Battery System Tester

User Manual

B300

▶ Copyright Information

▶ Safety Rules and Precautions

This manual includes operation instruction and warning. Damage to the meter may occur if it is not operated following the rules in this manual. This tester is designed and produced strictly according to IEC/EN61010–1 safety standard. Also, it reaches double insulation over–voltage standard CATIII 600V and pollution degree 2.

- Available for 12V&24V Starting Battery.
- Working voltage is DC 9V to 18V.
- The voltage value will be highter than the normal situation after the checked battery being fully charged. Please turn on the headlights for 2 to 3 minutes, then check the battery when its voltage value drops to the normal value.
- Check the insulating layer of the clamps before testing. It can only be operated with out any damage, bareness or disconnection. Do not use it when the housing is not covered completely or correctly, which will cause electric shock.
- Do not use or store the tester in the condition of high temperature, high humidity, combustibility, explosion, and strong electromagnetic field.
- Do not modify the internal circuit in order to avoid damage to the tester and danger to the user.
- Wear proper eye mask when testing or repairing in order to avoid objects hitting eyes from the engine.
- Keep the site ventilated when testing or repairing in order to avoid inhaling toxic gas.
- When the engine is running, do not place the tester or accessories besides the engine or the exhaust pipe in order to avoid damage by high temperature.
- Pay attention to the precautions and maintenance procedure from the manufacturer during repairing.

▶ Brief Introduction

- This battery tester is designed for testing the conditions of the 12V&24V lead–acid starting battery, cranking system and charging system.
- It comes with a large 3.2–inch color LCD screen and it supports classic touch– tone to help you read and operate more efficiently. It UTILIZES 4–wire Kelvin method to complete the collection of a series of complicated data for calculating every testing data with a build–in precise circuit and improved digital processor. Moreover, some circuit improvements including polar reversal protection, over–voltage input protection, and loose lead detection, ensure safety and convenience during testing.
- This is a must–have tool in the fields of battery sales,vehicle repair and battery inspection equipment system.

▶ Standard of Optional Storage Battery

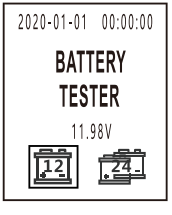
- **CCA:** 100~2000;
- **EN:** 100~2000;
- **MAC:** 100~2000;
- **IEC:** 100~1400;
- **CA:** 100~2000;
- **SAE:** 100~2000;
- **BCI:** 100~2000;
- **DIN:** 100~1400;
- **GB:** 100~1400;
- **JIS:** 26A17~245H52(100~2000CCA).

▶ Structure of Meter

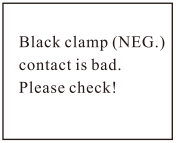
- **[▲]:** Increase the value / Page up;
- **[▼]:** Decrease the value / Page down;
- **[ESC]:** Cancel / Return;
- **[ENTER]:** Confirm / Test;
- **Red clamp:** Positive connection;
- **Black clamp:** Negative connection.

▶ Operation Instruction

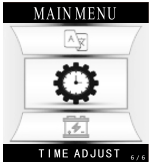
- The tester is powered by the vehicle battery. Please connect the RED clamp to the positive terminal, and connect the BLACK clamp to the negative terminal. It is recommended connect RED clamp prior to BLACK clamp. Once clamps are connected correctly and firmly, LCD screen will display the below figure, which means it is ready to use.

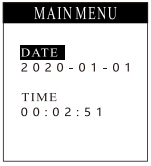


- Please check connections if below figures display.



- Then adjust time and language by selecting time adjust and language set under main menu.





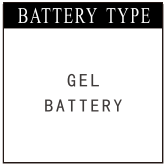
▶ Battery Capacity Test

This test determines starting capacity and status of battery by testing CCA/Voltage /Intemal resistance.

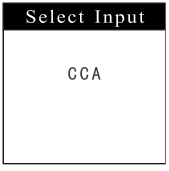
- 1.
  Please ensure engine and all electronic devices are turned off before operating battery test. Voltage will be higher than the normal situation due to the checked battery is fully charged. In this situation, turn on the headlights for 2 to 3 minutes, then turn off all devices and operate the test when the voltage drops to the normal value.

- 2.
  Press [▲▼] to select battery capacity, and press [ENTER] to continue.

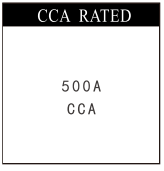
- 3.
  Press [▲▼] to select battery type and press [ENTER] to continue.



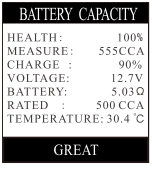
• 4.
Press [▲▼] to select testing standard which is displayed on the battery rating label, and press [ENTER] to continue.



• 5.
Press [▲▼] to select battery rating value which is displayed on the battery rating label.



• 6.
Press [ENTER] to start battery test. The test result will be displayed as below.



• 7.
Test result will be auto stored for reviewing. Press [ENTER] or [ESC] to return to main menu. Reference table for battery status of health (SOH).

SOH	RESULT	NOTE
>80%	GOOD	GOOD TO USE
>60%	NORMAL	GOOD TO USE
>45%	CAUTION	KEEP CAUTION
<45%	REPLACE	REPLACE IMMEDIATELY

• Please note that internal resistance refers to the sum total resistance of two series connection 12V batteries when testing 24V system.

▶ Cranking Test

This test determines cranking state by testing cranking voltage and time.

• 1.
Ensure the engine and all devices are turned off.

• 2.
Press [▲▼] to select cranking test and press [ENTER] to continue.

• 3.
Complete test by following guides displayed in screen.

• 4.
Test result will be auto stored for reviewing. Press [ENTER] or [ESC] to return to Main Menu.

Reading over 9.6V (for 24V system, reading over 16V) means cranking is good.

Reading below 9.6V (for 24V system, reading below 16V) means cranking is abnormal.

Please check associated parts, such as connections, wires, starter and battery's terminal corrupted or not.

Reference Table for Cranking Test (12V system)

VOLTAGE	CRANKING ABILITY	ACTION TO BATTERY
>10.7V	GOOD	NO ACTION
10.2~10.7V	NORMAL	KEEP CAUTION
9.6~10.2V	BAD	REPLACE IT SOON
<9.6V	VERY BAD	REPLACE IT IMMEDIATELY

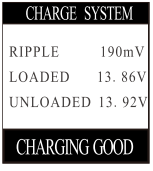
▶ Charge System Test

This test determines charge system by testing ripple voltage, loaded voltage and unloaded voltage.

• 1.
Turn on the engine.

• 2.
Press [▲▼] to select charge system, and press [ENTER] to continue.

• 3.
Complete test by following guides displayed in screen.



• 4.
Test result will be auto stored for reviewing. Press [ENTER] or [ESC] to return to main menu.

Reference Table for Charge System (12V system)

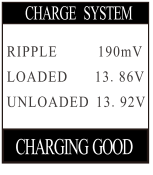
ACTION	VOLTAGE	ENGINE PERFORMANCE
All Electric System Off (Depress Accelerator)	>13. 5V	NORMAL
	13. 2~13. 5V	GENERAL
	13. 0~13. 2V	KEEP CAUTION
	<13V	INSPECTION IMMEDIATELY
All Electric System On (Depress Accelerator)	13. 4~14. 8V	NORMAL
	13. 2~13. 4V	GENERAL
	<13. 2V	INSPECTION IMMEDIATELY
For reference only. Bad battery will affect the test results.		

▶ Data Review

Every last data of each test will be auto stored for reviewing.

• 1.
Press [▲▼] to select data review and press [ENTER] to continue.

• 2.
Review every last test result of battery capacity, cranking test, charge system by pressing [ENTER].



▶ FAQ

- **What is the measurement principle of this tester?**

  The battery will gradually aging with increase of time. The main reason is that it can no longer generate some effectively chemical reaction because of aging of the surface of the battery plate. That is why most of the batteries can longer be used mainly. International Electric and Electronic Engineer Association (IEEE) formally looks the Conductivity Test as one of the standard of checking lead acid storage battery. It points out from IEEE standard 1118–1996 that : Conductivity Test is used to test AC current generated by putting the known frequency and amplitude AC signal to both sides of the battery. AC conductivity value is the ratio of AC current signal which keeps same phase with AC voltage and the AC voltage. This tester is designed from this principle actually.

- **Will the result be affected by the installation of negative current for the vehicle?**

  All the negative currency will affect the result. Therefore please remove the negative currency prior to checking, in order to achieve the accurate data.

- **Is it possible for us to know the life of battery with this tester?**

  The internal resistance of the sealed lead–acid battery is complicated. It is generated by ohm internal resistance, concentration polarization internal resistance, chemical reactions internal resistance and interference effect caused by double capacitance's charging. The ingredient of internal resistance and its relative content will change with different test method and different test moment, which can lead to different tested value of the internal resistance. And there is no strict relationship between, internal resistance or conductance and capacitance of the sealed lead–acid battery. So it is impossible to predict the life of battery according to a single battery's internal resistance. But it can be predicted the life of the battery will be over soon from the sudden increase of its internal resistance and decrease of its conductance.

- **Is the CCA value tested by this tester correct?**

  CCA is considered as a control standard with the produce of the battery. According to the accumulated records, the tested value of new battery is 10–15% higher than the standard value, and along with consuming of the battery, the value is getting close to standard, even lower afterward.

- **What is the difference between the method of this tester and the load test method?**

  The load test method:

  According to the physical formula R=V/1, test equipment forcibly make the high permanent DC current (presently 40–80A large current is available) go through the battery shortly (about 2–3 seconds). And then the tested voltage of the battery can be used to Hgure out the internal resistance by the formula.

Disadvantages of load test method:

(1)Just available for large capacitance battery or storage battery. The small capacitance battery can not load 40–80A large current in 2–3 seconds.

(2)When the large current going through the battery, there comes out polarization phenomenon from internal electrode, which can cause polarization internal resistance. As a result it has to be tested in a short time. Otherwise there is a large error of the internal resistance value.

(3)The internal electrode will be damage generally when large current go through the battery

The method of this tester:

Battery is actually equivalent to an active resistance. So we add a fixed frequency and small current to it, and then sample the voltage value. Eventually the internal resistance can be figured out after some operation such as rectification and smoothing.

Advantages of this method:

(1)It can be used for checking almost all the batteries including low capacity battery and internal resistance of the notebook battery exclusively.

(2)It will not harm the battery to use this method.

▶ SpeciHcation of Battery

- JIS Switch, Table (Reference Only)

Battery		CCA			Battery		CCA		
J1S (NEW)	J1S (OLD)		MF	CMF	J1S (NEW)	J1S (OLD)		MF	CMF
26A17R		200			55B24RS	NT80-6MS	430	420	500
26A17L		200			55B24LS	NT80-6MLS	430	420	500
26A19R	12N24-3	200	220	264	55D26R	N50Z	350	440	525
26A19L	12N24-3	200	220	264	55D26L	N50ZL	350	440	525
28A19R	NT65-7MS	250			60D23R		520		
28A19L	NT65-7MLS	250			60D23L		520		
32A19R	NS60-9ZS	270	295		65D23R		420	540	580
32A19L	NS60-9ZSL	270	295		65D23L		420	540	580
26B17R		200			65D26R	NS70	415	520	625
26B17L		200			65D26L	NS70L	415	520	625
28B17R		245			65D31R	N70	390	520	630
28B17L		245			65D31L	N70L	390	520	630
28B19R	NS40S	245			70D23R	3.5-60	490	540	580
28B19L	NS40SLS	245			70D23L	3.5-60	490	540	580
32B20R	NS40	270			75D23R		500	520	580
32B20L	NS40L	270			75D23L		500	520	580
32C24R	N40	240	325	400	75D26R	F100-5	490		
32C24L	N40L	240	325	400	75D26L	F100-5L	490		
34B17R		280			75D31R	N70Z	450	540	735
34B17L		280			75D31L	N70ZL	450	540	735
34B19R	NS40ZA	270	325	400	80D23R		580		
34B19L	NS40ZAL	270	325	400	80D26L		580		
36B20R	NS40Z	275	300	360	85B60R				500
36B20L	NS40ZL	275	300	360	85B60RL				500
36B20RS	NS40ZS	275	300	360	95D31R	NX120-7	620	660	850
36B20LS	NS40ZLS	275	300	360	95D31L	NX120-7L	620	660	850
38B20R	NX60-9ZA	330	340	410	95E41R	N100	515	640	770
38B20RS	NT60-9ZAS	330	340	410	95E41L	N100L	515	640	770

42B20R		330			115E41R	NS120	650	800	960
42B20L		330			115E41L	NS120L	650	800	960
42B20RS		330			115F51R	N120	650	800	960
42B20LS		330			115F51L	N120L	650	800	960
46B24R	NS60	325	360	420	130E41R	NX200-10	800		
46B24L	NS60L	325	360	420	130E41L	NX200-10L	800		
46B24RS	NS60S	325	360	420	130F51R			800	
46B24LS	NS60LS	325	360	420	130F51L			800	
46B26R		360			145F51R	NS150	780	920	
46B26L		360			145F51L	NS150L	780	920	
46B26RS		360			145G51R	N150	780	900	1100
34B19RS	NS40ZAS	270	325	400	80D26R	NX110-5	580	580	630
34B19LS	NS40ZALS	270	325	400	80D26L	NX110-5L	580	580	630
46B26LS		360			145G51L	N150L	780	900	1100
48D26R	N50	280	360	420	150F51R	NT200-2	640		
48D26L	N50L	280	360	420	150F51L	NT200-2L	640		
50D20R		310	380	480	165G51R	NS200	935	980	
50D20L		310	380	480	165G51L	NS200L	935	980	
50D23R	85B60RK	300			170F51R	NX250-2	1045		
50D23L	85B60RL	300			170F51L	NX250-2L	1045		
50B24R	NT80-6B	390			180G51R	NT250-4	1090		
50B24L	NT80-6BL	390			180G51L	NT250-4L	1090		
50D26R	50D20R		370		195G51R	NX300-5	1145		
50D26L	50D20L		370		195G51L	NX300-5L	1145		
38B20L	NX60-9ZL	330	340	410	105E41R	N100Z	580	720	880
38B20LS	NX60-9ZLS	330	340	410	105E41L	N100ZL	580	720	880
40B20L		330			105F51R	N100Z	580		
40B20R		330			105F51L	N100ZL	580		

• CONTINUED

Battery		CCA		
55D23R		355	480	500
55D23L		355	480	500
55B24R	NX100-S6	435	420	500
55B24L	NX100-S6L	435	420	500

Battery		CCA		
190H52R	N200	925	1100	1300
190H52L	N200L	925	1100	1300
245H52R	NX400-20	1530	1250	
245H52L	NX400-20L	1530	1250	

• Comparison Table of DIN & EN

Model	Same Model		DIN	EN
52805	52815		180	240
53517			175	300
53520	53521	53522	150	240
53625	53638	53836	175	300
53646	53621	89038	175	300
53653	53624	53890	175	300
54038	54039		175	300
54232			175	300
54312	54324	54464	220	330
54314	54312	88146	210	360
54457	54466	54459L	210	360
54459	54434	88046	210	360
54469	54449	54465	210	360
54519	54533	54812	210	360
54523	54524		220	300
54537	54545	54601	190	300
54551	54580		220	300
54553	54577	54579	220	300
54584	54578		220	300
54590			210	330
54827			240	360
55040	88056		265	450
55041	55042		220	360
55044	55414	88056	265	450
55046			300	510
55056			320	540
55057	54827	88156	320	540
55068	55069	55548	220	390
55218			265	420
55414	55415	55421	265	450
55422	55566	55040	265	450
55428	55423	55427	300	510
55457			265	450
55529			220	360
55531	55545	55550L	255	420
55559	55530	88056	265	420
55564	55552	55563	255	420
55564	55565	55548	255	420
55570	55567	55569L	255	420
56012			230	390
56048	56068	56069	250	390
56049	56069	56073	250	390
56091	55811		300	540
56111	55048		300	540
56218	56092		300	510
56219	56216		300	510
56220			280	510
56225	56323		300	510
56318	56312	56311	300	510
59515	59516		360	600
60018	60019		250	410
60026	58811		440	720
60044	60038		300	760
60527	60528		410	680
61017	61018		400	680
61023	62529		450	760
61047	61048		450	760
62034	62038	62045	420	680
63013			470	680
63545	63549		420	680
64020	64317	64318	325	550
64028	64035		520	760
64036			460	760
64317	64318	64323	540	900
65513			540	900
65514	65515		570	900
68032	68034		600	1000
70029	70038	70027	630	1050
70036	68040	68021	570	950
71014	71015		700	1150
72512			680	1150
73011			740	1200

▶ About Automotive Starting Battery

• Internal Resistance Vary in Different Batteries.

The internal resistance varies because of in conformity of internal chemical feature even if with the same type battery. It is very small so that we generally define it with unit of milliohm. Internal resistance is a significant technical standard to measure a battery. Normally the battery with small internal resistance has a great ability to discharge. On the contrary the battery with large internal resistance has a little ability to discharge.

• Impossible to Know Battery Capacity by Intuition.

Hydrometer can be used to check the condition of the battery. Battery water is distilled water and pure sulfuric acid of the proportion of 1.260/20 ℃ to allocate. For a new battery, it is supposed to supply distilled water with reduction of battery water for the reason that the degree of acid is fixed when the quantity of battery water remain the normal range. Distilled water supplement can maintain a certain amount of water, but also the PH value. If the battery works normally, in addition to the PH is fixed, the proportion of the value will be in a certain range.

Car Battery		
Voltage	Capacity	Proportion
>12. 7 V	100%	1. 26~1. 28
12. 6V	90%	1. 24
12. 4V	70~80%	1. 22

Car Battery		
Voltage	Capacity	Proportion
12. 1V	50%	1. 16
<12V	25%	<1. 13

If the battery finishes charging, the proportion of battery water does not reach 1.26–1.28, along with the tested voltage under 12.7V, the storage capacity of this battery has descended. It is impossible to recover its life by deliberately adjusting the proportion to 1.26 (Increase the sulfUric acid water), on the contrary shorten its life fast for the reason that it will increase the acidity of battery water, not the voltage however.

- **Common Abbreviation Definition of Battery Standard.**

RC – Reserve Capacity

Every storage battery has the ability to load averagely 25A electric per minute and maintains lowest 10.5V more or less in the situation of 80°F (27°C).

CCA – Cold Cranking Ampere

With the fixed current, every battery can be cooled in the situation of 0°F (–18°C)~ –20°F (–29°C) for 30 seconds and maintain the lowest voltage of 7.2V. The unit of CCA is Ampere. For some vehicles, especially long time used ones, it is hard to start the engine smoothly, and has to be done twice or for some seconds. Actually the electricity consumes most when starting the engine. The voltage drops off from the normal value 12.5V to 10.5V even lower at the moment that large current discharge shortly. The large CCA is very helpful to start the engine smoothly.

CA – Cranking Ampere

The main meaning is very close to that of CCA. The unit is Ampere also. The temperature under testing is the only one difference between them. CCA refers to the result that measured under 0°F(–17.8°C), and C A refers to the result that measured under 32°F (0°C). If there indicates both CCA and CA on the battery, CCA value is lower for the reason that the lower temperature is, the worse battery works.

AH – Ampere Hour

This is a standard written by Japanese Industrial Standard (JIS). It is explained that the battery discharges with a fixed ampere for 20 hours along with over 10.5V. Therefore the value multiplied by a fixed ampere and the number of hour is Ampere Hour. For example a battery discharges with 5 ampere fixed for 20 hours, its Ampere Hour is 100.

▶ Warranty Service

There are 2 years' warranty for MRCARTOOL product main unit and 1 year warranty for the accessories since the day the customers have received the product parcel.

▶ Warranty Access

- Repair or replace the equipment will be done according to the specific fault conditions.
- We guarantee that all replacement parts, accessories or equipment are brand new.
- When there is a product breakdown that can not be solved within 90 days, customer should provide video and pictures as proof, we will bear the freight cost and provide customer the accessories in need to replace. After receiving the product for more than 90 days, the customer shall bear the freight cost, we will provide the accessory for free to replace.

▶ Not Covered Warranty

- Items that come through the unofficial MRCARTOOL purchase channel.
- Product failure is caused by incorrect use of the product, use for other wrong purpose or human factors.

Mrcartool®

SHENZHEN SHANGJIA TECH CO., LTD
www.mrcartool.net
aftersale@mrcartool.net
+86-755-27807580
Shenhua Innovation Park, Shenzhen, China

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