

SR-MT Maximum Power Point Tracking Series

Solar charge controller

Manual



Dear user:

Thank you very much for choosing our products!

Please read the manual carefully before using our controllers.

I . Feature

- ◆ Built-in maximum power point tracking algorithm which could promote the pv system's energy utilization efficiency. The charging efficiency is 15%~20% higher than PWM mode.
- ◆ Adopting advanced digital power supply technology which make the energy conversion efficiency reach up to 97%
- ◆ Adopting sorts of tracking algorithm to track the best working point of the I-V curve promptly and accurately, the MPPT efficiency could reach up to 99.95%.
- ◆ With solar street light mode, which could recognize the day and night automatically.
- ◆ Four stage charging mode: MPPT-equalizing charge-boost voltage charge-floating charge.
- ◆ Various load control methods to improve the system's flexibility.
- ◆ With temperature compensation function to adjust the charge and discharge parameters automatically, which could improve the life of the battery
- ◆ Various system protection function. Including over-charge, over-discharge, over-load, over-heat, the battery reverse connection protection and so on.
- ◆ Mini size, high power density.
- ◆ Industrial quality, IP65 waterproof degree, metal shell.

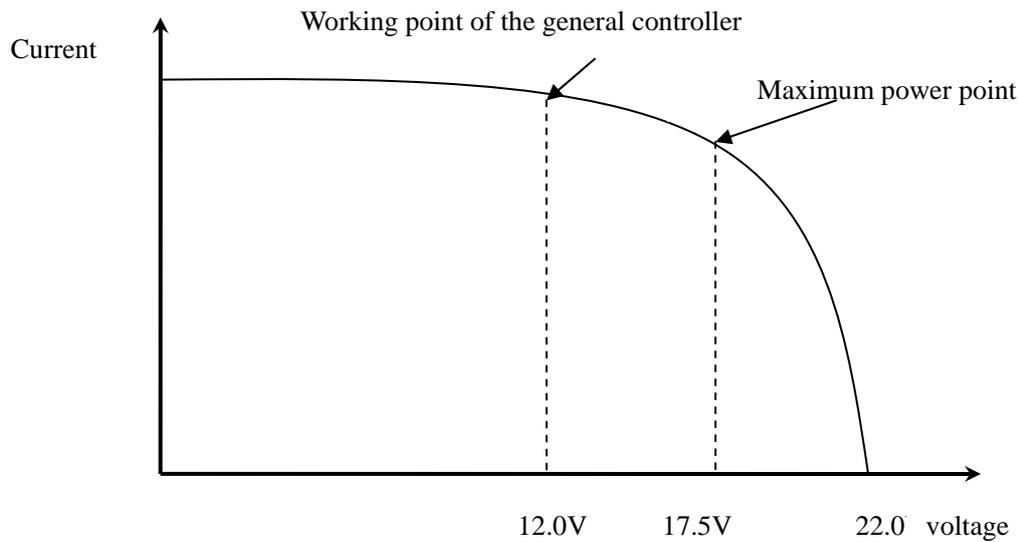
II . MPPT charging algorithm Instruction

The full name of the MPPT is maximum power point tracking. It is an advanced charging way which could detect the real-time power of the solar panel and the maximum point of the I-V curve that make the highest battery charging efficiency. Contrast with the traditional PWM controller, MPPT controller could play a maximum power of the solar panel so that a larger charging current could be supplied. Generally speaking, the MPPT controller's energy utilization efficiency is 15%~20% higher than PWM controller.

The voltage of the solar panel is about 12V when General controller is charging while the highest voltage of the solar panel (V_{pp}) is about 17V, so it doesn't play the largest power of the solar panel. MPPT controller overcome this problem by adjusting the input current and voltage constantly to realize the largest input power.

Meanwhile, the maximum power point will change due to the surrounding temperature and sunshine condition. MPPT controller will adjust the parameter constantly according to different conditions to make

the system working in the largest power point.

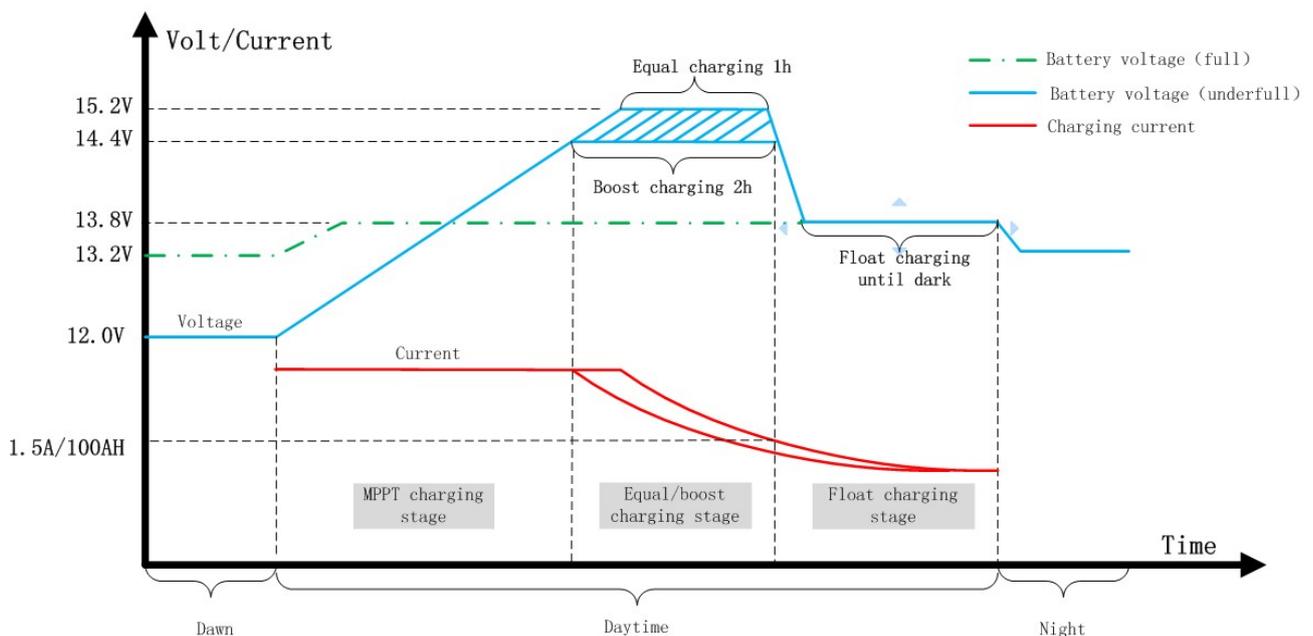


As a charging stage, MPPT can't be used alone. It must be combined with ascending charge, floating charge, equalizing charge to complete the battery charge

The controller will judge the battery's voltage before working. If the battery voltage is higher than $13.2V(*2/24V)$, the controller will judge the battery working as full charge state then the controller will enter into floating charge stage but not equalizing charge or charge hint.

When the battery's initial charging voltage below $13.2V(*2/24V)$, the charging process is: MPPT-equalizing charge-boost voltage charge-floating charge.

The course of equalizing charge is 1 hour, ascending charge is 2 hour, equalizing charge interval is 30 days. Charging curve as below:



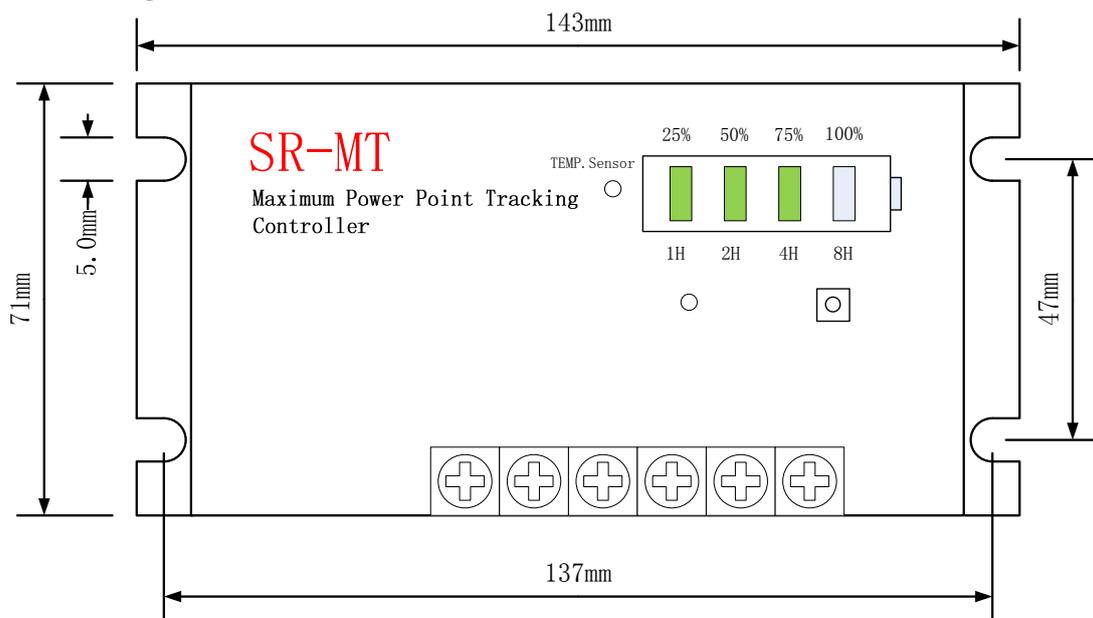
III. Usage suggestion

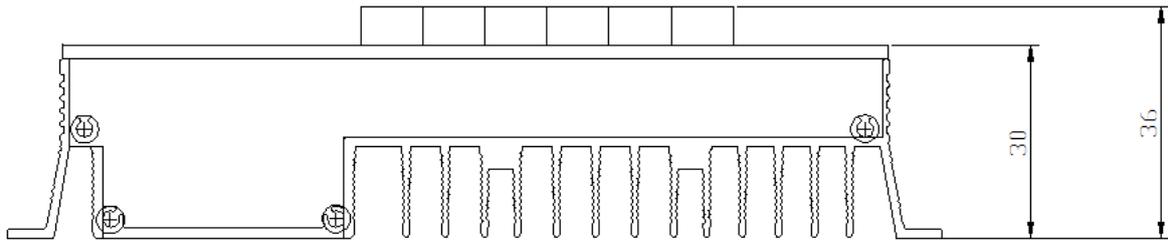
1. The controller would identify the battery voltage automatically. Please connect the battery first and ensure the connection is reliable.
2. MPPT controller is designed according to solar panel's I-V curve, so when the controller connect the general constant voltage DC source, the controller may not work.
3. Advice is installed in the ventilated and heat dissipated environment due to the controller will fever during operation.
4. The controller will detect the surrounding temperature to compensate the battery charging voltage so ensure the controller and battery is in the same environment.
5. Choosing the proper cable with enough capacity to avoid redundant power loss in the circuit. Too much circuit loss may lead to wrong judgement.
6. Full charge is very important for the battery. The battery should be full charged at least once a month or the battery will suffer permanent damage. The battery can be full charged only when the input power of the battery is more than power consumption of the load.
7. Please do not dip the controller into the corrosive liquid or the controller will be damaged and release harmful gas.
8. The solar panel's terminal voltage may exceed human safety voltage when connect 24V system, when manipulation is needed, please use insulating tools and ensure the hands dry.
9. Because the battery store lots of energy, do not allow the battery short circuit in any case. We suggest tandem connect a fuse on the battery
10. The battery may release combustible gas, please far away from the spark.
11. Ensure the children are far away from battery and controller
12. Please abide by the battery manufacturer's safety suggestion.

IV. Installation and use instruction

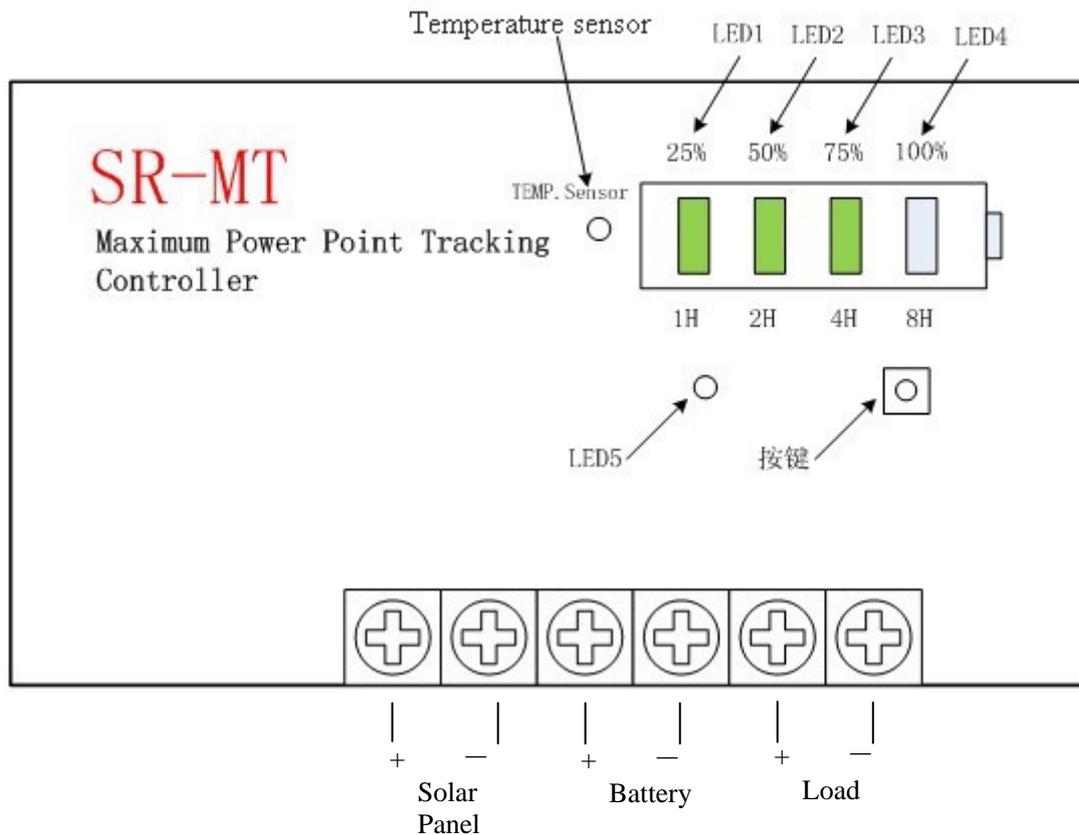
- 1. Fix the controller:** Fix the controller onto the surface of the specific place. Keep a certain distance between the controller and fitting surface to assure heat dissipation
- 2. Wire preparation:** Adopt the wire matching the current, plan the length of wire, strip 5mm insulation of one side of the controller's terminal and try to decrease the length of the connected wire so that a reduction in electrical loss.
- 3. Connect to the battery:** connect the battery wire to the controller firstly, Pay attention to the “+” and “-”, in case of reverse connection. If connected well, the indicator light will be on. Otherwise, please check the connection. If reverse connection, controller will not working but not damage the controller.
- 4. Connect to the solar panel:** Pay attention to the “+” and “-”, not reverse connect. If ample sunshine, controller will show charging mode. Or should check the connection is right or wrong. If solar panel under the sunshine will produce voltage immediately. If use 24V or more than 24V system, the solar panel voltage will exceed to body safety voltage, when use pls mind you to prevent electric shock.
- 5. Connect Load:** Connected the load to controller, make sure the current cannot over the rated current, and notice the positive and negative electrode. Prevent the system from reverse connect.

Installation size image:





V. Controller image

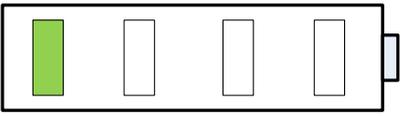
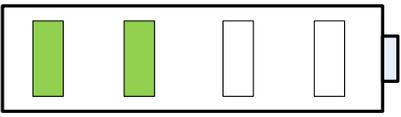
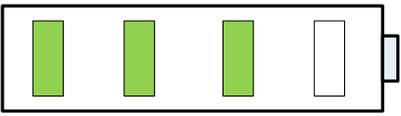
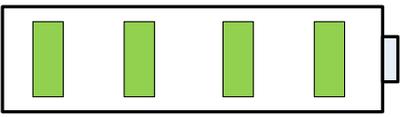


VI. Working state indication

1. Charge indication: 4 LED light flashing cycle, when the solar panel output voltage reach a certain value.
2. Battery capacity indication: When no charging , LED1 ~ LED4 indicates battery capacity approximation.
3. Load indication: Load indicator light long when the load normal work, flash slow when the load over current; Controller turn off the load when the current exceeds the rated current 1.25 times last 10s; Controller turn off the load and the indicator flash fast when the load short circuit.

System state indication:

LED1	LED2	LED3	LED4	LED5	System state
Flash fast	-	-	-	-	Battery over discharge
-	-	-	Flash fast		Battery over voltage
-	-	-	-	Flash slow	Over load
				Flash fast	Load short circuit
Flash cycle				-	Charging now

	-	Battery capacity 25%
	-	Battery capacity 50%
	-	Battery capacity 75%
	-	Battery capacity 100%

VII. Load working mode specification:

1、 Light + time control mode (1~12):

When no sunlight, the light intensity drops to the start point, the controller confirm the start signal after 5 minutes delay, then turn on the load. Load stop work when it works to setted time, the setting time from 1h to 12h. Specific setting time according to the load working mode set method.

2、 Debug mode (13) :

Use for the system debug, turn on the load when there is light signal, turn off the load when no light signal. Convenient for check the system after install.

3、 Manual mode (14) :

User can control the load off and on by button under this mode, regardless of whether during the day or night. This mode uses for some special load accasions or when debugging.

4、 Long-term on mode (15) : Load keep output, this mode suitable for the load which need

24h power.

VIII. Operating instruction

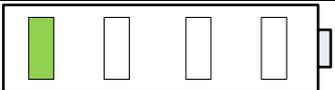
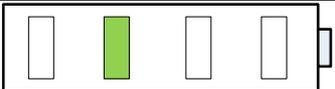
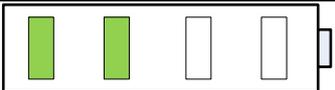
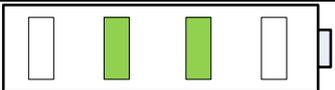
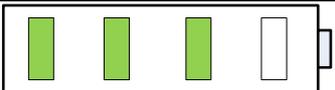
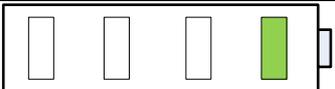
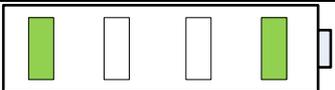
1. Mode display

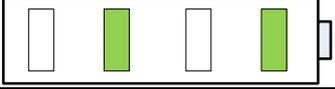
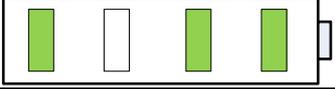
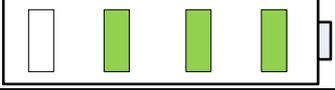
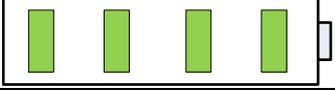
LED1, LED2, LED3, LED4 indicate the battery capacity on the normal mode, 4 LED light will be turned off about 0.5s when press the button, then the mode value of the controller displayed. (Specific please see the < mode working table>).

2. Mode adjusting

When press the button over 3s, LED1~LED4 start flashing, press the button again, state of LED will be changed. According to the number displayed in LED, can calculate the mode value, please stop press the button when you adjusted the mode you want. Wait for 10s setting mode quit auto, or press the button over 3s, setting mode quit.

3. Mode working table

NO.	Adjusting				Parameter specification
	1H	2H	4H	8H	
1					Light control on, delay 1h off.
2					Light control on, delay 2h off
3					Light control on, delay 3h off
4					Light control on, delay 4h off
5					Light control on, delay 5h off
6					Light control on, delay 6h off
7					Light control on, delay 7h off
8					Light control on, delay 8h off
9					Light control on, delay 9h off

10		Light control on, delay 10h off
11		Light control on, delay 11h off
12		Light control on, delay 12h off
13		Debug mode
14		Manual mode
15		Long-term on mode



IX. Protection function

1. Waterproof protection

Waterproof degree:: IP65

2. Input power limit protection

When the PV power more than rated power, controller will limit the PV power under the rated power to prevent the controller be damaged as the big current. We intensity suggest not use the solar panel exceed the rated power.

3. Battery reverse connection protection

Battery reverse connection will not damage the controller but the system not working.

4. Over load protection

When load current exceed 1.25 times of rated current and last 10s , load output stop.

5. Load short circuit protection

Load short circuit will not damage the controller but controller will stop output.

6. Solar panel reverse connection protection

Solar panel reverse connection will not damage the system.

7. Anti reverse charging protection at night

Prevent the battery discharge the solar panel at night

8. TVS lightning protection

9. Overheat protection

When the controller inner temperature exceed to 80 °C will stop charging;After controller temperature recover or below to 60°C,controller will working normally aga

X. Problems and solutions

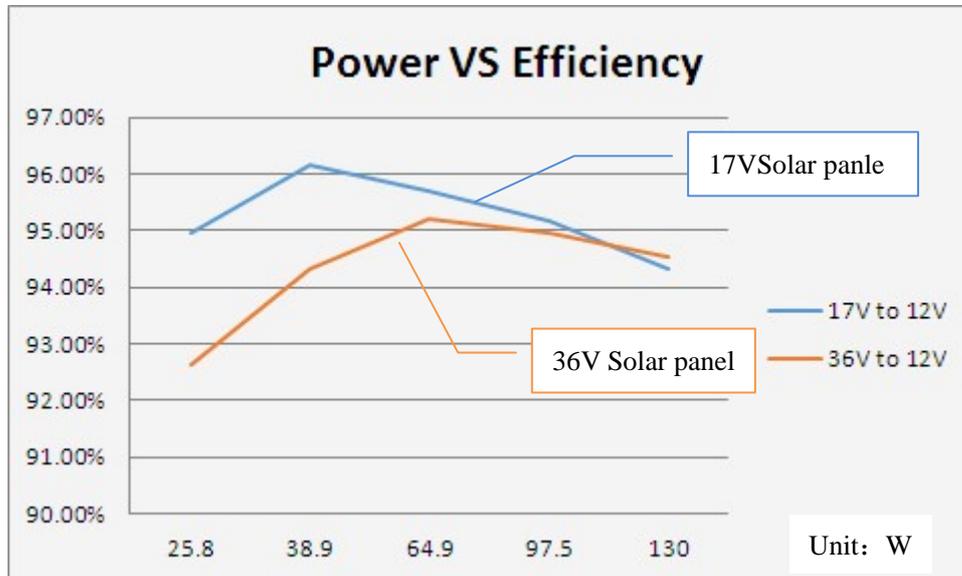
Phenomena	Problems and solutions
Sunny day, without charging indicate	Please check the PV wire connection is right and ensure connection reliable
100% indicator (LED4) twinkle fast	Over voltage for system, please check the battery connection is reliable and the battery voltage is not high
All indicator closed	Battery supply stop, please check the battery connection is right or wrong.
25% indicator (LED1) twinkle fast, without output	Over discharge for battery, after full charge will recovery automatically.
Load indicator (LED5) twinkle slow, without output	Load power exceed rated power, after decrease consumer will recovery automatically the next day or long press the key to recovery.
Load indicator (LED5) twinkle fast, without output	Load short circuit, after trouble removal will recovery automatically the next day or long press the key to recovery.
Load indicator (LED5) always on, without output	Please check the consumer connection is right and reliable.
charge circuit is normal, without charging	Overheat for the controller. when temperature decrease will recovery automatically.
Others Phenomena	Please check the connection is reliable or not, 12V/24V auto recognize is right or not.

XI. Parameter

<i>Name</i>	<i>Value</i>
System voltage	12V/24V Auto
Rated Load current	10A
Rated charging current	10A
Max input power (PV)	130W/12V; 260W/24V
No load loss	<10mA
Solar input voltage	<55V / 75V / 150V
Transfer efficiency	≤97%
MPPT tracking efficiency	>99.92%
Over voltage protection	16.5V; ×2/24V
Charging limited voltage	15.5V; ×2/24V
Equalizing charging voltage	15.2V; ×2/24V (25℃)
Equalizing charging interval	30 days
Boost charging voltage	14.4V; ×2/24V (25℃)
Float charging voltage	13.8V; ×2/24V (25℃)
Return voltage for over-discharging	12.5V; ×2/24V
over-discharging voltage	11.0V; ×2/24V
Boost voltage charging time	2hours
Equalizing voltage charging time	1hour
Temperature compensation	-4.0mv/℃/2V;
Over Temperature protection	80℃
Light-control open voltage	5V
Light-control close voltage	6V
Lighting control delay	5min
Working temperature	-35℃ ~ +65℃;
Waterproof degree	IP65
Weight	380g
Dimensions	143×71× 36 (mm) (L×W×H)

XII. Typical efficiency curve

12V Battery testing



24V Battery testing

