LODESTAR®

LD673A 蓄电池检测仪

支持AGM/EFB启停蓄电池检测

深圳市乐达精密工具有限公司

官网:http://lodestartools.com

目 录

注:因产品版本不同，说明书部分说明，图标释义，图示略有差异，特此说明。

注意事项和安全测量

本手册包括使用仪表说明和安全操作方法，不按手册使用仪表可能损坏仪表。本仪表遵循本公司企业执行标准 Q/TKM 003-2018 要求进行设计和生产。

1、电池极性柱，接线端子和其它附件或有可能含有铅或者铅化合物，或其它再生性的伤害。如接触到化学物质，请用水清洗。

2、电池是含有危险的化学物质，有可能造成灼伤或者爆炸。

3、不要在高温、高湿、易燃和易爆环境下使用和存放本仪表。

4、使用前应检查测试夹钳绝缘层完好、无破损、裸露及断线。后盖没有盖好前严禁使用。

5、如果仪器存在故障（例：发现毁坏、变形、泄漏物质、显示不全等）的现象，不能继续使用。

6、虽然汽车蓄电池电压低于安全电压，测量的时候还是尽可能不要接触测试夹钳口，以防电击的危险。

7、请勿随意改变仪表内部线路，线夹连接方式，以免损坏仪表和安全。

8、在测试或修理汽车时要戴合格的眼罩以防止引擎带起异物飞入眼睛。

9、请在通风良好的环境下运行及维修汽车，以防吸入有毒的气体。

10、如汽车引擎在运转，不要将检测仪表及配件放在引擎或排气管旁以免被高温损坏。

11、在维修汽车的时候注意汽车生产商的警告、注意事项和维修程序。

12、电瓶于刚充饱状态电压会略高于正常值，请开启大灯 2～3 分钟，待电压降回正常值再行测量。

13、本仪器内部无电池，仪表是通过被测蓄电池取电。

14、被测蓄电池如果刚充完电蓄电池自身温度较高，请待蓄电池完全冷却之后进行测试。

1．概述

全保护型汽车蓄电池检测仪是能够对汽车蓄电池的工作能力和启动型铅酸蓄电池性能以及汽车启动过程，充电过程，运行负荷的蓄电池性能测试工具。

本蓄电池检测仪测试过程及结果可直观清晰的显示在 LCD 屏幕上，采用四线开尔文测试接法测试。仪器设计加强了对输入信号线接错、接反、接入电压过高、测试钳夹接触不良提示等情况做了完善的保护措施，以求在使用过程中更加安全、方便。

本品可用于汽车蓄电池生产、蓄电池经销、汽配维修等涉及各类铅酸蓄电池使用的系统行业中，是检测铅酸蓄电池性能的理想工具。并可通过简易测量模式测量没有 CCA 数据的 12V 电瓶车车电瓶、UPS 电池、摩托车蓄电池等。

2．1、技术指标

产品	12V/24V 蓄电池测试
应用范围	12V/24V 铅酸蓄电池 支持 AGM/EFB 启停蓄电池
电池容量范围	3AH - 220AH
CCA 测量范围	100-2000
电压测量范围	9V-35V
工作温度	-20℃~60℃
测量精度	±5%
特殊功能	AH 简易测试功能 波形显示功能（彩屏机型具有此功能）
测量方法	四线开尔文测试法
线路全保护	具有线路保护功能，仪表误操作反夹蓄电池具有自保护功能

2.2 冷起动电流测量范围：

标准	描述	范围
CCA	冷启动电流 中国大陆常用	100-2000
IEC	国际电工委员会标准	100-1000
EN	欧洲工业标准	100-2000
DIN	德国工业标准	100-1000
JIS#(注)	日本工业标准	从 26A17 到 245H52
SAE	汽车工程协会标准	100-2000

注：JIS 规格的蓄电池上如无 CCA 数据标注，需查表对照 CCA 进行输入测试。本仪表测量时，务必要根据汽车所使用的蓄电池标准进行选择与设置。

3．产品结构及面板按键说明：

1：LCD 显示器	4：确认 OK 键
2：测试按键	5 和 6：向上、向下滚动键
3：返回取消键	7：测试夹，红色为正极夹，黑色为负极夹

4. 功能使用及说明：

将检测仪按被测蓄电池的正负极，正确夹好蓄电池，被测蓄电池电压大于 9V，检测仪可正常开机，开机界面如下：

◆选择“电瓶测试”，检测仪进入下一步

◆选择“设置”，可设置蓄电池检测仪显示语言，可设置选择：简体中文/英文。

4-1. 蓄电池电压类型选择(适用于 12V/24V 蓄电池测试仪) ⚠

测试前需要先根据电池电压进行选择设定。对应于 12V 蓄电池选择 12V；串联 24V 的蓄电池电池则选择 24V。选泽好电压后再进入下一步的项目测试工作；**12V 版本的产品没有此界面。**

普通屏版本检测仪 LCD 主菜单界面	

4-2. 蓄电池测试：

测试前准备 ⚠：如汽车在发动中，请先熄火并将汽车锁匙转至“OFF”位置。并拔下车钥匙。车辆行驶后电瓶可能处于刚充饱状态电压会略高于正常值，请开启大灯 2～3 分钟，待电压降回正常值再行测量。观察被测蓄电池上的冷启动电流标准参数和该蓄电池的标准。若被测蓄电池上没有相关参数，只有电压和 AH，可以采用本机的简易测量方法进行测量。

操作步骤：

（1）选择被测蓄电池模式：普通型蓄电池请选择：“普通标准电瓶”；有标注 AGM/EFB 启停型蓄电池的请选择：“AGM/EFB 启停蓄电池”，（本产品具有线路保护功能，选错模式测量不会对损伤仪表，尽可放心使用）

（2）选择测量模式：蓄电池上有标注冷启动电流标准参数和电瓶类型的，请选择：专业测试；若被测蓄电池上未查看到冷启动电流标准参数仅有电压和 AH 参数，请选择：简易测试。

注：简易测试为模拟 AH 电瓶容量测量，精度低于专业测试，建议优先选择使用专业测试进行使用！

***对于譬如电瓶车蓄电池、储能蓄电池、UPS、摩托车蓄电池等，因其属于非启动型蓄电池，没有冷启动电流参数，可以采用本仪表自带的简易测试功能输入蓄电池的 AH 参数进行测量，测试仪采取蓄电池内阻评估方式进行测量，不同厂家制造的铅酸蓄电池标准可能存在差异，测量结果仅供参考。**

***部分蓄电池没有极柱的，可以使用长螺丝拧到电池孔位中作为测量极柱进行测试。**

***汽车蓄电池极柱上有铁箍的，请保证铁箍与蓄电池极柱接触良好或者将铁箍卸载后进行测量。**

简易测试功能使用介绍：

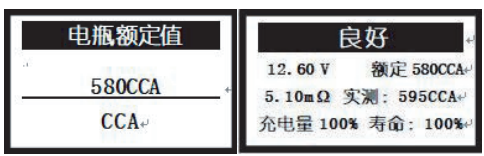
选择“简易测试”模式进入后输入被测蓄电池上 AH 电池容量数据：

在电池容量界面按仪器的的“上下”键，输入被测蓄电池的 AH 标准（以一个 60AH 蓄电池为例），输入后按测试键，即可测量，测量结果界面例如下图：

“专业测试”功能使用介绍：

选择“专业测试”模式进入后根据蓄电池上的参数标注选择蓄电池标准：如蓄电池为“CCA”标准，可通过直接选择 CCA，如图：

在“电池额定值”界面根据被测蓄电池上所表示的标准值按“上下”键进行输入，输入完毕按测试键进行测量，测量结果界面例如下图：



电瓶测试结果说明：

第一行：良好（被测蓄电池当前工况评估结果）

第二行：12.60V（被测蓄电池当前电压）额定：580CCA（测量前输入的标准值）

注：汽车蓄电池空载情况（未启动）时电压应为 12.30V—13.00V 为最佳，满电电压≥12.60V 若低于 12.30V 则为亏电或老化情况。

第三行：5.10mΩ（被测蓄电池当前内阻）实测：595CCA（蓄电池实际 CCA 值）

内阻：电瓶的 CCA 值越大，内阻一般会越小。内阻的标准会因为各厂商所使用不同材质制造电瓶，而有所不同，因此没一定标准。但同家厂商相同型号之电瓶，出厂时内阻值不会相差太大。★在使用 24V 测试时，内阻为两组 12V 电池串联总和。

实测 CCA：测试判定蓄电池实际的输出冷启动电流是否满足车辆启动，蓄电池输出的冷启动电流大于汽车启动标准的为最佳。

第四行：充电量 100%（被测蓄电池满电）寿命：100%（被测蓄电池寿命评估）

充电量：为当前被测蓄电池的含电量，此含电量不等于电瓶实际 AH 容量。

寿命：检测仪通过电压、内阻、实测 CCA 等数据智能评估的寿命为该蓄电池综合寿命状态。

寿命评估释义表

寿命	测试结果	备注
>80%	良好	电瓶状况良好
>60%	一般	电瓶状况一般
>45%	需注意	电瓶寿命将近，需留意
<45%	建议更换	电瓶寿命已尽，请参考更换

关于 JIS# 标准蓄电池测试方法：

注：一般日系原装汽车配用 JIS 规格蓄电池，上面只有蓄电池型号，对于此类蓄电池，使用 JIS 查表法设置进行测量，如蓄电池上已有 CCA 数据，请直接使用 CCA 数据进行测试即可，以下为仅按 JIS 蓄电池型号测试方法介绍。

在“电瓶形式”界面中选择 JIS，如图：

接着选择“手工录入”项手工调整输入电池启动电流的参考标准值，进行测试；

如蓄电池本体没有标出该值，用户可根据型号，通过仪表中“自动查表”项选择 JIS 型号，按<确认>键进入下一步，显示表中 “*”表示任意字符，带括号字符“[S]”表示该字符可有可没有：

找到对应的页后，先按<确认>键，进入选择型号选定：

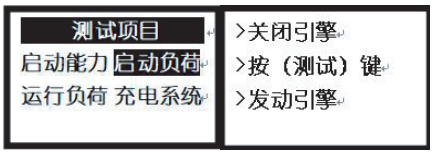
此时按测试键蓄电池进行测试即可。

4-3．启动负荷测试方法：

（1） 请先熄火并将汽车锁匙转至“OFF”位置，不用拔钥匙。

（2） 按蓄电池极性夹好线夹。

（3） 测试仪选择“启动负荷”项目，如图：



（4）按测试键进入待测界面，如图：

普通屏版本检测仪界面

（5）发动车子引擎，测试仪器就会自动测量并记录在发动车子引擎过程中蓄电池输出的实际启动电压。电池正常情况下在发动车子引擎过程电压应大于9.6V(对于 24V 系统，在发动车子引擎过程电压应大于 16 V)。

★如果启动电压＞9.6V(对于 24V 系统，读数大于 16 V)，代表启动系统良好。

★如果启动电压＜9.6V(对于 24V 系统，读数小于 16 V)，代表启动系统有问题。请检查相关部位如连接点，电线和起动机，电瓶端子处有无锈蚀。

★启动电压＜9.6V(对于 24V 系统，读数低于于 16 V)，需再次对该车辆蓄电池进行复测，若蓄电池工况良好，建议检查该车辆发电机或起动机工况。

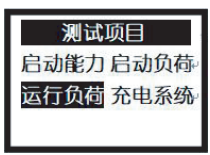
启动电压数据参考表(12V 系统)		
启动电表电压	电池放电性能	处置电池
10.7V 以上	佳	不需更换
10.2~10.7V	普通	需观察
9.6~10.2V	较差	近日需更换
9.6V 以下	极差	需立即更换

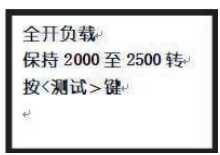
4-4．运行负荷测试方法：

（1） 请启动车辆，进入怠速状态。

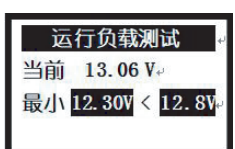
（2） 按蓄电池极性夹好线夹。

（3） 测试仪选择“运行负荷”项目，如图：





（4） 根据测试仪提示，将油门转速提高到 2000-2500 转按测试键，进入最大负载系统测试功能测试界面，如图：



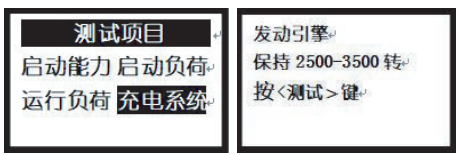
图中分别显示当前的电压 13.06V，标准电压 12.80V(对于 24V 系统，标准电压为 25.60 V)，以及最低电压 12.30V。如果大于 12.8V(对于 24V 系统，电压读数大于 25.60 V)，代表系统正常。如果电压读数小于 12.8V(对于 24V 系统，读数小于 25.60 V)，请检查发电机皮带是否磨损不堪使用，电线是否有短路。

4-5．充电系统测试

1、请启动车辆，进入怠速状态。

2、按蓄电池极性夹好线夹。

3、测试仪选择“充电系统”项目，如图：



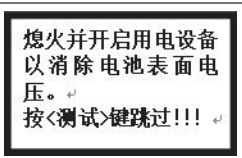
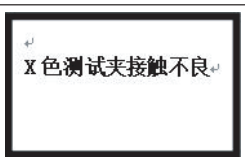
根据测试仪提示，将油门转速提高到 2500-3500 转按测试键，进入充电系统测试功能测试界面，如图：

充电系统最高输出图中分别显示当前的测试电压 14.05V；标准最高电压 15.00V(对于 24V 系统，标准最高电压为 30.00 V)，以及测得最高电压 14.11V；标准最低为 13.30V(对于 24V 系统，标准最低电压为 26.60 V)，以及测得最低电压 14.00V；

★如果电压读数大于 15.0V(对于 24V 系统，读数大于 30.00 V)，请检查调压器。
★如果电压读数小于 13.3V(对于 24V 系统，读数小于 26.60 V)，请检查连接点，电线和发电机。

充电系统测试数据参考表(12V 系统)		
状况	电池电压	发动机性能
没开大灯及冷气 （需踩油门检测）	13.5 以上	正常
	13.2~13.5	普通
	13.0~13.2	需注意
	13 以下	需立即进厂检测
开大灯及冷气 （需踩油门检测）	13.4~14.6	正常
	13.2~13.4	普通需注意
	13.2 以下	需立即进厂检测

4.6.**测试过程中异常问题说明**⚠

	如蓄电池电压过低时，仪表会提示，可直接继续测试，或对电池作充电处理，后再进行测试。
	蓄电池刚充完电因浮充而残留表面浮充电压，用户可开启汽车部分用电设备，把电池表面浮充电压消除后继续进行测试。
	检测仪是使用双测试夹，开尔文四线接法测试，仪表提示接触不良，请重新夹电池极柱，或检测线夹线路是否正常。

5.常见问题 ⚠

（1）简易测试模式：

利用蓄电池标标注的容量（AH），检测蓄电池的寿命。蓄电池能够容纳电荷的多少为蓄电池的“容量”，用“安时”来表征，符号“AH”。

例如：120AH。我们国家标准对蓄电池容量规定为 20 小时放电率。对 120AH 的蓄电池，就是以电流 6A 放电，可以放电 20 小时。蓄电池的容量（AH）是一直恒定不变的，利用 AH 可以对蓄电池寿命做出大致判定。因本仪表不具有放电功能，采用模拟方式和行业所采集到的不同 AH 对应的内阻标准进行测量评估，所测得的参数除电压、内阻、实际的 CCA，其他数据和结果仅供参考。

（2）精确测量

★通过蓄电池标注的冷启动电流（CCA），检测蓄电池寿命，所谓冷起动电流 CCA 值(Cold Cranking Ampere)指的是：在规定的某一低温状态下(通常规定在 0°F 或 - 17.8°C)蓄电池在电压降至极限馈电电压前，连续 30 秒释放出的电流量。

★CCA 和电池容量没有关系。

例如：有一个 12V 的蓄电池外壳标明 CCA 值为 600，其意义为在 0° F 时，在电压降到 7.2 伏特前，连续 30 秒可提供 600 安培(Ampere)的电流量。

CCA 检测的是重点考核蓄电池的放电能力，从而保证给起动机的使用提供可靠和真实的能源。放电能力衰减变小代表被测蓄电池开始老化。

★冷启动电流（CCA）值的高与低，是真正影响蓄电池寿命的主要因素。CCA 值过低的蓄电池打火启动困难或不畅,这和电池的质量和使用时间有很大的关系。而和蓄电池的容量（AH）没有关系。

6. 电瓶规格表下列表格为参考数据，实际数值以厂商出厂数据为准）

规格		冷启动电流 CCA			规格		冷启动电流		
JIS（新）	JIS（旧）		MF	CMF	JIS（新）	JIS（旧）		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	220	265	65D26R	NS70	415	520	625
26B17L		200	220	265	65D26L	NS70L	415	520	625
28B17R		245			65D31R	N70	390	520	625
28B17L		245			65D31L	N70L	390	520	625
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
34B17L		280			75D31L	N70ZL	450	540	735
34B19R	NS40ZA	270	325	400	80D26R		580	580	630
34B19L	NS40ZAL	270	325	400	80D26L		580	580	630
36B20R	NS40Z	275	300	360	85B60K				500
36B20L	NS40ZL	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	NT60-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
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	352	360	420	130E41L	NX20010L	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	NX100-5	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	N51L	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	NC250-12L	1045		
50B24R	NT80-S6	390			180G51L	NT250-15L	1090		
50B24L	NT80-S6L	390			180G51L	NT250-15L	1090		
50D26R	50D20R		370		195G52R	NX300-51	1145		
50D26L	50D20L		370		195G52L	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	

型号	相同型号	DIN	EN	型号	相同型号	DIN	EN
52805	52815	180	240	56420	56322 88066	300	510
53517		175	300	56530	56618 56638	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	540
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	60019	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
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	63545	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
56012		230	390	64317	64318 64323	540	900
56048	56068 56069	250	390	65513		540	900
56049	56069 56073	250	390	65514	65515	570	900
56077	56030	300	510	67043	67045	600	1000
56091	55811	360	540	58032	68034	600	1000
56111	55048	300	540	70029	70038 70027	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	56312 56311	300	510				

汤浅电池型号	CCA 值	汤浅电池型号	CCA 值
GT50L-MF	356CCA	75A-72	630CCA
GTH55DL-MF	356CCA	78A72	670CCA
GTH60DL-MF	325CCA	34-610MF	610CCA
GTH75DL-MF	520CCA	75-6MF	615CCA
GTH40S	275CCA	58-6MF	530CCA
GTH40L	276CCA	34-6MF	500CCA
GTH40	277CCA	24-500	500CCA
GTH60L	325CCA	34-710	710CCA
GTH75DL-MF(競技版)	520CCA	41-580	580CCA
GTH75D-MF(競技版)	521CCA	58-530	530CCA
55D23R-MF	522CCA	65-730	730CCA
34-60	525CCA	75-660	660CCA
58-60	525CCA	78-710	710CCA
65-70	700CCA	GR40R-MF	700CCA
74-60	525CCA	GR40R-CMF	820CA
75-72	500CCA	GR96R-MF	500CCA
35-580	580CCA	GR96R-CMF	580CCA
65-900	580CCA		

乐达以顾客为本

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Made in China

LODESTAR®

LD673A Battery Tester

Support AGM/EFB Battery

Shenzhen LODESTAR Precision Tools Co., Ltd.

Official website:http://lodestartools.com

CONTENT

Matters require special attention and safety measure:

This manual includes operation instructions of the instrument and safe operation methods. If the instrument was not operated in accordance to the instruction of the manual, the instrument may be damaged or unable to function. It is suggested that you read this product manual carefully and thoroughtly before use.

1) Battery poles, terminals and other accessories may contain lead or lead compounds and other hazardous chemicals, If chemicals come into contact with human skin, wash it with water immediately.
2) Battery contains hazardous chemicals that can cause burns or explosions. Please use the instrument in a safe environment and under safe conditions.
3) Do not use and store the instrument in high temperature, high humidity, flammable and explosive environment.
4) Before use, make sure the insulation layer of the test clamp is intact, without damage, and broken wires.
5) If the instrument has faults (e.g., damage, distortion, incomplete display, circuit damage, etc.), do not use it.
6) Although the car battery voltage is lower than the safe voltage, do not touch the test clamp opening as far as possible when measuring to, avoid the risk of electric shock.
7) Do not change or alter the internal circuit of the instrument to avoid damage to the instrument and potential safety hazards.
8) When testing or repairing a car, it is recommended to wear a qualified protective eye mask to prevent the engine from flying foreign objects into the eyes.
9) If the car engine is running, do not put the test instruments and accessories on the engine or exhaust pipe side to avoid damage by high temperature.
10) Pay attention to the manufacturer's warnings, precautions, and repair procedures when repairing your car.
11) This product can be used to measure common automotive battery and AGM/EFB automotive battery.
12) This product cannot measure the battery without CCA specification. For example: new energy car battery (pure electric car), electric motorcycle, forklift, household battery bicycle and so on.
13) This product is an industrial professional measuring instrument. Non-professionals please do not touch and operate it.
14) This product can only be used to measure lead-acid battery, can not be used to measure lithium battery。

1. Overview

Battery Analyzer is a suitable tool for testing the performance of Starting Automotive Battery (AGM/EFB) lead-acid battery ,vehicle start process, charging process, power load process.

The product is well designed adn easy to operate. The instrument uses high-definition screen with backlight, The test process is simple and the results are clear and intuitive. The product adopts four-wire kelvin test connection test. Instrument design has strengthened the protection measure for various incorrect operations, such as incorrect connection of input signal line input voltage overload and bad contact of test clamp etc, to ensure and more convenient operaton.

This product can be used in automobile battery production, automobile battery distribution, automobile parts maintenance and other equipment systems involving various types of lead-acid batteries. It is an ideal tool for testing the performance of lead-acid batteries and AGM/EFB automobile batteries.

2. Technical parameters and battery standards

2.1、Technical parameters：

Product	12V Battery Analyzer	12V/24V Battery Analyzer
Applied range	12V lead-acid(AGM/EFB) battery for starting automobile	12V/24V lead-acid(AGM/EFB) battery for starting automobile
Precision	±5%	
Battery capacity	3AH - 220AH	
CCA Measuring range	100-2000	
Voltage Measuring range	10~18V	10~35V
0perating temperature	-20℃~60℃（-4℉~140℉）	

2.2、Cold starting current measurement range：

Standard	Description	Range
CCA（SAE）	Cold starting current	100-2000
IEC	International electrotechnical commission standard	100-1000
EN	European industrial standard	100-2000
DIN	German industrial standard	100-1000
JIS(#)	Japanese industrial standard	26A17—245H52
***	Unknown standard	100-2000

(#)Note: JIS type Battery need to check the table against CCA

3. Button instruction

Button Function
〈▲〉〈▼〉: Increase and decrease or
Up and down
〈ESC〉: Cancel or return
〈OK〉: Confirm or Enter
〈TEST〉: Start measuring
Red clamp: positive pole wiring test clamp
Black clamp: Negative pole wiring test clamp.

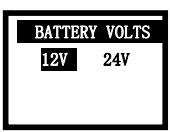
4. Operation Instructions:

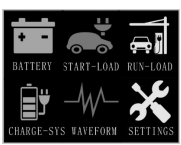
Instrument is powered by the battery under test.Please correctly clamp the battery according to the positive and negative terminals. The measured battery voltage is greater than 10V, the instrument can be started normally.

4-1. Battery voltage type selection (Suitable for 12V/24V Battery Analyzer) ⚠

Before testing, it is necessary to set the test battery voltage according to the type of battery voltage. For 12V batteries, 12V test items are selected; for 24V batteries, 24V test items are selected.

Select the battery voltage and then enter the next step of project testing: If you purchased a 12V battery analyzer, this feature is not available. After selecting the voltage specification, enter the battery test function





4-2. Battery test

4-2-1. Preparations before measurements ⚠

1）. Please turn off the car, turn the car key to the "OFF" position or unplug the car key.
2）. Just after the car has finished driving battery may be in full condition and the voltage will be slightly higher than the normal value . It is suggested that the headlight of the car should be turned on for 2-3 minutes before the voltage drops back to normal for further measurement.

4-2-2. Operation steps

1）.Positive pole of the battery is clamped according to the red test, and the negative pole of the battery is clamped by the black test. Note that good contact must be checked to avoid affecting test results.

2）.Press <▲> <▼> Press the button to select the 【**BATTERY**】 function test item and

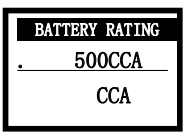
then press “**OK**”button。

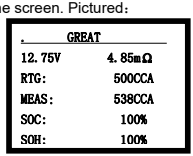
3）.After entering the 【**BATTERY TYPE**】 interface, according to the battery type REGULAR FLOODED or AGM/EFB BATTERY, set the battery type to the <▲> <▼> button selection. press <**OK**> to enter the selection，Pictured：

4）.At【**MEASURE MODE- PRECISE MEASURE**】interface, Measure the car battery, the battery has cold start current data, please choose “PRECISE MEASURE”, Please select “**FAST MEASURE**” for normal battery measurement without starting current data. by pressing <▲> <▼> button，Pictured：

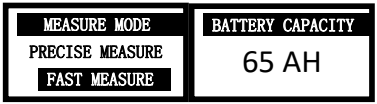
After entering the 【**BATTERY STANDARD**】 interface, according to the battery standard, set the test standard according to the <▲> <▼> button selection. If the battery is the "CCA" standard, the "CCA" can be selected by directly inputting CCA (when CCA parameters are known) or by consulting tables to check CCA. After selecting the test standard, press <**OK**> to enter the selection，Pictured：

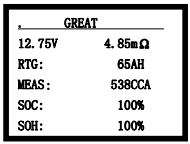
At【**BATTERY RATING**】 interface, according to the standard value expressed on the battery, adjust the value of battery test by pressing <▲> <▼> button，After setting the reference value of battery test, press the < **TEST**> key to start the test. The test is completed and the test results are displayed on the screen. Pictured：



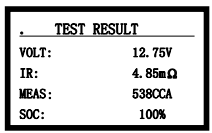


At 【**MEASURE MODE- FAST MEASURE**】 interface, When the car battery or normal battery does not have cold start current standard data. please choose 【**FAST MEASURE**】, The capacity data entered on the battery during measurement Volume data is generally XXAH, by pressing <▲> <▼> button,Then press the <**TEST**> key to measure，Pictured：





Measurement of unknown battery 【unknown battery= No cold start current parameters, no AH battery capacity parameters】.【BATTERY TYPE】- REGULAR FLOODED→【MEASURE MODE】-PRECISE MEASURE→【BATTERY STANDARD】- choose"***":



★In 24V test, CCA is 1/2 of the sum of two groups of 12V batteries in series.

Voltage	Battery voltage， Good battery voltage range:12.30V~12.60V, The voltage is low and the battery needs to be charged，Battery voltage is very low, battery damage.
RTG	The rated data entered during the measurement，Cold start current data or Battery capacity（AH）data
Internal Resistance(IR)	Generally speaking, the larger the CCA value of the battery, the smaller the internal resistance. Note: The standard of internal resistance vary from different manufacturers as different manufacturers use difffgerent materials to make batteries, However, the internal resistance of the battery of the same type from the same manufacturer will not differ greatly when it leaves the factory.
MEAS	Actual cold start current data measured by battery analyzer
SOC	State ofcharge：Percentage of battery remaining capacity
SOH	State of health; Battery health

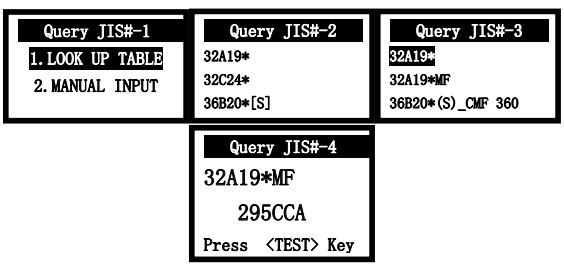
SOH: Display the battery's usage status. Replacement is recommended when battery life is less than 45%.

SOH	Display	Note
>80%	GREAT	Battery in good working condition
>60%	GOOD	Battery in good working condition
>45%	CAUTION	Battery performance is general, please pay attention to regular inspection.
≤45%	REPLACE BATTERY	Battery life is exhausted. Replacement is recommended

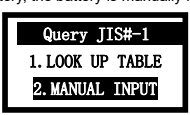
4-2-4. Method of Setting up and Using JIS Type Battery

Because JIS type batteries are different from CCA type and DIN type battery, the operation methods are as follows, Please select "JIS" in the【BATTERY STANDARD】BATTERY STANDARD" interface.:

Method 1:In the “Query JIS#-1” interface, select “1.LOOK UP TABLE”, According to the JIS battery model on the corresponding selection, direct testing can be.



Method 2:In the “Query JIS#-1” interface, select “2.MANUAL INPUT”, According to the CCA value labeled by the battery, the battery is manually input and tested.



★. During testing if the battery under test does not have any information and data. It can be tested by automobile exhaust standards. Or use the 【FAST MEASURE】 function to measure.
The reference data is as follows:

Automobile exhaust	Reference values of CCA
1200cc—1600cc	≈350CCA
1600cc—2000cc	≈500CCA
2000cc—3000cc	≈650CCA
＞3000cc	≈750CCA

4-3. START-UP LOAD test

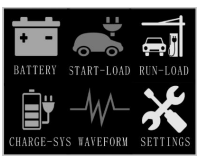
4-3-1.Preparations before measurements ⚠

Please turn off the car, turn the car key to the "OFF" position or unplug the car key.

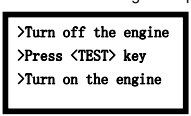
4-3-2.Operation steps

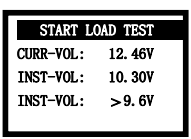
1）.Positive pole of the battery is clamped according to the red test, and the negative pole of the battery is clamped by the black test. Note that good contact must be checked to avoid affecting test results.

2）.Press <▲> <▼> Press the button to select the 【**START-UP LOAD**】 function test item and then press "**OK**"button。



3）.After selecting the test items, press the < **OK** > button to enter the 【**START-UP LOAD**】 interface, and press the < **TEST** > button according to the prompt.





The figure shows the current test voltage (static voltage) of 12.46V.Standard voltage 9.6V (for 24V systems, standard voltage 16 V).The minimum starting voltage during start-up is 10.30V.

4）.Start the car engine,The instrument automatically measures and records the minimum voltage output from the battery during the start-up of the car engine.Battery voltage should be greater than 9.6V in the process of engine operation under normal conditions.(For a 24V system, the engine voltage should be greater than 16V during the start-up process.)

4-3-3.START-UP LOAD test description：

If the minimum voltage is greater than 9.6V (for 24V system, the reading is greater than 16 V), the starting system is good.

If the minimum voltage is less than 9.6V (for 24V system, the reading is less than 16V), it means that the starting system has problems.（Please check the relevant parts such as connection points, wires and starters, and whether there is rust at battery terminals.）

Data Reference Table (12V System)		
Start the voltage	Discharge performance	Proposal
＞10.7V	Great	Everything is good
10.2~10.7V	Ordinary	Can continue to use, but pay attention to regular inspection
9.6~10.2V	Not good	Need to replace new batteries
＜9.6V	Bad	Replace the battery immediately

4-4. RUN-LOAD Test

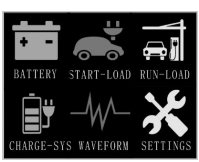
4-4-1.Preparations before measurements ⚠

Start the car and keep the engine idle.

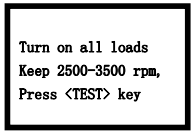
4-4-2.Operation steps

1）.Start the car and keep the engine idle.Positive pole of the battery is clamped according to the red test, and the negative pole of the battery is clamped by the black test. Note that good contact must be checked to avoid affecting test results.

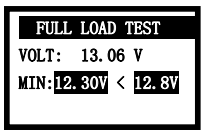
2）. Press <▲> <▼> Press the button to select the 【RUN-LOAD】 function test item and then press “**OK**”button。



3）. After selecting "**OK**", the instrument will prompt the following picture:



4）. Speed up the idle speed of the car to 2000-2500 RPM according to the instructions shown in the steps.Press the < Test > button to enter the【FULL LOAD TEST】test interface, as shown in the figure:



The figure shows the current test voltage of 13.06V.The standard voltage is 12.80V (for 24V system, the standard voltage is 25.60V), and the minimum voltage is 12.30V.

5）.Lowest voltage value is more than 12.8V (for 24V system, the voltage reading is more than 25.60 V), which means that the system is normal.

4-4-3. MAX WORK LOAD Related issues：

★If the voltage reading is less than 12.8V (for 24V system, the reading is less than 25.60V), please check whether the generator belt is worn out and the power line is short-circuited.

4-5. CHARGE SYSTEM TEST

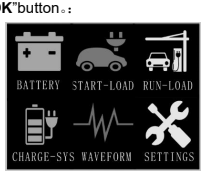
4-5-1.Preparations before measurements⚠

Start the car and keep the engine idle.

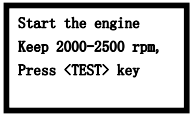
4-5-2.Operation steps:

1）. Start the car and keep the engine idle.Positive pole of the battery is clamped according to the red test, and the negative pole of the battery is clamped by the black test. Note that good contact must be checked to avoid affecting test results.

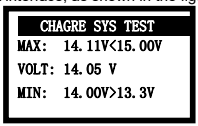
2）. Press <▲> <▼> Press the button to select the【**CHARGE-SYS**】function test item and then press "**OK**"button。:



3）. After selecting "**OK**", the instrument will prompt the following picture:



4）. Speed up the idle speed of the car to 2000-2500 RPM according to the instructions shown in the steps.Press the < **TEST** > button to enter the 【**CHARGE-SYS**】test interface, as shown in the figure:



CHARGE SYSTEM Test Voltage 14.05V;Standard maximum voltage 15.00V (for 24V systems, standard maximum voltage 30.00V),The maximum voltage is 14.11V.The standard minimum is 13.30V (for 24V system, the standard minimum voltage is 26.60V), and the measured minimum voltage is 14.00V.

4-5-3.CHARGE SYSTEM Related issues：

★If the voltage is greater than 15.0V (for 24V system, greater than 30.00V), please check the regulator.

★If the voltage is less than 13.3V (for 24V systems, less than 26.60V), check the connection points, wires and generators.

Data Reference (12V System)		
Status	Charging voltage	Engine or generator performance
Turn off headlights and air conditioners (need to step on throttle test)	＞13.5V	GOOD
	13.2V~13.5V	Ordinary
	13.0V~13.2V	Need to check
	＜13.00V	Need immediate repair
Turn on headlights and air conditioners (need to step on throttle detection)	13.4V~14.6V	GOOD
	13.2V~13.4V	Ordinary
	＜13.2V	Need immediate repair

4-6.FAQ:

FAQ-1 When using test battery startup capability, such as low battery voltage (12V system threshold is 11.94V; 24V system threshold is 23.88V), user can ignore the low voltage prompt to continue measuring, or remeasure after charging.

FAQ-2 When the starting capacity of the battery is tested, such as when the battery has just been charged, the residual surface floating charge voltage of the battery due to floating charge is too high (the 12V system threshold is 13.50V; the 24V system threshold is 27.00V). At this time, if the battery is installed on the car, the user can turn on some of the electrical equipment of the car and continue testing after eliminating the floating charge voltage on the battery surface; when the

battery is independent, the user can continue to connect the instrument to the battery, and use the instrument as the load to eliminate the floating charge voltage on the surface (relatively slow); or ignore the prompt, press the < test > key to skip and continue testing. Trial (not recommended, test results have a certain impact).

FAQ-3 Battery test clamp has poor contact，Please check whether the wires in the clamp are broken or not. If there is a break, repair or replace the clamp can continue to use.

FAQ-4 Automotive inverters will affect the test results of the instrument, so please remove the inverters before measuring to ensure the accuracy of the test.

FAQ-5 Can the instrument accurately predict when the battery willrun out?
The internal resistance of sealed lead-acid batteries is complex, which includes ohmic internal resistance, concentration differential polarization internal resistance, electrochemical reaction internal resistance and interference of double capacitor charging. The composition and relative content of the internal resistance measured by different test methods and at different times are different, so the internal resistance values measured are also different. There is no strict mathematical relationship between the internal resistance (or conductance) of sealed lead-acid batteries and the capacity of batteries. It is impossible to predict the service life of batteries based on the internal resistance (or conductance) of single batteries. However, when the internal resistance of the battery increases suddenly or the conductance decreases suddenly, the battery life is about to end.

FAQ-6 Is the CCA value measured by the instrument correct?
CCA is a control standard for battery production. According to the cumulative results, the measured value of the new battery will be higher than the label value (10-15%). With the use of users, it will approach the label value, and then lower than the label value.instrument can control the error accuracy by ±5%.

FAQ-7 Why the instrument cannot be used in measuring batteries of electric cars, motorcycles and Electric bicycle?
Because the batteries they use do not have cold start current startup capability and no CCA standard, they can not be measured. It can only be used for reference by simply measuring its voltage and internal resistance.

FAQ-8 Can the instrument measure battery AH?
Because the instrument has no discharge function, it can not measure the capacity of storage battery.

FAQ-9 Does the instrument require batteries?
The instrument does not need to be equipped with batteries. It is powered by the batteries under test. After the tested batteries are clamped with wire clamps, the instrument turns on and works. When the measured battery voltage is less than 9V, the instrument can not start.

5.Battery Analyzer with Built-in printer

Operation instructions

This operation is only limited to the use of Battery Analyzer with built-in printer.

5-1.Button Function

<▲><▼>：Increase and decrease or Up and down

<ESC> ： Cancel or return

<TEST>： Start measuring

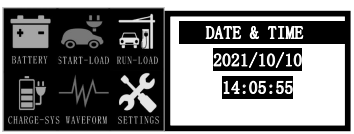
<OK> ： Confirmation or Enter

Red clamp: positive pole wiring test clamp

Black clamp: Negative pole wiring test clamp.

DATE&TIME:

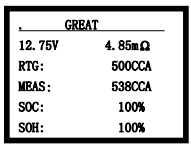
On the main menu，Options: SETTINGS→DATE&TIME→Time setting，Because the tester has a built-in CR-2032 button battery, it has a time storage function and automatically prints out the current time when printing the measurement results. So please set the current time before using.



Note:Description of printing function, Only the measurement results of 【BATTERY TEST】 can be printed.

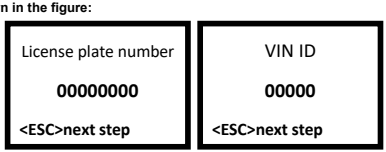
5-2. Operating steps:

After measuring in the function of 【BATTERY TEST】, the interface of measuring results is displayed as follows:

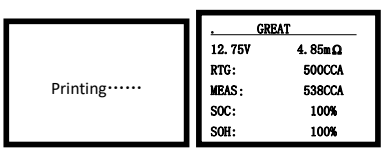


Press the "OK" button and the instrument will prompt you whether to print the test report, as shown in the figure:

Press the "OK" button to select YES and enter the license plate number and date setting interface, as shown in the figure:



After setting up, press "OK"button, print test report by printer, and return the screen to the measurement result interface, as shown in the figure:



Printed results are displayed, as shown in the figure:

PRECISE MEASURE MODE Print Results	FAST MEASURE Print Results
======BATTERY TEST REPORT====== Battery type : 12V Battery Result : GOOD Voltage: 12.60V IR : 5.52 mΩ SOC : 99 % SOH : 76 % Measured : 524 CCA Standard : 600 CCA License plate : ABCD1234 VIN ID: A1234 Date/Time : 2021/10/25 13:31:28 ==========END==========	======BATTERY TEST REPORT====== Battery type : 12V Battery Result : GREAT Voltage: 12.59V IR : 5.52 mΩ SOC : 98 % SOH : 88 % Measured : 524 CCA Standard : 70 AH Serial Number: 12345678 Date/Time : 2021/10/25 13:32:34 ==========END==========

5-3. Method of replacing printing paper:

	1.Open the cover of the printer.
	2.Put the printing paper into the printer,please note the direction.
	3.Set aside part of the printing paper outside,close the cover of the printer,and finish the operation.

6.Battery Specification Reference Table

Note:The actual value is based on the factory data of battery manufacturers. Data in this table is for reference only.

6-1．JIS Battery model

Model		CCA			Model		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	220	265	65D26R	NS70	415	520	625
26B17L		200	220	265	65D26L	NS70L	415	520	625
28B17R		245			65D31R	N70	390	520	625
28B17L		245			65D31L	N70L	390	520	625
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
34B17L		280			75D31L	N70ZL	450	540	735
34B19R	NS40ZA	270	325	400	80D26R		580	580	630
34B19L	NS40ZAL	270	325	400	80D26L		580	580	630
36B20R	NS40Z	275	300	360	85B60K				500
36B20L	NS40ZL	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	NT60-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
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	352	360	420	130E41L	NX20010L	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	NX100-5	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	N51L	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	NC250-12L	1045		
50B24R	NT80-S6	390			180G51L	NT250-15L	1090		
50B24L	NT80-S6L	390			180G51L	NT250-15L	1090		
50D26R	50D20R		370		195G52R	NX300-51	1145		
50D26L	50D20L		370		195G52L	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	

6-2. DIN、EN Battery model

MODEL	Approximate	DIN	EN	MODEL	Approximate	DIN	EN
52805	52815	180	240	56420	56322 88066	300	510
53517		175	300	56530	56618 56638	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	540
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	60019	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
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	63545	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
56012		230	390	64317	64318 64323	540	900
56048	56068 56069	250	390	65513		540	900
56049	56069 56073	250	390	65514	65515	570	900
56077	56030	300	510	67043	67045	600	1000
56091	55811	360	540	58032	68034	600	1000
56111	55048	300	540	70029	70038 70027	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	56312 56311	300	510				

6-3. YUASA Battery model

YUASA Battery model	CCA	YUASA Battery model	CCA
GT50L-MF	356CCA	75A-72	630CCA
GTH55DL-MF	356CCA	78A72	670CCA
GTH60DL-MF	325CCA	34-610MF	610CCA
GTH75DL-MF	520CCA	75-6MF	615CCA
GTH40S	275CCA	58-6MF	530CCA
GTH40L	276CCA	34-6MF	500CCA
GTH40	277CCA	24-500	500CCA
GTH60L	325CCA	34-710	710CCA
GTH75DL-MF(Sports VER）	520CCA	41-580	580CCA
GTH75D-MF(Sports VER）	521CCA	58-530	530CCA
55D23R-MF	522CCA	65-730	730CCA
34-60	525CCA	75-660	660CCA
58-60	525CCA	78-710	710CCA
65-70	700CCA	GR40R-MF	700CCA
74-60	525CCA	GR40R-CMF	820CA
75-72	500CCA	GR96R-MF	500CCA
35-580	580CCA	GR96R-CMF	580CCA
65-900	580CCA		

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