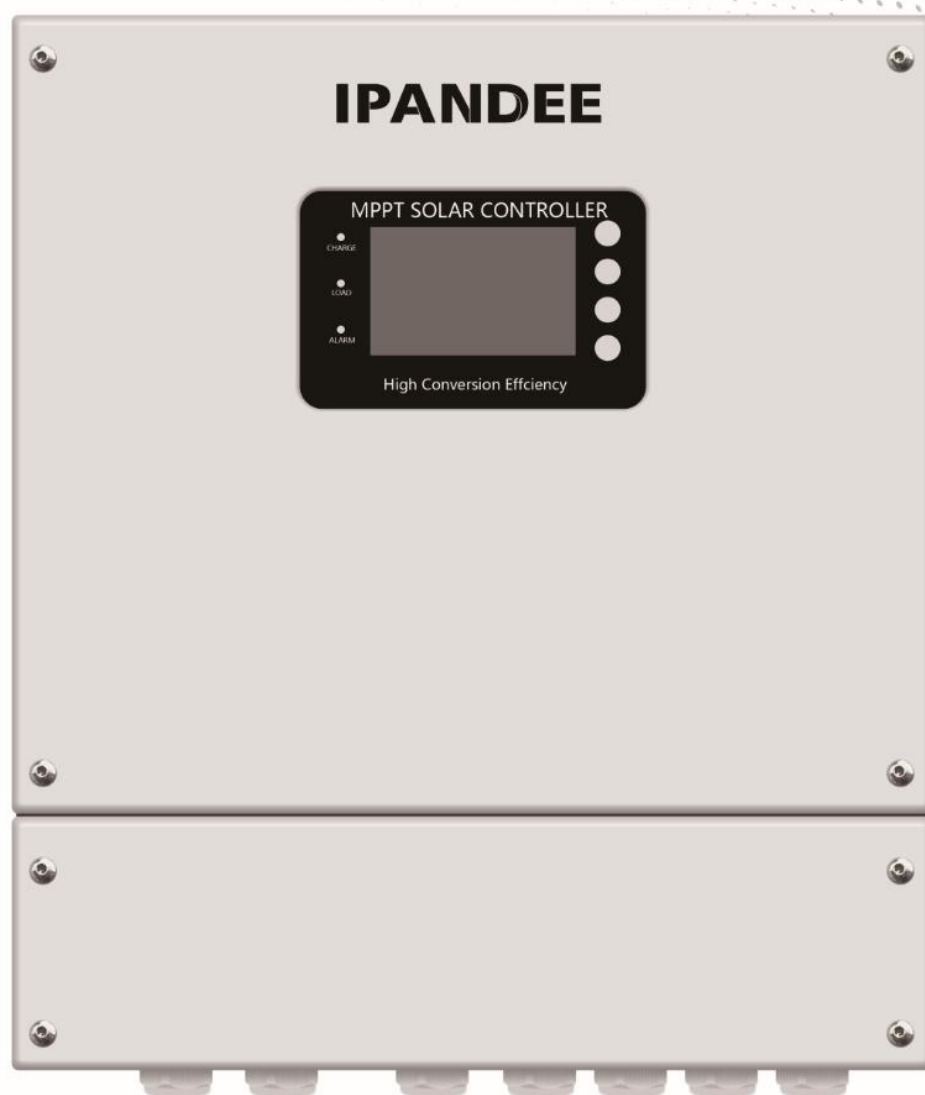


IPANDEE

Installation And Operation Manual

THE
MARS



Mars - MPPT

SOLAR CHARGE CONTROLLER

12V / 24V / 36V / 48V / 96V



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.

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 after power-off and restart. Please confirm the system voltage displayed in controller is consistent with the actual voltage. Otherwise, need to recheck the battery pack voltage.

Note: Please refer to [Table 9](#) for the battery system detailed system identification voltage.

2) The controller has set 3 kinds of conventional battery charging parameters (**Table 1**). 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)	- C = Cell's constant charging parameter. (9≤F<C≤15) - F = Cell's floating charging parameter. (9≤F<C≤15) - N = Series number of battery. [e.g. N=2, battery system is 24V] 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.
Flooded(FLD)	14.6 * N	13.8 * N	
Sealed(SEL)	14.4 * N	13.8 * N	
Gel(GEL)	14.2 * N	13.8 * N	
User (USER)	C * N	F * N	
Li-ion(Lit)	Set the charging and protection parameters according to the specifications of the selected lithium batteries.		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 1 (The MPPT controller can not wake up lithium ion battery.)

Strip Indicator Instruction

User can identify the controller current working status according to the flash rule of the light. (**Red - ALARM**,

Blue - Charging, Green - DC load)

	Strip Indicator Light	Controller Status
Blue - Charging	Flash for every second	Constant current charging mode(CC)
	Flash for every 3 second	Constant voltage charging mode(CV)
	Keep on lighting	Floating charging mode(CF)
Green - DC load	Lighting	DC load turn on
	Do out	DC load closed
Red - ALARM	Lighting	Fault mode
	Do out	Normal mode

Table 2

1.Characteristics



Item	Name
1	LCD
2	Upper cover plate
3	PV terminals
4	Battery terminals
5	Load terminals
6	Communication interface
7	Heat sink
8	Signal lamp
9	Button

Figure 1

2.Accessories Instruction

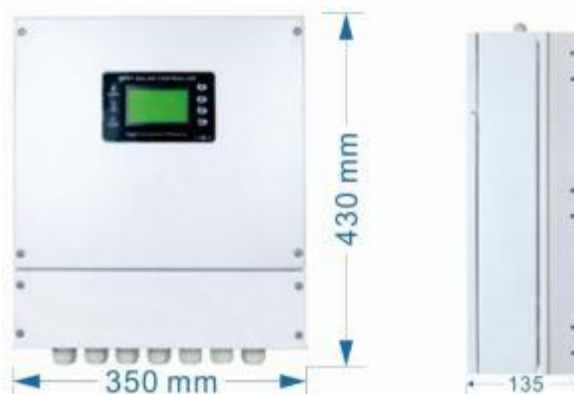
	Description	Quantity
Product	MPPT solar charge controller	1 unit
Installation accessories package	Temperature sensing wire	1 pcs
	RS485 to USB cable	1 pcs
Information pack	User Manual	1 unit
Optional	External WIFI communication module	1 unit
	Bluetooth communication module	1 unit

Table 3 (If there is any part missing, please contact your dealer.)

3.Installation position of controller

According to the size of the controller shown in **Figure 2**, the installation position of the controller should be reasonably selected. The space around the controller should be kept above 30CM, and the installation environment should be ventilated so that the controller can have good heat dissipation.

Figure 2



4. Serial connection (string) of PV modules

The **Table 4** is the quantity(N) of PV modules in series, for reference only.

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	2~3	4	2	4	2	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	2~3	3	2	2	1
48V	6	5	4	4	4	4	3	3	3	3	2	2
Voc * N = PV_{input} < DC300V												
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
48V	13	5~8	9	4~6	8	4~6	7	3~5	6	3~4	4	2~3
96V	13	10~12	9	7~8	8	6~8	7	6~7	6	5~6	4	4

Table 4

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 48.6V, the instant DC output voltage is 48.6V, too.

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

When the DC LOAD's working current is 100%-120% of rated current for **5 minutes**, 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. Steps of Switch on and off



Figure 3

Make sure that the controller is installed and connected as above

Opening process:

Step 1: open the circuit breaker on the battery side(breaker①), make sure that the controller is connected with the battery (the LCD of the controller will display the content), and set the battery type.

Step 2: if you need to use the DC load output, then set the output control mode first, and then open the

DC output circuit breaker(breaker②).

Step 3: open the circuit breaker on the input side of the solar panel PV(breaker③), if the PV input voltage is in the charge range of the controller, then the controller will enter the charging state.

Closing process: turn off the circuit breaker in turn: ③②①



Warning:

- If the system needs to connect the inverter, please connect the inverter directly to the battery, and do not connect with the load end of the controller.
- When the controller is in the normal charge state, do not disconnect the battery connection, otherwise the DC load may be damaged. Therefore, the damage to the controller will not be within the warranty.

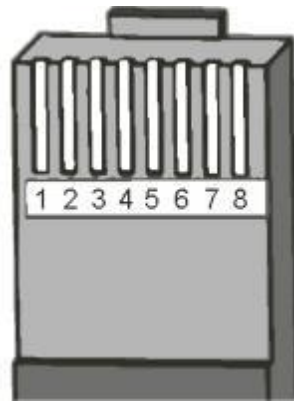
7.Communication port description

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 5**):

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

Table 5



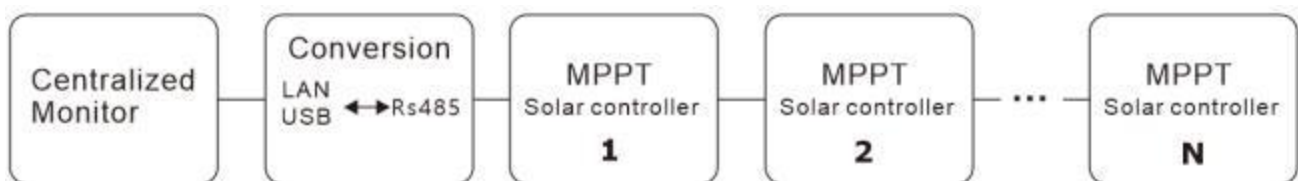
(Figure 4)

(**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 is ON (**low impedance**). Otherwise, it is OFF (**high impedance**). Dry contact access voltage **5V~12V**. The controller has dual RS485 communication ports. It can be used for 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. (**Figure 5**)

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



(Figure 5)

8.Operation

8.1 Function key

Buttons	Instruction
UP	Page up and numerical increase
DOWN	Page down and numerical reduction
ENTER	Enter in
ESC	Exit and save data

Table 6

8.2 Menu introduction(Table 7)

Main menu	Display contents		Introduction
Work Status	Fault:		Normal work will display No Fault. Abnormal work will display relevant Faults: Bat OVP: battery overcharge protection PV OVP: PV input over voltage protection Chg OCP: over Charge current protection Load OCP: load output over current protection Bat OTP: battery over temperature protection CHG OTP: MPPT internal over temperature protection PV UVP: PV input low voltage protection Stop Charge: Communication command control stops charging Unidentified: Battery system identification error (for lead acid batteries)
	Charging mode:		CC or CV or CF
	PV Volt:		PV input voltage
	Bat Temp:		After accessing the battery temperature line, the real-time temperature of the battery pack will be displayed.
	HS Temp:		Temperature of heat sink
	Load Current:		DC load output current
	Charge Current:		Charging current
	Charge Power:		Charging power
	Charge Volt:		Charging voltage
Setting	Load Set	Load: ON Mode BatLoadOff: BatLoadOn:	DC Load control mode: ON/OFF mode. Under voltage turn off DC load. Recovery voltage turn on DC load.
		Load: Light Ctrl PV Load On: Delay Time:	DC Load control mode: Light Ctrl mode. If PV is less than this voltage, the dc load can be turned on. Delay time of turning on DC load.
		Load: FT1-LigCtr- X PV Load On: Ctr2: FT1-LigCtr- X PV Load Off:	DC Load control mode: Time&Light(PV) control mode: FT1-LigCtr- X :Shut down after X hours in the dark. Defines the PV voltage at which the sky turns dark. FT2-LigCt- X :Turn on X hours before daylight. Defines the PV voltage at which the sky brightens.
		Load: D-Time Ctrl — NO — OFF — am 05:10 06:30 pm 18:30 21:30	DC Load control mode: Dual period control mode. Turn on time and turn off time of the dc load in the morning. Turn on time and turn off time of the dc load in the evening.
	Time&Addr Set	Time:	System clock setting.

		Date:	System date setting.
		Addr	Controller device address number setting
	Bat Set	Type:USER 12V:Auto Bulk Volt : Float Volt : MaxChgCurr : Over Volt : (Recovery) : Under Volt : (Recovery) :	Lead-acid battery type(GEL,SEL,FLD,USER). Quantity of batteries in series. Cell's constant charging voltage setting. Cell's float charging voltage setting. Max.Charging Current setting. Cell's over-voltage protection voltage setting. Cell's over-voltage recovery voltage setting. Cell's under-voltage protection voltage setting. Cell's under-voltage recovery voltage setting.
		Type:Li-ion Full Volt : Normal/Volt : MaxChgCurr : Over Volt : (Recovery) : Under Volt : (Recovery) :	Lithium ion battery type. Full charging voltage setting. Nominal voltage setting. Max.Charging Current setting. Over-voltage protection voltage setting. Over-voltage recovery voltage setting. Under-voltage protection voltage setting. Under-voltage recovery voltage setting.
Information	12/24/36/48V100A		Controller type
	Li BAT CHG SYS		System voltage
	Load :		DC load output control mode after user set
	TOTAL :		Total energy from this machine
	Firmware :		Firmware Ver.
	Bat :		Battery Type display

9.Common fault and trouble shooting.

Common Problems	Possible Reasons	Solution
Controller cannot start up, screen can not be on	Battery positive and negative reverse connected	Check the wiring sequence of power line connector plug and reconnect in the right order
Controller not charging, PV voltage undetectable	PV Input positive and negative reverse connected	Check the wiring sequence of power line connector plug and reconnect in the right order
Charging and standby keeps circulating	Number of solar panels is too less in series and PV voltage is low	PV Vmpp voltage must be greater than Vbat. Please refer to the proposed series-parallel scheme(Table 4)
	It may occur in cloudy weather or in early morning and at dusk	Normal phenomenon
	Unreasonable configuration of solar panels	Based on sufficient power, please refer to the proposed series-parallel scheme(Table 4)
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 battery voltage in LCD is in the range of controller system recognition
The battery is in a low energy state or emptying for a long time	Solar panels number 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

10.Parameters(Table 9)

			MS48L80	MS48L100	MS48H80	MS48H100	MS96H50
Product category	MPPT efficiency		≥ 99.5%				
	Standby power		< 3‰ Rated power				
	Standby power consumption		4W~5W				
	Battery system voltage		Automatic recognition		48V		96V
	Heat-dissipating method		Natural-cooling				
	Battery system voltage range(Lead acid)		9~15Vdc(12V sys) \ 18~30Vdc(24V sys) \ 32~40Vdc(36V sys) \ 42~60Vdc(48V sys)			36~60Vdc	72~120Vdc
	Li-ion battery system		9~60Vdc		36~60Vdc		72~120Vdc
Input Characteristics	Max.PV input voltage(Voc)		DC150V		DC300V		
	Start the charge voltage point		Battery volt. + 3V		Battery volt. + 10V		Battery volt. + 20V
	Low input voltage protection point		Battery volt. + 2V		Battery volt. + 5V		Battery volt. + 10V
	Over voltage protection point		DC150V		DC300V		
	Over voltage recovery point		DC145V				
	Rated PV power	12V system	1040W	1300W	—	—	—
		24V system	2080W	2600W	—	—	—
		36V system	3120W	3900W	—	—	—
		48V system	4160W	5200W	4160W	5200W	—
		96V system	—	—	—	—	5200W
Charge Characteristics	Battery types (Default Gel battery)		Sealed(SEL), Gel(GEL), Flooded(FLD), User-defined(USE), Li-ion(Lit)				
	Charge rated current		80A	100A	80A	100A	50A
	Output voltage stability precision		≤ ±0.2V				
	Charge method		3-Stage: CC(Constant current fast charging),CV(constant voltage charging),CF(float charging)				
LOAD Characteristics	Load voltage		The same as the battery voltage				
	Load rated current		80A	100A	80A	100A	50A
	Load control mode		On, Off , PV voltage control, Dual-time control, PV + Time control				
	Low voltage protection		The default protection point is 10.5V, and it is restored to 11V (can be set)				
	Setup method		PC software / APP / controller display				
Display & Communication	Display mode		LCD (128*64 dots) &backlight				
	Dry contact access voltage		5V~12V				
	Communication mode		Dual RJ45 port / RS485 protocol / Centralized monitoring / Support Modbus communication protocol / PC (via RS485-USB Cable) & APP (via Wi-Fi module or Bluetooth module) support WiFi module for APP cloud monitoring				
Other Parameters	Protect function		Input-output over \ under voltage protection,Prevention of connection reverse protection etc.				
	Operation ambient temperature		-20℃~+50℃				
	Storage temperature		-40℃~+70℃				
	IP(Ingress protection)		IP65				
	Max. connection size		50mm²				
	Recommended breaker		≥ 120A	≥ 150A	≥ 120A	≥ 150A	≥ 80A
	Net weight (kg)		13.2				
	Gross weight (kg)		14				
	Product size(mm)		430*350*135				
	Packing size(mm)		545*475*275				

11.service and support

There are good suggestions and faults in the process of use, welcome to inquire!
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