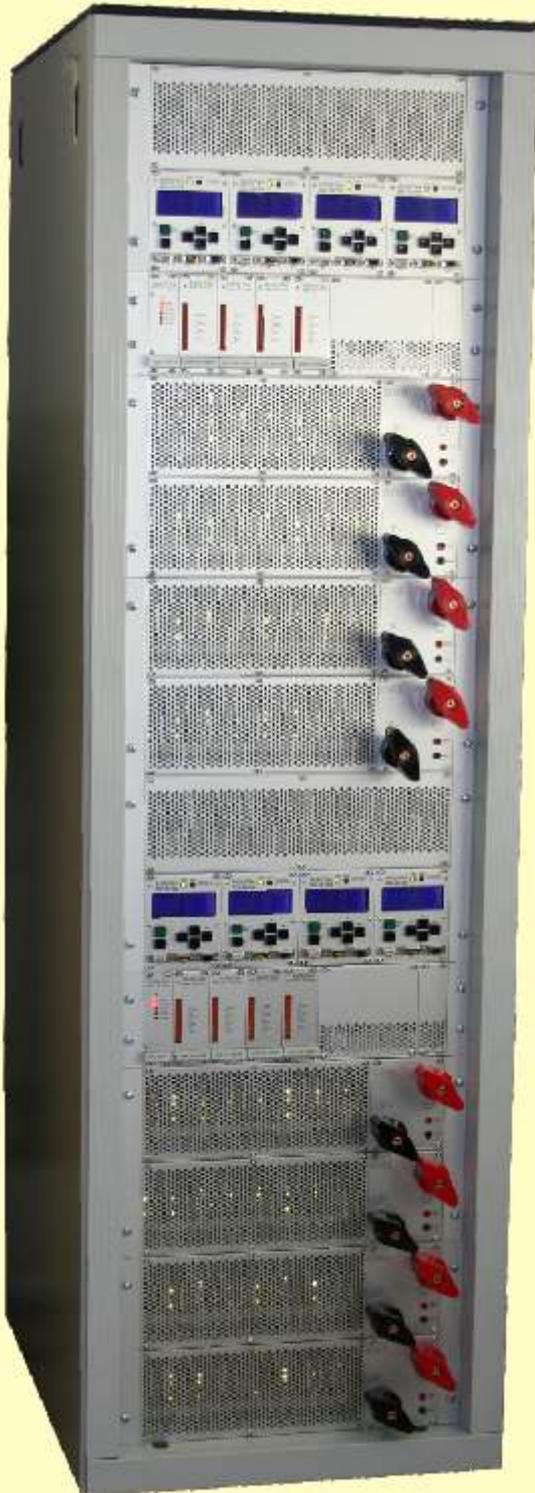


# BaSyTec

## Battery Test Systems

Research  
Development  
Production  
Quality control



HPS



GSM



LPS

# Modular

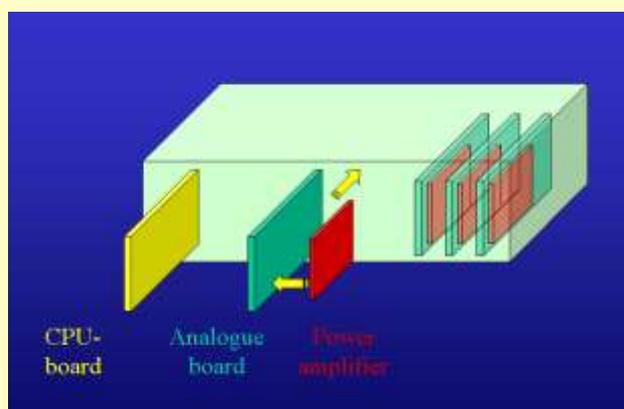
## Battery Test System

# BaSyTec, the Window to your Batteries

BaSyTec welcomes you to the next generation of battery test systems. Modular design, advanced software, and lots of extra features included as standard. All this at an economic price. This state of the art battery test system has been designed by engineers with extensive experience in test system design for energy storage devices, combined with additional ideas from customers. The result is a battery test system that not only meets the critical demands of today's users in a wide variety of applications, but also provides certain capabilities and features that are unmatched by the competition.

## Main Features

- **Truly Modular Design**  
Provides complete flexibility and cost efficiency.
- **Low Maintenance costs**  
Calibration by customer, Software included
- **Additional Analog Inputs**  
(for Reference Electrode, Temperature etc.)  
Four (4) per channel included, more possible
- **Native (analog) CC and CV Operating Modes**  
Allows precise, high speed control.  
Other modes operate under digital control.
- **High Speed Control and Data Acquisition**  
To meet today's pulse profile requirements
- **From 1 to 100 Independent Channels per System**  
Provides flexibility for any size of laboratory
- **Local Database and Analysis Tools**  
No need to export data to perform analysis
- **Ethernet Interface**
- **Network operation**  
Different possibilities for network data access (direct or via SQL server)
- **Enhanced Numerical/Graphical analysis and Report Generation**  
The most features and professional presentations available.
- **Direct interface to MS Excel and Word**



## Typical Applications

- Fundamental research
- Materials testing
- Investigation of single electrodes
- Galvanostatic tests
- Potentiostatic tests
- Cyclic voltammetry
- Battery performance testing
- Applications testing
- Cycle life tests
- Quality assurance
- Development of pulse charge methods
- Testing of double layer capacitors
- Testing of fuel cells

# Flexible and simple to use

## System Description

The true modular structure of the BaSyTec Battery Test System makes customization of the system easy and economic. Based on the standard 19 inch rack system, all modules are plug-in type. One benefit of this is that you can start with a small system, and easily grow the system as your budget allows. In addition, this modularity minimizes maintenance costs, and with only one (1) test channel per module, allows maximum system integrity. Each system is operated through a standard PC computer, which can be supplied by the user if preferred. Both RS232 and Ethernet communications are available between the test system and PC.

**Central Processor Unit (CPU)** - Each system contains one or more CPU cards, depending on the number and type of test channels.

**Test Channel Cards** - These are available in various voltage and current ranges, with the capability to mix different voltages and current ranges in the same system. Each test channel operates independently, allowing different tests to be performed at different times on the same system. Four (4) wire Kelvin type battery connection (May also be used for 3 wire measurements with reference electrode).

Four (4) additional analog inputs optional for each channel, for use as cell voltages, temperature (Pt100), pressure, humidity, pH etc. Low current systems, typically used for Research and Development applications, are normally supplied in a bench mounted case, with up to 9 or 16 test channels per 19 inch rack. Higher power systems are normally supplied in a floor standing rack cabinet, with size depending on the number of channels and the application.

**Digital I/O Card** - With or without relay contacts. For use with lights, push buttons or external systems.

**External Charge/Load Card** - To allow additional testing of chargers or loads.

**Remote control interface** - to include into superior environment.

**Open Software Interface** - to integrate any device into the testing process (monitoring systems, climate chambers, ...)

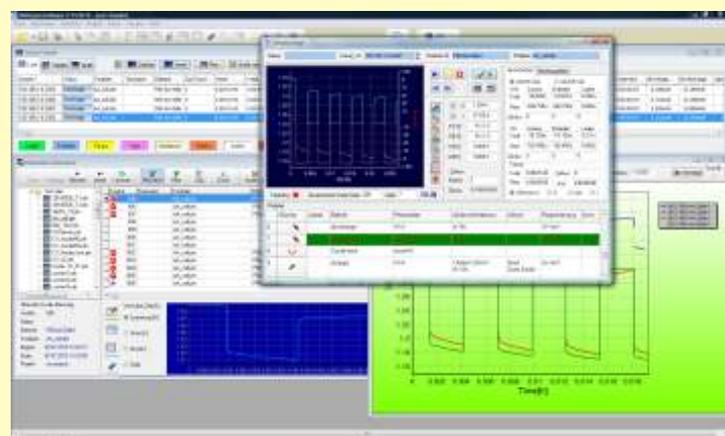
## Operation

Operation is under Microsoft Windows, 2000, XP, Vista 32Bit or 7/64Bit. The sequence of system operation is quite logical.

**Write a Test Plan** - Line oriented test plan, with a simple to understand and easy to use editor. Uses direct keyboard entry with assistance from wizards.

**Start a Test** - Individual channel or a group of channels can be started simultaneously, with the possibility to perform a time delayed start.

**Monitor in Real Time** - A single detailed screen displaying real time data and real time graphics is provided, essential for use in short term electrochemical experiments.



**Record Data** - Test data is recorded at user specified intervals (in any sampled variable) into a local SQL database in the system PC. This database system makes it simple to identify tests, and to get all information relating to the test, whether the test is still active or was completed a long time ago.

**Analyze Data** - The integral data analyzing tool makes it possible to analyze data from both active, completed or even archived tests. Analysis can be performed numerically using powerful filters or graphically, and can be used to generate professional reports. Analysis can be performed locally or via the company's network.

**Export Data** - The capability to export test data directly to MS Office or the company's internal network is provided.

# Technical Specification

No. of Test Channels	From 1 to 100 per system	
Current Ranges	100 $\mu$ A to 600A full scale	
Voltage Ranges	5V to 60 V full scale, bipolar or unipolar option	
Power Ranges	250 $\mu$ W to 10 KW per channel	
Measurement Resolution	0.003% FSR (16 bit)	
Measurement Accuracy	0.05% FSR	
Time Resolution	1 $\mu$ s	
Minimum Pulse Width	350 $\mu$ s	
Minimum Rise Time	1A/ $\mu$ s	
Typical Switch Time	< 50 $\mu$ s (low power systems up to 5A) 300 $\mu$ s + rise time from full charge to full discharge (High power systems)	
Control Modes	Analog - constant current and constant voltage Digital - constant power, constant load (Resistance), ramp voltage, ramp current, pulse, others.	
Measured Values	Current, voltage (input impedance up to 10G possible), time	
Calculated Values	Capacity, power, energy, deviations, resistance and many more (more than 70 predefined values), any others (by formula editor)	
Additional Input Channels	4 analog inputs per channel are standard Input ranges from 100 mV to 60V (please specify) Input impedance > 1 M Can be used to measure individual cell voltages in a battery pack or will accept inputs from thermistors (Pt100), pressure, humidity, pH, or other transducers with a suitable analog output. More inputs possible by internal or external datalogger	
No. of Steps per Test Plan	Unlimited in practice (50MB internal memory for test procedures)	
No. of nested Loops or Macros	Unlimited in practice	
Step Termination Criteria	All measured values and deviations All calculated values and deviations Digital inputs, values of open software interface	
Peak Data Recording Rate	2 kHz	
Data Recording Interval	Based on one or any combination of the following parameters. Increments of Time or any other measured or calculated value	
Database System	SQL type	
PC Computer	Supplied as an option. Minimum requirements 1GHz , 100GB HD, 1GByte RAM. Optional SQL Server for central data storage	
Climate chamber drivers	Included for most climate chambers	
Available Options	Digital I/O	Up to 8 digital inputs/outputs per card
	Relay Outputs	Up to 8/16 contacts per channel
	External Charge/Load Control	Inputs for external charger or external load + current measurement
	SSMS Interface	Safety interface supporting door lock, ...
	BSD	Battery Safety Device offers redundant parameter check and shut-off
	Multiple current ranges	To have better precision at low current
	Water cooling	Instead of air cooling
	CAN	For BMS communication
	Interface to other Systems	Open software interface to include other systems, Remote Control interface to include into other systems
	AC Power Supply Input	110V or 220V AC, 50/60 Hz (large systems 400V 3 Phase)

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