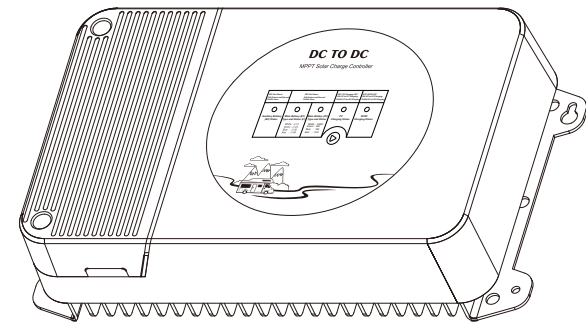


Solar DC-DC Buck-Boost Controller

M2425ND M2450ND
M4850ND

User Manual



*We may modify these specifications without prior notice.

1. Warnings and Tools Icon Chart

Icons	Name	Description
	High Voltage	High voltage device. Installation should be performed by an electrician.
	High Temperature	This device will produce heat. Mount device away from other items.
	Environmental Hazard	Electronic Equipment do not put in landfill.
	Wire Cutter	A wire cutter is needed for cutting and stripping prior wires to connect.
	Multi-meter	A multi-meter is needed for testing equipment and verifying polarity of cables.
	Anti-static Glove	Anti-static gloves are recommended to prevent controller damage caused by static electricity.
	Electrical Tape	Electrical tape is recommended to safely insulate spliced or bare wires.
	Screwdriver	A common size screwdriver is needed to attach wires to the controller.

2. Safety Tips

- It is very important to review this manual thoroughly before attempting installation.
- Beware of any nearby electrical equipment that may interfere with installing this device.
- And please don't plug in any AC source to this DC-DC product, or it may cause a fire or burn to the device.
- Solar panels may generate high voltages and currents, and please make sure your solar panels would be completely covered from sunlight during installation. It is recommended that the installation is performed by qualified electricians.
- Contact of wiring to this device may generate sparks, so please put on proper insulation wear while installing this device.
- To avoid damage to the battery or controller, use proper fuses in wiring. Please contact us if you need help with fuse sizing.
- Always keep children away from this device.
- Be certain to use the correct gauge of wire, see below for a table of recommended wire size for various current loads.

Solar Input Current	5A	10A	20A	30A	50A
Wire Cross Section Area (mm ²)	1.5	2.5	5	8	12
Wire AWG	15	13	10	8	6

* We suggest no more than 5A's current for each square millimeter's wire core, e.g., for current of 10A, at least you should use 2mm² wire.

3. Product Features

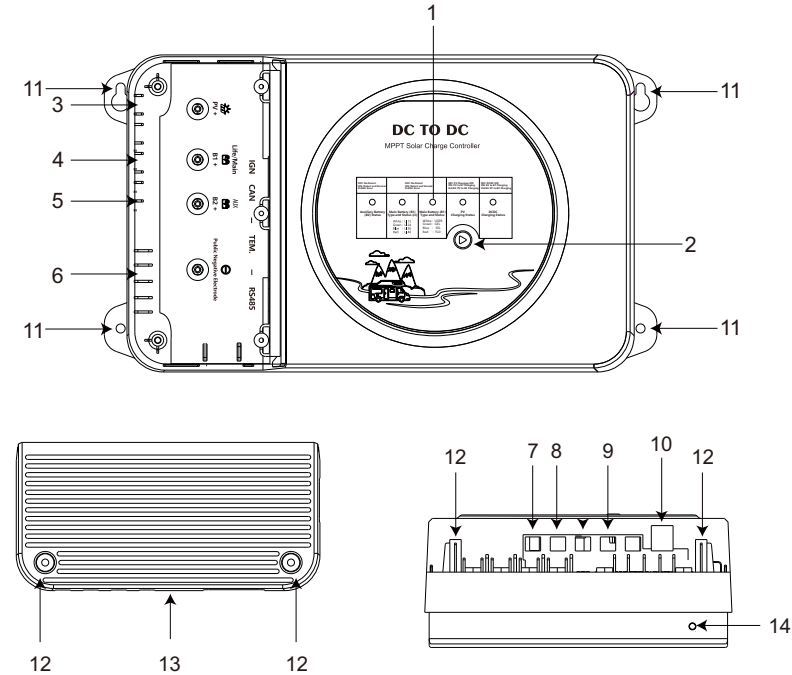
Thank you for choosing our product. This device is a DC-DC intelligent charger/controller for vehicle or similar systems with dual batteries. Applied in a dual battery system, this charger combines respective advantages of motor (ordinary/smart alternator) power generation and photovoltaic power generation.

In use of vehicles, the main/service battery is prior to being charged by the solar input as the default settings. The auxiliary/starter battery would get into charge automatically, after the starter battery was fully charged. Users can also set the charge priority between main & auxiliary batteries in the controller (through the external remote LCD screen). The auxiliary battery could enforce to charge the main battery by settings in the controller, or through the IGN alternator.

The controllers have features as follows:

- Supports dual battery system charge (BAT 1/main/service battery & BAT 2/ auxiliary/starter battery). If only one battery would be put in use, then please connect it in the main/service battery port as default settings.
- By continuously checking solar panel power output changes, the controllers employ multiple MPPT charge algorithms in combination to boost charging efficiency in iferent weather and temperature conditions.
- If the remote display was connected in the controller, the user could also operate the charge system in App through mobile phones via Bluetooth.
- Charging modes available for most common deep-cycle battery types in the market, including AGM (sealed lead acid batteries/SLD), GEL, Flooded, and Lithium. Auto recognition of 12V/24V/36V/48V battery system voltage.
- Supports recording of system running data for up to 300 days, compatible with monitoring App through iOS and Android.
- Industrial grade design with full ranges of electronic protections on PV and battery in the controller. (optional accessory, not in the standard package list).

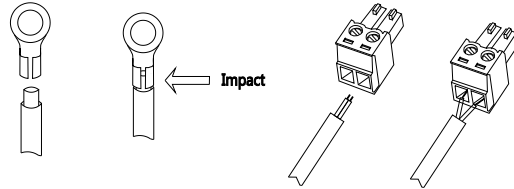
4. Device Diagram



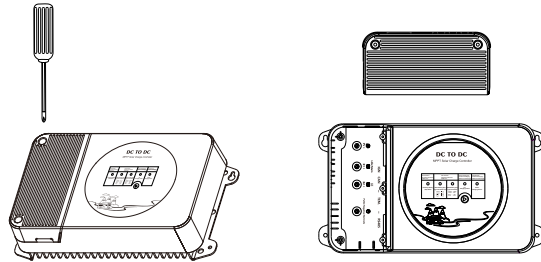
#	Description	#	Description
1	LED Indicator (DC,PV,BAT1,BAT1(LI),BAT2)	10	Rs485 Communication Port
2	Function Key	11	Mouting Holes
3	PV Positive Terminal	12	Junction Box Cover Mounting Screw Hole
4	Battery 1 Positive Terminal	13	Junction Box Cover
5	Battery 2 Positive Terminal	14	Shell Ground Connection Point
6	Public Negative Port		
7	IGN Single Input		
8	CAN Communication Port		
9	External BAT 1 Temperature Sensor		

5. Mounting Instruction

5.1 Wire preparation.

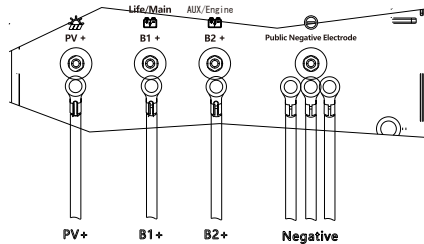


5.2 Remove the mounting cover plate.

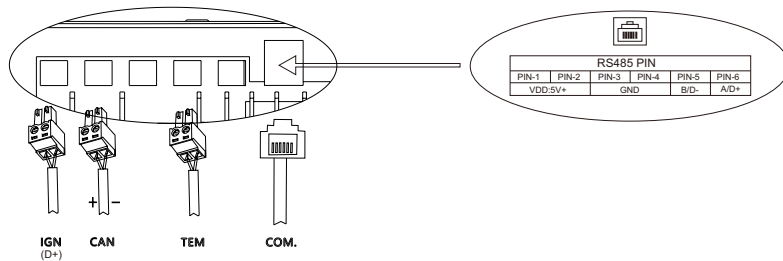


5.3 Connect the main wire.

The negative pole of the main wire is the common negative pole, so it can be installed in a random order.



5.4 Connect the communication or the secondary line.

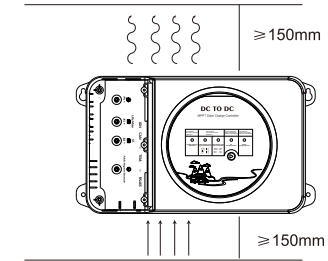


5.5 After connecting the wires, cover the mounting cover plate and tighten the screws.

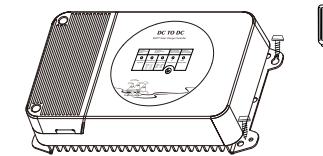
5.6 Fixed.

5.6.1 Placement.

This device adopts vertical heat dissipation, so it needs to be placed horizontally when it is fixed, so that the hot air can disperse smoothly.



5.6.2 Fixed with self-tapping screws or auxiliary fixing devices.

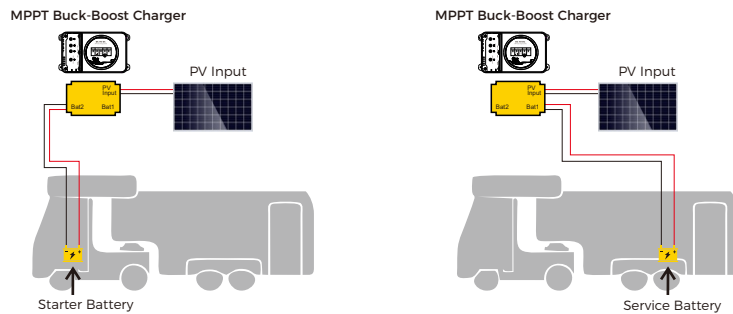


6. Wire Connection Sequences

- * The MPPT charging at PV terminal is buck charging, so the voltage at PV terminal must be greater than the voltage at battery terminal.
- * The EXT terminal is Buck-Boost charging, so the input voltage only needs to be within the maximum voltage range 35V.

6.1 Single-battery PV charging system.

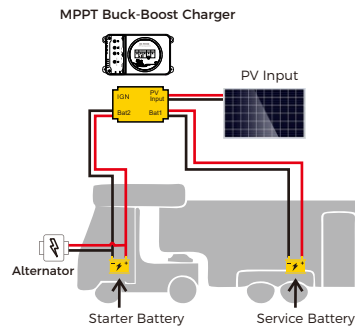
The single-battery system supports any connection of the main battery or the secondary battery. The example in the figure below only shows the connection of the battery terminal. Please refer to the following scenarios for the battery connection.



6.2 The Alternator directly connected to the starter battery.

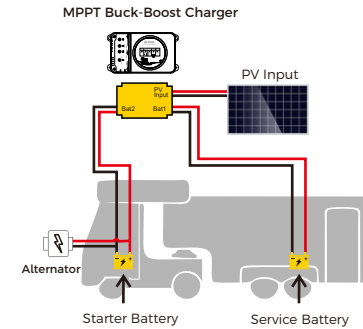
6.2.1 Smart Alternator.

The alternator will lead out the IGN signal line after starting. When the signal line is detected, the machine will detect the voltage of the starter battery. If the voltage is greater than the set voltage, the starter battery will start to charge the living battery.



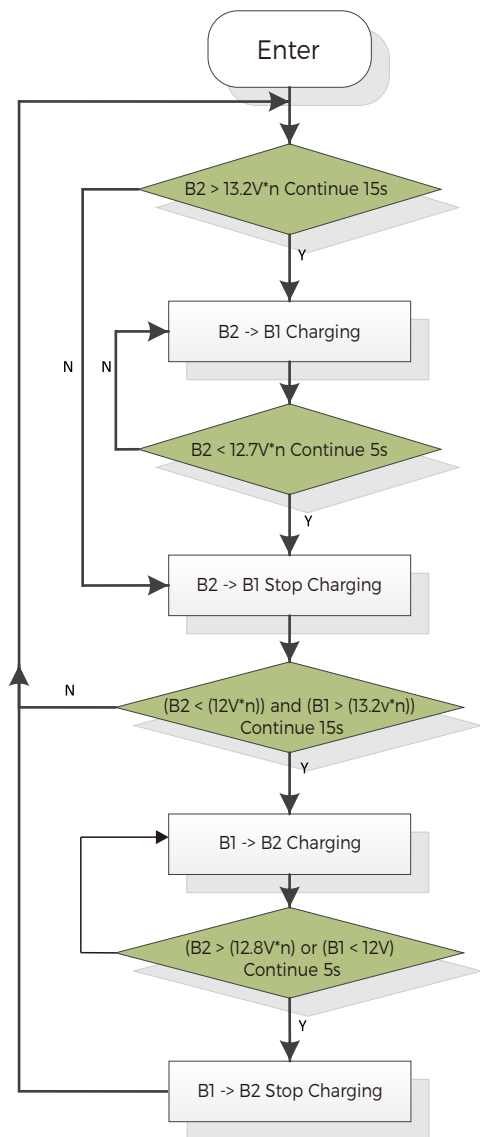
6.2.2 Regular Alternator.

The alternator will directly charge the starter battery after it is started. When the machine detects the voltage of the starter battery, if it is greater than the set voltage, the starter battery will start to charge the living battery.



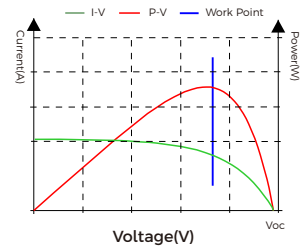
7. Working Process Introduction

7.1 Switching logic between battery 1 and battery 2 during normal operation. (battery without load) (take 12V system as an example)

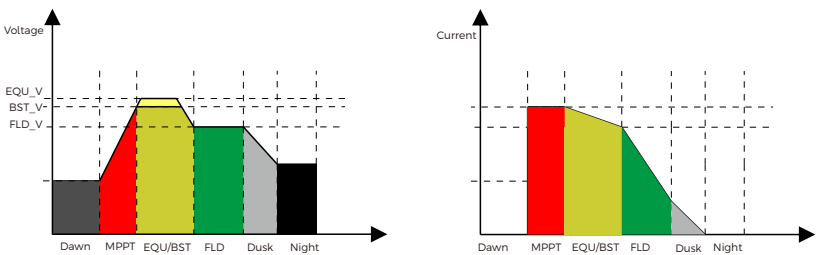


7.2 MPPT Charging.

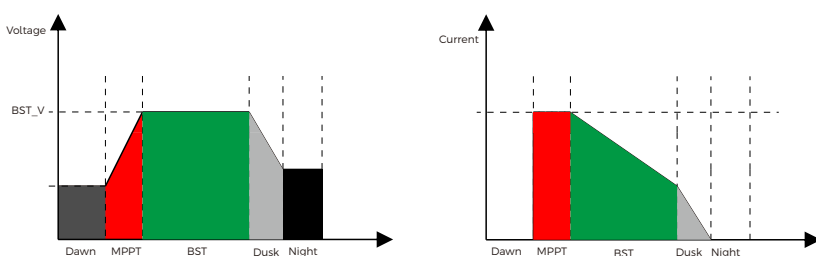
MPPT is the abbreviation of Maximum Power Point tracking. Since the photovoltaic curve has the following characteristics, it is hoped that the following Work Point can be tracked when the photovoltaic energy is used for charging.



7.2.1 Lead-acid 3-phases charging.

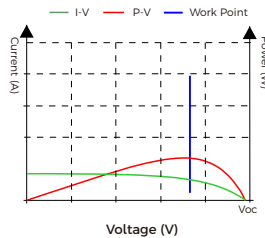
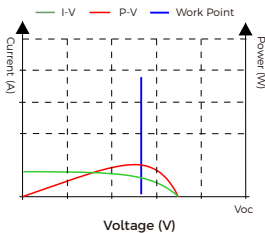


7.2.2 LI Battery Charging.

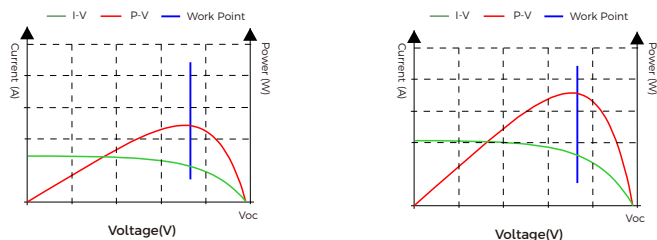


7.3 Photovoltaic Characteristics.

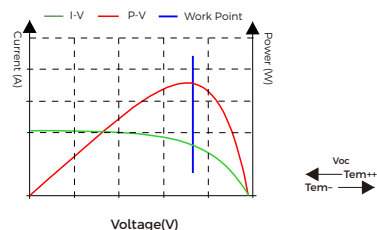
7.3.1 PV from dark to normal light. (low light on the left, light enhancement on the right)



7.3.2 The change of light intensity to photovoltaic curve. (weak light on the left and strong light on the right)



7.3.3 The effect of temperature on light. (the higher the temperature, the lower the open circuit voltage, but the overall power is almost the same)



8. Key + LED Battery type operation Chart

Operation Key	Modes	
Long Press ▶	Normal Mode	Enter B1 Type Setting Mode
	Setting Mode	Exit And Save
Short Press ▶	Setting Mode	Adjust B1 Type

Bat1 Type Table

LED	White	Green	Blue	Red
B1(LI)	Li12	Li24	Li36	Li48
B1	USE	GEL	SEL/AGM	FLD

9. LED Flash Rhythm Chart

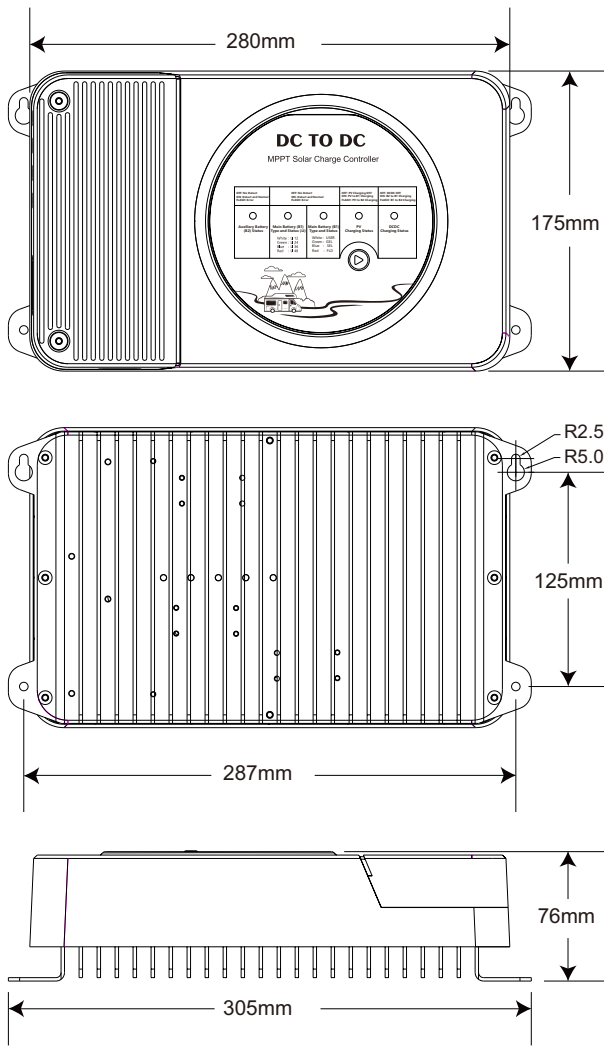
OFF: No Detect ON: Detect and Normal FLASH: Error	OFF: No Detect ON: Detect and Normal FLASH: Error		OFF: PV Charging OFF ON: PV to B1 Charging FLASH: PV to B2 Charging	OFF: DCDC OFF ON: B2 to B1 Charging FLASH: B1 to B2 Charging
Auxiliary Battery (B2) Status	Main Battery (B1) Type and Status (LI) White : LI 12 Green : LI 24 Blue : LI 36 Red : LI 48	Main Battery (B1) Type and Status White : USER Green : GEL Blue : SEL Red : FLD	PV Charging Status	DCDC Charging Status

LED Name	LED Display	Signal Indication
PV	Off	Solar Input Not Charging * PV LED is generally off during nighttime
	Steady On	PV is charging the life battery B1
	Flash	PV is charging the AUX battery B2
DC	Off	DCDC Charging Off
	Steady On	B2 is charging B1
	Flash	B1 is charging B2
B1	Off	No Detect
	Steady On	Connect Normal
	Flash	Error
B1	Off	No Detect
	Steady On	Connect Normal
	Flash	Error

10. LCD Display Interface Overview

Please check the LCD manual for more details.

11. Product Dimension



12. Controller Specification

The variable “n” is adopted as a multiplying factor when calculating parameter voltages, the rule for “n” is listed as: if battery system voltage is 12V, n=1; 24V, n=2.
For example, the equalize charge voltage for a 12V FLD (Flooded) battery bank is 14.8V*1=14.8V. The equalizing charge voltage for a 24V FLD (Flooded) battery bank is 14.8V*2=29.6V.

Parameter	Value
Charging Mode	MPPT
No-load Loss	25mA
System Wiring Grounded	Negative Grounded
Operating Temperature	-25°C ~ 45°C
Storage Temperature	-35°C ~ 65°C
Operating Altitude	<3000m
IP Protection	IP45
Charging Efficiency	>98%
Communication Port	RS485/CAN(Optional)
Charging Derating	Step derating and recovery at 70°C
Connectors	Bare wire terminals (V6)
Wire Gauge	8mm ² (8AWG)(30A) 12mm ² (6AWG)(50A)
LED Instructions	DC,PV,BAT1(two),BAT2
Operating Mode	External Display
Bluetooth	The built-in Bluetooth module of the display screen operated by APP
Protection	PV Over-Voltage, PV Reverse Protection, Battery Over Voltage, Battery Over-Charge, Battery Reverse Protection, Controller Over-Heating, High Ambient Temperature.

	Battery 1
Battery	Life Battery
Battery System Voltage	12/24V AUTO(M2425ND/M2450ND) 12/24V/36V/48V AUTO(M4850ND)
Battery Voltage Range	8V-32V(M2425ND/M2450ND) 8V-64V(M4850ND)
Battery Type	GEL/SEL/FLD/USE/LI
Max Current	25A(M2425ND) 50A(M2450ND) 50A(M4850ND)
	Battery 2
Battery	AUX Battery
Battery System Voltage	AUTO
Battery Voltage Range	8V-32V(M2425ND/M2450ND) 8V-64V(M4850ND)
Battery Type	GEL
Max Current	25A(M2425ND) 50A(M2450ND) 50A(M4850ND)
	Battery 2 to Battery 1
Charging Mode	BuckBoost
Battery 2 to Battery 1	Activ:B2 > 13.2V*n(Adjustable) and B1 > 5V Inactiv:B2 < 12.7V*n(Adjustable) or B1 < 5V
Battery 1 to Battery 2	Activ:B1 > 12.7V*n(Adjustable) and B2 < 12*n(Adjustable) Inactiv:B2 > 12.8V*n(Adjustable) or B1 < 12*n or B2 < 5V
	PV
Charging Mode	Buck MPPT+CC+CV
Max Solar Input Power	375W/750W(M2425ND) 750W/1500W(M2450ND) 750W/1500W/2250W/3000W(M4850ND)
Max Solar Input Voltage	100Voc(M2425ND/M2450ND) 140Voc(M4850ND)
PV Tracking Efficiency	>99%

