USER MANUAL

MPPT SOLAR CHARGE CONTROLLER

Suitable for Lead/Acid or Li-ion batteries

NMSC20 | NMSC40 | NMSC6

NORDMAX

MPPT
SOLAR CHARGE CONTROLLER

CE RoHS

NORDMAX

Please keep this manual in case of need
Revision data: 2021-09
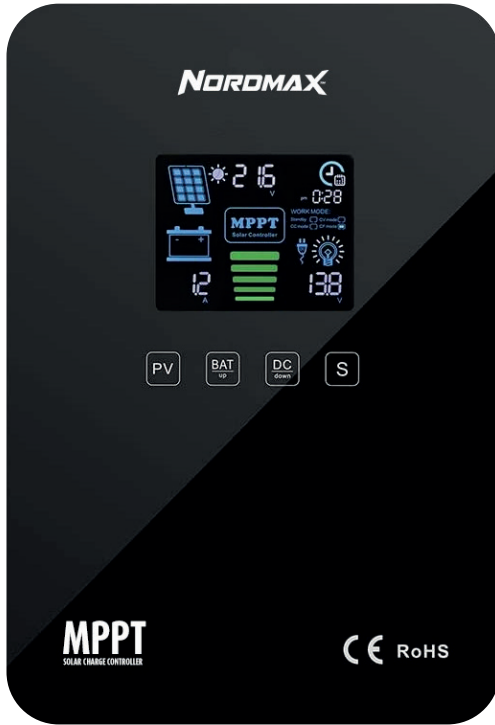
⚠ **Important safety instructions** (Please keep this handbook for future reference. Please read all instructions and precautions in the manual carefully before installation.)

This manual contains all the safety, installation and operation instructions of this series solar charge controller (hereinafter referred to as "controller"):

- Install the controller in a well ventilated place. The controller's case temperature may be very high during operation. Please don't touch the metal shell directly to prevent burns.
- It is recommended to connect fuse or circuit breakers to the input, load and battery terminals to prevent electric shock hazard during use.
- After installation,check all wiring connections are secure, so as to avoid the danger of heat build-up caused by virtual connection.
- If the controller does not display properly when first use, please cut off the fuse or circuit breaker immediately and check whether the wiring connection is correct or not.
- If the solar system needs to connect the inverter, please connect the inverter directly to the battery, instead of the load terminal of the controller.
- Don't disconnect the battery when the controller is charging. Otherwise, it may damage the DC load.

Operation fault codes description

Code	Description	Code	Description	Code	Description
001	Battery over-voltage	—	——	100	Trigger over-voltage protection
002	PV over-voltage	020	Internal over-temperature	200	Command mode(Stop charging)
004	Overcharging	—	——	400	Battery system unrecognized
008	Over-discharging	080	Battery under-voltage	—	——

Table 1

System Voltage and Battery Types

1)The controller identifies the system voltage according to the battery voltage at start-up. And the controller will re-identify the system voltage when power-off and restart. Please ensure the system voltage displayed in controller is consistent with the actual voltage. Otherwise, need to recheck the battery pack voltage.

Note: Please refer to **Specification** for the battery detailed system identification voltage.

2)The controller has 3 kinds of conventional battery charging parameters (**Table 2**) . To charge other types of batteries, please select "USE", then set up by PC software or APP. To charge lithium battery , please select "Lit", then set up on the controller, APP or PC software.

Battery type	Constant voltage = C*N (V)	Floating voltage = F*N (V)	
Flooded(FLD)	14.6 * N	13.8 * N	1. **C** = Cell's constant charging parameter.(9≤F<C≤15)
Sealed(SEL)	14.4 * N	13.8 * N	2. **F** = Cell's floating charging parameter.(9≤F<C≤15)
Gel(GEL)	14.2 * N	13.8 * N	3. **N** = Series quantity of battery. [e.g. N=2, battery system is 24V]
User (USE)	C * N	F * N	4. **Example**: If battery system is 48V, then N=4; If the cell's voltage C=14.6V, then Constant voltage= 14.6*4=58.4V.
Li-ion(Lit)	Set the charging and protection parameters according to the specifications of the selected lithium batteries. **Controller Set Example:** Step1: Enter the setup mode. Step2: Set the battery type to "Lit". Step3: Set the parameters of S05~S10. Step4: Save the setting parameters and exit. **Note:** Please refer to **Table 7**.		

Cell Specification
Nominal Voltage:3.7V
Charge Voltage:4.2V
Cut-off Voltage:2.7V
6 cells in series

Reference Settings
S06 : 22.2V Nominal Voltage
S05 : 25.2V Charge Voltage
S07 : 16.2V Under-volt protection

Table 2

Working status instruction

User can identify the controller current working status according to the flash rule of the light. (When the screen is off.)

Indicator Light	Instruction
The first light is always on(A)	Standby
All lights flashing(ABCD)	Error warning
Three lights turn on sequentially(ABC)	Charging
The fourth light is always on(D)	Load on

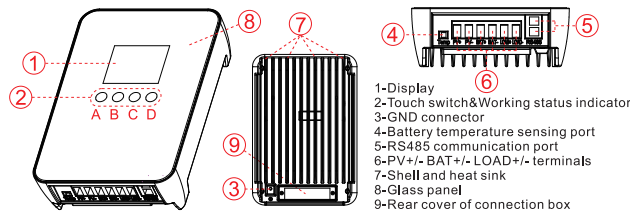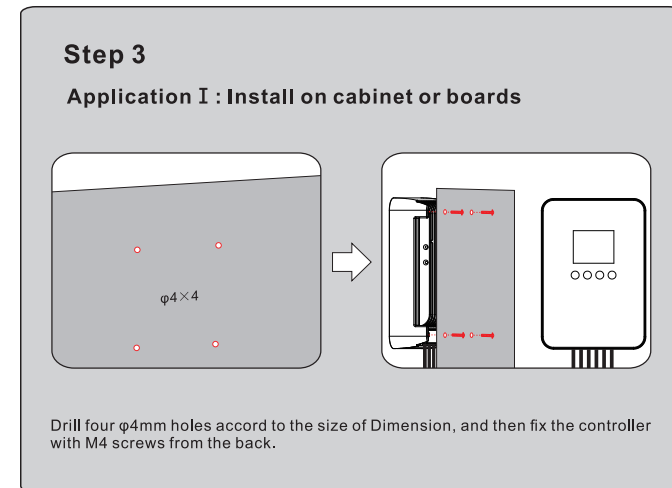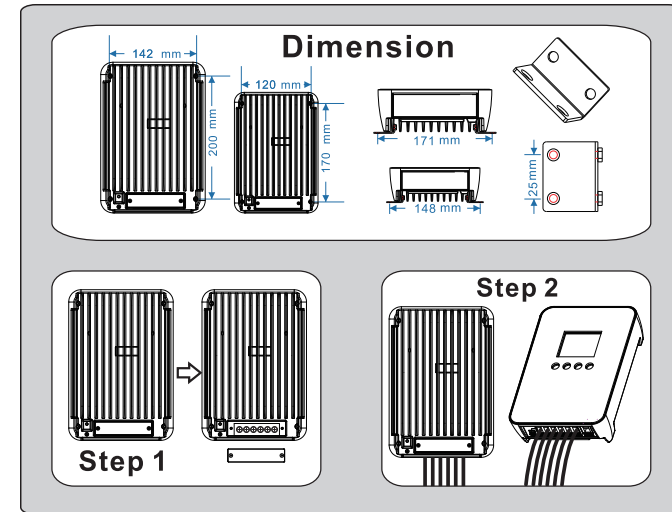**Table 3** (Tip: A/B/C/D comes from **Figure 1**)

1. Characteristics

1-Display
2-Touch switch&Working status indicator
3-GND connector
4-Battery temperature sensing port
5-RS485 communication port
6-PV+/- BAT+/- LOAD+/- terminals
7-Shell and heat sink
8-Glass panel
9-Rear cover of connection box

Figure 1

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2. Product List

	Description	Quantity
Product	MPPT controller	1 unit
Installation accessories package	Structural member	2 pcs
	Temperature sensing cable	1 pcs
	M4 screws (for mounting backboard)	4 pcs
	M4 screw (for controller)	4 pcs
	Plastic expansion particles	4 pcs
Accessory pack	User manual	1 pcs
	Operational instructions	1 pcs
Optional	RS485-USB cable	1 pcs
	External WIFI communication module	1 unit
	Bluetooth communication module	1 unit

Table 4 (If there are any parts missing, please contact dealer.)
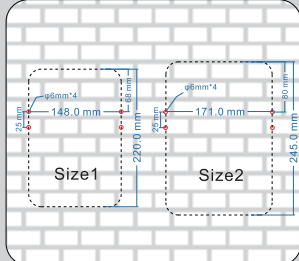
3. Installation Instructions

Dimension

142 mm
120 mm
200 mm
170 mm
171 mm
148 mm
25 mm

Step 2

Step 1

Step 3

Application I : Install on cabinet or boards

φ4×4

Drill four φ4mm holes accord to the size of Dimension, and then fix the controller with M4 screws from the back.
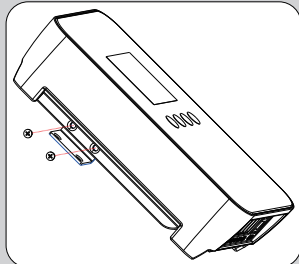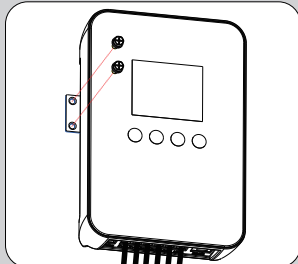
ApplicationⅡ: Mounting installation

Size1   Size2

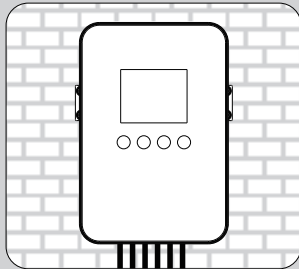1.Measure and mark the distance on the wall, drill Φ6mm holes and insert plastic expansion particles and tighten.
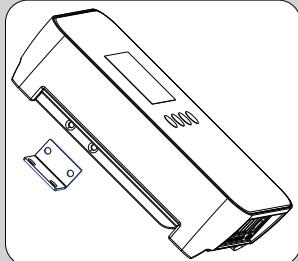
2.Align the installation accessories with the mounting holes on the controller.

3. Fasten the installation accessories to the controller with M4 screws.

4.Tighten and fix the controller to the wall with M4 screws.

Remark:

1. Above steps of mounting backboard are suitable for general wall installation. If installed on wooden wall, use self-tapping screws to fix it directly.

2. Be cautious to the controller installation position, keep 20cm space up and down for good ventilation and heat dissipation.

3. The ambient temperature of installation position must be within -20℃~+50℃, otherwise, the controller may not work properly.

5.Well-installed.

4. Serial connection(string) of solar panels

The Table 5 is the quantity(N) of solar panels in series, for reference only.

Voc * N = PV$_{input}$ < DC100V											
System Voltage	Voc<23V		Voc<31V		Voc<34V		Voc<38V		Voc<46V		Voc<62V
	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	4	2	3	1	2	1	2	1	2	1	1	1
24V	4	3	3	2	2	2	2	2	2	2	1	1

Voc * N = PV$_{input}$ < DC150V											
System Voltage	Voc<23V		Voc<31V		Voc<34V		Voc<38V		Voc<46V		Voc<62V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	6	2	4	1	4	1	3	1	3	1	2	1
24V	6	3	4	2	4	2	3	2	3	2	2	1
36V	6	4	4	3	4	3	3	3	3	2	2	1
48V	6	5	4	4	4	3	3	3	3	2	2	2

Table 5

5. DC Load Output Voltage and Max. Discharge Current

The controller has DC LOAD output function, and its output voltage range is the same as battery pack. For example, if the battery's voltage is 25.2V, the instant DC output voltage is 25.2V, too.

It can supply power to DC LOAD continuously if the DC LOAD's current in within the rated range.

When the DC LOAD's working current is 100%-120% of rated current for 5 mins, DC LOAD will be OFF. As soon as DC LOAD's working current is over 120% of rated current, the DC LOAD will be OFF immediately.

To restart DC LOAD, user should set Load Type to "ON" or "USE" manually through controller/APP/PC.

6. Communication port description

The communication port of the controller is compatible with RS485-USB communication cable for real-time monitoring by PC software and Wi-Fi module to have remote cloud monitoring by APP.

The communication port is a standard 8 pin RJ45 interface, and the pins are defined as follows(**Table 6**):

PIN	Function
1	RS485-A
2	RS485-B
3	Dry contact
4	Dry contact
5	GND
6	GND
7	+5V(Non-Isolated)
8	+5V(Non-Isolated)

Table 6

1 2 3 4 5 6 7 8
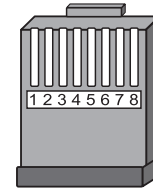
(Figure 2)

(**Note**: The pin definition is applicable to our related products ONLY!)

When the Load output is off due to the triggering protection mechanism, the dry contact output interface will be ON (**low impedance**). Otherwise, it is OFF (**high impedance**).

The controller has dual RS485 communication ports. It can be used for communication and parallel connection.

If need to monitor multiple controllers centrally, please set the device address order (1~254) of the controllers accordingly. **For example,** 5 controllers in parallel connection and monitor centrally, set controllers' address order as 1, 2, 3, 4, 5.

If want to monitor the multiple controllers in Master-Slave communication, set the host controller address to 255. **For example,** 5 controllers in parallel connection, just need to set the MASTER(host) controller address order as 255.

7. Operation

7.1 LCD display area description
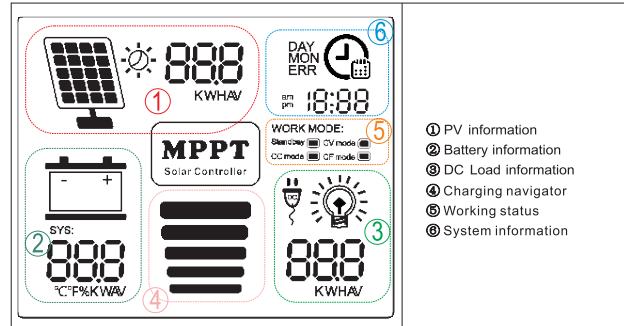
① PV information
② Battery information
③ DC Load information
④ Charging navigator
⑤ Working status
⑥ System information

7.2 Button Operation：(Four buttons：PV，BAT/up，DC/down，S)

Button	Accessible information	In setup mode fuction
PV up	PV voltage / PV current / PV power / PV total energy	
BAT up	Bat voltage / Bat current / Bat power / Bat temp / Bat type / Device address	Go up/increase
DC down	Load voltage / Load current / Load power / Load total energy / Load working mode	Go down/decrease

Button	Operational instructions	Setup items
S	● Long press 3S to enter or exit setup mode ● Press the button: -> Select of settable parameters S01~S14. -> Save parameters before exit	S01 Bat-Type->USER/SEL/FLD/GEL/LIT S02 Device address S03 Load mode->ON/OFF/USER S04 Bat-temp->℃/℉ S05 Charge-Volt->9~30V or 9~60V S06 Nominal-Volt->8.5~29V or 8.5~58V S07 Under-volt protection voltage S08 Under-volt recovery voltage S09 Over-volt protection voltage S10 Over-volt recovery voltage S11~S12 Realtime set S13~S14 Date set
		Available for Li-ion

Table 7

8. FAQ

Fault	Possible Reasons	Solution
Controller cannot start up, screen can not be on.	Battery positive and negative reversely connected.	Check the wiring, reconnect in right order.
Controller not charging, PV voltage undetectable.	PV Input positive and negative reversely connected.	Check the wiring, reconnect in right order.
Controller is on and PV voltage is normal, but not charging.	The controller can not recognize battery system voltage (The "System" in LCD flashes).	Check whether the battery voltage in LCD is in the range of controller system recognition.
The battery is in a low energy or empty for a long time.	Solar panels quantity are too less to generate enough energy.	Increase solar panels quantity.
	Battery capacity is too small to Store enough energy.	Increase battery capacity.

Table 8

9. External electrical port

The dry contact signal follows the state of LOAD.When load is on, the optocoupler receives the "OFF" signal.Dry contact turn to high impedance state	Optocoupler OFF Dry contact High impedance state Dry contact
The dry contact signal follows the state of LOAD.When load is off, the optocoupler receives the "ON" signal.Dry contact turn to low impedance state	Optocoupler ON Dry contact Low impedance state Dry contact
Common positive electrical schematic	PV+ PV- BAT+ BAT- LOAD+ LOAD-
Common negative electrical schematic	PV+ PV- BAT+ BAT- LOAD+ LOAD-

Table 9

10. Parameters and specifications

Easy managment with SolarMate App

With the app **SolarMate** you can easily control your regulator with your smart phone. The app is free of charge and can be download where you usually find your Apps or by scanning one of the QR codes below.
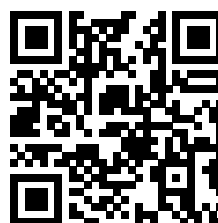

How to connect to SolarMate

Follow the steps below to use the SolarMate app or scan the QR code to the right to see an instructions video on how to use the app.

1 Open the app SolarMate.

2 Choose "Bluetooth Monitor" in the first step.

3 In the second step, click "List Data".

4 Choose the correct unit in the list. Be sure the number of the device matches the one on the controller you want to use.
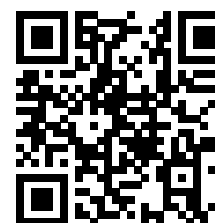
See an easy instructions video

Scan the QR code below to see an instructions video for the SolarMate app. ▼

Common positive MPPT controller		NMSC20	NMSC40	NMSC60
Product category	**MPPT efficiency**	$\geq$99,5 %		
	Standby consumption	0,5-1,2 W		
	Heat-dissipating method	Natural cooling		
	Battery system voltage range — 12 V system	9-15 V DC (Lead/Acid)		
	24 V system	18-30 V DC (Lead/Acid)		
	Lithium-ion	18-30 V DC (default) | $\leq$30 V DC (optional activation function)		
Input parameters	**Max. PV input voltage (Voc)**	100 V DC		
	Min. Vmpp voltage	Battery voltage + 2 V		
	Start-up charging voltage	Battery voltage + 3 V		
	Low input voltage protection	Battery voltage + 2 V		
	Over voltage protection / Recovery	100 V DC / 95 V DC		
	PV rated power — 12 V system	260 W	520 W	780 W
	24 V system	520 W	1 040 W	1 560 W
	Li-ion	252-504 W	504-1 008 W	756-1 512 W
Charge parameters	**Battery typers (Default GEL battery)**	GEL (default) | Sealed (SEL) | Flooded (FLD) | Li-ion (Lit) | User defined (USE)		
	Charge rated current	20 A	40 A	60 A
	Charge method	3 stages: CC (Constant Current) | CV (Constant Voltage) | CF (Floating charge)		
	Output voltage stability accuracy	$\leq$±0,2 V		
Load parameters	**Load voltage**	Same as battery voltage		
	Rated load current	20 A	30 A	30 A
	Load control mode	On/Off mode | PV voltage control mode | Dual-time control mode | PV+Time control mode		
Display & communication	**Display**	High definition LCD segment code backlight display		
	Communication	Dual RJ45 port | 8 pin RS485 communication for PC and App		
Other parameters	**Protections**	Input & output over/low voltage | Reversed polarity | Over heating | Battery shedding | Etc.		
	Operating / storage temperature	-20 to +50 °C / -40 to +75 °C		
	IP (Ingress protection)	IP43		
	Max. wiring size (mm²/AWG)	28 mm²		
	recommended breaker	$\geq$40 A	$\geq$63 A	$\geq$100 A
	Net weight / Gross weight	1,65 / 1,98 kg	2,35 / 2,78 kg	
	Product size / Packing size (mm)	220x148x58,8 mm / 289x214x104 mm	245x170x63,5 mm / 332x256x122 mm	