

# Beyond battery



## SOLUTIONS FOR BATTERIES

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R&D  
CELL  
MODULE  
PACK  
CLIMATIC CHAMBER



Hi-Tech Detection Systems

# HTDS : A PARTNER AT EACH STAGE OF YOUR PROJECT

HTDS - High Tech Detection Systems - is a French company specialized in the distribution and maintenance of Hi-tech detection systems.

HTDS offers a comprehensive range of electrochemical instrumentation and material characterization equipment, as well as various complementary solutions in the battery production sector (renewable energy sources and corrosion studies, material testing...) all from recognized providers : AMETEK Scientific Instruments, Palmsens, Landt Instruments, RePower...

Thanks to a local presence, close to our customers, we provide turn-key solutions including consulting, installation, training and maintenance services for all the equipment offered in our catalog. We have subsequently earned the trust of world leaders in academic and industrial fields.

## Focus on A PERSONALISED SUPPORT

HTDS supports you at all stages of the implementation of your project:

- Writing/specification studies
- Technological proposal
  - Installation
  - Maintenance
  - Training

## PRODUCT RANGE

Batteries is an increasingly important part of our everyday lives. They are everywhere : from mobile phones to computers and in all types of vehicles : bikes, cars, planes and even spaceships. Their expanding areas of application requests more and more robustness as they are exposed to extreme electrical loads and numerous environmental factors. In the production process, one issue remains above all a priority : safety.

To guarantee safety, various tests series are necessary throughout the battery's development and QA stages. And this is precisely where our solution range comes into play. With our solutions, you will quickly and simply perform professional tests on your batteries throughout your development and production process for a granted quality result.

HTDS' product range goes from analyzers and cycling tester systems to climatic chambers and is divided in 5 categories:

R&D

Cell

Module

Pack

Climatic chambers



A total solution package on battery formation and grading assures automatic mass production of battery



Full experience on equipment integration assures safe and efficient production



A total solution package on battery health monitoring and fire systems assures safety in production



Advanced battery testing solution satisfies a variety of battery production requirements

# OUR RANGE

## R&D



## CELL BATTERY SYSTEM



## MODULE BATTERY SYSTEM



## PACK BATTERY SYSTEM



## CLIMATIC CHAMBER



# SOLUTION FOR YOUR R&D

R&D for battery conception focuses on the study of the different parts and components of the battery : cathod, anod or electrolyte. HTDS proposes you various solutions to optimize the developpement of your batteries.

## PARSTAT-MC

### When a chassis isn't just a box...

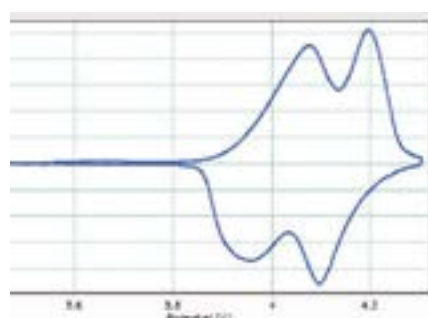
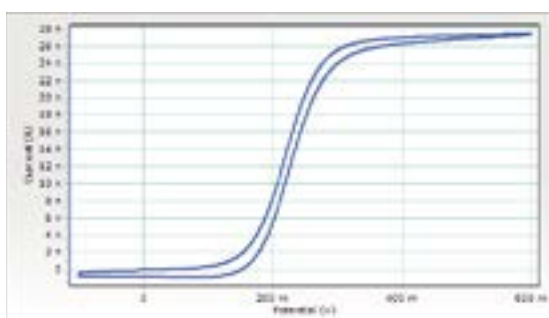
The PARSTAT MC potentiostat is the most modular and robust multichannel electrochemical research and testing platform in the market for energy storage and other applications.

The PARSTAT MC (PMC) Family consists of the PARSTAT MC Chassis and several models of potentiostats: PMC-1000, PMC-2000A, PMC-200.










- PMC Chassis supports multiple models and up to 20 channels with its unique design with data buffer, hot-swappable and user replaceable functional blocks.
- Model PMC-1000 provides current at  $\pm 2A$  to  $\pm 4$  nA range, 1.2 fA and expandable ( $\pm 30A$  to  $\pm 4$  pA, 122 aA)
- Model PMC-2000A provides 6-WIRE measurement for Anode/Cathode Impedance, voltage to  $\pm 30V$ , and EIS to 7 MHz.
- Model PMC-200 provides 2-potentiostats per card, 24-bit resolution, new processor and design for faster experiments.
- Model BOOSTER P10A/6V can boost current to 10A and in parallel up to 30A.



Three different technologies for one chassis



## FEATURES

MAX VOLTAGE & CURRENT Up to +/-30V and 30A			CURRENT RANGE 11 range of current (4nA to 2A)		ACCURACY Down to +/- 122aA resolution			
 Rise Time 56ns	 Accuracy 0,2% FS	 GITT-PITT testing modes	 24 Bit ADC System	 dQ/dV Curve	 1 microsec timebase	 True 3-Electrode System Test	 DCIR Test $DCIR = \frac{E_p - E_{1/2}}{k} \frac{1 - \alpha}{1 - \alpha}$	 EIS From 7 MHz to 10 $\mu$ Hz

Type of cells: Coin cells / Type D / Type DD

Whether you are working on a single cell or high volumes, HTDS provides you adapted solutions to check the life and cycle duration, capacities and internal resistances in the lower voltage ranges or at high currents.

## CELL BATTERY TESTING SOLUTIONS



### 340A series - High Precision Battery Testers

The multi-current range battery test systems M340A, G340A, D340A and D350A are designed for precision battery charge/discharge test, coulombic efficiency (current efficiency) test and supercapacitor test. Voltage and current test accuracy go down to 0.01% of the selected range. The sampling rate can go as high as to 0.01s (100Hz) with minimum pulse interval of 2ms.

#### Key Measurement Specifications

- Support half cell, three-electrode cell (with reference electrode) in the voltage range of  $\pm 5V$  (0-10V in option), current range 100 $\mu A$  to 40A (depending on the model)
- High rate charge and discharge tests. With 100C (0.6min) charge/discharge, the inaccuracy of capacity is less than 0.1%
- Full measurement records of voltage, current, coulombic efficiency, capacitance, internal resistance (DCIR) and more for precision energy storage materials research

FEATURES							
MAX VOLTAGE & CURRENT 5V 5A		CURRENT RANGE 150 $\mu A$ -5mA; 5mA-150mA; 150mA-5A				ACCURACY +/- 1.5nA	
Rise Time 1ms	Accuracy 0,01% FS	Charge & Discharge Working Mode	24 Bit ADC System	dQ/dV Curve	4 or 5 Range	Three-Electrode System Test	DCIR Test $DCIR = \frac{E_1 - E_2}{I_1 - I_2}$

Type of cells: Coin cells / Type D / Type DD / Super capacitor / Pouch cells / Prismatic cells

### CT-300X Series

The CT300X series Battery Test Systems are designed for energy storage materials research and various battery tests. Each tester has eight independent channels. They can be programmed to run automatic constant current charge and discharge test and cycle life test.



#### Key Measurement Specifications

- High-precision battery test systems with 8 channels designed for power cell tests
- Independence channels with each can be set as Constant-Current Discharge (CCD), Constant-Current Charge (CCC), Constant-Voltage Charge (CVC), Cycling loops, etc.
- Powerful data process software which can be used offline
- Data automatically backed-up on the hard drive or an external drive

FEATURES			
MAX VOLTAGE & CURRENT	CURRENT RANGE	ACCURACY	
CT-3001A/C 5V5A	1mA-100mA; 100mA-2A; 2A-3A; 3A-5A	0,05% FS	
CT-3001B 5V20A	5A-10A; 10A-20A	0,05% FS	
CT-3001D 5V60A	40A; 50A-60A	0,05% FS	
Rise Time 20ms	Charge & Discharge Working Mode	16 Bit ADC System	Up to 160 channels Computer

Type of cells: Coin cells / Pouch Cells / Prismatic Cells / Type D / Type DD

# CELL BATTERY SYSTEM

Industry demand for better batteries with higher capacity, shorter charge time and longer life represents a significant measurement challenge. HTDS proposes a suite of battery measurement and analysis tools intended for high power cells based on direct insights from the market and understanding of customer workflows.

## SI-9300R

The SI-9300R is a modular, multichannel battery analyzer that offers unrivaled measurement and diagnostic capabilities for the analysis of battery cell technologies intended for energy and power applications. Each module consists of five independent analyzer channels, each capable of 3 kW power. Up to eight modules can be installed in a 42U rack (40 channels) or four modules in 24U rack option (20 channels).



### Key Measurement Specifications

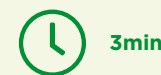
- Regenerative technology to reduce power and increase channel packing density
- Flux Gate Current Sensor Technology for high accuracy and excellent temperature stability
- Current Accuracy of 0.03% FSR, 300 A, 20 A and 2 A current Ranges
- 10 kHz EIS on board on every channel as standard with real-time EIS fitting for instant cell diagnostics
- Up to 10 V polarization suitable for single cells and small eV modules
- Two auxiliary voltage measurement channels on every channel for DC and EIS anode/cathode characterization
- Ability to parallel channels for 1000 Amp measurements



### Determination of SoH

Existing DC capacity tests take 2-3 hours

EIS-based method determines capacity in < 3 min



## FEATURES

MAX VOLTAGE & CURRENT 10V300A		CURRENT RANGE Up to 2A; 2A-20A; 20A-300A			ACCURACY +/- 600µA		
Regenerative Technology	Accuracy 0,01% FS	Charge & Discharge Working Mode	24 Bit ADC System	dQ/dV Curve	3 Range	EIS Measurement / Channel	DCIR Test

Type of cells: Coin cells / Type D / Type DD / Pouch Cells / Prismatic



## Application

NISSAN LEAF SoH Algorithm In collaboration with the Warwick Manufacturing Group (WMG, UK), Solartron Analytical has developed a State of Health Algorithm specifically for NISSAN LEAF modules. Unlike time consuming pulse power tests, our patented algorithm can provide the SoH of a cell in less than three minutes with an accuracy of +/- 3%. This provides significant cost and time benefits for grading cells for second life applications.

# CELL BATTERY SYSTEM

## HRCDS-5V

The HRCDS-5V Series is a power battery tester designed for precision battery charge/discharge test, coulombic efficiency (current efficiency) test. Voltage and current test accuracy go down to 0.02% of the range. The sampling rate can go as high as to 0.02s with minimum pulse interval of 20ms.

This instrument is ideal for laboratory high performance battery testing and quality control.

### Space-saving, energy-efficient, unique – cell testers with a high packing density

This cycler is the right choice for automated tests on battery cells in the current range from 2 Amps to 500 Amps. Thanks to its high packing density that is unique on the market, it offers up to 160 test circuits in just one cabinet. This makes it perfect for installations in all laboratories where high quantities of cells need to be tested.

### Maximum scalability

The device can be optimally scaled from a few circuits with just one plug-in unit to several thousand and grows easily with your demands.

### Parallel connection of circuits

Two or four power outputs can be easily connected in parallel to increase the current accordingly.

### High energy efficiency

The device features switch mode amplifiers with more than 99% efficiency. Regenerative DC links make a large part of the energy used available again for other test circuits. We also utilize regenerative power supply units.

### Incredibly space-saving

Thanks to the high packing density that is unique on the market, the device takes up little valuable laboratory space while also ensuring high test capacities.



### High quality result in high accuracy tests

For laboratory high performance battery testing and quality control



## Key Measurement Specifications

- Reliable, low noise, intelligent background operating system;
- Anti-reverse connection and data protection;
- Support second voltage comparison;
- Support multi-channel charge and discharge curve comparison;
- Support pulse testing, pulse width 20ms;
- Support 20ms working condition simulation test, operation can run continuously for one year.
- Support multi-channel parallel connection function
- DC/DC bi-directional charging and discharging, high quality discharge energy back to the grid, efficiency  $\geq 70\%$ .
- Support GBT31467/IEC61960 and other standard DCIR test.



## FEATURES

MAX VOLTAGE & CURRENT 5V500A...		CURRENT RANGE 0-30A; 30A/60A/80A/120A/200A/500A				ACCURACY 0,1mA & 0,1mV Resolution	
Rise Time <10ms	Charge & Discharge Working Mode	Accuracy 0,02% FS	Pulse Test	Regenerative Technology	Static/dynamic SOC test	16 Bit ADC/DAC System	DCIR Test

Type of cells: Type D / Type DD / Pouch Cells / Prismatic

# MODULE BATTERY SYSTEM

All highly efficient, our module testers are designed for simulating complex real-world test profiles such as EV drive profiles, smart battery and CANBus communication, and other custom charge/discharge regimes.

## HRCDS-60V/100V

The HRCDS-60V/100V Series is a battery module tester specifically designed for laboratories with high performance to run automated test on battery modules. Our module battery system (MBS) can be made on demand to meet specific needs tailored to your needs or we also have a standard series composed with various systems. With our module testers, you can easily perform precise high-current testing, check typical SLI batteries, as well as large and small lithium modules for stationary or mobile applications.

### Space-saving, energy-efficient, unique – cell testers with a high packing density

This cycler is the right choice for automated tests on battery cells in the current range from 20 amps to 60 amps. Thanks to its high packing density that is unique on the market, it offers up to 160 test circuits in just one cabinet. This makes it perfect for installations in all laboratories where high quantities of cells need to be tested.

### Maximum scalability

The device can be optimally scaled from a few circuits with just one plug-in unit to several thousand and grows easily with your demands.

### Key Measurement Specifications

- Support single battery voltage consistence testing
- Anti-reverse connection and data protection
- Support RS485/CAN battery pack communication protocol, CAN communication baud rate is changeable, support DBC import at one click
- Battery discharge and regenerate at 90%
- Power factor is up to 0.99
- Small size, high power density

### High energy efficiency

The device features switch mode amplifiers with up to minimum 90% efficiency. Regenerative DC links make a large part of the energy used available again for other test circuits. We also utilize regenerative power supply units.

### Incredibly space-saving

Thanks to the high packing density that is unique on the market, the device takes up little valuable laboratory space while also ensuring high test capacities.

### BMS CANBus/ RS485 communication supported



### APPLICATIONS

- E-bike
- Robot sweeper
- UAV
- E-vehicle
- Module, battery PACK
- Energy storage bus

## FEATURES

MAX VOLTAGE & CURRENT		CURRENT RANGE			ACCURACY		
60V60A		0-20A/30A/40A/60A			+/- 1mA		
100V60A		0-20A/30A/40A/60A			+/- 1mA		
Rise Time <10ms	Charge & Discharge Working Mode	Accuracy 0,02% FS	Pulse Test	Regenerative Technology	Static/dynamic SOC test	Support RS485/CAN protocole	DCIR Test





# PACK

Test driving profiles for a high-voltage battery in no time, and simulate driving cycles, the start-stop function or battery charge states with our pack testers.

## HRCDS-100V~200V-600V

The HRCDS-100V-600V is a high power fully automated test system designed for testing and characterizing Electric Vehicle and Energy Storage batteries.

### Key Measurement Specifications

- Support single battery voltage consistence testing
- Anti-reverse connection and data protection
- Support RS485/CAN battery pack communication protocol, CAN communication baud rate is changeable, support DBC import at one click
- Battery discharge and regenerate at 92%



### FEATURES

MAX VOLTAGE & CURRENT 600V/600A		CURRENT RANGE 0-100A/150A/200A/300A/600A			ACCURACY +/- 1mA		
Rise Time <5ms	Charge & Discharge Working Mode	Accuracy 0,05% FS	Pulse Test	Regenerative Technology	Static/dynamic SOC test	Support RS485/CAN/ LAN protocols	DCIR Test

### APPLICATIONS

E-vehicle / Module, battery PACK / Energy storage bus

## RCDS-750V~1500V

The RCDS-750V-1500V is a high power fully automated test system designed for testing and characterizing Electric Vehicle and Energy Storage batteries.

### Key Measurement Specifications

- Support single battery voltage consistence testing
- Anti-reverse connection and data protection
- Support RS485/CAN battery pack communication protocol, CAN communication baud rate is changeable, support DBC import at one click
- Battery discharge and regenerate at 95.34%
- Tri-level technology, wide voltage output, small current ripple, adapt to harsh electrical environment.



### APPLICATIONS

Bus / Module, battery PACK / Energy storage bus

### FEATURES

MAX VOLTAGE & CURRENT		CURRENT RANGE			ACCURACY		
750V/800A...		0-300A/400A/600A/800A...			+/- 1mA		
1500V/800A...		0-300A/400A/600A/800A...			+/- 1mA		
Rise Time <10ms	Charge & Discharge Working Mode	Accuracy 0,05% FS	Regenerative Technology	Static/dynamic SOC test	16 Bit ADC/DAC System	DCIR Test	DCIR Test

# CLIMATIC CHAMBERS

Temperature climatic chambers simulate a range of temperature and humidity conditions to test components and products, especially for those exposed to outdoor temperature and humidity conditions, such as energy storage, materials processing...Our test chambers are mainly configured with international famous brand components (Tecumesh, Bitzer, Schneider, Rainbow...). They provide reliable and continuous performance.

Our range of temperature / humidity climatic chambers meet all needs offering a variety of temperatures and sizes for battery test solutions.

Battery high low temperature test chamber is designed to test all types of batteries, including lithium-ion batteries. The battery test chamber has many safety functions built into the test chamber, which can handle battery tests and prevent safety accidents. In the laboratories involved in battery testing, tests based on charge and discharge cycles are a key activity. The instruments used for this type of test usually perform harsh and lengthy test protocols on the battery and can usually be connected to various instruments.

## Test standards

TIEC 62660-2,SAE J2464,IEC 60086-4,UL 1642,UN 38.3,IEC 61960,IEC 62133,UL 2054, IEEE 1625,IEEE 1725.

All our products are fully customizable and can be certified EUCAR 5 or 6.



- Volume range from 22L up to 2000L
- Temperature range from -70°C to +180°C
- Humidity range from 5% to 98%
- Vibration test available
- Double or triple layer models

	MODEL	SMC-80-CC-FB	SMC-150-CC-FB	SMC-225-CC-FB	SMC-408-CC-FB	SMC-800-CC-FB	SMC-1000-CC-FB	SMC-1500-CC-FB
TEMPERATURE	Temperature control	-70°C-180°C						
	Range	(A:0°C-180°C ; B:-20°C-180°C ; C:-40°C-180°C ; D:-70°C-180°C)						
	Temperature fluctuation	±0.5°C						
	Cooling rate	180.0°C-25.0°C Cooling rate 2.0-3.0°C/min			25.0°C--40.0°C Cooling rate 1.0-2.0°C/min			
		-40.0°C--70.0°C Cooling rate 0.7-1.5°C/min						
	Heating rate	-70.0°C-180.0°C Within 60 mins 3.0-5.0°C/min						
	Temperature uniformity	±1.5°C (-40.0°C-100.0°C) ±2.0°C (100.1°C-180.0°C- or -40.0°C--70.0°C)						
HUMIDITY	Humidity control range	20.0% RH - 98.0% RH						
	Humidity fluctuation	±1.0% RH						
	Humidity uniformity	±2.0% RH						
OPTIONS	CO <sub>2</sub> fire extinguisher	Automatic fire extinguishing and automatic shutdown of the machine to protect the equipment from burning						
	CO, h2 gas detector	When the battery will produce gas, it will detect gas solubility and discharge to outdoor when it exceeds the standard						
	Exhaust valve	When the test sample produces harmful gas, ventilate and exhaust internally						
SIZE	Interior size(mm) W*H*D	400*500*400	500*600*500	600*750*500	800*850*600	1000*1000*800	1000*1000*1000	1200*1000*1250
	Outer size(mm) W*H*D	600*1590*1160	700*1665*1275	800*1870*1315	1000*1950*1410	1200*2085*1590	1200*2085*1790	1400*2100*2030
	Volume (m <sup>3</sup> )	80L	150L	225L	408L	800L	1000L	1500L

# CLIMATIC CHAMBERS

## OUR CLIMATIC CHAMBERS



**High and low temperature explosion-proof test chamber**



**Precision high temperature oven**



**Double-layer battery oven**



**Walk-in high temperature explosion-proof chamber**

### Our different kind of climatic chambers for battery applications

- Battery explosion-proof oven
- Battery explosion-proof vacuum oven
- High low temperature explosion-proof test chamber
- Battery thermal abuse test chamber
- Parallel wind test chamber for battery
- Explosion-proof high low temperature shock chamber



The characteristics of the chamber can be adjusted according to the customer's test conditions.

# BATTERY DRY OVEN

### Application field

High temperature drying Oven can provide a stable test space for pre-heating, drying, changes about physics and chemistry testing It supplies precision temperature controller with high stability of platinum resistance to temperature that makes temperature well-distribution.

### Characteristics

- Continuous working time  $\geq 1,000$  hours under the test condition of  $+140^{\circ}\text{C}$ ;
- Equipped with an explosion-proof pressure relief port, when the pressure increases sharply, the pressure relief port automatically opens;
- The smoke sensor detects the smoke or fire and active the fire extinguishing system to extinguish the fire in the oven;
- Explosion-proof safety design, equipped with explosion-proof chains, glass explosion-proof film, insulation layer uses 100mm aluminum silicate insulation.

MODEL	SM-G-225-DA	SM-G-408-DA	SM-G-1000-DA	SM-G-1400-DA	SM-G-1600-DA
TEMPERATURE RANGE	RT+10°C~+300°C (A: +25°C~+200°C ; B: +25°C~+300°C)				
TEMPERATURE FLUCTUATION	±0.5°C				
HEATING RATE	25.0°C-100.0°C within 8 minutes (6.0°C-10.0°C-/min)				
TEMPERATURE UNIFORMITY	±2.0°C (25.0°C-100.0°C)				
	±2.5°C (100.1°C-200.0°C)				
INNER SIZE (MM) W*H*D	500*750*600	800*850*600	1000*1000*1000	1580*1400*640	1400*1800*650
OUTER SIZE (MM) W*H*D	1000*1560*730	1200*1650*930	1400*1830*1230	1880*2050*800	2200*2100*1100
VOLUME (CUSTOMIZABLE)	225L	408L	1000L	1400L	1600L

# OUR INTERNATIONAL NETWORKS

HTDS (Hi-Tech Detection Systems) is a company specialized in the distribution and maintenance of high-tech detection systems in France and abroad.

HTDS offers a full range of detection solutions dedicated to the following areas:  
Electrochemistry and electrical test - Security - Product Inspection - Analytical Sciences -  
Nuclear and Radiation Protection - Optoelectronics

HTDS's exclusive partners for electrochemistry are recognized as world leaders in their field.



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HTDS offers its products in France and abroad (BeNeLux, Switzerland, Algeria, Egypt, DRC, Madagascar, Libya, Morocco, Tunisia)