



4IN1 BATTERY TESTER

Suitable for all types of 12V lead-acid batteries

USER MANUAL

**12V
5A**



- ⚡ 8-step smart charging function
- ⚡ Full function of battery tester
- ⚡ Vehicle cranking system test
- ⚡ Vehicle alternator system test
- ⚡ Built-in automatic temperature compensation

TABLE OF CONTENTS

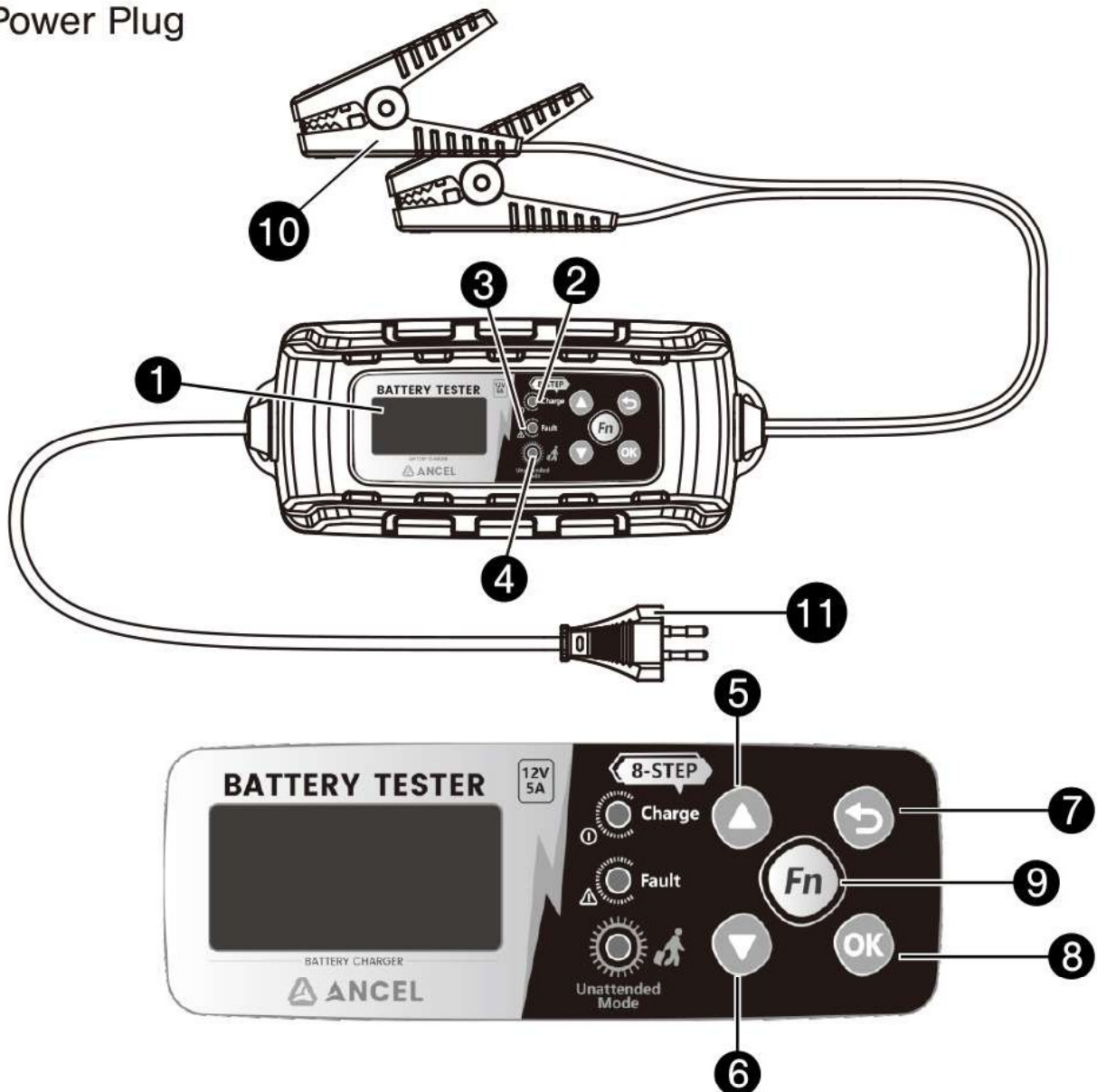
1. PRODUCT OVERVIEW	1
2. PRODUCT APPEARANCE	2
3. UNATTENDED MODE	3
4. SAFETY	4
5. CONNECT TO USE	
5.1 Connect the charger to the battery	5
5.1 Connect the charger to a power outlet	6
6. BATTERY CHARGE	
6.1 Quick Charging	7
6.2 Standard Charging	8
6.3 Charging Mode	8
6.4 Charging Mode Description	9
6.5 Charging Time	10
6.6 Indicator Light Description	10-11
6.7 Description of 8-Step Charging	12-14
7. BATTERY TEST	15-18
8. SYSTEM TEST	18-20
9. REVIEW DATA	21-22
10. SETUP	23-26
11. TECHNICAL SPECIFICATIONS	27-29

1. PRODUCT OVERVIEW

- (1) 8-step smart charger, which can charge various 12V lead-acid batteries.
- (2) Test the CCA value and health status of the 12V lead-acid battery.
- (3) Test the cranking system and alternator system of the vehicle.
- (4) The shortcut key “Fn” can be set to battery one-key quick test or one-key quick charging function.
- (5) The maximum charging current can be set to 5A/3A/1A.
- (6) Smart Unattended Mode, which can stay connected for a long time.
- (7) A maintainer mode is provided to continuously charge the battery with a maximum charging current of 0.8A.
- (8) Provides battery repair mode.
- (9) With IP65 waterproof, the charger can be used in wet environment.
- (10) The output power is automatically reduced when the charger temperature is too high.
- (11) Built-in high and low temperature compensation mechanism, automatically start winter or summer working mode.
- (12) Built-in overvoltage, overcurrent, overheating and reverse polarity protection functions, anti-overcharge, anti-overdischarge.

2. PRODUCT APPEARANCE

- 1 Display
- 2 Charging Indicator Light
- 3 Fault Indicator Light
- 4 Unattended Mode Indicator Light
- 5 Up Key
- 6 Down Key
- 7 Back Key
- 8 OK Key
- 9 Fn key - can be set to one-key quick test or one-key quick charging function.
- 10 Red/Black Clamps:
Connect the red clamp to the positive pole (+) of the battery.
Connect the black clamp to the negative pole (-) of the battery.
- 11 Power Plug



* Due to different standards in different regions, the power plug may be different from the picture.

3. UNATTENDED MODE



Unattended mode is suitable for charging when the charger is connected to the battery and left unattended for a long period of time, which can last for several months.

With the unattended mode, the charger will work with up to 50% power consumption. Allowing the charger to work under a small load can reduce heat generation and ensure the charger works safely for a long time.

In unattended mode, the battery is always ready to use. The charger will automatically monitor the battery, keep the power within the optimal range, and ensure that the battery will not be overcharged or overdischarged.

This mode greatly extends battery life compared to not using the battery for a long time.

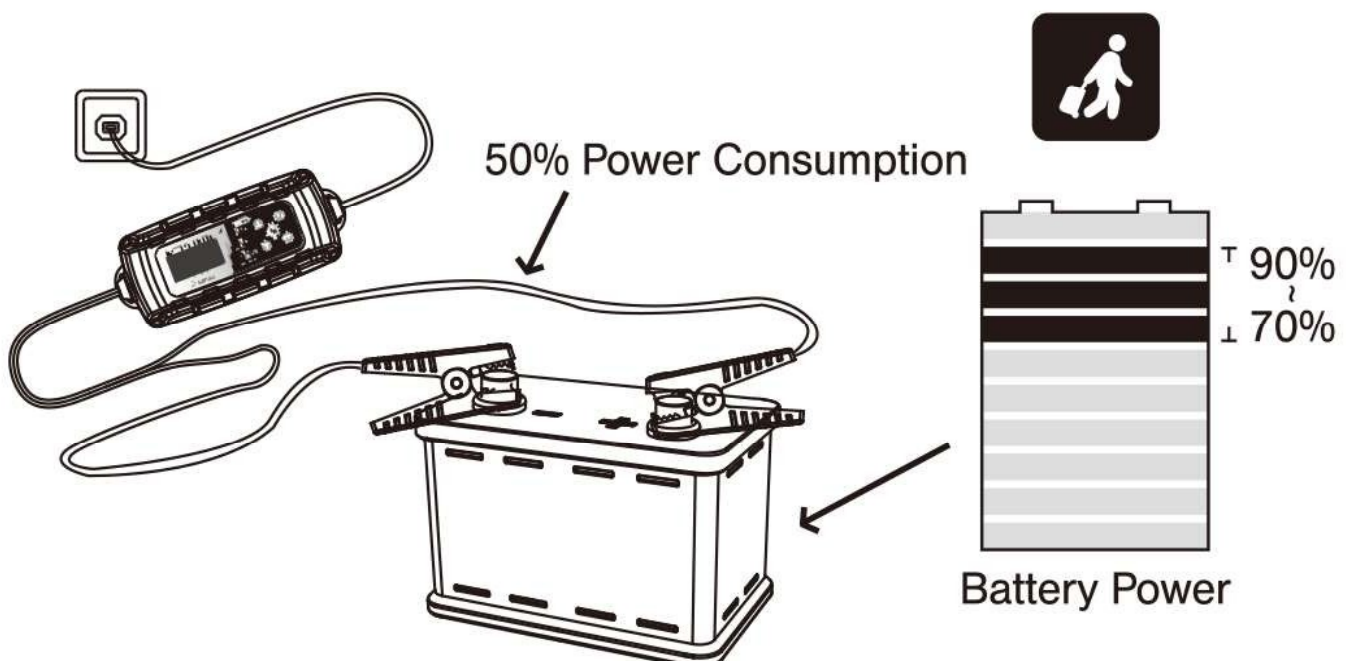
Note: The optimal range of power is suggested by the battery manufacturer, and the ranges of WET lead-acid batteries and AGM batteries are not the same.

Different SoH (State of Health) batteries have different corresponding voltages.

How to select Unattended Mode

When the 8-step charging is completed for one round, it will automatically enter the unattended mode, and the unattended mode indicator light will be on at this time.

In unattended mode, the charger will use 5-step charging, and the three steps of “STEP6” “STEP7” “STEP8” will automatically stop.



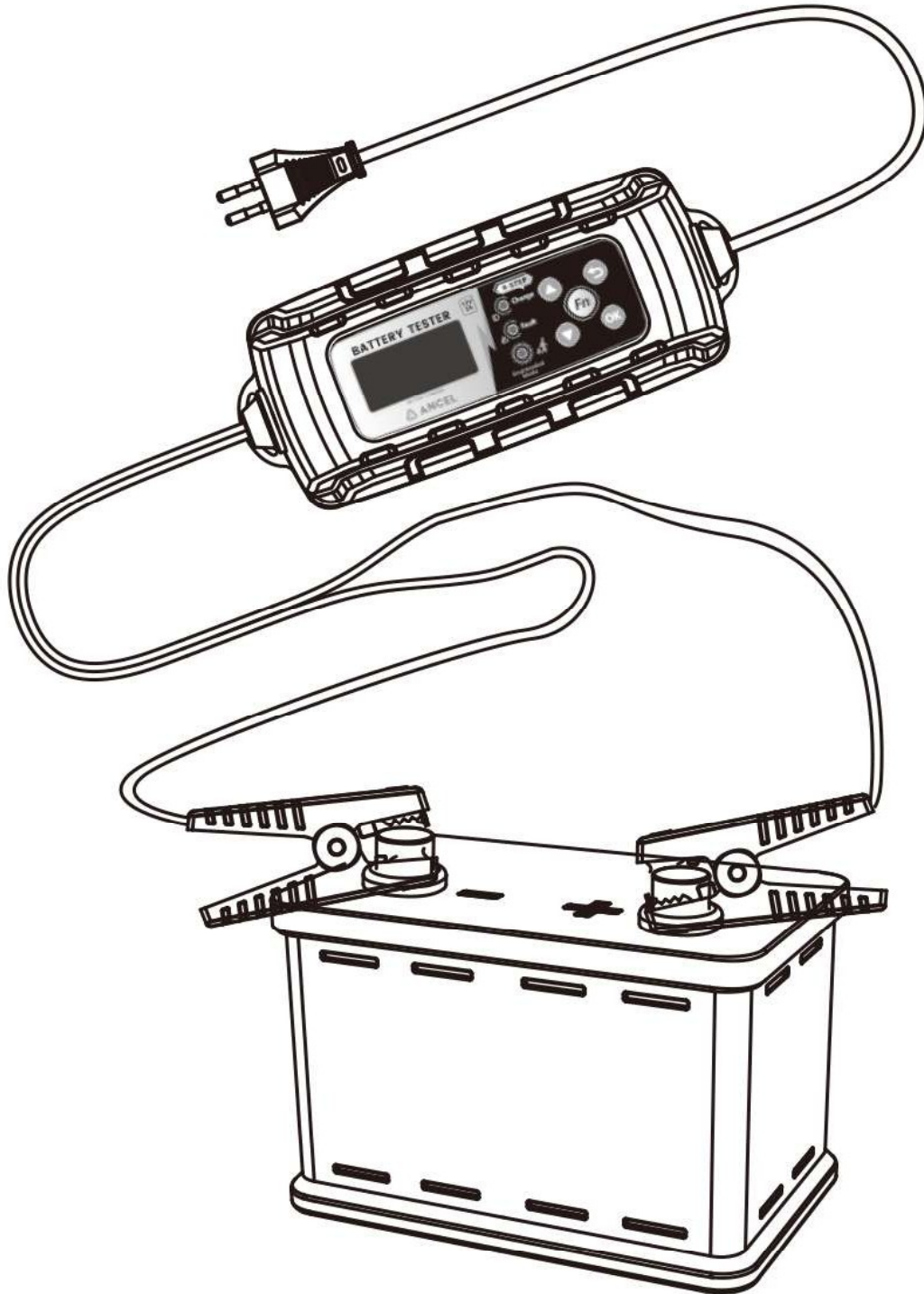
4. SAFETY

- (1) Connecting to the power supply must comply with the relevant national regulations on electrical installations.
- (2) The charger is only used to charge batteries that meet the specifications. Please do not use this charger for any other purpose. Always follow the battery manufacturer's recommendations.
- (3) Never attempt to charge non-rechargeable batteries.
- (4) Please check the power cord of the charger before use to make sure there are no cracks on the power cord.
- (5) Never charge a damaged battery.
- (6) Never charge a frozen battery.
- (7) Never place the charger on top of the battery while charging.
- (8) Ensure adequate ventilation during charging.
- (9) Do not cover the charger.
- (10) Do not immerse the charger in water.
- (11) A charging battery may emit explosive gases. Smoking is strictly prohibited near the battery. When the battery is near the end of its life, sparks may be generated inside.
- (12) Make sure the power cord is not kinked, or in contact with hot surfaces or sharp edges.
- (13) Battery acid is corrosive. If acid comes into contact with skin or eyes, wash with water immediately and seek medical attention as soon as possible.
- (14) Batteries consume water during use and charging. For water-refillable batteries, the water level should be checked regularly. If the water level is low, distilled water should be added.

5. CONNECT TO USE

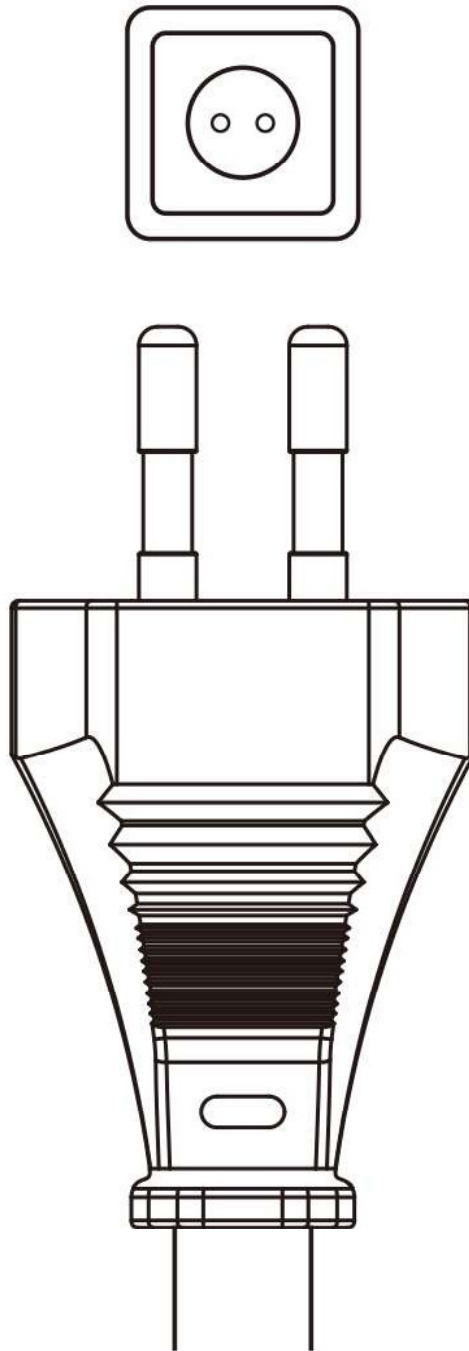
5.1 Connect the charger to the battery

Connect the red clamp to the positive pole (+) of the battery, connect the black clamp to the negative pole (-) of the battery.



5.2 Connect the charger to a power outlet

Insert the power plug into the AC outlet, then the display will show patterns and text.

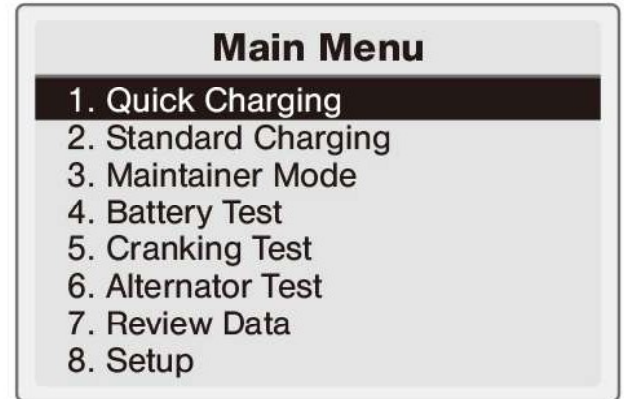


* Note: For starting and charging tests only, the power plug can be plugged into a power outlet or not.

6. BATTERY CHARGE

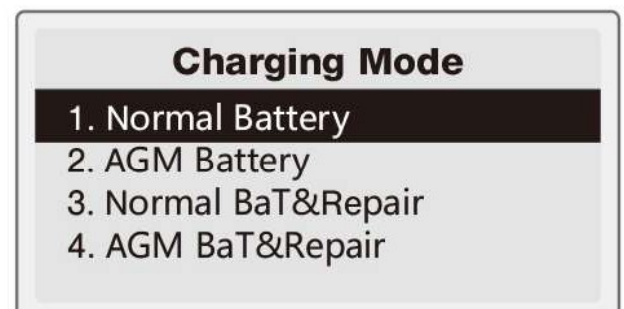
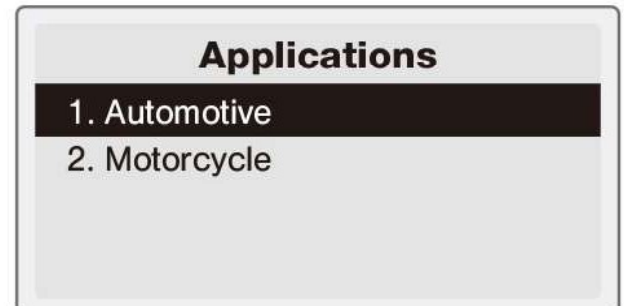
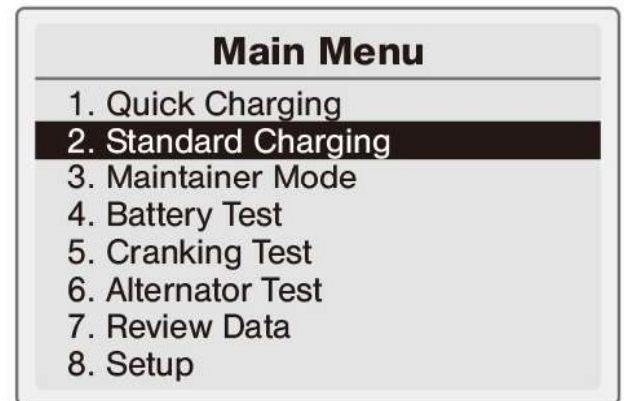
6.1 Quick Charging

- Select Quick Charging and press the OK key to confirm.
Quick Charging uses the mode saved from the previous charge.



6.2 Standard Charging

- Select Standard Charging and press the OK key to confirm.
- Use the up/down key to select the Automotive or Motorcycle battery, press the OK key to confirm.
- Use the up/down key to select the Charging Mode, press the OK key to confirm.

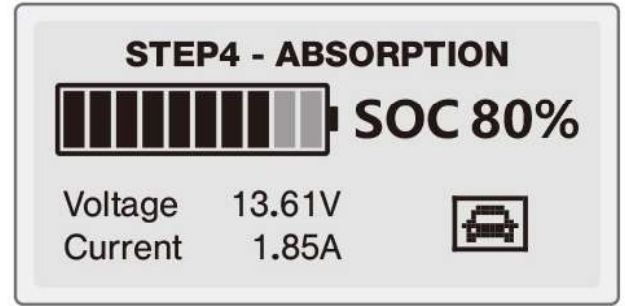


- Charging interface displays the steps to charge the battery.

When “STEP4” is displayed, the battery is 80% full.

When “STEP5” is displayed, the battery is almost fully charged.

















When “STEP6” is displayed, the battery is fully charged.



Charging Interface

- Charging interface display the percentage of the battery charged in real time.
- Charging interface display voltage and current in real time.





6.3 Charging Mode

Mode	Programs
	Small capacity battery charging mode
 	Small capacity AGM battery charging mode
 	Small capacity battery charging mode + Repair mode
  	Small capacity AGM battery charging mode + Repair mode
	Normal battery charging mode
 	Normal AGM battery charging mode
 	Normal battery charging mode + Repair mode
  	Normal AGM battery charging mode + Repair mode

The charging mode will be saved automatically, and the last charging mode will be defaulted when the charger is used next time.






Note: When the Repair mode is selected, the repair time will be up to several hours.

6.4 Charging Mode Description (5A Charging Current Selection)

Mode	Battery Capacity (Ah)	Programs	Temperature Range
	1.2-14 Ah	<p>Small capacity battery charging mode 0.8A Use for smaller batteries.</p>	-20°C~75°C (-4°F~167°F)
	14-160 Ah	<p>Normal battery charging mode 5A Use for normal (WET), Ca/Ca, maintenance-free, GEL and various AGM (Absorbent Glass Mat) batteries.</p>	-20°C~75°C (-4°F~167°F)
		<p>AGM Option Use for charging AGM batteries.</p>	-20°C~75°C (-4°F~167°F)
		<p>Repair Mode Used to restore the capacity of a fully discharged normal Ca/Ca battery. After the battery is deeply discharged, it is recommended to select the Repair mode to maximize the service life and restore the original capacity. Selecting Repair mode will add step6 to the charging mode. It is recommended to repair the battery once a year. Frequent use of the Repair mode may cause water loss in the battery.</p>	-20°C~75°C (-4°F~167°F)

6.5 Charging Time (5A Charging Current Selection)

The table shows the approximate time to charge a fully discharged battery to 80% capacity.

	Battery Capacity (Ah)	Time to charge to 80%
	2Ah	2 hours
	8Ah	8 hours
	20Ah	4 hours
	60Ah	12 hours
	110Ah	26 hours

6.6 Indicator Light Description

• Error Light

If the error light is on, check the following items:



- 1. Is the positive clamp of the charger connected to the positive terminal of the battery ?**
- 2. Is the charger connected to a 12-volt battery ?**
- 3. Has charging been interrupted in step1 ?**
The battery is severely sulfurized and may need to be replaced.
- 4. Has charging been interrupted in step2 ?**
The battery cannot be charged and may need to be replaced.
- 5. Has charging been interrupted in step5 ?**
The battery cannot hold power and may need to be replaced.

• Charging Light



1. **Steady Light**
Charging the battery
2. **Off**
Battery not charging


• Unattended Mode



1. **Steady Light**
After the first round of 8-step charging is completed, the unattended mode is automatically turned on. The battery is always ready to use when this indicator light is on.
2. **Off**
Not enter unattended mode

6.7 Description of 8-Step Charging (5A Charging Current Selection)

Voltage (V) Current (A)				
	1 Desulphation	2 Soft Start	3 Bulk	4 Absorption
	15.8V	0.8A, Until 12.6V	Increasing voltage to 14.4V 0.8A	Declining current 14.4V
	15.8V	0.8A, Until 12.6V	Increasing voltage to 14.7V 0.8A	Declining current 14.7V
	15.8V	0.8A, Until 12.6V	Increasing voltage to 14.4V 0.8A	Declining current 14.4V
	15.8V	0.8A, Until 12.6V	Increasing voltage to 14.7V 0.8A	Declining current 14.7V
	15.8V	5A, Until 12.6V	Increasing voltage to 14.4V 5A	Declining current 14.4V
	15.8V	5A, Until 12.6V	Increasing voltage to 14.7V 5A	Declining current 14.7V
	15.8V	5A, Until 12.6V	Increasing voltage to 14.4V 5A	Declining current 14.4V
	15.8V	5A, Until 12.6V	Increasing voltage to 14.7V 5A	Declining current 14.7V
Time limit:	Max 8 hours		Max 20 hours	Max 10 hours

	5 Analyse	6 Repair Mode	7 Float	8 Pulse	
Checks if voltage drops to 12V			13.6V 0.8A	12.7V-14.4V 0.8-0.3A	
Checks if voltage drops to 12V			13.6V 0.8A	12.7V-14.7V 0.8-0.3A	
Checks if voltage drops to 12V	Max 15.8V 0.3A		13.6V 0.8A	12.7V-14.4V 0.8-0.3A	
Checks if voltage drops to 12V	Max 15.8V 0.3A		13.6V 0.8A	12.7V-14.7V 0.8-0.3A	
Separator					
Checks if voltage drops to 12V			13.6V 5A	12.7V-14.4V 5-2A	
Checks if voltage drops to 12V			13.6V 5A	12.7V-14.7V 5-2A	
Checks if voltage drops to 12V	Max 15.8V 1.5A		13.6V 5A	12.7V-14.4V 5-2A	
Checks if voltage drops to 12V	Max 15.8V 1.5A		13.6V 5A	12.7V-14.7V 5-2A	
3 minutes		2 hours or 6 hours		Max 10 days (Charge cycle restarts if voltage drops)	

STEP1 Desulphation

Detects sulphated batteries. Pulsing current and voltage, removes sulphate from the lead plates of the battery restoring the battery capacity.

STEP2 Soft Start

Tests if the battery can accept charge. This step prevents that charging proceeds with a defect battery.

STEP3 Bulk

Charging with maximum current until approximately 80% battery capacity.

STEP4 Absorption

Charging with declining current to maximize up to 100% battery capacity.

STEP5 Analyse

Tests if the battery can hold charge. Batteries that cannot hold charge may need to be replaced.

STEP6 Repair Mode

Choose the Repair mode to add the Repair step to the charging process. During the Repair step voltage increases to create controlled gassing in the battery. Gassing mixes the battery acid and gives back energy to the battery.

STEP7 Float

Maintaining the battery voltage at maximum level by providing a constant voltage charge.

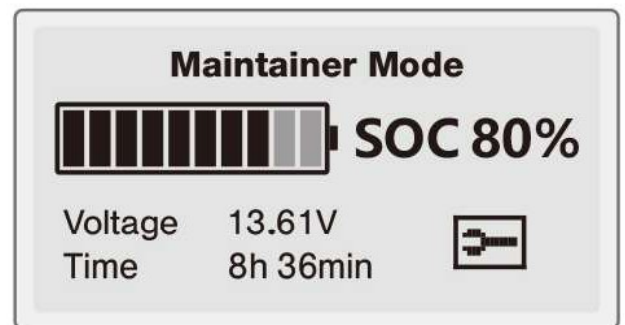
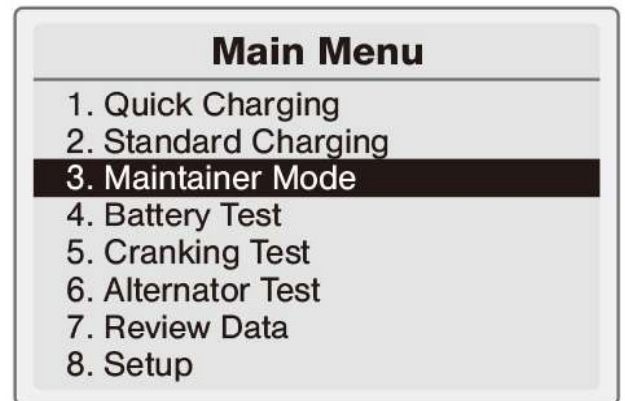
STEP8 Pulse

Maintaining the battery at 95–100% capacity. The charger monitors the battery voltage and gives a pulse when necessary to keep the battery fully charged.

7. MAINTAINER MODE

- Select Maintainer Mode and press the OK key to confirm.
- In maintainer mode, the charging function will not be disconnected regardless of whether the battery is fully charged, and the battery will be charged continuously with a maximum charging current of 0.8A.

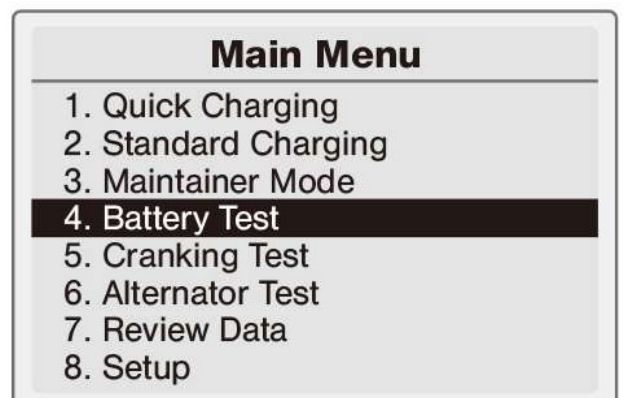
Note: The red/black alligator clips cannot be shorted in maintenance mode.



8. BATTERY TEST

Battery Test

- Select Battery Test and press the OK key to confirm.



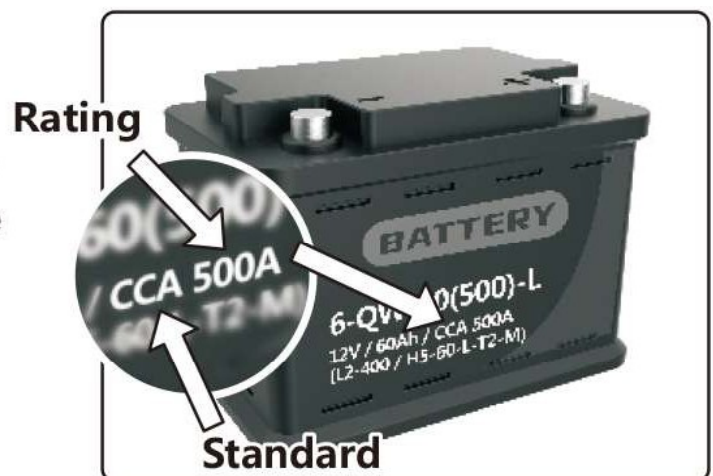
Select Battery Type

- After entering Battery Test, the tester will prompt to select Battery Type, i.e. Regular Flooded, AGM Flat Plate or AGM Spiral, Gel and EFB battery. Press up/down key to select Battery Type, then press OK key to confirm.

Battery Type
1. Regular Flooded
2. AGM Flat Plate
3. AGM Spiral
4. GEL
5. EFB

Select battery standard and rating

- For battery standards and ratings, please refer to the arrow position in the right figure.
- Different battery manufacturers may have different placements, if you are unsure, please contact the battery manufacturer or seller.



CCA: Cold Cranking Amps, specified by SAE&BCI, most frequently used value for starting battery at 0°F (-18°C).

BCI: Battery Council International Standard.

CA: Cranking Amps Standard, effective starting current value at 0°C.

MCA: Marine Cranking Amps Standard, effective starting current value at 0°C.

JIS: Japan Industrial Standard, displayed on the battery as combination of the numbers and letters, e.g. 55D23,80D26.

DIN: German Auto Industry Committee Standard.

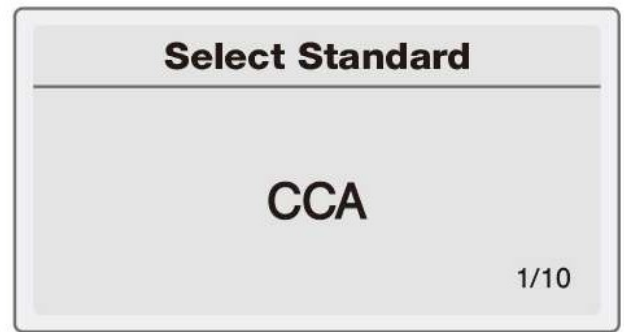
IEC: Internal Electro Technical Commission Standard.

EN: European Automobile Industry Association Standard.

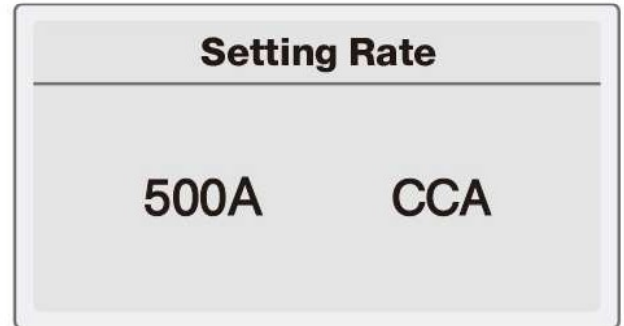
SAE: Society of Automotive Engineers Standard.

GB: China National Standard.

- Select the battery standard and press the OK key to confirm.



- Enter the battery rating and press the OK key to confirm.



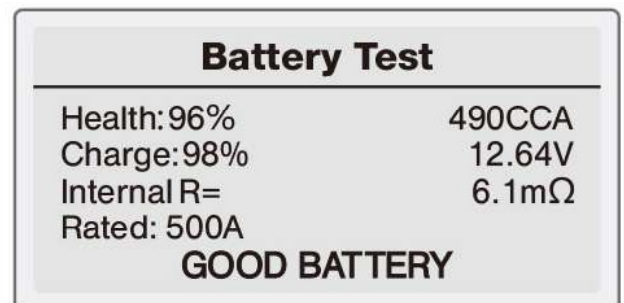
The “TESTING” interface is displayed during the test, and the test result will be displayed after a few seconds.

BATTERY TEST RESULT

Battery test result includes 5 types as following.

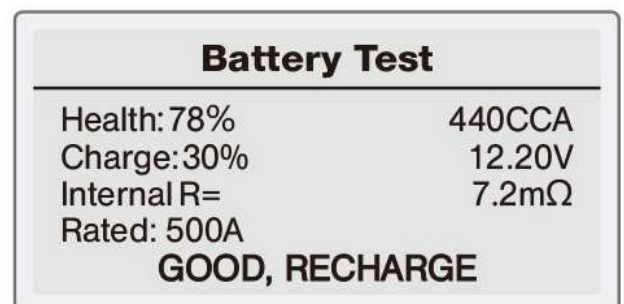
① GOOD BATTERY

- The battery is without any problem, please be relaxed to use.



② GOOD, RECHARGE

- Good battery but low power, recharge before using.



③ REPLACE

- The battery is near to or already reached the end of the using life, replace battery, otherwise, bigger trouble will be followed.

Battery Test	
Health:46%	340CCA
Charge:80%	12.68V
Internal R=	18.1mΩ
Rated: 500A	
REPLACE	

④ CHARGE & RETEST

- Low power leads to inaccurate results, please test after charging.

Battery Test	
Health:39%	310CCA
Charge:20%	12.08V
Internal R=	30.01mΩ
Rated: 500A	
CHARGE & RETEST	

⑤ BAD CELL

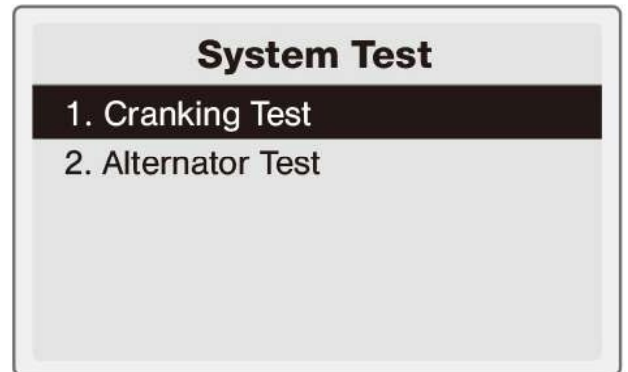
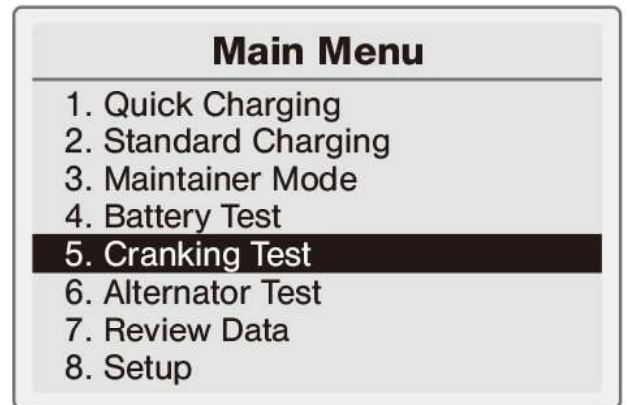
- There has been a bad cell inside the battery and needs to be replaced.

Note: The inside of the 12V lead-acid battery is composed of 6 cells of 2V units in series, and the bad cell is that at least one cell has been short-circuited and damaged.

Battery Test	
Health:0%	0CCA
Charge:20%	10.64V
Internal R=	45.2mΩ
Rated: 500A	
BAD CELL	

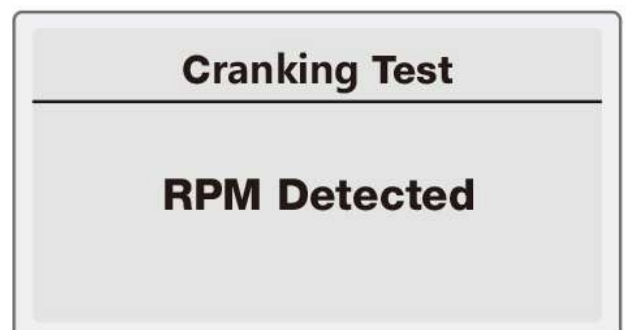
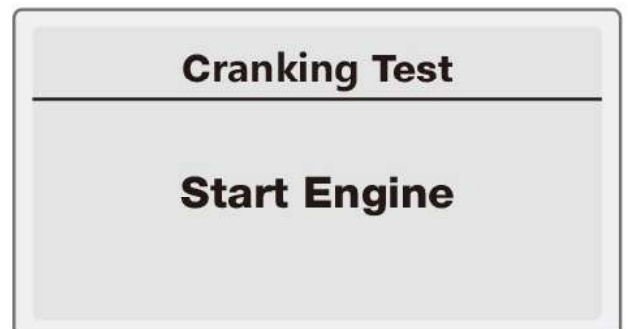
9. CRANKING TEST

- Select Cranking Test and press the OK key to confirm.



Note: Before selecting Cranking test, the engine is turned off.

- Follow the prompts to start the engine.



- Display the test results, which are the start-up duration, start-up status, and start-up voltage.

Cranking Test	
Time:	500ms
Cranking:	Normal
10.00V	

10. ALTERNATOR TEST

- Select Alternator Test and press the OK key to confirm.
- Do not turn off the engine during the test, follow the on-screen guidance.

Main Menu
1. Quick Charging
2. Standard Charging
3. Maintainer Mode
4. Battery Test
5. Cranking Test
6. Alternator Test
7. Review Data
8. Setup

Ripple Test
Turn off headlights and air conditioner, keep 10 seconds. Press OK continue.

Unload Test
Increase RPM to 2500-3000r/min and keep it 10 seconds. Press OK continue.

load Test
Turn on headlights and air conditioner to the max wind, keep RPM idle for 10s. Press OK continue.

- Display test results, which are load voltage, unload voltage, ripple voltage and charging status.

Note: “NO OUTPUT” means that the charging system has no output. When the battery power is exhausted, the vehicle will stop working. Check the alternator immediately or contact a service center.

Note: Does not support testing smart alternators.

Alternator Test	
Loaded	12.39V
Unloaded	12.41V
Ripple	15mV
NORMAL	

11. REVIEW DATA

Review Data

- Can view the historical data of Charging Record, Battery Test, Cranking Test and Alternator Test.

Charging Record

Battery Test

Main Menu

1. Quick Charging
2. Standard Charging
3. Maintainer Mode
4. Battery Test
5. Cranking Test
6. Alternator Test
- 7. Review Data**
8. Setup

Review Data

- 1. Charging Record**
2. Battery Test
3. Cranking Test
4. Alternator Test

STEP4 - ABSORPTION



Voltage 13.61V
Current 1.85A



Review Data

1. Charging Record
- 2. Battery Test**
3. Cranking Test
4. Alternator Test

Battery Test

Health: 96% 490CCA
Charge: 98% 12.64V
Internal R= 6.1mΩ
Rated: 500A
GOOD BATTERY

Cranking Test

Review Data

1. Charging Record
2. Battery Test
- 3. Cranking Test**
4. Alternator Test

Cranking Test

Time:	500ms
Cranking:	Normal

10.00V

Alternator Test

Review Data

1. Charging Record
2. Battery Test
3. Cranking Test
- 4. Alternator Test**

Alternator Test

Loaded	12.39V
Unloaded	12.41V
Ripple	15mV

NORMAL



12. SETUP

Setup

- Select Setup and press the OK key to confirm.

Fn

- Can set the shortcut key “Fn” to Quick Charging or Battery Test mode.

Main Menu

1. Quick Charging
2. Standard Charging
3. Maintainer Mode
4. Battery Test
5. Cranking Test
6. Alternator Test
7. Review Data
8. Setup

Setup

1. Fn
2. Charging Current
3. Language
4. Contrast
5. Beep
6. Tool Information

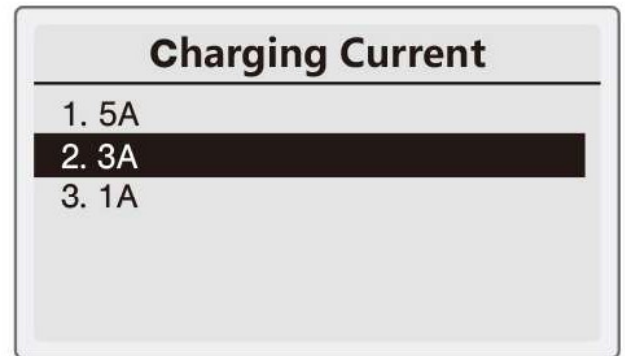
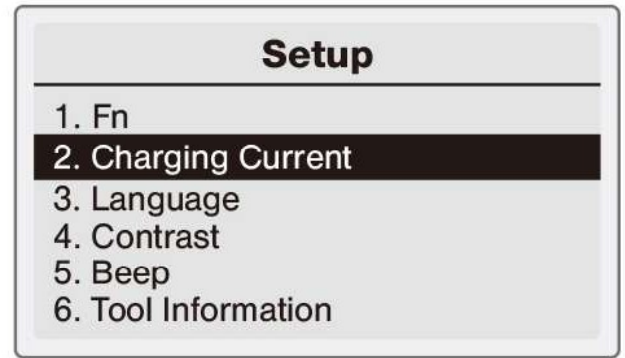
Fn

1. Quick Charging
2. Battery Test
3. Voltage

Charging Current

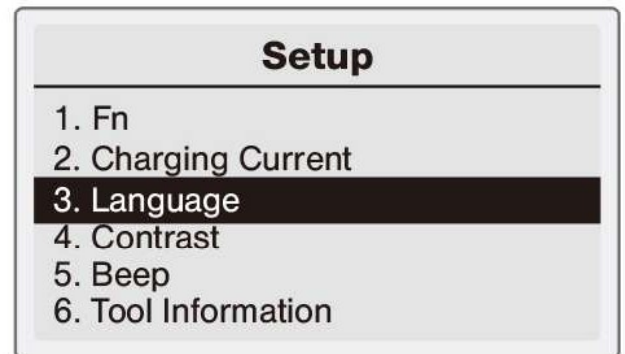
- Select max Charging Current and press the OK key to confirm.

The selected current will become the maximum current of the charge.



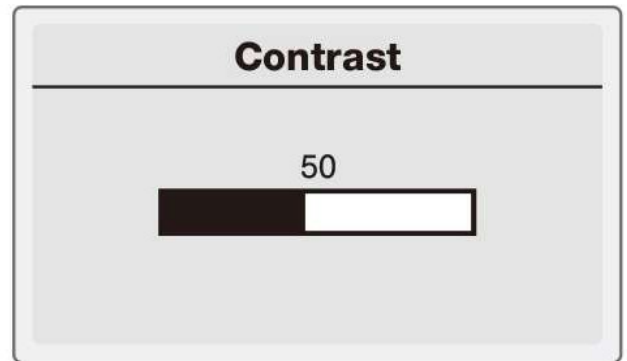
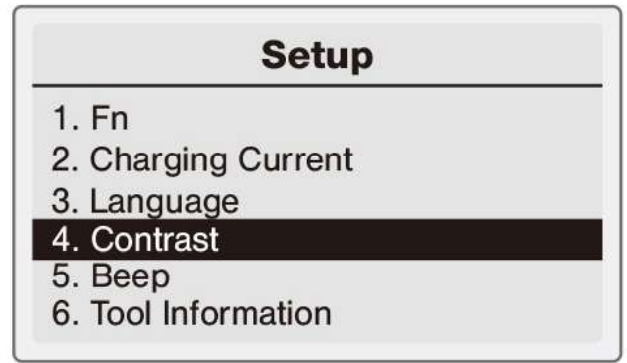
Language

- Select Language and press the OK key to confirm.



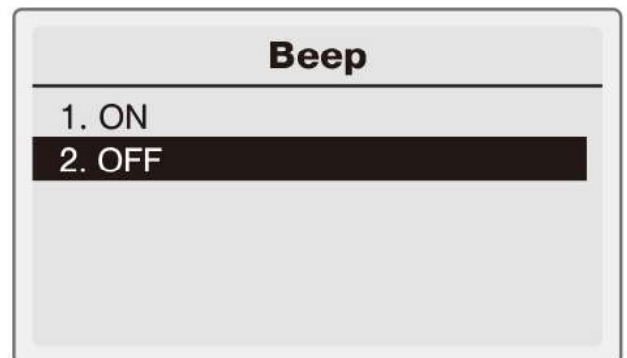
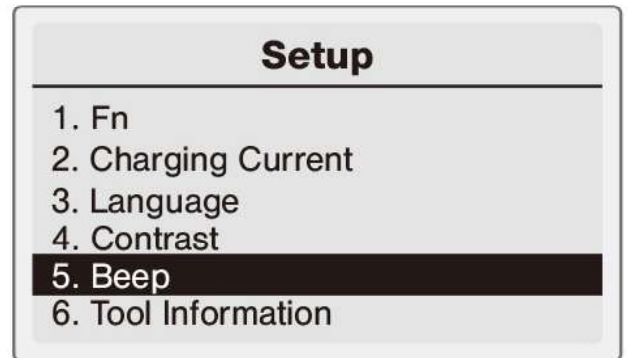
Contrast

- Select Contrast and press the OK key to confirm.



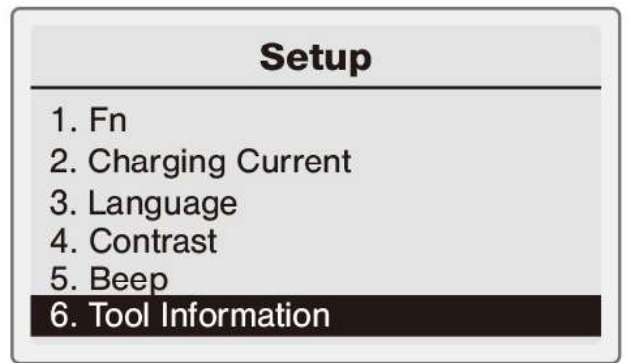
Beep

- The status of the buzzer can be set to ON or OFF, press the OK key to confirm.







Tool Information

- From system Setup menu, use OK key to select Tool Information.
- Press the back key to return to the previous menu.



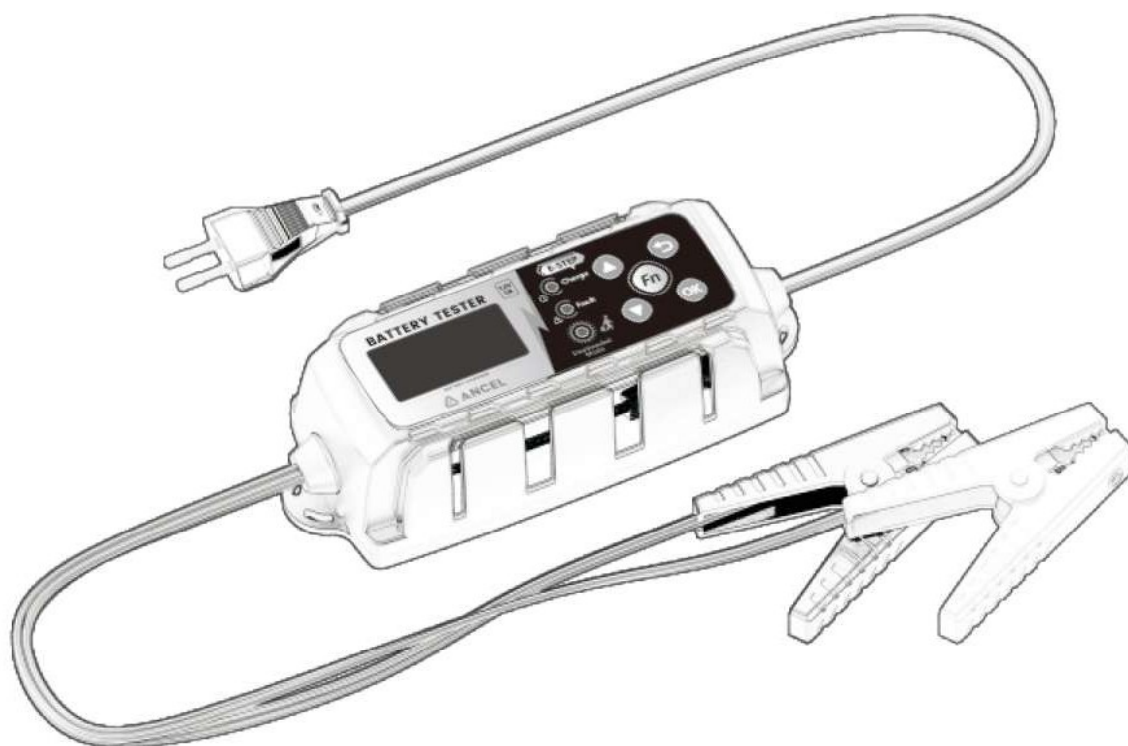
13. TECHNICAL SPECIFICATIONS

Input	100-240V~AC/50-60Hz
Charging Voltage	  14.4V  14.7V  15.8V Float 13.6V
Minimum Battery Voltage	2V
Maximum Current Selection	5A, 3A, 1A
Max Current of Unattended Mode	2.5A, 1.5A, 0.5A
AC Input Current	1.25A rms (At maximum charging current)
Reverse Leakage Current *	< 60mA/h
Ripple *	< 4%
Working Temperature	-20°C~70°C (-4°F~158°F)
Safety	Overvoltage protection、 overcurrent protection overheat protection、 reverse connection protection anti-overcharge、 anti-overdischarge
Charging Type	8-step, fully automatic charging cycle
Battery Type	All types of 12V lead-acid batteries (WET, MF, Ca/Ca, AGM and GEL)
Battery Capacity	1.2-160Ah
Dimensions	(L)190 x (W)74 x (H)58mm
Protection Class	IP65
Weight	580g
Temperature Compensation	Built-in charging voltage compensation according to ambient temperature

- Reverse leakage current refers to the current consumed by the battery when the charger is not connected to the AC power.
- The quality of charging voltage and charging current is very important. High ripple currents will heat up the battery, exacerbating the aging of the positive electrode. High ripple voltage may damage other equipment connected to the battery. The charger generates very clean voltage and current with low ripple.

Cold Cranking Amps Measure Range

Measure Standard	Description	Measure Range
CCA	Cold Cranking Amps	100-2000
BCI	Battery Council International Standard	100-2000
CA	Cranking Amps Standard	100-2000
MCA	Marine Cranking Amps Standard	100-2000
JIS	Japan Industrial Standard	26A17-245H52
DIN	German Auto Industry Committee Standard	100-1400
IEC	Internal Electro Technical Commission Standard	100-1400
EN	European Automobile Industry Association Standard	100-2000
SAE	Society of Automotive Engineers Standard	100-2000
GB	China National Standard	30-220Ah



BT521