SRNE MPL2420

SRNE MPL2420 MPPT Solar Charge Controller User Manual

Model: MPL2420

1. Introduction

The SRNE MPL2420 is an advanced Maximum Power Point Tracking (MPPT) solar charge controller designed for 12V/24V solar street light systems. It efficiently manages power from solar panels to charge batteries and power loads, ensuring optimal performance and longevity of your solar setup. This manual provides detailed instructions for installation, operation, and maintenance.

Figure 1: Front view of the SRNE MPL2420 MPPT Solar Charge Controller, showing model number, battery voltage, max solar power, solar Vmp, solar Voc, max charging current, and max load current.

2. Key Features

- **MovingTrack MPPT Technology:** Utilizes advanced Maximum Power Point Tracking technology for higher tracking efficiency and faster speed, optimizing solar energy harvest.
- **Battery Compatibility:** Compatible with both lead-acid and lithium batteries. Operating parameters can be customized via remote control.
- **UltraGreen Power Control:** Features UltraGreen power control technology, ensuring extremely low power consumption and sleep current for enhanced efficiency.
- **Lead-Acid Battery Charging:** Provides multi-stage constant voltage charging with temperature compensation for lead-acid batteries, prolonging battery life.

- **Flexible Load Modes:** Supports various load operation modes including Normally On, Light control + time control, and charging-only mode, adaptable to different system requirements.
- **Temperature Protection:** Includes battery charge and discharge high and low temperature protection, with settable operating temperature ranges.
- **Infrared Communication:** Enables infrared wireless communication for setting/reading parameters and checking status.
- **Comprehensive Protections:** Equipped with multiple safety features such as battery/PV reverse polarity protection, load short-circuit/over-current protection.
- **IoT Remote Monitoring:** Extensible to IoT remote communication monitoring functionality for advanced system management.
- **Durable Design:** Features a full aluminum housing and IP67 waterproof rating, making it suitable for various harsh outdoor environments.

3. Product Selection Table

The SRNE MPL series offers various models with different features. Refer to the table below for a detailed comparison.

Figure 2: Overview of SRNE MPL series controllers, including MPL1210-R, MPL1215/2410-R, MPL2415-R, and MPL2420-R, highlighting their main features.

MPL Series Product Models

Product Models	Description
MPL-R	MPPT Solar Charge Controller (-R: infrared remote control)
MPL-UL	With IoT remote control (built-in Lorawan module)
MPL-GP	With IoT remote control (built-in GPRS module)
MPL-C	With IoT remote control (RS485 interface, external communication module is required)
MPL-CT	With IoT remote control (TTL interface, external communication module is required)

4. Indicator and Remote Control Status

The MPL series controllers feature three red indicators to display operational status. Understand their meanings for proper monitoring.

Products selection table

Product models	Description
MPL-R	MPPT Solar Charge Controller(-R: infrared remote control)
MPL-UL	With IoT remote control (built-in Lorawan module)
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Indicator and remote control status

The MPL series controllers have three red indicators

Three red indicators:

Indicator	Status	Description	Remote control system status
PV indicator	Steady on	Solar panel voltage is higher than light control voltage	Idle
	Off	Solar panel voltage is lower than light control voltage	Idle
	Double flash	Fully charged	Fully charged
	Slow flash	In charging	Charging
	Quick flash	BMS protection or BAT overvoltage or PV overvoltage or over temperature (ambient temperature) or power/ current limited charging	E-BMS Battery overvoltage PV panel overvoltage Over temperature Overcurrent
BAT indicator	Steady on	Battery works properly	Idle
	Off	Battery is not connected or lithium battery protection board over discharge protection	
	Quick flash	Battery over-discharge	Over discharge
LOAD indicator	Steady on	Load is turned on	Discharging
	Off	Load is turned off	Idle
	Quick flash	Load is short circuited	Short circuit

Figure 3: Table detailing the status of PV, BAT, and LOAD indicators, along with their descriptions and corresponding remote control system status.

Indicator Status Guide

Indicator	Status	Description	Remote Control System Status
PV indicator	Steady on	Solar panel voltage is higher than light control voltage	Idle
	Off	Solar panel voltage is lower than light control voltage	Idle
	Double flash	Fully charged	Fully charged
BAT indicator	Slow flash	In charging	Charging
	Quick flash	BMS protection or BAT overvoltage or PV overvoltage or over temperature (ambient temperature) or poor/current limited charging	E-BMS, Battery overvoltage, PV panel overvoltage, Over temperature, Overcurrent
	Steady on	Battery works properly	Idle
	Off	Battery is not connected or lithium battery protection board over discharge protection	Over discharge
LOAD indicator	Quick flash	Battery over-discharge	Discharging
	Steady on	Load is turned on	Idle
	Off	Load is short circuited	Short circuit

5. Electrical Wiring Diagrams

Proper wiring is crucial for the safe and efficient operation of your solar charge controller. Follow these diagrams carefully.

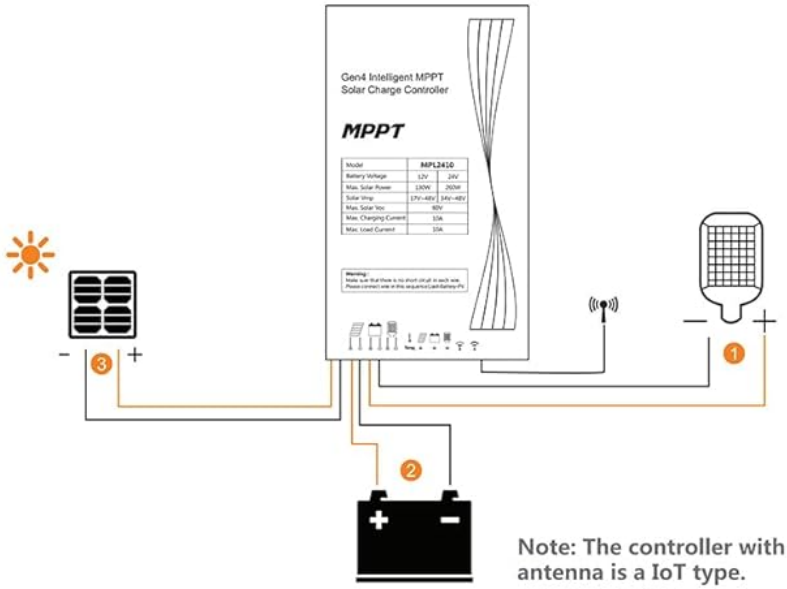
A. Wiring Diagram of the controller with built-in IoT module

Wiring sequence: Firstly connect the load, then the battery, and finally the solar panel.

Electrical wiring diagrams

A. Wiring diagram of the controller with built-in IoT module

Wiring sequence: Firstly connect the load, then the battery and finally the solar panel.



B. Wiring diagram of the controller with external IoT module

Wiring sequence: Firstly connect the external IoT module, then the load, then the battery and finally the solar panel.

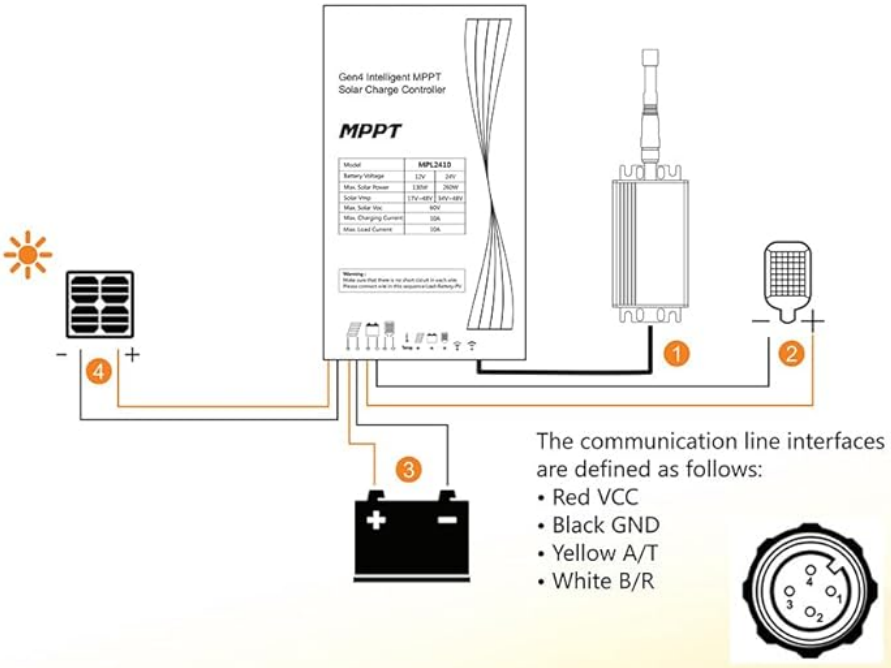
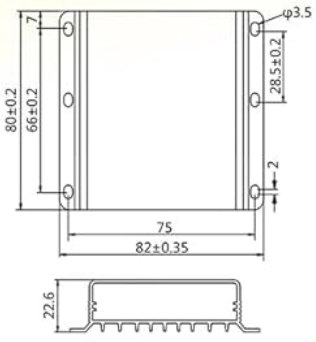


Figure 4: Wiring diagram showing connections for solar panel, battery, and load to an SRNE controller with a built-in IoT module. Note: The controller with antenna is an IoT type.

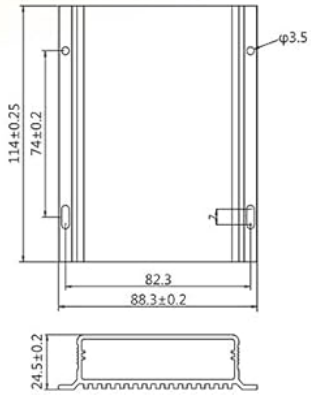
B. Wiring Diagram of the controller with external IoT module

Wiring sequence: Firstly connect the external IoT module, then the load, then the battery, and finally the solar panel.

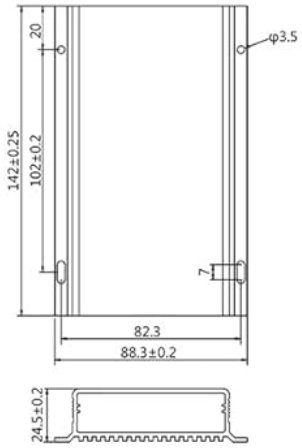
Installation method



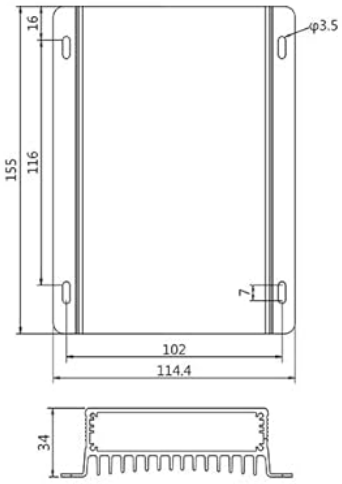
MPL1210 dimensions :
Overall dimensions : 80*82*22.6mm
Mounting dimensions : 66*75mm
Mounting hole diameter : φ3.5mm



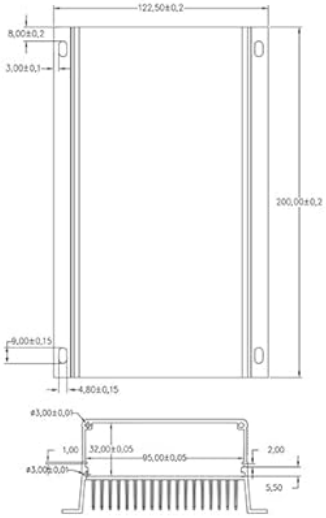
MPL1215/MPL2410 dimensions :
Overall dimensions : 114*88.3*24.5mm
Mounting dimensions : 74*82.3mm
Mounting hole diameter : φ3.5mm



MPL2415 dimensions :
Overall dimensions : 142*88.3*24.5mm
Mounting dimensions : 102*82.3mm
Mounting hole diameter : φ3.5mm



MPL2420 dimensions :
Overall dimensions : 155*114.4*34mm
Mounting dimensions : 116*102mm
Mounting hole diameter : φ3.5mm



MPL2430/MPL2440 dimensions :
Overall dimensions : 200*122.5*56mm
Mounting dimensions : 175*113mm
Mounting hole diameter : φ3.5mm

Load mode

1. Light control + time control mode:
When the working time in the first period is set to "1 ~ 14", When no sunlight is present, the solar panel voltage is lower than the light control on voltage, and after a time delay, the controller will switch on the load. The load will be switched off after working for a preset period of time and the maximum working time is 15 hours.

2. Normally on mode:
When the working time in the first period is set to "15", the load is a normally open module,
The energized load keeps outputting, and this mode is suitable for loads which need 24-hour power supply.

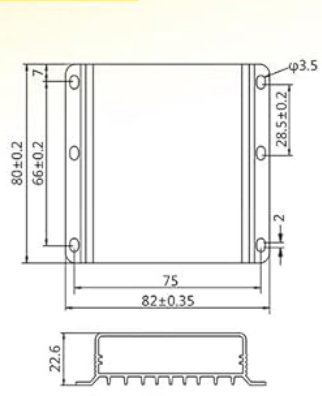
3.Charging mode:
When the working time in the first period is set to "0", the load does not work, only the charging function, charging during the day, and automatically entering the sleep mode at night, reducing system loss.

Figure 5: Wiring diagram illustrating connections for an external IoT module, solar panel, battery, and load to an SRNE controller. The communication line interfaces are defined as Red VCC, Black GND, Yellow A/T, and White B/R.

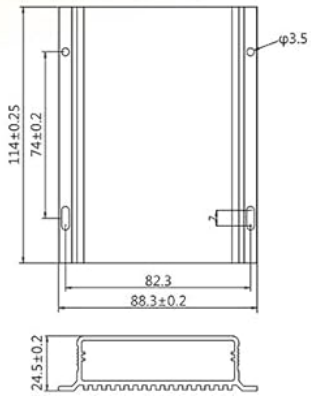
6. Installation Method

Ensure the controller is installed in a suitable location with adequate ventilation. Refer to the dimensions below for mounting.

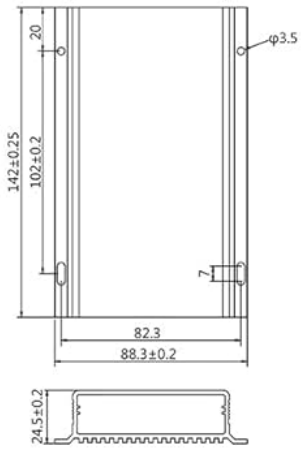
Installation method



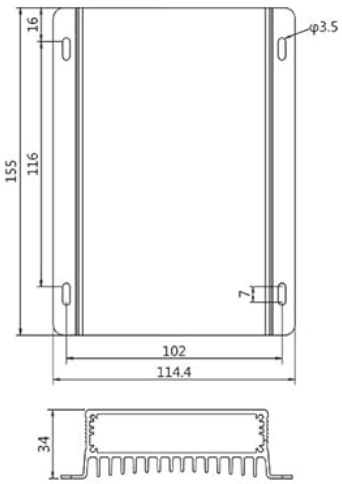
MPL1210 dimensions :
Overall dimensions : 80*82*22.6mm
Mounting dimensions : 66*75mm
Mounting hole diameter : φ3.5mm



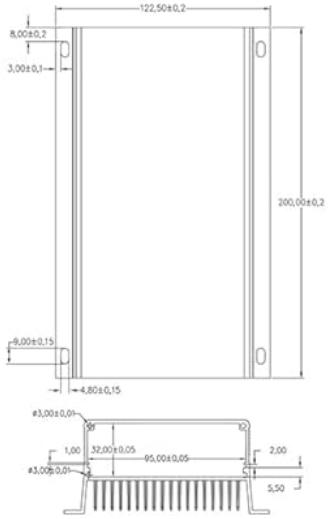
MPL1215/MPL2410 dimensions :
Overall dimensions : 114*88.3*24.5mm
Mounting dimensions : 74*82.3mm
Mounting hole diameter : φ3.5mm



MPL2415 dimensions :
Overall dimensions : 142*88.3*24.5mm
Mounting dimensions : 102*82.3mm
Mounting hole diameter : φ3.5mm



MPL2420 dimensions :
Overall dimensions : 155*114.4*34mm
Mounting dimensions : 116*102mm
Mounting hole diameter : φ3.5mm



MPL2430/MPL2440 dimensions :
Overall dimensions : 200*122.5*56mm
Mounting dimensions : 175*113mm
Mounting hole diameter : φ3.5mm

Load mode

1. Light control + time control mode:

When the working time in the first period is set to "1 ~ 14", When no sunlight is present, the solar panel voltage is lower than the light control on voltage, and after a time delay, the controller will switch on the load. The load will be switched off after working for a preset period of time and the maximum working time is 15 hours.

2. Normally on mode:

When the working time in the first period is set to "15", the load is a normally open module,
The energized load keeps outputting, and this mode is suitable for loads which need 24-hour power supply.

3.Charging mode:

When the working time in the first period is set to "0", the load does not work, only the charging function, charging during the day, and automatically entering the sleep mode at night, reducing system loss.

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*Figure 6: Dimensional drawings for various SRNE MPL series models, including overall dimensions, mounting dimensions, and mounting hole diameter. For MPL2420, overall dimensions are 155*114*34mm, mounting dimensions are 116*102mm, and mounting hole diameter is φ3.5mm.*

- **MPL2420 Dimensions:** Overall dimensions: 155*114*34mm. Mounting dimensions: 116*102mm. Mounting hole diameter: φ3.5mm.
- Ensure the mounting surface is flat and secure.
- Allow sufficient space around the controller for heat dissipation.

7. Load Mode Settings

The controller supports different load operation modes to suit various application scenarios.

1. **Light control + time control mode:**
   When the working time in the first period is set to "1 - 14", no sunlight is present, the solar panel voltage is lower than the light control voltage, and after a time delay, the controller will switch on the load. The load will be switched off after working for a preset period of time and the maximum working time is 15 hours.
2. **Normally on mode:**
   When the working time in the first period is set to "15", the load is a normally open module. The energized load keeps outputting, and this mode is suitable for loads which need 24-hour power supply.
3. **Charging mode:**
   When the working time in the first period is set to "0", the load does not work, only the charging function, charging during the day, and automatically entering the sleep mode at night, reducing system loss.

8. Technical Parameters

Detailed specifications for the MPL2420 controller.

Technical parameters

Items	Values							Adjustable	Default
Model	MPL1210	MPL1215	MPL2410	MPL2415	MPL2420	MPL2430	MPL2440		
Controller type	-R: infrared remote control; -C: with 485 communication interface								
System voltage	12V		12V/24V					√	Lead-acid
Static power consumption	-R:≤5mA	-R:≤6mA	-R:≤6mA/12V ≤4mA/24V		-R:≤6mA/12V ≤10mA/24V				
Sleep power consumption	≤1mA				≤2mA				
Load Maximum current	10A	15A	10A	15A	20A	30A			
Load working period	normally On mode/9-Period + Pre-dawn lighting								
Period adjustment range	1min / 10min								
Maximum solar input power	130W/12V	200W/12V	130W/12V 260W/24V	200W/12V 400W/24V	260W/12V 520W/24V	400W/12V 800W/24V	550W/12V 1100W/24V		
Maximum charge current	10A	15A	10A	15A	20A	30A			
Maximum solar input voltage	≤50V	≤35V	≤60V		≤100V				
MPPT Tracking efficiency	≥99%								
Charging conversion eff.	85%-98%								
Over voltage	PB-16.0V ; LI-charging voltage+2V ; ×2/24V system								
Limited charge voltage	PB-15.5V ; LI-charging voltage+1V ; ×2/24V system								
Equalizing charge voltage	PB-14.6V ; LI-without balanced charge ; ×2/24V system								
Equalizing charge interval	Pb:30 days ; Li:no ;								
Boost charge voltage (lead-acid) Charge voltage (lithium)	8.5V ~17.00V settable ; ×2/24V system							√	14.4V
Floating charge voltage (lead-acid) Charge return voltage(lithium)	8.5V ~17.00V settable ; ×2/24V system							√	13.8V
Over discharge voltage	8.5V ~17.00V settable ; ×2/24V system							√	11.0V
Over discharge return voltage	8.5V ~17.00V settable ; ×2/24V system							√	12.5V
Light control voltage	3V ~ 11V ; ×2/24V system							√	5V
Temperature compensation coefficient	PB : -3.0mV/℃/2V ; lithium battery: no compensation								
Light control delay	5s ~ 60s/2min ~ 60min							√	10s
High temperature charge	40℃ ~ +90℃							√	65℃
Low temperature charge	0℃ ~ -35℃							√	-35℃
Operating temperature	-35℃ ~ +65℃								
IP rating	IP67								
Protections	Battery reverse polarity protection, solar panel reverse polarity protection, solar panel over-voltage protection, lithium battery overcharge and over-discharge protection, lithium battery BMS overcharge detection protection,、load shortcircuit、load open circuit and short circuit protection								
Weight	260g	400g		510g	770g	1800g			

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Figure 7: Comprehensive table of technical parameters for MPL1210, MPL1215, MPL2410, MPL2415, MPL2420, MPL2430, and MPL2440 models.

MPL2420 Technical Specifications

Item	Value (MPL2420)
System voltage	12V/24V
Static power consumption	≤6mA/12V, ≤10mA/24V
Sleep power consumption	≤2mA
Load Maximum current	20A
Load working period	Normally On mode/9-Period + Pre-dawn lighting
Period adjustment range	1min / 10min
Maximum solar input power	260W/12V, 520W/24V
Maximum charge current	20A
Maximum solar input voltage	≤100V
MPPT Tracking efficiency	≥99%
Charging conversion eff.	85%-98%
Over voltage	PB-16.0V; LI-charging voltage+2V; ×2/24V system
Limited charge voltage	PB-15.5V; LI-charging voltage+1V; ×2/24V system
Equalizing charge voltage	PB-14.6V; LI-without balanced charge; ×2/24V system
Equalizing charge interval	PB:30 days; Lino: -

Item	Value (MPL2420)
Boost charge voltage (lead-acid)	8.5V ~ 17.00V settable; ×2/24V system
Charge voltage (lithium)	8.5V ~ 17.00V settable; ×2/24V system
Floating charge voltage (lead-acid)	8.5V ~ 17.00V settable; ×2/24V system
Charge return voltage (lithium)	8.5V ~ 17.00V settable; ×2/24V system
Over discharge voltage	8.5V ~ 17.00V settable; ×2/24V system
Over discharge return voltage	3V ~ 11V; ×2/24V system
Light control voltage	3V ~ 11V; ×2/24V system
Temperature compensation coefficient	PB: -3.0mV/°C/2V; Lithium battery: no compensation
Light control delay	5s ~ 60s/2min ~ 60min
High temperature charge	40°C ~ +90°C
Low temperature charge	0°C ~ -35°C
Operating temperature	-35°C ~ +65°C
IP rating	IP67
Protections	Battery reverse polarity protection, solar panel reverse polarity protection, solar panel over-voltage protection, lithium battery overcharge and over-discharge protection, lithium battery BMS overcharge detection protection, load short-circuit, load open circuit and short circuit protection
Weight	770g

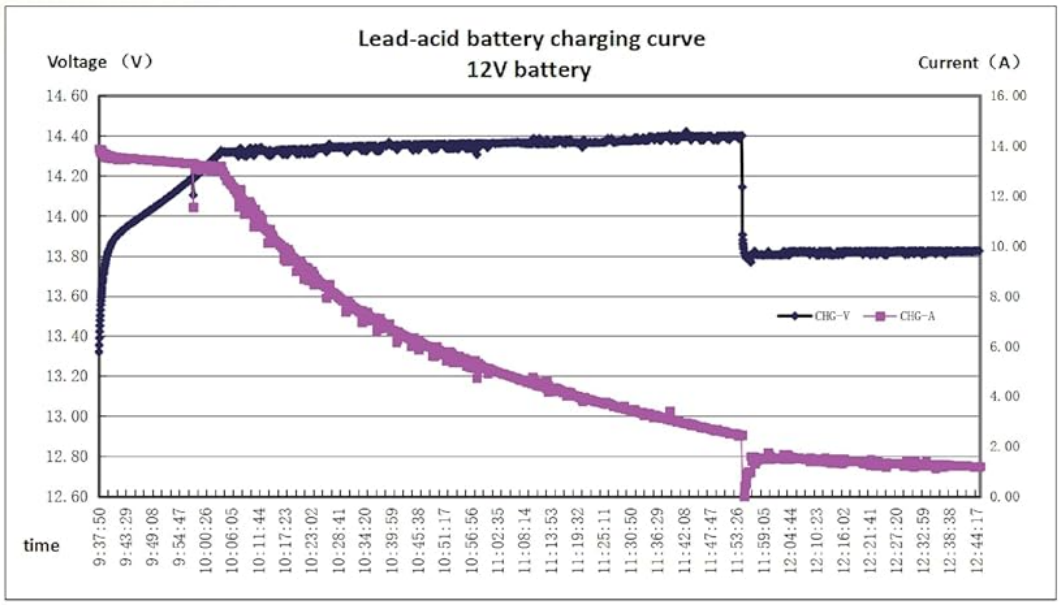
9. Typical Curves

These graphs illustrate the typical charging and efficiency characteristics of the controller.

12V Lead-acid Battery Charging Curve

A typical curve

12V Lead-acid Battery Charging Curve



24V Lead-acid Battery Charging Curve

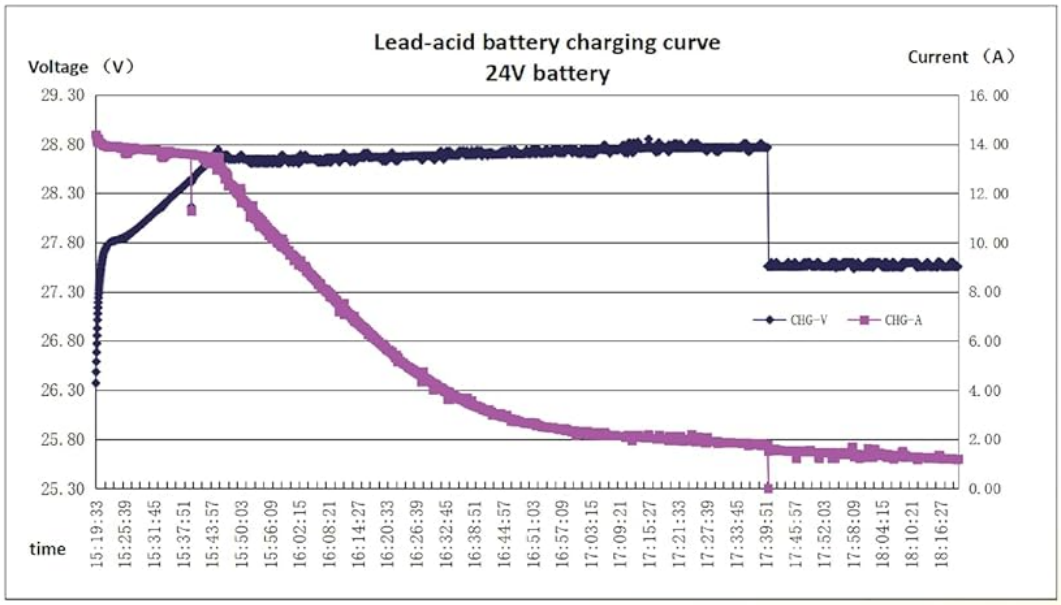


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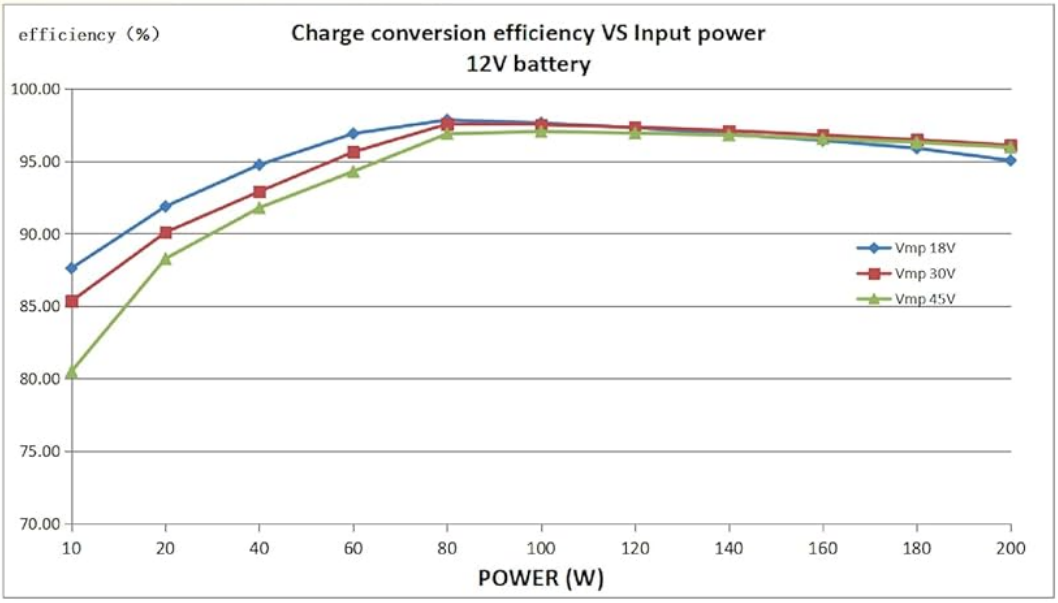
Figure 8: Graph showing the voltage and current profile during charging of a 12V lead-acid battery by the SRNE controller over time.

24V Lead-acid Battery Charging Curve

Charge Conversion Efficiency VS Input Power -12V battery



Charge Conversion Efficiency VS Input Power -24V battery

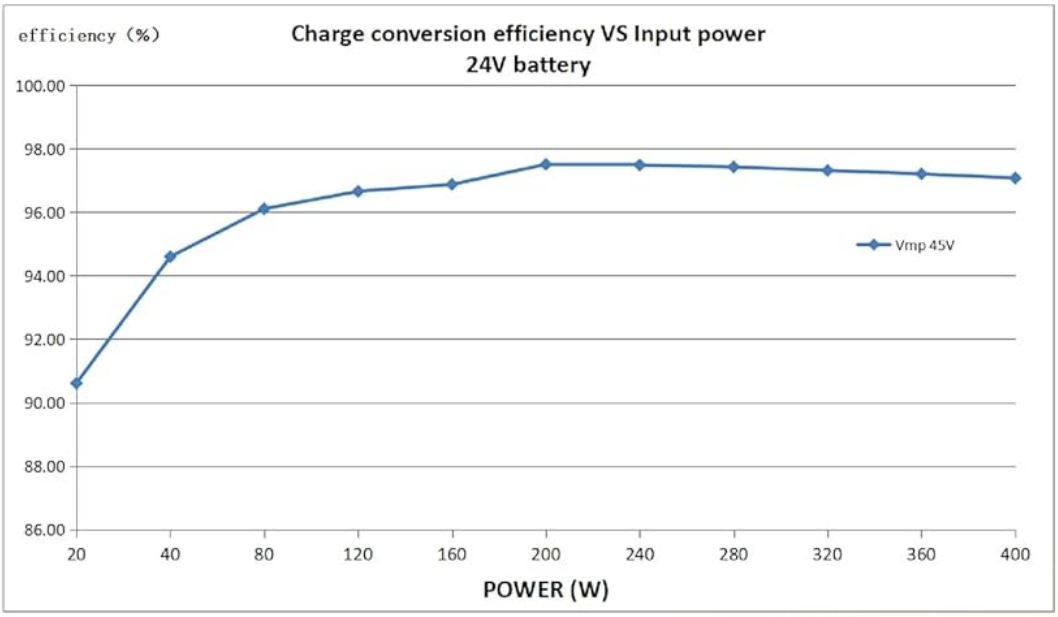


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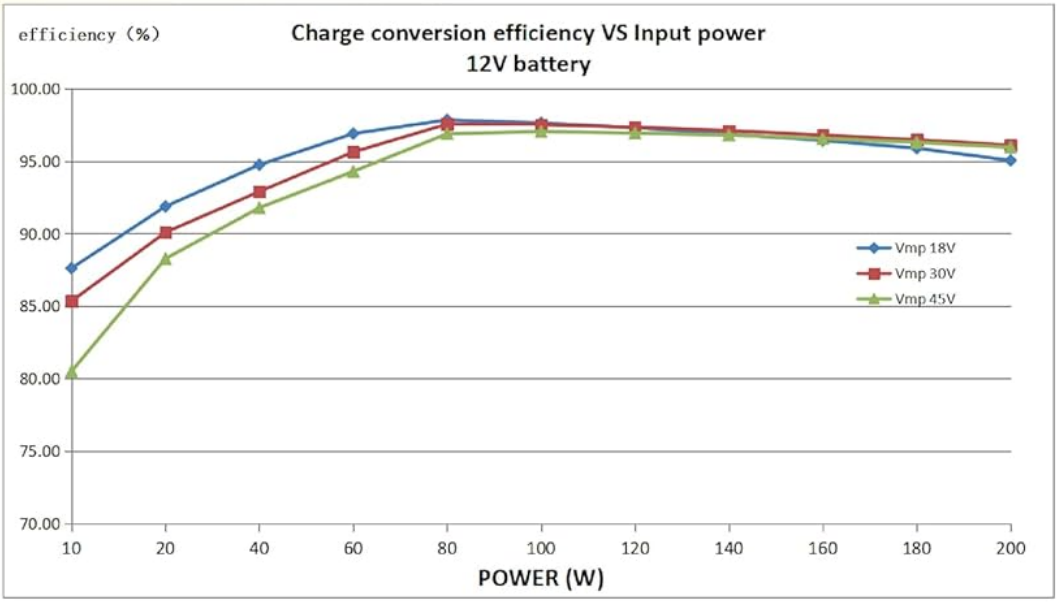
Figure 9: Graph illustrating the voltage and current profile during charging of a 24V lead-acid battery by the SRNE controller over time.

Charge Conversion Efficiency VS Input Power - 12V battery

Charge Conversion Efficiency VS Input Power -12V battery



Charge Conversion Efficiency VS Input Power -24V battery

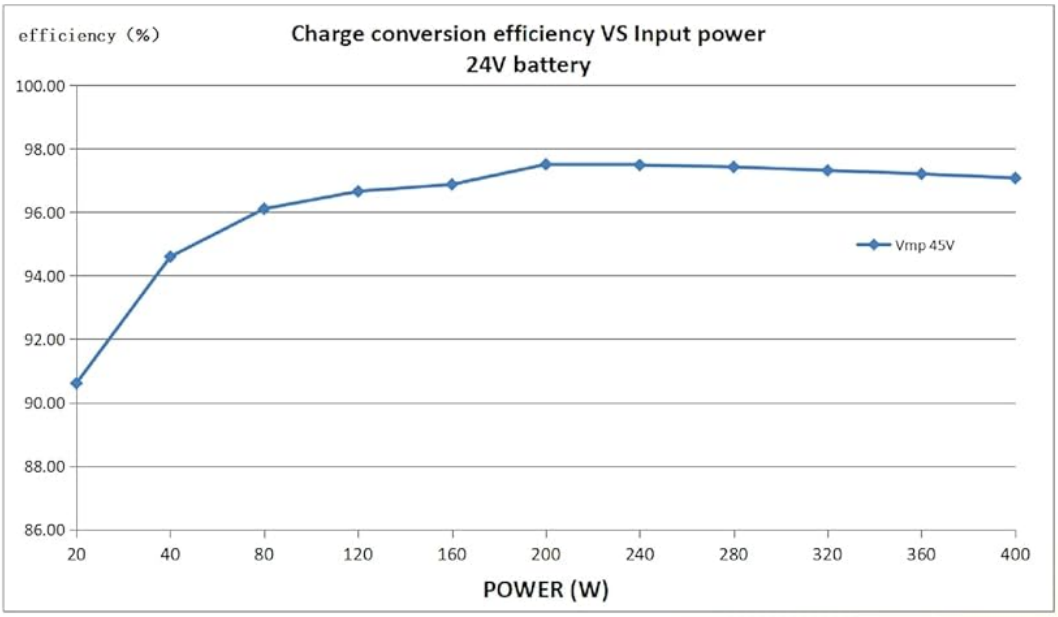
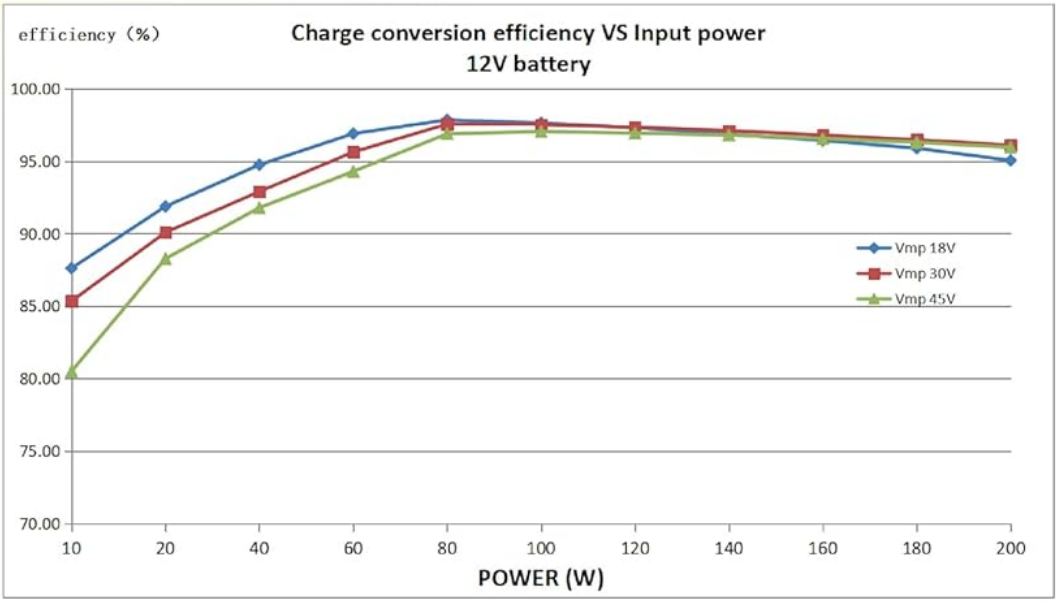


Figure 10: Graph depicting the charge conversion efficiency percentage against input power (W) for a 12V battery system, showing performance at different Vmp levels (18V, 30V, 45V).

Charge Conversion Efficiency VS Input Power - 24V battery

Charge Conversion Efficiency VS Input Power -12V battery



Charge Conversion Efficiency VS Input Power -24V battery

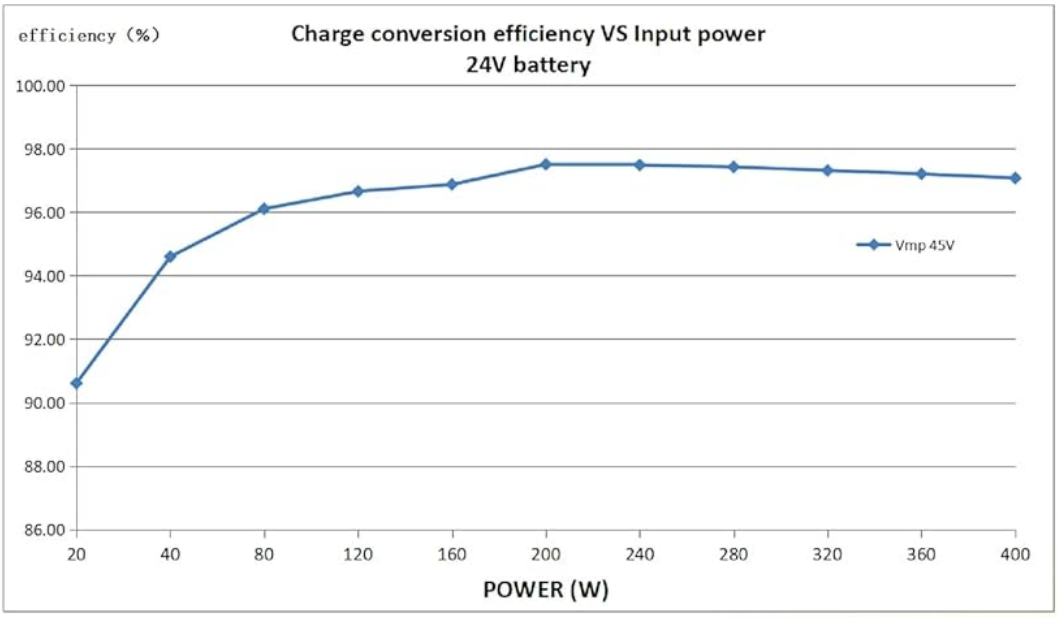


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Figure 11: Graph illustrating the charge conversion efficiency percentage against input power (W) for a 24V battery system, specifically for

10. Safety Precautions

Always observe the following safety guidelines to prevent injury and damage to the controller or other components.

- Read all instructions carefully before installation and operation.
- Ensure all wiring is correctly polarized and securely connected to prevent short circuits or damage.
- Do not attempt to disassemble or repair the controller yourself. Contact qualified personnel for service.
- Install the controller in a well-ventilated area, away from flammable materials and direct sunlight.
- Wear appropriate personal protective equipment (PPE) such as gloves and eye protection during installation.
- Disconnect all power sources (solar panel and battery) before performing any wiring or maintenance.
- Ensure the system voltage matches the controller's specifications (12V/24V).
- Keep children away from the solar power system components.

11. Troubleshooting

This section provides general guidance for common issues. For specific error codes or complex problems, refer to the indicator status table or contact support.

- **No Power/Indicators Off:**
  - Check battery connections and voltage.
  - Verify solar panel connections and ensure sufficient sunlight.
  - Ensure the controller is correctly wired to the battery first.
- **Battery Not Charging:**
  - Check solar panel voltage and current.
  - Ensure solar panel is clean and not shaded.
  - Verify PV indicator status (should be slow flash or steady on during charging).
  - Check for reverse polarity on PV or battery connections.
- **Load Not Working:**
  - Check load connections and ensure the load is not short-circuited or overloaded.
  - Verify BAT indicator status (should not be off due to over-discharge protection).
  - Check load mode settings (e.g., if in "charging mode", load will not operate).
  - Ensure battery voltage is above the over-discharge return voltage.
- **Over-temperature Protection:**
  - Ensure the controller is installed in a well-ventilated area.
  - Reduce ambient temperature if possible.
  - Check for obstructions around the controller's heat sink.

12. Warranty and Support

Specific warranty information for the SRNE MPL2420 controller is not provided in this manual. Please refer to the product

packaging, your purchase receipt, or contact your retailer for warranty details.
For technical support or service inquiries, please contact the manufacturer or your authorized dealer. Ensure you have your product model number (MPL2420) and purchase details ready when seeking assistance.