Full control of your characterizations

ELECTROCHEMISTRY AND ELECTRICAL TESTING

Potentiostats & Galvanostats
Scanning Electrochemical Systems
Solar Test Systems
Materials Test System
Climatic Chambers
Accessories

HTDS
Hi-Tech Detection Systems

POTENTIOSTATS & GALVANOSTATS

PORTABLE INSTRUMENTS

HTDS offers a complete range of electrochemistry instrumentation and materials characterization equipment. The devices are general purpose potentiostat and are highly suitable for embedded use in all your applications.
We have different small USB and battery powered potentiostats: EmStat is available as single channel potentiostat but can also be combined with a multipotentiostat as a polypotentiostat, or as multichannel potentiostat.

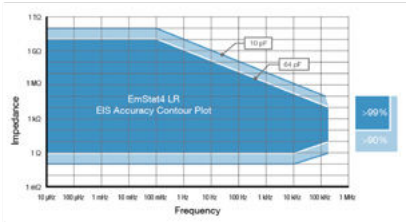
EmStat4X LR and HR : high performance in a small footprint

The EmStat4X is a small battery and USB-powered Potentiostat, Galvanostat, and optional Frequency Response Analyser (FRA) for Electrochemical Impedance Spectroscopy (EIS)

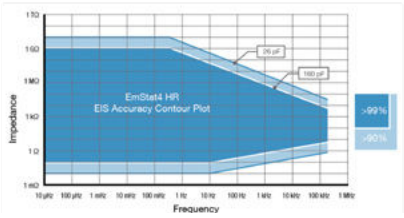
** Bluetooth and Android extension available*

	EmStat 4X Low Range	EmStat 4S High Range
DC-potential range	± 3 V	± 6 V
Compliance voltage	± 5 V	± 8 V
Applied dc-potential résolution	≤ 100 µV	≤ 200 µV
Applied potential accuracy	≤ 0,2 % with max. 1mV offset error	≤ 0,2 % with max. 1mV offset error
Current range	1 nA to 10 mA (8 ranges)	100 nA to 100 mA (7 ranges)
Max current	± 30 mA	± 200 mA
EIS (in option)	10 µHz to 200 KHz	10 µHz to 200 KHz

EmStat4X LR EIS Accuracy Contour Plot



EmStat4X HR EIS Accuracy Contour Plot

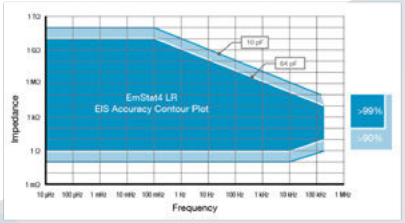


EmStat4S LR and HR: USB powered potentiostat / galvanostat with EIS

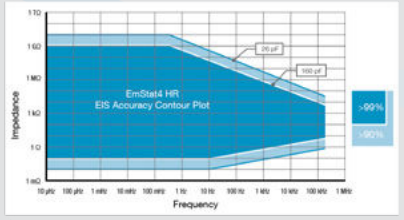
The EmStat 4S powered potentiostat galvanostat EIS is the smallest research grade electrochemical interfaces available on the market.

	EmStat 4S Low Range	EmStat 4S High Range
DC-potential range	± 3 V	± 6 V
Compliance voltage	± 5 V	± 8 V
Applied dc-potential résolution	≤ 100 µV	≤ 200 µV
Applied potential accuracy	≤ 0,2 % with max. 1mV offset error	≤ 0,2 % with max. 1mV offset error
Current range	1 nA to 10 mA (8 ranges)	100 nA to 100 mA (7 ranges)
Max current	± 30 mA	± 200 mA
EIS (in option)	10µHz to 200 KHz	10µHz to 200 KHz

EmStat4S LR EIS Accuracy Contour Plot



EmStat4S HR EIS Accuracy Contour Plot



POTENTIOSTATS & GALVANOSTATS

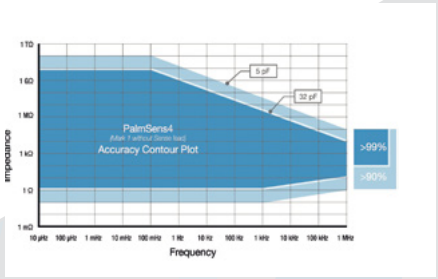
PORTABLE INSTRUMENTS

PalmSens 4 : compact, versatile and powerful

The PalmSens 4 is a USB and battery powered Potentiostat Galvanostat and an optional Frequency Response Analyser (FRA) for Eletrochemical Impedance Spectroscopy (EIS). The PalmSens4 is available ±5V or ±10V DC-potential ranges and with two different maximum frequencies for FRA / EIS.

** Bluetooth and Android extension available*

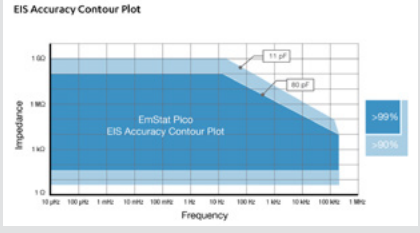
	PalmSens 4
FRA / EIS	10 µHz up to 1 MHz
Current range	100 pA to 10mA (9 ranges) - Max current ± 30 mA
Resolution	high resolution of 0,006% full scale range
Compliance voltage	±5 V or ±10 V potential range at 75 µV resolution
Charge	USB and battery powered
Memory	always a backup of your data with 8GB of internal storage



Sensit Smart : the smallest potentiostat on the market

The Sensit Smart is the world smallest ready-to-go potentiostat available on the market. The Sensit Smart can be directly inserted in a smartphone or tablet. The Sensit Smart supports most common electrochemical techniques, including Cyclic Voltammetry, Square Wave Voltammetry and Impedance Spectroscopy (FRA/EIS).

	Sensit Smart
DC potential range	-1.7 to +2 V
Compliance voltage	-2.0 to +2.3 V
Max current	± 3 mA
Current range	100 nA to 5 mA (10 or 12 ranges, depending on the mode)
Current resolution	0.006% of selected current range
Frequency range	0.016 Hz to 200 kHz
Power and communication	USB-C
EIS frequency range	1 mV to 0.25 V rms, or 0.708 V p-p
Max sensor width	Between 0.1 mm and 0.8 mm



SINGLE CHANNEL **& BI**
POTENTIOSTAT INSTRUMENTS

POWERFUL AND PREMIUM INSTRUMENTS IN A COMPACT CHASSIS

	PARSTAT 3000A	PARSTAT 3000A-DX	PARSTAT 4000A
Compliance Voltage	± 30V	± 30V(Chann.2), ± 12V(Chann.1)	± 48V
Polarization	± 30V	± 30V(Chann.2), ± 10V(Chann.1)	± 10V
Max Current Output	± 1A	± 1A(Chann.2), ± 2A(Chann.1)	± 4A
Min Current Range	± 4 nA (122fA resolution) down to ± 4pA (122aA)	± 4 nA (122fA resolution) down to ± 4pA (122aA)	± 40 pA (1,2fA resolution) down to ± fA (2aA)
EIS Max Frequency	7 MHz, Included	7 MHz, Included	10 MHz, Included
TTL output & Triggers	Supplied, DB9	Supplied, DB9	Supplied, DB9
Software	VersaStudio, Fully Enabled + VDK Developers Kit		

AFFORDABLE RESEARCH GRADE INSTRUMENTS

	VERSASTAT 3A	VERSASTAT 4A
Compliance Voltage	±12V	±12V
Polarization	±10V	±10V
Max Current Output	±2A up to ±20A (with external Booster)	±2A up to ±20A (with external Booster)
Min Current Range	±200 nA (6pA resolution) down to ± 4pA (122aA)	down to ± 4pA (122aA)
EIS Max Frequency	1MHz, Option	1MHz, Option
Isolation	User selectable : Floating (isolation) or grounded	User selectable : Floating (isolation) or grounded
TTL output & Triggers	Supplied, DB9	Supplied, DB9
Software	VersaStudio + VDK Developers Kit	

MULTI-CHANNEL **INSTRUMENTS**

THE MULTI CHANNEL FULLY TAILORED TO YOUR BUDGET

Our multi-channel potentiostats are designed for the most demanding users who want quality and high productivity without compromising on cost. The MultiEmStat 4 is a versatile multi-channel potentiostat with 4, 8 or 12 independent EmStat potentiostats. The channels can perform experiments independently of each other.
The MultiPalmSens 4 is a flexible multi-channel potentiostat, galvanostat and impedance analyzer with four up to 10 channels.

- Corrosion
- Fundamental Electrochemistry
- Sensors
- Coatings
- Education



	MultiEmStat 4		MultiPalmsens 4
	Low Range	High Range	
Channels number	4, 8 or 12 channels	4, 8 or 12 channels	4 to 10
Compliance Voltage	±5V	±8V	±5V , ±10V
Polarization	±3V	±6V	±5V , ±10V
Max Current Output	±30mA	±200mA	±30 mA
Min Current Range	±1 nA (92fA resolution)	±100 nA (9,2pA resolution)	±1 nA (1pA resolution)
EIS Max Frequency	200 KHz (in option)	200 KHz (in option)	100 KHz or 1MHz (in option)
Software	MultiTrace		

THE ULTIMATE MULTI-CHANNEL INSTRUMENT

Multi-channel system is designed for the complete DC and impedance characterization of a wide range of energy storage devices such as batteries, fuel cells and super-capacitors. The speed, range and resolution of the our systems also make it suited to other research applications:

- Corrosion
- SuperCaps
- Batteries
- Fundamental Electochemistry
- Sensors
- Coatings

	PMC 200	PMC 1000	PMC 2000A
Channels number max	20	10	10
Compliance Voltage	± 10V	± 12V	± 30V
Polarization	± 10V	± 10V	± 30V
Max Current Output	± 1A	± 2A	± 1A
Min Current Range	± 2 µA (238fA resolution)	± 4 nA (122fA resolution) down to ± 4pA (122aA)	± 4 nA (122fA resolution)
EIS Max Frequency	100 KHz, Included	1MHz, Option	7 MHz, Included
Software	VersaStudio + VDK Developers Kit		

BOOSTER OPTIONS

PMC Booster 5A Internal Booster -1 to 6V **PMC Booster 10A** Internal Booster -1 to 6V **Parallel booster up to 20 A**

SINGLE CHANNEL **INSTRUMENTS**

XM SERIES LABORATORY INSTRUMENTS

To ensure quality and accuracy of your measurements, even in extreme situations, HTDS offers a serie of instruments that guarantee you this standard.

	ModuLab XM ECS (4 or 8 slots)	EnergyLab XM	EchemLab XM
Polarization, Compliance Voltage	± 8V to ± 100V	± 8V	± 100V
Max Current Output	± 300mA up to ±100A	±2A up to ±100A	± 300mA up to ± 100A
Min Current Range	± 30 nA (1,5pA resolution) to ± 3pA (0,15 fA resolution)	± 30 nA (1,5pA resolution)	± 30 nA (1,5pA resolution)
FREQUENCY RESPONSE ANALYSER			
EIS Frequency range	10µHz to 1 MHz	10µHz to 1 MHz	10µHz to 1 MHz
Max sample rate	40MS/s	40MS/s	40MS/s
Frequency resolution	1 in 65,000,000	1 in 65,000,000	1 in 65,000,000
Frequency error	± 100 ppm	± 100 ppm	± 100 ppm
SIGNAL OUTPUT			
Waveform	Single Sine, Multi Sine	Single Sine, Multi Sine	Single Sine, Multi Sine
Single Sine	Linear/Log	Linear/Log	Linear/Log
Multi Sine/ Haromic Frequencies	All or selected	All or selected	All or selected
ANALYSIS CHANNELS			
EIS Accuracy (ratio)	± 0,1%, ± 0,1	± 0,1%, ± 0,1	± 0,1%, ± 0,1
Analysis Channels	RE, WE, Aux A/B/C/D	RE, WE, Aux A/B/C/D	RE, WE, Aux A/B/C/D

SCANNING **ELECTROCHEMICAL AND SOLAR TEST SYSTEMS**

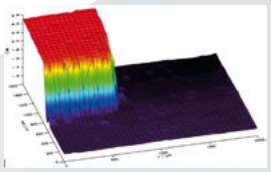
AN ADVANCED AND FLEXIBLE PLATFORM

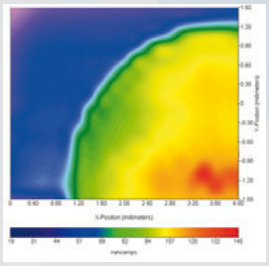
In general way on electrochemical experiments, the electrode response to a perturbation signal corresponds to a surface-averaged measurement ascribable to the behaviour of the hole electrode surface. However, electrochemical systems rarely show an ideal behaviour, and this can lead to difficulties with data interpretation. Thanks to this localized electrochemical platform, we look beyond this homogeneity to study the spatial dependence of the electrode properties. To do so, our solution includes up to 9 localized measurement techniques.

VersaSCAN

The VersaSCAN is a single platform capable of providing spatial resolution to both electrochemical and materials-based measurements. Potentiostats and Signal Recovery Lock-in Amplifiers are integrated via ethernet control to make accurate measurements of these small signals. Our platform offers 9 different techniques:

- Scanning Electrochemical Microscope System (SECM and ac-SECM)
- Constant Distance SECM (VS STYLUS)
- Scanning Vibrating Electrode Technique (SVET)
- Localized Electrochemical Impedance Spectroscopy (LEIS)
- Scanning Kelvin Probe (SKP)
- Scanning Droplet Cell (SDC and ac-SDC)
- Optical Surface Profiling (OSP)





PHOTOELECTROCHEMISTRY

HTDS offers a range of products focused on solar cell / photovoltaic research (developed in collaboration with Professor Laurie Peter of the University of Bath, UK). These instruments are very versatile. They can be used for various photoelectrochemical applications like water splitting research , PV cells, including Perovskites, research, or PhotoElectrolyzers and PhotoBatteries ...

SolarLab XM

SolarLab XM is an application specific XM instrument designed for research of solar cells and photovoltaics.

- Includes fully integrated optical bench
- Wavelengh range: 300nm - 1100nm
- Multiple techniques IMPS, IMVS, I-V, Charge extraction, PV decay with automated data analysis, AC measurement
- Measured parameters: Effective Diffusion Coefficient of Electron, Effective Lifetime of Electrons, Effective Lifetime of Electrons, Fill Factor, Pmax, Voc, Isc, Efficiency,Trapped Charge Density, Quantum Efficiency, Impedance / Capacitance
- Wide bandwidth impedance and capacitance measurements
- IPCE available as an option
- Compact chassis for smaller footprint

MATERIALS TEST **SYSTEMS**

MATERIALS & IMPEDANCE ANALYZERS

HTDS provides integrated solutions that enable researchers to measure the combined electrical, thermal and mechanical properties of materials. Testing over a wide temperature range from -268 to >1200°C is simplified using PC software with integrated temperature control facilities.

ModuLab XM MTS

The ModuLab XM MTS can perform time domain (DC) and frequency domain (AC) tests. As with other ModuLab-platform systems it can be expanded for electrochemical or photoelectrochemical experiments.

- Widest impedance range - 10 µohms to >100 Tohms
- Configurable for specific materials applications and expandable to electrochemical and photoelectrochemical experiments

MaterialsLab XM

The Materials Lab XM uses the same XM based platform to deliver ModuLab performance to a focused application, the study of materials. This focused design allows this instrument to occupy a small footprint.

- Application-focused on dielectrics, insulators, and electronic materials
- Impedance Range from 1 mOhm to 1 TOhm (1E^{15} Range)
- Auxiliary measurement port for synchronized measurement of optical, mechanical or other transducers.

	Modulab XM MTS	Materials Lab
Maximum Frecency	1 MHz	1 MHz
Combines with DC for Electrochemical Measurements	Yes, with XM PSTAT 1MS/s	No
Highest Impedance	100 Tohms	1 Tohms
Lowest Impedance	10 µOhms	1 mOhms
Software	XM Studio	

SAMPLE **HOLDERS**

Combined with the XM series analyzers, remote controlled furnaces and cryostats with dedicated designed sample holders simplify testing of solids, liquids and powders. Materials can also be tested in controlled atmospheric conditions with the use of single or dual gases for fuel cell, solid oxide and super ionic conductor applications.

129610A LHe/LN2 Cryostat System

The 129610A cryostat may be used together with any Solartron materials test system to run I-V, Pulse, C-V, Impedance, Mott-Schottky and a wide range of other materials test techniques. It offers fully integrated temperature control.

- Cryogen not in contact with sample - prevents sample damage
- Temperature Range of 5 K to 600 K
- Compatible with both liquid helium (LHe) and liquid nitrogen (LN2)

KEY POINTS
- Very low cryogen consumption
- Capillary tube around sample space

129620A High Temperature Test System

An integrated system uses a split tube furnace design together with a lab jack that allows easy sample access and positioning. The sample is positioned in a purpose designed sample holder between platinum electrodes that allow testing at very high temperature. Key applications are: solid-state materials, included SOFC and solid-state batteries.

- Operating range room temperature to 950 K (1200ºC)
- Various sample holder configurations are available depending on material requirements – 2 terminal/4 terminal/van der Pauw

KEY POINTS
- Dual gas supply is available for SOFC type applications
- Controlled atmospheres

12962A Room Temperature Sample Holders

The sample holder consists of two parallel electrodes, one of which is fixed in position and the other which can be moved into contact with the sample by adjustment of a micrometer.

- Electrode diameter of 20 mm standard. Options of 10 mm, 30 mm, 40 mm.
- Sample thickness range of 0.2 mm to 25.4 mm

KEY POINTS
- 2 terminal connections
- Sample types of solid, liquid, powder

129630 Micro Vacuum Probe Stations

As the “micro” name implies these probe stations are extremely small (140 mm / 5.5”) and portable so you can easily move the test station from one experiment to the next.

- Peltier model 129630 PT/PTH (w -40°C to 200°C with light emission options)
- Ceramic model 129630 CHL/CHH (RT to 450° / 750°C)
- Liquid Nitrogen model 129630 LN2 (w 77K to 300K)

KEY POINTS
- testing ceramics
- polymers
- sensors
- solid state materials
- thin films

CLIMATIC **CHAMBERS**

HTDS offers a complete range of climatic chambers including temperature & humidity and vibration test (high and low temperature operation & storage and a large humidity range).
Test chambers are widely used in research and industries included but not limited to: battery/new energy, aerospace, automotive, medical, pharmaceutical industry, machinery, electronical components, telecommunication, transportation, household appliances ... Corrosion tests are also in the focus of these solutions.

CLIMATIC CHAMBERS

Our test chambers are mainly configurated with international famous brand components (Tecumseh, Bitzer, Schneider, Rainbow...). They provide reliable performance and work continuously.
Our range of temperature / humidity climatic chambers meet all needs offering a variety of temperatures and sizes for various test solutions.

APPLICATIONS

Battery/New energy testing

Battery explosion-proof oven, battery explosion-proof vacuum oven, high low temperature explosionproof test chamber, walk-in high temperature explosion-proof chamber, battery thermal abuse test chamber, parallel wind test chamber for battery, explosion-proof high low temperature shock chamber, halt-hass vibration test.

Reliability testing

Temperature humidity chamber, thermal shock chamber, ESS chamber, temperature test chamber, walk in altitude test chamber, walk in temperature test chamber, temperature humidity and vibration combined chamber.

Weathering resistance testing

Rain test chamber (IP1-9K), Dust test chamber, Xenon lamp weathering chamber, Ozone aging test chamber.
UV weathering test chamber, temperature humidity and salt spray combined chamber.

Vibration/Shock testing

Vibration test system, shock test system.

Corrosion

Temperature and humidity controlled chamber, salt spray test chamber (brine test method, erosion resistant testing method).

KEY POINTS

- Fully customizable
- Remote monitoring a control (ethernet connection)
- Compact design
- Color LCD touch panel

ACCESSORIES

HTDS offers a wide range of accessories for all of products, including cells, classical electrodes and SPE, spectro UV-vis/IR.

CELLS

HTDS offers a various range of cells such as Standard three electrodes, Bulk electrolysis, EC and photo-EC H-Cells, photo-Electrochemical Cell Kit, Corrosion Cells, In-situ and operando Cells, Low Volume Cells, Spectro-electrochemistry cells and flow cells.

ELECTRODES

Classical Electrodes and SPE (Screen Printed Electrodes)

We offer different types of classical electrodes as working electrodes (Pt, Au, Glassy Carbon...), reference electrodes (aqueous and non aqueous media), RDE electrodes...

SPE (Screen Printed Electrodes)

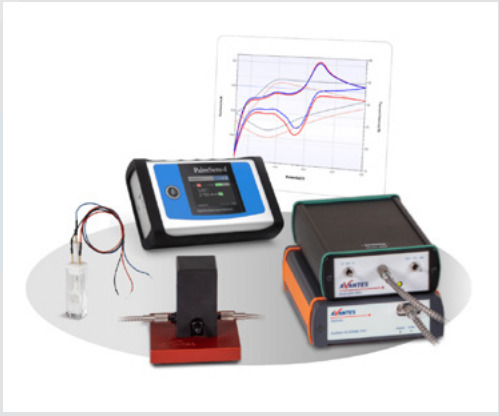
Compact and disposable, these units provide electrochemical cell systems with various configurations for the lab on the go.

SPECTRO UV-vis/IR

Gain more insight into electrochemistry with a spectrometer

Spectro-electrochemistry is a hyphenated / hybridized technique where electrochemical reactions or products are simultaneously characterized by electrochemical methods

This kit will allow users to conduct fully synchronous and in-situ measurements for electrochemistry along with UV-Vis Spectroscopy in the wavelength range of 200-1100 nm. Customized versions are possible for IR, Vis-NIR or Raman Spectroscopy as well



- Measure current, potential and spectrum simultaneously
- Tested Spectroelectrochemistry setup
- Synchronized measurements
- Combine results in PSTrace

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.

AMETEK

PalmSens

BASi RESEARCH PRODUCTS

Princeton Applied Research

solartron analytical

SANWOOD

redox.me

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

www.htds.fr

HTDS
Hi-Tech Detection Systems

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