

Model: 52489

INSTRUCTION MANUAL 6V 12V 24V BATTERY TESTER

INTRODUCTION

Thank you for your trust and for choosing our tester. We are confident that the product will meet your expectations. This manual contains instructions for the installation and use of the product, including important safety instructions for correct operation and installation. If you have any questions after reading this manual, please contact our Customer Service Department.

INFORMATION ABOUT THIS MANUAL

This manual describes, installation, operation and troubleshooting of this appliance. Please read all the information in it carefully before installing and operating the unit.

SAFETY INSTRUCTIONS

This manual contains guidelines on the use of the appliance, safe operating procedures and maintenance methods. Failure to comply with these recommendations may lead to damage to the appliance. The appliance has been designed and manufactured in accordance with the applicable standards.

- 1. Battery terminals, terminals and other accessories may contain lead, lead compounds or other harmful substances. In the event of contact with these substances, immediately flush the skin with water.
- 2. Batteries contain hazardous chemicals that can cause burns or explosions.
- 3. The equipment should not be used or stored in conditions of high temperature, humidity, or in environments with an increased risk of explosion or flammability.
- 4. Check the insulation condition of the test terminals before use. Any damage, wire breaks or exposed components must be removed immediately. Special care must be taken during operation.
- 5. If a failure of the device is detected (e.g. mechanical damage, deformation, substance leakage, incomplete display of information, etc.), further use of the device is prohibited.
- 6. Although the voltage of the car battery is lower than the voltage considered to be dangerous, measurements should be taken at a distance from the jaws of the test terminals to minimise the risk of electric shock.
- 7. Modification of the internal wiring or the way the terminals are connected is not permitted to avoid damage to the unit.

- 8. When testing or repairing a vehicle, use approved eye protection to minimise the risk of injury from foreign objects ejected by the engine.
- 9. Operation and maintenance of the vehicle should take place in a wellventilated room to prevent the inhalation of harmful gases.
- 10.Do not place test equipment or accessories near a running engine or exhaust system, as high temperatures can damage them.
- 11.Follow the manufacturer's recommendations, warnings and repair procedures when carrying out repairs to the vehicle.
- 12.When the battery is fully charged, the voltage may be temporarily higher than normal. To obtain a correct measurement, switch on the headlights for 2-3 minutes and wait for the voltage to stabilise before taking a measurement.
- 13. The device has no internal battery; it is powered directly by the battery under test.

ABOUT THE PRODUCT

The professional battery analyser is a tool for testing the performance and working condition of vehicle batteries, as well as the starting, charging and electrical load processes. The battery tester features an ergonomic design, simple operation and a full range of functions. The device is equipped with a 2.8-inch high-resolution colour display with backlighting, enabling the testing process and results to be clearly displayed on the TFT screen. The tester uses a four-wire Kelvin test connection. The unit's design has been enhanced with additional protections against incorrectly connected signal wires, polarity reversal, high voltage and poor contact of the test terminals, increasing safety and convenience of use. The product can be used in systems handling different types of lead-acid batteries, such as automotive battery manufacturing, battery distribution and automotive parts service. It is an ideal tool for testing the performance of lead-acid batteries.

CONSTRUCTION OF THE DEVICE

Illustration 1 in the appendix

- 1. Display Visual screen, 320 x 240 resolution, TFT colour display.
- 2. OK button Confirm the selected option and enter the function.
- 3. Down button Used to select between screens, allowing you to scroll down and up functions.

- 4. Up button Allows you to select between screens, scroll up and 5. down functions.
- 5. Back button Cancels a selection, reverses or returns to the previous screen.
- 6. USB interface Connects the device to the computer. A portable drive appears on the screen. Simply copy and paste the update file to complete the update process.
- 7. Up + Down buttons Screenshot function (the device stores up to 10 images).

FUNCTIONALITIES AND DESCRIPTION

1. Selection of battery voltage type:

Before starting the test, set the voltage of the battery under test according to its type. Select the 6V test option for a 6V battery; the 12V option for a 12V battery; the 24V option for a 24V battery.

Once you have selected the correct battery voltage, proceed to the next test step.

Example of selection for 12V battery: *Illustration 2 in the appendix*

2. Battery test:

The battery tester offers two types of test settings: Quick Test and Accurate Test.

Quick test: Allows a quick, indicative determination of the inrush current (CCA) of a battery based on its capacity when exact CCA parameters are not available. This method has some reference value, but the results are less precise

Accurate test: The user performs the test by setting the battery's exact CCA parameters as a reference. The results are more precise when the exact factory CCA values of the battery are known.

Note: The factory parameters of the CCA may vary between different battery models and series, even for the same brand and capacity. Therefore, it is recommended to use an accurate test method when you have the exact CCA parameters.

3. Test preparation:

- 1) If the car is running, switch off the engine and turn the ignition key to the "OFF" position.
- After the vehicle has been running for a while, the battery voltage may be slightly higher than the standard value when fully charged. Turn the lights on for 2-3 minutes and wait for the voltage to return to normal before measuring.
- 3) Check the standard inrush current (CCA) parameters on the battery under test and the CCA unit. If there is no such information on the battery, a measurement can be made using the fast local measurement method.
- 4. Operational steps:
 - A. Quick test (Note: The quick test is a simulation of the battery capacity test in AH, its accuracy is lower than the accurate test. It is recommended to use the accurate test!)
 - a) Connect the test terminal to the positive and negative terminals of the battery under test (the test terminals of the unit have no polarity, they can be connected freely). Note: It is important to ensure good contact and avoid catching on extension bars. If there is a metal clamp on the battery terminal, ensure that it makes good contact with the battery terminal or remove the clamp before performing the test.
 - b) Press *Illustration 5 in the appendix* to select the quick test option, then press <OK> to enter the option. As shown in the figure: *Illustration 3 in the appendix*
 - *c)* Press the *Illustration 5 button in the appendix* to adjust the standard battery capacity value in AH for the battery under test. Long press on the *Illustration 5* button *in the appendix* to continuously adjust the value. As shown in Fig: *Illustration 4 in the appendix*
 - d) Once the standard value has been adjusted, press the <OK> button to start the test. Press *Illustration 5 in the appendix* to see the battery life (SOH) and level of charge (SOC) of the battery under test. The test results are as follows: *Illustration 6 in the*
 - B. Thorough test
 - a) Connect the test terminal to the positive and negative terminals of the battery under test (the test terminals of the unit have no

polarity, they can be connected freely). Note: It is important to ensure good contact and avoid catching on extension bars. If there is a metal clamp on the battery terminal, make sure it makes good contact with the battery terminal or remove the clamp before testing.

- b) Press *Illustration 5 in the appendix* to select the in-vehicle test option, then press (OK) to enter the option. (Figure)
- c) Press *Illustration 5 in the appendix* to select the battery test option, then press (OK) to enter the options. *Figure 7 in the appendix*
- d) Select the type of battery to be tested. Press the *Illustration 5* buttons *in the appendix* to select the appropriate type and then press (OK), to confirm the selection (a normal battery is used in the example). *Figure 8 in the appendix*

(This product has a function to protect against an incorrect battery type test, so an incorrect selection will not damage the device).

- e) According to the battery standard, press the *Illustration 5* buttons *in the appendix* to select the corresponding test standard. If the battery complies with the "JIS" standard, you can enter the CCA parameters directly (if known) or select "CCA" as the test standard (after checking in the JIS settings table). After selecting the test standard, press the (OK) button to confirm the selection. *Figure 9 in the appendix*
- f) Based on the standard value marked on the battery under test, press the *Illustration 5* buttons *in the appendix* to adjust the reference value of the battery test standard (using the 500CCA battery as an example). Long presses of the *Illustration 5* buttons *in the appendix* allow continuous adjustment of the value. Illustration 10 in the appendix
- g) After adjusting the standard value, press the <OK> button to start the test. Press the *Illustration 5* buttons *in the appendix* to display the battery life (SOH) and battery capacity (SOC). The test results are as follows: *Illustration 11 in the appendix*
- 5. After adjusting the standard value, press the <OK> button to start the test. Press *Illustration 5 in the appendix* to see the battery life (SOH) and level of charge (SOC) of the battery under test. Description of the battery test results:

Normal test results as shown in the figure: *Figure 12 in the appendix*

6. Battery voltage:

12.74V - Normal voltage.

Under normal conditions, when the car battery is not under load (the engine is switched off), the voltage should be between 12.30V and 13.00V. The optimum voltage is within this range. If the voltage is lower than 12.30V, this may indicate a loss of power or mean that the battery is ageing.

BATTERY VOLTAGE	BATTERY VOLTAGE VOLUME (SOC)	DESCRIPTION
12.78V	100%	Charged
12.54V	75%	
12.30V	50%	
12.12V	25%	
11.94V	0%	Unloaded

7. CCA value: 500 CCA

The test determines the actual cold cranking ampere (CCA) value of the battery. In general, there is a minimum CCA standard for cars (petrol/diesel), and ideally the battery's CCA value should be higher than the vehicle's required starting standard.

Using the 24V test: the CCA value is equal to 1/2 of the series sum of the two sets of 12V batteries.

8. Internal resistance: 5.66 m Ω

A higher CCA value of the battery usually means a lower internal resistance.

Note: The standard of internal resistance varies according to the materials used by different manufacturers, so there is no single defined standard. However, for batteries of the same model from the same manufacturer, the internal resistance values should not vary too much after leaving the factory.

Using the 24V test: the internal resistance is the sum of the two sets of 12V batteries in series.

Service life: the service life measured and assessed by the device refers to the state of use of the battery under various operating conditions. It is recommended to replace the battery when its service life falls below 45%.

Recommended actions based on test results:

Test results: Battery life is 30% - Battery performance is poor and replacement is recommended. *Illustration 13 in the appendix*

Test results: The battery life is 81%, but the battery voltage is only 12.01V - The battery life is good, but the voltage is low. The battery is in normal condition, but needs charging. *Illustration 14 in the appendix*

Test results: The battery voltage is only 10.85V - The voltage is too low, which may affect the test results. In this case, it is recommended to charge the battery before performing the test. *Figure 15 in the appendix*

CHARGING SYSTEM TEST

1. Pre-test preparation:

If the car is switched off, start the engine before starting the test.

- 2. Operational steps:
 - 1) In the starting condition of the car, connect the test terminals to the battery terminals (the test terminals have no difference between the terminals and can be connected freely). Make sure the contact is good and avoid putting the terminals on the metal frames or bands of the battery. If there is a clamp on the terminal, make sure it is snug or remove it before testing.
 - 2) Press the *Illustration 5* buttons *in the appendix* to select the charge test option and then press (OK) to start the test.

Figure 16 in the appendix

3) Enter the wave test interface. A smaller waveform increase means a more stable voltage.

Illustration 17 in the appendix

4) After 10 seconds on the wave test interface, the device will display the following interface:

Illustration 18 in the appendix

5) After following the steps in step 4, press (OK) for the result of the charge test.

Illustration 19 *in the appendix*

The results of the charging test can be as follows:

- Normal: The battery is charging correctly.
- High voltage: The charging voltage is too high.
- No voltage: The battery is not being charged.
- 3. Charging test instructions:
- If the voltage reading is greater than 15.0V (for a 24V system: greater than 30.00V), check the voltage regulator.
- If the voltage reading is less than 13.3V (for a 24V system: less than 26.60V), check the connection points, wires and motor.

Data reference table (12 V system)		
Status	Battery voltage	Motor output
Need to press the accelerator	14.5 V over	
pedal to check)	13,6~14,5 V	
	13.6 V below	Not

BOOT SYSTEM TEST

1. Pre-test preparation:

If the car is running, switch off the engine and turn the ignition key to the "OFF" position.

- 2. Operational steps:
 - 1) Connect the test terminals to the battery terminals (the test terminals have no difference between the terminals and can be connected freely). Make sure the contact is good and avoid putting the terminals on the metal frames or bands of the battery. If there

is a clamp on the terminal, make sure it is a good fit or remove it before testing.

2) Press the *Illustration 5* buttons *in the appendix* to select the boot test option and then press (OK) to start the test.

Figure 20 in the appendix

3) Once the start-up test has started, the device will display the following interface:

Figure 21 in the appendix

4) After following the steps as instructed, you will receive the result of the start-up load test.

Figure 22 in the appendix

The result of the start-up load test shows: The start-up voltage is 12.76V, the start-up time is 8886 ms and the final result of the start-up capability test is normal.

3. Start-up load test instructions:

- If the start-up voltage reading is greater than 9.6V (for a 24V system: greater than 16V), this means that the start-up system is in good condition.
- If the starting voltage reading is less than 9.6V (for a 24V system: less than 16V), this indicates that the starting system has a problem. Check related parts such as connection points, wires, starters and battery terminals for corrosion.

System Load Test:

1. Pre-test preparation:

If the car is switched off, start the engine.

- 2. Operational steps:
 - 1. After starting the car, connect the test terminals to the battery terminals (the test terminals have no difference, they can be connected freely). Make sure the contact is good and do not clamp on the metal body frame. If there is a metal rim on the battery terminal, make sure it is well seated or test after removing it.

- Press the *Illustration 5* keys *in the appendix* to select the load test, then press < OK > to start the test.
 Figure 23 in the appendix
- 3. Once the load test has started, the device will display the relevant interface. *Figure 24 in the appendix*
- 4. After following the instructions from step 3, press < OK > for the load test result. *Illustration 25 in the appendix*

Example: current test voltage 15.25V, standard voltage 12.50V (for 24V system standard voltage 25.60V), lowest voltage 14.48V.

- 5. Read the lowest voltage value. If it is greater than 12.80V (for a 24V system, more than 25.60V), the load system is normal.
- 3. Description of the loading system:

If the voltage is less than 12.80V (for a 24V system, less than 25.60V), check the condition of the alternator belt and that the wires are not shorted.

WAVE MONITORING FUNCTION:

- 1. Connect the test terminals to the battery terminals (test terminals can be connected as desired). Make sure the contact is good and do not clamp on the metal body frame. If there is a metal rim on the battery terminal, make sure it is well seated or test after removing it.
- In the main menu, press the *Illustration 5* keys *in the appendix* to select the wave monitoring function and then press < OK > to start the test.
 Figure 26 in the appendix
- 3. In the wave monitoring interface, you can track voltage fluctuations live and the device will automatically save the records.
- Example: current test voltage 12.64V, minimum voltage 11.25V, maximum voltage 14.48V.

Figure 27 in the appendix

PLAYBACK FUNCTION:

- 1. In the main menu, press *Illustration 5 in the appendix* to select the playback function and then press < OK > to enter the selection interface. *Figure 28 in the appendix*
- 2. Select the wave playback item and press < OK > to enter the selection. *Illustration 29 in the appendix*

- Press the keys *Illustration 5 in the appendix* to select a stored waveform monitoring record (e.g. WAVEFORM1) and press < OK > to view the playback. *Illustration 30 in the appendix* Note: The first record stored is sequence 1 and the device can store up to 10 records. Once 10 records are exceeded, older records are overwritten.
- 4. When you enter playback, the device will display the corresponding interface. Press < OK > to play again, or < Back > to exit. *Illustration 31 in the appendix*
- 5. To clear saved records, press < .A. > < T >, select the option to clear records and press < OK > to clear all saved records. *Illustration 32 in the appendix*

RECORD MANAGEMENT FUNCTION:

- 1. Viewing records: From the main menu, press *Illustration 5 in the appendix* to select record management, then press < OK > to enter the selection interface. *Illustration 33 in the appendix*
- 2. Select the last test record and press < OK > to display it.
 - a. Figures 34 and 35 in the Annex
 - b. Example: R (resistance) 15.93mΩ; standard CCA 171A; nominal CCA 100A; VOL (voltage) 12.0V; SOH (battery life) 100%; SOC (level of charge) 11%; RESULT: Test after charging.
 - c. Note: Record management only saves the results of the accumulator tests and can only store one record (the most recent test result).
- 3. Deleting records: Press the *Illustration 5* keys *in the appendix* to select the option to delete records and press < OK > to delete.

SETTINGS FUNCTION:

From the main menu, press < .A. > < T > to select settings, then press < OK > to enter the settings. *Illustration 36 in the appendix*.

- Language selection: Enter the language selection interface, press
 .A. > < T > to select the desired language and press < OK > to confirm.
- 2. System self-test:

A) LCD test: Checks the display for dead pixels to avoid incomplete display of content.

B) Keyboard test: Checks that the keys are working properly.

C) Buzzer test: Checks that the notification and key sounds are working correctly.

3. Buzzer: Enter the buzzer interface, press < .A. > < T > to select the on/off option, then press < OK > to confirm. *Illustration 37 in the appendix*

TABLE OF TESTS:

In the main menu, press *Illustration 5 in the appendix* to select the test table and then press < OK > to enter the selection interface. *Figure 38 in the appendix* Press the *Illustration 5* keys *in the appendix* to select the different models to test (e.g. 12V) and press < OK > to complete the test.

Example: the red, yellow and green zones on the left are battery voltage tests; the charging system tests on the right. (The green zone indicates that the charging system is good, while the red zone indicates a problem with the charging system). *Illustration 39 in the appendix*

RESULT	DESCRIPTION	
Green- Good	The battery is in good condition, check the condition	
	of the vehicle's charging system.	
Yellow - Medium	The battery capacity is insufficient, which can mean:	
	The battery is faulty;	
	Part of the battery is undercharged and needs to be	
	recharged.	
Red - Weak	The battery may be damaged or discharged.	

TECHNICAL SPECIFICATIONS

PRODUCT	6/12V Battery test	12 / 24V Battery test
APPLICATION	6V /12V Lead-acid starter battery supports AGM/EFB start/stop	Lead-acid starter battery 12V/24V supports AGM/EFB start/stop
BATTERY CAPACITY	30AH ~200AH	30AH ~ 200AH
CCA MEASUREMENT	100 ~ 2000	100 ~ 2000

VOLTAGE	5V ~ 18V	9V ~ 36V
MEASUREMENT		
OPERATING	-20°C ~ 60°C	-20°C ~ 60°C
TEMPERATURE		
METHOD OF	Four-line Kelvin Test	Four-line Kelvin Test
MEASUREMENT		

FREQUENTLY ASKED QUESTIONS

1. What is the measurement principle of this tester?

Over time, the battery gradually ages. The main reason for this is the ageing of the surface of the battery plates, which prevents further effective chemical reactions. This is the main reason why most batteries stop working. The International Institute of Electrical and Electronics Engineers (IEEE) has formally adopted the conductivity measurement method as one of the standards for testing lead-acid batteries. IEEE Standard 1118-1996 clearly states: "Measuring the conductivity of a battery involves applying an AC signal of known frequency and amplitude to both ends of the battery and then measuring the AC current generated. The AC conductivity value is the ratio of the AC signal in phase with the AC voltage to the AC voltage." This product was developed based on this principle.

2. Do reverse current flows affect the outcome?

All reverse current flows affect the device's test results, so they must be removed before measurement to ensure test accuracy.

3. Does this product accurately predict when the battery will expire?

The internal resistance of a lead-acid battery is complex and includes various components such as ohmic resistance, polarisation and interference effects. These values vary depending on the measurement method and time. There is no strict relationship between internal resistance and battery capacity, so battery life cannot be predicted accurately. However, a sudden increase in internal resistance or a decrease in conductivity indicates that the end of the battery life is approaching.

4. Is the CCA value measured by this product correct?

The CCA is a control standard for battery production. New batteries typically have a higher CCA than the value on the label (by 10% ~ 15%). Over time and with changes in use conditions, the value approaches the label and then falls below it

- 5. What is the difference between the test method for this product and the load test method?
- a) Load test method:

The test forces a large current (40A ~ 80A) through the battery for 2 ~ 3 seconds, measuring the voltage to calculate the internal resistance.

Disadvantages: only high-capacity batteries can withstand this current. High current causes polarisation and can damage the battery electrodes.

b) Product test method:

It uses a constant frequency and a small current, measures the voltage and then calculates the internal resistance.

Advantages: Can measure all batteries, including small capacity batteries. Does not cause significant damage to the battery.

RC (Reserve Capacity):	Measures how long a battery can maintain a minimum voltage of 10.5V with a 25 amp load at 80°F (27°C).
CCA (Cold Start Current):	Determines the maximum current the battery can deliver at 0°F (-18°C) for 30 seconds while maintaining a minimum voltage of 7.2V. A higher CCA means better performance in cold conditions.
CA (starting current):	Similar to CCA, but measured at 32°F (0°C). CA values are usually higher than CCA due to the warmer measurement temperature.
AH (ampere-hour):	Represents the capacity of a battery, calculated as the product of the discharge current and the length of time the battery can maintain a voltage above 10.5V. For example, a battery that

THE MEANING	OF COMMON	ABBREVIATIONS FOR	BATTERY STANDARDS:

	discharges at 20 amps for 20 hours has a capacity of 400 AH.
DIN (German System Standard):	Measures battery performance at 0°F (-18°C), maintaining 9.0V for 30 seconds and 8.0V for 150 seconds.
IEC (International	At 0°F (-18°C), the battery should maintain 8.4V for
Association for	60 seconds at medium current intensity.
Electronics Technology):	
BSR (British Standard	At 0°F (-18°C), the battery should maintain 6.0V for
for Verification):	180 seconds at medium current intensity.
SCI (International	At 0°F (-18°C) to -20°F (-29°C), the battery should
Battery Association):	maintain 7.2V for 30 seconds at medium current intensity.

CONSERVATION

- 1. Keep the tester clean by using a soft, dry cloth to remove dust and dirt. Do not use chemicals.
- 2. Regularly check power cables and connectors for damage such as abrasion, cracks or loose connections.
- 3. Ensure that the vents are clean and not blocked to ensure adequate cooling of the charger.
- 4. Store in a dry, cool place, away from direct sunlight, moisture and heat sources.
- 5. Avoid contact with water or other liquids to prevent electrical damage.

UTILISATION

This product is subject to the regulations for the disposal of electrical and electronic equipment (WEEE). Do not dispose of it with municipal waste. Take it to an electro-waste collection point that provides safe recycling in accordance with GPSR standards. Check where the nearest electro-waste collection points are located.

If you have any questions about disposal, contact the manufacturer or an authorised service centre.

INFORMATION ON WARRANTY AND SERVICING

The product is covered by a 24-month manufacturer's warranty from the date of purchase. The warranty covers any defects in materials and workmanship. Please contact our service department if you have any problems with your device to ensure prompt and professional service. The warranty does not cover damage resulting from misuse, falls, mechanical damage, unauthorised repairs or attempts at disassembly. The warranty is invalid if the housing has been opened or the warranty seal has been removed.

ATTACHMENT







	Test	Items	
6V			
12V			
24V			





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In-vehicle
Battery Test
Charging Test
Startup Test
Load Test

	Select Type
Regt	ular Flooded
AGM	Flat Plate
AGM	Spiral
GEL	
EFB	

	Battery	Туре
CCA		
IEC		
EN		
DIN		
CA		
BCI		
MCA		
SAE		























Charging	Test
Loaded	14.45V
Unloaded	14.63V
Ripple	26mV
Results	Normal





Stε	irt Load	Test
Time		8886ms
Starting	Ability	Normal
Voltage		12.76V





	Load	Test
Current		15.25V
Min		14.48V>12.8V
Load Capa	wity	Good

 Main Menu

 Image: Check
 Image: Check

 Image: Check

 Image:





















Last	Record	
		15.93mΩ
		171A
		100A
		-12.07V
		100%
		11%
Retest	After	Charged
	Last Retest	Last Record Retest After







