Short-circuit protection is programmable to prevent output shutdown when opening the capacitive or inductive loads.
- Small size, PID algorithm adopt to control the voltage output, make the control more stable and accurate.
- The optical control point voltage and charging voltage can be set.
- Perfect EMC & thermal design.
- Full automatic electronic protect function.

2. Safety instructions and waiver of liability

2.1 Safety Instructions

The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instructions.

Please take care when meeting these symbols.



WARNING: Indicates a potentially dangerous condition. Use extreme caution when performing this task.



CAUTION: Indicates a critical procedure for safe and proper operation of the controller.



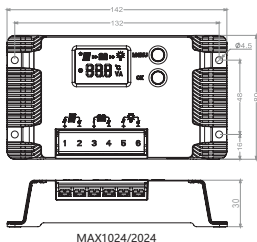
WARNING:

- 1) There are no user serviceable parts inside the controller. Do not disassemble or attempt to repair the controller.
- 2) This controller will generate heat during operation. Please pay attention to installing the controller in a flat and well ventilated area.
- 3) Keep children away from batteries and the charge controller.

2.2 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

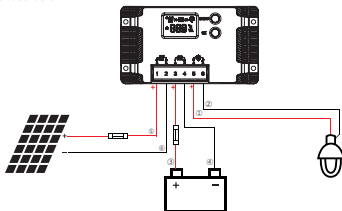
3. Dimensions (unit: mm)



4. Connection and grounding

4.1 Connection

We strongly recommend connecting a fuse directly to the battery terminal to protect from any short circuit in the battery circuit. PV-modules generate current whenever light shines on them. The generated current is directly proportional to the light intensity. Even low levels of light, will deliver the PV-Modules no load, full voltage. It is thus utterly advisable to protect PV-modules from any incident light during installation; Never touch uninsulated cables(ends), only use electric insulated tools, and make sure that the wire cross section is adequate for the PV module operating currents. Connections must always be conducted in the sequence as described below.



WARNING: High pressure danger! Solar cell modules may produce a high open circuit voltage, to disconnect the circuit breaker or fuse before wiring, the wiring process must be careful.



WARNING: Risk of explosion! In case the battery's positive and negative terminals or leads get ever in touch, i.e. short-circuited, a fire or explosion hazard might get triggered. Always pay maximum when handling batteries and related circuits.



WARNING: The load end is prohibited from accessing the inductive load! Prohibit PV reverse connection!



CAUTION: 1. This controller can only use photovoltaic panels as a charging source, please do not use DC power as a charging source.
2. Should the temperature sensor be short-circuited or damaged, the controller can charge or discharge the battery at the default 25 °C.
3. If a power inverter is used the system, it should be connected to the battery via a DC relay. Do not connect it to the controller's load terminals.

1st step: Connect loads

Connect the load cable with the correct polarity of the right-hand side pair of terminals on the solar charge controller (with the lamp symbol). To avoid the presence of any tension on the cable/wires, please connect these first to the load before connecting them to the charge controller.

2nd step: Connect the battery

Connect the battery cable to the two terminals in the middle of the controller with the correct polarity (the controller is marked with the battery icon).

1) Should your system be nominal 12 Vdc, make sure the battery voltage is between the 10.0 and 15.0 Vdc voltage range;

2) For 24 Vdc nominal voltage, the battery voltage should be within the 20.0 to 30.0 Vdc range; If the polarity is correct, the LCD on the controller will begin to display those.

3rd step: Connect the solar module

When connecting the PV-Module make sure to cover it from incident sun light. Double check the PV-Module will not exceed the maximum permissible input current of the Charge Controller (please refer to the section Technical Data). Connect the solar module connection cable to the correct polarity of the left pair of terminals on the solar charge controller (with the solar module symbol).

4th step: Final work

Tighten all cables connected to the controller and remove all the remains around the controller (leaving avoid of minimum 15 cm).

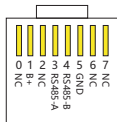
4.2 Grounding

Be aware that the positive terminals of controller are interconnected and therefore bear the same electrical potential. If any grounding is required, always do this on the positive wires/terminals.

4.3 RS485 (MAX1024/2024-C)

The controller is equipped with an RJ45 interface featuring RS485 communication functionality. The pin definitions for the RJ45 interface are as follows:

Pin No.	Definition
0	NC
1	B+
2	NC
3	RS485-A
4	RS485-B
5	GND
6	NC
7	NC



RJ45 interface



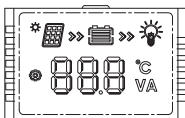
Please contact the sales for the latest version of the communication protocol.

5. Operation

5.1 Key function

Mode	Operating
Browse interface	Short press OK .
Static display	Press the MENU and OK key at the same time for 1s, the LCD screen will lock the interface. Press the OK key, the LCD interface will unlock and start scrolling.
Setting parameter	Press the MENU key for 1s to enter the setting mode when the icon  appears on the display interface, and exit automatically after 30s.
Load On/Off	When the controller is working in street lamp mode, press the MENU key for 3s to turn on the load, press the MENU key again or 1min later the load will be turned off.

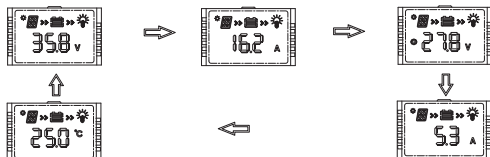
5.2 LCD Display



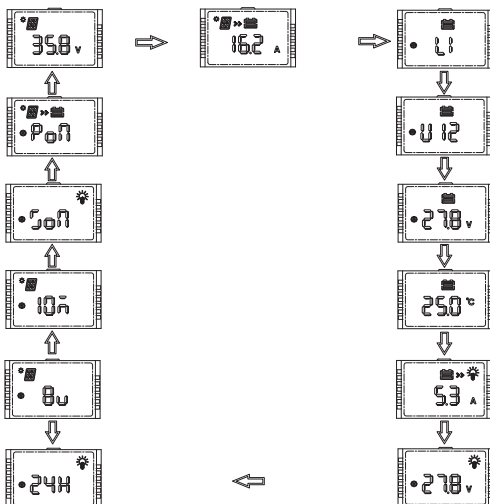
5.2.1 Status Description

Item	Icon	Status
PV array	  >> 	Daytime, charging
Battery	   	Battery capacity Indicate low voltage protection, 25%, 50%, 75%, 100%
Load	 >> 	Load on, discharge
Other description	   	Units are placed after the numbers: Hours (H), Minutes (M), Seconds (S), Voltage (V)

5.2.2 The interface automatically cycles in the displayed sequence



5.2.3 Press OK to browse the interface



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
A	b	c	d	e	f	G	H	I	J	K	L	M	N	O	P	Q	R
S	T	U	V	W	X	Y	Z	0	1	2	3	4	5	6	7	8	9
S	t	u	v	w	x	y	z	0	1	2	3	4	5	6	7	8	9

5.3 Parameters setting

When the icon  appears in the display interface, it means that the parameters can be set. Press the MENU key for 1s, then icon  flashes, Press the OK key to raise the parameters, and press the MENU key to lower the parameters. Press and hold the MENU key for 1 second to exit.

5.3.1 Battery type

The operation interface can select Lithium(LI/LFP), AGM, GEL or FLD for battery type.



Display	Battery type
GEL	GEL(Default)
AGM	AGM
FLD	Flooded
LI	NCM lithium
LFP	LiFePO ₄

5.3.2 Voltage level

The current interface can set the voltage level of the battery:

①Lithium battery type display voltage level:



※ 1.The battery type LI+ with voltage level U12 corresponds to a 3-series(3S)NCM lithium battery(three cells in series), and the battery type LI+ with voltage level U24 corresponds to a 6-series(6S)NCM lithium battery(six cells in series);

2.The battery type LFP+ with voltage level U12 corresponds to a 4-series(4S)LFP battery (four cells in series), and the battery type LFP+ with voltage level U24 corresponds to an 8-series(8S)LFP battery(eight cells in series).

②Non lithium battery type display voltage level (ATO automatic recognition):



5.3.3 Boost Charging Voltage(BCV)



1. When the battery type is set to Lithium, the current interface allows you to set the "Boost Charging Voltage(BCV)" and the "Boost Voltage Reconnect Voltage(BVR)". Press and hold the MENU button for 1 second to set the BCV and press and hold the MENU button again to set the BVR.

2. When the battery type is AGM/GEL/FLD, you can set the BCV on the current screen.

Note: The GEL battery is not have equalization.

5.3.4 Low Voltage Disconnect Voltage(LVD)



1. When the battery type is set to Lithium, the current interface allows you to set the "Low Voltage Disconnect Voltage(LVD)" and the "Low Voltage Reconnect Voltage(LVR)". Press and hold the MENU button for 1 second to set the LVD and press and hold the MENU button again to set the LVR.

Note: $LVR \geq LVD + 0.6V$.

2. When the battery type is GEL/FLD/AGM, you can set the LVD on the current screen.

Note: The LVR of non lithium battery types is 0.8V/1.6V higher than the LVD.

5.3.5 Voltage Default Parameter

Battery type	AGM	GEL	FLD	Range	LFP	LI	Range	
							MAX1024/2024-U	MAX1024/2024-C
OVD	15.8V	15.8V	15.8V	/	16.2V	14.3V	/	/
OVR	15.5V	15.5V	15.5V	/	15.2V	13.3V	/	/
Equalization	14.8V	/	14.8V	/	/	/	/	/
BCV	14.5V	14.5V	14.5V	14.0~14.8V	14.2V	12.3V	9.5~17.0V	10.0~32.0V
BVR	/	/	/	/	13.8V	11.8V	9.2~16.8V	9.6~31.8V
Float	13.7V	13.7V	13.7V	/	/	/	/	/
LVR	12.0V	12.0V	12.0V	/	12.6V	10.5V	9.6~16.8V	9.6~31.0V
LVD	11.2V	11.2V	11.2V	10.8~11.8V	11.1V	9.5V	9.0~15.3V	9.0~30.0V
Remarks	In a 24V system, the overvoltage protection threshold for AGM, GEL, and FLD batteries is 31.3V.				The LFP battery type is not available on the MAX1024/2024-C. For LI batteries, the setting ranges are identical for 12V and 24V systems.			

※ The voltage parameters in the table are 12V system parameters, 24V displayed values are multiplied by a factor of 2.

*Note: OVD: Over Voltage Disconnect Voltage

OVR: Over Voltage Reconnect Voltage

BCV: Boost Charging Voltage

BVR: Boost Voltage Reconnect Voltage

LVD: Low Voltage Disconnect Voltage

LVR: Low Voltage Reconnect Voltage

5.3.6 Load mode



Universal type controller, 24H output(default).

When the controller is set to 24H output mode, there is always an output at the load end regardless of the charging or discharging state(except the protection state).

Note: The test function is not valid in this state.



Dusk to Dawn Mode(D2D)



Lighting time at night(time 1~12 hours); 01 to 12 corresponds to 1 to 12 hours
Light control priority, when the PV voltage > Optically controlled spot, then shut down the load.



Lighting time in the day(time 1~12 hours); 01 to 12 corresponds to 1 to 12 hours
The load is turned off at night, and the load is turned off after the lighting period is performed during the day.



If the load mode is selected" **USE** ", then you can switch on and off the load output manually by pressing **MENU** shortly.



1.If the controller turns off the load due to low voltage disconnect, over voltage disconnect, over current protection, short-circuit protection or over temperature protection, the load will turn on automatically when the controller recovers from protection state.

2.Please note: Pushing the MENU button can still activate the function of the key, even during of the above five kinds protection states.

5.3.7 Optically controlled spot



The controller automatically identifies day and night by measuring the open circuit voltage of the solar panel. Depending on the location and the different solar panels, the user can set different day/night threshold voltage). The voltage setting range: 3.0~10.0V(default: 8.0/16.0V).

5.3.8 Optical delay



When the night comes, the controller identifies the day/night threshold voltage.Through modifying the" day/ night threshold delay" to put off the lighting time.

Setting range is 0~60 seconds(step length is 5 seconds)and 1~30 minutes (step length is 1 minute)(the default setting is 0 seconds).

5.3.9 Short circuit protection



When the capacitive load is started, there will be a large current, which may trigger the short-circuit protection of the controller and cause the output to turn off.

In this case, the user can turn off the short-circuit protection function. SoN is enabled, SoF is disabled, and the default state is enabled.

Setting info: keep the defaults.

5.4.0 PWM charging Settings (Lithium batteries)



PWM has the potential to cause noise and interference in the system, especially when using lithium batteries with BMS, PWM charging may trigger BMS protection, resulting in system failure. Therefore, the customer can choose to turn off the PWM, in this mode once the battery voltage is charged to the preset voltage, the controller immediately stops charging, until the battery voltage drops, and then restart the charging. PoN is enabled, PoF is disabled, and the default value is enabled.

Setting info: keep the defaults.

6.1 Fault indication

Status	Icon	Description	Solution
Load short circuit	 E01	Load shut down, load light flashing, LCD displays E01.	①Clear short circuit Fault ②Restart the controller
Load over current	 E02	Load shut down, load light flashing, LCD displays E02.	①Reduce electrical load ②Restart the controller
Battery low voltage	 E03	Battery level empty, battery icon frame flashing, LCD displays E03.	Load automatically reconnects after battery charging.
Battery over voltage	 E04	Battery level full, battery icon flashing, LCD displays E04.	Check if there is any other energy source charging the battery. If not, the controller is likely faulty.
Over temperature	 E05	Charge/Discharge shut down, °C icon flashing, LCD displays E05.	Check for nearby heat sources and ensure proper ventilation. The controller will resume normal operation once the temperature drops.
PV over voltage	 E06	Voltage too high, solar panel icon flashing, LCD displays E06.	Reduce solar PV voltage
PV short circuit	 E08	Solar panel short circuit, solar panel icon flashing, LCD displays E08.	Check if the solar panel is damaged. If so, please replace the photovoltaic panel.

The presence of two or more different error conditions simultaneously could potentially damage the controller. Therefore, before proceeding to the next step, be sure to clear all existing faults first.

※ When PV overcurrent occurs, the controller stops charging, and there is no alarm displayed on the screen.

The following table shows the PV overcurrent protection methods:

Test conditions	Test content	Basis for determination
PV overcurrent	Charging current ≤ 1.15 times rated value	Normal charging
	$1.15 \text{ times rated value} < \text{Charging current} < 1.25 \text{ times rated value}$	10s protection/10s recovery
	$1.25 \text{ times rated value} \leq \text{Charging current} < 2 \text{ times rated value}$	5s protection/10s recovery
	$2 \text{ times rated value} \leq \text{Charging current}$	1s protection/10s recovery

6.2 Maintenance

For best system performance, the following inspections and maintenance tasks are recommended to be carried out for at least two times a year.

- Make sure no block on air-flow around the controller. Clear up any dirt and fragments on radiator.
- Check all the naked wires to make sure insulation is not damaged.
- Repair or replace some wires if necessary.
- Tighten all terminal screws to the indicated torque; Inspect for loose, broken or burnt cable connections.
- Check and confirm that LCD is consistent with required. Pay attention to any troubleshooting or error indication. Take corrective action if necessary.
- Make sure all system components are effectively and tightly connected to ground.
- Check all terminals for any corrosion signs, damaged insulation, increased temperature.
- Check for any dirt, nesting insects and any corrosion signs. Implement corrections actions as early as possible.



WARNING: Risk of electric shock!

Make sure that all the power is turned off before above operations, and then follow the corresponding inspections and operations.

7, Technical Data

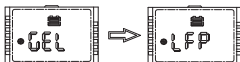
	Item	Standard product	MAX1024	MAX2024
		Suffix description	-U: With USB function(5V, 2A max); -C: With RS485 function	
Battery Parameters	Max Charging Current		10A	20A
	System Voltage		12/24VDC or automatic recognition	
	Max volt on Bat. terminal		35V	
	Battery Type		GEL/Flooded/AGM(Default: GEL)	
	Lithium battery type		LiFePO ₄ /NCM lithium battery	
	Temp.Compensation		-4.17mV/K per cell (Boost, Equalization), -3.33mV/K per cell (Float)	
Panel Parameters	Max volt on PV terminal		25V/50V	
	Dusk/Dawn detect volt.		3.0~10.0V/6.0~20.0V(Default: 8.0V/16.0V)	
Load	Output Current		10A	20A
	Load mode		24H(Default) , D2D, Night working mode, Daytime working mode, User-defined Mode	
System Parameters	Dimensions		80*142*30mm	
	Net weight(Standard product/-U/-C)		136g/146g/140g	168g/178g/172g
	Self consumption		9~20mA	
	Grounding		Common Positive	
	Power terminals		8AWG(10mm ²)	
	Ambient temperature		-20℃~+45℃	
	Ambient humidity		≤95%RH, No condensation	
	Storage temperature		-25℃~+70℃	
	Protection degree		IP32	

⚡ Around oblique line value separately on behalf of 12V and 24V system's value.

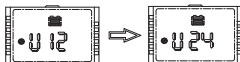
※ Parameter operation example:

Sample:How to change the battery type to a 8-series(8S)LiFePO₄ battery(LFP),adjust the Boost Charging Voltage(BCV) to 29V,and adjust the Boost Voltage Reconnect Voltage(BVR) to 28.6V?

①Change battery type:Press the OK button briefly to enter the following settings page.Press and hold the MENU button for 1 second;the "⊗" icon will begin to flash.Then,briefly press the OK button to select"LFP".Finally,press and hold the MENU button for about 1 second to complete the battery type setting.



②Change voltage level:Press the OK button briefly to enter the following settings page. Press and hold the MENU button for 1 second;the "⊗" icon will begin to flash.Then,briefly press the OK button to select"U24".Finally, press and hold the MENU button for about 1 second to complete the voltage level setting.



③Adjust the lithium battery to increase voltage:Short press the "OK" button to enter the following setting page. Long press the "MENU" button for 1 second, the "⊗" icon will start flashing, and the screen displays Boost Charging Voltage(BCV) of 28.4V. Short press the "OK" button to adjust the parameter to 29V. Then, long press the "MENU" button for about 1 second to set the Boost Voltage Reconnect Voltage(BVR). The screen displays the default Boost Voltage Reconnect Voltage(BVR) of 27.6V. Short press the "OK" button to adjust the parameter to 28.6V. Finally, long press the "MENU" button for about 1 second to complete the setting.

