# Contents

**cte 承德科技** CHEN TECH ELECTRIC

# BT 2000

- The smallest in the industry → Significantly increase laboratory utilization.

- Modulized design → Easy to maintain.

- 0.02%F.S. accuracy; data recording frequency of 1 ms; support multiple basic and advanced operating modes.
( Ex, CC, CC-CV, CP, CR, Waveform, Pulse, DCIR, ACIR, EIS and so on)

# Safety Plus

- Dual OV and OT detection mechanism; an independent program monitors the voltage and temperature of batteries being tested, and suspends equipment operations when the system is abnormal.

- Abnormal channel status detection; continuously matches the process and channel status, and issues a warning or suspends equipment if it is inconsistent.

- Extra and independent monitoring mechanism; uses third party hardware attached to the equipment to monitor battery voltage and temperature at all times, and directly cuts off equipment power when there are any abnormalities.

- External monitoring of power values; the external smart meter records various power related values, and the data is used for abnormalities tracking and comparison.

# MCP Plus

- Economical solution that can satisfy requirements for automated production of power batteries.

- Modulized design applied and hot swapping supported→ Increases equipment uptime.

- Size optimization →
Effectively increases production capacity by multiple times.

# 2020/ 2021 HIGHLIGHTS

# Analysis Plus

Multiple advanced analytics tools are introduced to assist battery researchers learn battery characteristics in an efficient way.

- Coulombic Efficiency

  The effective charge/discharge efficiency is obtained through a complete charge and discharge process. The coulombic efficiency curve is obtained based on statistics of numerous cycles, and used to evaluate the battery life.

- dQ/dV

  The differential capacity curve is drawn with dQ (capacity change)/dV (voltage change) as the vertical axis and voltage as the horizontal axis, and is used to analyze battery characteristics and state of health
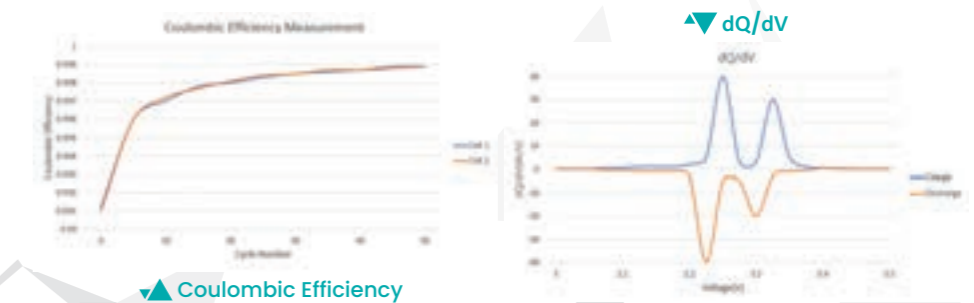
# SBT 1000

- <60 seconds and >92% accuracy battery state of health evaluation →
Lower equipment and power cost required for new/used batteries testing by 99% and above.

- Utilized AI and big data technologies to continue optimizing the battery state of health model to increase test accuracy.

- Incorporated 2 proprietary technologies and won the 2020 Taiwan Excellence Awards.

TAIWAN EXCELLENCE 2020

dQ/dV

Coulombic Efficiency

# CULTIVATING A GREENER FUTURE FOR THE BATTERY INDUSTRY.

*As a member of the global village, Chen Tech is committed to developing advanced testing technologies and integrating information technologies, providing our clients eco-friendly battery production and testing solutions.*

# cte
# SERVICE GUARANTEE

## Cost Efficient

Auto-Calibrator rental

Remote and online collaboration support

## Timely

Online system operations and troubleshooting guidelines

Rapidly response to repair requests

Real-time remote troubleshooting

## Effective

High-efficiency circuit design

High performance components selection

Module replacement design

Rapid response for high cusomter satisfaction

## 1984

Chen Tech Electric is established followed by the opening of our first factory.

Produced high power DC control equipment.

## 1989

Began producing large lead-acid battery and sealed battery testing/ production equipment.

## 1996

Our large-scale lead-acid and VRLA battery testing/ production equipment becomes the market leader in Taiwan.

Awarded ISO 9001 Quality Management Systems Certification.

Opened second factory, located in Erchong, Taiwan, and incorporated R&D for NiMH battery related products.

## 2000

Opened sales and client service branch office in Guangzhou, China to provide more localized and prompt client services to meet the growing demand for Chen Tech Electric products and services.

## 2012

Our charging/ discharging equipment entered the supply chain of Korean manufacturers; we also established distribution center in Korea.

Enhanced gas gauge products to support multi-communication protocols; established and integrated solution for battery production information management system.

## 2013

Introduced the CRM system and established a service database that integrated prior experience from providing services to clients.

In response to the global pursuit of sustainability and low-carbon solutions, we invested in the research and development of advanced PWM controls and energy recycling technology, proposing the intelligent energy management solution SEMTest, which reduces energy consumption during battery manufacturing and testing by up to 70% - the best in the industry.

## 2014

Became the exclusive sales representative of Japan's SoftEnergy Controls Inc., to sell automated energy-efficient battery formation line, effectively reducing the labor and electricity costs needed for large-scale production of power battery.

## 2015

Developed premium portable battery testing equipment, MCL2 Mini, and provided different levels of current output (µA to A), enabling a mobile testing environment for battery researchers.

Developed MCF-Lite, the testing equipment for batteries used in wearable devices. MCF-Lite can be switched between two current output ranges and supports output as low as 50µA. A solution that is both economical and flexible.

Established sales representatives in the United States and Thailand, introducing Chen Tech's products to the cutting-edge testing markets.

## 2003

Initiated R&D for producing testing/ production equipment for lithium-ion battery cells and battery packs to meet next-generation technology developments and established a new production platform.

## 2004

Began developing lithium-ion and lithium polymer batteries, battery packs for consumer electrics, single-cell battery learning and formation equipment in response to the increasing demand in the consumer goods market.

## 2005

Utilized our abundance of expertise and experience in the field of electric vehicle applications to participate in a BES operation of first generation of electricity - powered motorcycles in Suzhou, China and further expanded our R&D department.

## 2006

Established a sales and client service branch office in Suzhou, China in response to our increasing market share in lithium-ion battery equipment.

## 2016

Collaborated with Germany's power supply company to develop an energy-efficient power battery testing system, PBT 1000, which can perfectly simulate the performance of power battery in actual vehicle operation.

The first in the industry to invest in the field of second-life batteries as well as the research on state of health (SoH) of batteries. A battery SoH evaluation system was developed, which can determine the SOH of a second-life battery as well as its remaining life span within 30 seconds at 92% accuracy.

## 2017

The BT 1000 Responsive Multi-range Battery Test Equipment and the PBT 1000 Power Battery Pack Test Equipment are selected for the Best Products category during the 14th National Brand Yushan Award.

Introduced the MCE A Battery Cell Production System in response to the development of electric vehicles as well as the high demand for power batteries, which integrated automated production lines and effectively reduced the production costs of power batteries while improving production yield.

## 2019

Lithium Battery State of Health (SOH) Rapid Evaluation Solution SBT 1000 won the 2020 Taiwan Excellence Award for productivity and energy industry.

Established a Kansai Office in Osaka, Japan to provide Kansai customers with immediate and local services.

## 2020

Demo room formally opened, provides customers with a comfortable space for display and discussion, improving the service experience provided by Chen Tech Electric.

## 2007

Began developing testing equipment for lithium-ion battery, LiFePO4 battery, and power battery packs in response to growing demand for electric vehicles.

## 2009

Our laptop battery pack production/ testing equipment becomes market leader in the world.

Began exploring the fields of power battery smart chargers, charging and exchange stations, and charging and exchange applications for hybrid and light electric vehicles.

## 2010

Started developing single-cell high precision charging/ discharging equipment MCL/ MCP to meet demands for charging/ discharging control precision from battery manufacturers.

## 2011

In order to establish roots in Japan's local market and to further cooperate with major Japanese manufacturers, we established a branch office offering sales and client service in Tokyo, Japan.

We organized a software and system integration team to develop a scalable cloud-based BES battery exchange platform and advanced data analytics software for cell testing.

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# WORLD IDE *BATTERY TEST EXPERT*

**ACCESSORIES**

iBest SOFTWARE

DATA ANALYZER

AUTO CALIBRATOR

CUSTOMIZED FIXTURE

BMS DATA COLLECTOR
GDA-300
iBox-G

AUXILIARY VOLTAGE
ES-100B

AUXILIARY TEMPERATURE
ET-100B
ET-100C

Power / Lead-acid Cell
IT Cell
Cell level
System/pack level
(Power)

**ECONOMY MANUFACTURING**
**PRECISION MANUFACTURING**
**BASIC RESEARCH**
**ADVANCED RESEARCH**

MCIF P.49
MCIF Plus P.47
MCE S P.43
MCP Plus P.41
BPT 1100E Plus P.45

MCE A P.37
MCF Lite P.39
SBT 1000 P.35

MCB P.33
MCT 18B/18M Plus P.31

PBT 2000 P.21
MCL2 P.25
BT 2000 P.19
GBT 1000 P.23
ABT 1000 P.29
MCL2 Mini P.27

*Accept customized hardware and software development

Legend: ● Standard ○ Option

Column groups:
- **LITHIUM BATTERY ADVANCED RESEARCH**: BT 2000, PBT 2000, GBT 1000, MCL2, MCL2 Mini
- **LITHIUM BATTERY BASIC RESEARCH/ PRODUCTION**: ABT 1000, MCB, MCE A, MCF Lite, MCP Plus
- **LEAD-ACID BATTERY RESEARCH & DEVELOPMENT**: MCT 18B/18M Plus
- **LEAD-ACID BATTERY PRODUCTION**: MCE S, MCIF Plus, MCIF

| Category | Feature | BT 2000 | PBT 2000 | GBT 1000 | MCL2 | MCL2 Mini | ABT 1000 | MCB | MCE A | MCF Lite | MCP Plus | MCT 18B/18M Plus | MCE S | MCIF Plus | MCIF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACCURACY | Voltage | ±0.02% F.S. | ±0.1% F.S. | ±0.02% F.S. | ±0.02% F.S. | ±0.02% F.S. | ±0.04% F.S. | ±0.04% F.S. | ±0.05% F.S. | ±0.075% F.S. | ±0.1% F.S. | ± 0.04% F.S. | ±0.5% F.S. | ±0.5% F.S. | ±0.5% F.S. |
| | Current | ±0.02% F.S. | ±0.1% F.S. | ±0.02% F.S. | ±0.02% F.S. | ±0.02% F.S. | ±0.03% F.S. | ±0.03% F.S. | ±0.05% F.S. | ±0.06% F.S. | ±0.1% F.S. | ± 0.03% F.S. | ±0.5% F.S. | ±0.5% F.S. | ±0.5% F.S. |
| DATA RECORDING TIME | Standard | 0.1s | 0.1s | 0.1s (1s in GSM mode) | 0.1s | 0.1s | 0.1s | 0.1s | 1s | 1s | 1s | 0.1s | 1s | 1s | 1s |
| | Option | 10ms, 1ms | 10ms | | 10ms, 1ms | 10ms | | | | | 0.1s | | | | |
| CHARGE/ DISCHARGE MODE | CC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | CC-CV | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● (Charge Only) |
| | CP | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| | CR | ○ | ○ | | ○ | | | | | | | | | | |
| | waveform | ○ | ● | | ○ | | | | | | | | | | |
| | Pulse ( 100Hz ) | ○ | ● ( 50Hz ) | | ○ | ○ | | | | | | | | | |
| | GSM ( CC Mode Only ) | | | ● | | | | | | | | | | | |
| | ACIR | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | | | |
| | DCIR | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | Current Ramp | ○ | ● | | | | | | | | | | | | |
| | Voltage Ramp | ○ | ● | | | | | | | | | | | | |
| ACCESSORY | BMS & Gauge Data Collector | ○ | ○ | ○ | ○ | | | ○ | ○ | | | | | | |
| | Auxiliary Voltage | ○ | ○ | ○ | ○ | | | ○ | ○ | | | | ○ | ● Built-in | ○ |
| | Auxiliary Temperature | ○ | ○ | ○ | ○ | | | ○ | ○ | | | | ○ | | ○ |
| | Chamber | ○ | ○ | ○ | ○ | ○ | ● Built-in | ○ | ○ | ○ | ○ | ○ | | | |
| | Auto-Calibrator | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | Barcode Scanner | | | | | | | ○ | ○ | ○ | ○ | | | | |
| | Alarm Buzzer | ○ | ● | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● |
| TEST AUTO-START MODE | By Detecting Battery | | | | | | | ○ | ○ | ○ | ○ | | | | |
| | By Gas Gauge | | | | | | | ○ | ○ | | | | | | |
| | By Bar Code | | | | | | | ○ | ○ | ○ | ○ | | | | |
| OTHER FUNCTIONS | Discharge to 0V (5V Model) | ● | | ○ | ○ | ● | | ○ | | | ● | | | | |
| | Multiple Current Ranges | ● ( 2~4Ranges ) | ○ | | | | | | | ● (1~2 Ranges) | | | | | |
| | Data Analysis | ○ | ○ | ○ | ○ | ● | ○ | ○ | ○ | ○ | ○ | ○ | | | |
| | Charge and Discharge Rapidly Switch (≤5ms) | ● | ● | | ○ | | | | | | | | | | |
| | BMS & Gas Gauge Data Collection | ○ | ○ | ○ | ○ | | | ○ | ○ | | | | | | |
| | SoC Control | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | |
| | Ni-MH Battery Testing | ● | | ● | ● | ● | ● | ● | ● | ● | ○ | | | | |
| | Parallel Connections among Channels | ○ | ○ | | ○ | ○ | | ○ | | | ○ | | | | |
| | Third-party Chamber Integration | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ○ | | | |
| | Energy Recycle | | ● | | | | | | ● | | | | | ● | |
| | | P.19 | P.21 | P.23 | P.25 | P.27 | P.29 | P.33 | P.37 | P.39 | P.41 | P.31 | P.43 | P.47 | P.49 |

# FIND THE ONE

◄▶ We provide the following products based on different applications and their critical battery testing requirements :

**ESS | Starting Batteries For Vehicles**

Energy Recycle

**Mobile Phone | Tablet | Laptop**

Multiple Current Ranges · High Precision · Rapid Data Recording · Pulse Charge/Discharge · BMS Control · Temp/Humidity Control

**Electric Vehicles**

Energy Recycle · Dynamic waveform simulation · Charge / Discharge Rapid Switch · BMS Control · High Power · Multiple Current Ranges · SOH Evaluation · Pulse Charge/Discharge

**Wearable Device**

Output/Control · Multiple Current Ranges · High Precision · Temp/Humidity Control
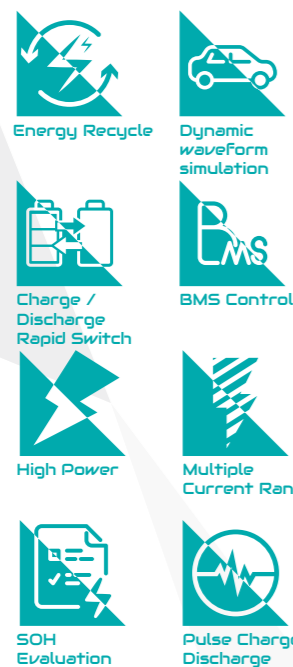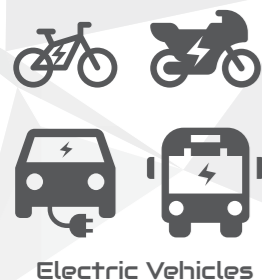
**Materials**

Output/Control · Multiple Current Ranges · 0V Discharge · Rapid Data Recording · High Precision

# COMPACT MULTI-RANGE BATTERY TEST EQUIPMENT

## BT 2000 SERIES

### Applied test

- **ACE** — Life cycle test
- **Capacity test**
- **Dynamic waveform simulation**
- **Pulse Charge/Discharge**
- **DCIR** — DCIR measurement
- **ACIR** — ACIR measurement

### Applied technology

- Charge and discharge rapid switch
- Dynamic waveform simulation
- BMS data collection
- Rapid data recording
- High Precision
- Discharge to Negative Voltage
- Multiple Current Ranges
- Microampere level current output/ control

| | | | | | |
|---|---|---|---|---|---|
| **AC Power** | | | Customized According To Client Needs | | |
| **Loading Range** | | Charge | 0~100V* | Discharge | 0~100V*（Option: Discharge to Negative Voltage） |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec* | Measurement / Voltage | Range | 0~Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | Accuracy | ±0.02% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | | |
| | | Range | 2~4 (Option) | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | |
| | Constant Power | Maximum Power | Depend on Spec | | Accuracy | ±0.02% F.S. |
| | | Resolution | 16 bit | | | |
| | | Accuracy | ±0.04% F.S. | | | |
| **Data Recording Time** | | 100ms (Option：10ms, 1ms) | | | |
| **Switch Time between Charge and Discharge** | | <5ms | | | |
| **Communication Interface** | | Ethernet | | | |
| **Ambient** | | 23°C ± 2°C; 20~90HR | | | |
| **Optional Features** | | Constant Resistance、Dynamic Waveform Simulation、Pulse Charge/Discharge、DCIR Measurement、ACIR Measurement、Voltage Ramp、Current Ramp、Parallel Connections among Channels、BMS & Gas Gauge Data Collection、Chamber Integration、Data Analyzer | | | |
| **Accessory** | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Customized Fixture、Auto-Calibrator、Alarm Buzzer | | | |

*Accept Customized Request

## The best solution for the following needs

◄ To accurately and rapidly record battery parameter changes during test processes.

◄ To test various types of batteries using the same equipment, improving asset utilizationv rates.

◄ During new battery development cycles, e.g., from materials research to full battery test, precise test results are required.

## Main Features

- Innovative mechanical design; the smallest in the industry.
- Module replacement design.
- Output and measurement accuracy is within ±0.02% F.S.
- 4 ranges of current precision, customizable based on customer requirements.
- A data recording frequency of 1ms.
- Unlimited phase of pulse charging/discharging; the minimum width is 10ms.
- Capable of discharging batteries to negative voltage.

## Others

- Independent control and output of each channel.
- Able to make parallel connections among multiple channels in any configuration to increase current output.
- Operating modes：Constant Current、Constant Voltage、Constant Power、Dynamic Waveform Simulation、Pulse Charge/Discharge、Current Ramp、Voltage Ramp、DCIR、ACIR、Constant Resistance Charge/Discharge.
- Software with high expandability，with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units、chambers, and other externally connected modules.
- Advanced data analysis functionality.
- BMS CAN signal analysis.
- Mechanical designs can be adjusted according to customer specifications.
- Various types of international testing standards for drive simulation, DCIR and pulse charging/discharging.

| Model | Voltage(V) | Current (A) | | | |
|---|---|---|---|---|---|
| | | Range 1 | Range 2 | Range 3 | Range 4 |
| BT 2000 5V/1A | 5 | 1 | 0.1 | 0.01 | 0.001 |
| BT 2000 5V/5A | 5 | 5 | 0.5 | 0.02 | 0.001 |
| BT 2000 5V/10A | 5 | 10 | 1 | 0.02 | 0.001 |
| BT 2000 5V/20A | 5 | 20 | 5 | 0.5 | 0.02 |
| BT 2000 5V/30A | 5 | 30 | 5 | 0.5 | 0.02 |
| BT 2000 5V/50A | 5 | 50 | 5 | 0.5 | 0.02 |
| BT 2000 5V/100A | 5 | 100 | 10 | 0.5 | 0.02 |
| BT 2000 5V/150A | 5 | 150 | 10 | 0.5 | 0.02 |
| BT 2000 5V/200A | 5 | 200 | 50 | 5 | 0.5 |
| BT 2000 5V/250A | 5 | 250 | 50 | 5 | 0.5 |
| BT 2000 5V/300A | 5 | 300 | 50 | 5 | 0.5 |
| BT 2000 5V/350A | 5 | 350 | 50 | 5 | 0.5 |
| BT 2000 5V/400A | 5 | 400 | 50 | 5 | 0.5 |
| BT 2000 5V/450A | 5 | 450 | 50 | 5 | 0.5 |
| BT 2000 5V/500A | 5 | 500 | 50 | 5 | 0.5 |
| BT 2000 20V/40A | 20 | 40 | 20 | 10 | 5 |
| BT 2000 20V/60A | 20 | 60 | 30 | 15 | 5 |
| BT 2000 60V/60A | 60 | 60 | 30 | 15 | 5 |
| BT 2000 60V/100A | 60 | 100 | 50 | 20 | 10 |
| BT 2000 100V/300A | 100 | 300 | 150 | 50 | 10 |

# ECO SERIES - POWER BATTERY PACK TEST EQUIPMENT

## PBT 2000 SERIES

### Applied test

- Life cycle test (ACE)
- Capacity test
- Dynamic waveform simulation
- Pulse Charge/ Discharge
- DCIR measurement
- ACIR measurement
- Battery simulation

### Applied technology

- Charge and discharge rapid switch
- Dynamic waveform simulation
- BMS data collection
- High power output
- Dual control modes (×2)
- Touch operation
- Multiple Current Ranges
- Energy Recycle

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **AC Power** | | | Customized According To Client Needs | | | | | |
| **Power Factor** | | | >0.99 | | | | | |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec | Measurement | Voltage | Range | Depend on Spec | |
| | | Resolution | 16 bit | | | Resolution | 16 bit | |
| | | Accuracy | ±0.1% F.S. | | | Accuracy | ±0.1% F.S. | |
| | Constant Current | Maximum Charge/ Discharge Current | Depend on Spec | | Current | Range | Depend on Spec | |
| | | Range | 2 (Option) | | | Resolution | 16 bit | |
| | | Resolution | 16 bit | | | Accuracy | ±0.1% F.S. | |
| | | Accuracy | ±0.1% F.S. | | | | | |
| **Data Recording Time** | | 100ms (Option:10ms) | | | | | | |
| **Switch Time between Charge and Discharge** | | <2ms | | | | | | |
| **Dynamic Waveform Simulation** | | FUDS, DST ,HPPC, Custom Patterns | | | | | | |
| **Bidirectional Converter Efficiency** | | Up to 95% | | | | | | |
| **Communication Interface** | | Ethernet | | | | | | |
| **Optional Features** | | Constant Resistance、DCIR Measurement、ACIR Measurement、BMS & Gas Gauge Data Collection、Chamber Integration、Data Analyzer、Parallel Connections among Channels | | | | | | |
| **Accessory** | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Battery Connecting Cable、Parallel Connection Module、Power Distribution Switch Box、Power Distribution Unit. | | | | | | |

*Accept Customized Request

## ▷ The best solution for the following needs

- ◀ To test large-capacity batteries or DC motors.
- ◀ With green factories as the target, aiming to reduce carbon emissions and energy costs.
- ◀ To evaluate the performance of batteries under a real operational environment.
- ◀ Comprehensive battery test data collection and analysis.
- ◀ Need customizable electric vehicle battery test patterns and communication protocols support.
- ◀ To test various types of batteries using the same equipment, improving asset utilization rates.

## Main Features

- ■ Max. output is 500kW/1000V/2000A.
- ■ The discharged energy recycling efficiency is able to reach up to 95%.
- ■ Built-in FUDS, DST, HPPC and many other international drive simulation testing standards, also supports custom drive cycles profile.
- ■ Possesses the dual functionality for performing battery testing and battery simulations.
- ■ Supports 2 ranges of current output and measurements.
- ■ PC control and panel control dual-mode operations, touch controls are supported by panel operation.
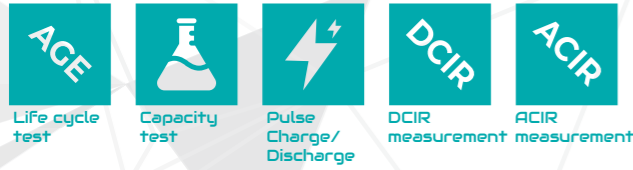- ■ Meets EN ISO 13849-1 performance level D.

## Others

- ■ Independent control and output of each channel.
- ■ Supports 2 parallel channels to increase current output.
- ■ Operating modes：Constant Current、Constant Voltage、Constant Power、Dynamic Waveform Simulation、Pulse Charge/Discharge、Current Ramp、Voltage Ramp、DCIR、ACIR、Constant Resistance Charge/Discharge.
- ■ Software with high expandability，with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units、chambers, and other externally connected modules.
- ■ Advanced data analysis functionality.
- ■ BMS CAN signal analysis.
- ■ Various types of international testing standards for drive simulation, DCIR and pulse charging/discharging.

| Model | Power (kW) | Voltage(V) | Current (A) | Model | Power (kW) | Voltage(V) | Current (A) |
|---|---|---|---|---|---|---|---|
| PBT 2000 300-60-200 | 60 | 300 | 200 | PBT 2000 1000-160-1000 | 160 | 1000 | 1000 |
| PBT 2000 300-60-600 | 60 | 300 | 600 | PBT 2000 600-250-600 | 250 | 600 | 600 |
| PBT 2000 300-60-1000 | 60 | 300 | 1000 | PBT 2000 600-250-1000 | 250 | 600 | 1000 |
| PBT 2000 300-100-600 | 100 | 300 | 600 | PBT 2000 800-250-600 | 250 | 800 | 600 |
| PBT 2000 300-100-1000 | 100 | 300 | 1000 | PBT 2000 800-250-1000 | 250 | 800 | 1000 |
| PBT 2000 600-100-200 | 100 | 600 | 200 | PBT 2000 1000-250-600 | 250 | 1000 | 600 |
| PBT 2000 600-100-600 | 100 | 600 | 600 | PBT 2000 1000-250-1000 | 250 | 1000 | 1000 |
| PBT 2000 600-100-1000 | 100 | 600 | 1000 | PBT 2000 600-320-600 | 320 | 600 | 600 |
| PBT 2000 800-100-200 | 100 | 800 | 200 | PBT 2000 600-320-1000 | 320 | 600 | 1000 |
| PBT 2000 800-100-600 | 100 | 800 | 600 | PBT 2000 800-320-600 | 320 | 800 | 600 |
| PBT 2000 800-100-1000 | 100 | 800 | 1000 | PBT 2000 800-320-1000 | 320 | 800 | 1000 |
| PBT 2000 1000-100-200 | 100 | 1000 | 200 | PBT 2000 1000-320-600 | 320 | 1000 | 600 |
| PBT 2000 1000-100-600 | 100 | 1000 | 600 | PBT 2000 1000-320-1000 | 320 | 1000 | 1000 |
| PBT 2000 1000-100-1000 | 100 | 1000 | 1000 | PBT 2000 600-400-1000 | 400 | 600 | 1000 |
| PBT 2000 600-160-600 | 160 | 600 | 600 | PBT 2000 800-400-1000 | 400 | 800 | 1000 |
| PBT 2000 600-160-1000 | 160 | 600 | 1000 | PBT 2000 1000-400-600 | 400 | 1000 | 600 |
| PBT 2000 800-160-200 | 160 | 800 | 200 | PBT 2000 1000-400-1000 | 400 | 1000 | 1000 |
| PBT 2000 800-160-600 | 160 | 800 | 600 | PBT 2000 600-500-1000 | 500 | 600 | 1000 |
| PBT 2000 800-160-1000 | 160 | 800 | 1000 | PBT 2000 800-500-1000 | 500 | 800 | 1000 |
| PBT 2000 1000-160-200 | 160 | 1000 | 200 | PBT 2000 1000-500-600 | 500 | 1000 | 600 |
| PBT 2000 1000-160-600 | 160 | 1000 | 600 | PBT 2000 1000-500-1000 | 500 | 1000 | 1000 |

# TELECOM DEVICE BATTERY TEST EQUIPMENT

## GBT 1000 SERIES

### Applied test

**AGE** — Life cycle test
**Capacity test**
**Pulse Charge/Discharge**
**DCIR** — DCIR measurement
**ACIR** — ACIR measurement

### Applied technology

**High Precision**
**0V Discharge**
**KHz level pluse**

### ▶ The best solution for the following needs

◀ High-frequency pulse testing requirements.

◀ To perform tests on various mobile communication protocols, such as GSM and PWM.

## Main Features

- Output and measurement accuracy is within ±0.02% F.S.
- kHz level pulse frequency.

## Others

- Independent control and output of each channel.
- Operating modes：Constant Current、Constant Voltage、Constant Power、GSM、DCIR、ACIR.
- Software with high expandability，with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units, chambers, and other externally connected modules.
- Advanced data analysis functionality.
- Mechanical designs can be adjusted according to customer specifications.
- With various types of international testing standards for DCIR and pulse charging /discharging already built in.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | Charge | 0～20V* | Discharge | 2-20V*（Option: Discharge to 0V） | | |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec* | Measurement | Voltage | Range | 0～Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | ±10A* | | Current | Range | 11A* |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Power | Maximum | Depend on Spec | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.04% F.S. | | | | |
| Data Recording Time | | 100ms (1s in GSM mode) | | Pulse | Phase | | 8 |
| Communication Interface | | Ethernet | | | Time | Maximum Pulse Width | 60s |
| | | | | | | Minimum Pulse Width | 500μs |
| Ambient | | 23°C±2°C; 20~90 HR | | | | Resolution | 50μs |
| Optional Features | | DCIR Measurement、ACIR Measurement、Chamber Integration、Data Analyzer、BMS & Gas Gauge Data Collection | | | | | |
| Accessory | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Customized Fixture、Auto-Calibrator、Alarm Buzzer | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| GBT 1000 5V/10A | 5 | 10 |
| GBT 1000 20V/10A | 20 | 10 |

# NEW GENERATION ADVANCED BATTERY TEST EQUIPMENT

## MCL2 Series

### Applied test

- **AGE** — Life cycle test
- **Capacity test**
- **Dynamic waveform simulation**
- **Pulse Charge/Discharge**
- **DCIR** measurement
- **ACIR** measurement

### Applied technology

- Charge and discharge rapid switch
- Dynamic waveform simulation
- BMS data collection
- Rapid data recording
- High Precision
- 0V Discharge

### The best solution for the following needs

- Requires highly-precise testing results.
- The diversity of the battery specs to be tested is limited.
- To accurately and rapidly record battery parameter changes during test processes.

## Main Features

- Output and measurement accuracy is within ±0.02% F.S.
- A data recording frequency of 1ms.
- 2 phases of pulse charging/discharging; the minimum width is 10ms.

## Others

- Independent control and output of each channel.
- Able to make parallel connections among multiple channels in any configuration to increase current output.
- Operating modes: Constant Current、Constant Voltage、Constant Power、Dynamic Waveform Simulation、Pulse Charge/Discharge、DCIR、ACIR、Constant Resistance Charge/Discharge.
- Software with high expandability, with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units, chambers, and other externally connected modules.
- Advanced data analysis functionality.
- BMS CAN signal analysis.
- Mechanical designs can be adjusted according to customer specifications.
- Various types of international testing standards for drive simulation, DCIR and pulse charging/discharging.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | Charge | 0~100V* | Discharge | 2~100V*(Option: Discharge to 0V) | | |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec* | Measurement | Voltage | Range | 0~Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Power | Maximum | Depend on Spec | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.04% F.S. | | | | |
| Data Recording Time | | 100ms (Option: 10ms, 1ms) | | | | | |
| Communication Interface | | Ethernet | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | Constant Resistance、Dynamic Waveform Simulation、Pulse Charge/Discharge、DCIR Measurement、ACIR Measurement、Parallel Connections among Channels、BMS & Gas Gauge Data Collection、Chamber Integration、Data Analyzer | | | | | |
| Accessory | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Customized Fixture、Auto-Calibrator、Alarm Buzzer | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCL2 5V/3A | 5 | 3 |
| MCL2 5V/5A | 5 | 5 |
| MCL2 5V/10A | 5 | 10 |
| MCL2 5V/20A | 5 | 20 |
| MCL2 5V/30A | 5 | 30 |
| MCL2 5V/50A | 5 | 50 |
| MCL2 5V/100A | 5 | 100 |
| MCL2 5V/200A | 5 | 200 |
| MCL2 5V/300A | 5 | 300 |
| MCL2 5V/400A | 5 | 400 |
| MCL2 5V/500A | 5 | 500 |
| MCL2 5V/1000A | 5 | 1000 |
| MCL2 20V/5A | 20 | 5 |
| MCL2 20V/10A | 20 | 10 |
| MCL2 20V/20A | 20 | 20 |

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCL2 20V/30A | 20 | 30 |
| MCL2 60V/10A | 60 | 10 |
| MCL2 60V/15A | 60 | 15 |
| MCL2 60V/20A | 60 | 20 |
| MCL2 60V/30A | 60 | 30 |
| MCL2 60V/60A | 60 | 60 |
| MCL2 60V/80A | 60 | 80 |
| MCL2 60V/100A | 60 | 100 |
| MCL2 60V/200A | 60 | 200 |
| MCL2 60V/500A | 60 | 500 |
| MCL2 100V/100A | 100 | 100 |
| MCL2 100V/200A | 100 | 200 |
| MCL2 100V/300A | 100 | 300 |
| MCL2 100V/500A | 100 | 500 |

# NEW GENERATION PORTABLE BATTERY TEST EQUIPMENT

## MCL2 Mini Series

### Applied test

- AGE — Life cycle test
- Capacity test
- Pulse Charge/Discharge
- DCIR — DCIR measurement
- ACIR — ACIR measurement

### Applied technology

- μA — Microampere level current output/ control
- High Precision
- 0V Discharge
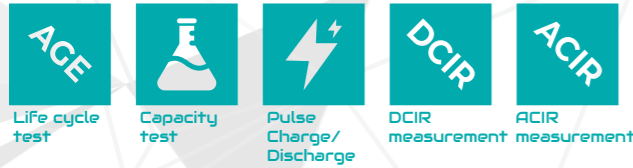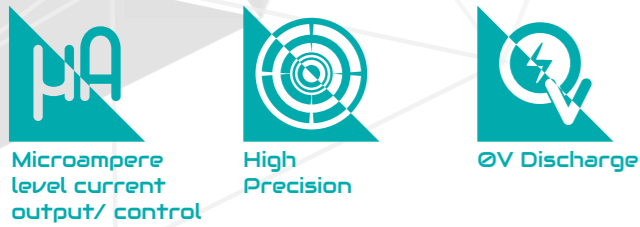
### The best solution for the following needs

◀ Requires the use of the same equipment in multiple locations to perform battery testing, so that reliable test results can be obtained by testing under an environment with minimal equipment variations.

◀ Requires highly-precise testing results.

◀ To accurately and rapidly record battery parameter changes during test processes.

### Main Features

- Portable equipment with a size and weight which can be hand-carried or placed inside a suitcase.
- Output and measurement accuracy is within ±0.02% F.S.
- A data recording frequency of 10ms.

### Others

- Independent control and output of each channel.
- Able to make parallel connections among multiple channels in any configuration to increase current output.
- Operating modes：Constant Current、Constant Voltage、Constant Power、Pulse Charge/Discharge、ACIR、DCIR.
- Integrated control with external chambers.
- Advanced data analysis functionality.
- With various types of international testing standards for DCIR already built in.

| AC Power | | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|---|
| Channels | | | | 4 | | | |
| Loading Range | | | Charge | 0~5V | Discharge | 0~5V | |
| Output | Constant Voltage | Maximum Voltage | 5V | Measurement | Voltage | Range | 0~5.5V |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Power | Maximum | Depend on Spec | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ± 0.04% F.S. | | | | |
| Data Recording Time | | 100ms (Option: 10ms) | | | | | |
| Communication Interface | | Ethernet | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | Pulse Charge/Discharge、DCIR Measurement、ACIR Measurement、Parallel Connections among Channels、Chamber Integration | | | | | |
| Accessory | | Chamber、Customized Fixture、Auto-Calibrator | | | | | |

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCL2 Mini 5V/5A | 5 | 5 |
| MCL2 Mini 5V/10mA | 5 | 0.01 |

# CHAMBER INTEGRATED BATTERY TEST EQUIPMENT

## ABT 1000 Series

### Applied test

**AGE** — Life cycle test

**Capacity test**

**DCIR** — DCIR measurement

**°C** — Environmental test

### Applied technology

**0V Discharge**

**Temp/ Humidity Control**

## ▸The best solution for the following needs

◂ With requirements for long-term testing.

◂ To gain an understanding of how different environmental variables (temperature and humidity) can impact a battery's performance.

◂ To optimize the use of space inside the laboratory.

◂ To provide integration functionalities through hardware in order to lessen the operational burden for related personnel.

## Main Features

■ Through the integration of the battery testing system and the chamber into one equipment, a single software application can be used to control the entire unit. In addition, space utilization can be improved by 20 to 50%.

■ Customization is possible based on different power and precision specifications required by the customer.

■ Customized fixtures can be made for the batteries to be tested.

## Others

■ Independent control and output of each channel.

■ Able to make parallel connections among multiple channels in any configuration to increase current output.

■ Operating modes：Constant Current、Constant Voltage、Constant Power、DCIR.

■ Advanced data analysis functionality.

■ Mechanical designs can be adjusted according to customer specifications.

■ With various types of international testing standards for DCIR already built in.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| **Loading Range** | | | Charge | 0~5V | Discharge | 2~5V* (Option: Discharge to 0V) | |
| Output | Constant Voltage | Maximum Voltage | 5V | Measurement | Voltage | Range | 0~5.5V |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.04% F.S. | | | Accuracy | ±0.04% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.03% F.S. | | | Accuracy | ±0.03% F.S. |
| | Constant Power | Maximum Power | Depend on Spec* | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.07% F.S. | | | | |
| **Data Recording Time** | 100ms | | | | | | |
| **Communication Interface** | Ethernet | | | | | | |
| **Ambient** | 23°C±2°C; 20~90 HR | | | | | | |
| **Optional Features** | DCIR Measurement、Data Analyzer | | | | | | |
| **Accessory** | Customized Fixture、Auto-Calibrator、Alarm Buzzer | | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| ABT 1000 5V/10A | 5 | 10 |
| ABT 1000 5V/15A | 5 | 15 |
| ABT 1000 5V/20A | 5 | 20 |
| ABT 1000 5V/30A | 5 | 30 |
| ABT 1000 5V/50A | 5 | 50 |
| ABT 1000 5V/100A | 5 | 100 |

# LEAD-ACID BATTERY TEST EQUIPMENT

## MCT 18B/18M Plus Series

### Applied test

**Life cycle test**

**Grading**

**Capacity test**

### ▶The best solution for the following needs

◀ Planning to gradually expand the scope of existing testing equipment.

◀ In pursuit of flexible testing solutions and expecting to search/browse through the results quickly.

◀ Requiring dedicated research and testing solutions for 6/12V lead-acid batteries. (Customized solutions for 2V can be made available)

| AC Power | | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | | Charge | 2~18V | Discharge | 4~18V | |
| Output | Constant Voltage | Maximum Voltage | 18V | Measurement | Voltage | Range | 0~19.8V |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.04% F.S. | | | Accuracy | ±0.04% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.03% F.S. | | | | |
| | Constant Power | Maximum | Depend on Spec | | | Resolution | 24 bit |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.07% F.S. | | | Accuracy | ±0.03% F.S. |
| Capacity Grading(Option) | | 10 grades, 20 grades | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | ACIR Measurement、Chamber Integration、Data Analyzer | | | | | |
| Accessory | | Chamber、Customized Fixture、Alarm Buzzer | | | | | |

*Accept Customized Request

### Main Features

■ Supports constant current (CC), constant current-constant voltage (CC-CV), constant power (CP), dynamic constant current discharging (DPC), dynamic constant power discharge (DPP) and other charging/discharging modes.

■ Includes built-in features for data analysis and various report generation.

■ Expandable design; purchasable based on demand, also supports flexible expansions in the future.

■ Meets multiple international testing standards.

■ Solutions can be customized for meeting the 2V battery testing requirements.

### Others

■ Independent control and output of each channel.

■ Operating modes：Constant Current、Constant Voltage、Constant Power、ACIR.

■ Expandable test software equipped with comprehensive features, able to achieve integrated control with externally connected chambers.

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCT 18B Plus 18V/25A | 18 | ±25 |
| MCT 18B Plus  18V/50A | 18 | ±50 |
| MCT 18M Plus 18V/1030A | 18 | +10/-30 |
| MCT 18M Plus 18V/2060A | 18 | +20/-60 |
| MCT 18M Plus 18V/40120A | 18 | +40/-120 |

# ECONOMY BATTERY TEST EQUIPMENT

## MCB Series

## Applied test

**AGE**
Life cycle test

**Capacity test**

**Formation**

**Grading**

**On-going reliability test (ORT)**

**DCIR**
DCIR measurement

**ACIR**
ACIR measurement

## Applied technology

**BMS data collection**

**0V Discharge**

## ►The best solution for the following needs

◄ In pursuit of affordable battery testing solutions.

◄ Suitable for battery production requirements.

◄ To test large quantities of batteries over an extended period.

## Main Features

■ ±0.04%accuracy on voltage; ±0.03%accuracy on current.

■ A data recording frequency of 100ms.

## Others

■ Independent control and output of each channel.

■ Able to make parallel connections among multiple channels in any configuration to increase current output.

■ Operating modes: Constant Current、Constant Voltage、Constant Power、DCIR、ACIR.

■ Software with high expandability, with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units, chambers, and other externally connected modules.

■ Advanced data analysis functionality.

■ BMS CAN signal analysis.

■ Mechanical designs can be adjusted according to customer specifications.

■ With various types of international testing standards for DCIR already built in.

| AC Power | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|
| **Loading Range** | | Charge | 0~100V* | Discharge | 2~100V*(Option: Discharge to 0V) | |
| **Output** | Constant Voltage | Maximum Voltage | Depend on Spec* | **Measurement** | Voltage | Range | 0~Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.04% F.S. | | | Accuracy | ±0.04% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.03% F.S. | | | Accuracy | ±0.03% F.S. |
| | Constant Power | Maximum | Depend on Spec | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.07% F.S. | | | | |
| **Data Recording Time** | | 100ms | | | | | |
| **Communication Interface** | | Ethernet | | | | | |
| **Ambient** | | 23°C±2°C; 20~90 HR | | | | | |
| **Optional Features** | | DCIR Measurement、ACIR Measurement、Parallel Connections among Channels、BMS & Gas Gauge Data Collection、Chamber Integration、Data Analyzer、Automated/semi-automated activation | | | | | |
| **Accessory** | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Customized Fixture、Auto-Calibrator、Barcode Scanner、Alarm Buzzer | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) | Model | Voltage(V) | Current (A) |
|---|---|---|---|---|---|
| MCB 5V/3A | 5 | 3 | MCB 20V/30A | 20 | 30 |
| MCB 5V/5A | 5 | 5 | MCB 60V/10A | 60 | 10 |
| MCB 5V/10A | 5 | 10 | MCB 60V/15A | 60 | 15 |
| MCB 5V/20A | 5 | 20 | MCB 60V/20A | 60 | 20 |
| MCB 5V/30A | 5 | 30 | MCB 60V/30A | 60 | 30 |
| MCB 5V/50A | 5 | 50 | MCB 60V/60A | 60 | 60 |
| MCB 5V/100A | 5 | 100 | MCB 60V/80A | 60 | 80 |
| MCB 5V/200A | 5 | 200 | MCB 60V/100A | 60 | 100 |
| MCB 5V/300A | 5 | 300 | MCB 60V/200A | 60 | 200 |
| MCB 5V/400A | 5 | 400 | MCB 60V/300A | 60 | 300 |
| MCB 5V/500A | 5 | 500 | MCB 60V/500A | 60 | 500 |
| MCB 5V/1000A | 5 | 1000 | MCB 100V/100A | 100 | 100 |
| MCB 20V/5A | 20 | 5 | MCB 100V/200A | 100 | 200 |
| MCB 20V/10A | 20 | 10 | MCB 100V/300A | 100 | 300 |
| MCB 20V/20A | 20 | 20 | MCB 100V/500A | 100 | 500 |

## LITHIUM BATTERY STATE OF HEALTH
## RAPID EVALUATION SOLUTION

### SBT 1000 Series

### Applied test

**State of health monitoring**

**Grading**

### Applied technology

**Comprehensive indicators**

**Rapid evaluation**

**High Precision**

**Handheld**

**Big Data Analysis**

**Artificial intelligence**

| AC Power | | | | Customized According To Client Needs | |
|---|---|---|---|---|---|
| Applicable Battery | Voltage | 60V and less | Capacity | 200Ah and less | |
| Test Time/ per Battery | <60s | | Cell Voltage*2 Measurement | Max Voltage | 8V |
| Daily Capacity*1 | 720 pcs/CH | | | Accuracy | ±0.02% F.S. (±1.6mV) |
| Modeling Time | 12~25 Days | | | Resolution | 1mV |
| Max. Charge/ Discharge Spec | Depend on Spec | | | | |
| Voltage | Accuracy | ±0.02% F.S. | | | |
| | Resolution | Depend on Spec | | | |
| Current | Accuracy | ±0.02% F.S. | | | |
| | Resolution | Depend on Spec | | | |
| Ambient | 23°C±2°C; 20~90 HR | | | | |
| Communication Interface | Ethernet | | | | |
| Accessory | Barcode Scanner、Barcode Printer | | | | |

*1 Calculated with 60 seconds used for testing, 60 seconds for battery replacement, and 24 hours a day      *2 Optional

### ▶ The best solution for the following needs

◀ Rapid evaluation of electric vehicle used battery health status.

◀ Rapid batch testing of batteries.

## Main Features

■ Takes only 60 seconds to test a battery set, significantly increasing production capacity.

■ Patented technology incorporated in battery SOH model achieves an accuracy of 92% and above.

■ Applies big data analysis and continuous learning by AI on model refinement, accuracy will continue to improve after each test.

■ Won the 2020 Taiwan Excellence Award for productivity and energy industry.

## Others

■ Supports mobile device operation to increase convenience of operations.

■ Customized measurement parameters based on customer requirements.

■ Supports barcode start up to increase testing efficiency.

■ Supports barcode print out for more convenient follow-up on test results.

| Model | Voltage(V) | Current (A) |
|---|---|---|
| SBT 1000 5V/5A | 5 | 5 |
| SBT 1000 5V/10A | 5 | 10 |
| SBT 1000 30V/50A | 30 | 50 |
| SBT 1000 30V/100A | 30 | 100 |
| SBT 1000 30V/150A | 30 | 150 |
| SBT 1000 30V/200A | 30 | 200 |
| SBT 1000 60V/50A | 60 | 50 |
| SBT 1000 60V/100A | 60 | 100 |
| SBT 1000 60V/150A | 60 | 150 |
| SBT 1000 60V/200A | 60 | 200 |

TAIWAN EXCELLENCE 2020

# ECO SERIES-BATTERY PRODUCTION EQUIPMENT

## MCE A Series

### Applied test

AGE — Life cycle test
Capacity test
Formation
Grading
DCIR — DCIR measurement
ACIR — ACIR measurement

### Applied technology

Energy Recycle

BMS data collection

## ▶ The best solution for the following needs

◀ Large-scale production of power batteries.

◀ Factory space is limited and space utilization must be enhanced.

◀ With green factories as the target, aiming to reduce carbon emissions and energy costs.

◀ Requires the introduction of automated manufacturing to reduce the number of personnel deployed inside the factory.

## Main Features

- ±0.05% F.S.Accuracy.
- The discharged energy recycling efficiency is able to reach up to 60%.
- Innovative mechanical design reduces equipment footprint by 50%.
- Automated production line integration.
- Each computer is capable of controlling more than 2,000 channels simultaneously.
- With the introduction of the middle layer controller, once the production process has begun, it is no longer necessary for the equipment to remain connected to a PC.

## Others

- Independent control and output of each channel.
- Operating modes：Constant Current、Constant Voltage、Constant Power、DCIR、ACIR.
- Software with high expandability，with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units, chambers, and other externally connected modules.
- Advanced data analysis functionality.
- BMS CAN signal analysis.
- Mechanical designs can be adjusted according to customer specifications.
- With various types of international testing standards for DCIR already built in.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | Charge | 0~60V* | Discharge | 2~60V* | | |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec* | Measurement | Voltage | Range | 0~Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.05% F.S. | | | Accuracy | ±0.05% F.S. |
| | Constant Current | Maximum Charge/ Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/ Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.05% F.S. | | | Accuracy | ±0.05% F.S. |
| | Constant Power | Maximum | Depend on Spec | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.1% F.S. | | | | |
| Data Recording Time | | 1s (Option：100ms) | | | | | |
| Communication Interface | | Ethernet | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | DCIR Measurement、ACIR Measurement、BMS & Gas Gauge Data Collection、Data Analyzer、 Chamber Integration、Automated/semi-automated activation | | | | | |
| Accessory | | BMS & Gas Gauge Data Collector、Auxiliary Voltage、Auxiliary Temperature、Chamber、Customized Fixture、 Auto-Calibrator、Barcode Scanner、Alarm Buzzer | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCE A 5V/20A | 5 | 20 |
| MCE A 5V/30A | 5 | 30 |
| MCE A 5V/60A | 5 | 60 |
| MCE A 5V/100A | 5 | 100 |
| MCE A 5V/200A | 5 | 200 |
| MCE A 5V/400A | 5 | 400 |
| MCE A 60V/50A | 60 | 50 |
| MCE A 60V/80A | 60 | 80 |
| MCE A 60V/120A | 60 | 120 |
| MCE A 60V/160A | 60 | 160 |
| MCE A 60V/240A | 60 | 240 |
| MCE A 60V/320A | 60 | 320 |

## CONSUMER ELECTRONICS AND WEARABLE DEVICE BATTERY TEST EQUIPMENT

### MCF Lite SERIES

**Applied test**

- AGE — Life cycle test
- Capacity test
- On-going reliability test (ORT)
- Failure analysis
- DCIR measurement
- ACIR measurement

**Applied technology**

- Multiple Current Ranges
- 0V Discharge
- Microampere level current output/ control

### ▶ The best solution for the following needs

◄ To test microbatteries.

◄ To test large quantities of batteries over an extended period.

◄ In pursuit of solutions which are highly precise as well as economical.

◄ To test various types of batteries using the same equipment, improving asset utilization rates.

### Main Features

- ±0.075% F.S.accuracy on voltage; ±0.06% F.S.accuracy on current.
- Supports two ranges of current output and measurements.
- Standard models support 0V discharging.
- Optional battery fixture connects to the equipment directly, battery installation/removal instantly becomes easy and convenient without having to deal with tangled wires.

### Others

- Independent control and output of each channel.
- Operating modes：Constant Current、Constant Voltage、Constant Power、DCIR、ACIR.
- Integrated control with external chambers.
- Advanced data analysis functionality.
- With various types of international testing standards for DCIR already built in.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | | Charge | 0~7V | Discharge | 0~7V | |
| Output | Constant Voltage | Maximum Voltage | Depend on Spec* | Measurement | Voltage | Range | 0~Maximum Voltage*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.075% F.S. | | | Accuracy | ±0.075% F.S. |
| | Constant Current | Maximum Charge/ Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/ Discharge Current*1.1 |
| | | Current Range | 2 (Dual Model) | | | | |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.06% F.S. | | | | |
| | Constant Power | Maximum | Depend on Spec* | | | Accuracy | ±0.06% F.S. |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.14% F.S. | | | | |
| Data Recording Time | | 1s | | | | | |
| Communication Interface | | Ethernet | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | DCIR Measurement、ACIR Measurement、Chamber Integration、Data Analyzer、Automated/semi-automated activation | | | | | |
| Accessory | | Chamber、Customized Fixture、Alarm Buzzer、Auto-Calibrator、Barcode Scanner | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) | |
|---|---|---|---|
| | | Range 1 | Range 2 |
| MCF Lite Single 2V/0.05A | 2 | 0.05 | X |
| MCF Lite Single 2V/0.3A | 2 | 0.3 | X |
| MCF Lite Single 2V/0.5A | 2 | 0.5 | X |
| MCF Lite Single 2V/3A | 2 | 3 | X |
| MCF Lite Single 5V/0.05A | 5 | 0.05 | X |
| MCF Lite Single 5V/0.3A | 5 | 0.3 | X |
| MCF Lite Single 5V/0.5A | 5 | 0.5 | X |
| MCF Lite Single 5V/3A | 5 | 3 | X |
| MCF Lite Single 7V/0.05A | 7 | 0.05 | X |
| MCF Lite Single 7V/0.3A | 7 | 0.3 | X |
| MCF Lite Single 7V/0.5A | 7 | 0.5 | X |
| MCF Lite Single 7V/3A | 7 | 3 | X |
| MCF Lite Dual 2V/0.5A | 2 | 0.5 | 0.05 |
| MCF Lite Dual 2V/3A | 2 | 3 | 0.3 |
| MCF Lite Dual 5V/0.5A | 5 | 0.5 | 0.05 |
| MCF Lite Dual 5V/3A | 5 | 3 | 0.3 |
| MCF Lite Dual 7V/0.5A | 7 | 0.5 | 0.05 |
| MCF Lite Dual 7V/3A | 7 | 3 | 0.3 |

# ECONOMICAL BATTERY CELL PRODUCTION EQUIPMENT

## MCP Plus SERIES
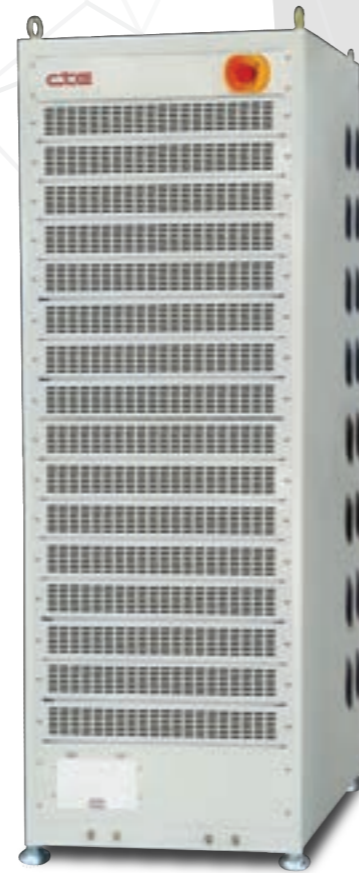
### Applied test

- **ACE** — Life cycle test
- **Capacity test**
- **Formation**
- **Grading** (2 3)
- **DCIR** — DCIR measurement
- **ACIR** — ACIR measurement

### ▶The best solution for the following needs

◀ Large-scale production of battery cells.

◀ Factory space is limited and space utilization and productivity must be enhanced.

### Main Features

■ Innovative mechanical design reduces equipment size by 50%.

■ Able to integrate automated production lines to increase production capacity.

■ Modulized design and hot swapping capability increase equipment uptime.

### Others

■ Independent control and output of each channel.

■ Able to make parallel connections among multiple channels in any configuration to increase current output.

■ Operating modes: Constant Current、Constant Voltage、Constant Power、ACIR、DCIR.

■ Software with high expandability，with integrated control of voltage measurement modules、temperature measurement modules、BMS data collection units, chambers, and other externally connected modules.

■ Advanced data analysis functionality.

| AC Power | | | Customized According To Client Needs | | | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | | Charge | 0~5V | Discharge | 2~5V | |
| Output | Constant Voltage | Maximum Voltage | 5V | Measurement | Voltage | Range | 0~5.5V |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.1% F.S. | | | Accuracy | ±0.1% F.S. |
| | Constant Current | Maximum Charge/ Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/ Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.1% F.S. | | | Accuracy | ±0.1% F.S. |
| | Constant Power | Maximum | Depend on Spec* | | | | |
| | | Resolution | 16 bit | | | | |
| | | Accuracy | ±0.2% F.S. | | | | |
| Data Recording Time | 1s (Option：100ms) | | | | | | |
| Communication Interface | Ethernet | | | | | | |
| Ambient | 23℃ ± 2℃; 20~90HR | | | | | | |
| Optional Features | ACIR Measurement、DCIR Measurement、Chamber Integration、Automated/semi-automated activation、Data Analyzer、Parallel Connections among Channels | | | | | | |
| Accessory | Chamber、Customized Fixture、Auto-Calibrator、Barcode Scanner、Alarm Buzzer | | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCP Plus 5V/1A | 5 | 1 |
| MCP Plus 5V/5A | 5 | 5 |
| MCP Plus 5V/10A | 5 | 10 |
| MCP Plus 5V/20A | 5 | 20 |
| MCP Plus 5V/30A | 5 | 30 |
| MCP Plus 5V/50A | 5 | 50 |
| MCP Plus 5V/100A | 5 | 100 |
| MCP Plus 5V/150A | 5 | 150 |
| MCP Plus 5V/200A | 5 | 200 |
| MCP Plus 5V/250A | 5 | 250 |
| MCP Plus 5V/300A | 5 | 300 |
| MCP Plus 5V/350A | 5 | 350 |
| MCP Plus 5V/400A | 5 | 400 |
| MCP Plus 5V/450A | 5 | 450 |
| MCP Plus 5V/500A | 5 | 500 |

# ECO SERIES-LEAD-ACID BATTERY FORMATION EQUIPMENT

## MCE S Series

**Applied test**

AGE
Life cycle test

Capacity test

Formation

**Applied technology**

Energy Recycle
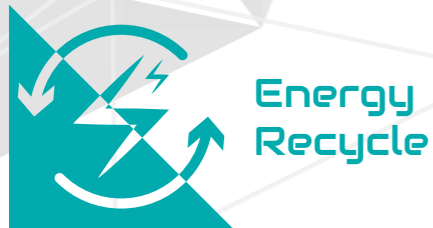
## ▶ The best solution for the following needs

◄ Required for lead-acid battery formation and research.

◄ The quality of the plant's power supply is not stable.

◄ Requires obtaining real-time data related to the current production progress as well as the plant's power consumption status.

◄ With green factories as the target, aiming to reduce carbon emissions and energy costs.

◄ Manufacturing with a certain degree of flexibility; hoping to arrange the production schedule according to the most energy efficient method.

## Main Features

■ Supports DC-DC and DC-AC energy recycling, with an efficiency rating of up to 97%.

■ Once the system reaches a full load, its power factor is greater than 99%.

■ When the system load is greater than 30%, the total harmonic distortion is less than 3%.

■ Data visualization on the central display dashboard.

■ Comprehensive software capability.

■ Smart scheduling functionality.

## Others

■ Independent control and output of each channel.

■ Operating modes: constant current.

■ Software with high expandability, with integrated control of voltage measurement modules and temperature measurement modules.

■ Provides customized software packages.

| AC Power | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|
| Loading Range | | Charge | 100~300V | Discharge | 100~300V | |
| **Output** | Constant Voltage | Maximum Voltage | 300V | **Measurement** | Voltage | Range | 0~330V |
| | | Resolution | 0.1V | | | Resolution | 0.1V |
| | | Accuracy | ±0.5% F.S. | | | Accuracy | ±0.5% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | Depend on Spec | | | Resolution | Depend on Spec |
| | | Accuracy | ±0.5% F.S. | | | Accuracy | ±0.5% F.S. |
| Data Recording Time | | 1s | | | | | |
| Communication Interface | | CANBus | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |
| Optional Features | | Smart Energy Management System | | | | | |
| Accessory | | Auxiliary Voltage, Auxiliary Temperature | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCE S 300V/0304A | 300 | +3/-4 |
| MCE S 300V/0507A | 300 | +5/-7 |
| MCE S 300V/0608A | 300 | +6/-8 |
| MCE S 300V/1014A | 300 | +10/-14 |

# BATTERY PACK TEST EQUIPMENT FOR CORE PACK/ HARD PACK

## BPT 1100E Plus Series

### Applied test

Wake up | OCV | Charging/discharging tests | Cell voltage measurement and voltage variation check | Cell temperature measurement and temperature variation check

Overcharge /overdischarge & reset tests | I/O control | ACIR measurement | BMS parameters reading
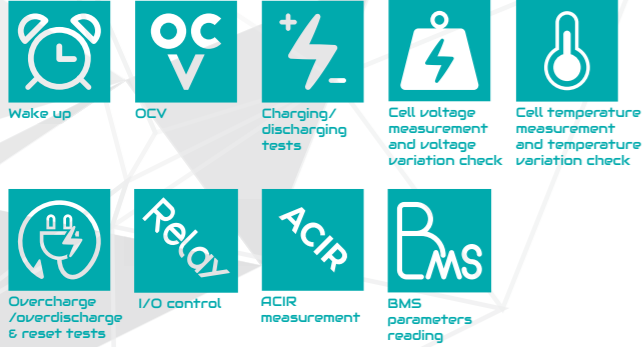
### ▷The best solution for the following needs

◀ Requires flexible testing for core packs/ hard packs.

◀ Requires the ability to collect, analyze, and discriminate gas gauge/BMS communication data.

◀ Requires various communication protocols support.

◀ To streamline personnel deployment inside the factory, with automated manufacturing as the goal.

### Main Features

■ Able to connect with the customer's MES system to achieve seamless data transmission.

■ Supports multiple gas gauge IC tests, including all major models provided by suppliers such as TI, Maxim, and Renesas.

■ Test items: wake up, OCV test, charging/ discharging tests, cell voltage measurement and voltage variation check, cell temperature measurement and temperature variation check, overcharge/overdischarge & reset tests, ACIR measurement, DCIR measurement, I/O control, and BMS parameters reading.

### Others

■ EIA standard chassis, suitable for standard rack assembly.

| AC Power | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|
| Loading Range | | Charge | 2~18V* | Discharge | 2~18V* | |
| Output | Constant Voltage | Maximum Voltage | 18V* | Measurement | Voltage | Range | 0~19.8V* |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| | Constant Current | Maximum Charge/ Discharge Current | ±12A* | | Current | Range | 0~13.2A* |
| | | Resolution | 16 bit | | | Resolution | 24 bit |
| | | Accuracy | ±0.02% F.S. | | | Accuracy | ±0.02% F.S. |
| Ambient | 23ºC±2ºC; 20~90 HR | | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| BPT 1100E Plus 18V/12A | 18 | 12 |

# ADVANCED LEAD - ACID BATTERY
# FORMATION EQUIPMENT

## MCIF Plus SERIES

### Applied test

**Formation**

### Applied technology

**×2 Dual control modes**

**Touch operation**

## ▶ The best solution for the following needs

◀ Large-scale and economical production of lead-acid batteries.

◀ Manufacturing a variety of series and parallel connected batteries.

◀ When the production line does not have excess controllers, PCs, or relevant electronic connection equipment

◀ Customized system construction and data analysis.

◀ Requires high-efficiency energy consumption.

◀ With software development requirements for large systems.

## Main Features

■ Intuitive touch-screen operation.

■ With built-in memory modules, each equipment is able to store more than 24 hours of test data without being connected to a PC.

■ PC control and panel control dual-mode operations.

■ Information displayed on the screen can be configured.

■ Single-cell voltage measurement feature is already built-in.

## Others

■ Independent control and output of each channel.

■ Operating modes：Constant Current、Constant Voltage、Constant Power.

■ Provides customized software and hardware packages.

| AC Power | | | | | Customized According To Client Needs | | |
|---|---|---|---|---|---|---|---|
| Loading Range | | | Charge | 6~300V | Discharge | 6~270V | |
| Output | Constant Voltage | Maximum Voltage | 300V | | Measurement | Voltage | Range | 0~330V |
| | | Resolution | 0.01V | | | | Resolution | 16 bit |
| | | Accuracy | ±0.5% F.S. | | | | Accuracy | ±0.5% F.S. |
| | Constant Current | Maximum Charge/Discharge Current | Depend on Spec* | | | Current | Range | 0~Maximum Charge/Discharge Current*1.1 |
| | | Resolution | 16 bit | | | | Resolution | 16 bit |
| | | Accuracy | ±0.5% F.S. | | | | Accuracy | ±0.5% F.S. |
| Data Recording Time | | 1s | | | | | |
| Data Storage Method | | USB | | | | | |
| Communication Interface | | Ethernet | | | | | |
| Ambient | | 23ºC±2ºC; 20~90 HR | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCIF Plus 300V/5A | 300 | 5 |
| MCIF Plus 300V/10A | 300 | 10 |
| MCIF Plus 300V/30A | 300 | 30 |
| MCIF Plus 300V/50A | 300 | 50 |
| MCIF Plus 300V/60A | 300 | 60 |
| MCIF Plus 300V/100A | 300 | 100 |

# LEAD-ACID BATTERY FORMATION EQUIPMENT

## MCIF SERIES

### Applied test

Formation

### Applied technology

×2

## Dual control modes

## ▶ The best solution for the following needs

◂ To mass produce lead-acid batteries.

◂ Requires high-efficiency energy consumption.

◂ With software development requirements for large systems.

◂ Manufacturing a variety of series and parallel connected batteries.

◂ Need customized system construction and data analysis.

## Main Features

- PC control and panel control dual-mode operations.
- The latest generation of communication protocols is applied; compatible with the latest PC models.

## Others

- Independent control and output of each channel.
- Operating modes：Constant Current、Constant Voltage.
- Provides customized software and hardware packages.
- Software with high expandability, with integrated control of voltage measurement modules and temperature measurement modules.

| AC Power | | | Customized According To Client Needs | | | |
|---|---|---|---|---|---|---|
| Loading Range | | Charge | 6~300V | Discharge | 6~270V | |
| Output | Constant Voltage | Maximum Voltage | 300V | Measurement | Voltage | Range | 0~330V |
| | | Resolution | 0.01V | | | Resolution | 16 bit |
| | | Accuracy | ±0.5% F.S. | | | Accuracy | ±0.5% F.S. |
| | Constant Current | Maximum Charge/ Discharge Current | Depend on Spec* | | Current | Range | 0~Maximum Charge/ Discharge Current*1.1 |
| | | Resolution | 16 bit | | | Resolution | 16 bit |
| | | Accuracy | ±0.5% F.S. | | | Accuracy | ±0.5% F.S. |
| Data Recording Time | 1s | | | | | | |
| Communication Interface | RS-485 | | | | | | |
| Ambient | 23ºC±2ºC; 20~90 HR | | | | | | |
| Optional Features | Auxiliary Voltage、Auxiliary Temperature | | | | | | |

*Accept Customized Request

| Model | Voltage(V) | Current (A) |
|---|---|---|
| MCIF 300V/5A | 300 | 5 |
| MCIF 300V/10A | 300 | 10 |
| MCIF 300V/30A | 300 | 30 |
| MCIF 300V/50A | 300 | 50 |
| MCIF 300V/60A | 300 | 60 |
| MCIF 300V/100A | 300 | 100 |

## AUTO-CALIBRATOR
## ACP2 Series

### ▸The best solution for the following needs

◂ When the factory has multiple procurement channels and requires efficient calibration on channels in order to save time.

◂ To minimize the impact of manual calibration due to individual differences with respect to calibration results.

### Main Features

■ Adopts the USB interface, plug and play.

■ The flexible and scalable design is capable of calibrating up to 8 channels simultaneously, which saves times and human resources by nearly 800%.

■ Customizable reports with up to 11 current and voltage calibration points.

■ With the built-in detachable shunt and Agilent multimeter, performing calibration and maintenance is easy and convenient.

| Model | ACP2 L Series | ACP2 N Series | ACP2 M Series | ACP2 B Series |
|---|---|---|---|---|
| AC Power | AC110/220V | AC110/220V | AC110/220V | AC110/220V |
| Applicable Spec | 20V/1A and less | 20V/3A~20A and less | 20V/20A~50A and less | 20V/50A~100A and less |
| Applicable CTE Product Series | MCF Lite Series<br>MCL2 Mini Series<br>BT 2000 Series<br>MCP Plus Series | MCB Series<br>MCL2 Series<br>MCL2 Mini Series<br>ABT 1000 Series<br>GBT 1000 Series<br>BT 2000 Series<br>MCP Plus Series | MCB Series<br>MCL2 Series<br>ABT 1000 Series<br>BT 2000 Series<br>MCP Plus Series | MCB Series<br>MCL2 Series<br>ABT 1000 Series<br>BT 2000 Series<br>MCP Plus Series |

## BMS DATA COLLECTOR
## GDA-300 Series / iBox-G

### ▸The best solution for the following needs

◂ Must obtain various data related to the gas gauge/BMS during the battery module/ pack testing process, followed by integrating the data with other test results.

◂ Requires the use of gas gauge/BMS data to control testing processes.

### Main Features

■ Uses CANBus to reduce the number of communication units required.*

■ Connects to BMS, and uses its data to control the test program.

■ Supports commonly used communication protocols including SMBus, $I^2C$, HDQ for IT batteries and Modbus and CANBus for power batteries; can be further expanded.

■ Supports data flash.*

■ Multiple activation methods.

■ Adopts a platform-based design that can support the data collection of a large variety of BMS ICs.

*iBox-G only

| Model | iBox - G | GDA-300 |
|---|---|---|
| CH/ per Unit | 8CH | 4CH |
| CH/ per System | 256CH | 128CH |
| Mechanism Design | Rack/ Portable | Rack/ Portable |
| Communication Protocols (Battery) | SMBus/ $I^2C$ / HDQ | SMBus/ $I^2C$ / HDQ |
| Communication Protocols (PC) | Ethernet/ Wifi | RS-485 |
| Communication Speed | 2Sec / 8CH* | 5Sec / 16CH |
| Number of parameters | 47 | 47 |
| Temperature Classification | 0~60ºC | 0~60ºC |
| SmartCHarge | Yes | Yes |
| SBS Write | Yes | Yes |
| Gauge Condition | Yes | Yes |

*Optional 1Sec/4CH

# AUXILIARY VOLTAGE
## ES-100B Series



### ▶ The best solution for the following needs

◀ Must monitor single-cell voltage inside the battery module/ pack, or to control the testing process with this data.

## Main Features

- Each module contains 24 measurement points.
- Measurement accuracy ±0.02%F.S.
- A data recording frequency of 100ms.
- Measurement data can be used as conditions for controlling the test program.

| Model | Auxiliary Voltage ES-100B |
|---|---|
| Channels | 24 |
| Measurement Range | ±64V,±32V,±8V |
| Measurement Resolution | 16 bit |
| Accuracy | 0.02% F.S. |
| Data Recording Time | 100ms (24CH) |

# AUXILIARY TEMPERATURE
## ET-100B / ET-100C Series



### ▶ The best solution for the following needs

◀ Must monitor single-cell temperature inside the battery module/ pack, or to control the testing process with this data.

◀ Requires multi-point, decentralized monitoring of battery temperatures to ensure test safety.

## Main Features

- Each module contains 8 to 24 measurement points.
- Measurement accuracy can reach 1℃.
- Supports various mainstream temperature sensors available on the market, such as: Thermocouple, Thermistor, RTD, and Diode. (can be selected according to customer specifications)

| Model | Auxiliary Temperature ET-100B |
|---|---|
| Channels | 24 |
| Measurement Range* | -50ºC~125ºC |
| Measurement Resolution | 0.1ºC |
| Accuracy | ±1ºC (-40ºC~90ºC) |
| Temperature Sensor | Thermistor |
| Supported Type | 103JT |
| Data Recording Time | 100ms (24CH) |

| Model | Auxiliary Temperature ET-100C | | | |
|---|---|---|---|---|
| Channels | 16CH | 8CH | 8CH | 16CH |
| Scanning Speed | 4CH/s (16CH/4s) | | | |
| Accuracy | ±1ºC | | | |
| Resolution | 0.1ºC | | | |
| Temperature Sensor | Thermocouple | RTD | Thermistor | Diode |
| Supported Type | Type J, K, E, N, R, S, T, B | PT-10, PT-50, PT-100, PT-200, PT-500, PT-1000, NI-120 | 44004 2.252kΩ, 44005 3kΩ, 44007 5kΩ, 44006 10kΩ, 44008 30kΩ | 3904 |
| Measurement Range* | -265~800ºC | -200~800ºC | -40~150ºC | -60~130ºC |

*Depend on chosen thermal sensors

## STANDARD / CUSTOMIZED FIXTURES

Dedicated fixtures for various cylindrical、polymer、coin cell batteries are available. Customized fixtures, fixture boxes, and fixture racks can also be made according to customer specifications.

### FIXTURES

ACC-034  ACC-024

18650

JIG-V05A

ACC-039  DCC-001

ACC-03  ACC-032

### FIXTURE RACK

FRA-C294F

FFRA-034A

FFRA-042A
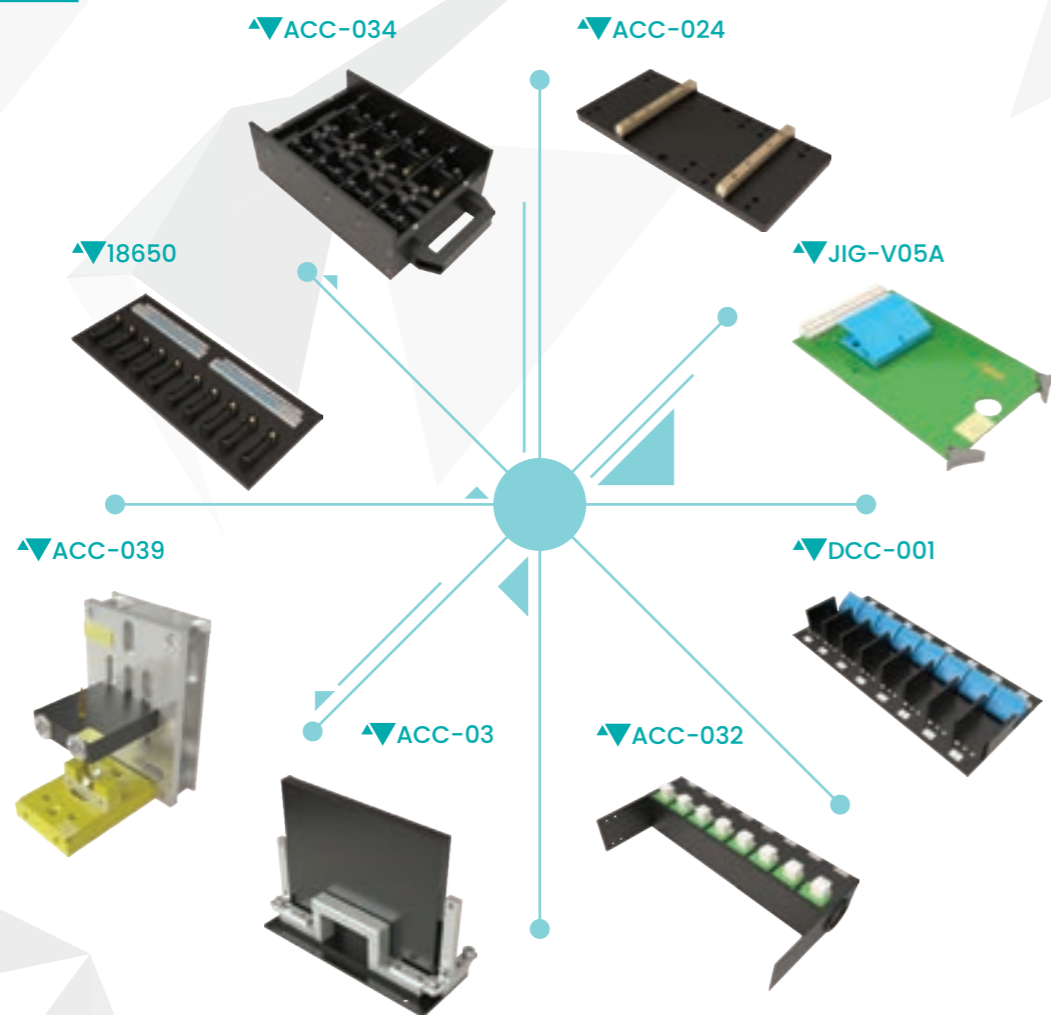
| Model | | 18650 | ACC-034 | ACC-024 | JIG-V05A |
|---|---|---|---|---|---|
| Battery type | Cylindrical | v | v | v (with nickel tabs) | |
| | Polymer | | | v (with battery tabs at both sides) | v |
| | Coin Cell | | | | |
| Battery size (W*D*H, mm) | | 18650 | 18650, 20700, 21700, 26650 | Adjustable | Adjustable |
| Maximum Current | | 5A | 5A | 100A | 10A |
| Minimum Channels | | 1 | 4 | 1 | 1 |
| Used In Chamber | | x | v | v | v |

| | DCC-001 | ACC-032 | ACC-03 | ACC-039 |
|---|---|---|---|---|
| | | | | |
| | v | v (welding tab with wires) | | |
| | | | v | v |
| | Adjustable | 40*50*3~5 | Adjustable | Adjustable |
| | 10A | 3A | 3A | 10A |
| | 1 | 8 | 1 | 1 |
| | x | x | x | v |

# iBest Software
## Upgraded User Experience
### AWARD-WINNING TECHNOLOGY / USER-FRIENDLY INTERFACE

◀ Configuration ▶    ◀ Execution ▶    ◀ Analysis ▶    ◀ Within One Click ▶

# iBest software + Data analyzer

## PROGRAM CONFIGURATION

**Simple** — Provides different test program configuration interfaces for beginners and experts to satisfy different needs. Easy to configure, intuitive operation, and no need for an instruction manual.

**Comprehensive** — Provide a variety of test program options to meet different kinds of testing needs.

Test modes ▶ Constant current (CC), Constant current-Constant voltage (CC-CV), Constant power (CP), Constant power-Constant voltage (CP-CV), Constant resistance (CR), Pulse, Waveform, ACIR, DCIR, Current Ramp, Voltage Ramp.

Step Cutoff Conditions ▶ Time, EV, EC, ET, mAh, Wh, END mAh , Total mAh, Total Wh, SoC, END SoC, Ni-MH conditions, Gauge conditions, BMS conditions,CHamber conditions, ΔI, Capacity Decay

Protection Mechanism ▶ OC, LC, OV, LV, OT, Verr, Cerr, CC Time, CV Time, ΔI, Cell Voltage Unbalance, Temperature Unbalance

Data Recording Interval ▶ Δt, Δ V, ΔI, ΔT

Support a variety of international standardized test patterns. No need to be edited manually.

Pulse ▶ Intel Turbo Boost, GSM, PWM

Dynamic waveform ▶ FUDS (Fig. 1), DST (Fig. 2), HPPC

DCIR measurement ▶ ISO 12405, IEC 61960

Battery performance testing ▶ UL, IEC, SAE International, and GB Standards
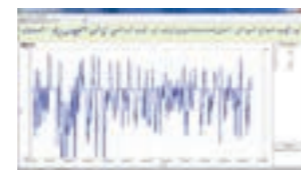

▲ Fig. 1 FUDS Cycle Test


▲ Fig. 2 DST Cycle Test

**Customization** — Introduce variable setting functions; supports diverse charging/discharging test patterns and data recording. Test programs can be configured freely.

**Integration** — Control a variety of plug-in modules such as chamber, Gas Gauge/ BMS data collector, auxiliary voltage, and auxiliary temperature, eliminating the tedious operation of separate control.

**Smart** — Provides multiple convenient ways to configure test program, such as custom variables, C-rate, and current ramp, are provided to speed up process editing.

**Safety** — Test curves can be previewed after completing the test program setting. Set protection criteria for the batteries to avoid any human error that might cause accident. (Fig. 3)


▲ Fig. 3 Pre-test Simulation

**Confidential** — Supports .dbc file import for CANBus communication protocols used for power battery BMS. BMS data can be collected easily during testing without revealing the confidential information to CTE.

**Control** — Includes account management mechanisms, supports multi-role access restrictions.

## PROGRAM EXECUTION

**Personalization** — Multiple displays of channel status as well as color choices, parameters displayed can be customized, and can be adjusted based on personal preferences and the execution status of the test program. (Fig. 4, 5, 6)

**Easy to understand** — The main display provides clear information about each testing channel's current status. Additional data can be shown on other display panels based on the personal preference of the operator, no crucial data will be missed.

**Immediate** — Test data can be viewed in real time. The program can be adjusted dynamically during the test to rectify any unexpected issue. (Fig. 7)

**Flexible** — Supports prescheduled pause functionality; test program can be halted during specific points in time for personnel inspection and analysis, no more waiting around.
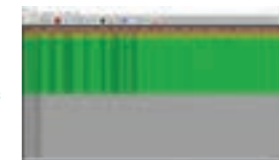
**Efficient** — Throughout the production process, it is not necessary to link the equipment to a PC for data logging, enhancing equipment efficiency.

**Assurance** —
- Dual OV and OT detection mechanism; an independent program monitors the voltage and temperature of batteries being tested, and suspends equipment operations when the system is abnormal.
- Abnormal channel status detection; continuously matches the process and channel status, and issues a warning or suspends equipment if it is inconsistent.
- Extra and independent monitoring mechanism; uses third party hardware attached to the equipment to monitor battery voltage and temperature at all times, and directly cuts off equipment power when there are any abnormalities.
- External monitoring of power values; the external smart meter records various power related values, and the data is used for abnormalities tracking and comparison.
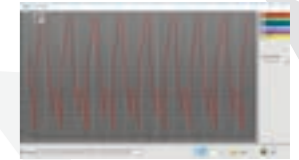

▲ Fig. 4 Default status display panel
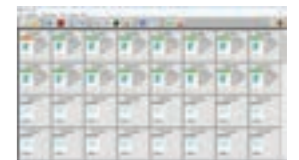

▲ Fig. 5 32 Channels status display panel


▲ Fig. 6 4 Channels status display panel


▲ Fig. 7 Real time test curve

## DATA ANALYSIS

**Time-saving** — A variety of test data presentations that can be adjusted according to the needs of researchers, saving data processing time.

Text and graphical reports ▶    Graphs zoom-in and zoom-out ▶

Self-defined X and Y-axis parameters on graphs ▶

**Convenient** —
- Users will be able to choose from a selection of templates for data tables and curve charts available in the system, or create a brand new template based on their requirements.
- Testing graphics and raw data can be displayed simultaneously, cross-reference data mechanisms are also provided. (Fig. 8)
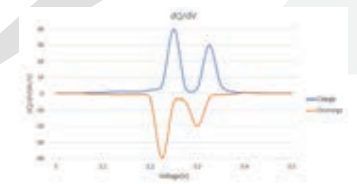- Data retrieval tools allow users to quickly browse important test data.
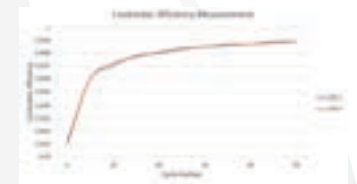
**Professional** — Multiple advanced analytics tools are introduced to assist battery researchers learn battery characteristics in an efficient way.

Report ▶ Step Report

Charts ▶ Cycle life、Coulombic Efficiency、ΔQ/ ΔV... and more. (Fig. 9, 10)

**Compatible** — Test data can be exported in .csv format and manipulated in the third-party software that clients are familiar with, improving the data usability.


▲ Fig. 8 Test curve and report


▲ Fig. 9 Coulombic Efficiency


▲ Fig. 10 ΔQ/ ΔV