MPPT

Solar Charger Controller

USER MANUAL

Model： FALCON MPPT DUO 30

1 . Increase the charging efficiency. Compared with the traditional PWM controller, the MPPT charging efficiency can be increased by 10-30%. (Controller conversion efficiency>95%)

2. Five types of batteries can be selected through the DIP switch. GEL battery, lead-acid battery, AGM, LiFePO4, and Lithium-ion

3. Double battery charging. Two groups of batteries can be connected at the same time, and the batteries can be charged according to the priority set by the user, Improve the charging efficiency of solar panels

4. With Bluetooth function, it can be connected to an external Bluetooth module, and the controller parameters can be displayed through the mobile phone APP (you need to purchase a separate Bluetooth adapter), and the effective distance of Bluetooth is 10 meters.

5. It is allowed to connect two groups of batteries of different types and voltages (12V or 24V) at the same time. The controller will judge the current battery type and battery voltage before charging, Use different charging strategies

6. Fully automatic unattended charging. With overload, overheating, reverse current protection (to prevent the battery from flowing back to the solar panel when it is cloudy or without sunlight at night)

7. Overcharge protection. When the battery is fully charged, the charging current will decrease. When the battery is empty, the battery will be charged immediately

8. Automatic temperature compensation function. The two batteries use independent temperature sensors to ensure that the batteries use the best charging parameters in low or high temperature environments.
Extend the service life of the battery. It is strongly recommended not to install the battery and the controller in the place of the heat source, so as to avoid the misoperation of the controller

Remarks: Lithium battery has no temperature compensation, no need to connect temperature sensor

1. Only GEL batteries, lead-acid batteries, AGM , LiFePO4 and Lithium-ion(NCM) batteries that meet the rated voltage can be charged (lithium batteries must have BMS) batteries

2. The power of the solar panel cannot exceed the rated power

3. The wire diameter of the connecting cable refers to the value recommended by the factory. If the cable is too small, it will cause the cable to overheat and energy loss

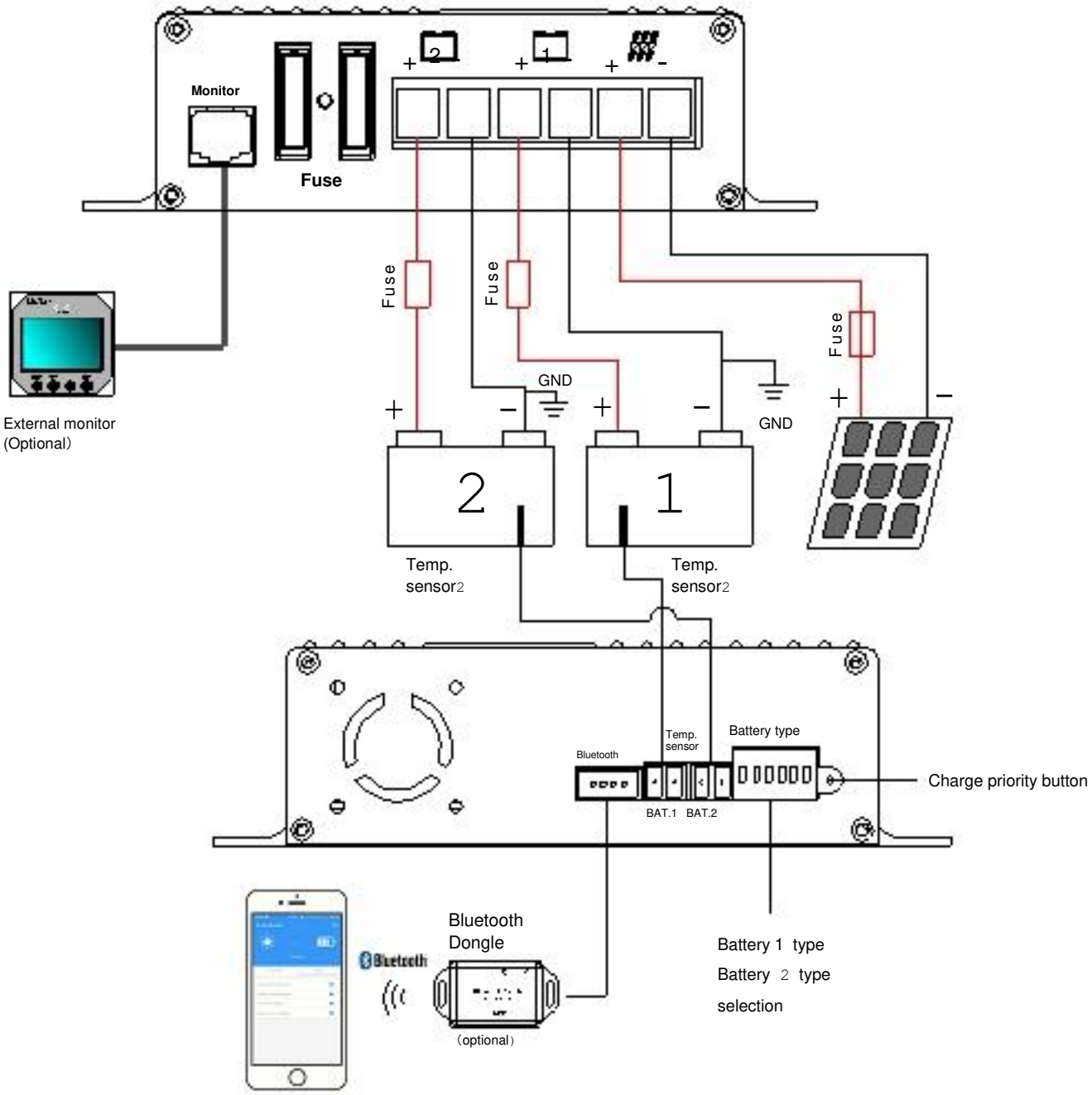
4. Install a rated fuse near the battery end to protect the cable between the battery and the solar panel

5. Please install in a well-ventilated room to prevent rain, moisture, dust, corrosive battery gas and no condensation in the environment

6. Temperature sensor, Bluetooth module, display are optional accessories, please order separately if necessary

7. Keep the controller and battery away from children.

Installation



Installation Notes

1. Battery

1.1 Battery type: Two group of batteries can be connected to different types of batteries (lead-acid or lithium batteries), and the controller will judge the battery type before charging

1.2 Battery voltage: Two group of batteries can choose 12V or 24V voltage at will, the controller can automatically judge the voltage and adopt different charging parameters

1.3 A fuse must be installed on the positive pole before the battery is connected to the controller. The size of the fuse is 1.5-2 times the rated charging current

1.4 Access sequence: The two group of batteries are connected to the controller in no particular order. Connect the connecting wires to the controller terminals first, and finally to the positive and negative poles of the battery

⚠ Warning: It is strictly forbidden to short-circuit the positive and negative electrodes of the battery, otherwise there will be a risk of fire and explosion. Please operate with caution.

2. Solar panel

2.1 Solar panel voltage: The open circuit voltage of the solar panel must be less than 50V. Excessive voltage may damage the controller

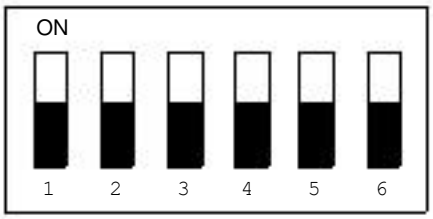
2.2 Solar panel power: solar panels power must lower than the rated power can be connected, and the excessive power controller will automatically limit the charging power to the rated value,Excess energy will be automatically released

2.3 Connect the fuse to the positive pole of the solar panel, the fuse specification is 1.5-2 times of the maximum current of the solar panel.

3. **Battery selection**

Battery / Type	1 Battery 1			2 Battery 2		
Switch number	1	2	3	4	5	6
GEL	↓	↓	↓	↓	↓	↓
Lead-acid	↓	↓	↑	↓	↓	↑
AGM	↓	↑	↓	↓	↑	↓
LiFePO4	↓	↑	↑	↓	↑	↑
Lithium-ion (NCM)	↑	↓	↓	↑	↓	↓

Battery type selection



ON: ↑ OFF: ↓

3.1. Before charging starts, the battery type must be selected. Change the battery type during charging is invalid

3.2. If the battery selection is wrong and it is not one of the 5 batteries, the "Charge" and "Warning" LED lights will flash simultaneously.

3.3. If you only charge one battery, you can connect the battery to any battery terminal, and then select the battery type on the corresponding switch. It is recommended to choose any lead-acid battery type for the other group of batteries ,It is not recommended to choose lithium iron phosphate or ternary lithium batteries. Because if a lithium battery is selected, the controller will try to charge if there is no battery connected, which will waste charging time.

3.4. In the process of switching between two sets of batteries, the controller will first detect the battery type when charging another group of batteries. If the battery type changes, the charging parameters will also change. But if you are charging the battery, it is invalid to modify the current battery type

3.5. 2 group of batteries can choose different battery types, and different battery voltages (12V or 24V are ok), the controller can automatically identify

4. **System ground**

4.1. The negative poles of the two group of batteries are connected together, so the system needs to be grounded, please connect to the negative pole of the battery

5. **Fan on and off** (only MPPT5030-DUO)

5.1. Fan ON: Controller internal temperature>45℃, or charging current>15A

5.2. Fan OFF：The internal temperature is less than 42 ℃ and the charging current is less than 15A

5.3. If the temperature is greater than 42 ℃, the fan will continue to run for 30 seconds before turning off

6. Temperature Sensor （optional）

6.1. Collect the temperature of the battery, the controller can accurately compensate the temperature of the charging parameters. Compensation value: -3mV/2V/℃

6.2. If the temperature sensor is not connected, the controller defaults the battery temperature to a fixed value of 25℃

6.3. Temperature detection range: -20℃--70℃, if the range is exceeded, the default is 25℃

⚠ **Lithium battery has no temperature compensation function, no need to connect temperature sensor, only lead-acid battery has temperature compensation function**

7. **Monitor** (**optional**)

7.1. The external display can display the voltage of two groups of batteries, solar panel voltage, charging current, charging energy WH, charging ampere hour AH, battery temperature, battery priority order in real time. Please refer to the display manual for specific instructions.

8. **Bluetooth Dongle** （**Optional**）

8.1 With an external Bluetooth adapter, the controller is connected to the mobile phone APP through Bluetooth, and the charging parameters are sent to the mobile phone. The customer can view the controller's parameters (effective distance 10 meters), including battery voltage, solar panel voltage, charging current, charging WH, charging AH, and history records and fault prompts

8.2. APP includes Android version and Apple version, free to use

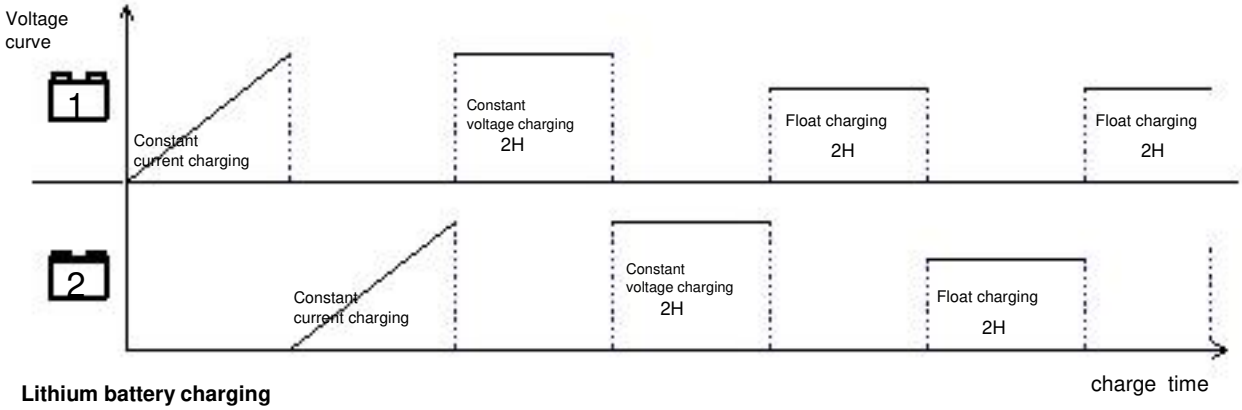
For specific instructions, please refer to the Bluetooth adapter manual

9. Charging priority

9.1.The default battery 1 is the priority charging battery, first charge the battery 1, when the battery 1 enters the constant voltage charging stage, it will automatically change to the battery 2 charging, when the battery 2 also enters the constant voltage charging stage, change to the battery 1 charging again, and the battery 1 After 2 hours of constant voltage charging, switch to battery 2 for constant voltage charging for 2 hours, then change to battery 1 for floating charge, and then change to battery 2 for floating charge after floating charge of battery 1 until the end. The charging process can refer to the figure below

9.2. Press and hold the button for 2 seconds to change the priority order of battery charging. It is recommended to select the priority order before charging. If the priority is changed during the charging process, the current charging will stop immediately, and then change to the higher priority battery charging

9.3. If only one battery is connected, the charging phase will continue without change. If the switch is not connected to the battery, please choose a lead-acid battery



10. Lithium battery charging

10.1. Lithium battery 0V charging is activated: When the lithium battery BMS is in the protection state and there is no output, the controller can automatically activate the lithium battery for charging

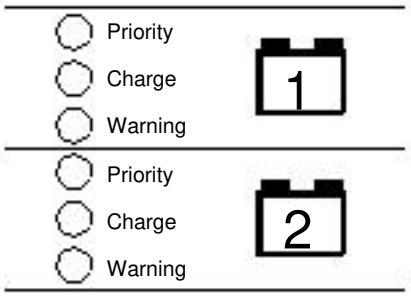
10.2. This controller only applies to LiFePO4 with a nominal voltage of 12.8V and Lithium-ion battery with a nominal voltage of 11.1V. Other specifications of lithium batteries need to be explained with the salesperson, and the controller charging parameters need to be adjusted accordingly.

11. Wire diameter and fuse specifications

Model	solar panel/battery	Fuse
MPPT5030-DUO	6mm 2	60A(30A*2)
MPPT5020-DUO	4mm 2	40A
MPPT5010-DUO	2.5mm 2	20A

LED indicator

Battery	LED	Status
1	Priority(Green)	OFF： Battery 2 priority
		ON： Battery 1 priority
		Flashing: solar panel is over-voltage or temperature of the controller is over-heat
	Charge(Green)	OFF： No charging
		Slow flashing (1 time /2 seconds): Constant current charging
		Fast flashing (1 time /second): Constant voltage charging
		ON: Battery full
	Warning(Red)	Off: The battery voltage is normal
		ON: battery voltage is low
		Fast flashing (1 time /second): Battery over-voltage



Power-on self-test

6 LED are on. After the fan rotates for 1 second, the LED off, and the fan stops rotating

Battery voltage error

Battery voltage>32V, all 6 LED indicators Flicker, need to power off to eliminate

Battery	LED	Status
	Priority(Green）	OFF： Battery 1 priority
		ON： Battery 2 priority
		Flashing: solar panel is over-voltage or temperature of the controller is over-heat
	Charge(Green)	OFF： No charging
		Slow flashing (1 time /2 seconds): Constant current charging
		Fast flashing (1 time /second): Constant voltage charging
		ON: Battery full
	Warning(Red）	Off: The battery voltage is normal
		ON: battery voltage is low
		Fast flashing (1 time /second): Battery over-voltage

Protective function

1	Battery over-voltage	1.Battery voltage>Overvoltage protection value: stop charging 2. Battery voltage>Constant voltage value +0.2V for 10 seconds, stop charging
2	Battery low-voltage	Battery voltage<Low-voltage protection value: stop charging
3	Solar panel overpower protection	The maximum solar panel input power is limited to the maximum rated power, and the excess part is released
4	Solar panel over-voltage protection	Open circuit voltage>50V, stop charging
5	Reverse connection protection	1. Battery 1 reverse connection, protection 2. Battery 2 reverse connection, protection 3. solay panel reverse connection, protection
6	Over-heat protecton	If the internal temperature of the controller exceeds 80℃, stop charging, and resume charging when it drops to 60℃

Charging parameter

Charging stage / Battery type	Boost charge	Equalizing charge	Float charge
GEL	14.3V(2h)	no	13.8V
Lead-acid	14.4V(2h)	14.6V	13.5V
AGM	14.7V(2h)	14.8V	13.5V
LiFePo4（12.8V)	14.4V(1h)	no	13.8V
Lithium-ion(11.1V)	12.6V(1h)	no	12.5V

Remarks: The above parameters are 12V system parameters, if it is 24V system, the parameter value is multiplied by 2

Technical Parameters

Model	MPPT5030-DUO				MPPT5020-DUO
system voltage	12V/ 24V auto recognition				
Rated charging current	30A				20A
Battery voltage range	9V-32V				
PV max. open circuit voltage	50V(25℃)				
PV Max. input power	12V: 390W 24V: 780W				12V: 260W 24V: 520W
Battery type	GEL	Lead-acid	AGM	LiFePO4	Lithium-ion
Battery over-voltage protection	15.5V			15.5V	13.5V
Battery overvoltage recovery voltage	13.7V			14.6V	12.8V
Direct float charge voltage (no constant voltage charge)	12.6V			13.5V	12.4V
Automatically change to priority battery	12.0V			12.8V	11.1V
Boost charging recovery voltage	13.2V			13.2V	12V
Constant voltage charging time	2h			1h	1h
Self-consumption current	16mA-18mA				
Grounding type	If the system needs to be grounded, only the negative pole of the battery can be grounded				
Temperature compensation	-3mv/℃/2V				
Working temperature range	-20℃+50℃				
IP level	IP20				
Demension	155×147×43mm				135×147×43mm
Weight	0.78kg				0.58kg

Remarks: The above battery voltage parameters are 12V system parameters, if it is 24V system, the parameter value is multiplied by 2 times

Disclaimer

The manufacturer is not responsible for any damage caused by violating the recommendations or specifications mentioned in this manual, or ignoring the recommendations of the battery manufacturer, if there are maintenance services by non-manufacturer designated personnel, abnormal use, incorrect installation or incorrect The manufacturer is not liable for system design situations.