

※Thank you for selecting the Tracer BPL series lithium battery MPPT solar charge controller with built-in LED driver. Please read this manual carefully before using the product and pay attention to the safety information.

※ Do not install this product in humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.

MPPT Solar Charge Controller

---with built-in LED Driver

1. Overview

The Tracer BPL series lithium battery MPPT solar charge controller combines a solar charge controller and LED constant current driver into one unit. It is ideal for solar LED lighting, especially when a dimmer function is needed. The advanced Maximum Power Point Tracking charging methods enables the system charging and discharging management to obtain the most radical optimization. Increase the system flexibility yet lower the system cost. The features are listed below:

- Adopt high-quality components of ST, IR, and Infineon, ensure products' lifespan
- Wide working environment temperature(-40°C~60°C)
- Apply to lead-acid battery and lithium battery
- Lithium battery self-activating and low-temperature protection function
- The maximum conversion efficiency of 98%
- Advanced Maximum Power Point Tracking (MPPT) technology, with tracking efficiency of no less than 99.5%
- Accurately multiple power points recognize and track
- Lithium battery low-temperature protection function
- Lithium battery limit current in low temperature
- Digital precision constant current control and the control accuracy are less than $\pm 2\%$
- Intelligent power reduction mode with a 365-day lighting control technology
- Maximum output efficiency of 96%
- PV and Load power limitation function
- The output current can be adjusted among the rated power and current range
- Monitoring and setting parameters via Mobile APP, the PC software.
- Standard Modbus communication protocol for RS485 bus connections to offer a better communication protocol compatibility
- Connecting the IoT (Internet of Things) module and Cloud Server monitoring software to realize remote monitoring of the multi-machine system
- The RS485 connector can provide a power supply
- Aluminum housing for better cooling
- Real-time energy statistics function
- IP67 waterproof degree

2. Product Features



①	Temperature Sensor ⁽¹⁾	⑤	Charging Status LED indicator
②	PV Positive and Negative Wires	⑥	Battery Status LED indicator
③	Battery Positive and Negative Wires	⑦	RS485 waterproof port ⁽²⁾
④	Load Positive and Negative Wires	⑧	Waterproof cap(Included)

(1)The temperature sensor is short-circuited or damaged. The controller will charge or discharge at the default temperature of 25 °C.

(2)The port can provide the DC power supply of 5VDC/150mA and have the short circuit function.

⚠ **NOTE:** When the RS485 communication port is not working, the waterproof cap must be installed to prevent water from getting in.

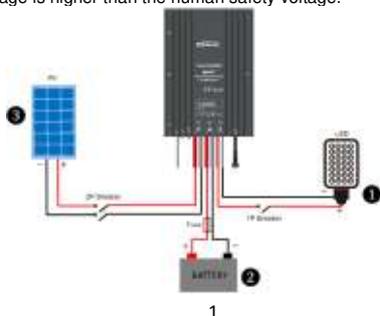
3. Wiring

• Reference for Serial connection of LED

System Voltage	Serial connection	Min. Output Voltage	Max. Output Voltage
12V	5~18 LED	15V	60V
24V	10~18 LED	30V	60V

⚠ **NOTE:** It is calculated by the LED specification of 1W/3.3V. If the user uses the unconventional LED, The actual LED voltage must be less than the Max. Load Output Voltage.

⚠ **WARNING:** Caution electricity! With the product's built-in boost LED driver, the output voltage is higher than the human safety voltage.



• Connection Order

- 1) Connect components to the charge controller in the sequence as shown above and pay much attention to the "+" and "-" . Please don't insert the fast-acting fuse or turn on the breaker during the installation. When disconnecting the system, the order will be reserved.
- 2) After powering the controller, check the battery LED indicator on the controller. It will be green. If it's not green, please refer to chapter 9.
- 3) Connecting a fast-acting fuse in series through battery positive (+) in the circuit and the battery fast-acting fuse must be 1.25 to 2 times to the rated current. The installed distance is within 150mm.
- 4) The charging and discharging process can't be operated simultaneously, and the discharge process should be operated before charging.

• Load self-test function

The load is ON when the controller power on for 10 seconds. After 10 seconds, it will restore to set working mode.

4. LED Indicators

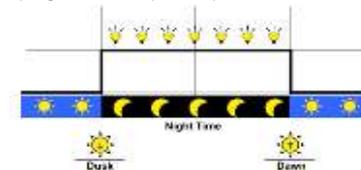
Indicator	Color	Status	Instruction
PV	Green	On Solid	PV connection normal but low voltage(irradiance) from PV, no charging
	Green	OFF	No PV voltage(night time) or PV connection problem
	Green	Slowly Flashing(1Hz)	In charging
	Green	Fast Flashing(4Hz)	PV overvoltage
BATT	Green	On Solid	Battery normal
	Green	Slowly Flashing(1Hz)	Battery full charged
	Green	Fast Flashing(4Hz)	Battery overvoltage
	Orange	On Solid	Battery under voltage
	Red	On Solid	Battery over-discharged
	Red	Fast Flashing(4Hz)	Battery overheating or low temperature
Charging indicator(green) and battery indicator(orange) flash twice			Set parameters successfully
Charging indicator(green) and battery indicator(orange) fast flash simultaneously			System voltage error※

※When the battery type is a lithium battery, the controller cannot recognize the system voltage automatically.

5. Load Working Mode

1) Manual Mode

2) Light ON/OFF (Default)



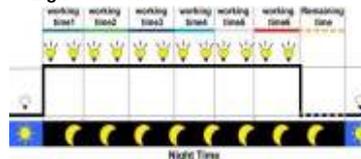
Turn-On voltage (Adjustable):
5V (12Vsystem), delay10min.

Turn-Off voltage (Adjustable):
6V (12Vsystem), delay10min.

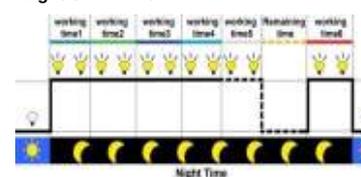
Note: 24V system voltage×2

3) Light ON + Timer

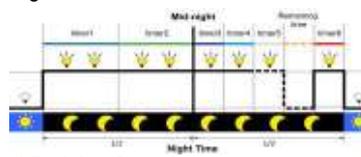
Light ON + Timer1



Light ON + Timer2



Light ON + Timer3



4) Real-time Control

Control the load ON/OFF time by setting a real-time clock.

5) Intelligent Power Reduction Mode

When the battery voltage is reduced to the "Reduce Power Start Voltage (adjustable)," the intelligent power reduction mode is enabled. The LED output current automatically decreases linearly with the battery's voltage drop. When the battery voltage is reduced to the "Reduce Power End Voltage (adjustable)," the LED output current is 2% of the rated load current. The minimum percentage can be set to 1%. Also, when the battery voltage exceeds "Reduce Power Start Voltage," the controller exits the intelligent power reduction mode.

⚠ **NOTE:** In the Light ON/OFF and Light ON/Timer mode, the load is turned on after one minute delay (adjustable).

⚠ **NOTE:** The controller's real-time clock is an analog clock, valid at power-on and invalid after power-off. When using the time mode, the clock needs to be calibrated by handheld devices. The controller cannot be powered off after calibration.

6. Optional Accessories and Software

1) PC Software(www.epever.com——Solar Station Monitor)

2) APP Software (Android phone(www.epever.com——ChargeController(Li)); iPhone (APP Store——EPEVER——EP-01)

※MT50 does not support the relevant parameters of the lithium battery.



7. Protection

Protection	Conditions	Status
PV Reverse Polarity	The PV can be reversely connected with a controller when: ✓ Only the PV connects to the controller. ✓ The battery is positively connected. The PV's open-circuit voltage is below 85V (This requirement is only for Tracer 26/39/5210BPL).	The controller is not damaged
Battery Reverse Polarity	The battery can be reversed when the PV is not connecting, or the connection is reversed. WARNING: The controller will be damaged when the PV connection is correct and the battery connection is reversed!	
Battery Over Voltage	The battery voltage reaches the OVD	Stop charging
Battery Over Discharge	The battery voltage reaches the LVD	stop discharging
Battery Overheating	The temperature sensor is higher than 65°C	Output is OFF
	The temperature sensor is less than 55°C	Output is ON
Lithium battery Low Temperature	The temperature sensor is less than the low-temperature value(Default 0°C)	Lithium battery stop charging/discharging
	The temperature sensor is higher than the low-temperature value(Default 0°C)	Lithium battery charging
Load Short Circuit	Load current ≥ 2.5 times rated current When the short circuit occurs at the 1 st , 2 nd , 3 rd , 4 th , 5 th , and 6 th time, the output turns off for 5s, 10s, 15s, 20s, 25s, and all the time.	Output is OFF Clear the fault: Restart the controller or wait for one night-day cycle (night time>3 hours).

Lithium battery limit current in low temperature

Limit current temperature
 $T1 > T2 > T3 > T4 > T5 > T6$
 Limit current $I1 > I2 > I3 > I4 > I5 > I6$

When the temperature is lower than T1, the charging current is I1; when the temperature is lower than T2, the charging current is I2; and so on. However, when the temperature rises gradually from T4 to T1, it is performed at I4.

9. Troubleshooting

Faults	Possible reasons	Troubleshooting
LED Charging indicator turns off during daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV and battery wire connections are correct and tight
No LED indicator	Battery voltage may be less than 9V	Measure battery voltage with the multi-meter. Min.9V can start up the controller
Battery LED indicator green fast Flashing	Battery over voltage	Check if the battery voltage is higher than OVD, and disconnect the PV
Battery LED indicator red	Battery over discharged ^①	When the battery voltage is restored to or above the LVR point (low voltage reconnect voltage), the load will recover
Battery LED indicator red flashing	Battery overheating	The controller will automatically turn off the system. But while the temperature declines below 50 °C, the controller will resume.
Powering on normally, the load is off	①The connecting wires are error or virtually connected ②Load mode is not appropriate. ③This controller does not match the LED light. ④Output short circuit.	① Check the connecting cable. ② Check the load's mode and parameters. ③The LED voltage is not within the controller's output voltage range. ④Check the connecting cables and LED light.
	The dimming function is invalid	①Replace the LED light ②Reduce the system voltage level and replace the product model. For example, change the 24V system to a 12V system and replace the corresponding controller.

①After the battery is over-discharged, the battery indicator is red. And the load is turned off until the voltage reaches the Low Voltage Reconnect Voltage (LVR). To judge whether the system is normal, measure whether the battery voltage is higher than the LVR. If not, restart the controller to detect whether the load output is normal.
NOTE: The LVR can be set but must pay more attention to modification. Too low LVR may damage the battery.

8. Technical Specifications

Item	Tracer2606BPL	Tracer3906BPL	Tracer5206BPL	Tracer2610BPL	Tracer3910BPL	Tracer5210BPL
Nominal system voltage	12/24VDC Auto(Lithium batteries cannot identify system voltage automatically)					
Battery input voltage range	9~32VDC					
Rated charge current ^①	10A	15A	20A	10A	15A	20A
Rated charge power	130W/12V;260W/24V	200W/12V;400W/24V	260W/12V;520W/24V	130W/12V; 260W/24V	200W/12V; 400W/24V	260W/12V;520W/24V
Max. PV open circuit voltage	60V (at minimum operating environment temperature) 46V(at 25°C environment temperature)			100V (at minimum operating environment temperature) 92V (at 25°C environment temperature)		
MPP Voltage range	(Battery voltage+2V) ~ 36V (Battery voltage+2V) ~ 72V					
Max. output current	3.3A	4.5A	6.6A	3.3A	4.5A	6.6A
Max. output power ^②	100W	130W	200W	100W	130W	200W
Output voltage range	(Max. battery voltage+2V) ~ 58V					
Load open circuit voltage	58V					
Load over voltage protection	63V					
Maximum output efficiency	96%					
Output current control accuracy	≤2%					
Battery Type	Lead-acid battery: Sealed(Default) / Gel / Flooded/User; Lithium battery: LiFePO4/ Li-NiCoMn/ User					
Lead-acid	Equalize Charging Voltage	Sealed :14.6V/Gel: No / Flooded:14.8V/User:9-17V (X2/24V)				
	Boost Charging Voltage	Sealed :14.4V/Gel: 14.2V/Flooded:14.6V/User:9-17V (X2/24V)				
	Float Charging Voltage	Sealed/Gel/Flooded:13.8V/User:9-17V (X2/24V)				
	Low Voltage Reconnect Voltage	Sealed/Gel/Flooded:12.6V/User:9-17V (X2/24V)				
	Low Voltage Disconnect Voltage	Sealed/Gel/Flooded:11.1V/User:9-17V (X2/24V)				
Lithium	Boost Charging Voltage	LiFePO4:14.5V/ Li-NiCoMn:12.5V / User:9-17V (X2/24V)				
	Low Voltage Reconnect Voltage	LiFePO4:12.8V / Li-NiCoMn:10.5V / User:9-17V (X2/24V)				
	Low Voltage Disconnect Voltage	LiFePO4:11.1V / Li-NiCoMn:9.3V / User:9-17V (X2/24V)				
Self-consumption	≤15mA/12V;≤22mA/24V					
Temperature compensation coefficient	-3mV/°C/2V(Lithium batteries don't have temperature compensation coefficient)					
Communication	RS485					
Environment temperature	-40°C ~ +60°C					
Enclosure	IP67					
Dimension (L x W x H)	124×89×30mm	150×93.5×32.7mm	153×105×52.1mm	124×89×30mm	150×93.5×32.7mm	153×105×52.1mm
Mounting hole size	Φ3.5mm					
Mounting size (L x W)	88×76mm	120×83mm	120×94mm	88×76mm	120×83mm	120×94mm
Power cable	PV/BAT:14AWG(2.5mm ²) LOAD:18AWG(1.0mm ²)		PV/BAT:12AWG(4mm ²) LOAD:16AWG(1.5mm ²)		PV/BAT:14AWG(2.5mm ²) LOAD:18AWG(1.0mm ²)	
Net weight	0.54kg	0.73kg	1.18kg	0.54kg	0.73kg	1.18kg

①The controller has the charge current limit function. The charge current can be set via the app and remote controller.

②The Max. output power is the same for the 12V or 24V system, shown above the table.

Any changes without prior notice! Version number: V3.5