sensit /BT ™

HANDHELD AND WIRELESS DUAL-CHANNEL POTENTIOSTAT

PalmSens

Contents

WITH INTEGRATED

EmStat *pico* ™

Built with ANALOG DEVICES

Sensit BT: with integrated EmStat Pico

The Sensit BT is built around the EmStat Pico module.

The EmStat Pico is a joint development by PalmSens BV and **Analog Devices Inc**. PalmSens is known for introducing the first commercially available handheld potentiostat. Together with Analog Devices, PalmSens has developed the EmStat Pico: the world's smallest electrochemical interface module.

More information: www.palmsens.com/pico

Sensit BT: SPE and SNS Configurations

SENSIT BT.SPE

SENSIT BT.**SNS**

Two SPE Sensor connectors, compatible with most Screen-Printed Electrodes / Sensors

Sensor pitch:	2.54 mm
Electrode connections:	RE, WE, CE
Allowed sensor thickness:	Between 0.1 mm and 0.8 mm
Maximum sensor width:	11 mm

With cable for connecting to any kind of electrochemical sensor or cell

Cable length:	40 cm
Connectors:	2 mm banana
Electrode connections:	RE, WE, WE2, CE

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Compact Electrochemical Interfaces

Main Specifications

Power:	USB / battery
Communication:	USB (type C) and Bluetooth (Classic and BLE)
Full dc-potential range:	-1.7 V to +2 V
EIS frequency range:	0.016 Hz to 200 kHz
Current ranges:	100 nA to 5 mA (max ±3 mA)
Current resolution:	0.006% (5.5 pA on 100 nA range)
Dimensions:	75 x 55 x 23 mm (excl. cable)
Weight:	75 g
Battery life:	12 hours at max. power consumption Full charge in < 3 hours
Storage memory:	500 MB for storing up to 16 million datapoints

Supported Techniques

The following electrochemical techniques are supported by the Sensit BT.

Voltammetric techniques:
- Linear Sweep Voltammetry   **LSV**
- Cyclic Voltammetry   **CV**
- Square Wave Voltammetry   **SWV**
- Differential Pulse Voltammetry   **DPV**
- Normal Pulse Voltammetry   **NPV**

The above techniques can also be used for stripping voltammetry

Techniques as a function of time:
- Chronoamperometry   **CA**
- Pulsed Amperometric Detection   **PAD**
- Open Circuit Potentiometry   **OCP**
- MultiStep Amperometry   **MA**

Electrochemical Impedance Spectroscopy:
- Scanning or fixed frequency mode   **EIS**

Dual-channel and Bipotentiostat functionality

The Sensit BT.SPE can be used for running sequential measurements on two different Screen-Printed Electrodes (SPE's) each with their own Reference, Counter and Working electrodes. The second channel can also be used in Bipotentiostat mode, functioning as second Working Electrode versus the Reference and Counter electrode of channel 1. Both channels are recorded simultaneously in the Bipotentiostat mode.
The Sensit BT.SNS has a lead connected to the WE of channel 2 and can be used out-of-the-box for BiPotentiostat measurements.

The second Working Electrode (WE2) can either be set at a potential offset with respect to WE1 or at a fixed potential with respect to RE1.

The Bipotentiostat mode is supported in Low Speed mode (see table in next section) for all techniques, excluding EIS and OCP.

Full Specifications

The Sensit BT works in three different modes;
Low Speed mode: for scan rates up to 1 V/s or a bandwidth of 100 Hz.
High Speed mode: for high scan rates and frequencies.
Max Range mode: a combination of the Low and High Speed modes for optimal
                     dynamic dc-potential range

The optimal mode is automatically selected in
PSTrace for Windows and **PStouch** for Android,
based on the selected technique and parameters.

General	Low Speed mode	High Speed mode	Max Range mode
▪ Full dc-potential range	-1.2 to +2 V	-1.7 to +2 V	-1.7 to +2 V
▪ Dynamic dc-potential range [1]	2.2 V	1.2 V	2.6 V
▪ Compliance voltage	-2.0 to +2.3 V [2]		
▪ Maximum current	±3 mA		
▪ Max. acquisition rate (datapoints/s)	100	1000	100
▪ Supports FRA/EIS	NO	YES	NO

Potentiostat (controlled potential mode)	Low Speed mode	High Speed mode	Max Range mode
▪ Applied dc-potential resolution	537 µV	395 µV	932 µV
▪ Applied potential accuracy	< 0.2%	< 0.5%	< 0.5%
▪ Available current ranges	100 nA, 2 uA, 4 uA, 8 uA, 16 uA, 32 uA, 63 uA, 125 uA, 250 uA, 500 uA, 1 mA, 5 mA	100 nA, 1 uA, 6 uA, 13 uA, 25 uA, 50 uA, 100 uA, 200 uA, 1 mA, 5 mA	100 nA, 1 uA, 6 uA, 13 uA, 25 uA, 50 uA, 100 uA, 200 uA, 1 mA, 5 mA
▪ Current accuracy	< 0.5 % for current ranges > 100 nA, < 2% for 100 nA current range	< 1% of the selected current range, < 2% for 100 nA current range	< 1% of the selected current range, < 2% for 100 nA current range
▪ Measured current resolution	0.006% of selected current range (5.5 pA on 100 nA range)		
▪ Measured potential resolution (for OCP)	56 µV		

[1] The dynamic range is the range that can be covered during a single scan within the full potential range.
For example; a linear scan can start at -1.5 V and end at 1.1 V or vice versa, covering 2.6 V dynamic range.

[2] The compliance voltage is the maximum potential between Working and Counter electrode and depends on the selected mode.

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FRA / EIS (impedance measurements) in High Speed Mode only

▪ Frequency range	0.016 Hz to 200 kHz
▪ Ac-amplitude range	1 mV to 0.25 V rms, or 0.708 V peak-peak

Electrometer

▪ Electrometer amplifier input	> 1 TΩ // 10 pF
▪ Bandwidth	250 kHz

Other

▪ Storage	4000 datapoints on-board
▪ Dimensions	75 x 55 x 23 mm (excl. cable)
▪ On-board temperature sensor	±0.25 °C
▪ Operation temperature range	0 °C to +40 °C

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Included with Sensit BT

The Sensit BT.SPE comes with:
- Rugged carrying case
- Dummy Cell SPE version
- 2x spare SPE connector
- USB-C cable
- Quick Start
- PSTrace software on USB stick
- PSTrace Manual
- Access to software on my.palmsens.com
- 3-year warranty

The Sensit BT.SNS comes with:
- Rugged carrying case
- Dummy Cell
- 5x croc clips
- USB-C cable
- Quick Start
- PSTrace software on USB stick
- PSTrace Manual
- Access to software on my.palmsens.com
- 3-year warranty

PSTrace: Software for Windows

Select current ranges for auto ranging and the starting current range.

Switch between plots if curves with different units are available.

**Method Editor**

Measurement data and curves

Click on a measurement in the legend to see the available data and to generate more curves.

Click on a curve in the legend to change its title or appearance.

**The Sensit BT is compatible with PSTrace for Windows.**

Other functions in PSTrace 5:
- Equivalent Circuit Fitting
- Open your data in Origin and Excel with one click of a button
- Save all available curves, measurement data and methods to a single file
- Browse measurements on Sensit BT's internal storage
- And many more…
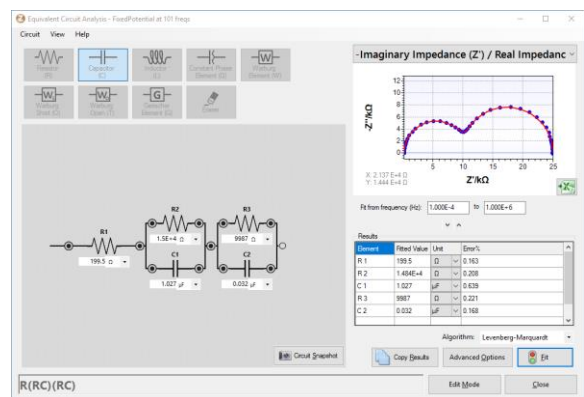
Integration with third party software:
- Excel
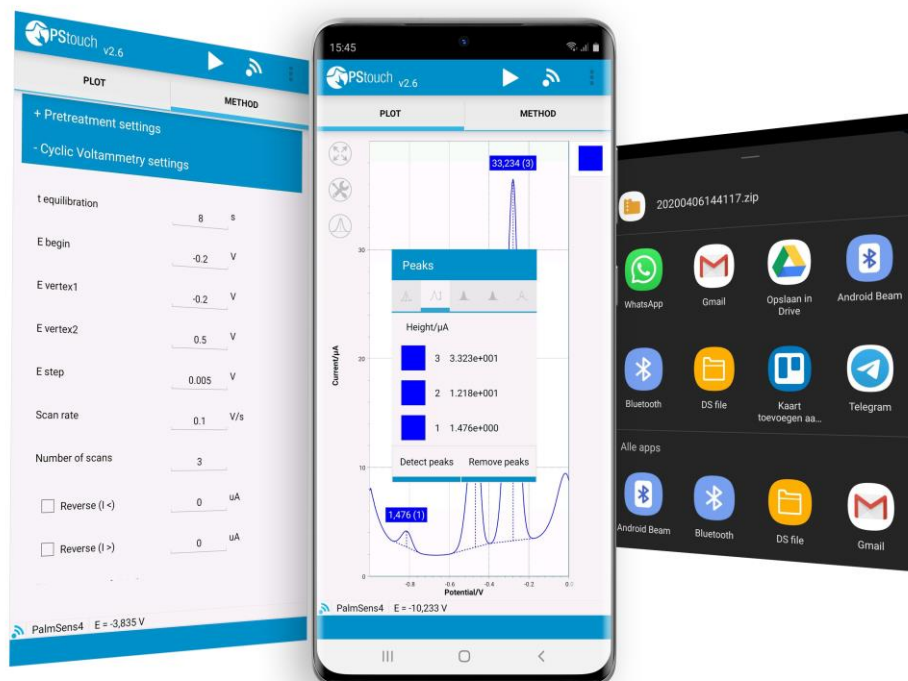- Origin
- Matlab
- ZView
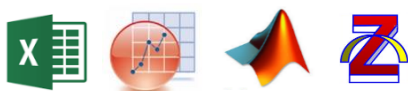
System requirements

Minimum PC requirements are:
- Windows 7, 8, or 10 (32-bit or 64-bit)
- 1 GHz or faster 32-bit (x86) or 64-bit (x64) processor
- 1 GB RAM (32-bit) or 2 GB RAM (64-bit)

For more information about software visit
www.palmsens.com/software

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PStouch: App for Android

The Sensit BT is compatible with PStouch for Android.

PStouch features:
- Setting up and running measurements
- Loading and saving measured curves
- Analysing and manipulating peaks
- Sharing data directly via e-mail or Dropbox
- Concentration determination by means of Standard Addition or Calibration Curve
- Support for PalmSens accessories such as a Multiplexer or Stirrer

All method and curve files are fully compatible with PSTrace software for Windows.

For more information about software visit:
www.palmsens.com/software

Build your own app or PC software

With the PalmSens SDKs you can develop user friendly software for use with Sensit BT in a short amount of time.

Using the PalmSens SDK for Xamarin you can create an Android (mobile) application for your Sensit BT. The SDK comes with working code examples which can be used as a basis for your application.

The PalmSens SDK for WinForms or WPF allows you to build a Windows application for either Bluetooth or USB connected devices.

MethodSCRIPT™: EmStat Pico Scripting Language

The Sensit BT is built around the EmStat Pico module. The EmStat Pico module works with the new MethodSCRIPT™ scripting language. This language allows developers to program a human-readable script directly into the Pico module. The simple script language allows for running electrochemical techniques supported by EmStat Pico and makes it easy to combine different measurements and other tasks.

More script features include:
- Use of variables
- (Nested) loops
- Logging results to an SD card
- Digital I/O for example for waiting for an external trigger
- Reading auxiliary values like pH or temperature
- Going to sleep or hibernate mode

Sensit BT customization options for OEM

The Sensit BT can be re-branded for OEM purposes. Contact us about the possibilities.

Please don't hesitate to contact PalmSens BV for more details: info@palmsens.com

PalmSens BV
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www.palmsens.com

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