4x4 ACCESSORIES

20A MPPT SOLAR CONTROLLER

Model: TRACER2206AN

+ OWNERS/INSTRUCTION MANUAL

CONTENTS

Disclaimer

The company assumes no responsibility for damages caused by the following circumstances:

- Improper use or use in an environment that does not comply with the working conditions.
- The controller must not be installed in harsh environments such as those that are humid, have high salt spray, are corrosive, greasy, flammable, explosive, or have excessive dust.
- Current, voltage, or power exceeding the controller's specified limits during actual operation.
- Ambient temperatures exceeding the controller's limited operating temperature range.
- Accidents such as arcing, fire, or explosions caused by failure to follow the controller's markings or manual instructions.
- Unauthorized disassembly or repair of the controller.
- Damage caused by force majeure events such as lightning strikes, heavy rain, or flash floods.
- Damage that occurred during the transportation or handling of the controller.

SIMPLIFIED QUICK SETUP GUIDE

Safety First

- Do not install in humid, corrosive, flammable, or dusty environments.
- Disconnect PV array and battery fuses before installation.
- Use protective gear when handling batteries.

Installation Steps

1. Mounting

- Install indoors or in a well-ventilated area.
- Leave 150mm clearance above and below the controller.
- Use Ø5mm mounting holes.

2. Wiring Order

1. Battery → Load → PV Array
2. Use 10AWG wire for battery and load.
3. Install fast-acting fuses:

- Battery side: 32A/125V/2P, within 150mm of battery. (Use a 2-pole circuit breaker for best protection. A single-pole breaker or fuse is acceptable as a minimum requirement)
- PV side: 32A/125V/2P.

3. Grounding

- Controller is common-negative.
- Ground the shell terminal to reduce EMI and shock risk. (refer to manual Section 2.1)

Connections

- PV Array: Max Voc = 46V, Max input current = 20A.
- Battery: 12V/24V auto-recognition (except lithium).
- Load: Connect directly to controller (not inverter)

Initial Setup

1. Power On

- Connect battery fuse to power the controller.
- Then connect load and PV array fuses.

2. Battery Type Selection

- Press and hold ENTER on battery voltage screen.
- Use SELECT to choose:

  Sealed (default)

  Gel

  Flooded

  Lithium (LiFePO4, Li (NiCoMn)O2)

  User-defined (USE)

3. Set Parameters (USE Mode)

- Boost Voltage, Float Voltage, LVD, LVR, etc.
- Use MT52 remote meter (PLU709360) for advanced settings.

Final Checks

- Confirm display shows correct battery and PV status.
- Check for error icons or blinking indicators.
- Refer to troubleshooting section if needed.

IMPORTANT SAFETY INSTRUCTIONS

Please keep this manual for future review.

This manual contains safety, installation, and operating instructions for the Tracer2206AN MPPT solar charge controller (referred to as the "controller" below).

- Please read all instructions and precautions in this manual carefully before installation and use.
- The controller contains no user-serviceable or repairable parts. Do not attempt to disassemble or repair the controller yourself.
- Install the controller indoors to protect its components and prevent water from entering the unit.
- The heat sink can get very hot during operation; please install the controller in a well-ventilated area.
- Do not install the controller in a humid, salty, corrosive, greasy, flammable, explosive, or dusty environment.
- It is recommended to install a suitable fast-acting fuse or circuit breaker externally to the controller.
- Before installing or adjusting the controller's wiring, disconnect the photovoltaic (PV) array and the fast-acting fuse or circuit breaker near the battery terminals.
- After installation, check that all wiring connections are secure to prevent loose connections from causing heat buildup and potential hazards.

1. GENERAL INFORMATION

1.1 Overview

The Tracer2206AN incorporates a new design philosophy, centered around a high-performance solar charge and discharge controller.

Featuring a next-generation MPPT (Maximum Power Point Tracking) control algorithm, the controller significantly reduces the loss rate and duration of the maximum power point, boosting tracking efficiency and response speed. This allows it to accurately track the maximum power point of the photovoltaic array under various conditions, increasing the energy utilization of solar panels by 10% to 30% compared to traditional PWM charging methods.

To ensure system stability, the controller includes functions for charging current and power limitation, as well as automatic power reduction during high temperatures. This guarantees stable operation even with oversized PV arrays or in hot environments. The RS485 communication port is equipped with a protective chip, further enhancing product stability and adapting to diverse application needs.

Furthermore, this solar controller uses a digitally controlled, adaptive three-stage charging mode to extend battery life and improve system performance. It also offers comprehensive electronic protection features such as overcharge, over-discharge, PV reverse connection, and battery reverse connection protection, ensuring the safe, stable, and long-term operation of the solar power system. The product is suitable for a wide range of applications, including RVs, communication base stations, household systems, and outdoor monitoring.

Features:

- High quality and low failure rate components of ST or IR to ensure the service life
- Advanced MPPT technology, with Max. tracking efficiency higher than 99%
- Advanced MPPT control algorithm to minimize the lost rate and lost time
- Accurate recognising and tracking technology of multi-peaks maximum power point
- Wider MPP(maximum power point) running voltage to optimize PV utilisation
- Maximum DC/DC conversion efficiency of 98%
- Support multiple battery types including lithium batteries
- Equipped with a stable self-activation function for the lithium battery
- Set the battery voltage parameters on the LCD①
- Battery temperature compensation
- Limit the charging power & charging current to no higher than the rated value
- Real-time energy statistics function
- Charging power reduction automatically for over-temperature
- RS485 communication interface
- Standard Modbus communication protocol based on the RS485 communication bus, extending the communication distance
- A power protection chip, which can provide 5VDC/200mA power and over-current, short-circuit protections, is adopted by the communication interface
- Constant voltage output function②
- Comprehensive electronic protections
- Multiple load work modes
- Low self-consumption, lower than 10mA
- Operation at full load without charging power reduced in the working temperature range

① For the Boost Charging Voltage (BCV), Float Charging Voltage (FCV), Low Voltage Disconnect Voltage (LVD), and Low Voltage Reconnect Voltage (LVR), users can modify them on the controller LCD when the battery type is "User."

② To enable the constant voltage output function, ensure that the input power is higher than the output power. Suppose the input power is lower than the output power. In that case, the controller enters the ON-OFF state intermittently caused by the under-voltage protection.

1.2 Characteristics

Figure 1-1 Product Characteristics

①	SELECT button	⑥	Mounting Hole Φ5mm
②	RTS interface	⑦	ENTER button
③	PV Terminals	⑧	LCD
④	Battery terminals	⑨	RS485 port
⑤	Load terminals		

★ Suppose the remote temperature sensor is not connected to the controller or damaged. In that case, the controller will charge or discharge the battery at the default temperature setting of 25 °C (no temperature compensation).

1.3 Maximum power point tracking technology

Due to the nonlinear characteristics of the solar array, there is a maximum energy output point (Max Power Point) on its curve. Traditional controllers, equipped with switch charging technology and PWM charging technology, can't charge the battery at the maximum power point and cannot obtain the maximum energy available from the PV array. In contrast, the solar charge controller with Maximum Power Point Tracking (MPPT) Technology can lock the point to obtain the maximum energy and deliver it to the battery.

This MPPT algorithm continuously compares and adjusts the operating points to locate the array's maximum power point. The tracking process is fully automatic and does not need the user's adjustment.

As Figure 1-2, the curve is also the array's characteristic curve; the MPPT technology will 'boost' the battery charge current through tracking the MPP. Assuming 100% conversion efficiency exist in the solar system, the following formula is established:

Input power (P_{PV}) = Output power (P_{Bat})

↓

Input voltage (V_{Mpp}) * input current (I_{PV}) = Battery voltage (V_{Bat}) * battery current (I_{Bat})

Normally, the V_{Mpp} is always higher than V_{Bat}. Due to the principle of energy conservation, the I_{Bat} is always higher than I_{PV}. The greater the difference between V_{Mpp} & V_{Bat}, the greater the difference between I_{PV} & I_{Bat}. The greater the difference between the array and the battery will also decrease the system conversion efficiency. Therefore, the controller's conversion efficiency is particularly important in the PV system.

Figure 1-2 is the maximum power point curve, whose shaded area is the traditional solar charge controller (PWM Charging Mode). It is known that the MPPT mode can improve solar PV usage. According to the test, the MPPT controller can raise 20%-30% efficiency compared to the PWM controller. (Specified value may fluctuate due to the influence of the circumstance and energy loss.)

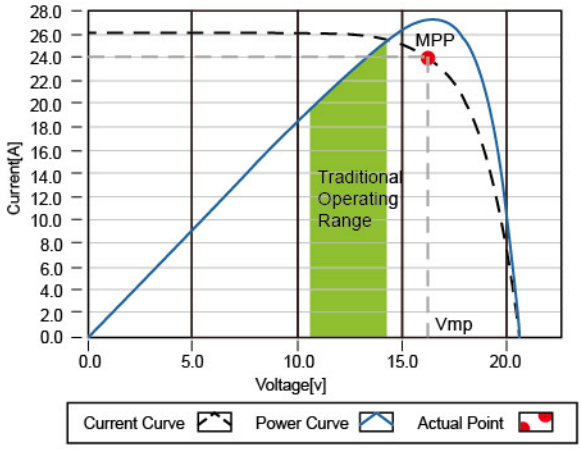


Figure 1-2 Maximum Power Point Tracking Technology

In actual application, as shading from cloud, tree, and snow, the panel may appear Multi-MPP. However, in actuality, there is only one real Maximum Power Point. As the below Figure 1-3 shows:

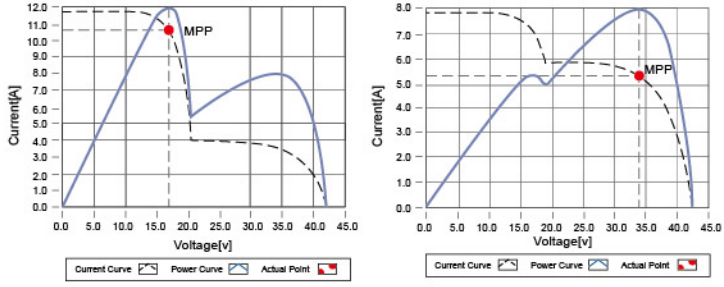


Figure 1-3 Mutil-MPP Curve

Suppose the program works improperly after appearing Multi-MPP. In that case, the system will not work on the real max power point, which may waste most solar energy resources and seriously affect the system's normal operation. The typical MPPT algorithm, can track the real MPP quickly and accurately. It can improve the PV array's utilisation rate and avoid resource waste.

1.4 Battery charging stage

The controller has a three-stage battery charging algorithm, including Bulk Charging, Constant Charging, and Float Charging. Through the three-stage charging method, the system can extend the battery's lifespan.

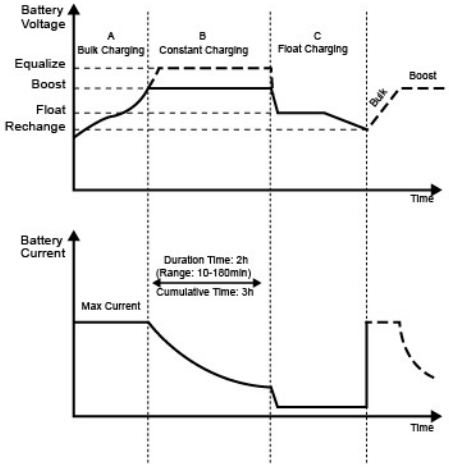


Figure 1-4 Battery charging stage curve

A) Bulk Charging

The battery voltage has not yet reached constant voltage (Equalize or Boost Charging Voltage). The controller operates in constant current mode, delivering its maximum current to the batteries (MPPT Charging). When the battery voltage reaches the constant voltage set point, the controller will start to operate in constant charging mode.

B) Constant Charging

When the battery voltage reaches the constant voltage set point, the controller will start to operate in constant charging mode. The MPPT charging stops during this process, and the charging current will drop gradually at the same time. Constant charging has two stages, namely, EQUALIZE CHARGING and BOOST CHARGING. These two charging processes are not repeated.

● Boost Charging

The default duration of the BOOST CHARGING stage is generally 2 hours. Customers can also adjust the constant time and preset value according to actual needs. When the duration is equal to the set value, the system will switch to the FLOAT CHARGING stage.

● Equalize Charging

WARNING	Explosive Risk! Equalizing flooded batteries would produce explosive gases, so well ventilation of the battery box is recommended.
CAUTION	● Equipment damage! ● Equalization may increase battery voltage to the level that damages sensitive DC loads. Verify that the load's allowable input voltages are greater than the equalizing charging setpoint voltage. ● Over-charging and excessive gas precipitation may damage the battery plates and activate material shedding on them. Too high an equalize charging or for too long may cause damage. Please carefully review the specific requirements of the battery used in the system.

Some battery types benefit from EQUALIZING CHARGING, stirring electrolytes, balancing battery voltage, and accomplishing chemical reactions. EQUALIZE CHARGING increases the battery voltage to make it higher than the standard complement voltage, gasifying the battery electrolyte.

If the controller automatically controls the next charge for equalizing charging, the EQUALIZING CHARGING time is 120 minutes. Equalize charge and boost charge are not carried out constantly in a full charge process to avoid too much gas precipitation or overheating of the battery.

CAUTION	● Due to the installation environment or load work, the system may not stabilize the battery voltage at a constant voltage. The controller will accumulate the time when the battery voltage is equal to the set value. When the accumulative time is equal to 3 hours, the system will automatically switch to FLOAT CHARGING. ● If the controller time is not adjusted, the controller will EQUALIZE CHARGING following the inner time.

C) Float Charging

After the constant charging stage, the controller will reduce the battery voltage to the FLOAT CHARGING preset voltage by reducing the charging current. During the floating charge stage, the battery is charged weakly to ensure that the battery is maintained in a fully charged state. In the FLOAT CHARGING stage, loads can obtain almost all power from the solar panel. Suppose loads' power exceeds the solar array's power. In that case, the controller will no longer maintain the battery voltage in the float charging stage. When the battery voltage goes lower than the set value of the boost recharge voltage, the system will exit the FLOAT CHARGING stage and enter the BULK CHARGING stage again.

2 INSTALLATION

2.1 Warning

- Please read the instructions to familiarize yourself with the installation steps before installation.
- Do not install the controller in humid, high salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.
- Be careful when installing the batteries. Please wear eye protection when installing the open-type lead-acid battery and rinse with clean water in time for battery acid contact.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Acid gas may be generated when the battery is charged. Confirm that the surrounding environment is well ventilated.
- Avoid direct sunlight and rain infiltration when installing it outdoor.
- Loose power connectors and corroded wires may produce high heat that can melt wire insulation, burn surrounding materials, or even cause a fire. Ensure tight connections and secure cables with cable clamps to prevent them from swaying in moving applications.
- Only charge the lead-acid and lithium-ion batteries within the control range of this controller.
- The battery connector may be wired to another battery or a bank of batteries. The following instructions refer to a singular battery. Still, it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
- Select the system cables according to 5A/mm^2 or less current density.
- The wire size of the grounding wire should not be less than 4mm^2.
- The torque of tightening the wiring screw should not be less than 1.2 N.m.

2.2 Requirements for the PV array

Serial connection (string) of PV modules

As the core component of the solar system, the controller needs to suit various types of PV modules and maximize solar energy conversion into electricity. According to the open-circuit voltage (V_{OC}) and the maximum power point voltage (V_{MPP}) of the MPPT controller, the serial connection of PV modules suitable for different controllers can be calculated. The below table is for reference only.

Tracer2206AN:

System voltage	36cell Voc< 23V		48cell Voc< 31V		54cell Voc< 34V		60cell Voc< 38V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	2	2	1	1	1	1	1	1
24V	2	2	-	-	-	-	-	-

System voltage	72cell Voc< 46V		96cell Voc< 62V		Thin-Film module Voc> 80V
	Max.	Best	Max.	Best	
12V	1	1	-	-	-
24V	1	1	-	-	-

CAUTION	The above parameters are calculated under the STC (Standard Test Condition) — module temperature 25°C, air mass1.5, irradiance 1000W/m².)

2.3 Wire size

The wiring and installation methods conform to the national and local electrical code requirements.

● PV wire size

The PV array's output current varies with its size, connection method, and sunlight angle. The minimum wire size can be calculated by its ISC (short circuit current). Please refer to the ISC value in the PV module's specifications. When the PV modules are connected in series, the total ISC equals any PV module's ISC. When the PV modules are connected in parallel, the total ISC equals the sum of the PV module's ISC. The PV array's ISC must not exceed the controller's maximum PV input current. For max. PV input current and max. PV wire size, please refer to the table as below:

Model	Max. PV input current	PV wire size	Circuit breaker(NOT INCLUDED)
Tracer2206AN	20A	10AWG	32A/125V/2P

CAUTION	When the PV modules are connected in series, the total voltage must not exceed the max. PV open circuit voltage 46V at 25°C environment temperature.

● Battery and Load Wire Size

The battery and load wire size conform to the rated current, the reference size as below:

Model	Rated charge current	Rated discharge current	Battery wire size	Load wire size	Circuit breaker (NOT INCLUDED)
Tracer2206AN	20A	20A	10AWG	10AWG	32A/125V/2P

CAUTION	● The wire size is only for reference. Suppose there is a long distance between the PV array and the controller or between the controller and the battery. In that case, larger wires can be used to reduce the voltage drop and improve performance. ● The recommended wire is selected for the battery according to the conditions that its terminals are not connected to any additional inverter.

2.4 Mounting

WARNING	● Risk of explosion! Never install the controller in a sealed enclose with flooded batteries! Do not install the controller in a confined area where battery gas can accumulate. ● Risk of electric shock! When wiring the PV modules, the PV array may generate a high open-circuit voltage. Turn off the breaker or fuse firstly, and be careful when wiring.
CAUTION	The controller requires at least 150mm of clearance above and below for proper airflow. Ventilation is highly recommended if mounted in an enclosure.

Installation procedures:

Step 1: Determine the installation location and heat-dissipation space

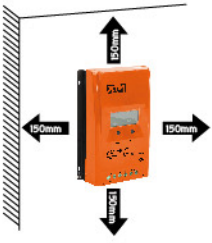
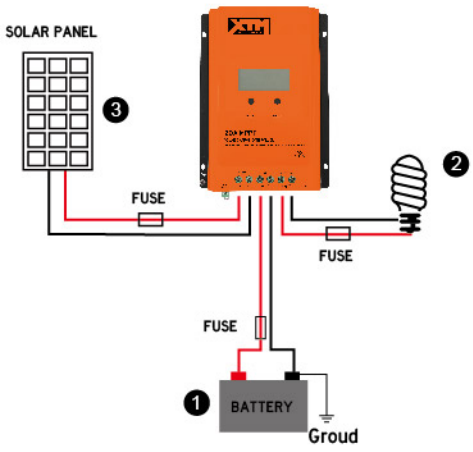


Figure2-1 Mounting

Step 2: Connect the system in the order of battery -- load --PV array following Figure 2-2," Schematic Wiring Diagram," and disconnect the system in the reverse order.



LOAD FUSE NOT INCLUDED

Figure 2-2 Wiring Diagram

CAUTION	● Please do not connect the circuit breaker or fast-acting fuse during the wiring and ensure that the electrode polarity is correctly connected. ● A fast-acting fuse whose current is 1.25 to 2 times the controller's rated current must be installed on the battery side with a distance from the battery no longer than 150mm. ● The cable length of the battery should not exceed 3 meters. ● The recommended cable length of the PV array should not exceed 3 meters. ● Suppose the controller is to be used in an area with frequent lightning strikes or an unattended area. In that case, it must install an external surge arrester. ● If an inverter is to be connected to the system, connect the inverter directly to the battery, not to the load side of the controller.

Step 3: Grounding

Tracer2206AN is common-negative controller. Negative terminals of the PV array, the battery, and the load can be grounded simultaneously, or any negative terminal is grounded. However, according to the practical application, the negative terminals of the PV array, battery, and load can also be ungrounded. However, the grounding terminal on its shell must be grounded. It shields electromagnetic interference and avoids electric shock to the human body.

CAUTION	It is recommended to use a common-negative controller for common-negative systems, such as the RV system. The controller may be damaged if a common-positive controller is used and the positive electrode is grounded in the common-negative system.

Step 4: Connect accessories

● Connect the temperature sensor

Included Accessory

Connect one end of the remote temperature sensor to the interface.

CAUTION	Suppose the remote temperature sensor is not connected to the controller or damaged. In that case, the controller will charge or discharge the battery at the default 25 °C (no temperature compensation).

● Connect the accessories for RS485 communication

Refer to 3.3 "Setting"

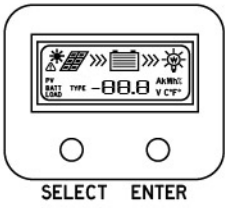
CAUTION	The internal circuit of the RS485 port has no isolation design. Connecting an RS485 communication isolator to the port is recommended before communicating.

Step 5: Power on the controller

Connect the battery fast-acting fuse to power the controller. Connect the fast-acting fuse and circuit breaker of the load and PV array. Then the system will be operating in preprogrammed mode.

CAUTION	If the controller is not operating properly or the battery indicator shows an abnormality, please refer to 4.2 "Troubleshooting".

3 OPERATION



IMPORTANT

The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.

3.1 Buttons

Mode	Note
Load ON/OFF	It can turn the load On/Off via the ENTER button in manual load mode.
Clear fault	Press the ENTER button.
Browsing mode	Press the SELECT button.
Setting mode	Press the ENTER button and hold on 5s to enter the setting mode. Press the SELECT button to set the parameters. Press the ENTER button to confirm the setting parameters or no operation for 10s. It will exit the setting interface automatically.

3.2 Interface

1) Status Description

Name	Icon	Satus
PV array		Day
		Night
		No Charge
		Charging
	PV	PV array's voltage, current, and generate energy
Battery		Battery capacity, In charging
	BATT.	Battery Voltage, Current, Temperature
	BATT. TYPE	Battery type
Load		Load ON
		Load OFF
	LOAD	Current/Consumed energy/Load mode

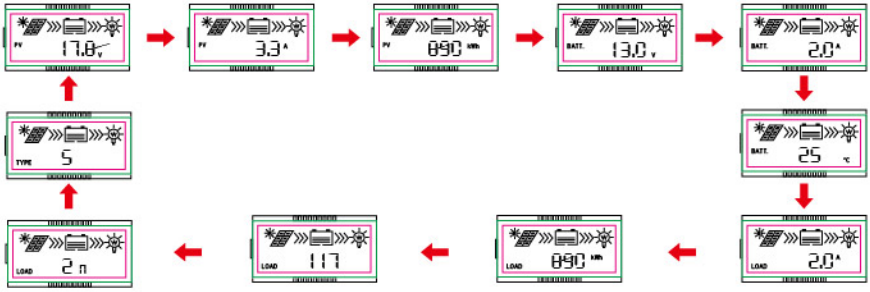
2) Error codes

Status	Icon	Instruction
Battery over-discharged	⚠	Battery level shows empty, battery frame blink, fault icon blink
Battery over voltage	⚠	Battery level shows full, battery frame blink, fault icon blink
Battery overheating	⚠	Battery level shows current value, battery frame blink, fault icon blink
Load failure	⚠	Overload ①, Load short circuit

① When the load current reaches1.02-1.05 times, 1.05-1.25 times, 1.25-1.35 times, and 1.35-1.5 times more than the rated value, the controller will automatically turn off the loads in 50 seconds, 30 seconds,10 seconds, and 2 seconds respectively.

3)Browse interface

Press the SELECT button to cycle display the following interfaces.



3.3 Setting

1) Clear the generated energy

Step 1: Press the ENTER button and hold 5s under the PV-generated energy interface, and the value will be flashing.

Step 2: Press the ENTER button to clear the generated energy.

2) Switch the battery temperature unit

Press the ENTER button and hold 5s under the battery temperature interface.

3) Battery type

① Support battery types

② Set the battery type via the LCD

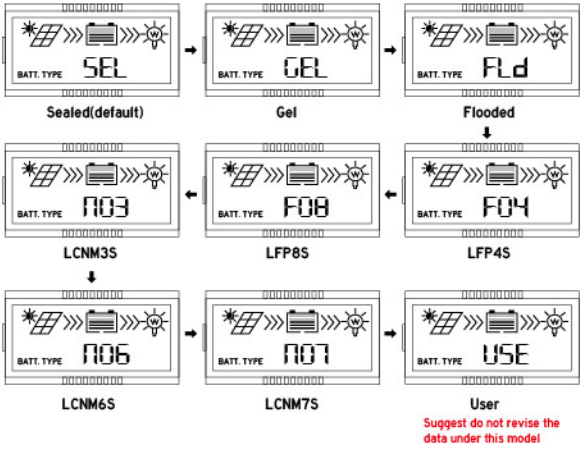
①	Battery	Sealed (default)
		Gel
		Flooded
②	Lithium battery	LiFePO4 (4S/12V, 8S/24V)
		Li(NiCoMn)O2 (3S/12V, 6S/24V, 7S/24V)
③	User	

Operation:

Step1: Press the SELECT button to browse the battery voltage interface.

Step2: Press and hold the ENTER button until the battery-type interface flashes.

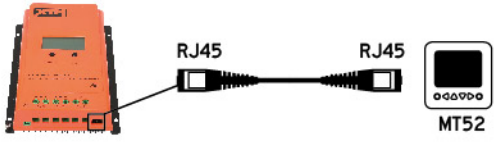
Step3: Press the SELECT button to change the battery type, shown as below.



Step4: Press the ENTER button to confirm.

③ Setting the battery parameters by remote diplay (Not included, PLU709360 MT52 sold separately)

Connect the controller to the remote meter (MT52) through a standard network cable. After selecting the battery type as "USE," set the voltage parameters by the MT52.



④ Operation:

Step1: On the battery voltage interface, press and hold the ENTER button to enter the battery type interface.

Step2: Press the SELECT button to change the battery type, such as selecting the "GEL"; and then press the ENTER button to confirm and back to the battery voltage interface automatically.

Step3: On the battery voltage interface, press and hold the ENTER button to enter the battery type interface again.

Step4: Press the SELECT button to change the battery type to the "USE". Under the "USE" battery type, the battery parameters that can be set via the LCD are shown in the table below:

Parameters	Default	Range	Operation Steps
System voltage level(SYS)*	0	0/12/ 24V DC	1) Under the "USE" interface, press the ENTER button to enter the "SYS" interface. 2) Press the ENTER button again to display the current "SYS" value. 3) Press the SELECT button to modify the parameter. 4) Press the ENTER button to confirm and enter the next parameter. * When the "0" selected, the product can select the voltage automatically.
Boost charging voltage(BCV)	14.4V	9~16V	5) Press the ENTER button again to display the current voltage value. 6) Press the SELECT button to modify the parameter (short press to increase 0.1V, long press to decrease 0.1V). 7) Press the ENTER button to confirm and enter the next parameter.
Float charging voltgae(FCV)	13.8V	9~16V	
Low voltage reconnect(LVR)	12.6V	9~15.4V	
Low voltage disconnect voltage(LVD)	11.1V	9~15.4V	
Lithium battery protection enable (LEN)	NO	YES/NO	Press the SELECT button to modify the switch status. Note: It exists automatically from the current interface after no operation of more than 10S.

* The SYS value can only be modified under the non-lithium "USE" type. That is, the battery type is Sealed, Gel, or Flooded before entering the "USE" type, the SYS value can be modified; if it is lithium battery type before entering the "USE" type, the SYS value cannot be modified.

Only the above battery parameters can be set on the local controller, and the remaining battery parameters follow the following logic (the voltage level of 12V system is 1, the voltage level of 24V system is 2).

Battery type / Battery parameters	Sealed/Gel/Flooded User	LiFePO4 User	Li(NiCoMn)O2 User
Over voltage disconnect voltage	BCV+1.4V*voltage level	BCV+0.3V*voltage level	BCV+0.3V*voltage level
Charging limit voltage	BCV+0.6V*voltage level	BCV+0.1V*voltage level	BCV+0.1V*voltage level
Over voltage reconnect voltage	BCV+0.6V*voltage level	BCV+0.1V*voltage level	Boost charging voltage
Equalize charging voltage	BCV+0.2V*voltage level	Boost charging voltage	Boost charging voltage
Boost reconnect charging voltage	FCV-0.6V*voltage level	FCV-0.6V*voltage level	FCV-0.1V*voltage level
Under voltage warning reconnect voltage	UVW+0.2V*voltage level	UVW+0.2V*voltage level	UVW+1.7V*voltage level
Under voltage warning voltage	LVD+0.9V*voltage level	LVD+0.9V*voltage level	LVD+1.2V*voltage level
Discharging limit voltage	LVD-0.5V*voltage level	LVD-0.1V*voltage level	LVD-0.1V*voltage level

⑤ Battery voltage parameters

● Measure the parameters in the condition of 12V/25°C. Please double the values in the 24V system.

Battery type / Battery parameters	Sealed	GEL	FLD
Over voltage disconnect voltage	16.0V	16.0V	16.0V
Charging limit voltage	15.0V	15.0V	15.0V
Over voltage reconnect voltage	15.0V	15.0V	15.0V
Equalize charging voltage	14.6V	--	14.8V

Battery parameters \ Battery type	Sealed	GEL	FLD
Boost charging voltage	14.4V	14.2V	14.6V
Float charging voltage	13.8V	13.8V	13.8V
Boost reconnect charging voltage	13.2V	13.2V	13.2V
Low voltage reconnect voltage	12.6V	12.6V	12.6V
Under voltage warning reconnect voltage	12.2V	12.2V	12.2V
Under voltage warning voltage	12.0V	12.0V	12.0V
Low voltage disconnect voltage	11.1V	11.1V	11.1V
Discharging limit voltage	10.6V	10.6V	10.6V
Equalize Duration	120 minutes	--	120 minutes
Boost Duration	120 minutes	120 minutes	120 minutes

CAUTION	When the default battery type is selected, the battery voltage parameters cannot be modified. To change these parameters, select the "USE" type.

● When the battery type is "USE," the battery voltage parameters follow the following logic:

A. Over Voltage Disconnect Voltage > Charging Limit Voltage ⩾ Equalize Charging Voltage ⩾ Boost Charging Voltage ⩾ Float Charging Voltage > Boost Reconnect Charging Voltage.

B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ⩾ Discharging Limit Voltage.

D. Under Voltage Warning Reconnect Voltage>Under Voltage Warning Voltage ⩾ Discharging Limit Voltage;

E. Boost Reconnect Charging voltage >Low Voltage Reconnect Voltage.

⑥ Lithium Battery voltage parameters

Battery type / Battery parameters	LFP		LNCM		
	LFP4S	LFP8S	LCNM 3S	LCNM 6S	LCNM 7S
Over voltage disconnect voltage	14.5 V	29.0 V	12.8 V	25.6 V	29.8 V
Charging limit voltage	14.3 V	28.6 V	12.6 V	25.2 V	29.4 V
Over voltage reconnect voltage	14.3 V	28.6 V	12.5 V	25.0 V	29.1 V
Equalize charging voltage	14.2 V	28.4 V	12.5 V	25.0 V	29.1 V
Boost charging voltage	14.2 V	28.4 V	12.5 V	25.0 V	29.1 V
Float charging voltage	13.3 V	26.6 V	12.2 V	24.4 V	28.4 V
Boost reconnect charging voltage	13.0 V	26.0 V	12.1 V	24.2 V	28.2 V
Low voltage reconnect voltage	12.8 V	25.6 V	10.5 V	21.0 V	24.5 V
Under voltage warning reconnect voltage	12.2 V	24.4 V	12.2 V	24.4 V	28.4 V
Under voltage warning voltage	12.0 V	24.0 V	10.5 V	21.0 V	24.5 V
Low voltage disconnect voltage	11.3 V	22.6 V	9.3 V	18.6 V	21.7 V
Discharging limit voltage	11.0 V	22.0 V	9.3 V	18.6 V	21.7 V

* LFP4S is for the 12V system, and LFP8S is for the 24V system.

* LNCM3S is for the 12V system, LNCM6S and LNCM7S are for the 24V system.

● When the battery type is "USE," the Lithium battery voltage parameters follow the following logic:

A. Over Voltage Disconnect Voltage>Over Charging Protection Voltage(Protection Circuit Modules(BMS))+0.2V;

B. Over Voltage Disconnect Voltage>Over Voltage Reconnect Voltage=Charging Limit Voltage ⩾ Equalize Charging Voltage=Boost Charging Voltage ⩾ Float Charging Voltage>Boost Reconnect Charging Voltage;

C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ⩾ Discharging Limit Voltage.

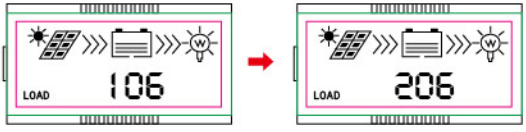
D. Under Voltage Warning Reconnect Voltage>Under Voltage Warning Voltage⩾ Discharging Limit Voltage;

E. Boost Reconnect Charging voltage> Low Voltage Reconnect Voltage;

F. Low Voltage Disconnect Voltage ⩾ Over Discharging Protection Voltage (BMS)+0.2V

CAUTION	The required accuracy of BMS is no higher than 0.2V. We will not assume responsibility for the abnormal when the accuracy of BMS is higher than 0.2V.

4) Local load mode setting



When the LCD shows the above interface, operate as follows:

Operation:

Step1: Press the SELECT button to jump to the load type interface.

Step2: Press and hold the ENTER button until the load type interface flashes.

Step3: Press the SELECT button to modify the load type.

Step4: Press the ENTER button to confirm.

① Load mode

1**	Timer 1	2**	Timer 2
100	Light ON/OFF	2n	Disabled
101	The load will be on for 1 hour since sunset	201	The load will be on for 1 hour before sunrise
102	The load will be on for 2 hours since sunset	202	The load will be on for 2 hours before sunrise

1**	Timer 1	2**	Timer 2
103~113	The load will be on for 3 ~13 hours since sunset	203~213	The load will be on for 3 ~13 hours before sunrise
114	The load will be on for 14 hours since sunset	214	The load will be on for 14 hours before sunrise
115	The load will be on for 15 hours since sunset	215	The load will be on for 15 hours before sunrise
116	Test mode	2 n	Disabled
117	Manual mode (Default load ON)		
118	Always ON mode (The load always maintains the output state, and this mode is suitable for loads that require 24hours power supply)		

CAUTION	When selecting the load mode as the Light ON/OFF mode, Test mode, and Manual mode, only the Timer 1 can be set; and the Timer 2 is disabled and display "2 n ".

4. OTHERS

4.1 Protection

No.	Protections	Instruction
1	PV overcurrent	When the actual PV array's charging current or power is higher than the controller's rated charging current or power, the controller will charge the battery per the rated current or power.
2	PV short-circuit protection	Not in the PV charging state, the controller will not be damaged when the PV array is short-circuited. WARNING: It is forbidden to short-circuit the PV array during charging. Otherwise, the controller may be damaged.
3	PV reverse polarity protection	When the PV array's polarity is reversed, the controller may not be damaged and resume work after correcting the mis-wiring. CAUTION: If the PV array is reversed and its actual power is 1.5 times the controller's rated power, the controller may be damaged.
4	Night reverse charging protection	Avoid the battery from discharging to the PV module at night.

No.	Protections	Instruction
5	Battery reverse protection	The battery can be reversely connected when the PV is disconnected. Correct the wire connection to resume work. ⚠ WARNING: The controller will be damaged when the PV connection is correct and the battery connection is reserved!
6	Battery over voltage protection	When the battery voltage reaches the over voltage disconnect voltage, the PV array will automatically stop charging the battery to avoid battery damage.
7	Battery over-discharging protection	The battery discharging is automatically stopped when the battery voltage is lower than the low voltage disconnect voltage.
8	Battery overheating protection	The controller detects the battery temperature through an external temperature sensor. The battery stops working when its temperature exceeds 65°C and resumes work when it is below 55°C.
9	Lithium battery low temperature protection	When the temperature detected by the optional temperature sensor is lower than the Low-Temperature Protection Threshold (LTPT), the controller will stop charging and discharging automatically. When the detected temperature is higher than the LTPT, the controller will work automatically (The low temperature charge limit is -5°C by default, the low temperature discharge limit -20°C by default and can be set from -40°C to 0°C).
10	Load short circuit protection	When a short circuit occurs on the load side (which is 4 times higher than the rated load current), the controller automatically cuts off the output. The output still attempts to resume five times automatically (delay 5 seconds, 10 seconds, 15 seconds, 20 seconds, 25 seconds). Suppose you want the controller to restart the auto-recovery process. In that case, you need to press the Load button, or restart the controller, or experience a night-to-day change (night time > 3 hours).
11	Overload protection	If the load current exceeds 1.05 times the controller's rating, the controller will cut off the output after a delay. After the overload occurs, the output attempts to resume automatically five times (delay of 5 seconds, 10 seconds, 15 seconds, 20 seconds, 25 seconds). Suppose you want the controller to restart the auto-recovery process. In that case, you need to press the Load button, or restart the controller, or experience a night-to-day change (night time > 3 hours).
12	Device overheating protection	An internal temperature sensor can detect the internal temperature of the controller. The controller stops working when its internal temperature higher than 85 and resumes working when its internal temperature is below 75°C.
13	TVS high voltage transients protection	The controller's internal circuitry is designed with Transient Voltage Suppressors (TVS), which can only protect against high-voltage surge pulses with less energy. Suppose the controller is to be used in an area with frequent lightning strikes. In that case, it is recommended to install an external surge arrester.

★ When the controller's internal temperature reaches 81°C, the charging power automatic reduction function is enabled. Temperature increases by 1°C, the charging power is reduced by 5%, 10%, 20%, and 40%. If the internal temperature is higher than 85°C, the controller stops charging the battery. When the internal temperature is not more than 75°C, the controller resumes charging per the rated charging power.

4.2 Troubleshooting

Faults	Faults	Troubleshooting
PV array open-circuit	When there is plenty of direct sunlight on the PV array, the LCD shows 🌙	Confirm whether the connection of the PV array is correct and tight
The battery voltage is lower than 8V	The wire connection is correct; the controller is not working	Please check the voltage of the battery (at least 8V voltage to activate the controller)
Battery over voltage	⚠  Battery frame blink	Check whether the battery voltage is higher than OVD (over voltage disconnect voltage) and disconnect the PV array connection
Battery over discharged	⚠  Battery frame blink	① When the battery voltage is restored to or above LVR (low voltage reconnect voltage), the load will recover. ②Take other ways to recharge the battery
Battery overheating	⚠  Battery frame blink	Once the temperature is below 55°C, the controller will resume operation.
Overload	1. Load off	① Please reduce the number of electric devices. ②Restart the controller or press the button to clear faults
Load short-circuit	2. ⚠  Load and fault	① Check carefully loads connection, clear the fault. ② Restart the controller or press the button to clear faults

① When the load current goes higher than 1.02-1.05 times, 1.05-1.25 times, 1.25-1.35 times, and 1.35-1.5 times the rated value, the controller may automatically turn offloads in 50 seconds, 30 seconds,10 seconds, and 2 seconds respectively.

4.3 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year.

- Make sure there is no blockage of airflow around the controller. Clear up any dirt and fragments on the radiator.
- Check all the naked wires to ensure insulation is not damaged from sun exposure, frictional wear, dryness, insects or rats, etc. Repair or replace wires if necessary.
- Verify the indicator display is consistent with the actual operation. Pay attention to any troubleshooting or error conditions. Take necessary corrective action.
- Confirm that terminals have no corrosion, insulation damage, high temperature, burnt/discolored sign, and tighten terminal screws to the suggested torque.
- Clear up dirt, nesting insects, and corrosion in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the controller and even other equipment.

⚠ CAUTION	Risk of electric shock! Ensure that the power is turned off before the above operations, and then follow the corresponding inspections and operations.

5 SPECIFICATIONS

Electrical Parameters

Parameter	Tracer2206AN
Electrical Parameters	
System rated voltage	12/24VDC① Auto-recognition
Rated charging current	20A
Rated discharge current	20A
Controller working voltage range	8~31V
Max. PV open circuit voltage	60V② 46V③
MPPT voltage range	(Battery voltage +2V) ~ 36V
PV rated charge power	260W(12V) / 520W(24V)
Static losses	⩽8mA (12V), ⩽5mA (24V)
Discharge circuit voltage drop	⩽0.23V
Temperature compensate coefficient④	-3mV/°C/2V: (Default)

Parameter	Tracer 2206AN
Grounding type	Common negative
RS485 port	5VDC/200mA(RJ45)
LCD backlight time	60S
Environmental parameters	
Environment temperature⑤	-25°C~+45°C (100% loads working)
Storage temperature	-20°C~+70°C
Relative humidity	< 95% (N.C.)

① When a lithium battery is used, the system voltage can't be identified automatically.

② At minimum operating environment temperature

③ At 25°C environment temperature

④ When a lithium battery is used, the temperature compensation coefficient will be 0 and can't be changed.

⑤ The controller can full load working in the working environment temperature. When the internal temperature reaches 81°C, the reducing charging power mode is turned on. Refer to chapter 4.1 Protection.

Mechanical parameters

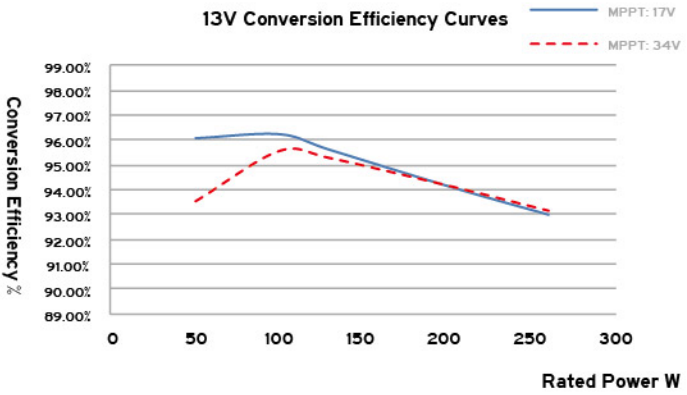
Model	Tracer2206AN
Dimension	220x154x52mm
Mounting dimension	170x145mm
Mounting hole size	Ø5mm
Terminal	6AWG
Recommended wire size	10AWG
Net Weight	0.92kg

ANNEX I CONVERSION EFFICIENCY CURVES

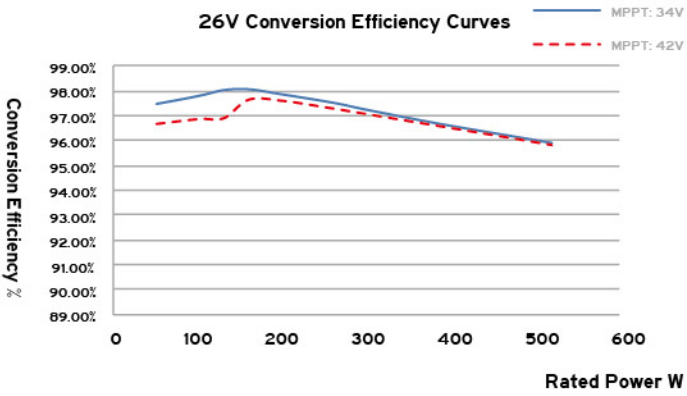
Test condition: Illumination Intensity: 1000W/m² Temperature: 25°C

Model: Tracer2206AN

1. PV array Max. power point voltage (17V, 34V) / system voltage (13V)



2. PV array Max. power point voltage (34V, 42V) / system voltage (26V)



WARRANTY

Our product is guaranteed to be free from quality and manufacturing defects for a period of 36 months.

If your product becomes defective during this period, SRGS PTY LTD will offer you either a replacement, credit or refund where a product is faulty; wrongly described; different from the sample shown to you or do not do what they are supposed to do.

This warranty will not cover substantially modified product; misuse or abuse of the product contrary to user instructions or packaging label; change of mind and normal wear and tear.

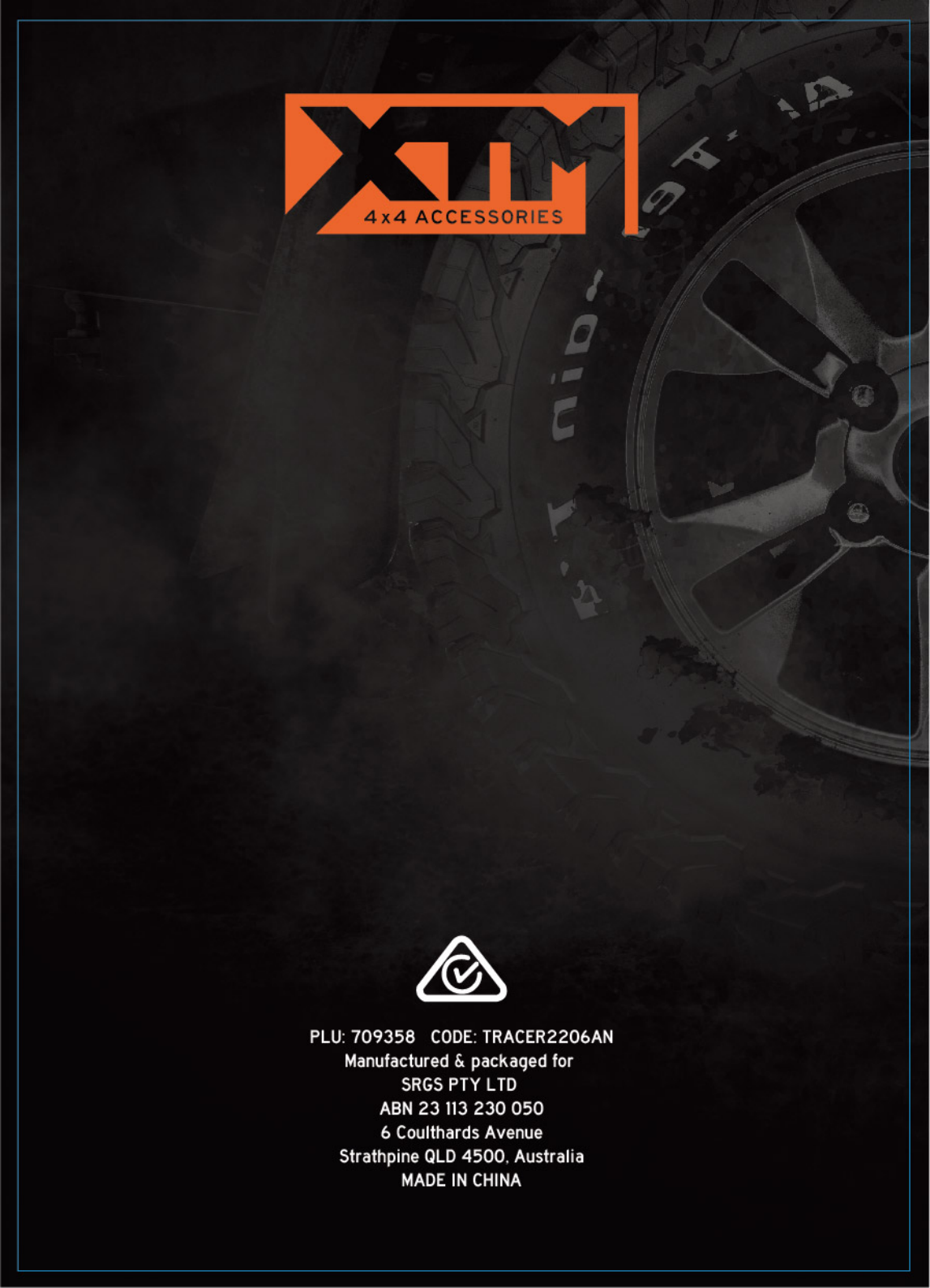
Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and failure does not amount to a major failure.

To claim the warranty, take the product to the front Service Desk of your nearest store of purchase. You will need to show receipt or other proof of purchase. Additional information may be required to process your claim. Should you not be able to provide proof of purchase with a receipt or bank statement, identification showing name, address and signature may be required to process your claim.

Any expenses relating to the return of your product to the store will normally have to be paid by you. For online store purchases, SRGS PTY LTD will pay for the return freight for any product assessed as having a major failure.

The benefits to the customer given by this warranty are in addition to other rights and remedies of the Australian Consumer Law in relation to the goods or services to which this warranty relates.

This warranty is provided by SRGS PTY LTD, 6 Coulthards Avenue, Strathpine QLD 4500, Australia. Phone: 1300 880 764.



PLU: 709358 CODE: TRACER2206AN
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Strathpine QLD 4500, Australia
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