

Battery Inspection Device Operating Instruction

1. Overview

Suitable for 12-volt and 24-volt lead-acid battery performance testing, and vehicle starting process, charging process, load process battery performance testing.

The instrument is well designed, easy to operate, with accurate reading, complete functions, and large screen LCD display. Internal use of accurate circuit and powerful digital processing unit, using the four-line Kelvin test connection method to complete a series of complex data collection and calculation after each test data. Input protection is installed inside the instrument to prevent positive and negative polarity connection, prevent voltage access is too high, test clamp head contact and other protective measures, safer and more convenient in the use process.

This product is suitable for battery production and sales, auto parts maintenance and all kinds of lead-acid battery used in the equipment system of lead-acid battery performance test tools.

2. Theory

With the increase of time, the battery will be aging gradually, the main reason is that the battery plate surface aging, it cannot longer carry out effective chemical reaction, which is most batteries cannot continue to use the main reason. The International Institute of Electrical and Electronics Engineers (IEEE) regards the conductance test method as one of the testing standards for the detection of lead-acid batteries officially. In the IEEE standard 1118-1996, it is stated clearly that: "Battery conductance is measured by adding an AC signal of known frequency and amplitude to both ends of the battery, and then measuring the resulting AC current. The AC conductance value is the ratio of the AC current signal in the same phase as the AC voltage to the AC voltage." This product was developed based on such judgment.

3. Safety rules and precautions:

The instrument is designed and manufactured in strict accordance with the safety requirements of GB4793.1 electronic measuring instruments and the safety standards of IEC/EN61010-1. It is designed in accordance with the safety standards of double insulation over voltage standard CATIII1600V and pollution level 2.

(1) Suitable for DC 12 volt and 24-volt voltage.

(2) The operating voltage range is DC (DC)9 volts ~35 volts:

(3) When the battery is just full, the voltage will be higher than the normal value slightly. Please turn on the headlamp for 2~3 minutes, and then measure when the voltage drops back to the normal value.

(4) Before use, check that the insulation layer of the test fixture is intact without damage, exposure, and broken wire. Do not use it when the shell is damaged or cracked, or it may cause electric shock.

(5) Do not use or store the instrument in high temperature, high humidity, flammable, explosive and strong electromagnetic field.

(6) Do not change the internal circuit of the instrument, so as not to damage the instrument and safety.

(7) Wear qualified eye masks and protective tools during testing or use to prevent

accidents.

(8) Please test in a well-ventilated environment to prevent accidents.

(9) If the engine is running, do not put instruments and accessories in the engine compartment to avoid accidents and high temperature damage.

(10) Pay attention to the warnings, precautions and maintenance procedures of the automobile manufacturer when testing the automobile battery.

(11) Optional battery standards:

CCA:100~2000










IEC:100~1000

EN: 100~1700

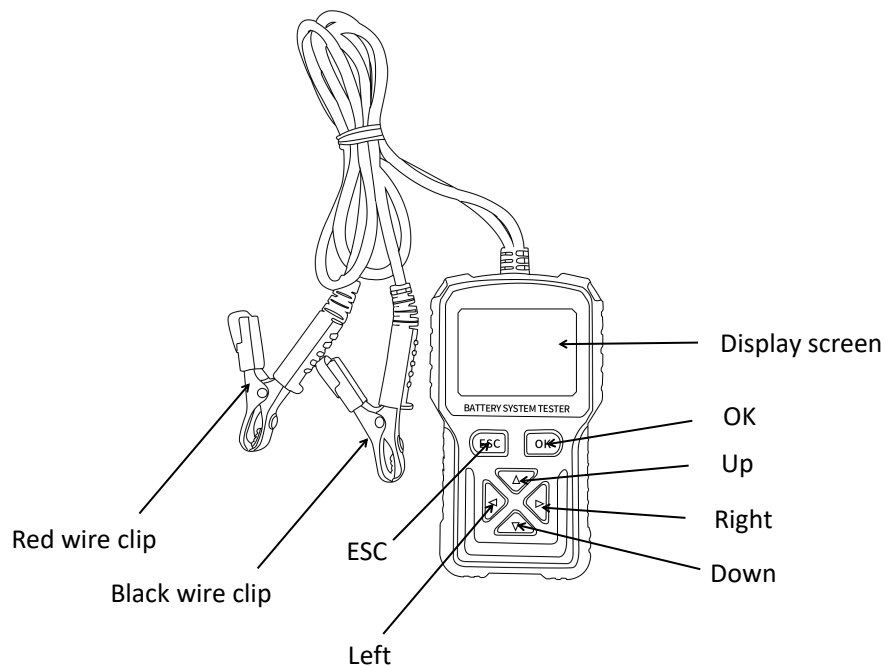
DIN:100~1000

JIS: Check the table against CCA

4. International electrical symbol

	Direct Current
	Alternating Current
	DC/AC
	Warning Pay attention to safety signs
	Dangerous voltage (danger of electric shock)
	Grounding
	Double insulated or highly insulated
	Fuse wire
	Battery

5. Product ICONS and descriptions



6. Operation keys and test clamp function introduction

Triangle: Move up, down, left, and right, parameter change

<ESC> : Cancel, exit, return button.

<OK>: Confirm key, test key.

Red test clamp: positive connection test clamp.

Black test clamp: negative wiring test clamp.

7. Function Instruction:

8-1. Battery voltage type selection

Before testing, check whether the battery nominal voltage is 12V or 24V. If the battery nominal voltage is not 12V or 24V, do not test it. After confirming the battery voltage, the next step is "battery startup capability test", "startup load test", "Running maximum load test", and "Charging system test",

8-2. Preparation before test

If the engine of the car is running, turn the car OFF and turn the key to the OFF position.

After the vehicle runs for a while, the voltage will be slightly higher than the normal value when the battery is just full. Please turn on the headlights for 2-3 minutes and then turn off the headlights until the voltage drops back to the stable value.

8-3. Operating steps

The red test clamp is connected to the positive terminal of the battery, and the black test clamp is connected to the negative terminal of the battery. If the connection is good, the instrument will start automatically. Note: The machine has no on-off button and standby battery is not included in the instrument. The power supply required for starting the instrument will be started automatically after the test wire clamp relates to the tested battery. Attention must be paid to good contact so as not to affect the test results.

8-3-1 Common battery quick measurement

(1) Check the battery label voltage, and select a voltage by pressing the right or left button on the battery label voltage. If the battery identifier is 12V, select 12V. Figure 1:

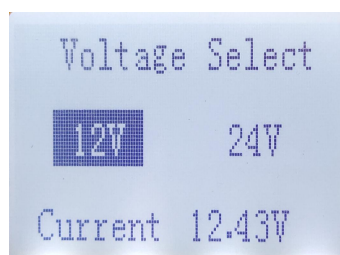


Figure 1

(2) Press the OK key to enter, according to the required test requirements, press the triangle up or down key to select the corresponding test unit. Figure 2:

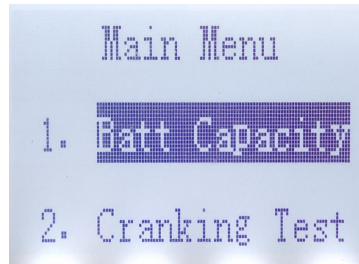


Figure 2

(3) Press the OK key to enter the battery startup ability test. According to the battery type under test, press the triangle up or down key to select the corresponding test type, as shown in Figure 3:

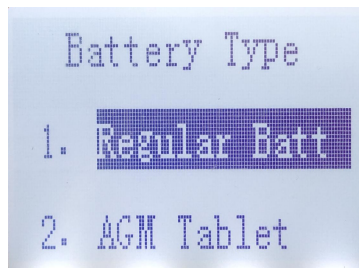


Figure 3

(4) Press the OK key to enter and press the triangle up or down button to select the test mode, as shown in Figure 4:

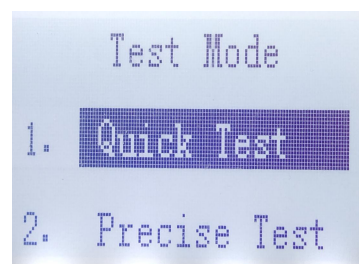


Figure 4

(5) Press the OK key to enter, and press the triangle up or down button to adjust the battery capacity, consistent with the battery label. Figure 5:



Figure 5

(6) Press the OK key to enter and get the result. Figure 6:

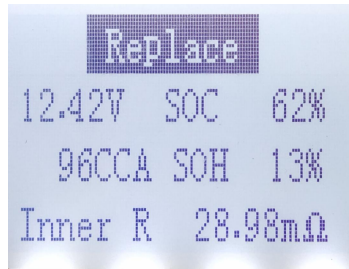


Figure 6

The measured result is:

voltage 12.42 volts.
Battery capacity ratio is 62%
Discharge 96CCA for 30 seconds
Battery life is 13%
Battery internal resistance 28.98 mΩ.
Result: Advise to replace the battery.

After the measurement, press ESC to exit the main menu. Figure 7:

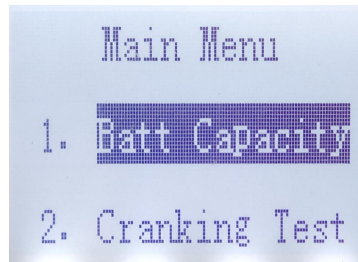


Figure 7

8-3-2. Common battery accurate test:

(1) Press the OK key to enter the main menu, and press the triangle down button to select precise measurement. Figure 8:

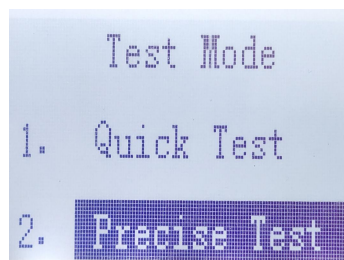


Figure 8

(2) Press OK key to enter and select battery form. Figure 9:

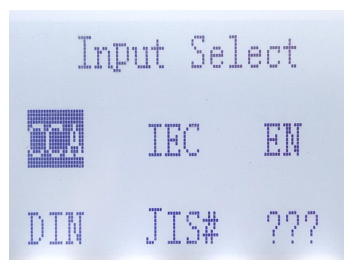


Figure 9

(3) Press OK key to enter and set the battery specifications (this step requires querying the CCA value of the battery), as shown in Figure 10:

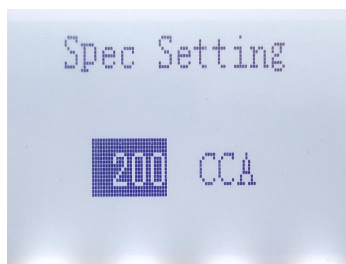


Figure 10

(4) Press the OK key to enter and get the result. Figure 11:

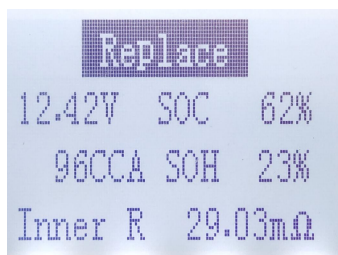


Figure 11

The measured result is:

Voltage 12.42 volts.

Battery capacity ratio is 62%.

Discharge 96 CCA for 30 seconds.

Battery life is 23%.

Battery internal resistance 29.03 mΩ.

Result: Advise to replace the battery.

Note: The higher the CCA value of the battery, the smaller the internal resistance will be.

Note: The standard of internal resistance varies according to the different materials used by different manufacturers, so there is no standard. Normally the same manufacturer of the same type of battery, the factory when the internal resistance value will not be much different.

Note: In the 24V test, the internal resistance is the sum of two groups of 12V batteries in series.

(5) After the measurement, press ESC to exit the main menu. Figure 12:

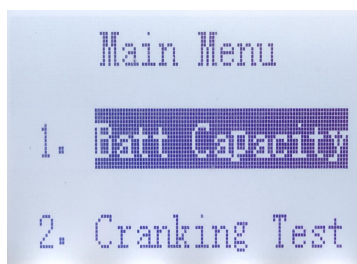


Figure 12

8-3-3 The system of Start loading test:

(1) Press the triangle down button to start the system load test. Note: Before running the test, the engine is in the stopped state, as shown in Figure 13:

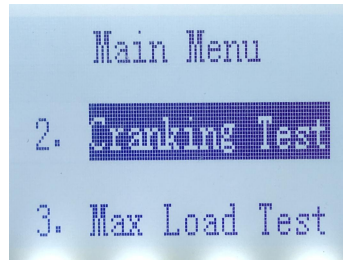


Figure 13

(2) Press the OK key to enter, as shown in Figure 14:

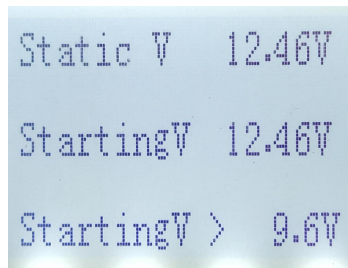


Figure 14

Under this measurement interface, start the ignition of the car until the engine runs, and then release the ignition button. Measure the battery voltage before the start of the battery, and during the start of the battery drop voltage.

After the test, press ESC to exit the main menu.

8-3-4 Run maximum load tests:

(1) On the main menu interface, press the down button to select the maximum load test, and press the OK key to enter, as shown in Figure 15:

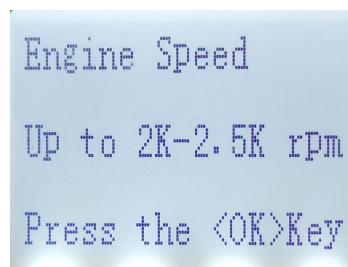


Figure 15

According to the display content, increase the engine speed, reach the specified speed position, press the OK key to test.

Figure 16:

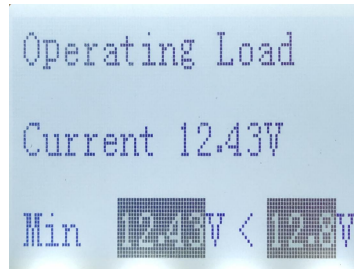


Figure 16

Measured results, maximum load voltage and minimum load voltage.

Press ESC to exit the main menu.

8-3-5. Charging system test:

(1) Press Triangle Down button to select charging system test, as shown in Figure 17:

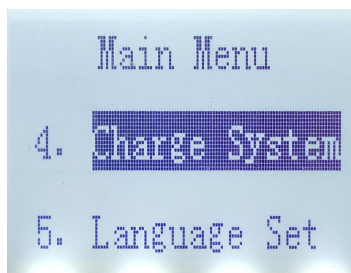


Figure 17

(2) Press OK key to enter, as shown in Figure 18:

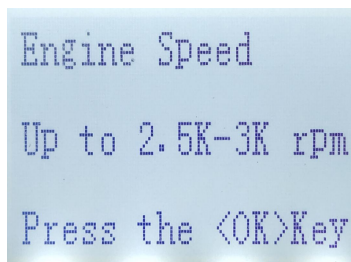


Figure 18

(3) According to the display content, increase the engine speed, reach the specified speed position, press the OK key to test as shown in Figure 19:

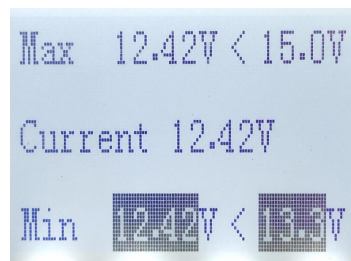


Figure 19

The minimum charge value and maximum charge value are measured.

Press ESC to exit the main menu.

8-3-6. Language Settings:

(1) Press the Triangle Down button to select the language Settings, as shown in

Figure 20:

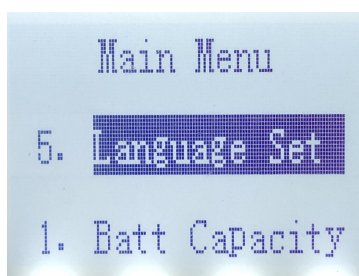


Figure 20

(2) Press the OK key to enter, as shown in Figure 21:



Figure 21

Press the triangle up or down button to select the desired language, and press OK to confirm.

9. When the battery life is less than 45%, replacement is recommended. Life represents the current state of the battery,

Life	Test Result	Remark
>80%	Good	The battery is in good condition.
>60%	Fine	The battery is fine.
>45%	problems to be noticed	The battery is in poor condition and needs to be replaced.
<44%	Recommended replacement	Battery condition is very poor, recommended replacement.

10. Ability to start

Numerical reference table (12V)		
Start up voltage	Battery discharge performance	Advice
>10.7V	Good	Don' t Change
10.2V~10.7V	Normal	Need to Check
9.6V~10.2V	Poor	Note that it needs to be replaced
<9.6V	Very Poor	Replaced

11. Charging capability

Numerical reference table (12V)		
Operating condition	Voltage of battery	Performance of charging
No headlights, no air conditioning (Increase the engine speed to a certain value)	>13.5V	Good
	13.2V~13.5v	Normal
	13V~13.2V	Attention, check the charging system equipment

according to the instrument)	<13V	Immediate maintenance
Turn on the headlights and air conditioning (Increase the engine speed to a certain value according to the instrument)	13.4V~14.6V	Good
	13.2V~13.4V	Normal
	<13.2V	Attention, check the charging system equipment
The above values are for reference only. If there is a problem with the battery, the final test result will be affected		

12. Q&A

12-1. If the car is loaded with reverse current, will it affect the results?

All adverse currents will affect the test result of the instrument. Therefore, please remove the adverse current before measuring to ensure the accuracy of the test.

12-2. Can this product predict battery failure time?

The internal resistance of sealed lead-acid battery is complex, which includes the ohm internal resistance of battery, the internal resistance of concentration difference polarization, the internal resistance of electric chemical reaction and the interference effect of double layer capacitor charging. The internal resistance values measured by different testing methods and different time contain different components and their relative content, so the measured internal resistance values are not the same. No strict mathematical relationship has been observed between the internal resistance (or conductance) of sealed lead-acid batteries and the capacity of the batteries. It is impossible to predict the battery life based on the internal resistance (or conductance) value of a single battery. However, the sudden increase of the battery internal resistance or the sudden decrease of the conductance indicates that the battery life is about to end.

12-3. Is the CCA value measured by this product correct?

CCA is a control standard for battery production. According to the cumulative results, the measured value of the new battery is higher than the marked value, and approaches the marked value with different use conditions gradually, and falls below the marked value as the battery is used for a longer time.

12-4. What are the differences between this product test method and the load test method?

Load test method:

According to the physical formula $R=V/I$, the test device forces the battery to pass a large constant DC current for a short period of time, measures the voltage at both ends of the battery, and calculates the current internal resistance of the battery according to the formula.

This method has some shortcomings compared with the professional load testing method:

(1) Only large-capacity batteries or accumulators can be measured. Small-capacity batteries cannot load large current in a short time.

(2) When the battery passes through a large current, the electrode inside the battery will be polarized, resulting in internal resistance to polarization. So the measurement time must be very short, otherwise the measured internal resistance error is very large.

(3) Large current passing through the battery will cause certain damage to the electrodes inside the battery.

The product measurement method:

Because the battery is equivalent to an active resistance, because we apply a fixed frequency and fixed current (small current) to the battery, and then sample its voltage, after a series of processing such as rectification and filtering, calculate the internal resistance value of the battery through the calculation circuit.

Advantages of this method:

(1) This measurement method can be used to measure almost all batteries, including small capacity batteries. This method is used to measure the internal resistance of pen batteries generally.

(2) Using this method to measure the battery itself will not have much damage.

13. Battery specification sheet

(The actual numerical data delivered by the manufacturer shall prevail)

13-1. JIS code conversion table

Model		Cold start current CCA			Model		Cold start current CCA		
JIS (NEW)	JIS (OLD)		MF	CMF	JIS (NEW)	JIS (OLD)		MF	CMF
26A17R		200			55B24RS	NT80-S6S	430	420	500
26A17L		200			55B24LS	NT80-S6LS	430	420	500
26A19R	12N24-4	200	220	264	55D26R	N50Z	350	440	525
26A19L	12N24-3	200	220	264	55D26L	N50ZL	350	440	525
28A19R	NT50-N24	250			60D23R		520		
28A19L	NT50-N24L	250			60D23L		520		
32A19R	NX60-N24	270	295		65D23R		420	540	580
32A19L	NX60-N24L	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	35-60	490	540	580
28B19L	NS40LS	245			70D23L	25-60	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
Model		Cold start current CCA			Model		Cold start current CCA		

JIS (NEW)	JIS (OLD)		MF	CMF	JIS (NEW)	JIS (OLD)		MF	CMF
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	85B60K				500
36B20L	NS40SL	275	300	360	85BR60K				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-N24	330	340	410	95E41R	N100	515	640	770
38B20RS	NX60-N24S	330	340	410	95E41L	N100L	515	640	770
38B20L	NX60-24L	330	340	410	105E41R	N100Z	580	720	880
38B20LS	NX60-24LS	330	340	410	105E41L	N100ZL	580	720	880
40B20L		330			105F51R	N100Z	580		
40B20R		330			105F51L	N100ZL	580		
42B20R		330			115E41R	NS120	650	800	960
42B20L		330			115E41L	NS120L	650	800	960
42B20R		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	NT200-12	640		
48D26L	N50L	280	360	420	150F51L	NT200-12L	640		
50D20R		310	380	480	165G51R	NS200	935	980	
50D20L		310	380	480	165G51L	NS200L	935	980	
50D23R	85BR60K	500			170F51R	NX250-12	1045		
50D23L	85B60K	500			170F51L	NX250-12L	1045		
50B24R	NT80-S6	390			180G51R	NT250-15	1090		
50B24L	NT80-S6L	390			180G51L	NT250-15L	1090		
50D26R	50D20R		370		195G51R	NX300-51	1145		
50D26L	50D20L		370		195G51L	NX300-51L	1145		
55D23R		355	480	500	190H52R	N200	925	1100	1300
55D23L		355	480	500	190H52L	N200L	925	1100	1300
55B24R	NX100-S6	435	420	500	245H52R	NX400-20	1530	1250	
55B24L	NX100-S6L	435	420	500	245H52L	NX400-20L	1530	1250	

13-2.DIM、EN Model comparison table

Model	Same Model	DIM	EN	Model	Same Model	DIM	EN
52805	52815	180	240	56420	56322 88066	300	510
53517		175	300	56530	56618 56639	300	510
53520	53521 53522	150	240	56618	56619 56620	300	510
53625	53638 53836	175	300	56633	56647 56641	300	510
53646	53621 88038	175	300	56820	56821 56828	315	540
53653	53624 53890	175	300	57024	57029	315	510
54038	54039	175	300	57113	57539	400	680
54232		175	300	57114	56821 88074	400	680
54313	54324 54464	220	330	57218	57219	420	720
54317	54312 88146	210	360	57220	57217	420	720
54437	54466 54459L	210	360	57230		380	640
54459	54434 88046	210	360	57412	57413 57412L	400	680
54469	54449 54465	210	360	57512	57513 57531	350	570
54519	54533 54612	210	360	58515	58424	450	760
54523	54524	220	300	58521	58513	320	540
54537	54545 54801	190	300	58522	58514	320	540
54551	54580	220	300	58815	58821	395	640
54533	54577 54579	220	300	58820	58515 58527	395	640
54584	54578	220	300	58827		400	640
54590		210	330	58838	58833 88092	400	680
54827		240	360	59040	59017 59018	360	600
55040	88056	265	450	59218	59219	290	480
55041	55042	220	360	59226	59215	450	760
55044	55414 88056	265	450	59514		320	540
55046		300	510	59518	59519	395	640
55056		320	540	59615	59616	360	600
55057	54827 88156	320	540	60018	60018	250	410
55068	55069 55548	220	390	60026	58811	440	720
55218		255	420	60044	60038	500	760
55414	55415 55421	265	450	60527	60528	410	680
55422	55566 55040	265	450	61017	61018	400	680
Model	Same Model	DIM	EN	Model	Same Model	DIM	EN
55428	55423 55427	300	510	61023	62529	450	760
55457		265	450	61047	61048	450	760
55529		220	360	62034	62038 62045	420	680
55531	55545 55559L	255	420	63013		470	680
55559	55530 88056	255	420	63545	63549	420	680
55564	55552 55563	255	420	64020	64317 64318	325	550
55564	55565 55548	255	420	64028	64035	520	760
55570	55567 55565L	255	420	64036		460	760

Model	Same Model	DIM	EN	Model	Same Model	DIM	EN
56012		230	390	64317	64318 64323	540	900
56048	56068 56069	250	390	655132		540	900
56049	56069 56073	250	390	65514	65515	570	900
56077	56030	300	510	67043	67045	600	1000
56091	55811	360	540	68032	68034	600	1000
56111	55048	300	540	70029	70027 70038	630	1050
56218	56092	300	510	70036	68040 68021	570	950
56219	56216	300	510	71014	71015	700	1150
56220		280	510	72512		680	1150
56225	56323	300	510	73011		740	1200
56318	56311 56312	300	510				

14. 汽 Automotive Battery Knowledge

14-1. Different types of batteries have different internal resistance

Batteries of the same type have different internal resistance due to inconsistent internal chemical characteristics. The internal resistance of a battery is so small that we define it in milliohm units. Internal resistance is an important technical index to measure battery performance. In general, batteries with low internal resistance have a strong ability to discharge large current, while those with high internal resistance have a weak ability to discharge.

14-2. The amount of charge stored in a battery cannot be measured by feeling. A hydrometer can be used to measure the working state of the battery. Battery water is distilled water + pure sulfuric acid 1.260/20°C specific gravity to deploy, the new battery, if the battery water in the normal range, its acidity is fixed, battery water less, add distilled water, in addition to maintain a certain amount of water, can also maintain the pH value, if the battery works normally, then in addition to the pH value fixed, its specific gravity value will also be in a certain range.

Batteries for small cars		
Voltage (V)	Electric Quantity (%)	Ph specific gravity
>12.7	100%	1.26~1.28
12.6	90%	1.24
12.4	70~80%	1.22
12.1	50%	1.16
<12	25%	<1.13

If after full charging, the specific gravity of the battery water cannot reach 1.26-1.28, and the measured voltage cannot reach more than 12.7V, it means that the storage capacity of the battery has decreased. At this time, if the specific gravity of the battery water is adjusted to 1.26 (increasing the proportion of sulfuric acid water) deliberately, it will not only fail to change the state of the battery. It would also cause the battery to wear out faster, because the acidity in the water would increase, but it would not increase the voltage.

15. Common battery standard abbreviation meaning

*RC-Reserve Capacity Reserve energy

Each cell has an average load of 25 amps per minute at 80° F(27° C) and can maintain a minimum voltage of around 10.5 volts.

*CCA-Cold Cranking Ampere Cold start current

At a fixed current intensity, each battery cooled and soaked at 0° F(-18 ° C) to -20° F(-29 ° C) can last 30 seconds, maintaining a minimum voltage of 7.2 volts. The unit of cold start current is amperes. General vehicles, those that are too old especially, often cannot start the engine smoothly when the motor is driven, and must be maintained for more than a few seconds or the second start. In fact, when the engine is started, the battery power consumption is the most, a short time of large current output moment, the battery voltage can drop from the normal 12.5V to 10.5V or even below. The larger the cold start current will be helpful for this situation.

*CA-Cranking Ampere Start up current

Its main significance is like that of CCA, and the unit is also amperes. The only difference from CCA is the temperature at the time of measurement. CCA was obtained at minus 17.8 degrees Celsius, while CA was obtained at zero degrees Celsius. If both CCA and CA are marked on the same battery, the CCA value will be lower than the CA value, because the lower the temperature, the worse the battery performance.

*AH-Ampere Hour Ampere hour

Ampere hour, also known as ampere hour, is a standard formulated by the Japanese Industrial Standards (JIS). In simple terms, a battery can discharge at a fixed amperage for 20 hours at a voltage above 10.5 volts, so the fixed amperage multiplied by the number of hours is amperage hours. For example, if a 5-amp discharge is fixed for 20 hours, the number of amperage hours of the battery is 100.

*DIN — German system standard

At cold temperatures of 0° F(-18 ° C), the battery can reach amperage at 9.0 volts for 30 seconds and maintain minimum voltage, while at 8.0 volts for 150 seconds.

*IEC — International Electronic Technology Association

At average current intensity, each cooled immersion cell at 0° F(-18 ° C) can carry a minimum voltage of 8.4 volts for 60 seconds.

*BSR — British verification standard

At average current intensity, each cooled immersion cell at 0° F(-18 ° C) can carry a minimum voltage of 6.0 volts for 180 seconds.

*ABCI — International Battery Association

At average current intensity, each cooled immersion cell at 0° F(-18 ° C) to -20° F(-29 ° C) can carry a minimum voltage of 7.2 volts for 30 seconds.

16.Packing List:

Name	QTY
Main machine (including red and black cable clips)	1
The cloth	1
Instruction Manual	1
Certificate of conformity/Warranty card	1
Desiccant	1